

## Supplementary information

# N-Heterocyclic Carbene Catalyzed Conjugate Umpolung Reactions Leading to Coumarin Derivatives

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People's Republic of China.

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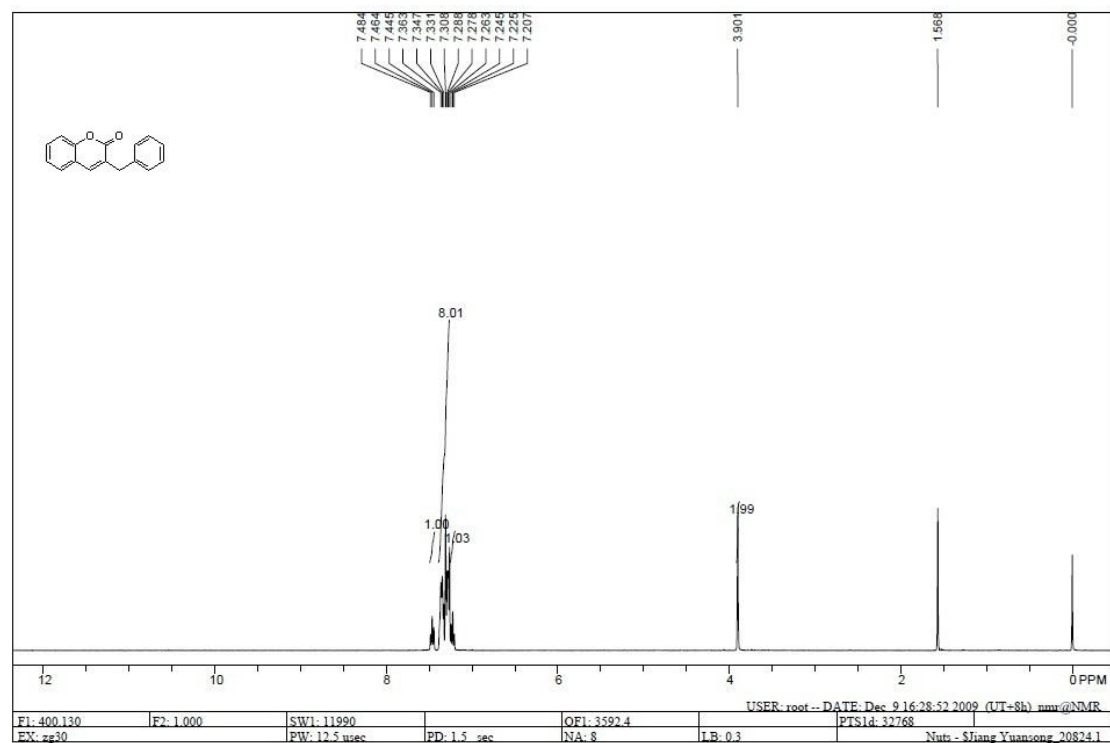
Page S25:  $^1\text{H}$  NMR and  $^{13}\text{C}$  NMR spectra of compound **7d**

Page S26:  $^1\text{H}$  NMR and  $^{13}\text{C}$  NMR spectra of compound **7e**

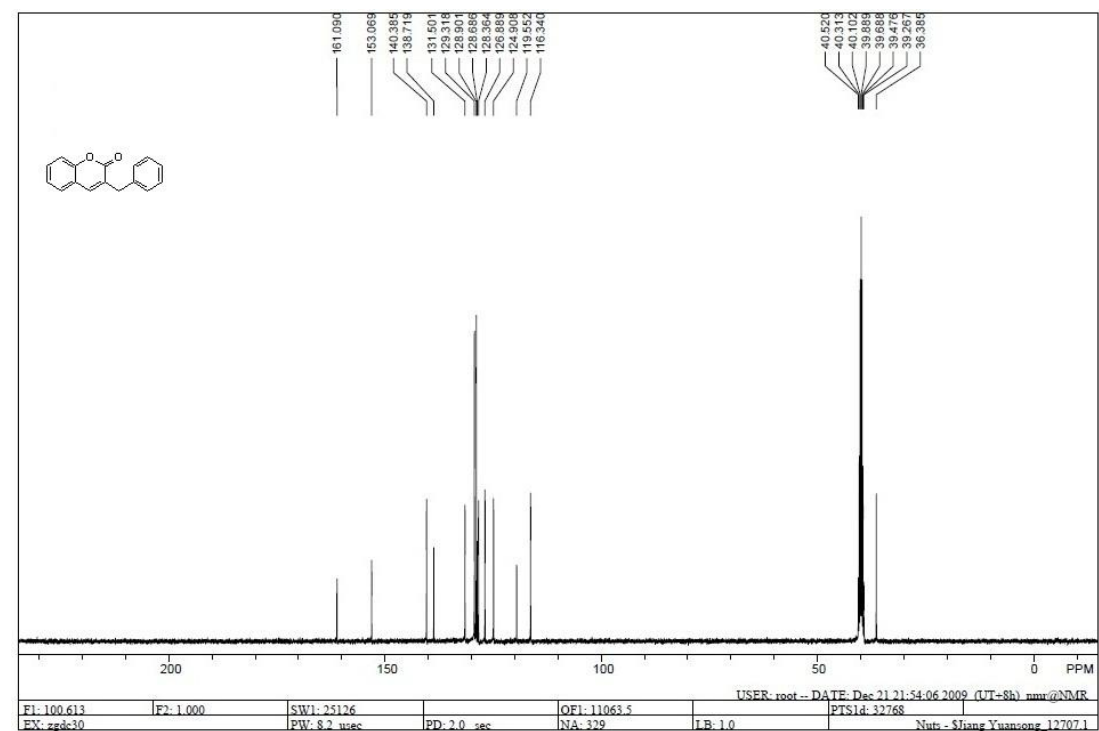
Page S27:  $^1\text{H}$  NMR and  $^{13}\text{C}$  NMR spectra of compound **7f**

### 3-Benzyl-2H-chromen-2-one (4a)

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )

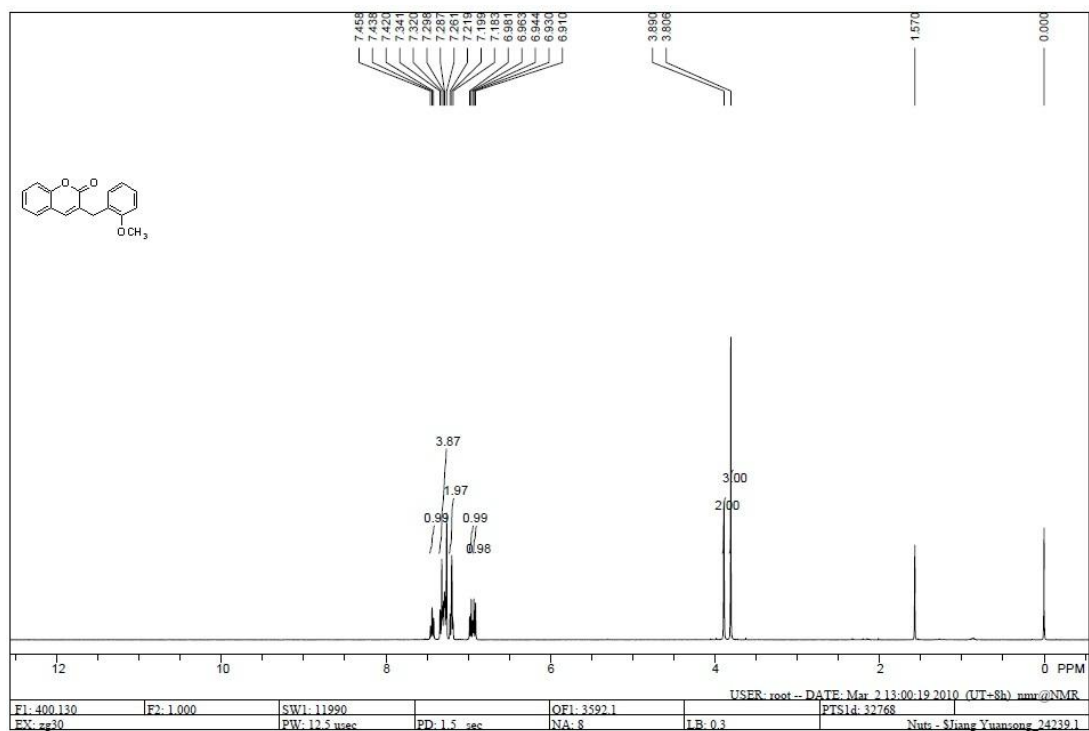


$^{13}\text{C}$  NMR (100 MHz,  $\text{DMSO}-d_6$ )

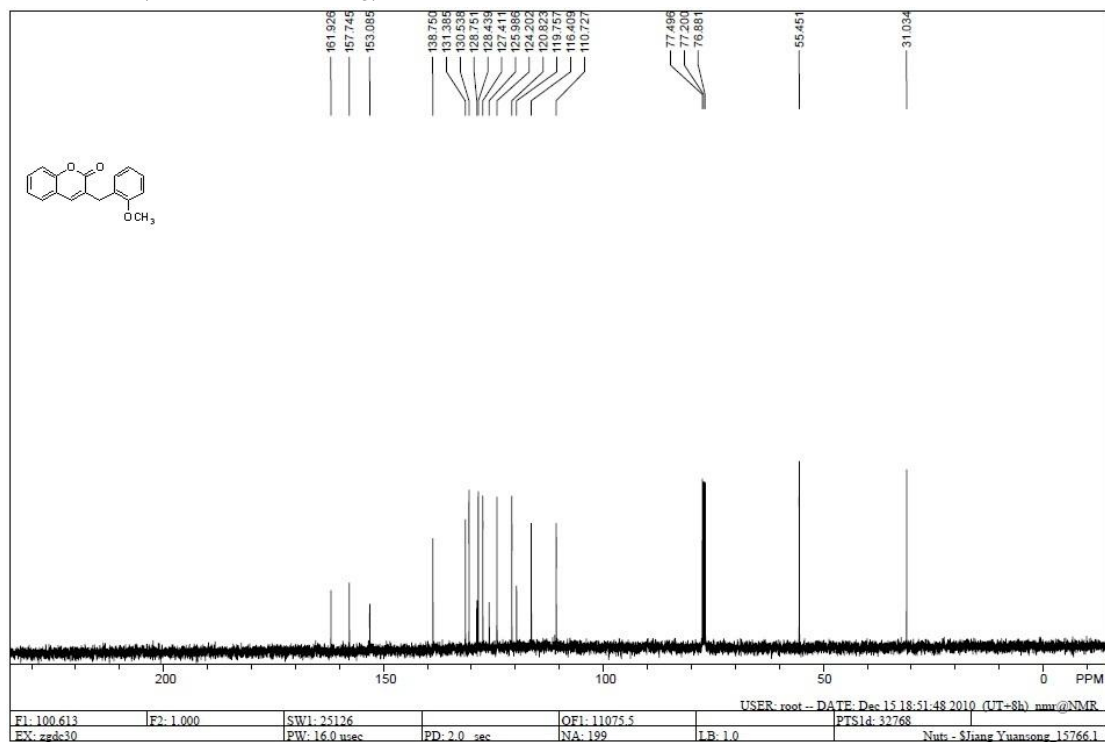


### 3-(2-Methoxybenzyl)-2H-chromen-2-one (4b)

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)

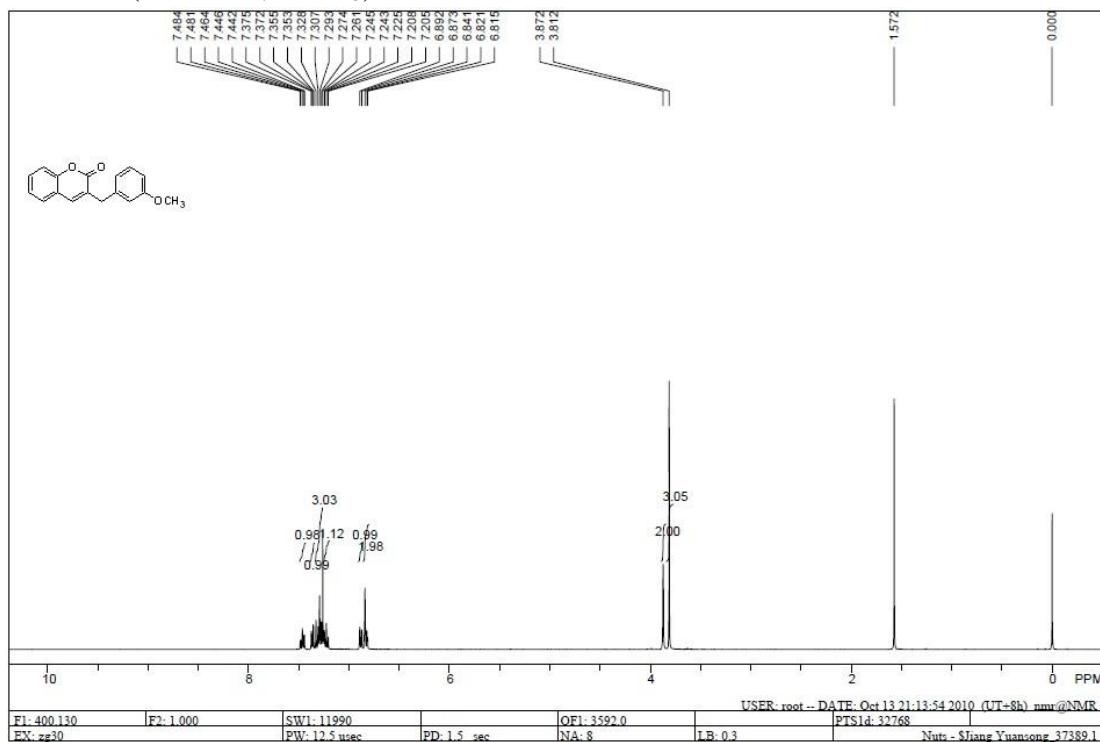


<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)

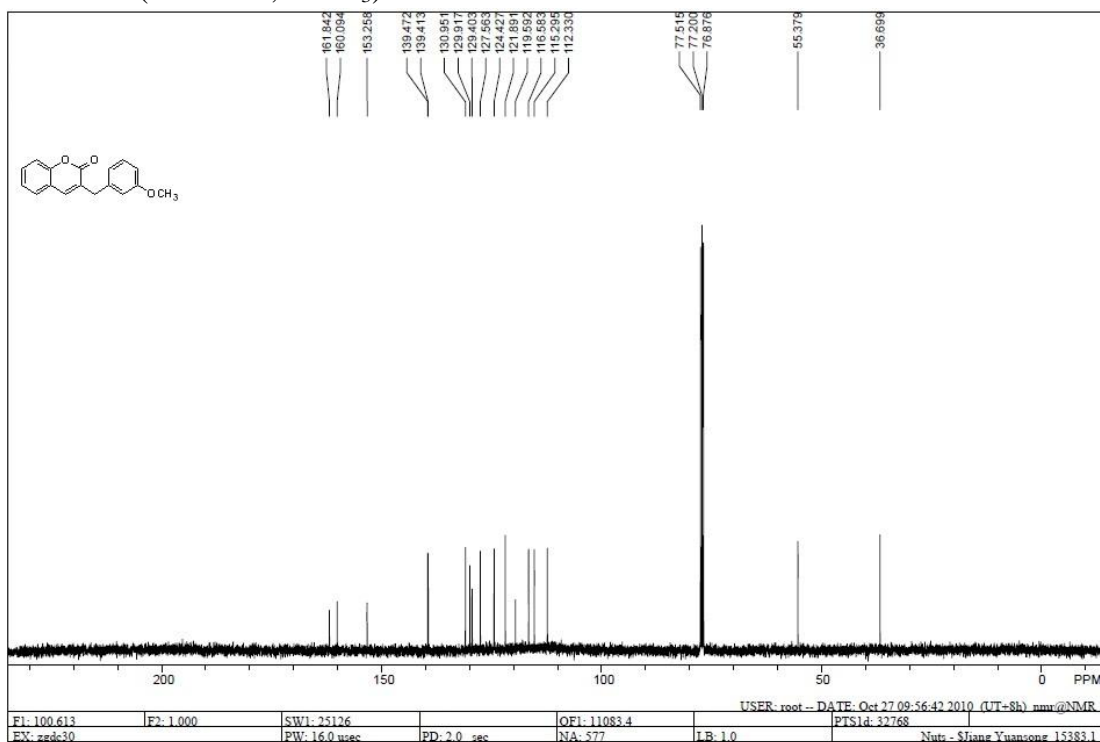


### 3-(3-Methoxybenzyl)-2H-chromen-2-one (4c)

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)

