

Novel Hybrids of 6-Amino-3-*n*-butylphthalide and Neuroprotective Groups against Ischemic  
Stroke†

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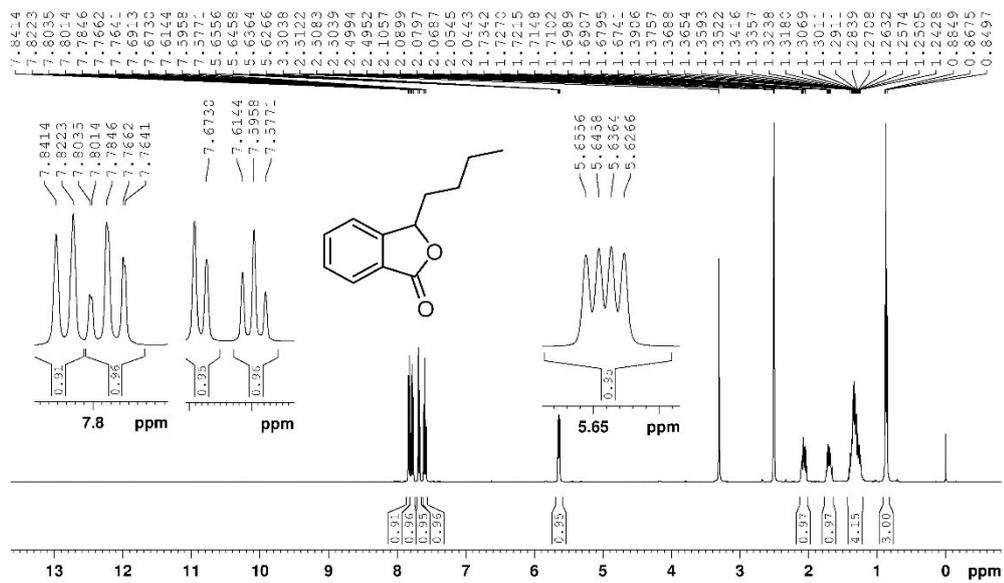
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<sup>1</sup>H NMR, MS, HRMS and HPLC for final compounds of representative compounds

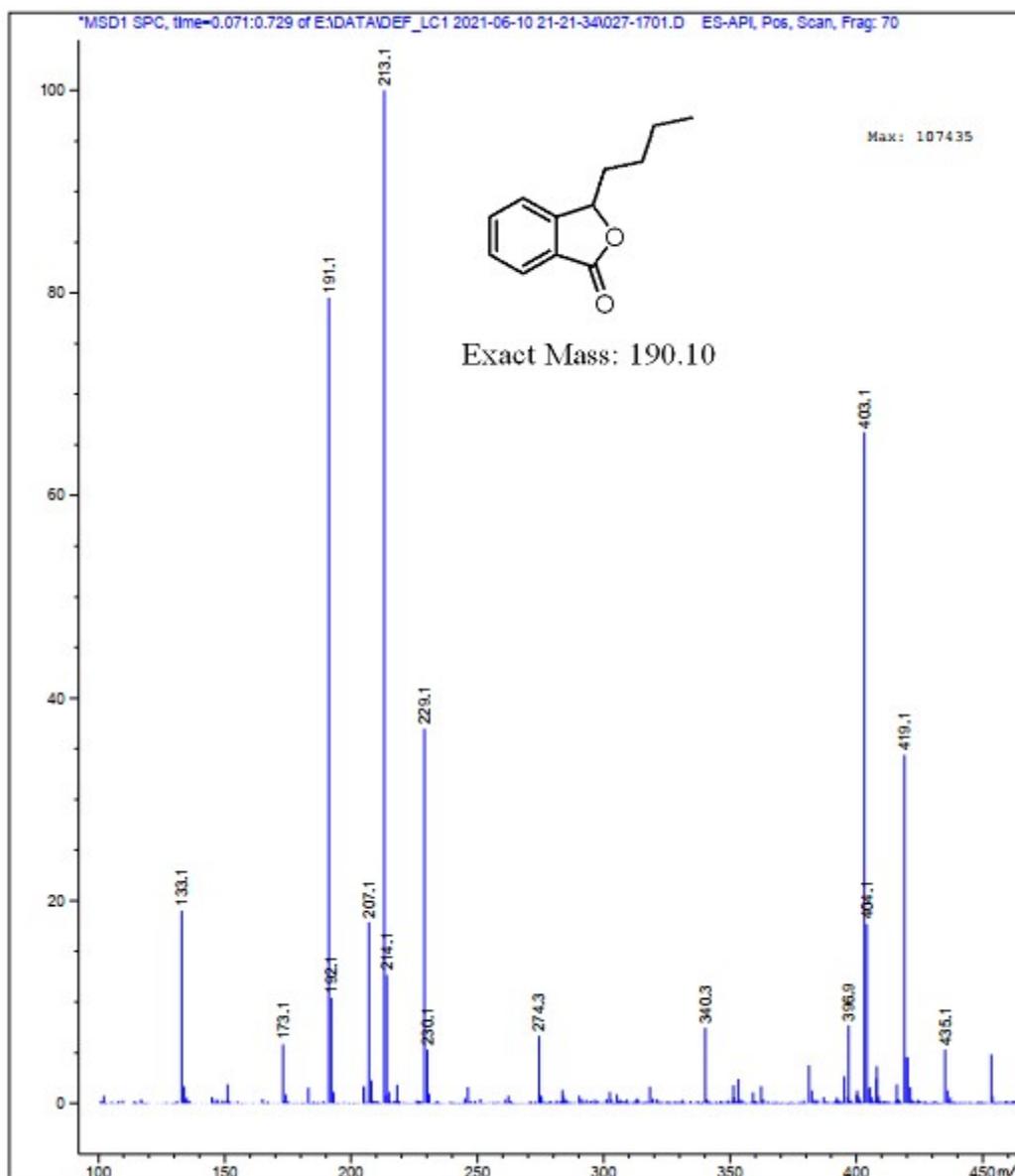
HPLC analysis conditions Column Details:

|                      |  |
|----------------------|--|
| Column Details:      | WondaSil C18 Superb (4.6mm×150mm, 5μm) |
| Column Temperature:  | 30 °C                                  |
| Flow Rate:           | 1 mL/min                               |
| Detector Wavelength: | 254 nm                                 |
| Injection volume:    | 20 μl                                  |

Solvent A: acetonitrile; Solvent B: water. Method: 40 % to 80 % of A and 20 % to 60 % of B



**Fig.1** <sup>1</sup>H NMR (400 MHz, DMSO-*d*<sub>6</sub>) of compound NBP (A2).



**Fig.2** MS of compound **NBP (A2)**.

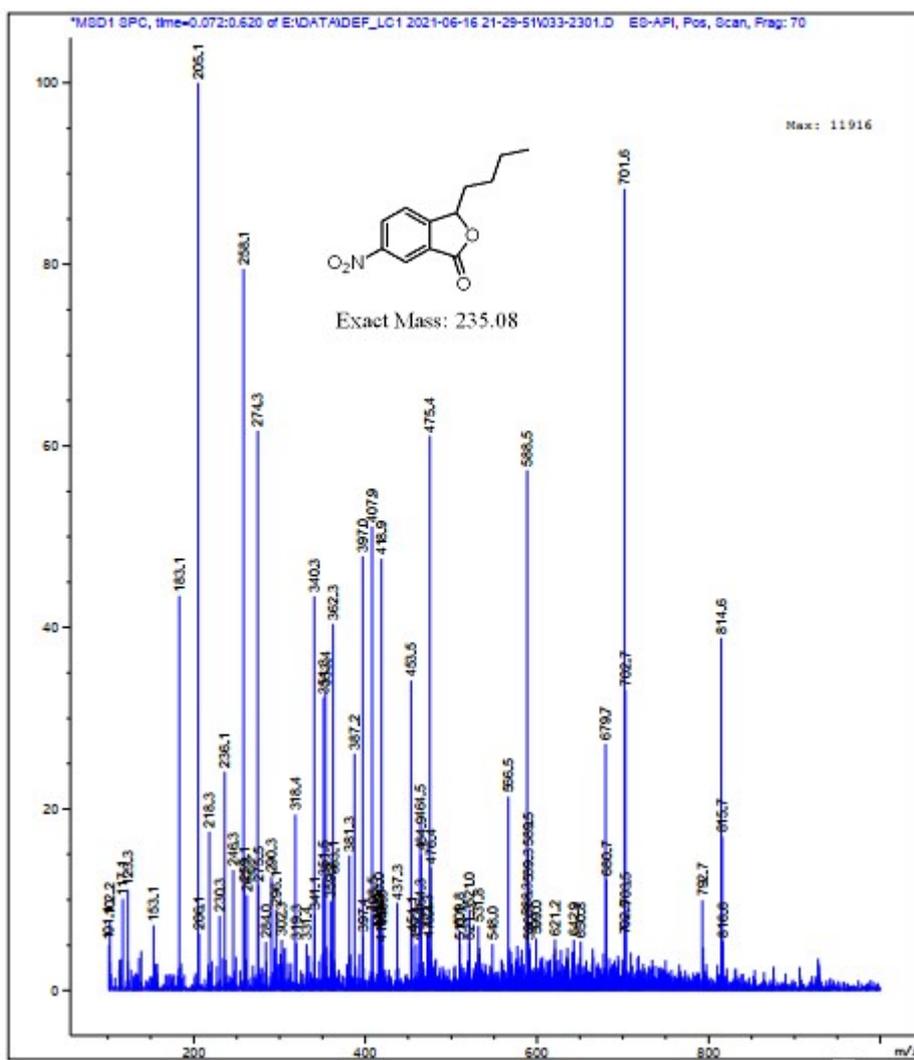
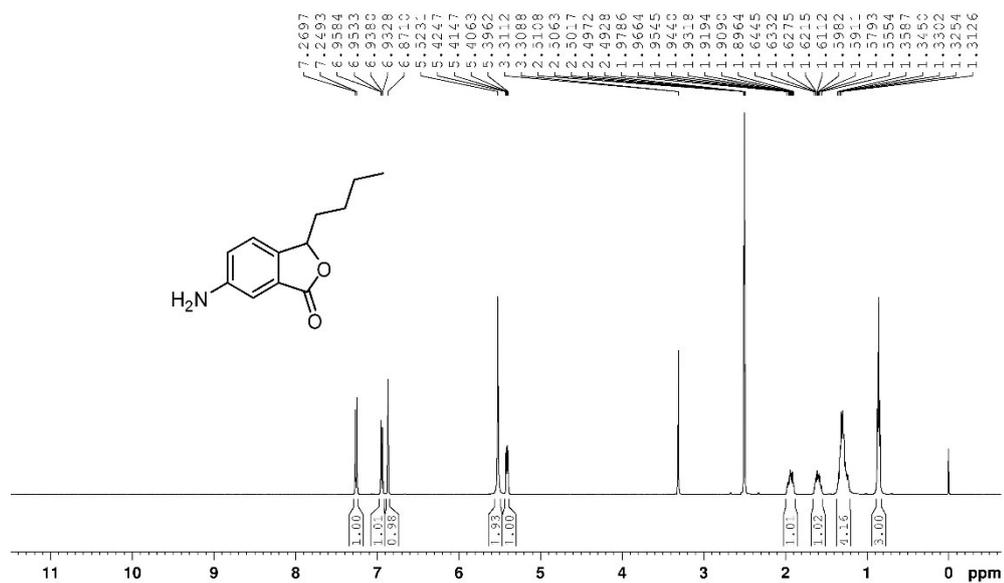
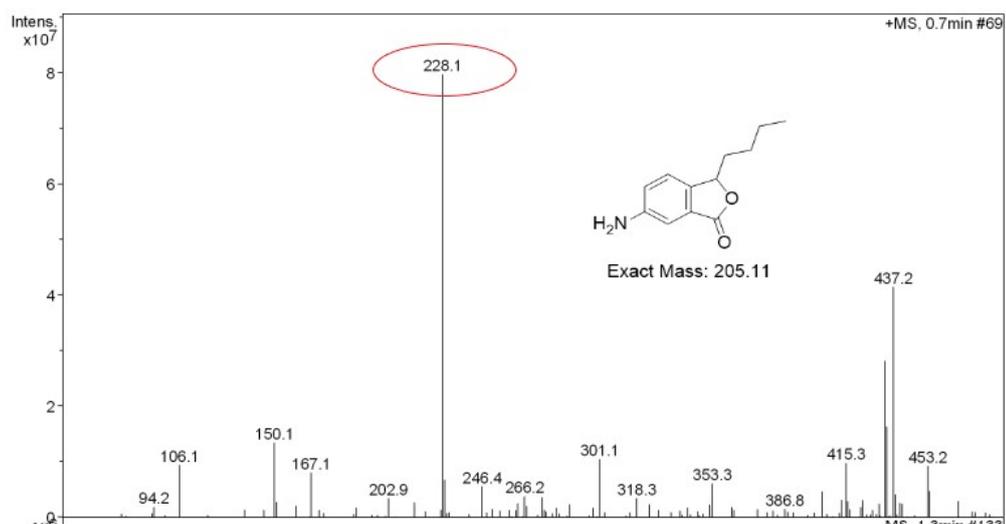


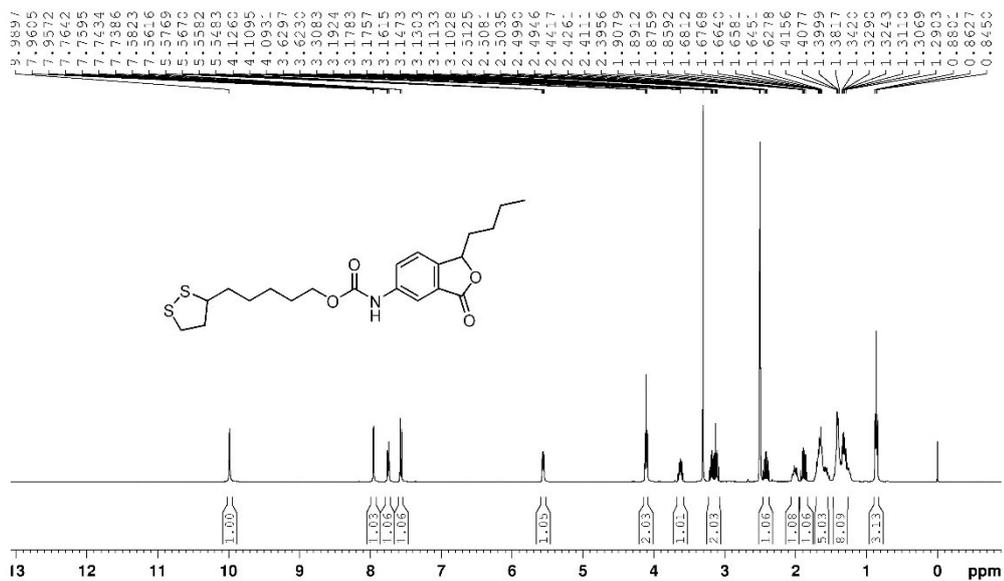
Fig.3 MS of compound A3.



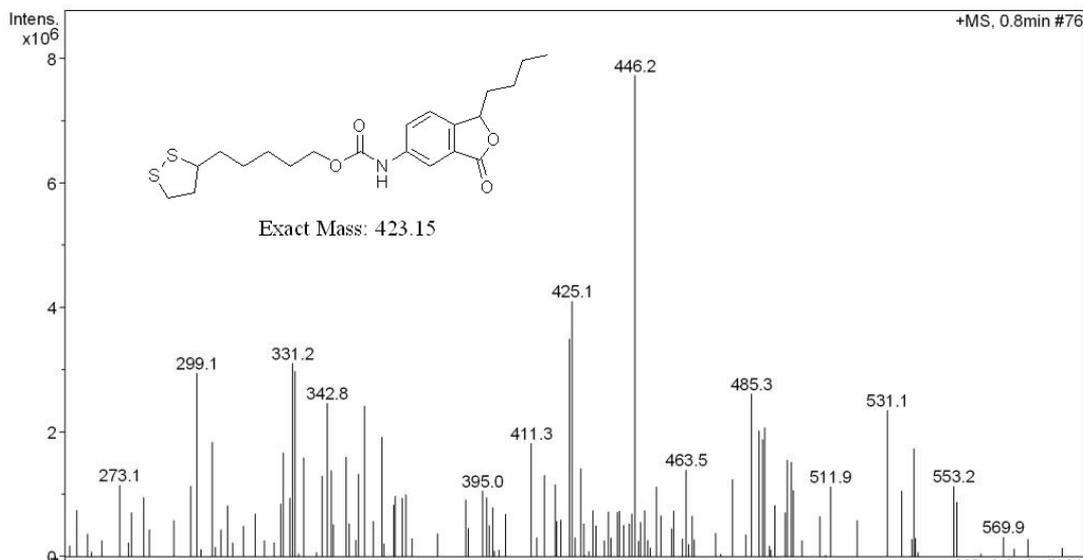
**Fig.4** <sup>1</sup>H NMR (400 MHz, DMSO-*d*<sub>6</sub>) of compound A4.



**Fig.5** MS of compound A4.

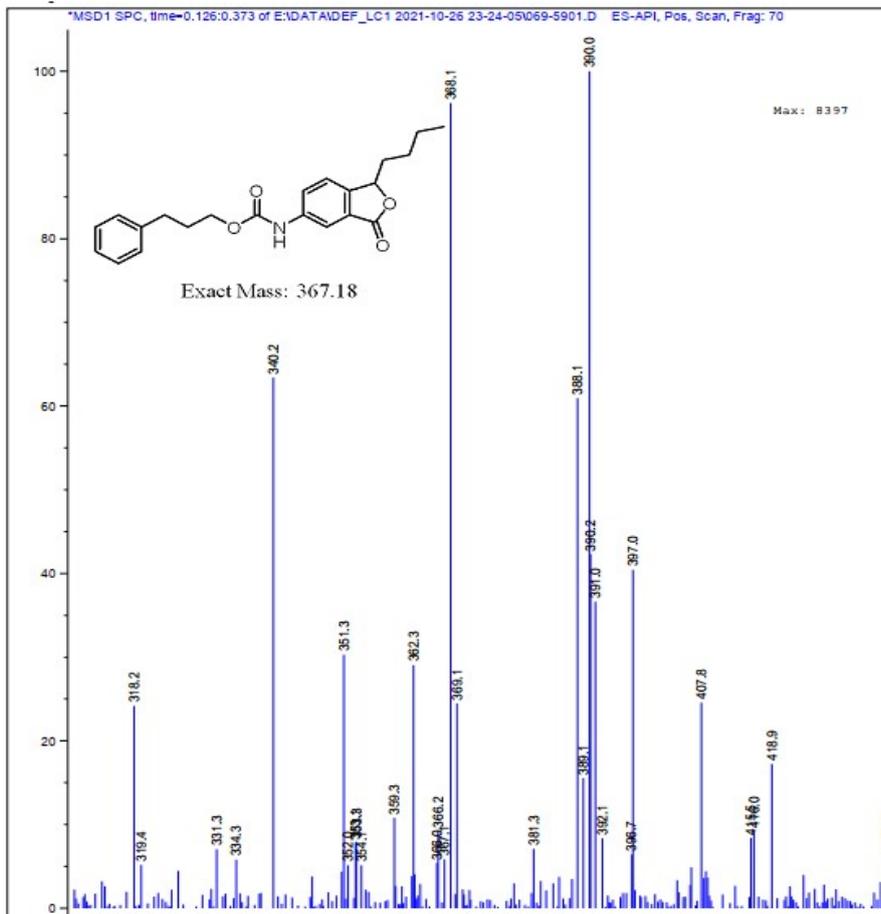


**Fig.6** <sup>1</sup>H NMR (400 MHz, DMSO-*d*<sub>6</sub>) of compound ABP1.



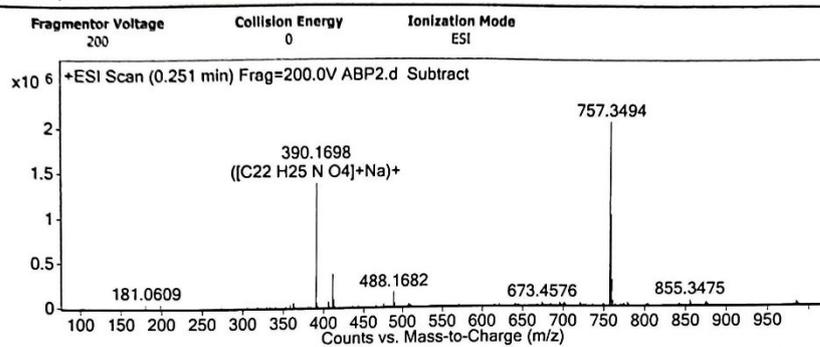
**Fig.7** MS of compound ABP1.





**Fig.10 MS of compound ABP2.**

**User Spectra**



**Fig.11 HRMS of compound ABP2.**

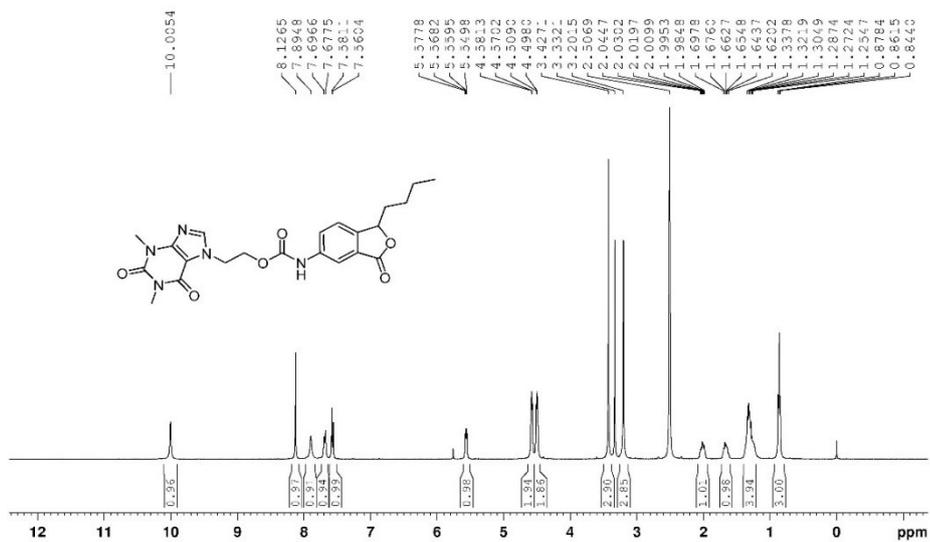
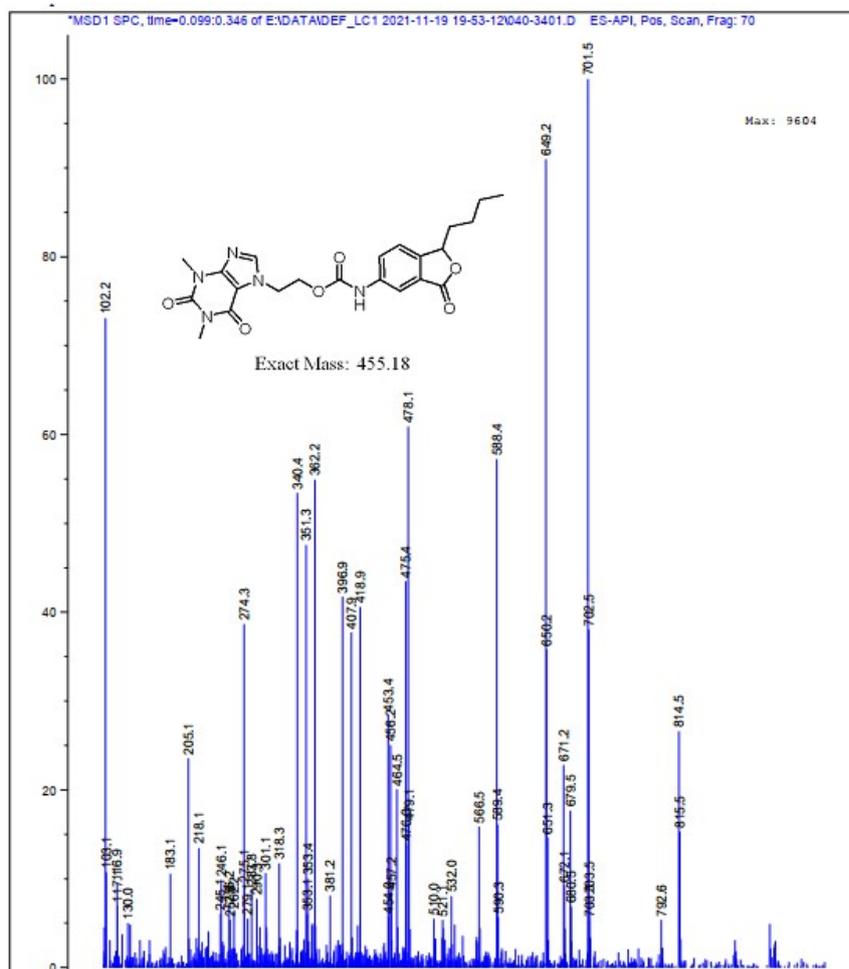
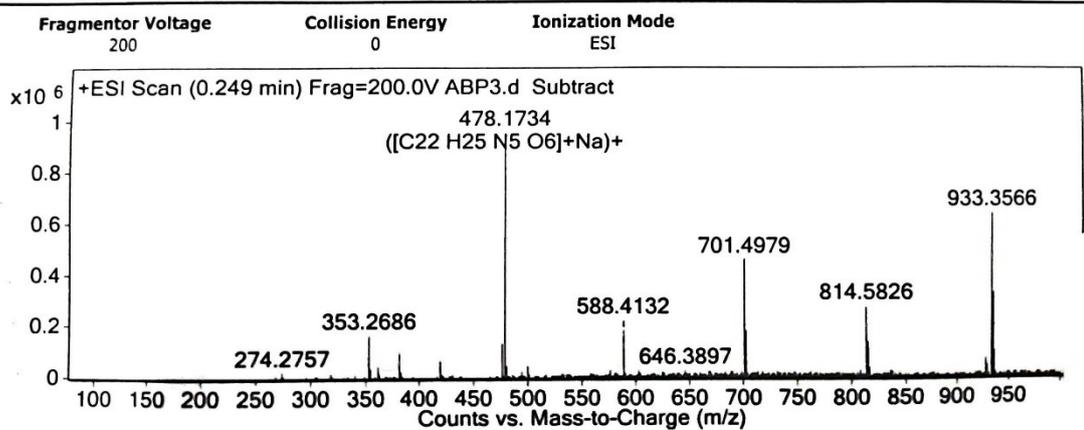


Fig.12 <sup>1</sup>H NMR (400 MHz, DMSO-*d*<sub>6</sub>) of compound ABP3.



