

## **Supplementary Information**

### **Synthesis, Characterization and *in vitro* Anticancer Activity of Novel 8,4'-Oxyneolignan Analogues**

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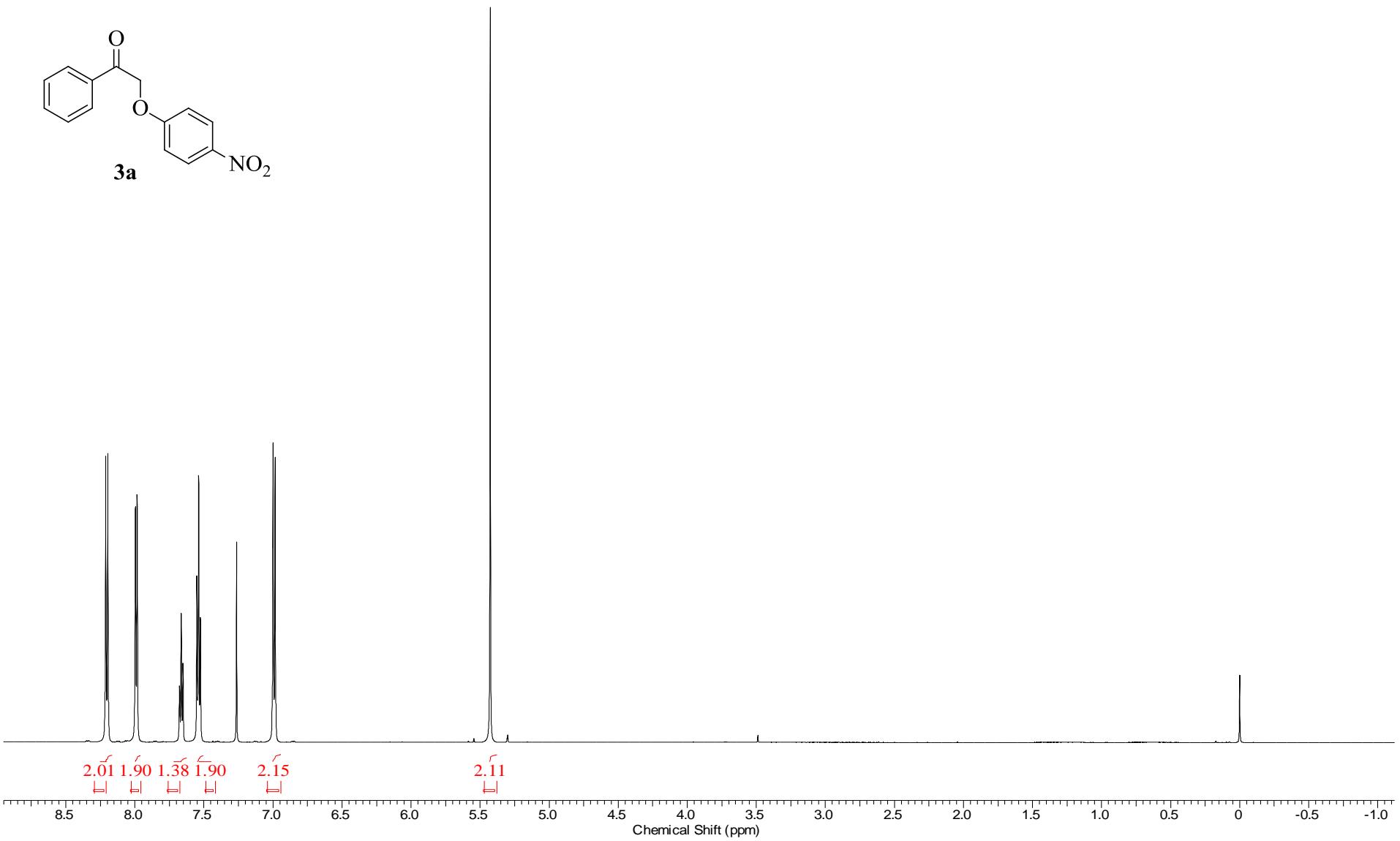
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<sup>c</sup>*Instituto de Ciências Exatas e Naturais, Universidade Federal do Pará, 66075-110 Belém-PA, Brazil*

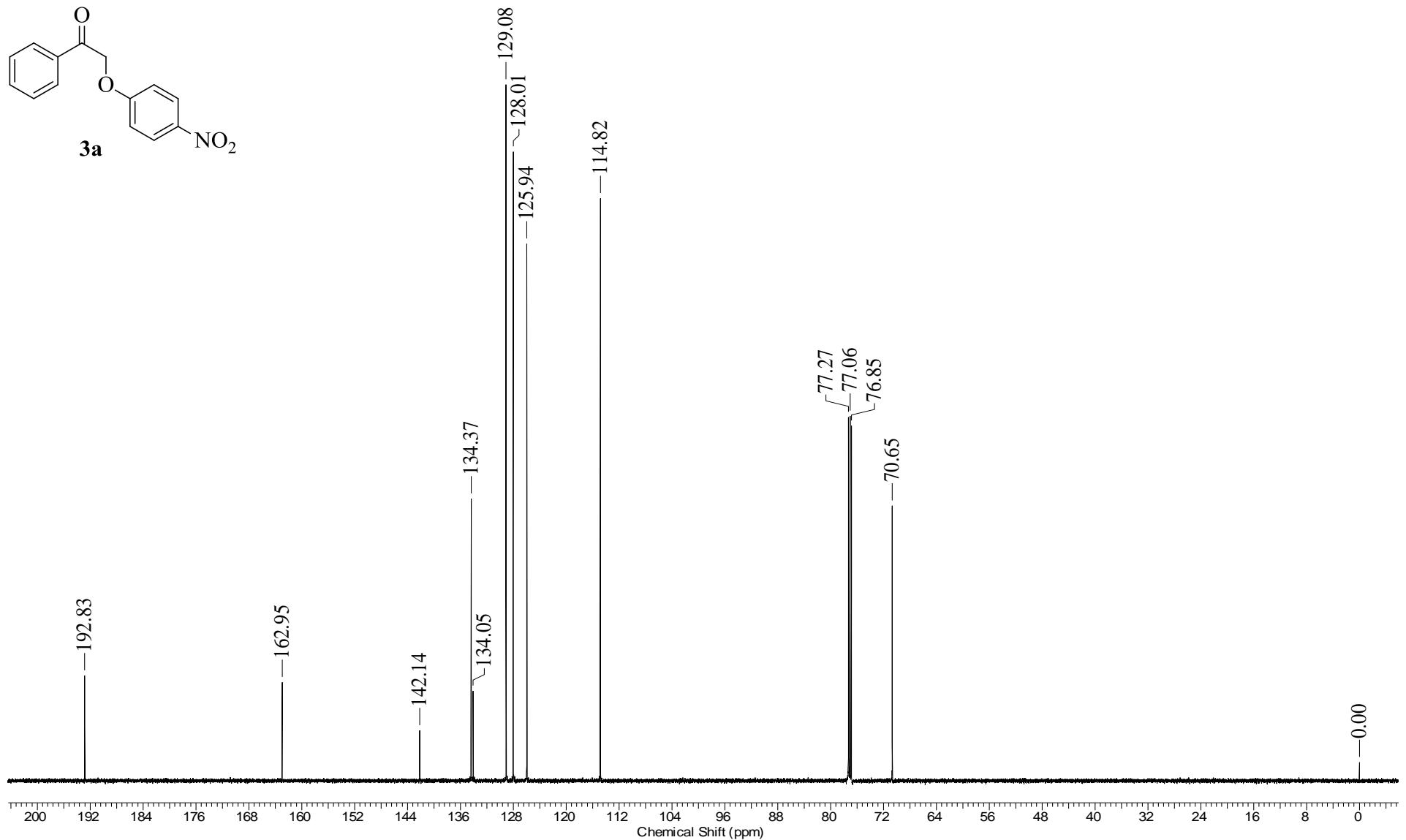
<sup>d</sup>*Laboratório de Síntese Orgânica, Universidade Estadual de Campinas, 13083-872 Campinas-SP, Brazil*

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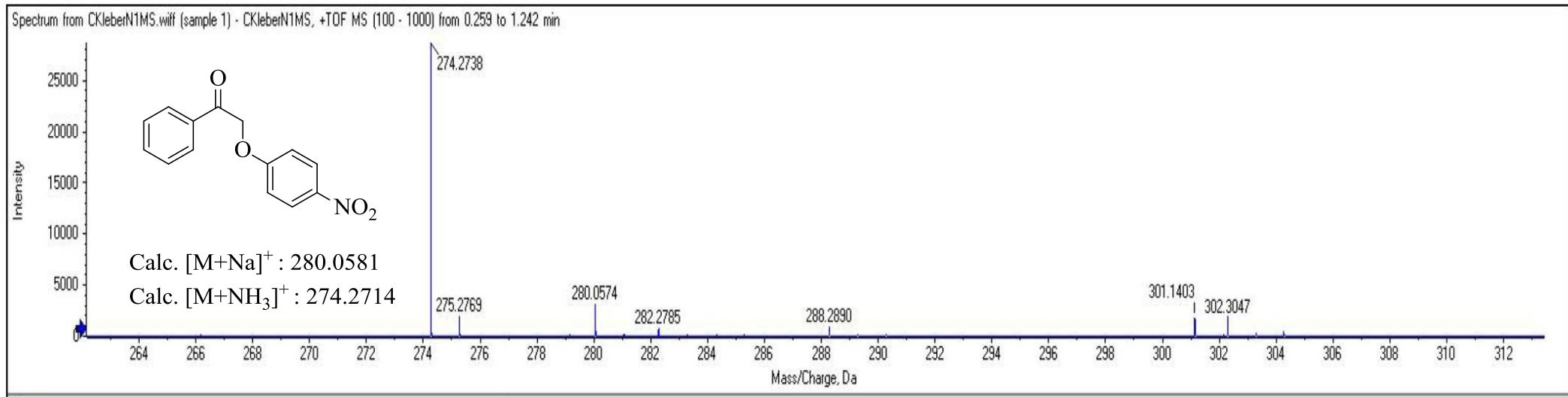
\*e-mail: ckleber@unb.br



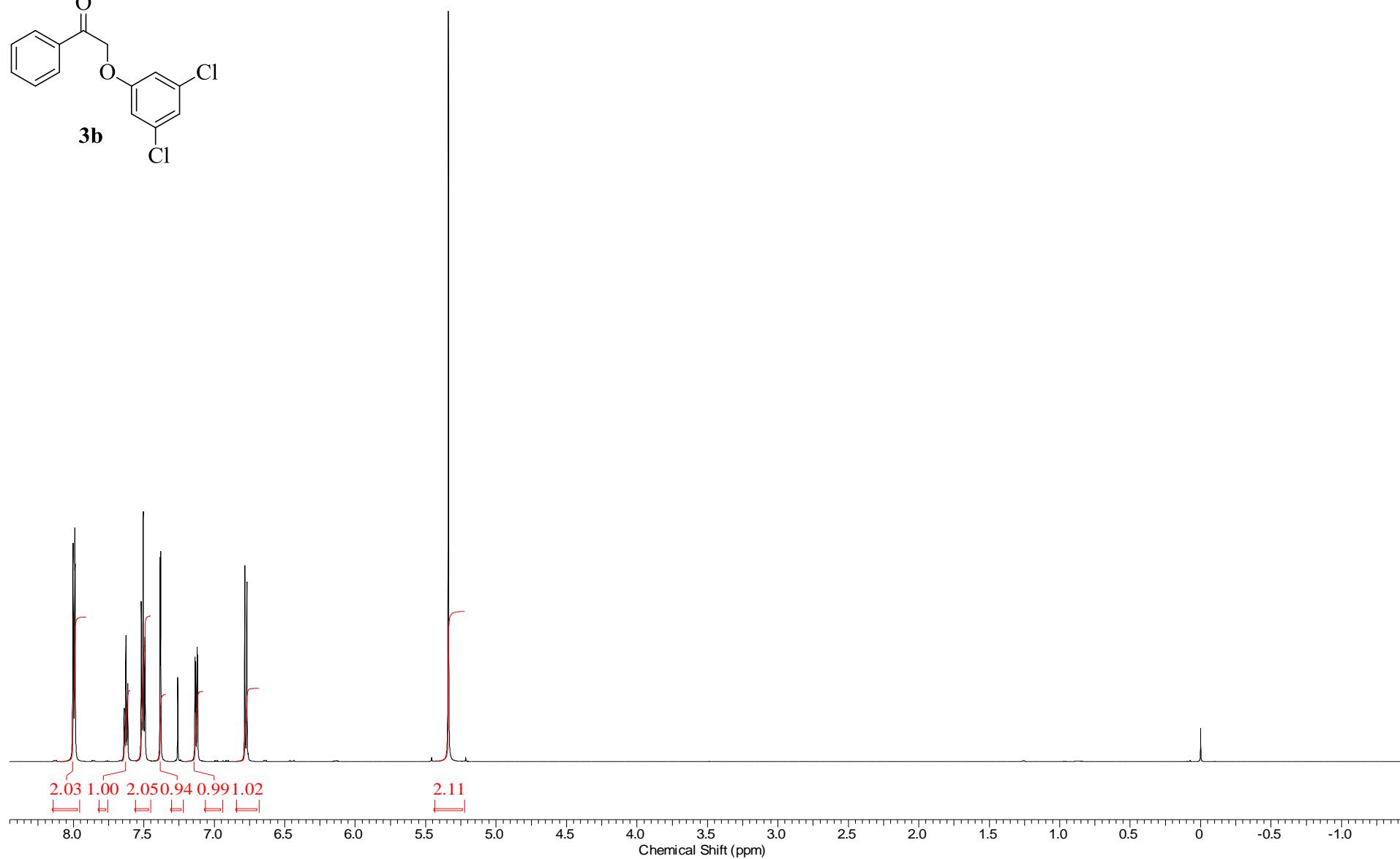
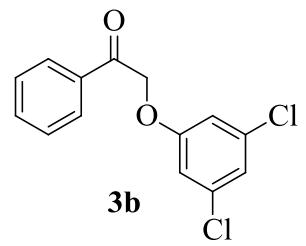
**Figure S1.**  $^1\text{H}$  NMR spectrum (600 MHz,  $\text{CDCl}_3$ ) of compound **3a**.



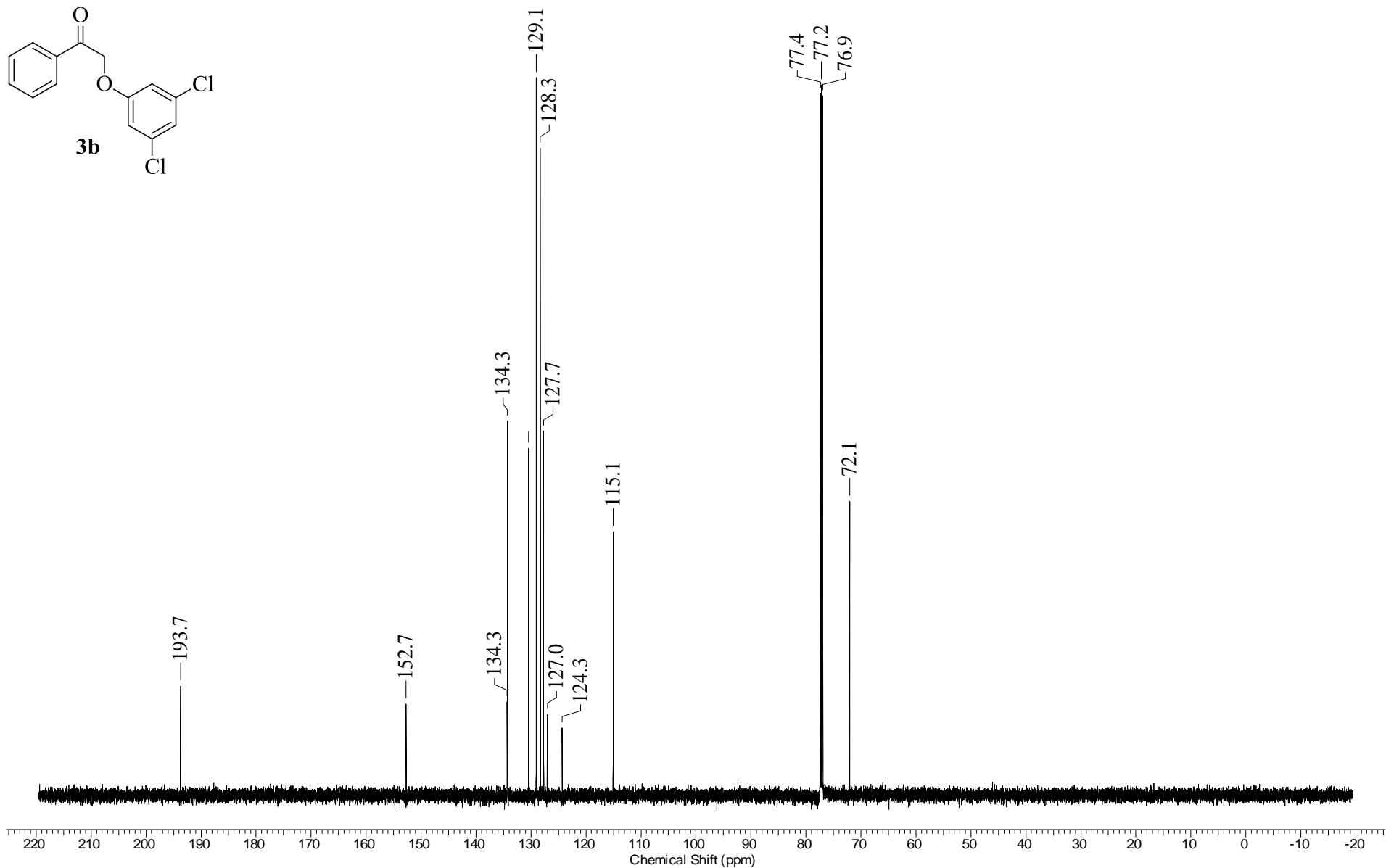
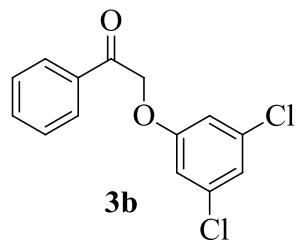
**Figure S2.**  $^{13}\text{C}$  NMR spectrum (150 MHz,  $\text{CDCl}_3$ ) of compound **3a**.



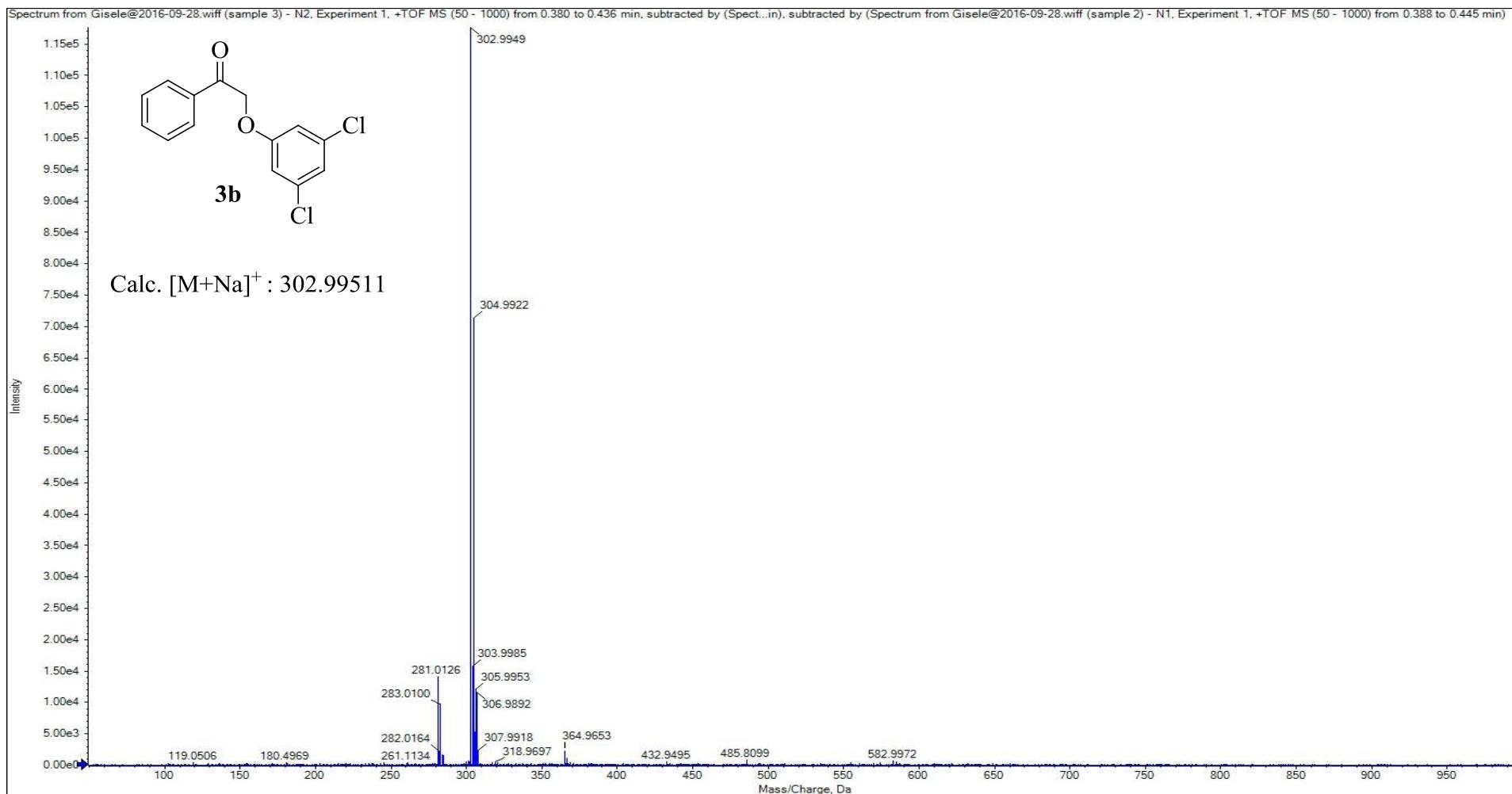
**Figure S3.** HRMS spectrum of compound **3a**.



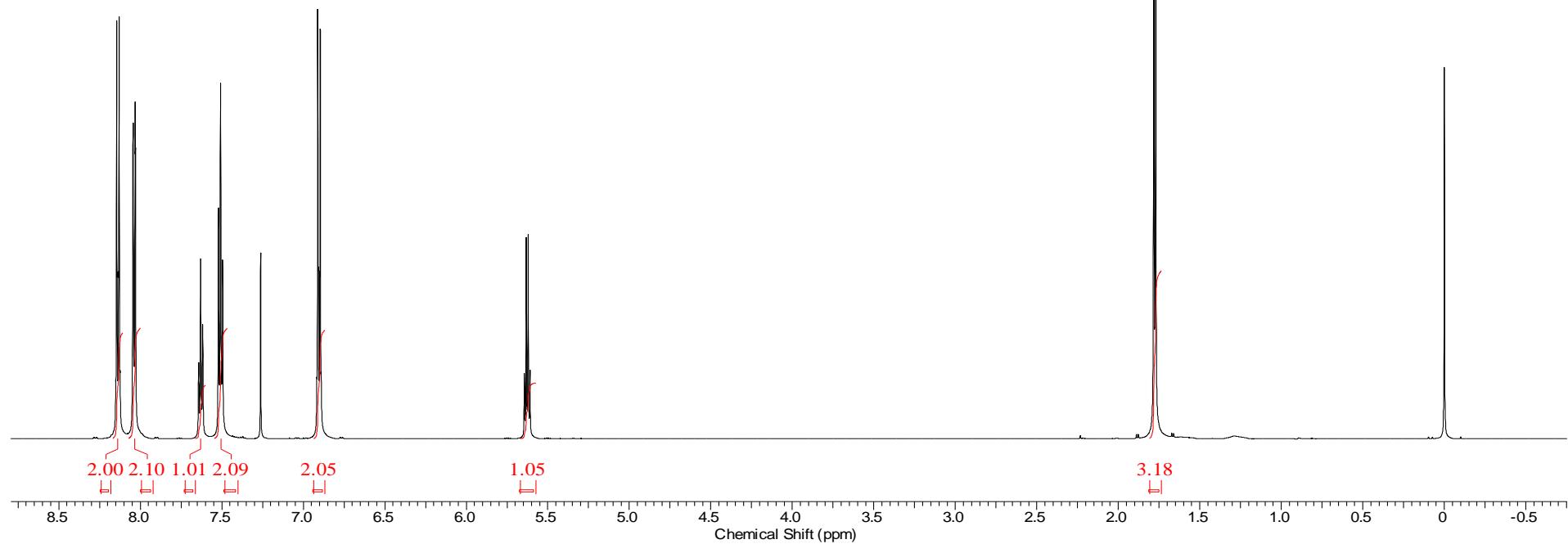
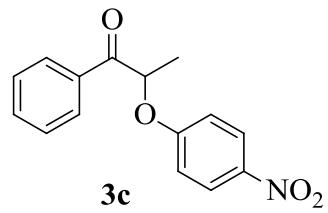
**Figure S4.** <sup>1</sup>H NMR spectrum (600 MHz, CDCl<sub>3</sub>) of compound **3b**.



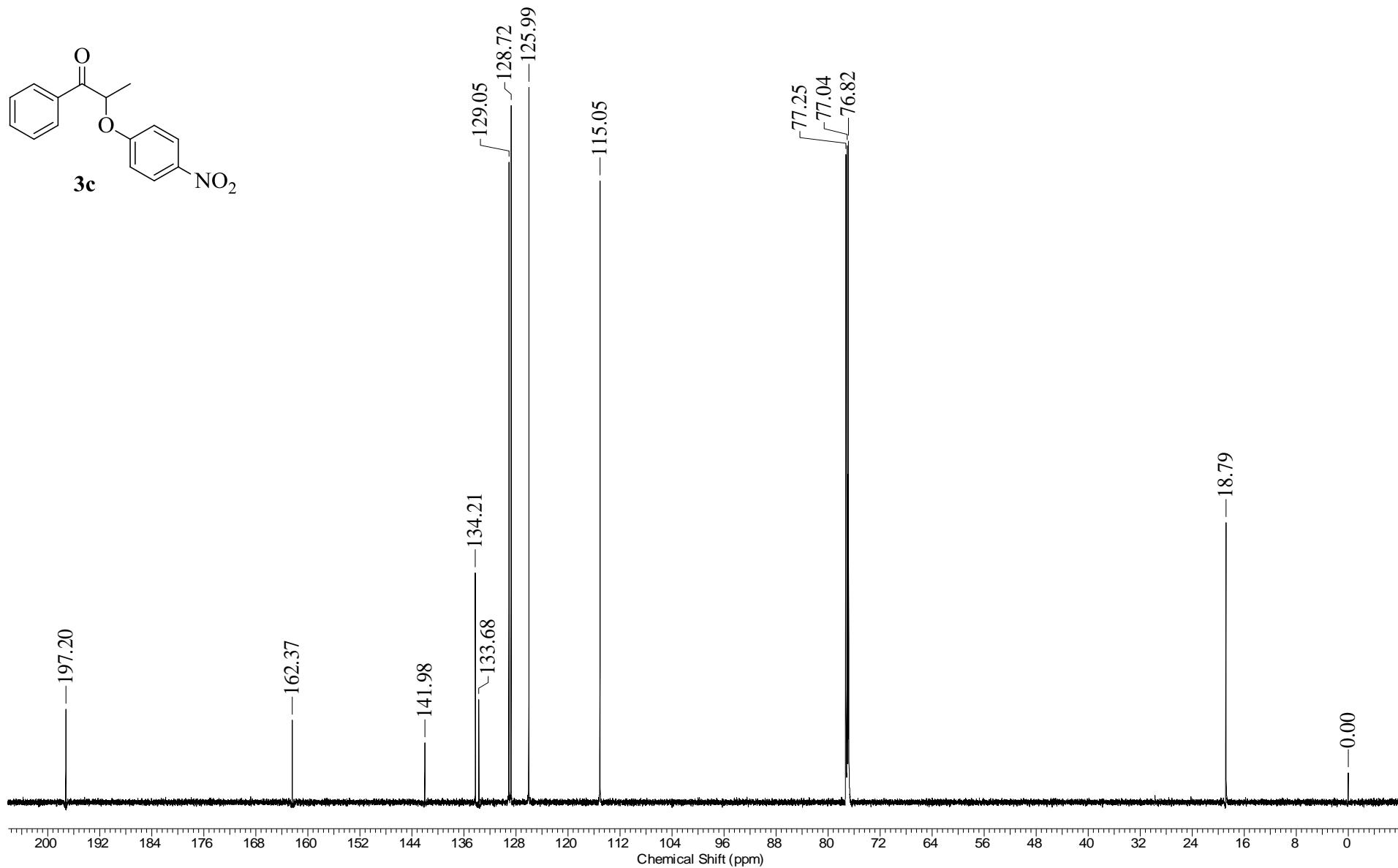
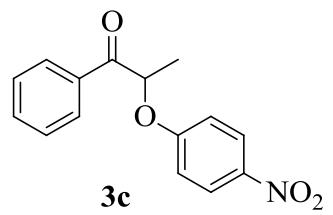
**Figure S5.** <sup>13</sup>C NMR spectrum (150 MHz, CDCl<sub>3</sub>) of compound **3b**.



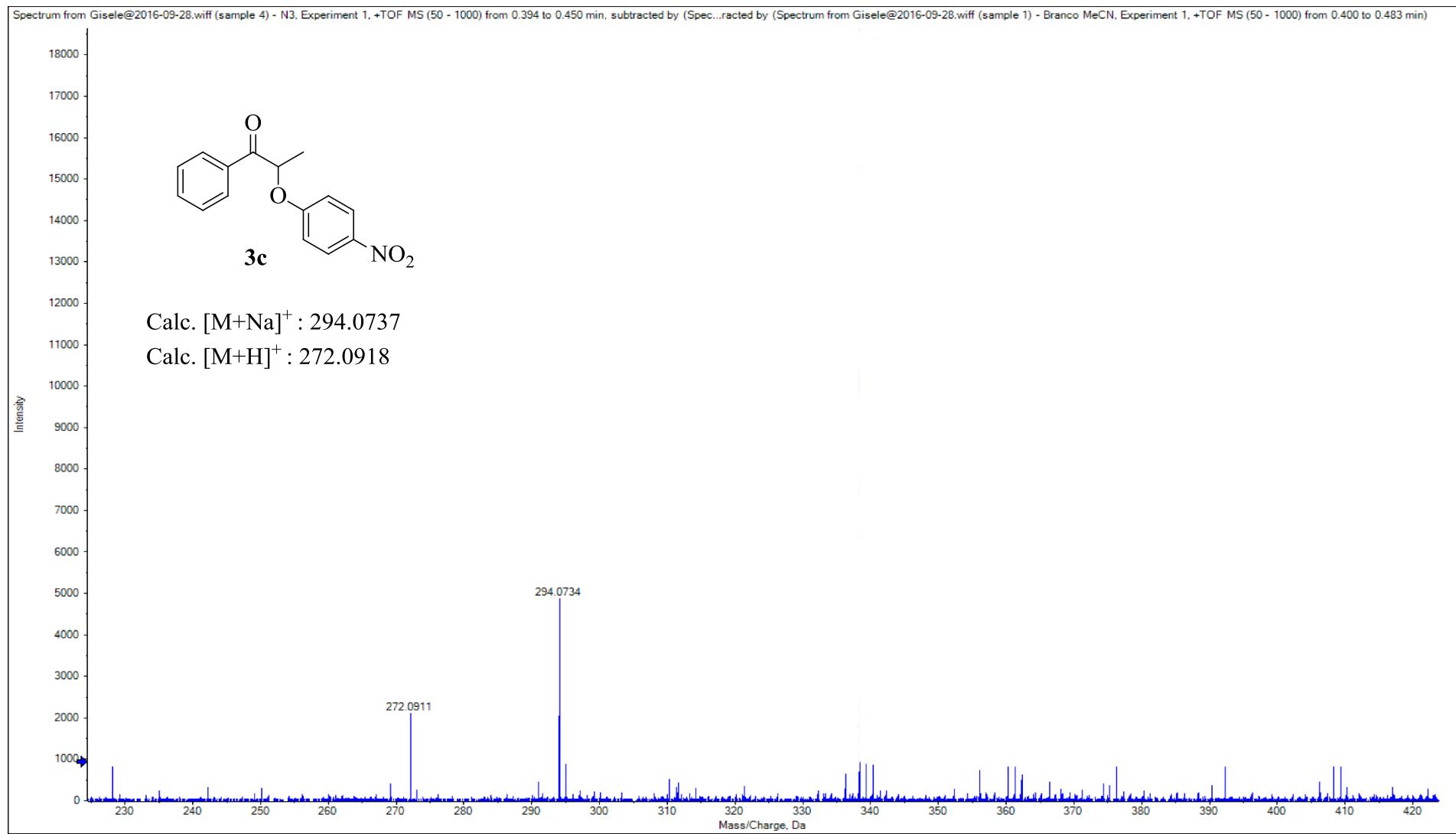
**Figure S6.** HRMS spectrum of compound **3b**.



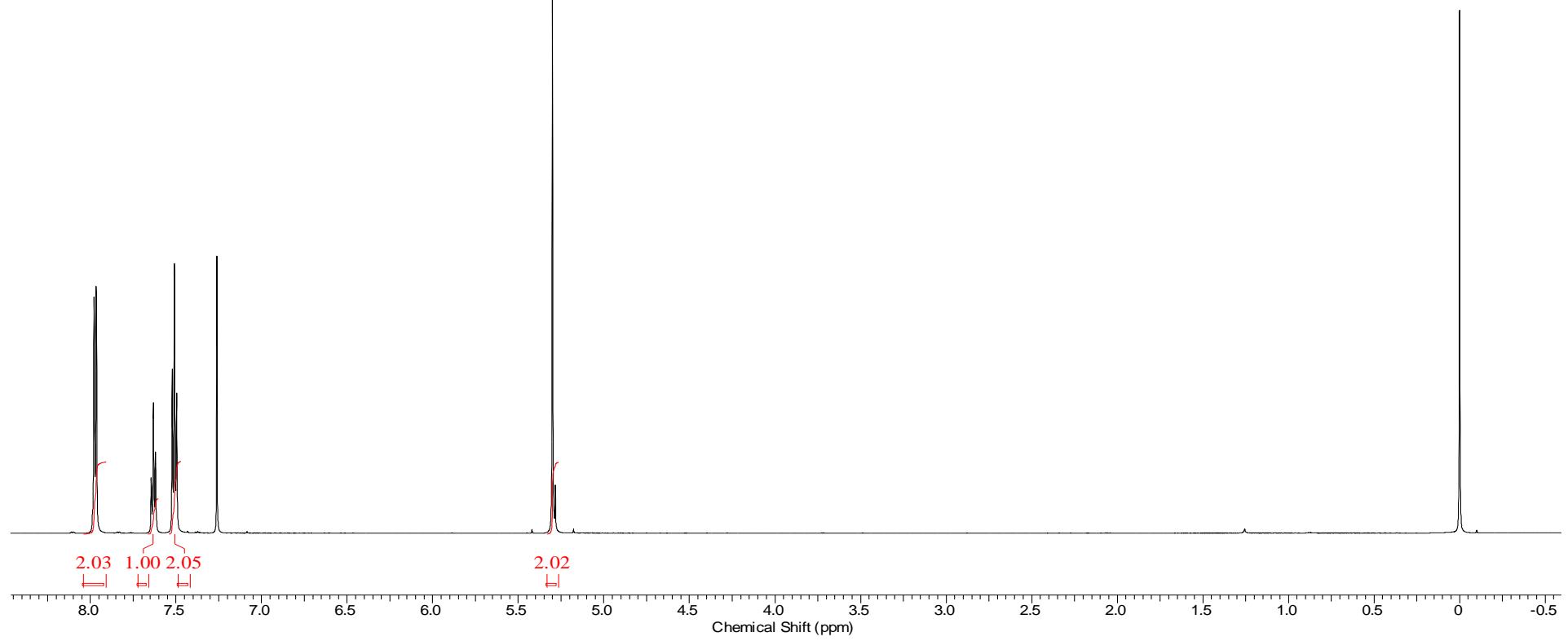
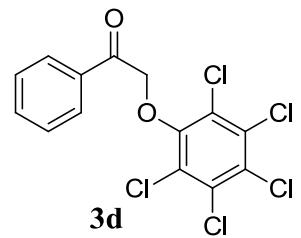
**Figure S7.**  $^1\text{H}$  NMR spectrum (600 MHz,  $\text{CDCl}_3$ ) of compound **3c**.



