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# **Formation and Disproportionation of Xanthenols to Xanthenes and Xanthones and Its Use in Synthesis**

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## **Supporting Information**

	Page
<sup>1</sup> H NMR and <sup>13</sup> C { <sup>1</sup> H} NMR Spectra	S1-S100

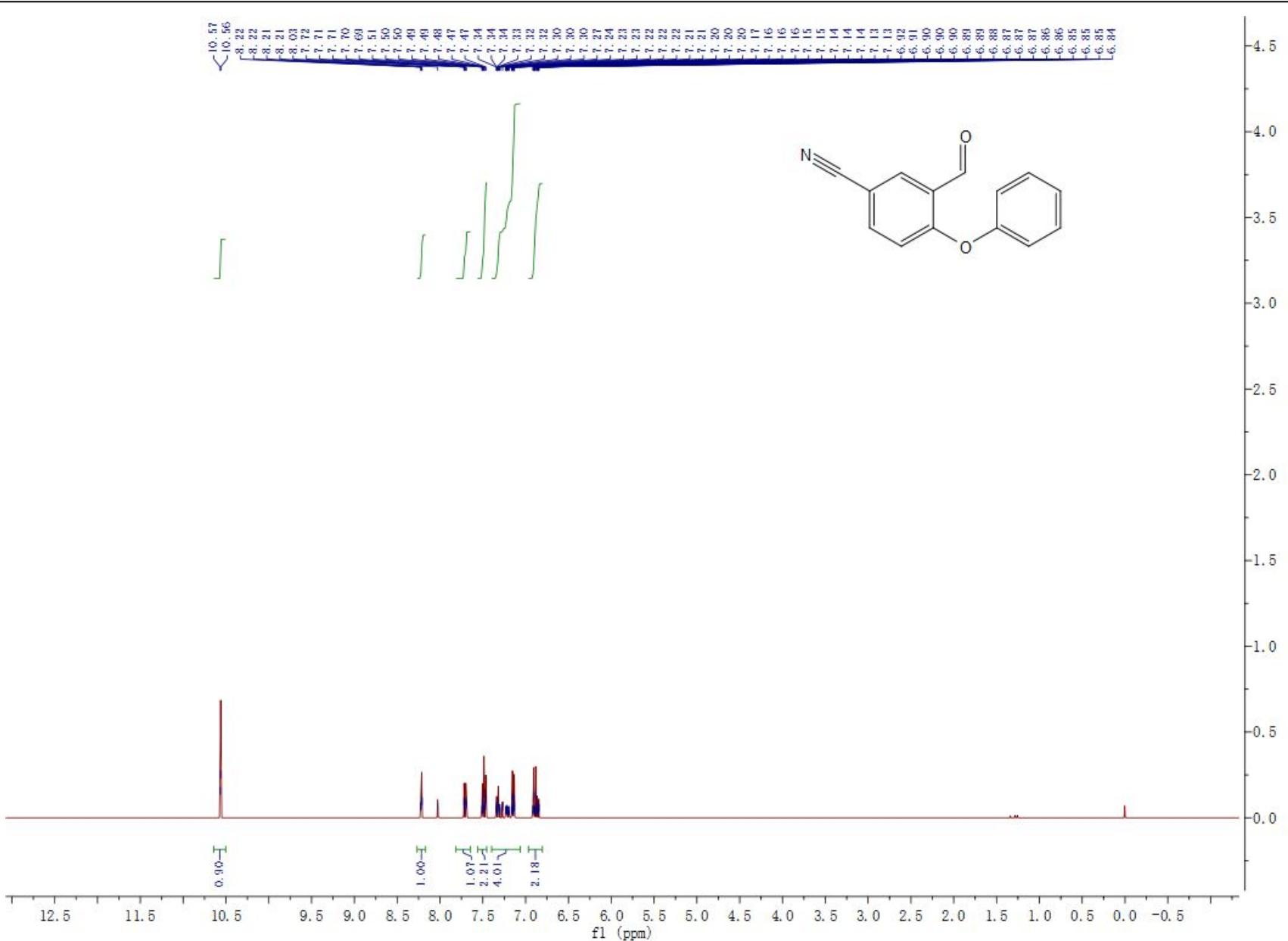
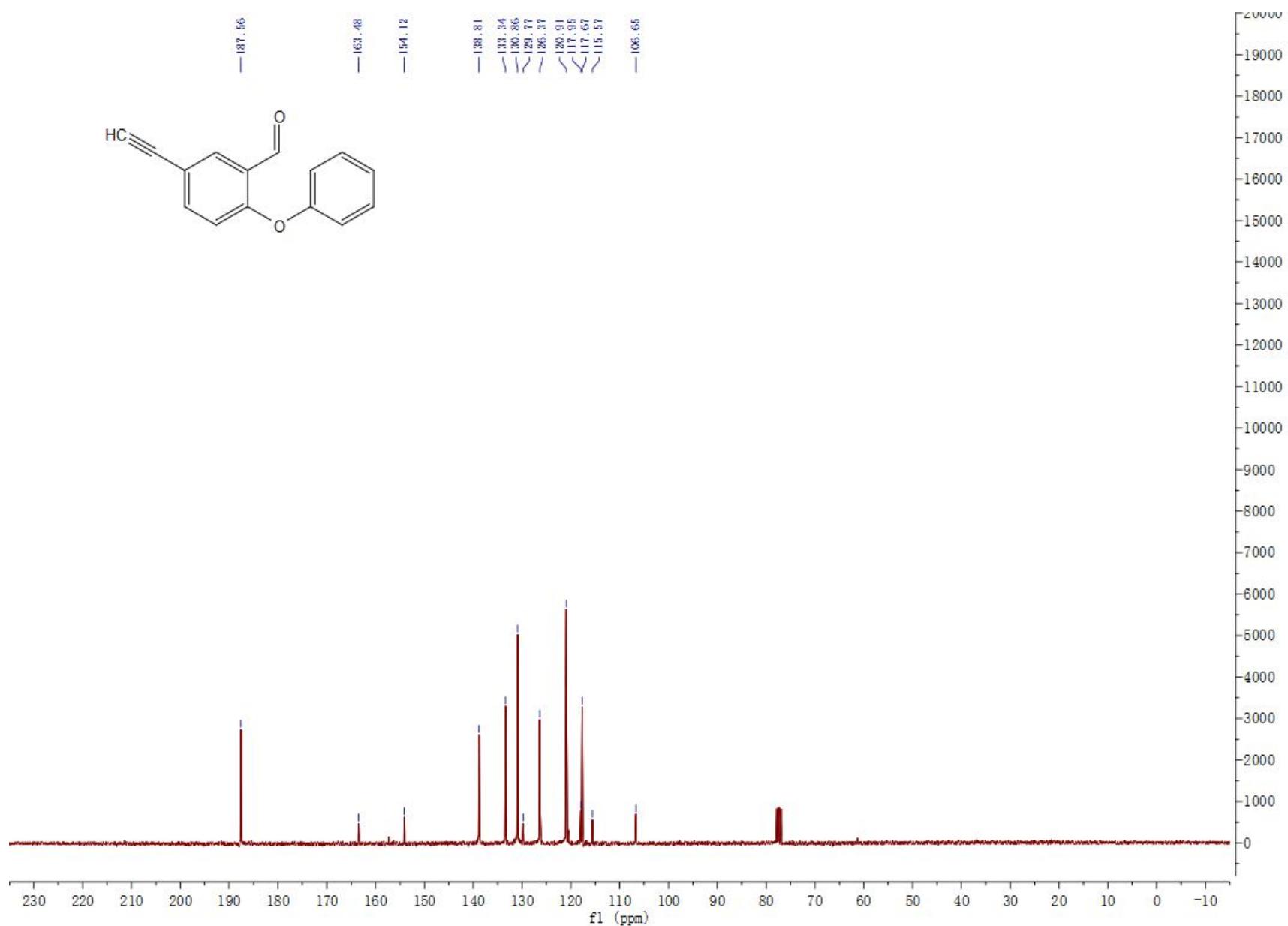


Figure S1:  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 14a



**Figure S2:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (75 MHz,  $\text{CDCl}_3$ ) spectrum of compound 14a

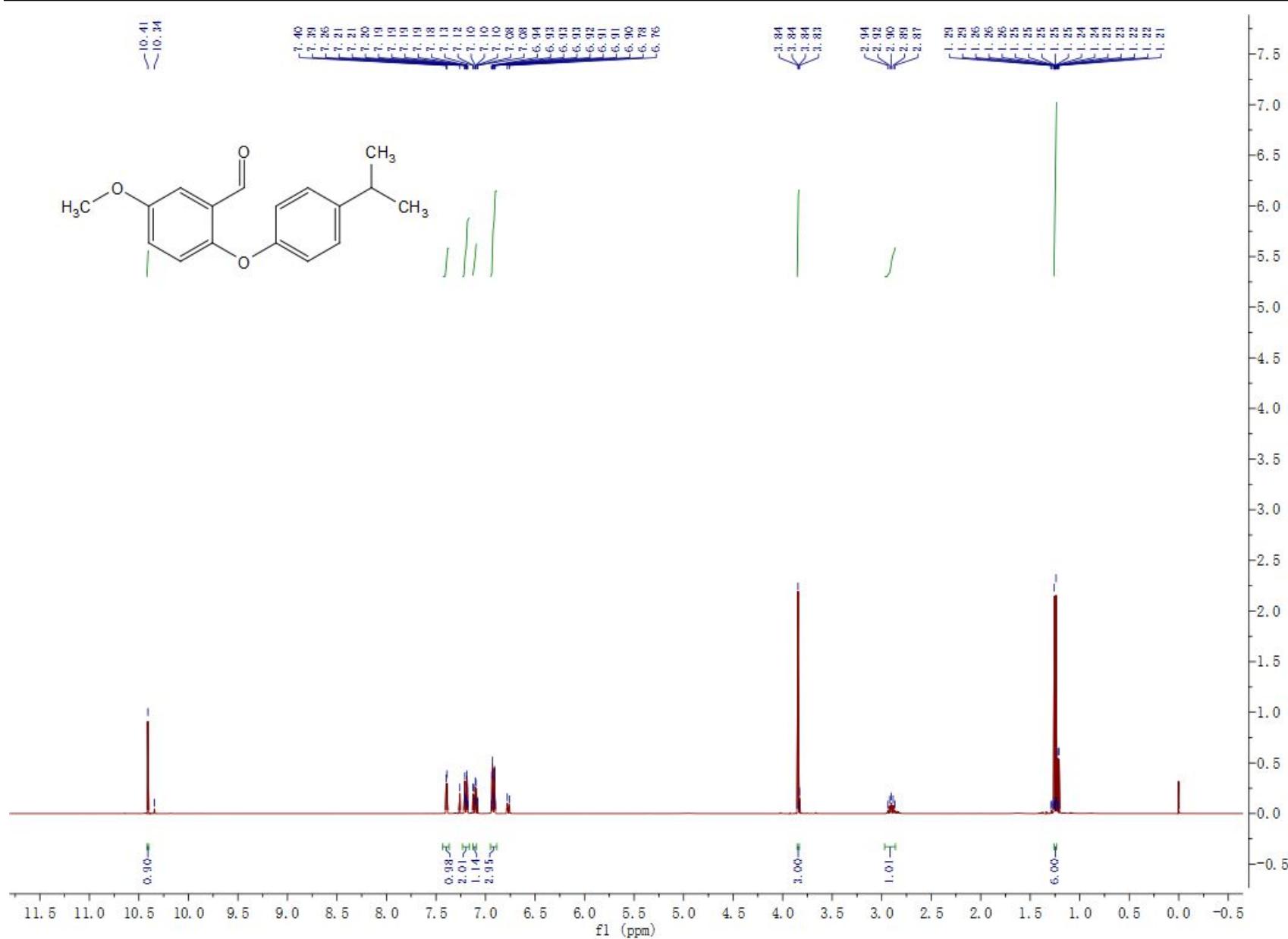


Figure S3:  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 17a

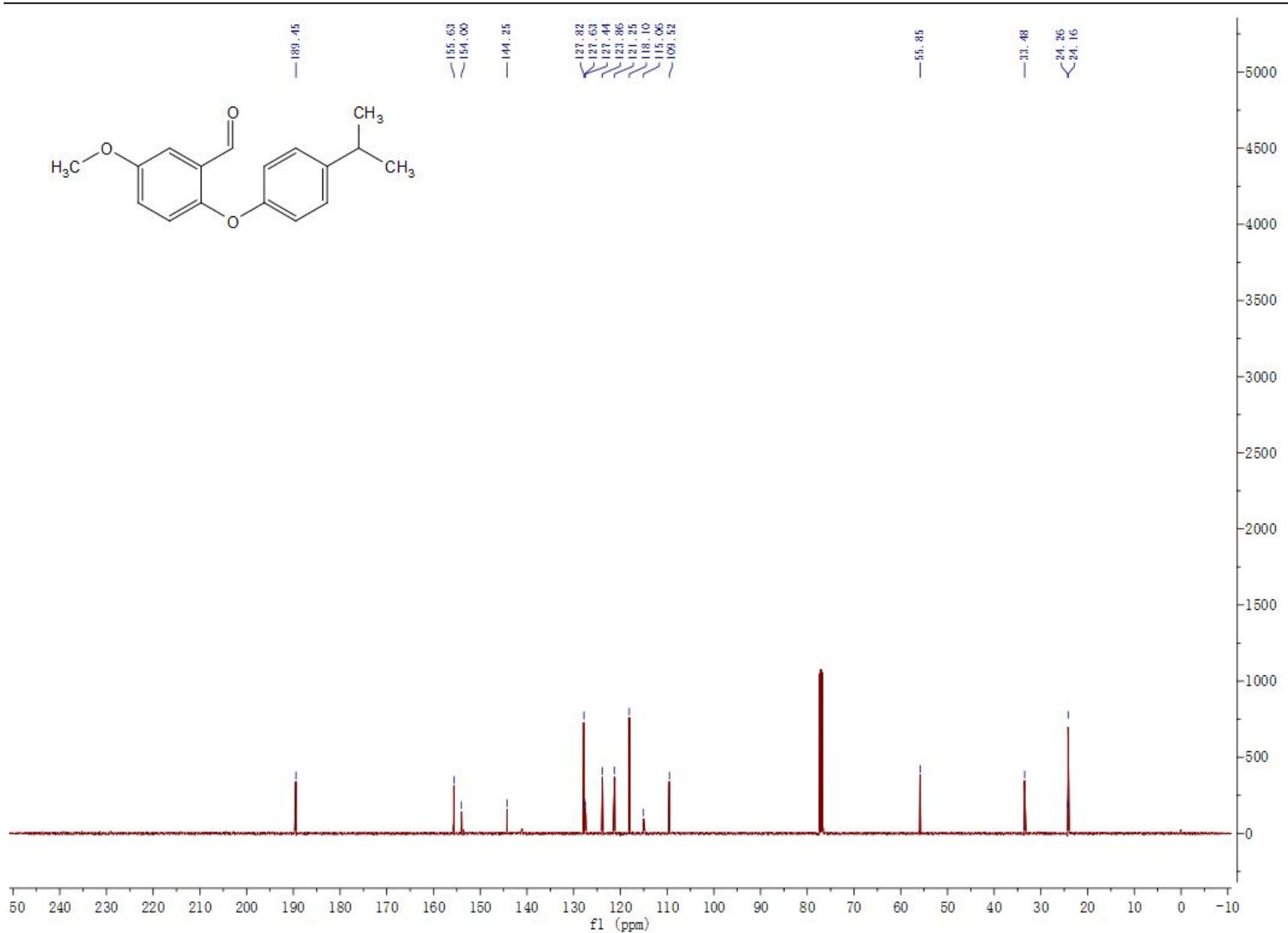


Figure S4:  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 17a

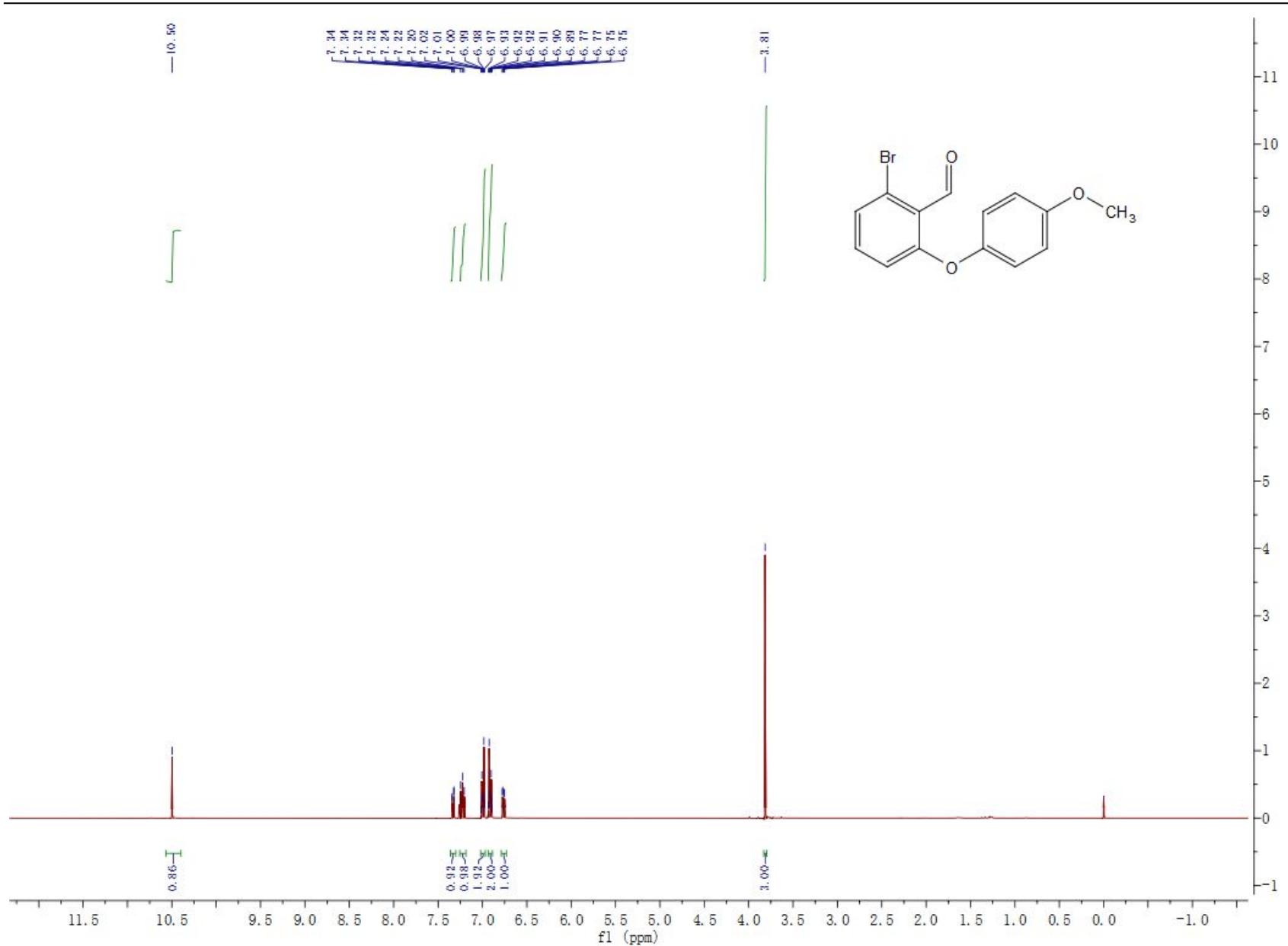


Figure S5:  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 19a

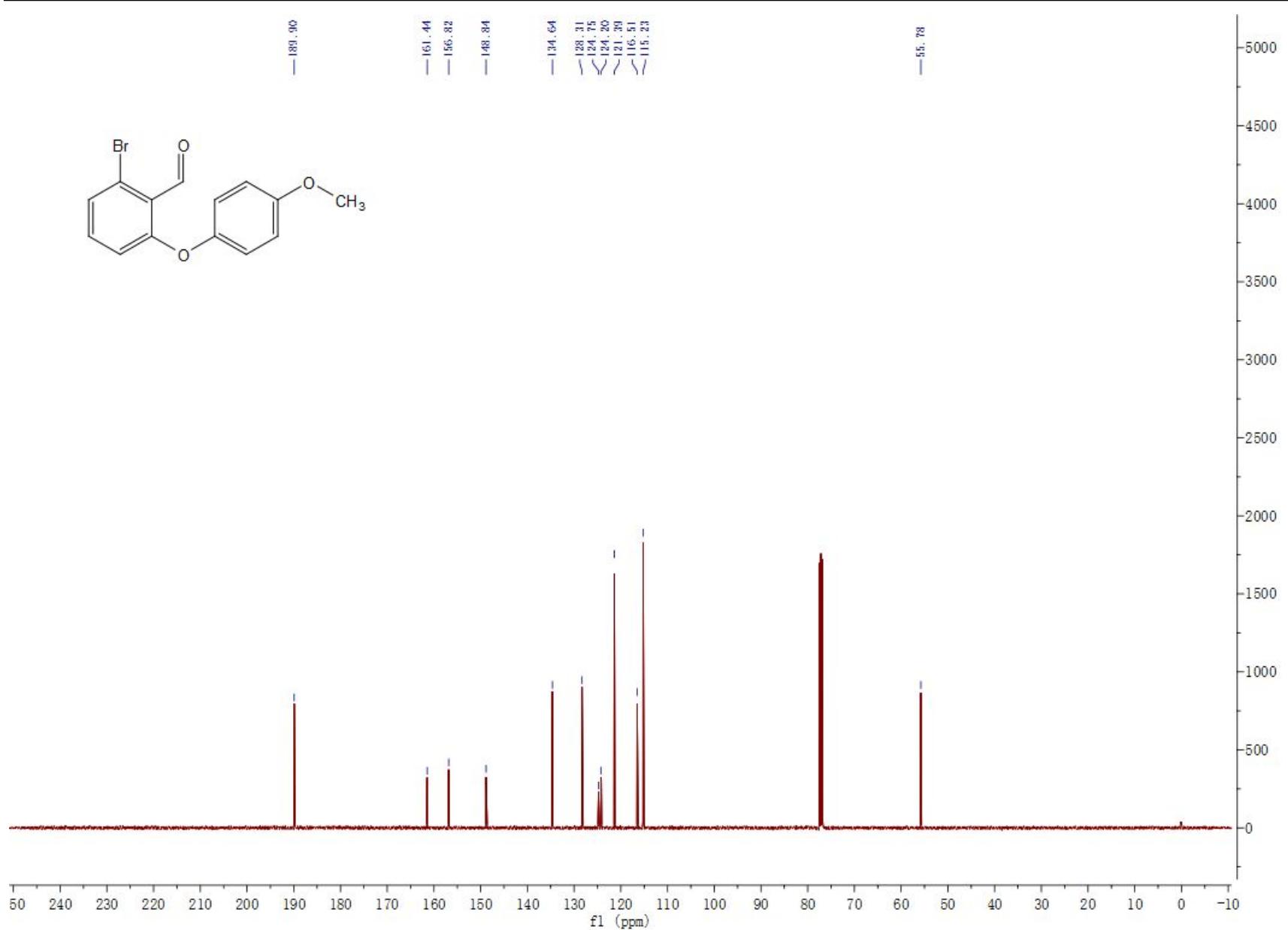
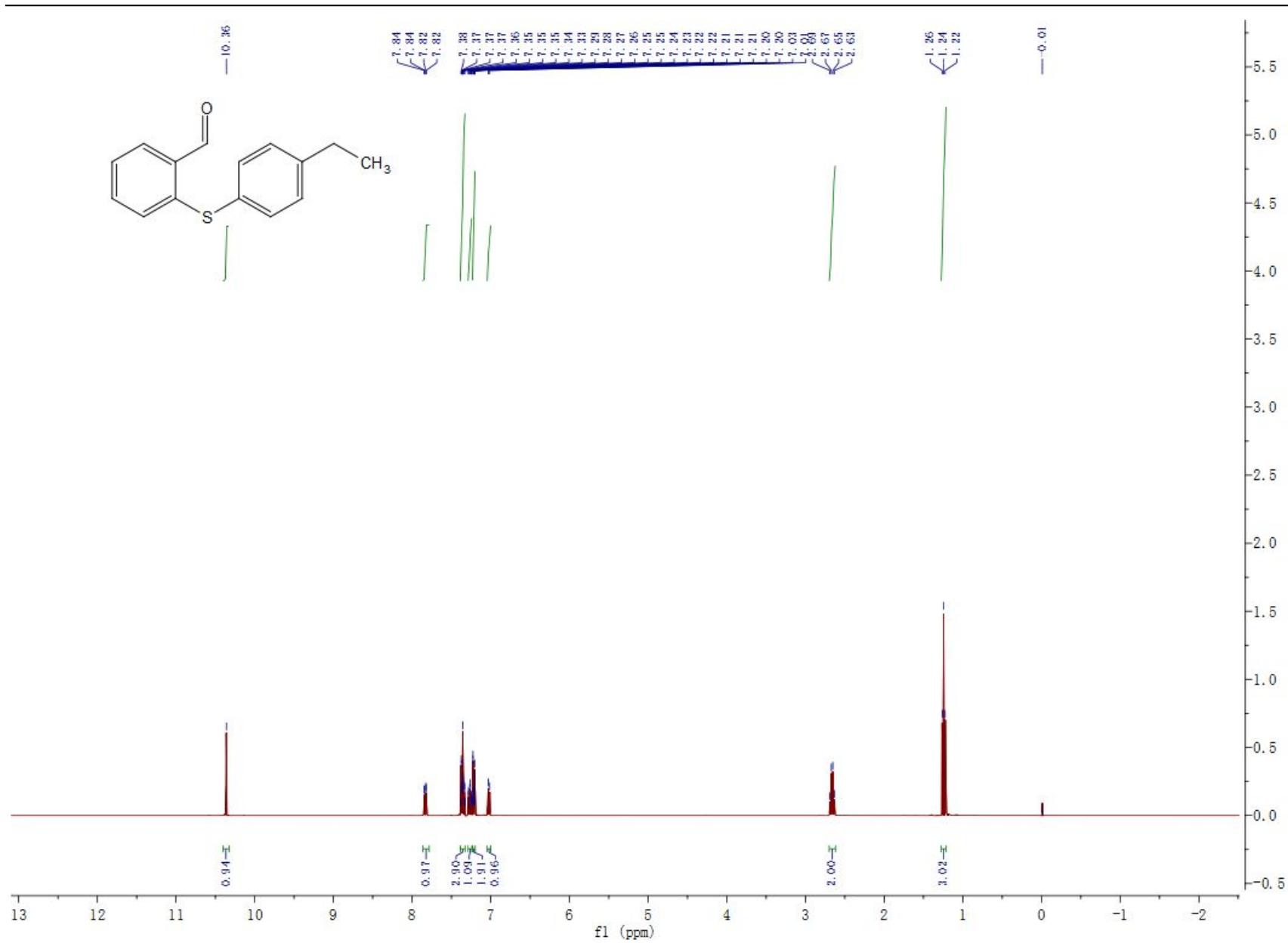
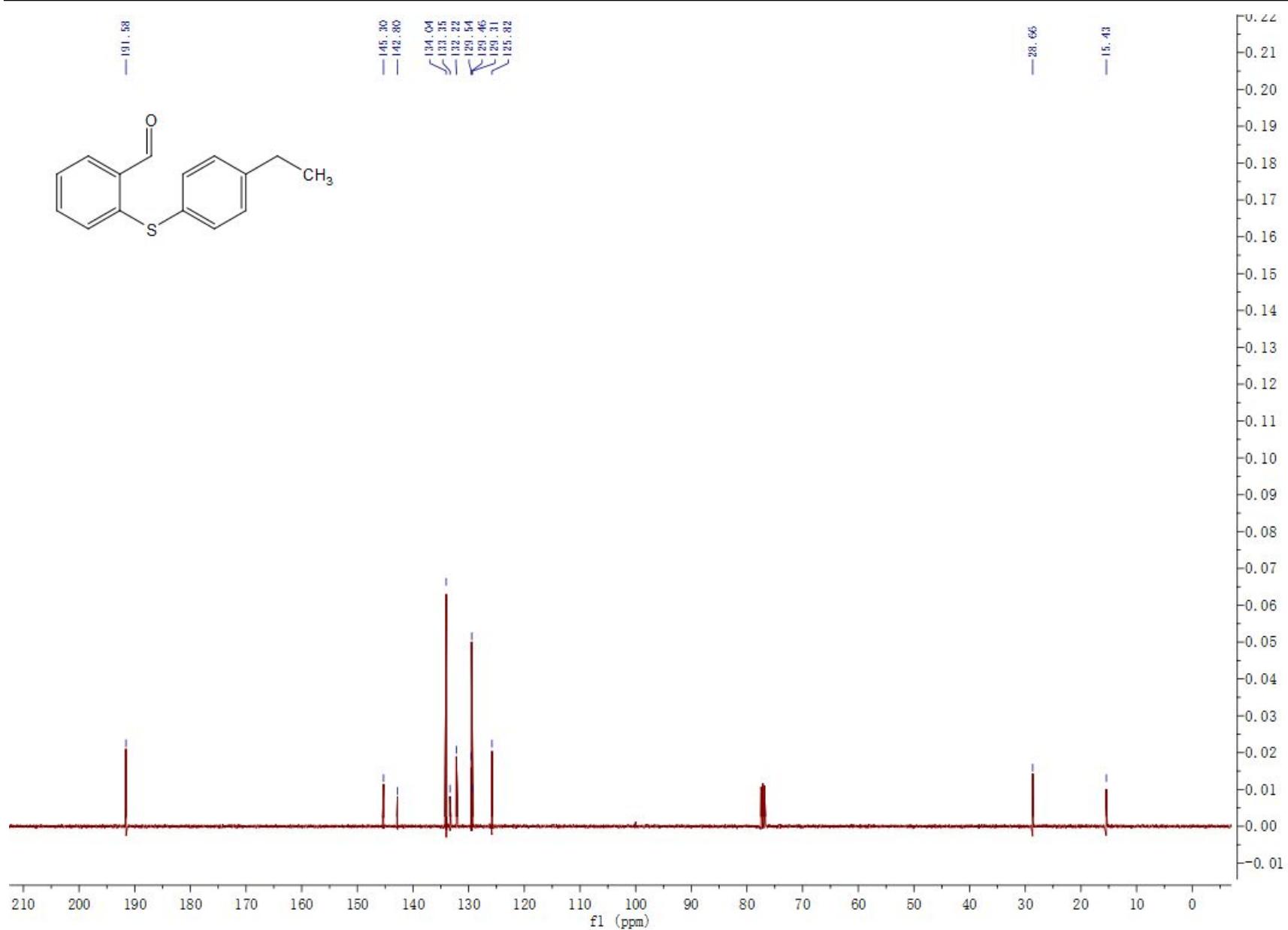


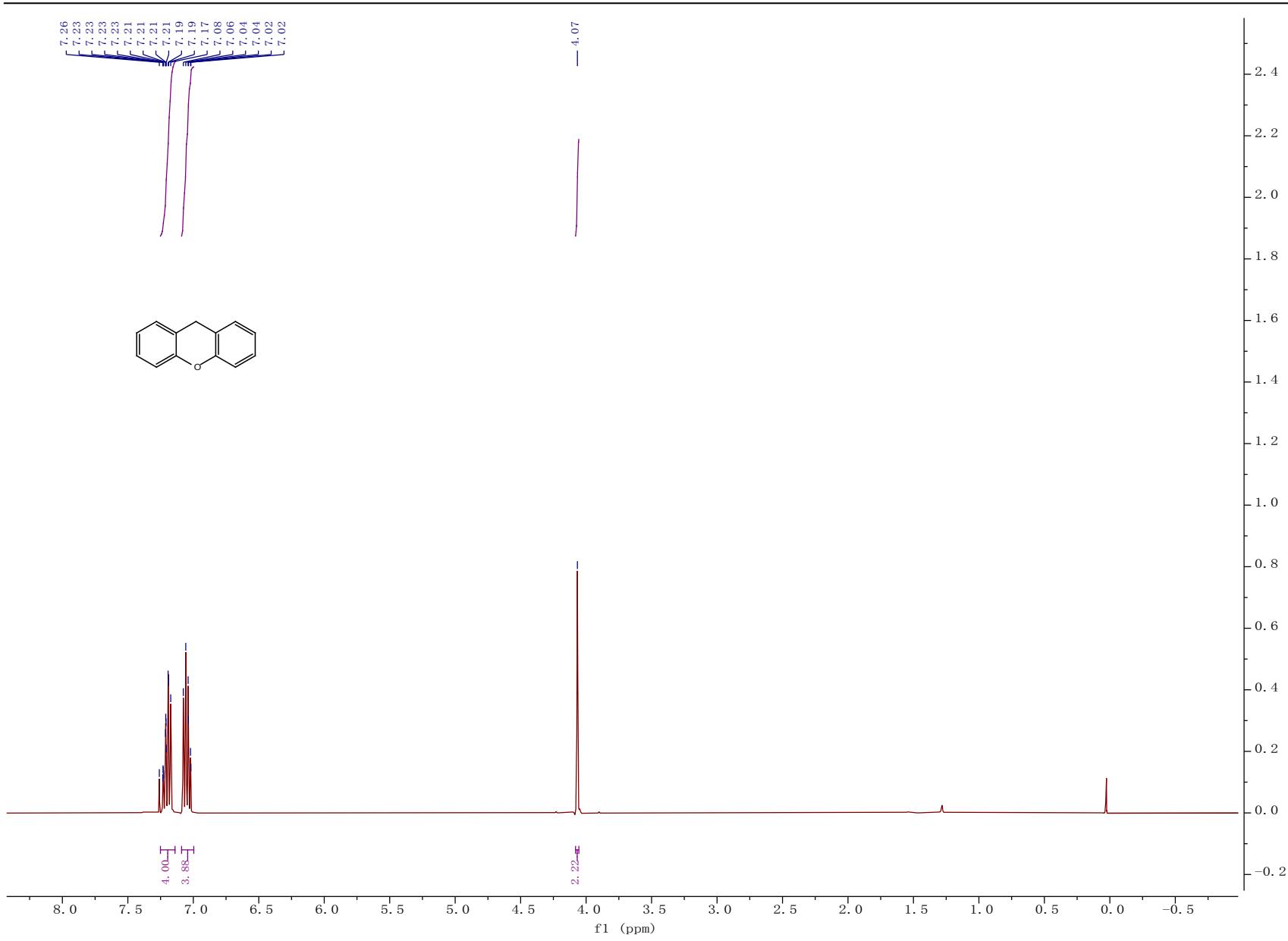
Figure S6:  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 19a



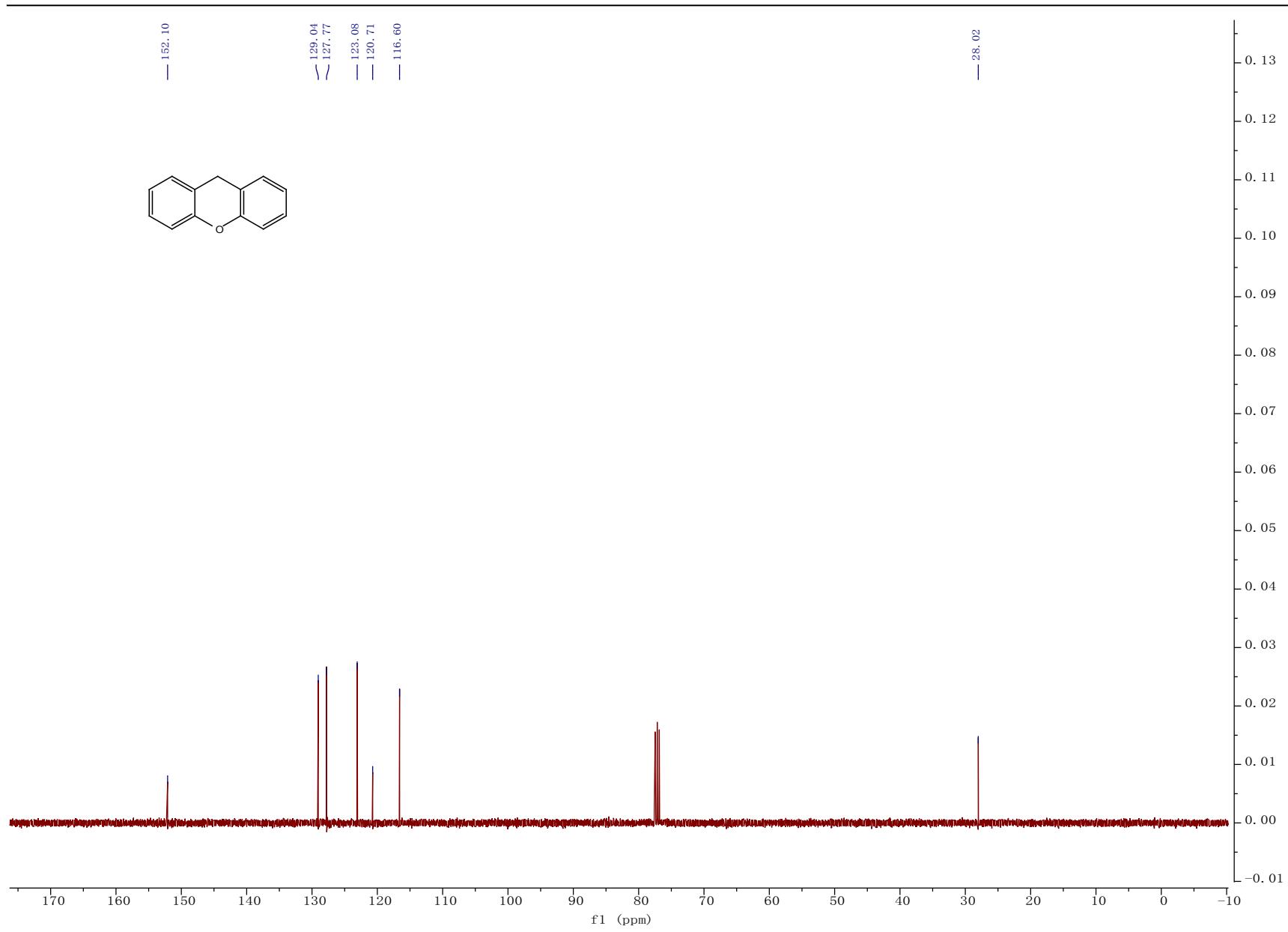
**Figure S7:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 22a



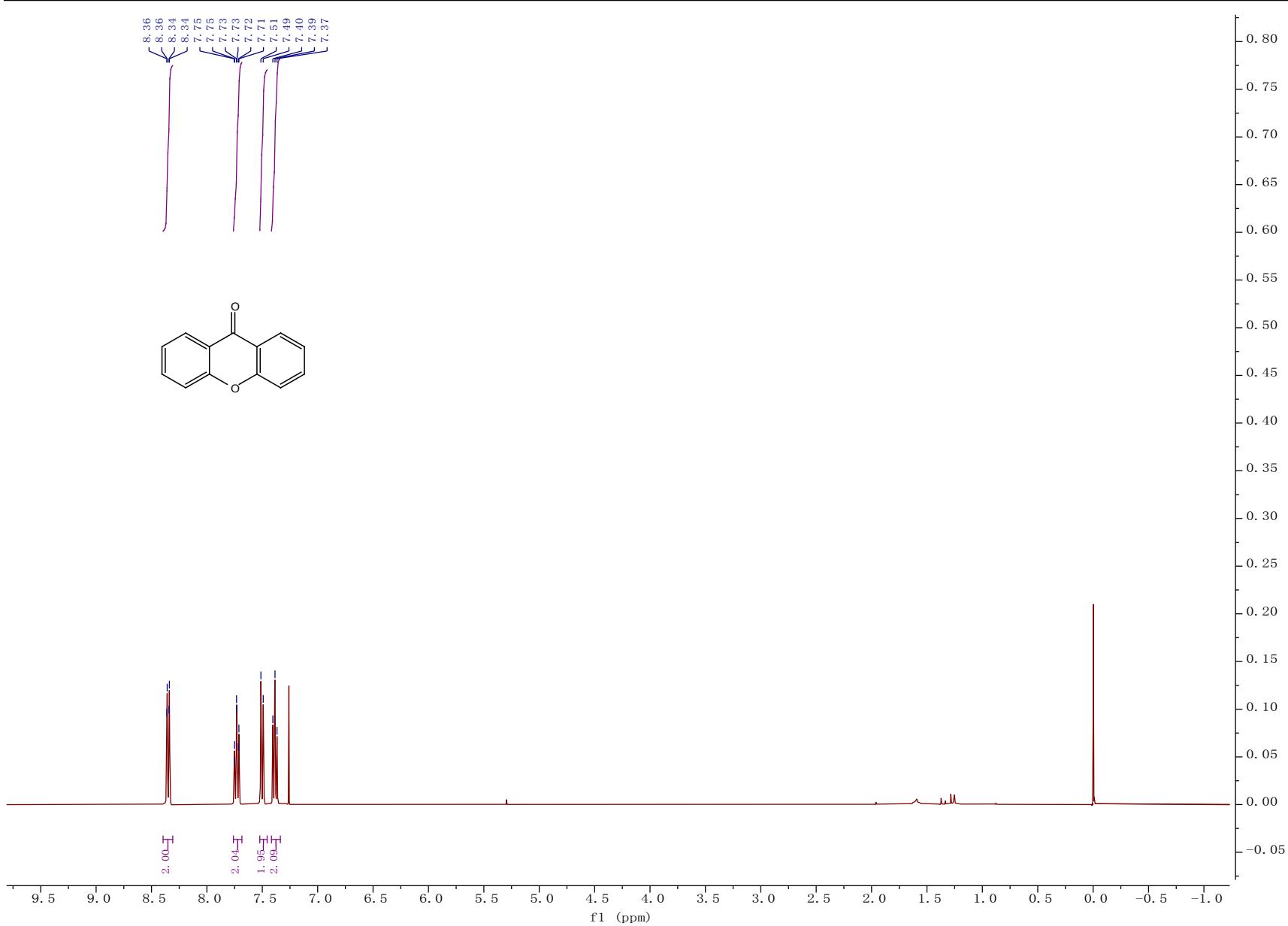
**Figure S8:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of compound 22a



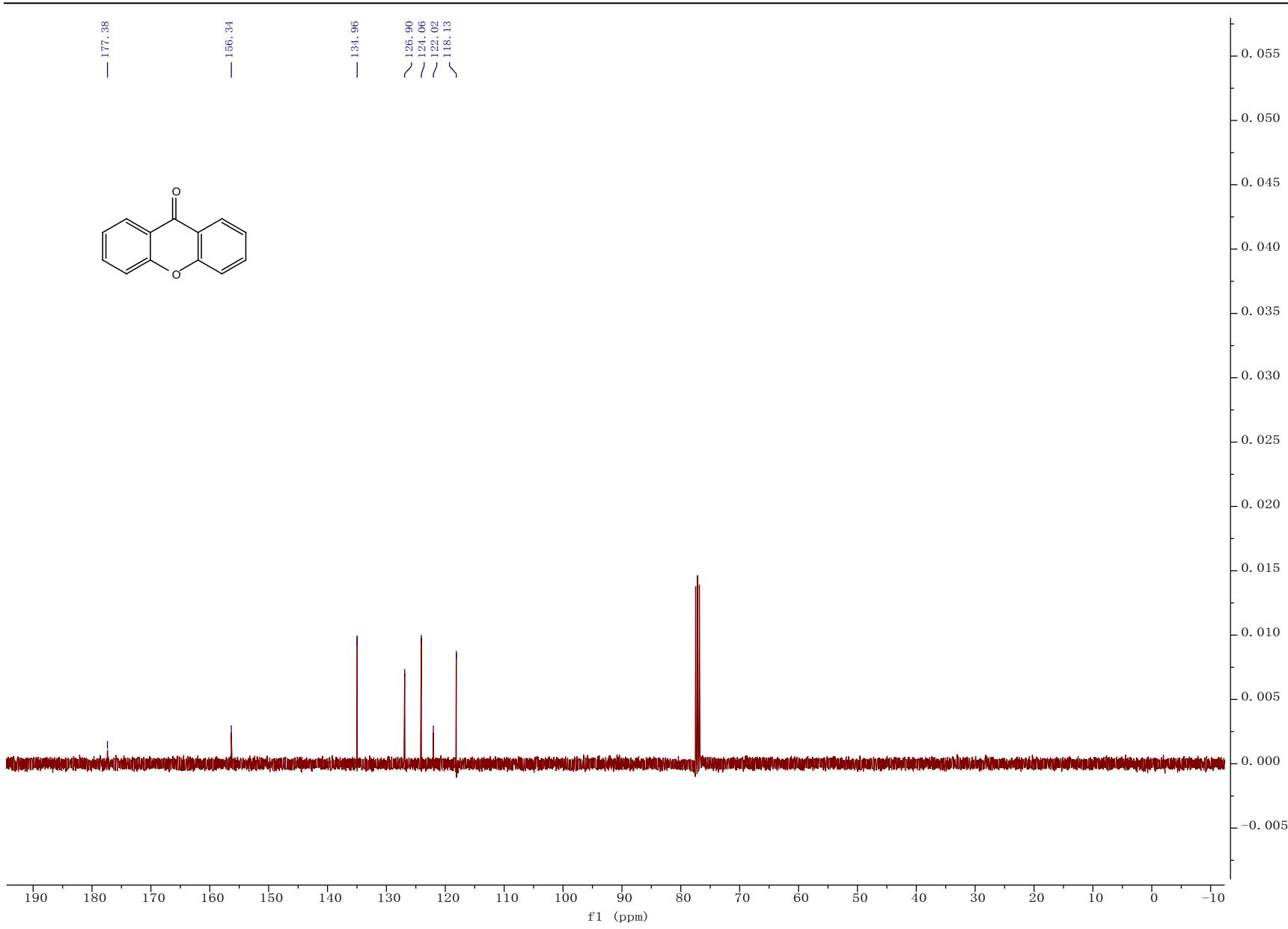
**Figure S9:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 1b