**Fig.13** MS of compound **ABP3**.

**User Spectra**



**Fig.14** HRMS of compound **ABP3**.

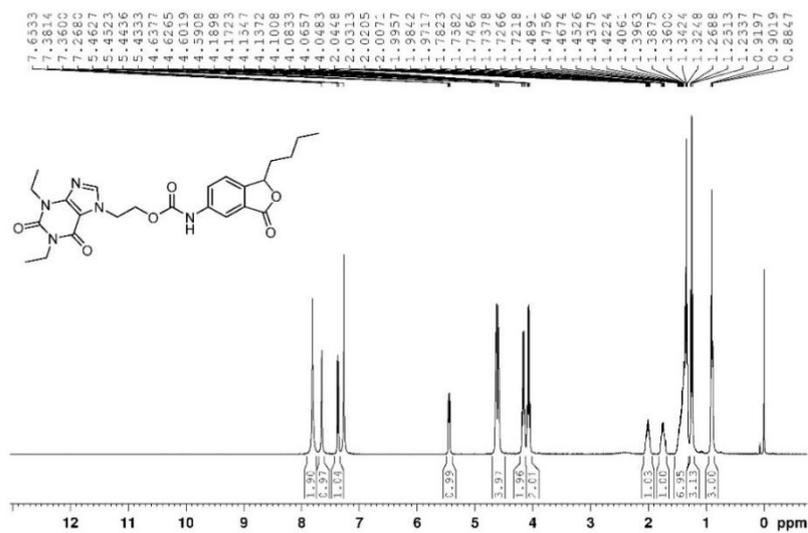


Fig.15  $^1\text{H}$ NMR (400 MHz,  $\text{CDCl}_3$ ) of compound ABP4.

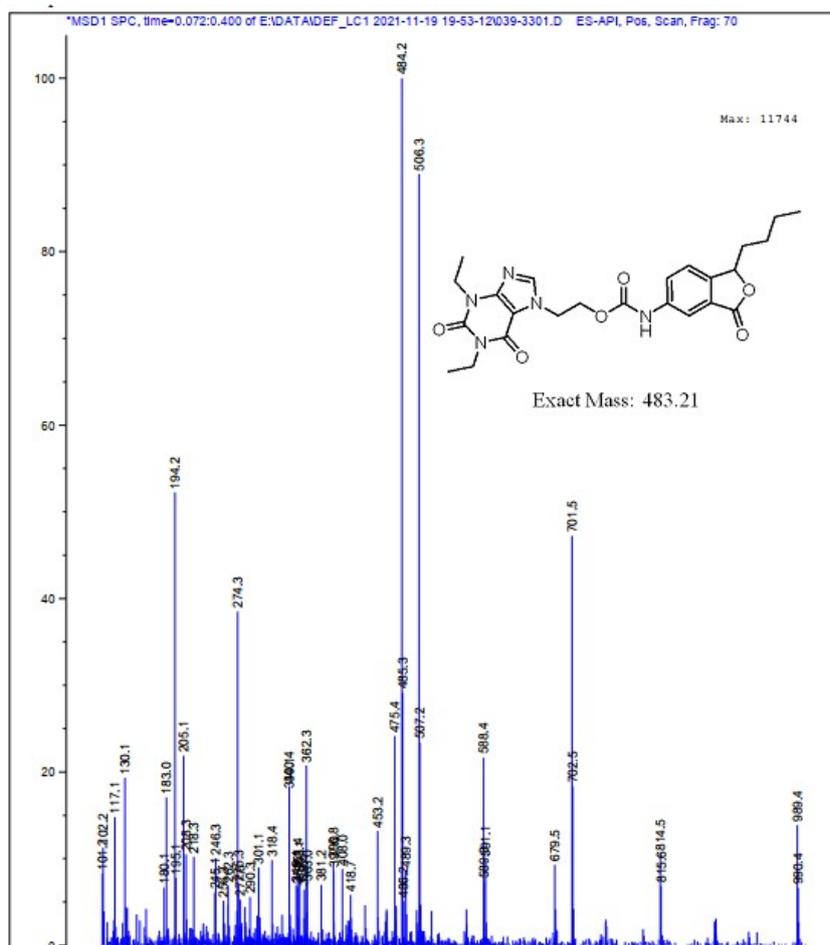
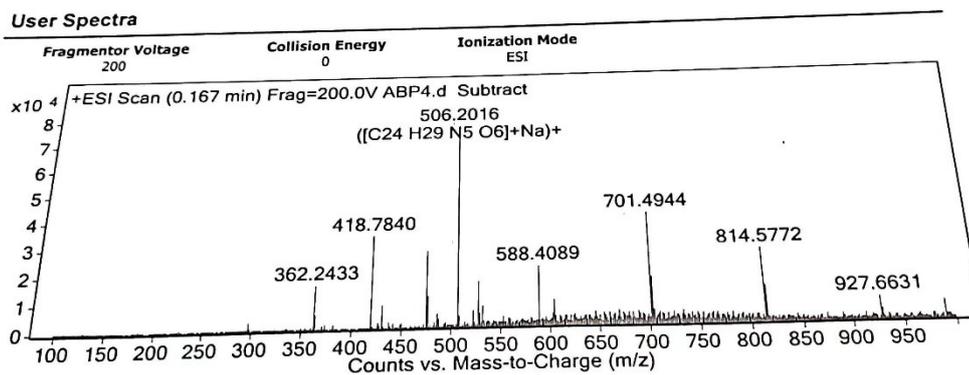
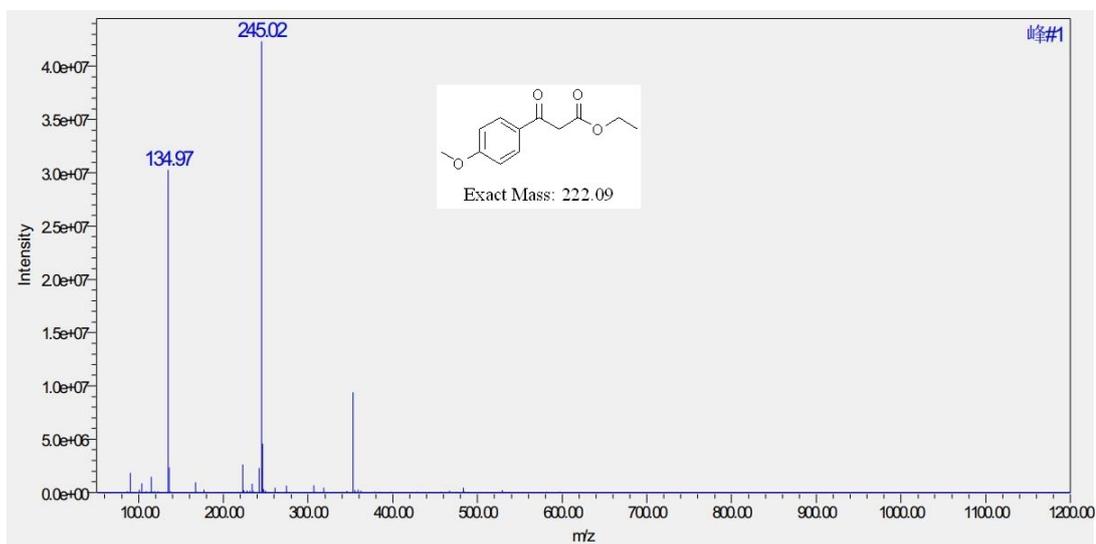


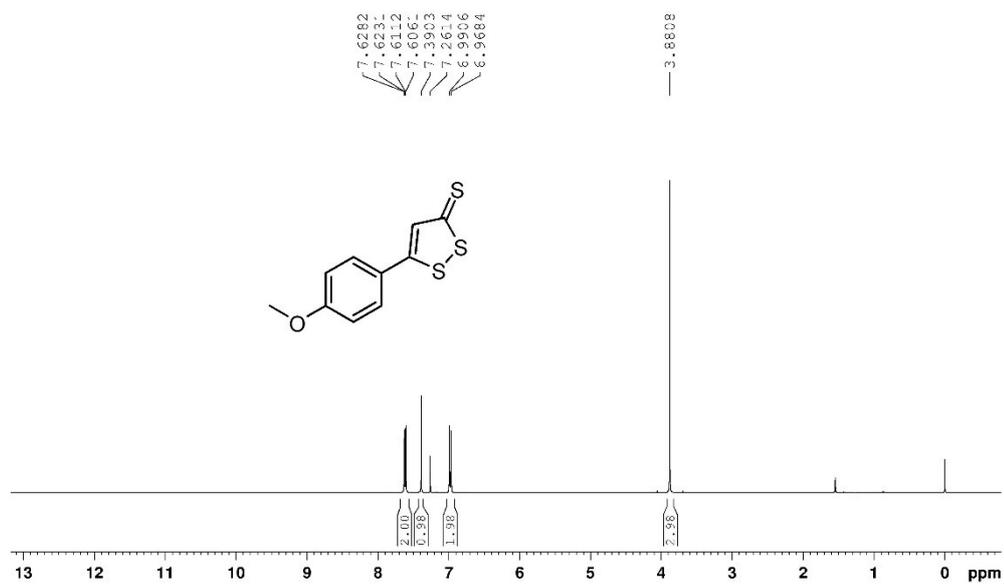
Fig.16 MS of compound ABP4.



**Fig.17 HRMS of compound ABP4.**



**Fig.18 MS of compound A7.**



**Fig.19** <sup>1</sup>HNMR (400 MHz, CDCl<sub>3</sub>) of compound **A8**.

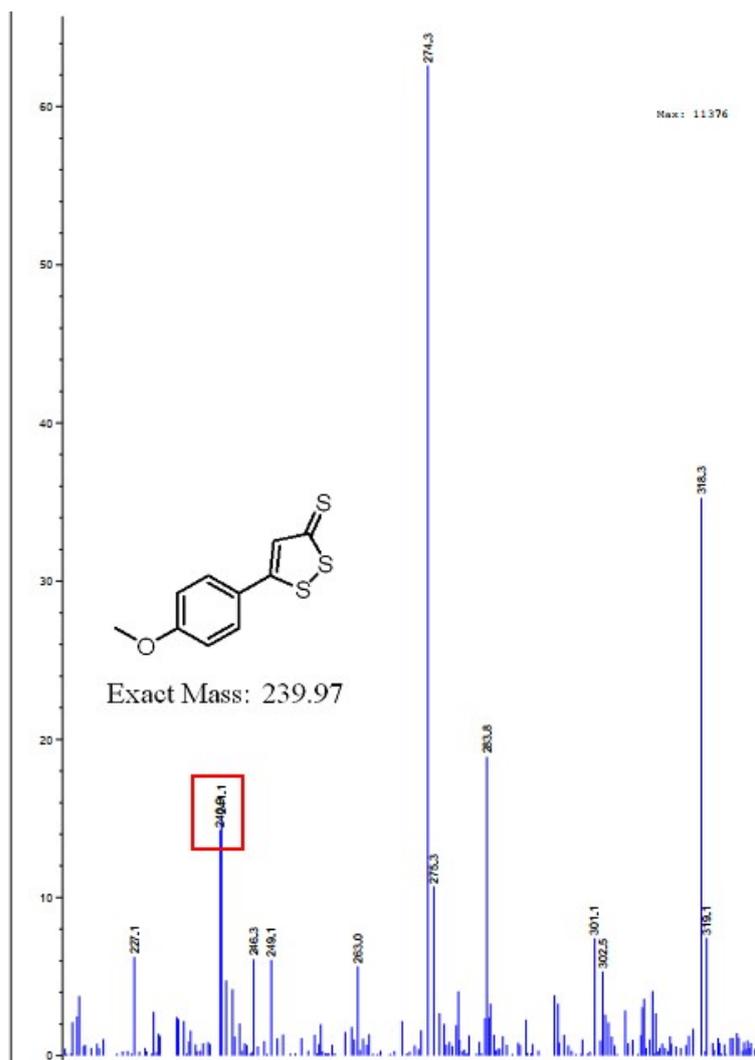


Fig.20 MS of compound A8.

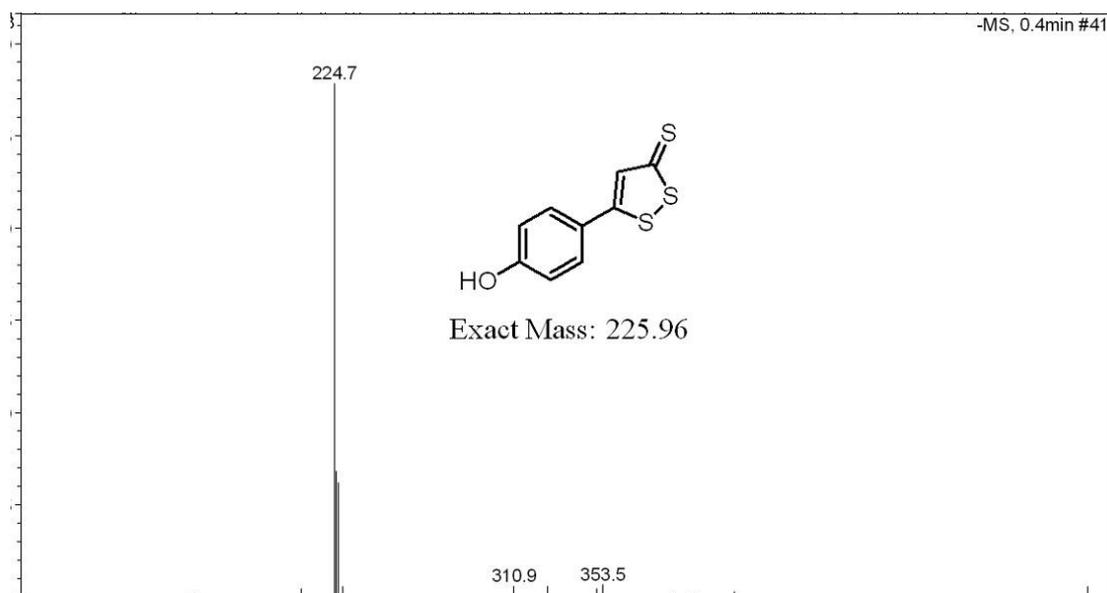


Fig.21 MS of compound A9.



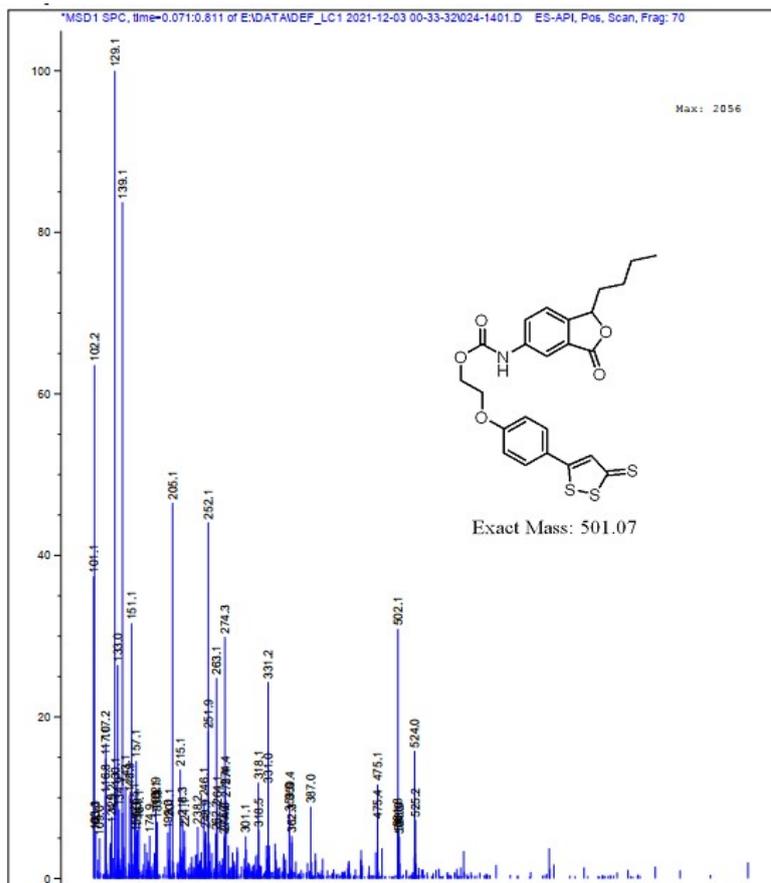
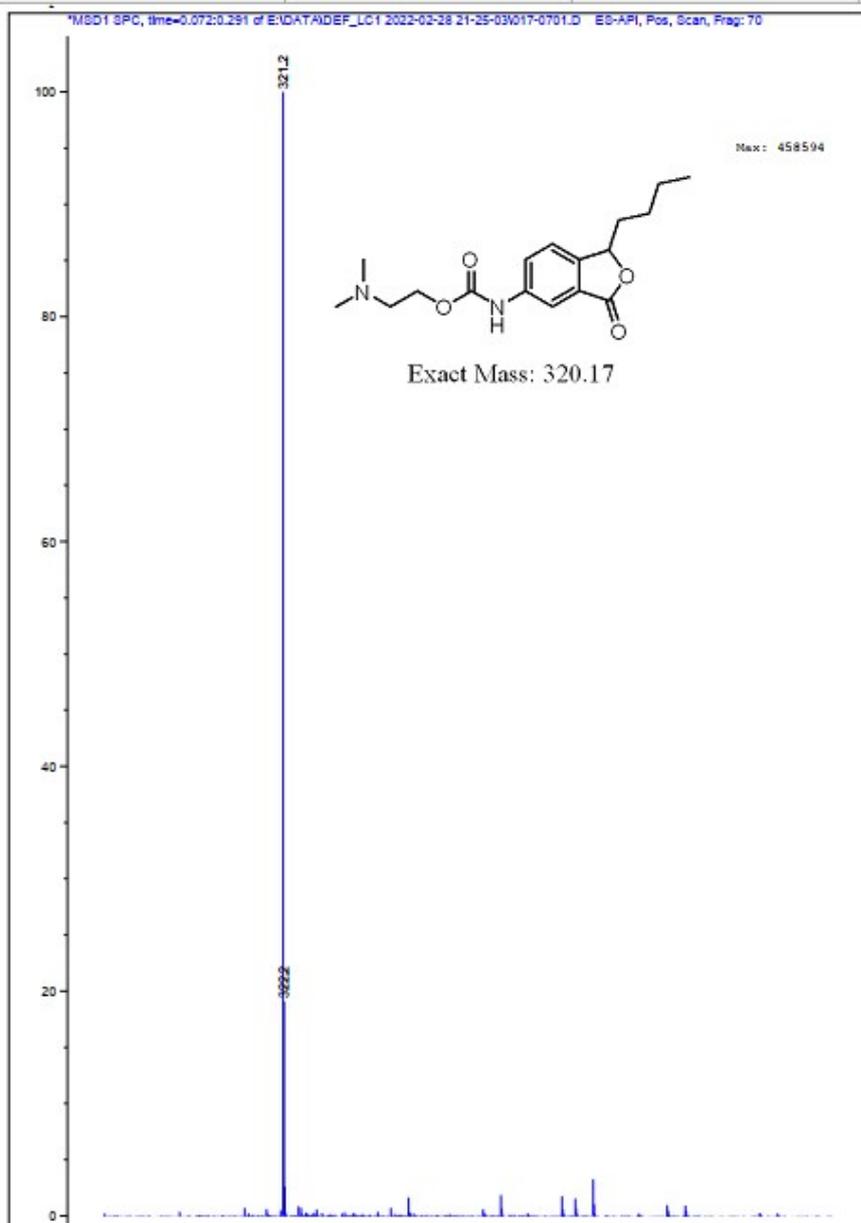
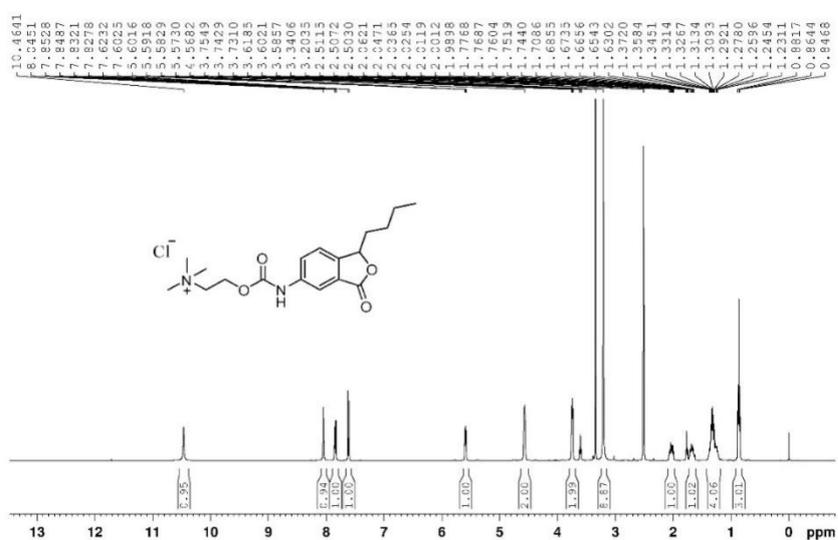


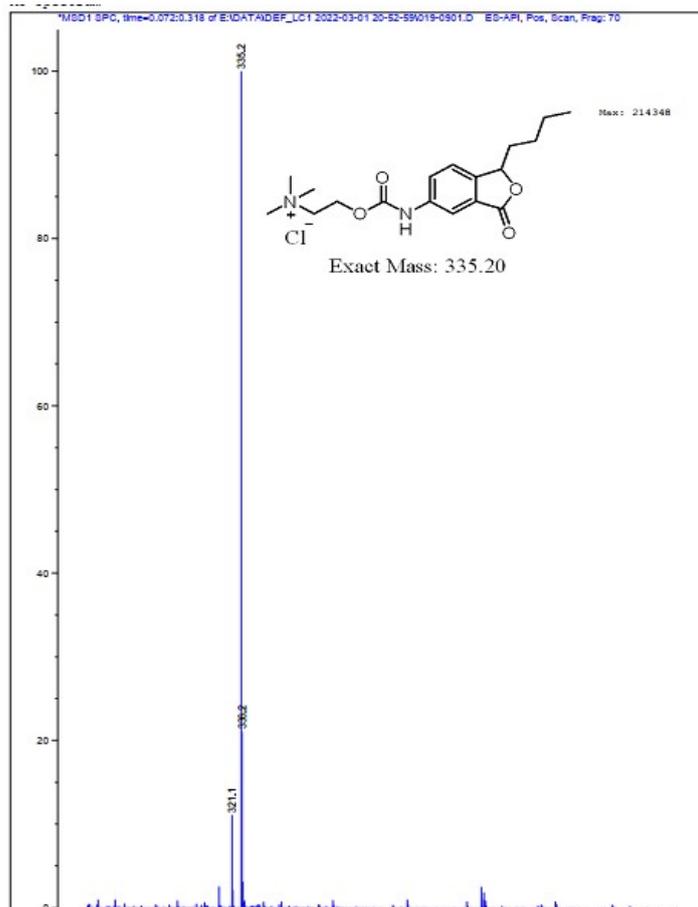
Fig.24 MS of compound ABP5.