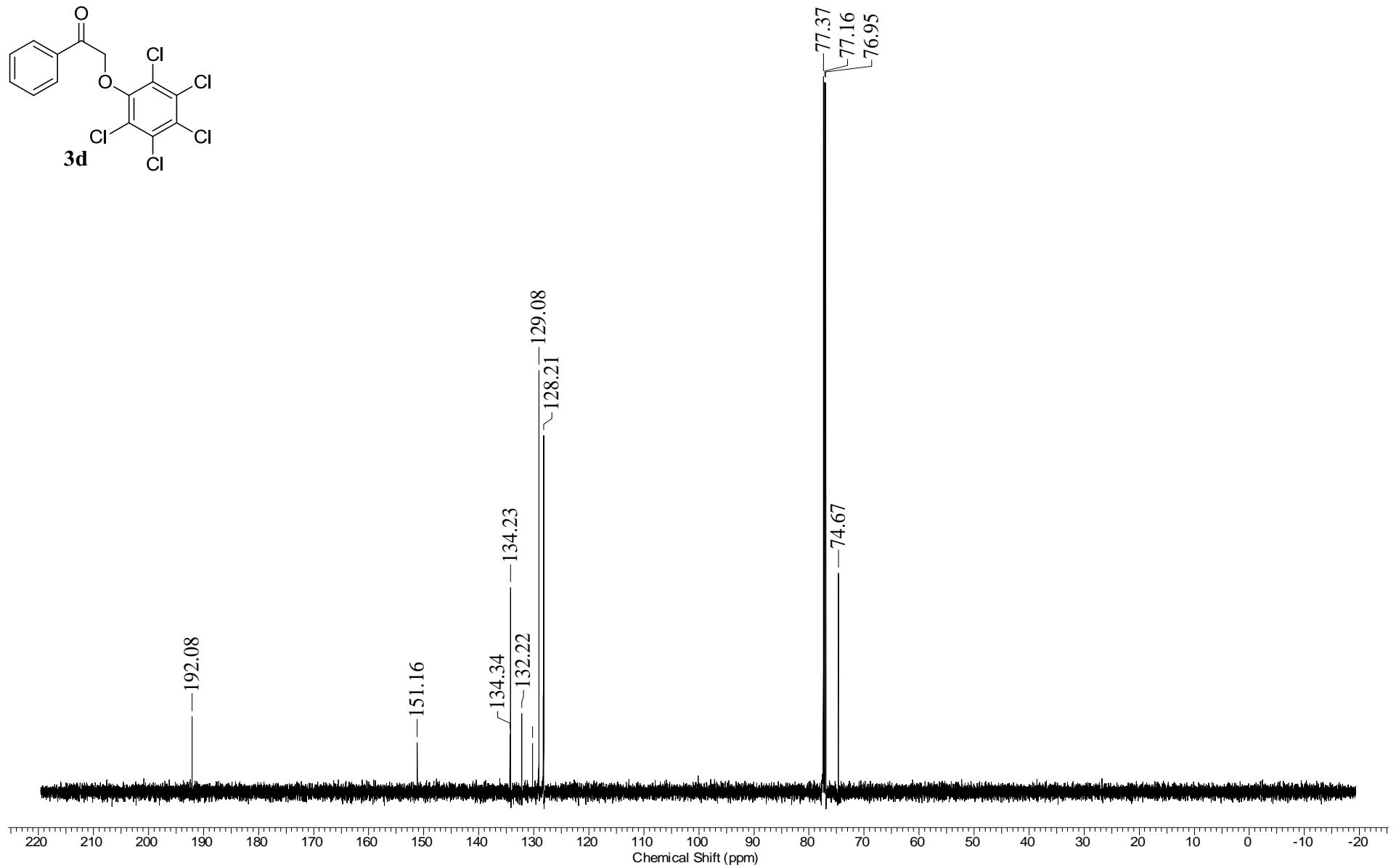
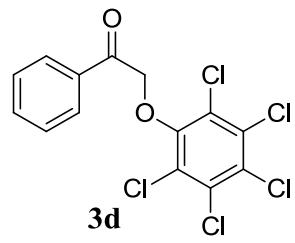
**Figure S8.** <sup>13</sup>C NMR spectrum (150 MHz, CDCl<sub>3</sub>) of compound **3c**.



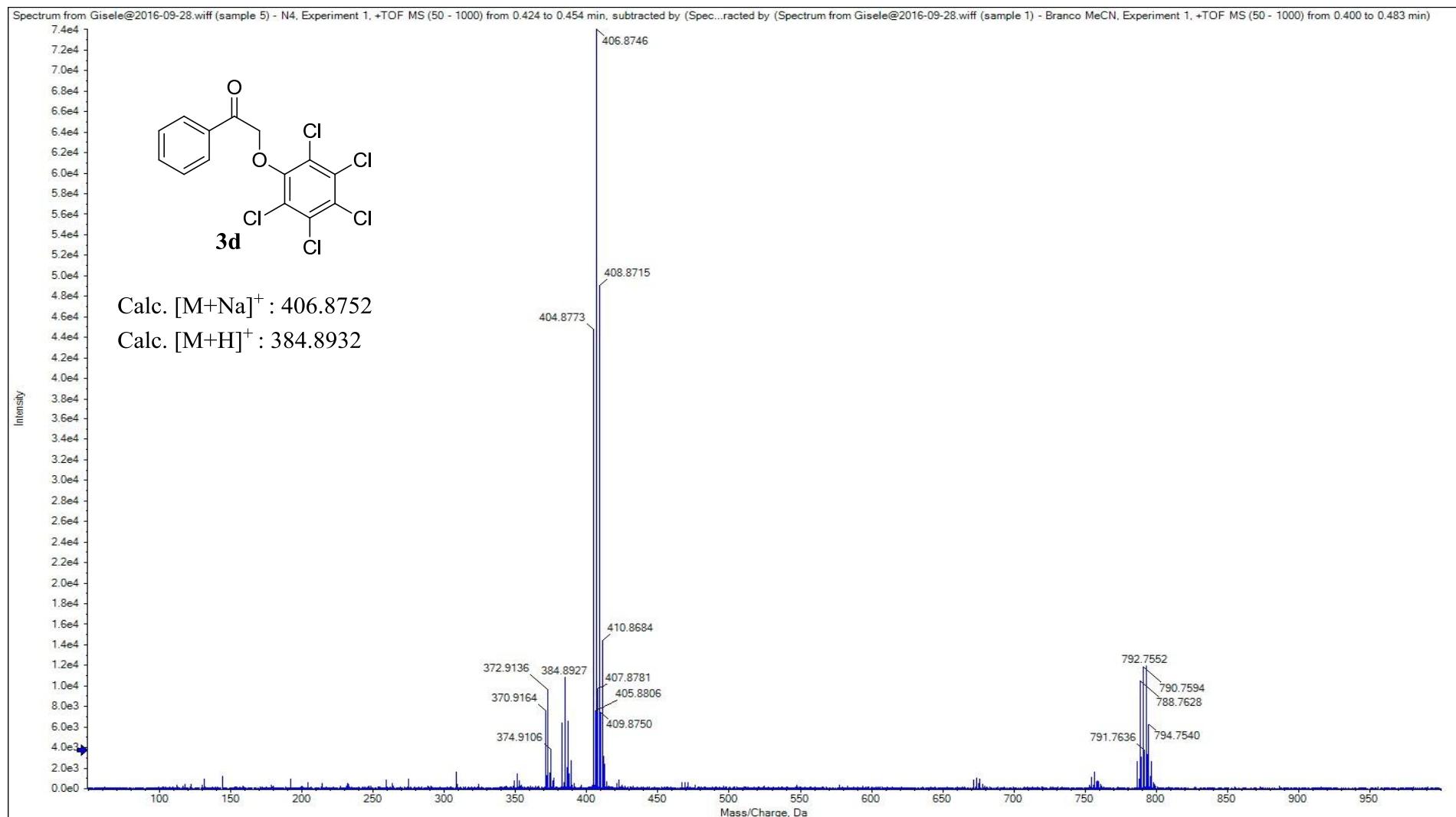
**Figure S9.** HRMS spectrum of compound **3c**.



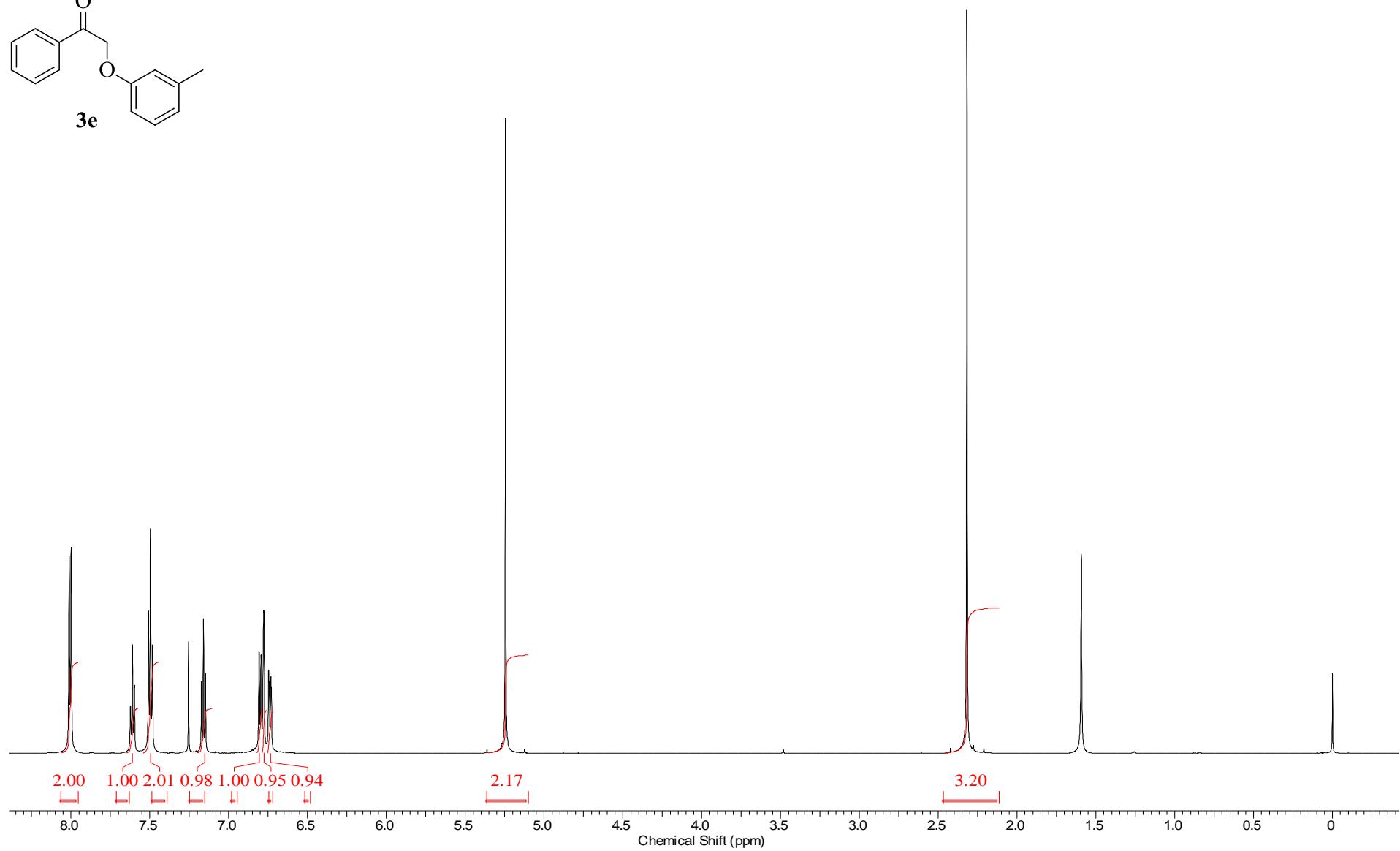
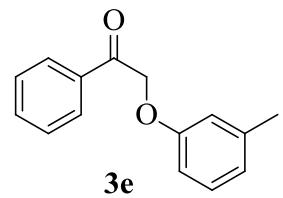
**Figure S10.** <sup>1</sup>H NMR spectrum (600 MHz, CDCl<sub>3</sub>) of compound **3d**.



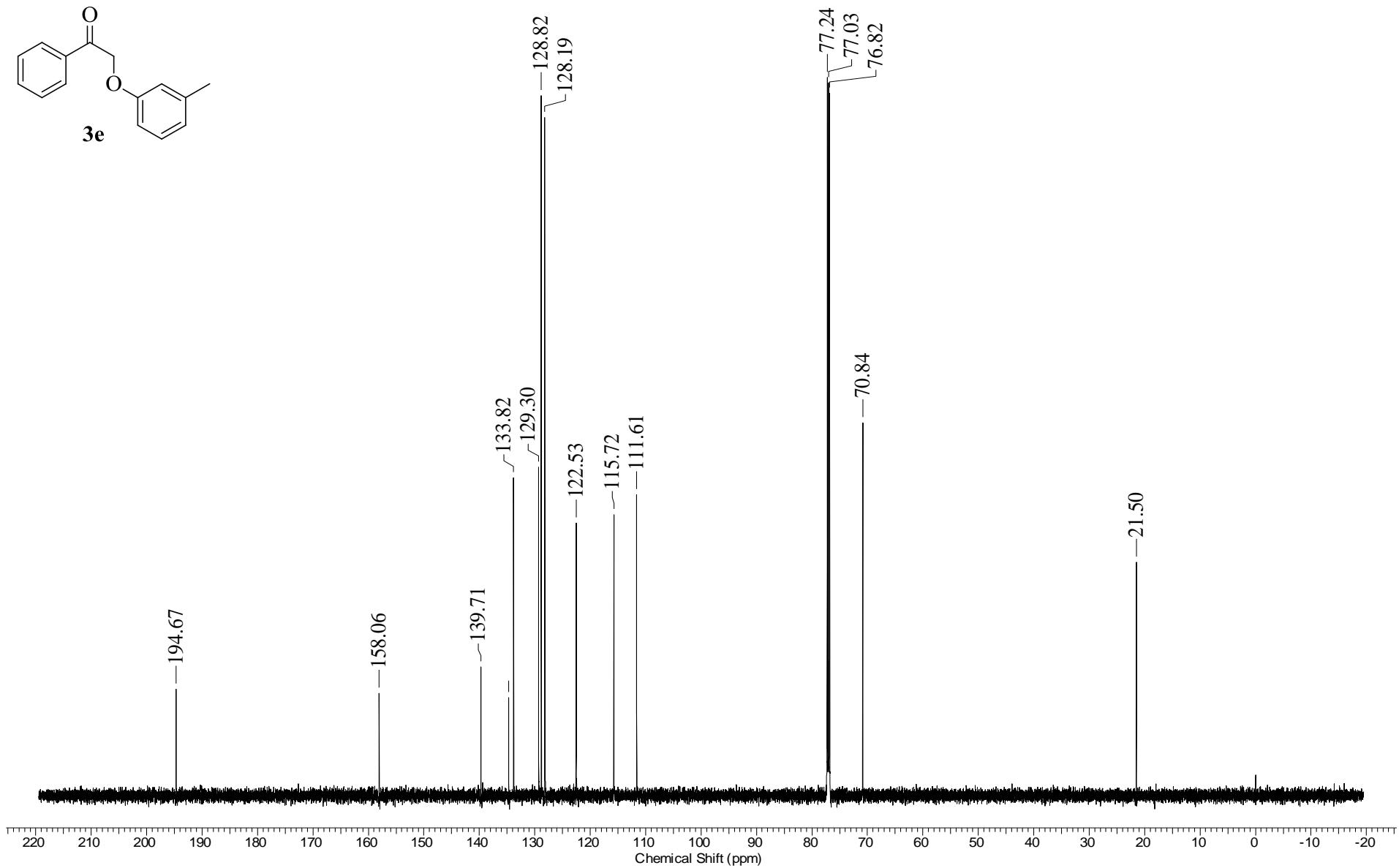
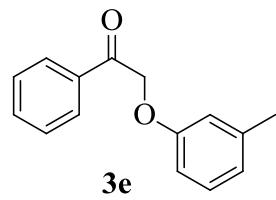
**Figure S11.** <sup>13</sup>C NMR spectrum (150 MHz, CDCl<sub>3</sub>) of compound 3d.



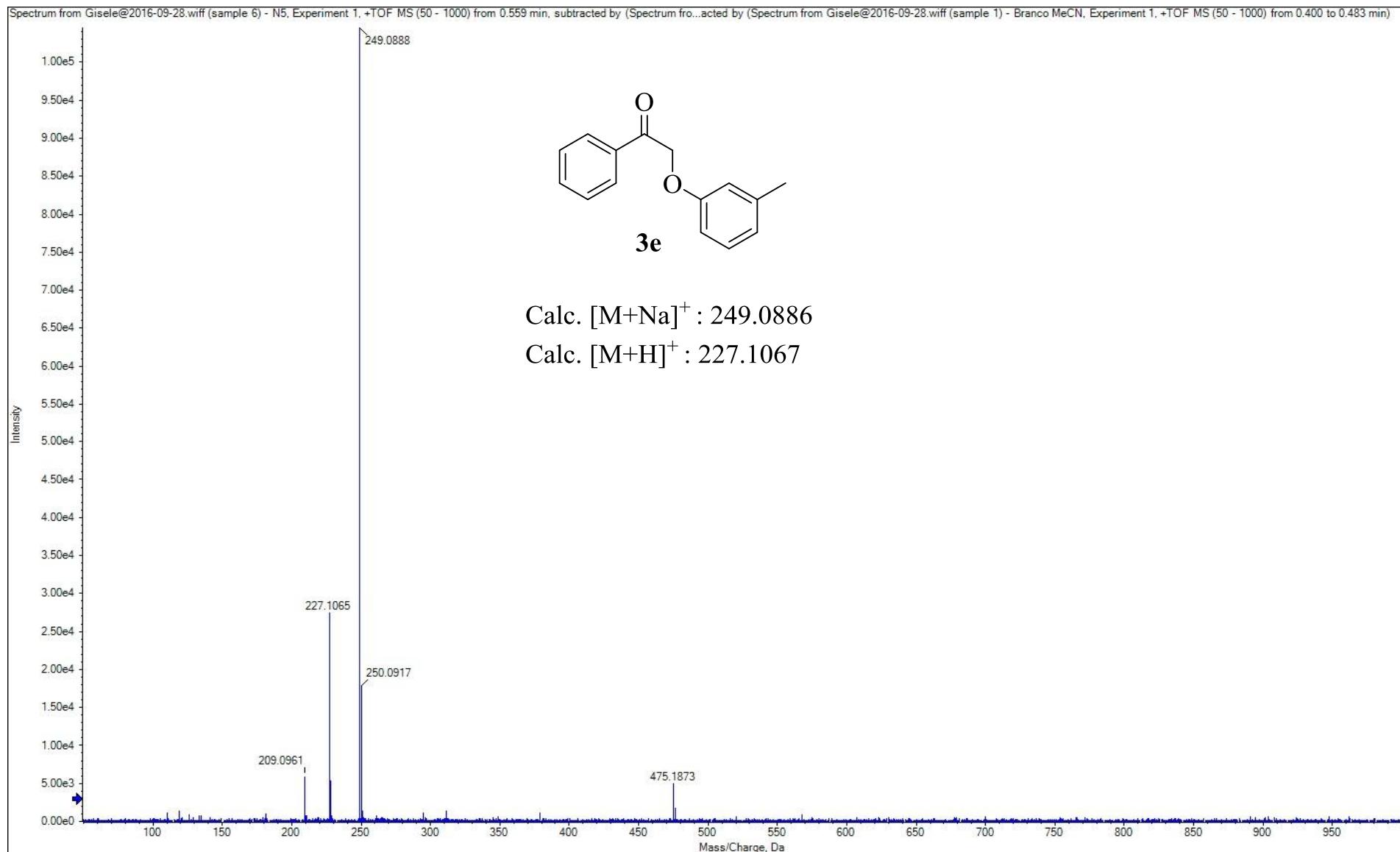
**Figure S12.** HRMS spectrum of compound **3d**.



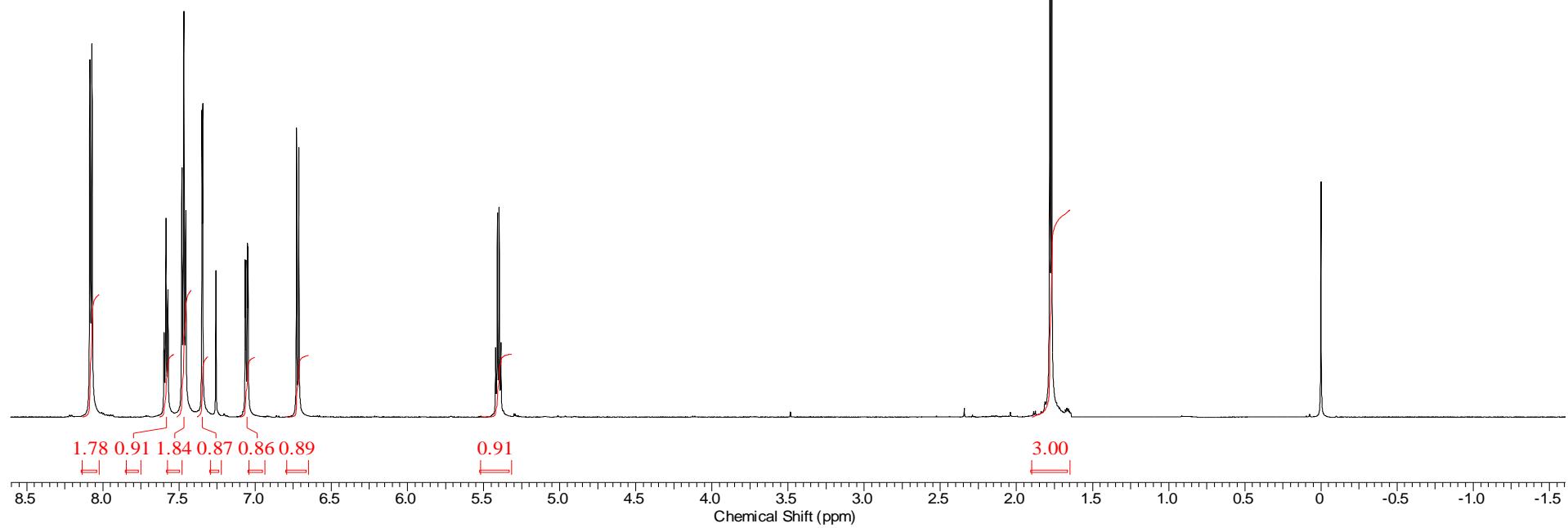
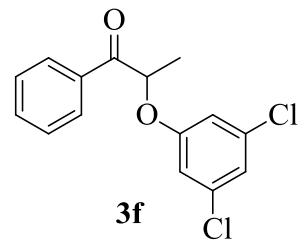
**Figure S13.** <sup>1</sup>H NMR spectrum (600 MHz, CDCl<sub>3</sub>) of compound 3e.



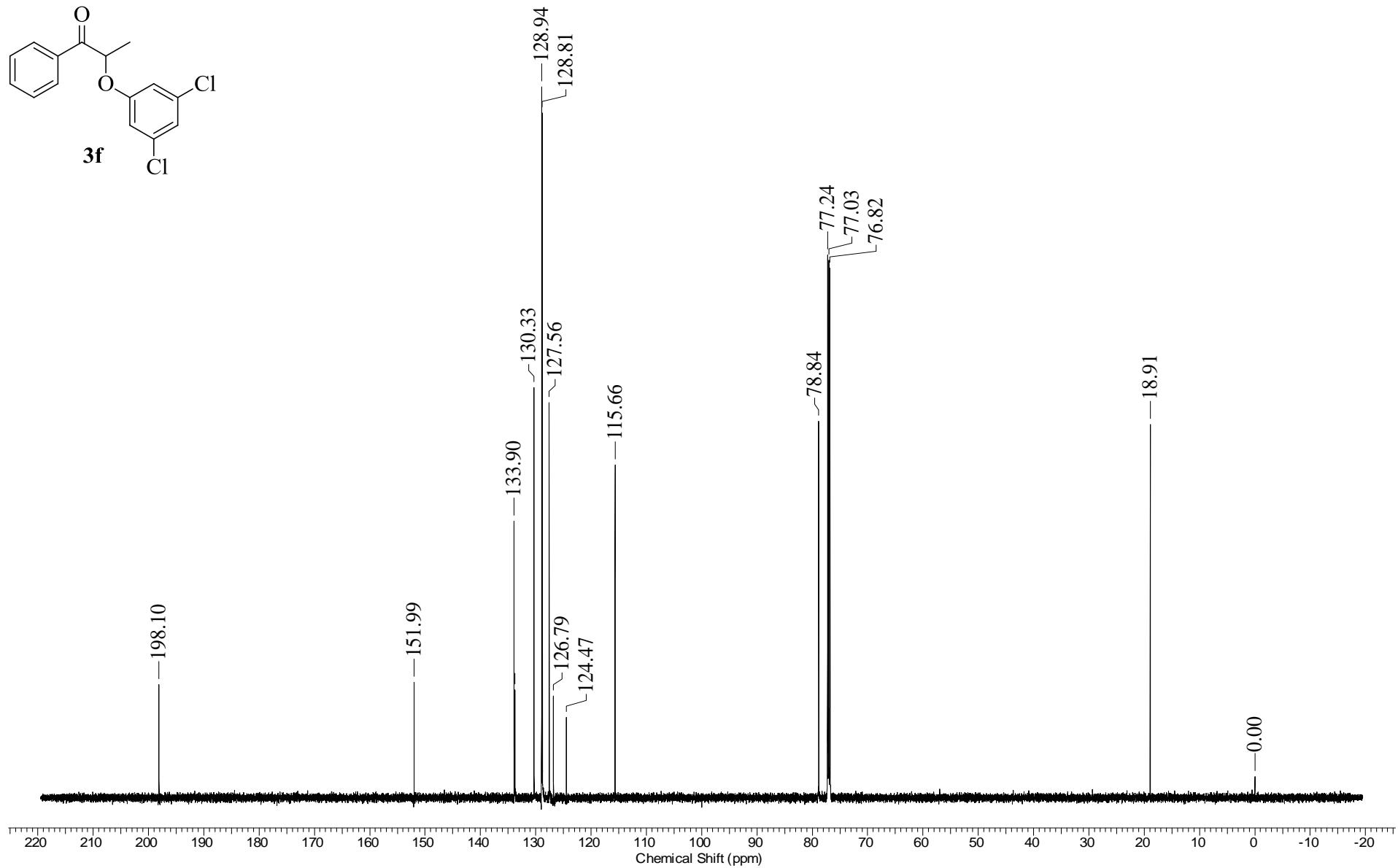
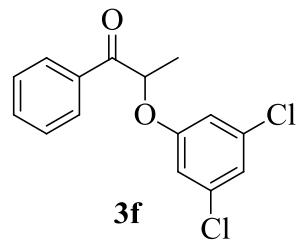
**Figure S14.** <sup>13</sup>C NMR spectrum (150 MHz, CDCl<sub>3</sub>) of compound **3e**.



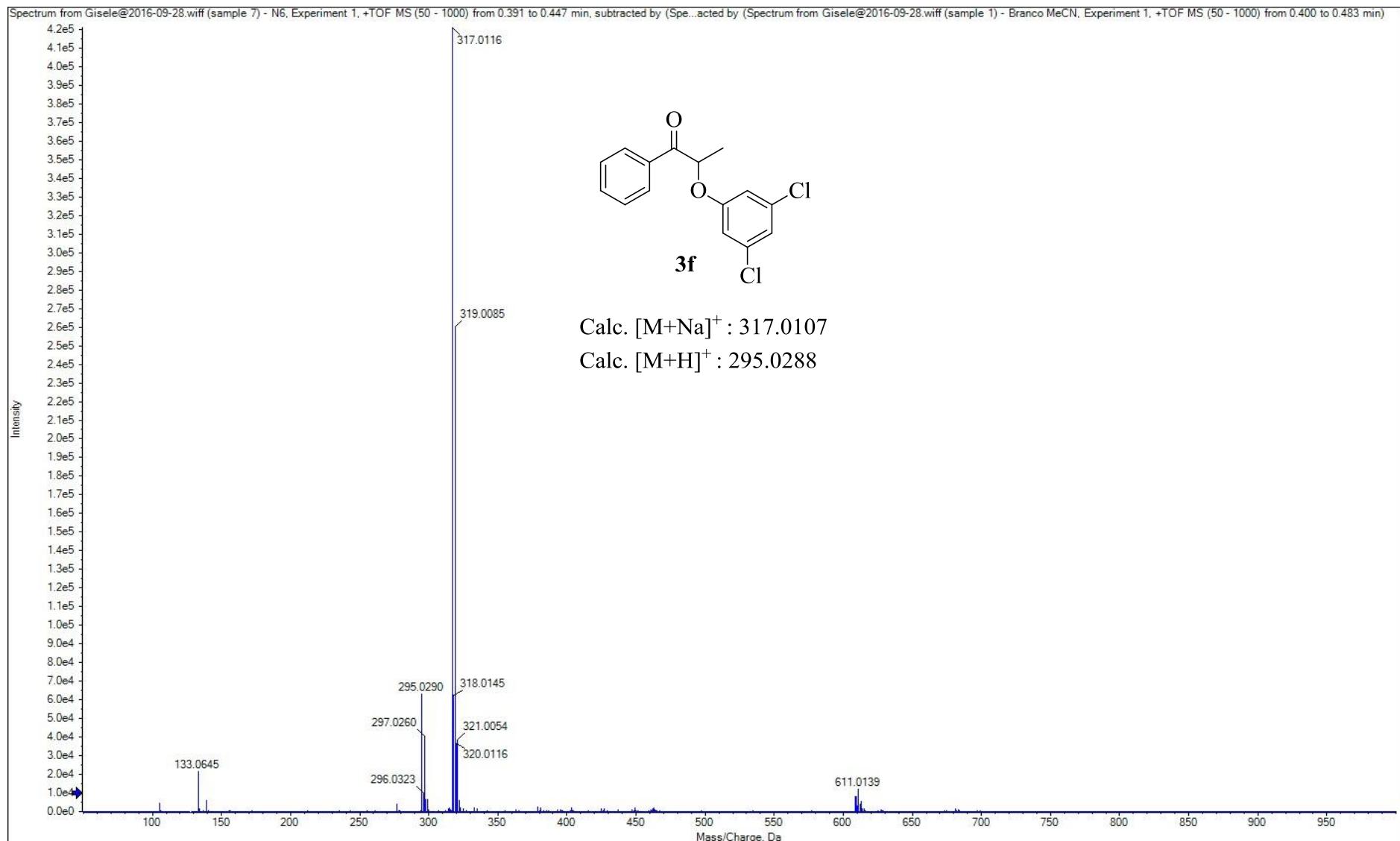
**Figure S15.** HRMS spectrum of compound 3e.



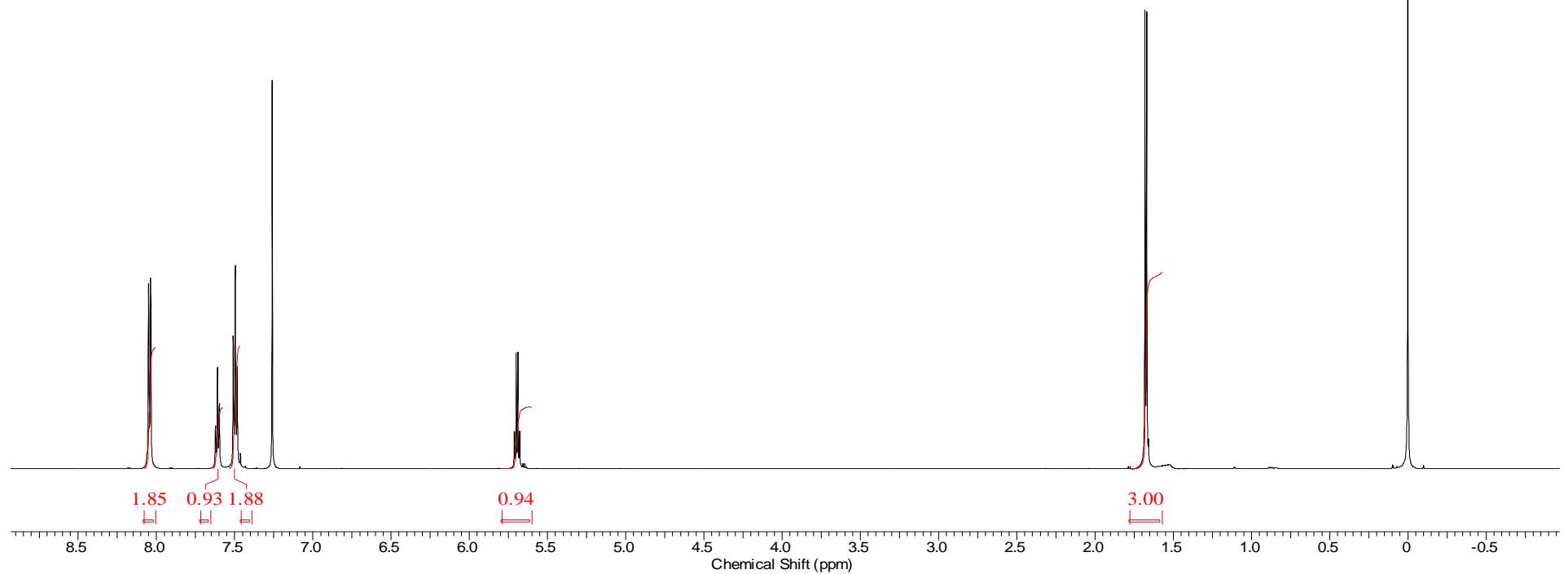
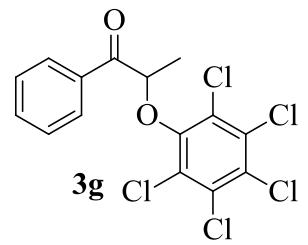
**Figure S16.** <sup>1</sup>H NMR spectrum (600 MHz, CDCl<sub>3</sub>) of compound **3f**.



