

# **Supporting Information**

**for**

## **Palladium-Catalyzed Annulation of 2,2'-Diodobiphenyls with Alkynes: Synthesis and Applications of Phenanthrenes**

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Department of Chemistry, National Cheng Kung University, No.1 Ta-Hsueh Road, 70101 Tainan,  
Taiwan.

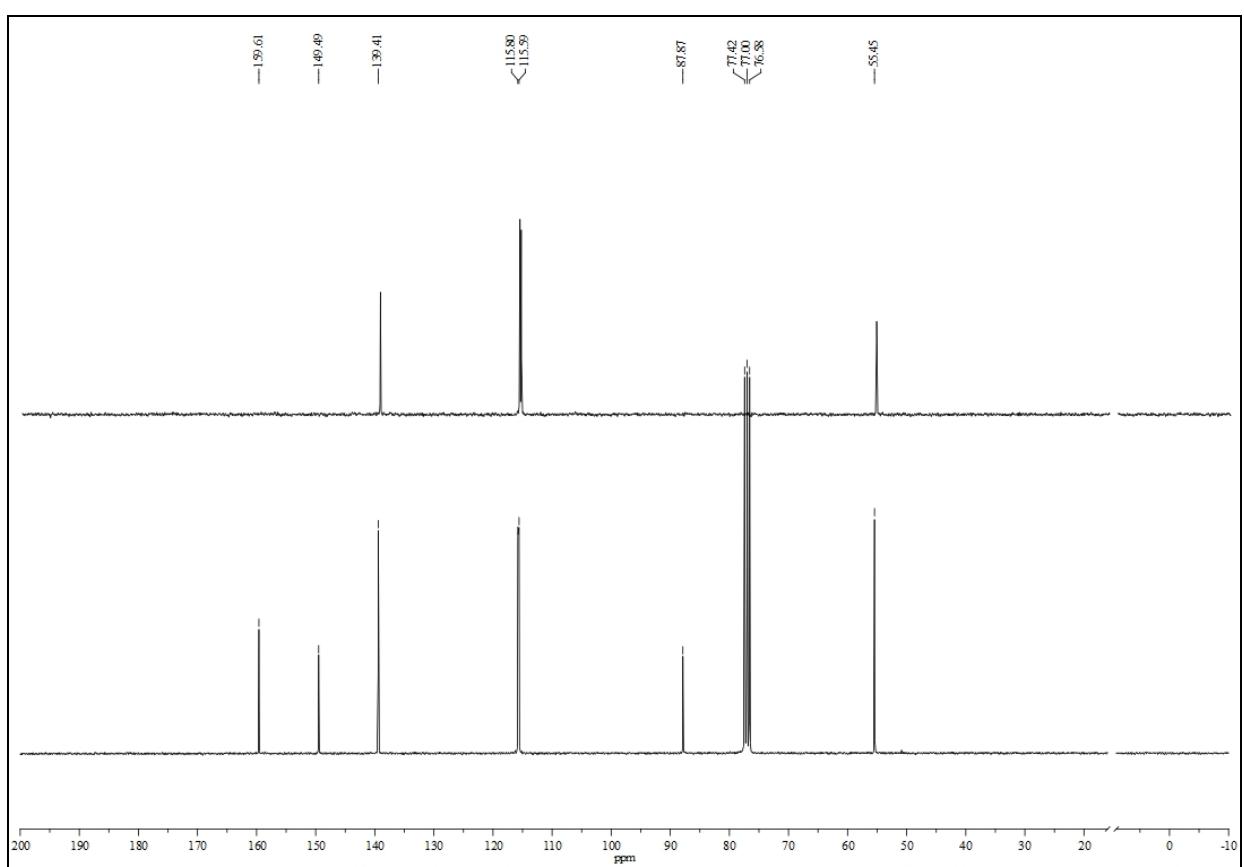
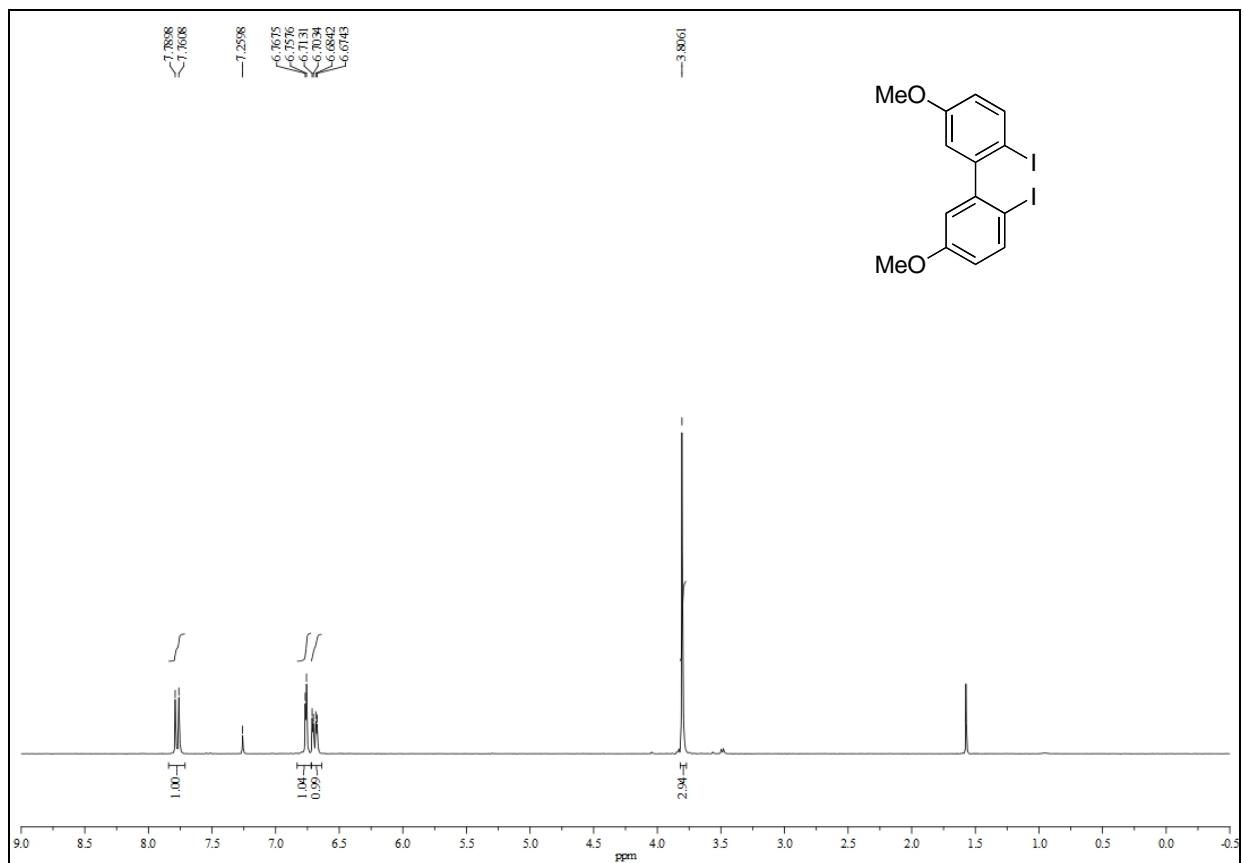
E-mail: [ytwuchem@mail.ncku.edu.tw](mailto:ytwuchem@mail.ncku.edu.tw)

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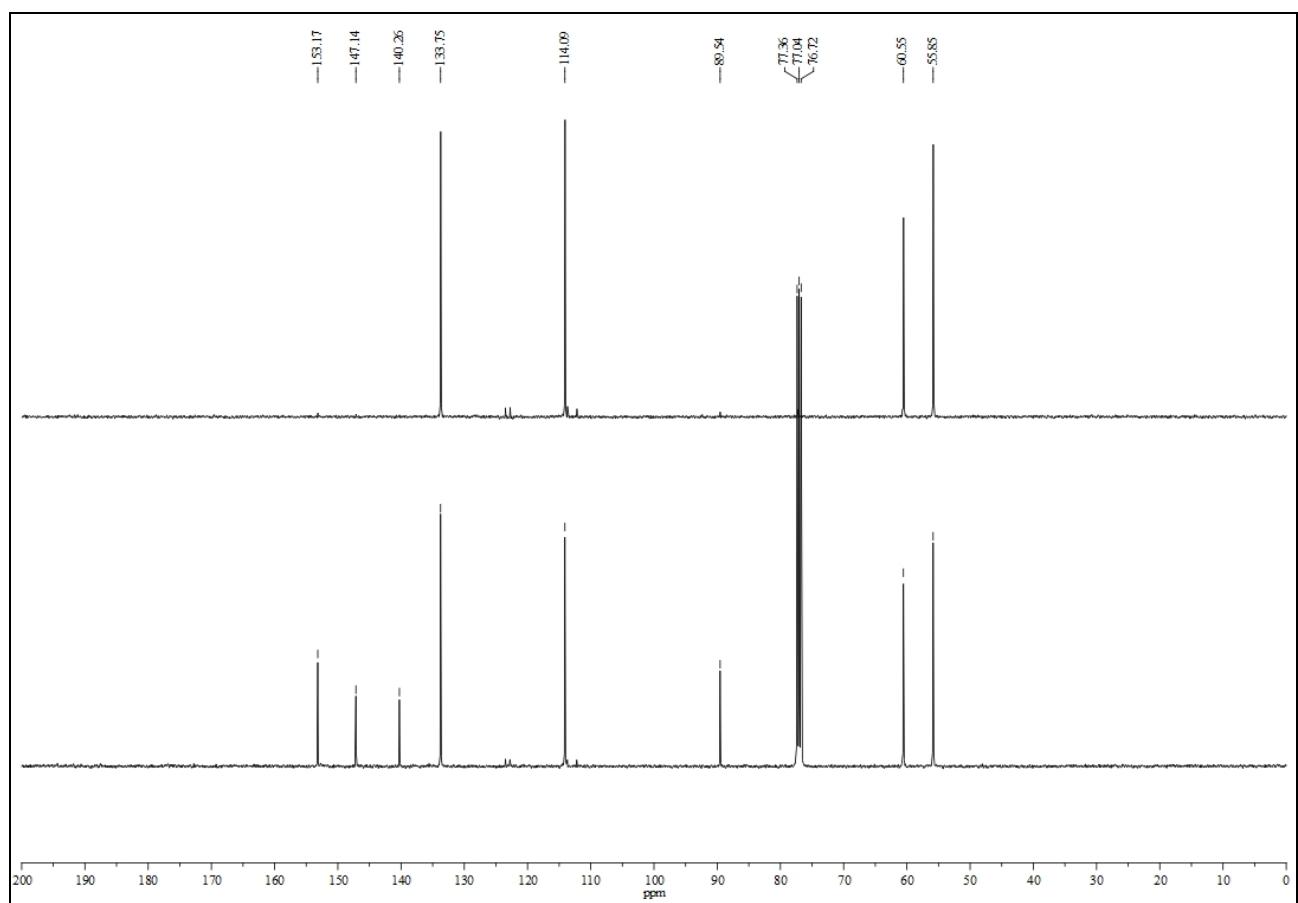
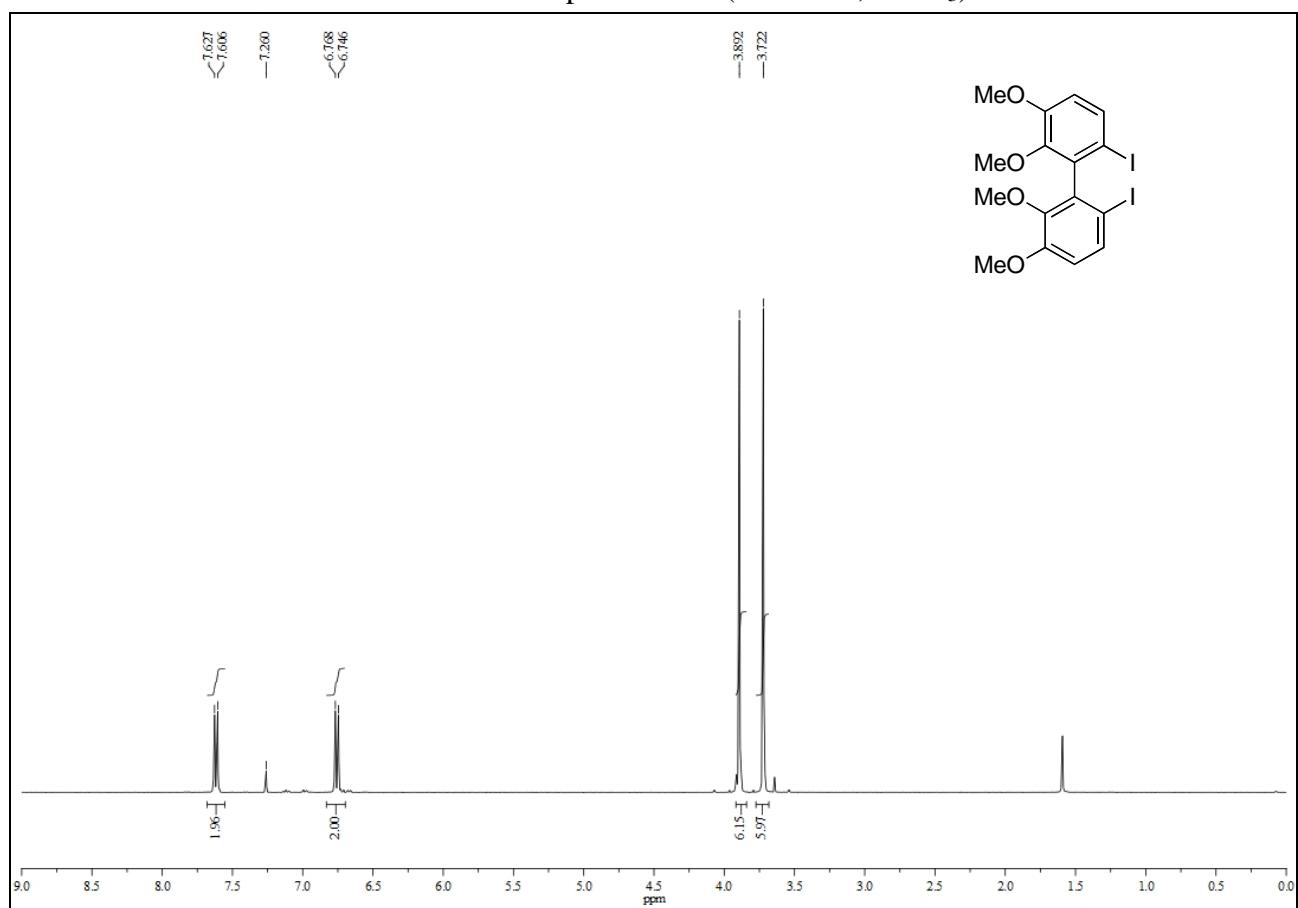
<b>A.</b>	NMR spectra	SI-2
<b>B.</b>	2D NMR spectra of alkaloid <b>10</b>	SI-30

## A. NMR Spectra

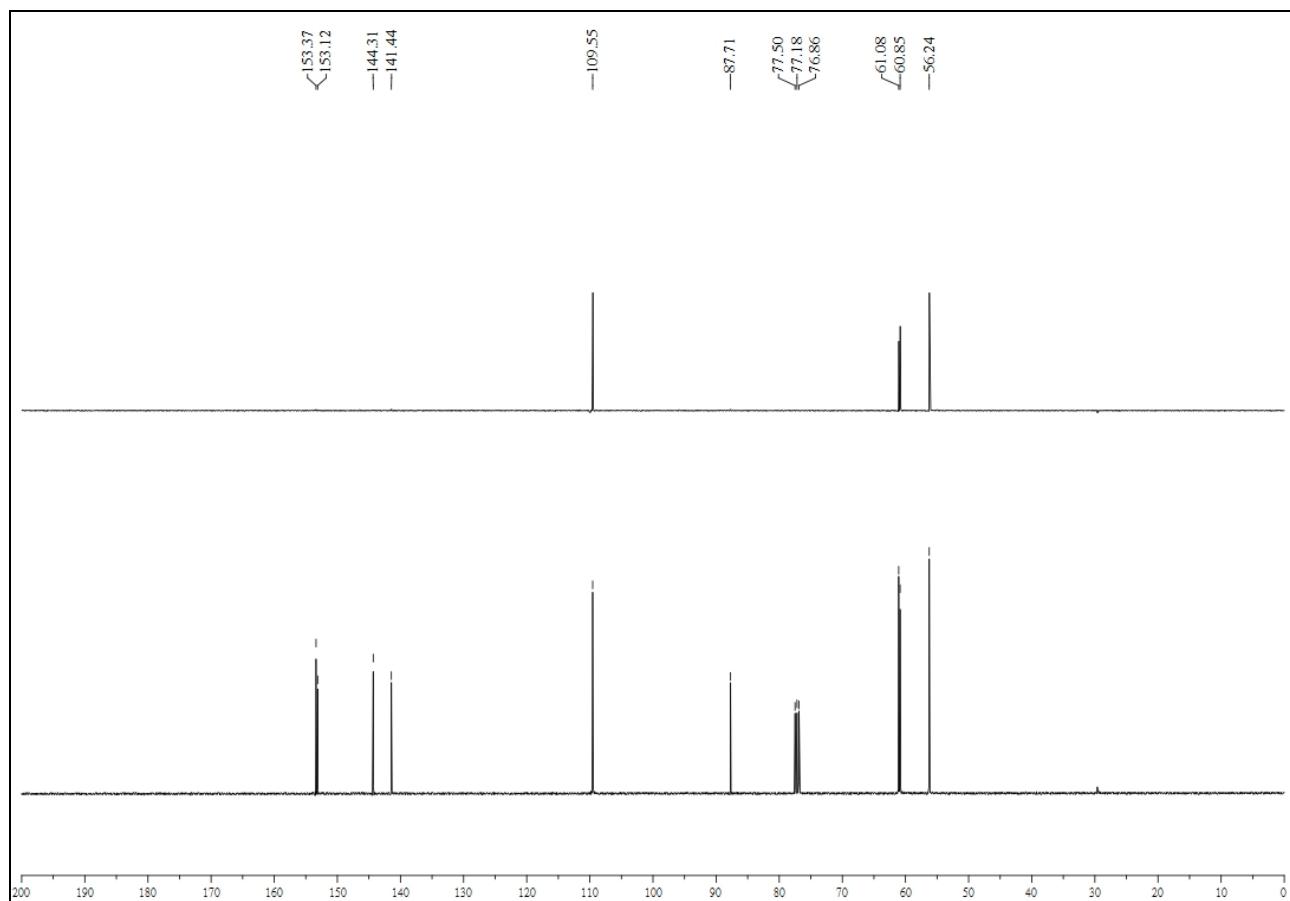
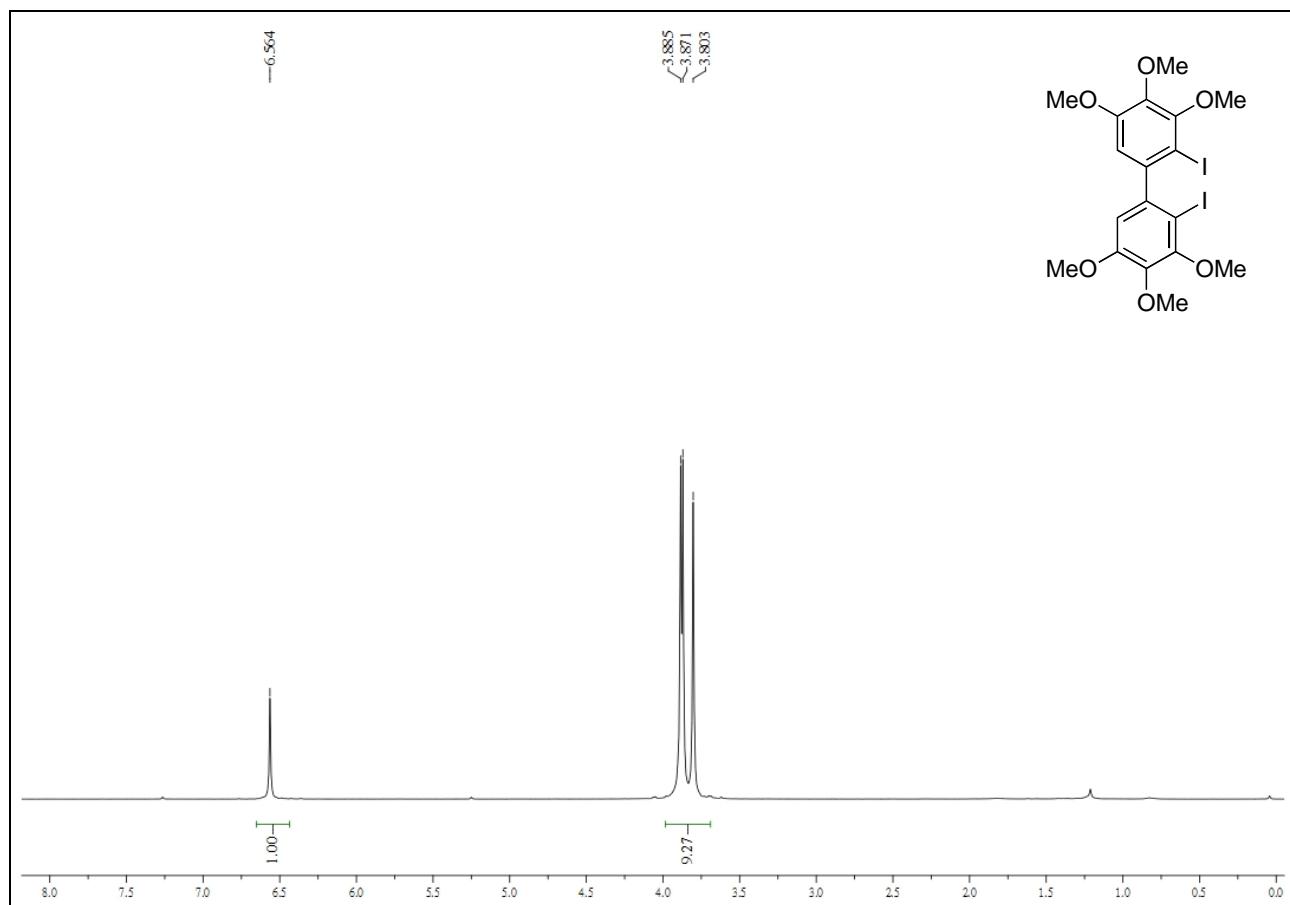
$^1\text{H}$  and  $^{13}\text{C}$  NMR spectra of **6c** (300 MHz,  $\text{CDCl}_3$ ):