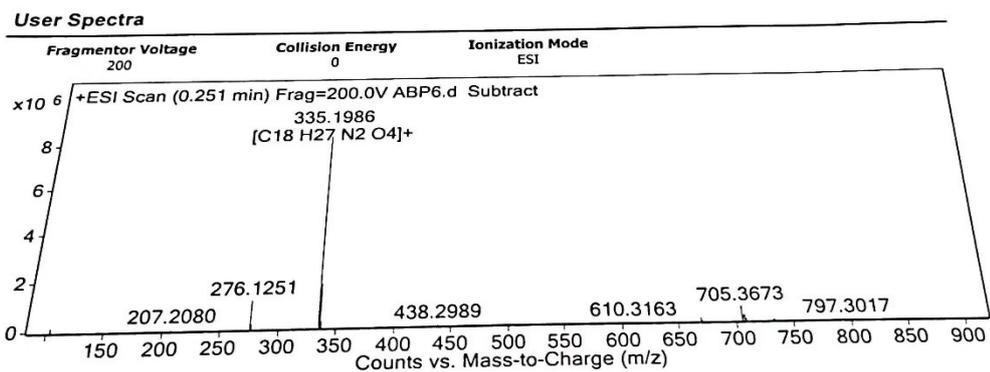
**Fig.25** MS of compound **A11**.



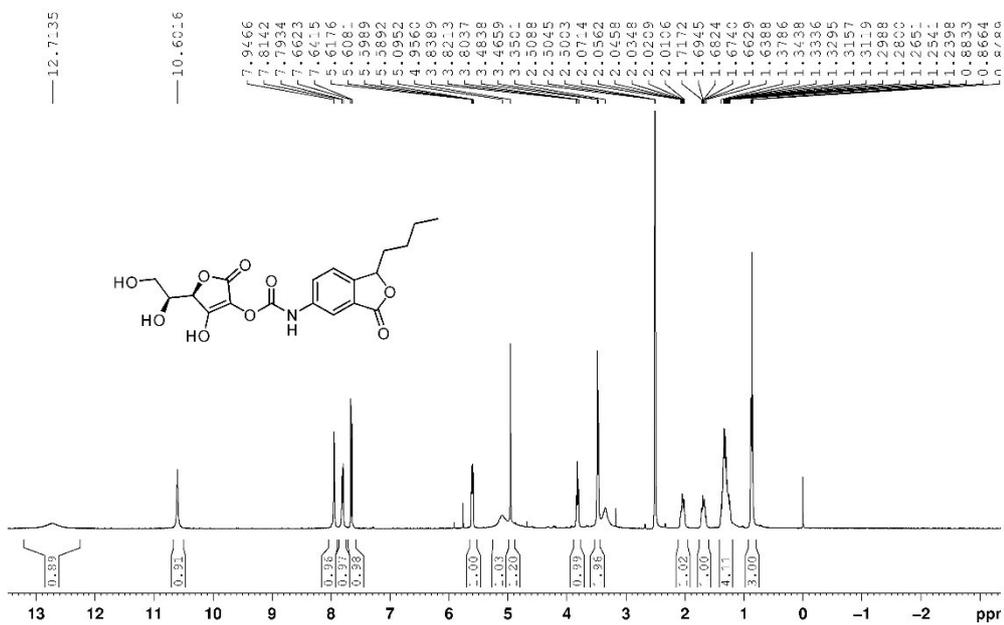
**Fig.26**  $^1\text{H}$ NMR (400 MHz,  $\text{DMSO-}d_6$ ) of compound ABP6.



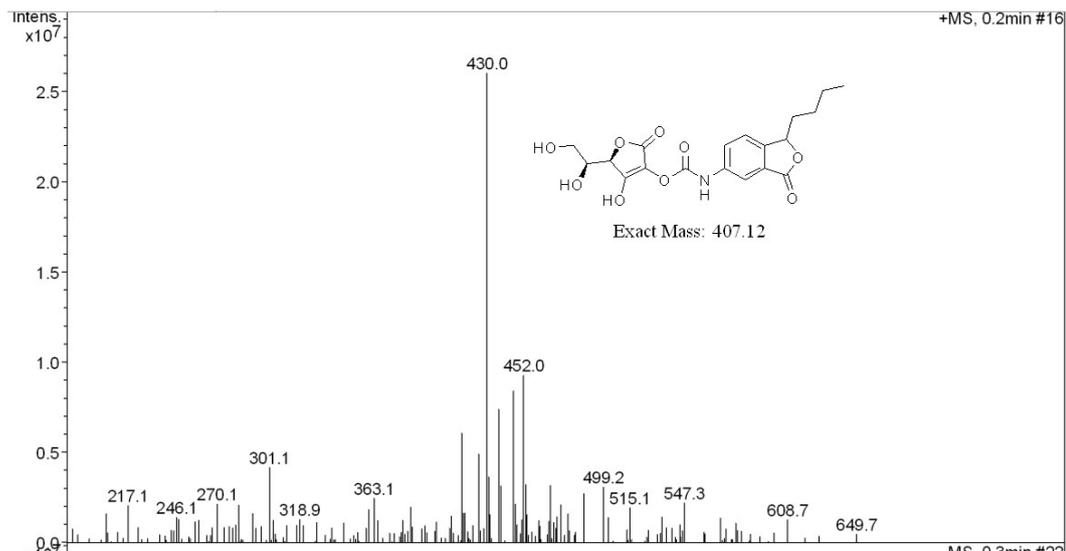
**Fig.27** MS of compound ABP6.



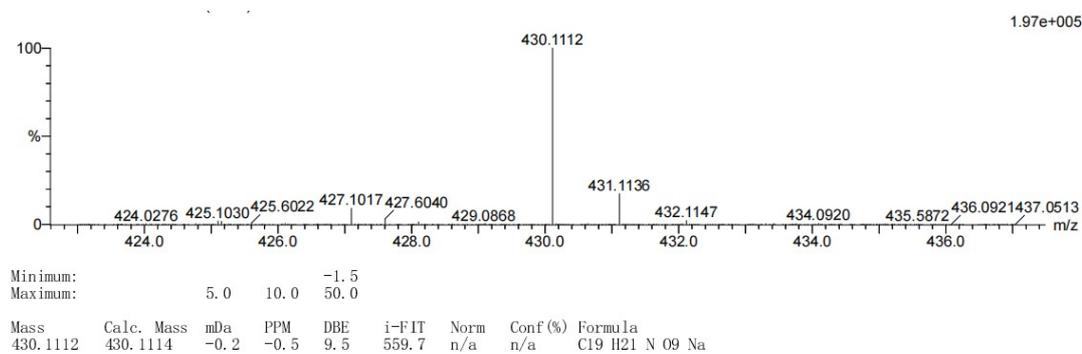
**Fig.28** HRMS of compound ABP6.



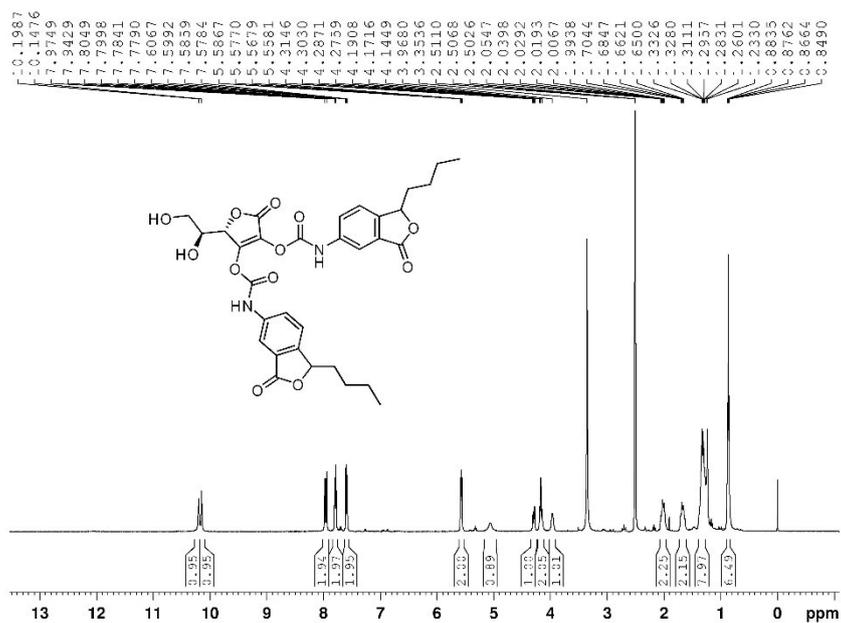
**Fig.29** <sup>1</sup>H NMR (400 MHz, DMSO-*d*<sub>6</sub>) of compound ABP7.



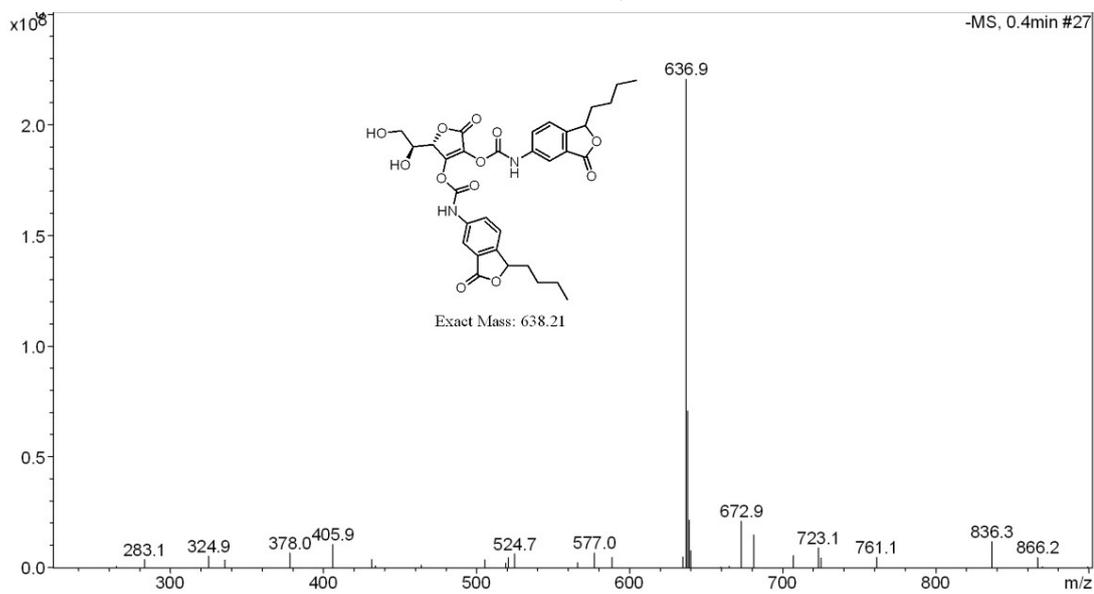
**Fig.30** MS of compound ABP7.



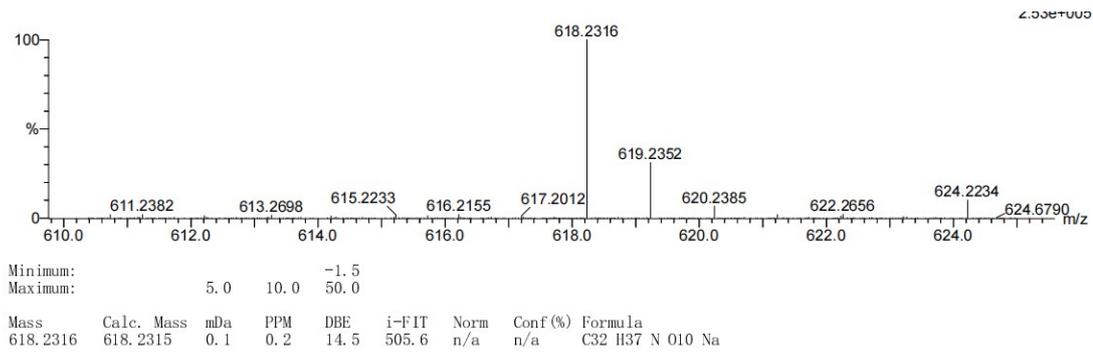
**Fig.31** HRMS of compound ABP7.



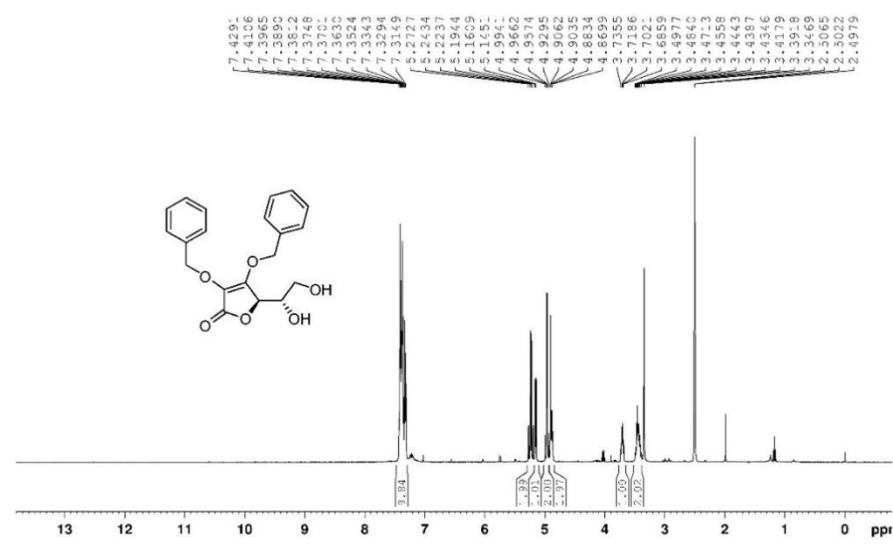
**Fig.32**  $^1\text{H}$ NMR (400 MHz,  $\text{DMSO}-d_6$ ) of compound ABP8.



**Fig.33** MS of compound ABP8.



**Fig.34** HRMS of compound **ABP8**.



**Fig.35** <sup>1</sup>H NMR (400 MHz, DMSO-*d*<sub>6</sub>) of compound **B2**.

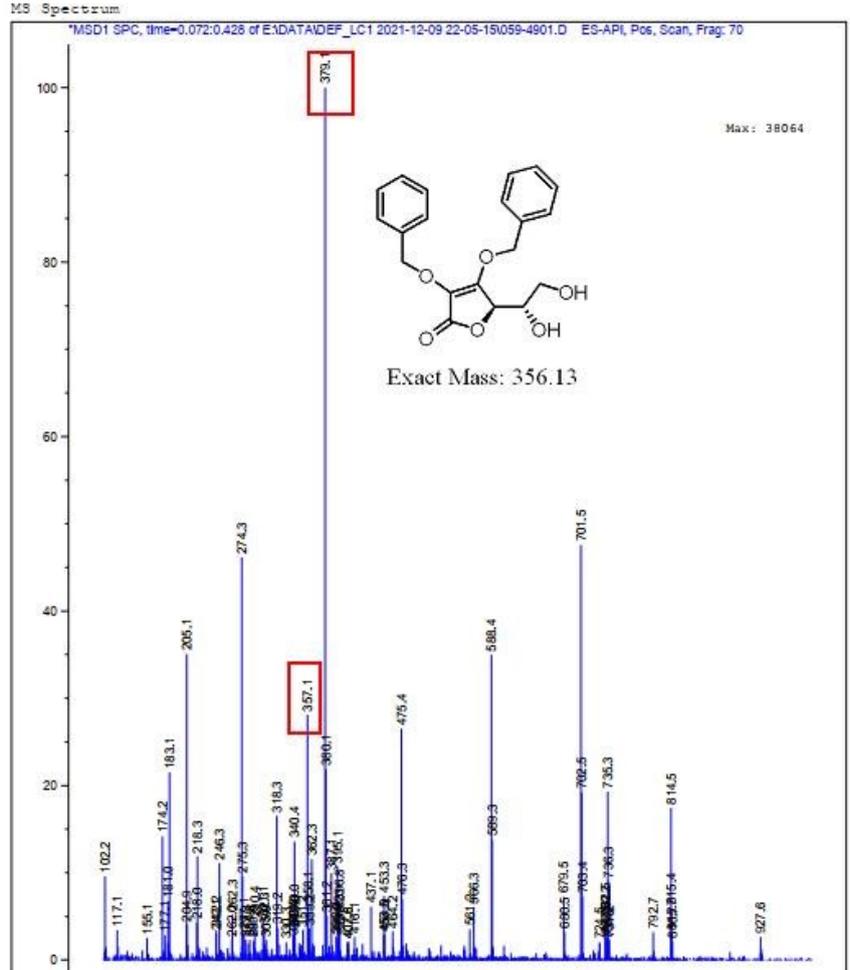


Fig.36 MS of compound B2.

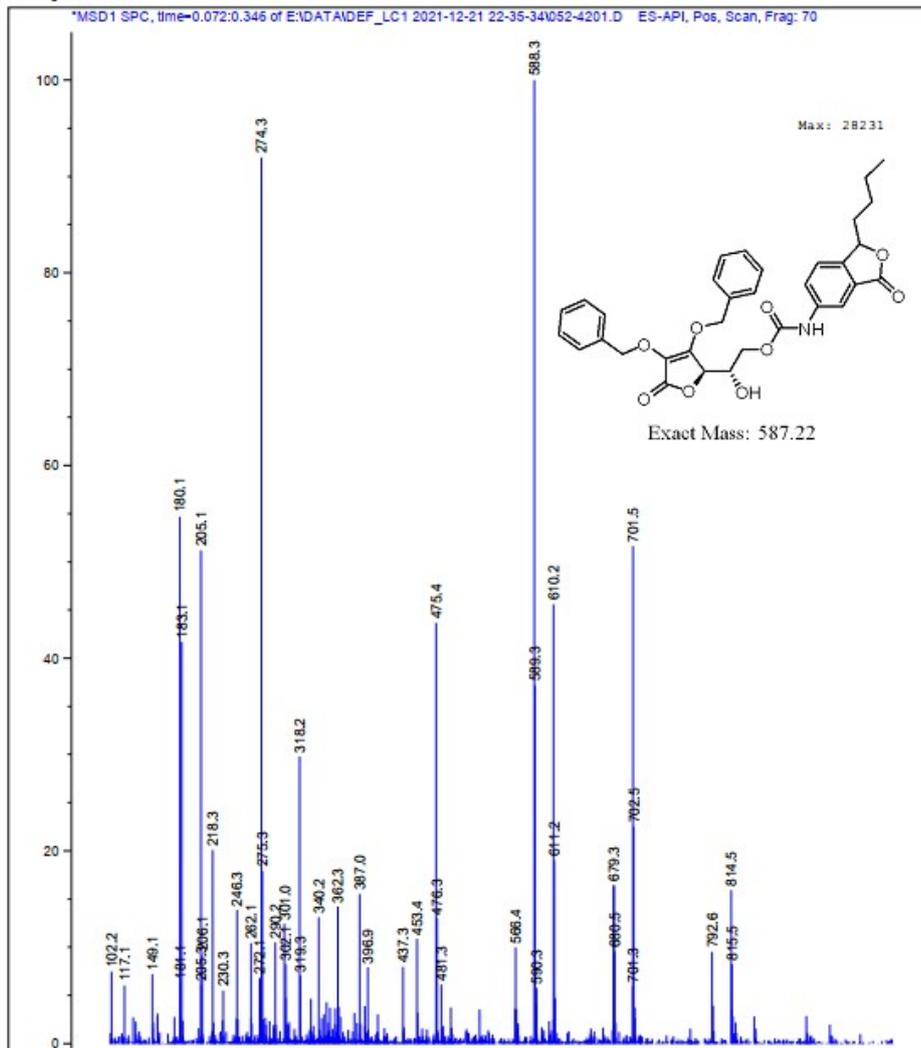


Fig.37 MS of compound B9.

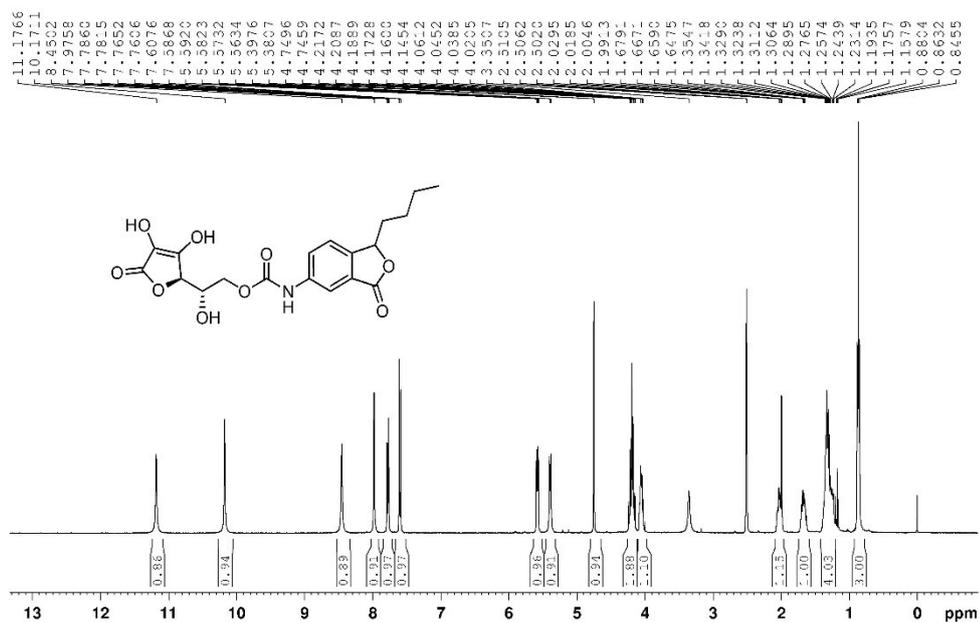


Fig.38 <sup>1</sup>H NMR (400 MHz, DMSO-*d*<sub>6</sub>) of compound ABP9.

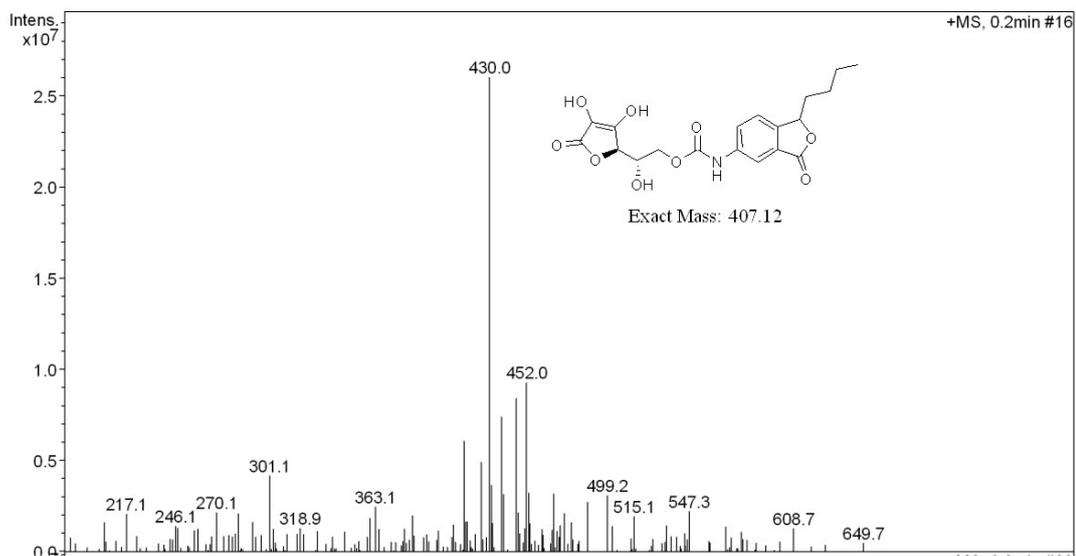
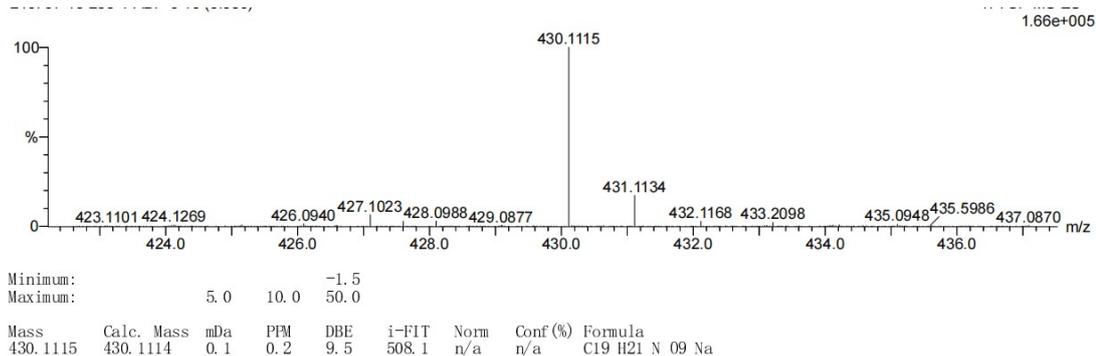
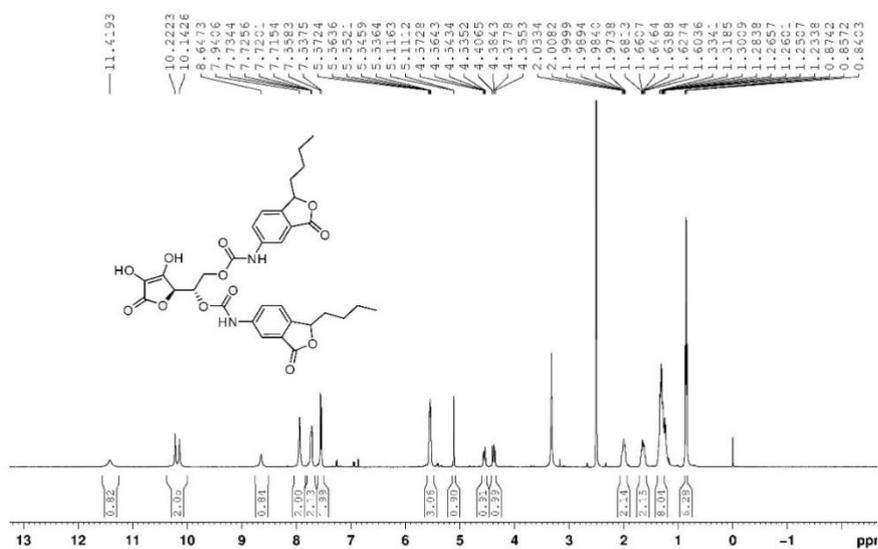


Fig.39 MS of compound ABP9.