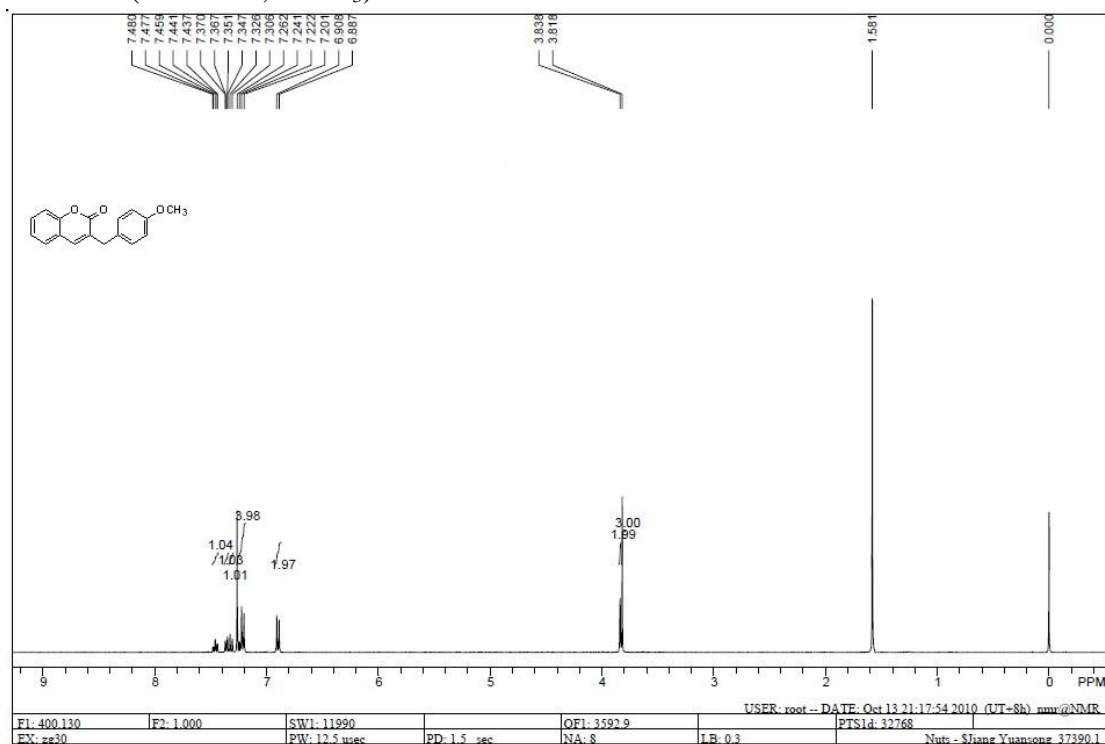


<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)

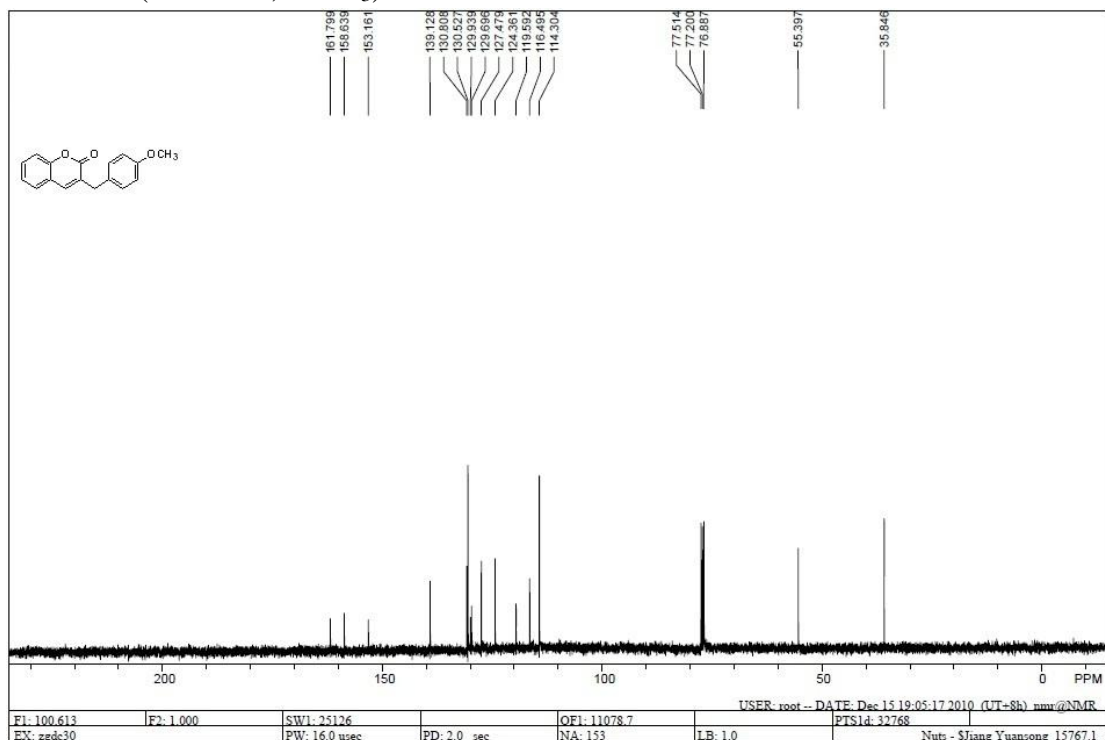


### 3-(4-Methoxybenzyl)-2H-chromen-2-one (4d)

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)

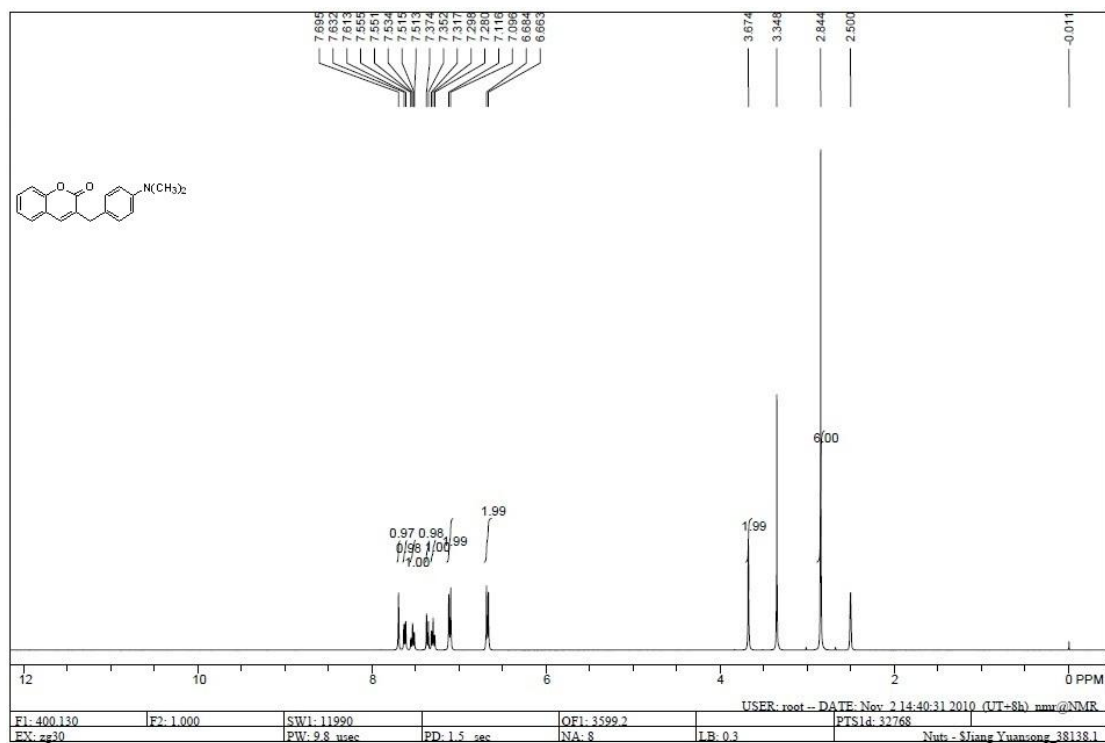


<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)

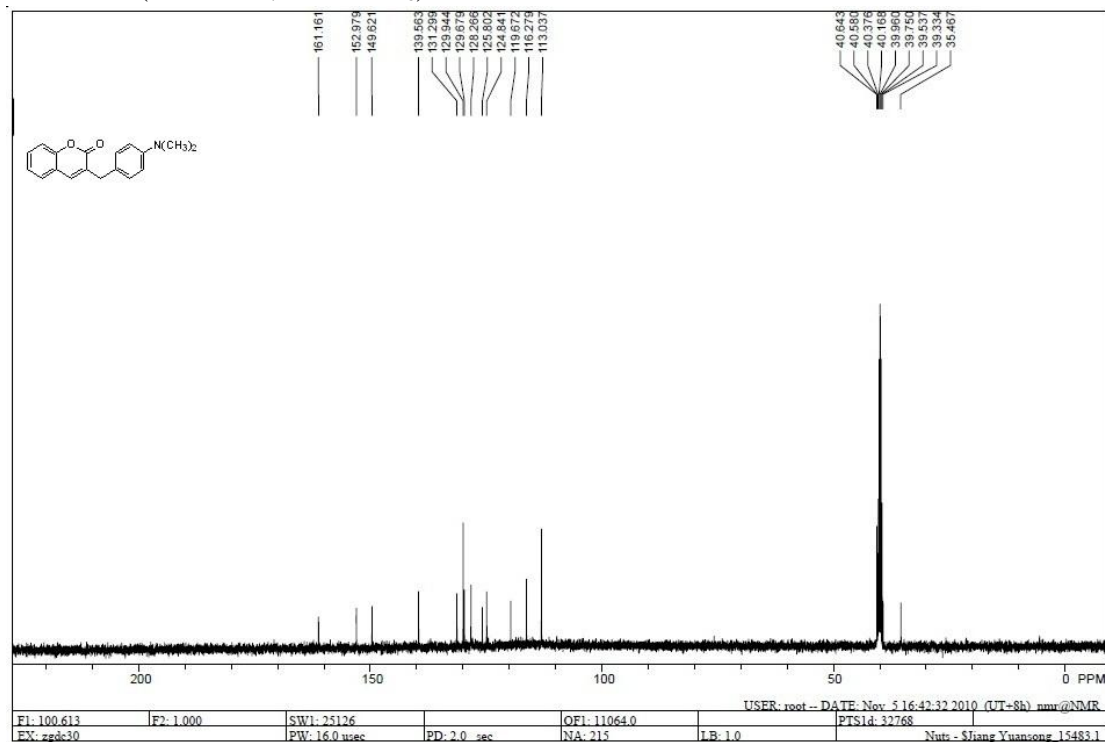


### 3-(4-(Dimethylamino)benzyl)-2H-chromen-2-one (4e)

<sup>1</sup>H NMR (400 MHz, DMSO-*d*<sub>6</sub>)

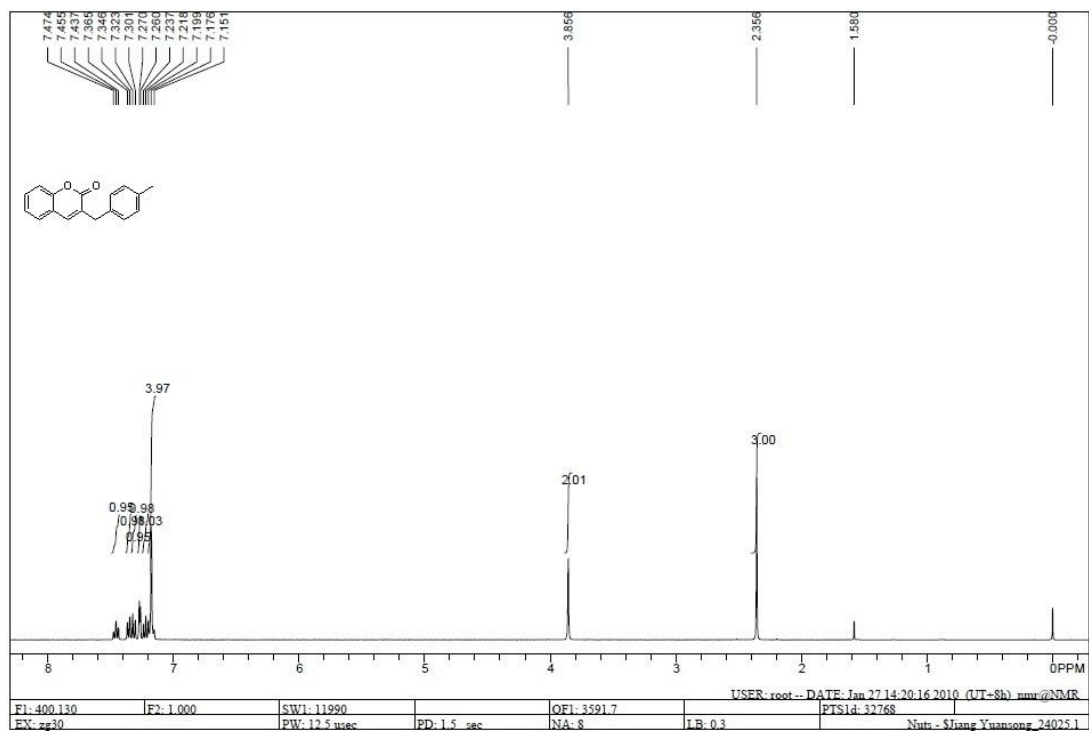


<sup>13</sup>C NMR (100 MHz, DMSO-*d*<sub>6</sub>)

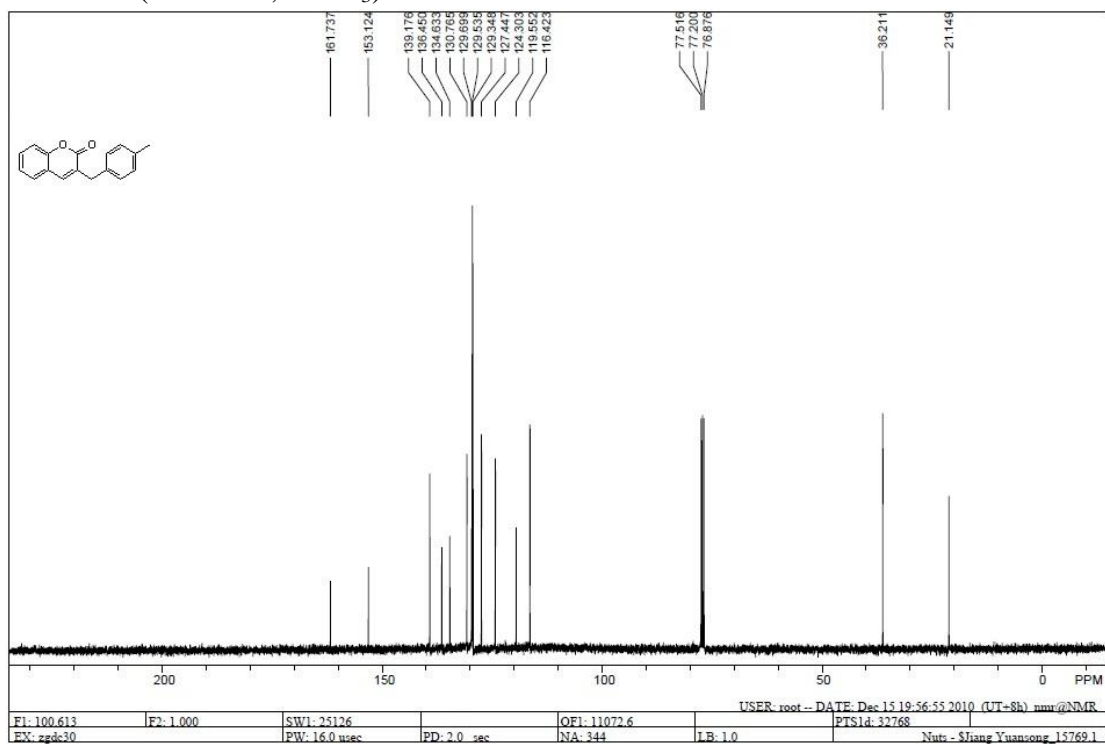


### 3-(4-Methylbenzyl)-2H-chromen-2-one (4f)

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)