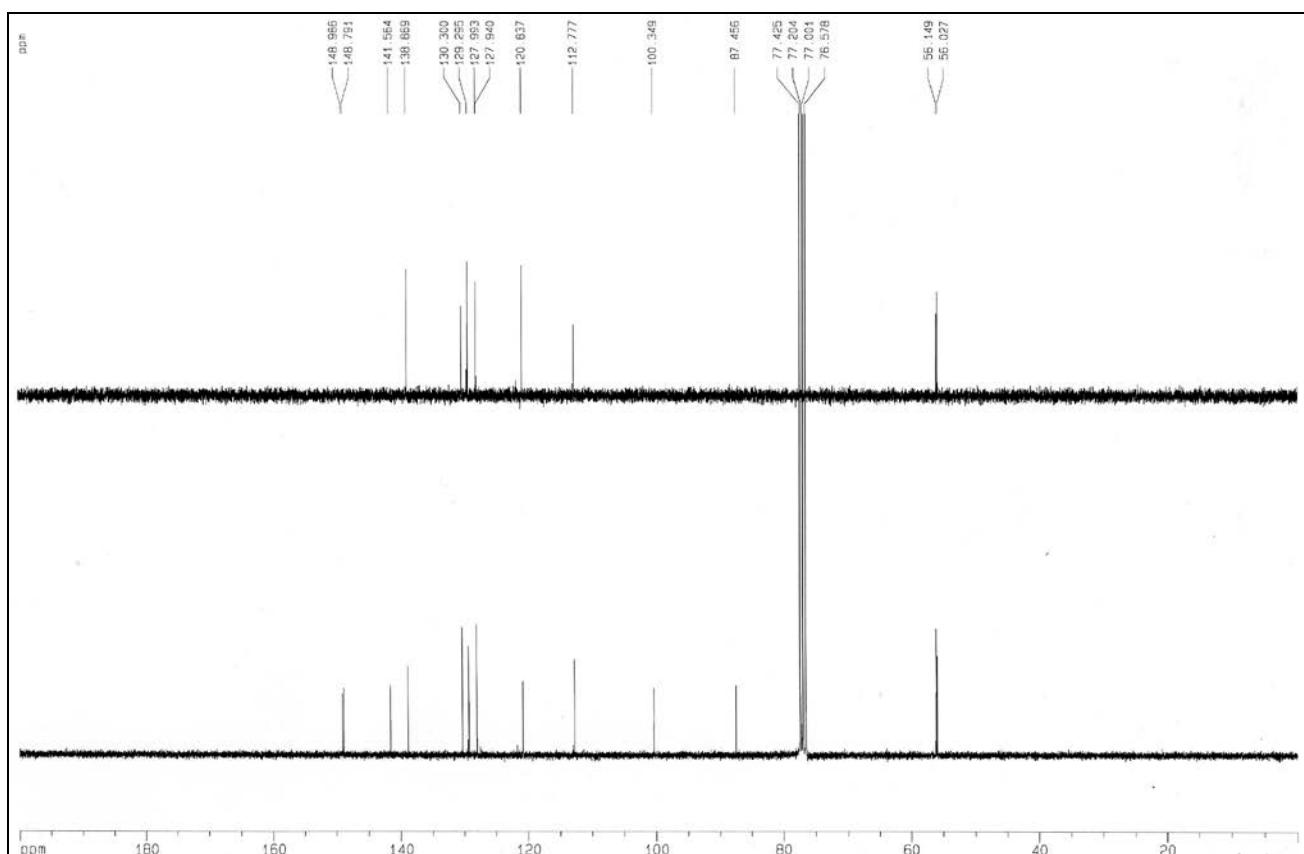
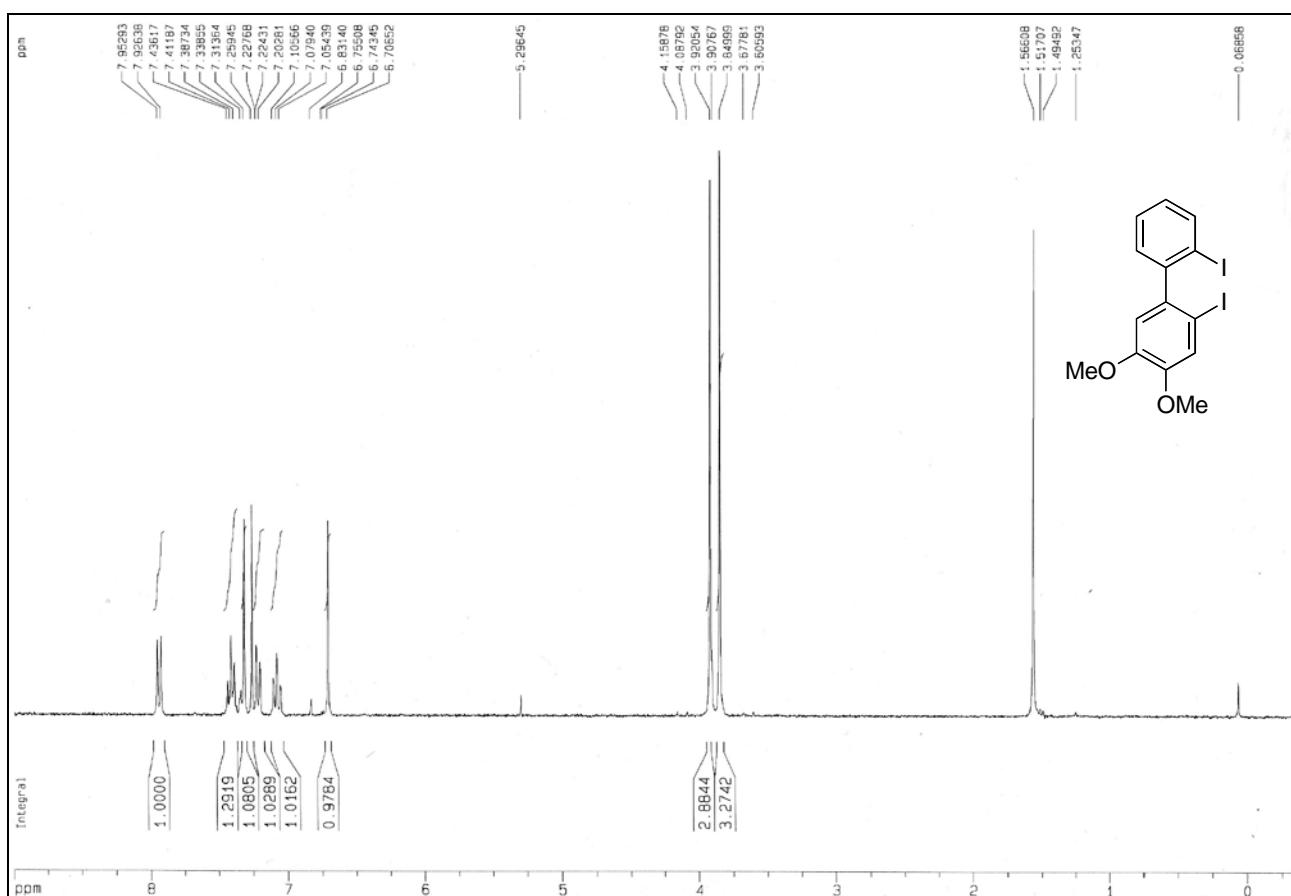
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **6e** (400 MHz, CDCl<sub>3</sub>):



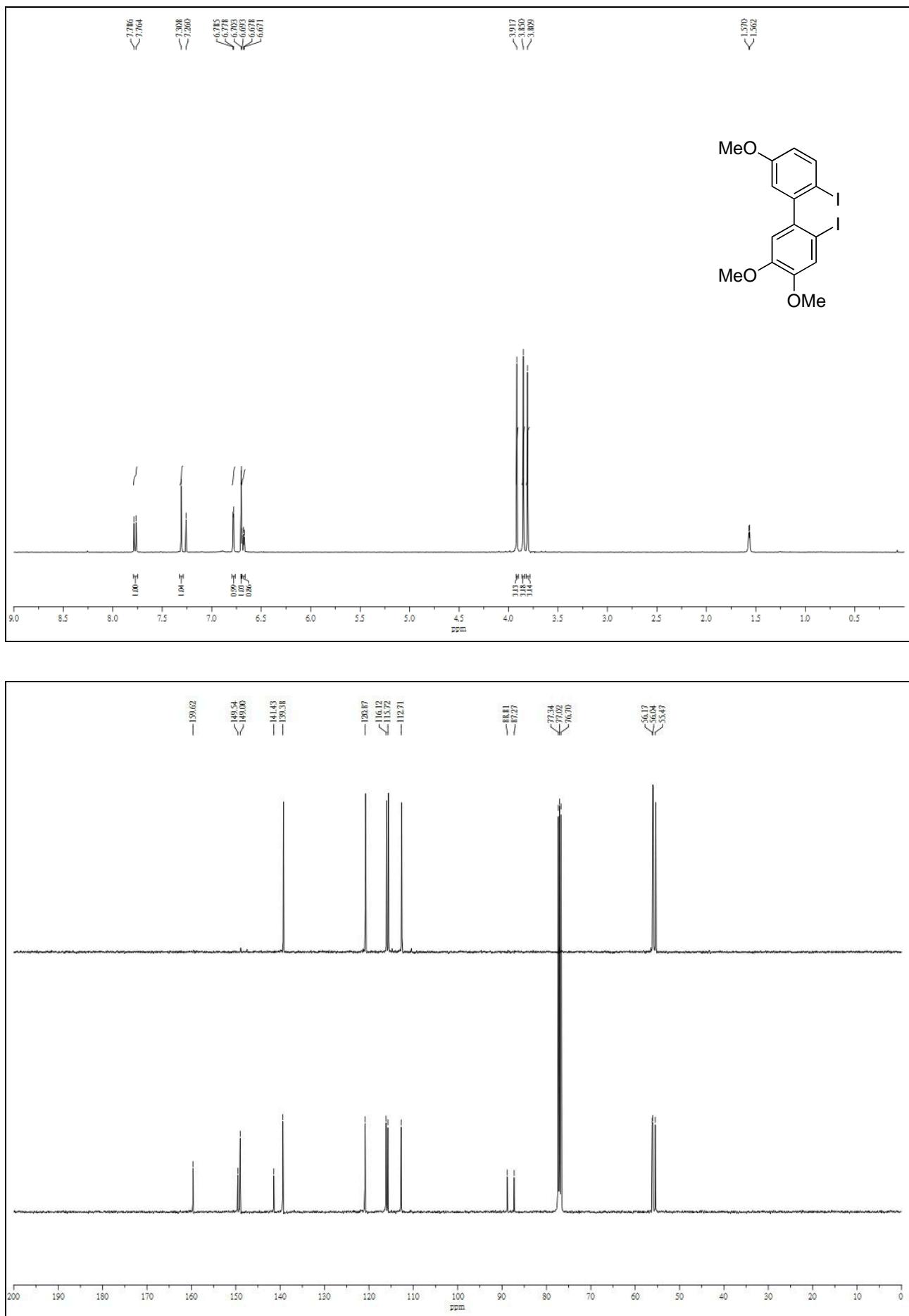
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **6f** (400 MHz, CDCl<sub>3</sub>):



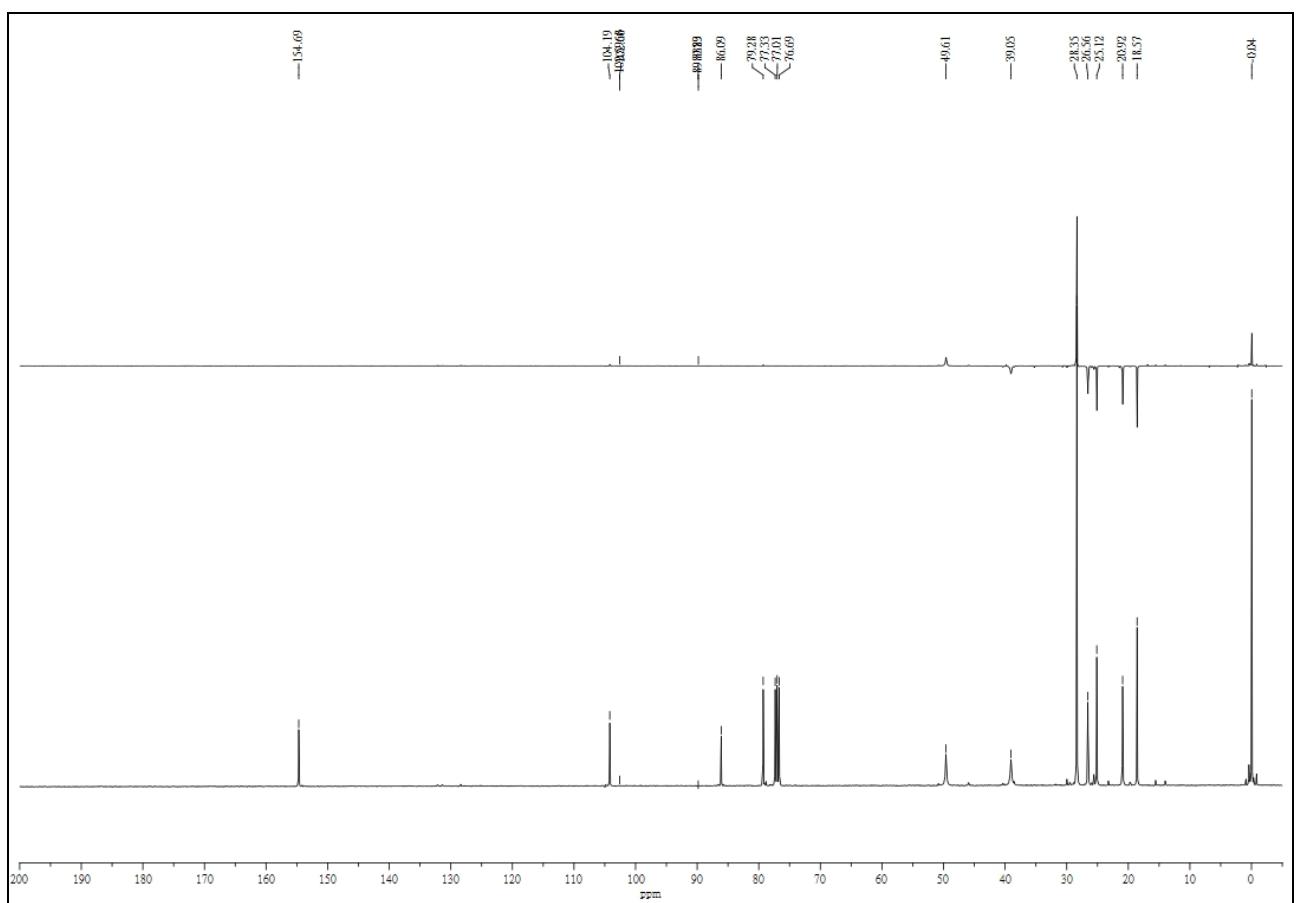
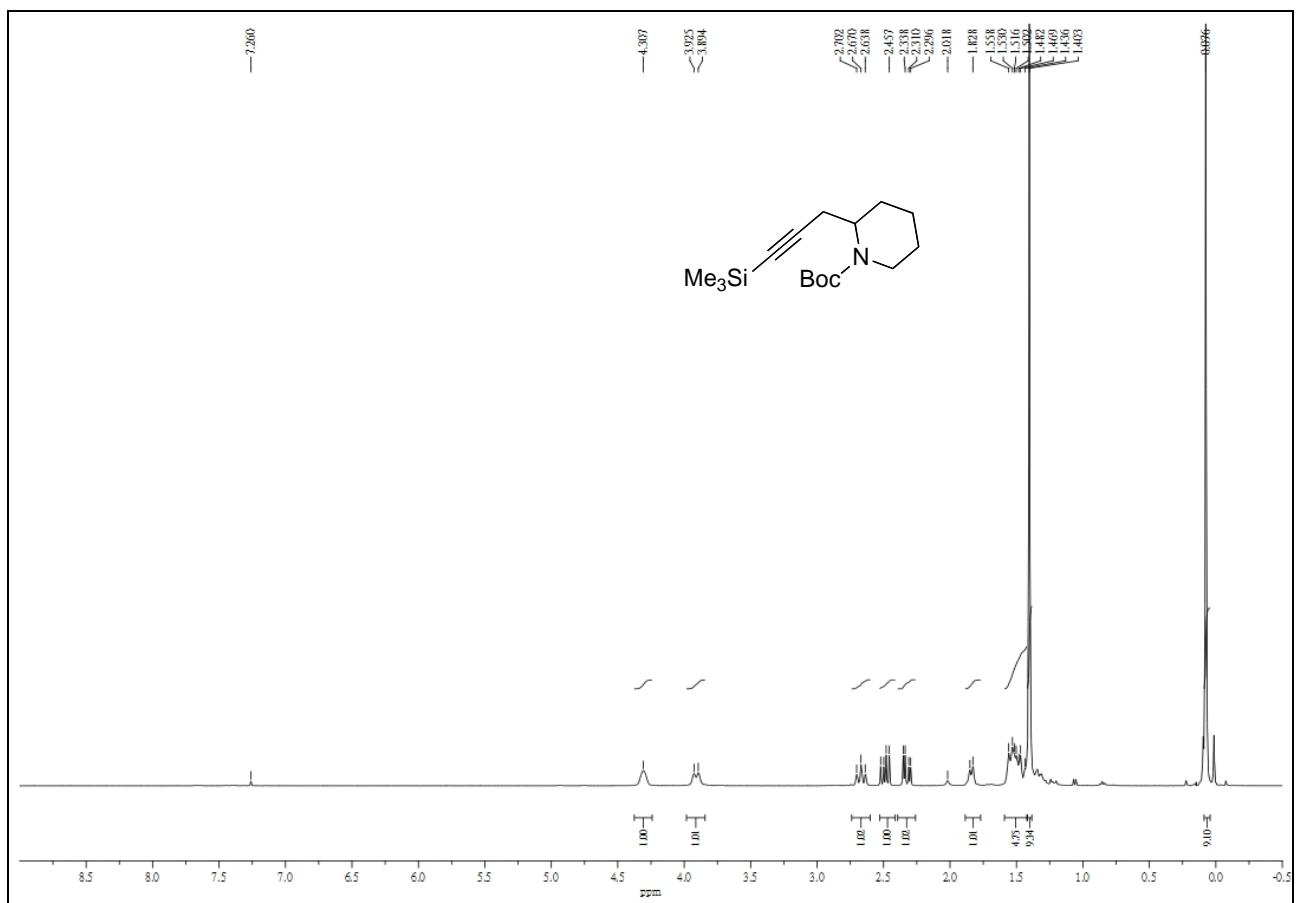
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **6g** (300 MHz, CDCl<sub>3</sub>):



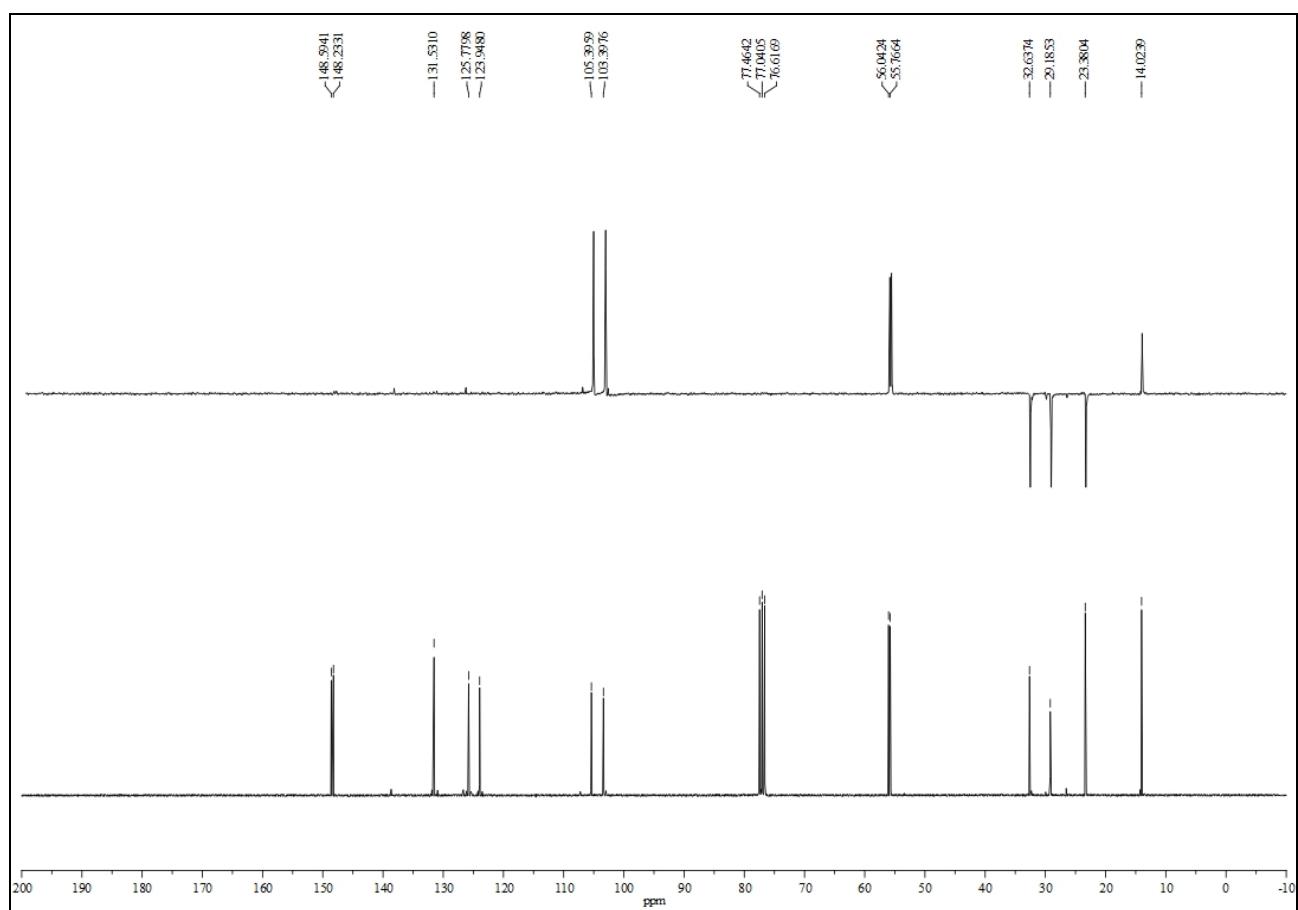
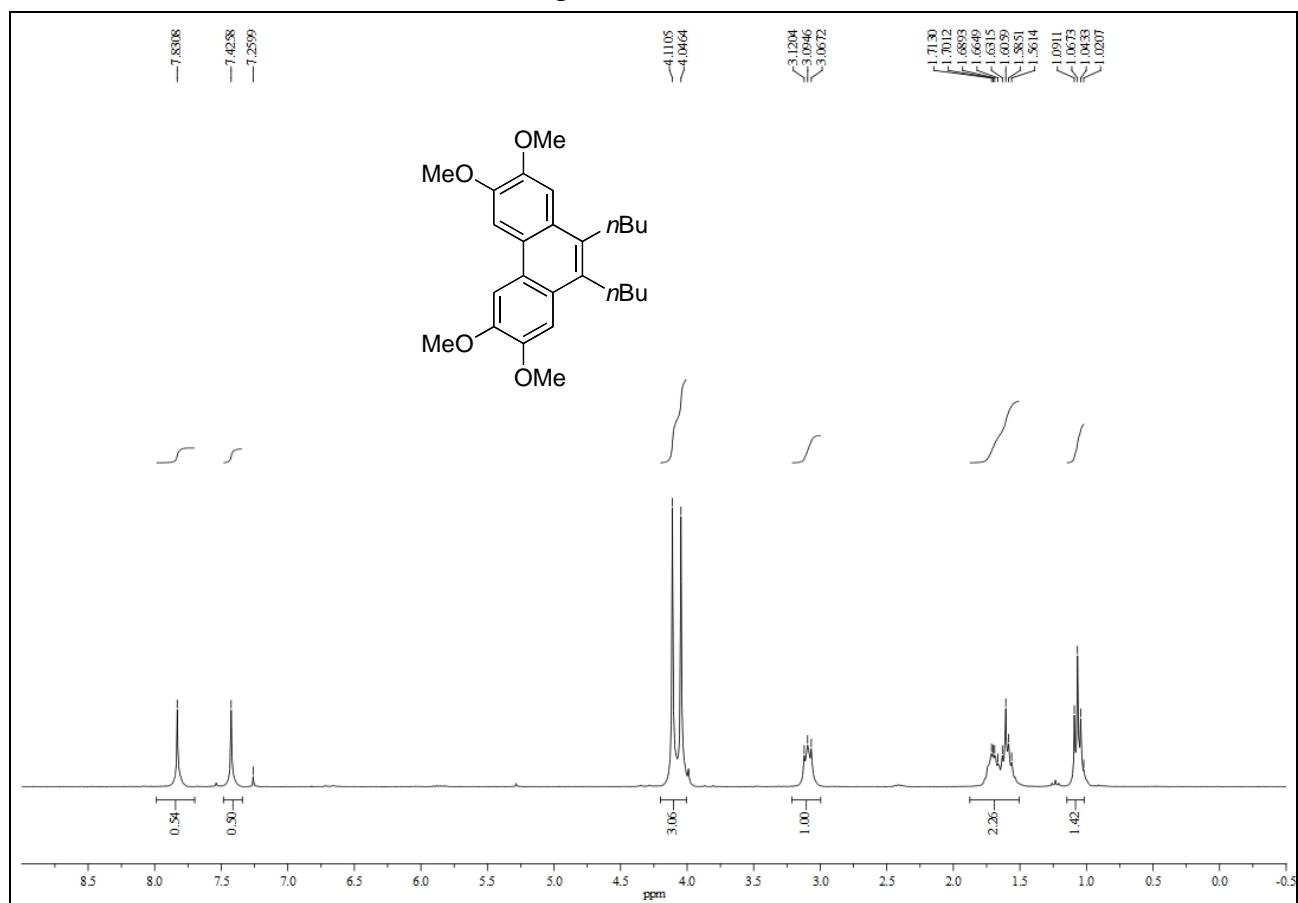
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **6h** (400 MHz, CDCl<sub>3</sub>):