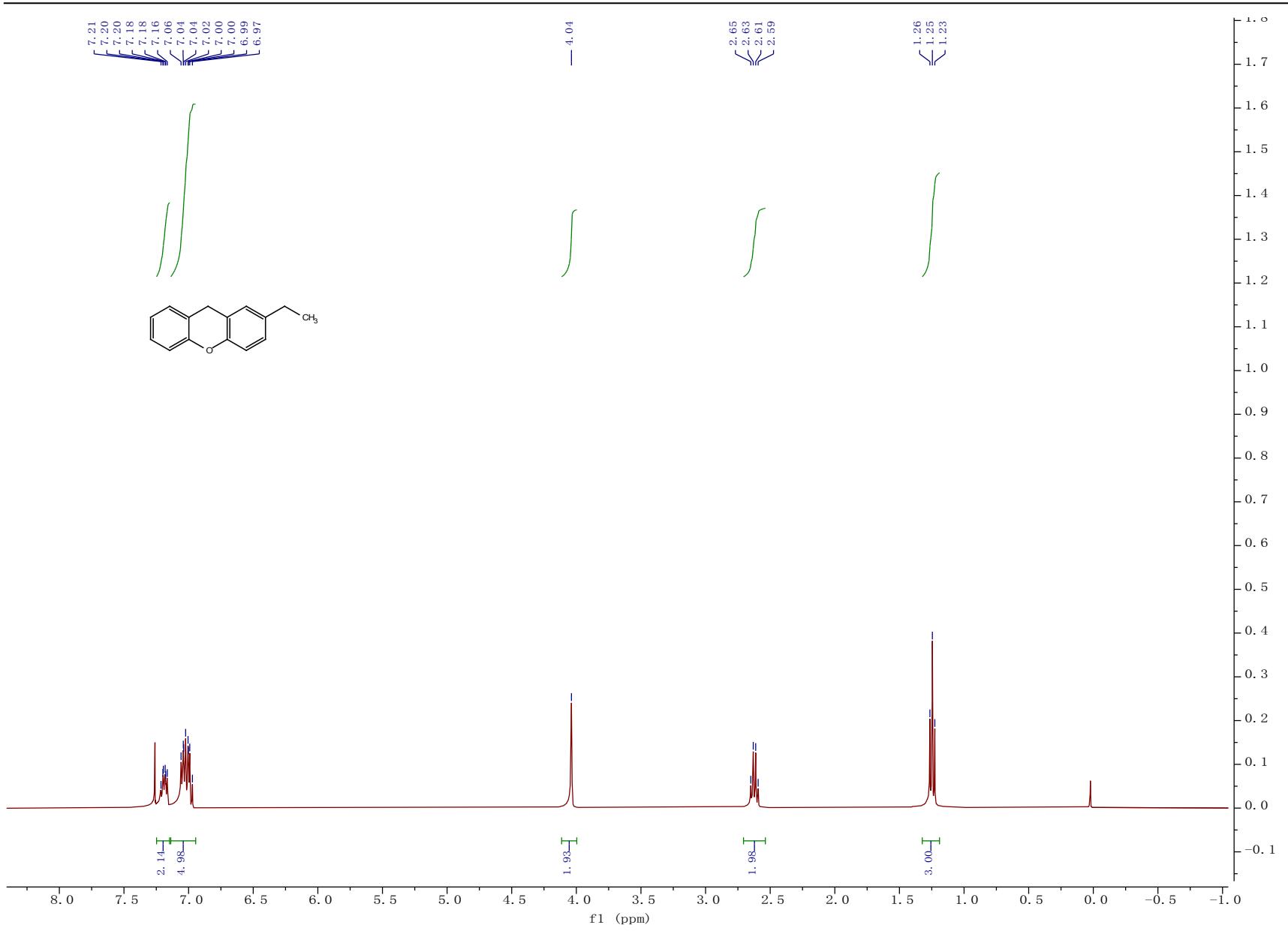
**Figure S10:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of compound 1b



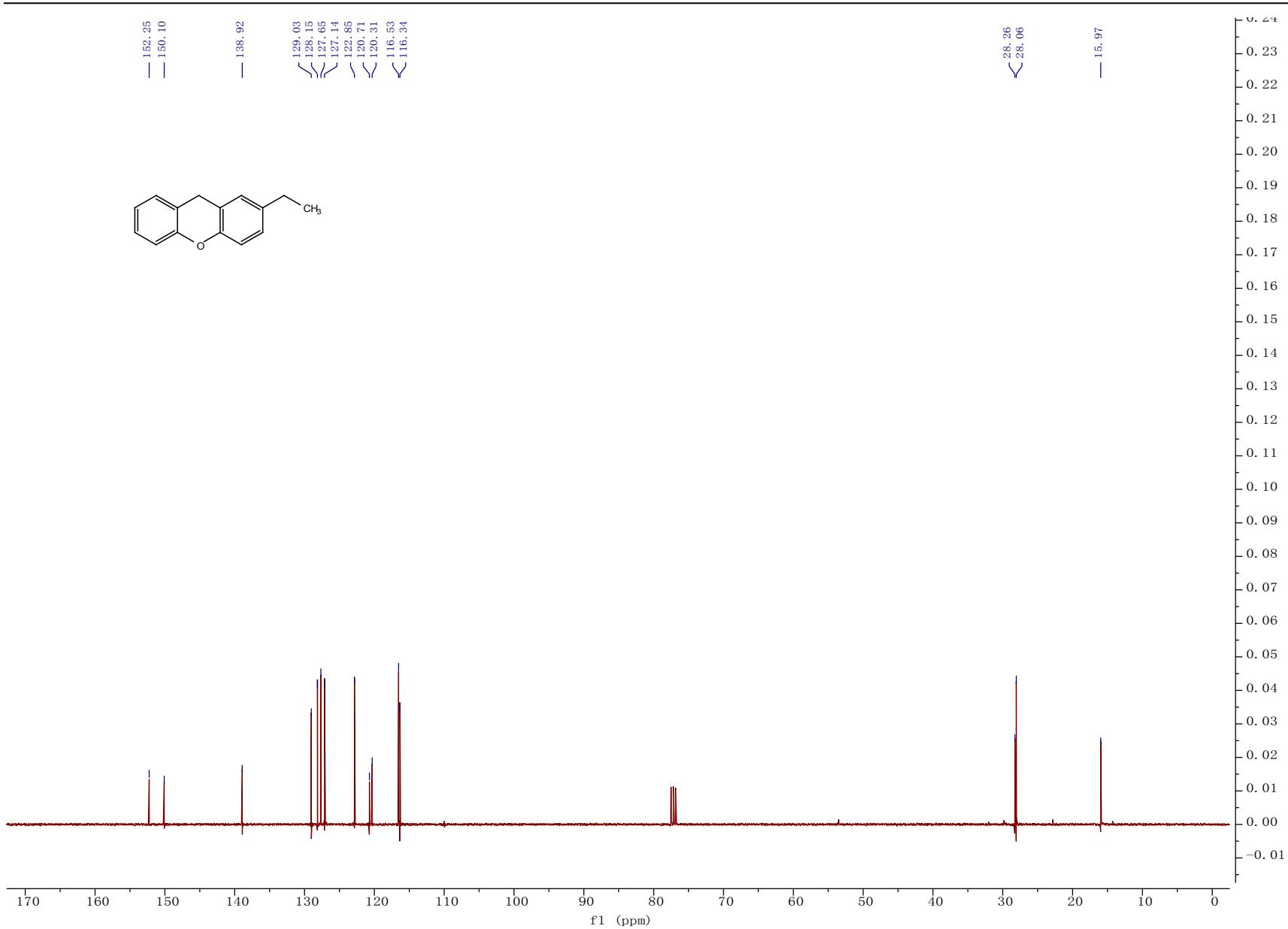
**Figure S11:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound **1c**



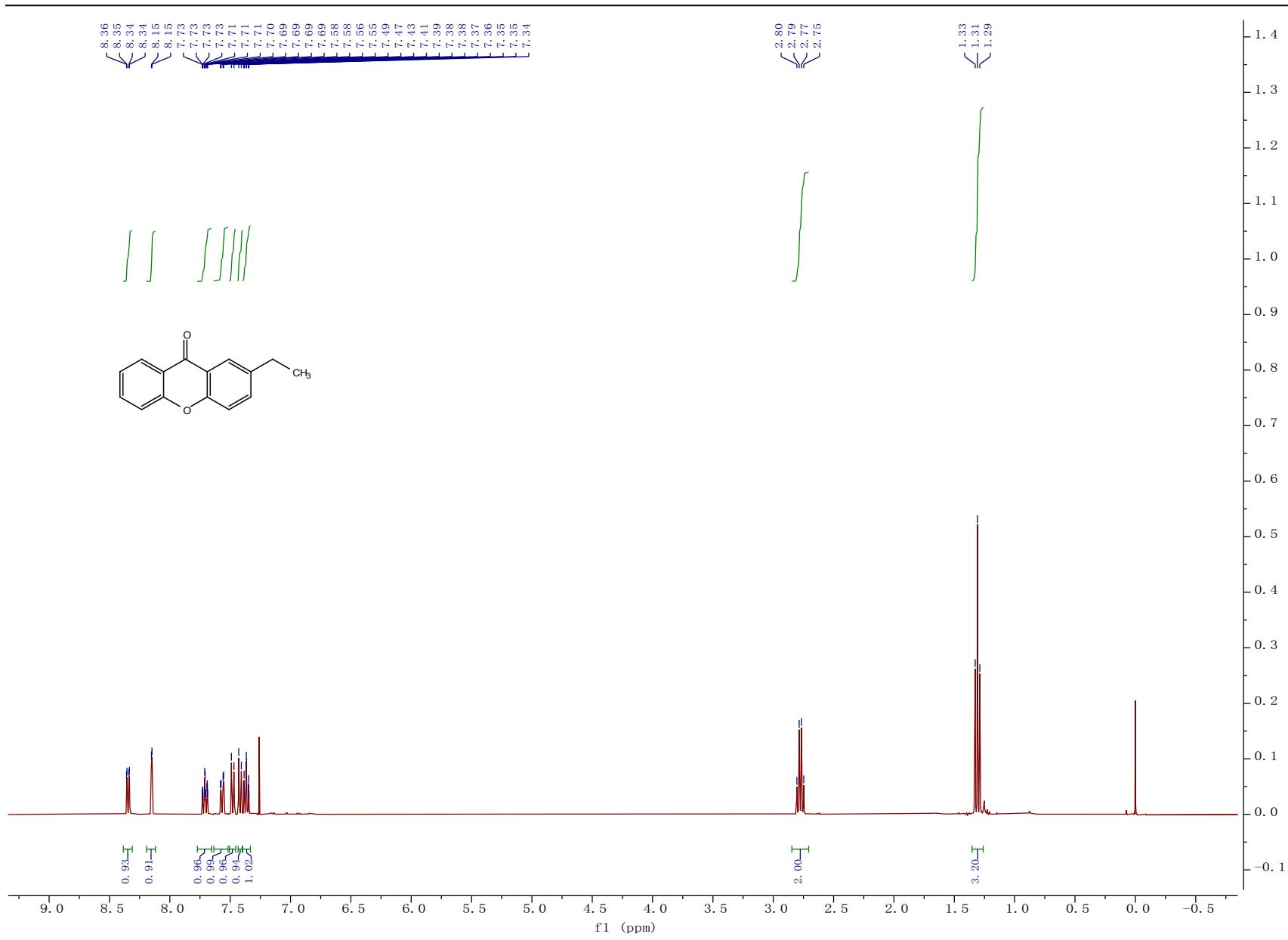
**Figure S12:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of compound 1c



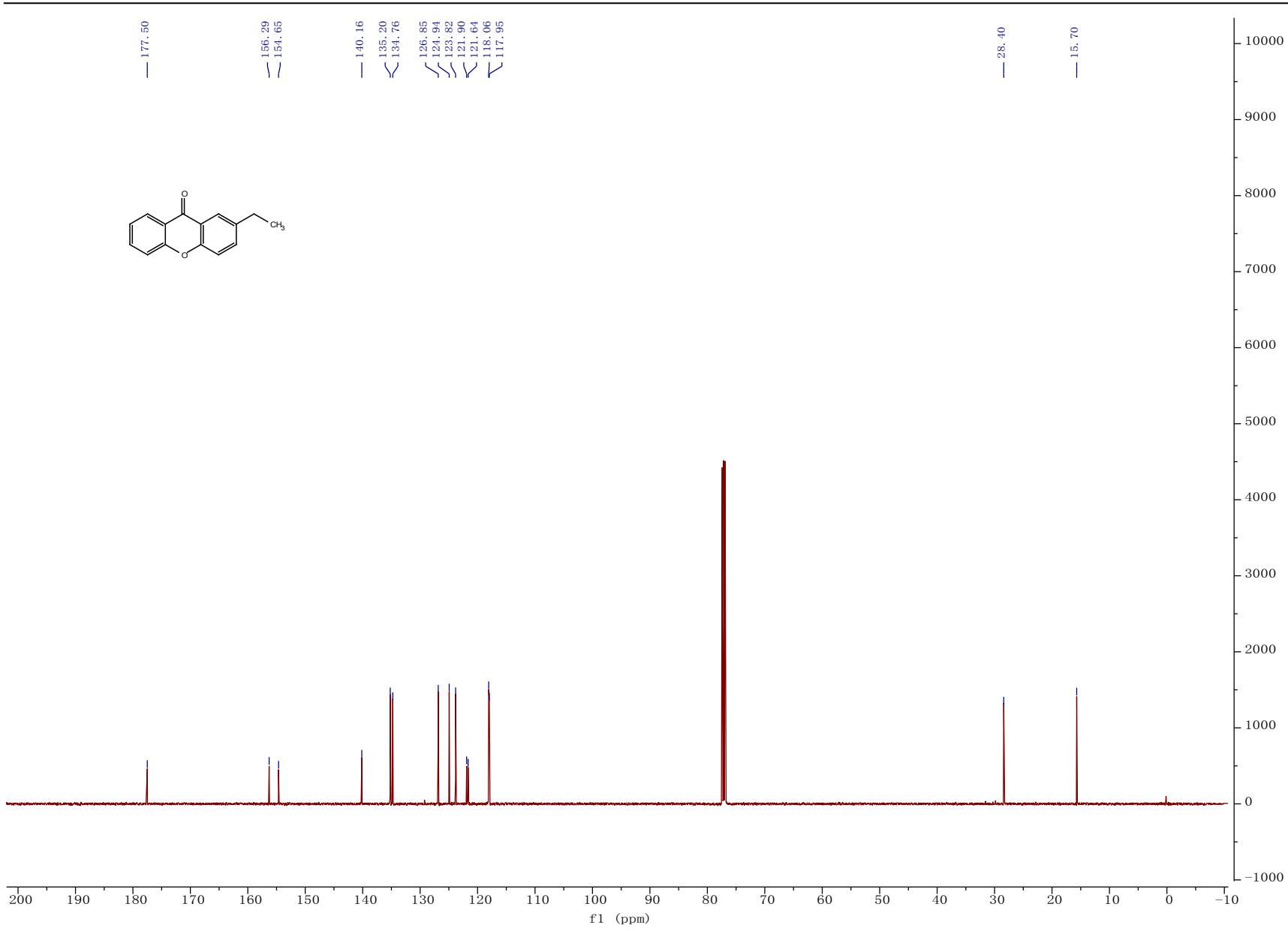
**Figure S13:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 2b



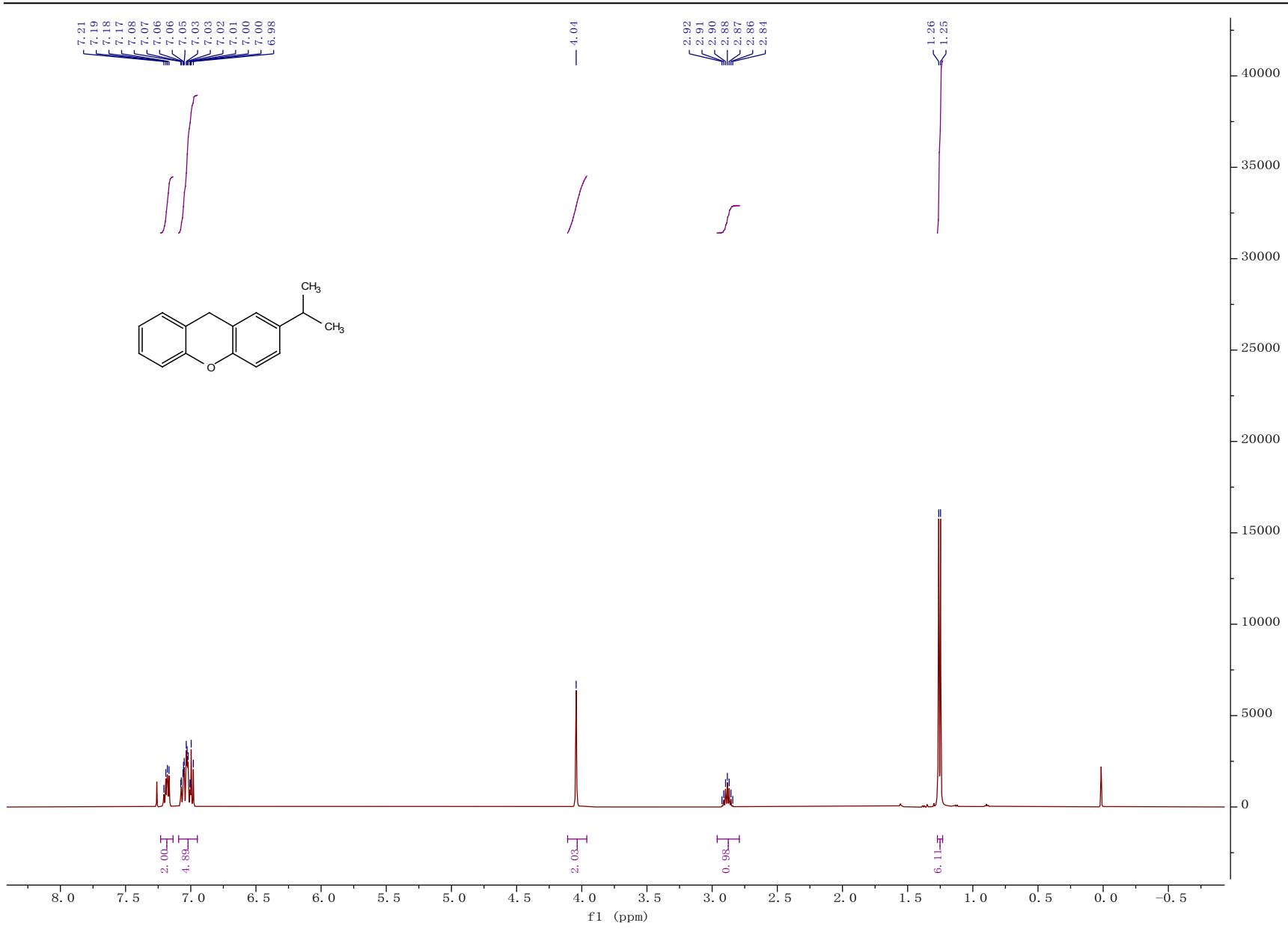
**Figure S14:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of compound 2b



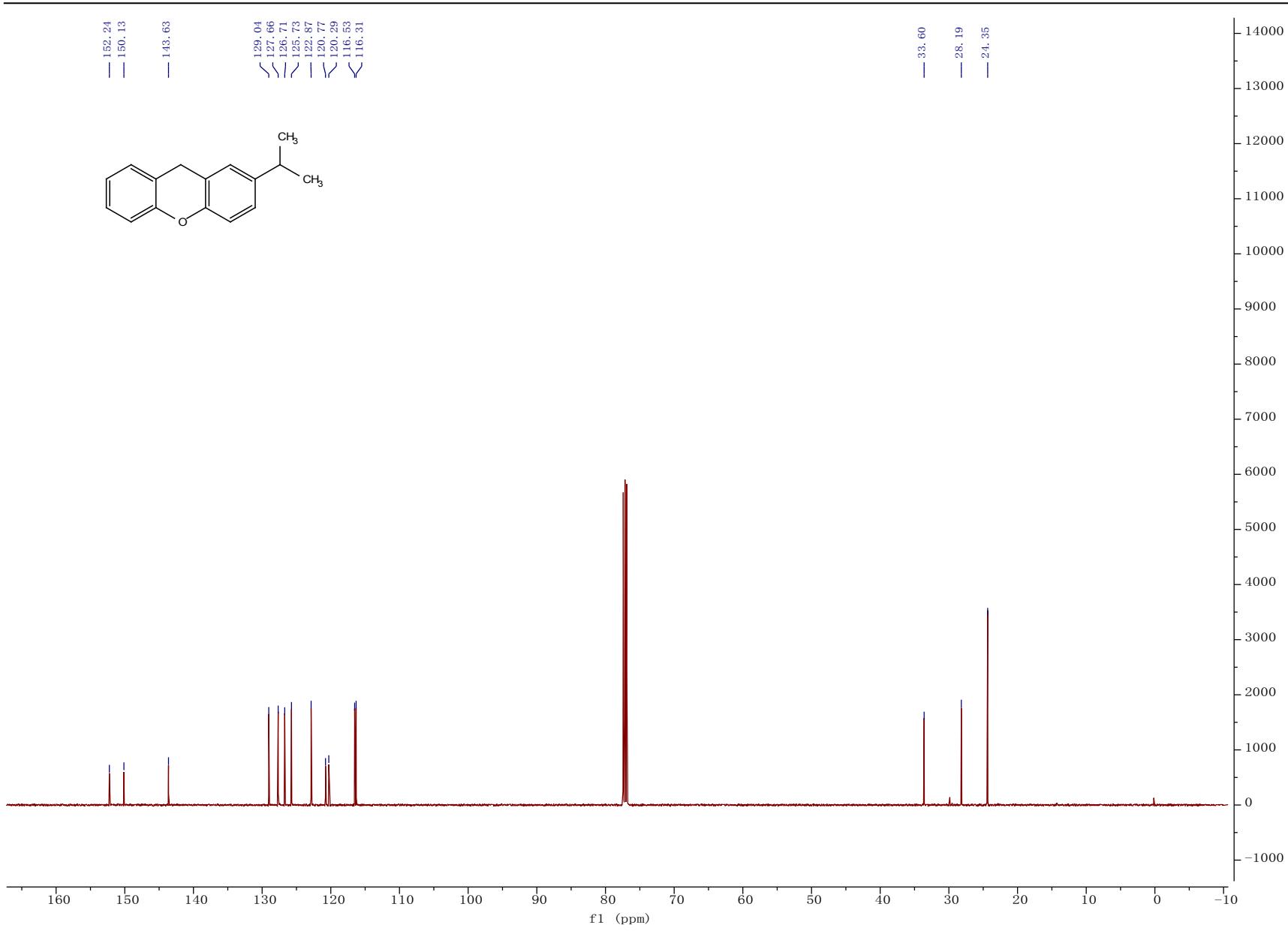
**Figure S15:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 2c



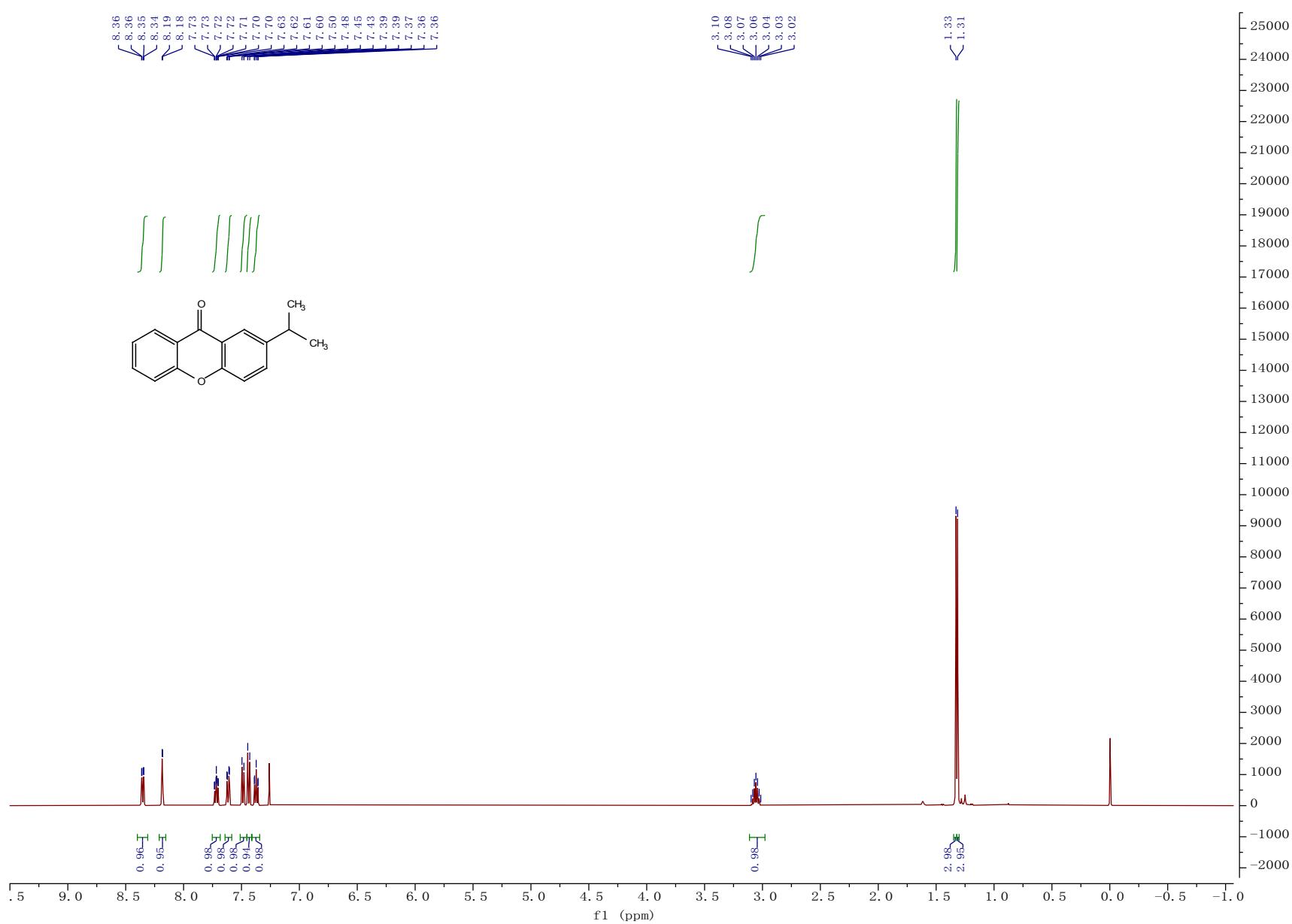
**Figure S16:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 2c



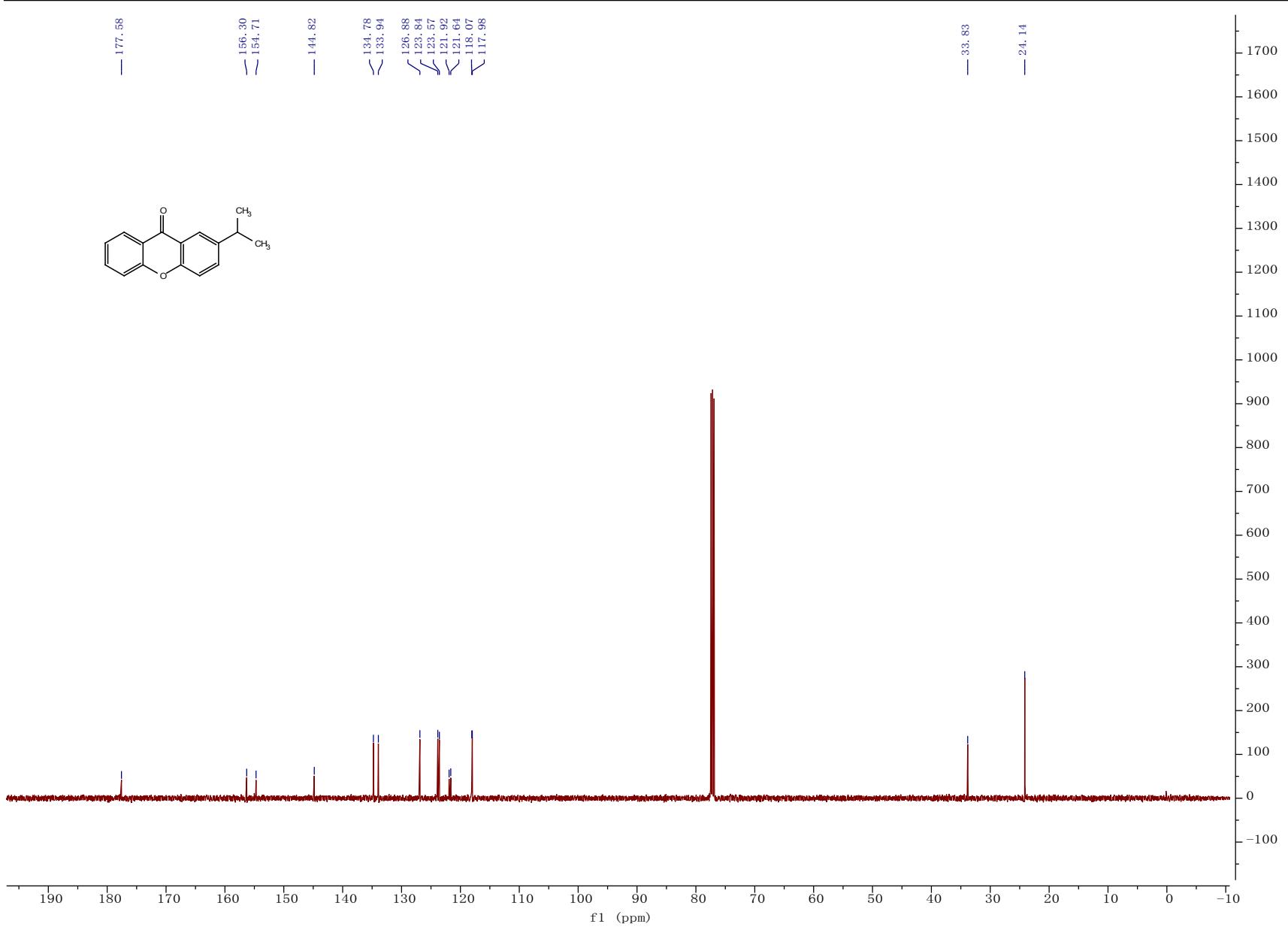
**Figure S17:**  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 3b



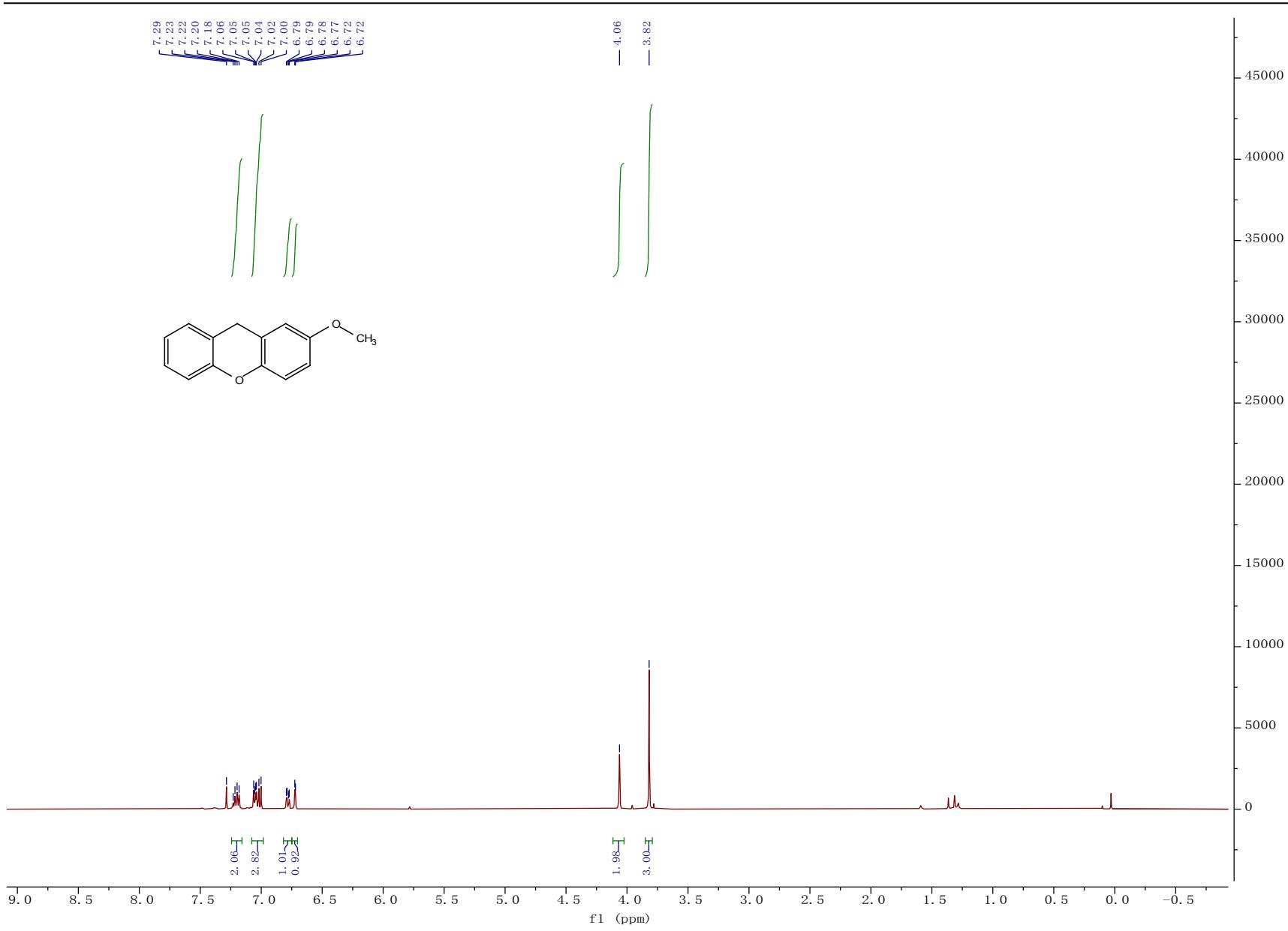
**Figure S18:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 3b



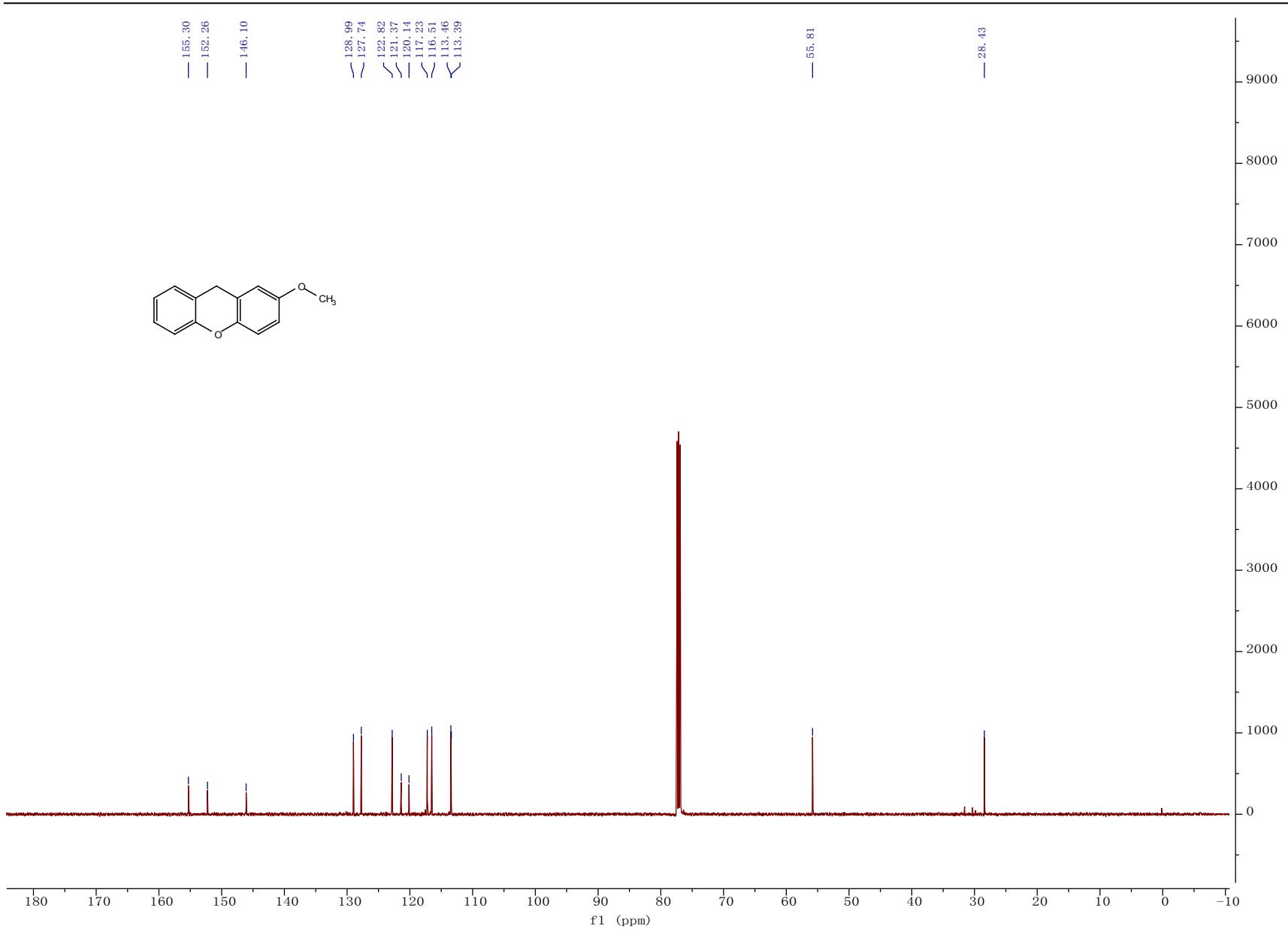
**Figure S19:**  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 3c



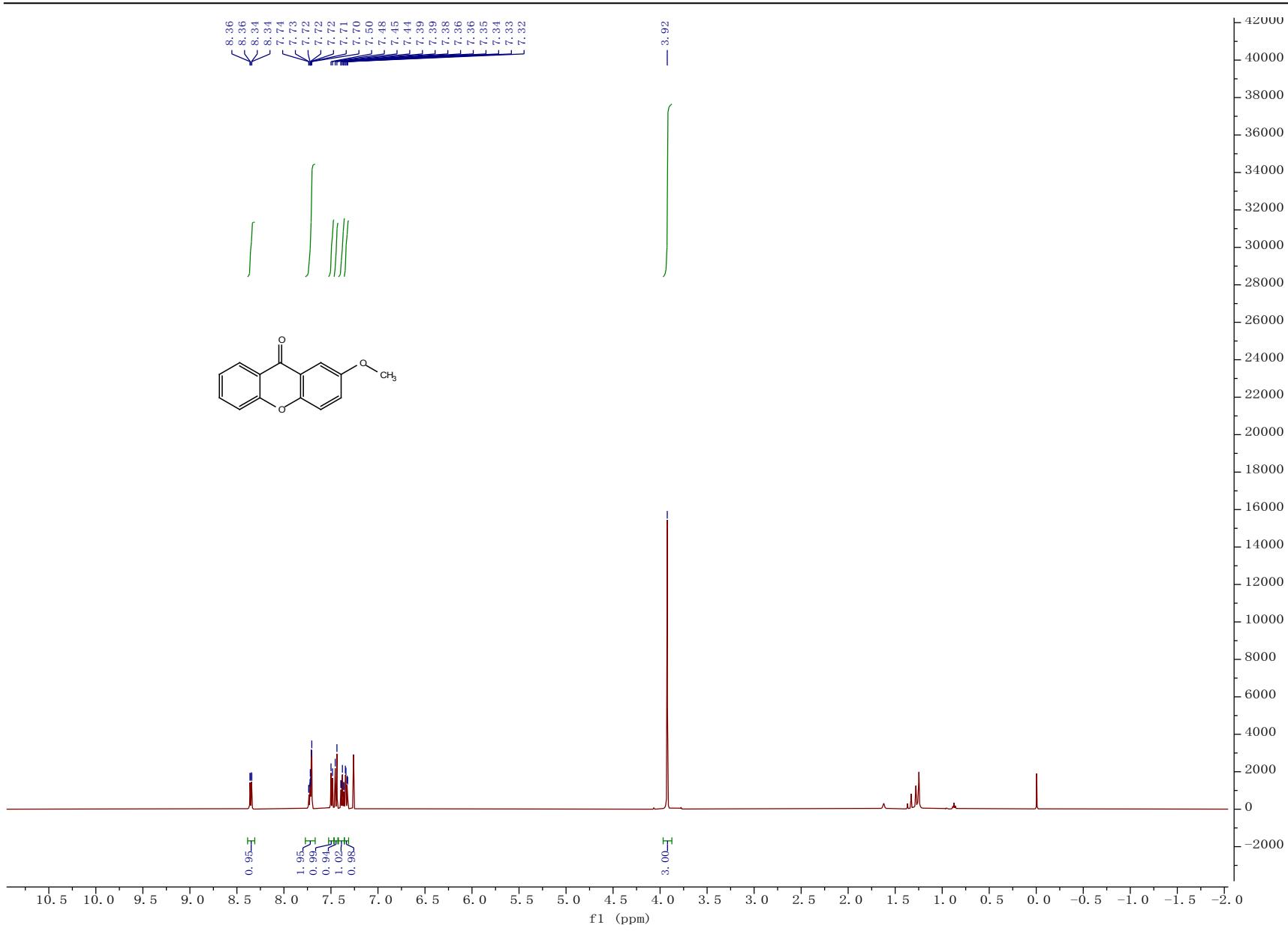
**Figure S20:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 3c



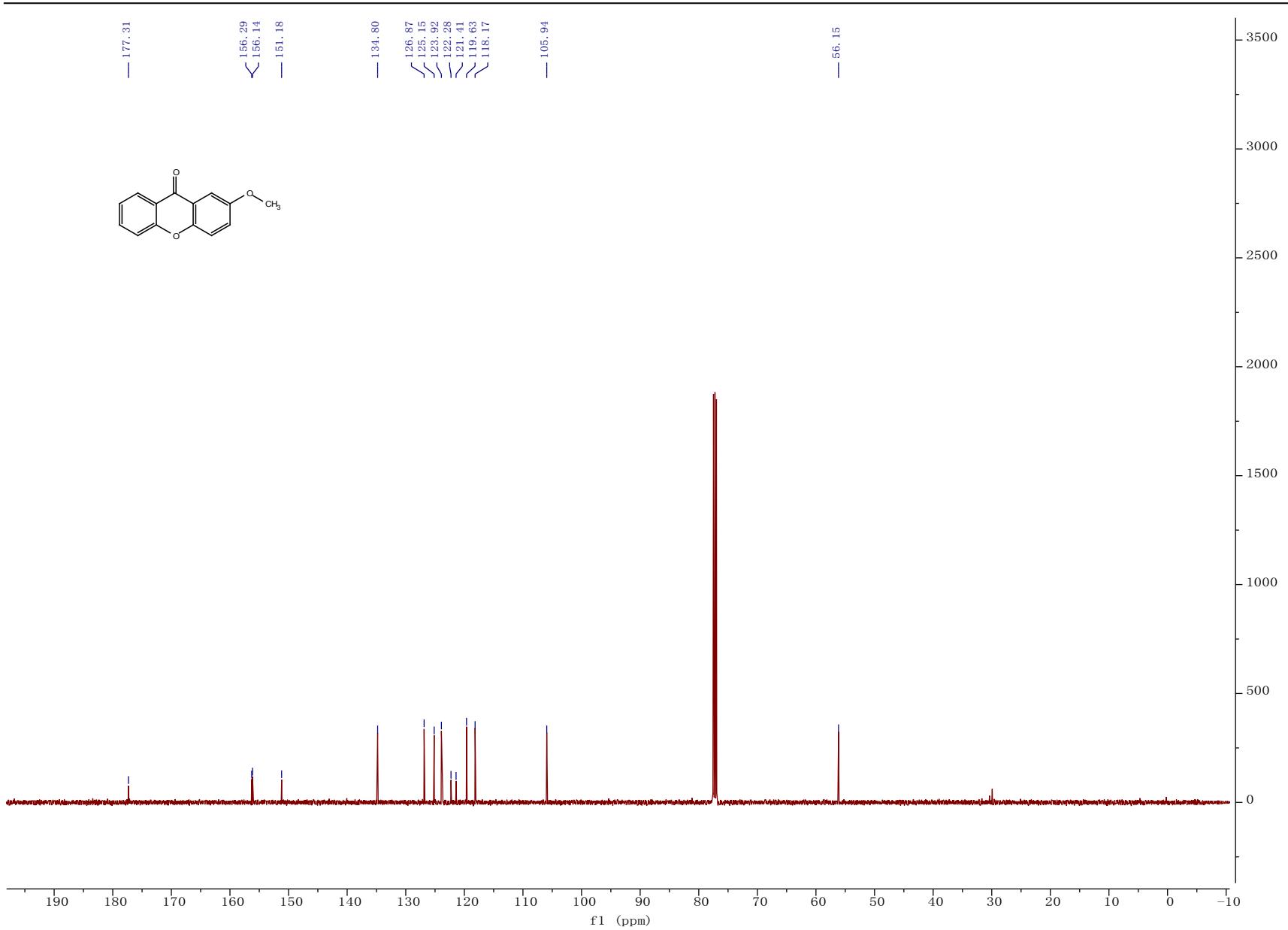
**Figure S21:**  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 4b



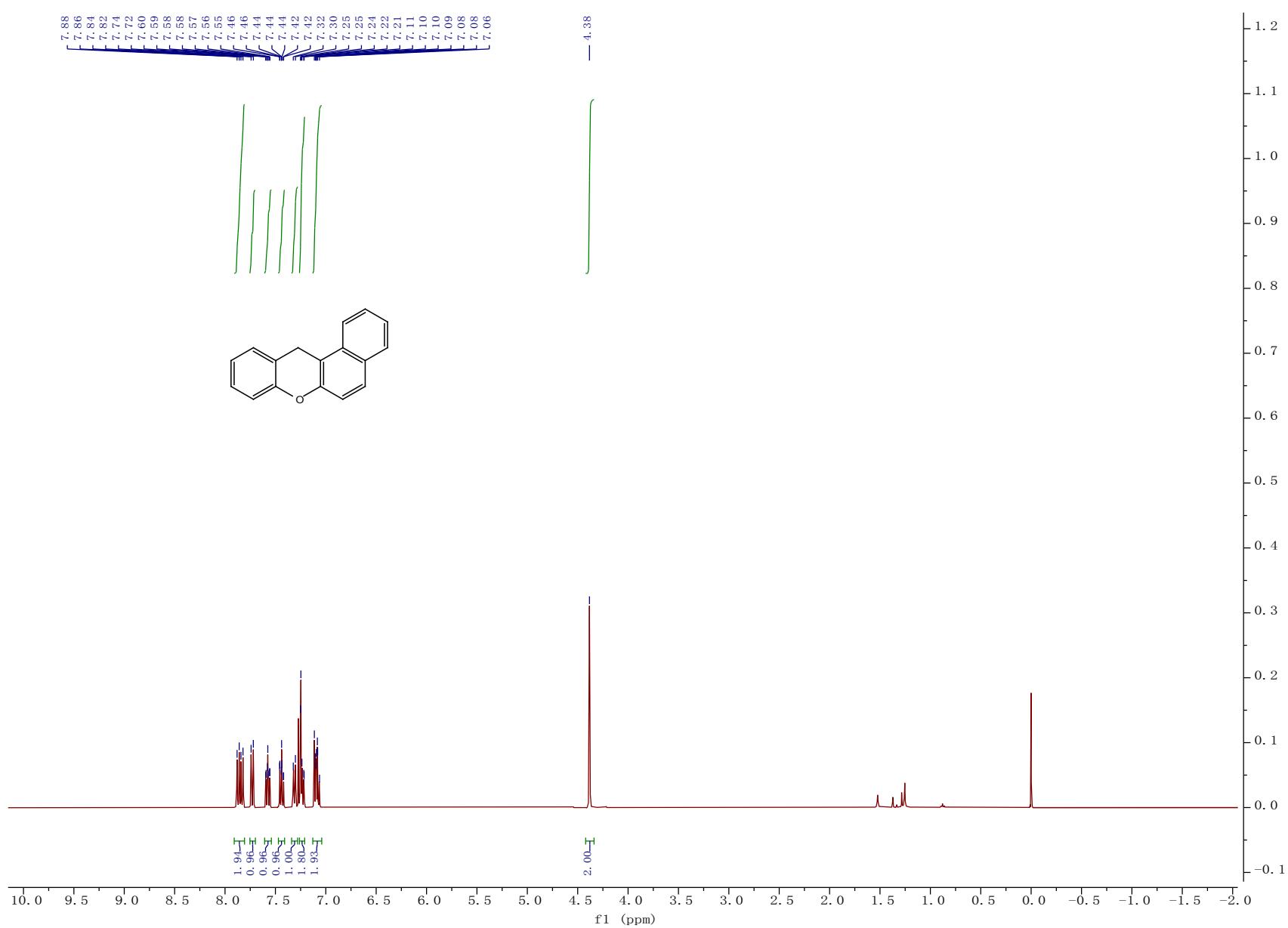
**Figure S22:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 4b