**Fig.40** HRMS of compound ABP9.



**Fig.41**  $^1\text{H}$ NMR (400 MHz, DMSO- $d_6$ ) of compound ABP12.

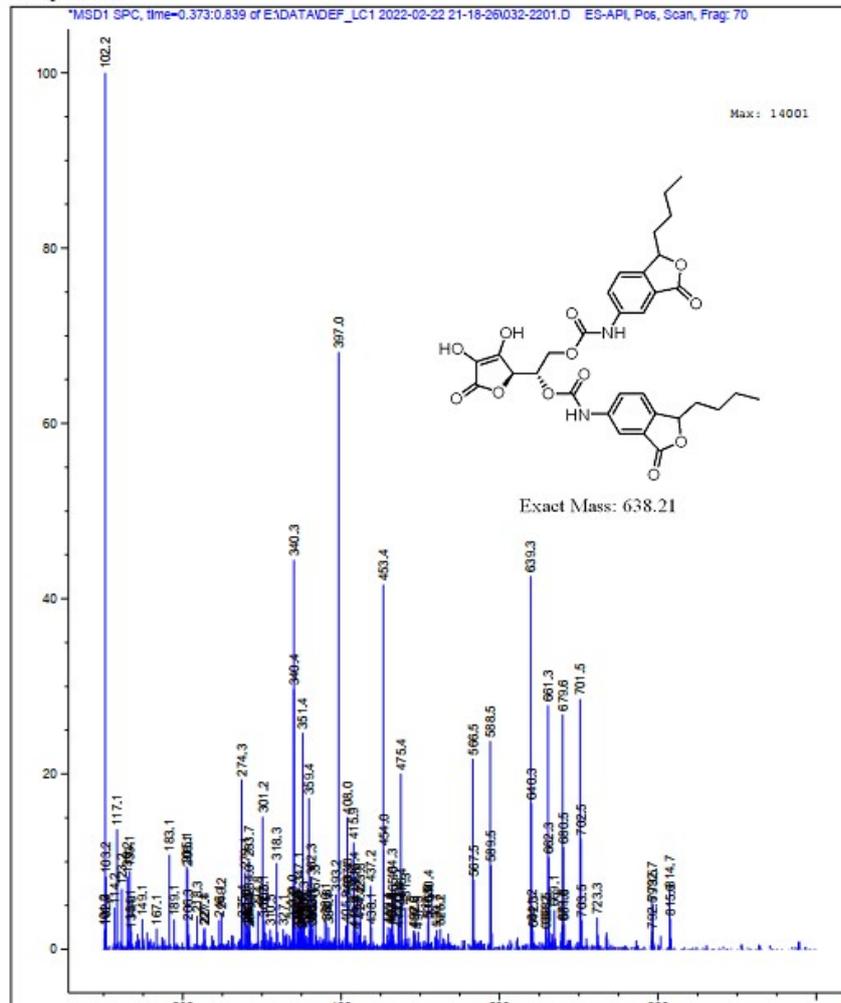


Fig.42 MS of compound ABP12.

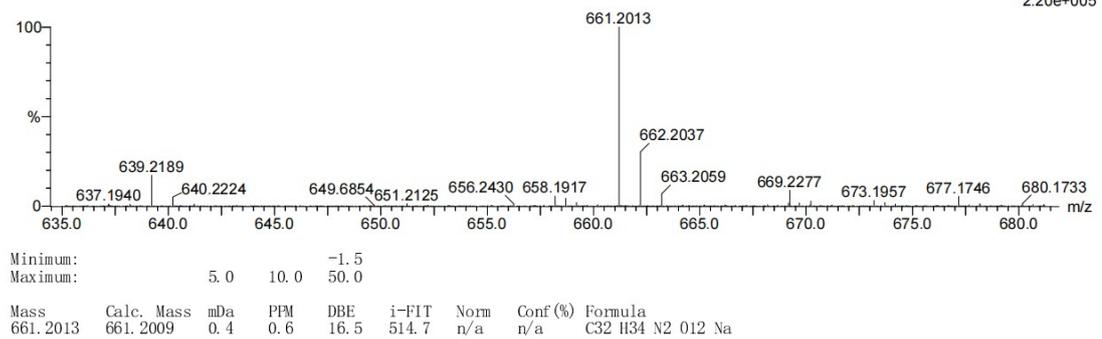


Fig.43 HRMS of compound ABP12.

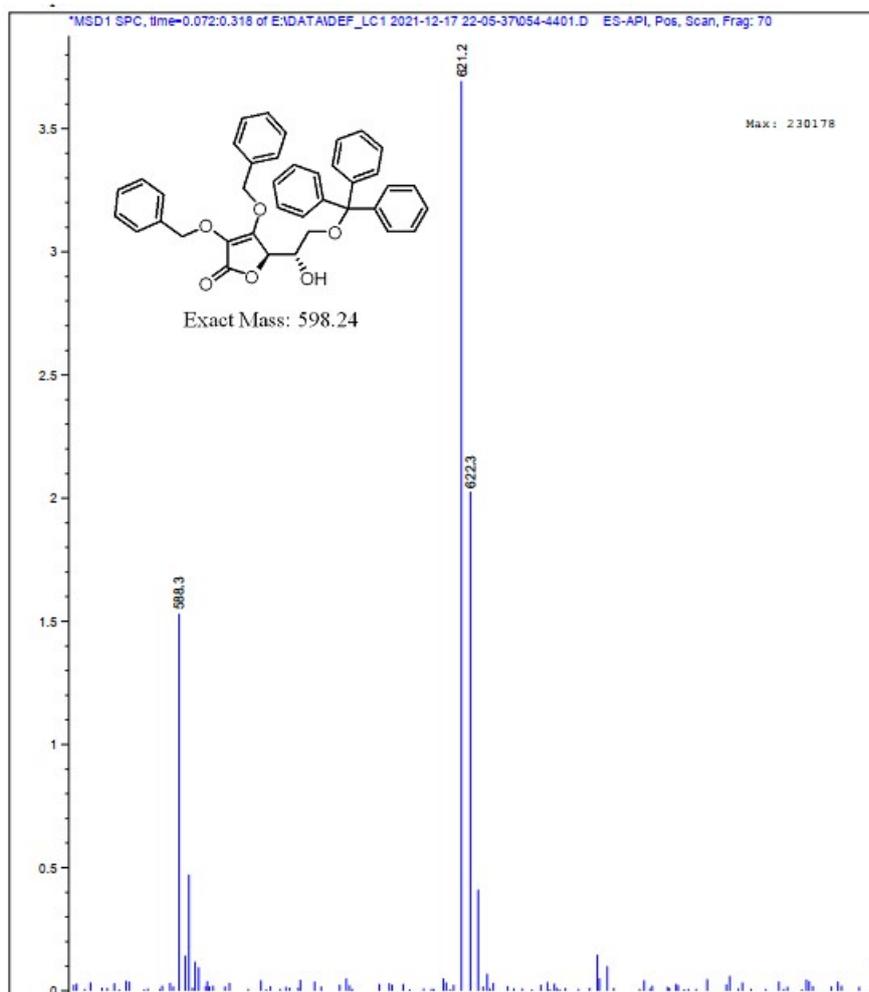


Fig.44 MS of compound B3.

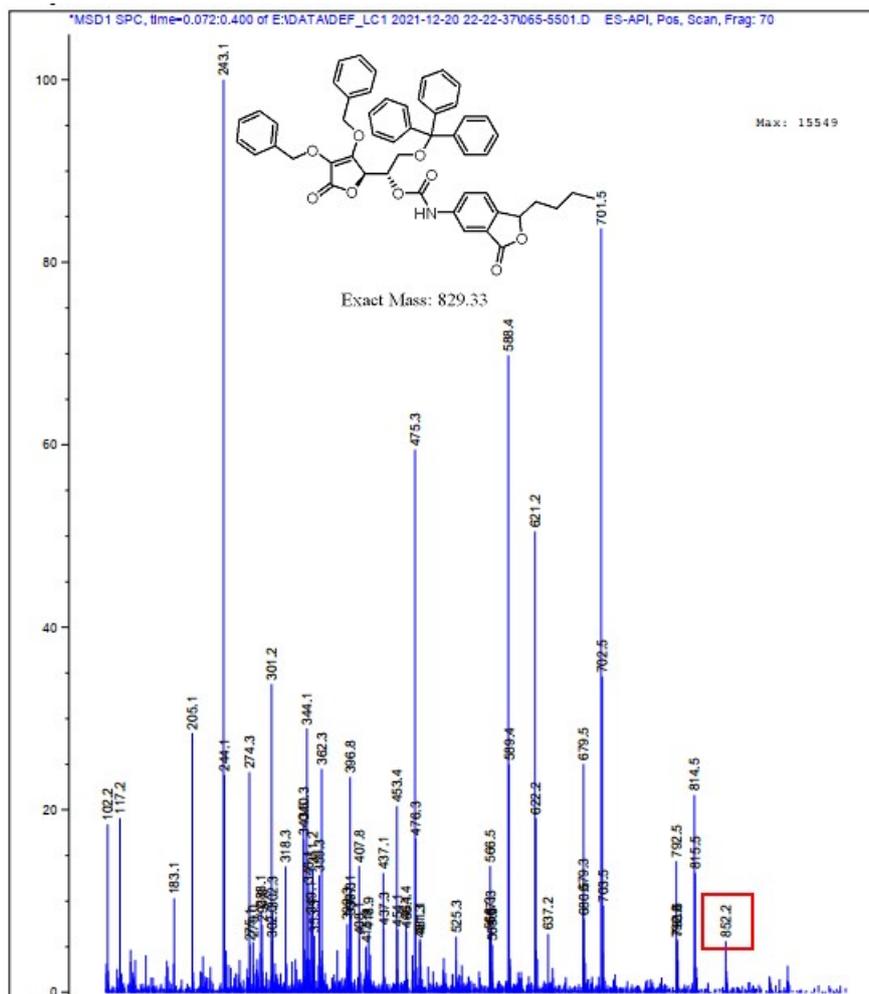


Fig.45 MS of compound B4.

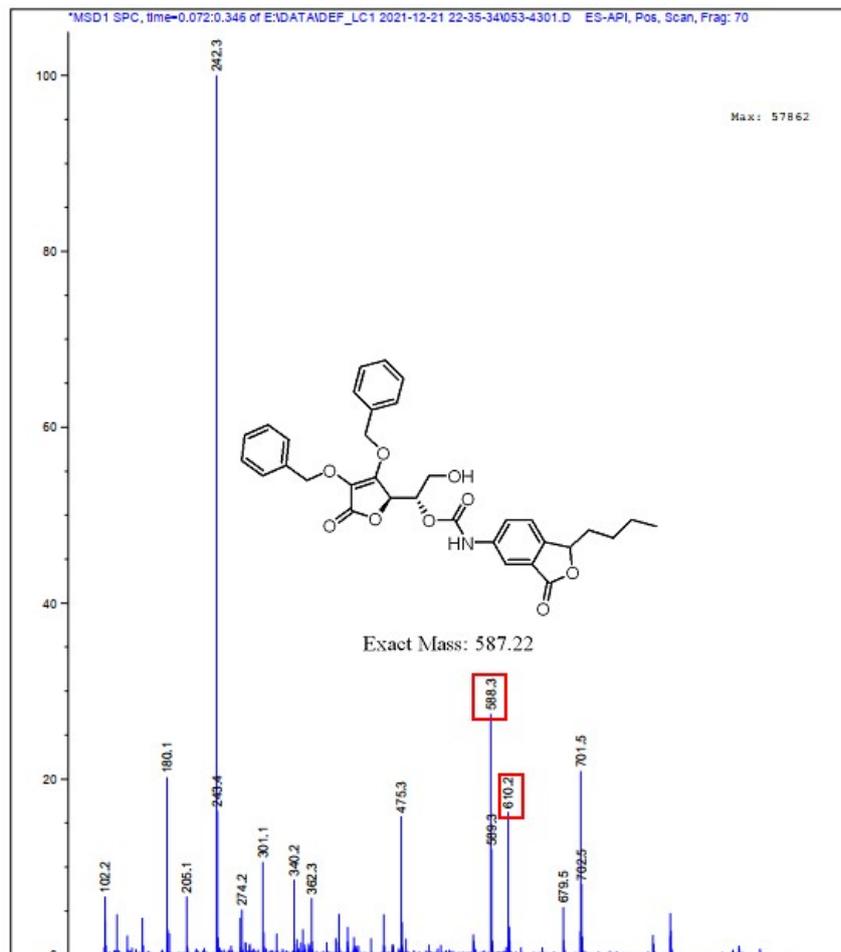


Fig.46 MS of compound B5.

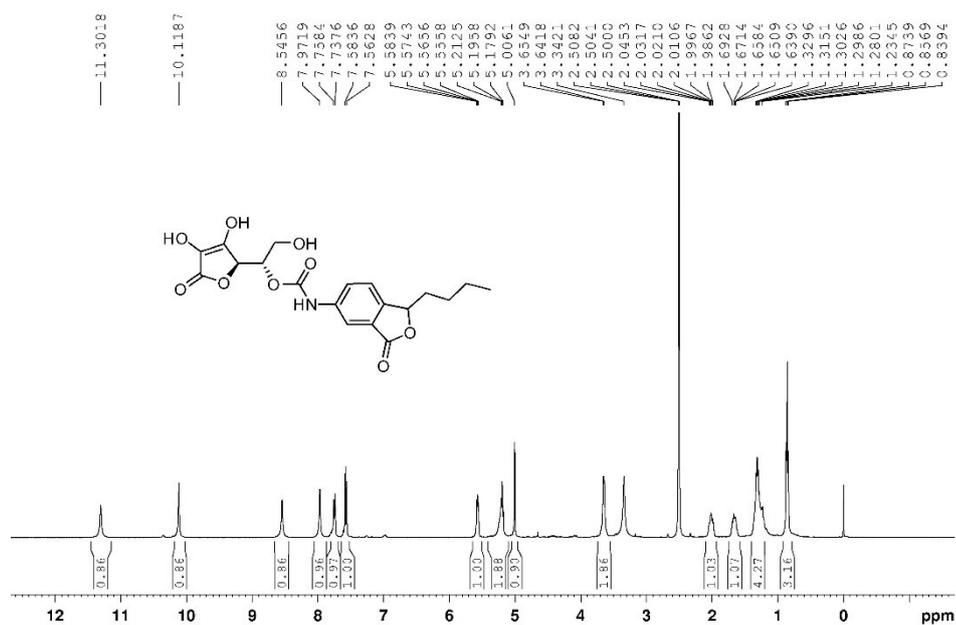


Fig.47 <sup>1</sup>H NMR (400 MHz, DMSO-*d*<sub>6</sub>) of compound ABP11.

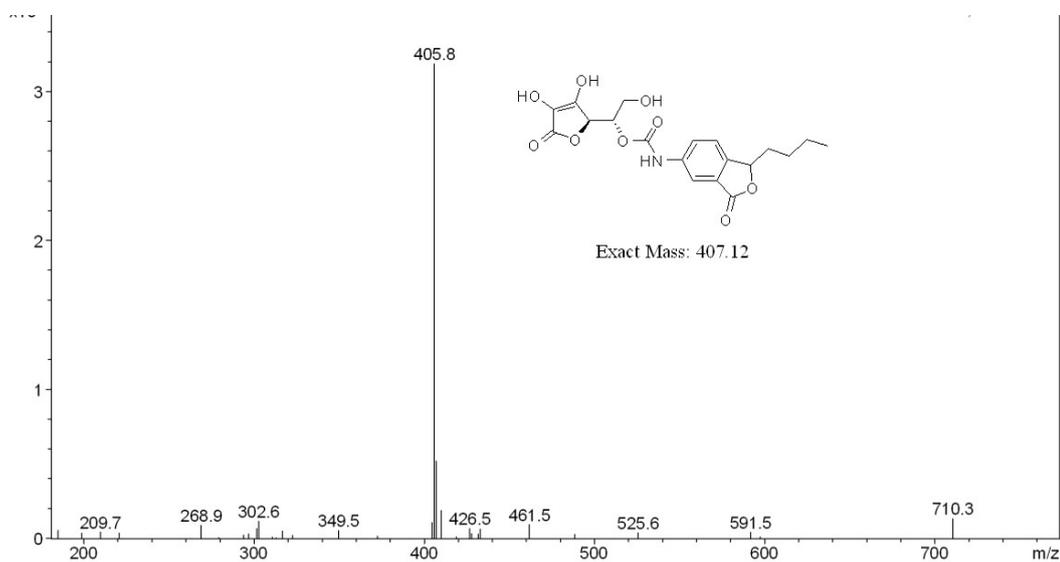
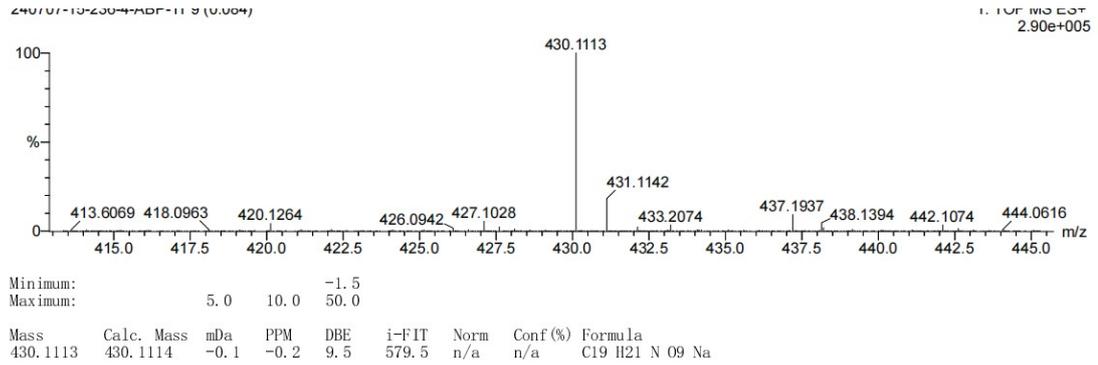
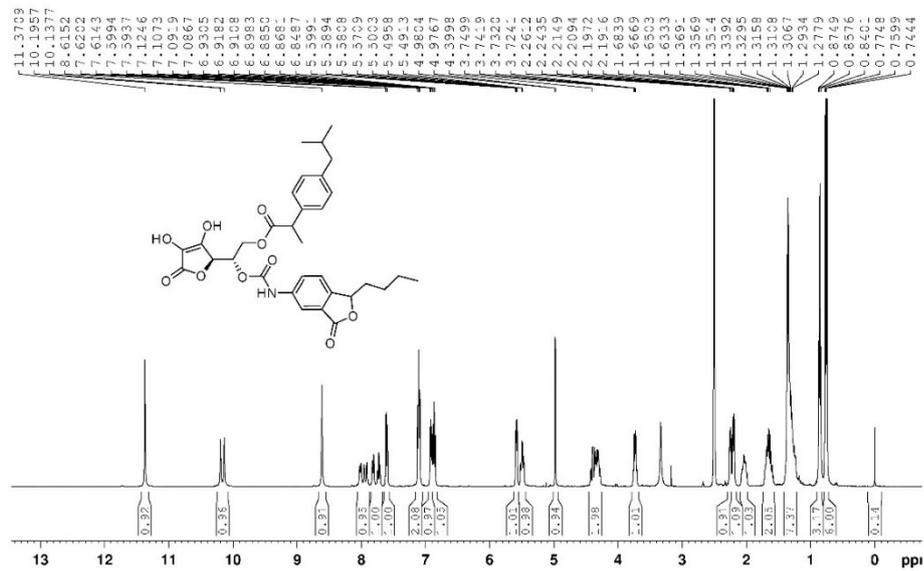


Fig.48 MS of compound ABP11.



**Fig.49** HRMS of compound ABP11.



**Fig.50** <sup>1</sup>H NMR (400 MHz, DMSO-*d*<sub>6</sub>) of compound ABP10.

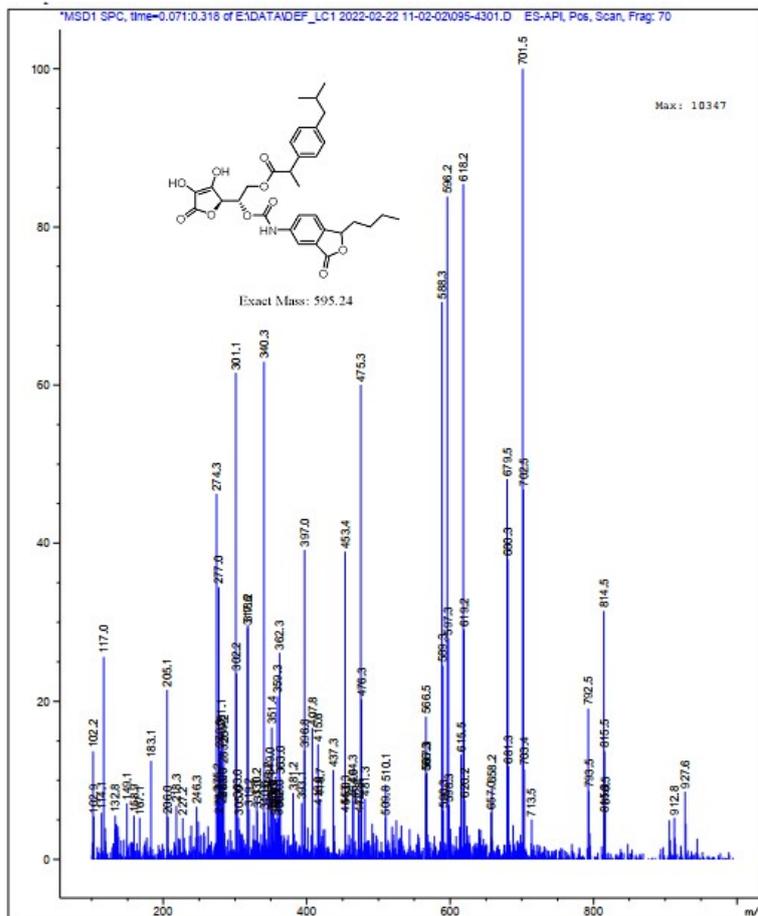


Fig.51 MS of compound ABP10.

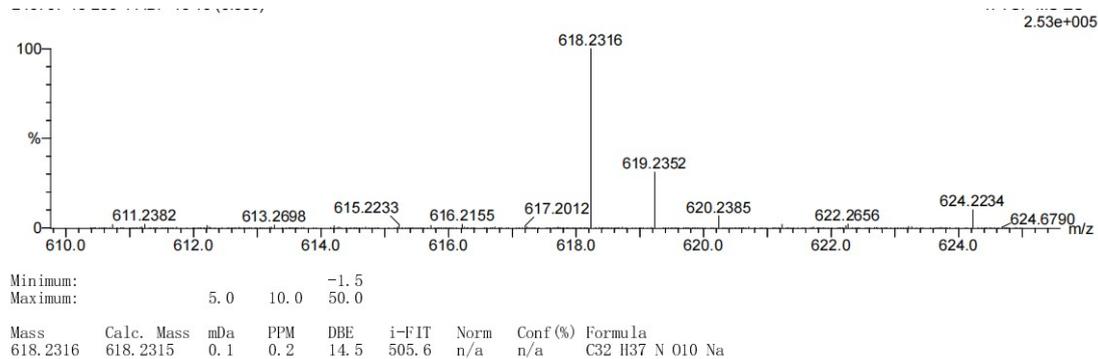


Fig.52 HRMS of compound ABP10.