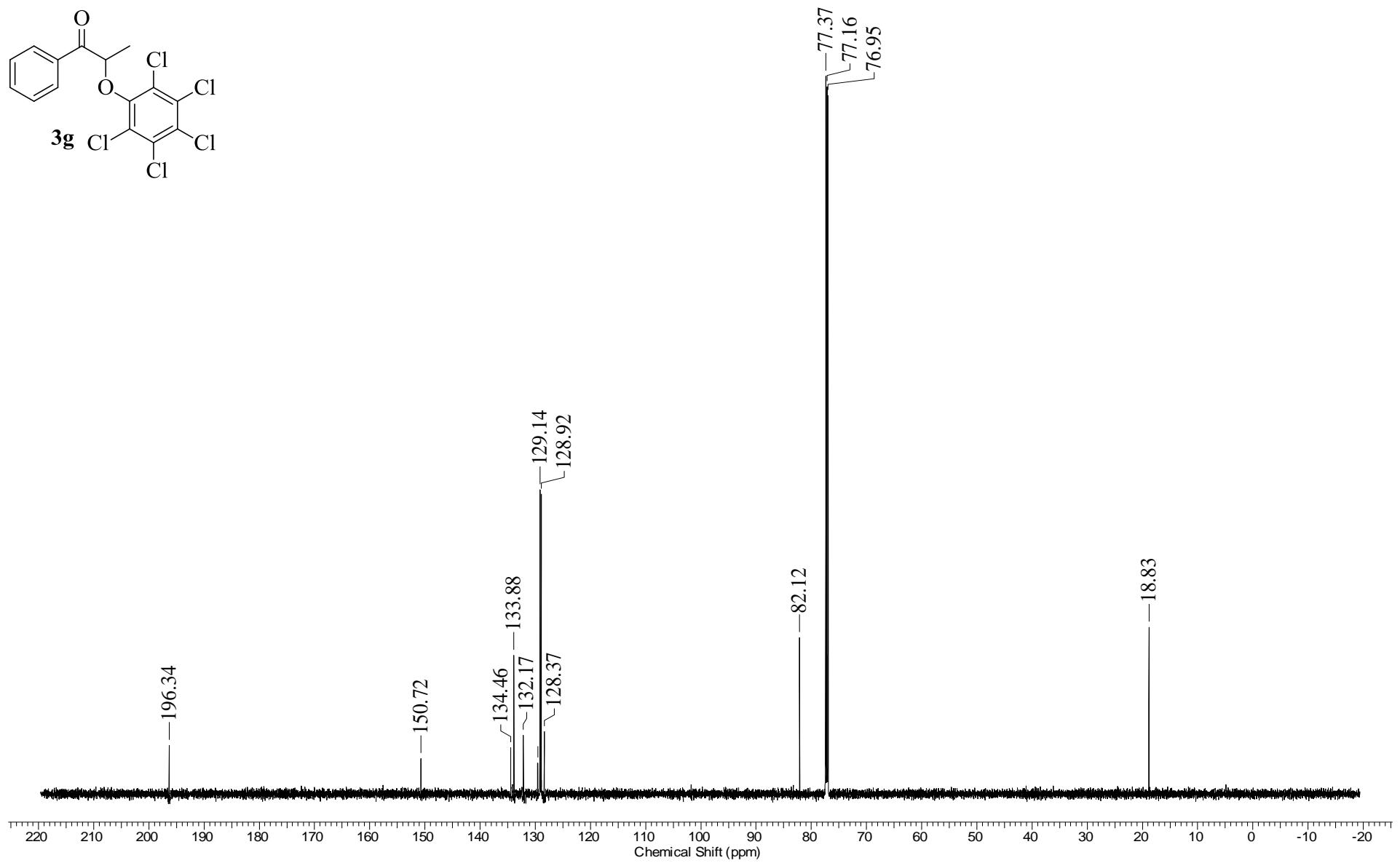
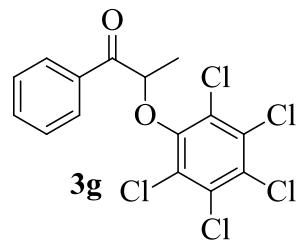
**Figure S17.** <sup>13</sup>C NMR spectrum (150 MHz, CDCl<sub>3</sub>) of compound 3f.



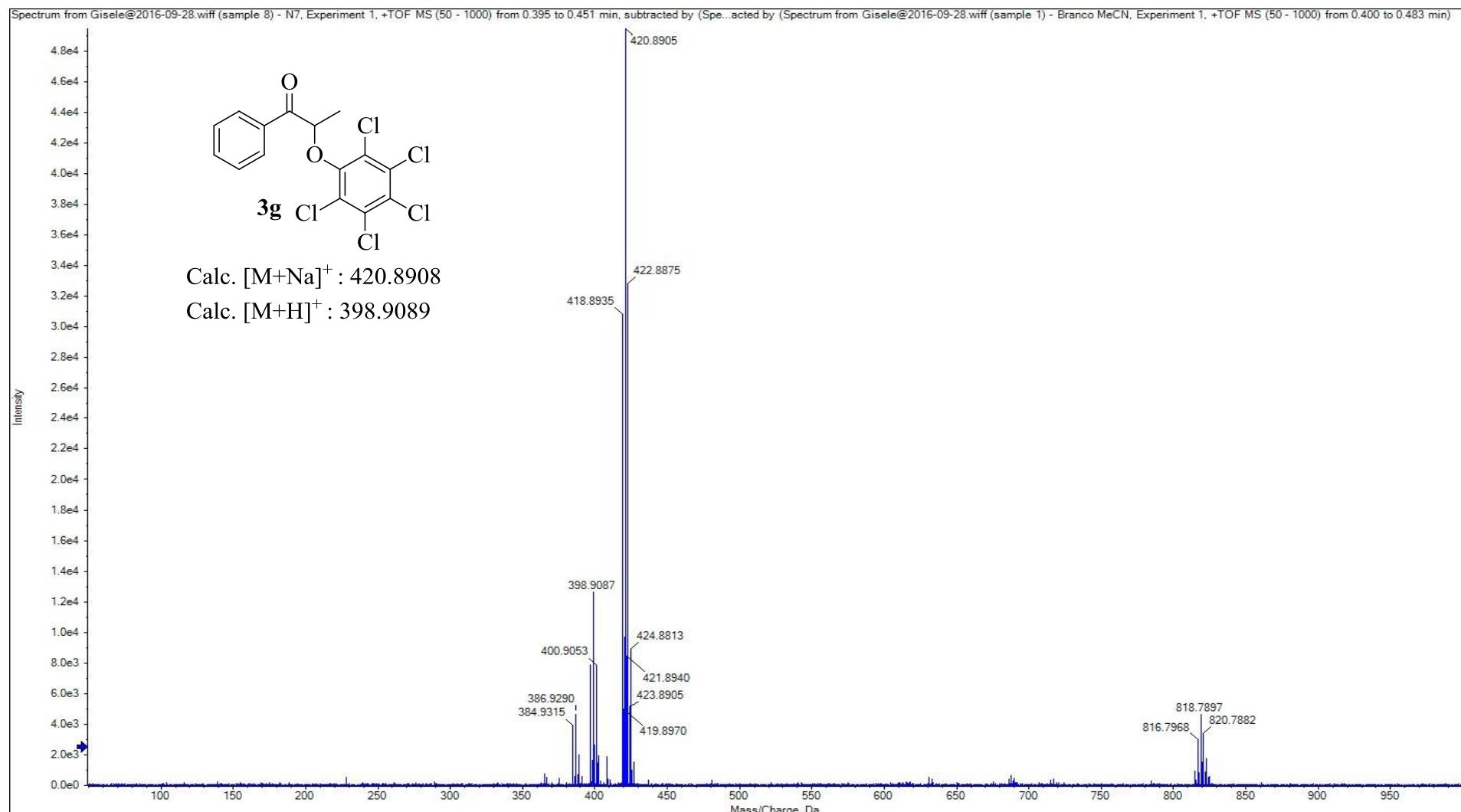
**Figure S18.** HRMS spectrum of compound **3f**.



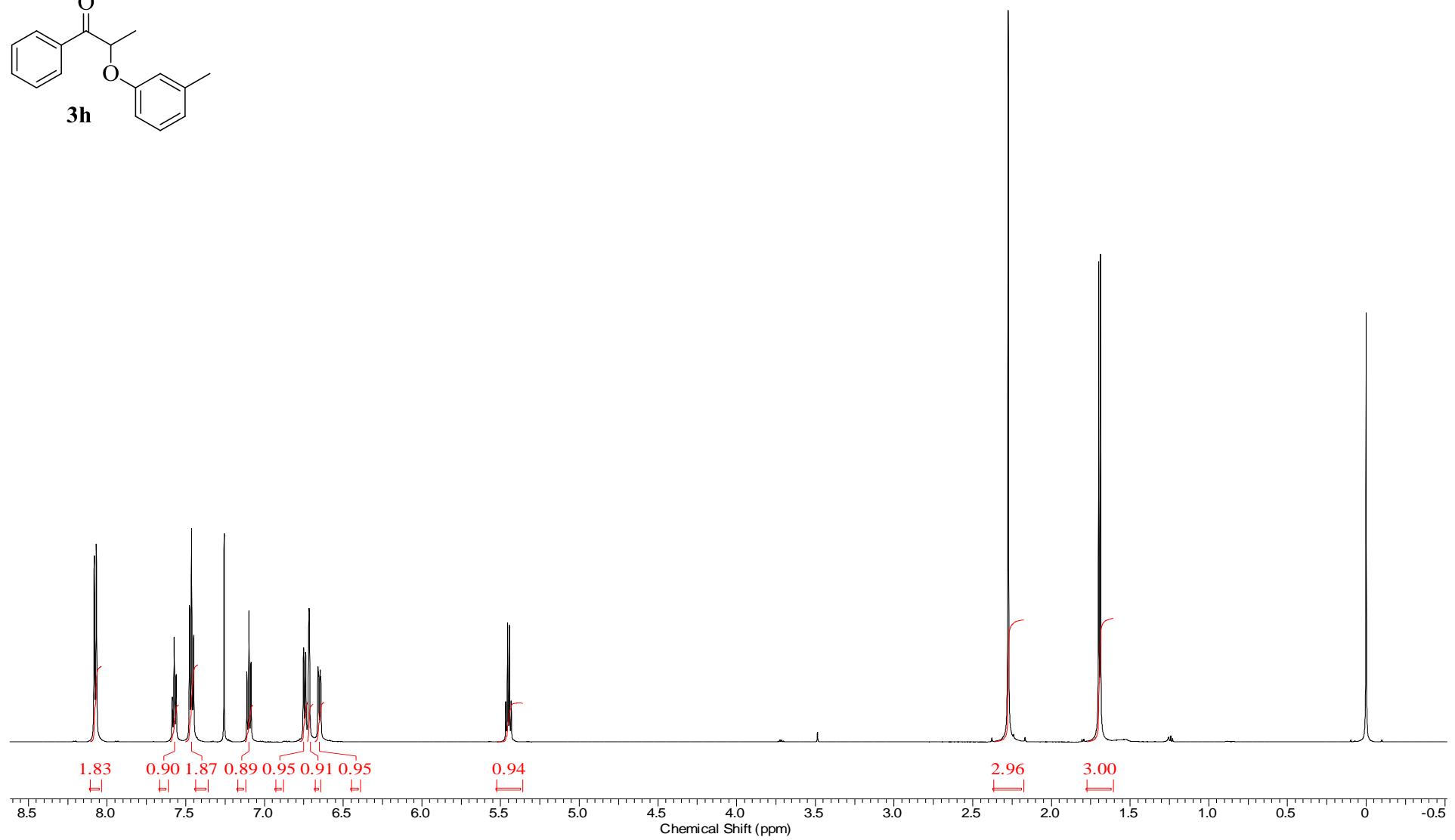
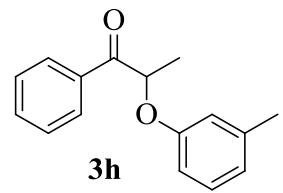
**Figure S19.**  $^1\text{H}$  NMR spectrum (600 MHz,  $\text{CDCl}_3$ ) of compound **3g**.



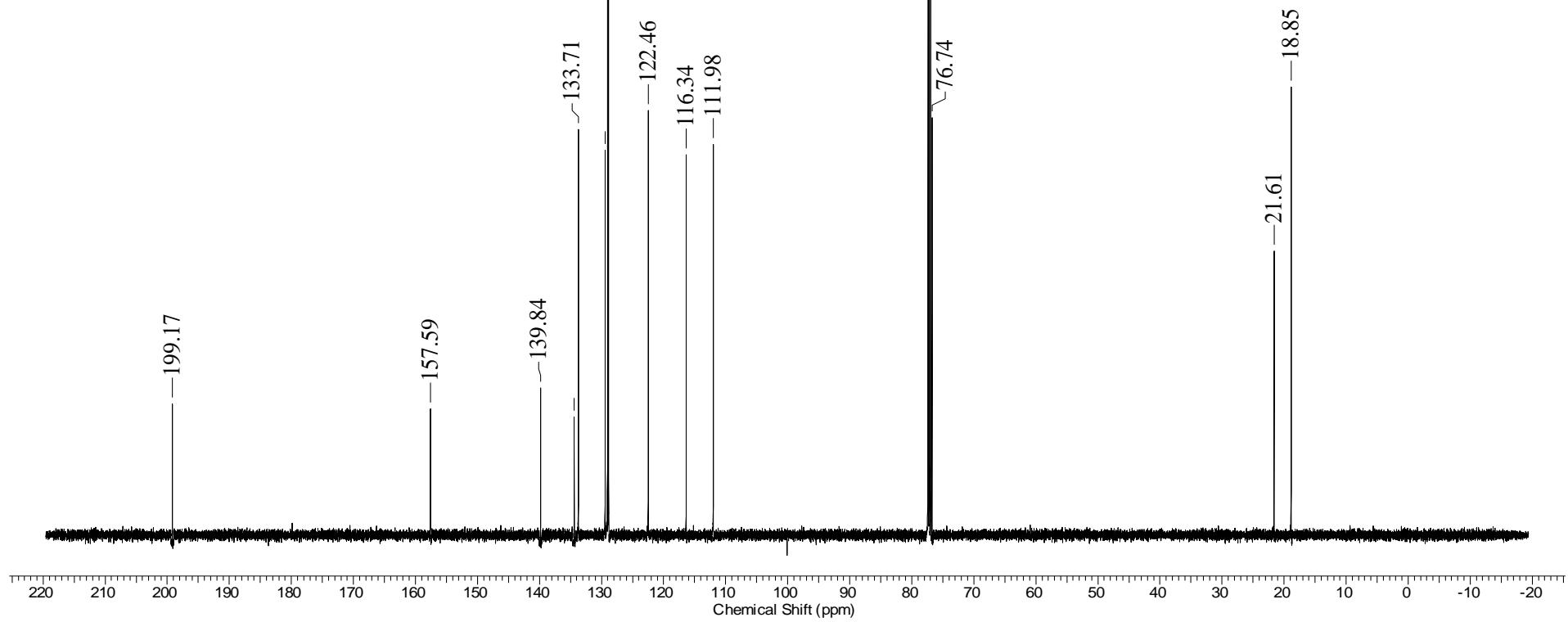
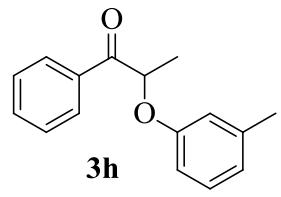
**Figure S20.**  $^{13}\text{C}$  NMR spectrum (150 MHz,  $\text{CDCl}_3$ ) of compound **3g**.



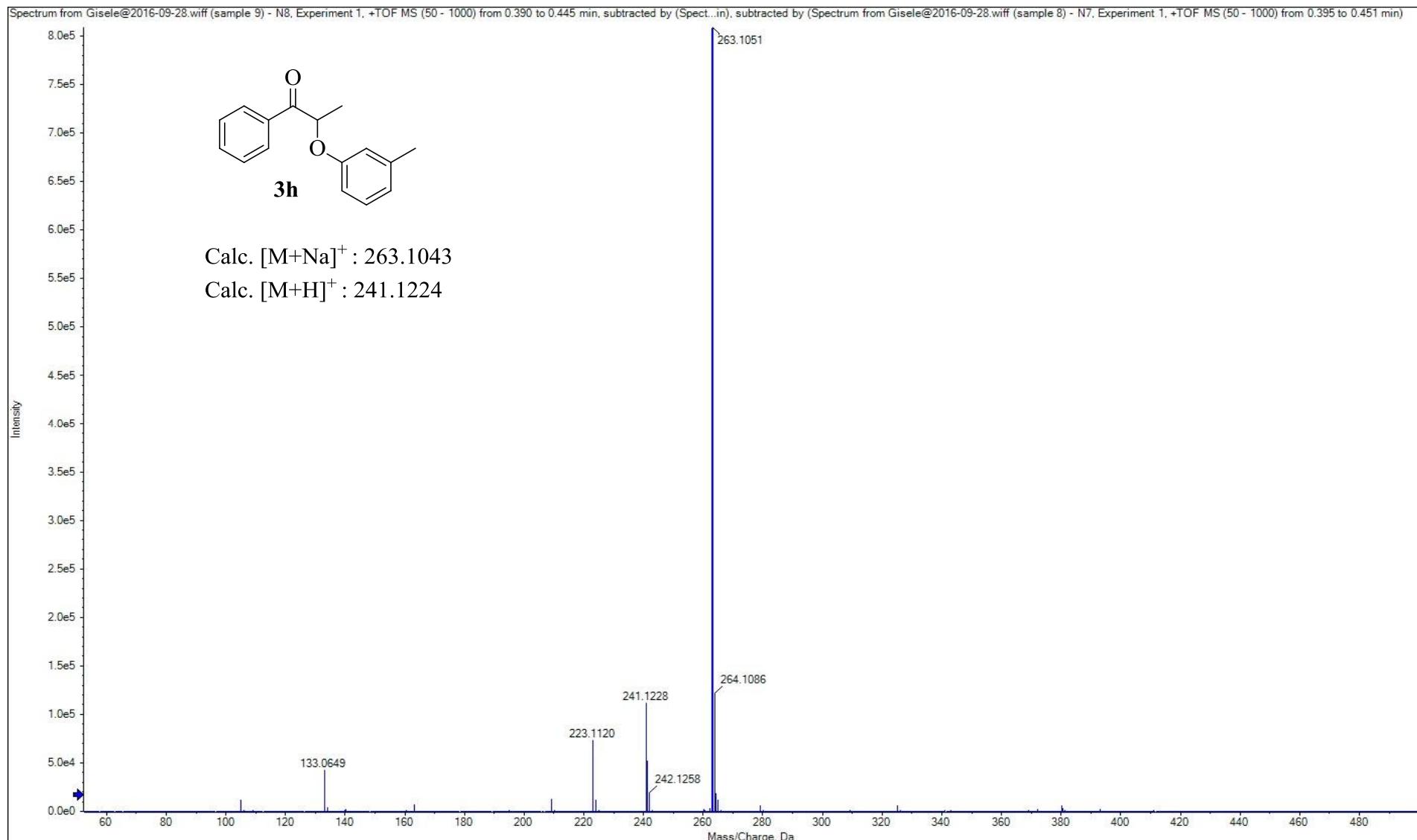
**Figure S21.** HRMS spectrum of compound **3g**.



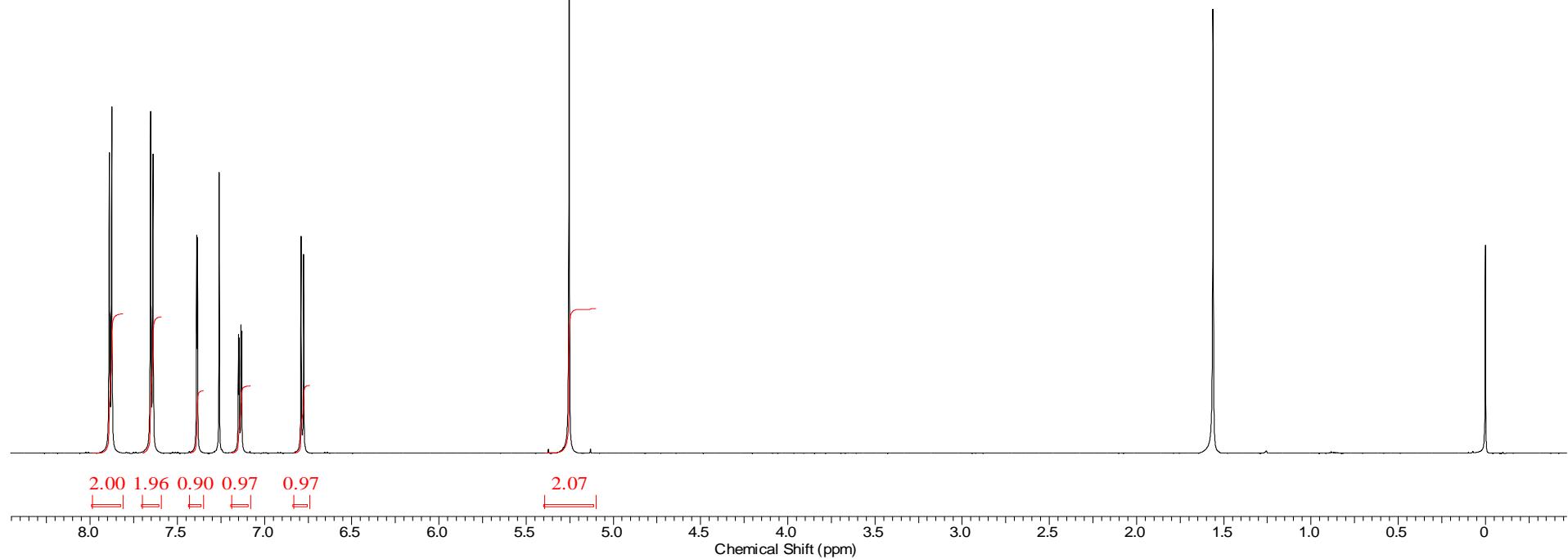
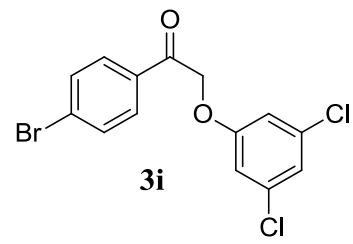
**Figure S22.** <sup>1</sup>H NMR spectrum (600 MHz, CDCl<sub>3</sub>) of compound **3h**.



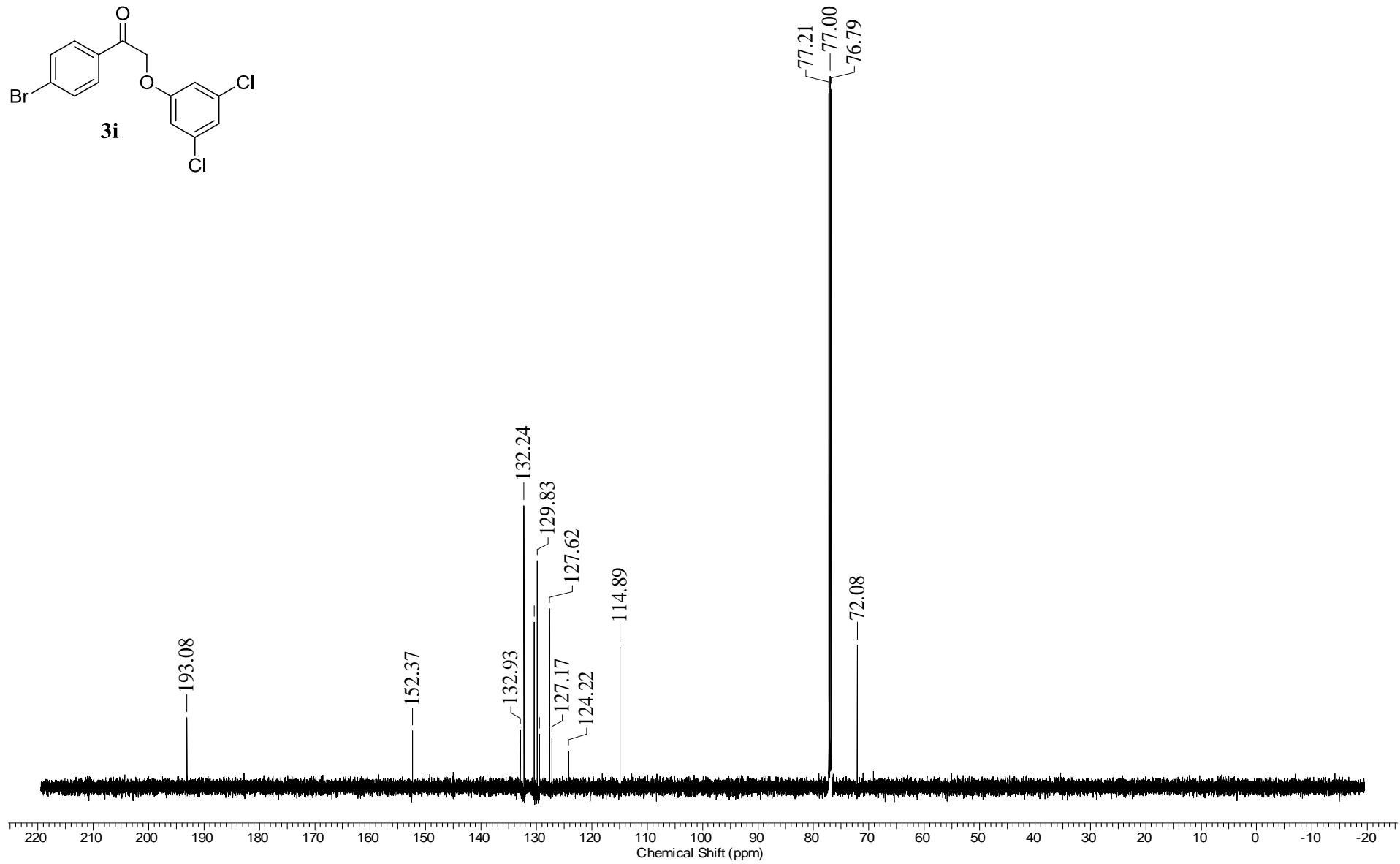
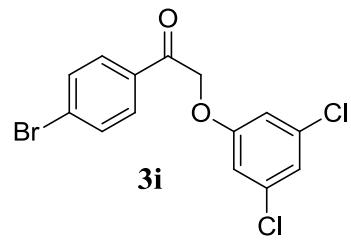
**Figure S23.** <sup>13</sup>C NMR spectrum (150 MHz, CDCl<sub>3</sub>) of compound **3h**.



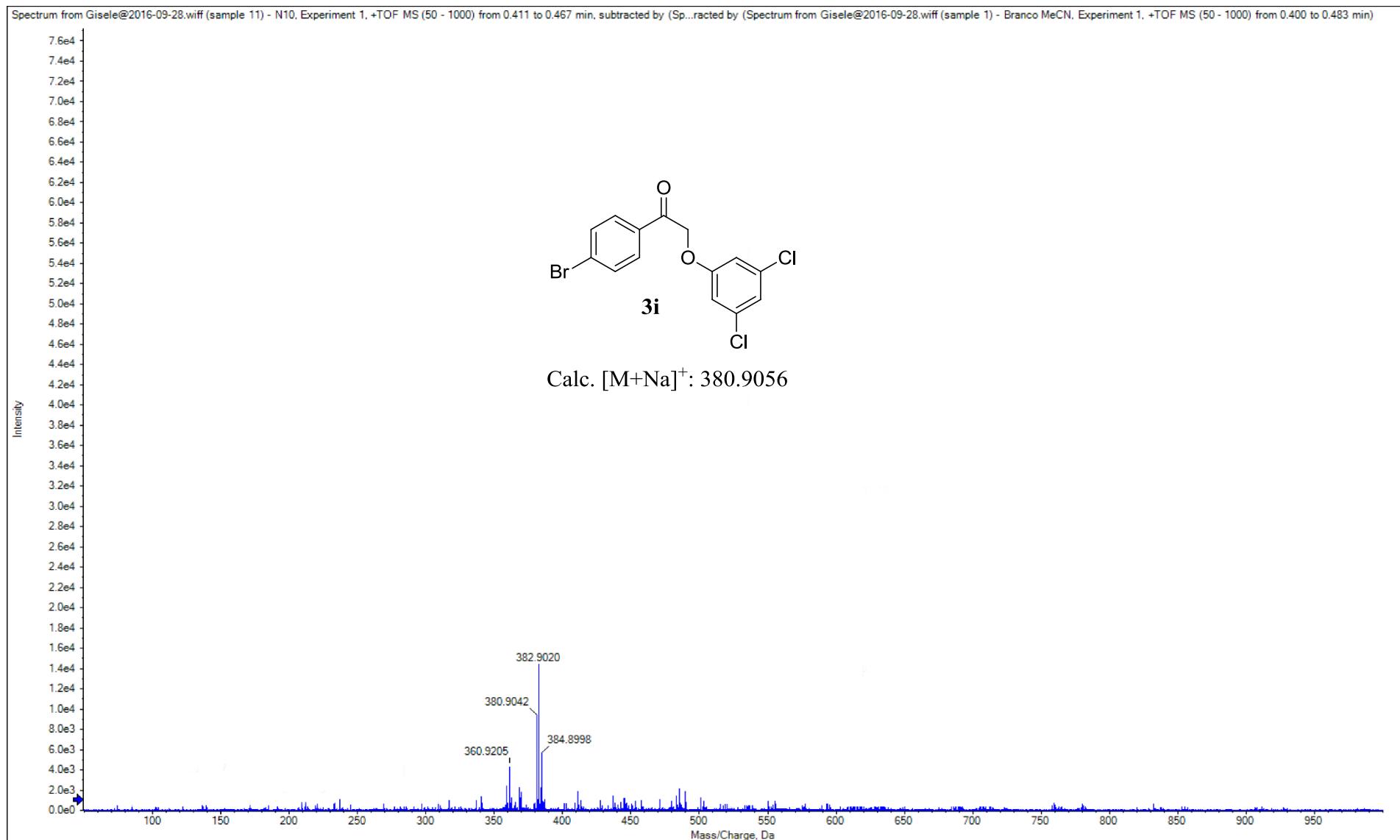
**Figure S24.** HRMS spectrum of compound **3h**.



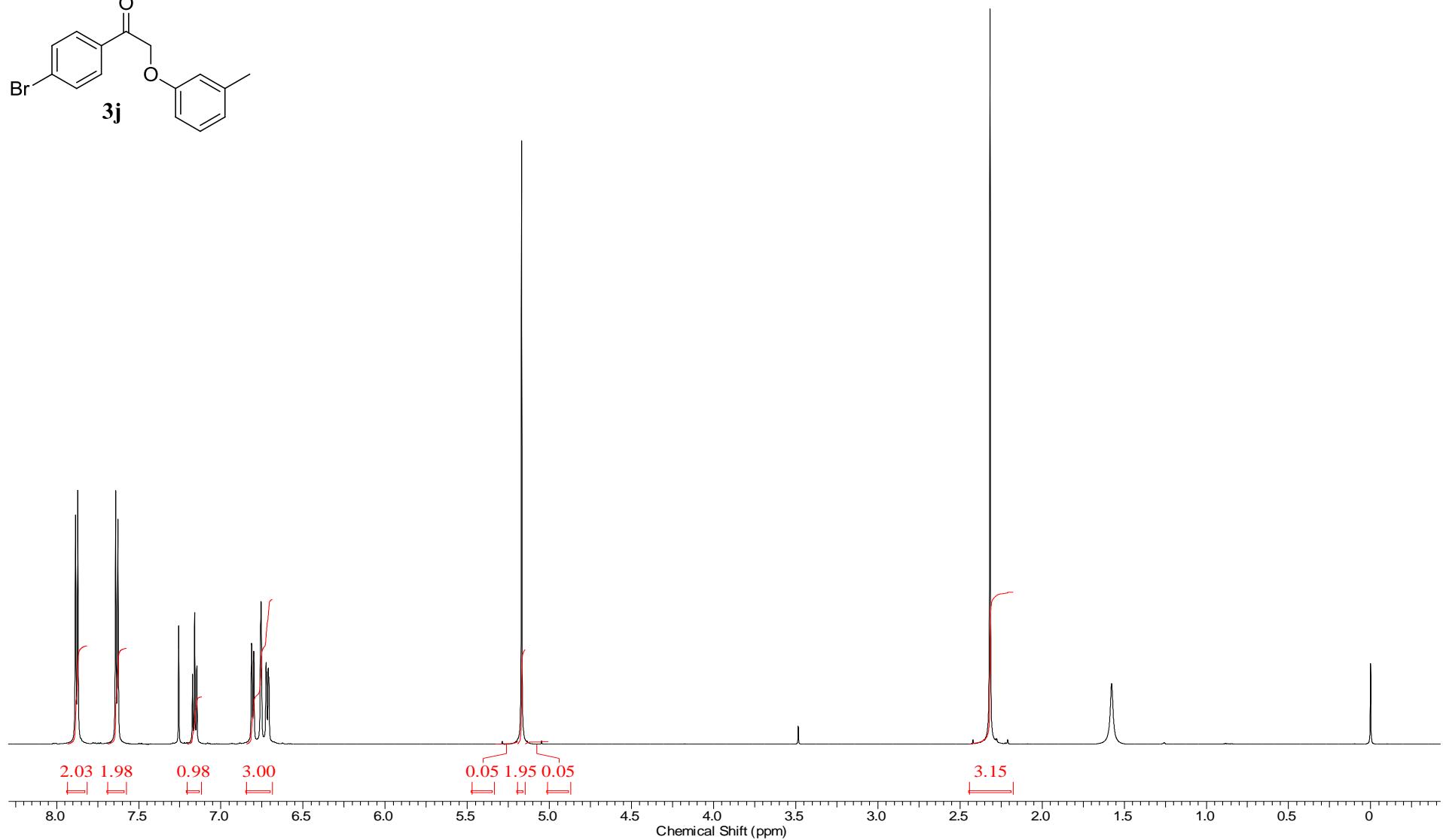
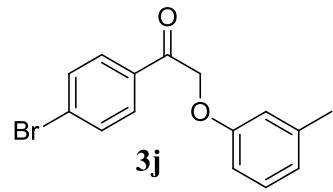
**Figure S25.**  $^1\text{H}$  NMR spectrum (600 MHz,  $\text{CDCl}_3$ ) of compound **3i**.



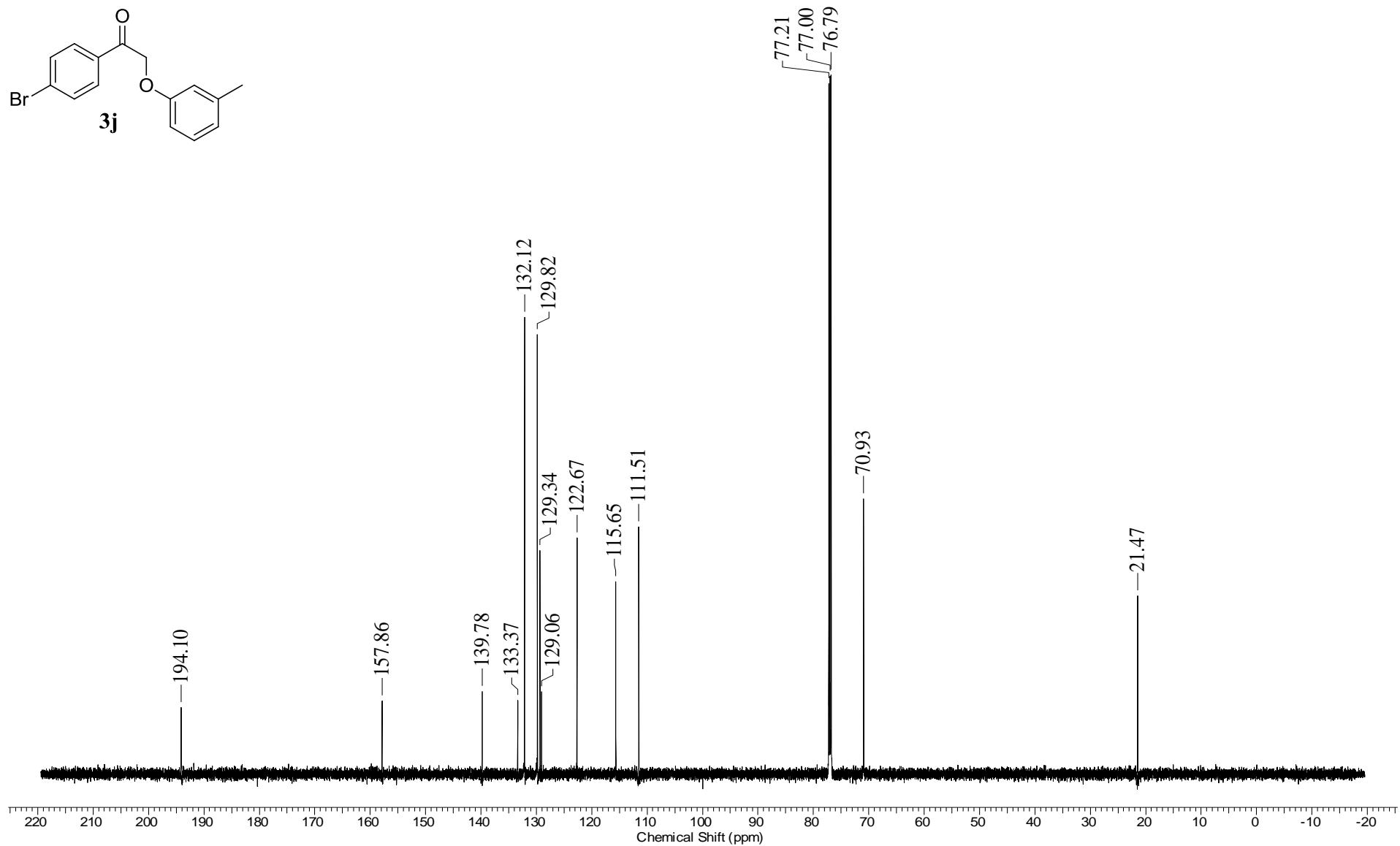
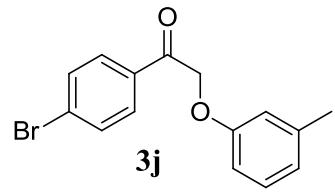
**Figure S26.** <sup>13</sup>C NMR spectrum (150 MHz, CDCl<sub>3</sub>) of compound 3i.