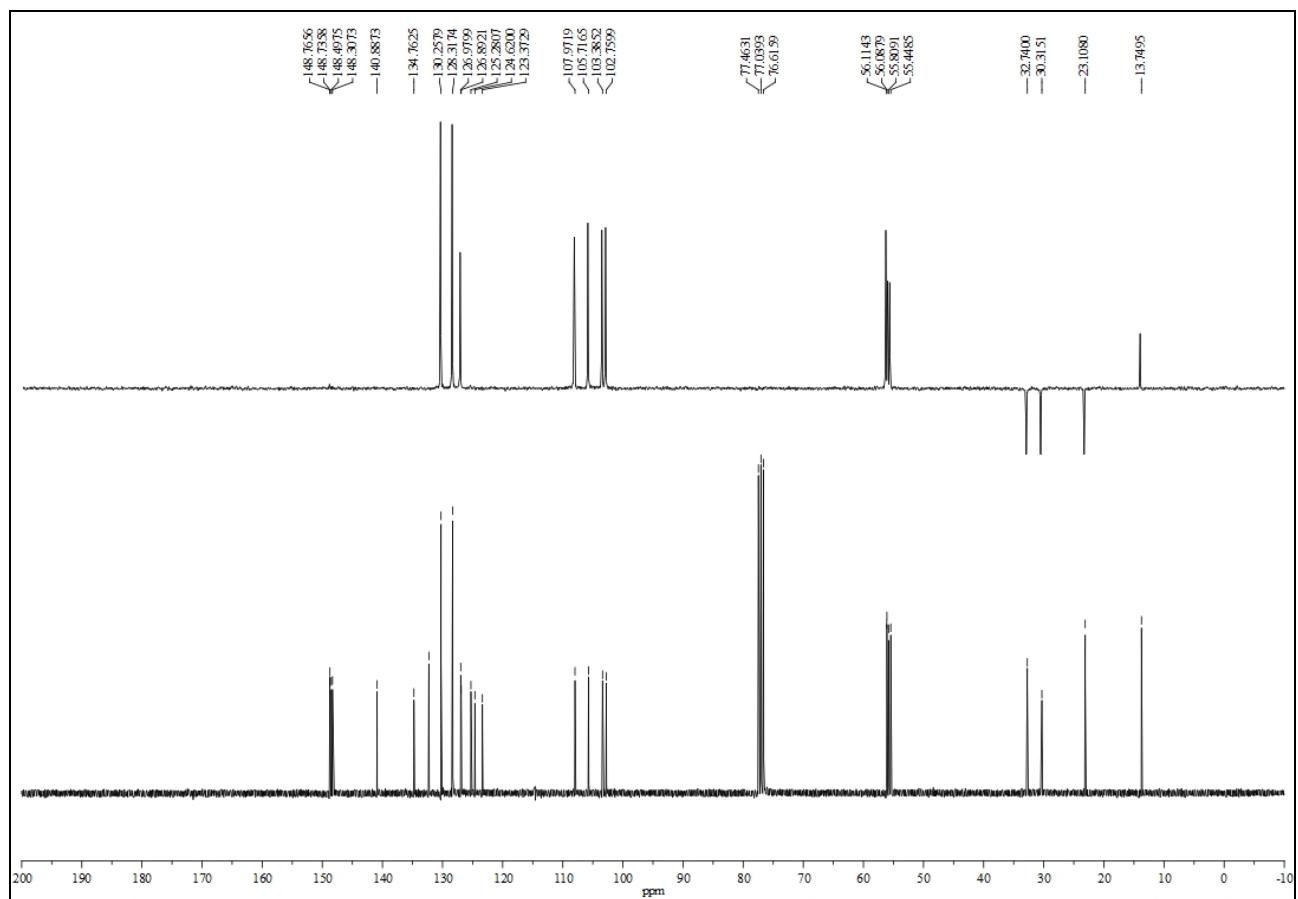
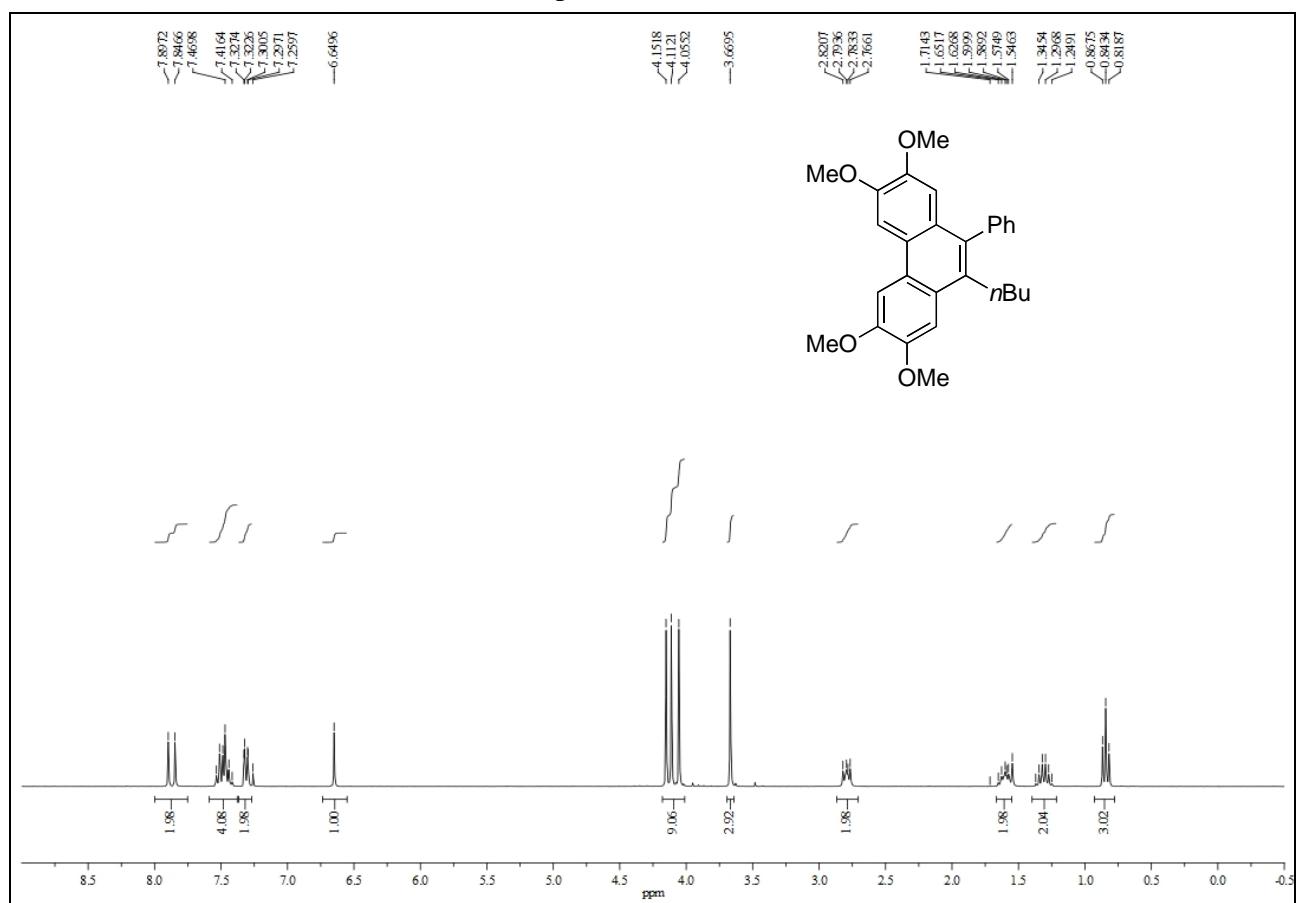
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **7k** (400 MHz, CDCl<sub>3</sub>):



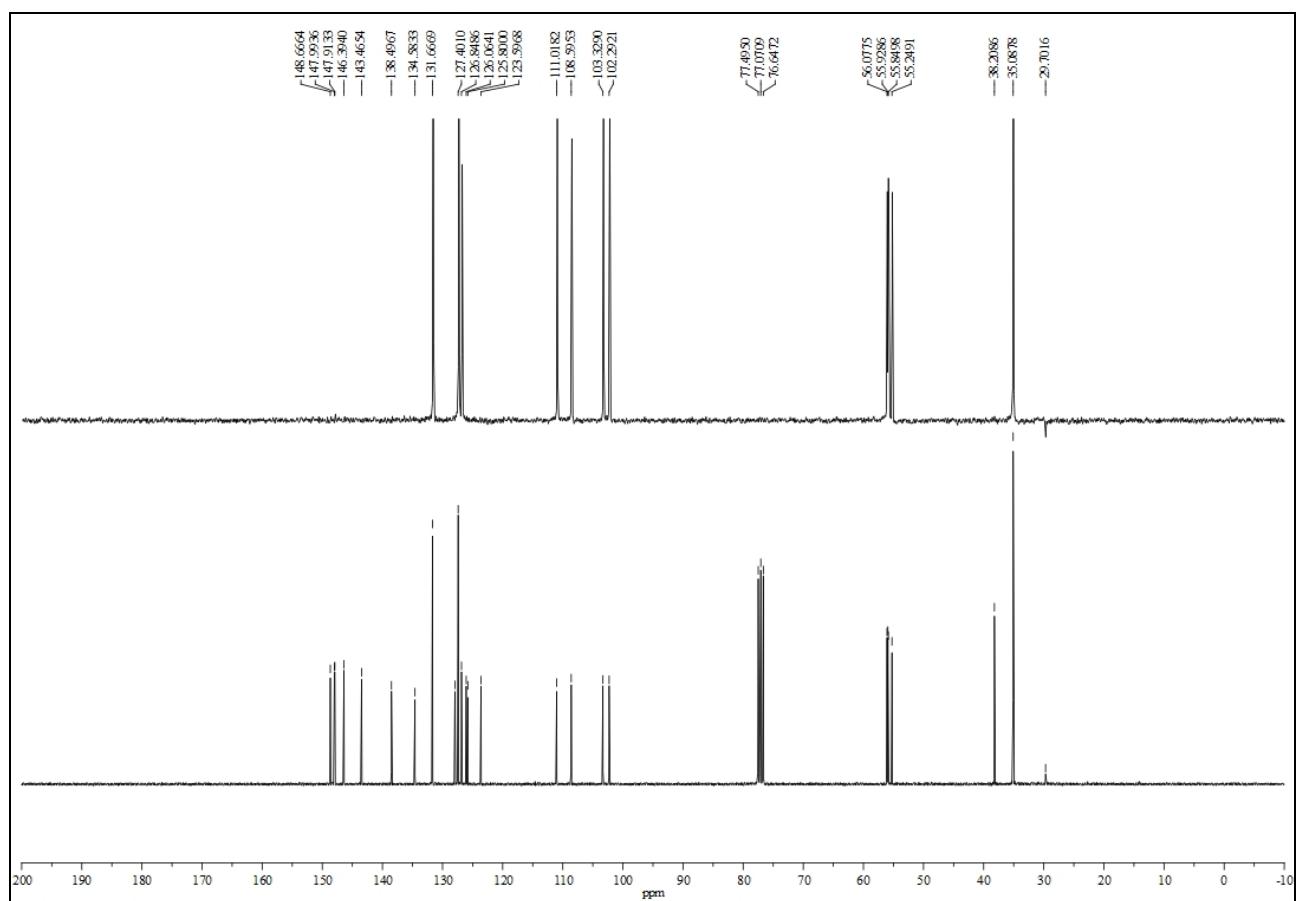
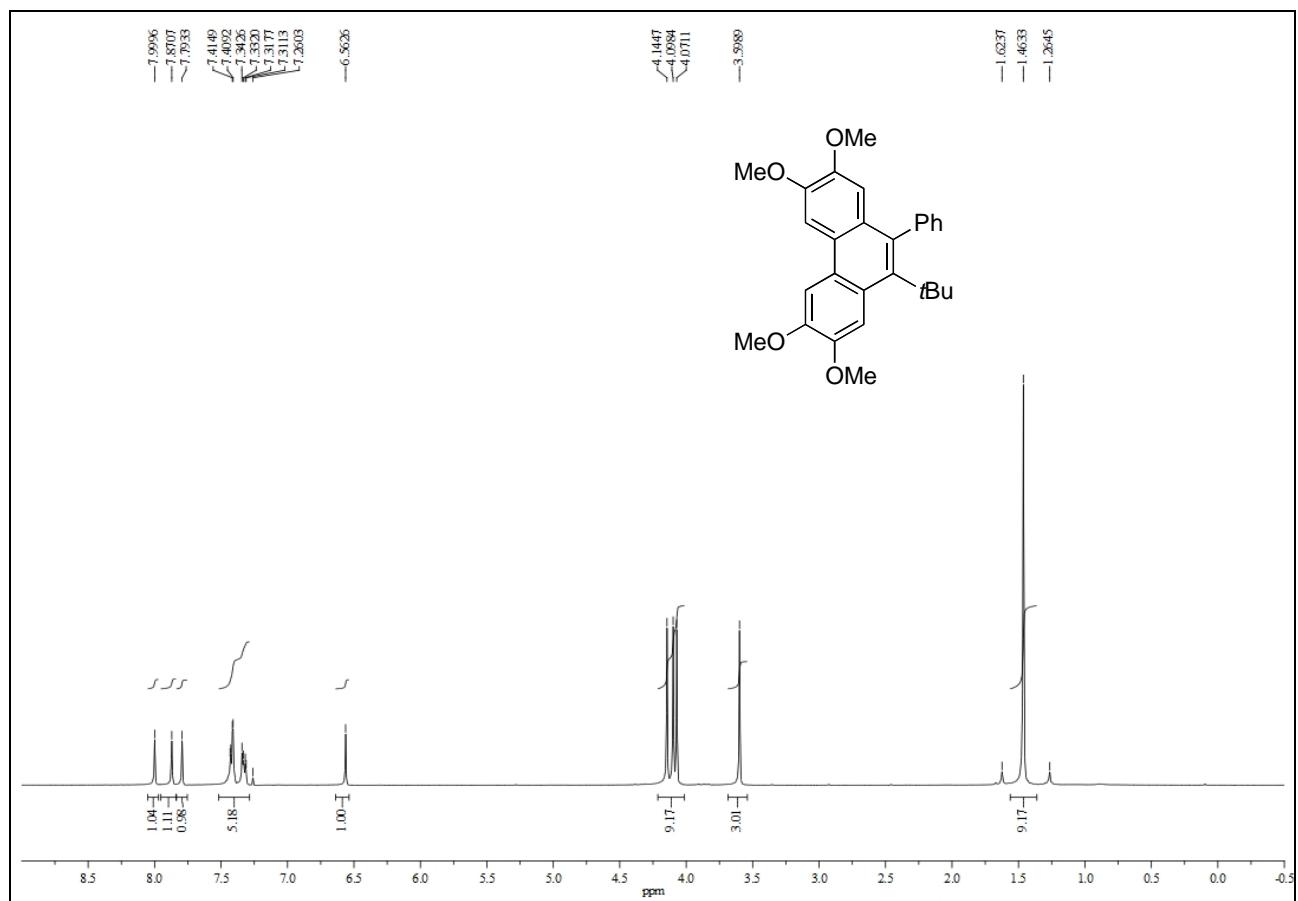
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8aa** (300 MHz, CDCl<sub>3</sub>):