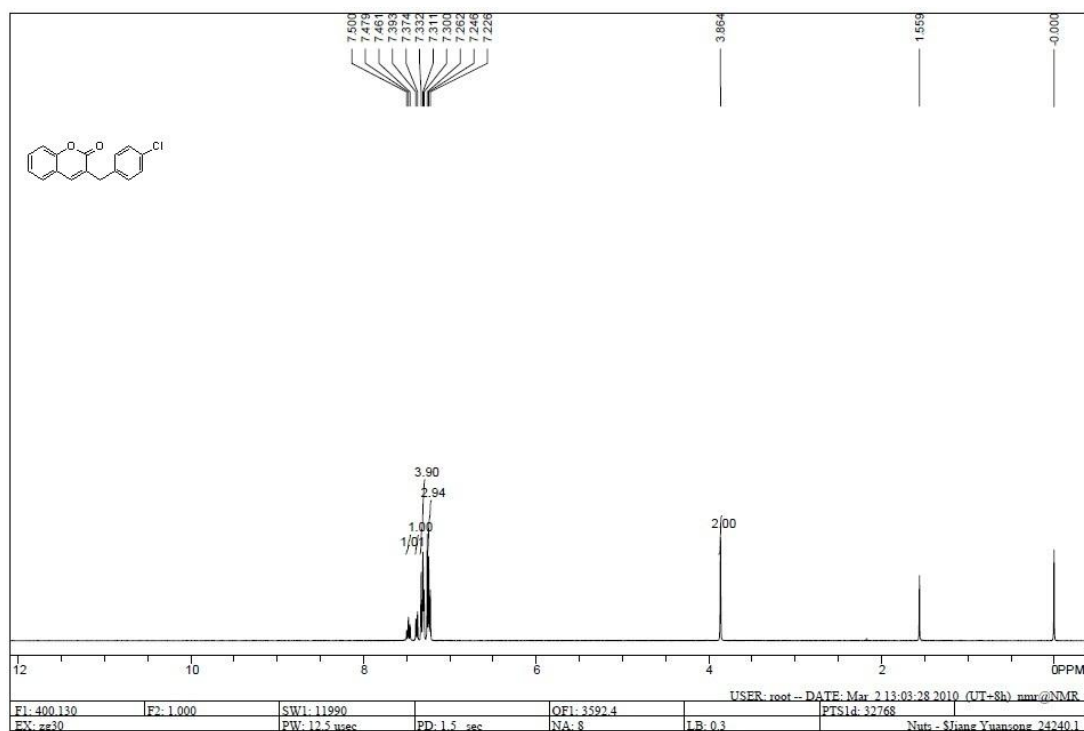
<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)



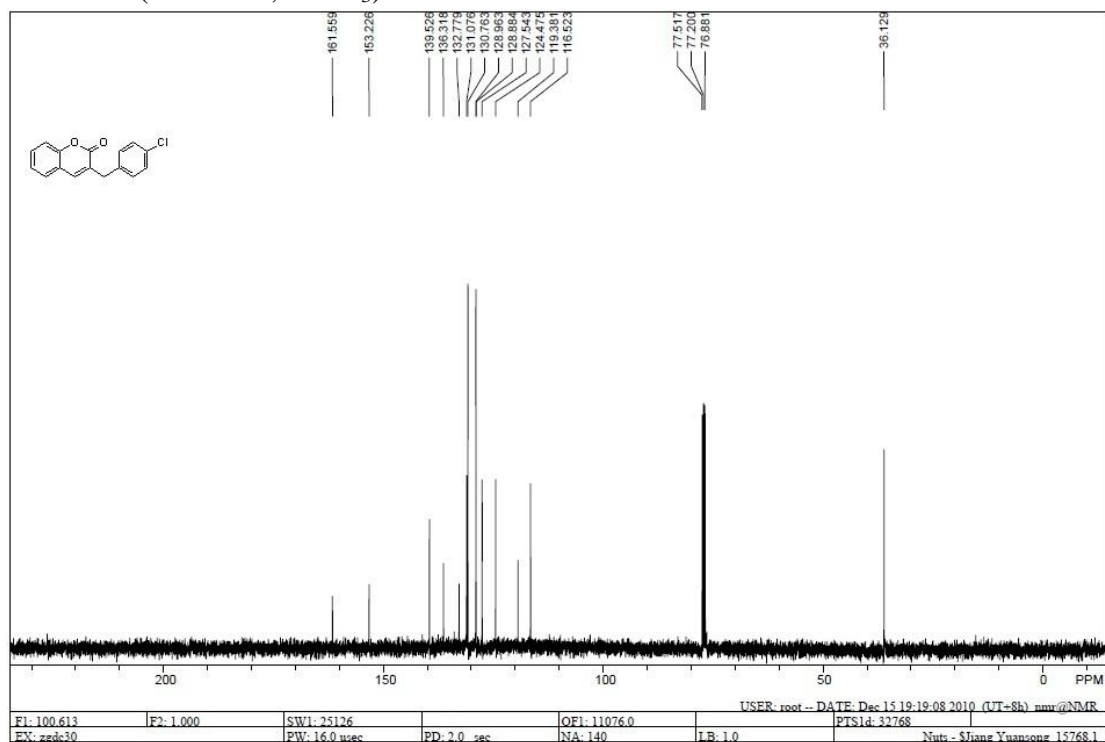


### 3-(4-Chlorobenzyl)-2H-chromen-2-one (4g)

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )

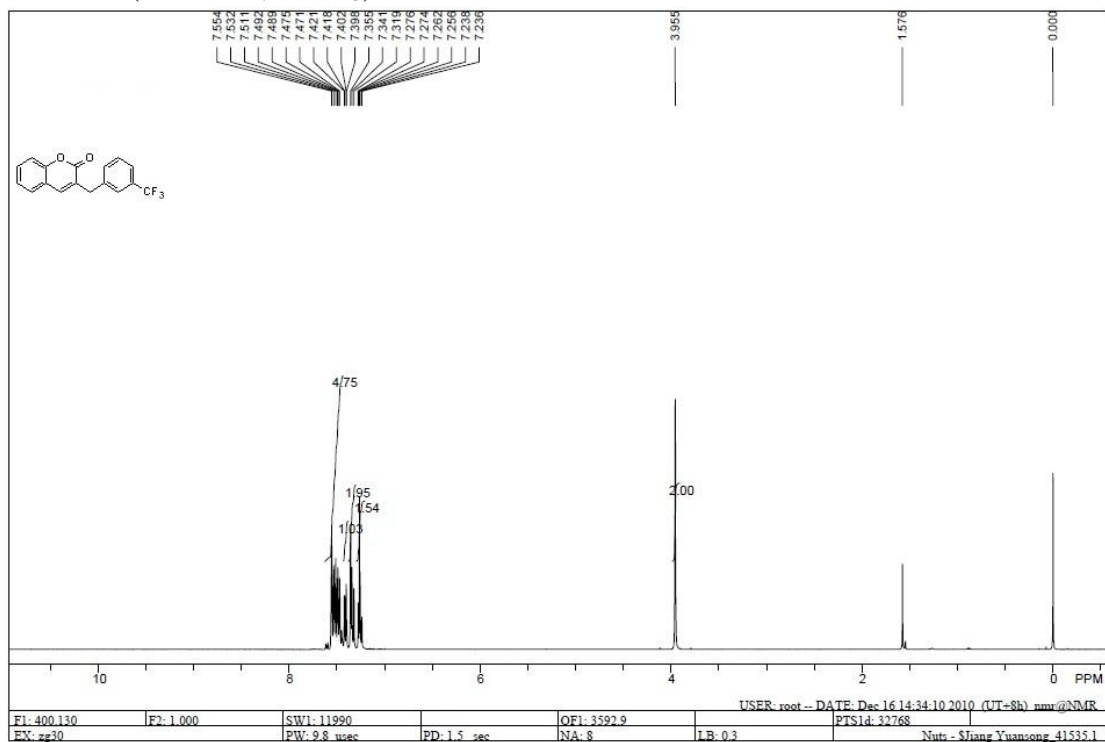


$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )

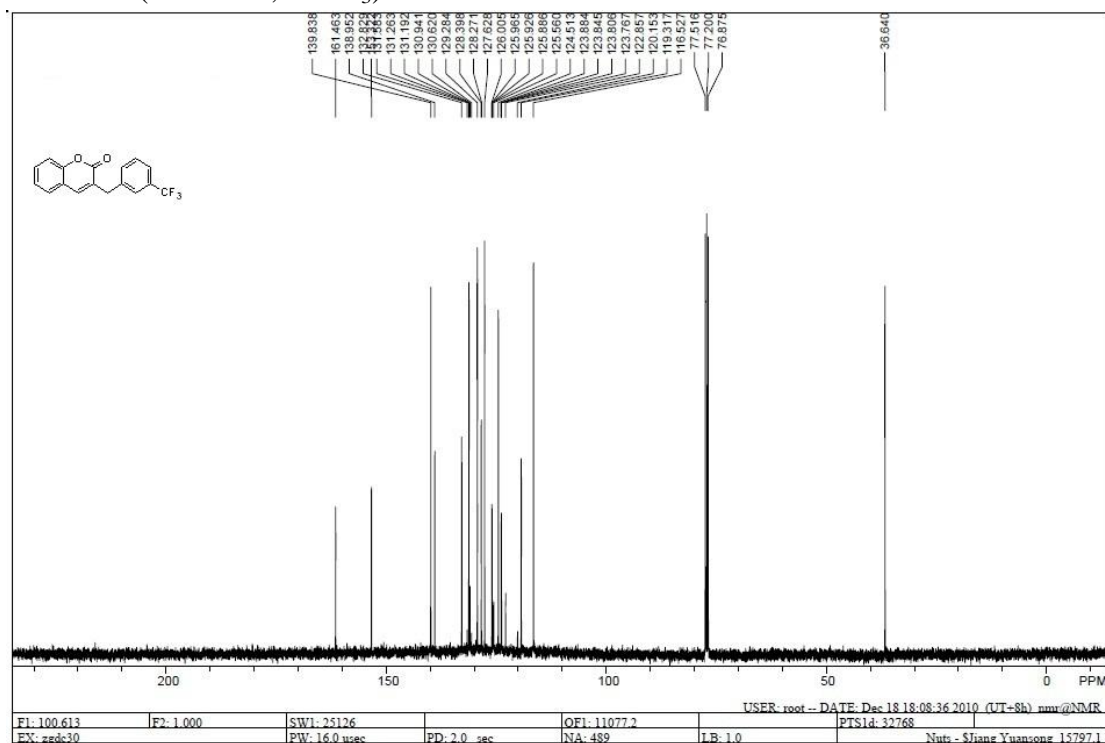


### 3-(4-(Trifluoromethyl)benzyl)-2H-chromen-2-one (4h)

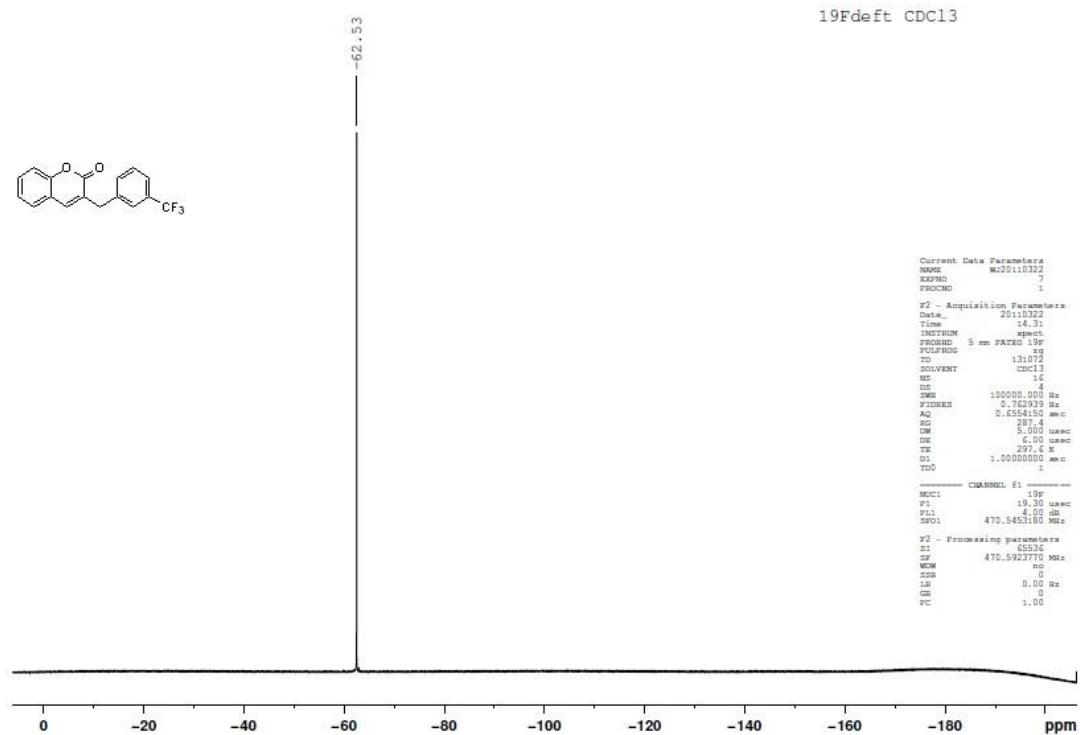
<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)



<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)

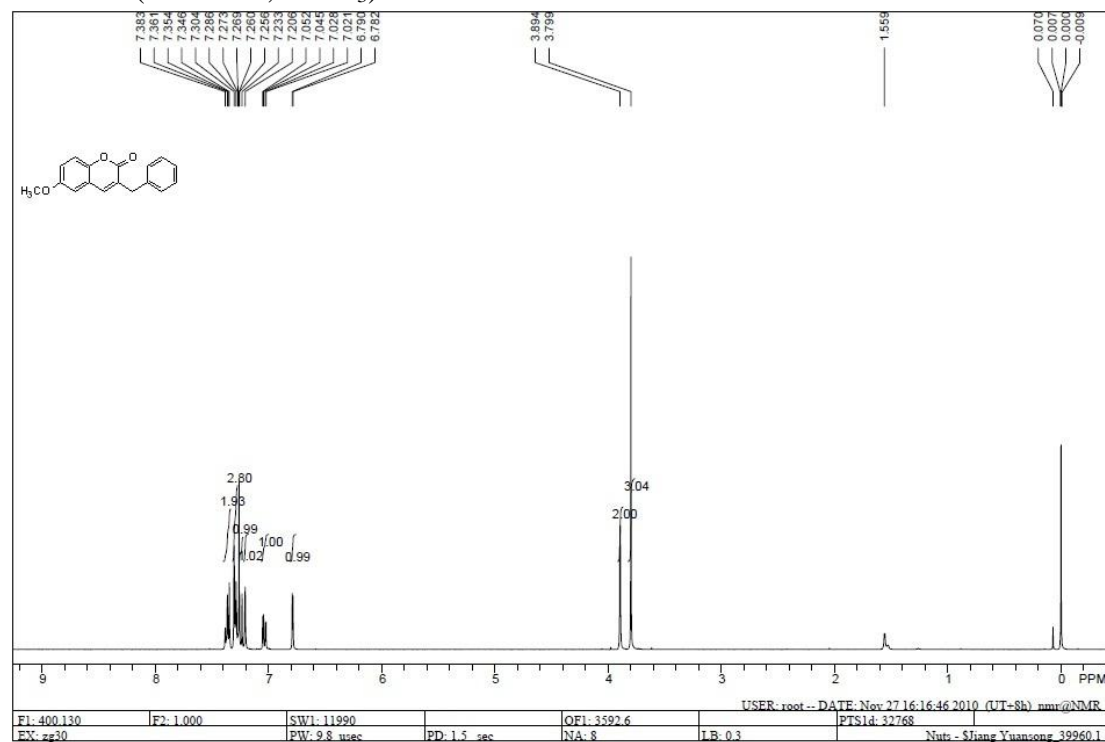


<sup>19</sup>F NMR (470 MHz, CDCl<sub>3</sub>)