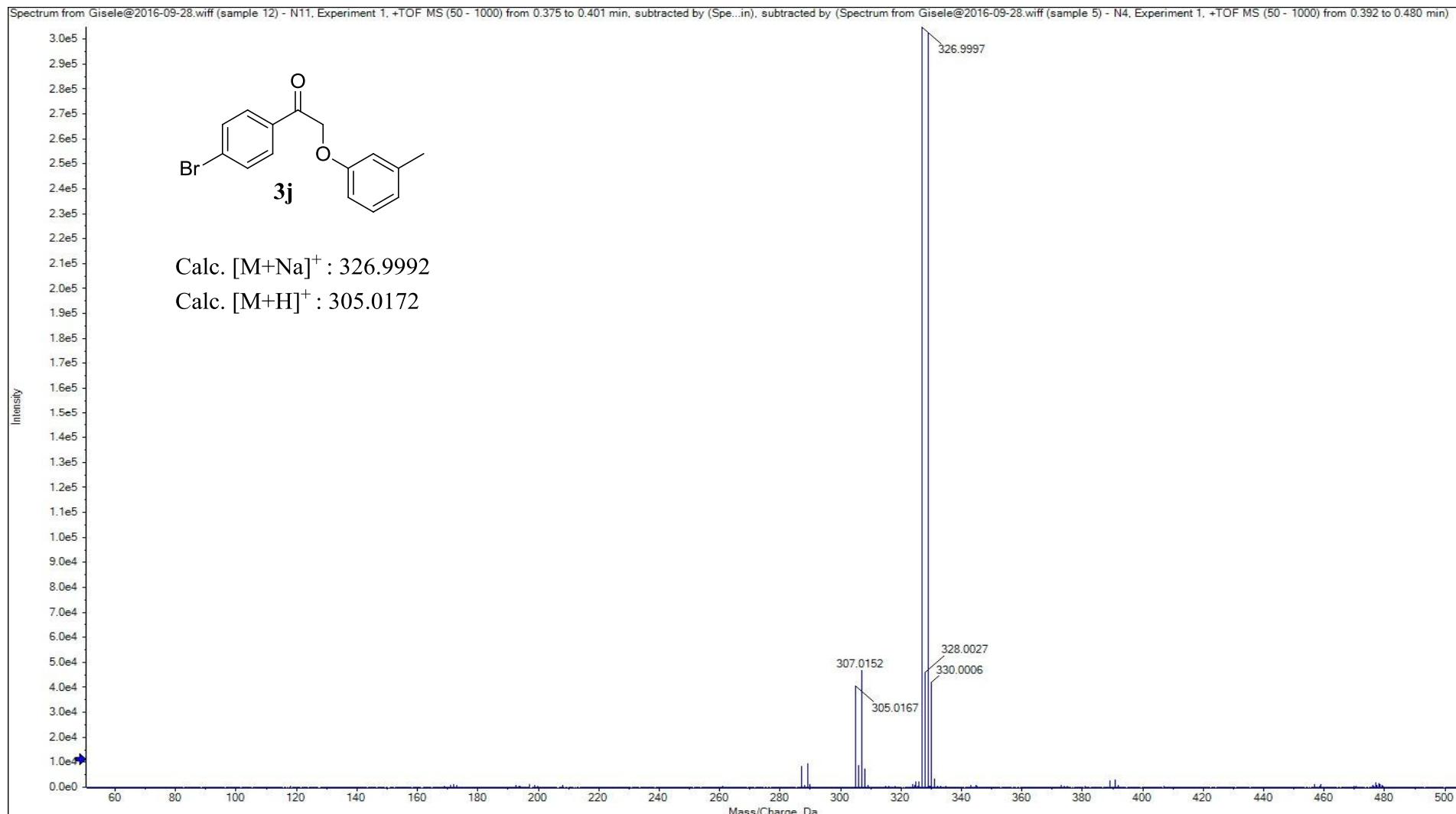
**Figure S27.** HRMS spectrum of compound **3i**.



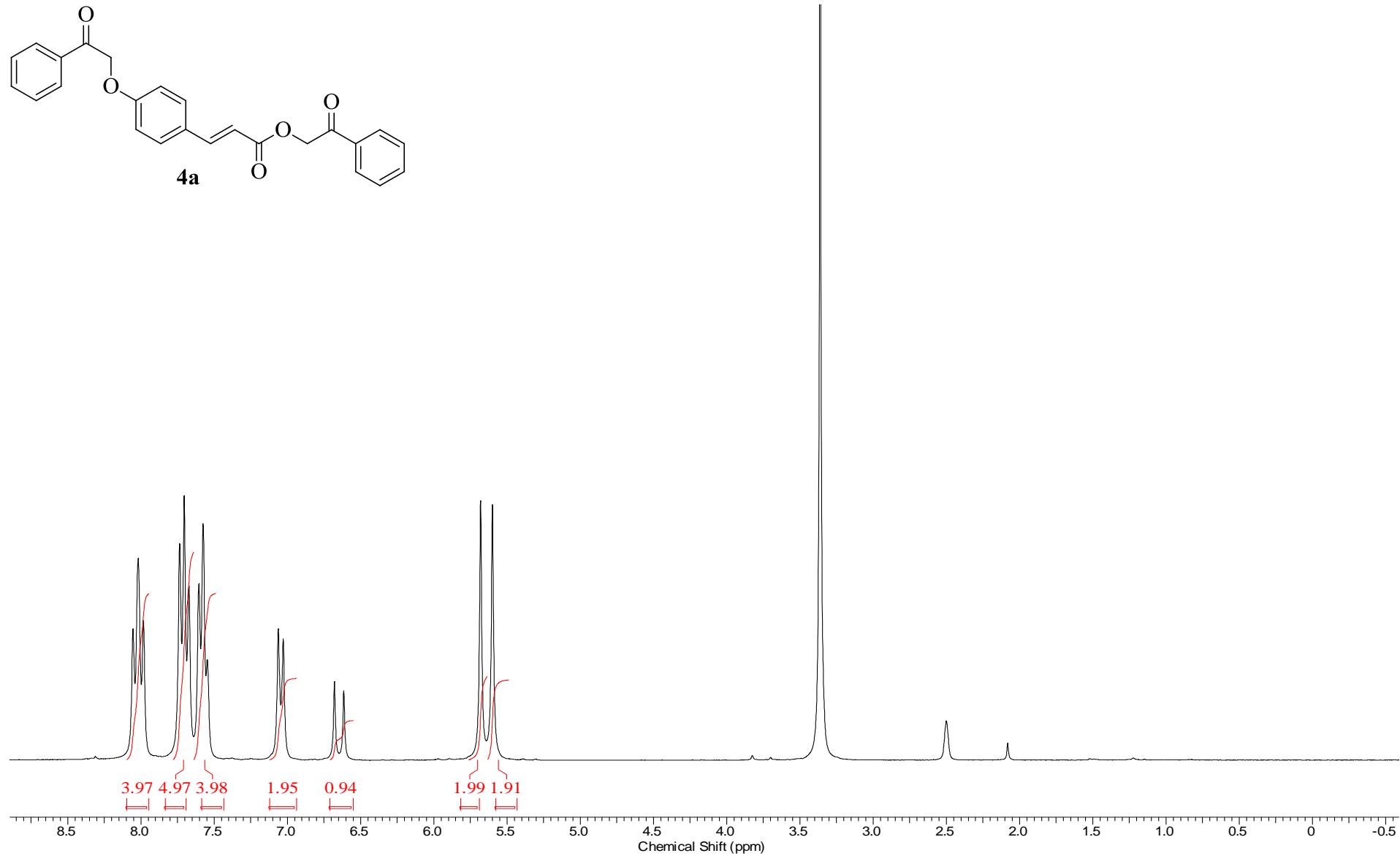
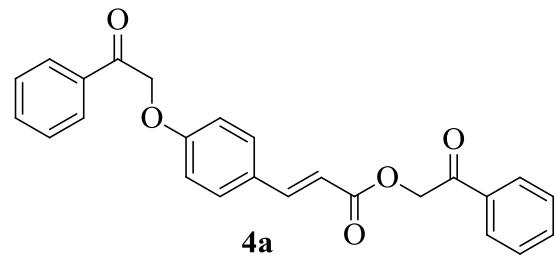
**Figure S28.**  $^1\text{H}$  NMR spectrum (600 MHz,  $\text{CDCl}_3$ ) of compound **3j**.



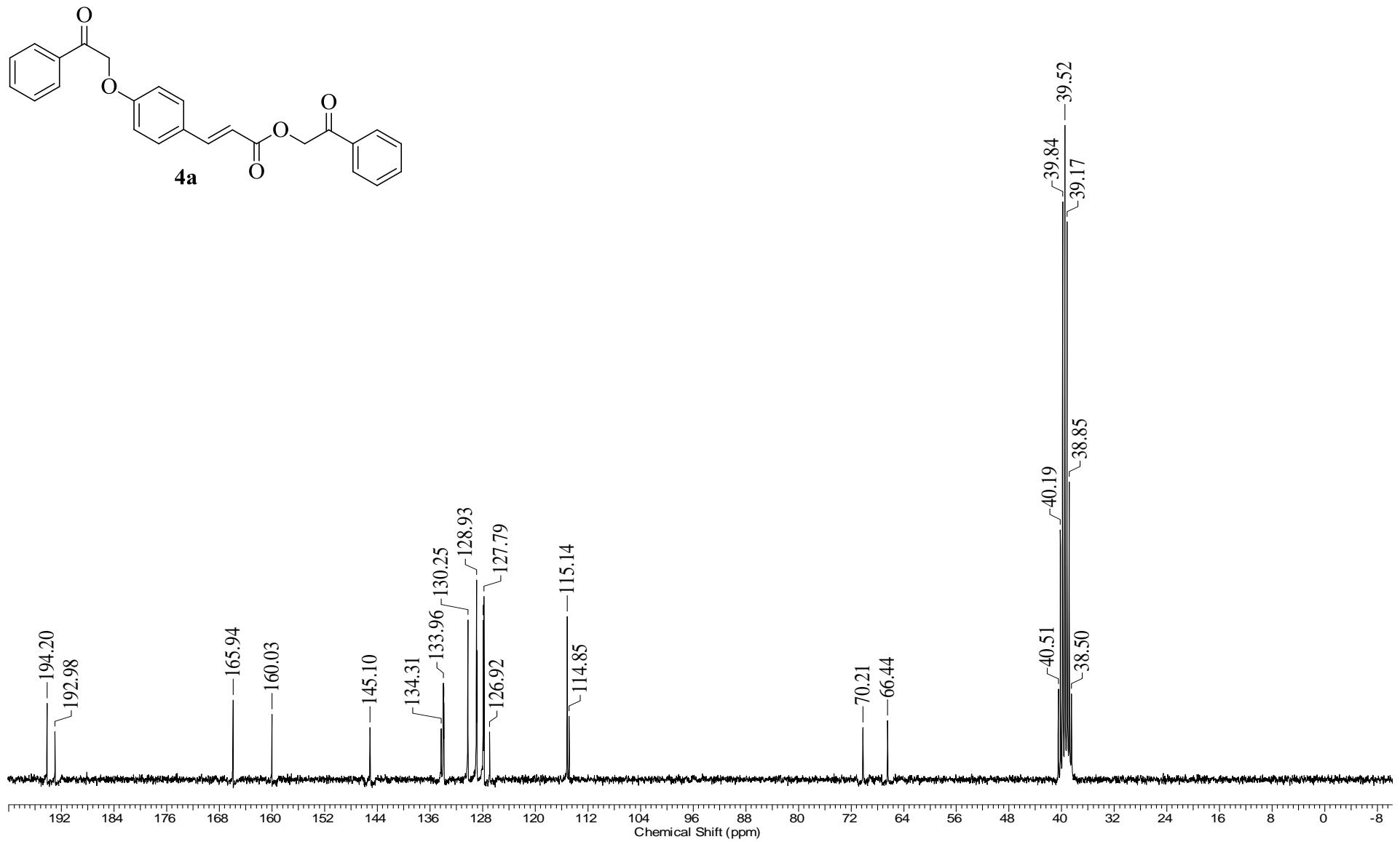
**Figure S29.** <sup>13</sup>C NMR spectrum (150 MHz, CDCl<sub>3</sub>) of compound 3j.



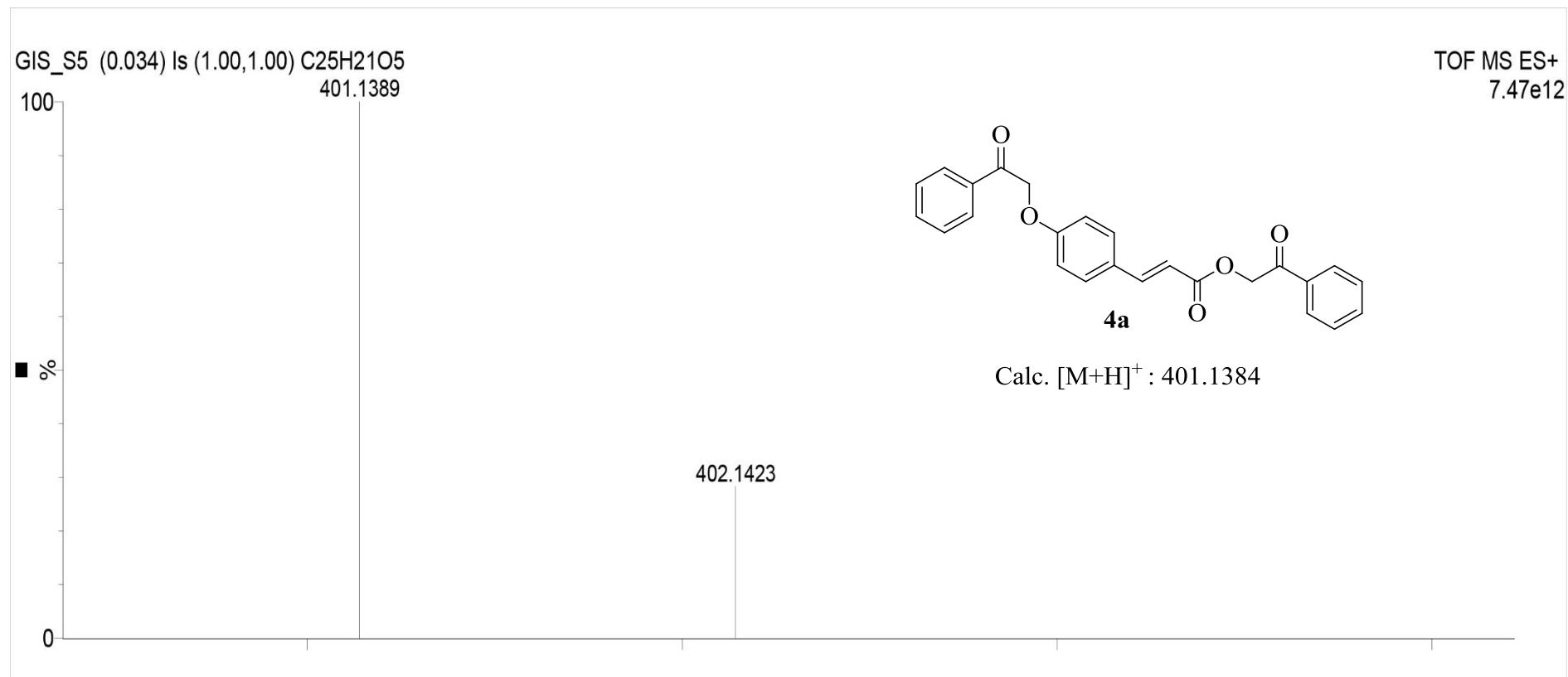
**Figure S30.** HRMS spectrum of compound **3j**.



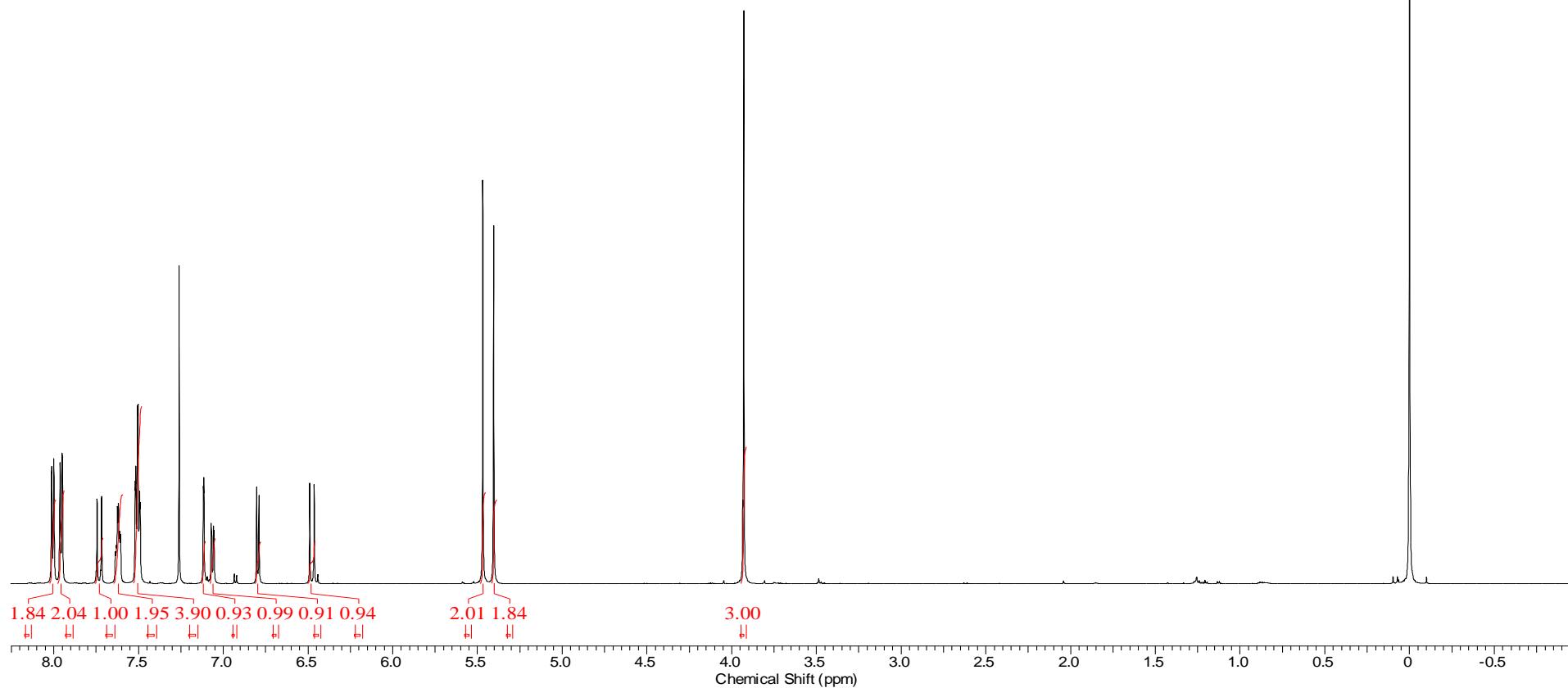
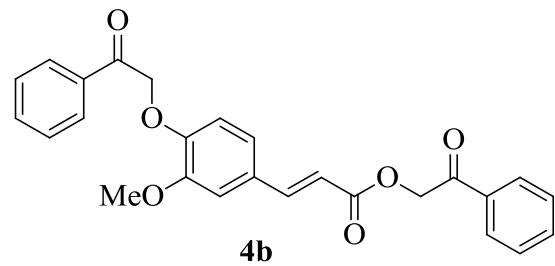
**Figure S31.** <sup>1</sup>H NMR spectrum (250 MHz, DMSO-*d*<sub>6</sub>) of compound **4a**.



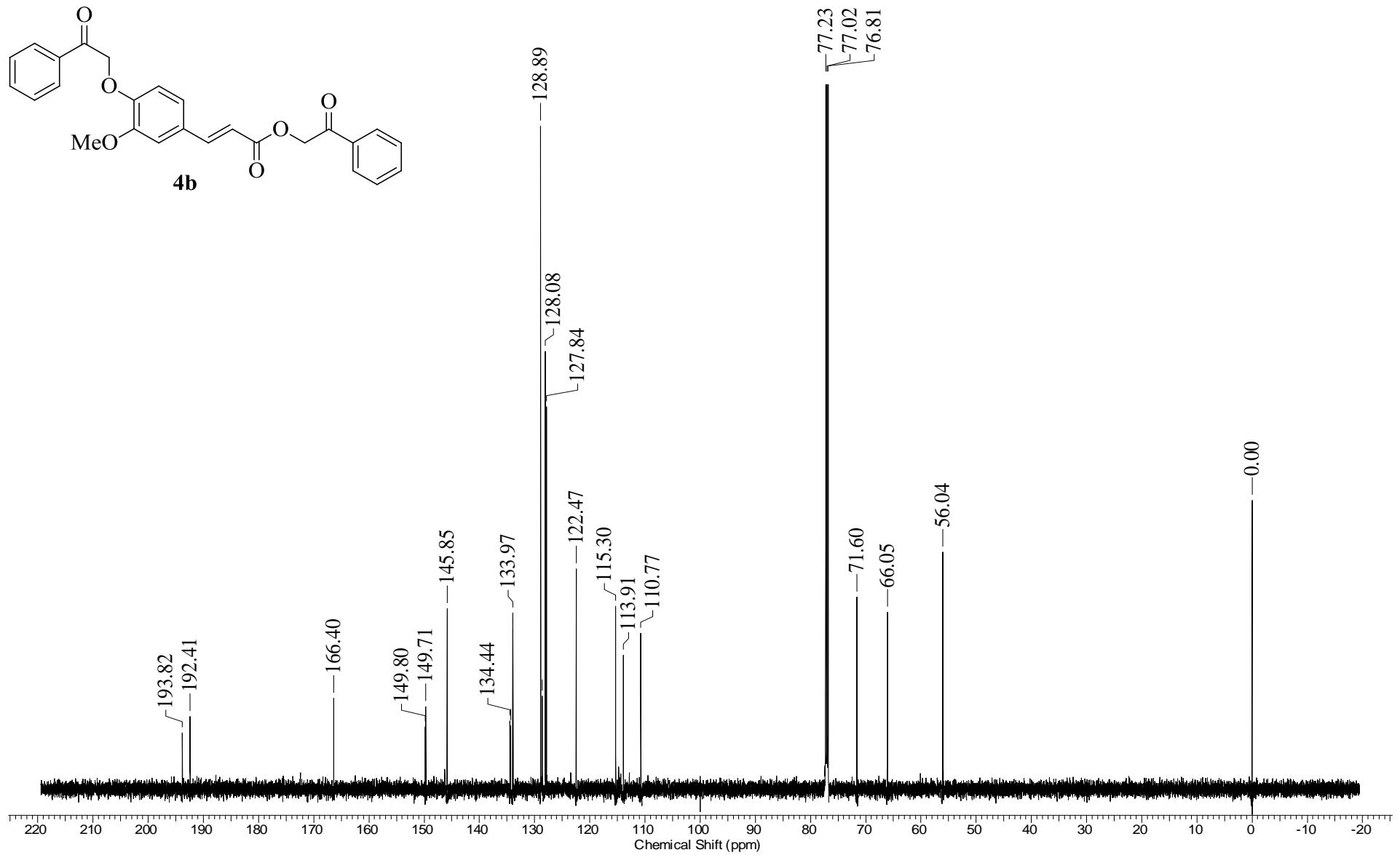
**Figure S32.** <sup>13</sup>C NMR spectrum (62.5 MHz, DMSO-*d*<sub>6</sub>) of compound **4a**.



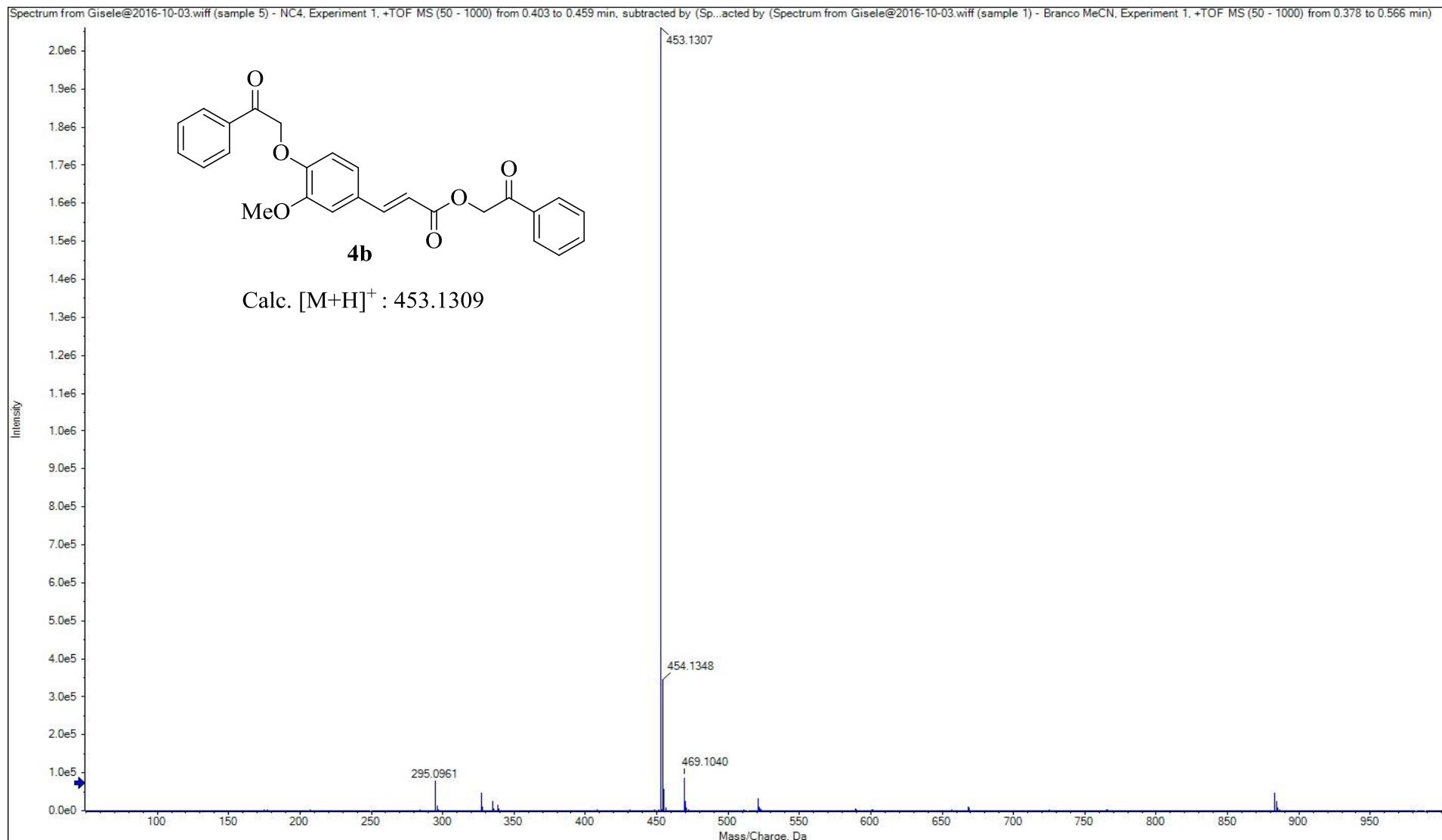
**Figure S33.** HRMS spectrum of compound **4a**.



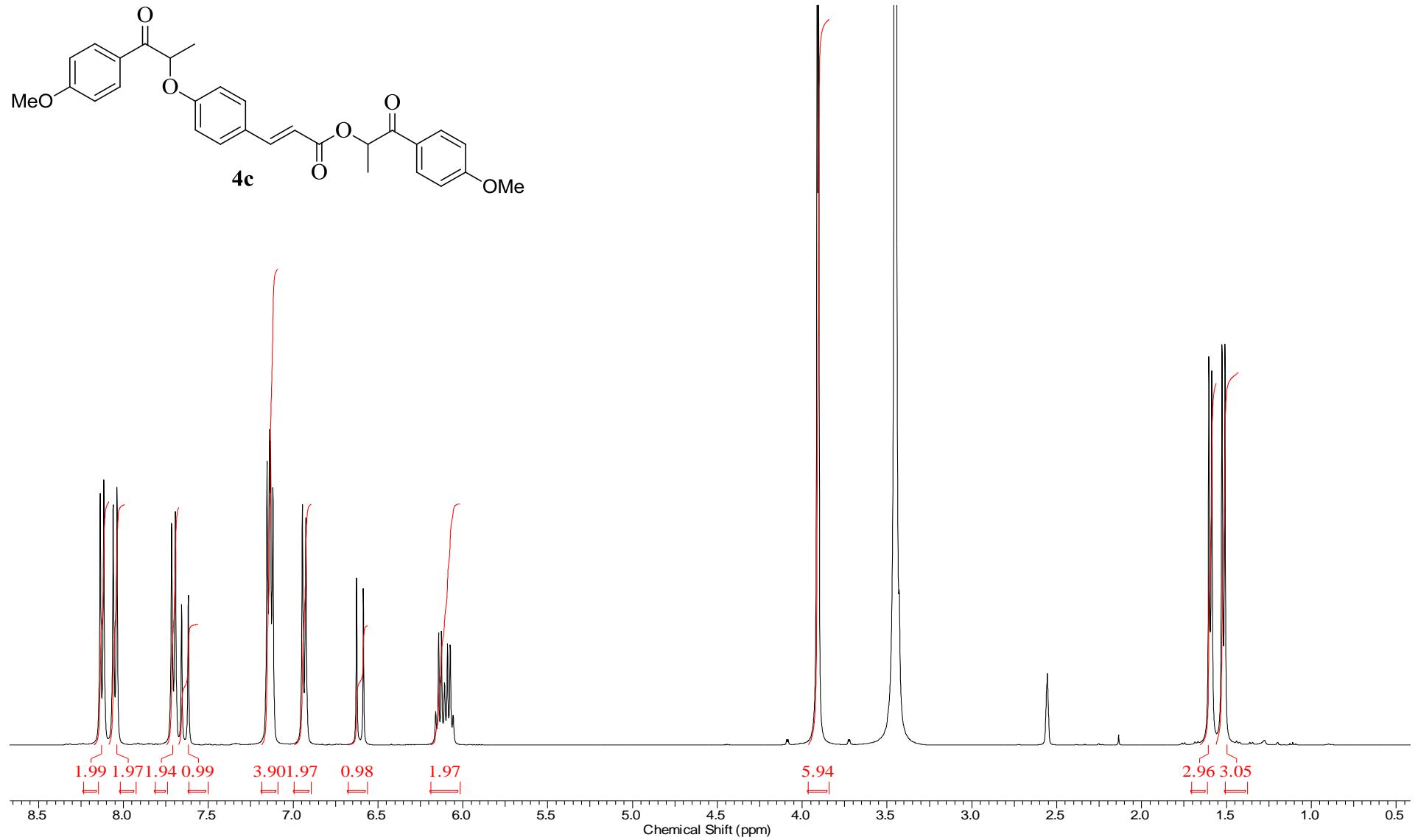
**Figure S34.** <sup>1</sup>H NMR spectrum (600 MHz, CDCl<sub>3</sub>) of compound 4b.



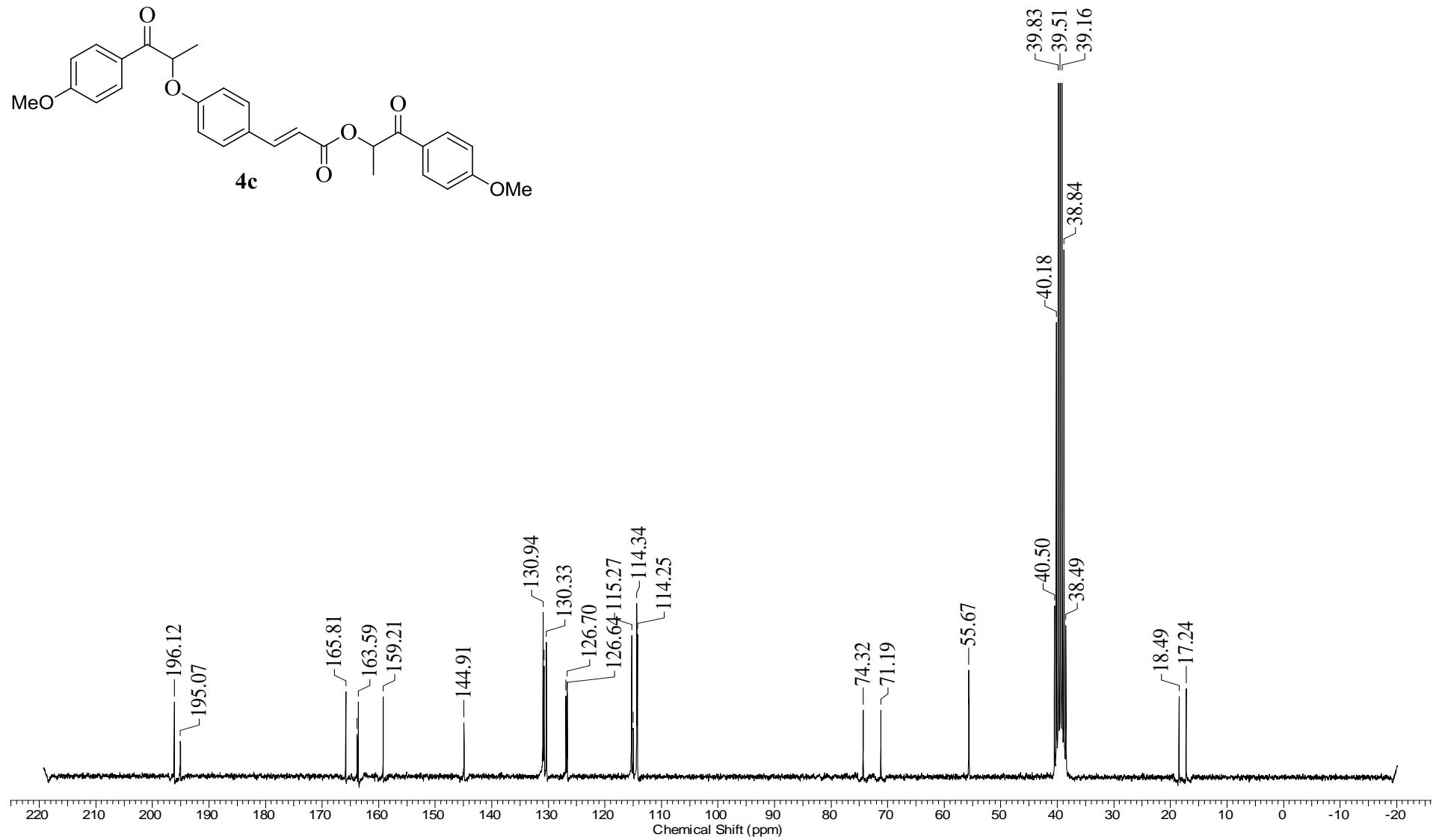
**Figure S35.**  $^{13}\text{C}$  NMR spectrum (150 MHz,  $\text{CDCl}_3$ ) of compound **4b**.