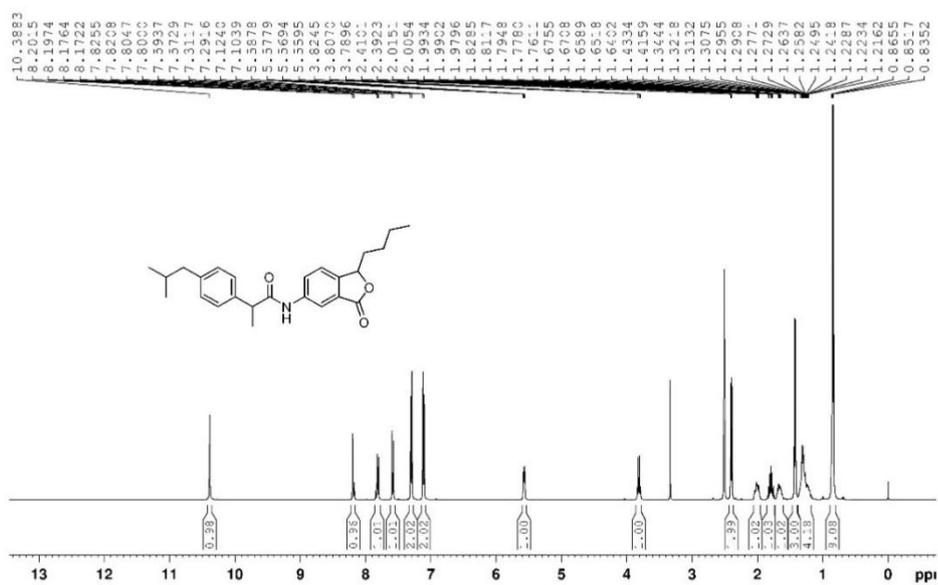


Fig.53 <sup>1</sup>HNMR (400 MHz, DMSO-*d*<sub>6</sub>) of compound ABP13.

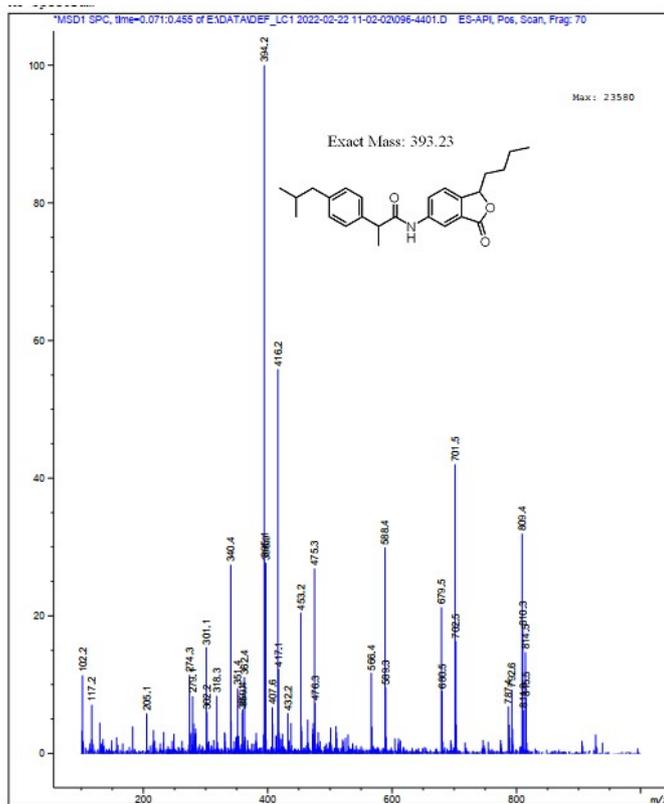


Fig.54 MS of compound ABP13.

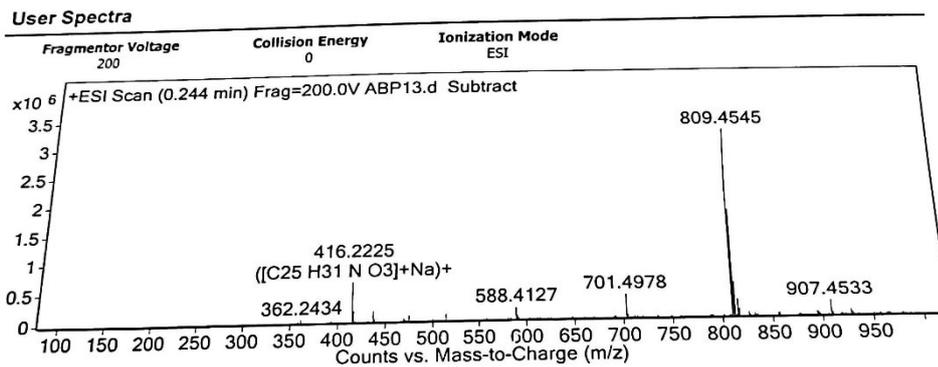


Fig.55 HRMS of compound ABP13.

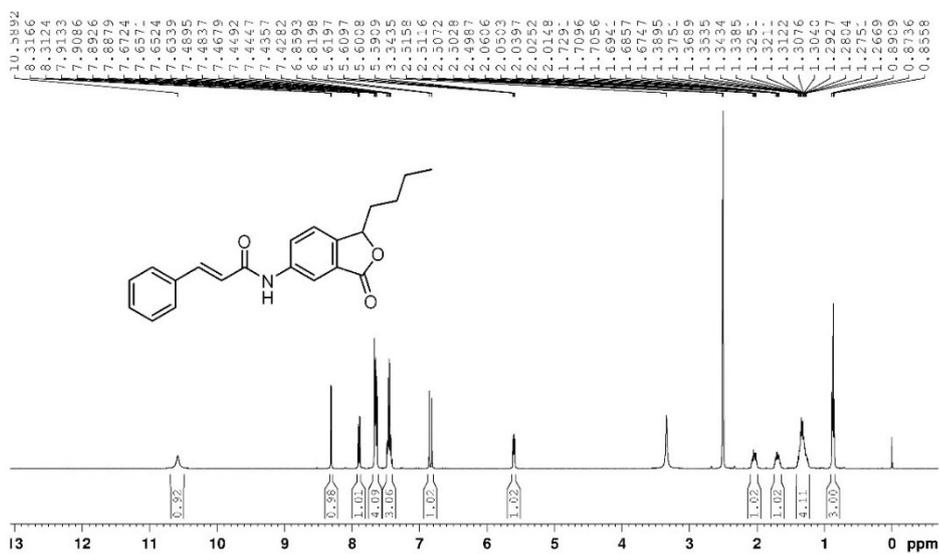


Fig.56  $^1\text{H NMR}$  (400 MHz,  $\text{DMSO-}d_6$ ) of compound ABP14.

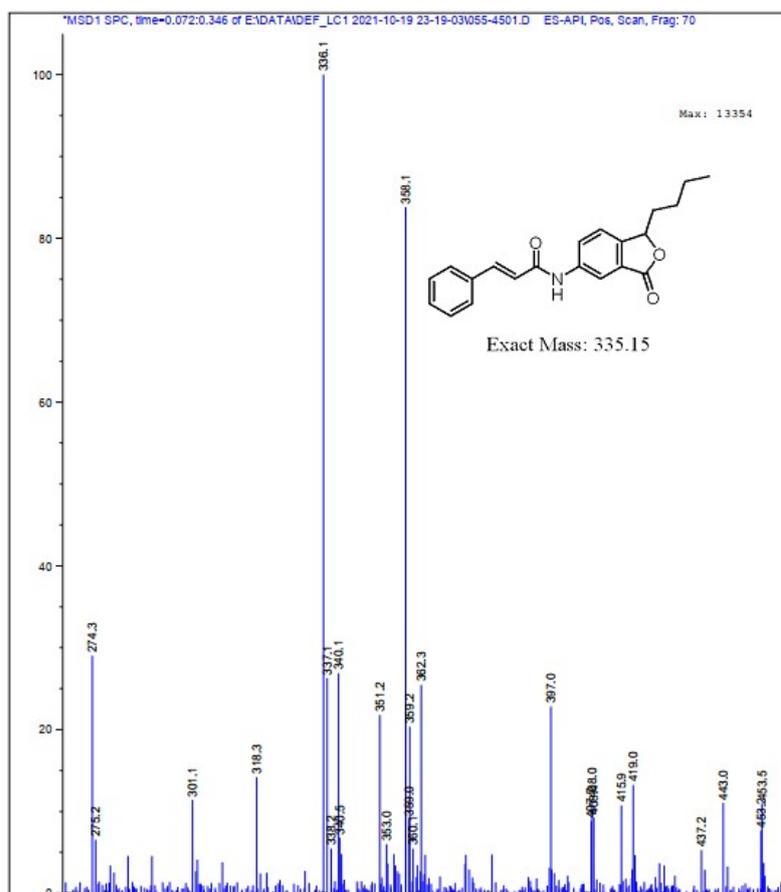


Fig.57 MS of compound ABP14.

User Spectra

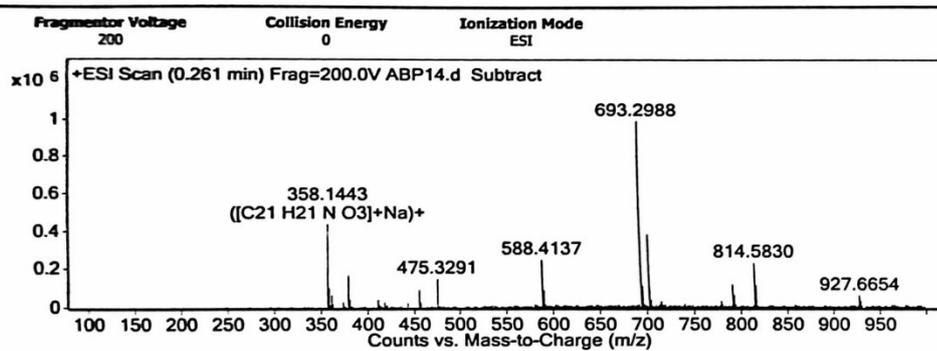


Fig.58 HRMS of compound ABP14.

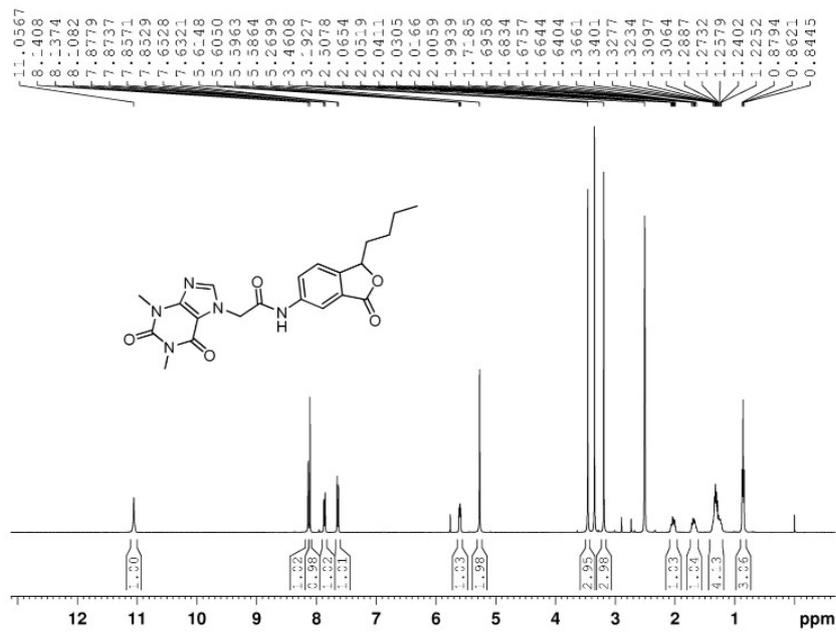


Fig.59 <sup>1</sup>H NMR (400 MHz, DMSO-*d*<sub>6</sub>) of compound ABP15.

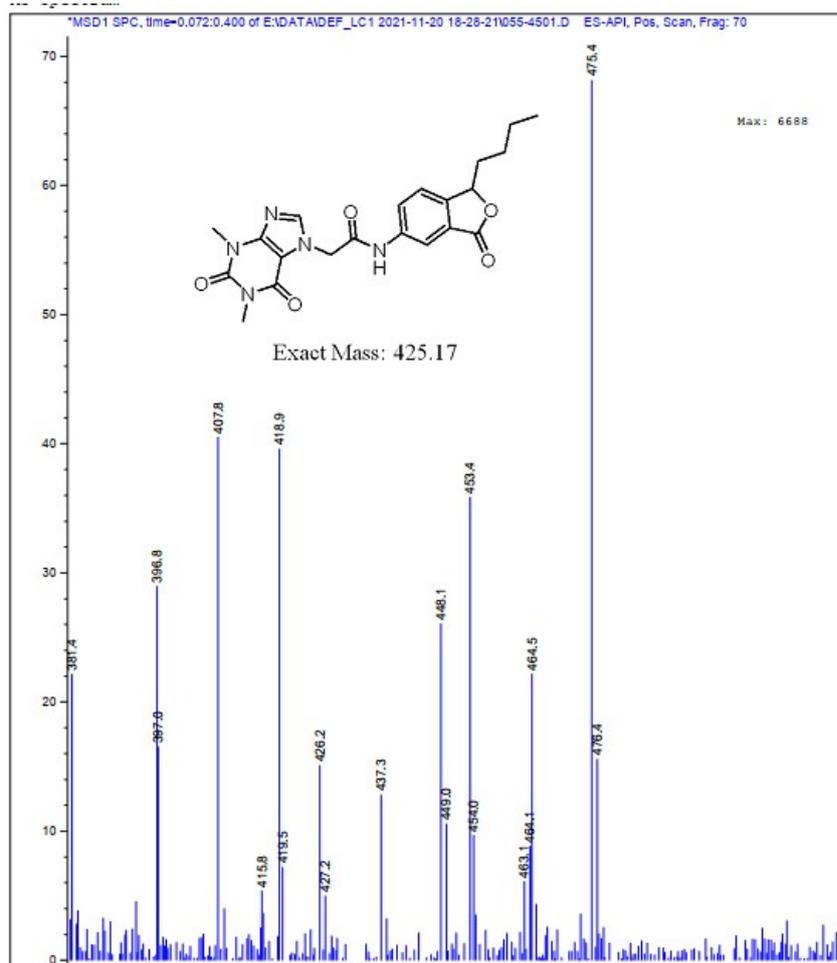


Fig.60 MS of compound ABP15.

User Spectra

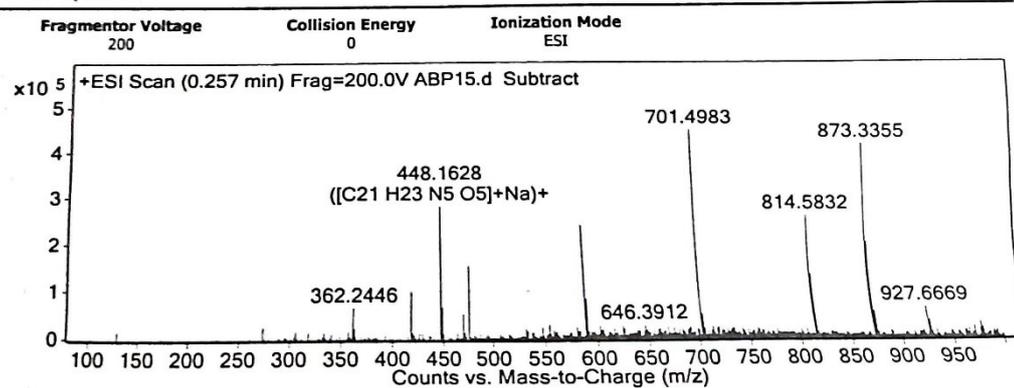


Fig.61 HRMS of compound ABP15.

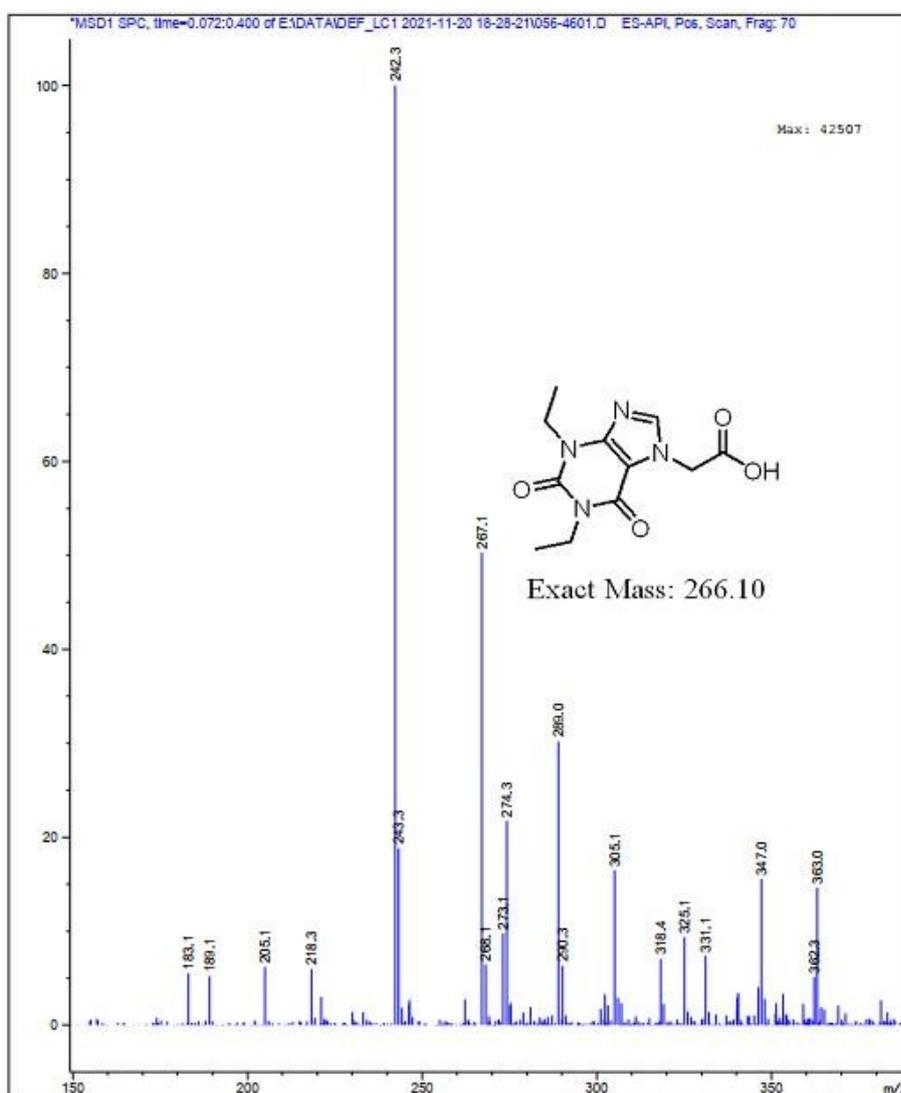
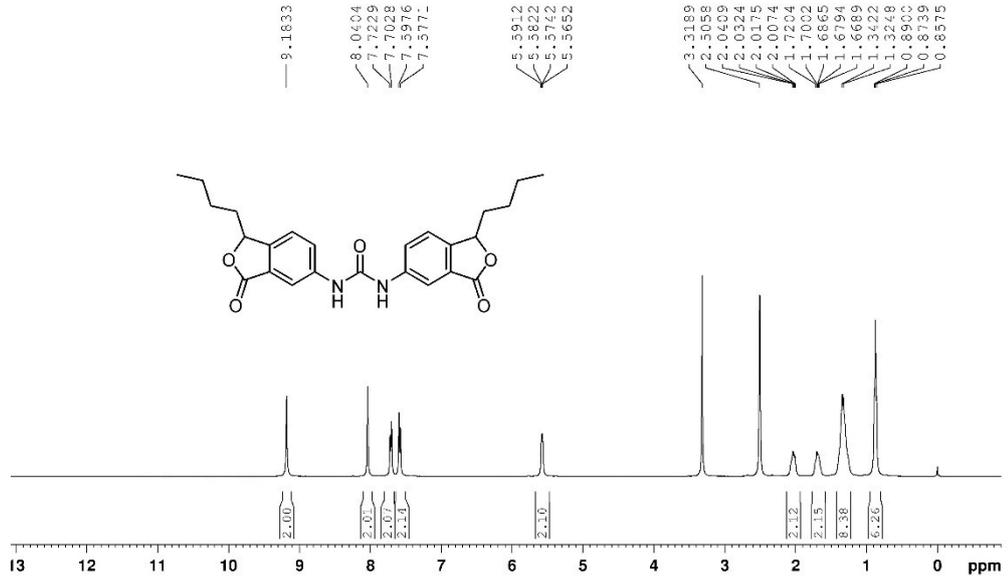


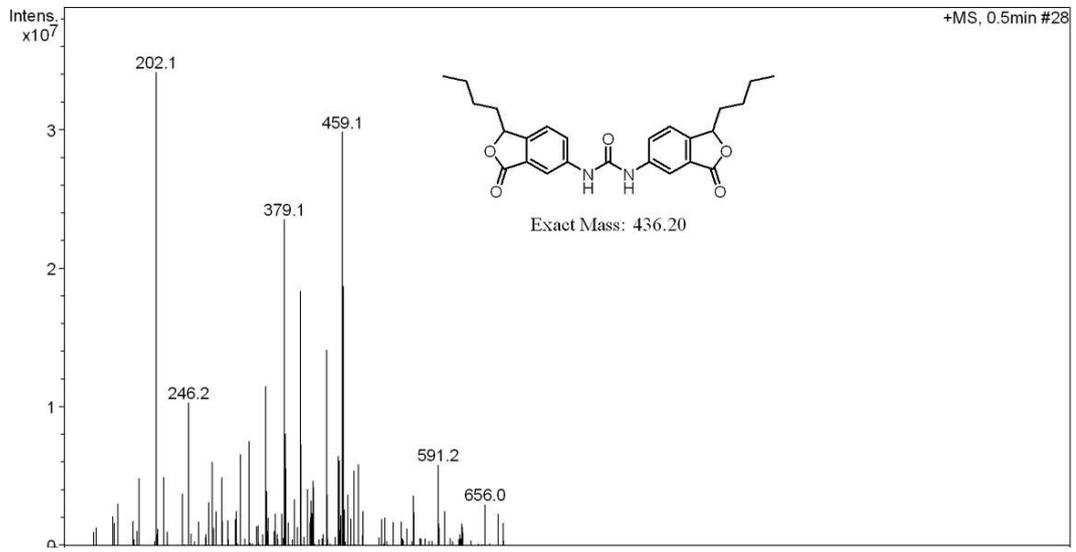
Fig.62 MS of compound A12.



**Fig.65** HRMS of compound **ABP16**.



**Fig.66** <sup>1</sup>H NMR (400 MHz, DMSO-*d*<sub>6</sub>) of compound **ABP17**.



**Fig.67** MS of compound **ABP17**.



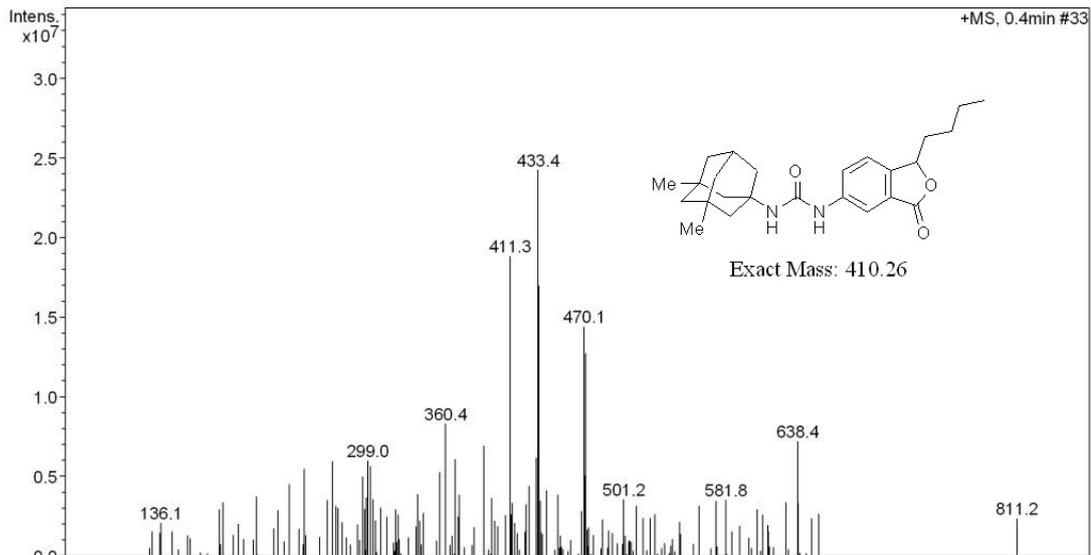


Fig.70 MS of compound ABP18.