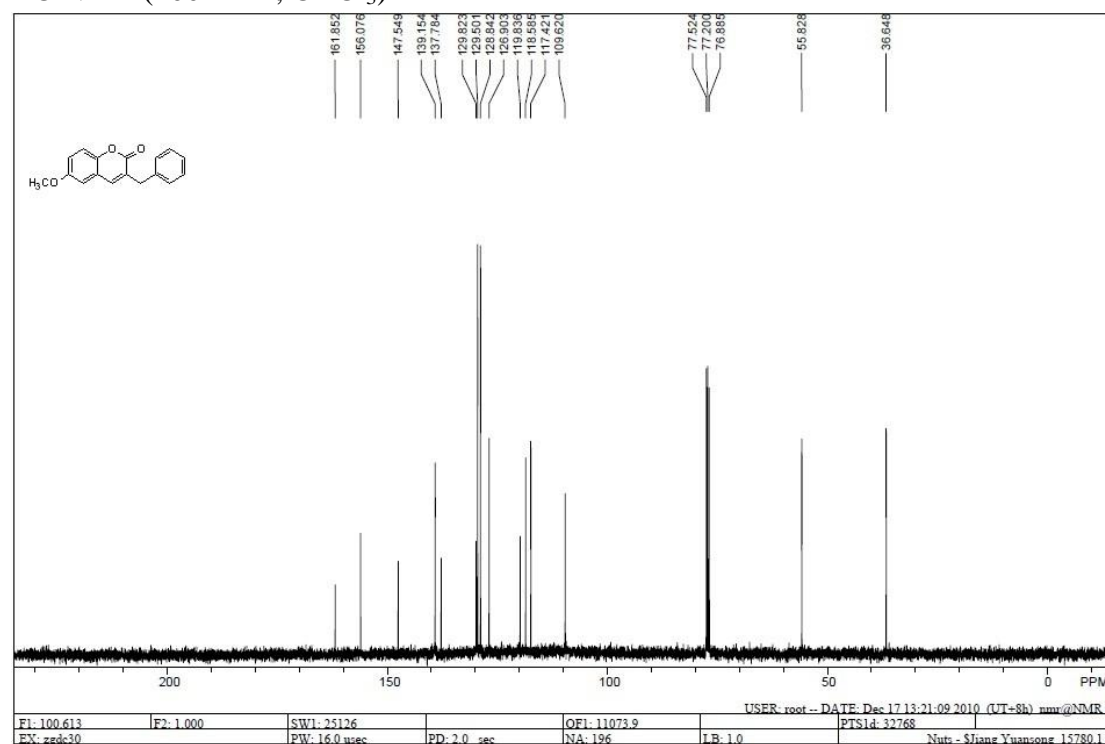


### 3-Benzyl-6-methoxy-2H-chromen-2-one (4i)

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )

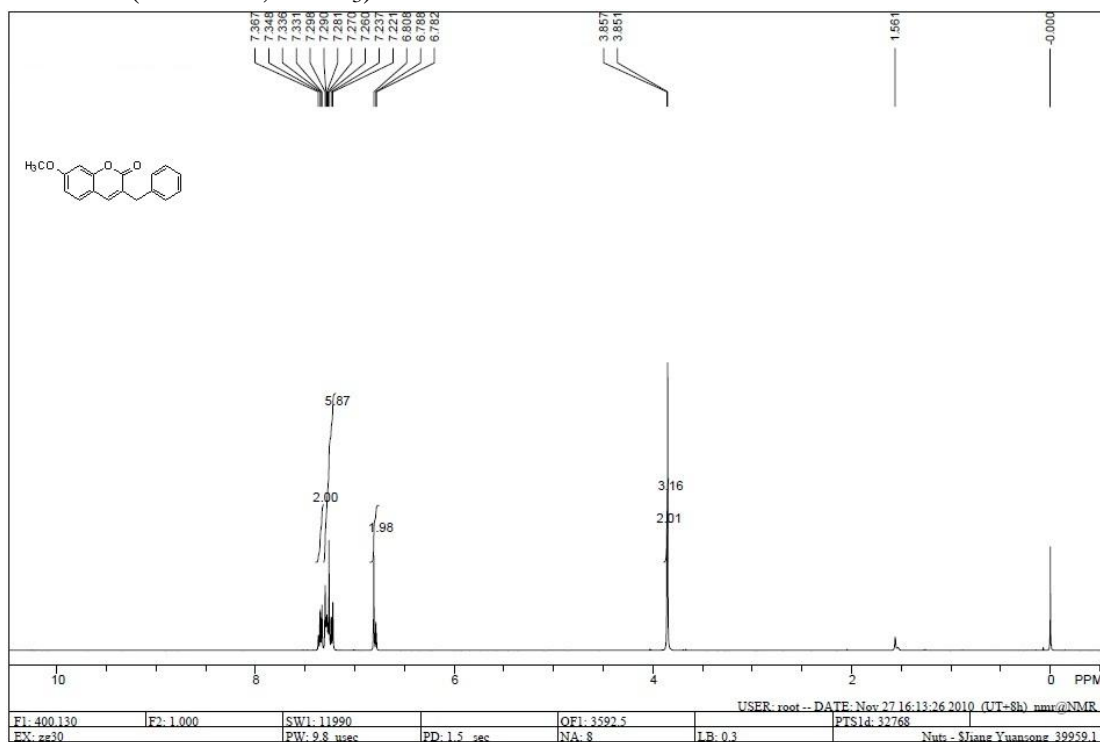


$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )

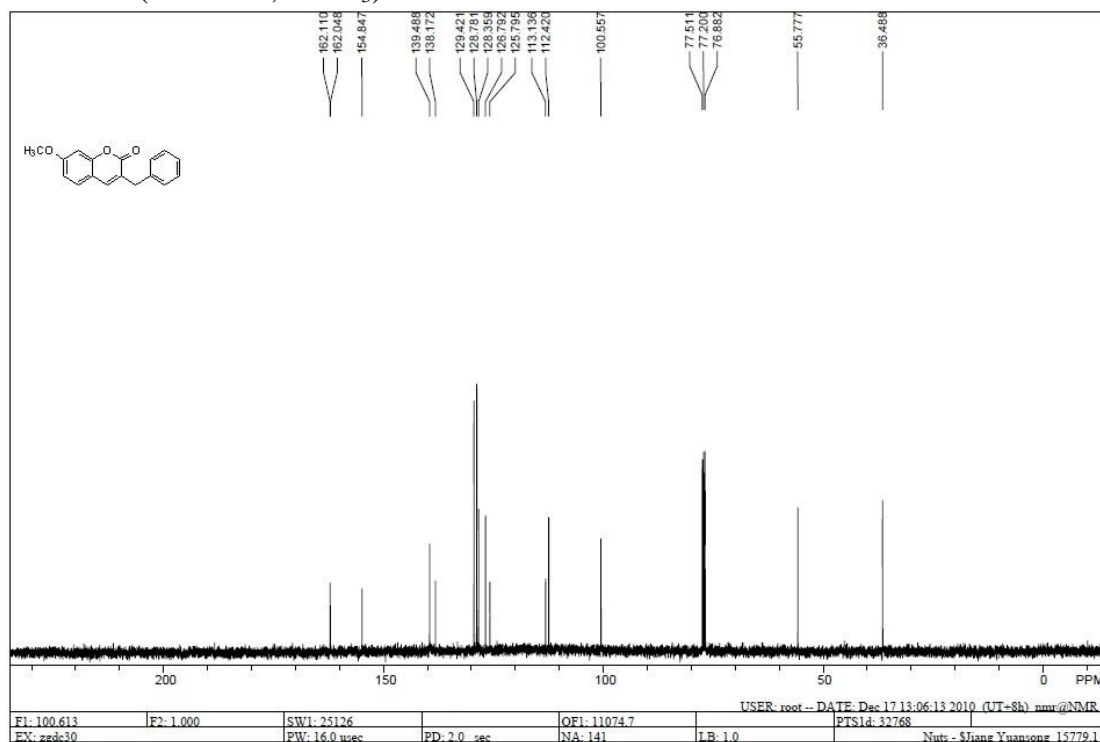


### 3-Benzyl-7-methoxy-2H-chromen-2-one (4j)

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )

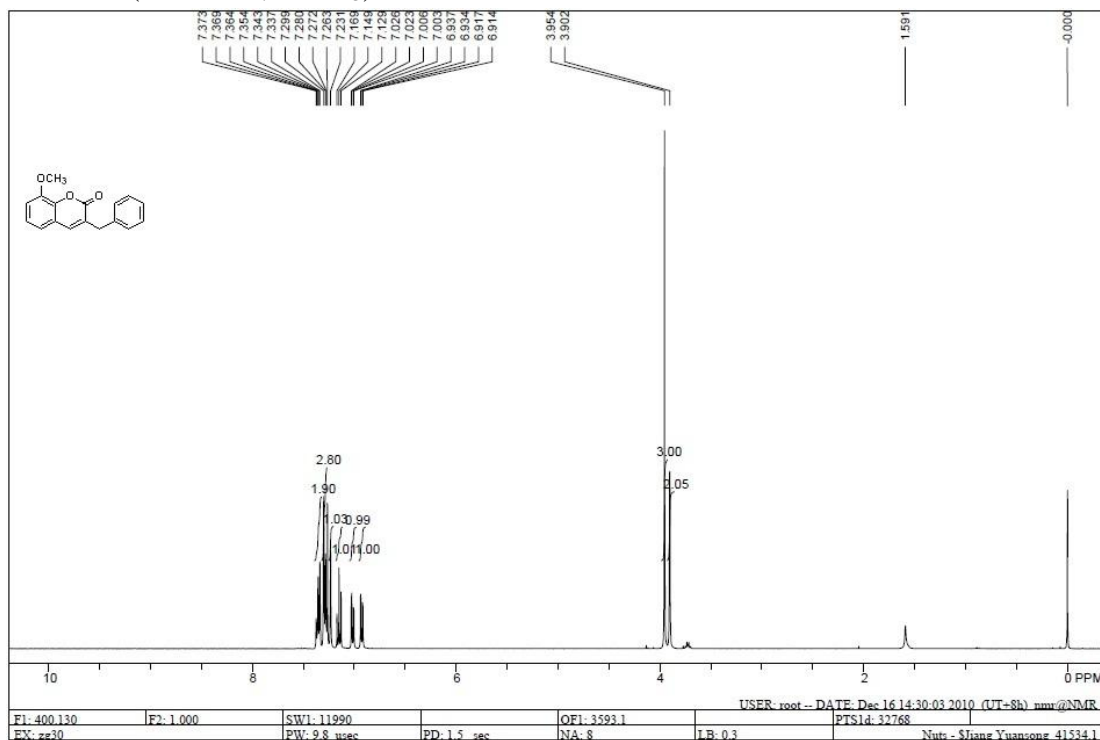


$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )

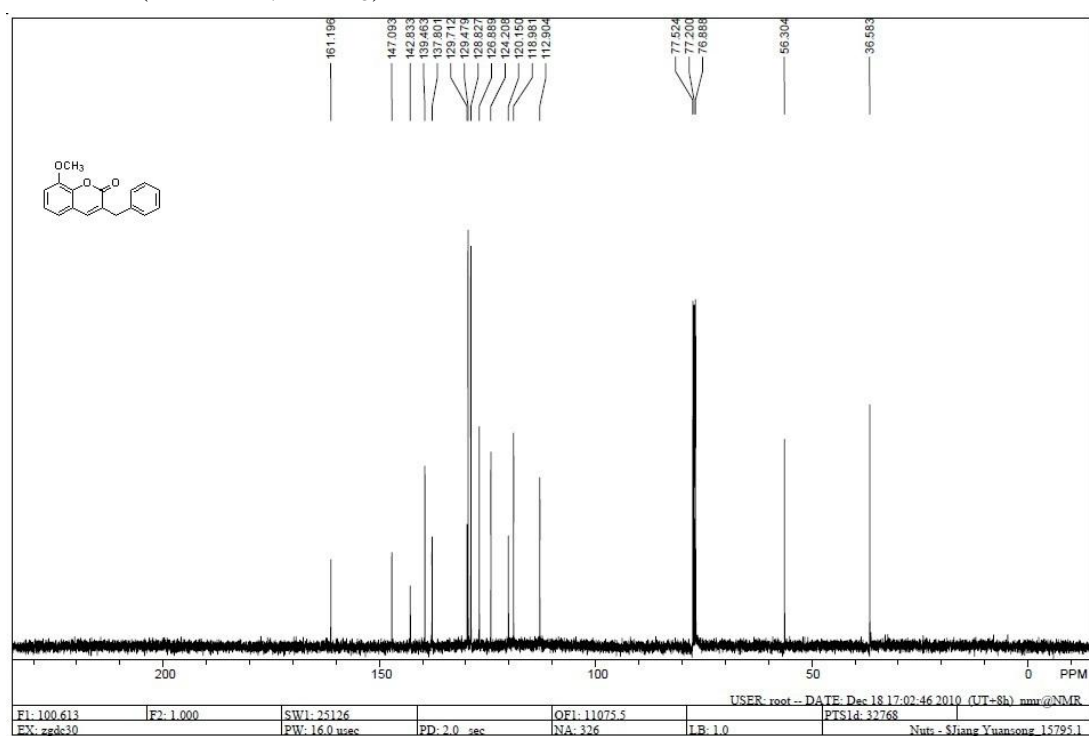


### 3-Benzyl-8-methoxy-2H-chromen-2-one (4k)

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )

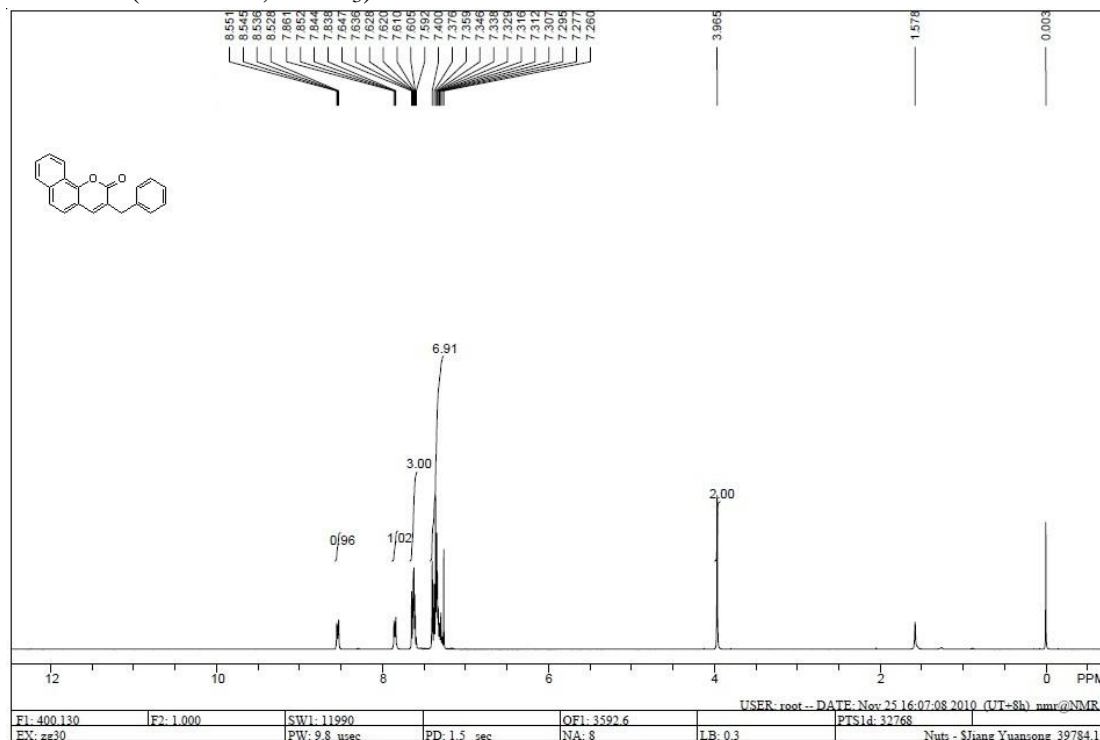


$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )