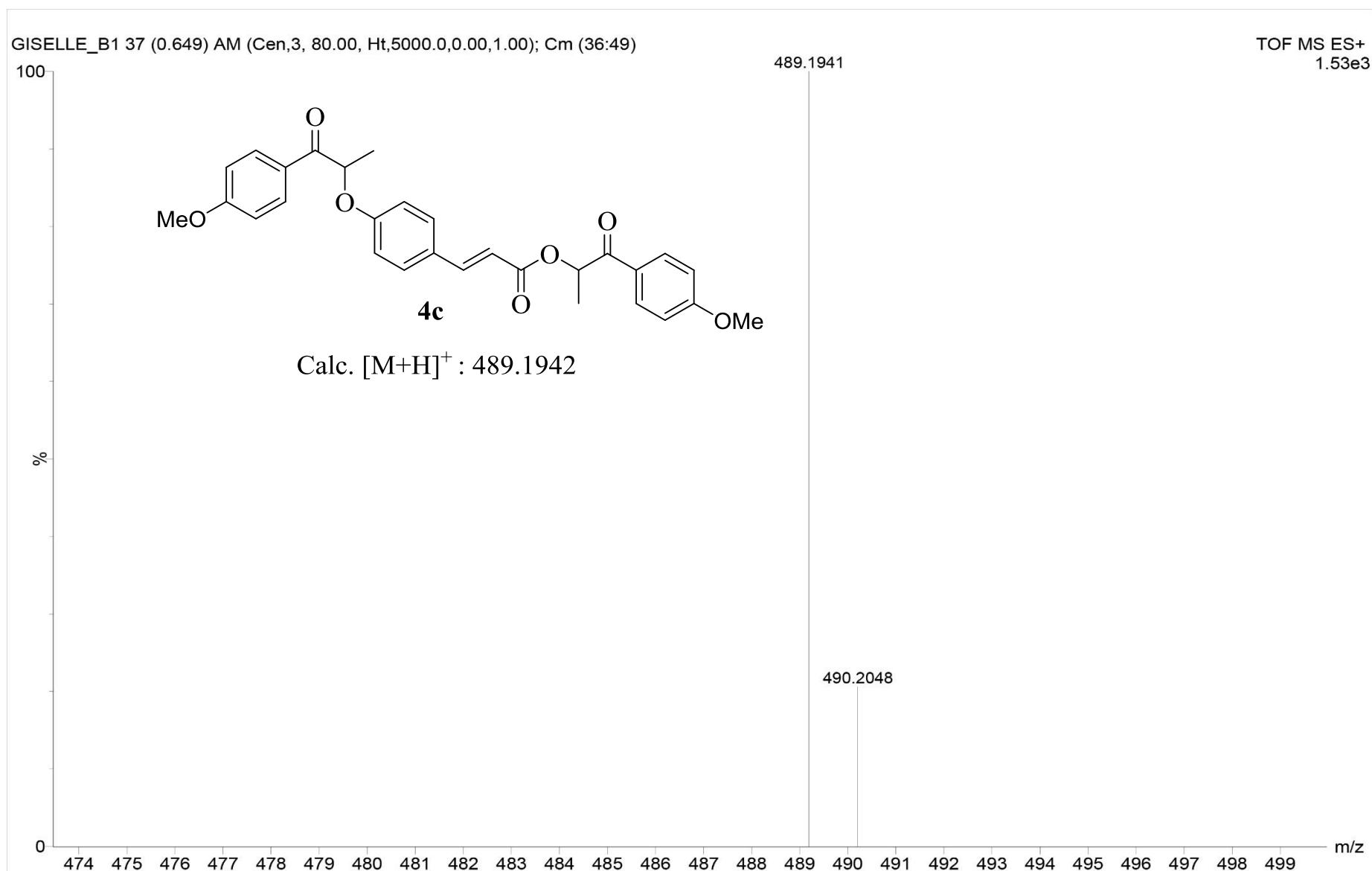
**Figure S36.** HRMS spectrum of compound **4b**.



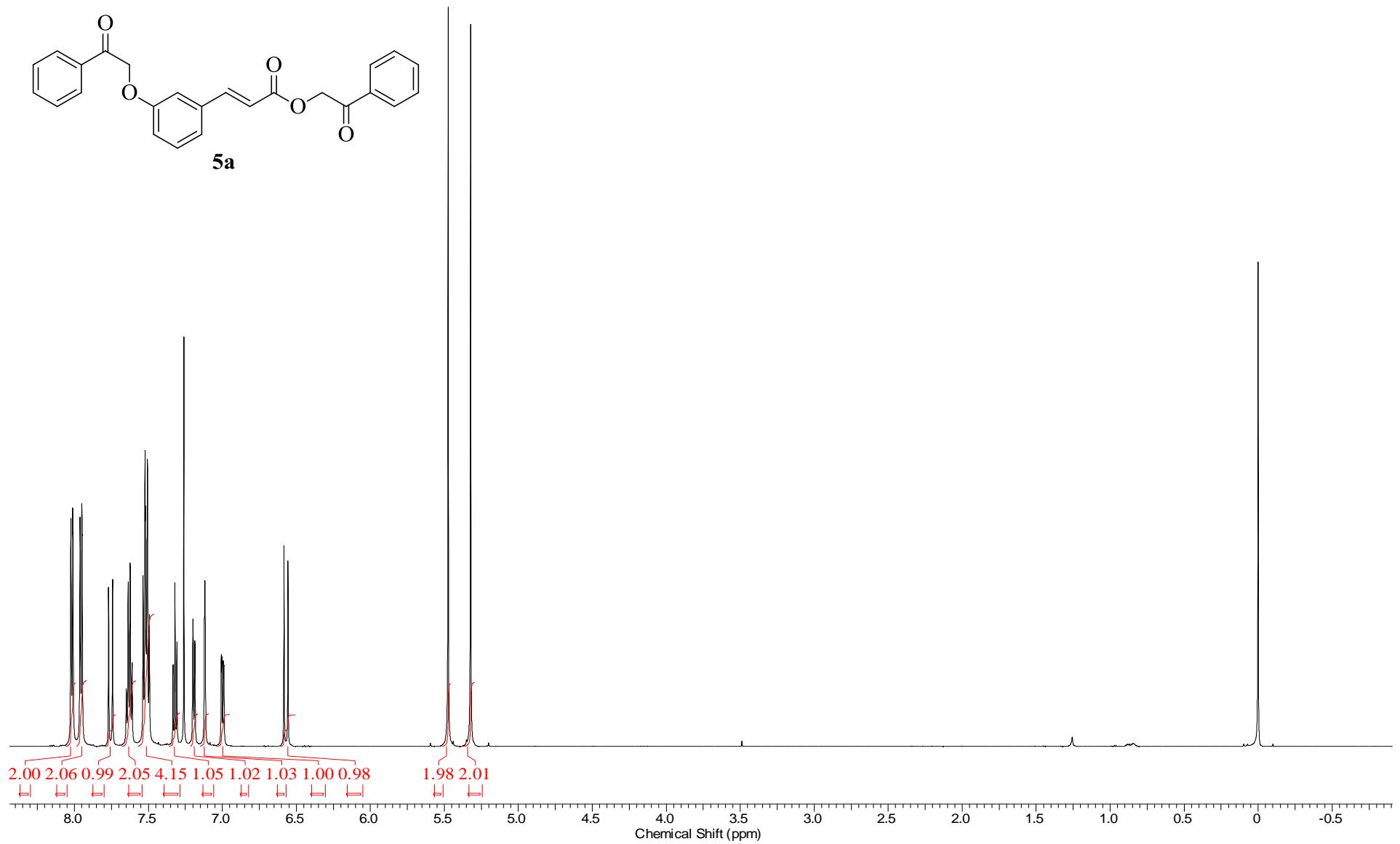
**Figure S37.**  $^1\text{H}$  NMR spectrum (400 MHz,  $\text{DMSO}-d_6$ ) of compound **4c**.



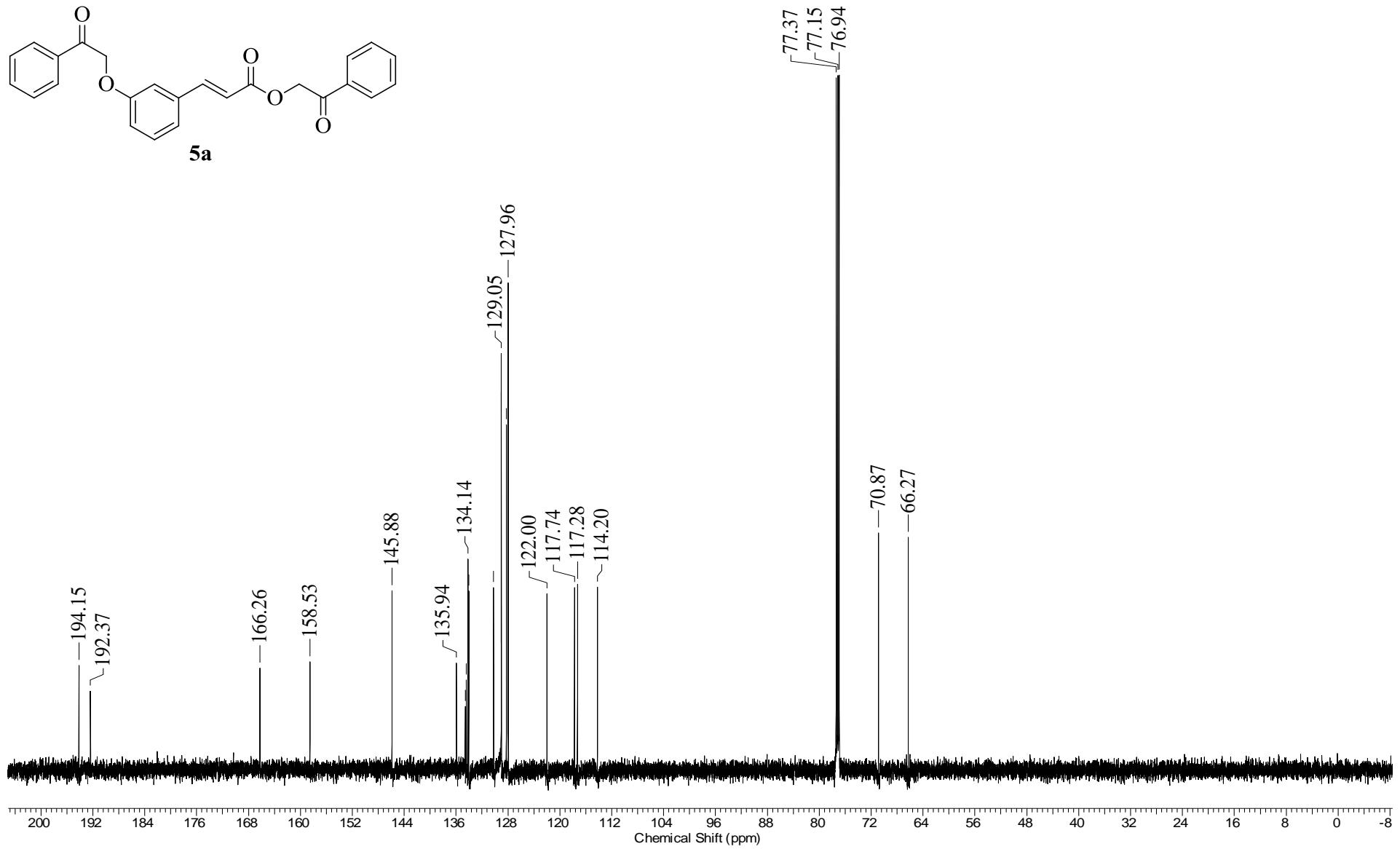
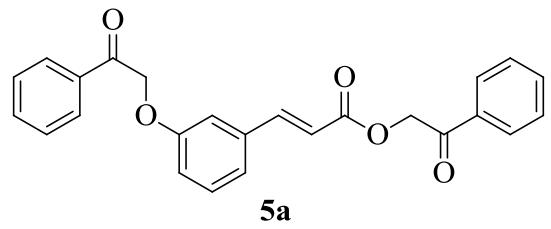
**Figure S38.** <sup>13</sup>C NMR spectrum (100 MHz, DMSO-*d*<sub>6</sub>) of compound **4c**.



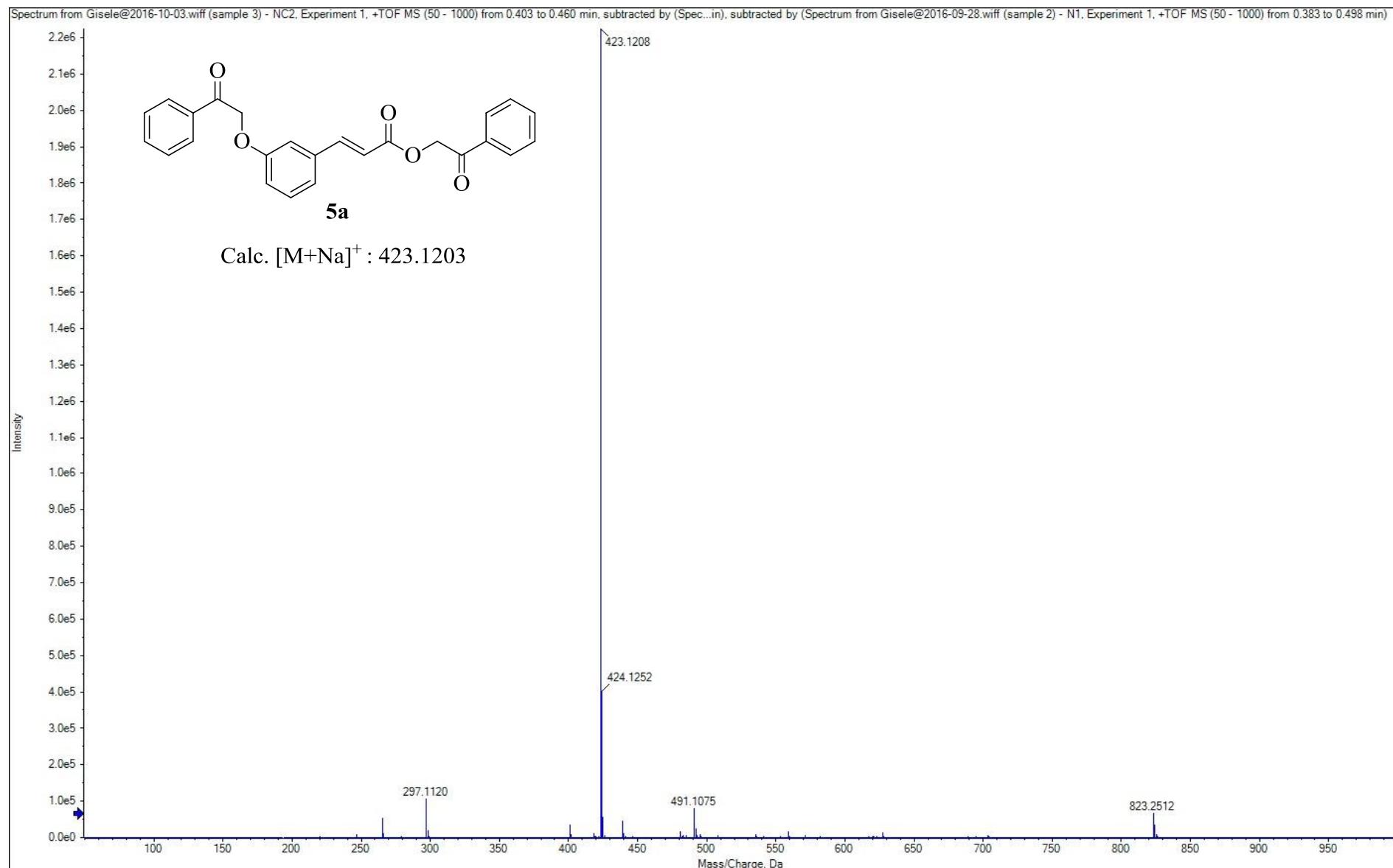
**Figure S39.** HRMS spectrum of compound **4c**.



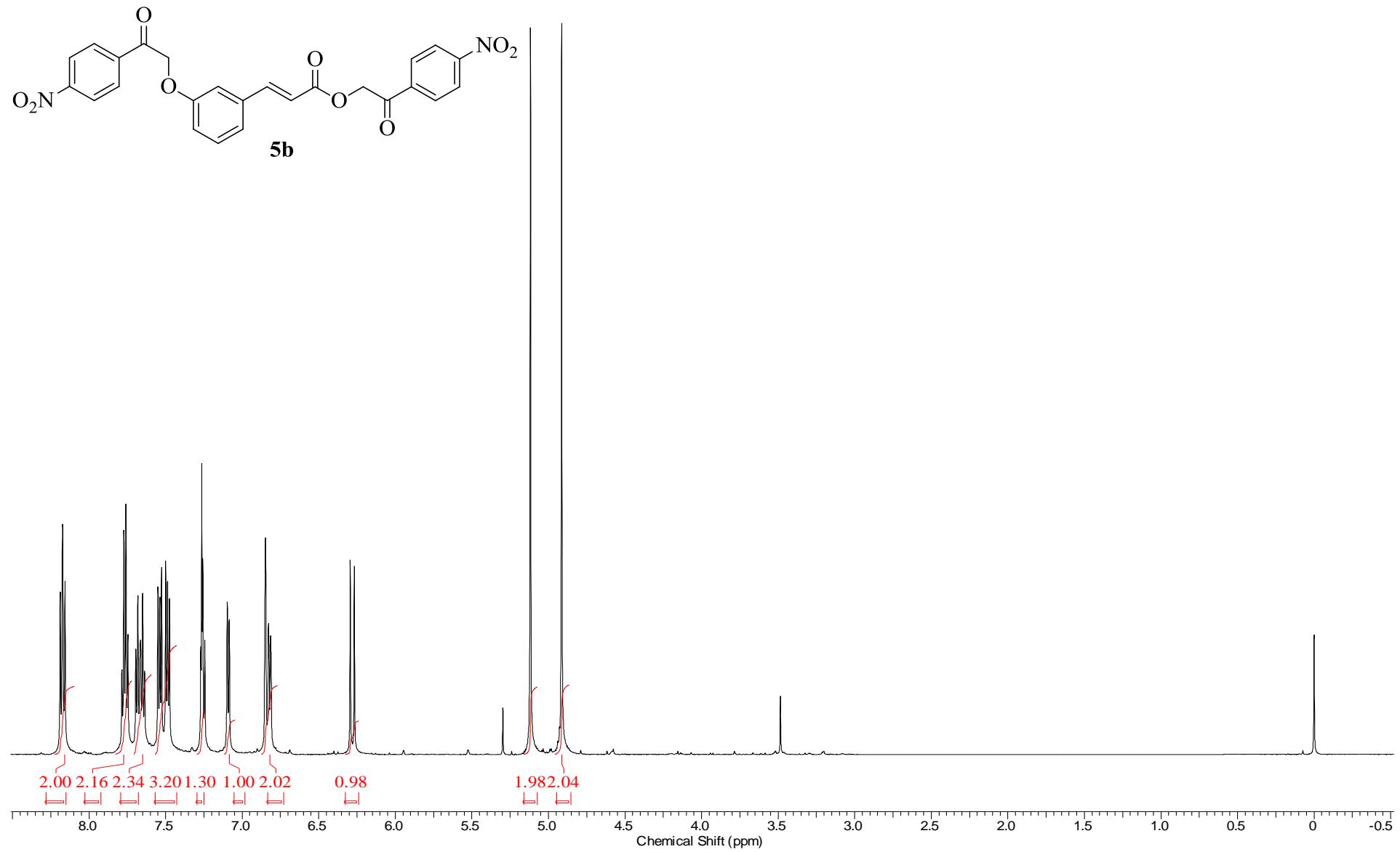
**Figure S40.**  $^1\text{H}$  NMR spectrum (600 MHz,  $\text{CDCl}_3$ ) of compound **5a**.



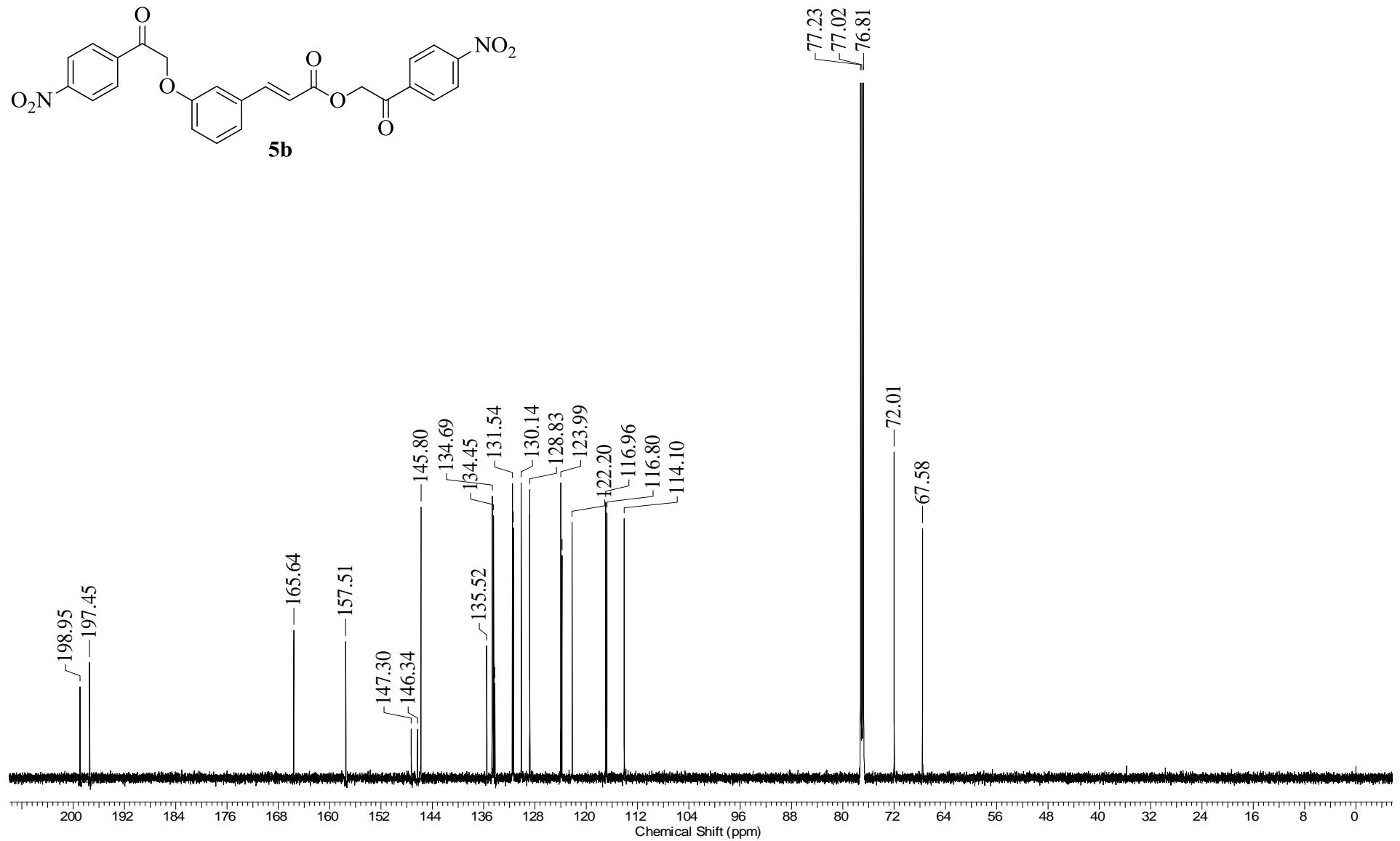
**Figure S41.**  $^{13}\text{C}$  NMR spectrum (150 MHz,  $\text{CDCl}_3$ ) of compound **5a**.



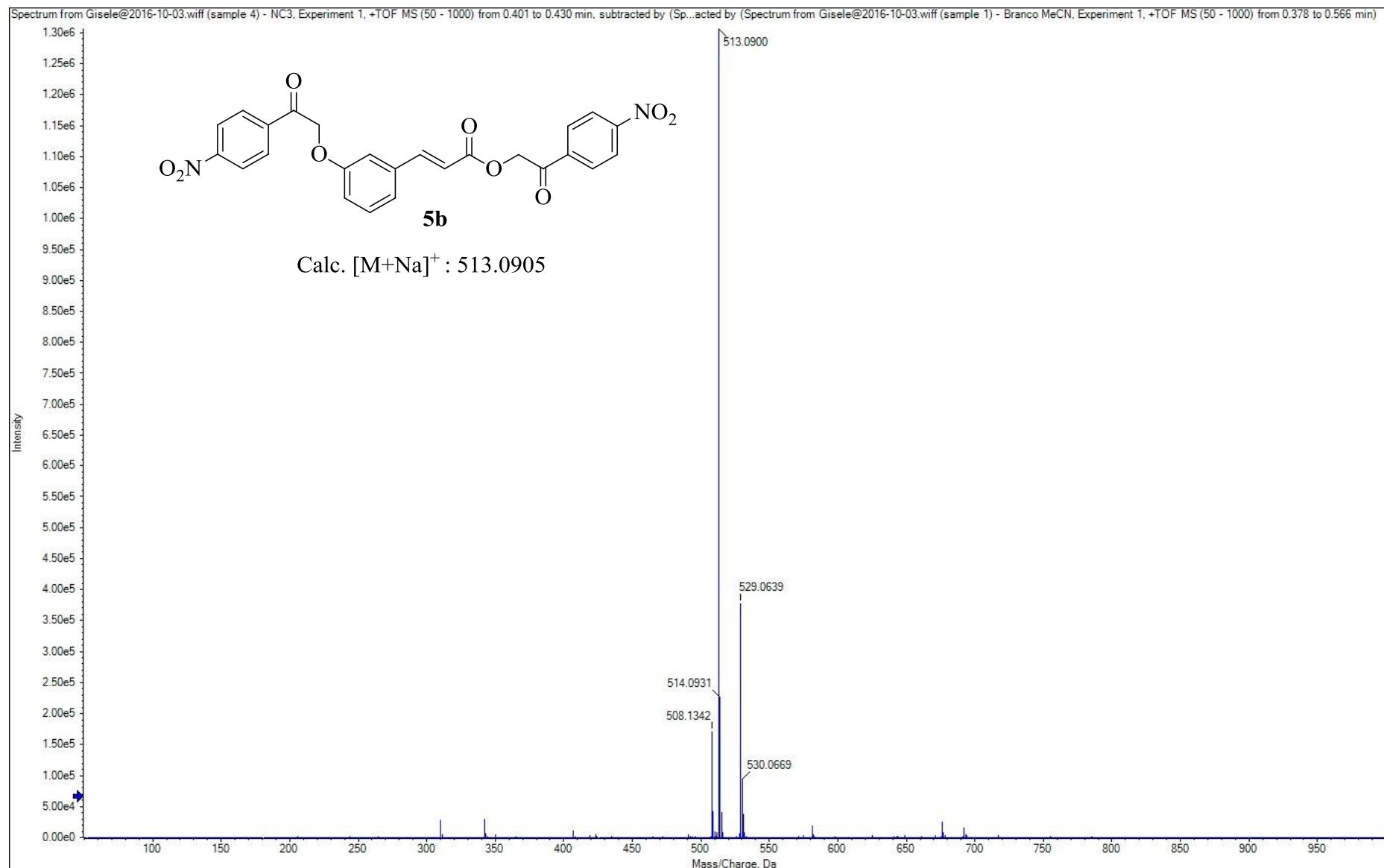
**Figure S42.** HRMS spectrum of compound **5a**.



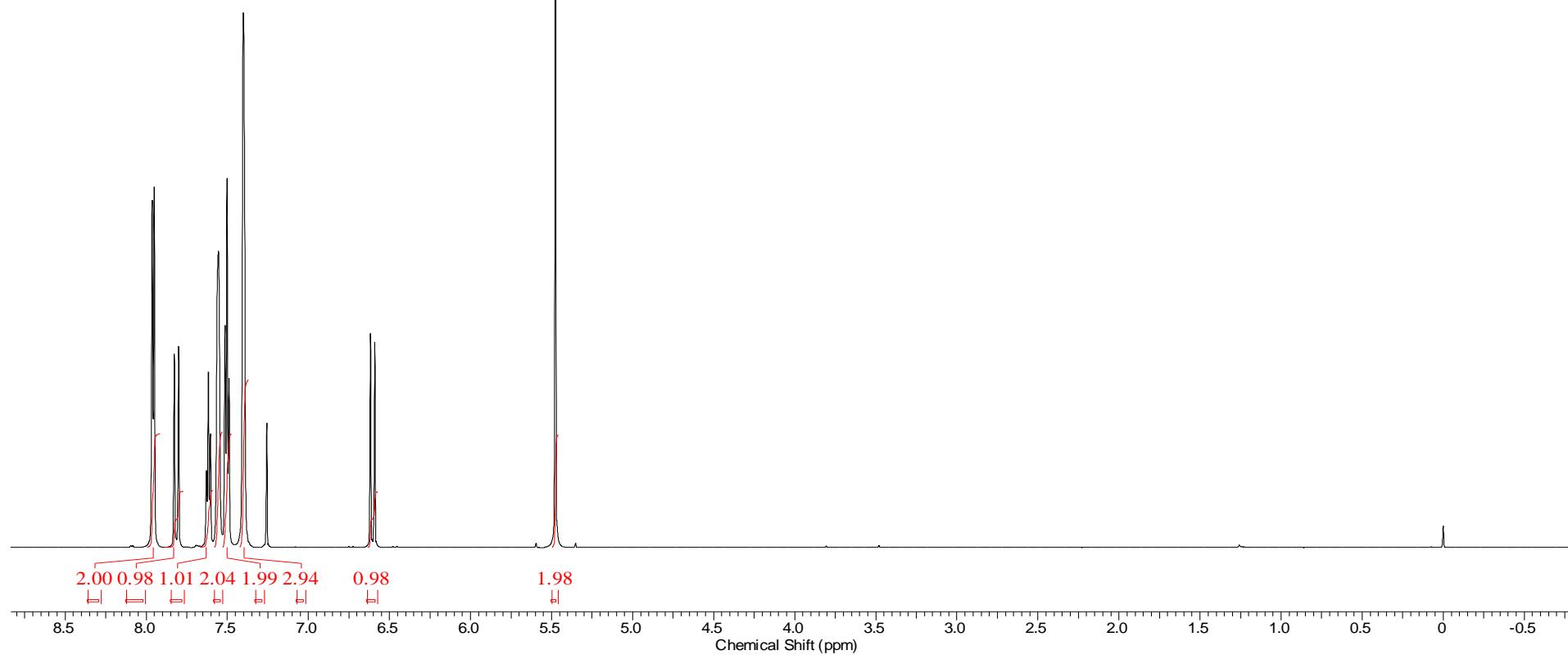
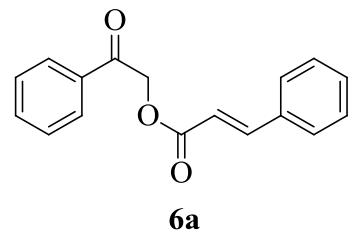
**Figure S43.**  $^1\text{H}$  NMR spectrum (600 MHz,  $\text{CDCl}_3$ ) of compound **5b**.



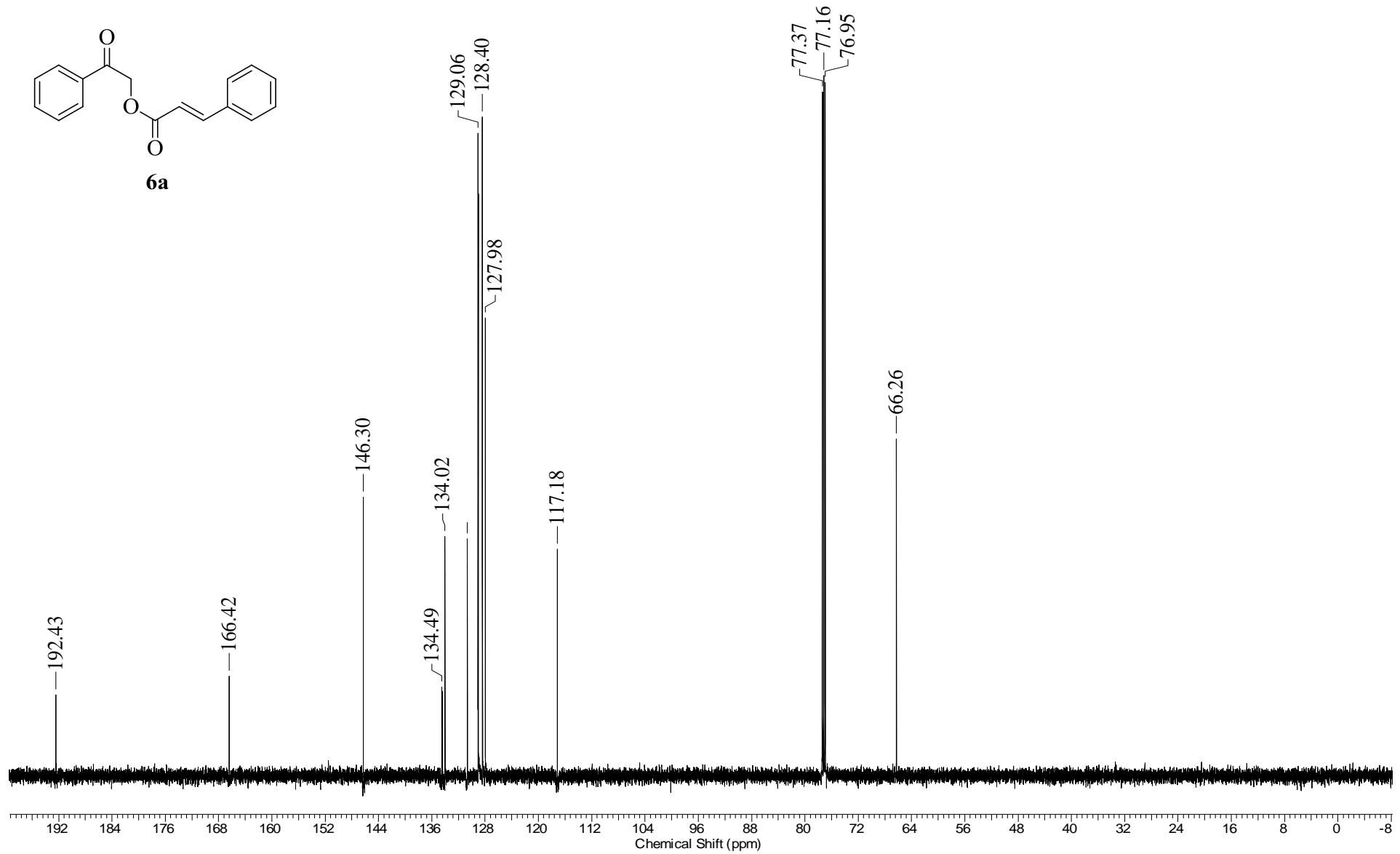
**Figure S44.**  $^{13}\text{C}$  NMR spectrum (150 MHz,  $\text{CDCl}_3$ ) of compound **5b**.