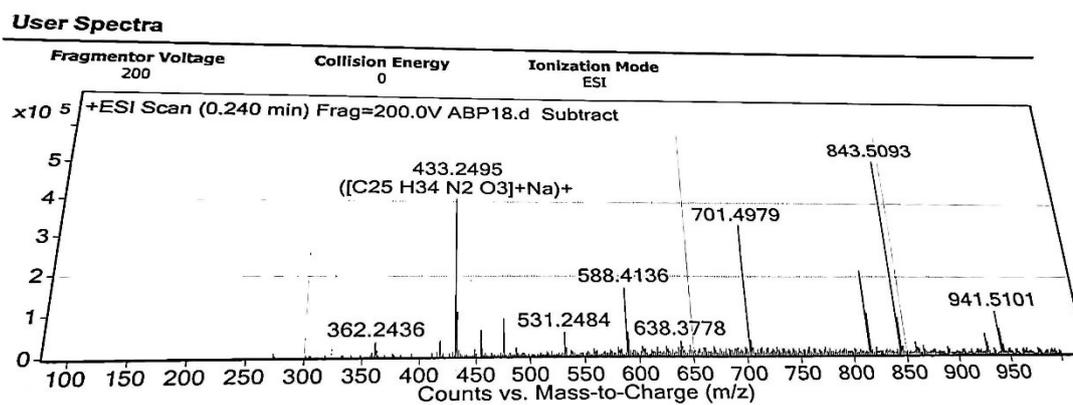


Fig.71 HRMS of compound ABP18.

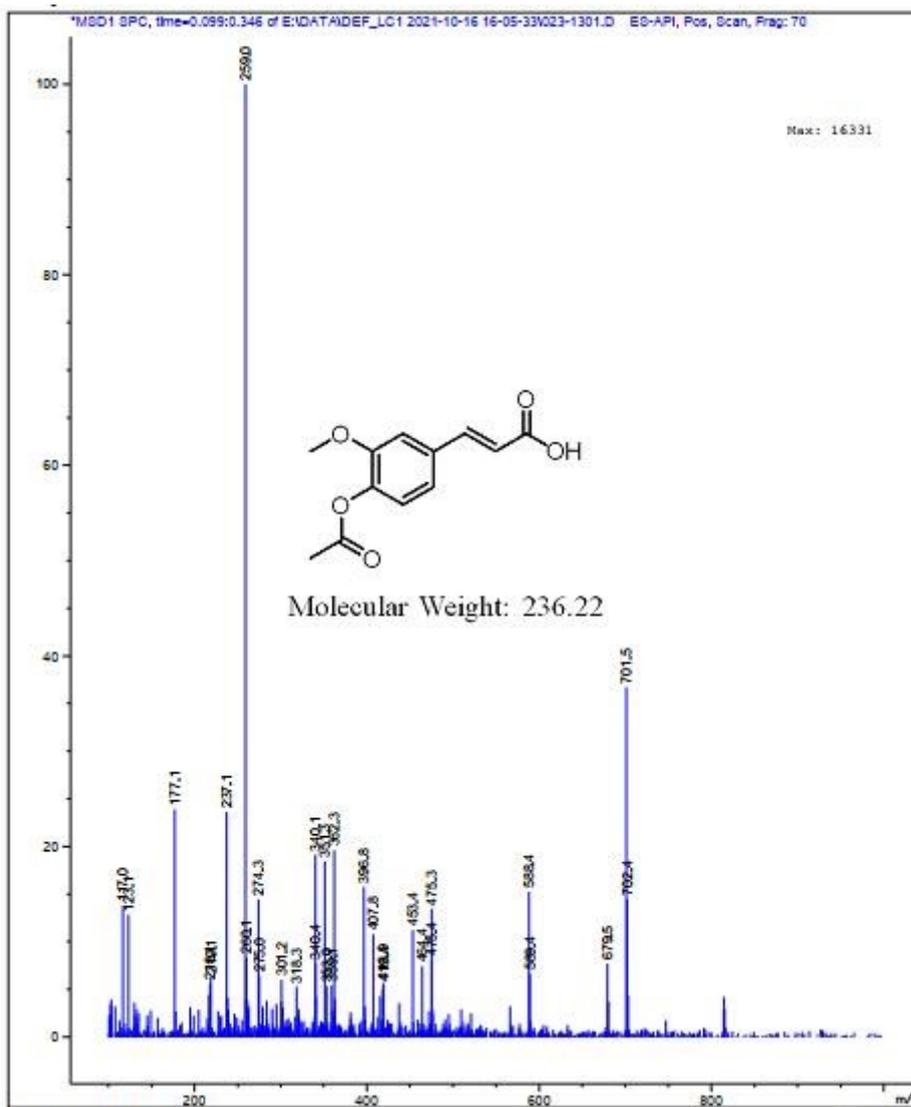


Fig.72 MS of compound D1.

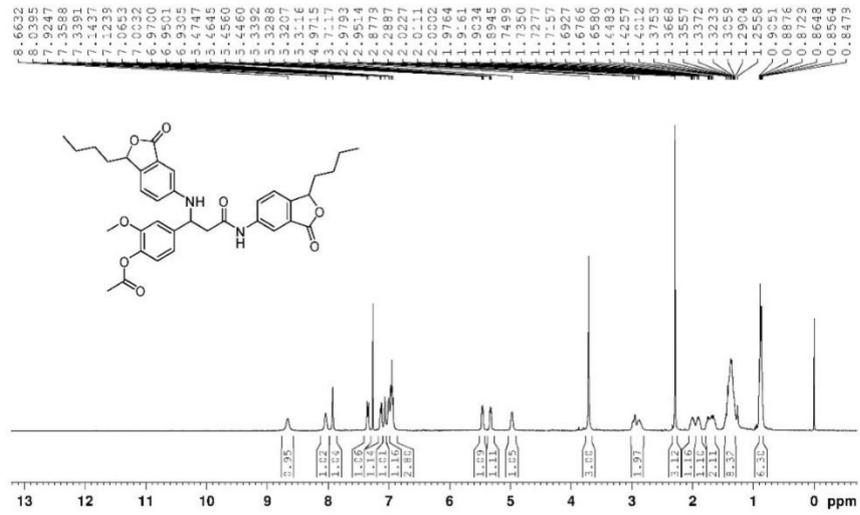


Fig.73 <sup>1</sup>HNMR (400 MHz, CDCl<sub>3</sub>) of compound ABP19.

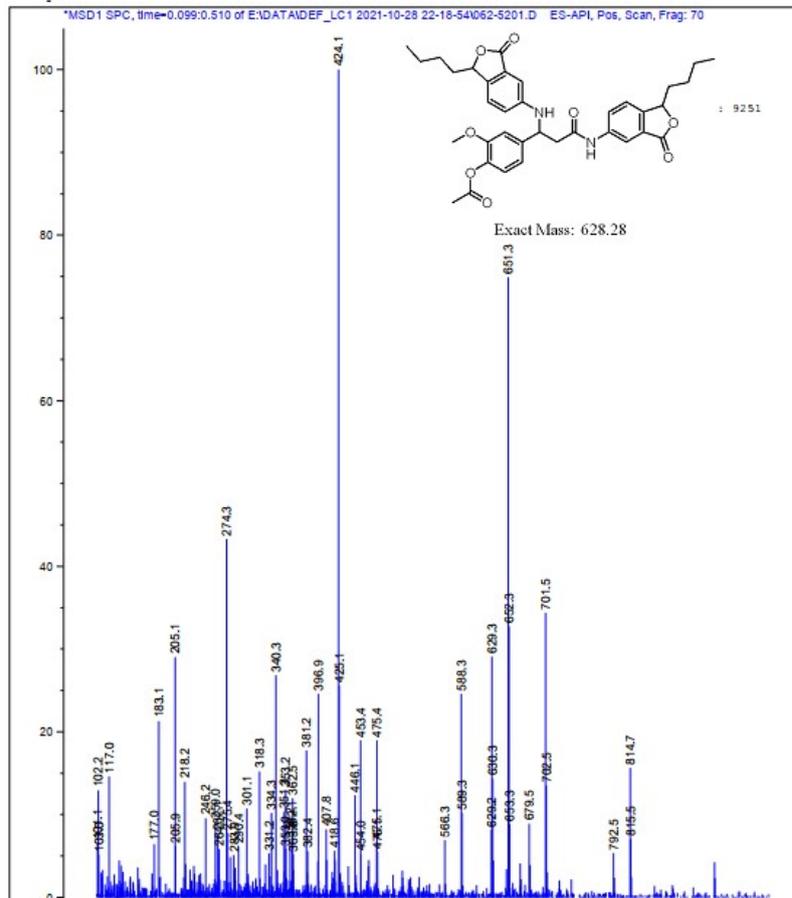
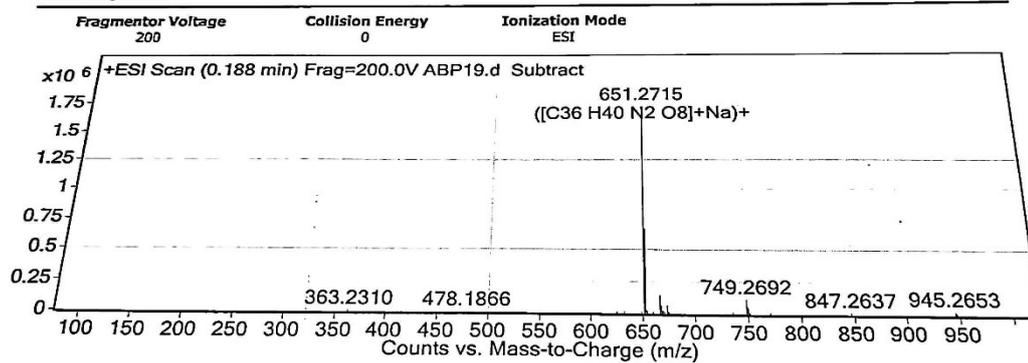
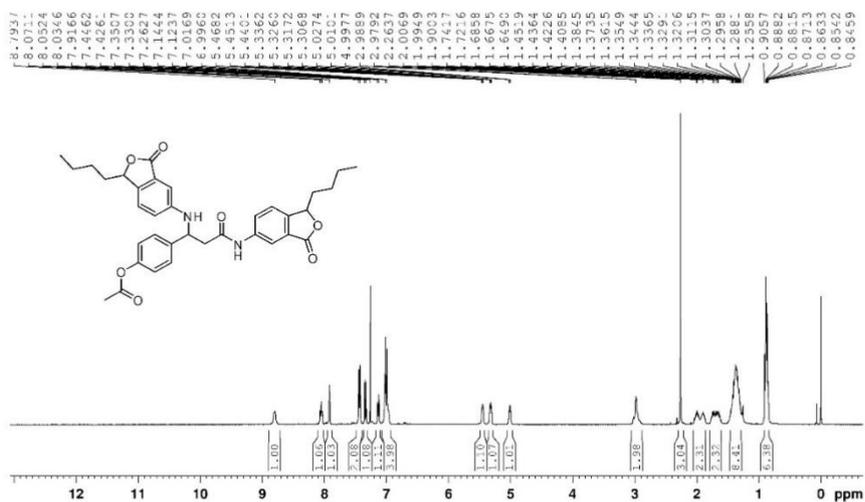


Fig.74 MS of compound ABP19.

**User Spectra**



**Fig.75** HRMS of compound **ABP19**.



**Fig.76** <sup>1</sup>HNMR (400 MHz, CDCl<sub>3</sub>) of compound **ABP20**.

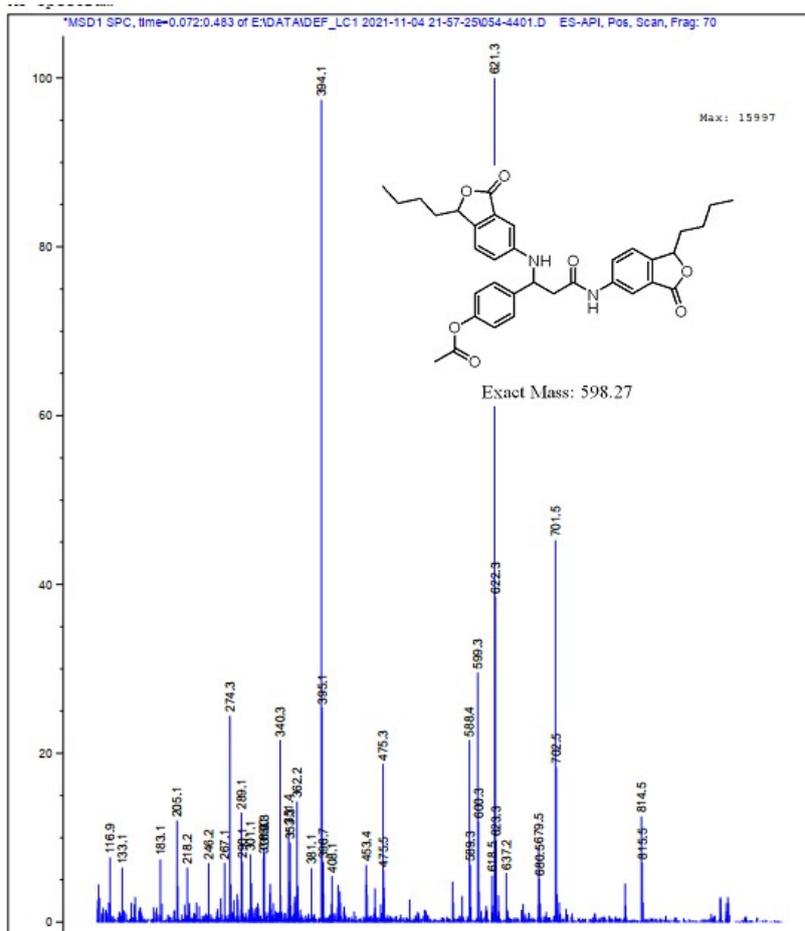


Fig.77 MS of compound ABP20.

User Spectra

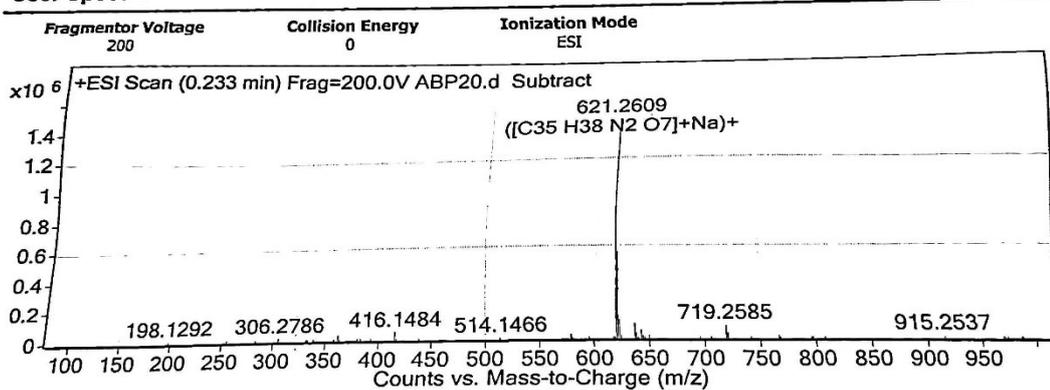
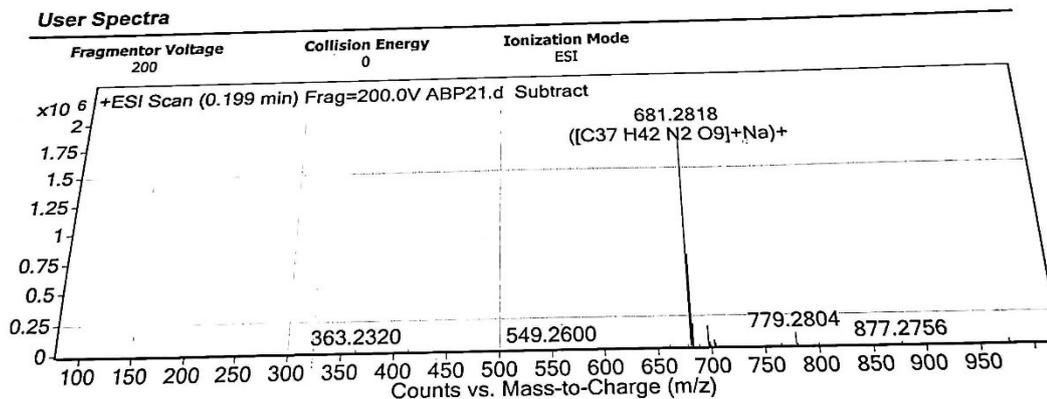


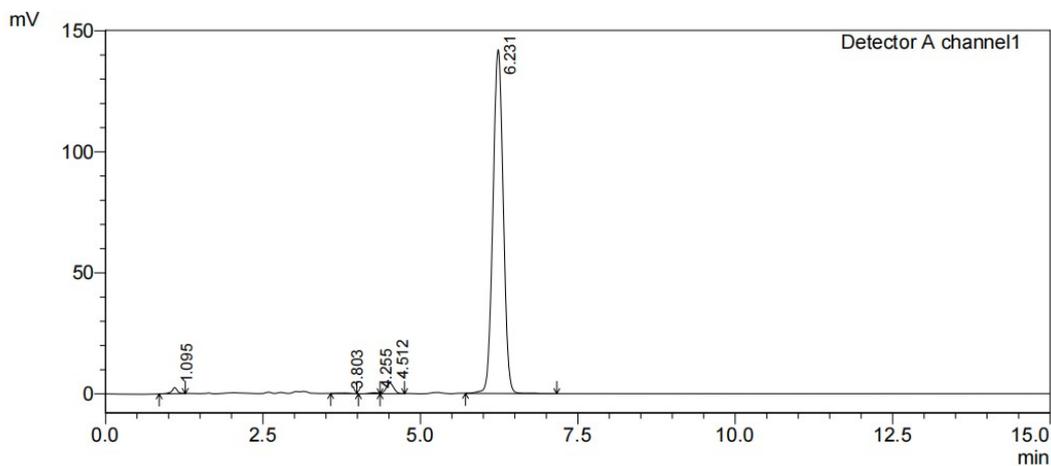
Fig.78 HRMS of compound ABP20.



**Fig.80 MS of compound ABP21.**



**Fig.81 HRMS of compound ABP21.**

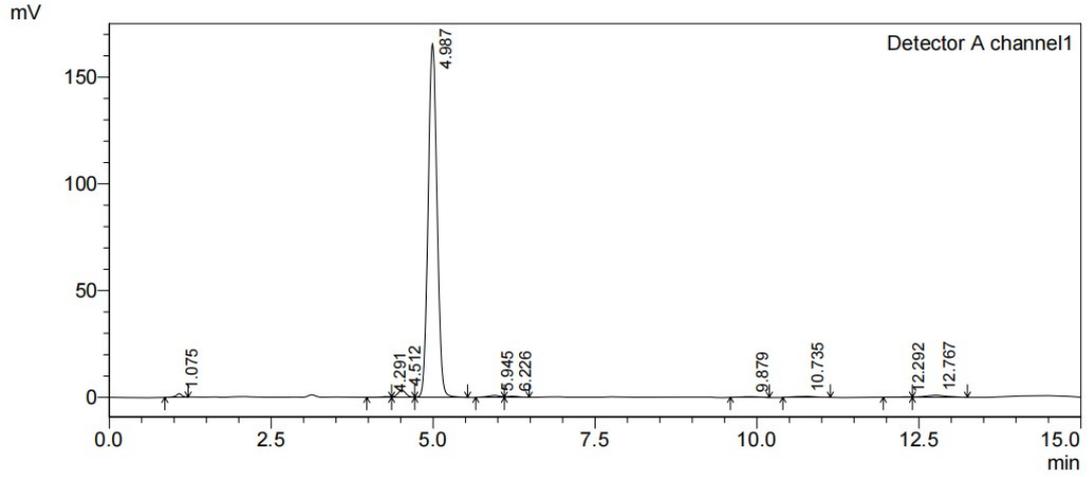


**Fig.82 HPLC for compound ABP1**

**Peak Results**

| peak  | time  | Area    | height | Area %  | height % |
|-------|-------|---------|--------|---------|----------|
| 1     | 1.095 | 15030   | 2479   | 0.900   | 1.659    |
| 2     | 3.803 | 2671    | 221    | 0.160   | 0.148    |
| 3     | 4.255 | 3891    | 394    | 0.233   | 0.264    |
| 4     | 4.512 | 36664   | 4267   | 2.196   | 2.855    |
| 5     | 6.231 | 1611535 | 142073 | 96.511  | 95.074   |
| total |       | 1669790 | 149433 | 100.000 | 100.000  |

**Table 1 peak results of ABP1**

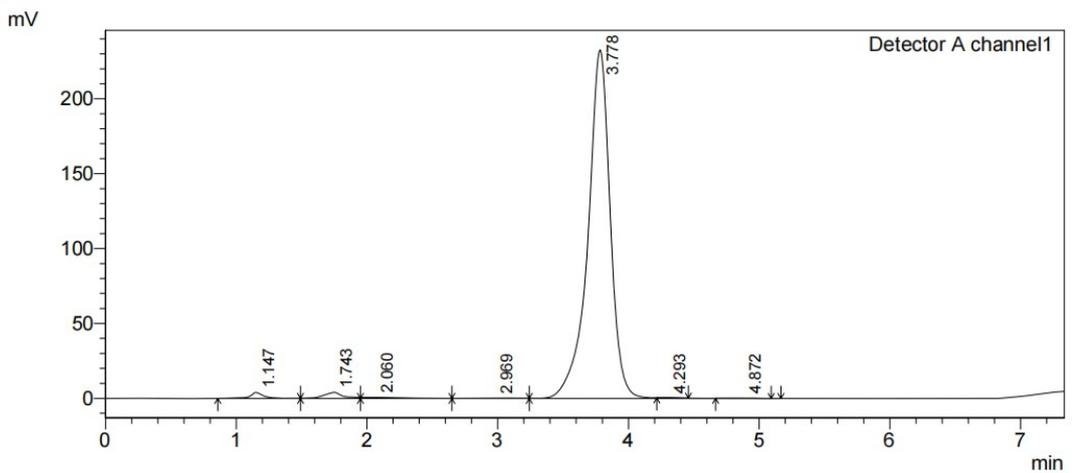


**Fig.83 HPLC for compound ABP2**

Peak Results

| peak  | time   | Area    | height | Area %  | height % |
|-------|--------|---------|--------|---------|----------|
| 1     | 1.075  | 9850    | 1616   | 0.592   | 0.930    |
| 2     | 4.291  | 2544    | 271    | 0.153   | 0.156    |
| 3     | 4.512  | 29048   | 3350   | 1.745   | 1.927    |
| 4     | 4.987  | 1577568 | 165721 | 94.787  | 95.340   |
| 5     | 5.945  | 9722    | 821    | 0.584   | 0.472    |
| 6     | 6.226  | 5169    | 474    | 0.311   | 0.273    |
| 7     | 9.879  | 3518    | 222    | 0.211   | 0.127    |
| 8     | 10.735 | 6854    | 382    | 0.412   | 0.220    |
| 9     | 12.292 | 1459    | 84     | 0.088   | 0.048    |
| 10    | 12.767 | 18604   | 882    | 1.118   | 0.507    |
| total |        | 1664335 | 173822 | 100.000 | 100.000  |

**Table 2 peak results of ABP2**

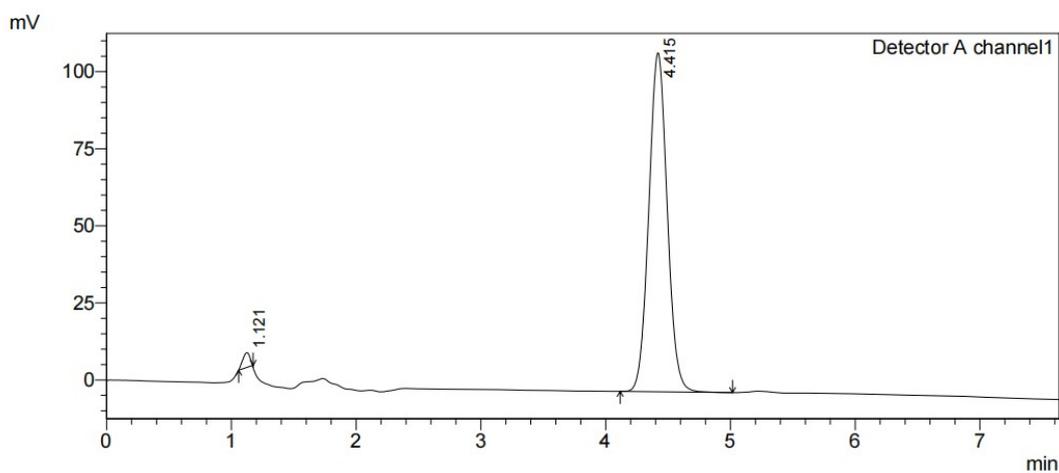


**Fig.84 HPLC for compound ABP3**

Peak Results

| peak  | time (min) | Area    | height | Area %  | height % |
|-------|------------|---------|--------|---------|----------|
| 1     | 1.147      | 28399   | 3964   | 0.996   | 1.637    |
| 2     | 1.743      | 40756   | 4009   | 1.429   | 1.656    |
| 3     | 2.060      | 14919   | 751    | 0.523   | 0.310    |
| 4     | 2.969      | 5114    | 243    | 0.179   | 0.101    |
| 5     | 3.778      | 2758881 | 232787 | 96.739  | 96.139   |
| 6     | 4.293      | 1249    | 146    | 0.044   | 0.060    |
| 7     | 4.872      | 2557    | 234    | 0.090   | 0.097    |
| total |            | 2851875 | 242135 | 100.000 | 100.000  |