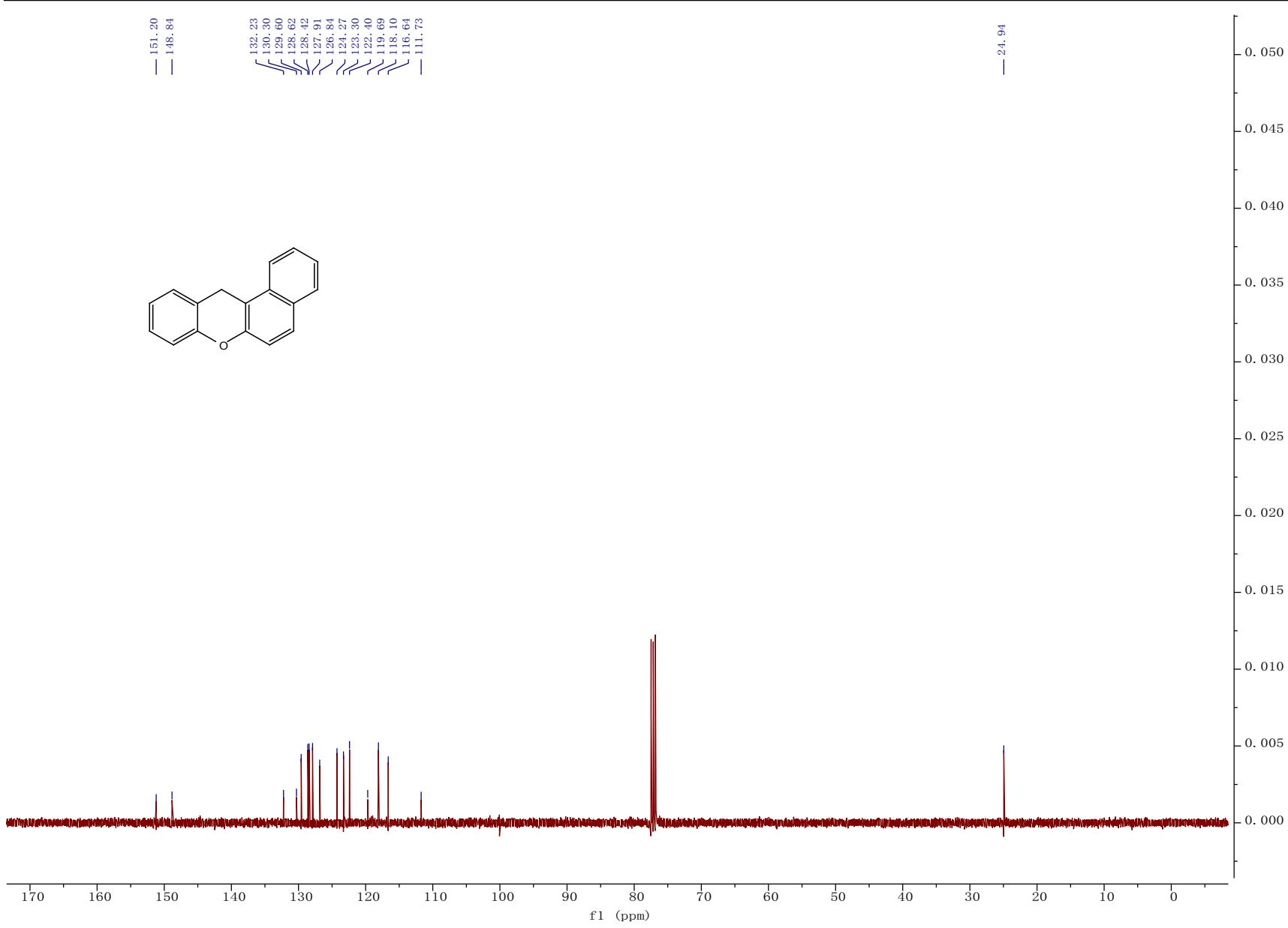
**Figure S23:**  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 4c



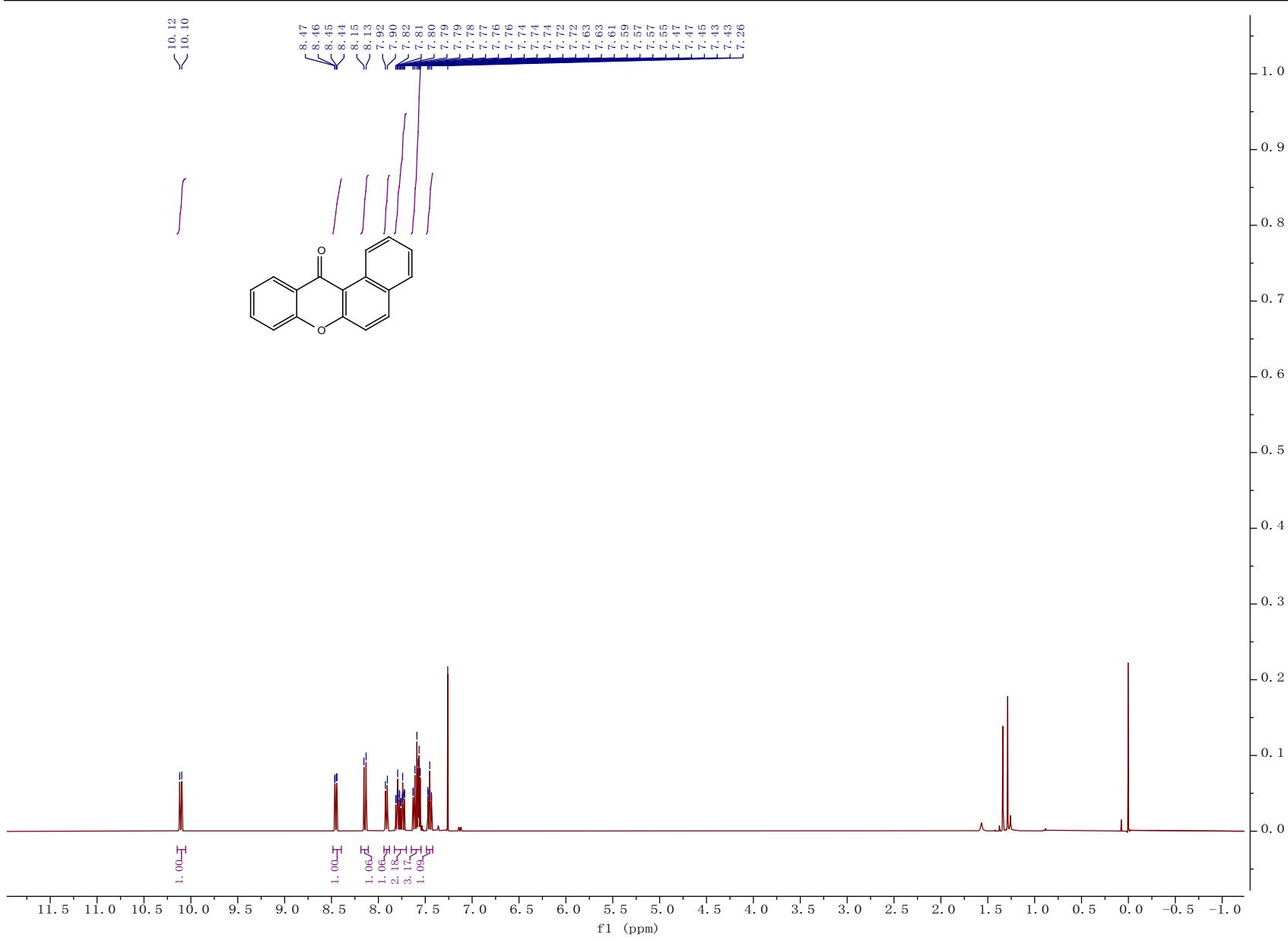
**Figure S24:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 4c



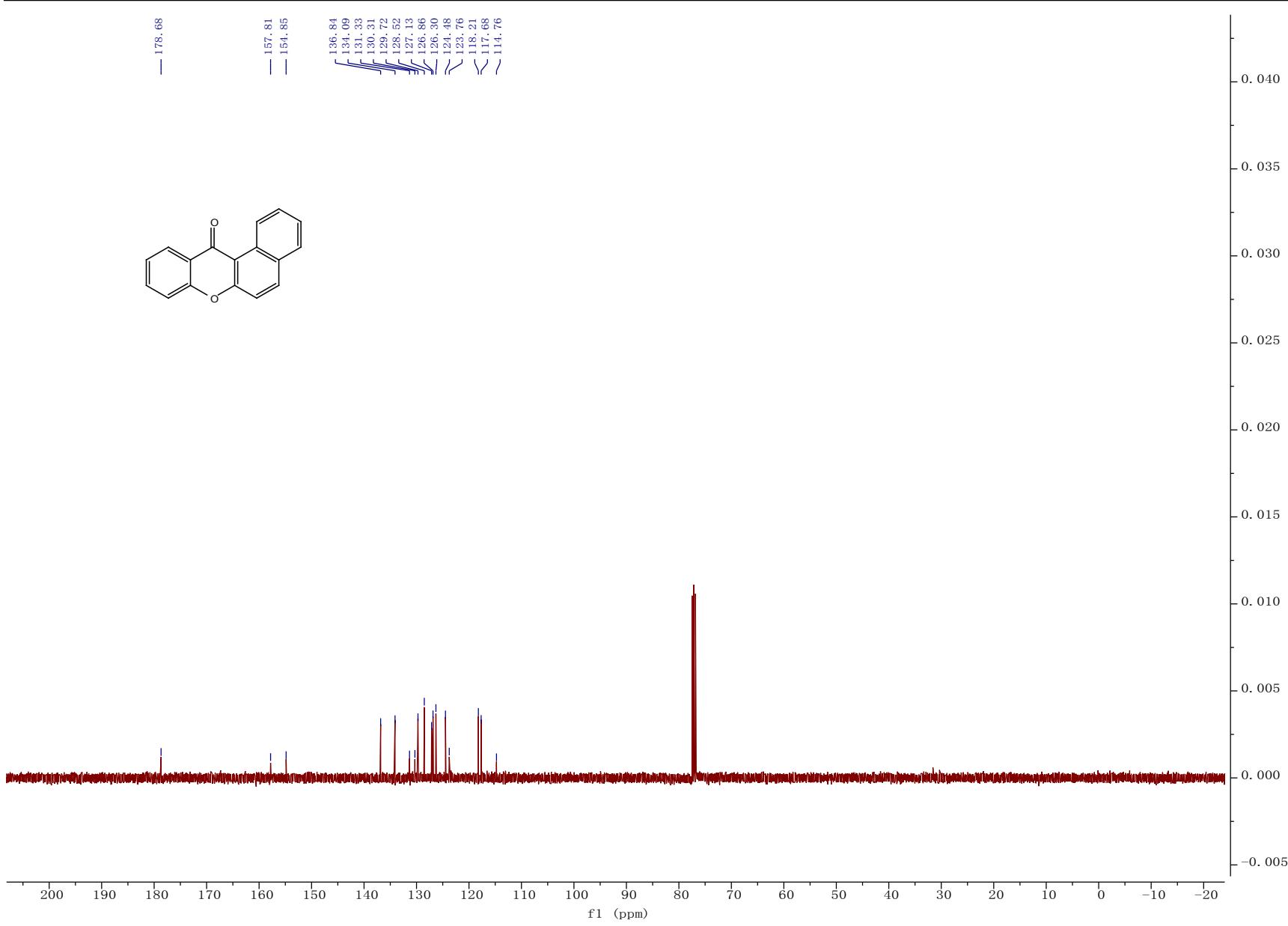
**Figure S25:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 5b



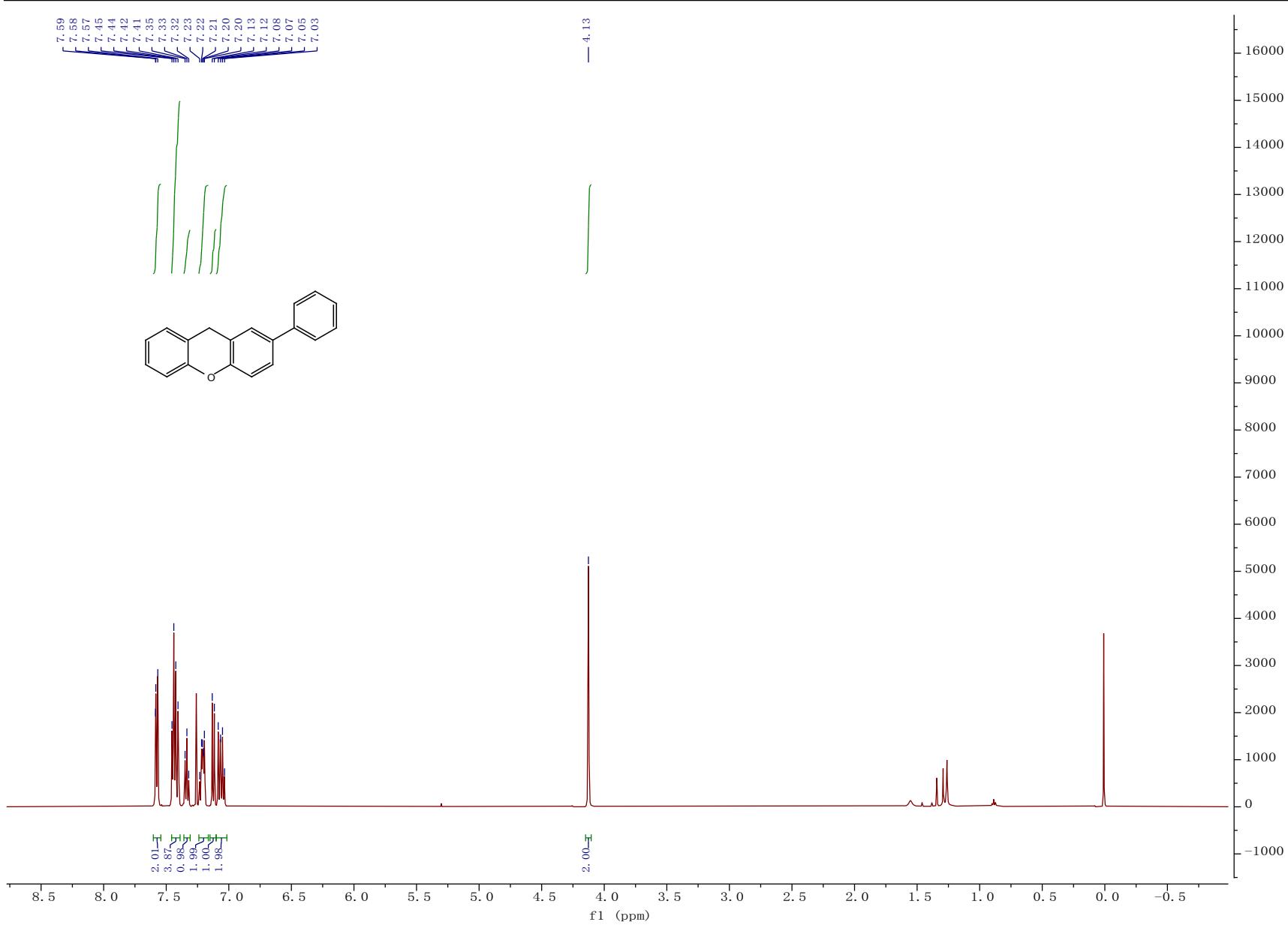
**Figure S26:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of compound 5b



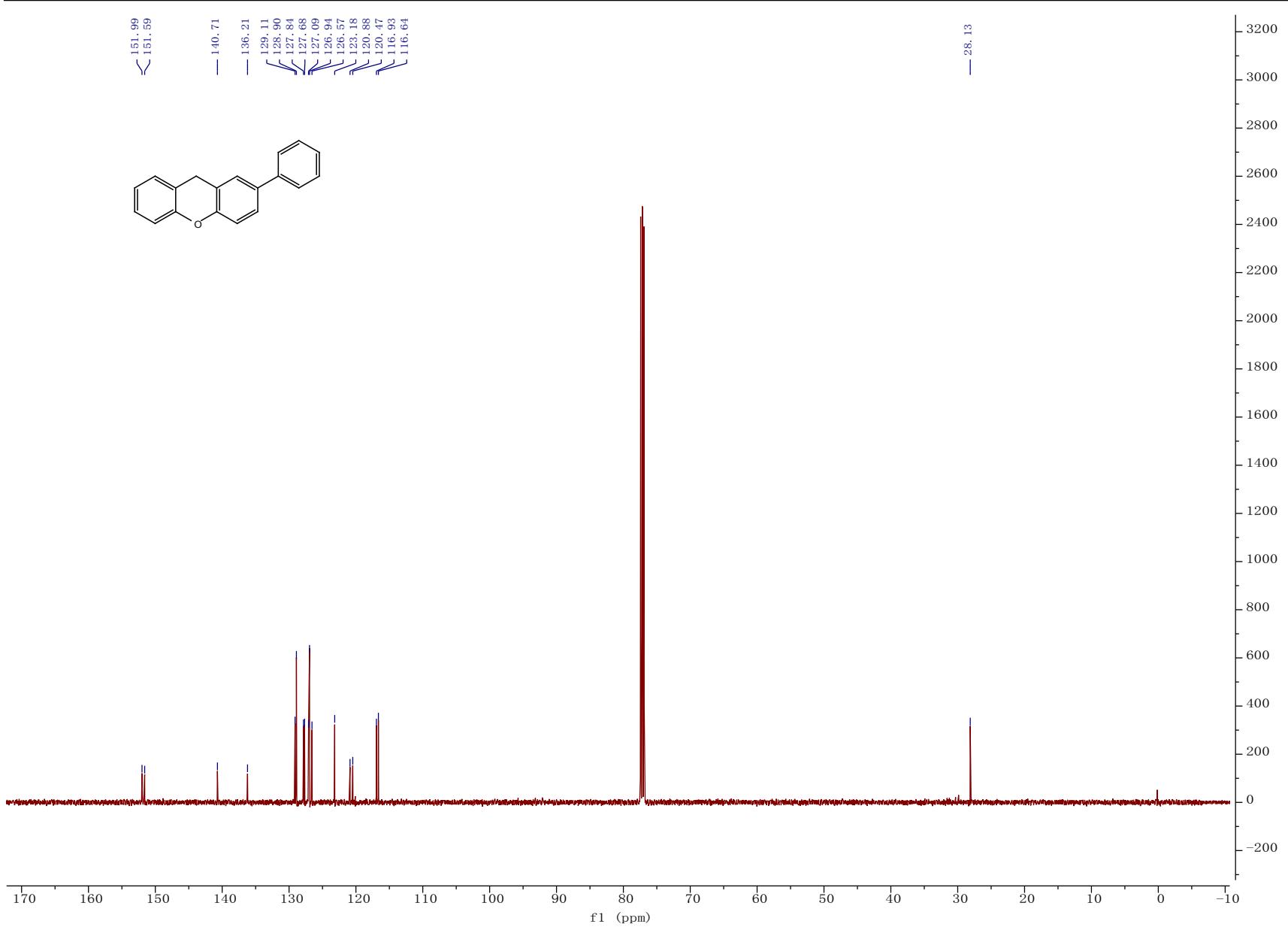
**Figure S27:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 5c



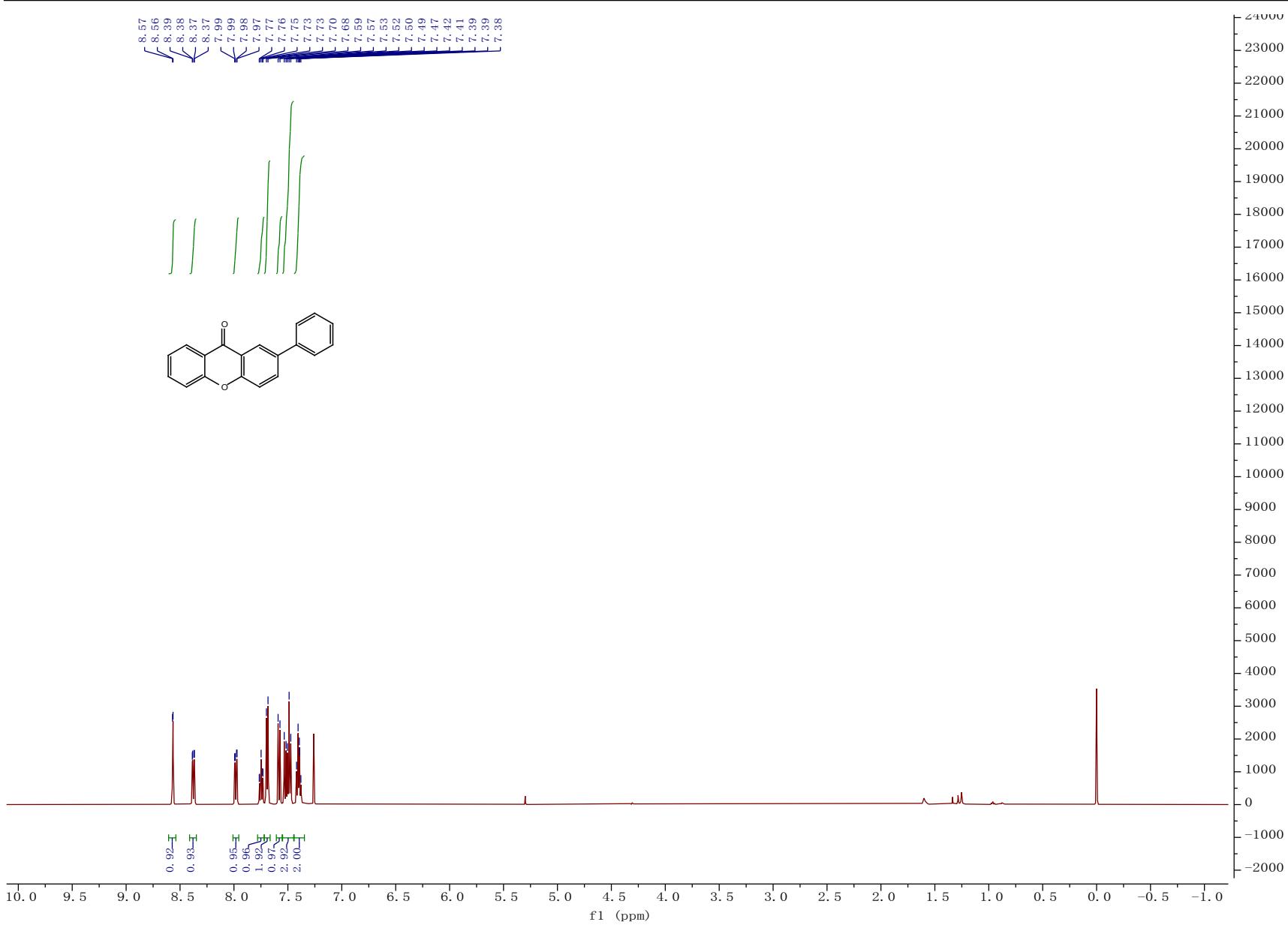
**Figure S28:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of compound 5c



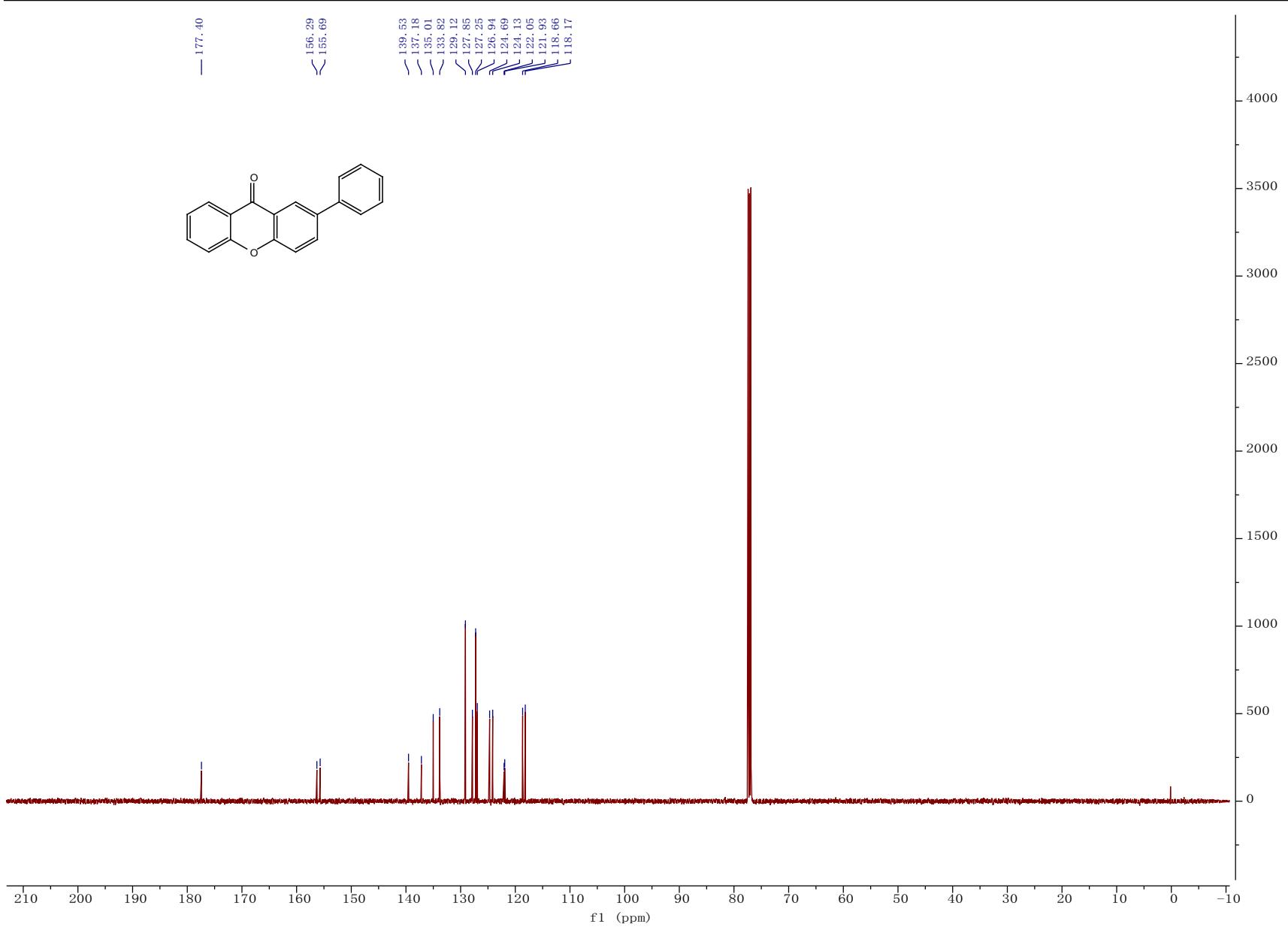
**Figure S29:**  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 6b



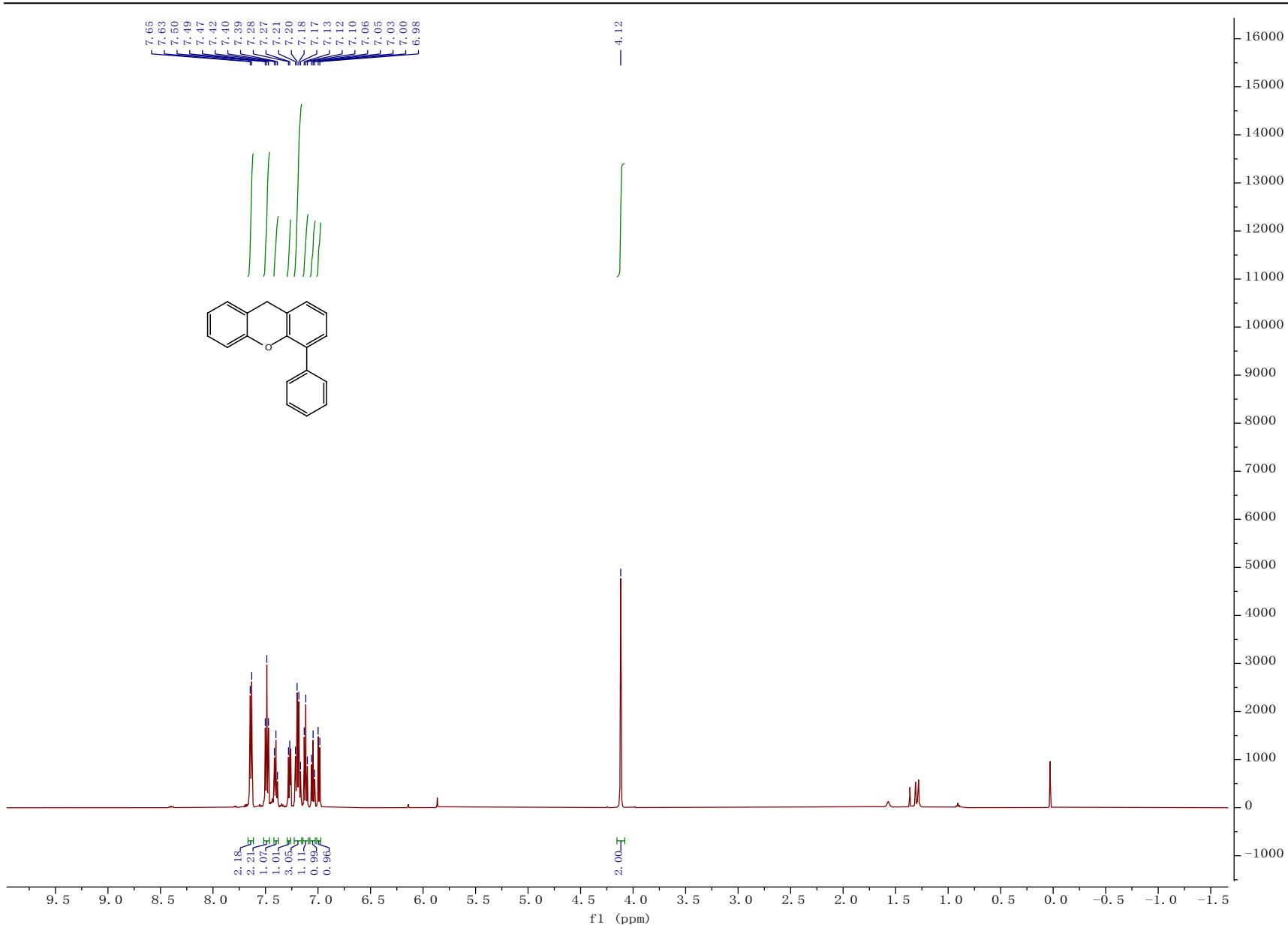
**Figure S30:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 6b



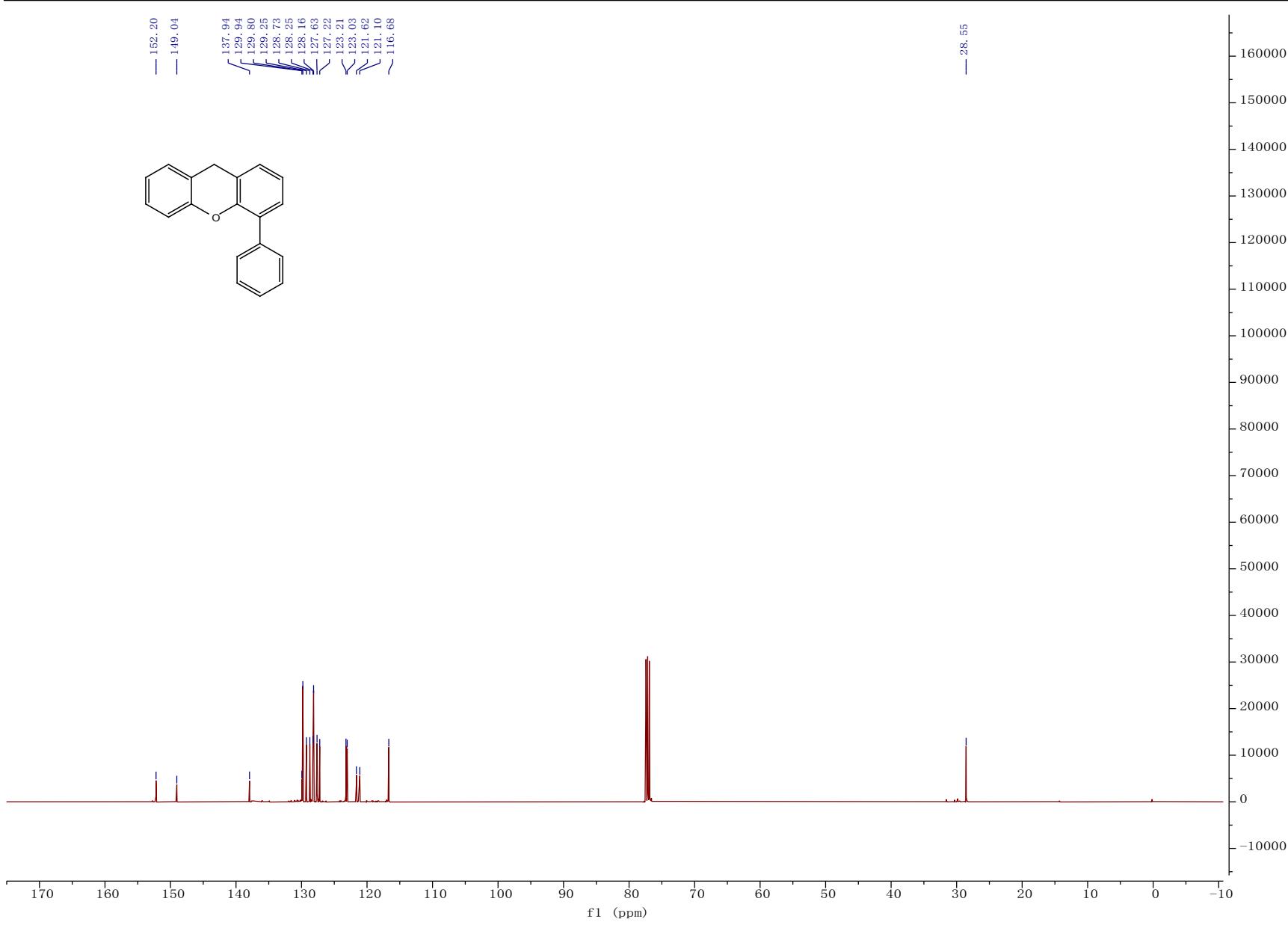
**Figure S31:**  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 6c



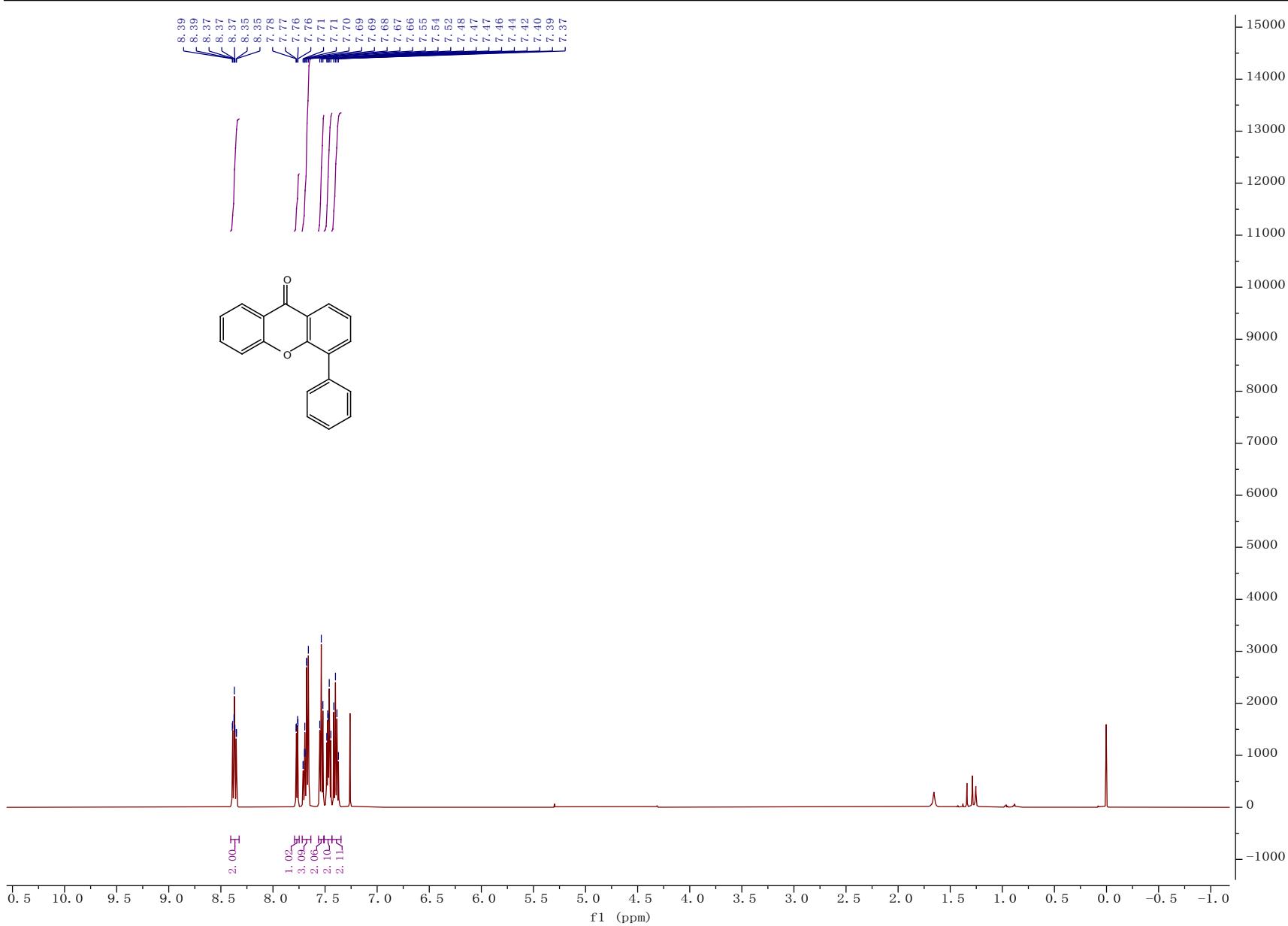
**Figure S32:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 6c



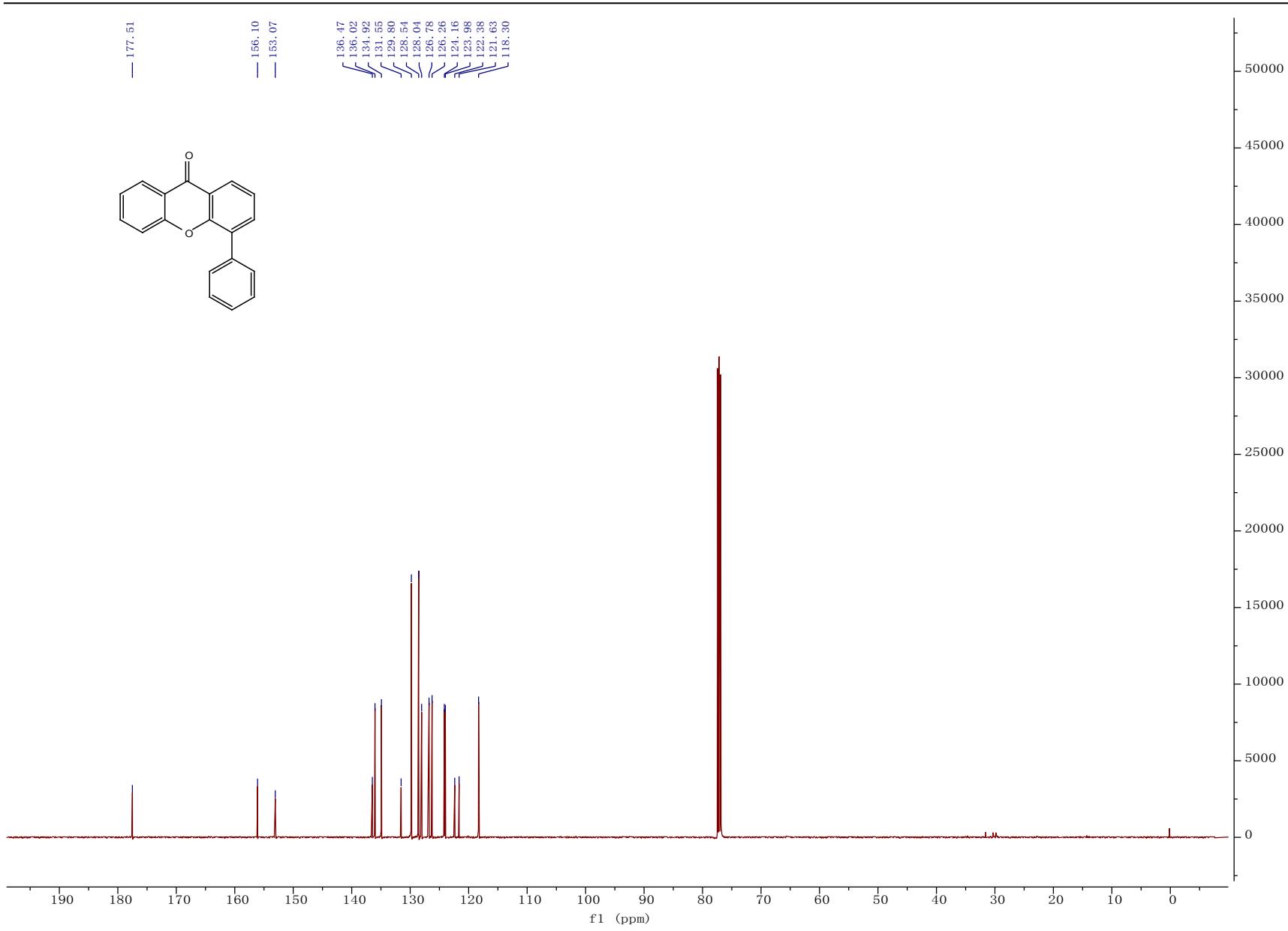
**Figure S33:**  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 7b



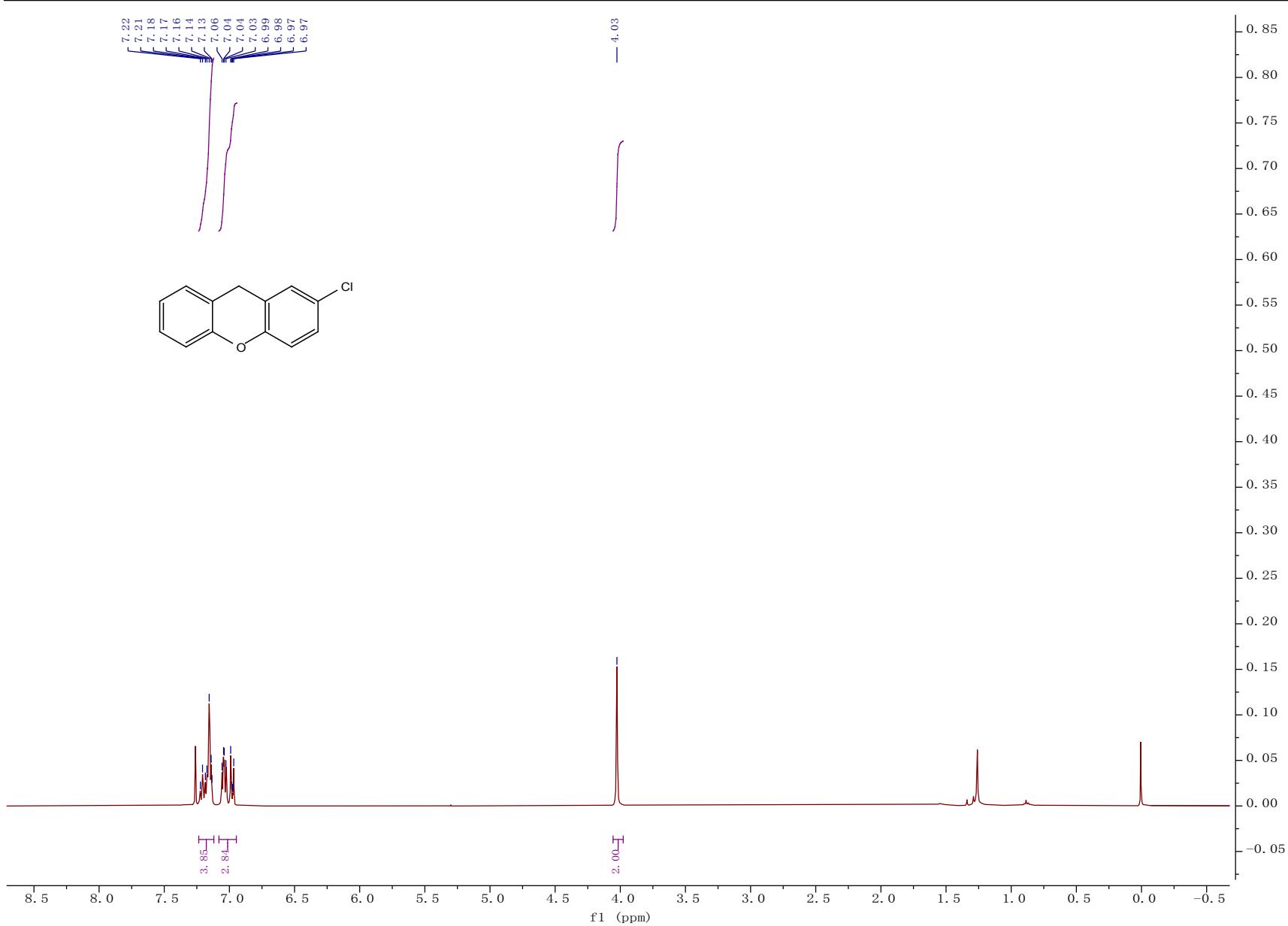
**Figure S34:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 7b



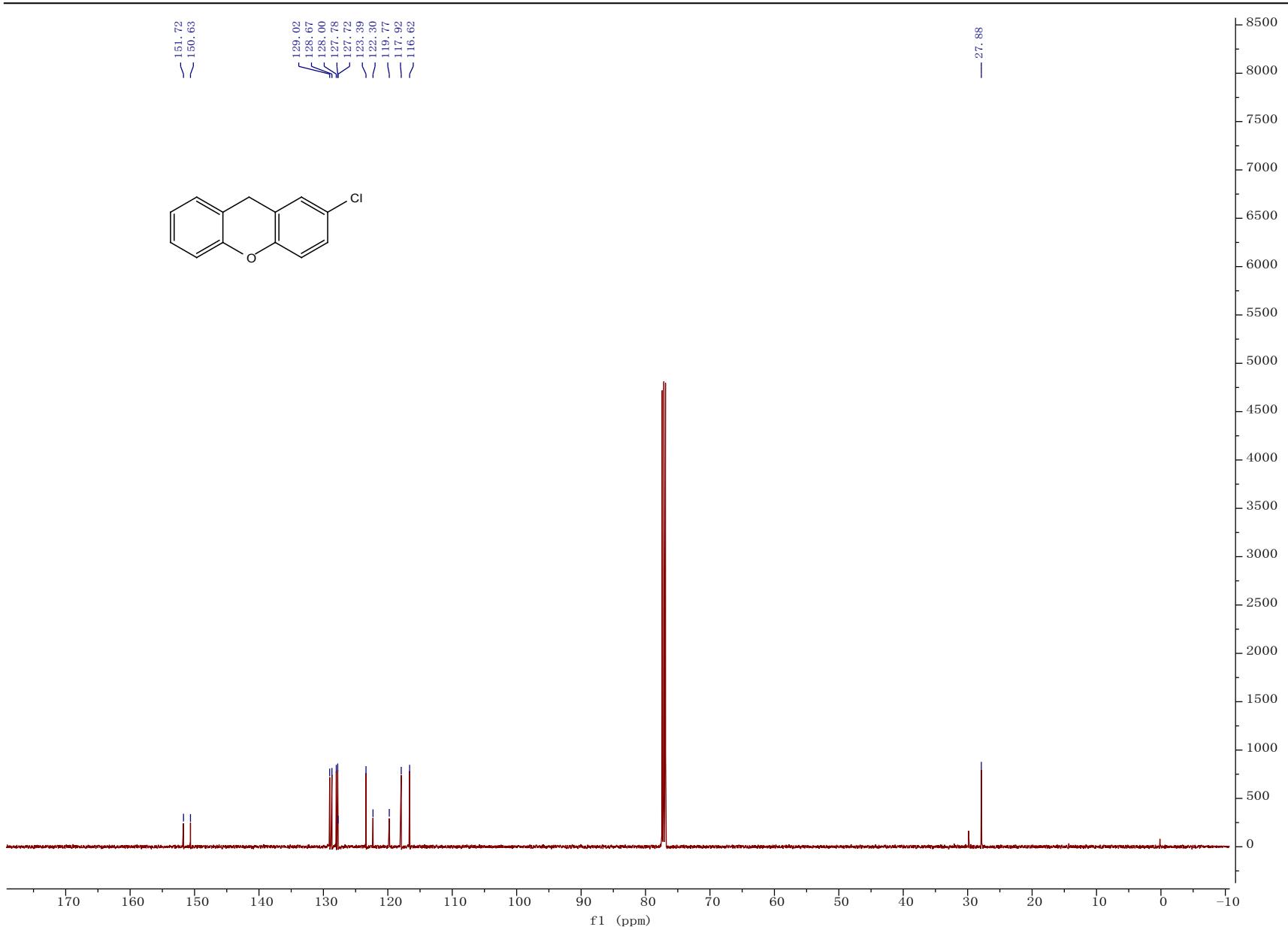
**Figure S35:**  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 7c