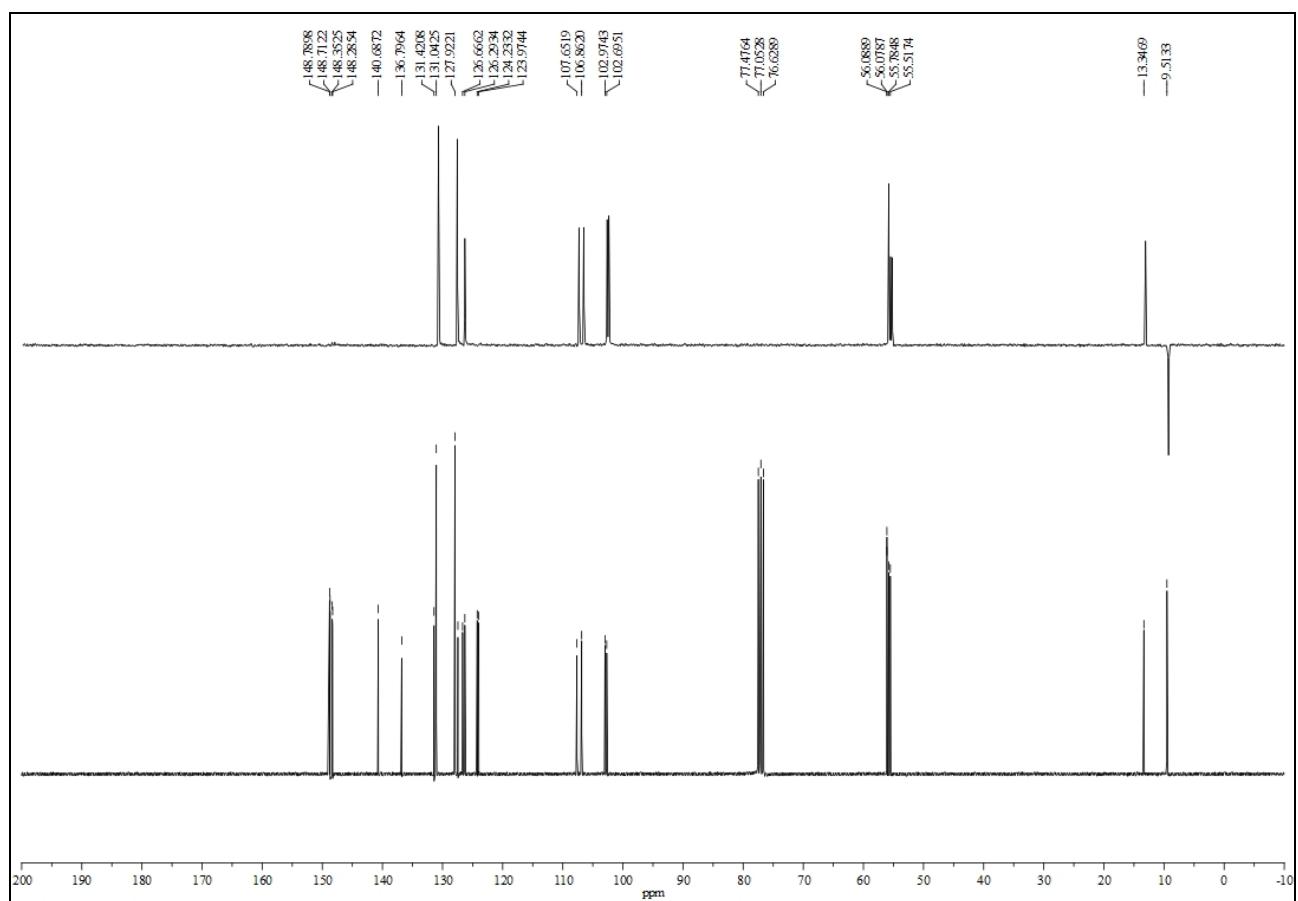
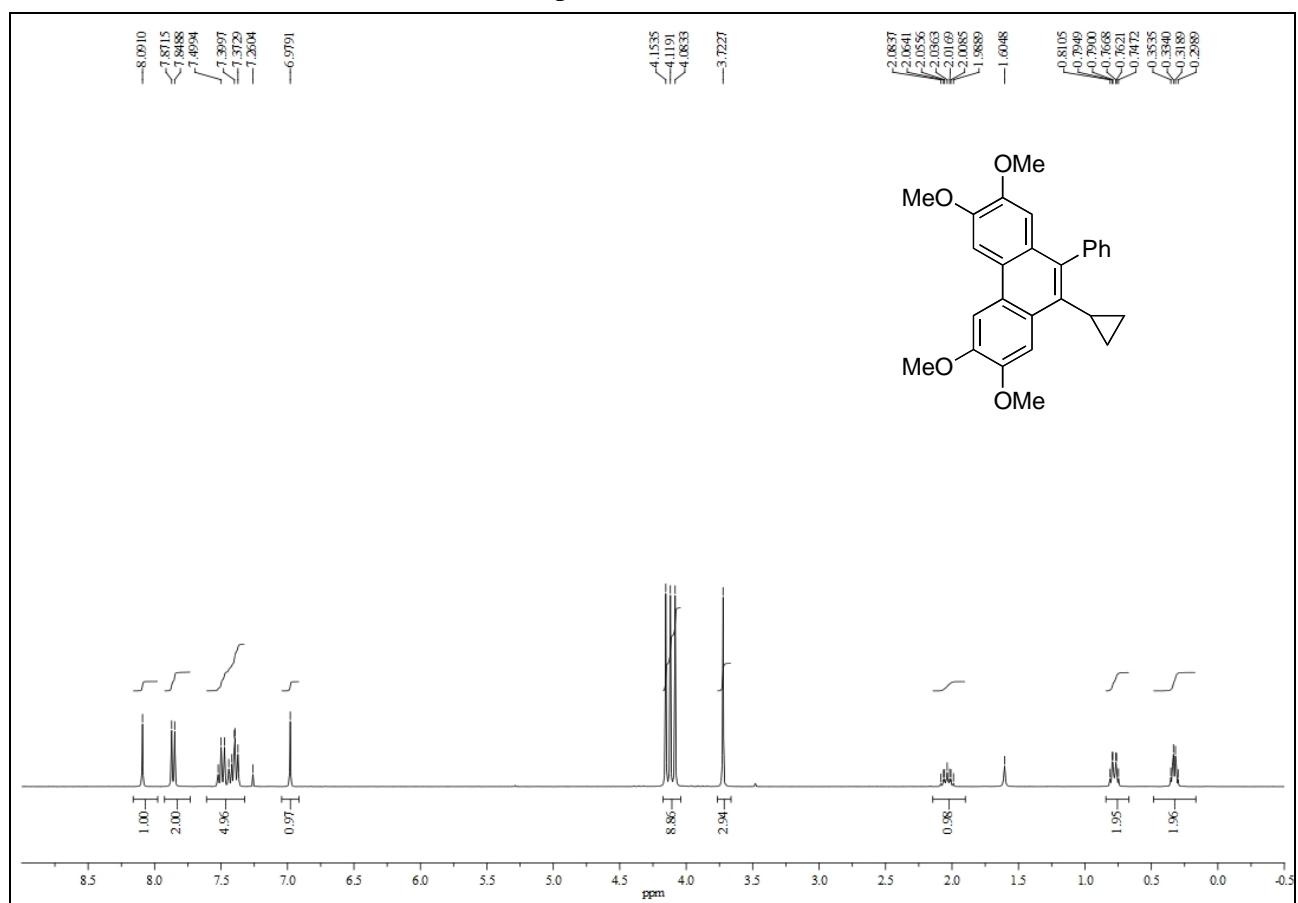
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8ab** (300 MHz, CDCl<sub>3</sub>):



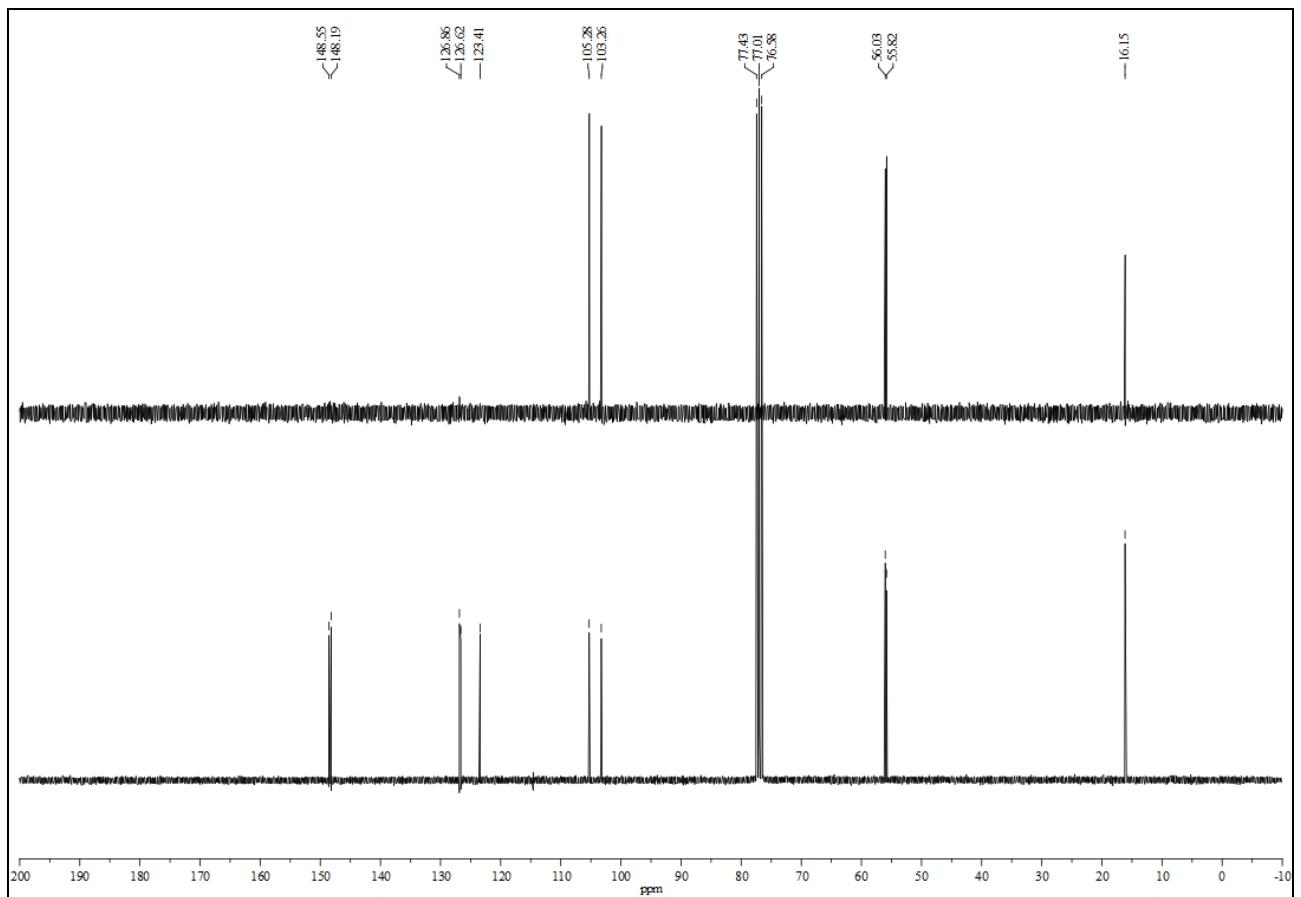
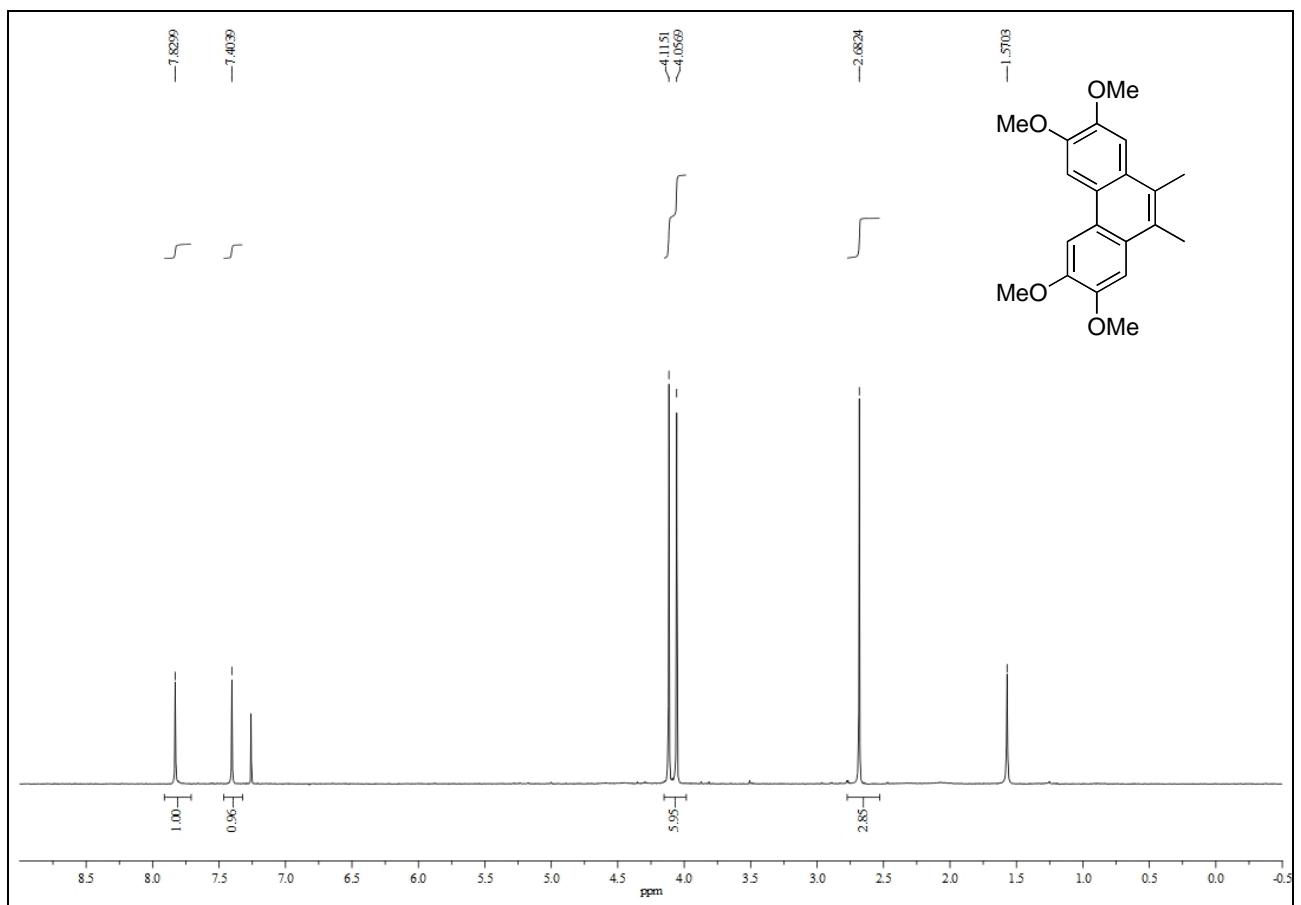
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8ac** (300 MHz, CDCl<sub>3</sub>):



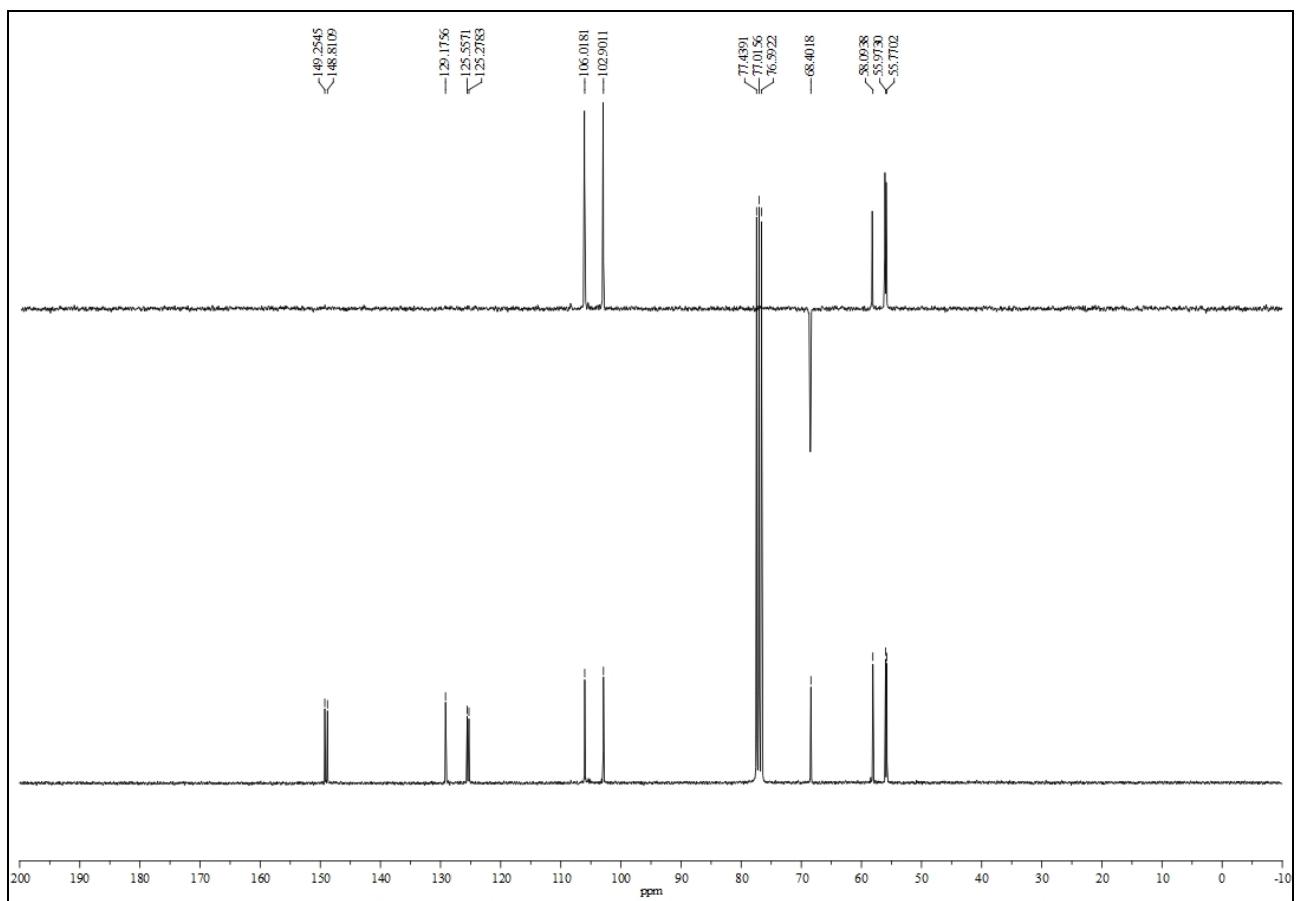
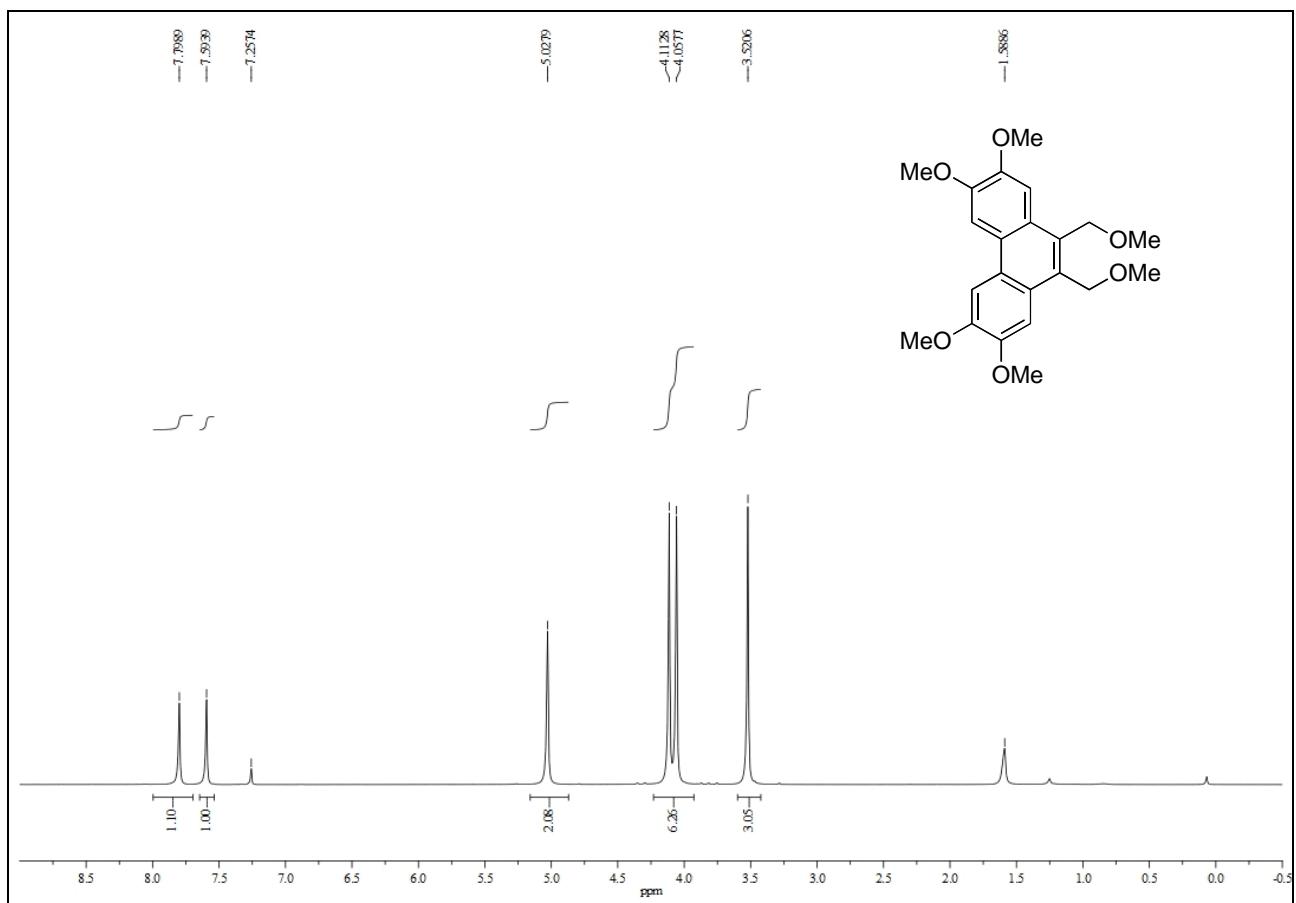
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8ad** (300 MHz, CDCl<sub>3</sub>):