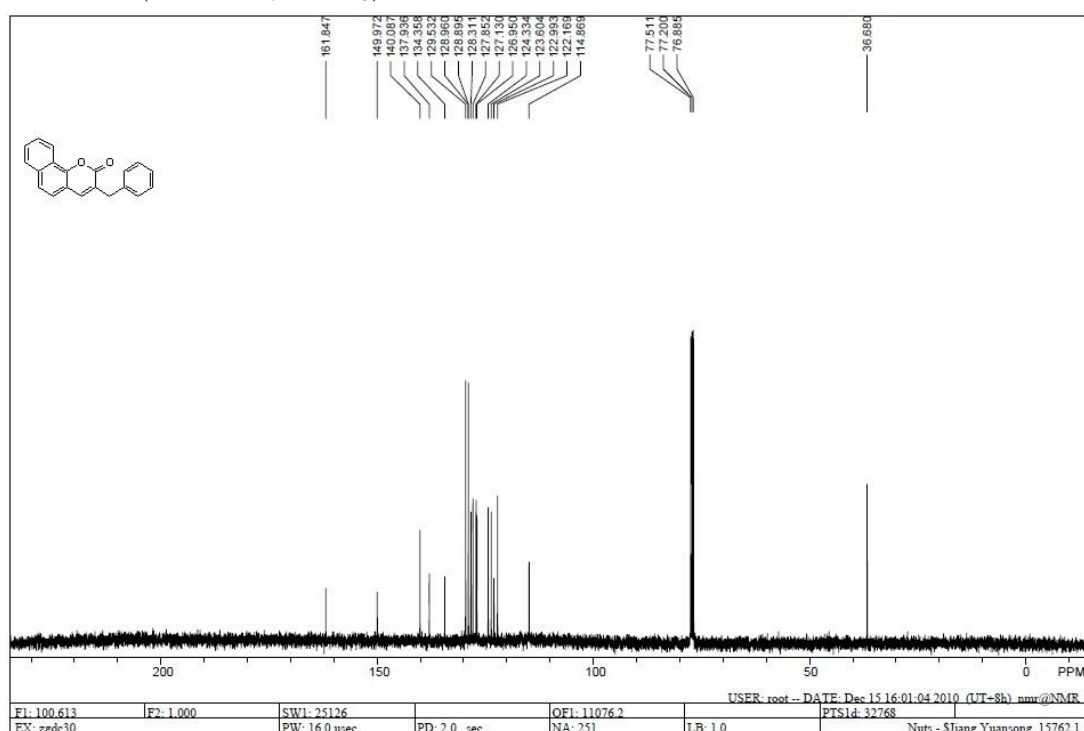


### 3-Benzyl-2H-benzo[h]chromen-2-one (4l)

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)

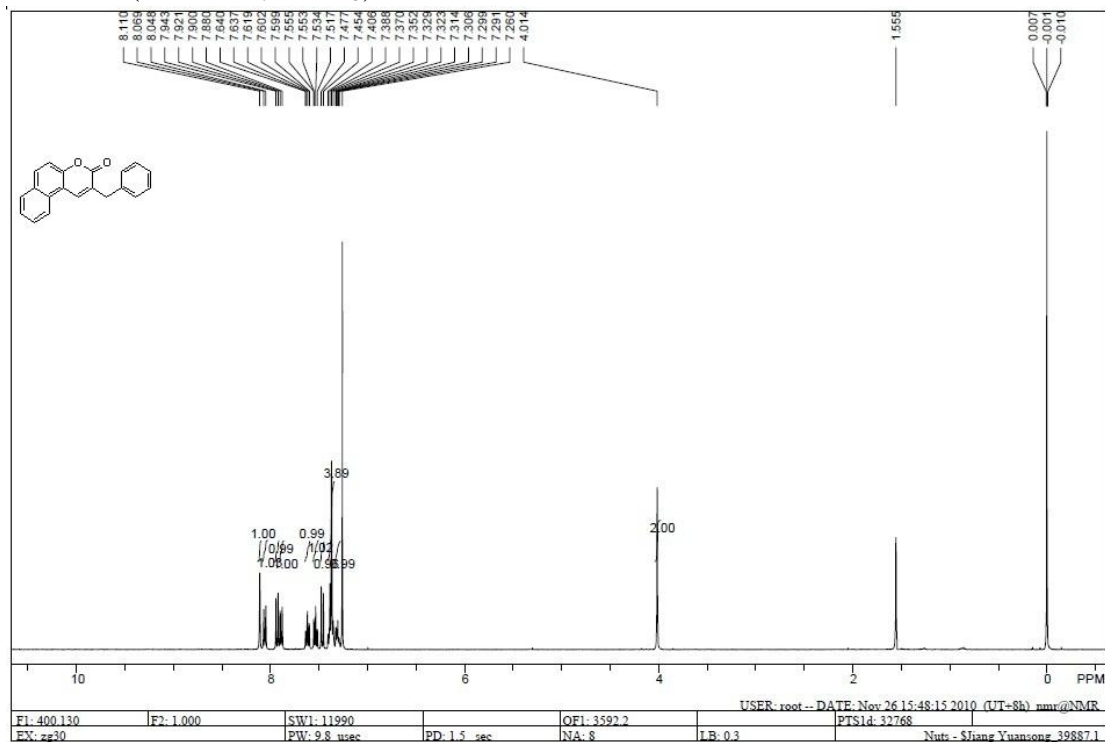


<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)

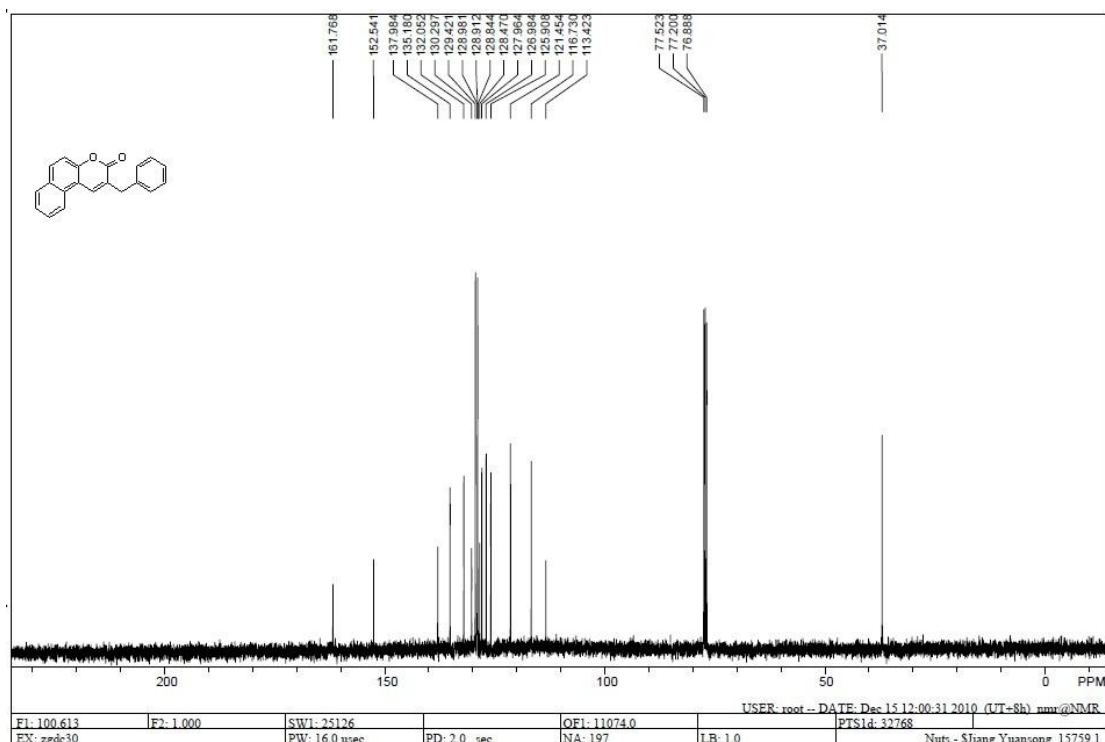


## 2-Benzyl-3*H*-benzo[*f*]chromen-3-one (4m)

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)



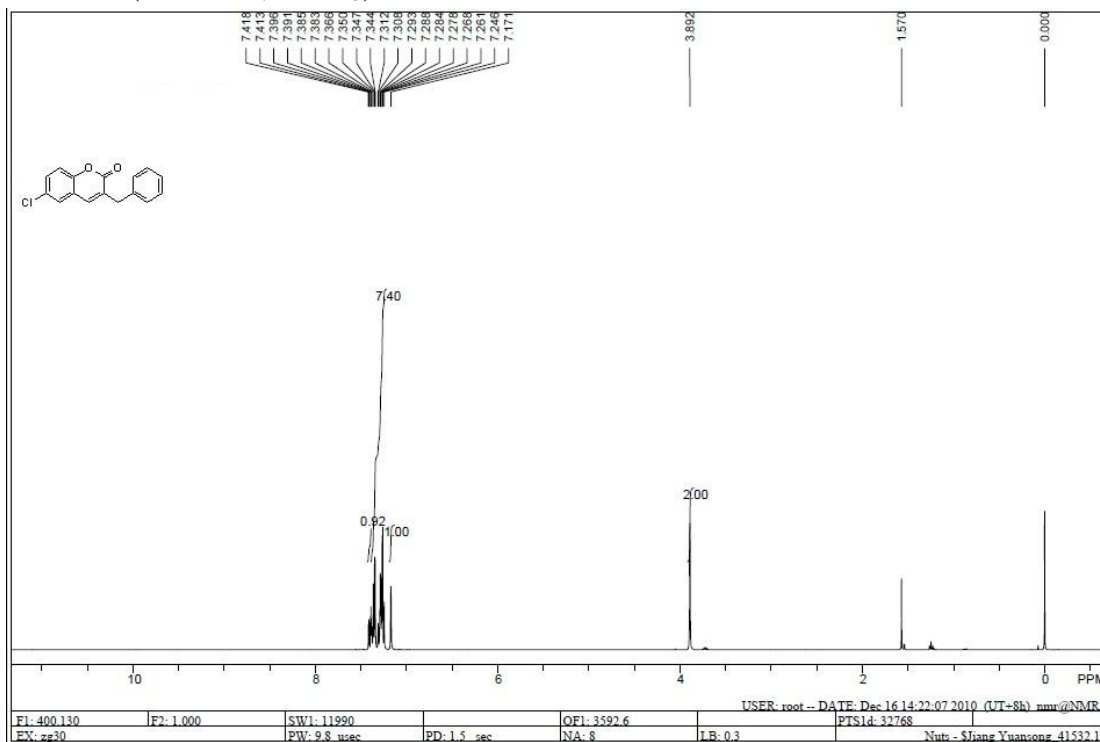
<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)



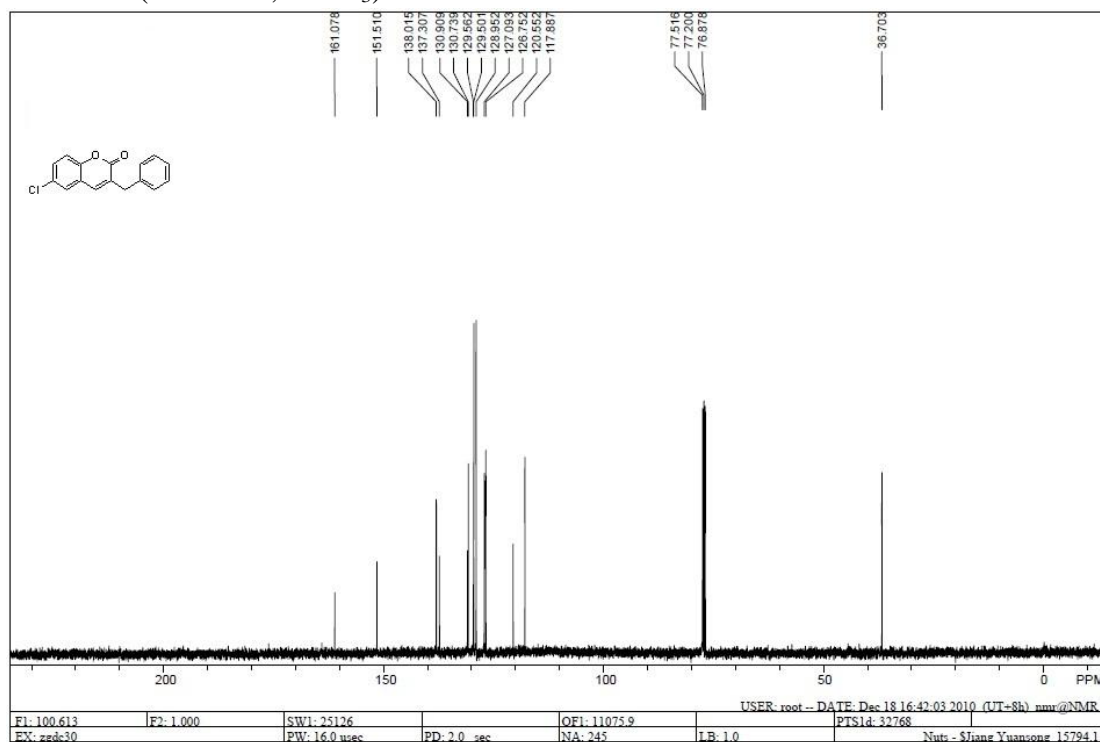


### 3-Benzyl-6-chloro-2H-chromen-2-one (4n)

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)

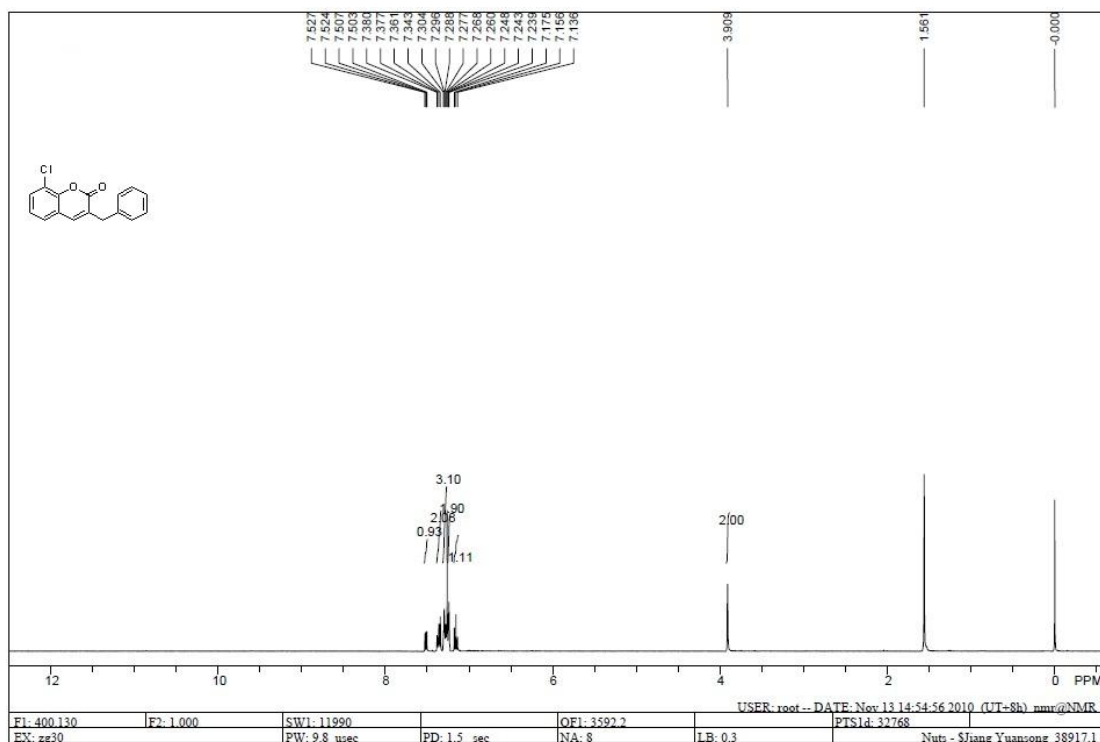


<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)