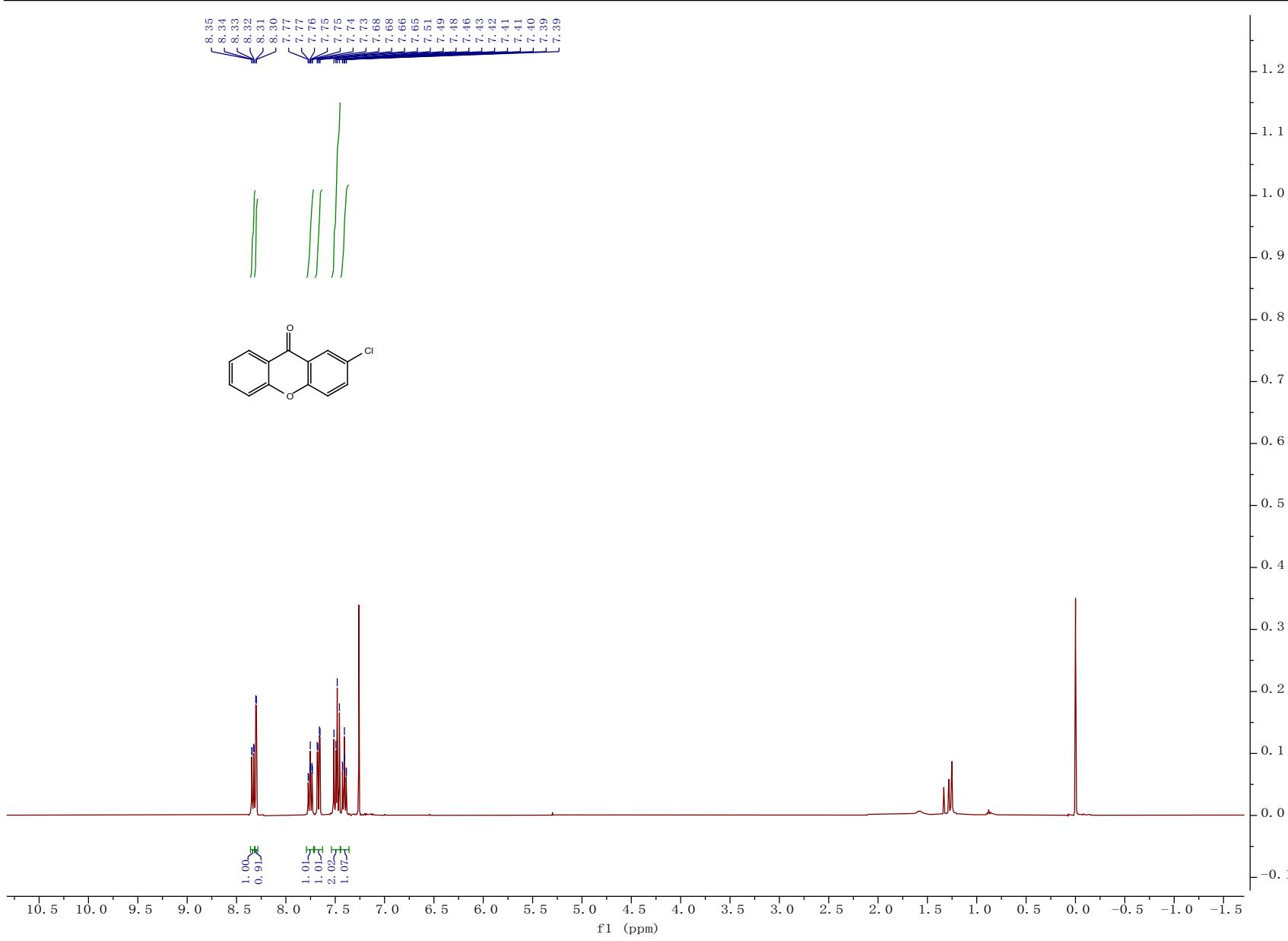
**Figure S36:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz, CDCl<sub>3</sub>) spectrum of compound 7c



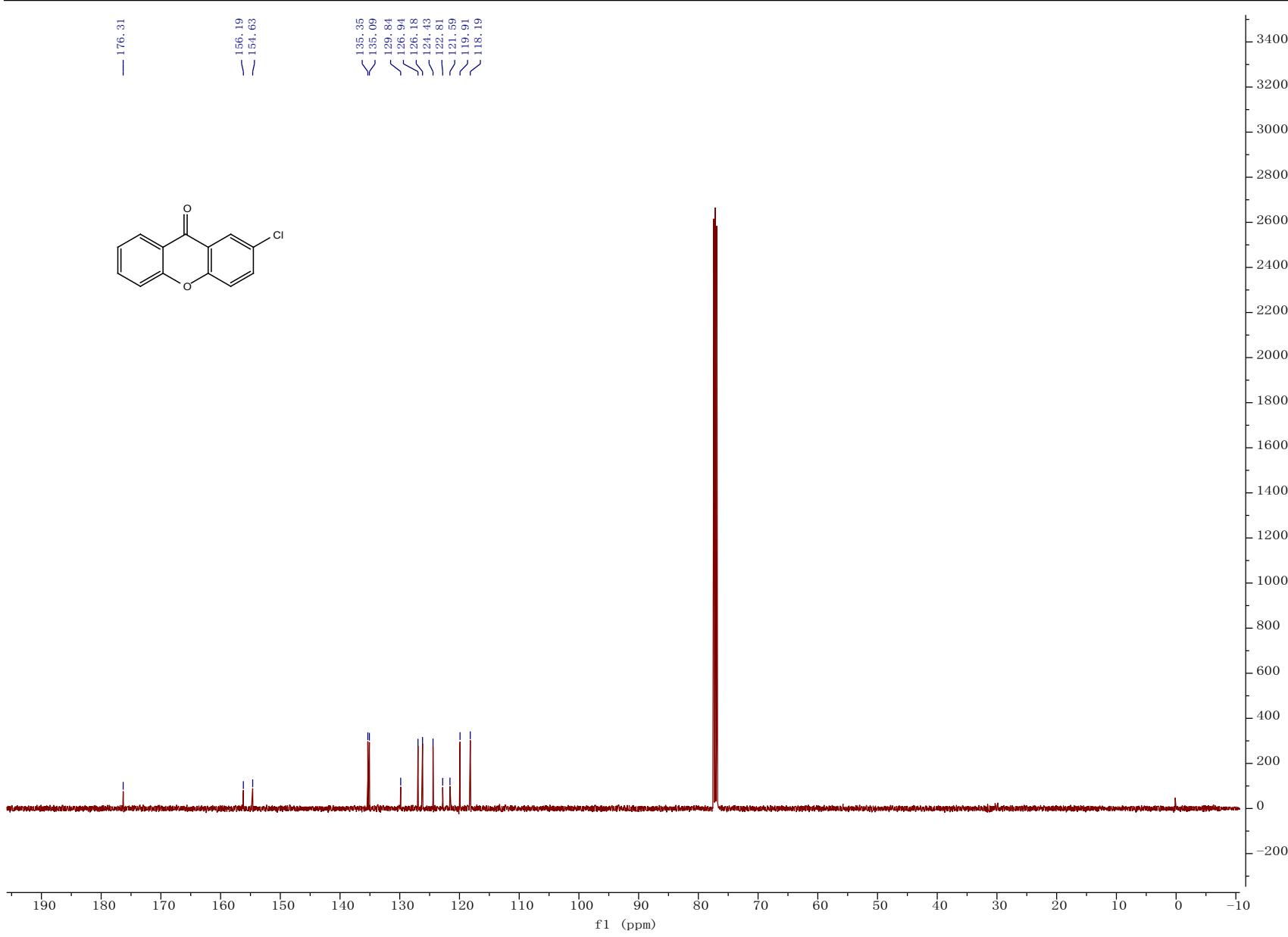
**Figure S37:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 8b



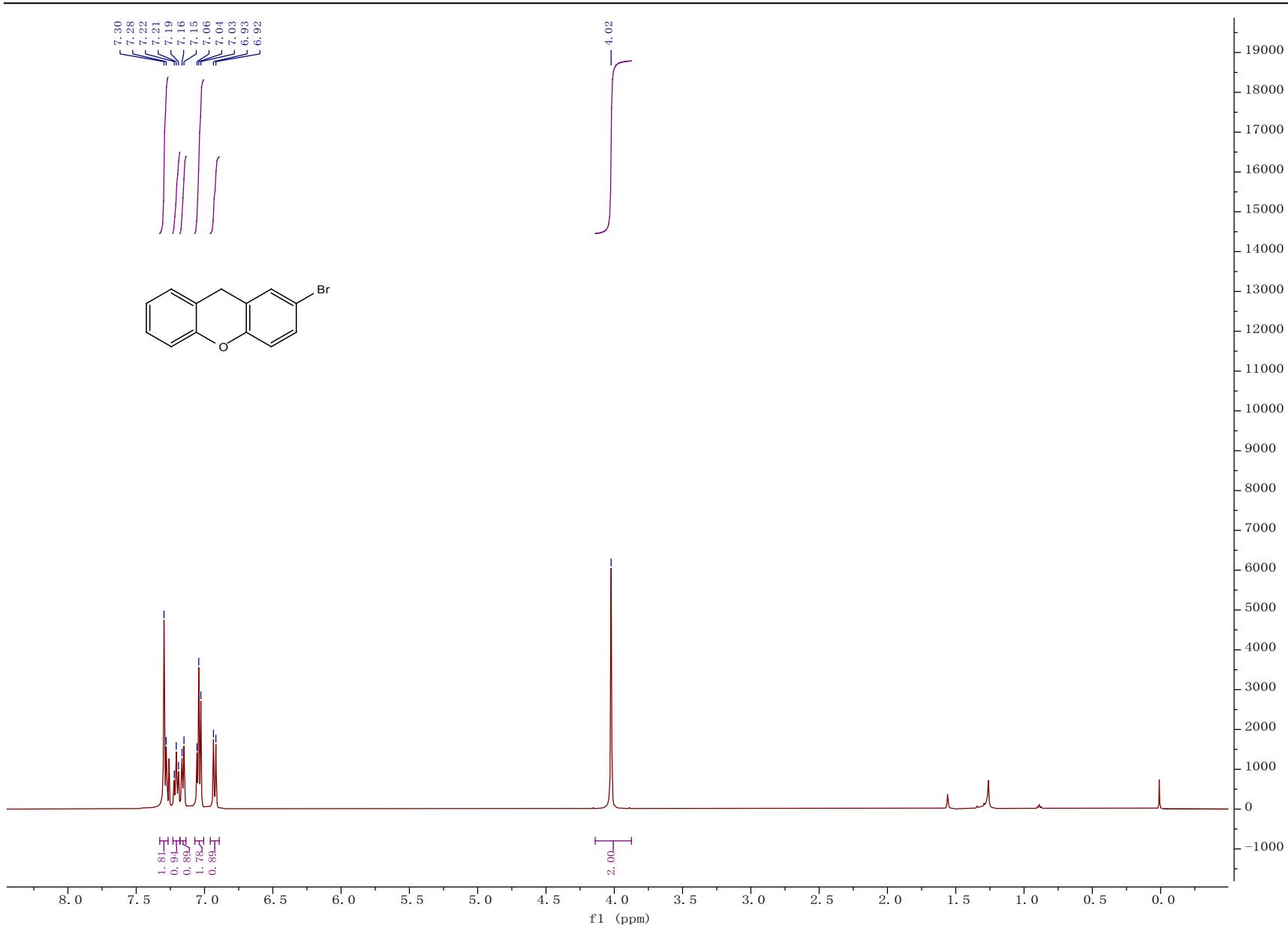
**Figure S38:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 8b



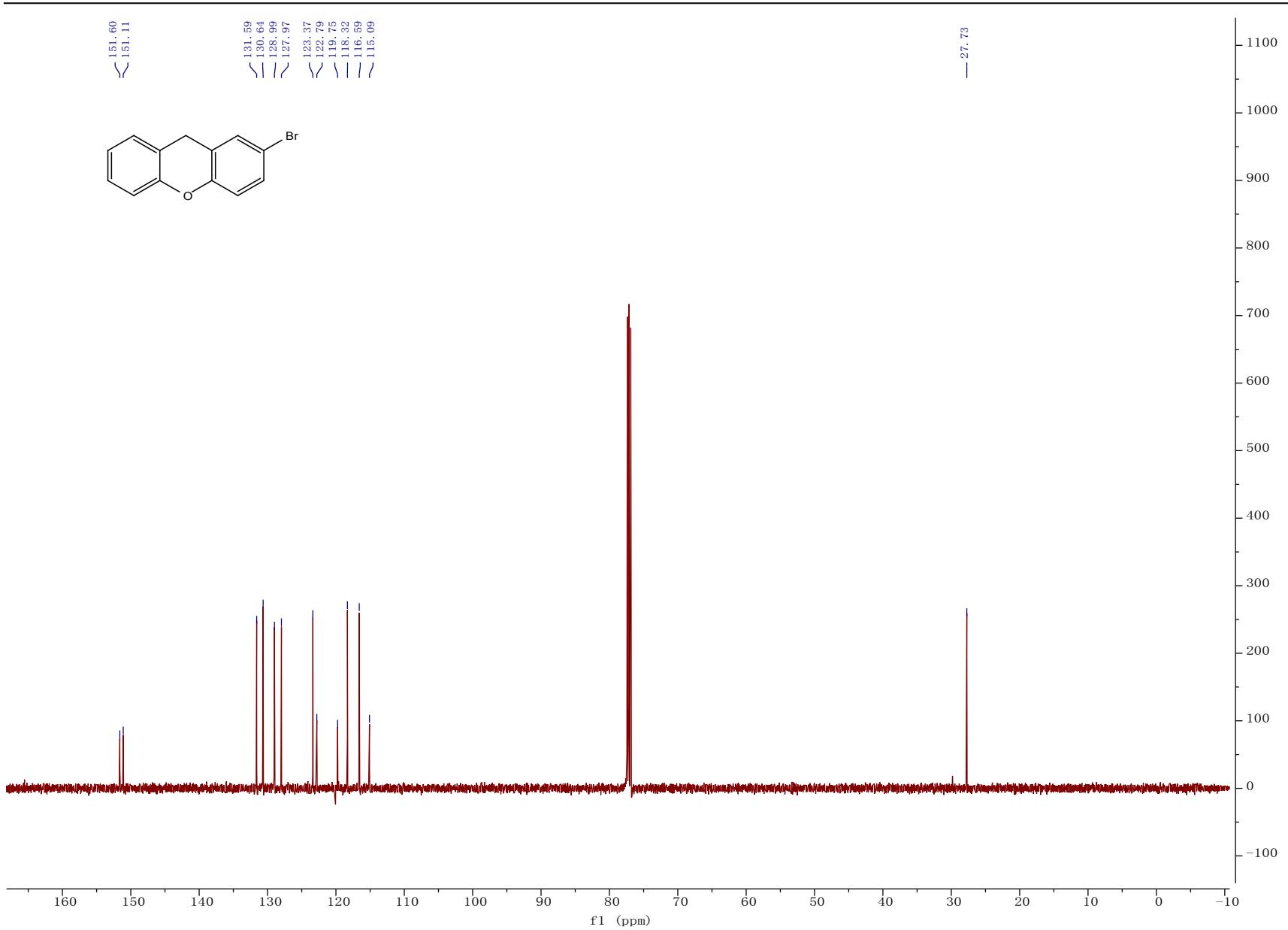
**Figure S39:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 8c



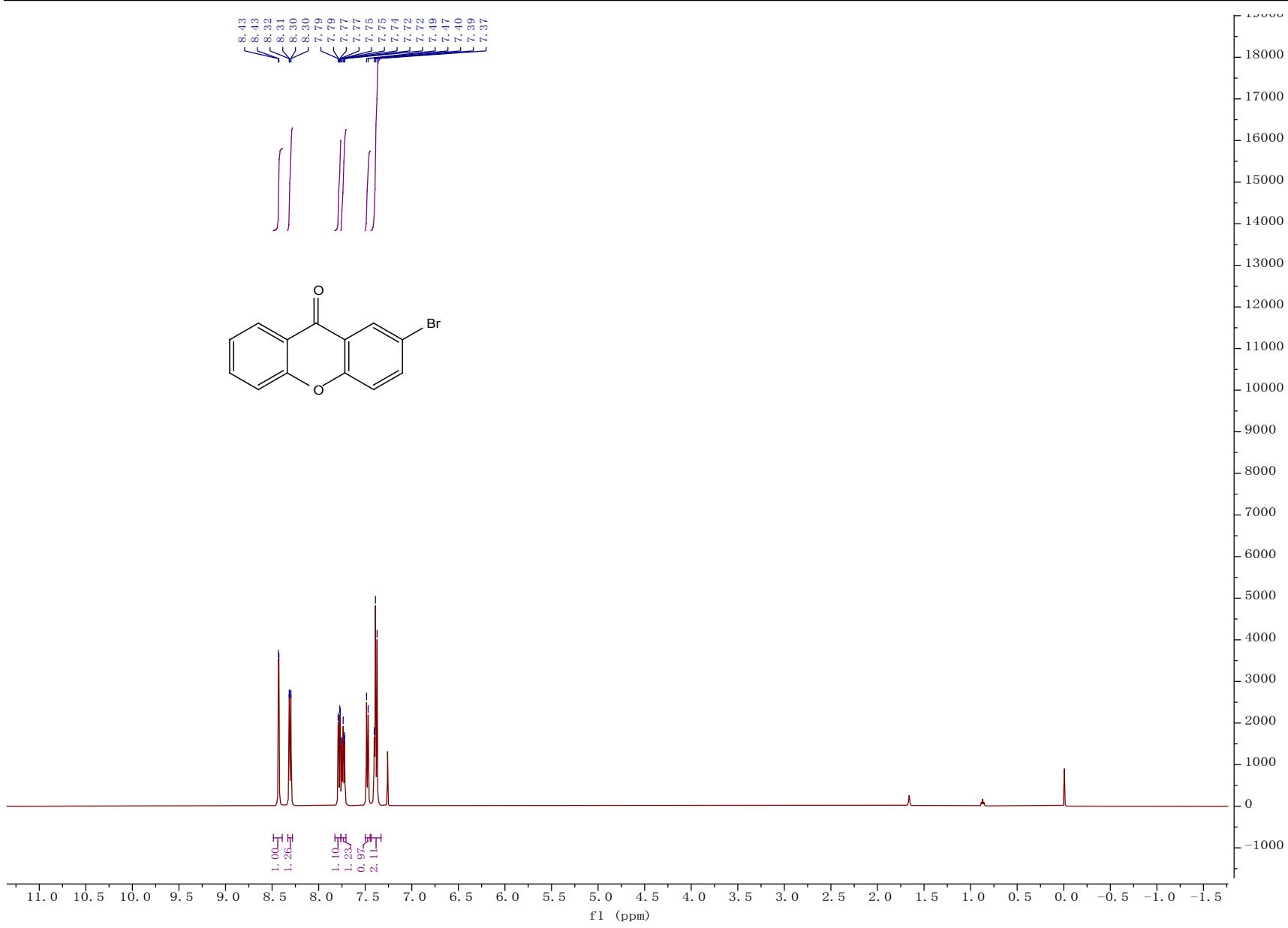
**Figure S40:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound **8c**



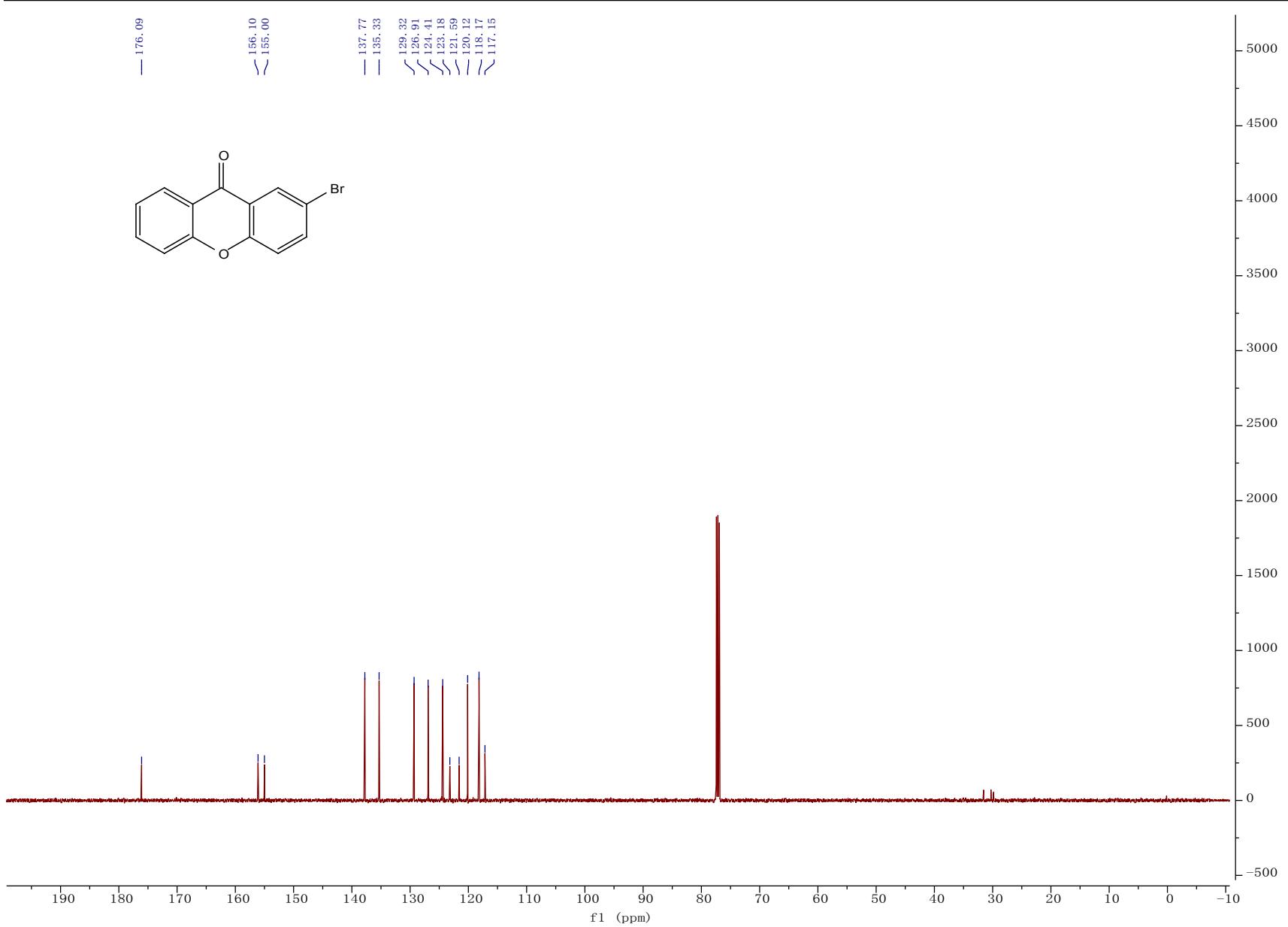
**Figure S41:**  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 9b



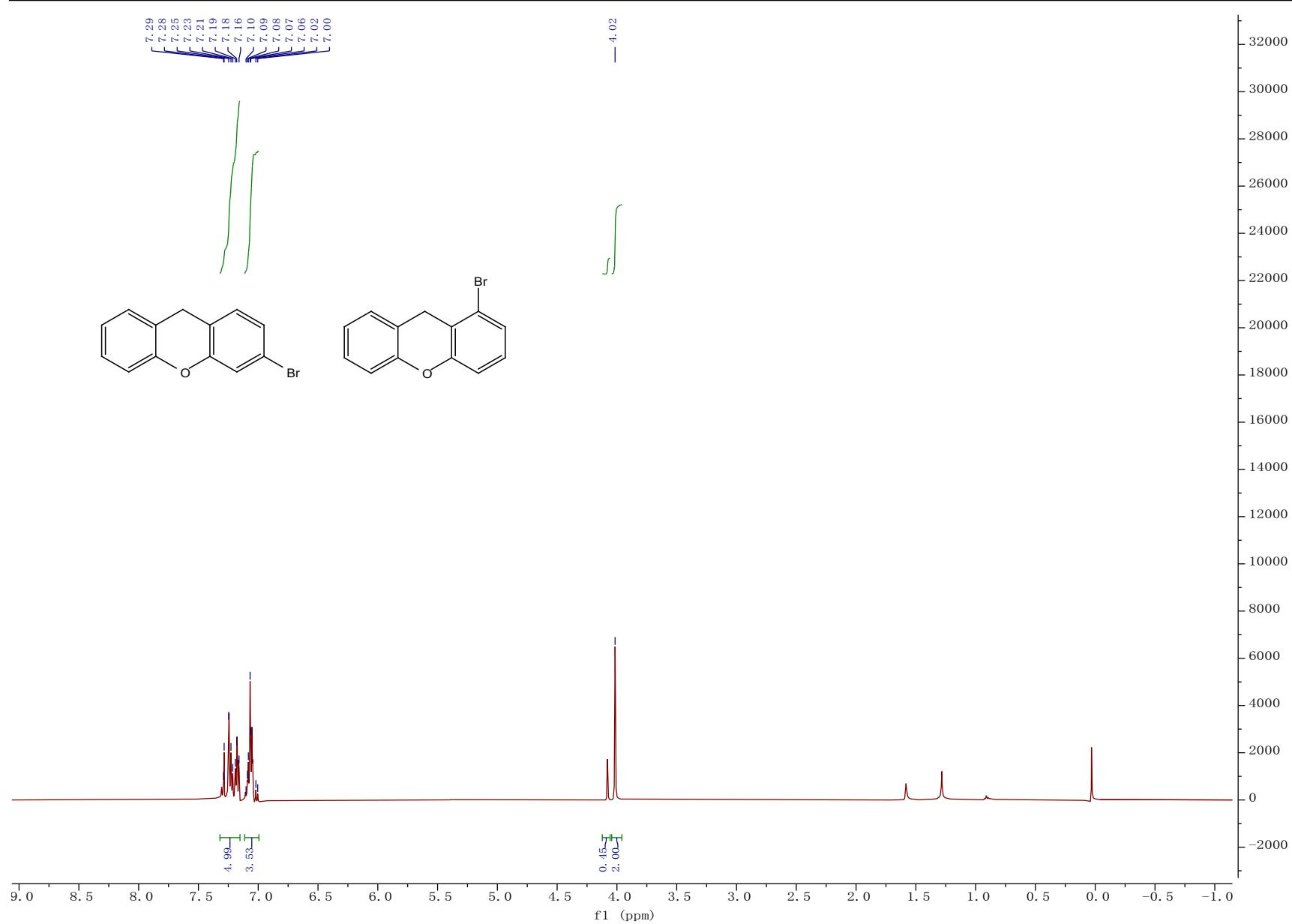
**Figure S42:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 9b



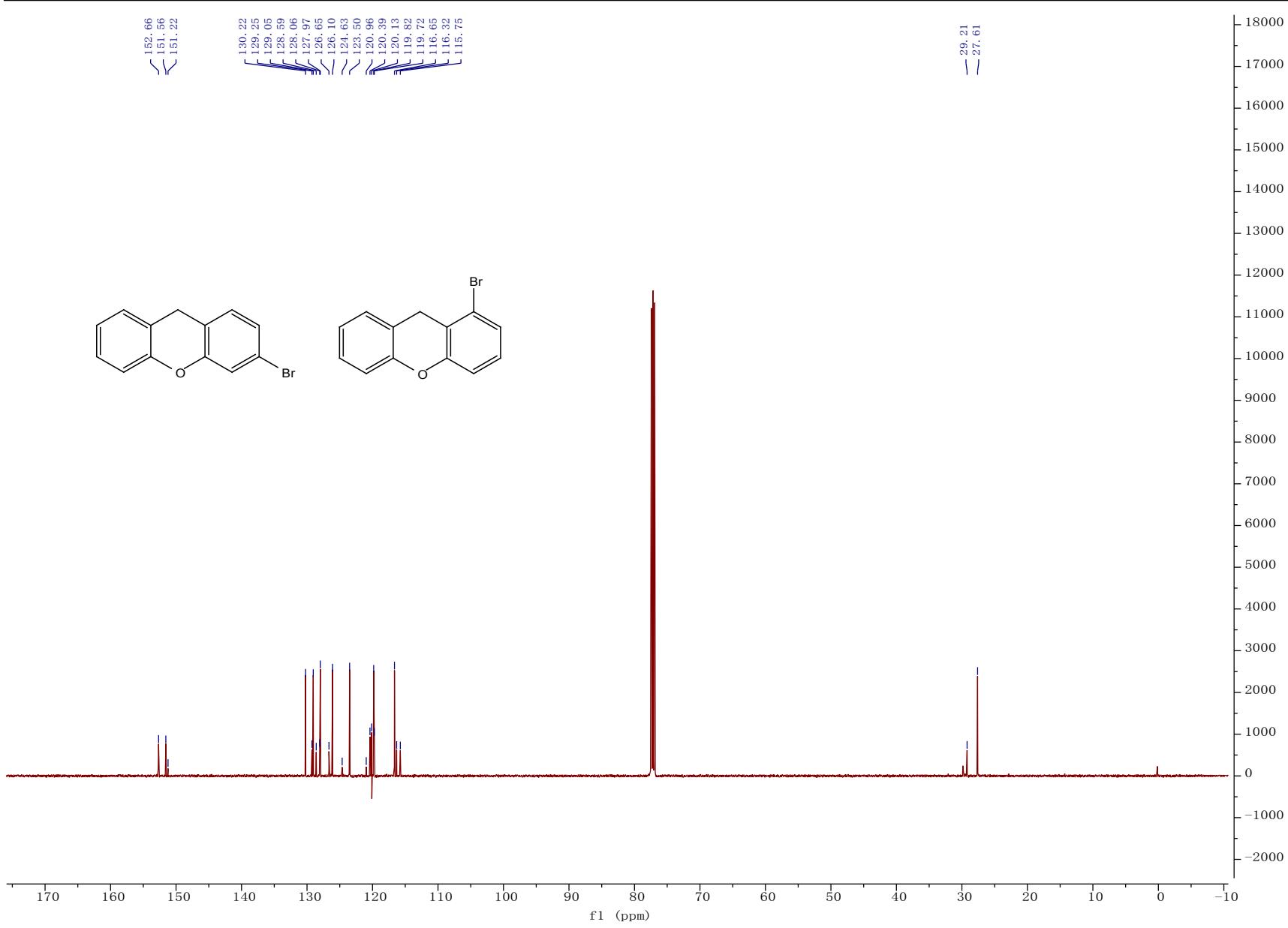
**Figure S43:**  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 9c



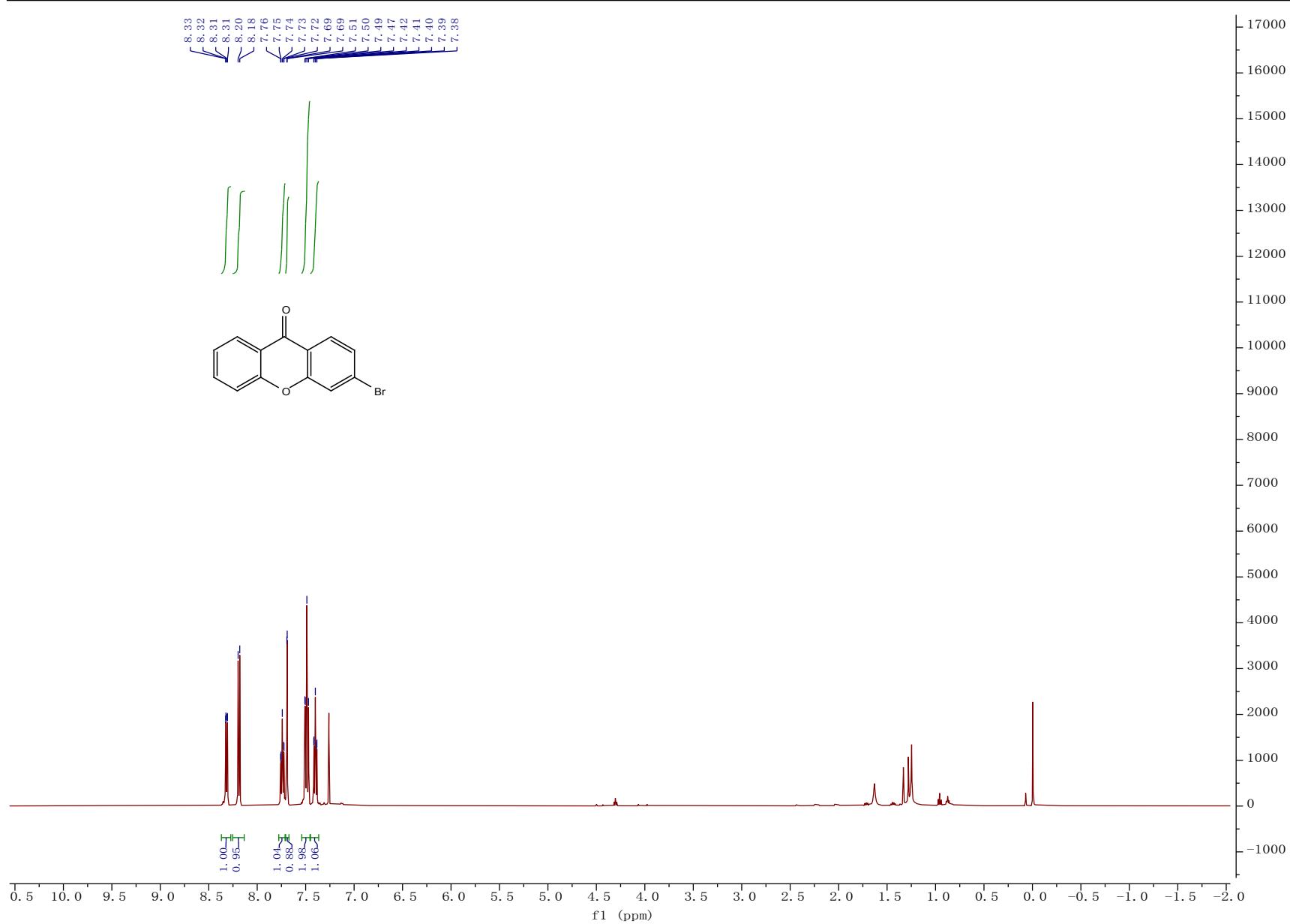
**Figure S44:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 9c



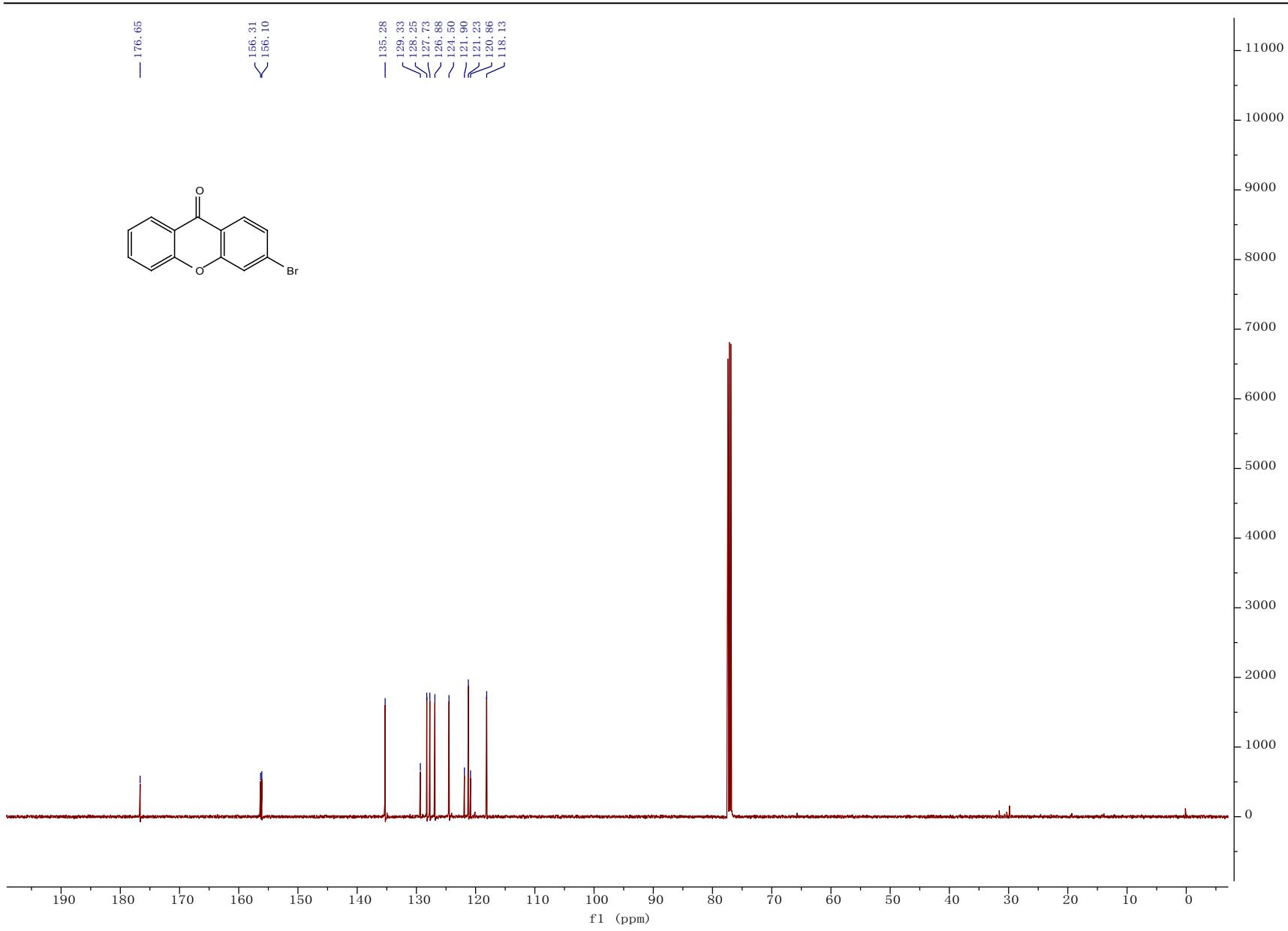
**Figure S45:**  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 10b and 11b



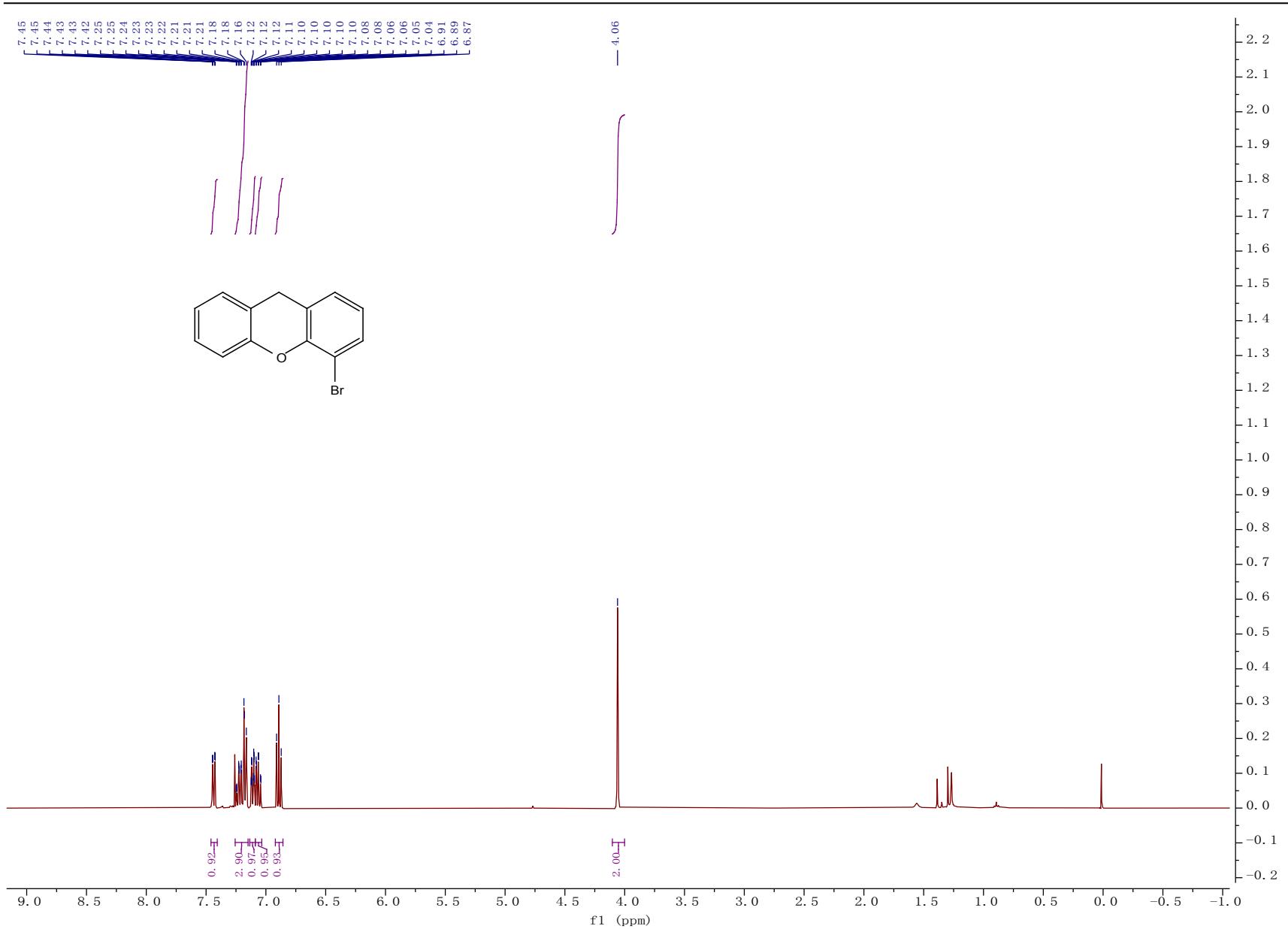
**Figure S46:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 10b and 11b



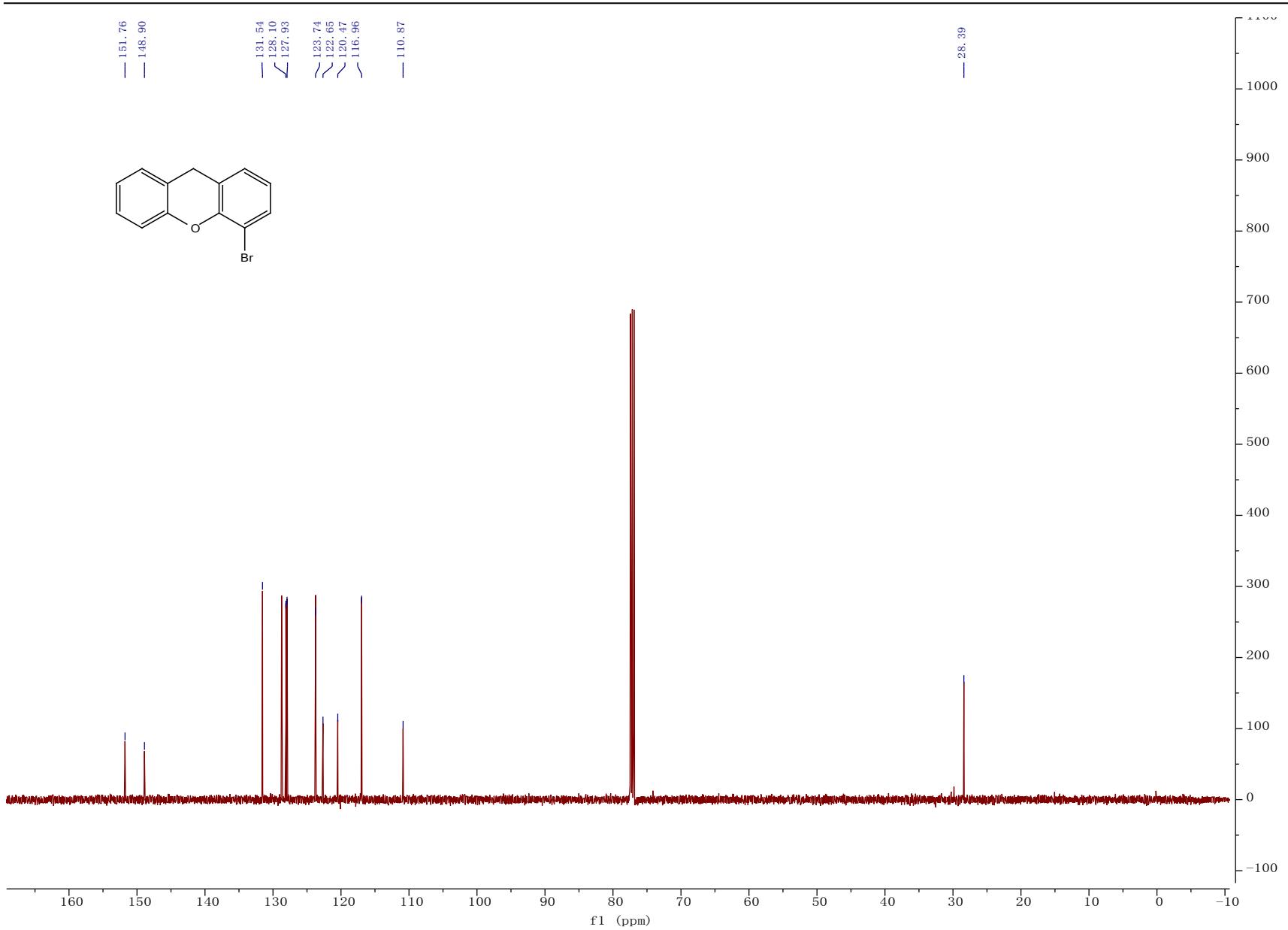
**Figure S47:  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 11c**