**Table 3** peak results of **ABP3**

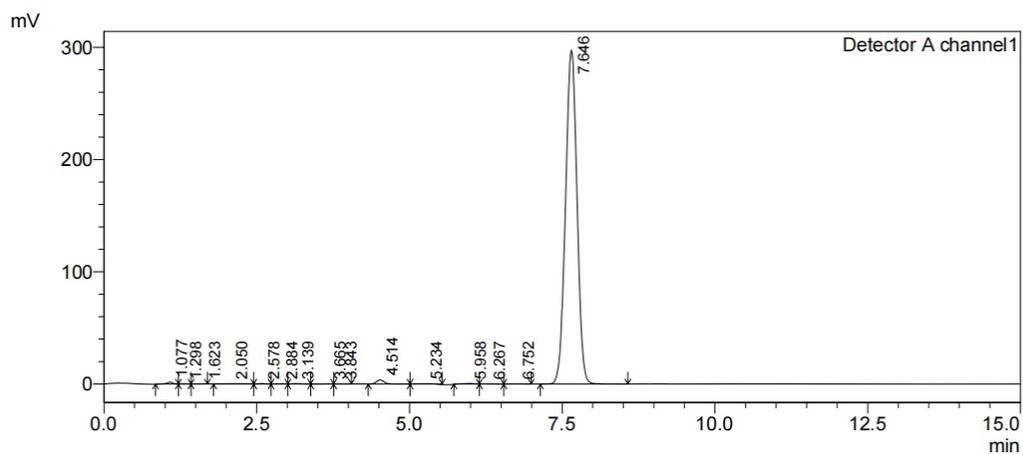


**Fig.85** HPLC for compound **ABP4**

Peak Results

| peak  | time (min) | Area    | height | Area %  | height % |
|-------|------------|---------|--------|---------|----------|
| 1     | 1.121      | 19140   | 4855   | 1.669   | 4.229    |
| 2     | 4.415      | 1127374 | 109955 | 98.331  | 95.771   |
| total |            | 1146514 | 114810 | 100.000 | 100.000  |

**Table 4** peak results of **ABP4**

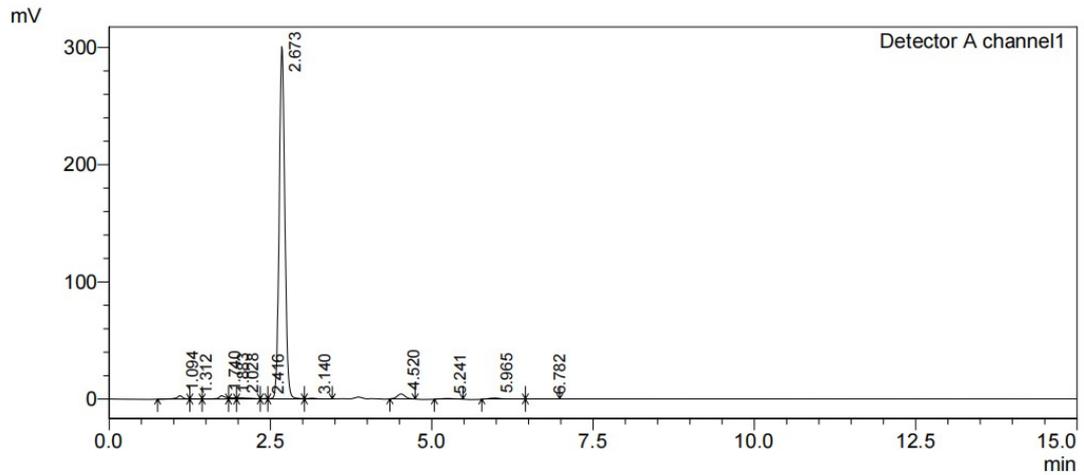


**Fig.86 HPLC for compound ABP5**

**Peak Results**

| peak  | time (min) | Area    | height | Area %  | height % |
|-------|------------|---------|--------|---------|----------|
| 1     | 1.077      | 11553   | 1727   | 0.291   | 0.563    |
| 2     | 1.298      | 2336    | 247    | 0.059   | 0.080    |
| 3     | 1.623      | 2264    | 209    | 0.057   | 0.068    |
| 4     | 2.050      | 8945    | 446    | 0.225   | 0.145    |
| 5     | 2.578      | 3771    | 490    | 0.095   | 0.160    |
| 6     | 2.884      | 2818    | 292    | 0.071   | 0.095    |
| 7     | 3.139      | 4449    | 469    | 0.112   | 0.153    |
| 8     | 3.665      | 1506    | 131    | 0.038   | 0.043    |
| 9     | 3.843      | 1435    | 147    | 0.036   | 0.048    |
| 10    | 4.514      | 32471   | 3625   | 0.817   | 1.182    |
| 11    | 5.234      | 4516    | 418    | 0.114   | 0.136    |
| 12    | 5.958      | 6592    | 613    | 0.166   | 0.200    |
| 13    | 6.267      | 1862    | 147    | 0.047   | 0.048    |
| 14    | 6.752      | 1434    | 108    | 0.036   | 0.035    |
| 15    | 7.646      | 3886659 | 297561 | 97.836  | 97.042   |
| total |            | 3972612 | 306630 | 100.000 | 100.000  |

**Table 5 peak results of ABP5**

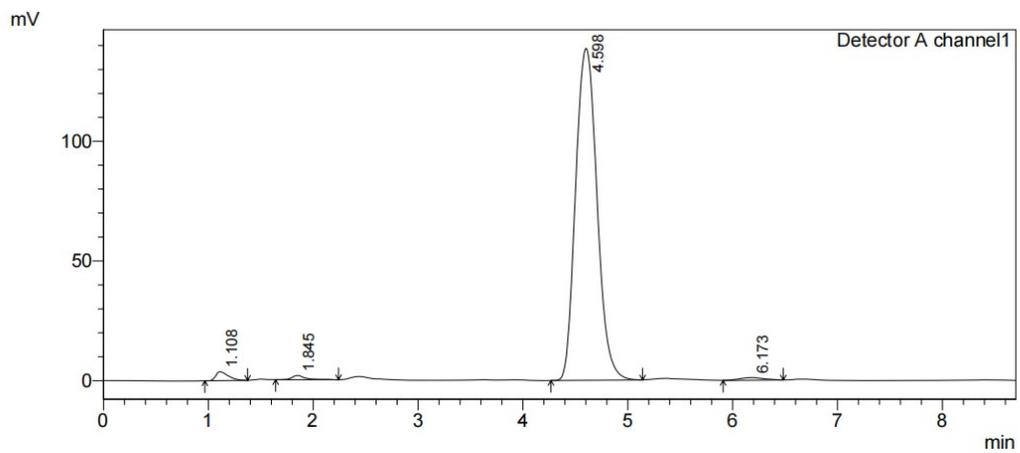


**Fig.87 HPLC for compound ABP6**

Peak Results

| peak  | time (min) | Area    | height | Area %  | height % |
|-------|------------|---------|--------|---------|----------|
| 1     | 1.094      | 18871   | 2900   | 0.967   | 0.920    |
| 2     | 1.312      | 2040    | 233    | 0.104   | 0.074    |
| 3     | 1.740      | 20530   | 2839   | 1.052   | 0.901    |
| 4     | 1.883      | 7906    | 1069   | 0.405   | 0.339    |
| 5     | 2.028      | 14647   | 1081   | 0.750   | 0.343    |
| 6     | 2.416      | 2261    | 352    | 0.116   | 0.112    |
| 7     | 2.673      | 1831488 | 300665 | 93.807  | 95.374   |
| 8     | 3.140      | 5674    | 594    | 0.291   | 0.188    |
| 9     | 4.520      | 34865   | 4190   | 1.786   | 1.329    |
| 10    | 5.241      | 4343    | 455    | 0.222   | 0.144    |
| 11    | 5.965      | 8462    | 767    | 0.433   | 0.243    |
| 12    | 6.782      | 1312    | 103    | 0.067   | 0.033    |
| total |            | 1952400 | 315248 | 100.000 | 100.000  |

**Table 6 peak results of ABP6**

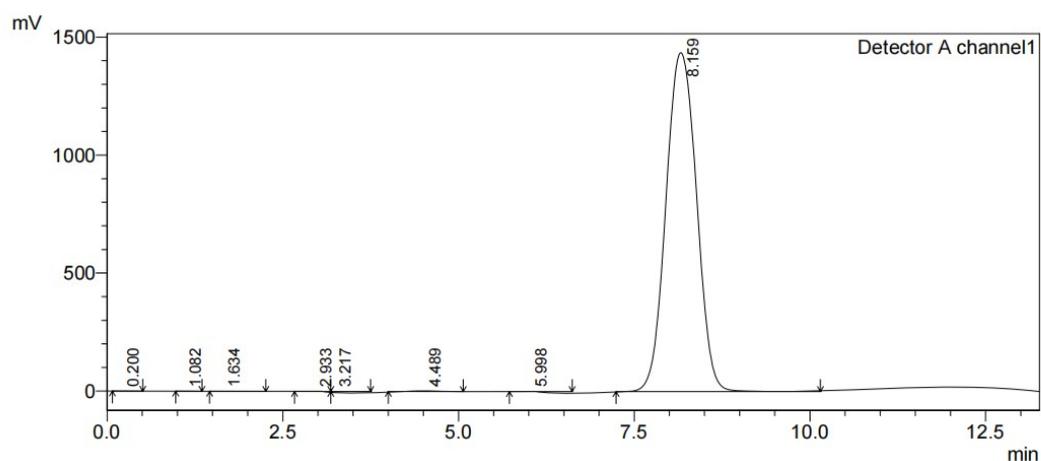


**Fig.88 HPLC for compound ABP7**

### Peak Results

| peak  | time(min) | Area    | height | Area %  | height % |
|-------|-----------|---------|--------|---------|----------|
| 1     | 1.108     | 30888   | 3740   | 1.519   | 2.575    |
| 2     | 1.845     | 15965   | 1752   | 0.785   | 1.206    |
| 3     | 4.598     | 1968993 | 138659 | 96.828  | 95.470   |
| 4     | 6.173     | 17643   | 1088   | 0.868   | 0.749    |
| total |           | 2033489 | 145239 | 100.000 | 100.000  |

**Table 7** peak results of **ABP7**

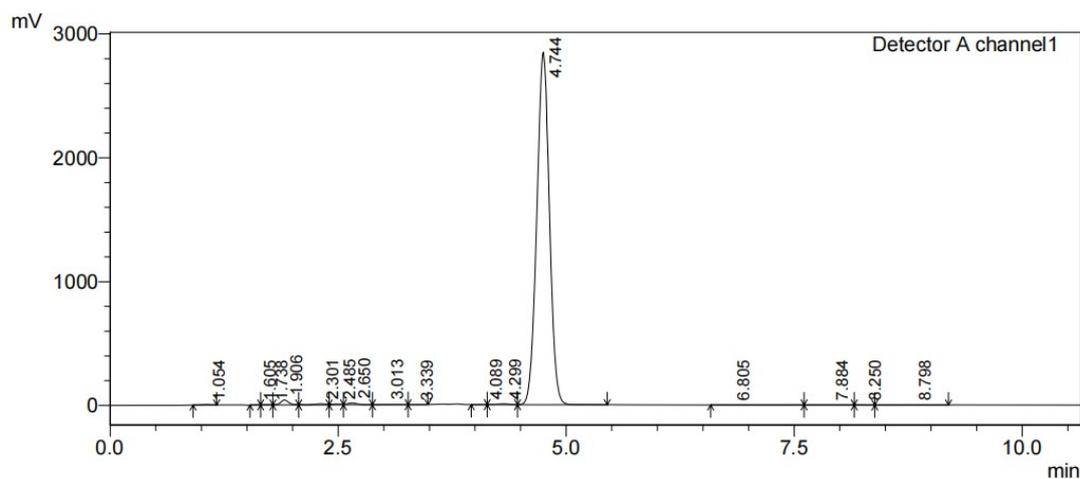


**Fig.89** HPLC for compound **ABP8**

### Peak Results

| peak  | time (min) | Area     | height  | Area%   | height % |
|-------|------------|----------|---------|---------|----------|
| 1     | 0.200      | 1555     | 118     | 0.004   | 0.008    |
| 2     | 1.082      | 2314     | 265     | 0.005   | 0.018    |
| 3     | 1.634      | 8805     | 369     | 0.020   | 0.026    |
| 4     | 2.933      | 8924     | 461     | 0.020   | 0.032    |
| 5     | 3.217      | 6060     | 317     | 0.014   | 0.022    |
| 6     | 4.489      | 63277    | 2654    | 0.145   | 0.184    |
| 7     | 5.998      | 4587     | 183     | 0.011   | 0.013    |
| 8     | 8.159      | 43435812 | 1436345 | 99.781  | 99.697   |
| total |            | 43531334 | 1440711 | 100.000 | 100.000  |

**Table 8** peak results of **ABP8**

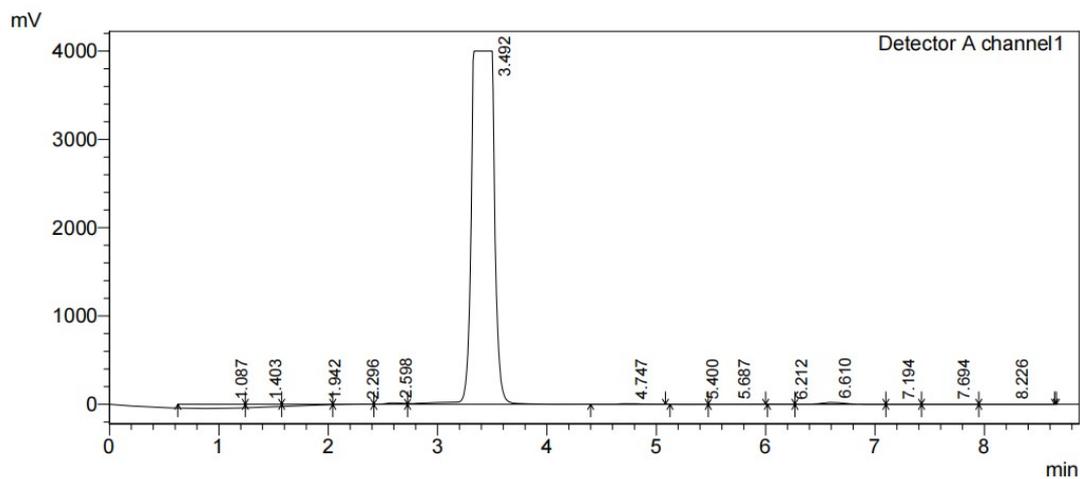


**Fig.90 HPLC for compound ABP9**

Peak Results

| peak  | time (min) | Area     | height  | Area %  | height % |
|-------|------------|----------|---------|---------|----------|
| 1     | 1.054      | 19721    | 3353    | 0.070   | 0.114    |
| 2     | 1.605      | 5656     | 1210    | 0.020   | 0.041    |
| 3     | 1.738      | 13080    | 2059    | 0.047   | 0.070    |
| 4     | 1.906      | 246159   | 38813   | 0.876   | 1.322    |
| 5     | 2.301      | 95267    | 8220    | 0.339   | 0.280    |
| 6     | 2.485      | 54360    | 7012    | 0.193   | 0.239    |
| 7     | 2.650      | 117128   | 14771   | 0.417   | 0.503    |
| 8     | 3.013      | 30017    | 2130    | 0.107   | 0.073    |
| 9     | 3.339      | 5366     | 644     | 0.019   | 0.022    |
| 10    | 4.089      | 7299     | 1039    | 0.026   | 0.035    |
| 11    | 4.299      | 76384    | 6914    | 0.272   | 0.235    |
| 12    | 4.744      | 27411072 | 2848312 | 97.518  | 97.010   |
| 13    | 6.805      | 5061     | 321     | 0.018   | 0.011    |
| 14    | 7.884      | 8082     | 500     | 0.029   | 0.017    |
| 15    | 8.250      | 1219     | 117     | 0.004   | 0.004    |
| 16    | 8.798      | 12966    | 679     | 0.046   | 0.023    |
| total |            | 28108837 | 2936094 | 100.000 | 100.000  |

**Table 9 peak results of ABP9**

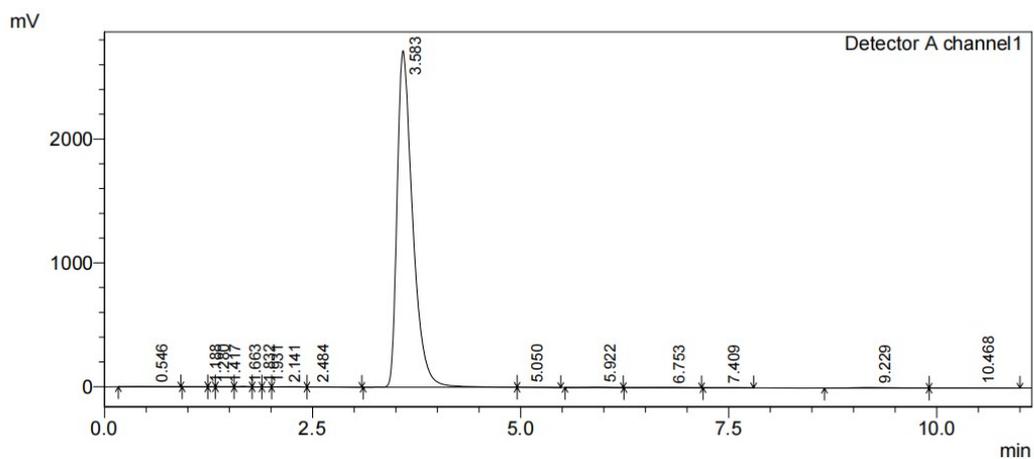


**Fig.91** HPLC for compound **ABP10**

Peak Results

| peak  | time (min) | Area     | height  | Area %  | height % |
|-------|------------|----------|---------|---------|----------|
| 1     | 1.087      | 6325     | 468     | 0.011   | 0.012    |
| 2     | 1.403      | 4394     | 292     | 0.008   | 0.007    |
| 3     | 1.942      | 4818     | 280     | 0.008   | 0.007    |
| 4     | 2.296      | 33801    | 3590    | 0.059   | 0.089    |
| 5     | 2.598      | 183355   | 17835   | 0.319   | 0.440    |
| 6     | 3.492      | 56779935 | 3999997 | 98.831  | 98.660   |
| 7     | 4.747      | 84773    | 6721    | 0.148   | 0.166    |
| 8     | 5.400      | 2212     | 205     | 0.004   | 0.005    |
| 9     | 5.687      | 38429    | 3215    | 0.067   | 0.079    |
| 10    | 6.212      | 1062     | 121     | 0.002   | 0.003    |
| 11    | 6.610      | 295446   | 20529   | 0.514   | 0.506    |
| 12    | 7.194      | 3767     | 251     | 0.007   | 0.006    |
| 13    | 7.694      | 3971     | 192     | 0.007   | 0.005    |
| 14    | 8.226      | 9375     | 633     | 0.016   | 0.016    |
| total |            | 57451661 | 4054328 | 100.000 | 100.000  |

**Table 10** peak results of **ABP10**

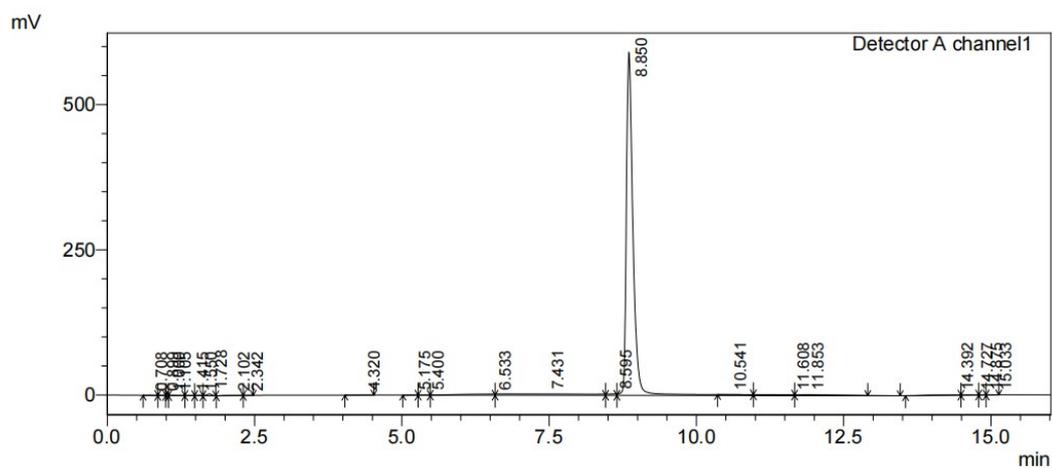


**Fig.92 HPLC for compound ABP11**

**Peak Results**

| peak  | time (min) | Area     | height  | Area %  | height % |
|-------|------------|----------|---------|---------|----------|
| 1     | 0.546      | 65366    | 2772    | 0.182   | 0.101    |
| 2     | 1.188      | 12999    | 1445    | 0.036   | 0.053    |
| 3     | 1.280      | 7858     | 1588    | 0.022   | 0.058    |
| 4     | 1.417      | 22910    | 2296    | 0.064   | 0.083    |
| 5     | 1.663      | 26601    | 4385    | 0.074   | 0.159    |
| 6     | 1.832      | 4582     | 789     | 0.013   | 0.029    |
| 7     | 1.931      | 5598     | 1234    | 0.016   | 0.045    |
| 8     | 2.141      | 36090    | 1661    | 0.100   | 0.060    |
| 9     | 2.484      | 37759    | 1655    | 0.105   | 0.060    |
| 10    | 3.583      | 35278353 | 2717146 | 98.075  | 98.788   |
| 11    | 5.050      | 17583    | 531     | 0.049   | 0.019    |
| 12    | 5.922      | 63816    | 3713    | 0.177   | 0.135    |
| 13    | 6.753      | 68994    | 2194    | 0.192   | 0.080    |
| 14    | 7.409      | 17936    | 932     | 0.050   | 0.034    |
| 15    | 9.229      | 178622   | 4971    | 0.497   | 0.181    |
| 16    | 10.468     | 125778   | 3173    | 0.350   | 0.115    |
| total |            | 35970844 | 2750485 | 100.000 | 100.000  |

**Table 11 peak results of ABP11**

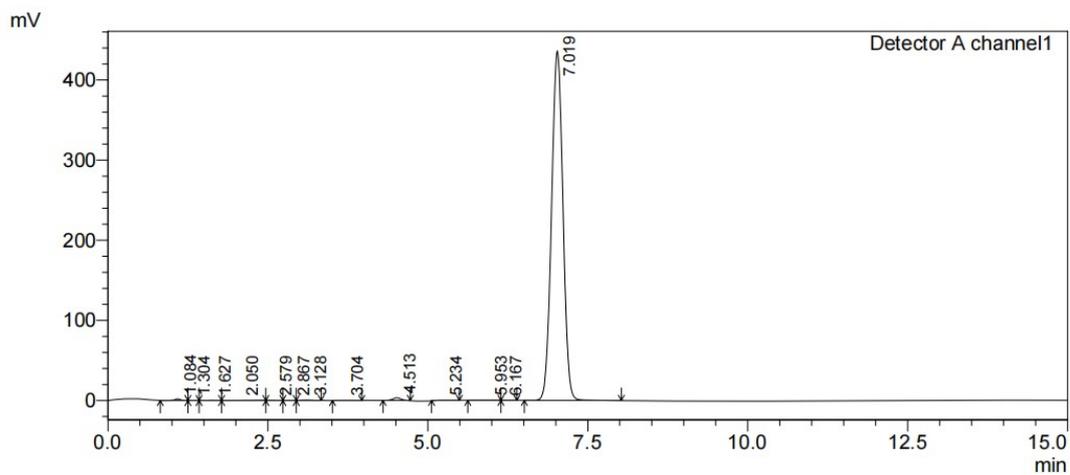


**Fig.93 HPLC for compound ABP12**

**Peak Results**

| peak  | time (min) | Area    | height | Area %  | height % |
|-------|------------|---------|--------|---------|----------|
| 1     | 0.708      | 3330    | 232    | 0.063   | 0.038    |
| 2     | 0.899      | 3213    | 391    | 0.061   | 0.064    |
| 3     | 1.000      | 1369    | 449    | 0.026   | 0.074    |
| 4     | 1.105      | 9409    | 533    | 0.177   | 0.087    |
| 5     | 1.415      | 7158    | 744    | 0.135   | 0.122    |
| 6     | 1.550      | 7283    | 869    | 0.137   | 0.143    |
| 7     | 1.728      | 20792   | 3378   | 0.392   | 0.554    |
| 8     | 2.102      | 14574   | 646    | 0.275   | 0.106    |
| 9     | 2.342      | 1444    | 236    | 0.027   | 0.039    |
| 10    | 4.320      | 2250    | 223    | 0.042   | 0.037    |
| 11    | 5.175      | 3730    | 306    | 0.070   | 0.050    |
| 12    | 5.400      | 4561    | 382    | 0.086   | 0.063    |
| 13    | 6.533      | 82445   | 2219   | 1.554   | 0.364    |
| 14    | 7.431      | 236115  | 2438   | 4.451   | 0.400    |
| 15    | 8.595      | 27255   | 2610   | 0.514   | 0.428    |
| 16    | 8.850      | 4780084 | 590887 | 90.105  | 96.895   |
| 17    | 10.541     | 6182    | 130    | 0.117   | 0.021    |
| 18    | 11.608     | 15957   | 455    | 0.301   | 0.075    |
| 19    | 11.853     | 29199   | 822    | 0.550   | 0.135    |
| 20    | 14.392     | 32401   | 757    | 0.611   | 0.124    |
| 21    | 14.727     | 10357   | 519    | 0.195   | 0.085    |
| 22    | 14.875     | 2962    | 377    | 0.056   | 0.062    |
| 23    | 15.033     | 2929    | 222    | 0.055   | 0.036    |
| total |            | 5305001 | 609825 | 100.000 | 100.000  |