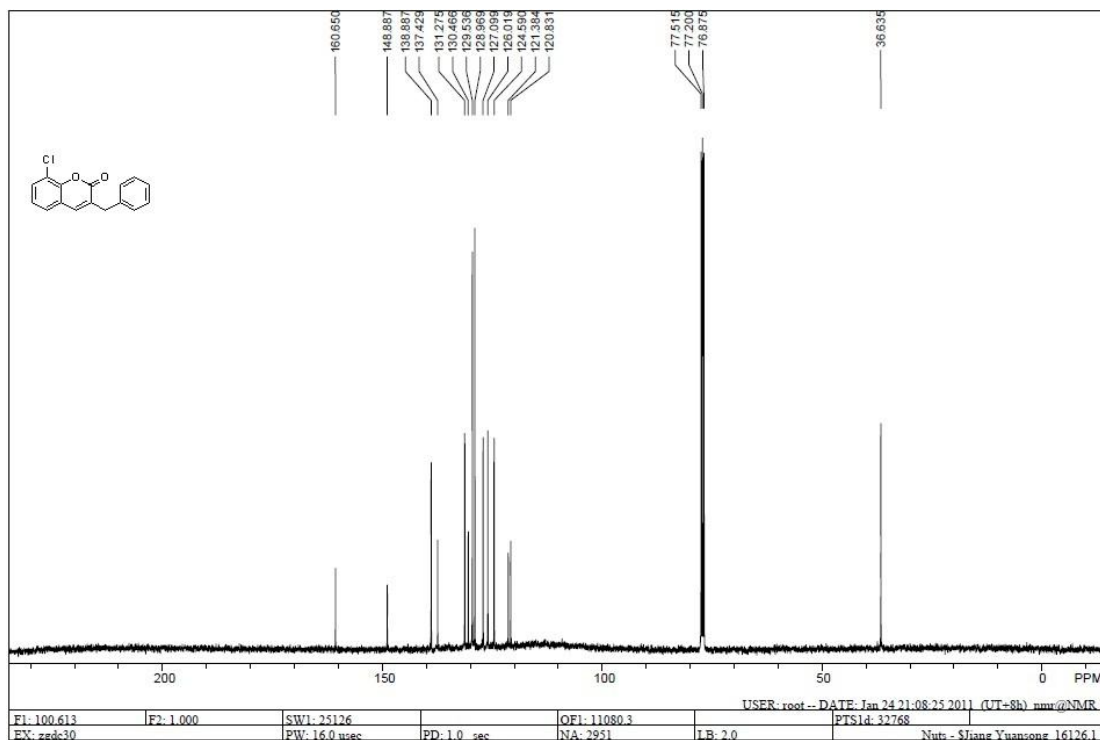


### 3-Benzyl-8-chloro-2H-chromen-2-one (4o)

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)

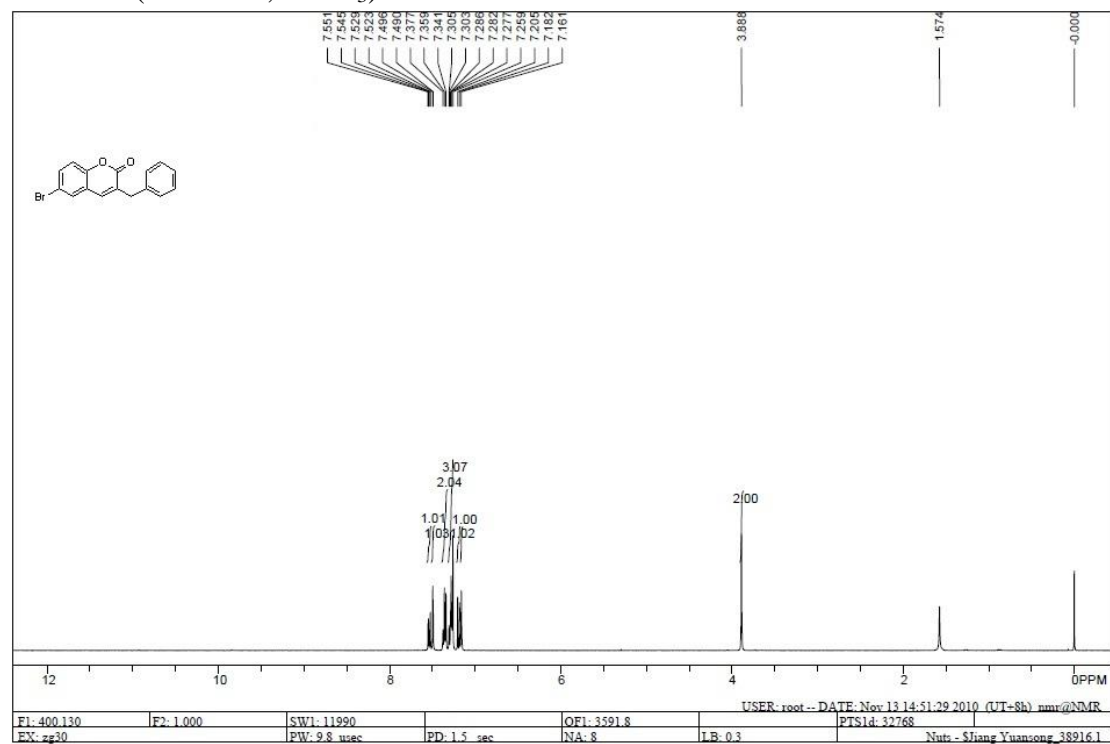


<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)

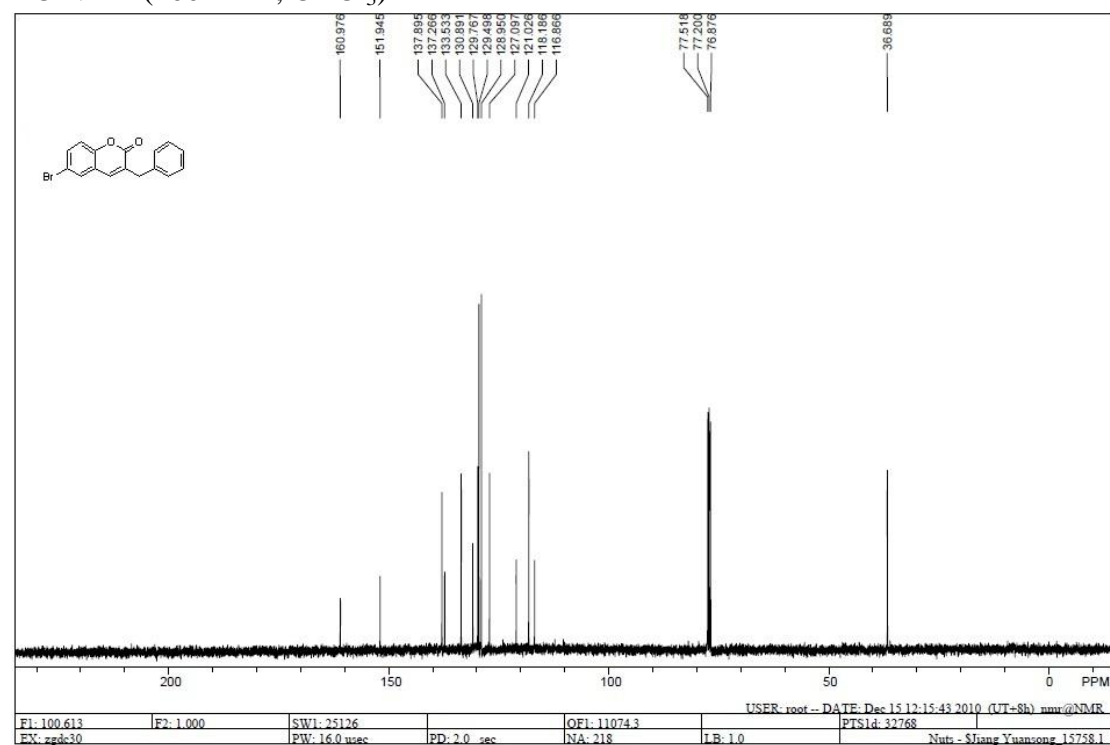


### 3-Benzyl-6-bromo-2H-chromen-2-one (4p)

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)

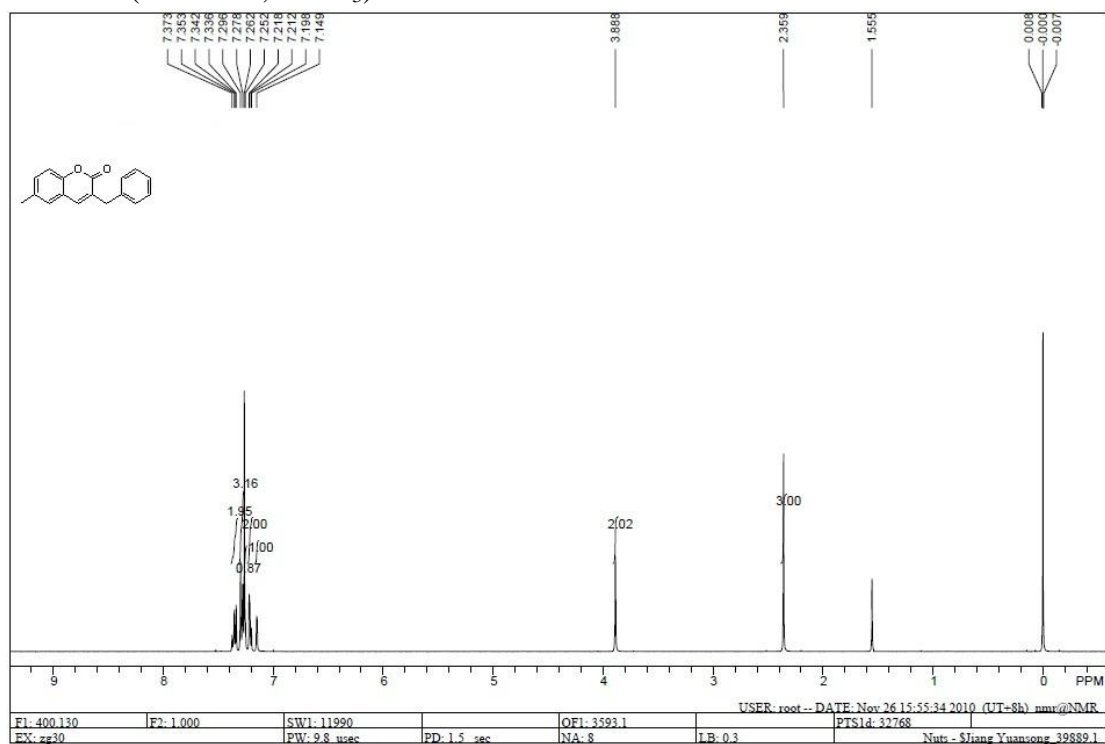


<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)

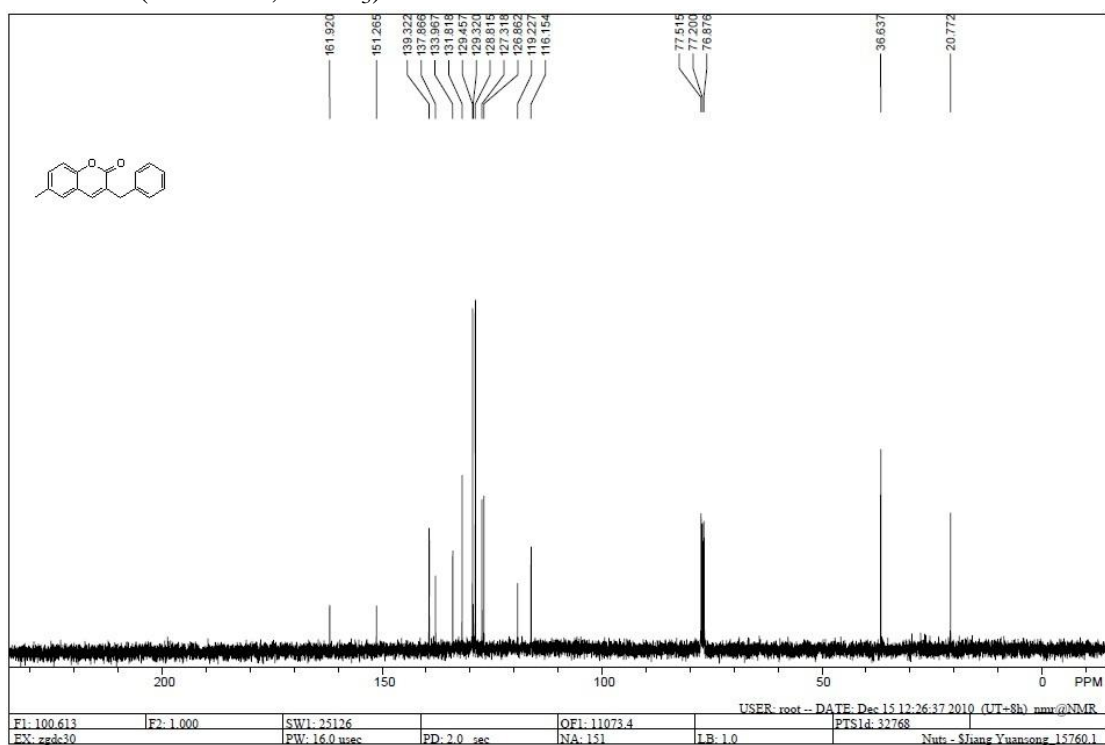


### 3-Benzyl-6-methyl-2H-chromen-2-one (4q)

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)

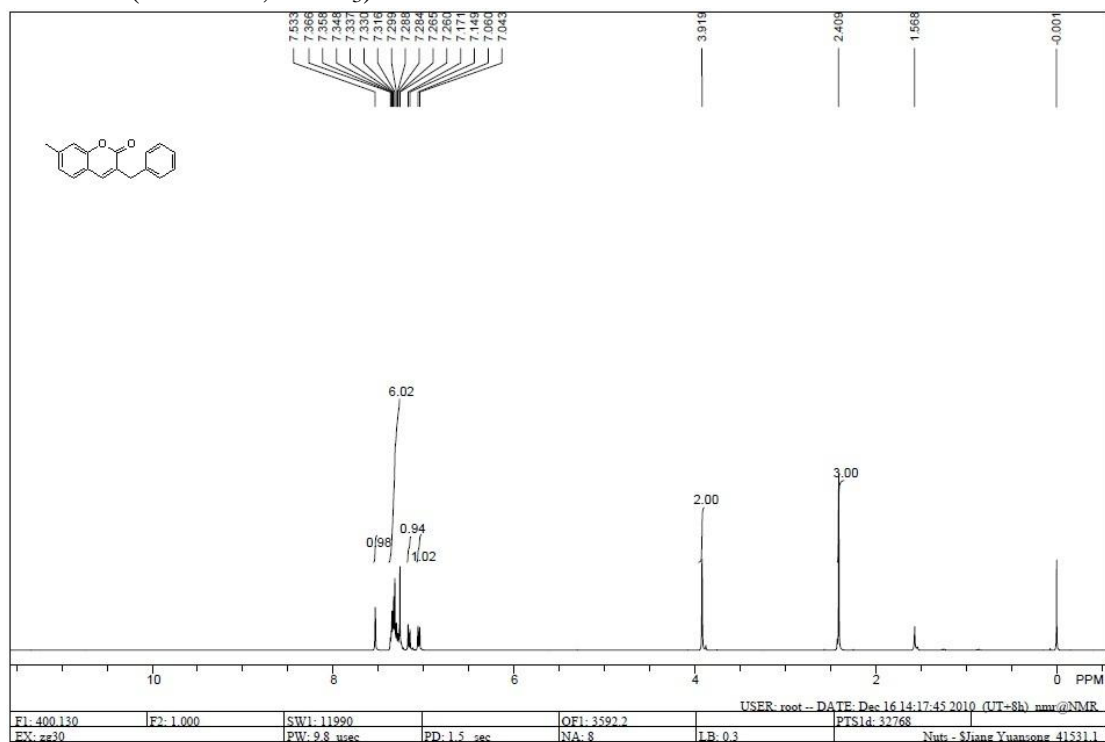


<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)