**Figure S48:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 11c



**Figure S49:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 12b



**Figure S50:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 12b

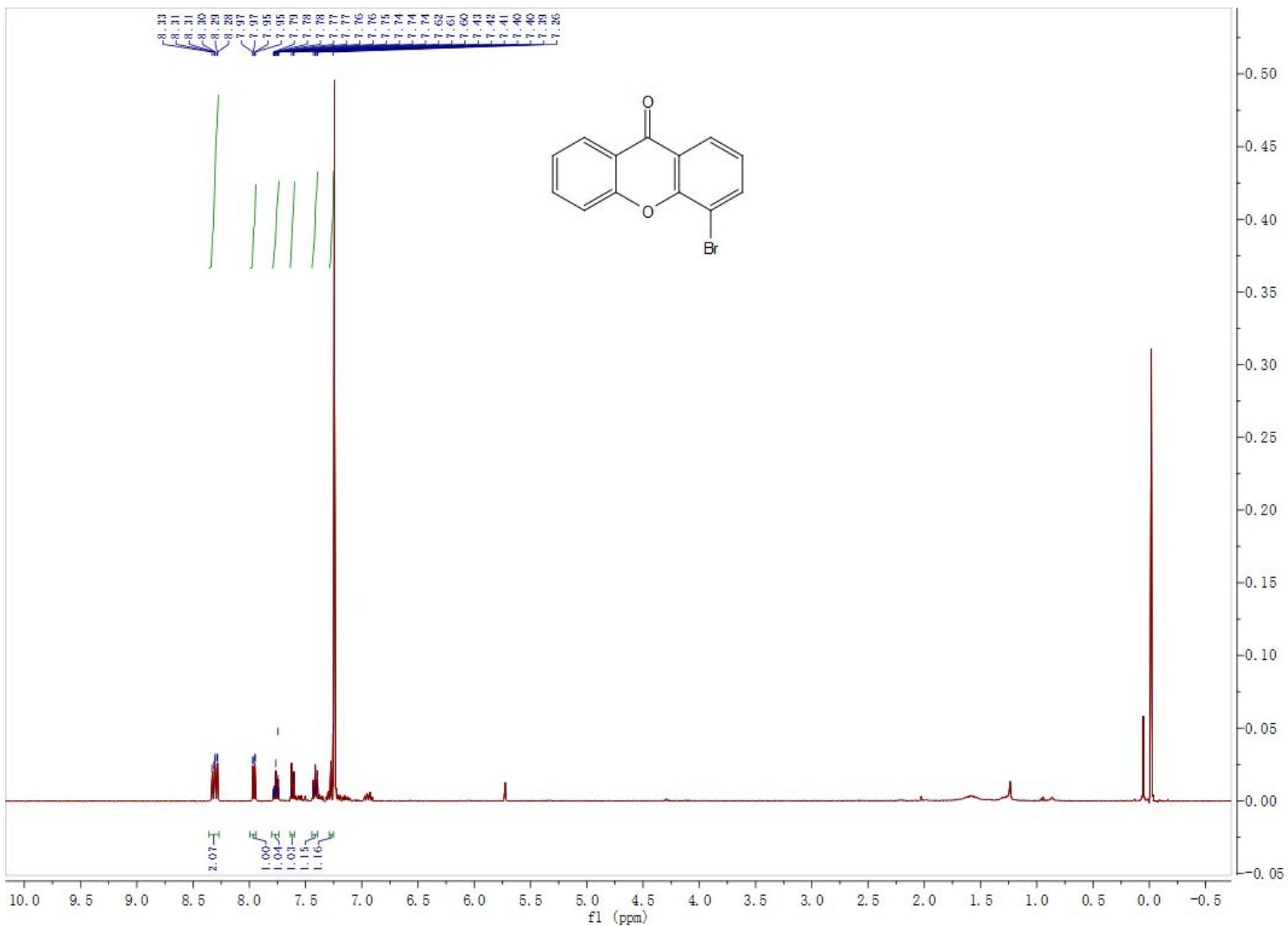
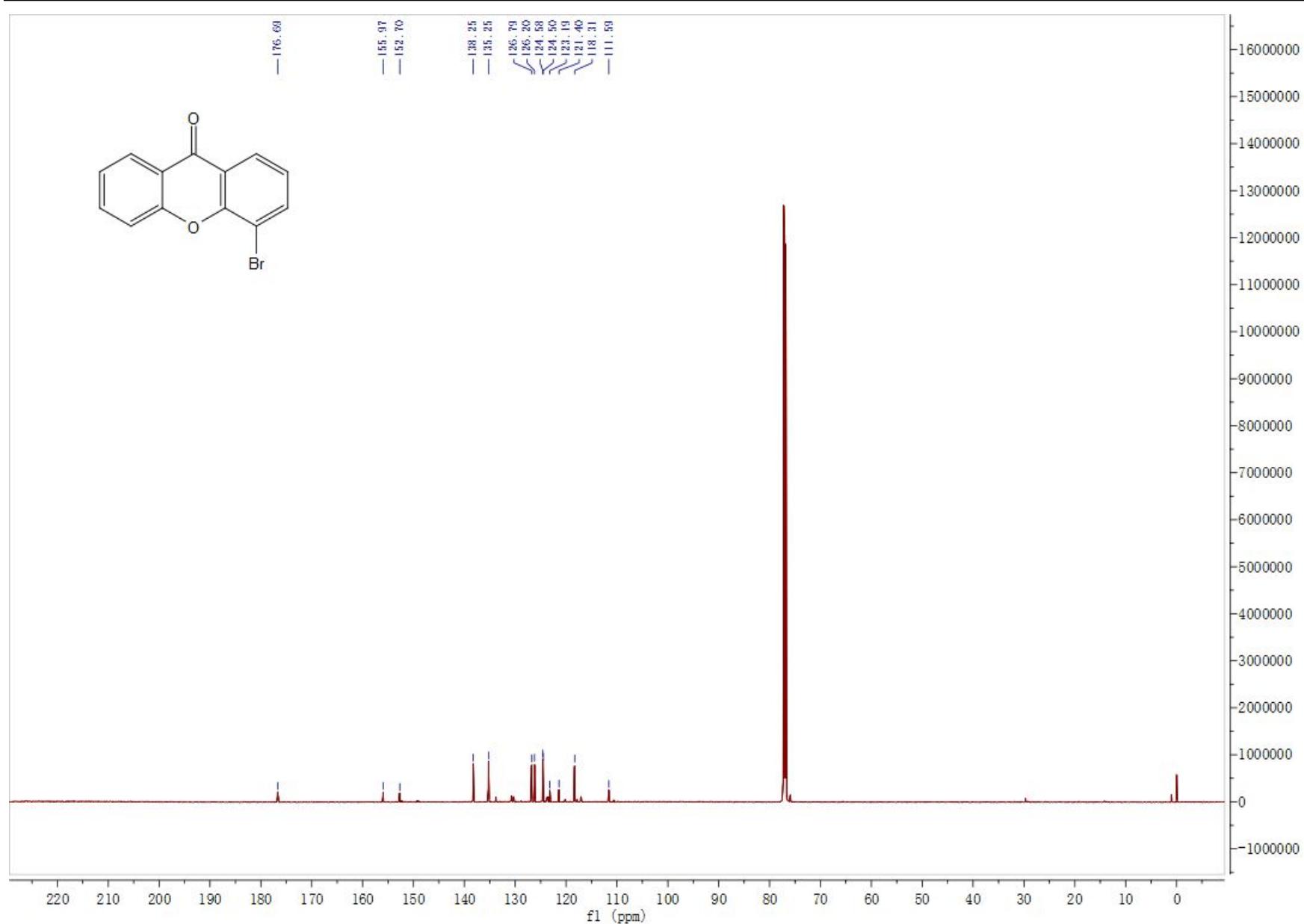
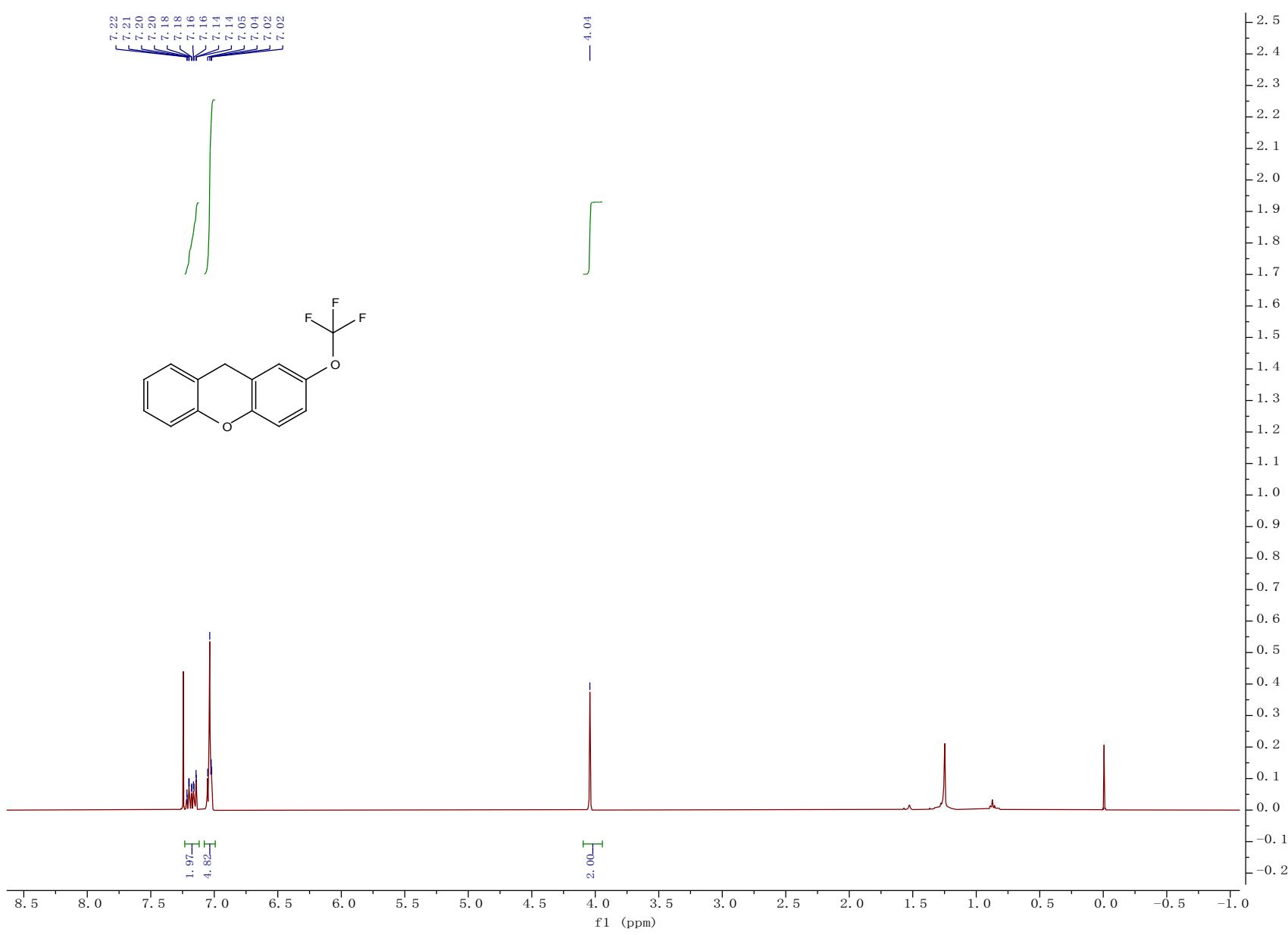


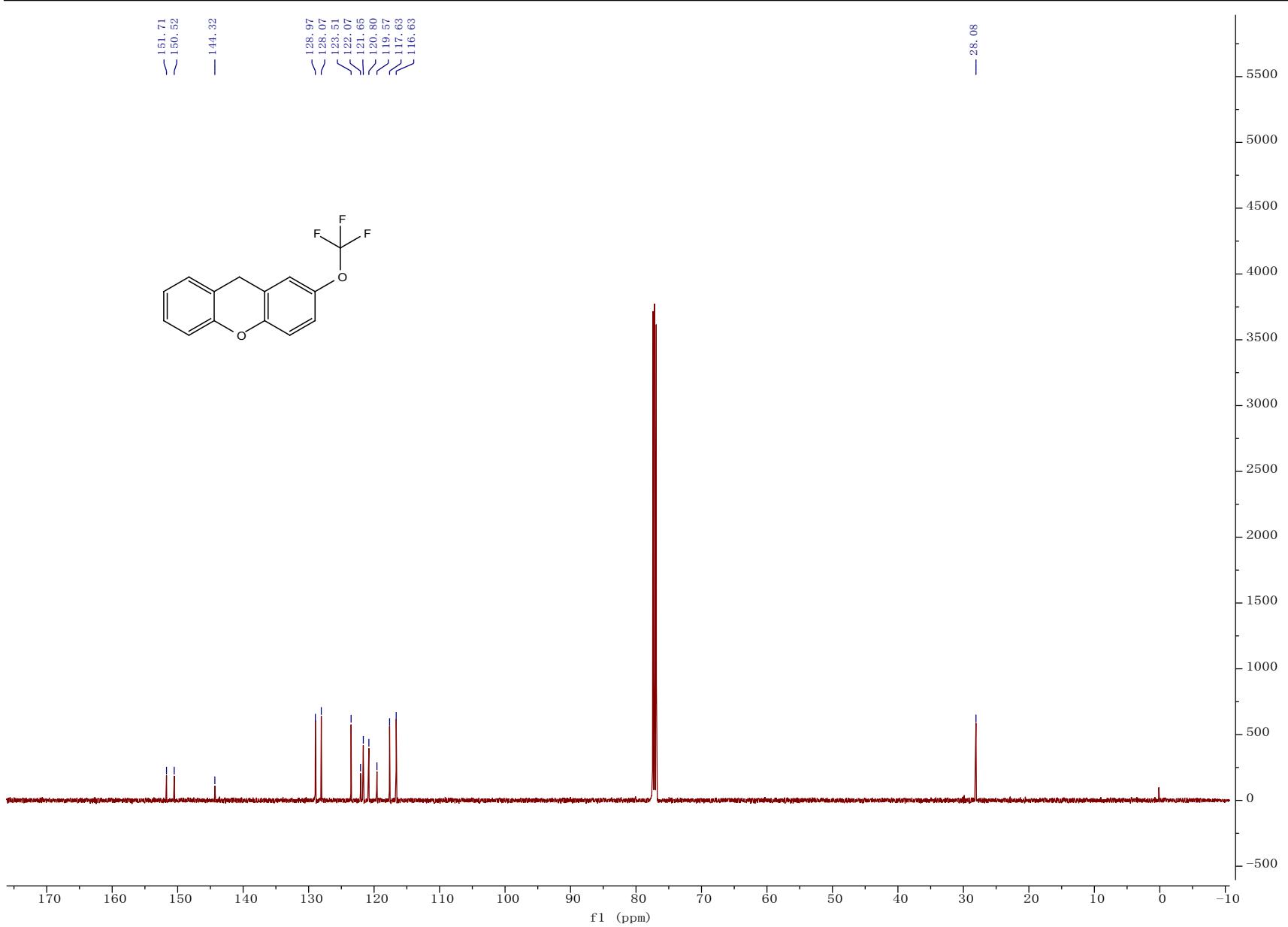
Figure S51:  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 12c



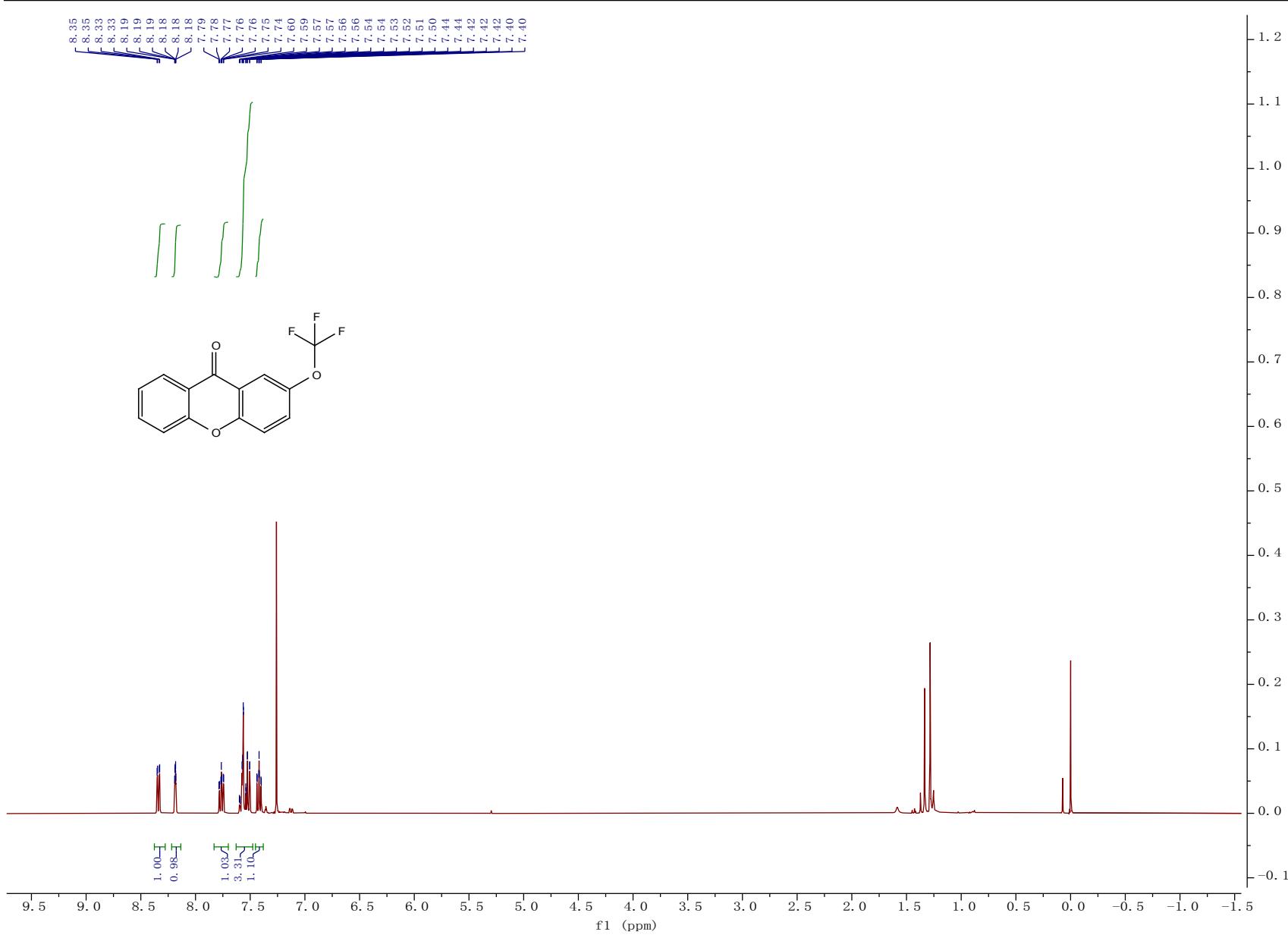
**Figure S52:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (150 MHz,  $\text{CDCl}_3$ ) spectrum of compound 12c



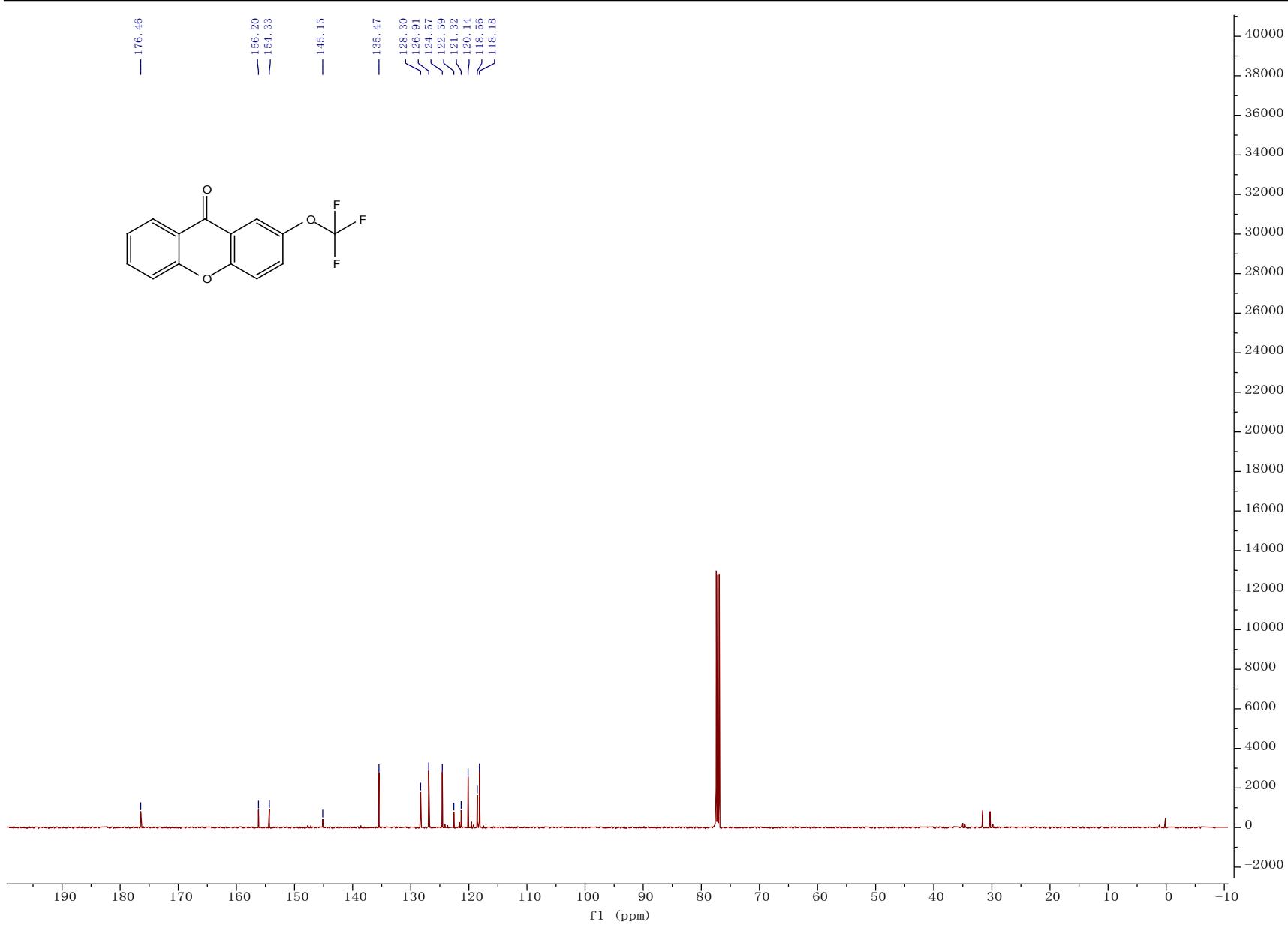
**Figure S53:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 13b



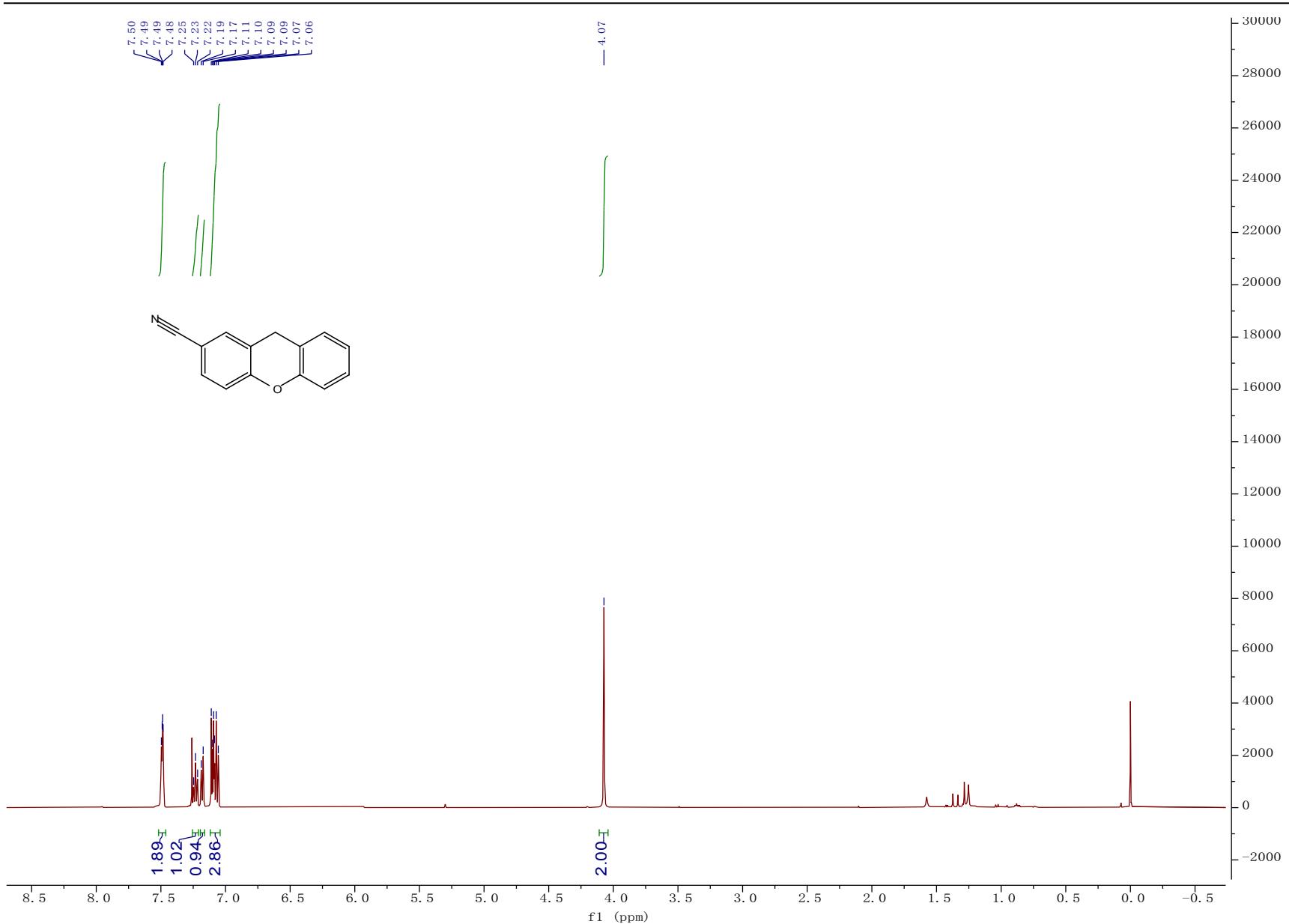
**Figure S54:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 13b



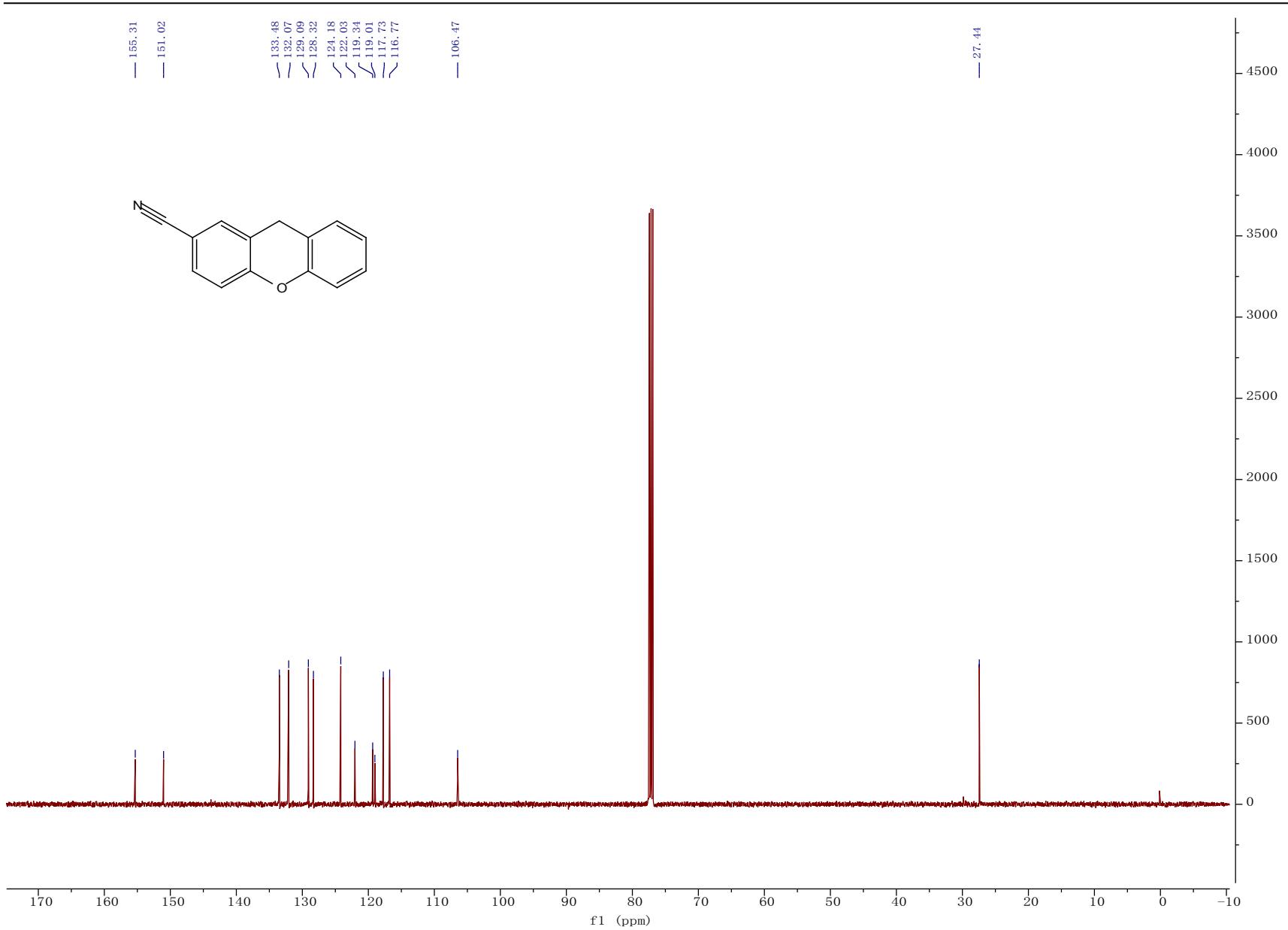
**Figure S55:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 13c



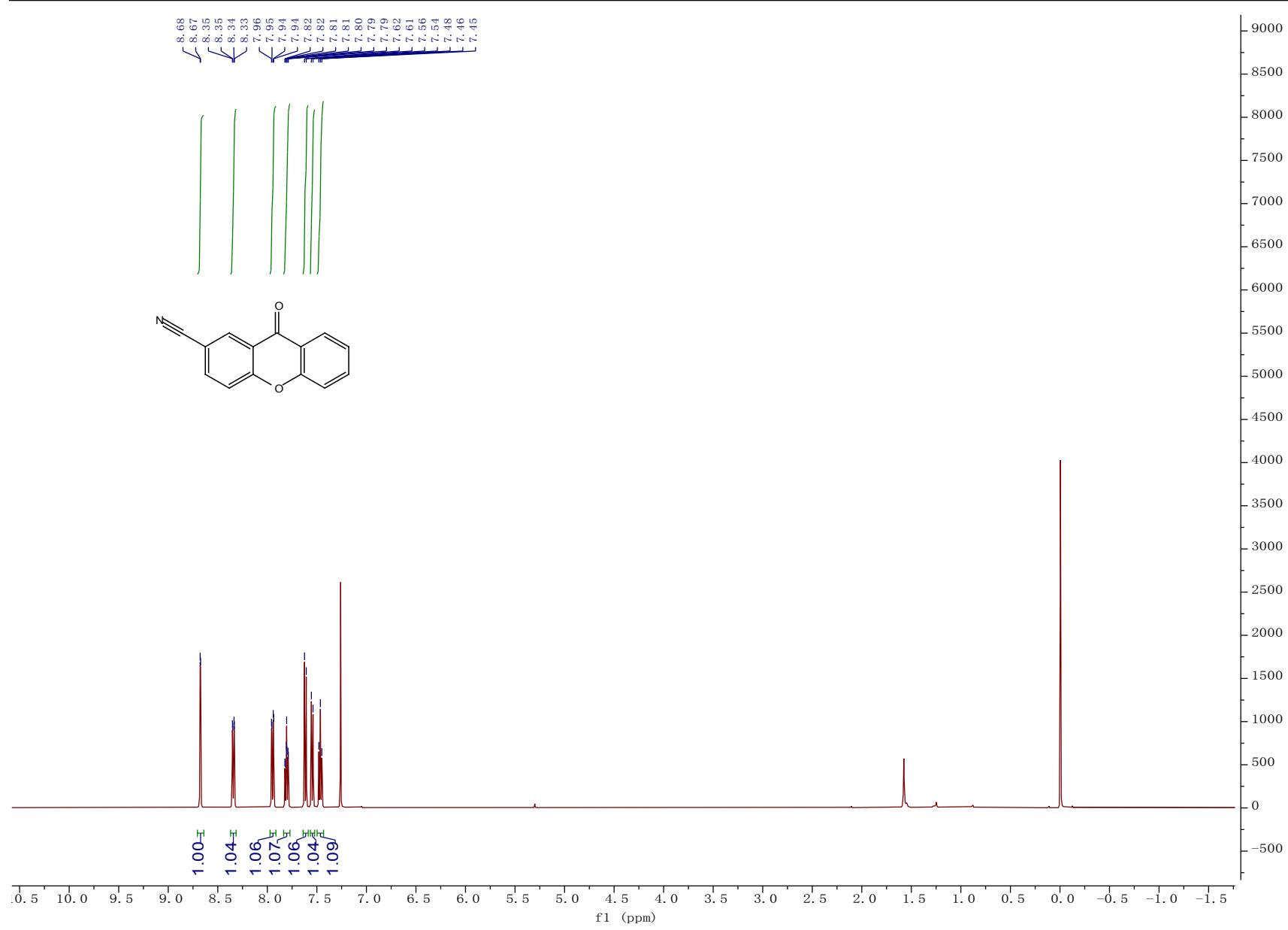
**Figure S56:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 13c



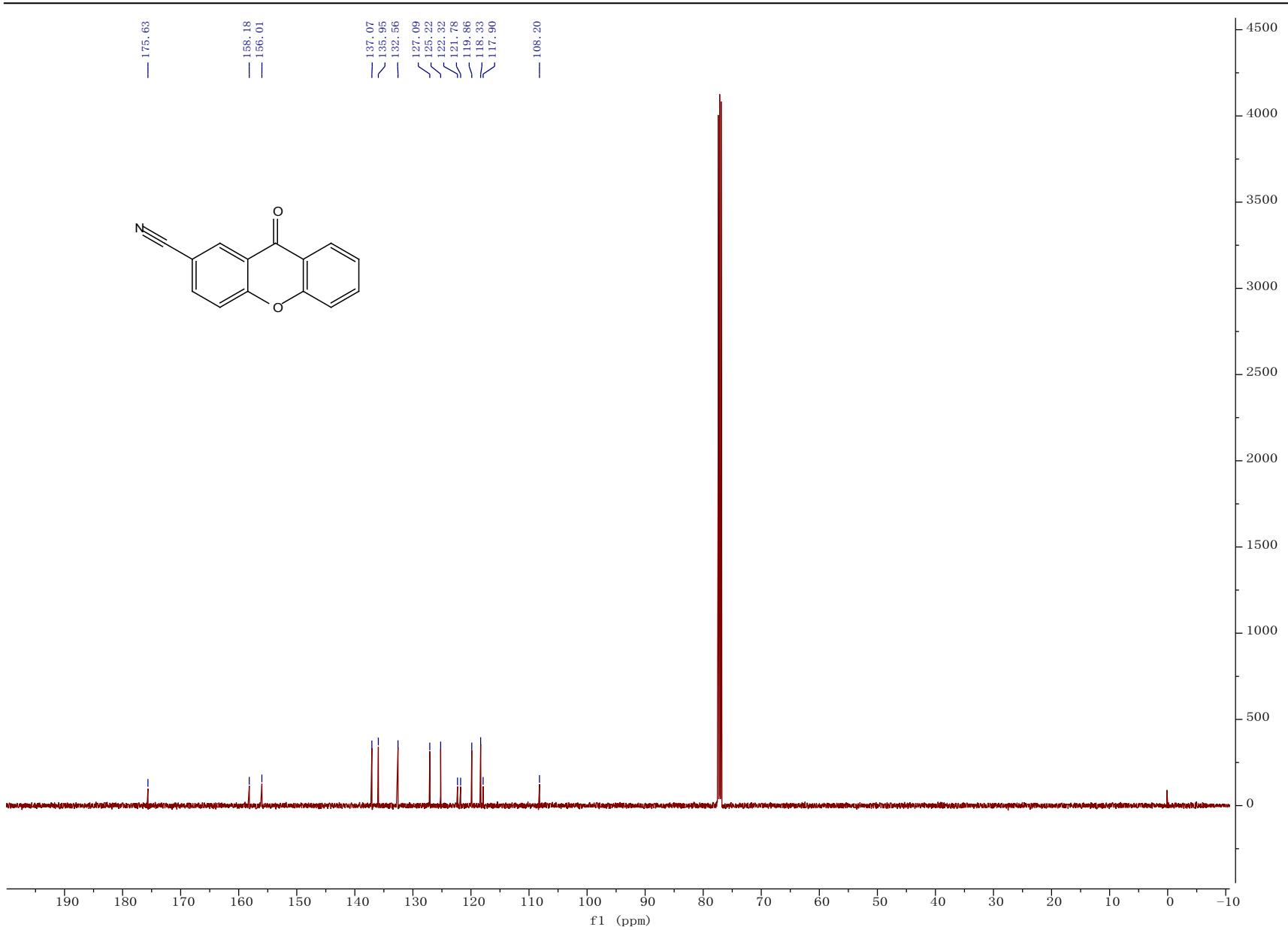
**Figure S57:**  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 14b



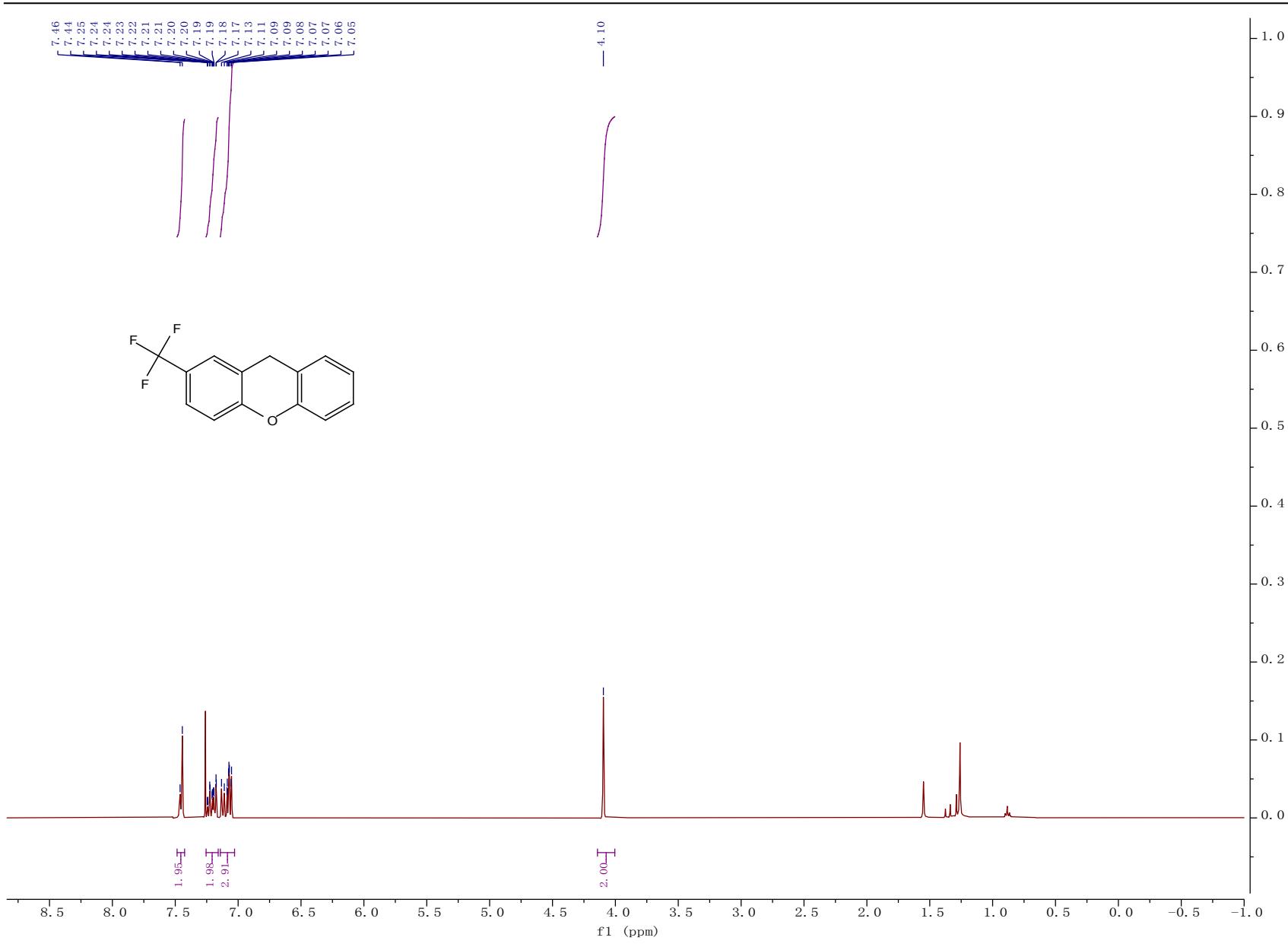
**Figure S58:**  $^{13}\text{C}$   $\{\text{H}\}$  NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 14b



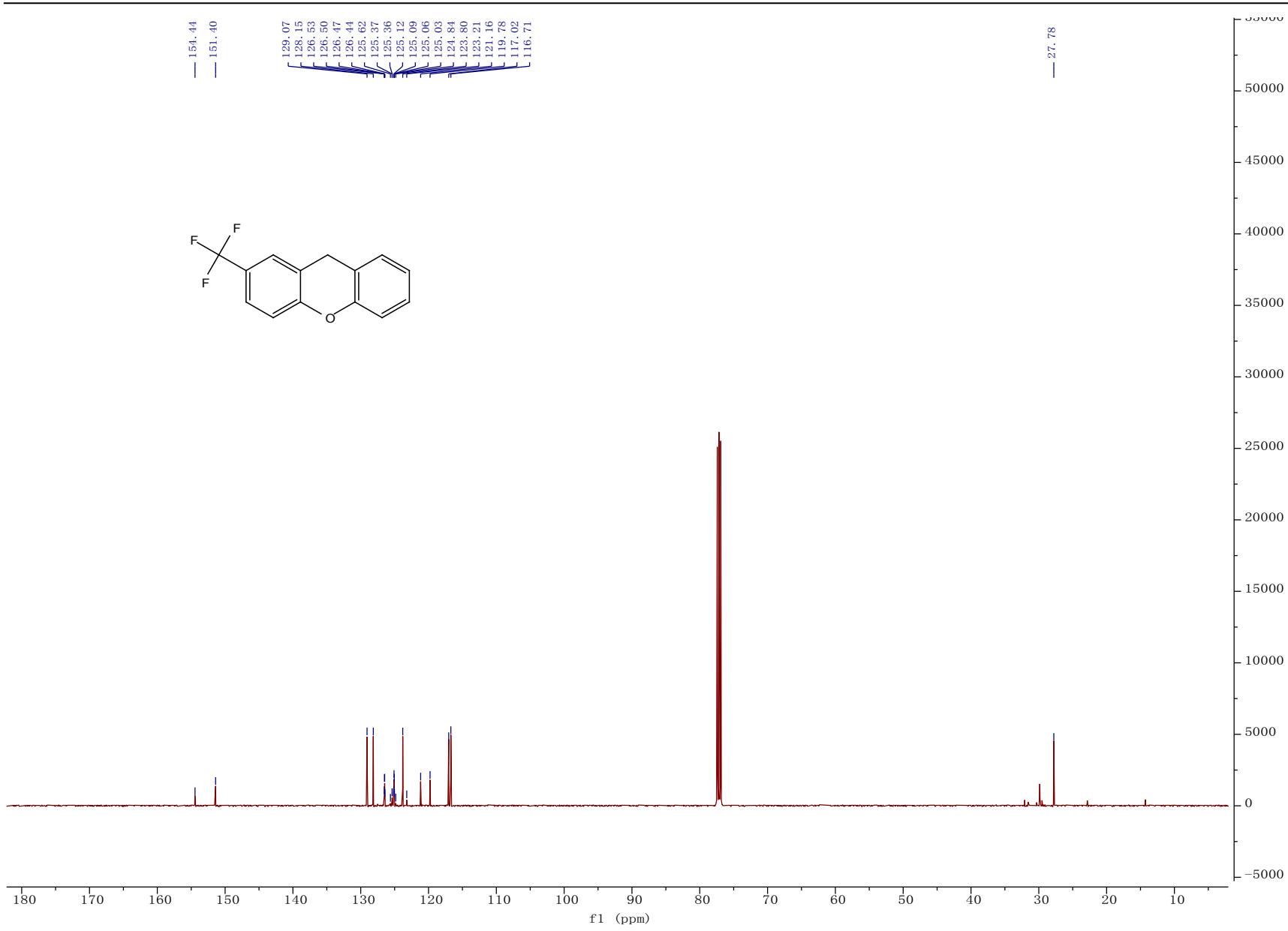
**Figure S59:**  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 14c



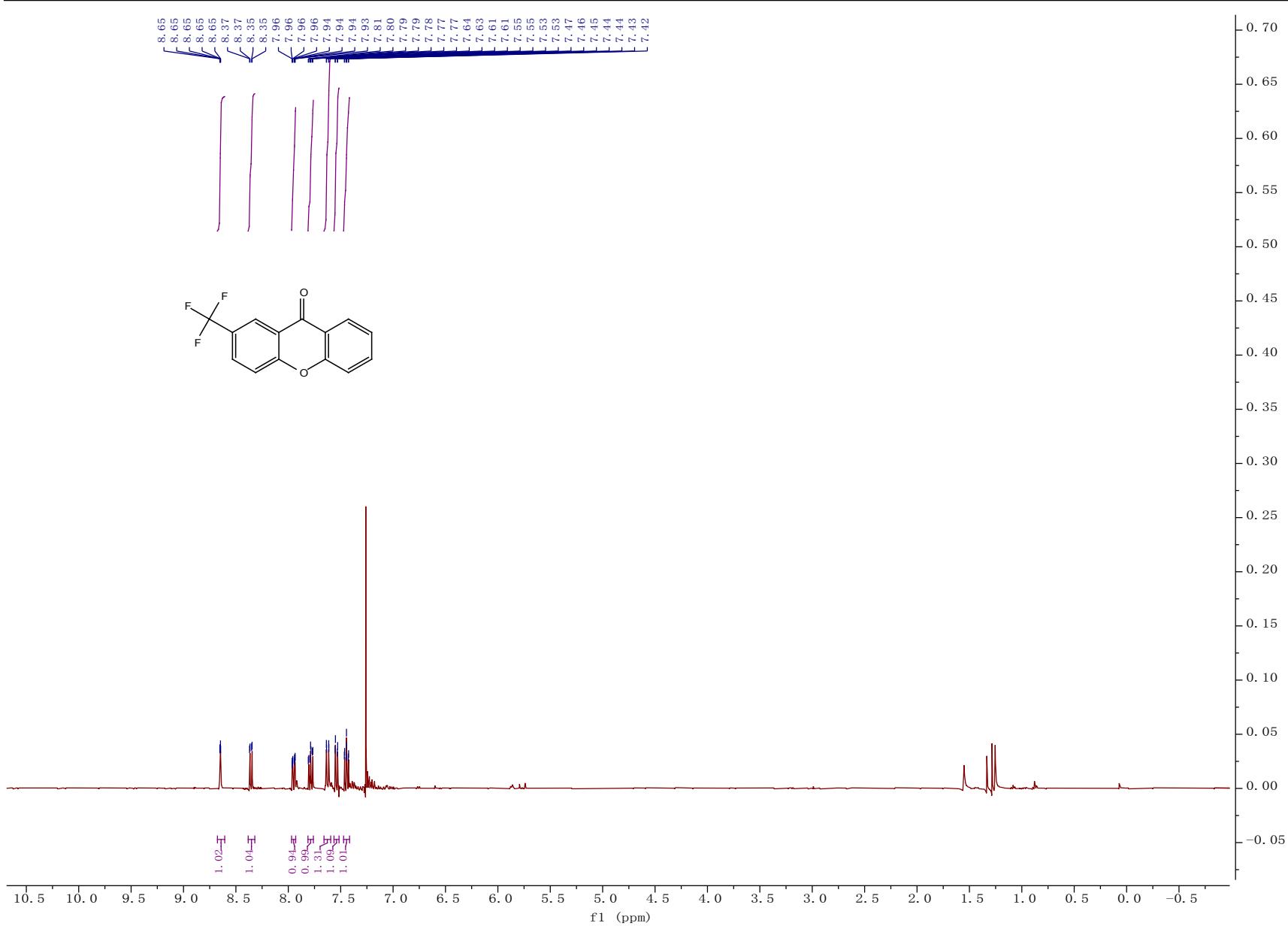
**Figure S60:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz, CDCl<sub>3</sub>) spectrum of compound 14c