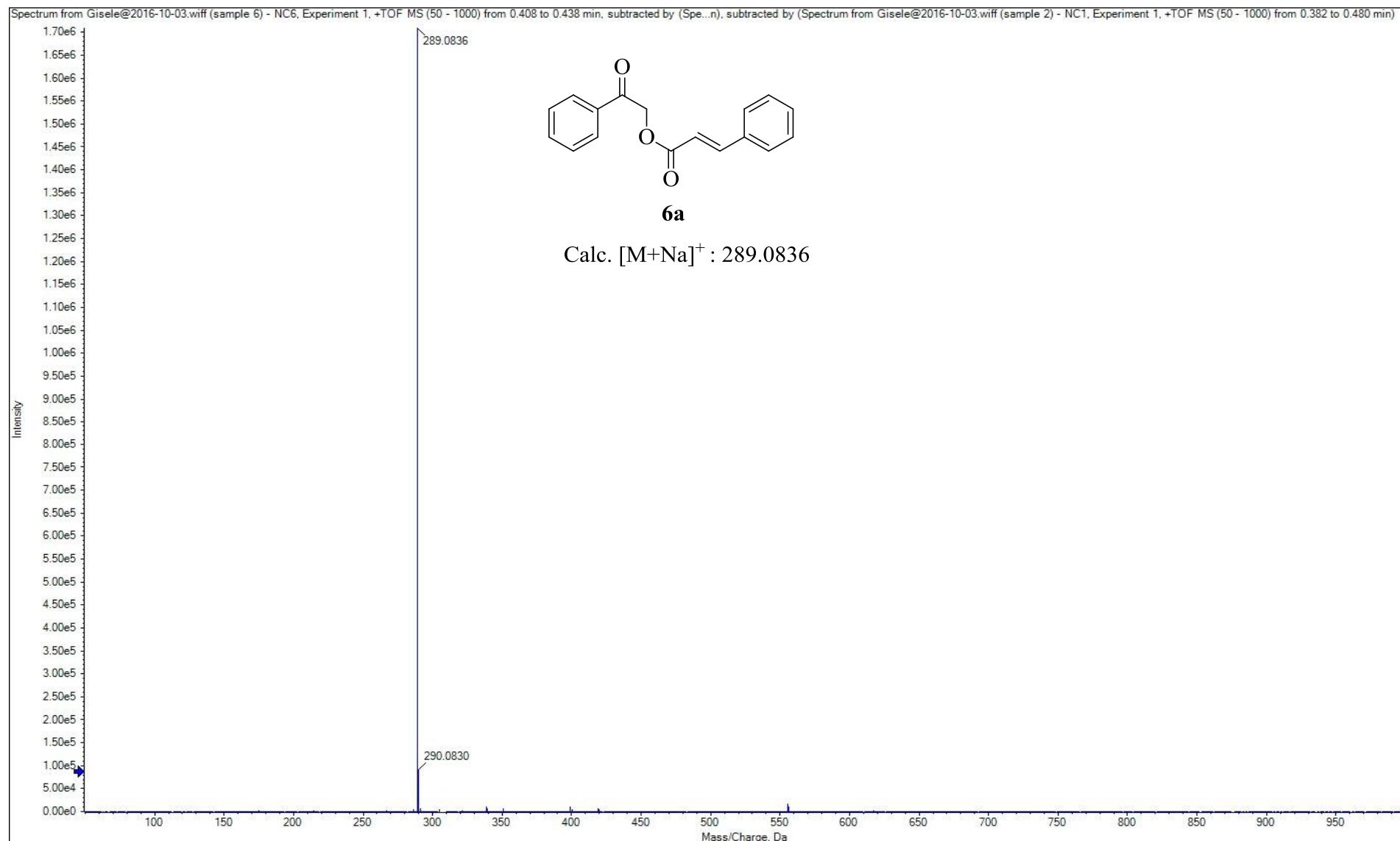
**Figure S45.** HRMS spectrum of compound **5b**.



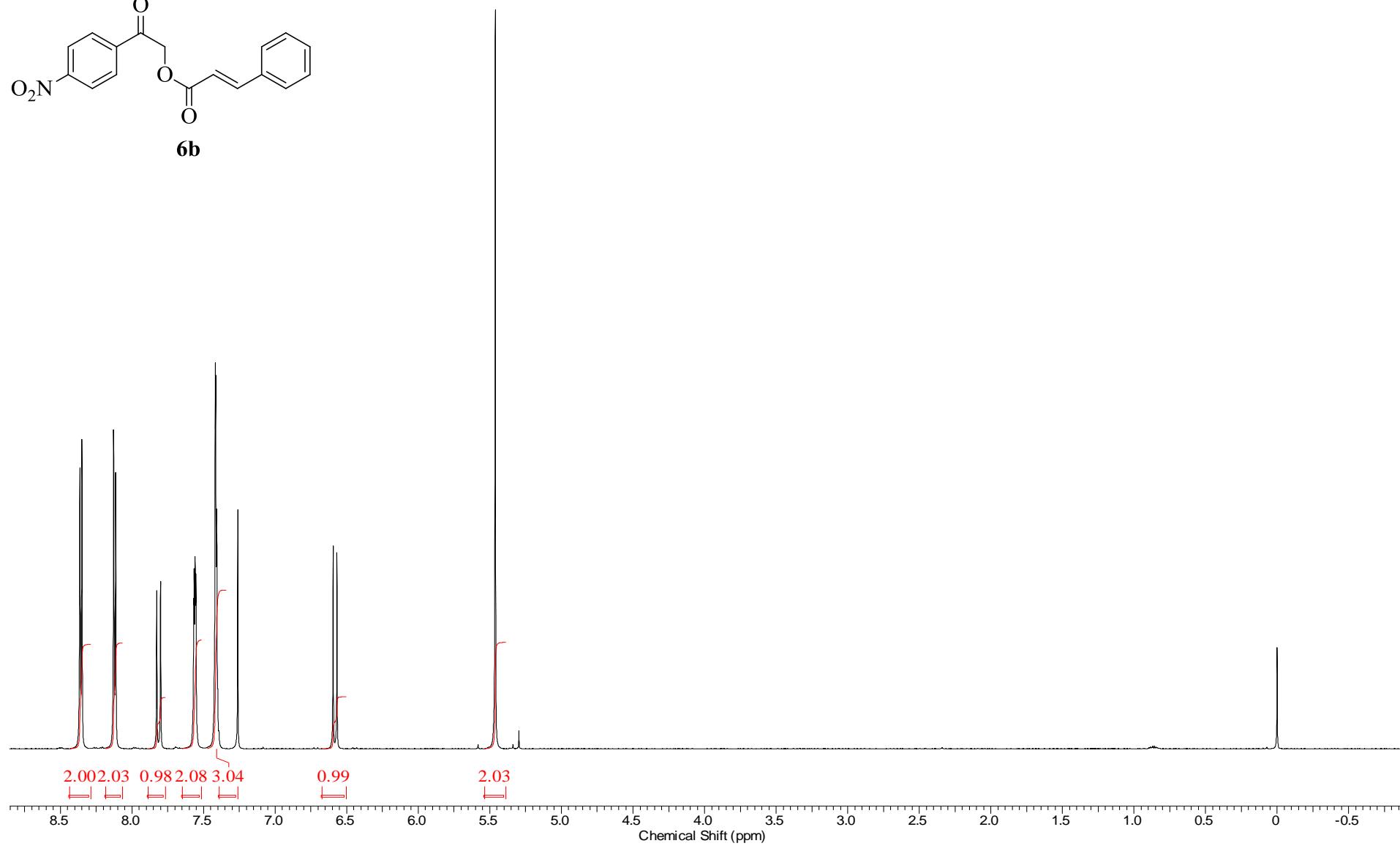
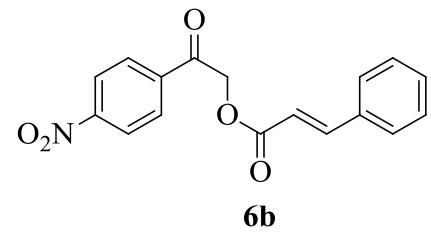
**Figure S46.**  $^1\text{H}$  NMR spectrum (600 MHz,  $\text{CDCl}_3$ ) of compound **6a**.



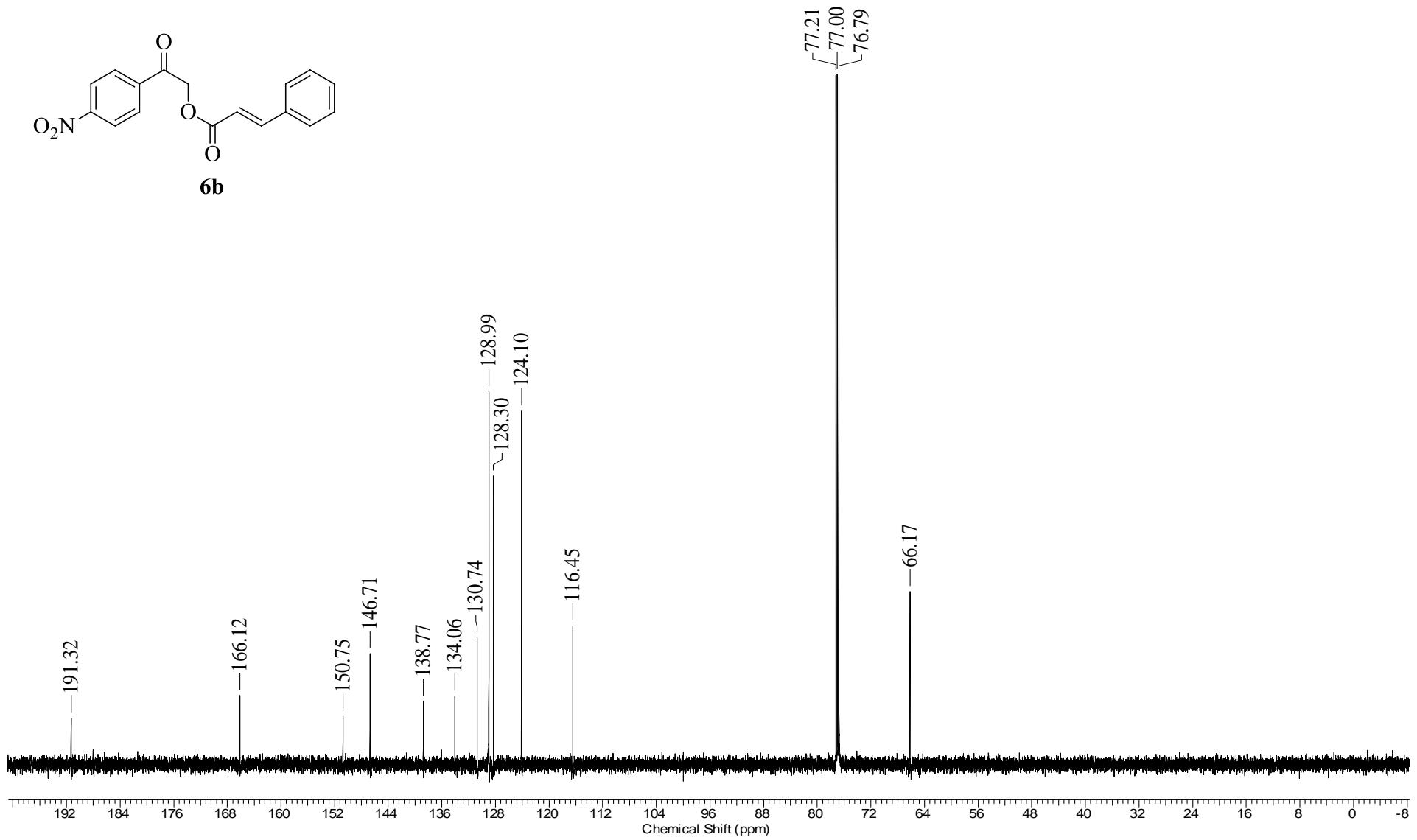
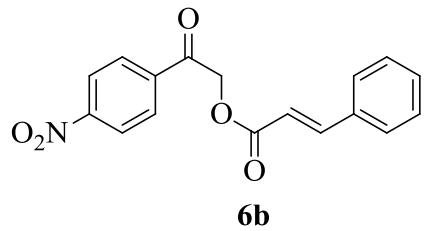
**Figure S47.**  $^{13}\text{C}$  NMR spectrum (150 MHz,  $\text{CDCl}_3$ ) of compound **6a**.



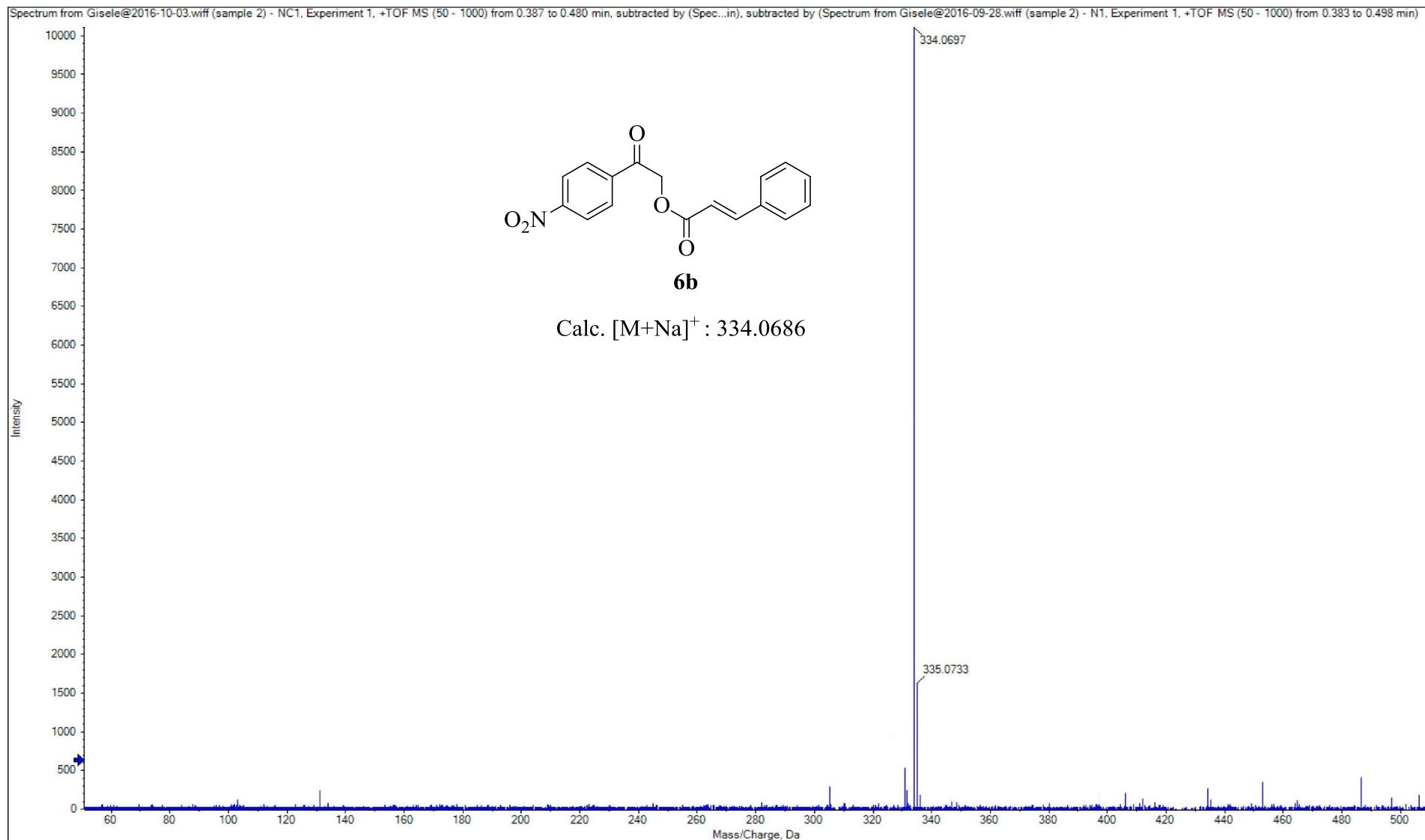
**Figure S48.** HRMS spectrum of compound **6a**.



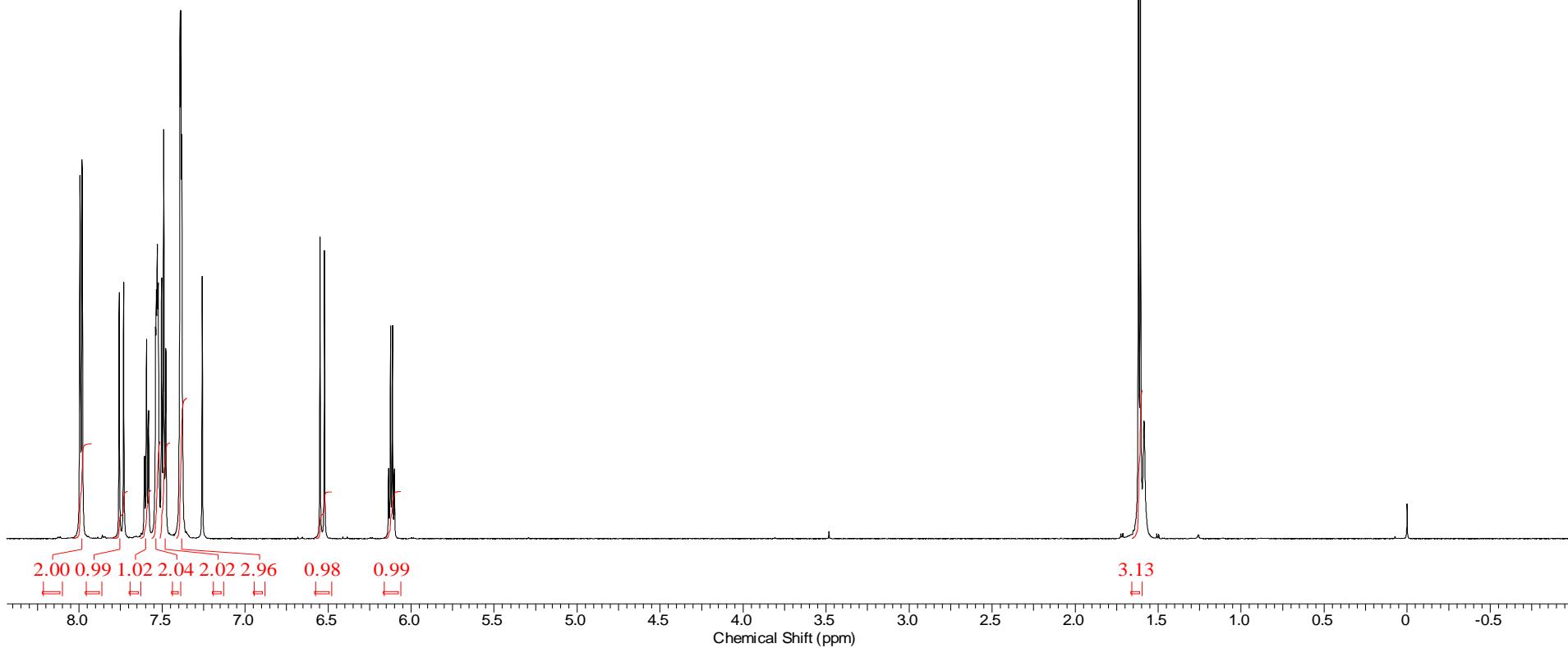
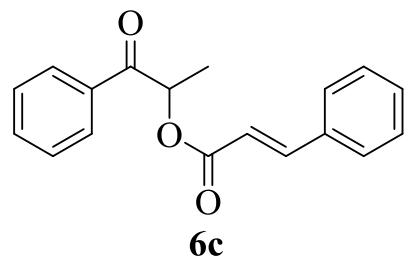
**Figure S49.** <sup>1</sup>H NMR spectrum (600 MHz, CDCl<sub>3</sub>) of compound **6b**.



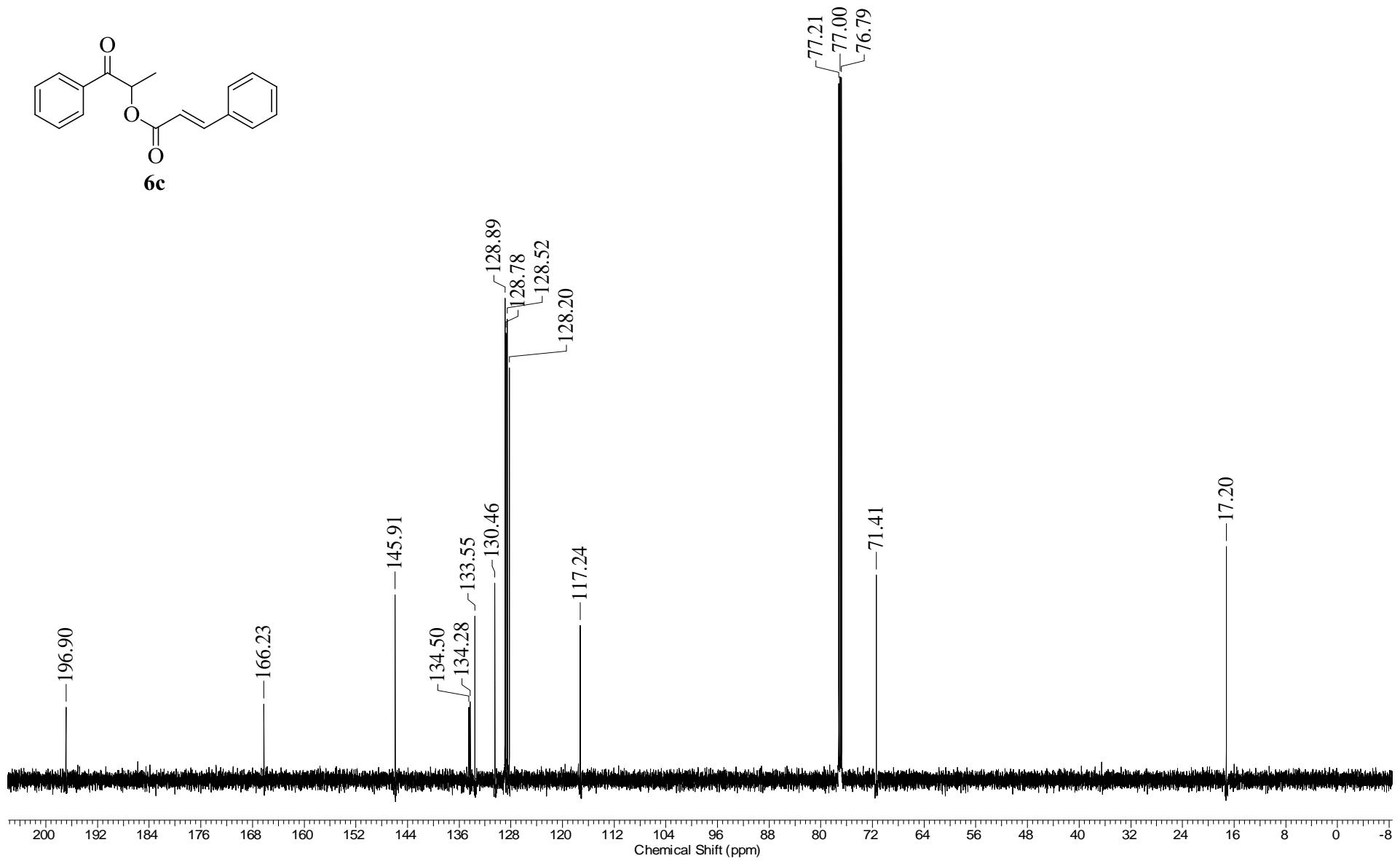
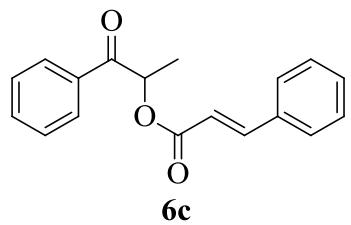
**Figure S50.**  $^{13}\text{C}$  NMR spectrum (150 MHz,  $\text{CDCl}_3$ ) of compound **6b**.



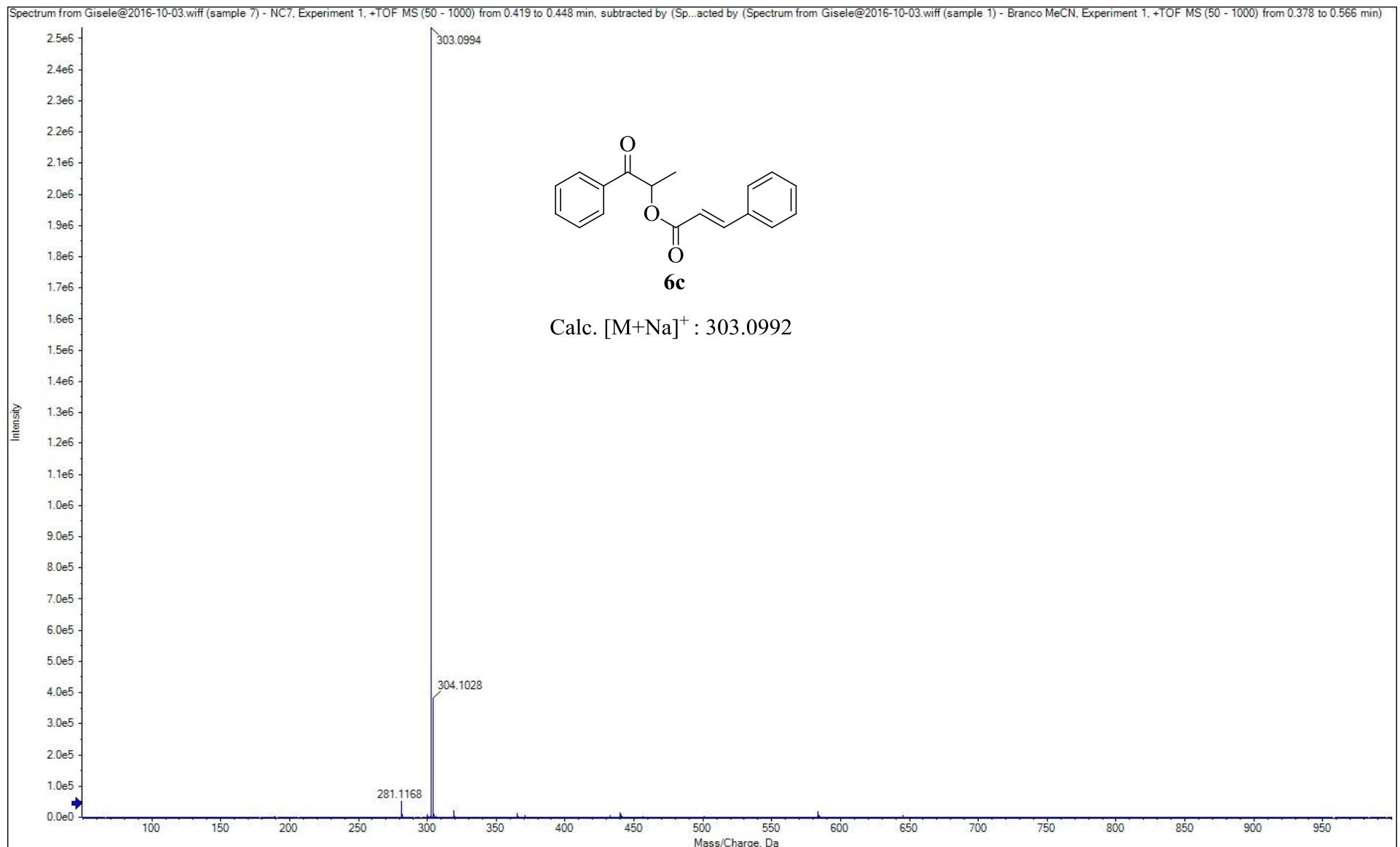
**Figure S51.** HRMS spectrum of compound **6b**.



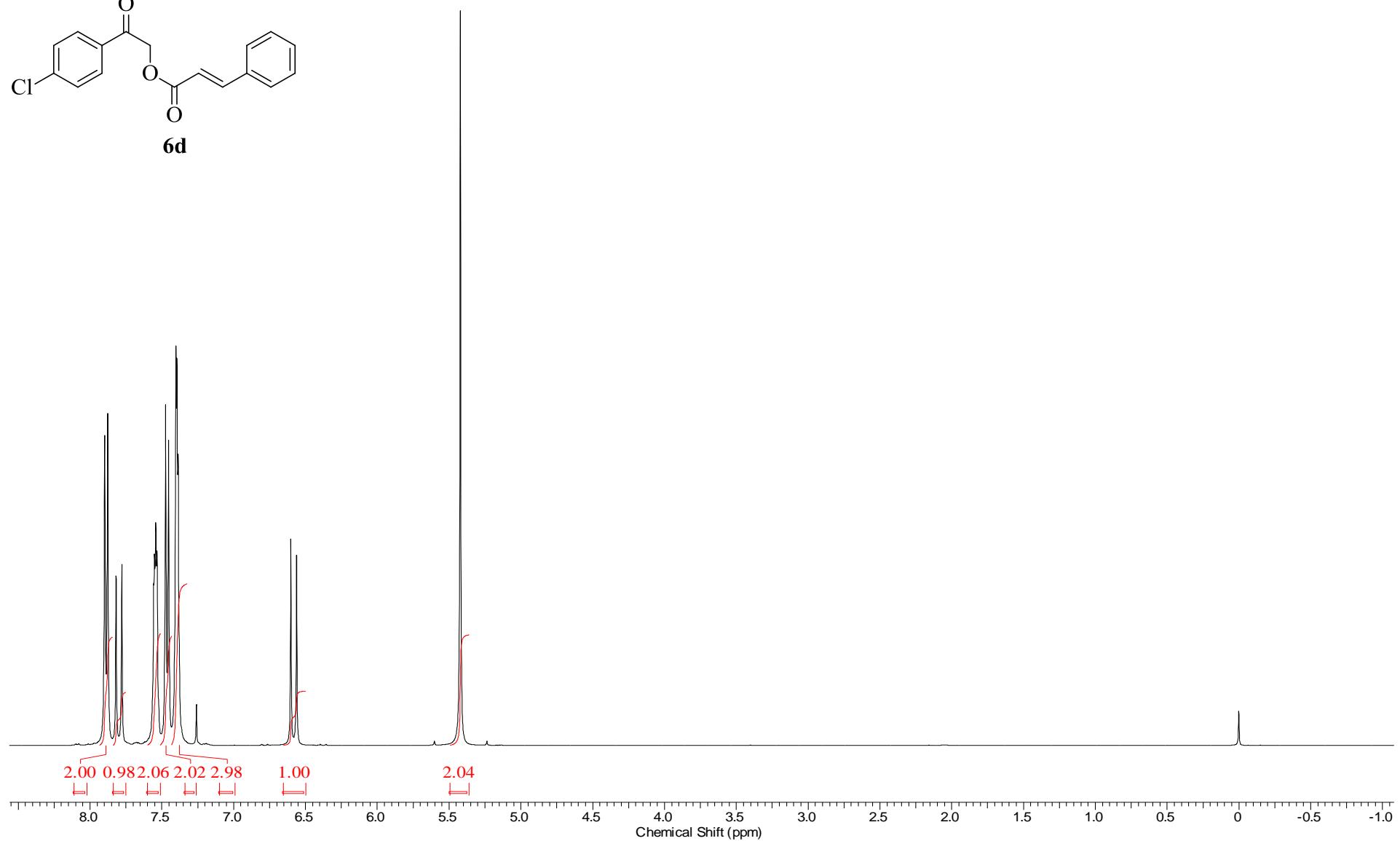
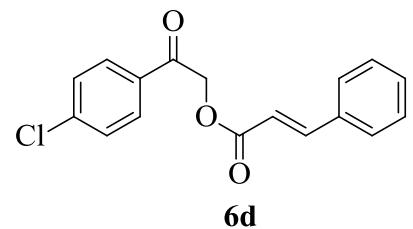
**Figure S52.** <sup>1</sup>H NMR spectrum (600 MHz, CDCl<sub>3</sub>) of compound **6c**.



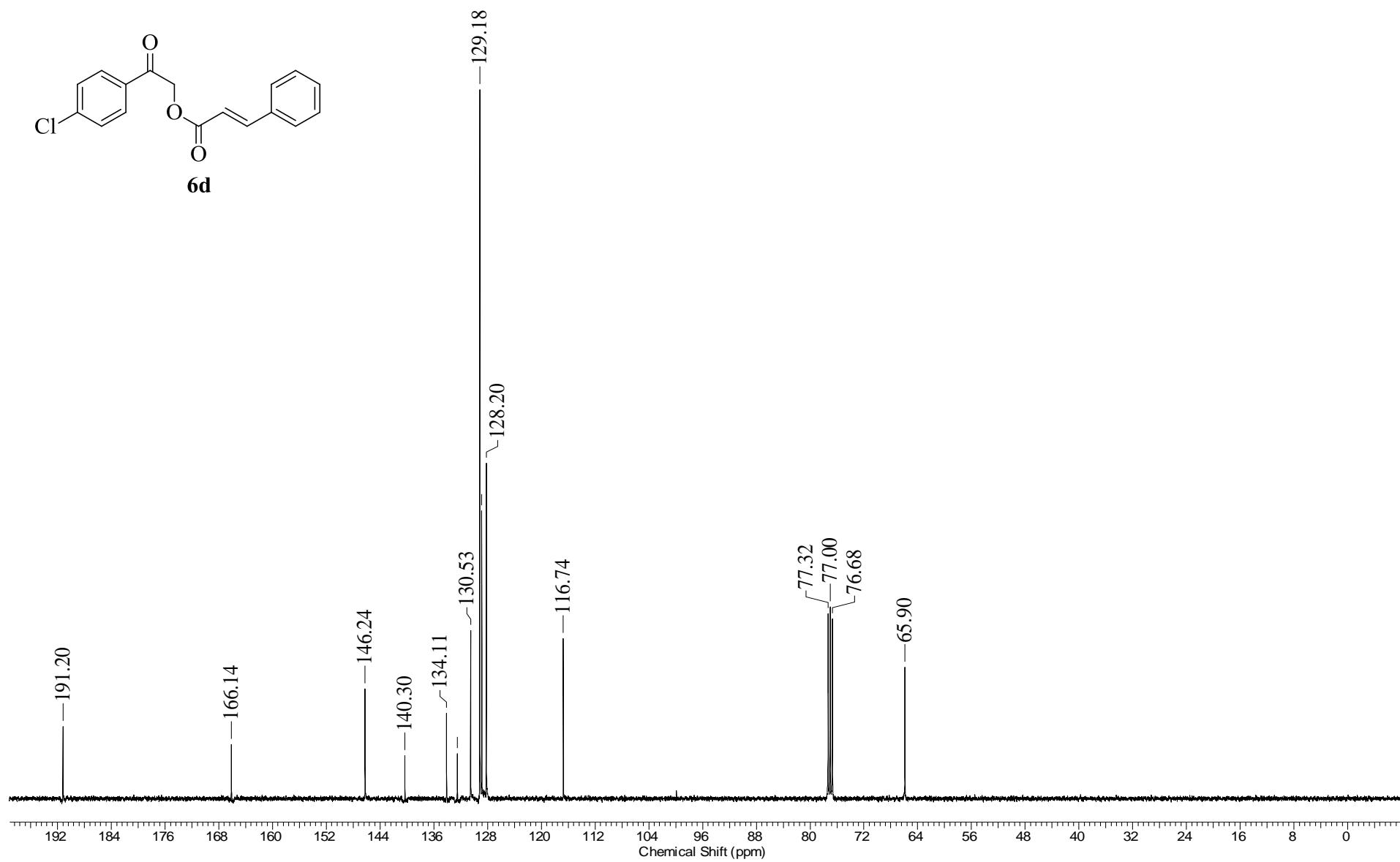
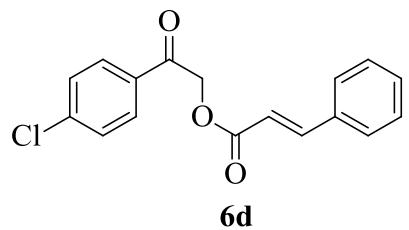
**Figure S53.**  $^{13}\text{C}$  NMR spectrum (150 MHz,  $\text{CDCl}_3$ ) of compound **6c**.