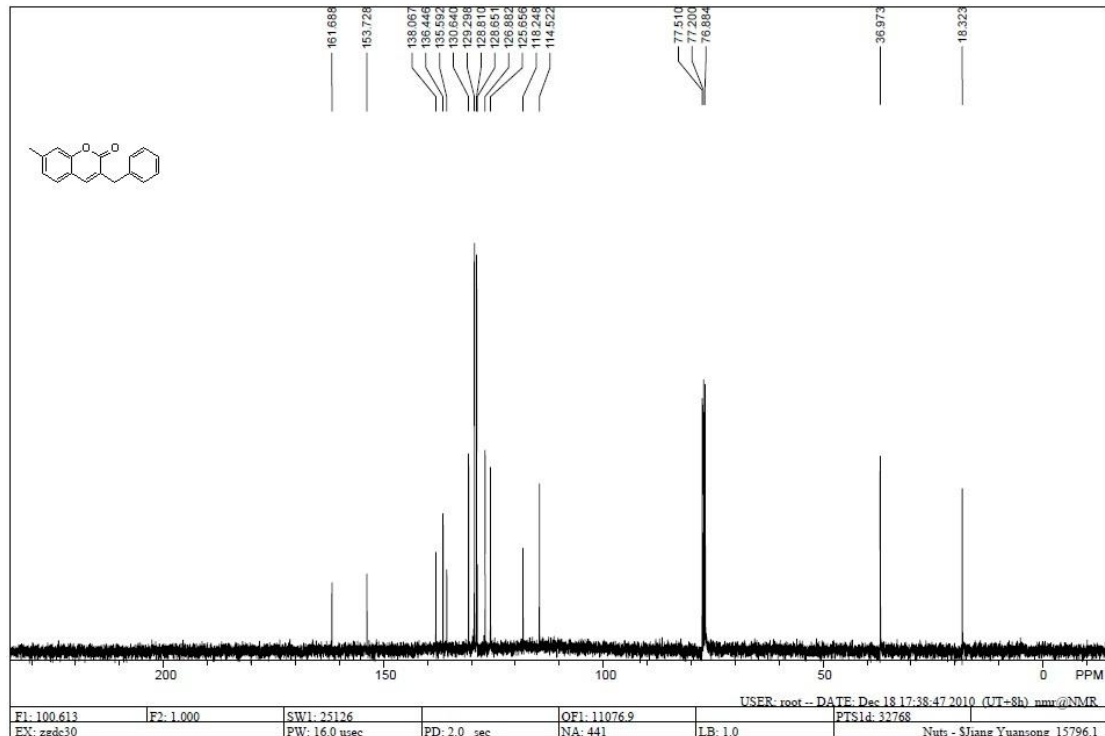


### 3-Benzyl-7-methyl-2H-chromen-2-one (4r)

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)

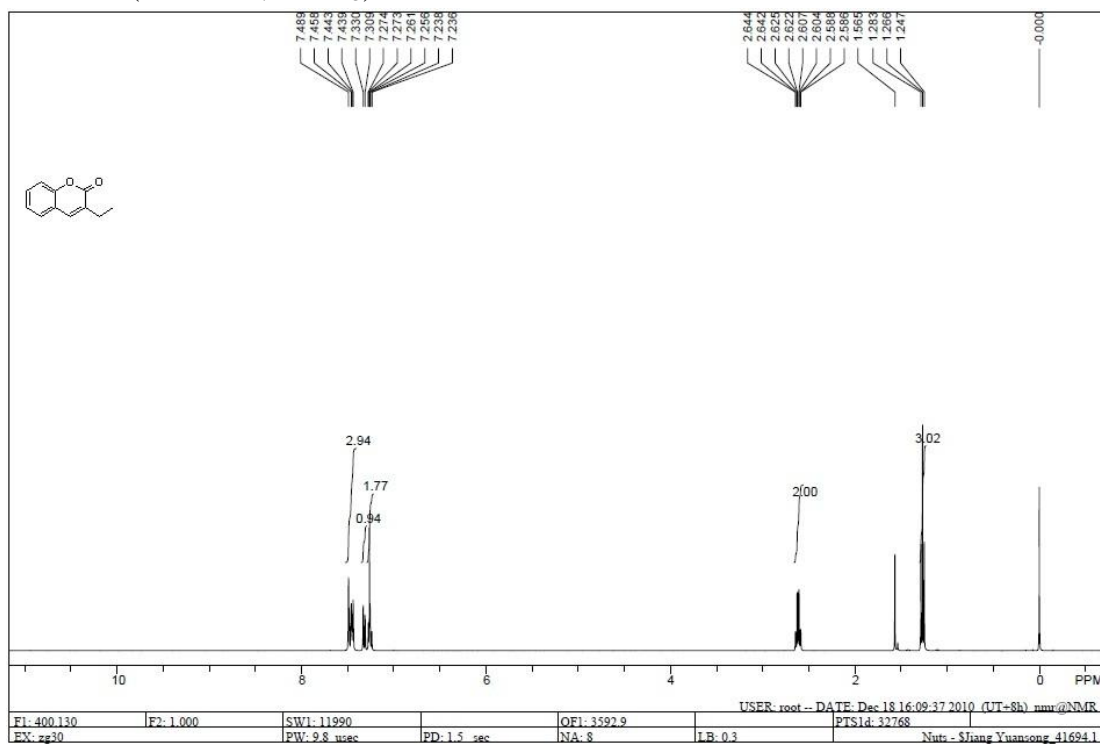


<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)

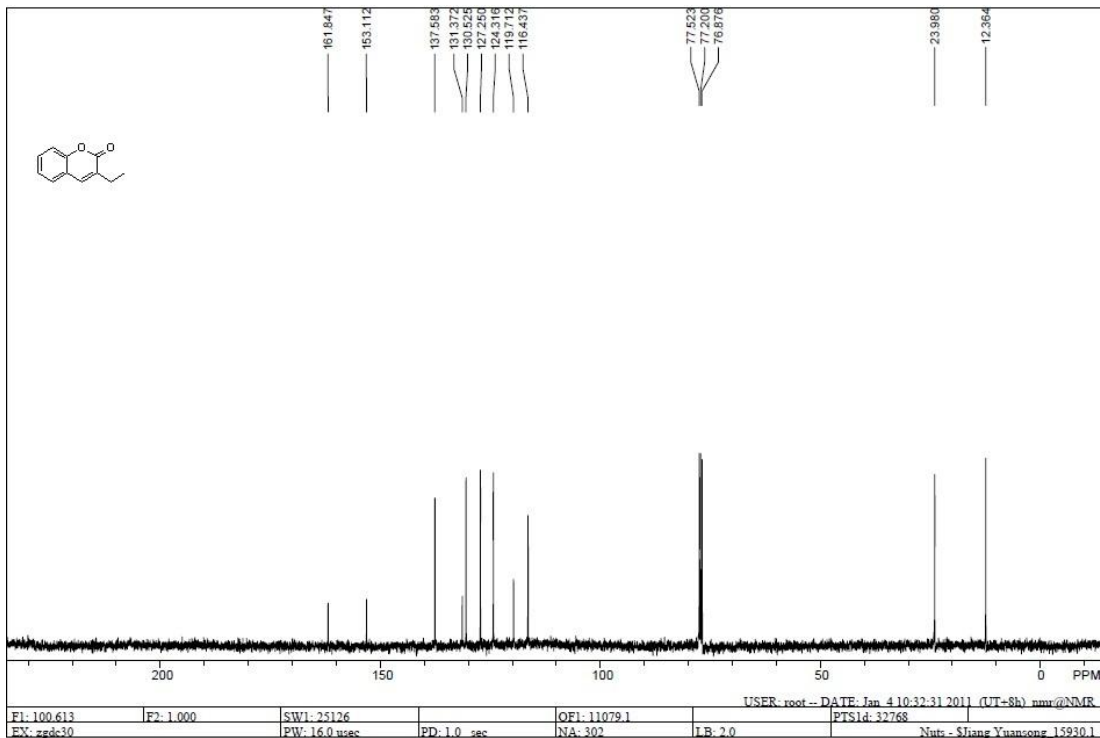


### 3-Ethyl-2H-chromen-2-one (7a)

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)

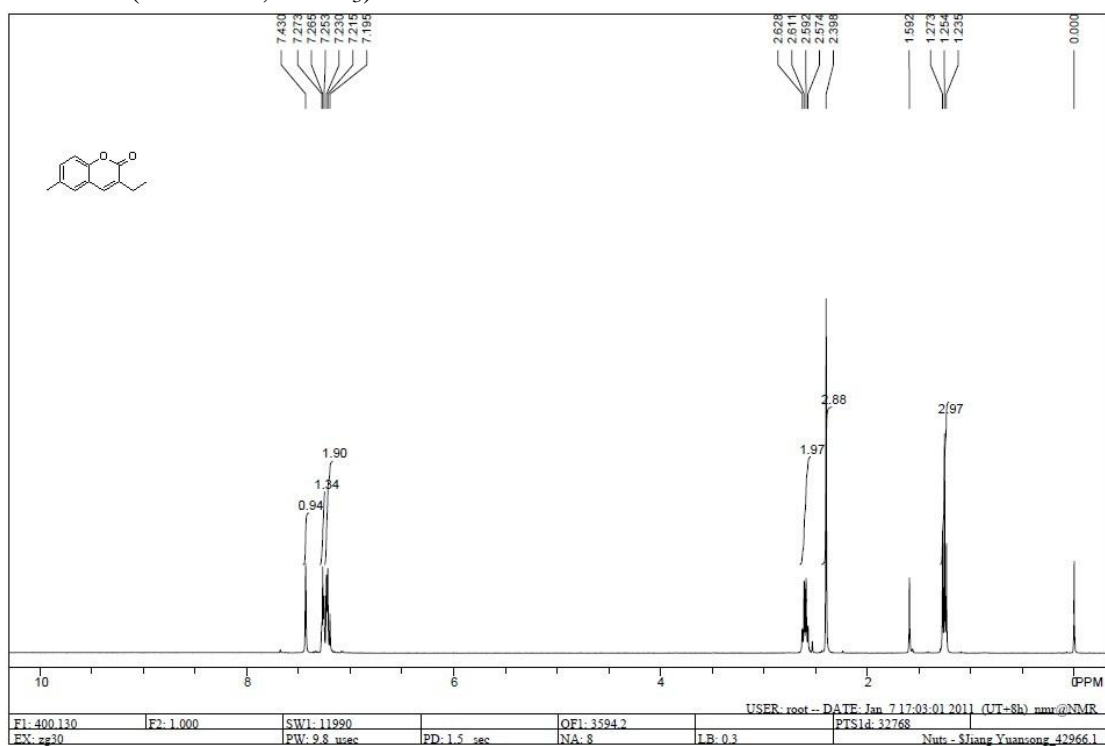


<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)

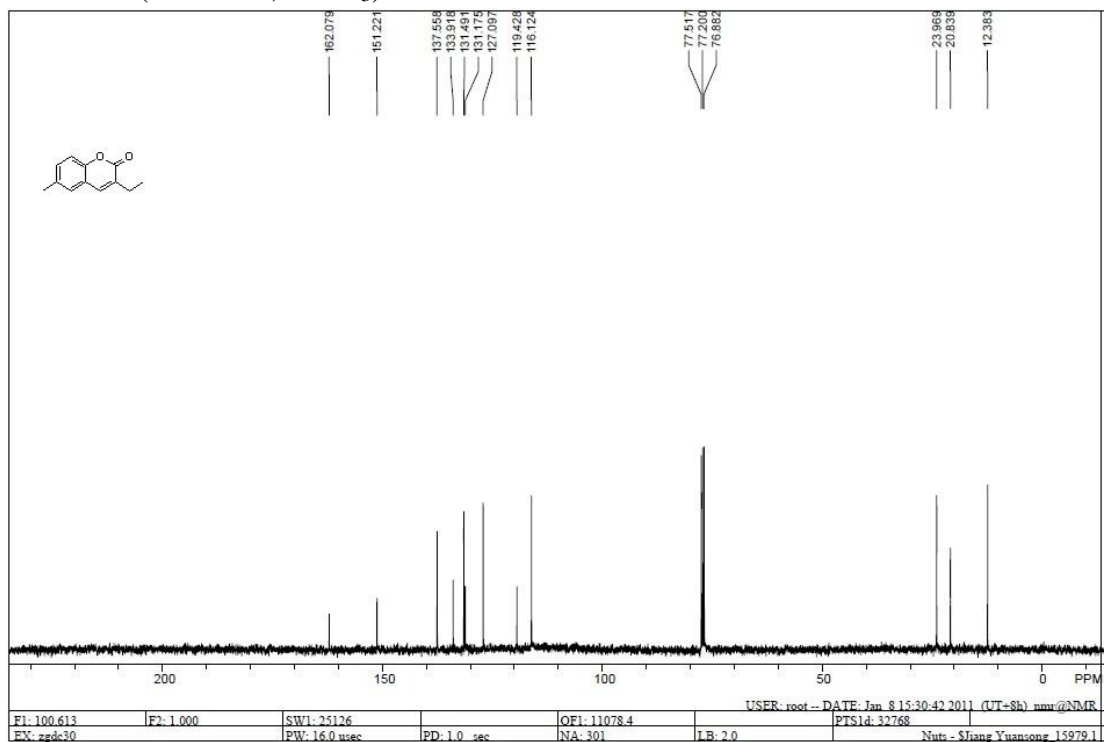


### 3-Ethyl-6-methyl-2H-chromen-2-one (7b)

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )

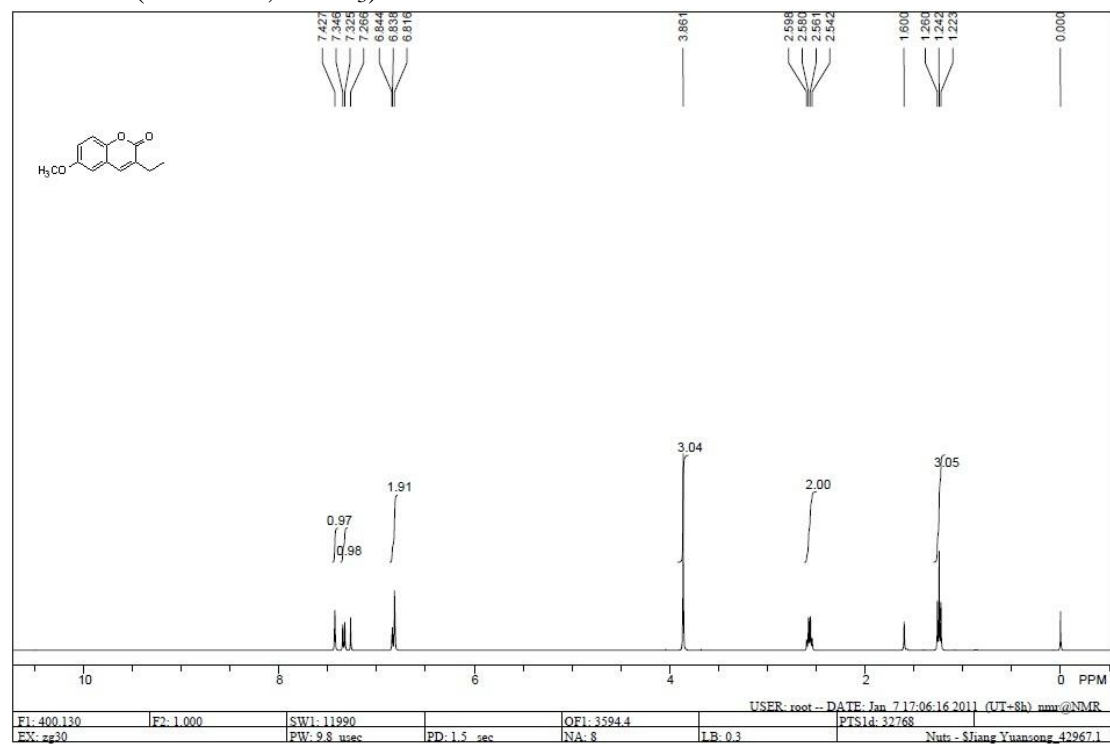


$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )