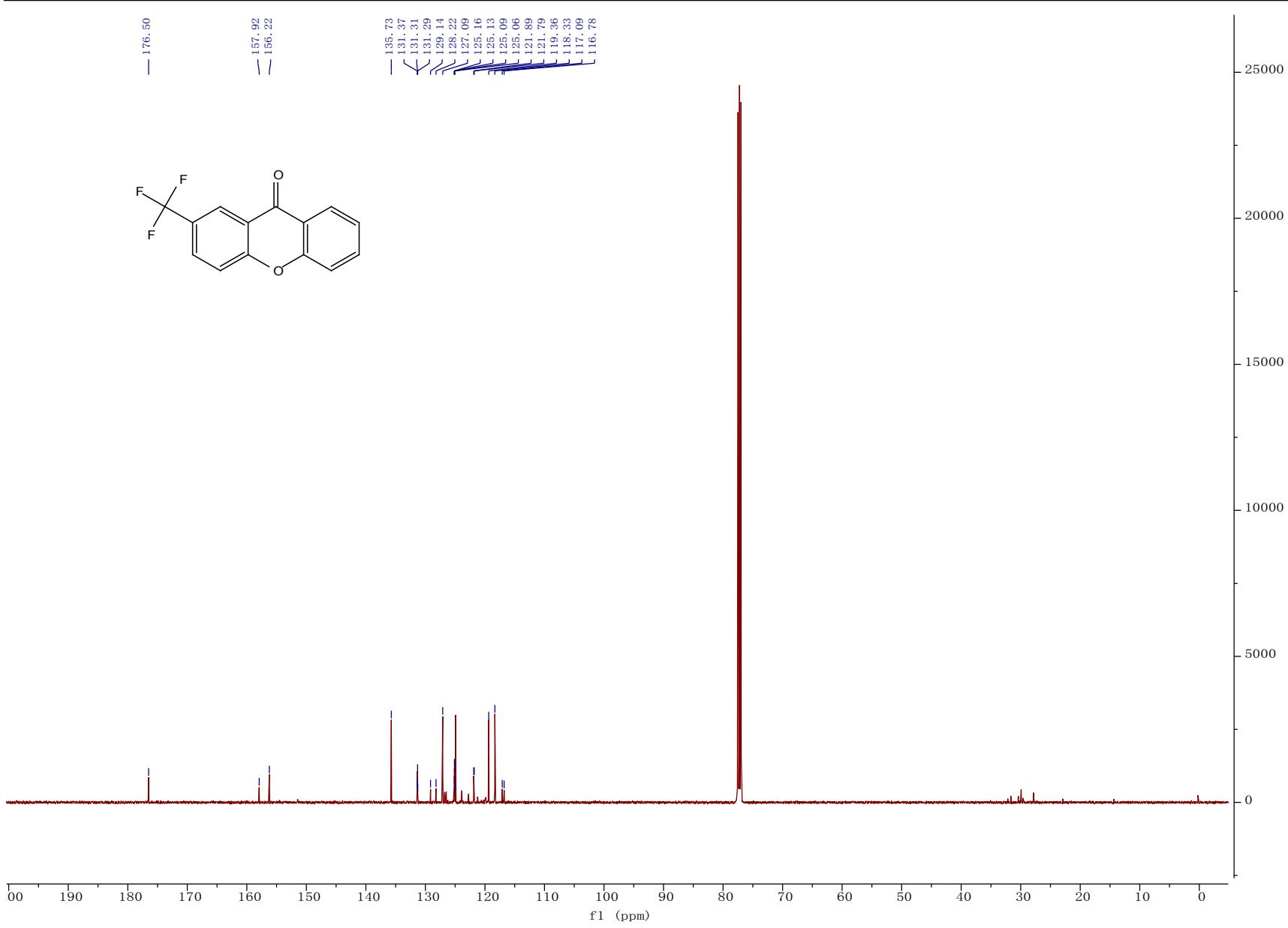
**Figure S61:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 15b



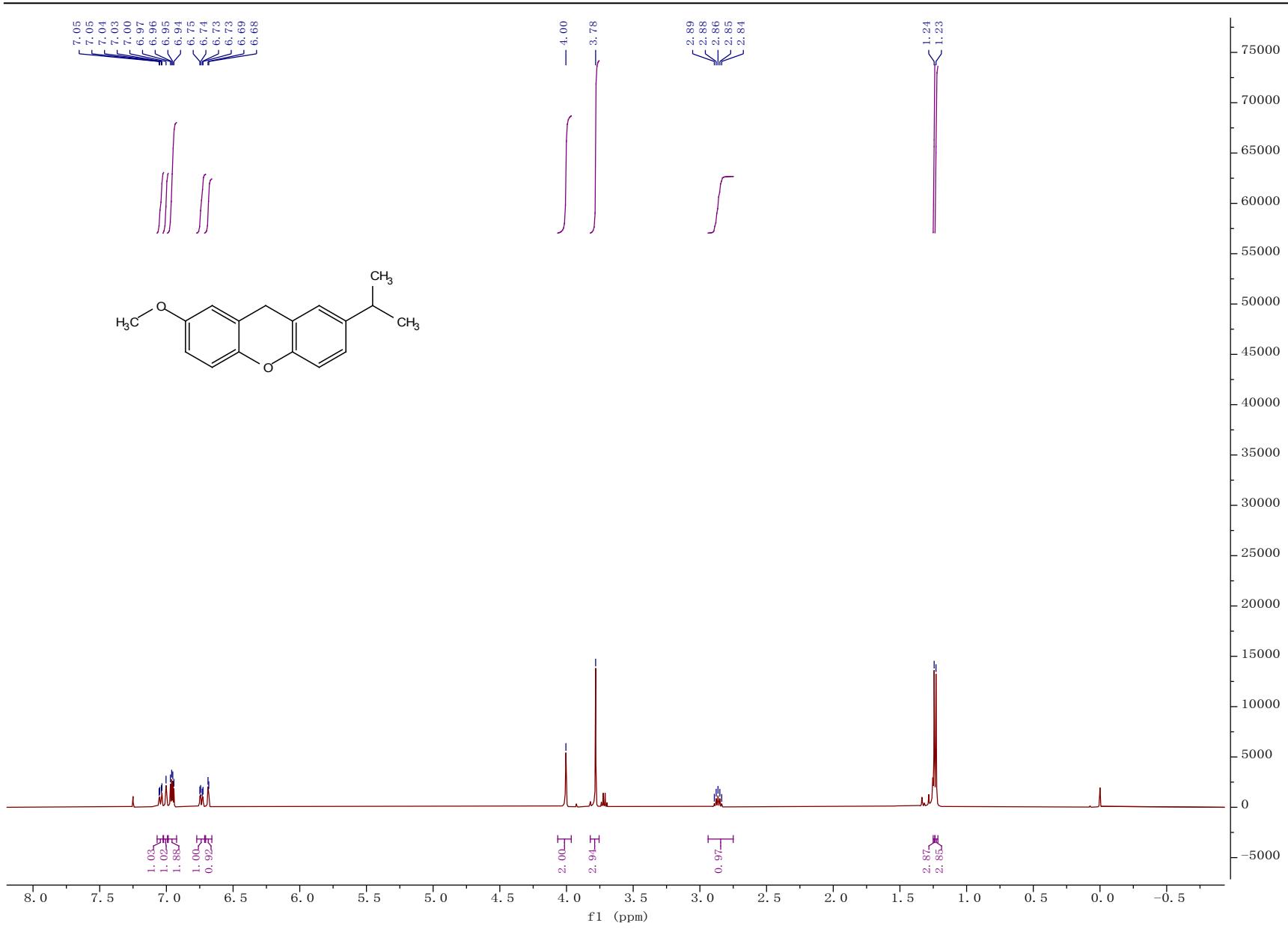
**Figure S62:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz, CDCl<sub>3</sub>) spectrum of compound 15b



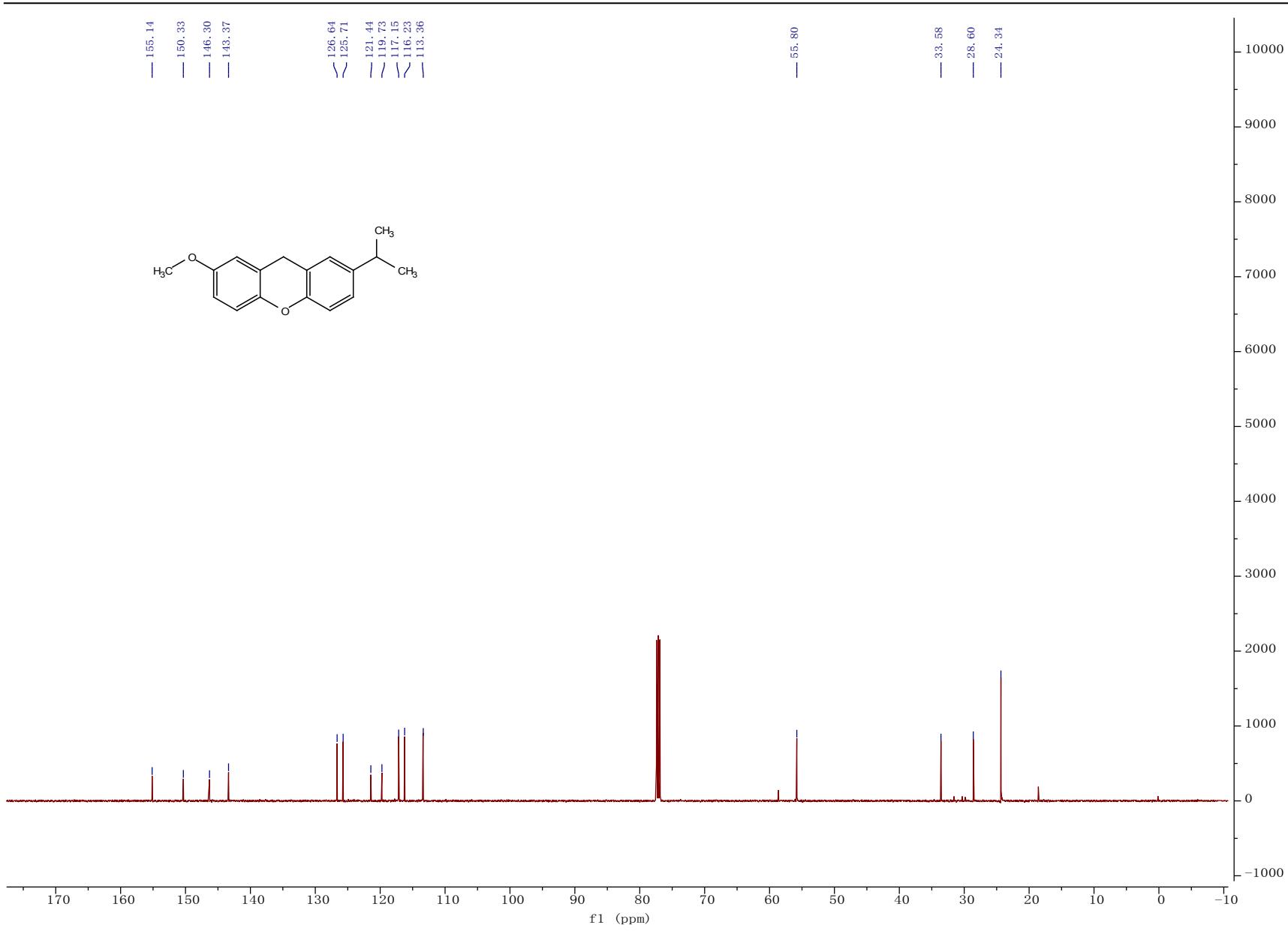
**Figure S63:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 15c



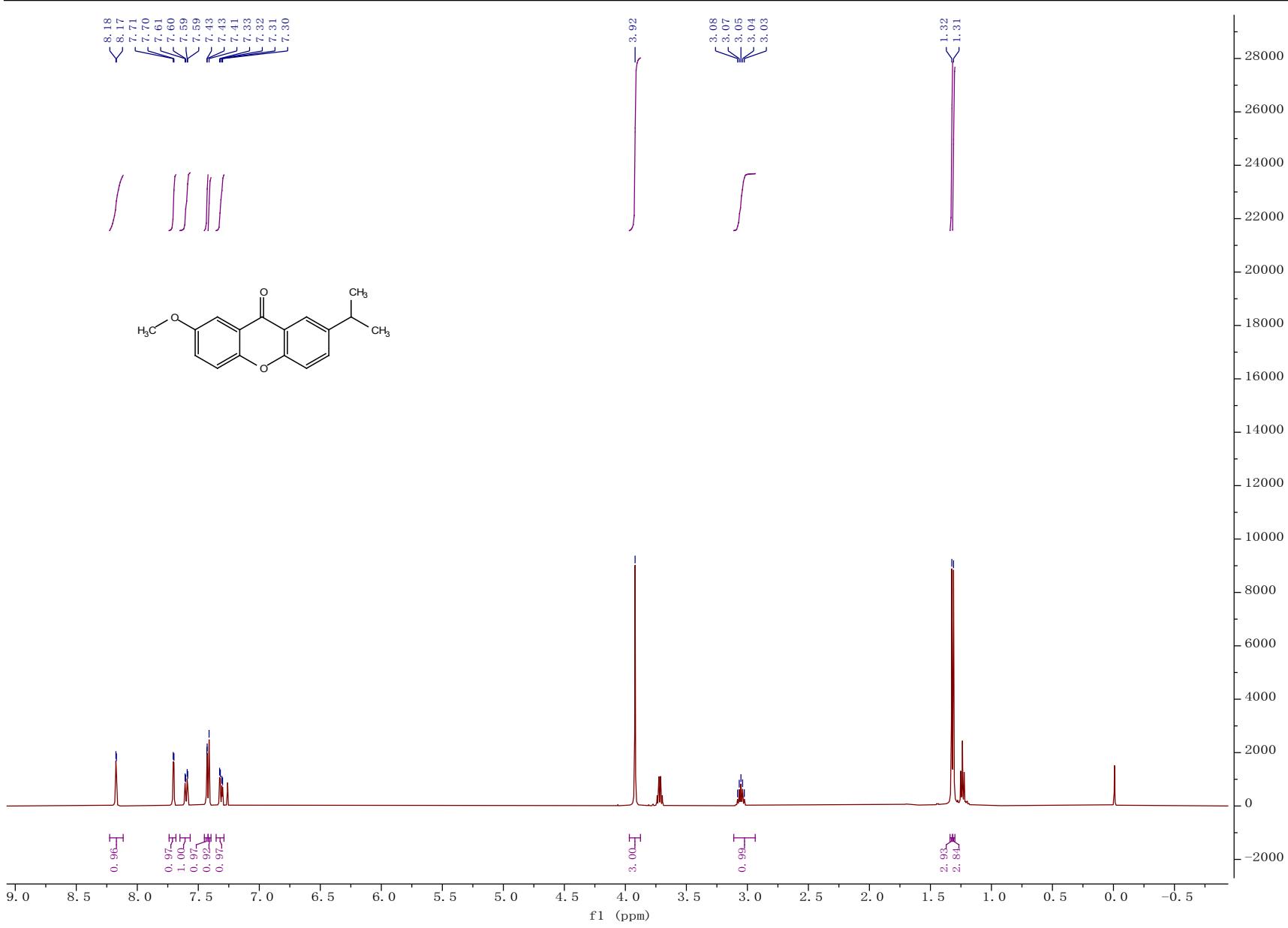
**Figure S64:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 15c



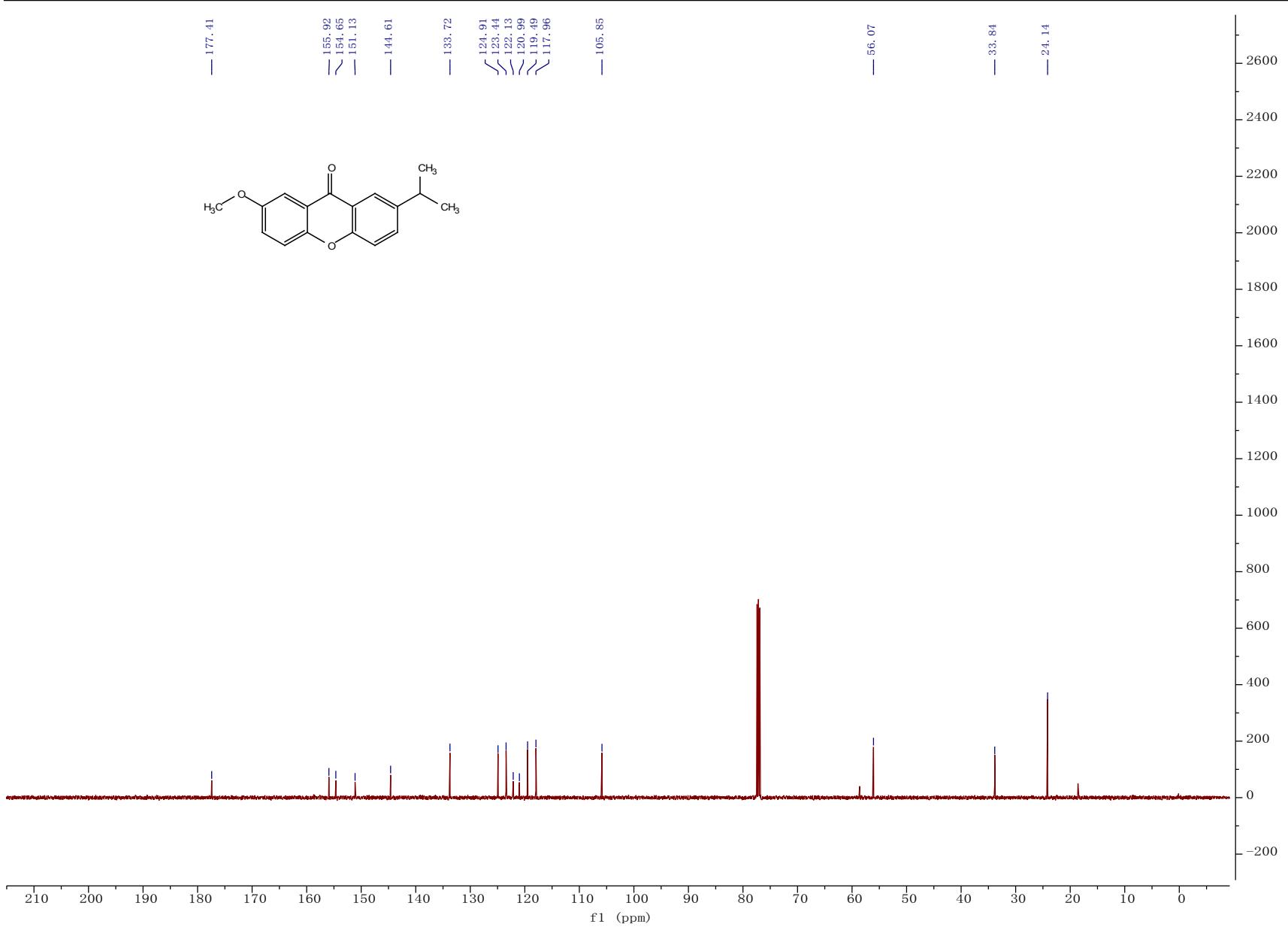
**Figure S65:** <sup>1</sup>H NMR (500 MHz, CDCl<sub>3</sub>) spectrum of compound 17b



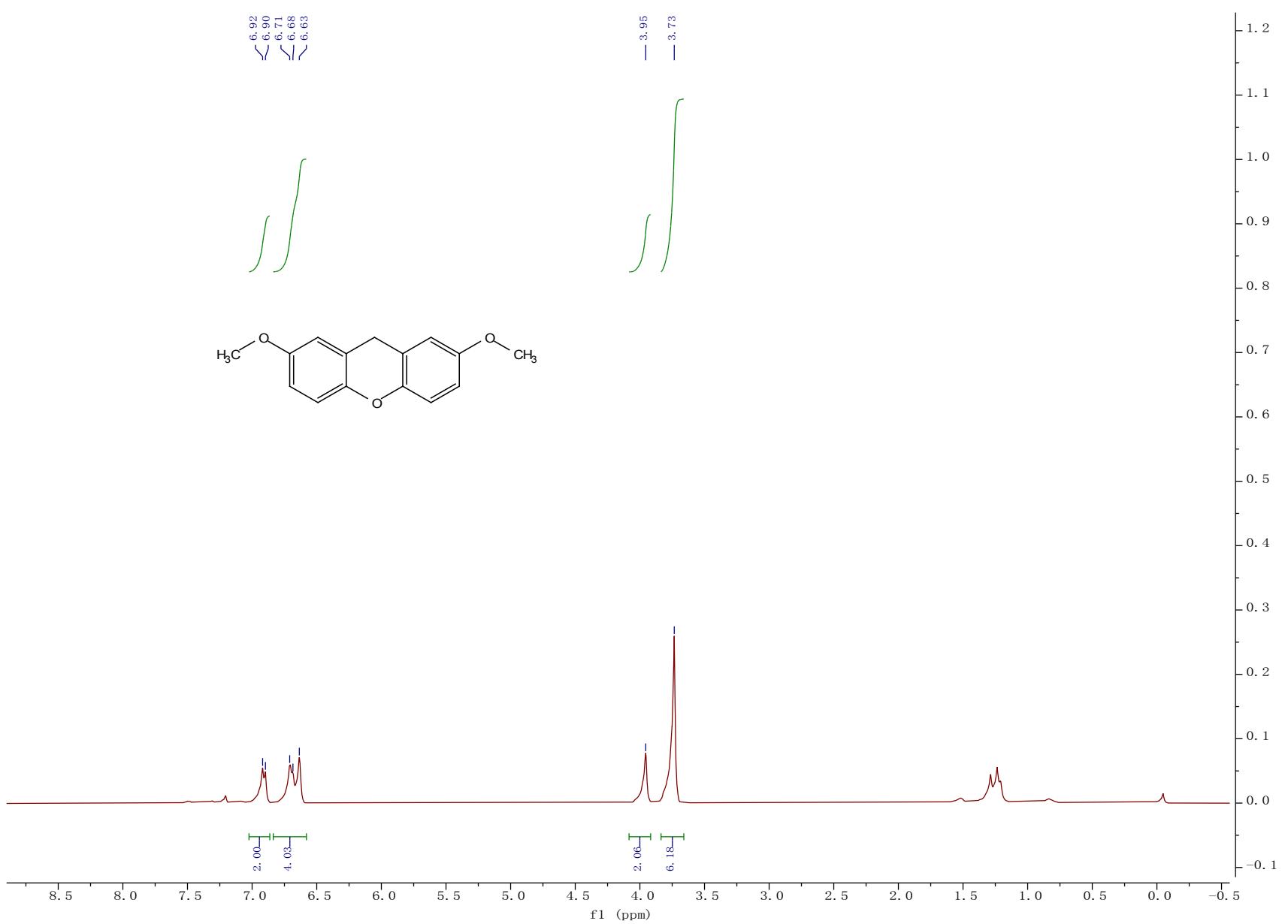
**Figure S66:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 17b



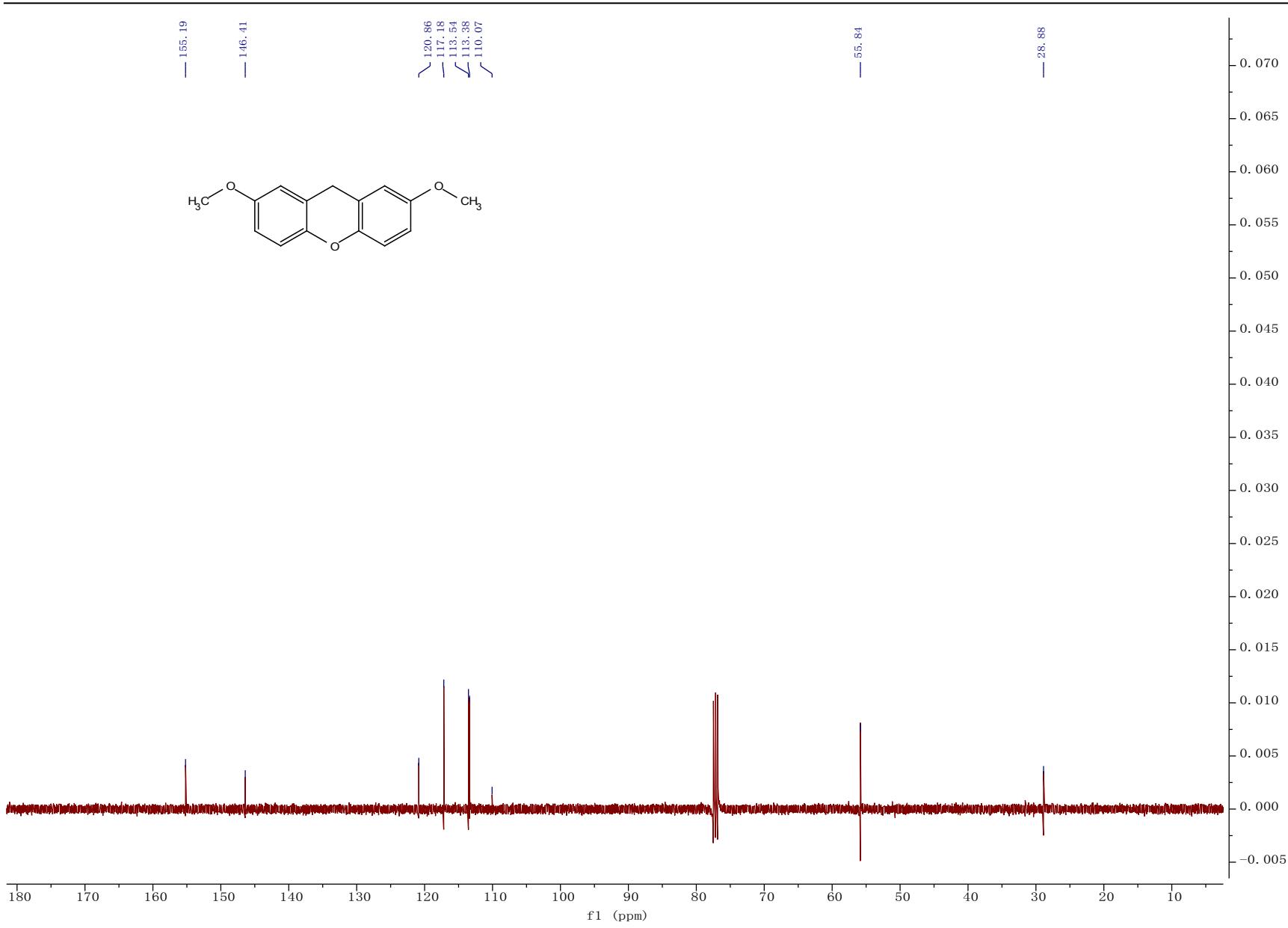
**Figure S67:**  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 17c



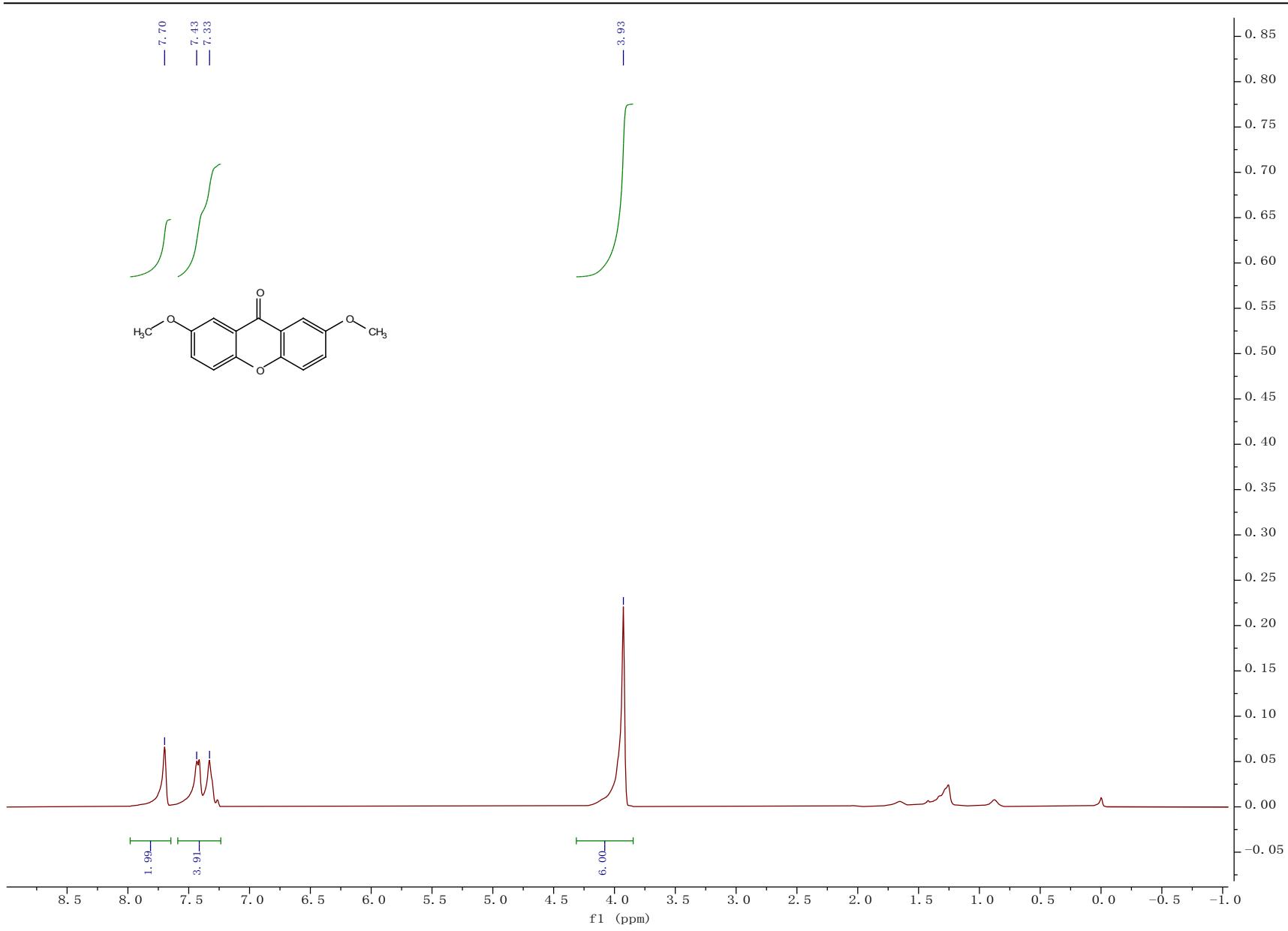
**Figure S68:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 17c



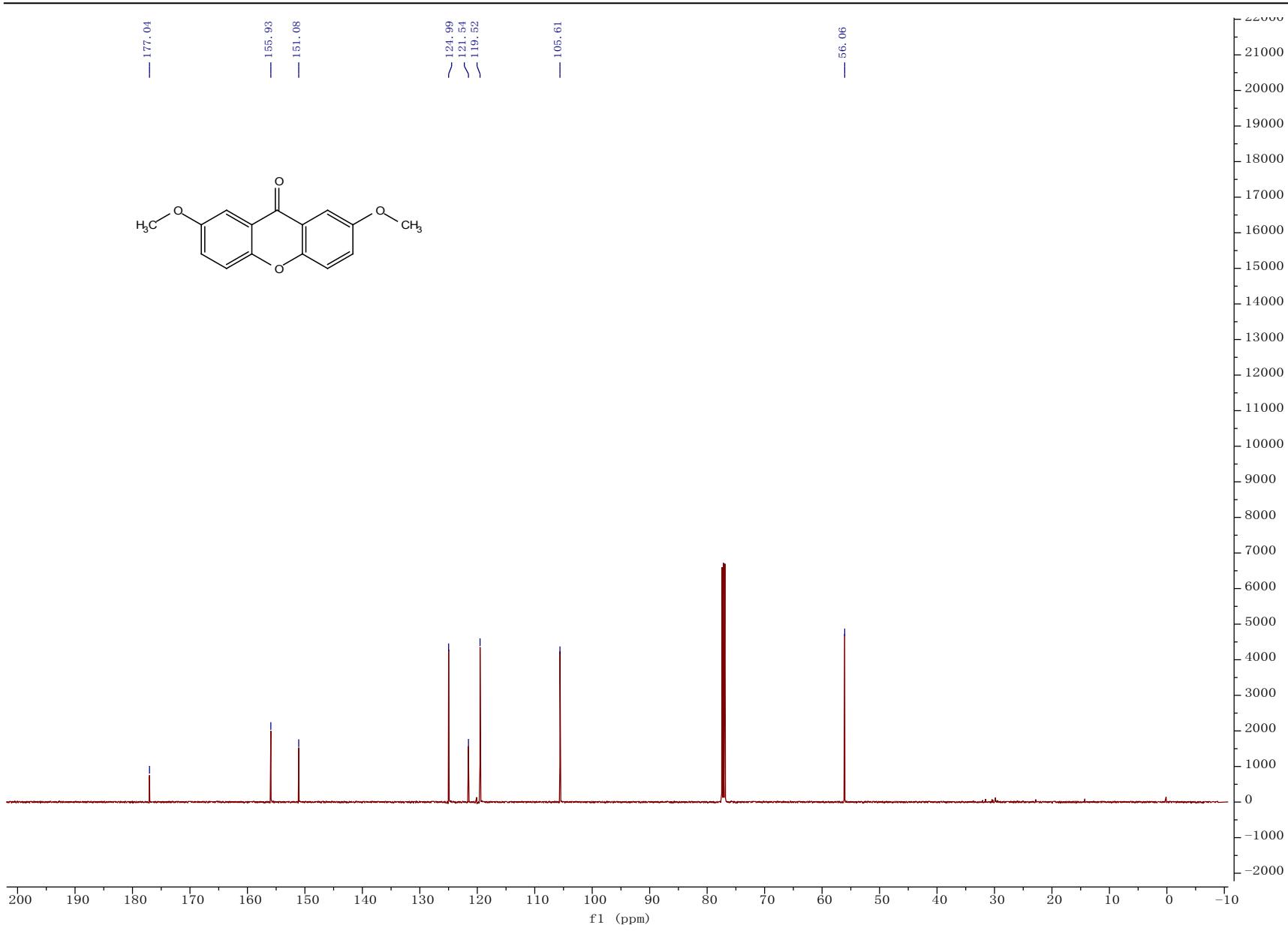
**Figure S69:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 18b



**Figure S70:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of compound 18b



**Figure S71:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 18c



**Figure S72:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 18c

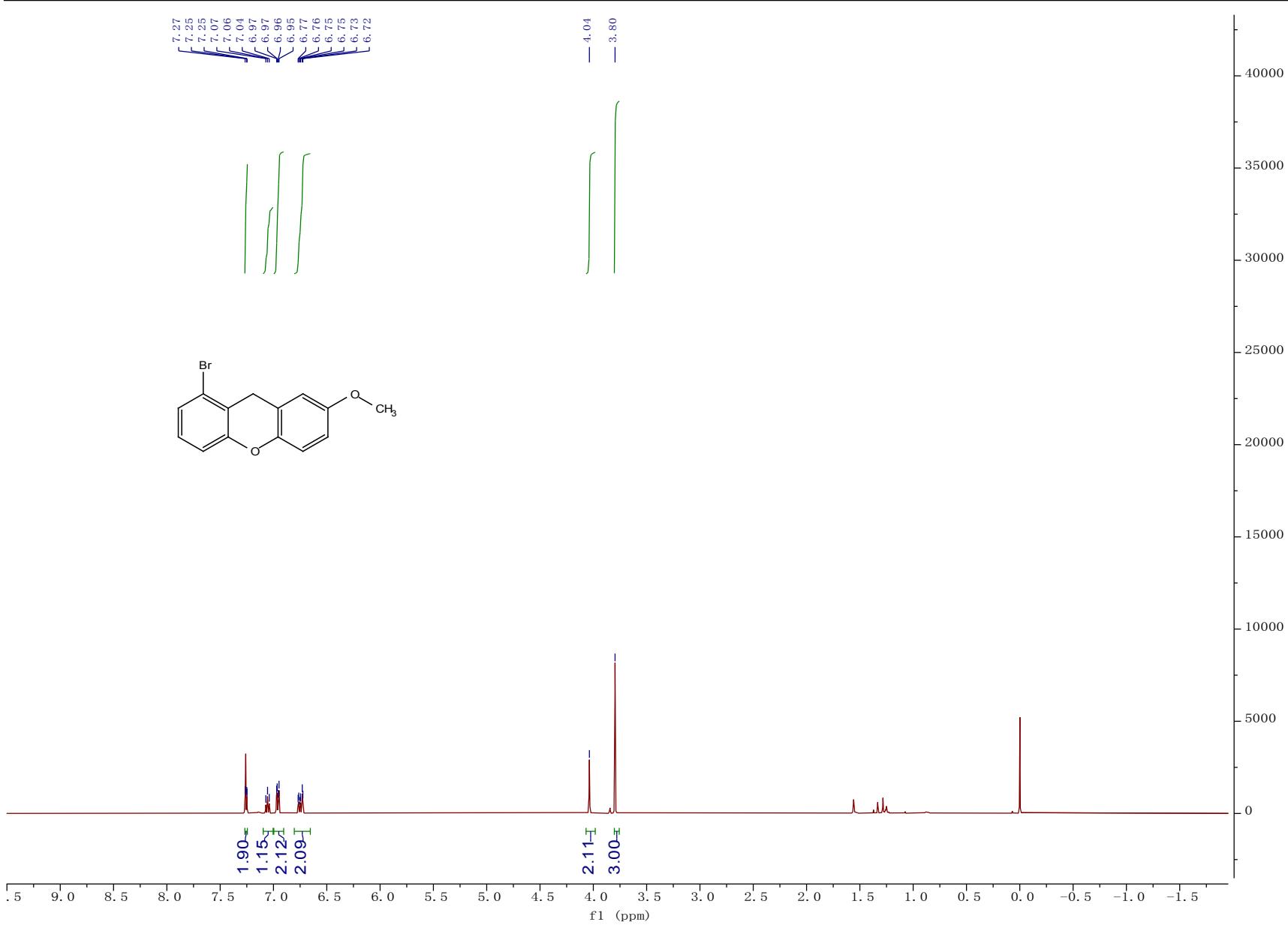
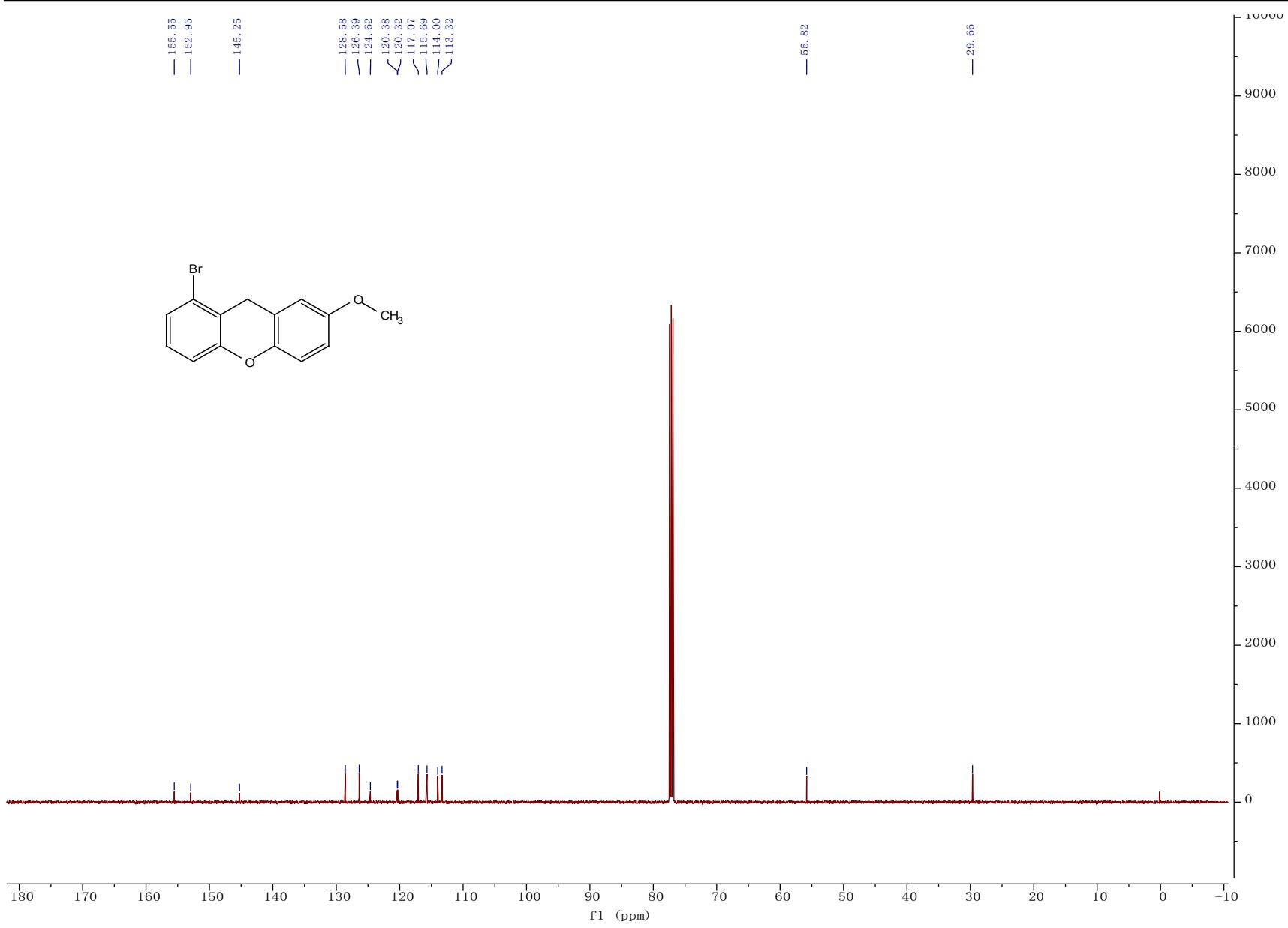
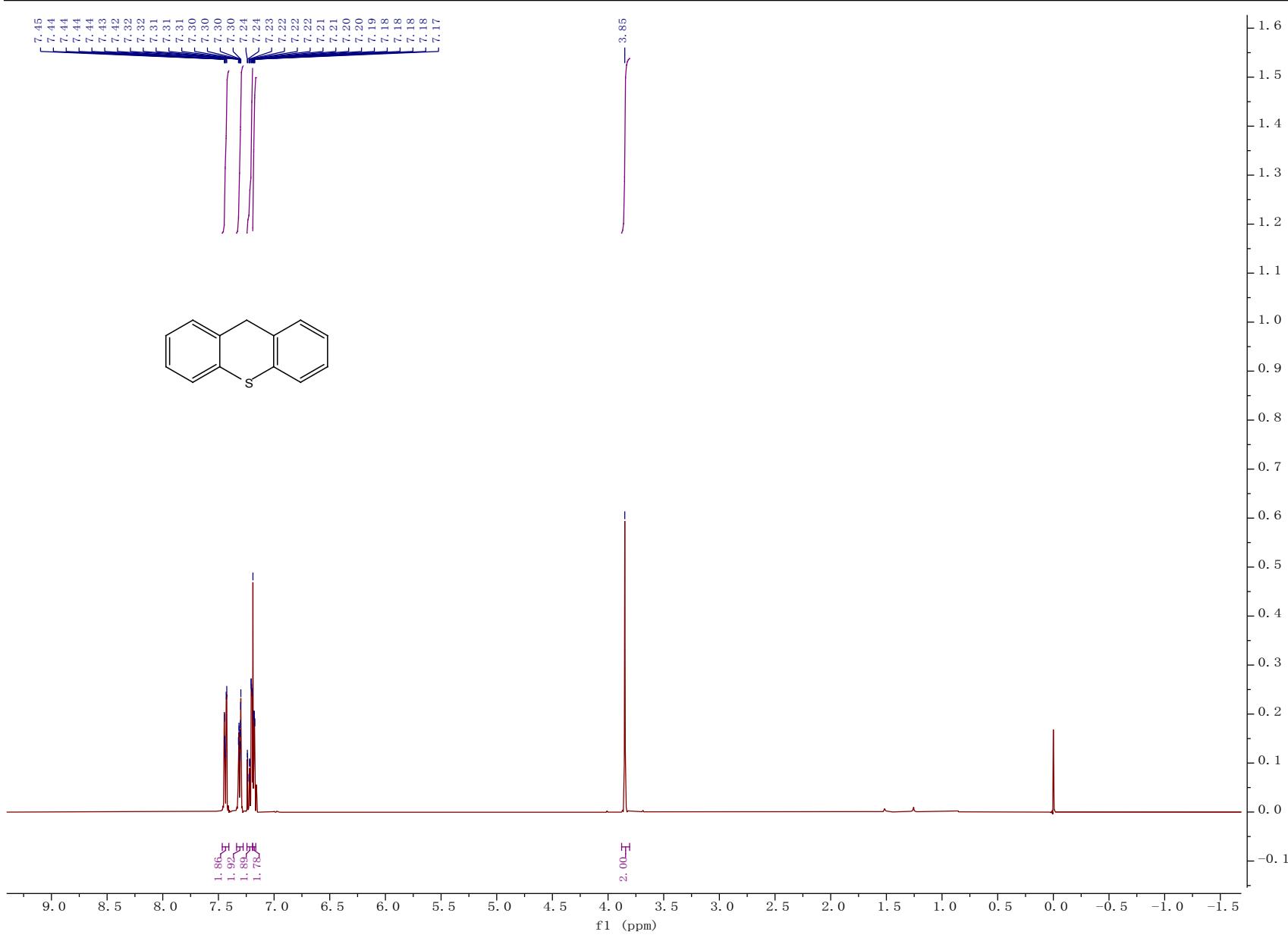