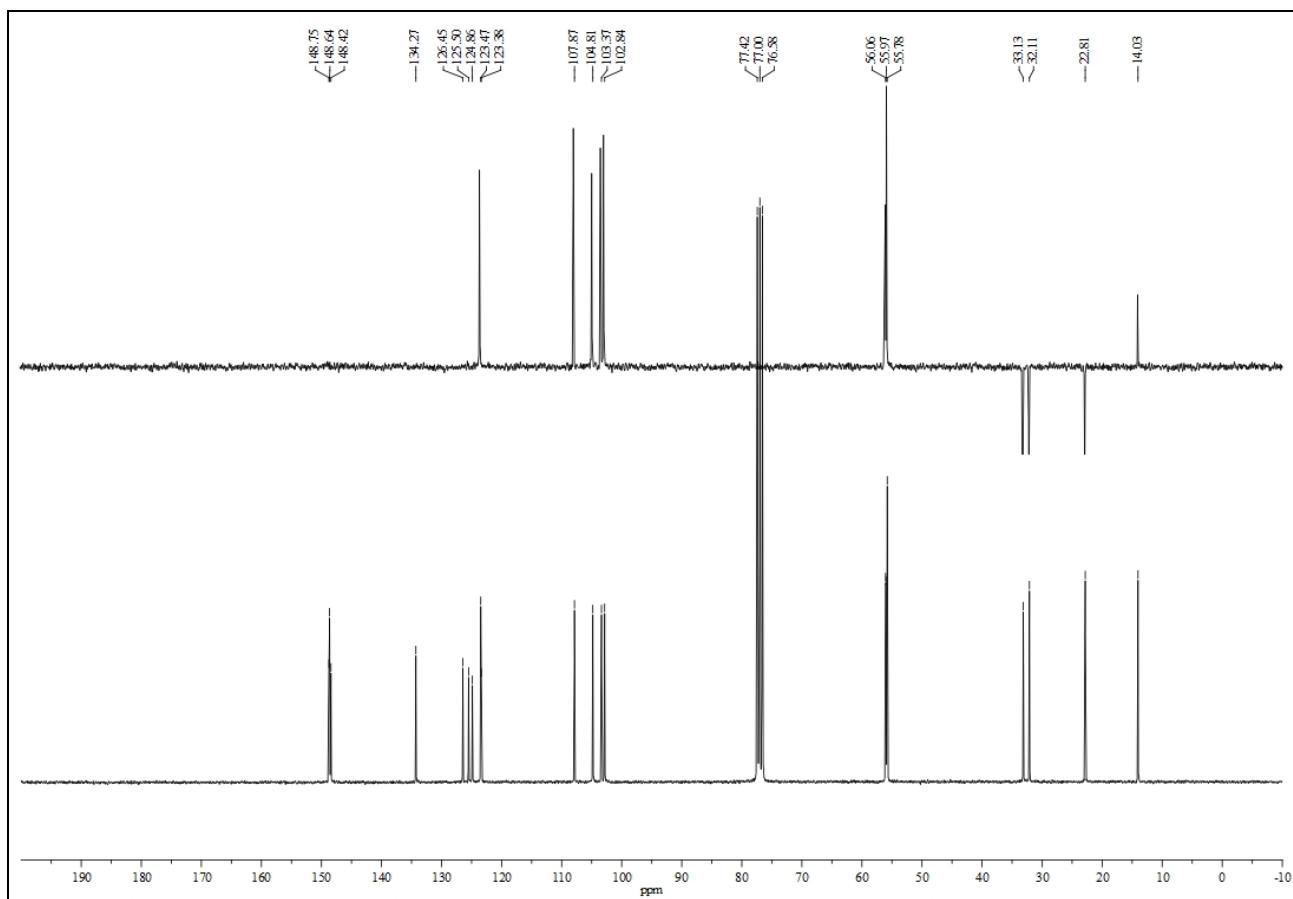
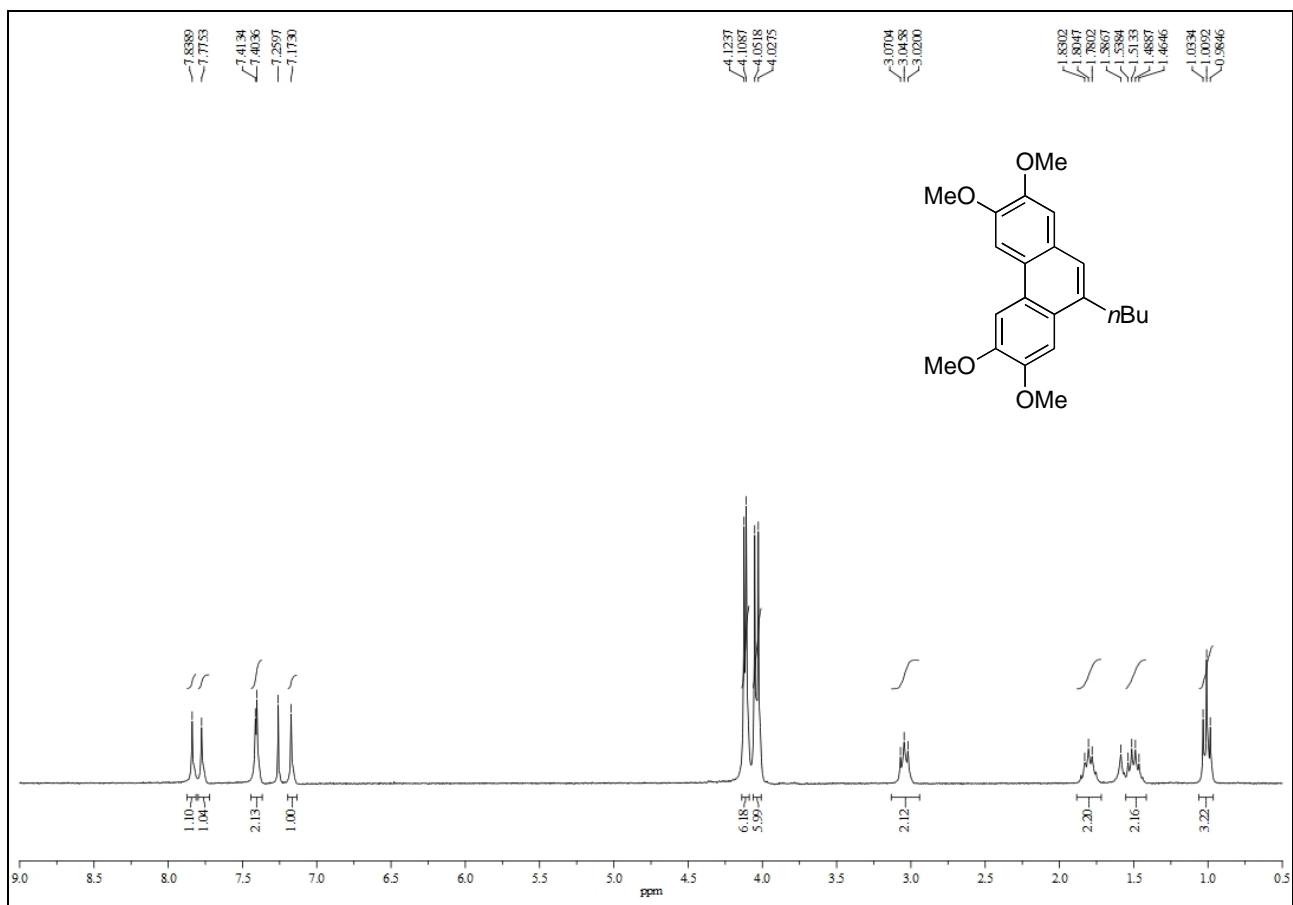
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8ae** (300 MHz, CDCl<sub>3</sub>):



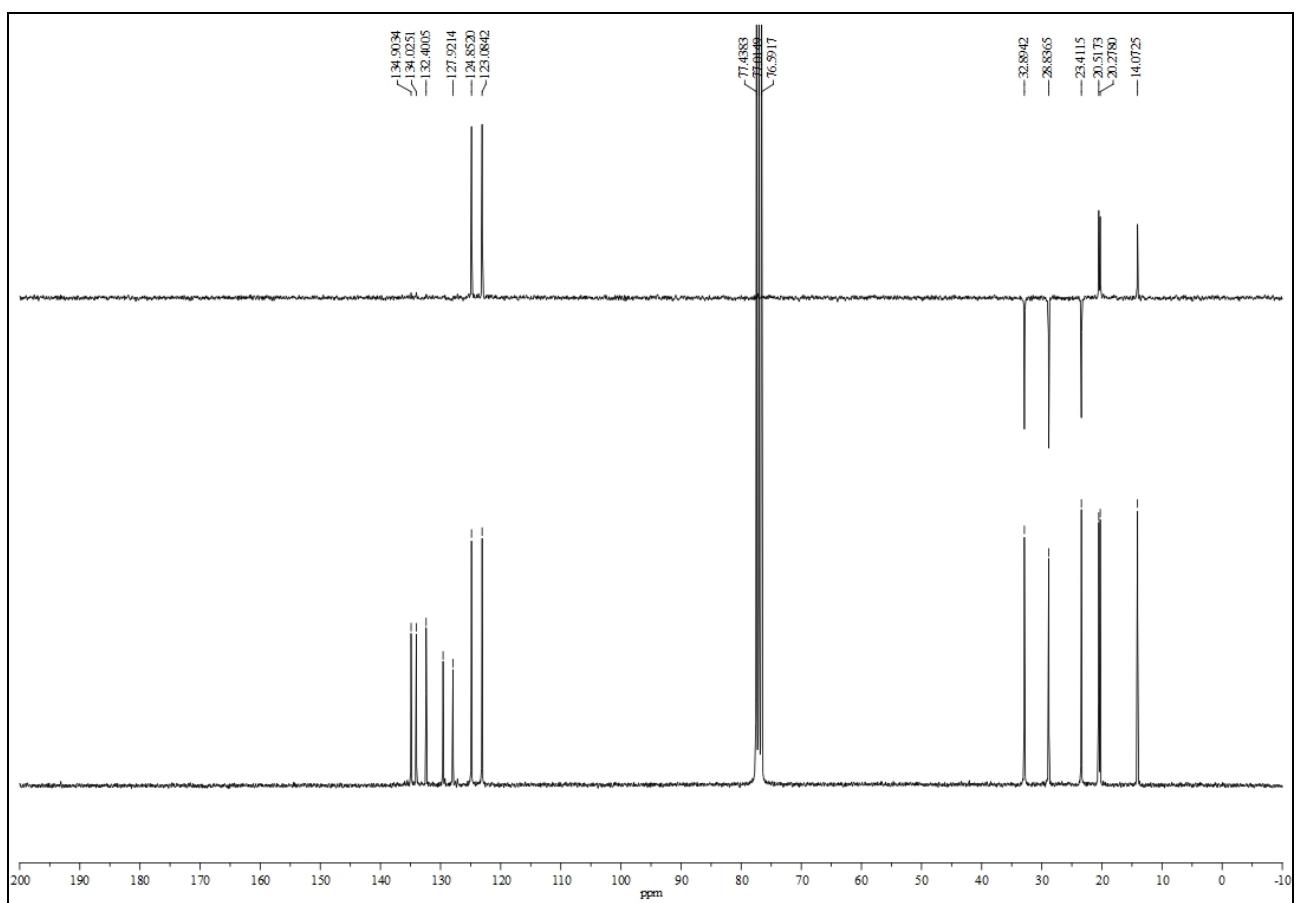
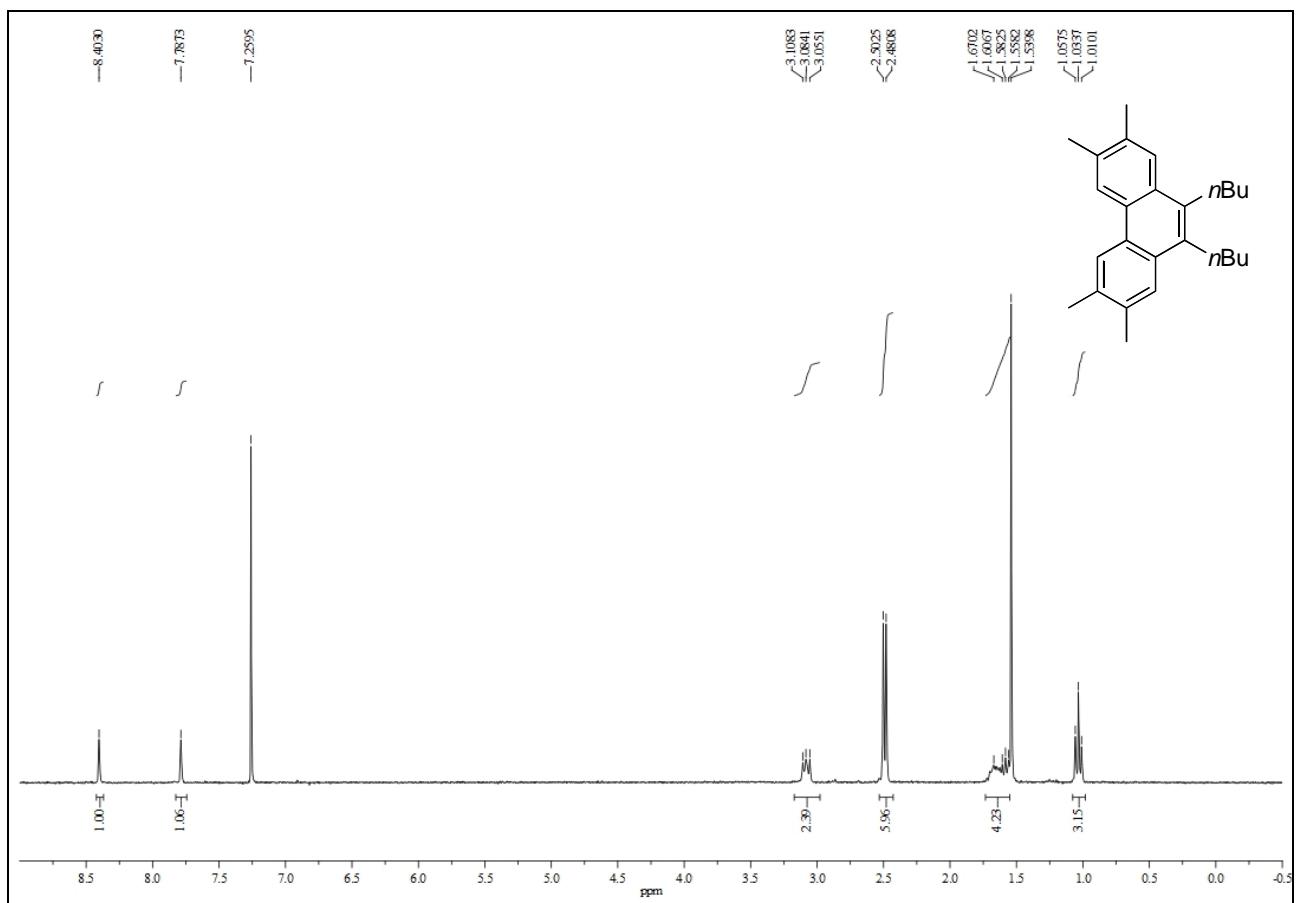
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8af** (300 MHz, CDCl<sub>3</sub>):



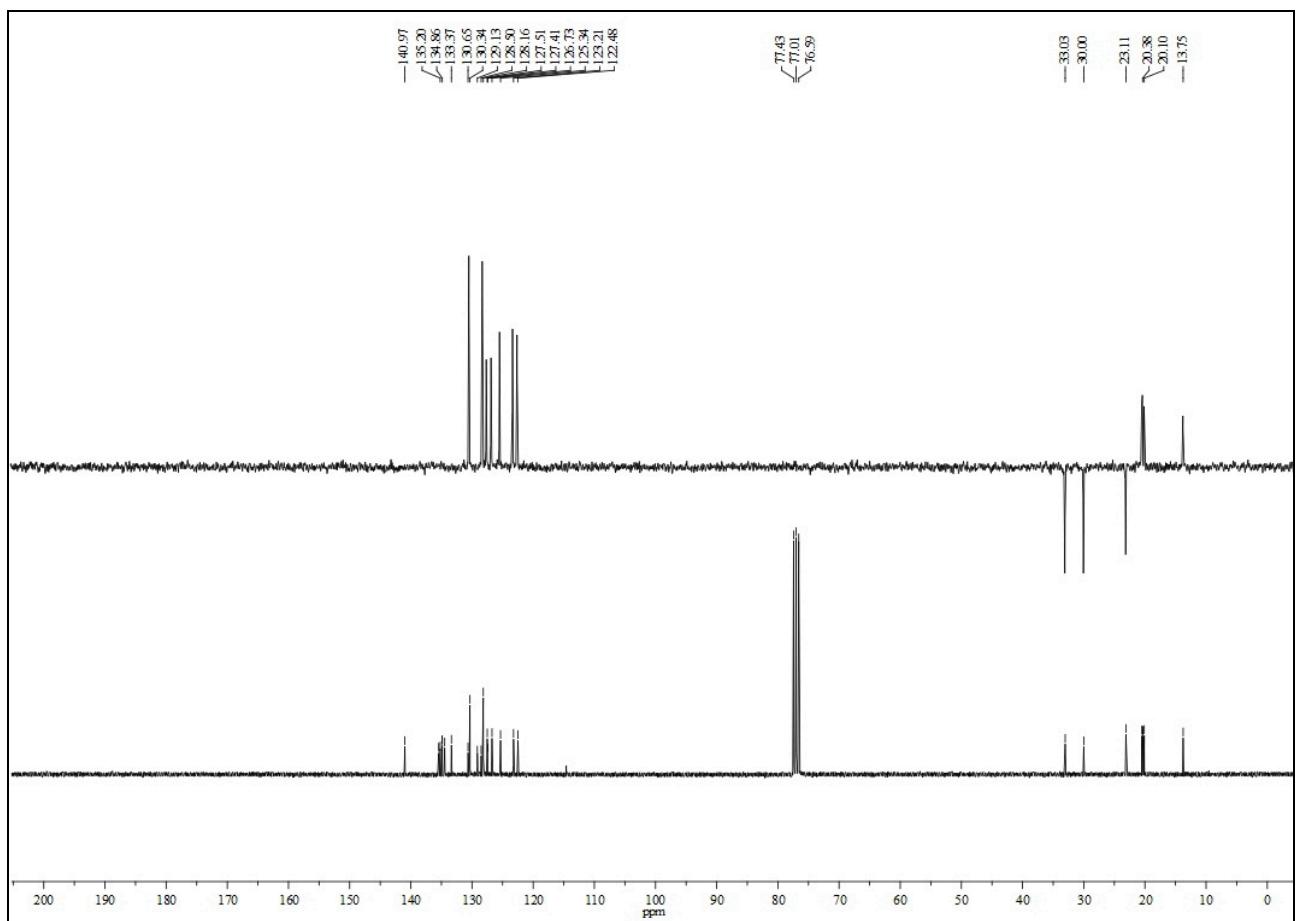
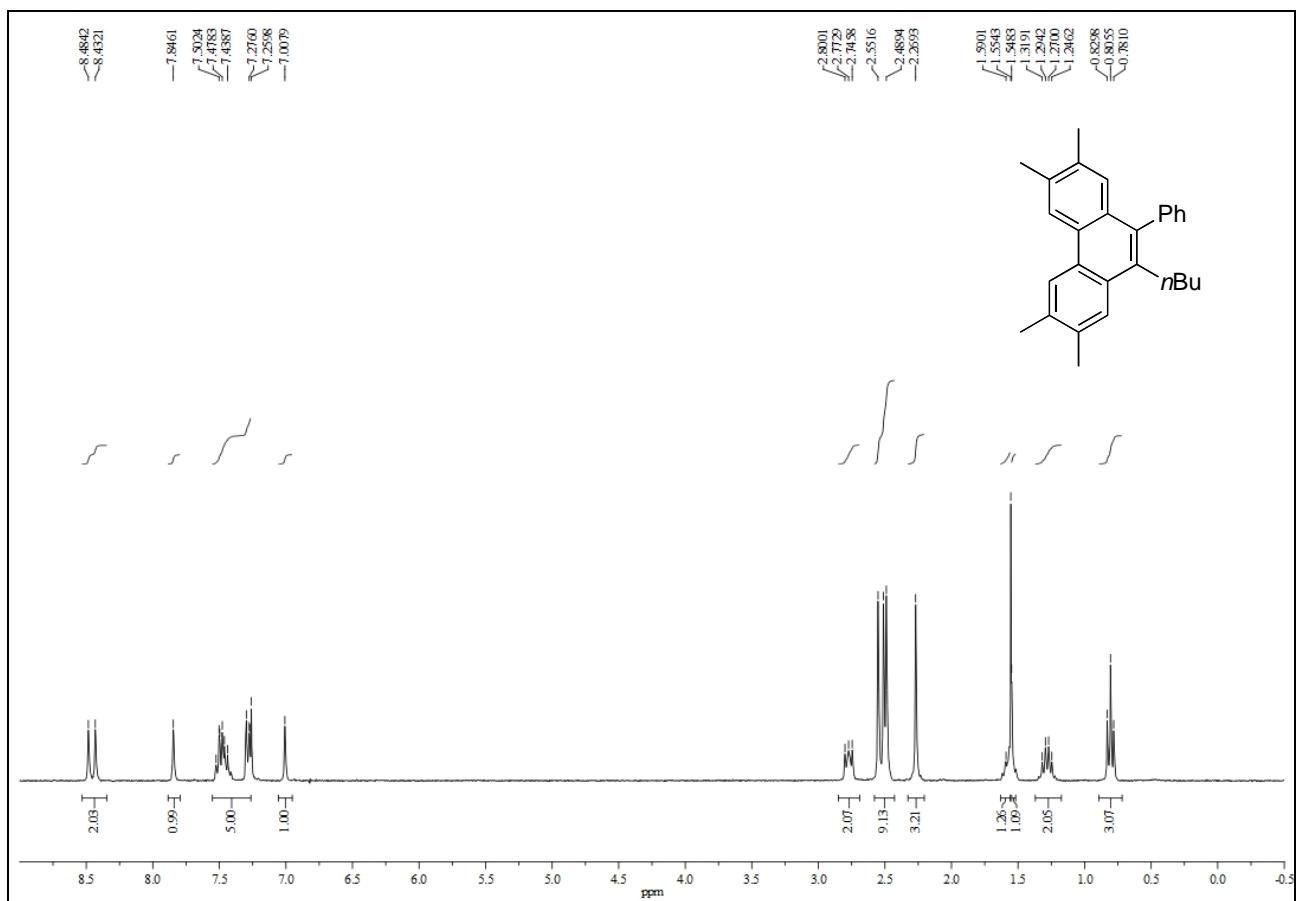
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8ag'** (300 MHz, CDCl<sub>3</sub>):