**Figure S54.** HRMS spectrum of compound **6c**.



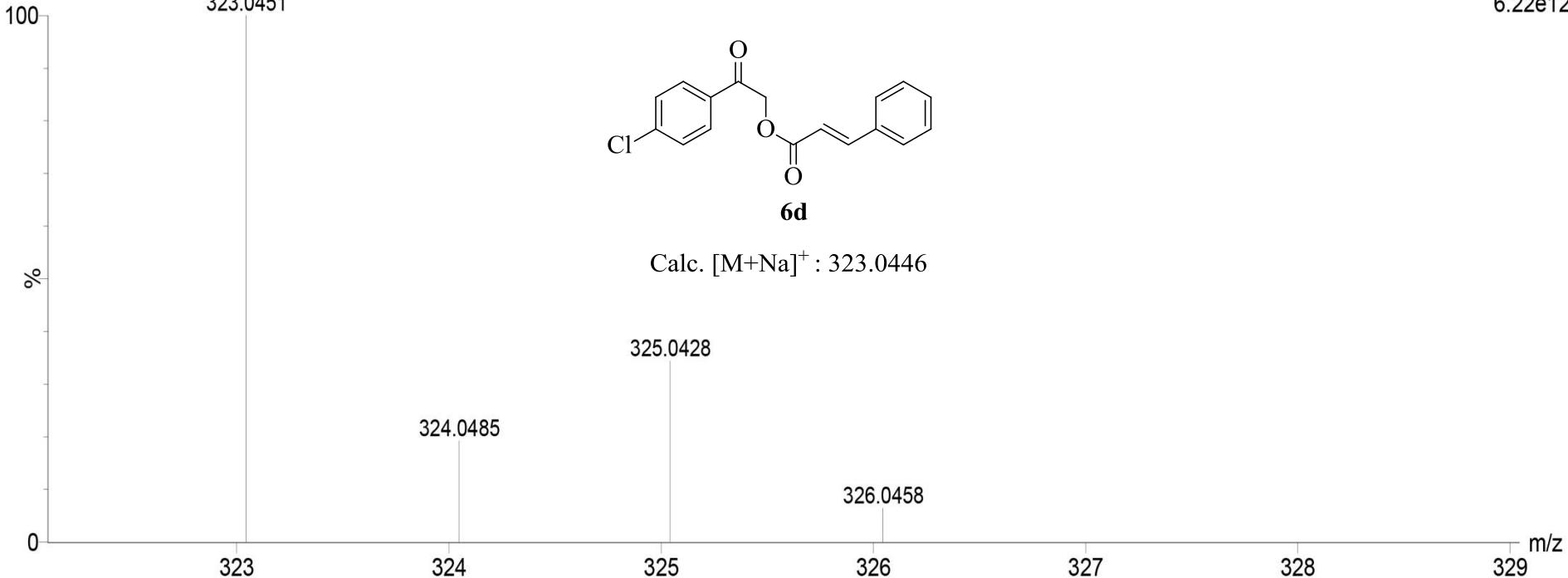
**Figure S55.**  $^1\text{H}$  NMR spectrum (400 MHz,  $\text{CDCl}_3$ ) of compound **6d**.



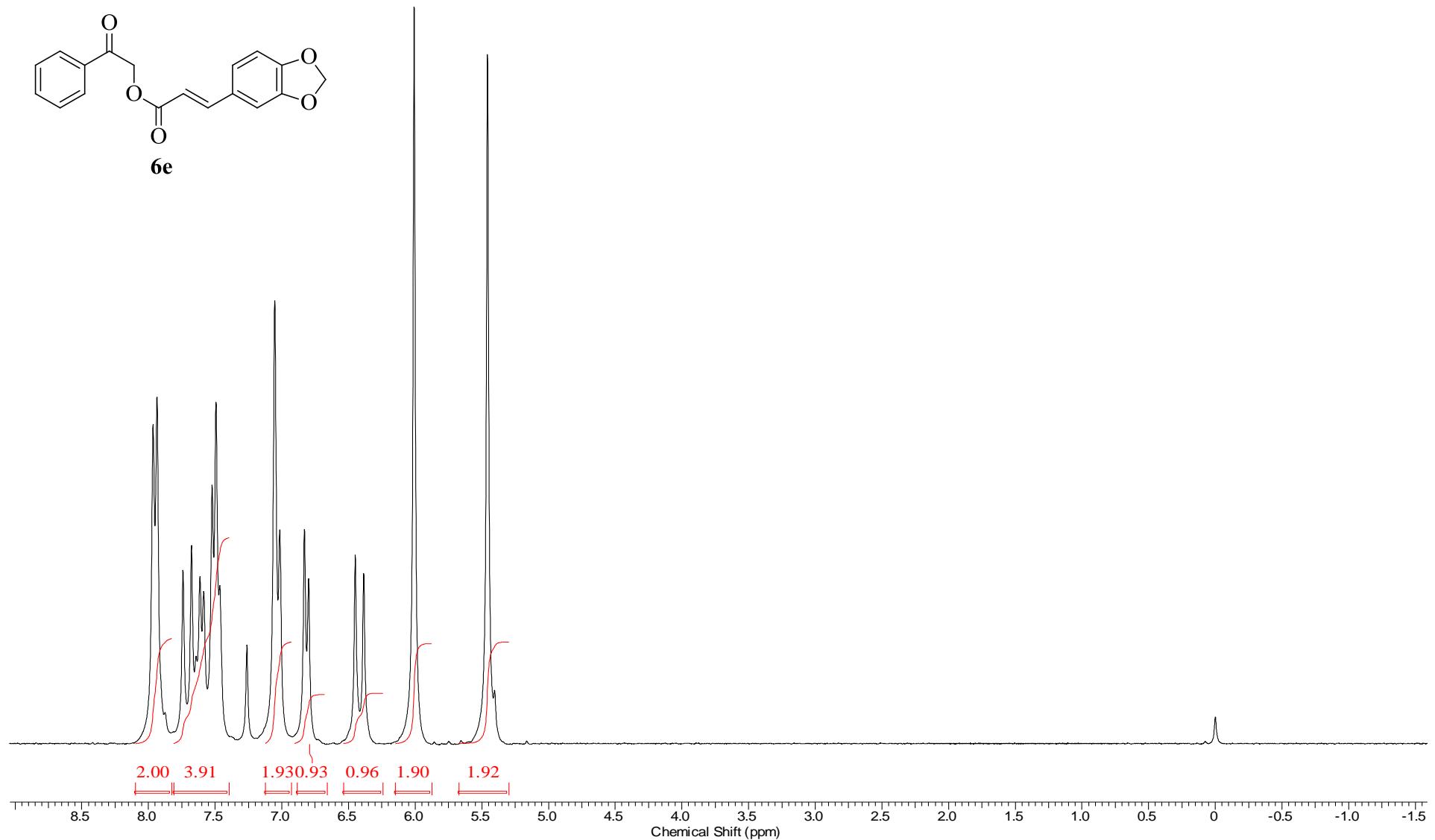
**Figure S56.**  $^{13}\text{C}$  NMR spectrum (100 MHz,  $\text{CDCl}_3$ ) of compound **6d**.

GIS\_S8 (0.034) ls (1.00,1.00) C17H13ClO3Na  
323.0451

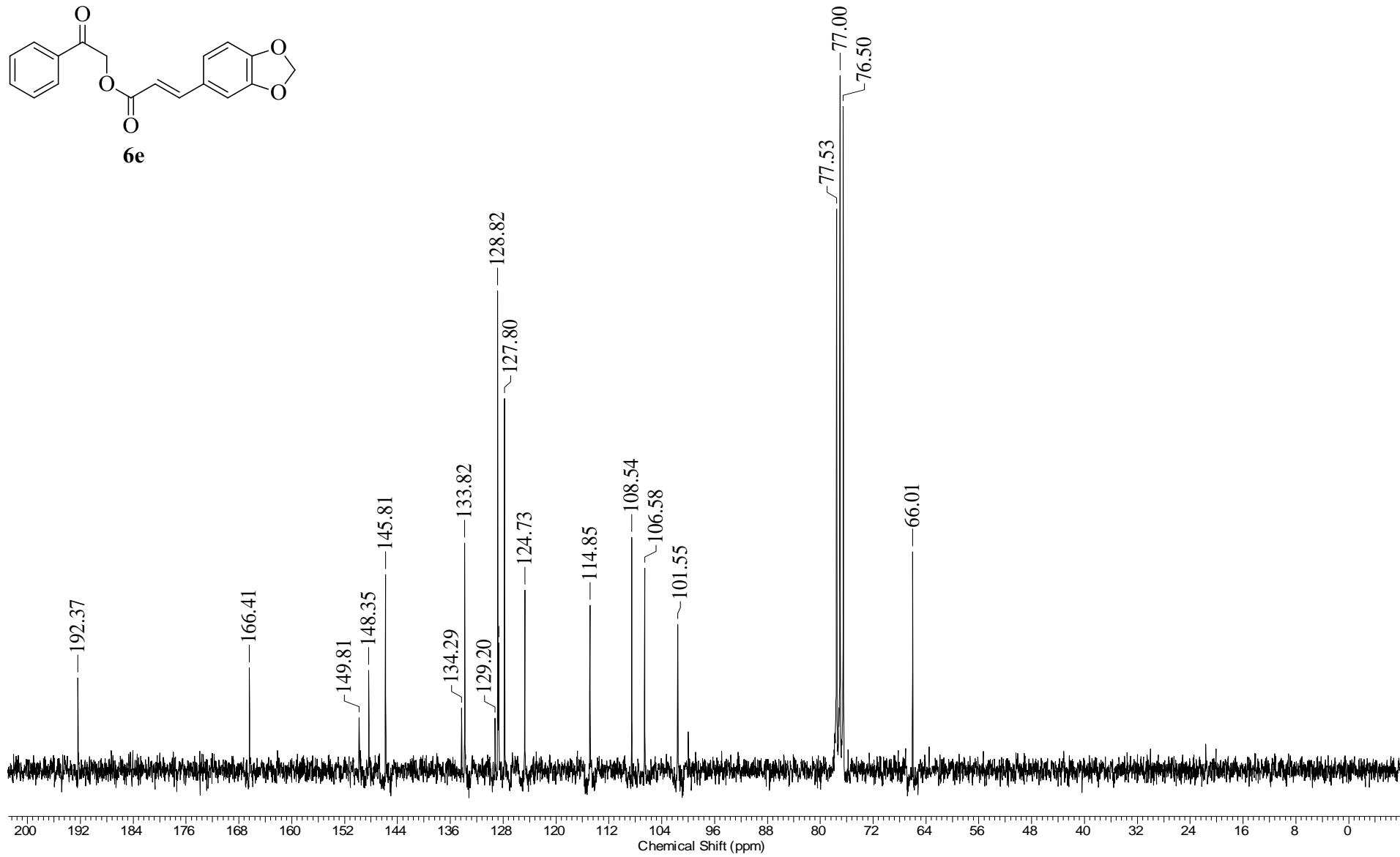
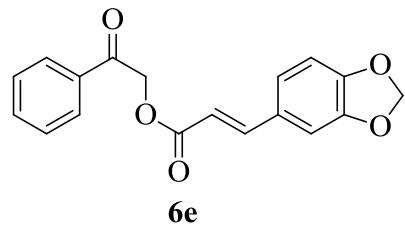
TOF MS ES+  
6.22e12



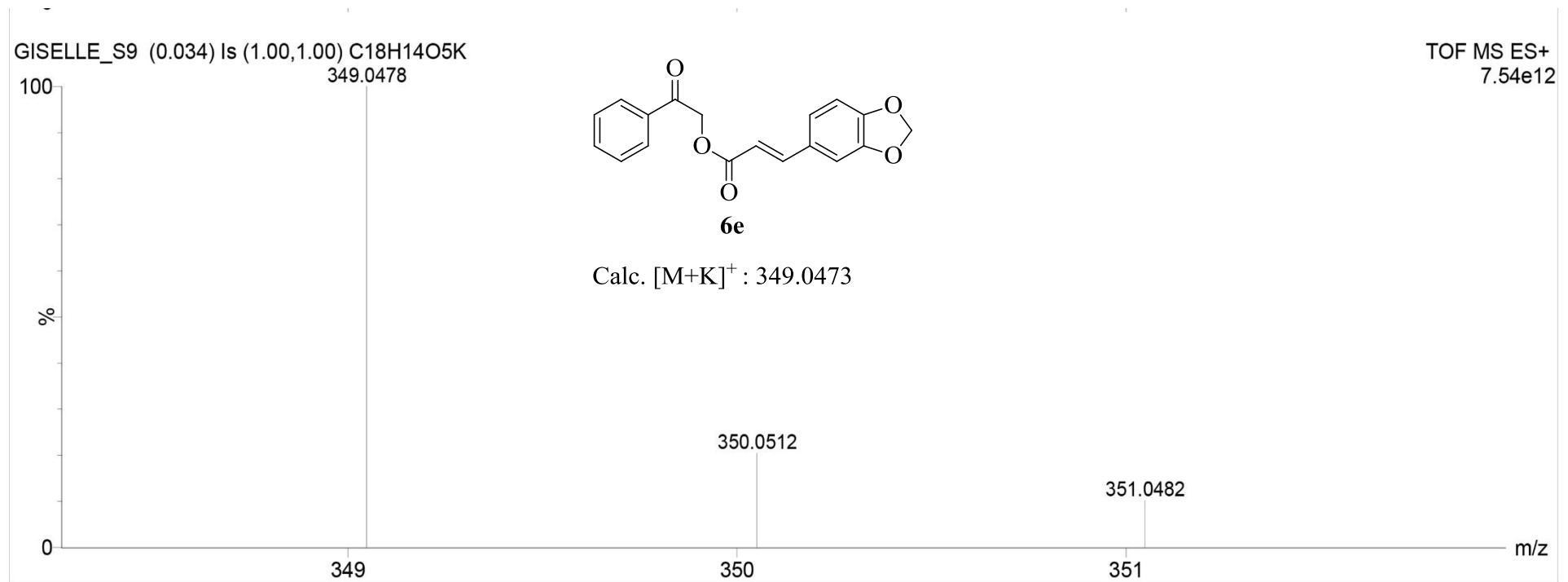
**Figure S57.** HRMS spectrum of compound **6d**.



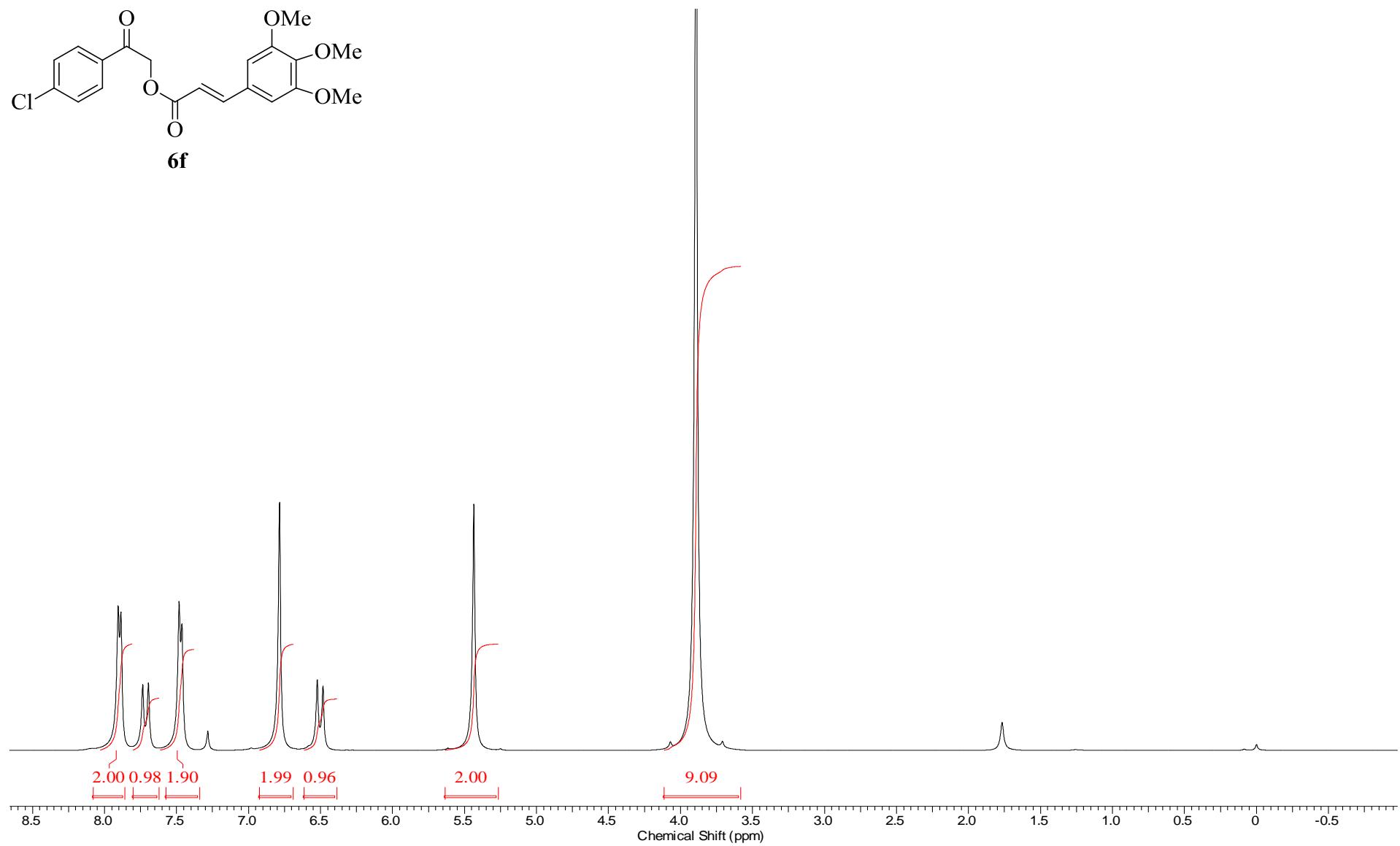
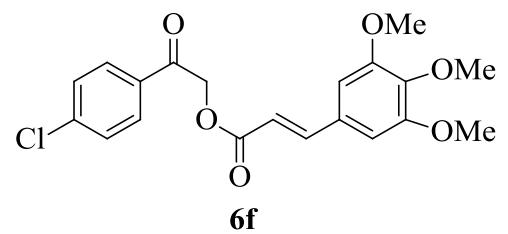
**Figure S58.**  $^1\text{H}$  NMR spectrum (250 MHz,  $\text{CDCl}_3$ ) of compound **6e**.



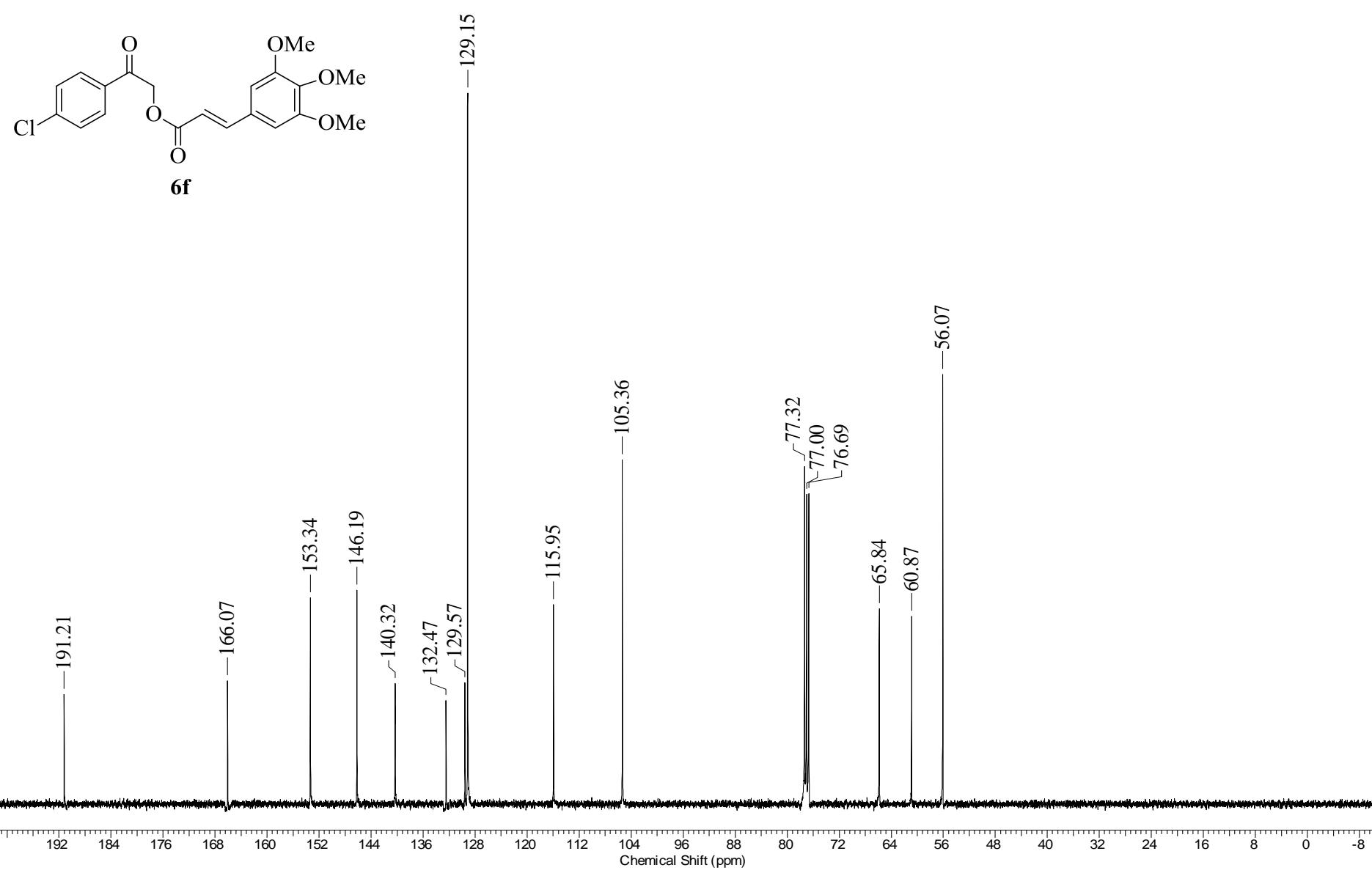
**Figure S59.** <sup>13</sup>C NMR spectrum (62.5 MHz, CDCl<sub>3</sub>) of compound **6e**.



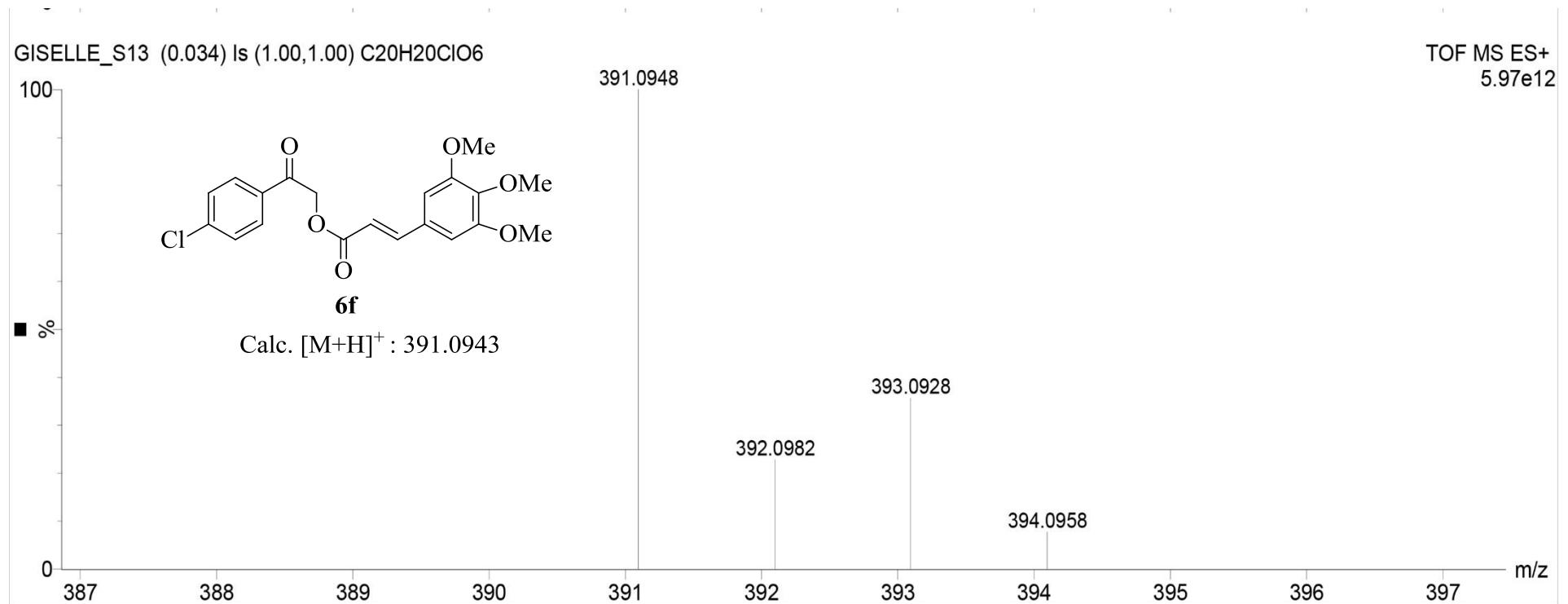
**Figure S60.** HRMS spectrum of compound **6e**.



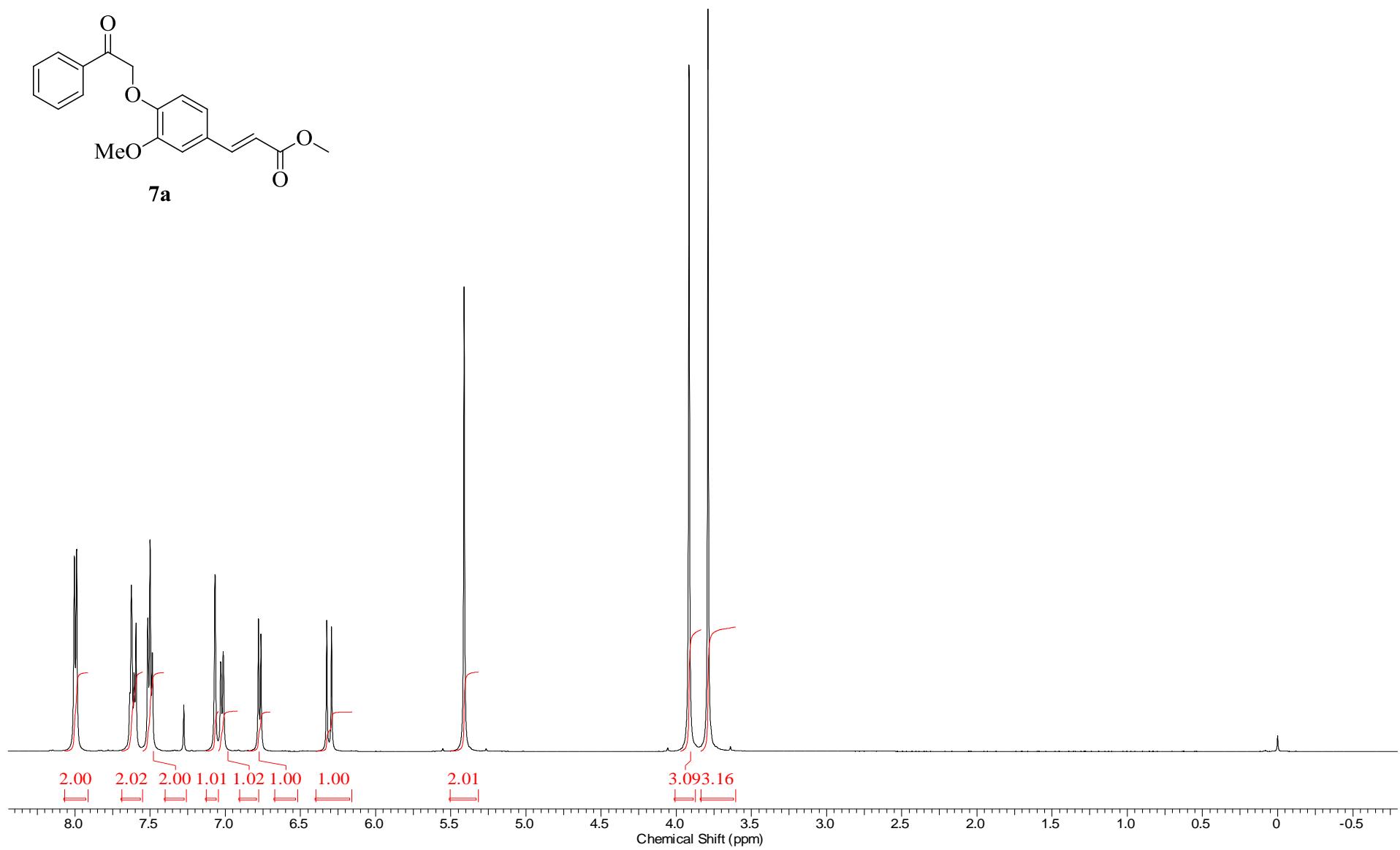
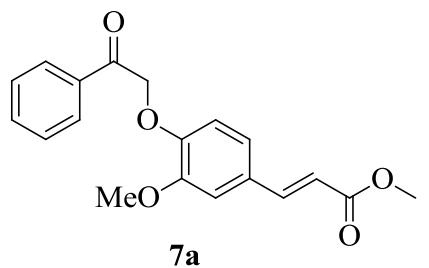
**Figure S61.**  $^1\text{H}$  NMR spectrum (400 MHz,  $\text{CDCl}_3$ ) of compound **6f**.



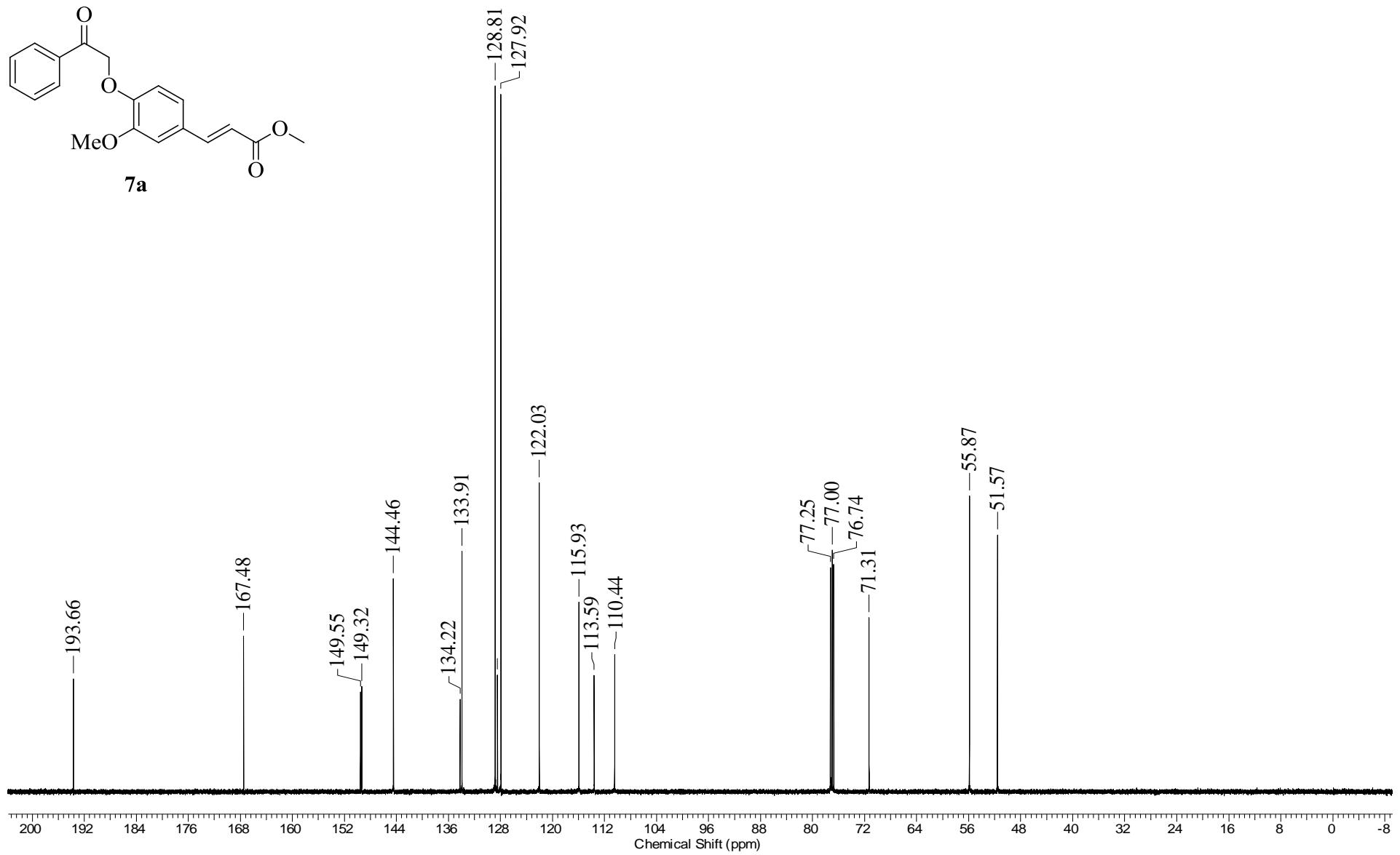
**Figure S62.**  $^{13}\text{C}$  NMR spectrum (100 MHz,  $\text{CDCl}_3$ ) of compound **6f**.



**Figure S63.** HRMS spectrum of compound **6f**.



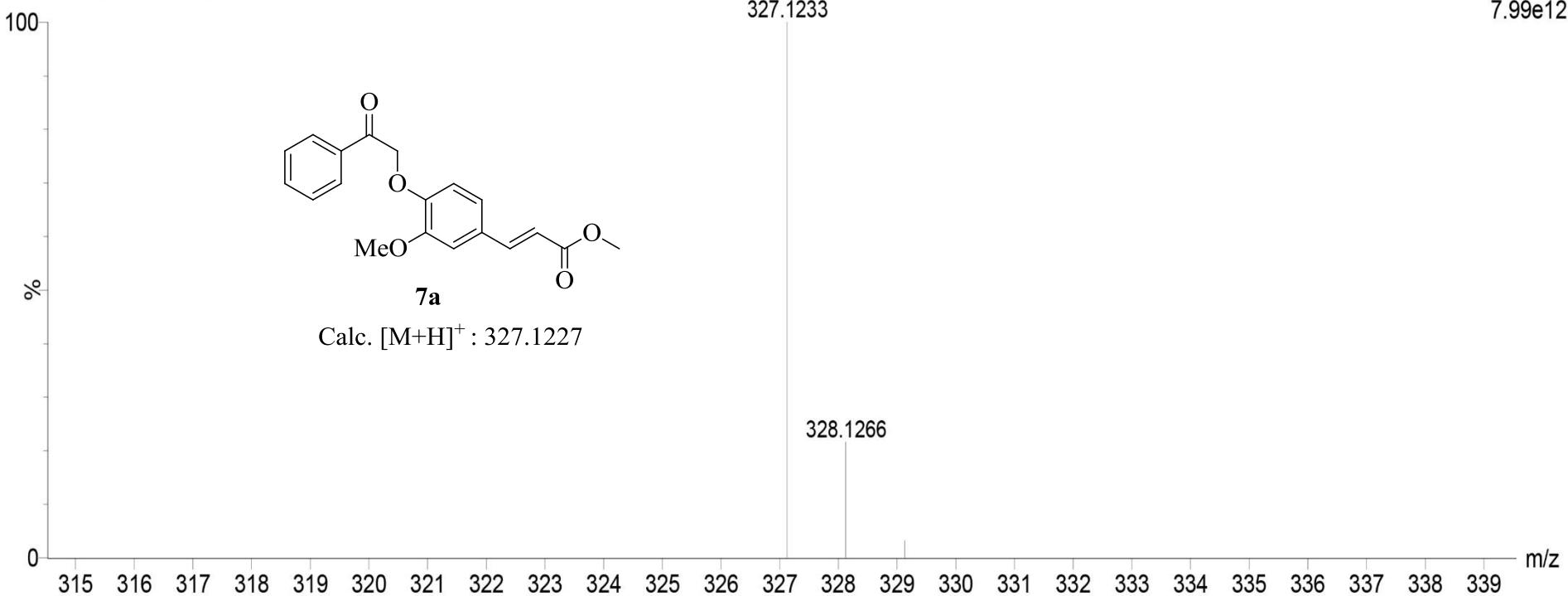
**Figure S64.**  $^1\text{H}$  NMR spectrum (500 MHz,  $\text{CDCl}_3$ ) of compound **7a**.