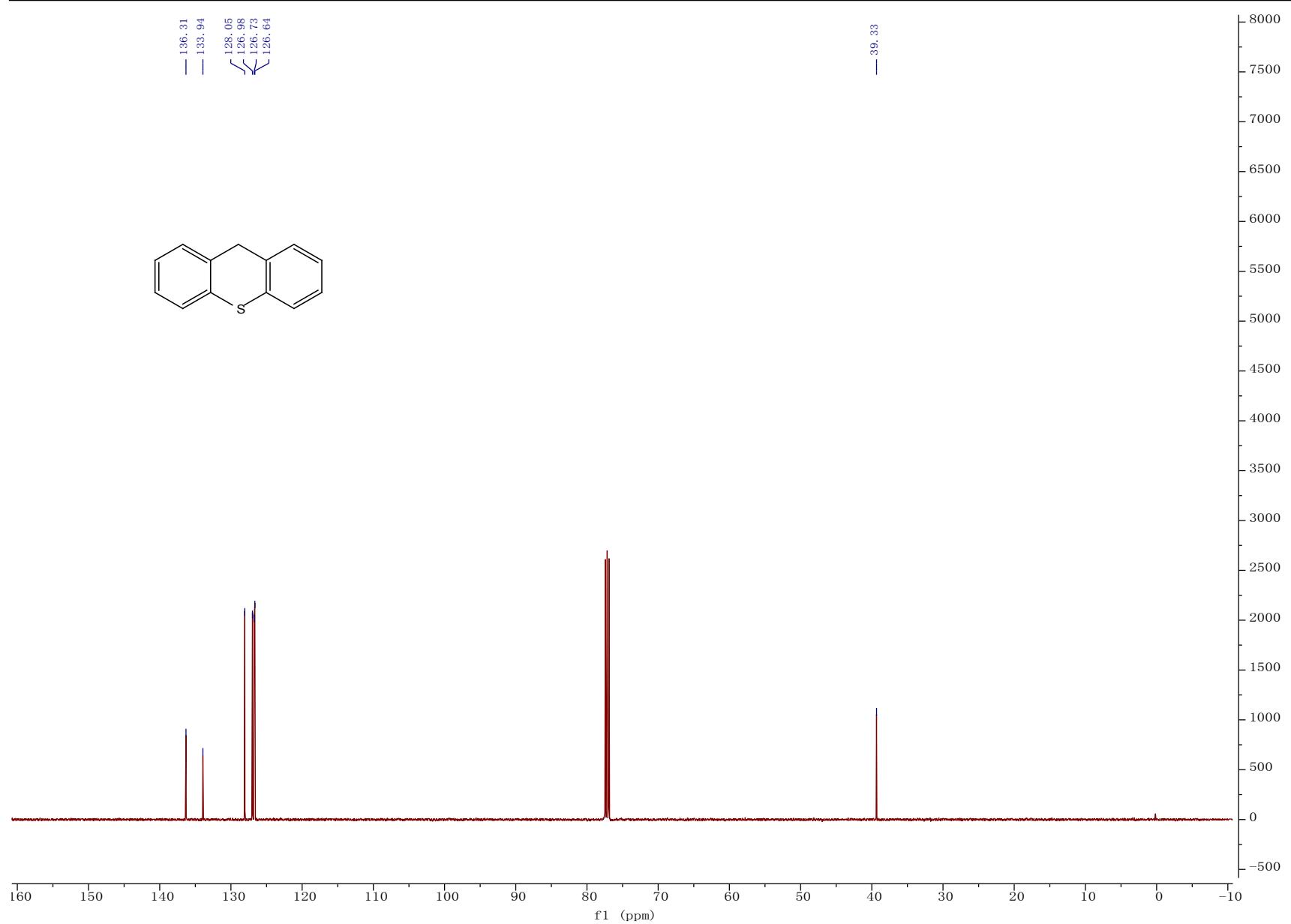
Figure S73:  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ) spectrum of compound 19b



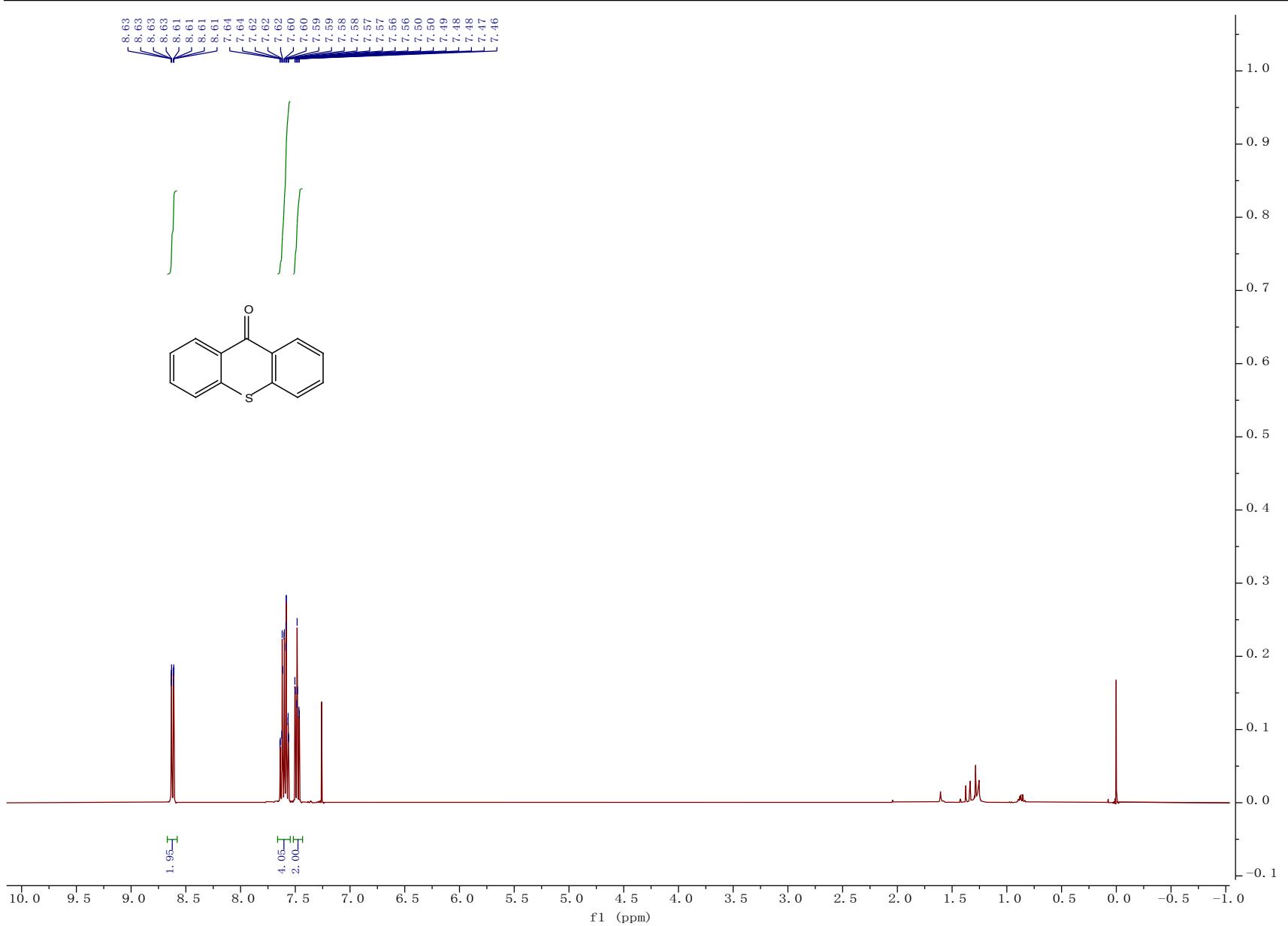
**Figure S74:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 19b



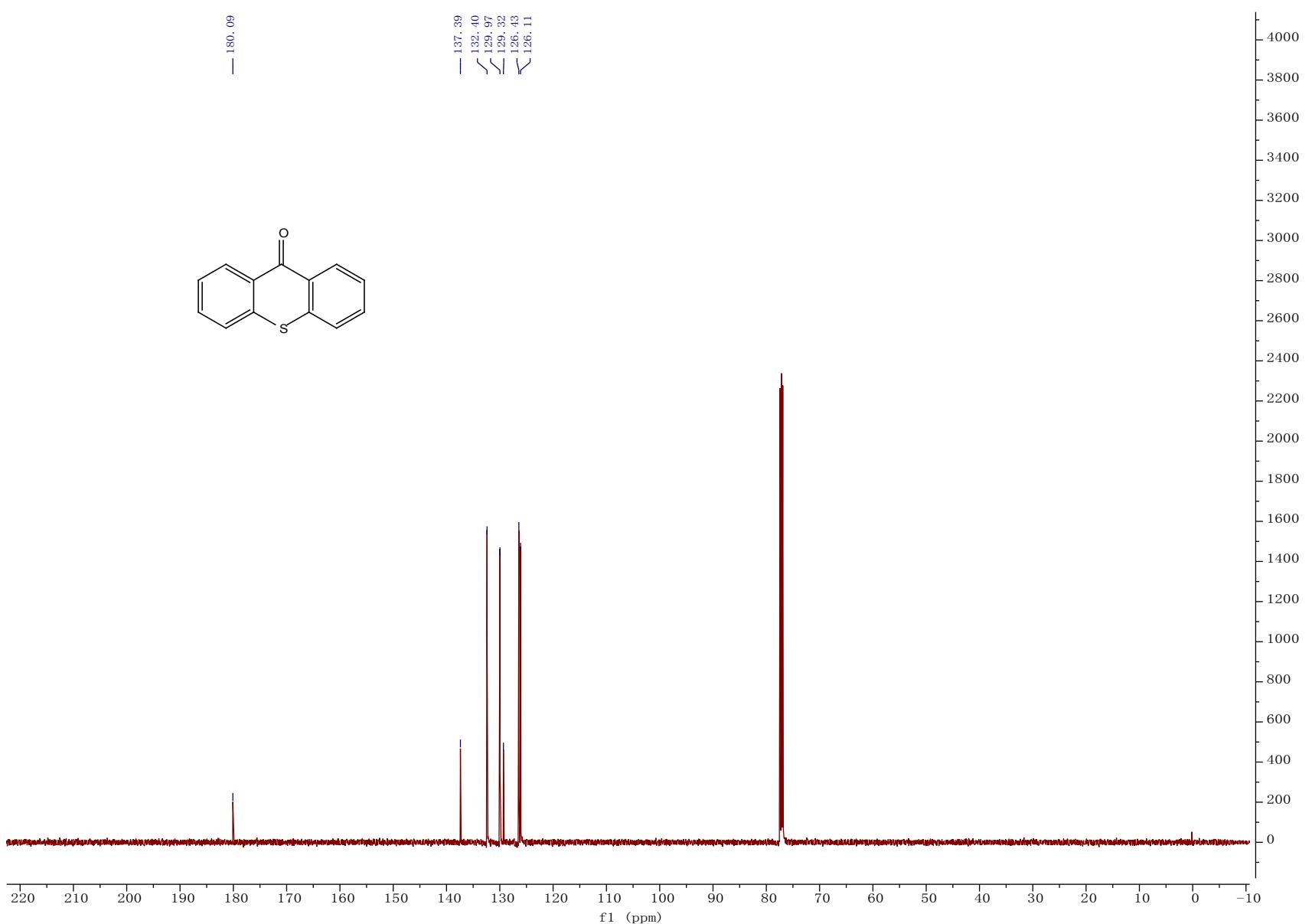
**Figure S75:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 20b



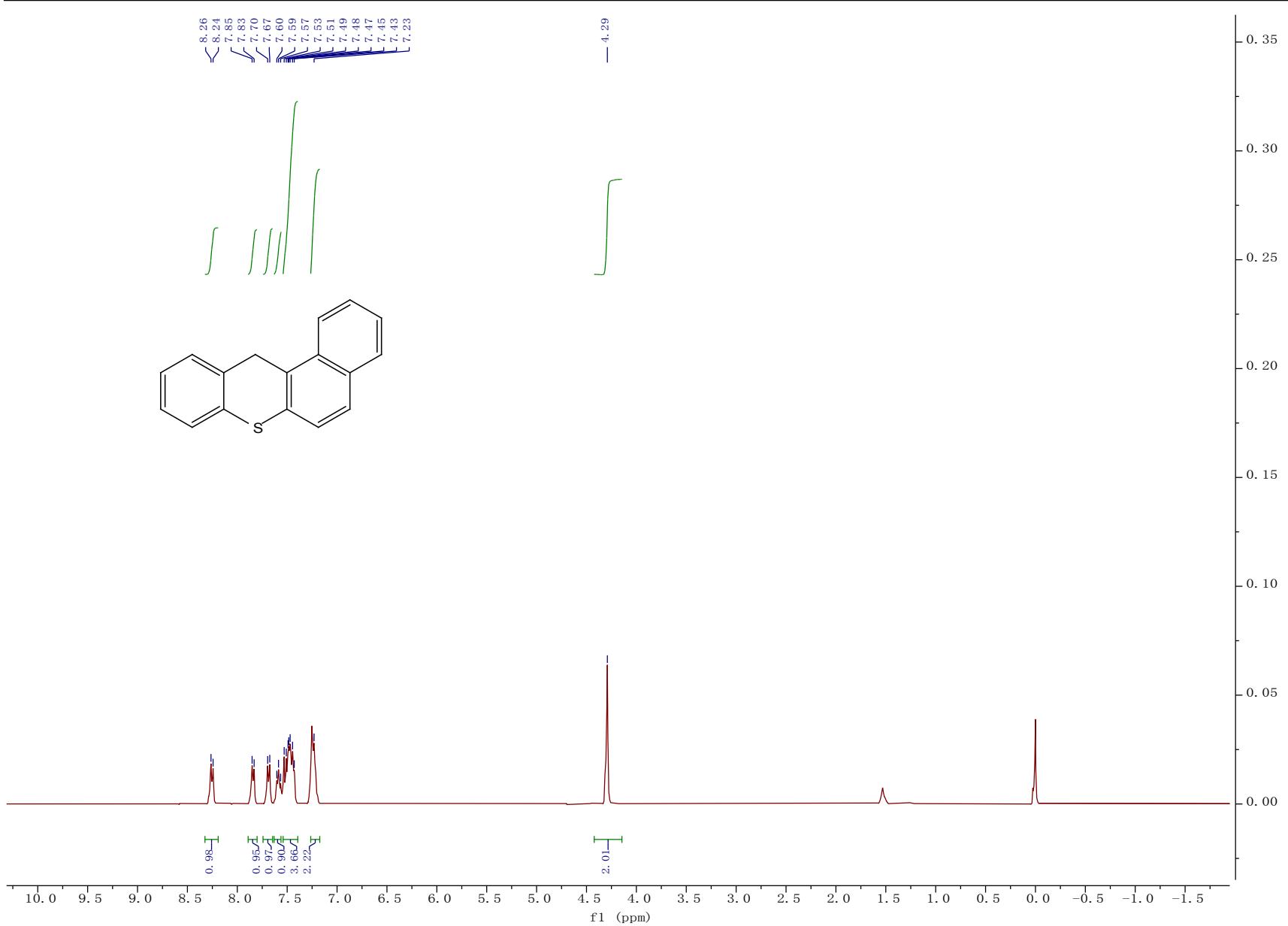
**Figure S76:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 20b



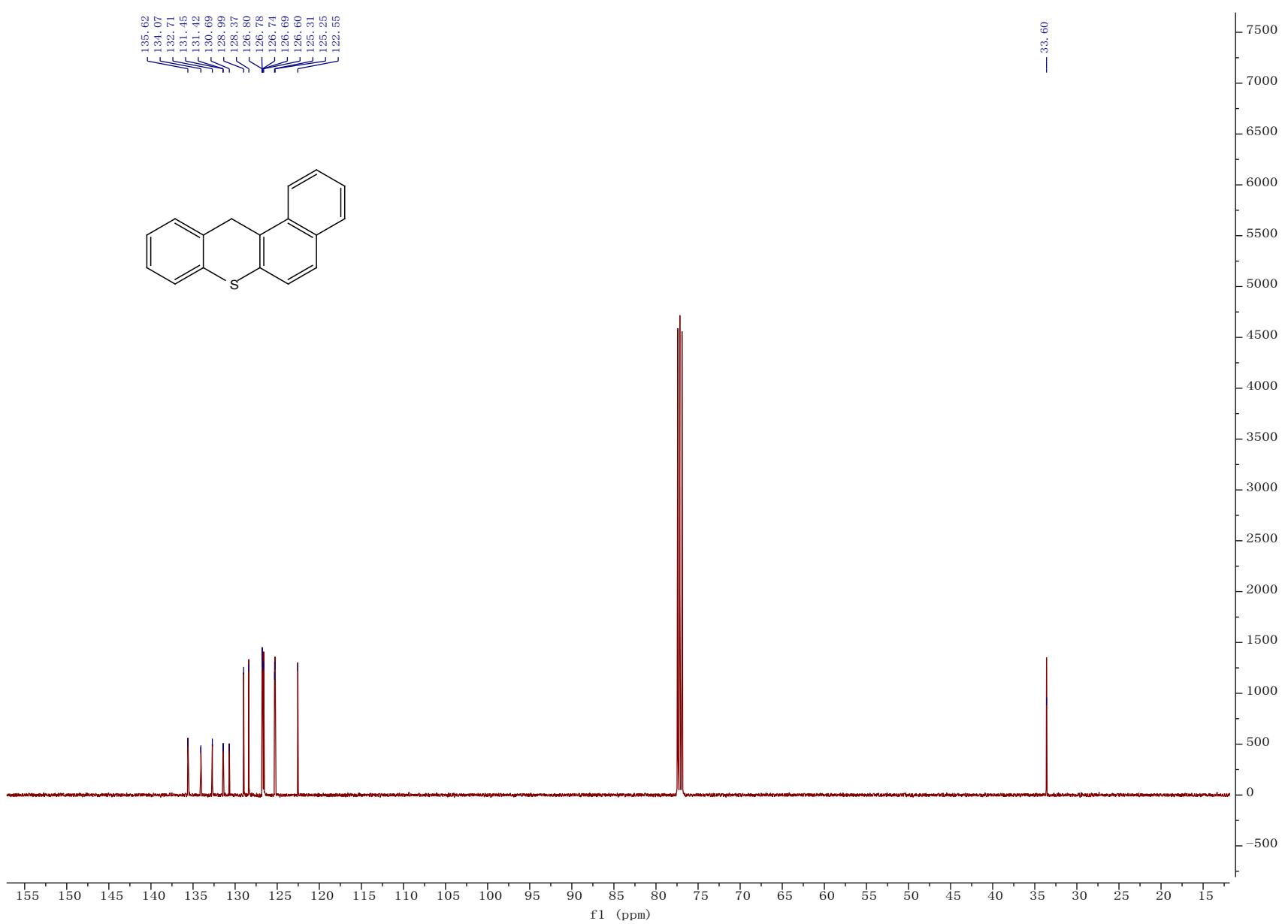
**Figure S77:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 20c



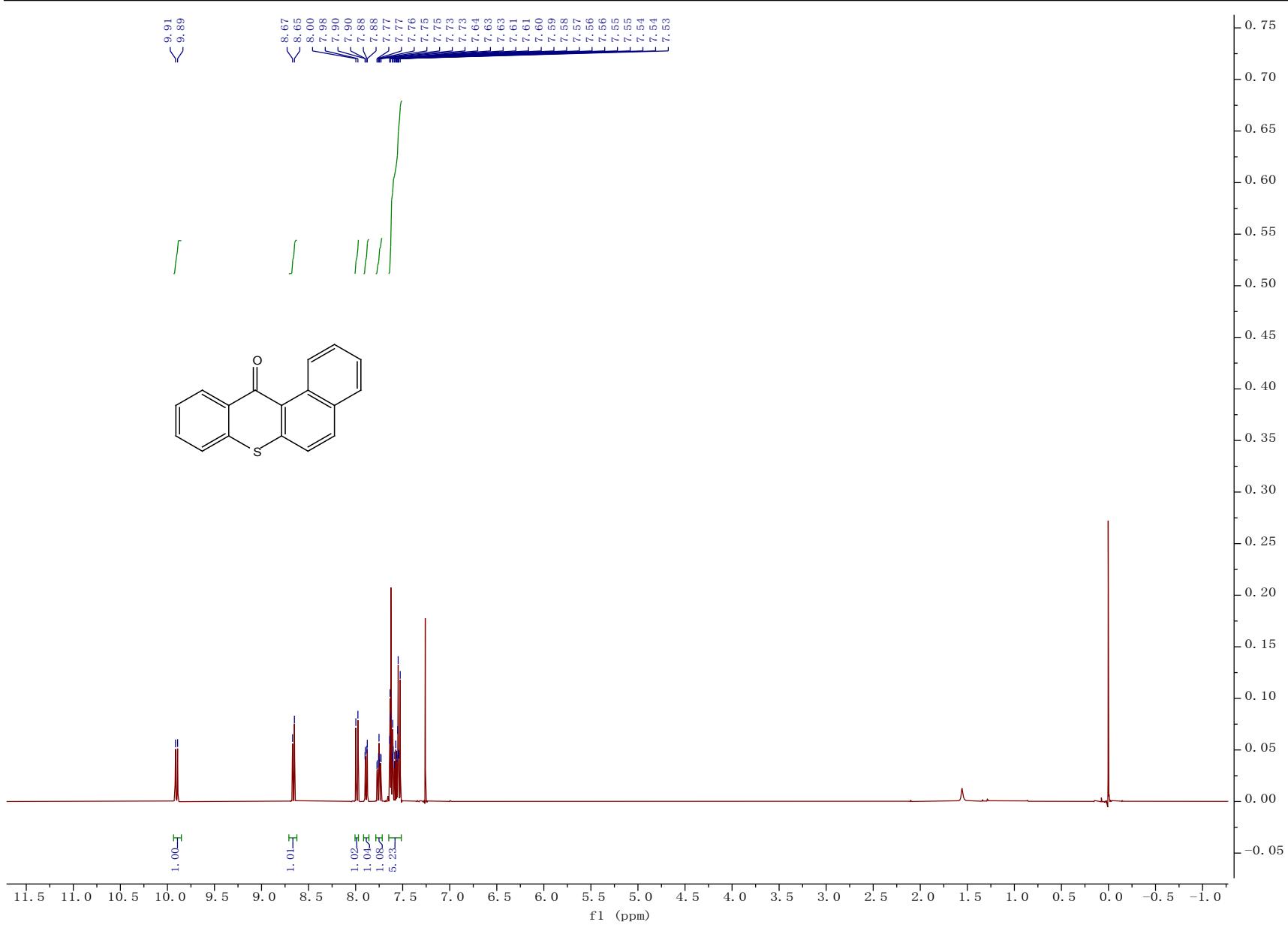
**Figure S78:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 20c



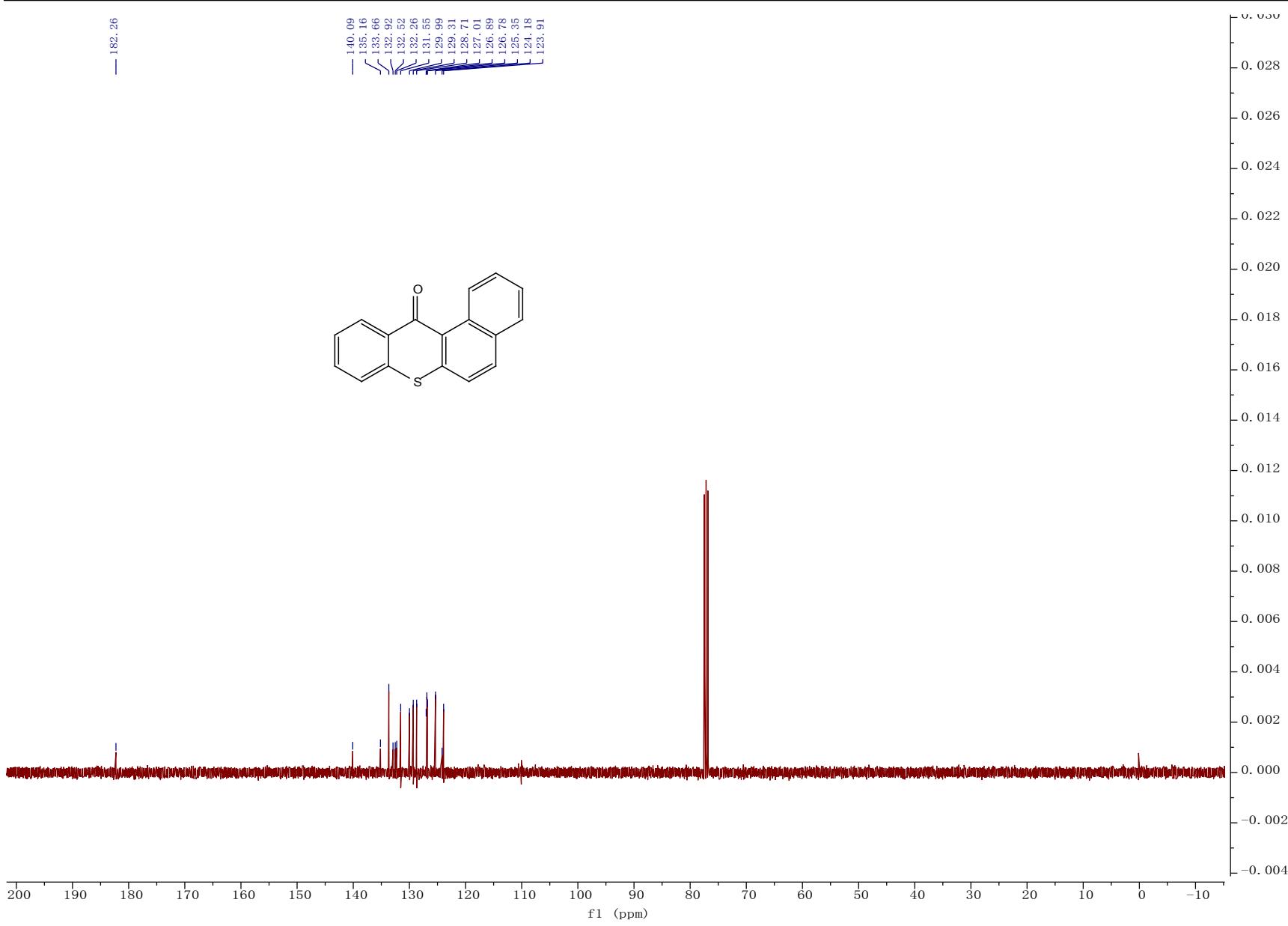
**Figure S79:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 21b



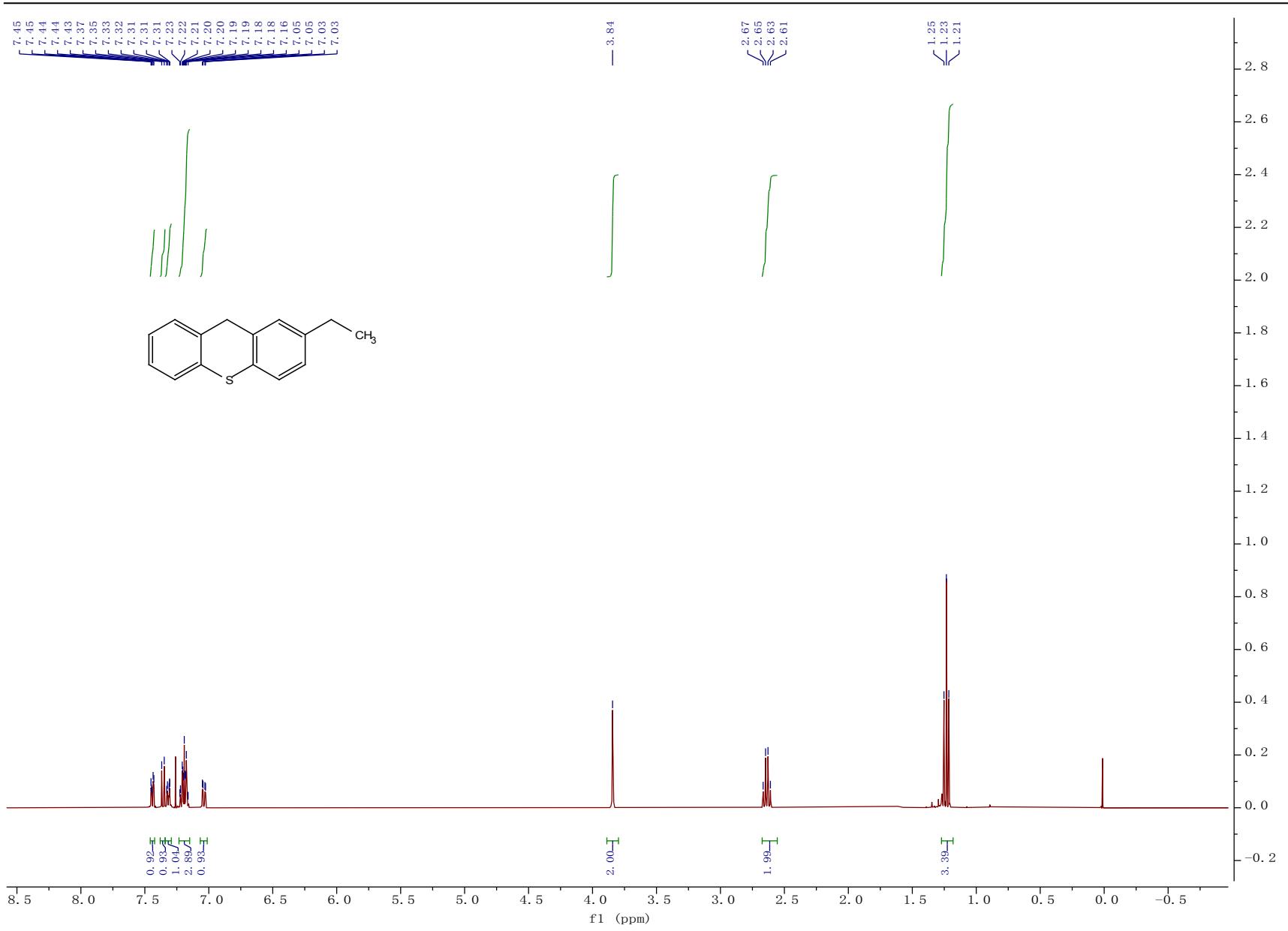
**Figure S80:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 21b



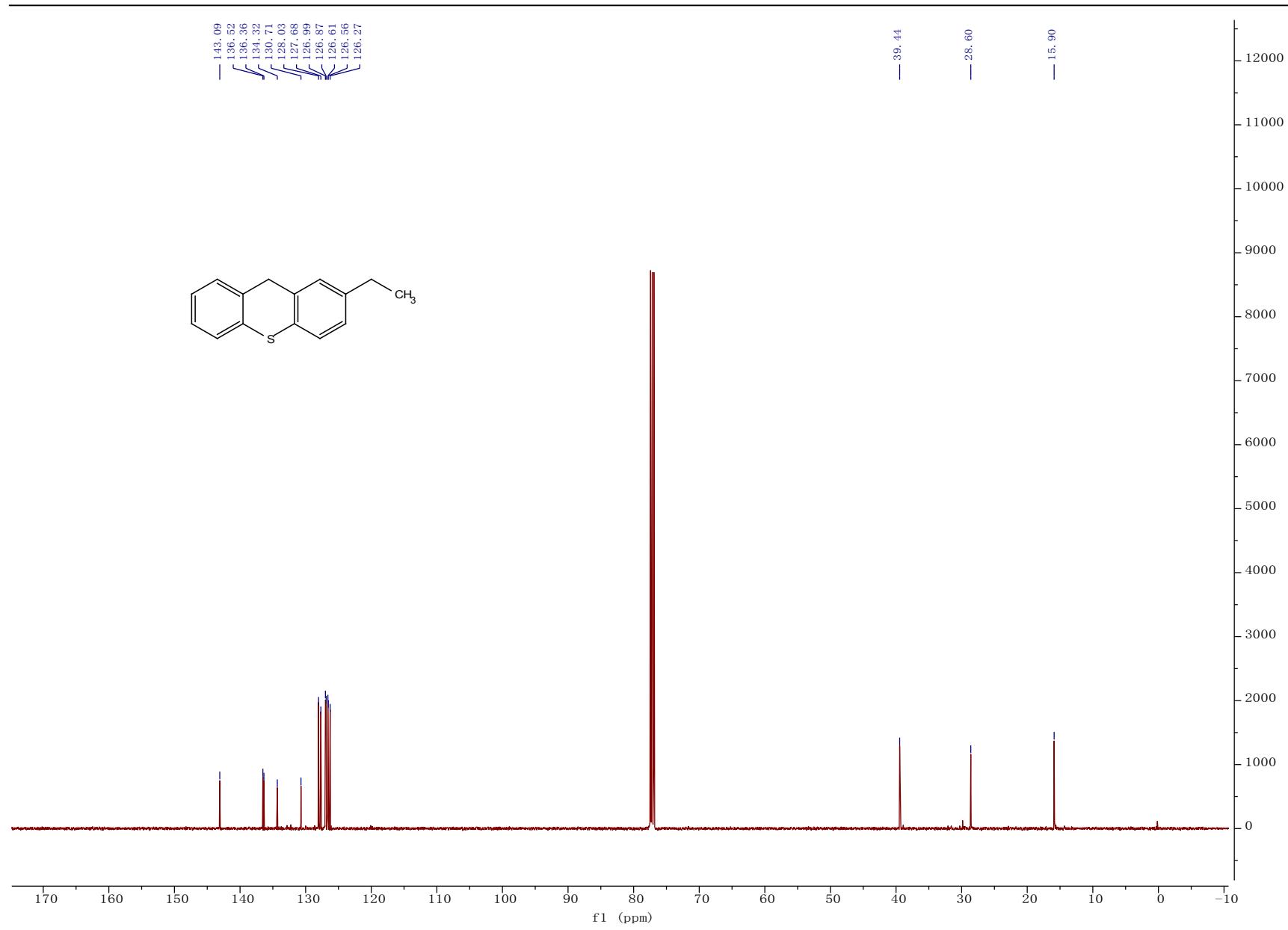
**Figure S81:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 21c



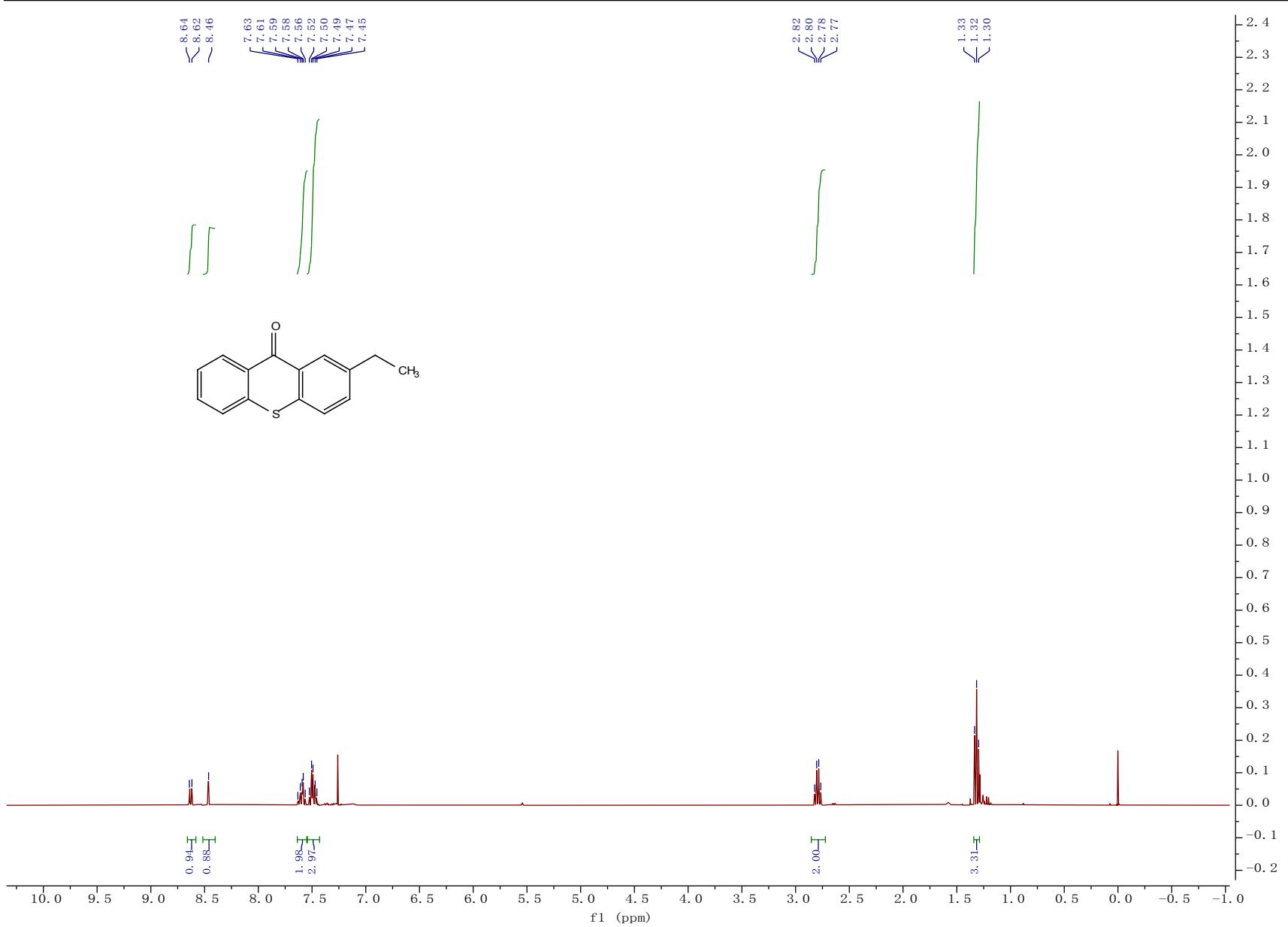
**Figure S82:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of compound 21c



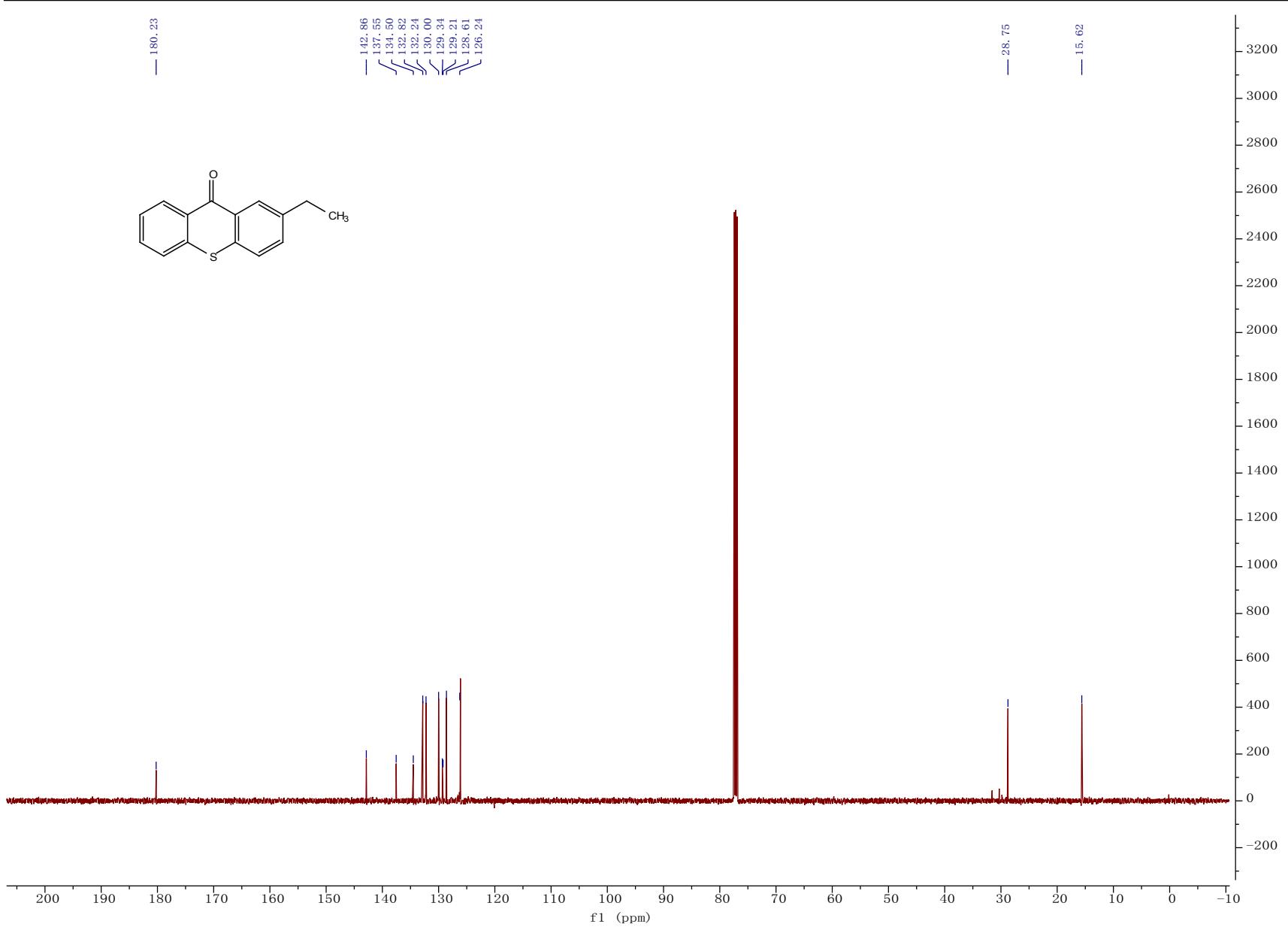
**Figure S83:  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 22b**



**Figure S84:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 22b



**Figure S85:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 22c



**Figure S86:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 22c

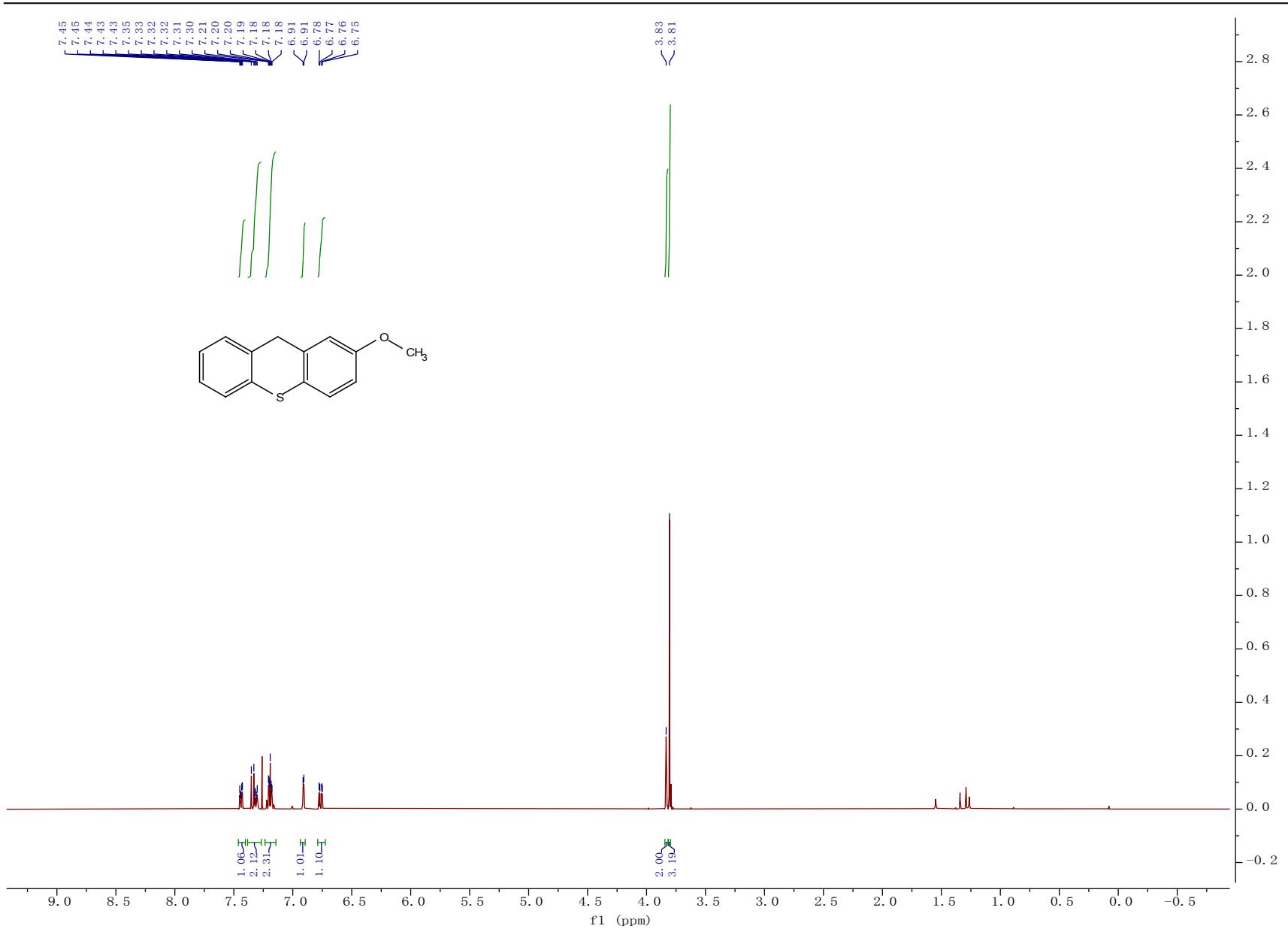
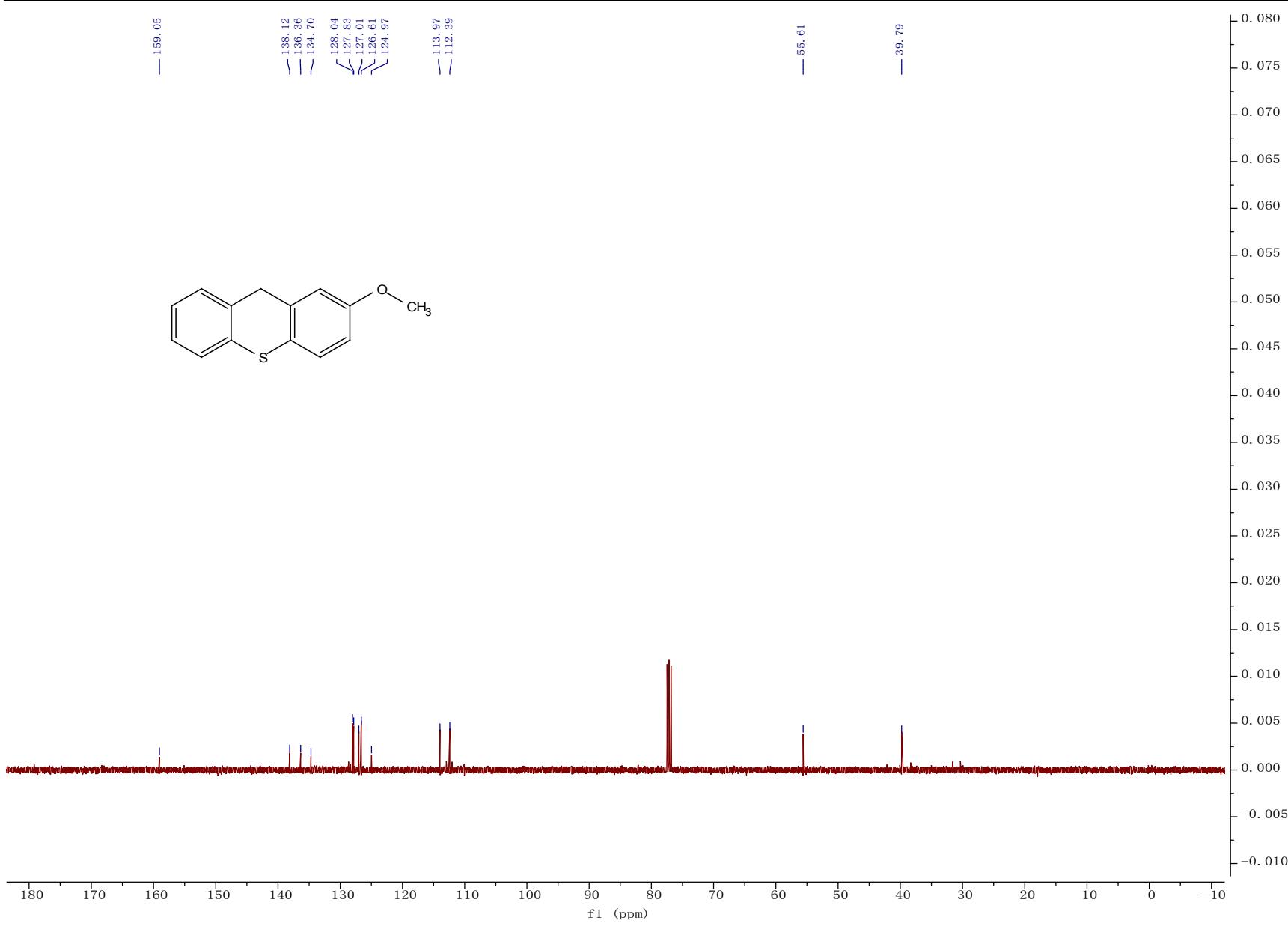
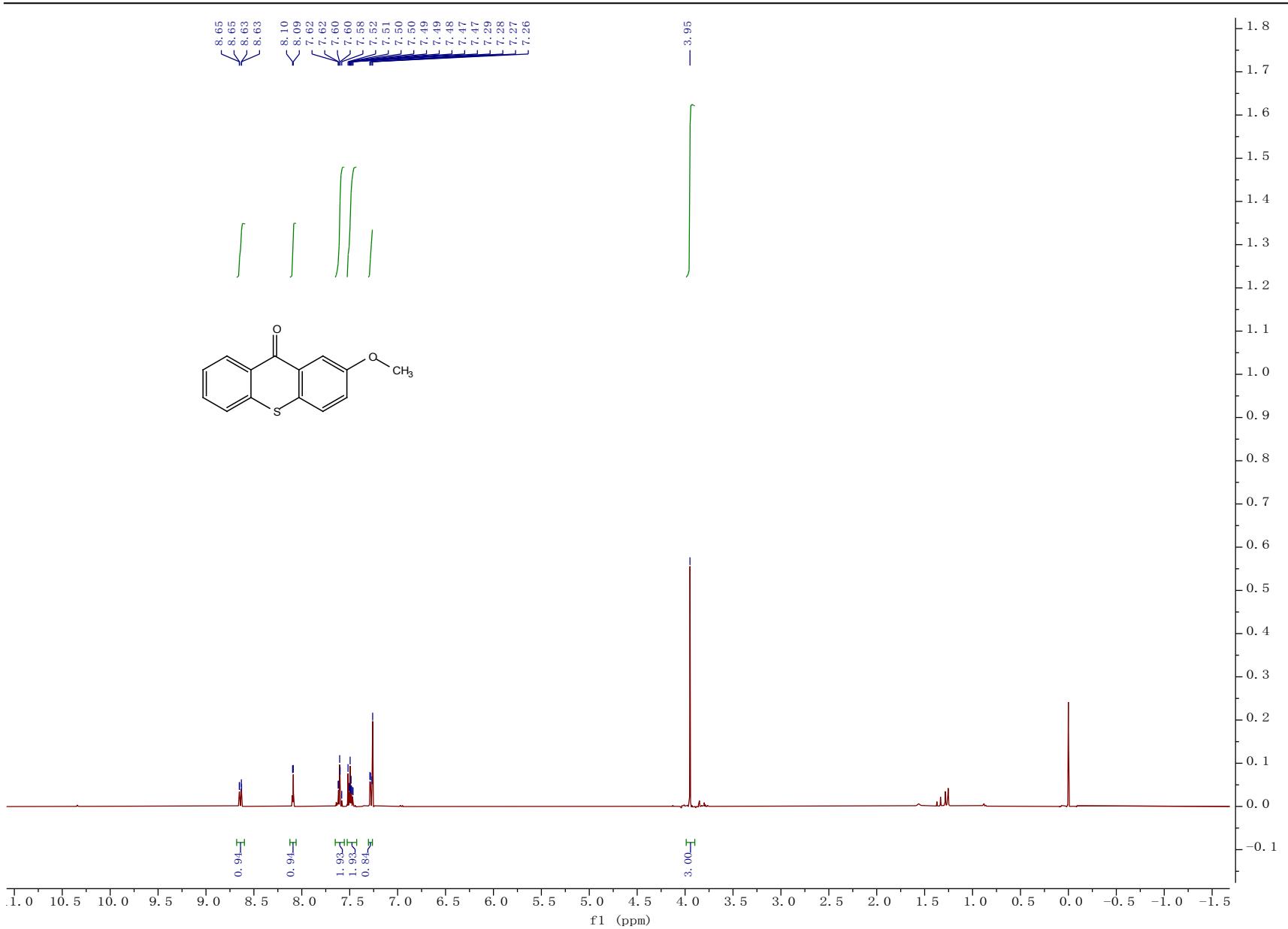