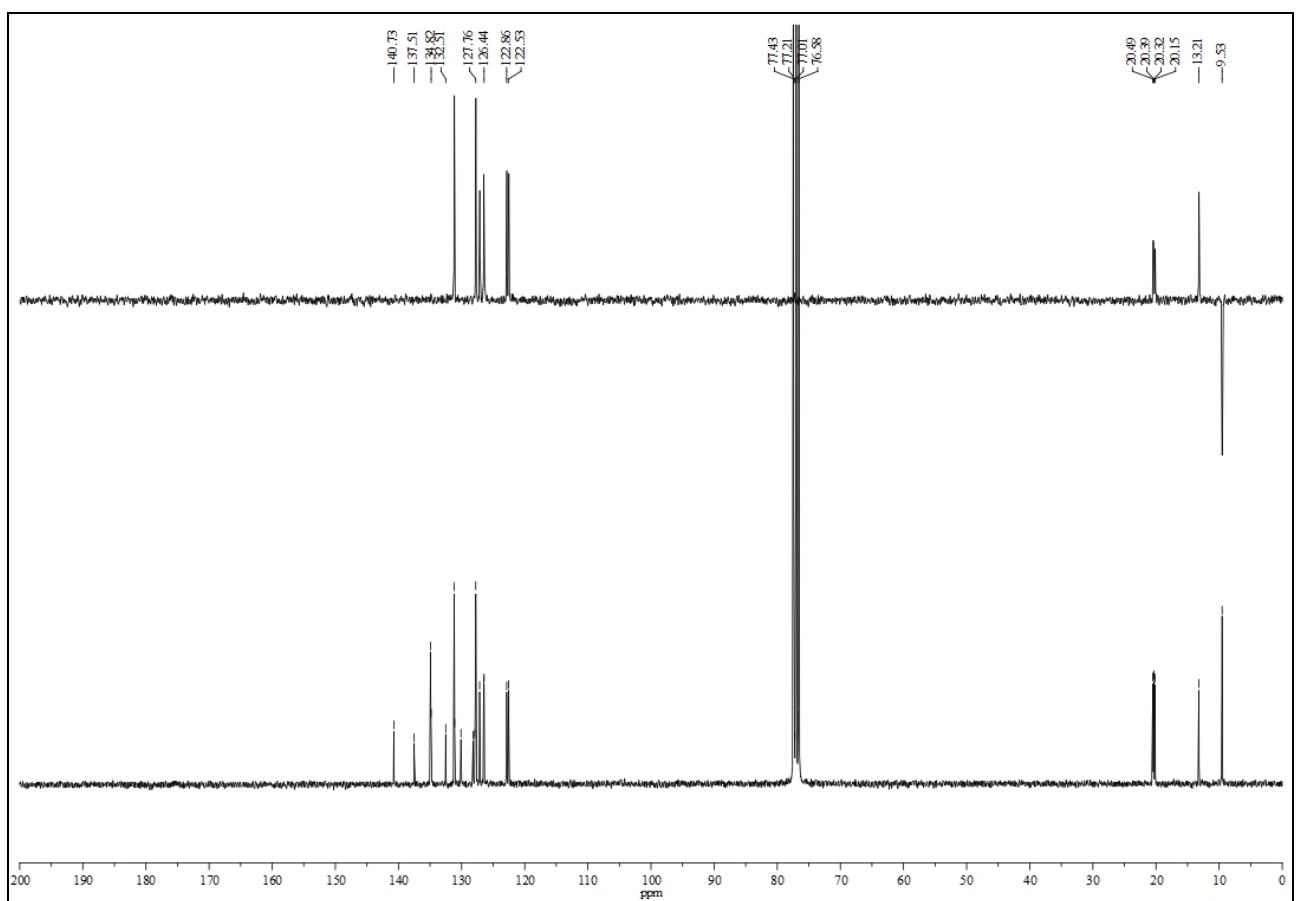
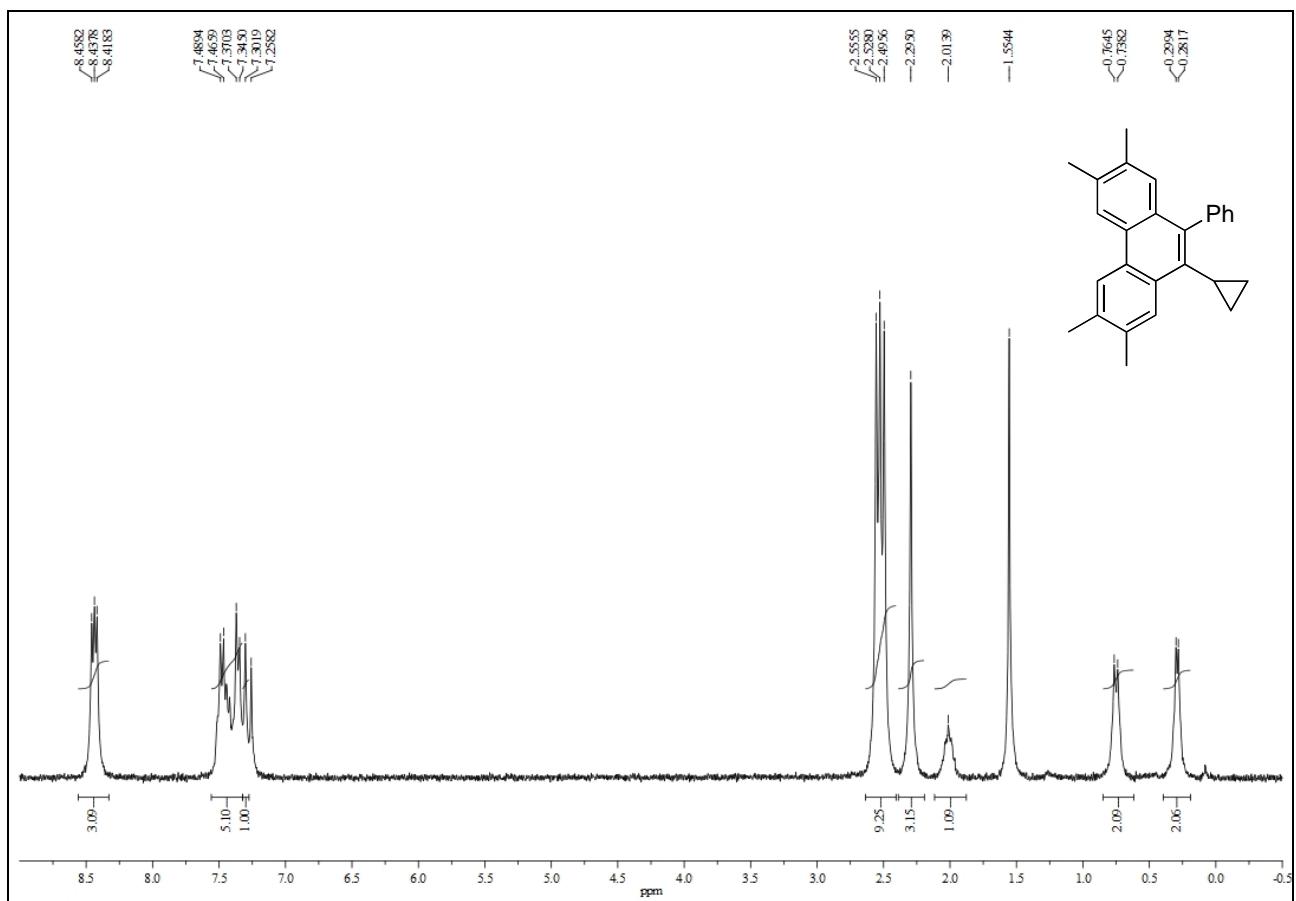
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8ba** (300 MHz, CDCl<sub>3</sub>):



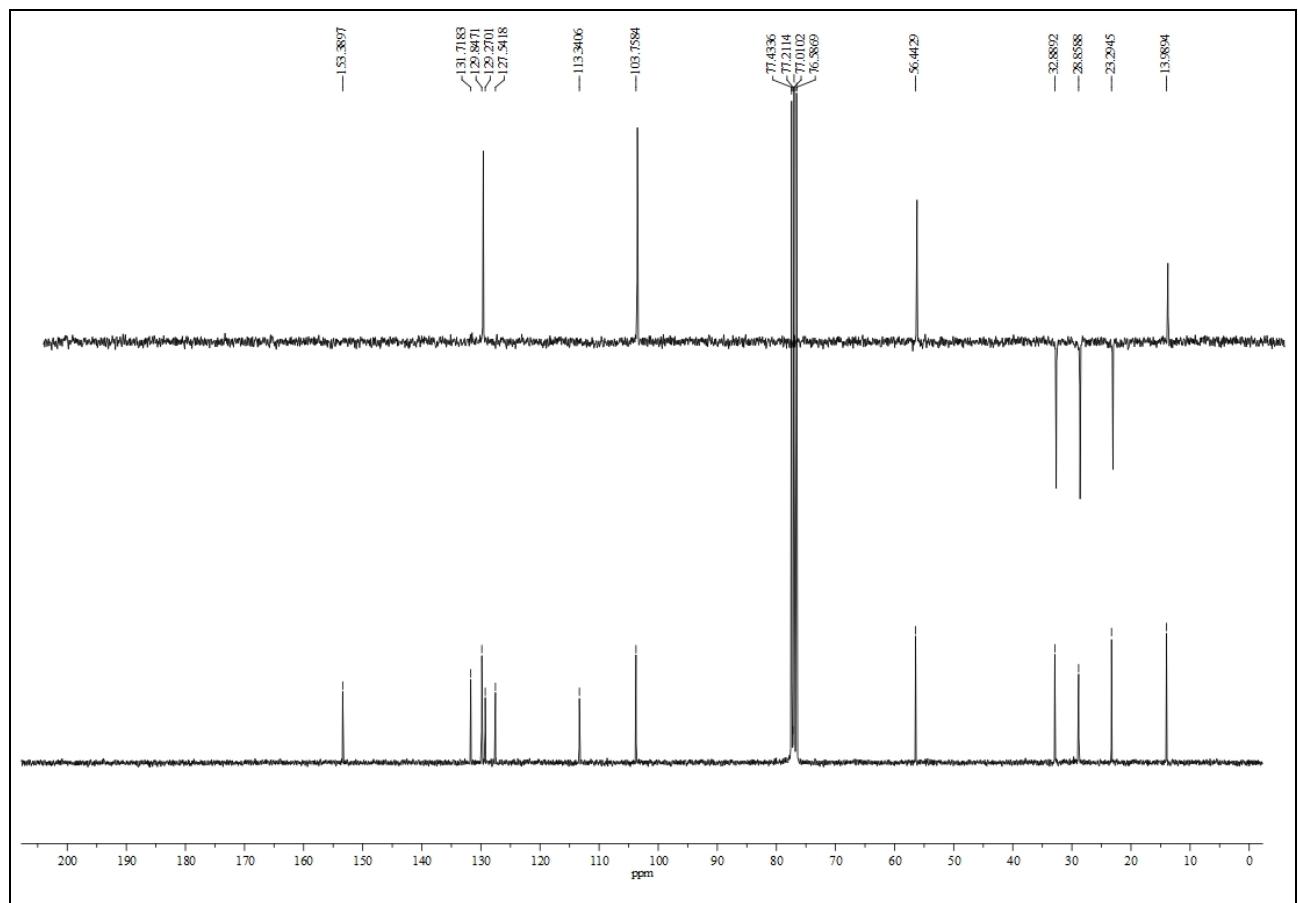
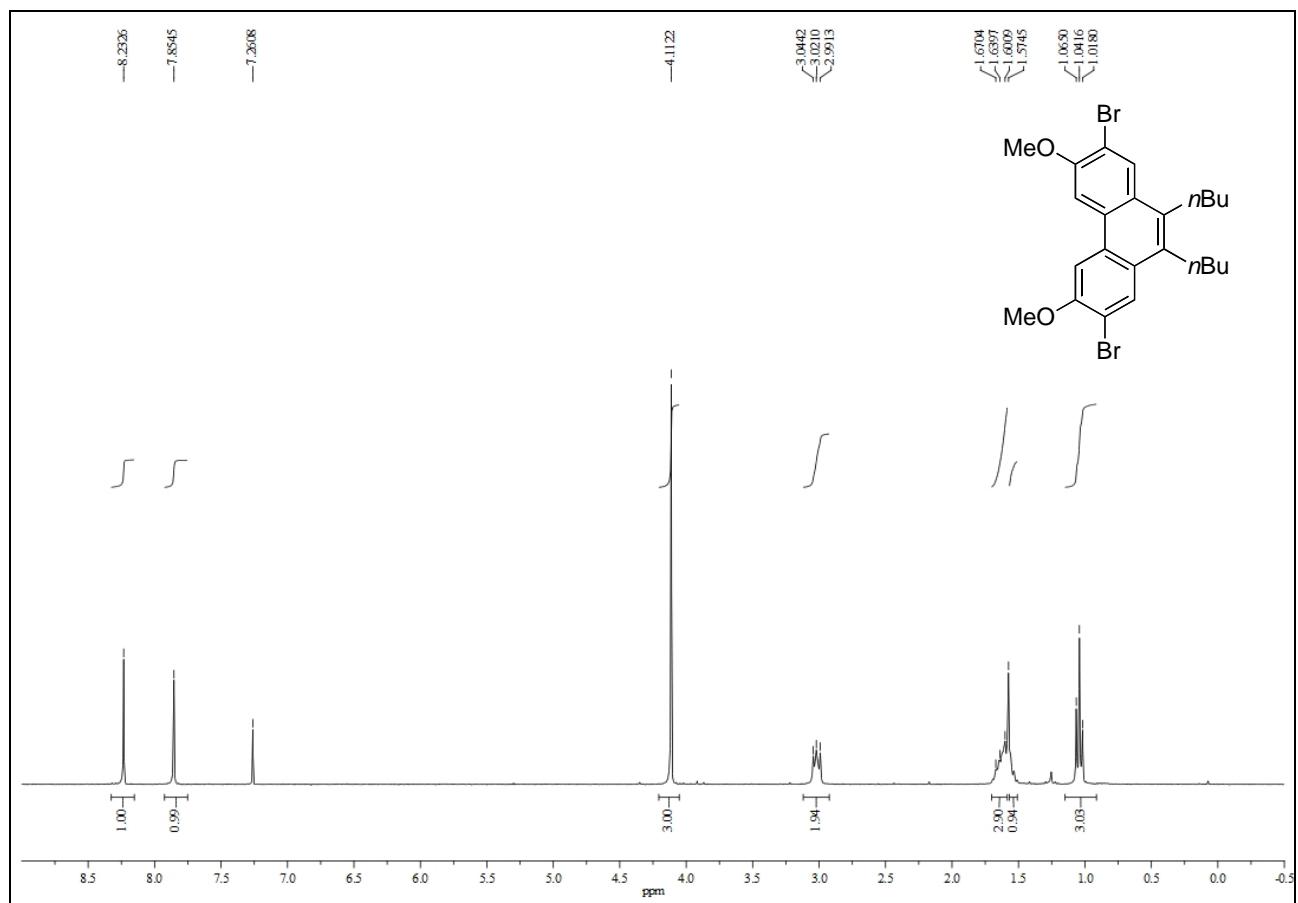
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8bb** (300 MHz, CDCl<sub>3</sub>):



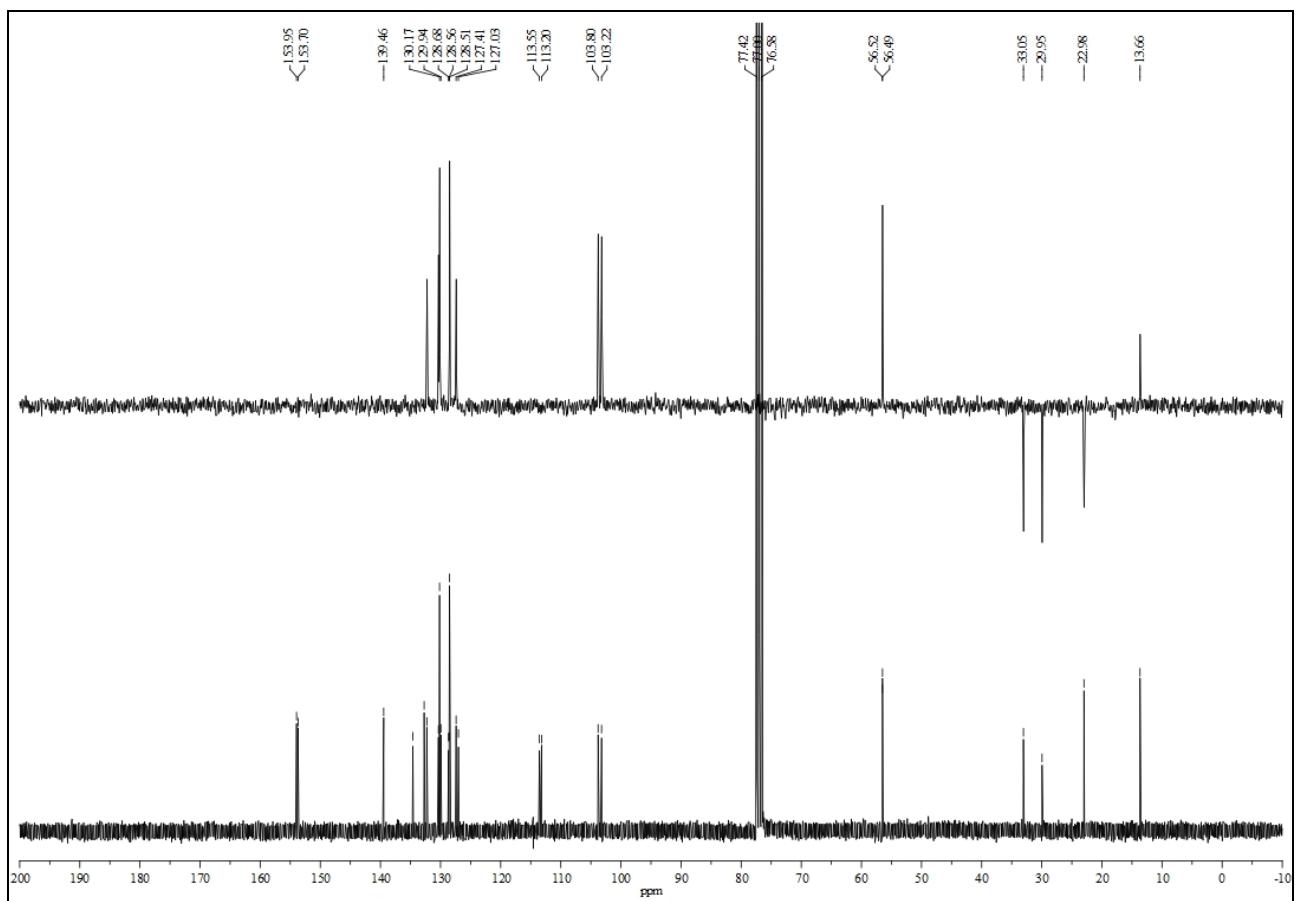
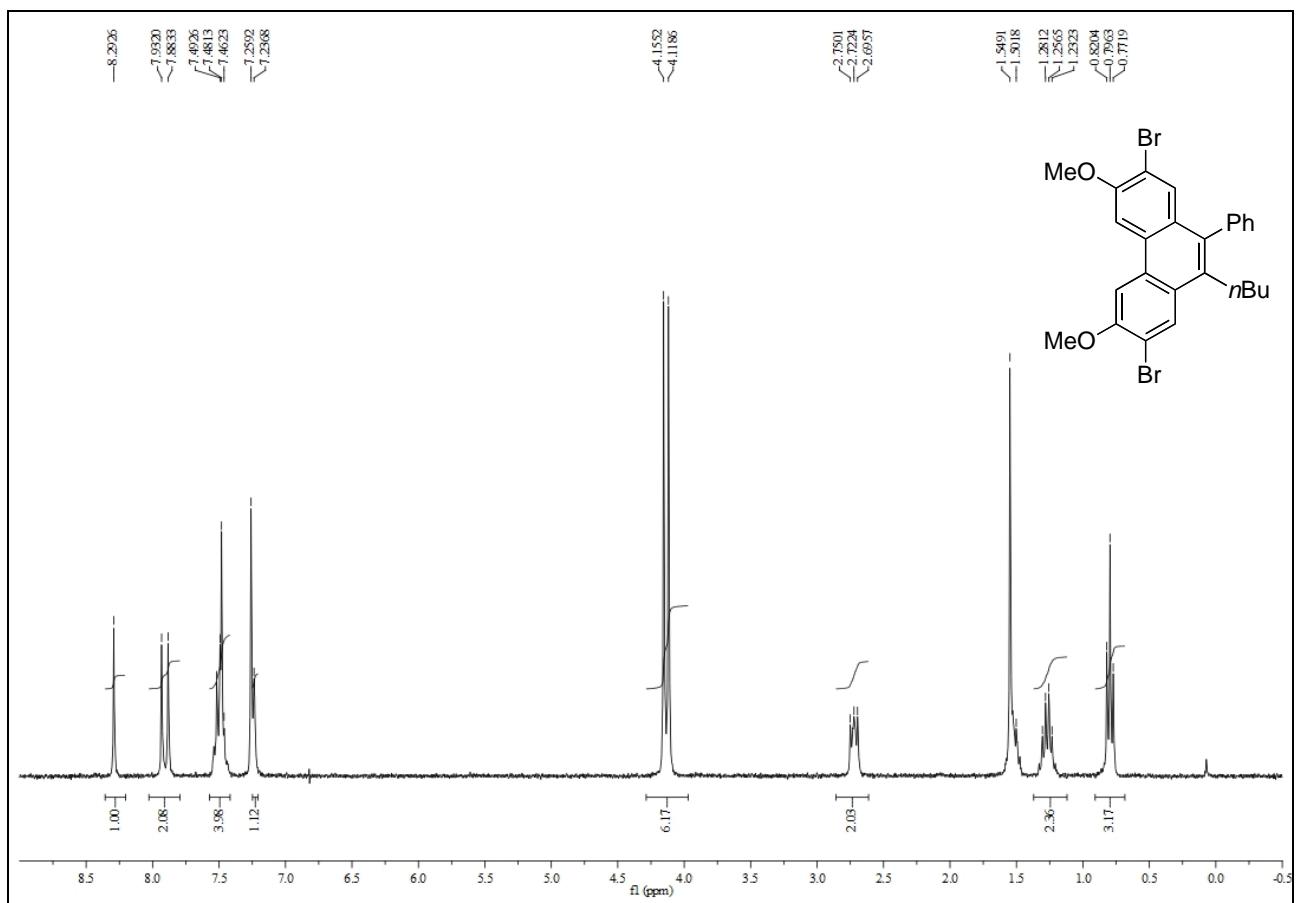
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8bd** (300 MHz, CDCl<sub>3</sub>):