**Table 12 peak results of ABP12**

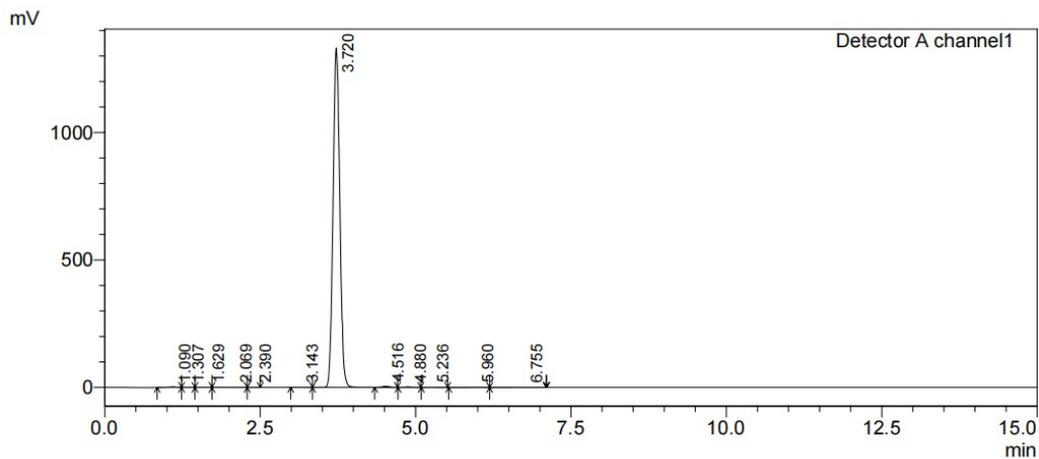


**Fig.94** HPLC for compound **ABP13**

Peak Results

| peak  | time (min) | Area    | height | Area %  | height % |
|-------|------------|---------|--------|---------|----------|
| 1     | 1.084      | 13724   | 2013   | 0.252   | 0.453    |
| 2     | 1.304      | 1521    | 191    | 0.028   | 0.043    |
| 3     | 1.627      | 3181    | 321    | 0.058   | 0.072    |
| 4     | 2.050      | 8807    | 398    | 0.162   | 0.089    |
| 5     | 2.579      | 1826    | 200    | 0.033   | 0.045    |
| 6     | 2.867      | 1222    | 138    | 0.022   | 0.031    |
| 7     | 3.128      | 5854    | 469    | 0.107   | 0.105    |
| 8     | 3.704      | 2054    | 191    | 0.038   | 0.043    |
| 9     | 4.513      | 28181   | 3268   | 0.517   | 0.735    |
| 10    | 5.234      | 3326    | 358    | 0.061   | 0.081    |
| 11    | 5.953      | 7540    | 600    | 0.138   | 0.135    |
| 12    | 6.167      | 1012    | 139    | 0.019   | 0.031    |
| 13    | 7.019      | 5372456 | 436318 | 98.564  | 98.137   |
| total |            | 5450703 | 444603 | 100.000 | 100.000  |

**Table 13** peak results of **ABP13**

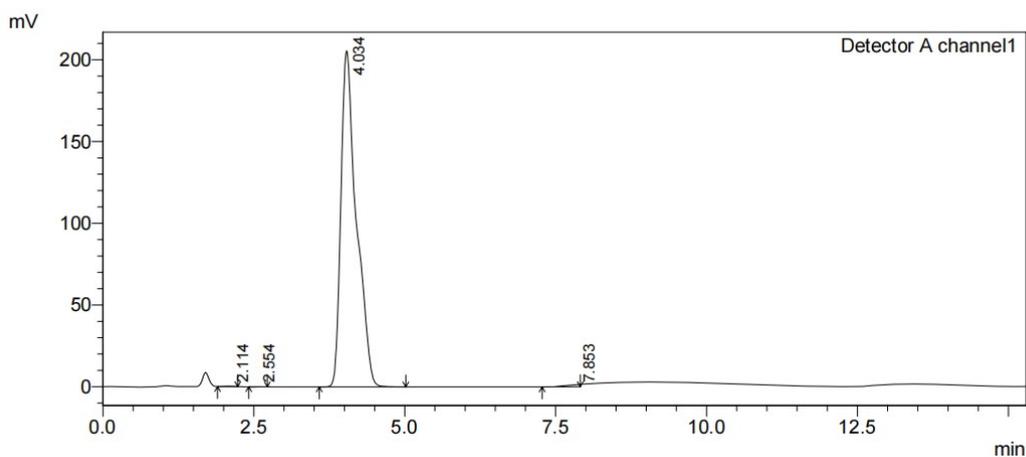


**Fig.95 HPLC for compound ABP14**

**Peak Results**

| peak  | time (min) | Area     | height  | Area %  | height % |
|-------|------------|----------|---------|---------|----------|
| 1     | 1.090      | 16488    | 2585    | 0.163   | 0.193    |
| 2     | 1.307      | 2093     | 233     | 0.021   | 0.017    |
| 3     | 1.629      | 2254     | 261     | 0.022   | 0.019    |
| 4     | 2.069      | 7208     | 379     | 0.071   | 0.028    |
| 5     | 2.390      | 1606     | 183     | 0.016   | 0.014    |
| 6     | 3.143      | 3486     | 419     | 0.035   | 0.031    |
| 7     | 3.720      | 9995171  | 1331427 | 99.037  | 99.189   |
| 8     | 4.516      | 33041    | 3949    | 0.327   | 0.294    |
| 9     | 4.880      | 13933    | 1539    | 0.138   | 0.115    |
| 10    | 5.236      | 3690     | 405     | 0.037   | 0.030    |
| 11    | 5.960      | 8973     | 754     | 0.089   | 0.056    |
| 12    | 6.755      | 4376     | 174     | 0.043   | 0.013    |
| total |            | 10092318 | 1342308 | 100.000 | 100.000  |

**Table 14 peak results of ABP14**

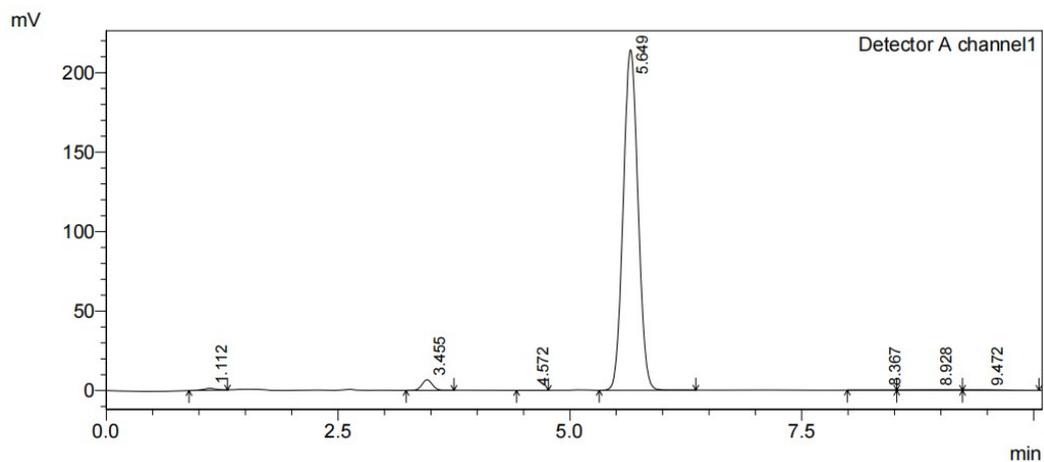


**Fig.96** HPLC for compound **ABP15**

Peak Results

| peak  | time (min) | Area    | height | Area %  | height % |
|-------|------------|---------|--------|---------|----------|
| 1     | 2.114      | 1414    | 144    | 0.039   | 0.070    |
| 2     | 2.554      | 269     | 35     | 0.007   | 0.017    |
| 3     | 4.034      | 3659147 | 205554 | 99.901  | 99.890   |
| 4     | 7.853      | 1942    | 48     | 0.053   | 0.023    |
| total |            | 3662772 | 205780 | 100.000 | 100.000  |

**Table 15** peak results of **ABP15**

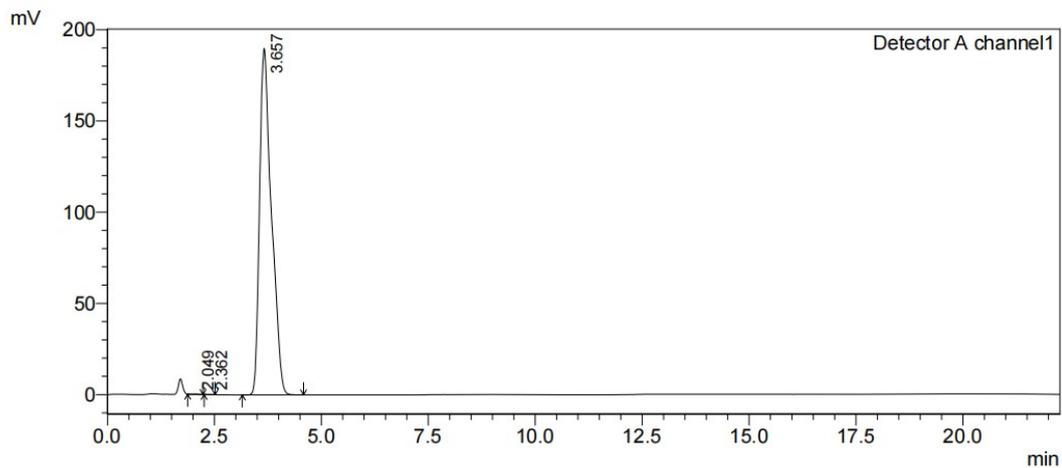


**Fig.97** HPLC for compound **ABP16**

Peak Results

| peak  | time (min) | Area    | height | Area %  | height % |
|-------|------------|---------|--------|---------|----------|
| 1     | 1.112      | 11143   | 1253   | 0.454   | 0.562    |
| 2     | 3.455      | 51840   | 6688   | 2.112   | 3.000    |
| 3     | 4.572      | 1187    | 103    | 0.048   | 0.046    |
| 4     | 5.649      | 2368685 | 214192 | 96.521  | 96.063   |
| 5     | 8.367      | 2070    | 99     | 0.084   | 0.044    |
| 6     | 8.928      | 10040   | 289    | 0.409   | 0.130    |
| 7     | 9.472      | 9102    | 347    | 0.371   | 0.156    |
| total |            | 2454067 | 222971 | 100.000 | 100.000  |

**Table 16** peak results of **ABP16**

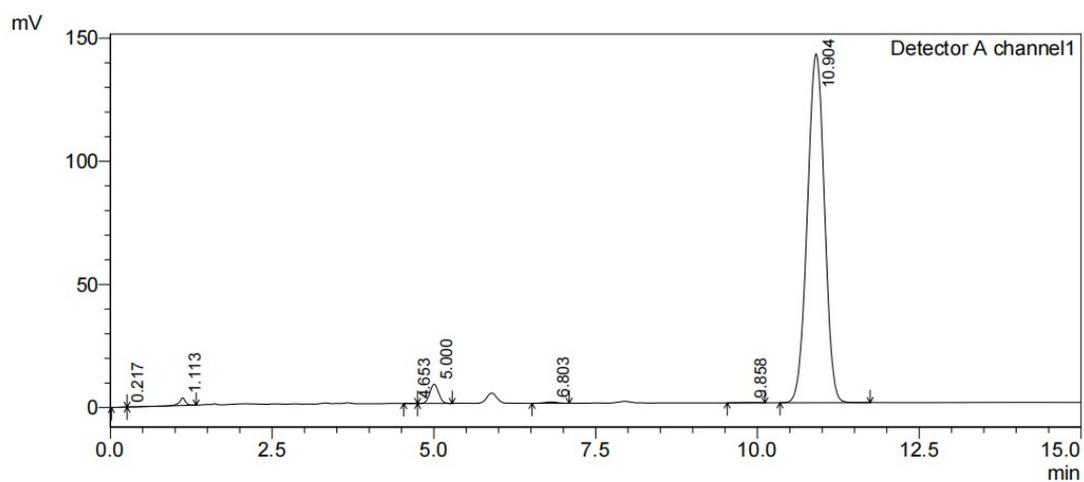


**Fig.98** HPLC for compound **ABP17**

Peak Results

| peak  | time(min) | Area    | height | Area %  | height % |
|-------|-----------|---------|--------|---------|----------|
| 1     | 2.049     | 1373    | 156    | 0.037   | 0.082    |
| 2     | 2.362     | 782     | 76     | 0.021   | 0.040    |
| 3     | 3.657     | 3660496 | 189901 | 99.941  | 99.878   |
| total |           | 3662652 | 190133 | 100.000 | 100.000  |

**Table 17** peak results of **ABP17**

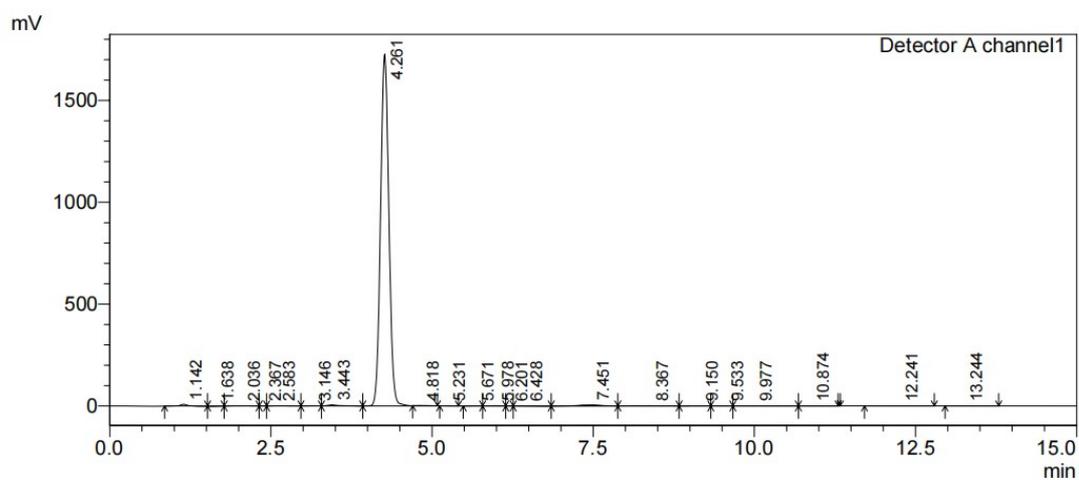


**Fig.99** HPLC for compound **ABP18**

Peak Results

| peak  | time(min) | Area    | height | Area %  | height % |
|-------|-----------|---------|--------|---------|----------|
| 1     | 0.217     | 453     | 64     | 0.017   | 0.042    |
| 2     | 1.113     | 20352   | 3124   | 0.752   | 2.038    |
| 3     | 4.653     | 307     | 46     | 0.011   | 0.030    |
| 4     | 5.000     | 74334   | 7796   | 2.746   | 5.085    |
| 5     | 6.803     | 6602    | 532    | 0.244   | 0.347    |
| 6     | 9.858     | 1499    | 87     | 0.055   | 0.057    |
| 7     | 10.904    | 2603091 | 141656 | 96.174  | 92.401   |
| total |           | 2706638 | 153305 | 100.000 | 100.000  |

**Table 18** peak results of **ABP18**

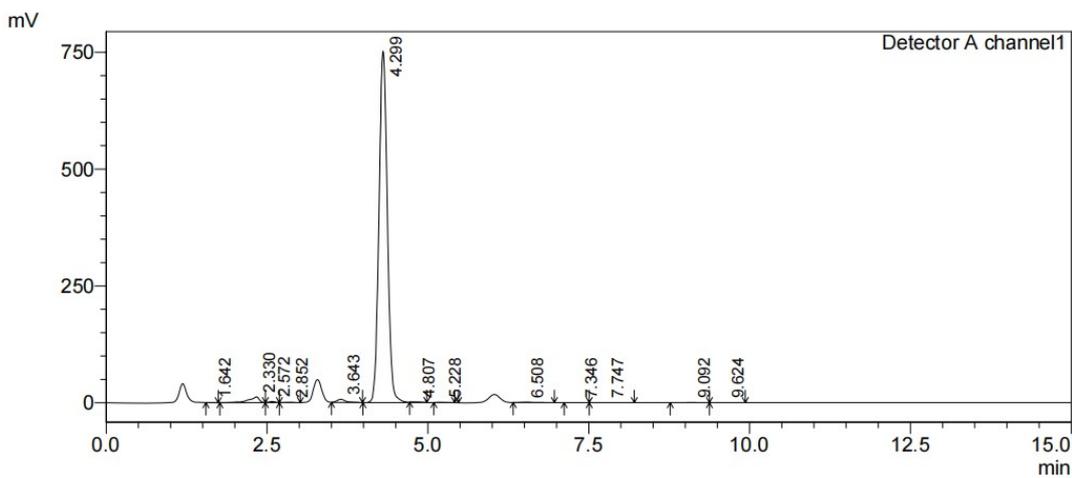


**Fig.100** HPLC for compound **ABP19**

Peak Results

| peak  | time (min) | Area     | height  | Area %  | height % |
|-------|------------|----------|---------|---------|----------|
| 1     | 1.142      | 61172    | 8183    | 0.382   | 0.466    |
| 2     | 1.638      | 3092     | 418     | 0.019   | 0.024    |
| 3     | 2.036      | 13206    | 639     | 0.082   | 0.036    |
| 4     | 2.367      | 1888     | 284     | 0.012   | 0.016    |
| 5     | 2.583      | 13552    | 761     | 0.085   | 0.043    |
| 6     | 3.146      | 9349     | 686     | 0.058   | 0.039    |
| 7     | 3.443      | 65731    | 5333    | 0.410   | 0.304    |
| 8     | 4.261      | 15614298 | 1727701 | 97.461  | 98.408   |
| 9     | 4.818      | 9548     | 974     | 0.060   | 0.056    |
| 10    | 5.231      | 2449     | 295     | 0.015   | 0.017    |
| 11    | 5.671      | 1338     | 124     | 0.008   | 0.007    |
| 12    | 5.978      | 12114    | 1033    | 0.076   | 0.059    |
| 13    | 6.201      | 2720     | 399     | 0.017   | 0.023    |
| 14    | 6.428      | 15267    | 736     | 0.095   | 0.042    |
| 15    | 7.451      | 114687   | 5235    | 0.716   | 0.298    |
| 16    | 8.367      | 21018    | 821     | 0.131   | 0.047    |
| 17    | 9.150      | 5546     | 232     | 0.035   | 0.013    |
| 18    | 9.533      | 5726     | 302     | 0.036   | 0.017    |
| 19    | 9.977      | 32072    | 823     | 0.200   | 0.047    |
| 20    | 10.874     | 5858     | 293     | 0.037   | 0.017    |
| 21    | 12.241     | 8295     | 292     | 0.052   | 0.017    |
| 22    | 13.244     | 2070     | 91      | 0.013   | 0.005    |
| total |            | 16020997 | 1755653 | 100.000 | 100.000  |

**Table 19** peak results of **ABP19**

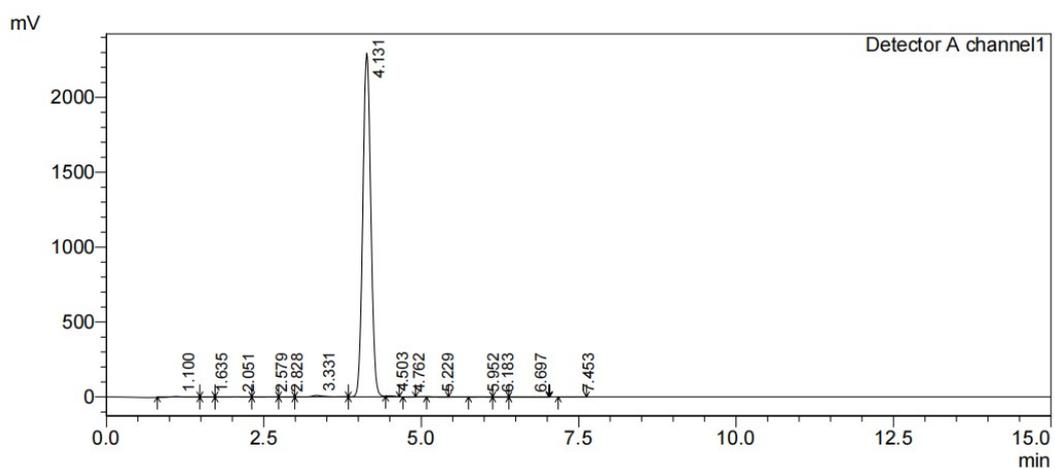


**Fig.101** HPLC for compound **ABP20**

Peak Results

| peak  | time (min) | Area    | height | Area %  | height % |
|-------|------------|---------|--------|---------|----------|
| 1     | 1.642      | 2429    | 659    | 0.034   | 0.085    |
| 2     | 2.330      | 143742  | 12588  | 2.027   | 1.620    |
| 3     | 2.572      | 15995   | 2418   | 0.226   | 0.311    |
| 4     | 2.852      | 8144    | 705    | 0.115   | 0.091    |
| 5     | 3.643      | 61534   | 6618   | 0.868   | 0.852    |
| 6     | 4.299      | 6832785 | 751973 | 96.350  | 96.768   |
| 7     | 4.807      | 3874    | 515    | 0.055   | 0.066    |
| 8     | 5.228      | 4348    | 519    | 0.061   | 0.067    |
| 9     | 6.508      | 8771    | 543    | 0.124   | 0.070    |
| 10    | 7.346      | 1724    | 113    | 0.024   | 0.015    |
| 11    | 7.747      | 2669    | 108    | 0.038   | 0.014    |
| 12    | 9.092      | 4170    | 251    | 0.059   | 0.032    |
| 13    | 9.624      | 1479    | 77     | 0.021   | 0.010    |
| total |            | 7091664 | 777087 | 100.000 | 100.000  |

**Table 20** peak results of **ABP20**



**Figure.102** HPLC for compound **ABP21**

Peak Results

| peak  | time (min) | Area     | height  | Area %  | height % |
|-------|------------|----------|---------|---------|----------|
| 1     | 1.100      | 28993    | 3328    | 0.140   | 0.144    |
| 2     | 1.635      | 2595     | 312     | 0.013   | 0.013    |
| 3     | 2.051      | 14284    | 726     | 0.069   | 0.031    |
| 4     | 2.579      | 11374    | 755     | 0.055   | 0.033    |
| 5     | 2.828      | 5764     | 437     | 0.028   | 0.019    |
| 6     | 3.331      | 152802   | 10526   | 0.736   | 0.455    |
| 7     | 4.131      | 20503964 | 2295493 | 98.797  | 99.122   |
| 8     | 4.503      | 15958    | 2482    | 0.077   | 0.107    |
| 9     | 4.762      | 1113     | 170     | 0.005   | 0.007    |
| 10    | 5.229      | 3642     | 426     | 0.018   | 0.018    |
| 11    | 5.952      | 8131     | 789     | 0.039   | 0.034    |
| 12    | 6.183      | 1009     | 109     | 0.005   | 0.005    |
| 13    | 6.697      | 3009     | 213     | 0.014   | 0.009    |
| 14    | 7.453      | 1066     | 68      | 0.005   | 0.003    |
| total |            | 20753705 | 2315834 | 100.000 | 100.000  |

**Table 21** peak results of **ABP21**