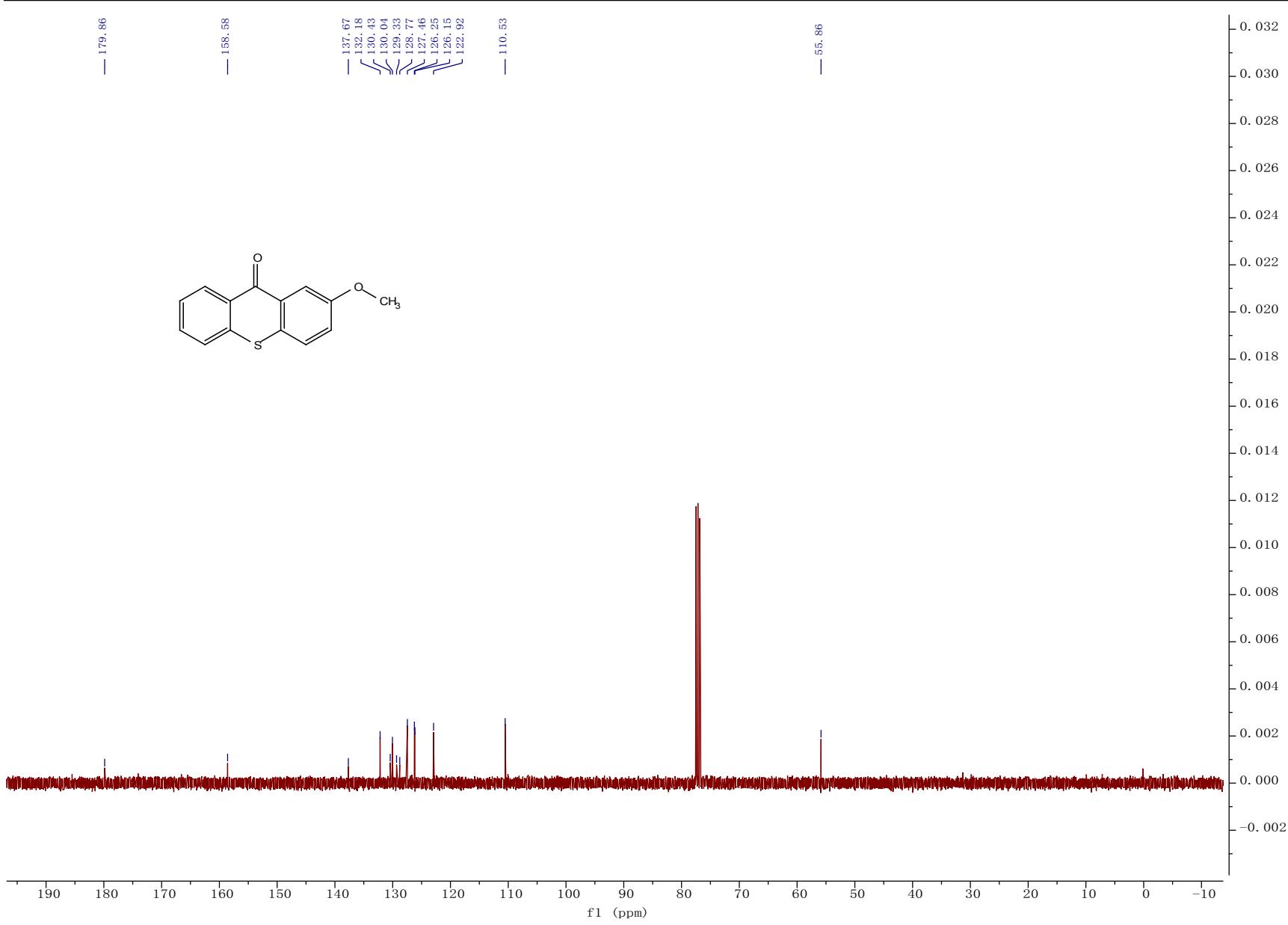
Figure S87:  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 23b



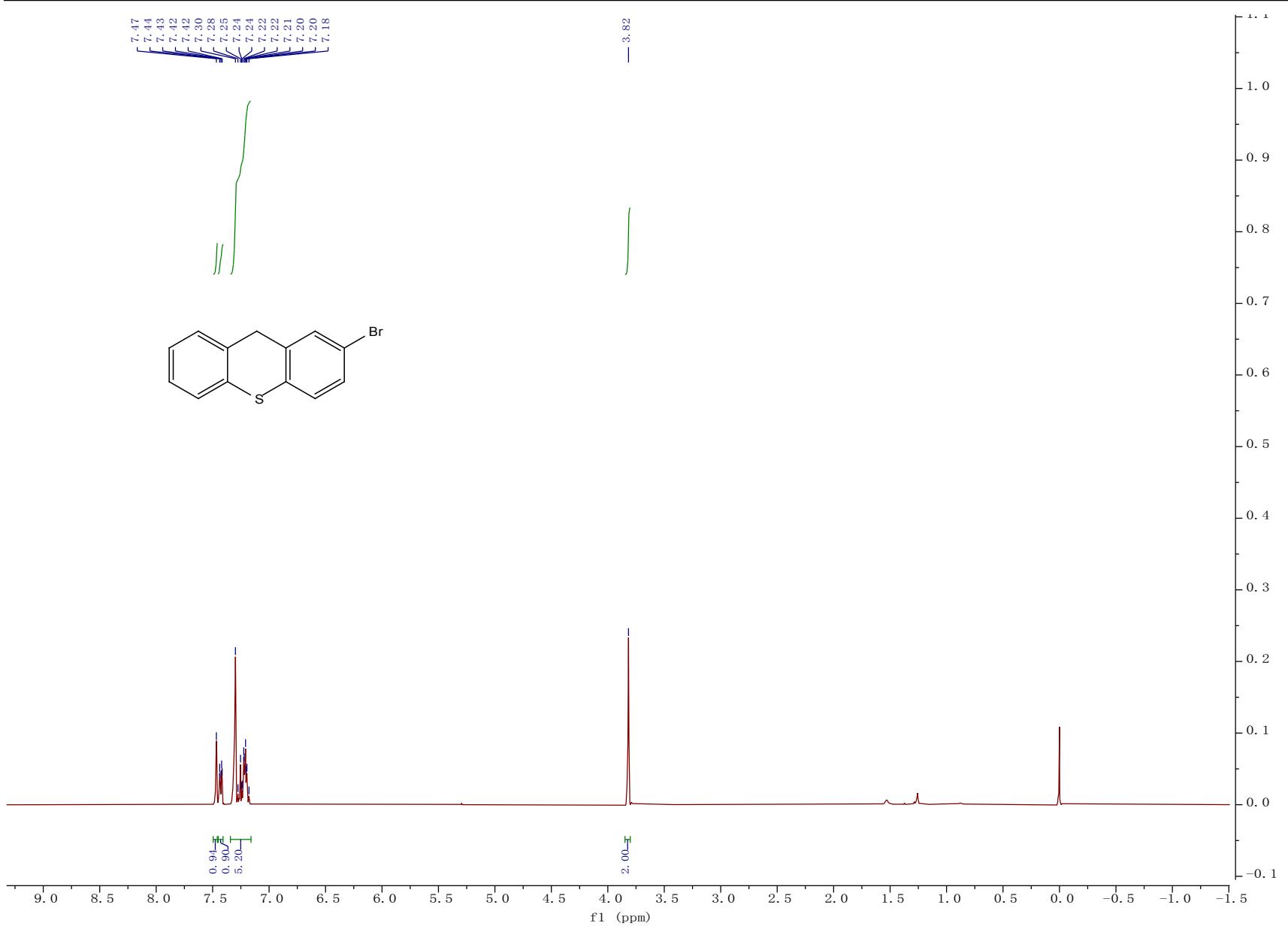
**Figure S88:**  $^{13}\text{C}$   $\{^1\text{H}\}$  NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of compound 23b



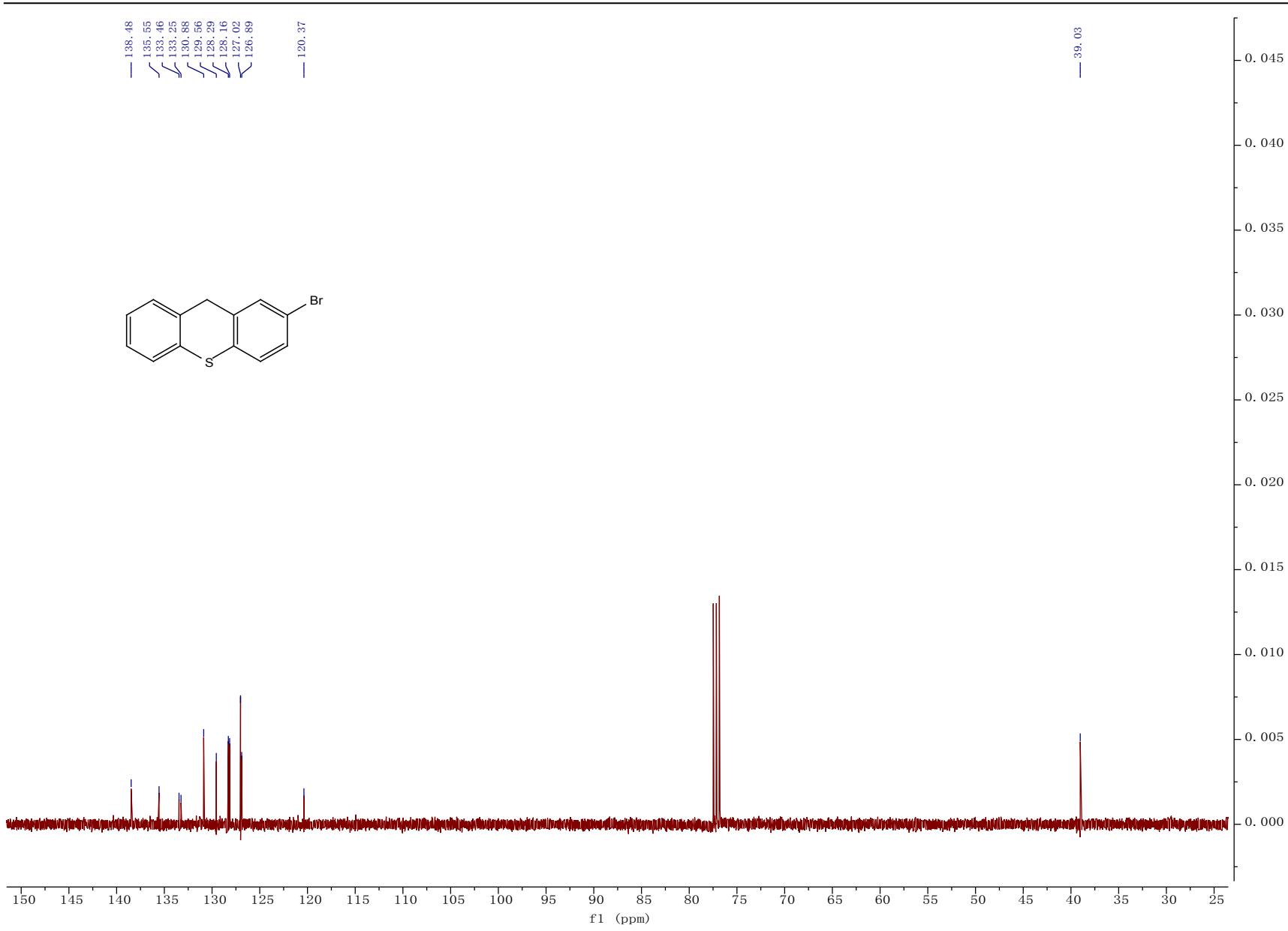
**Figure S89:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 23c



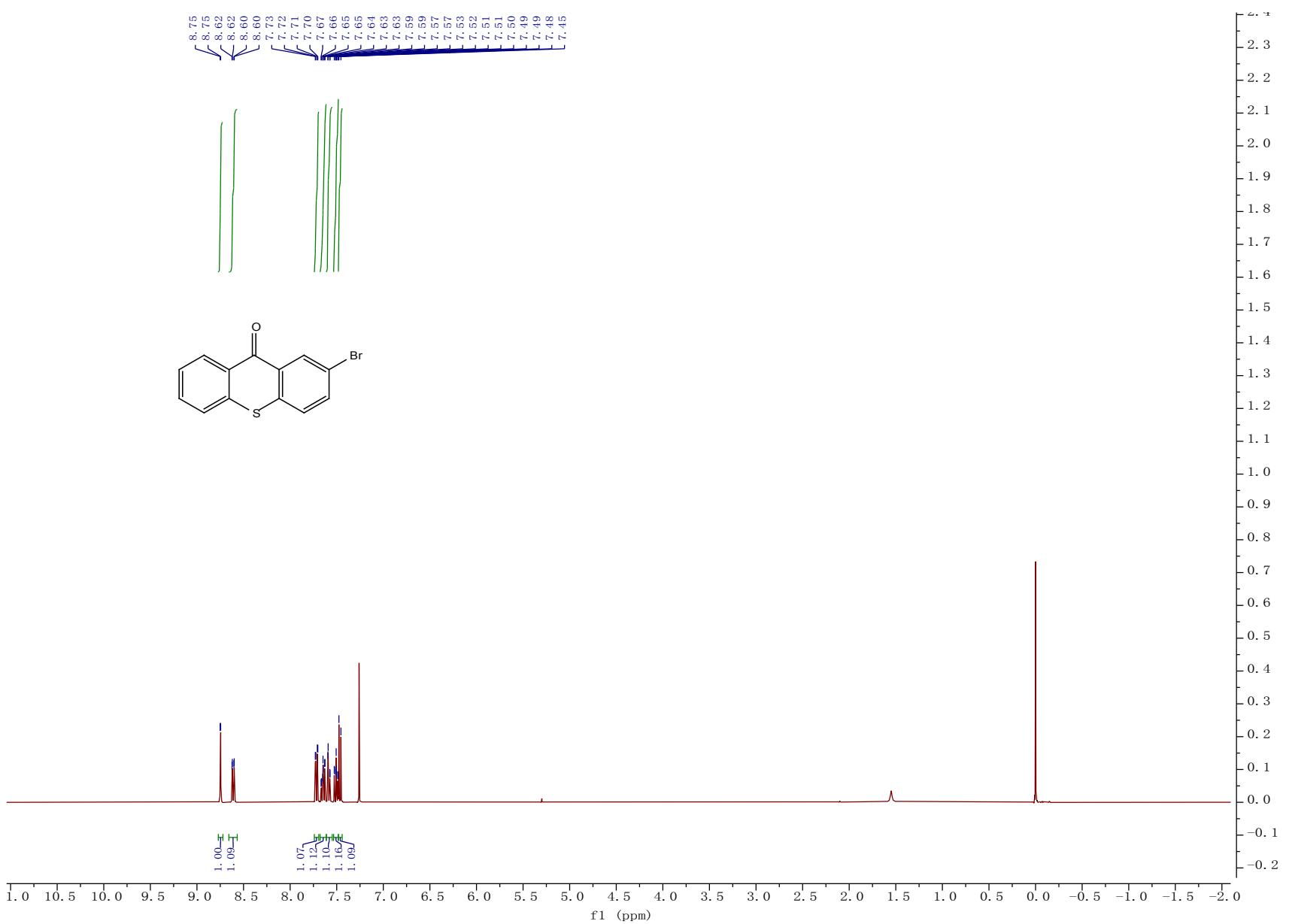
**Figure S90:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (100 MHz, CDCl<sub>3</sub>) spectrum of compound 23c



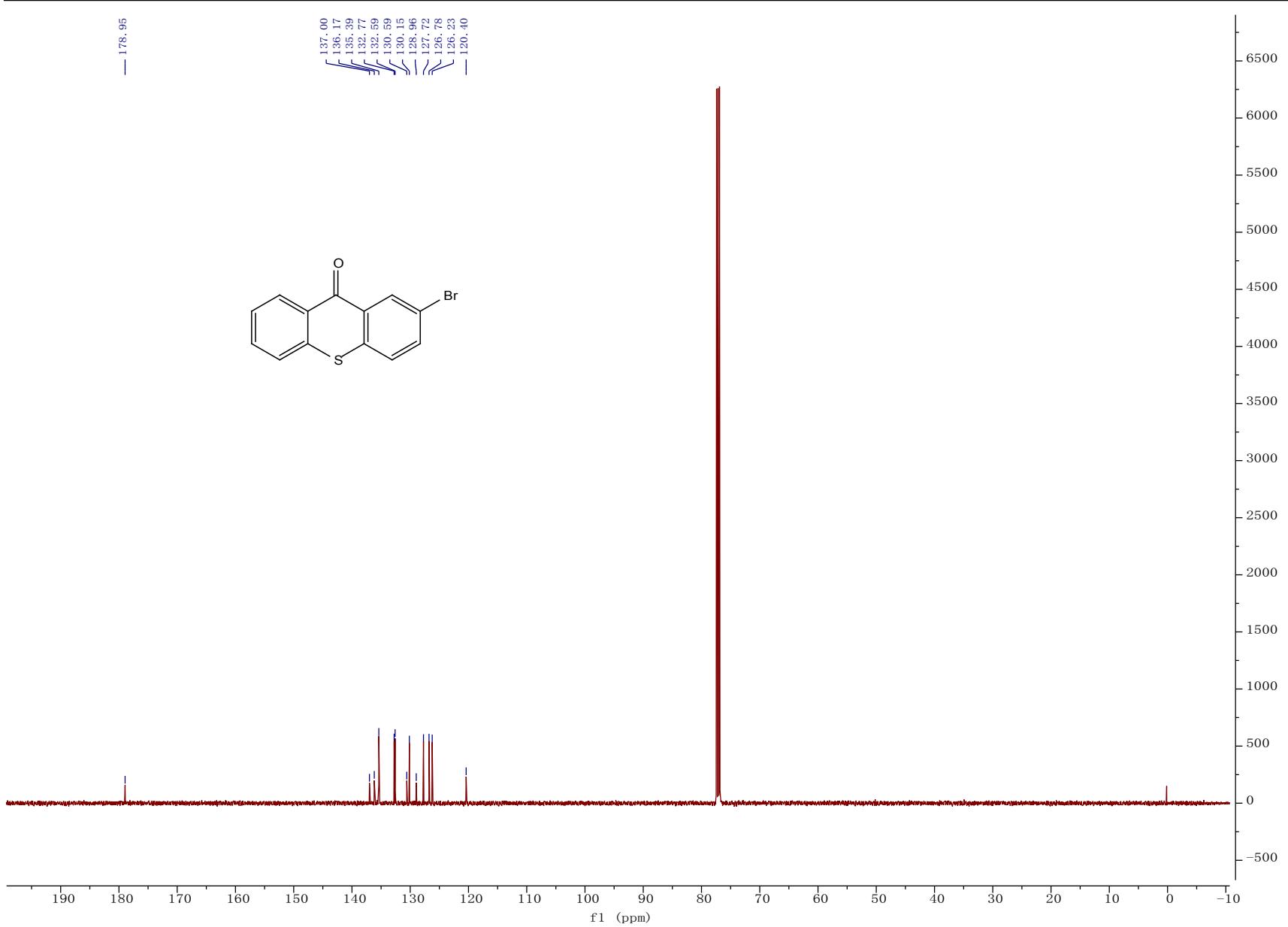
**Figure S91:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 24b



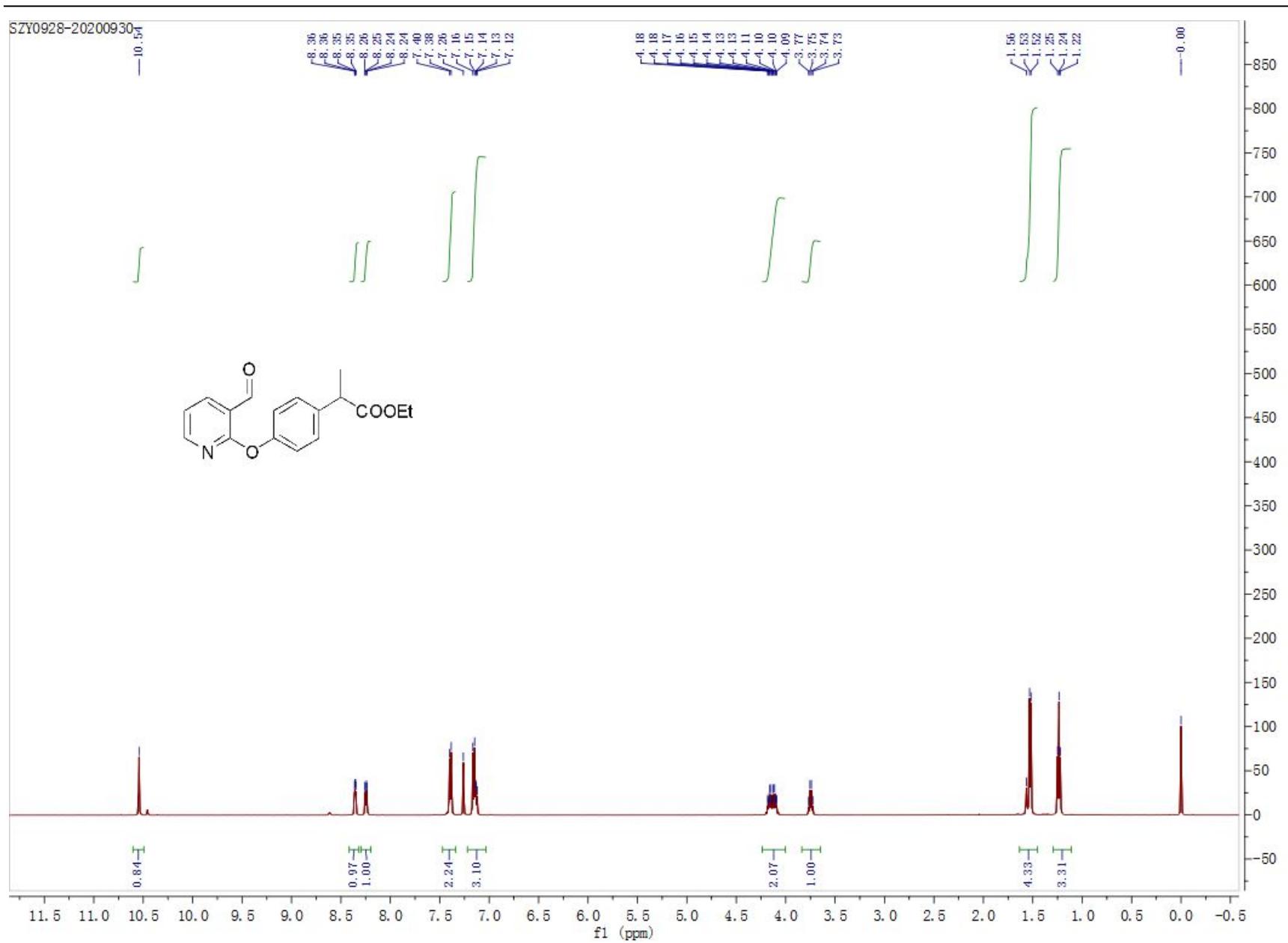
**Figure S92:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of compound 24b



**Figure S93:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 24c

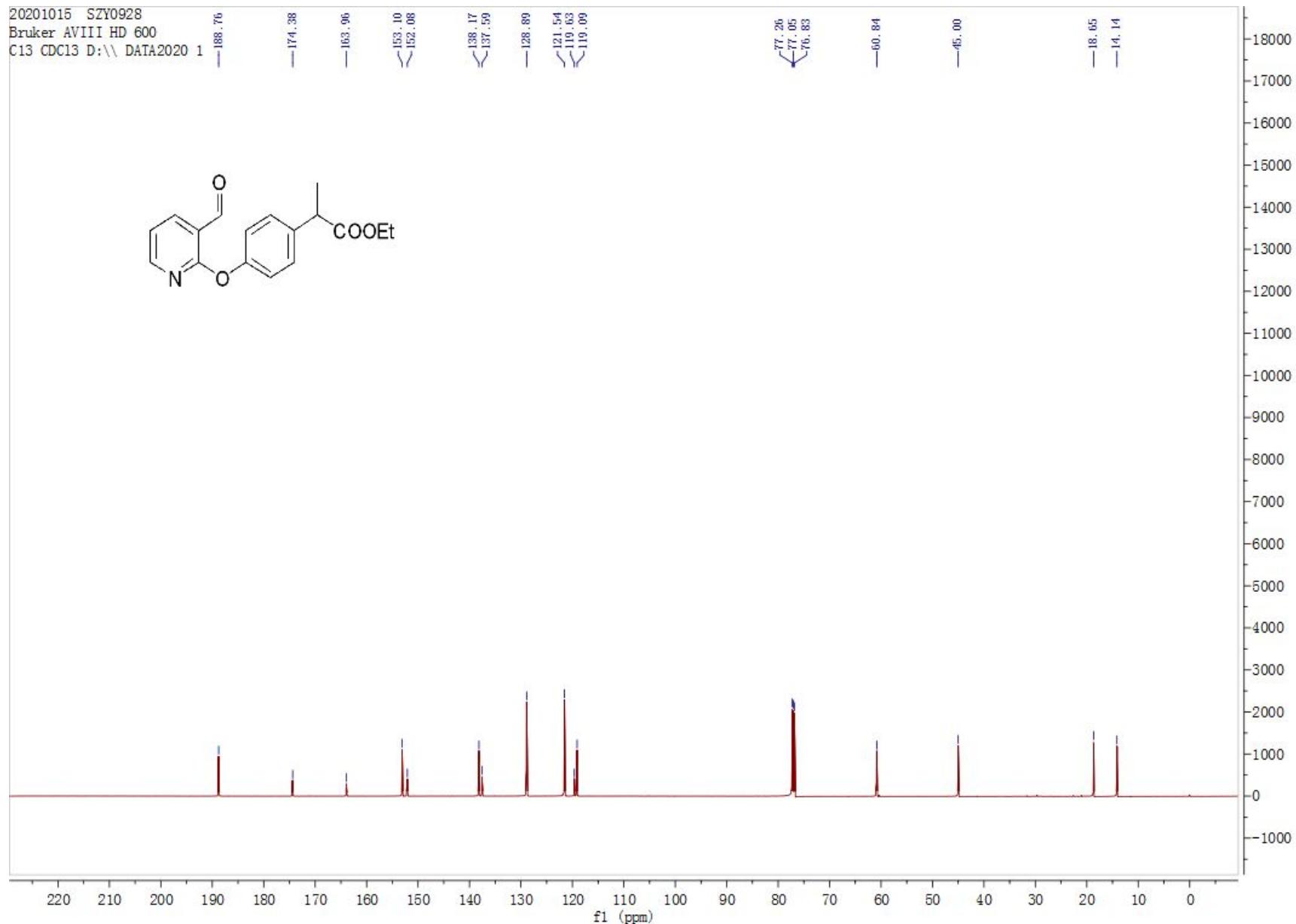
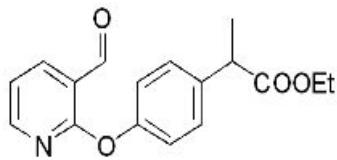


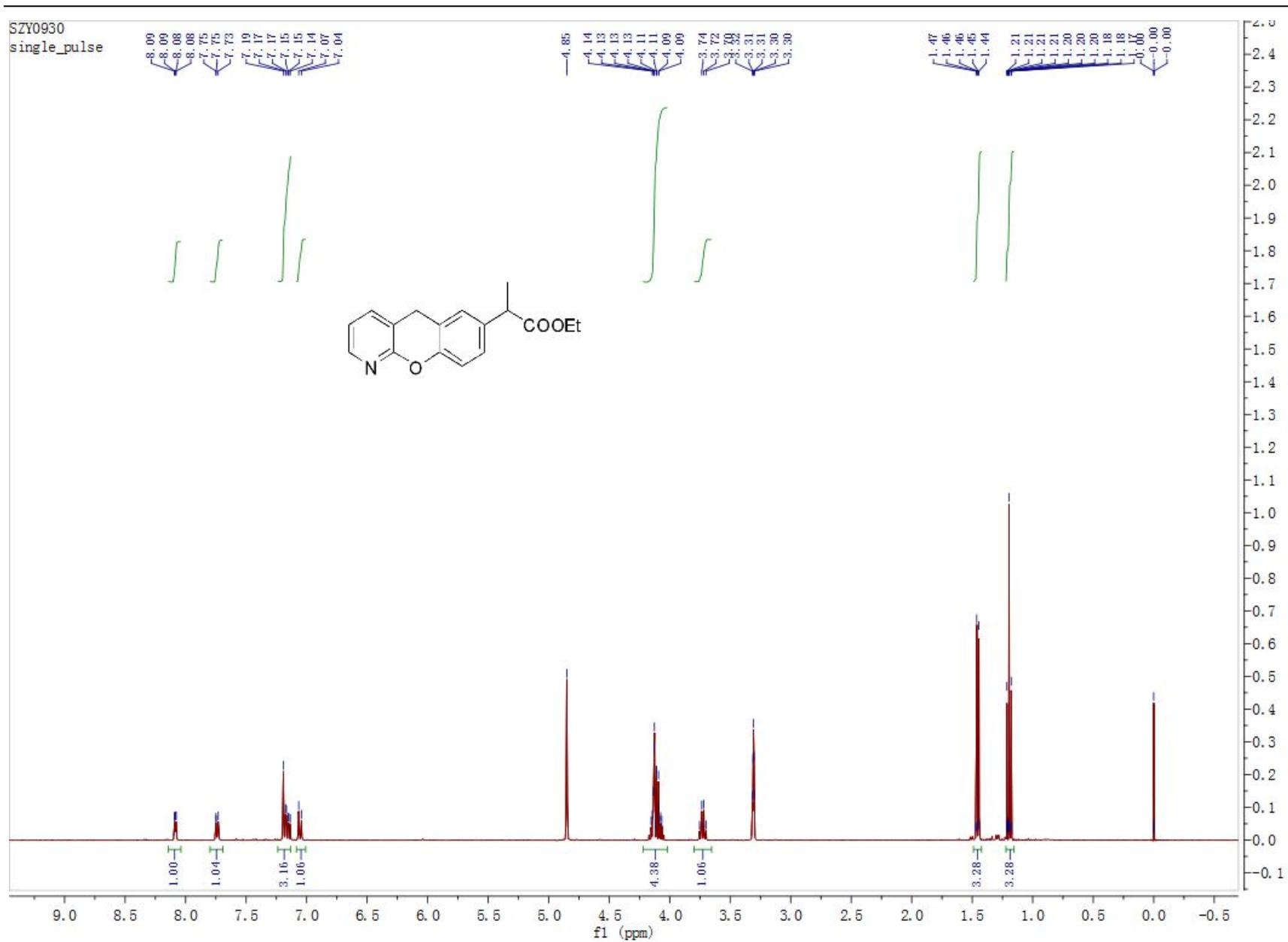
**Figure S94:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (125 MHz,  $\text{CDCl}_3$ ) spectrum of compound 24c



**Figure S95:**  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of compound 25

20201015 SZY0928  
Bruker AVIII HD 600  
C13 CDC13 D:\\\\ DATA2020 1





**Figure S97:**  $^1\text{H}$  NMR (400 MHz,  $\text{CD}_3\text{OD}$ ) spectrum of compound 26

20201015 SZY0930  
Bruker AVIII HD 600  
C13 CD3OD D:\\\\ DATA2020 2

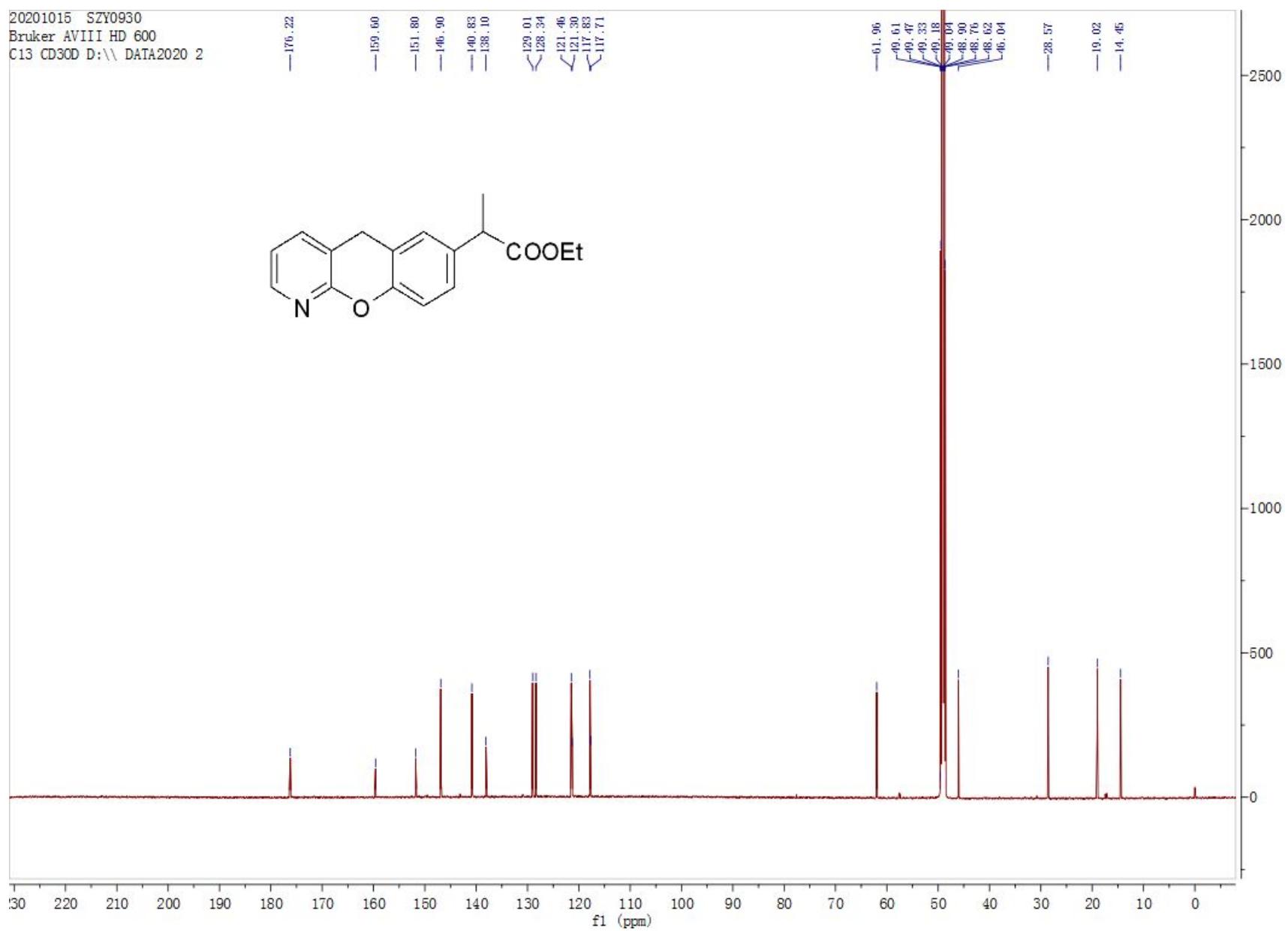


Figure S98:  $^{13}\text{C}$  { $^1\text{H}$ } NMR (150 MHz,  $\text{CD}_3\text{OD}$ ) spectrum of compound 26

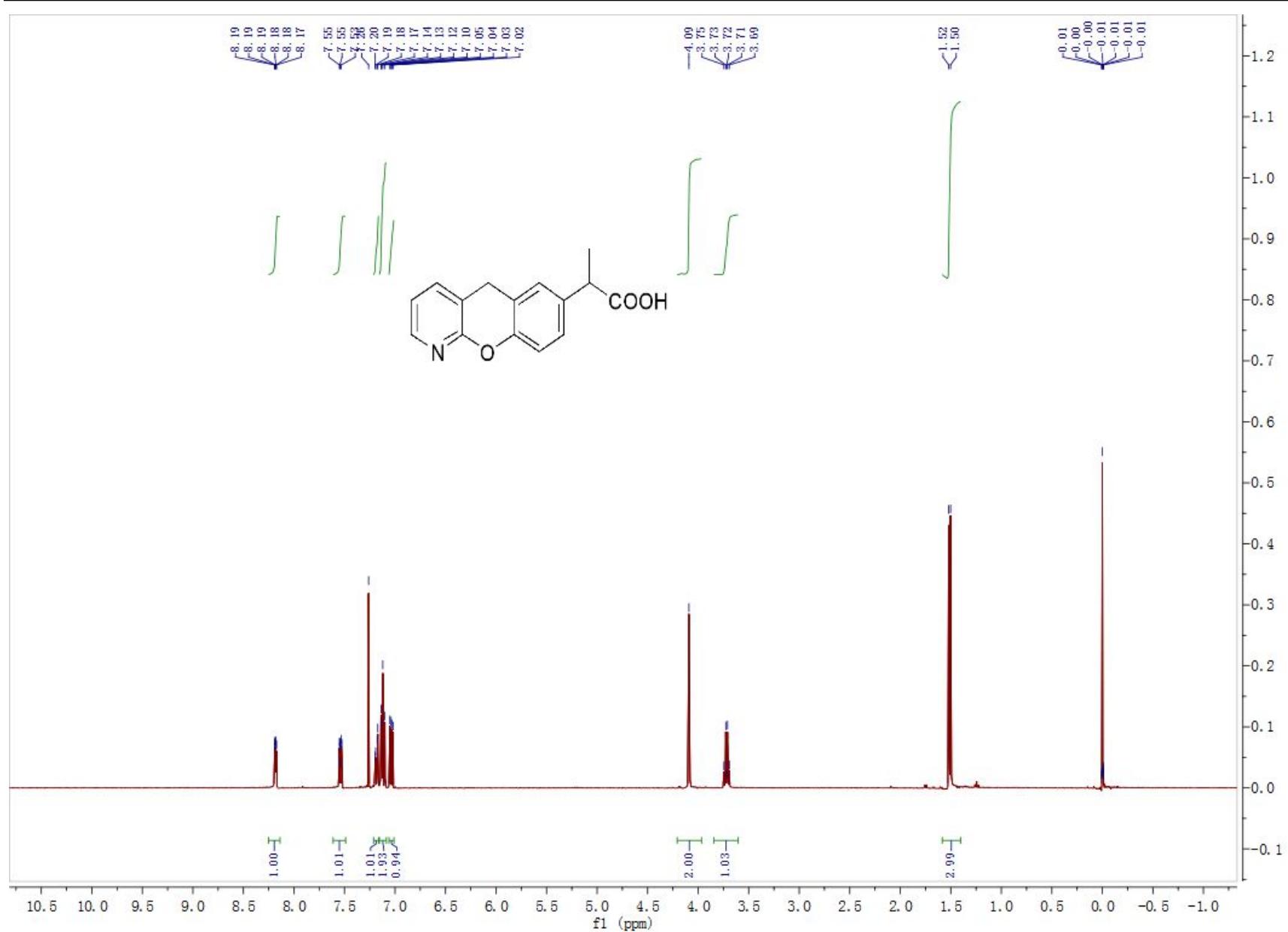
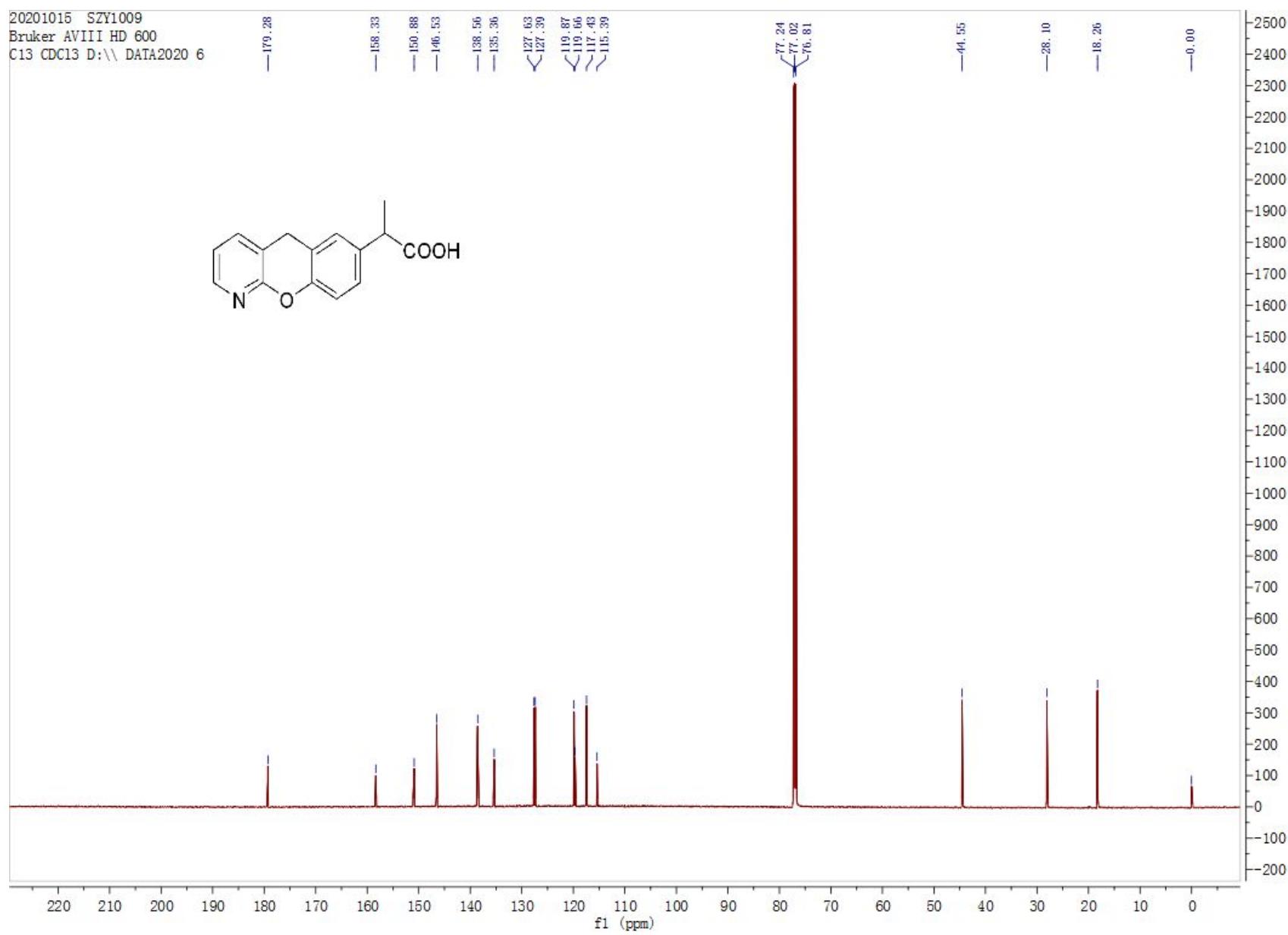


Figure S99:  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of Pranoprofen

20201015 SZY1009  
Bruker AVIII HD 600  
C13 CDC13 D:\\\\ DATA2020 6



**Figure S100:**  $^{13}\text{C}$  { $^1\text{H}$ } NMR (150 MHz,  $\text{CDCl}_3$ ) spectrum of Pranoprofen