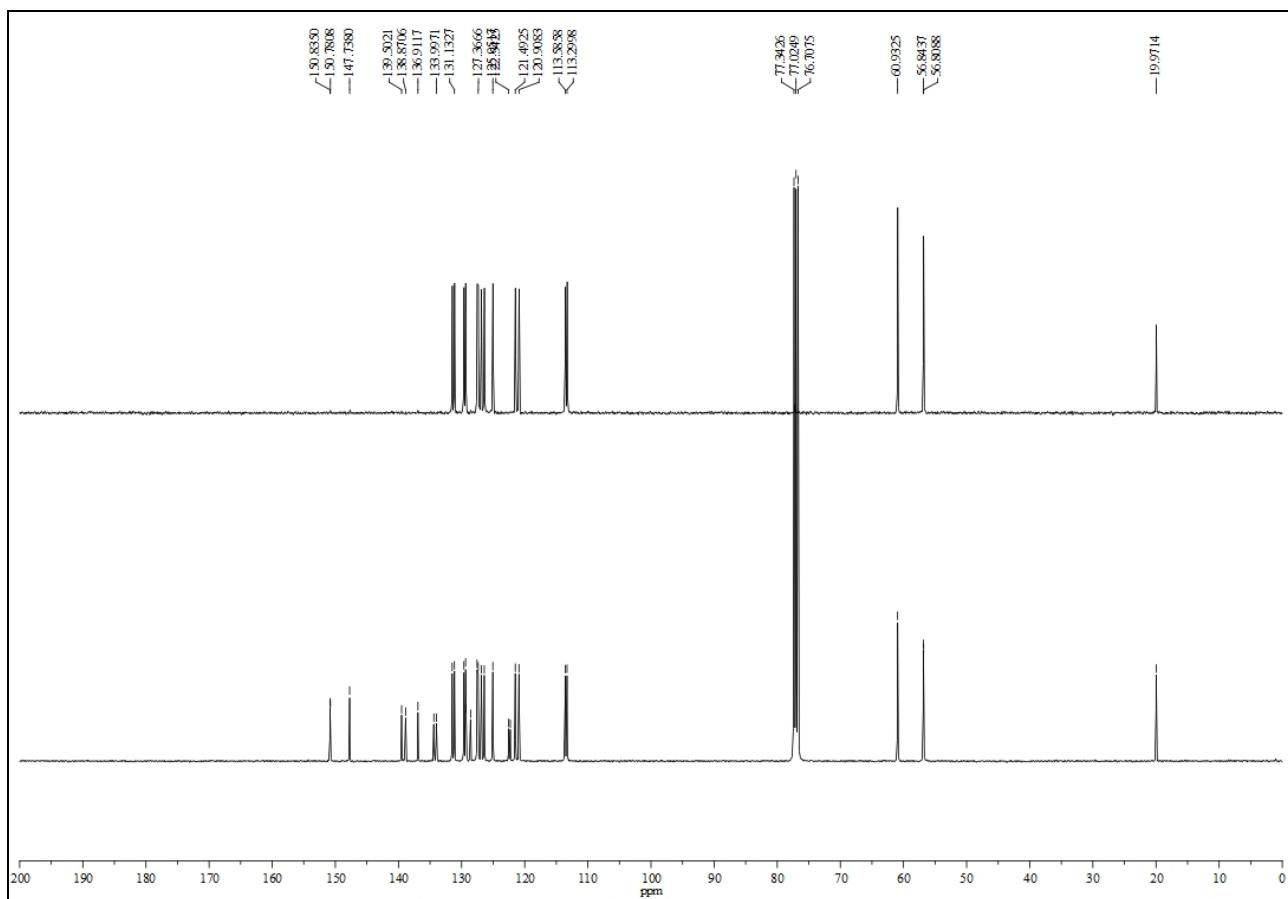
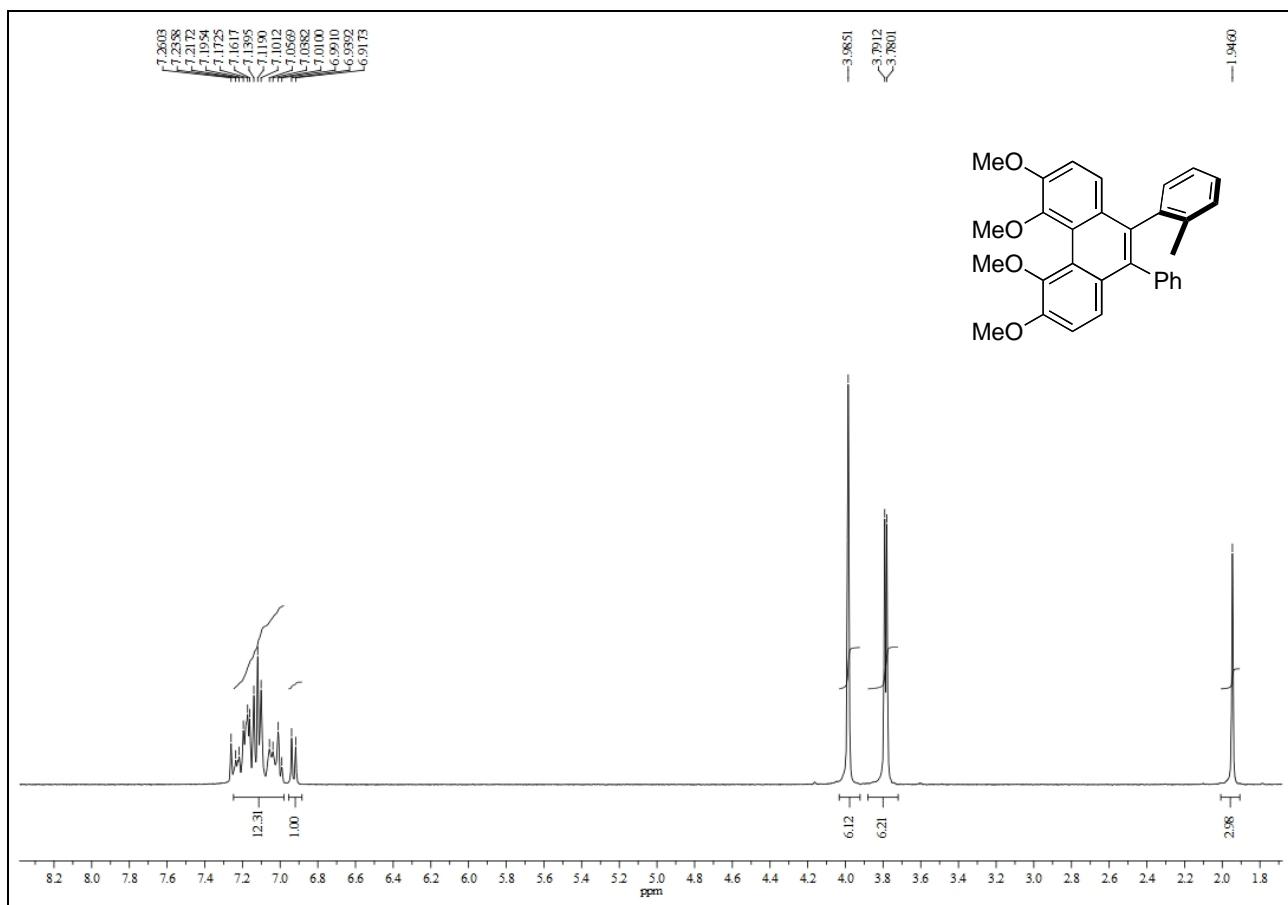
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8da** (300 MHz, CDCl<sub>3</sub>):



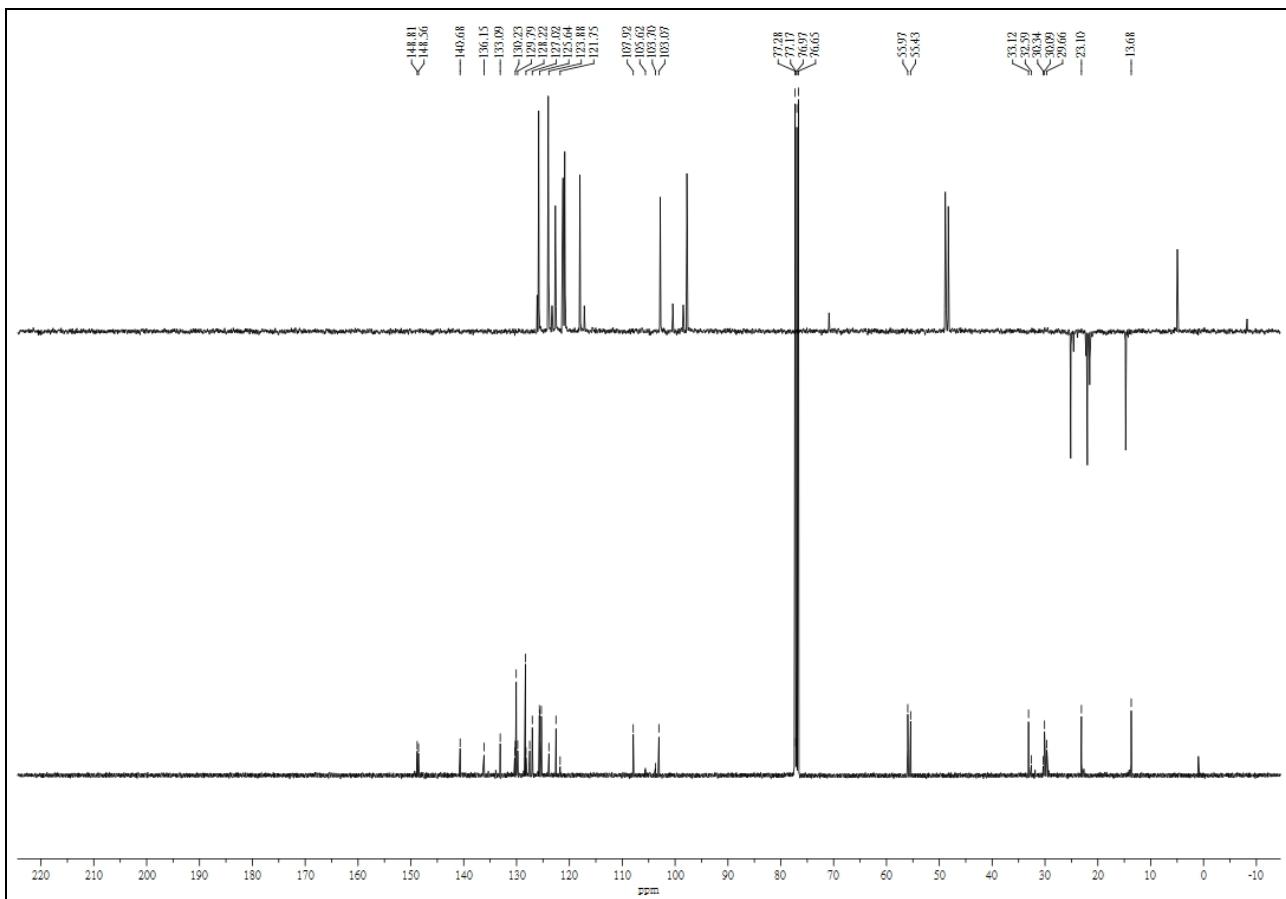
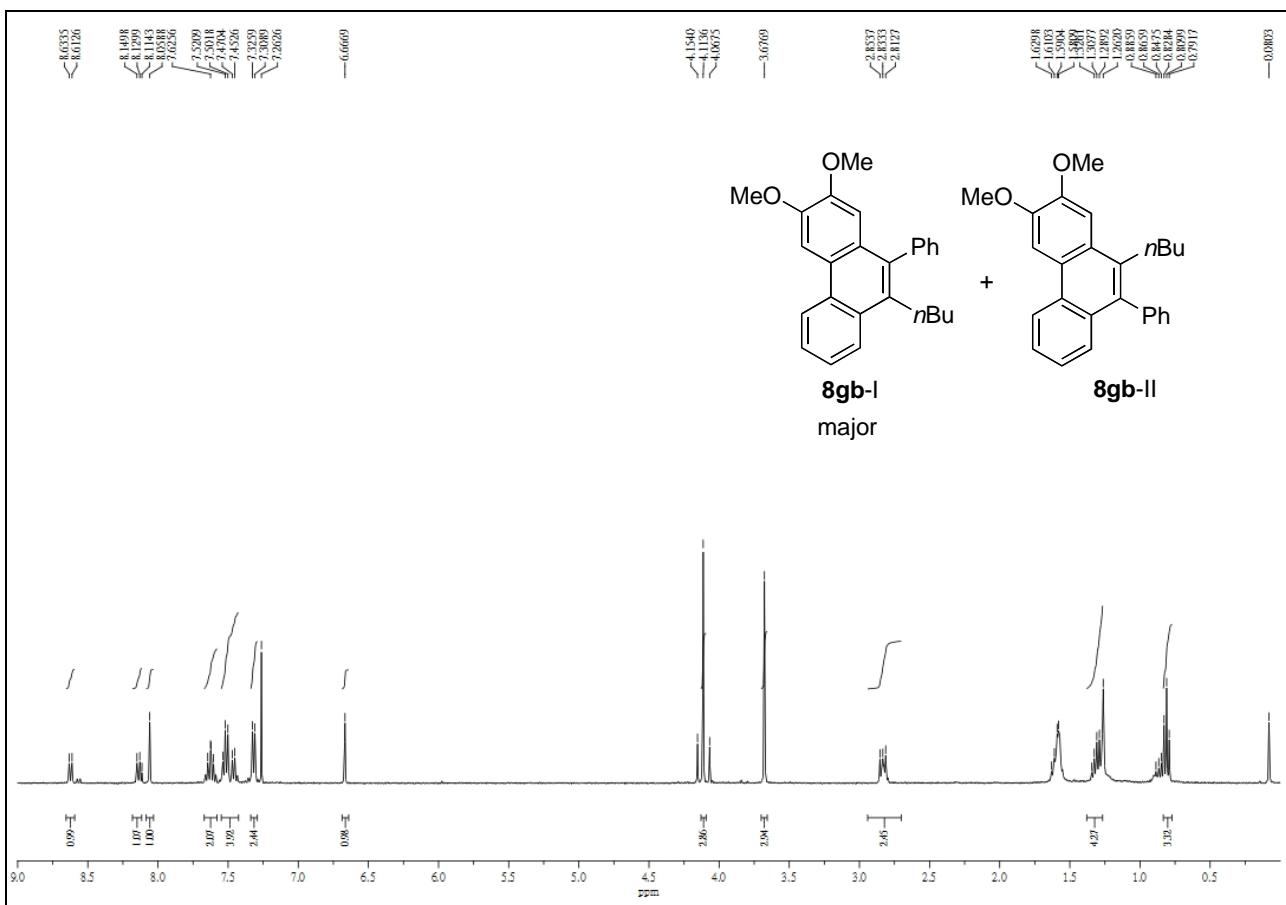
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8db** (300 MHz, CDCl<sub>3</sub>):



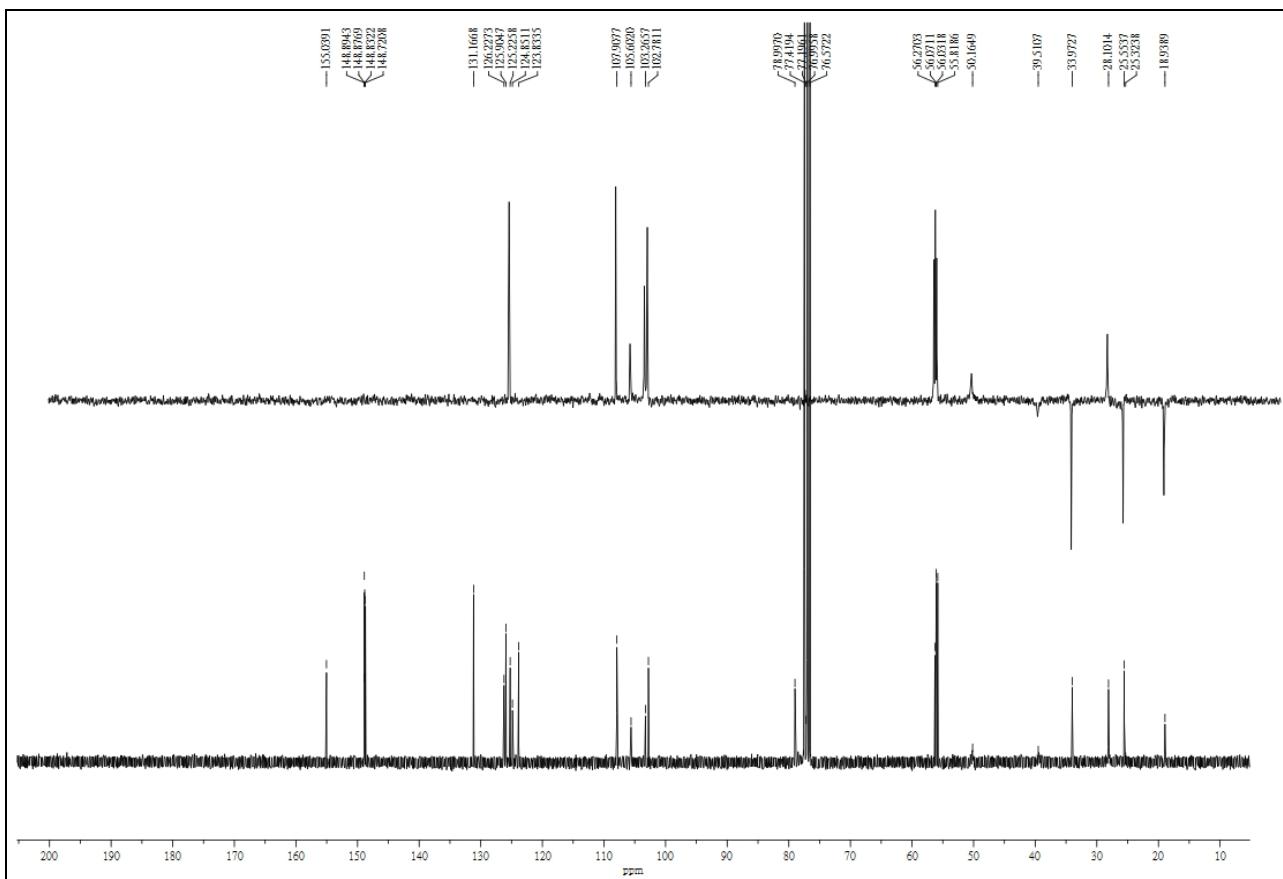
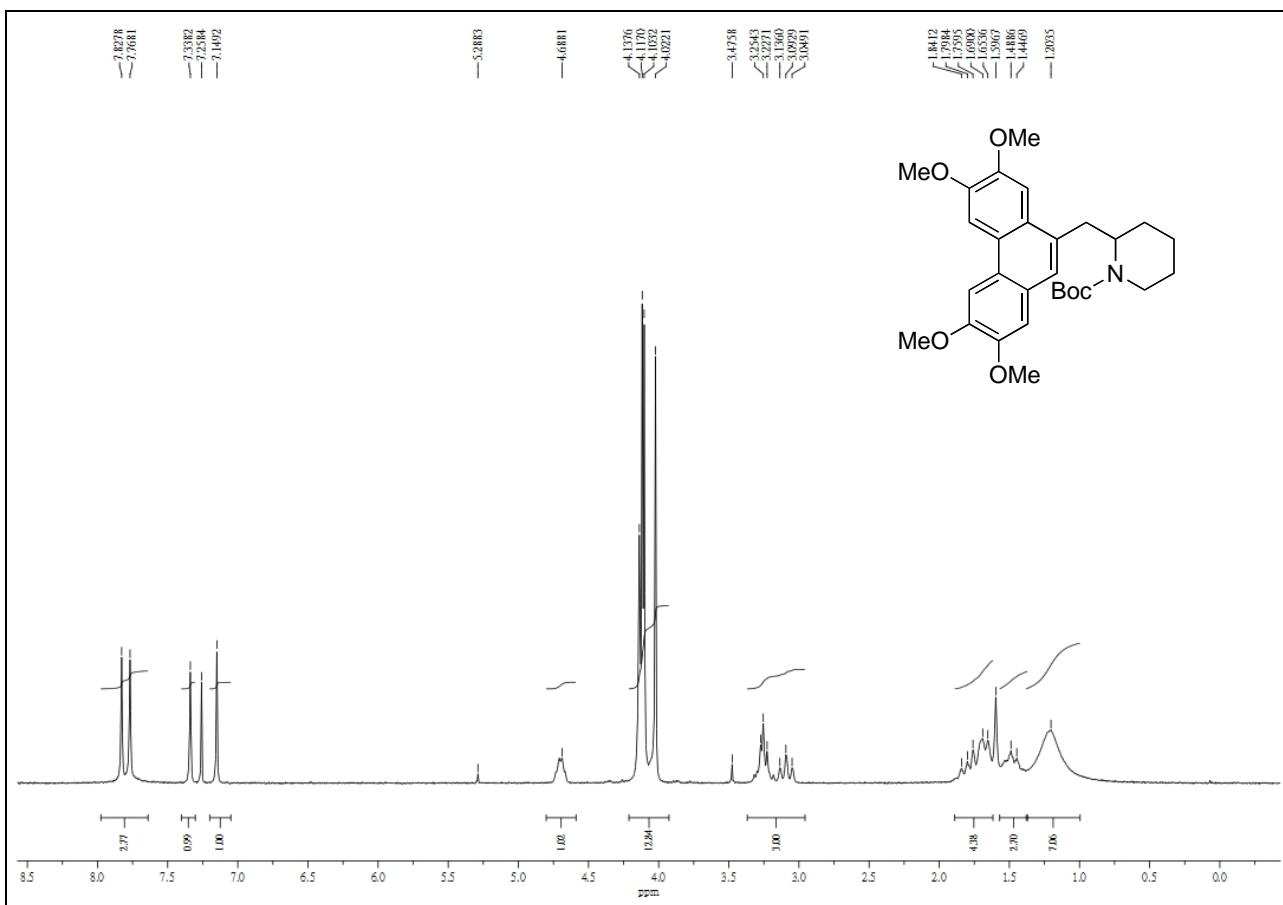
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8ei** (400 MHz, CDCl<sub>3</sub>):