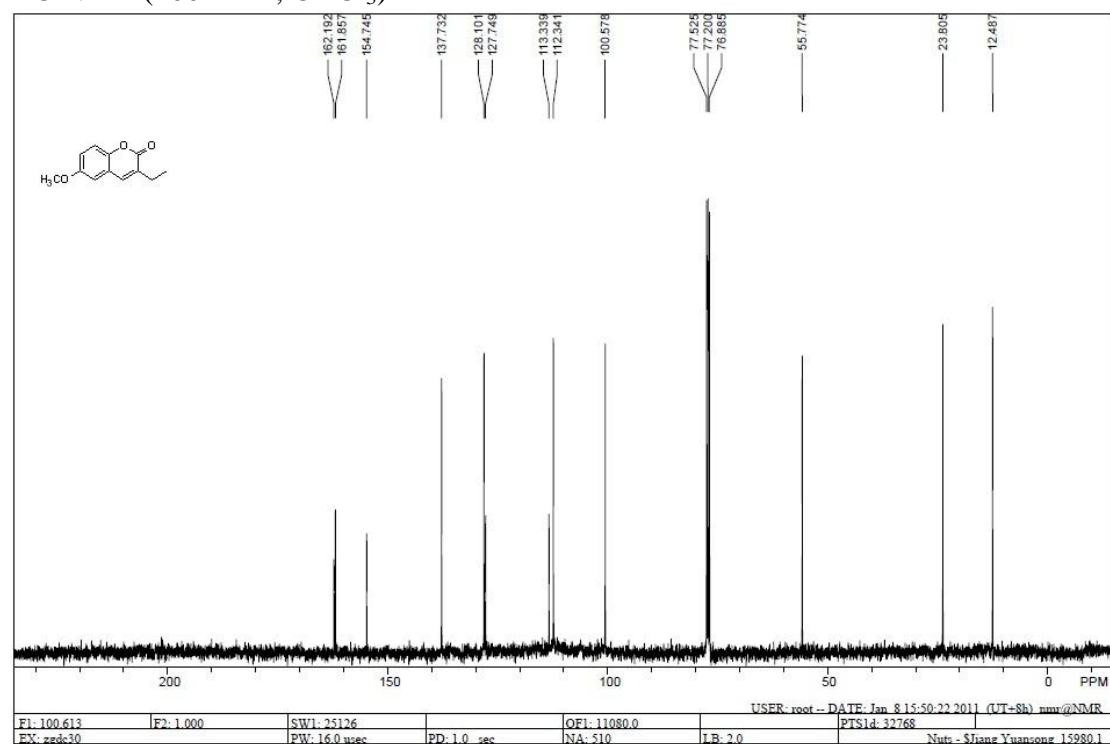


### 3-Ethyl-6-methoxy-2H-chromen-2-one (7c)

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )



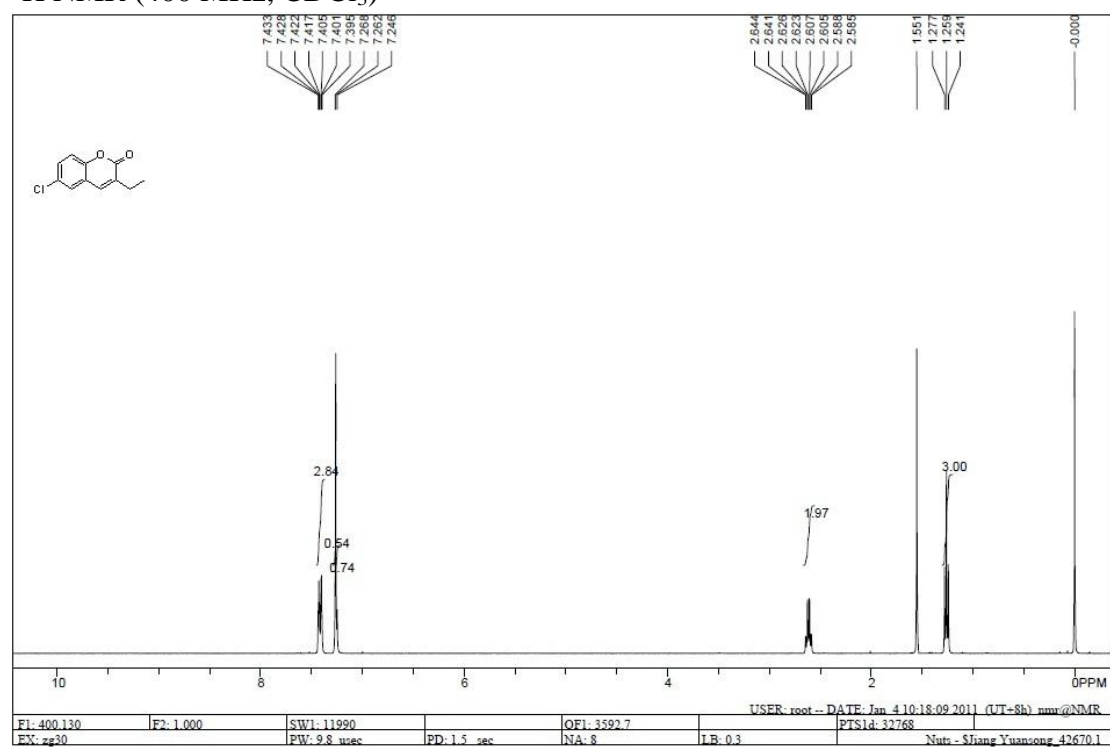
$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )



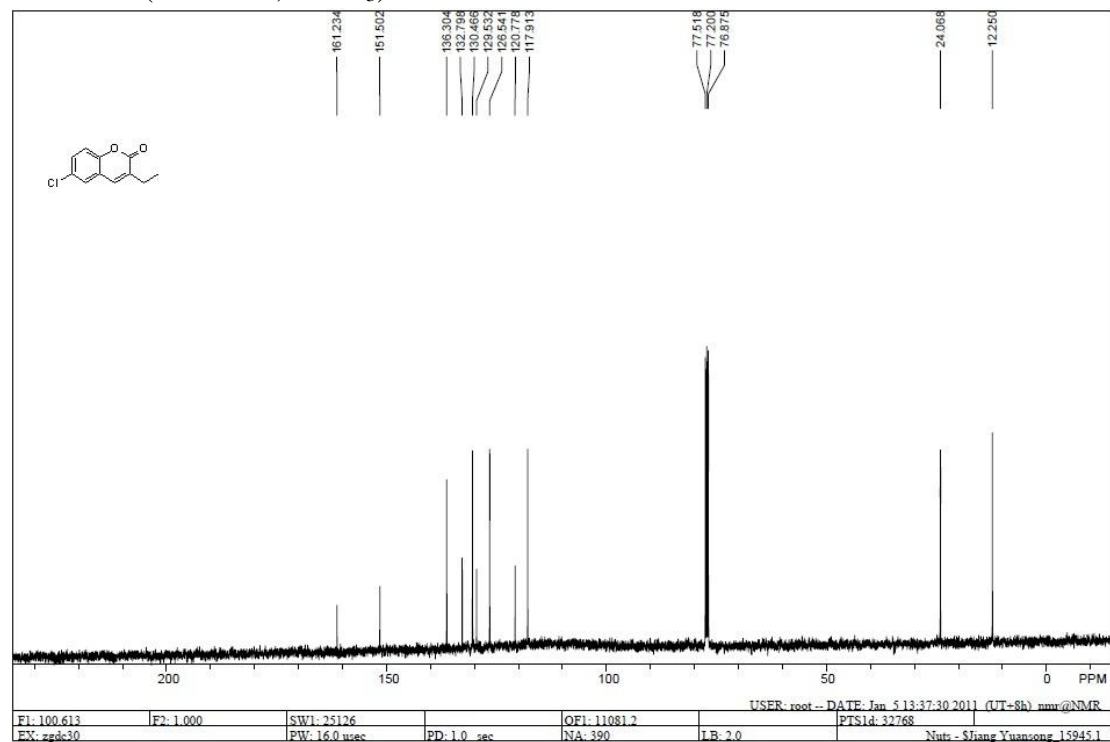


### 6-Chloro-3-ethyl-2H-chromen-2-one (7d)

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)

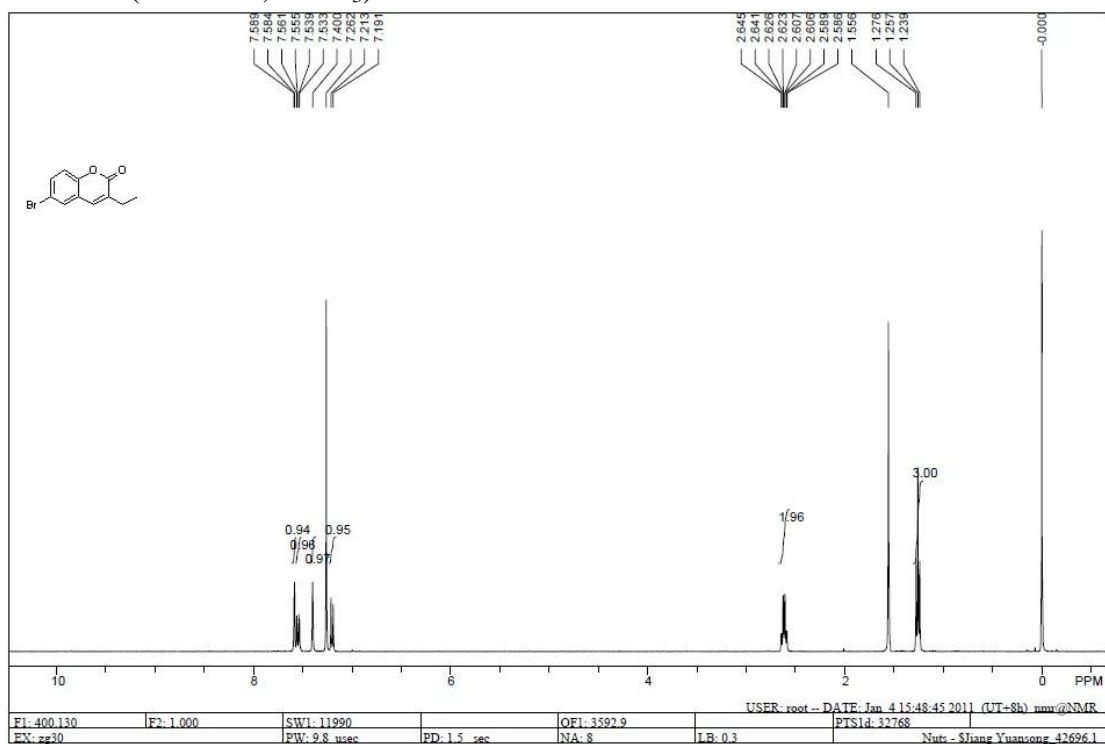


<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)

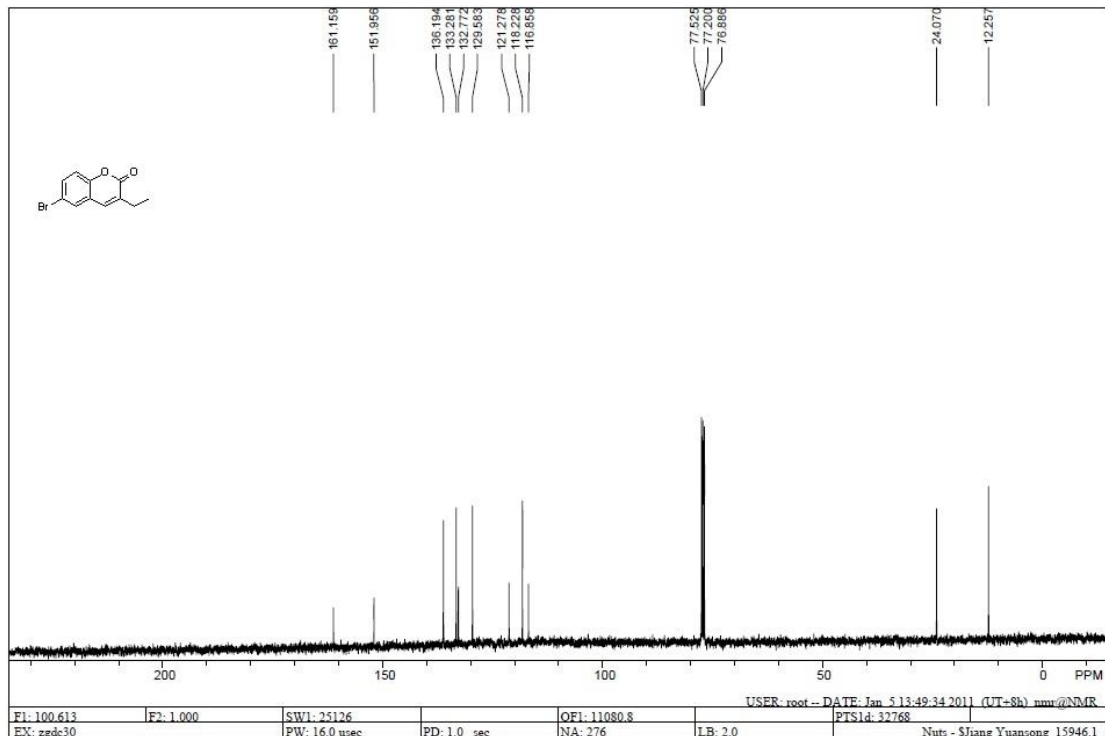


### 6-Bromo-3-ethyl-2H-chromen-2-one (7e)

$^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )

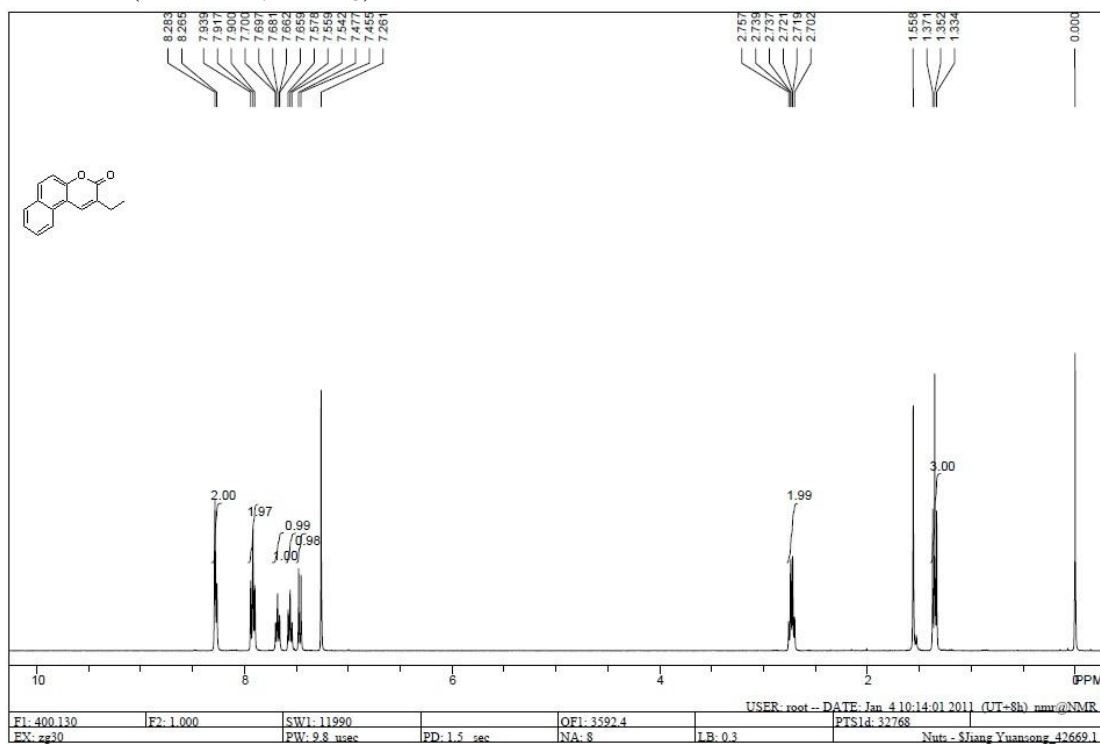


$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )



## 2-Ethyl-3H-benzo[f]chromen-3-one (7f)

<sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)



<sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)