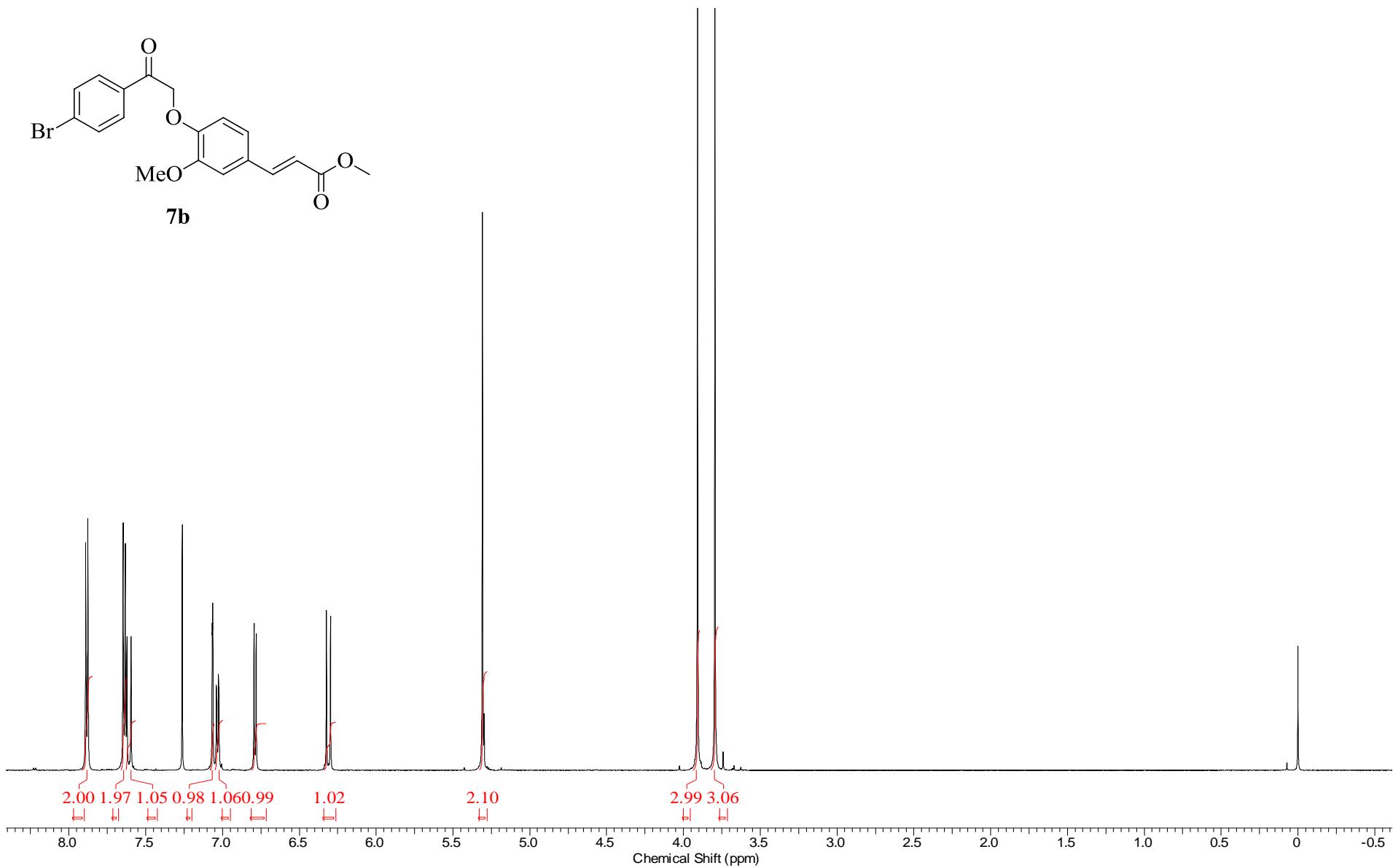
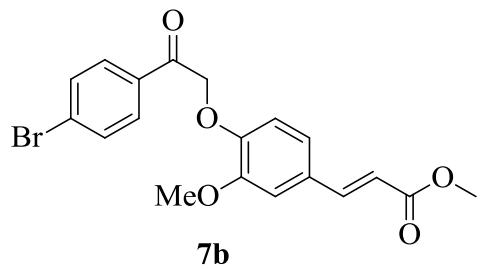
**Figure S65.**  $^{13}\text{C}$  NMR spectrum (125 MHz,  $\text{CDCl}_3$ ) of compound **7a**.

GISELLE\_S19 (0.034) ls (1.00,1.00) C19H19O5

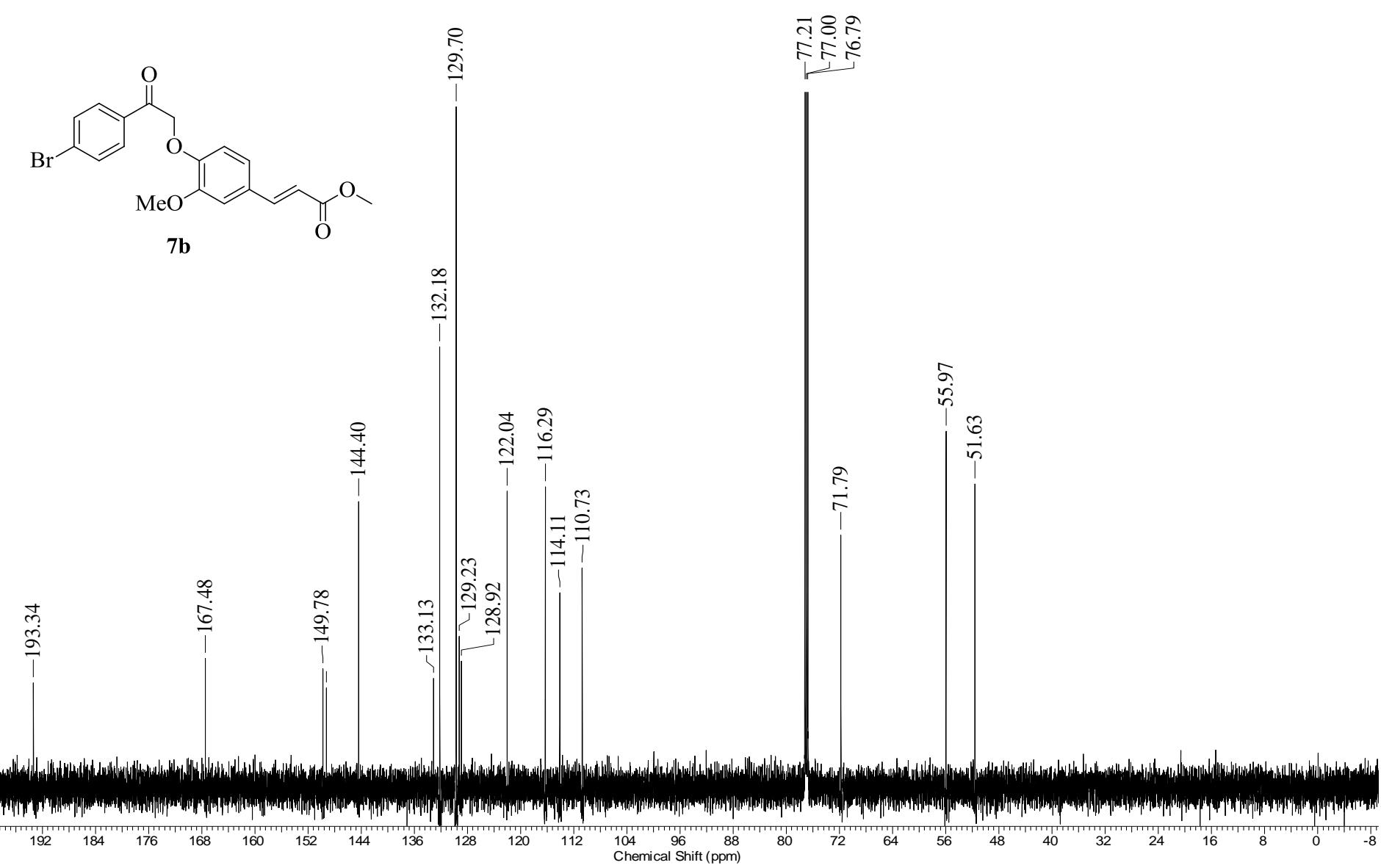
TOF MS ES+  
7.99e12



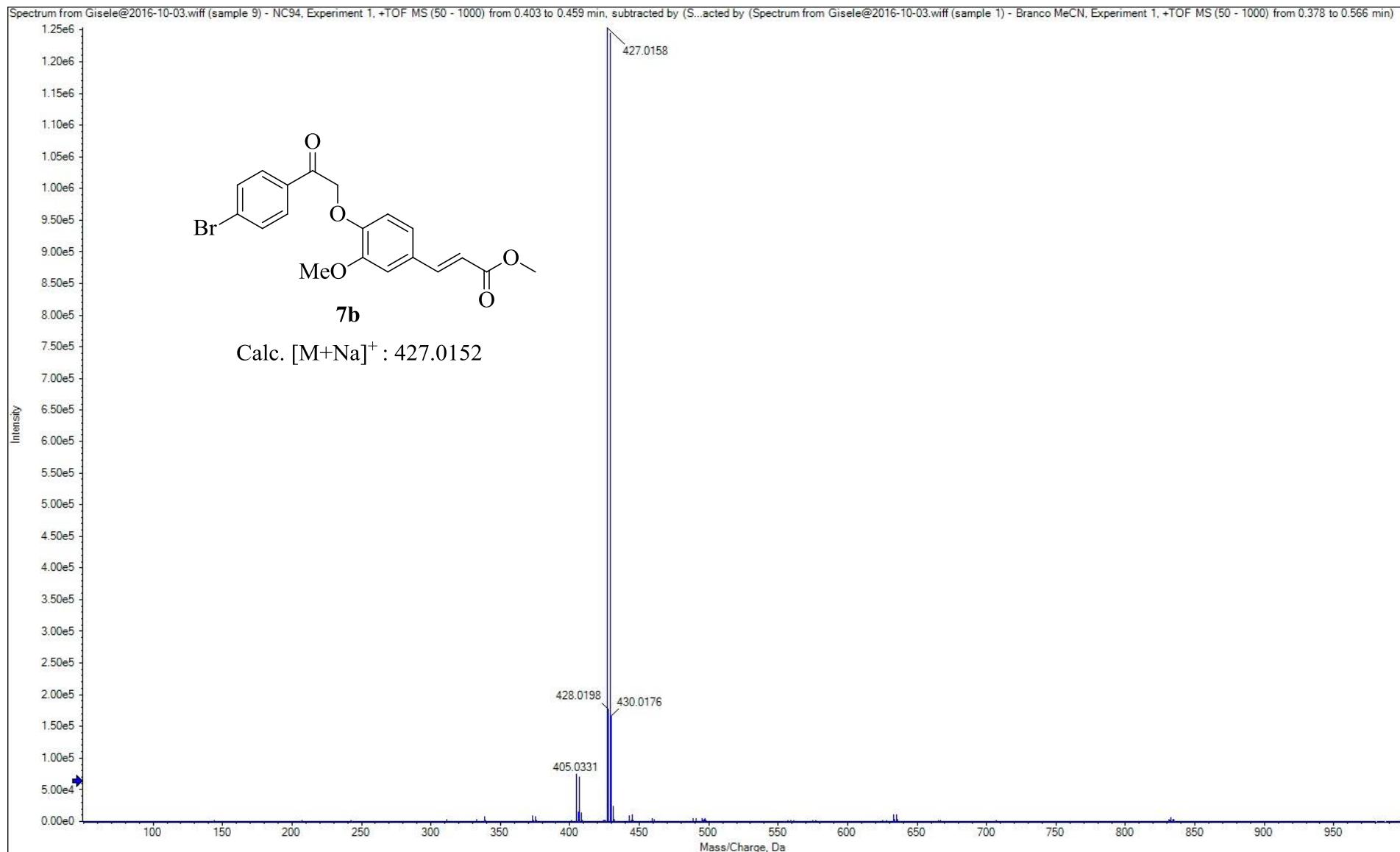
**Figure S66.** HRMS spectrum of compound 7a.



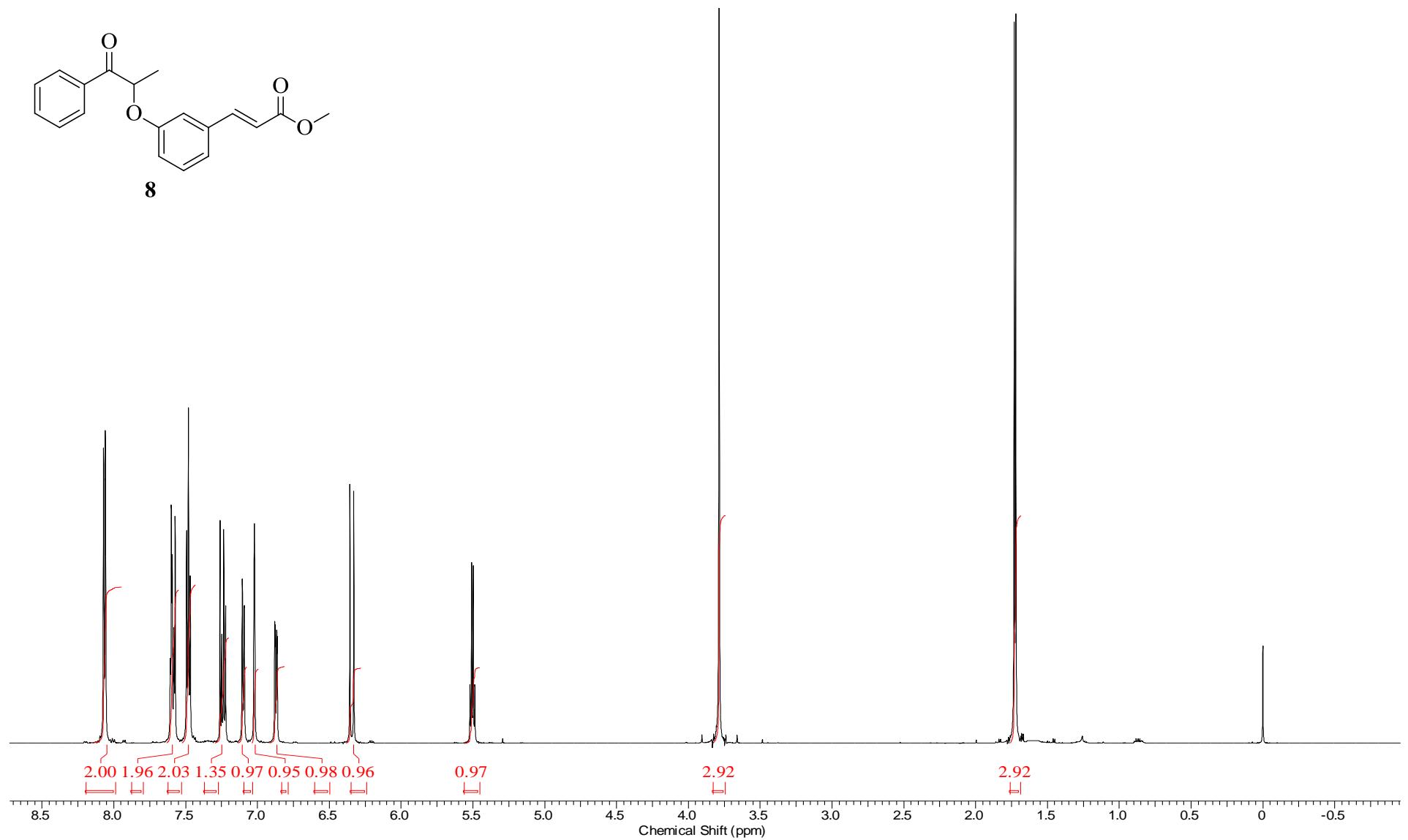
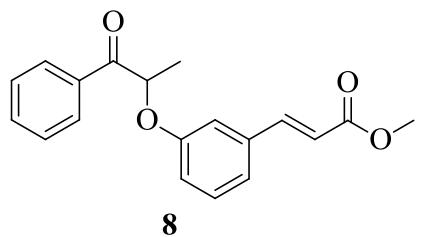
**Figure S67.**  $^1\text{H}$  NMR spectrum (600 MHz,  $\text{CDCl}_3$ ) of compound **7b**.



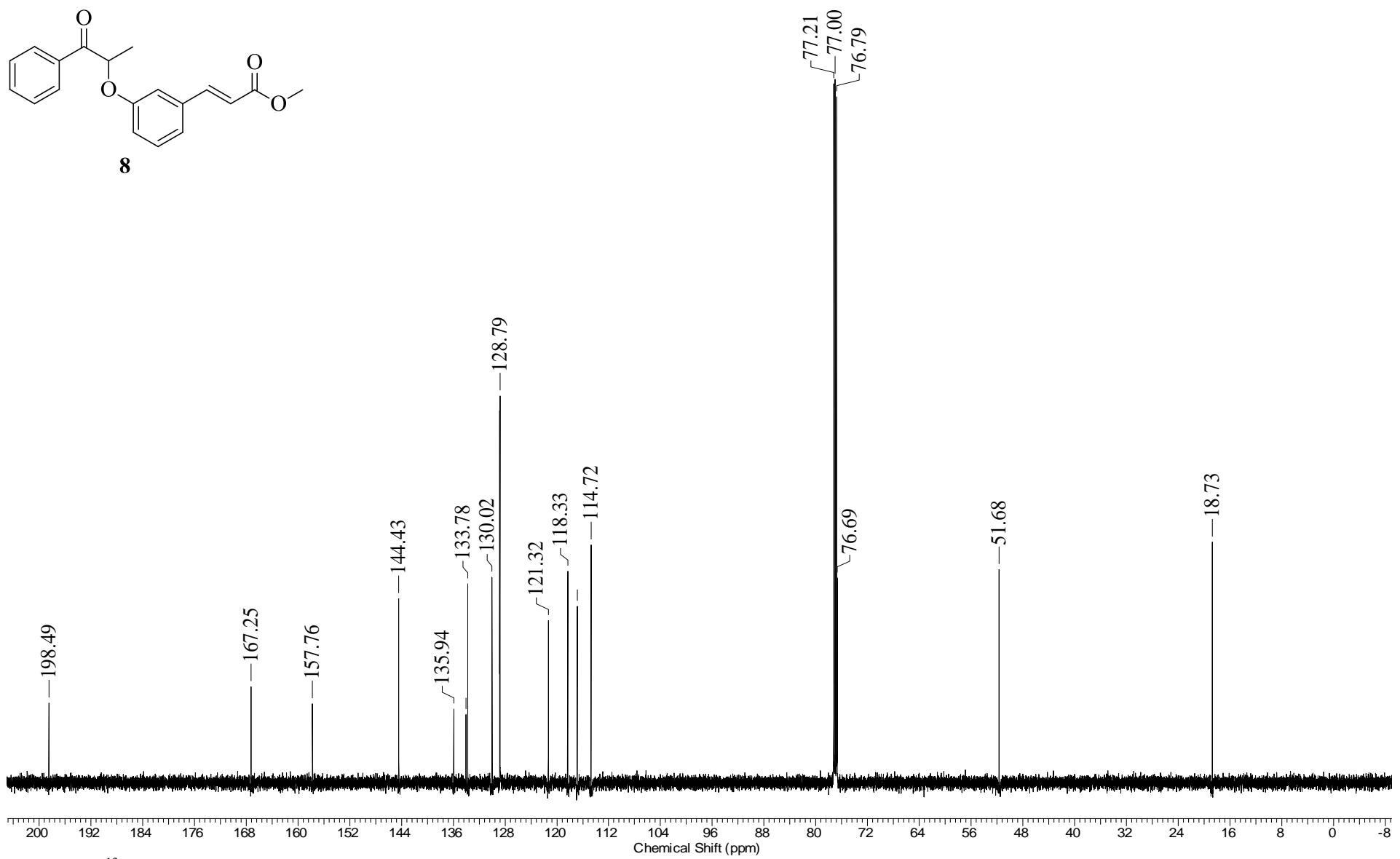
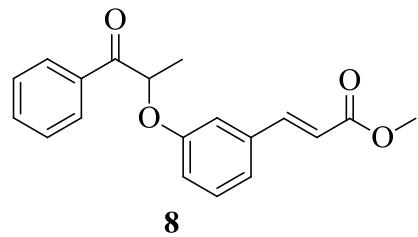
**Figure S68.**  $^{13}\text{C}$  NMR spectrum (150 MHz,  $\text{CDCl}_3$ ) of compound **7b**.



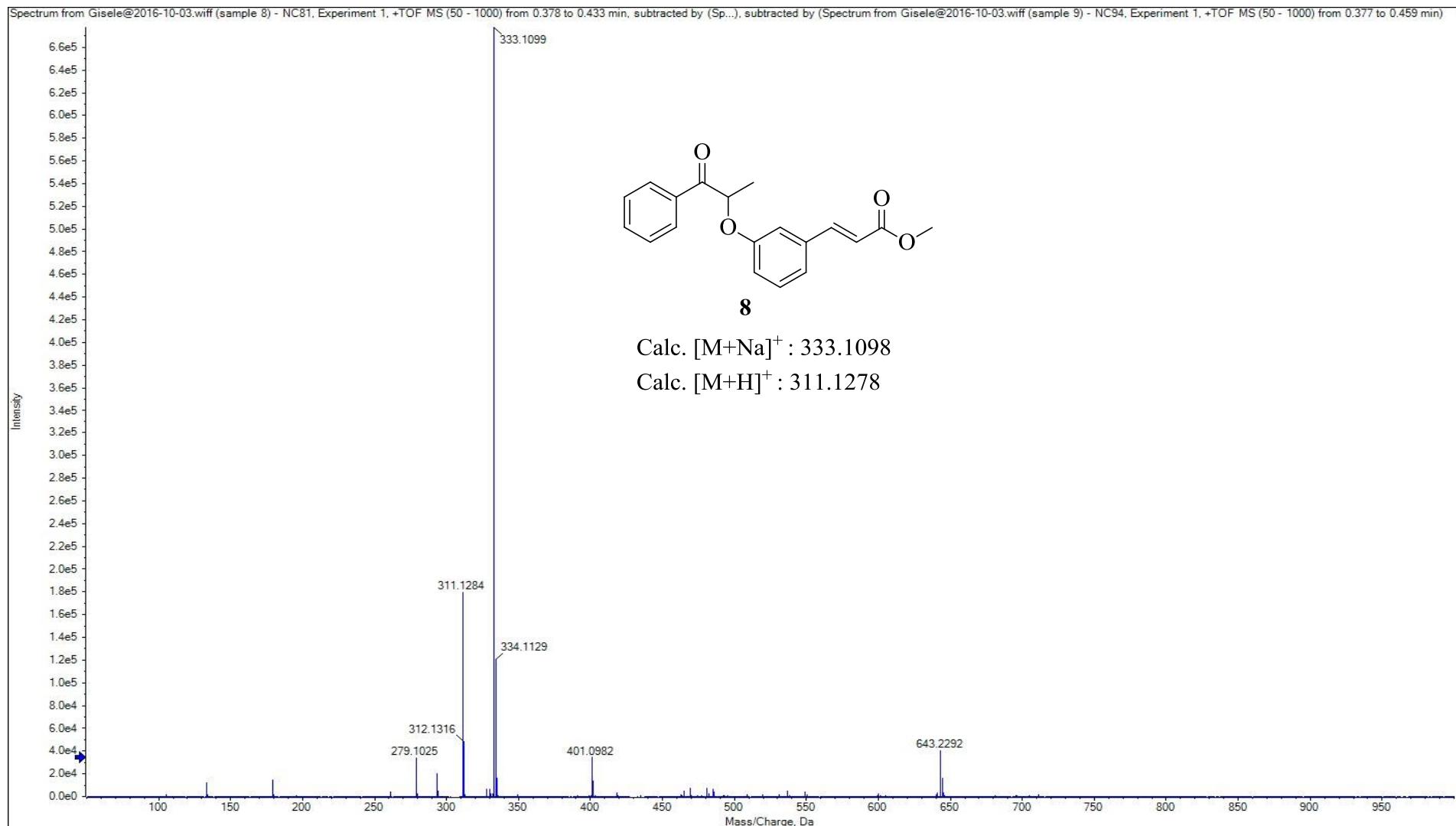
**Figure S69.** HRMS spectrum of compound **7b**.



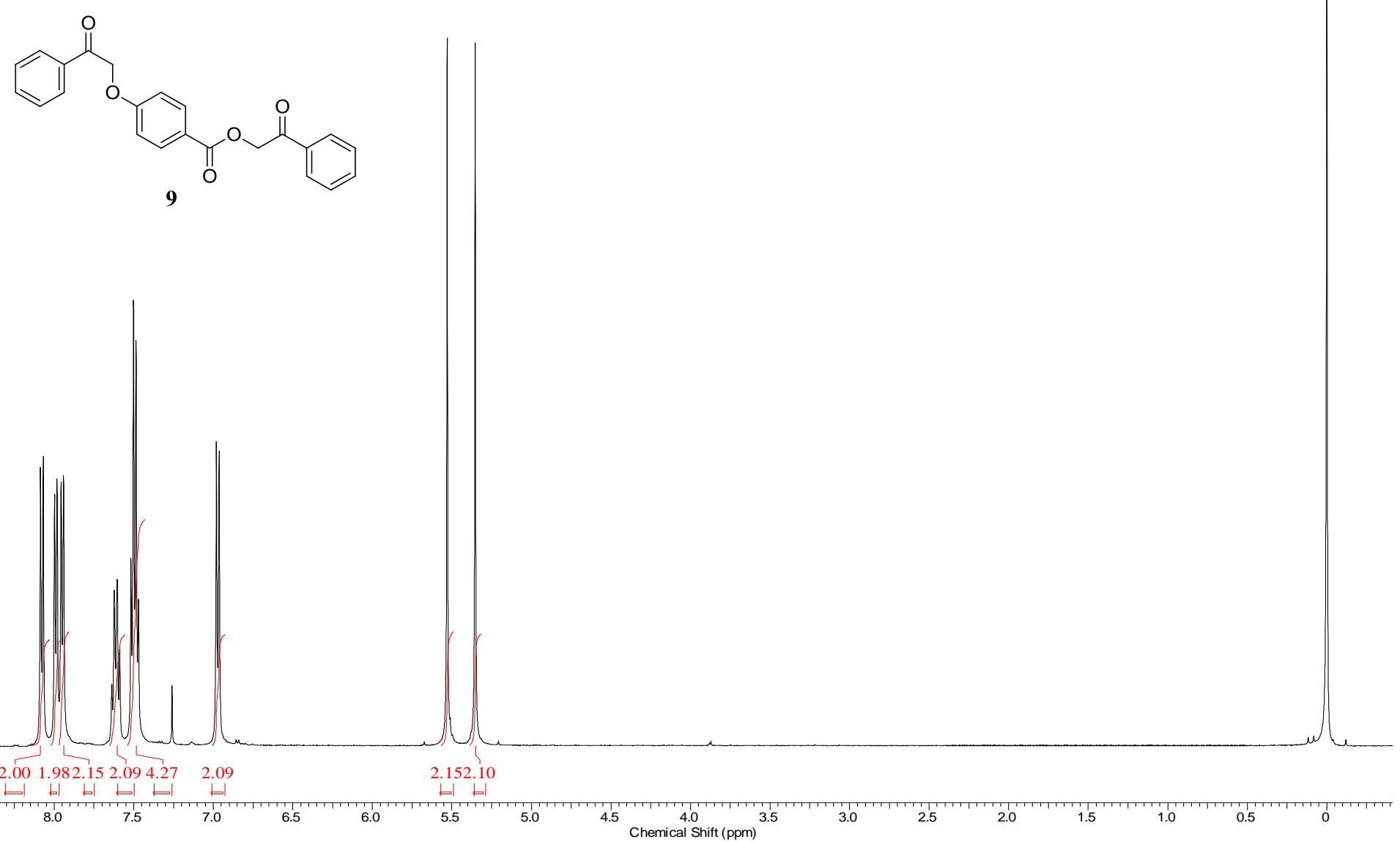
**Figure S70.**  $^1\text{H}$  NMR spectrum (600 MHz,  $\text{CDCl}_3$ ) of compound **8**.



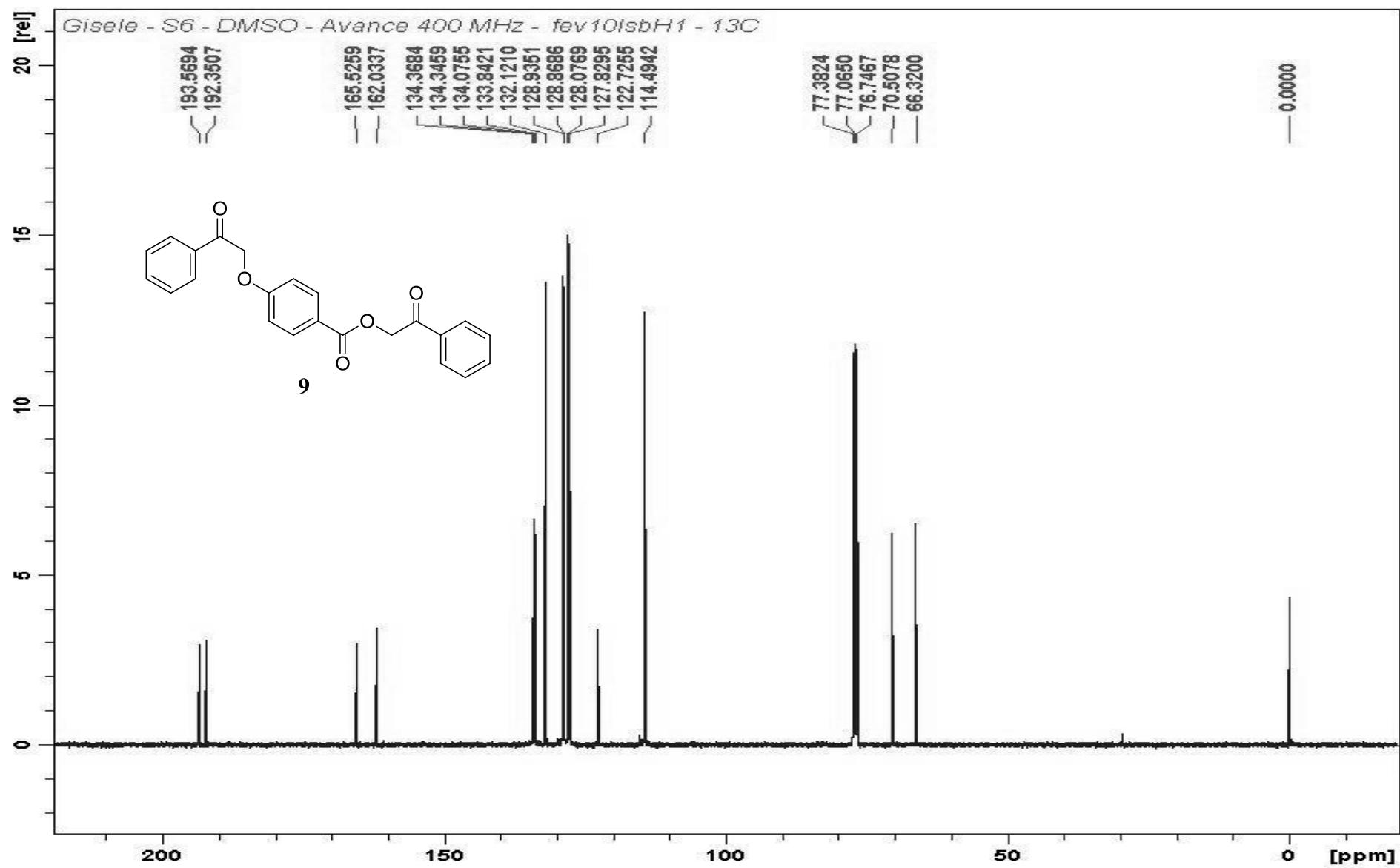
**Figure S71.**  $^{13}\text{C}$  NMR spectrum (150 MHz,  $\text{CDCl}_3$ ) of compound **8**.



**Figure S72.** HRMS spectrum of compound **8**.



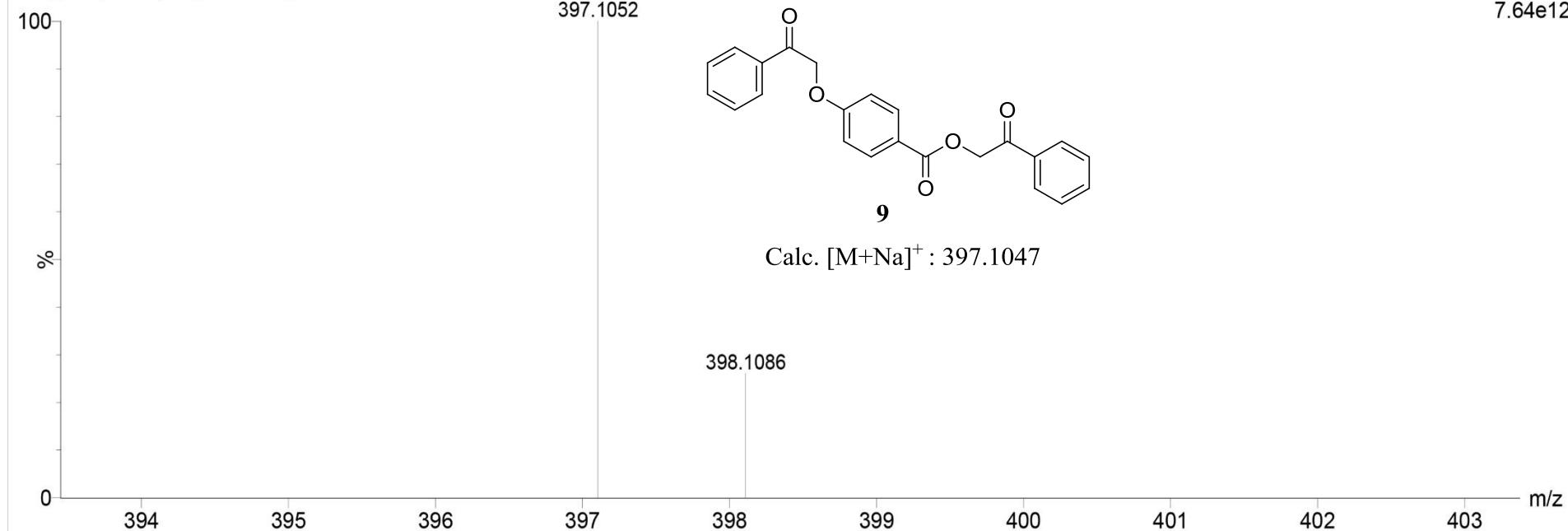
**Figure S73.**  $^1\text{H}$  NMR spectrum (500 MHz,  $\text{CDCl}_3$ ) of compound **9**.



**Figure S74.**  $^{13}\text{C}$  NMR spectrum (100 MHz,  $\text{DMSO}-d_6$ ) of compound **9**.

GIS\_S6 (0.034) ls (1.00,1.00) C<sub>23</sub>H<sub>18</sub>O<sub>5</sub>Na

TOF MS ES+  
7.64e12



**Figure S75.** HRMS spectrum of compound **9**.