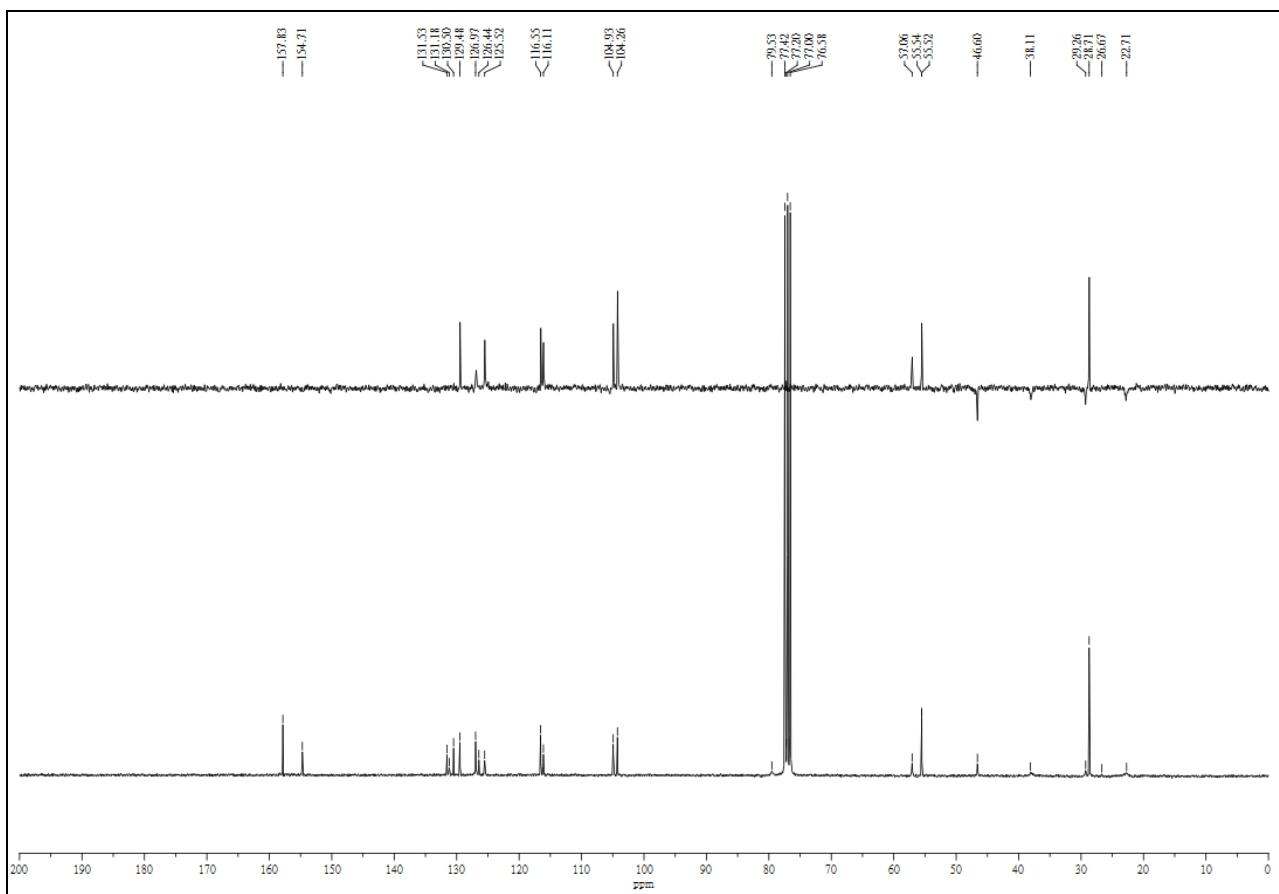
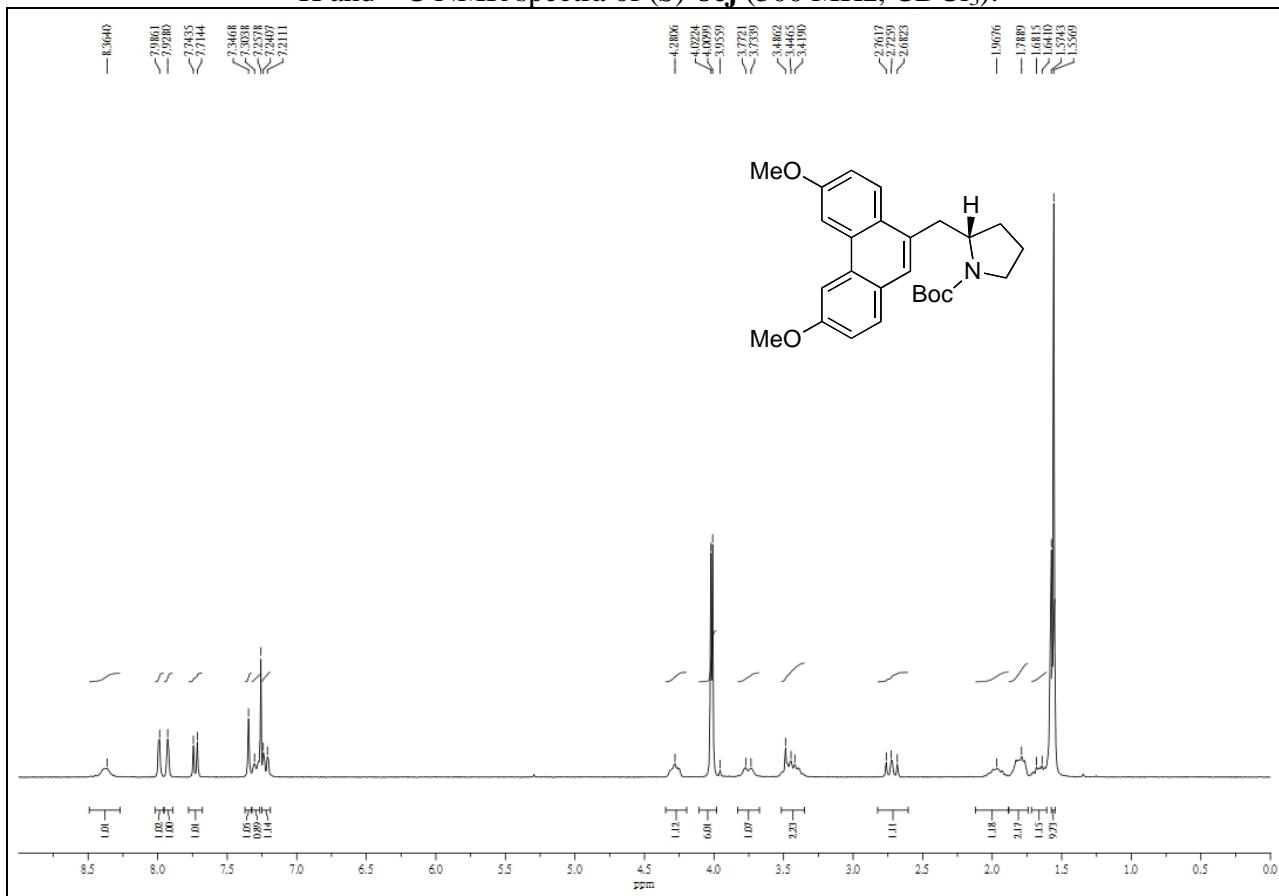
<sup>1</sup>H and <sup>13</sup>C NMR spectra of a mixture of **8gb-I** and **8gb-II** (400 MHz, CDCl<sub>3</sub>):



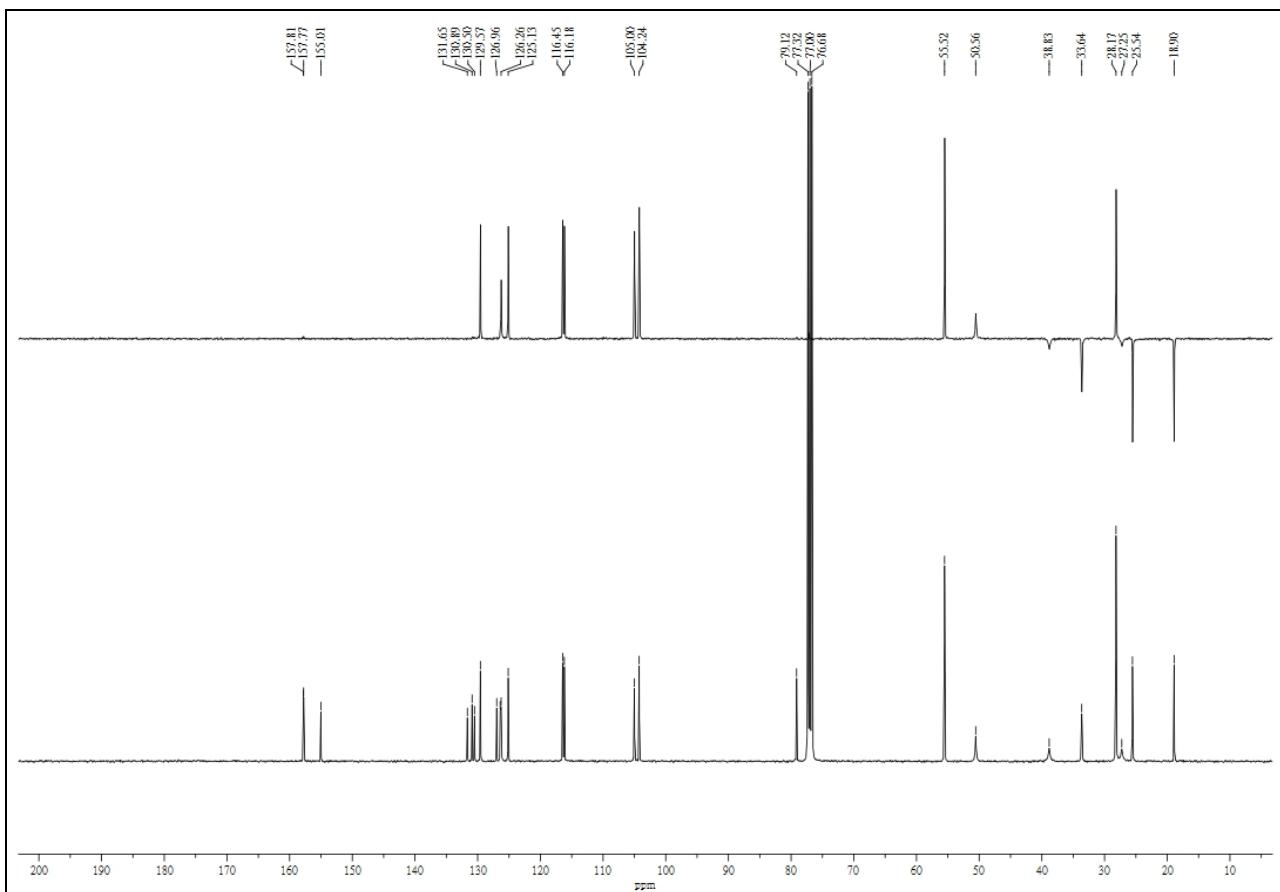
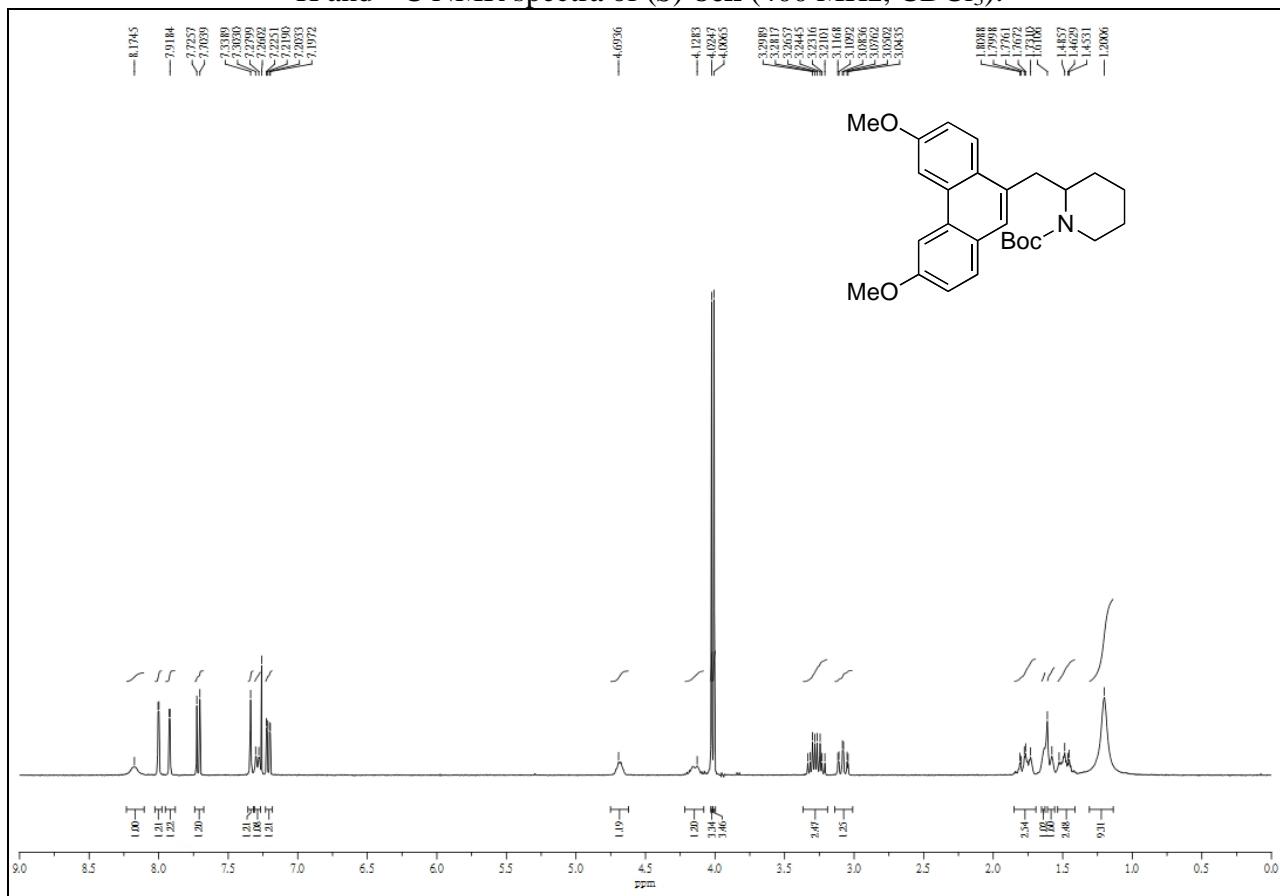
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8ak** (300 MHz, CDCl<sub>3</sub>):



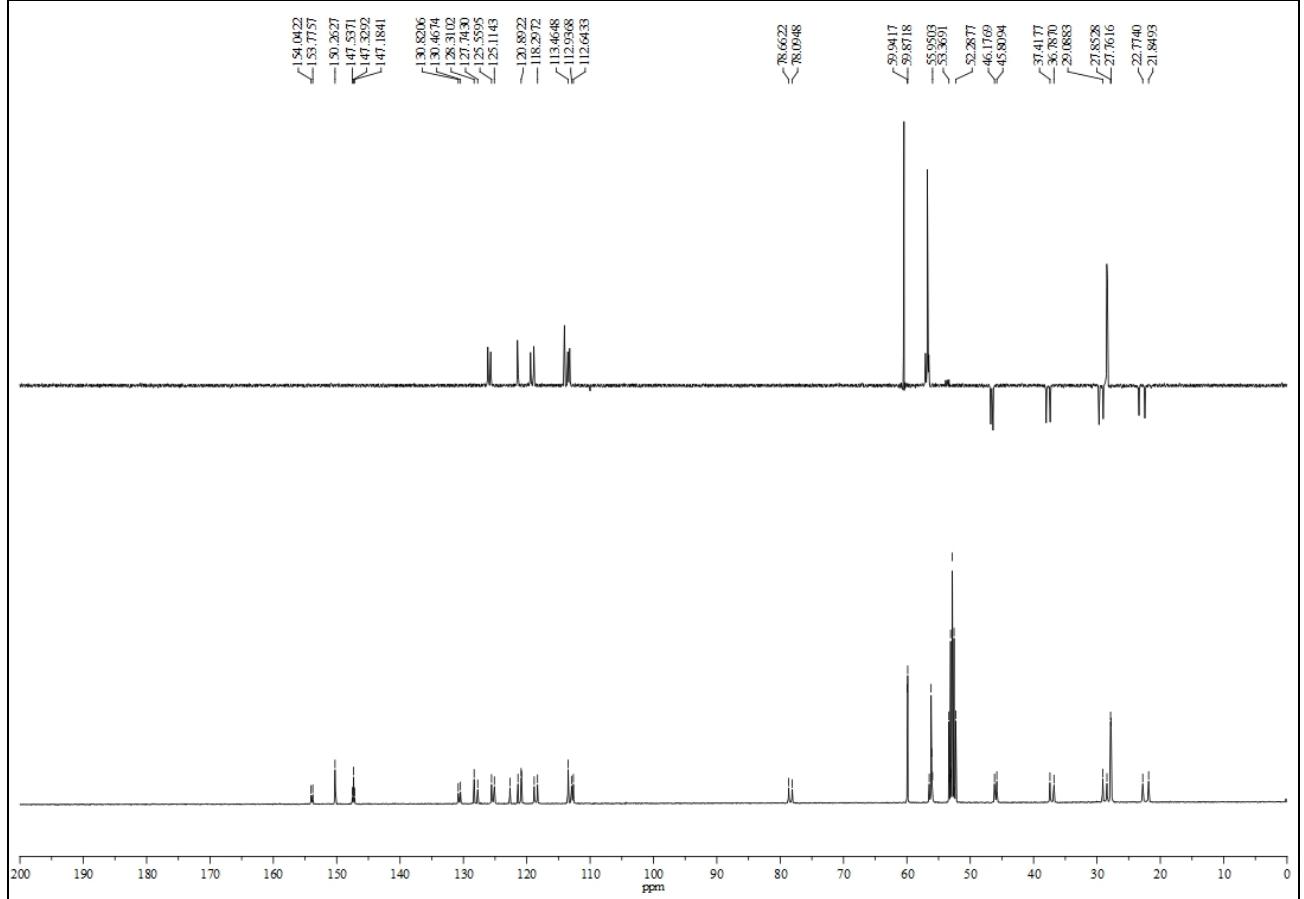
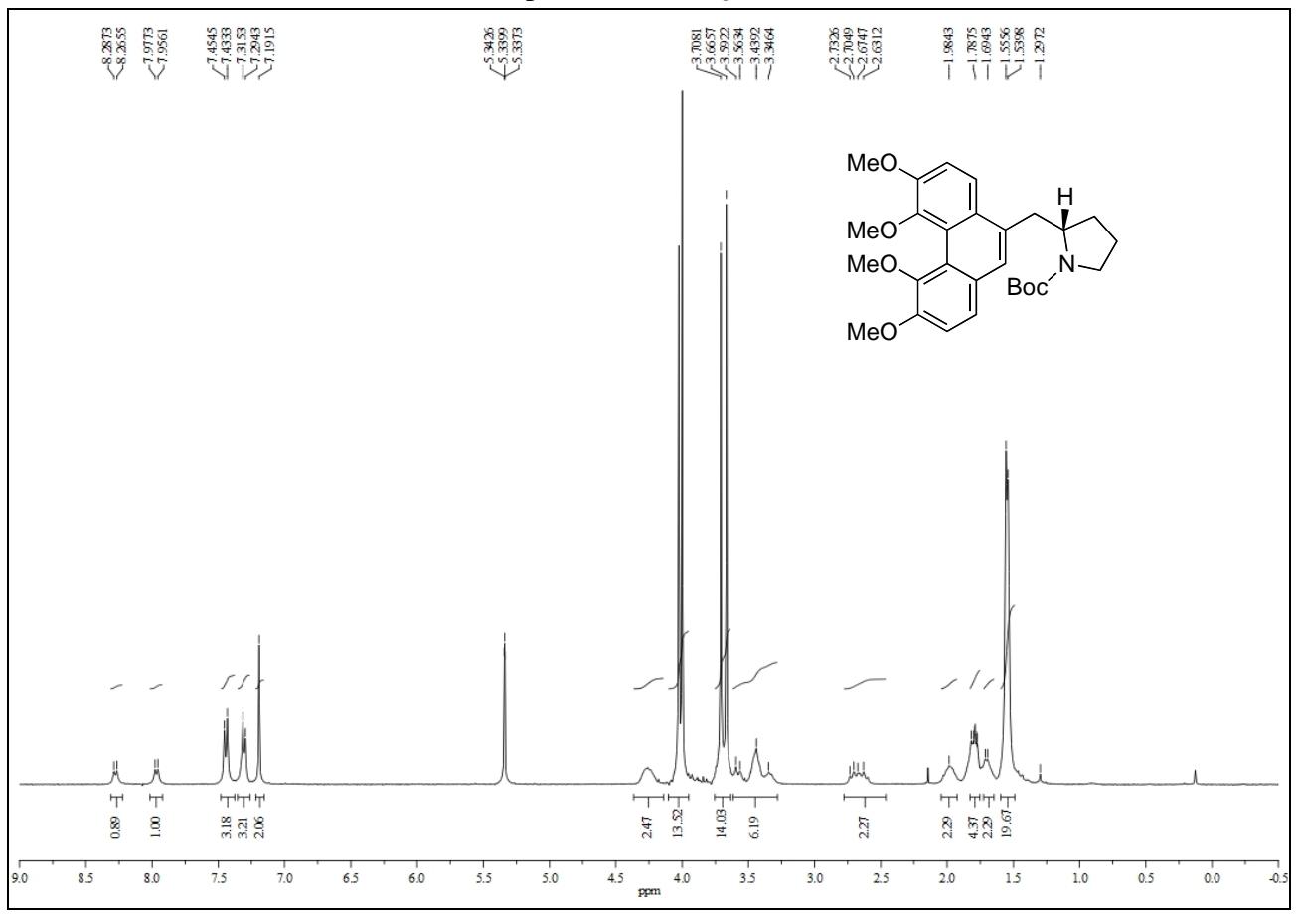
<sup>1</sup>H and <sup>13</sup>C NMR spectra of (*S*)-**8cj** (300 MHz, CDCl<sub>3</sub>):



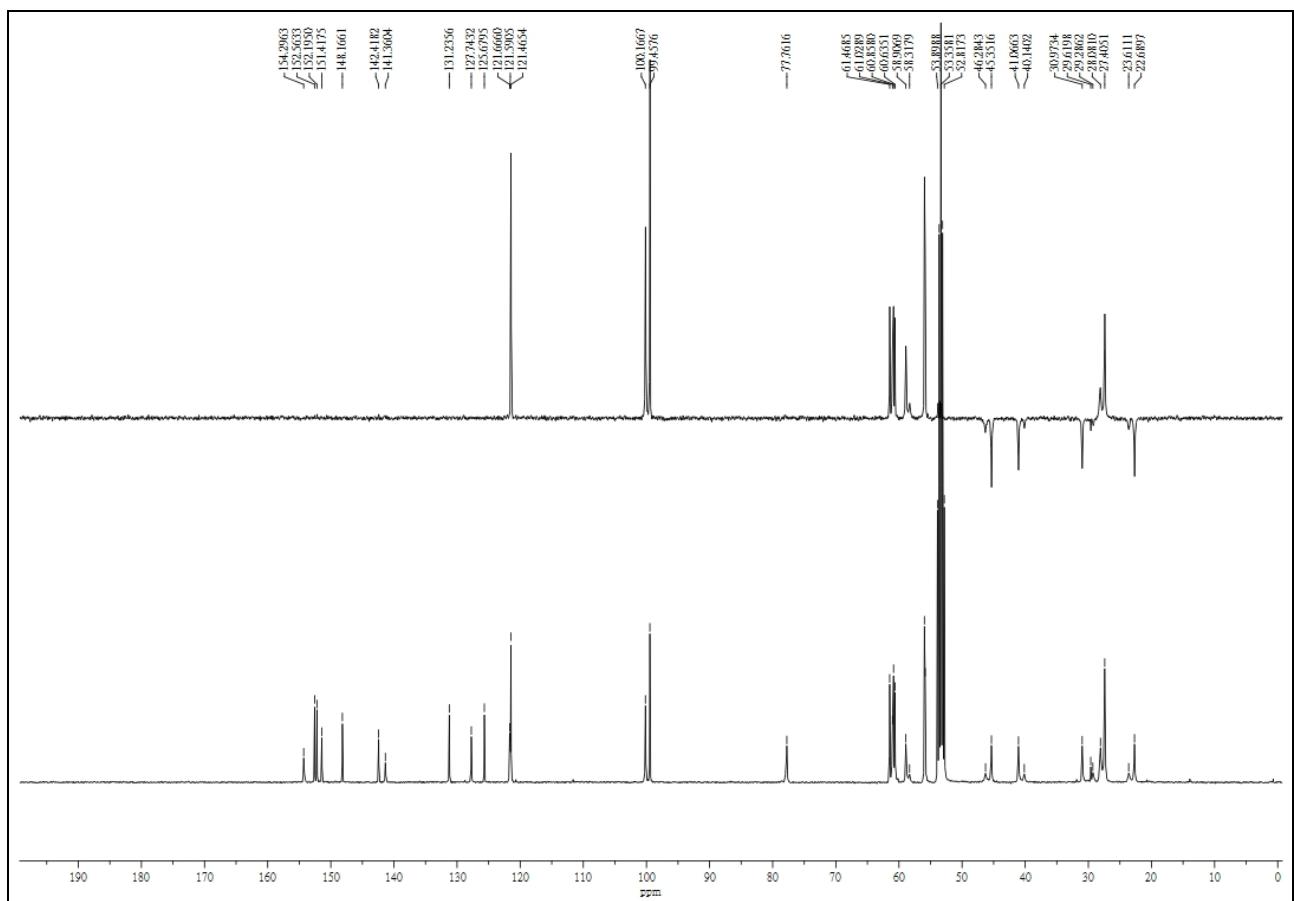
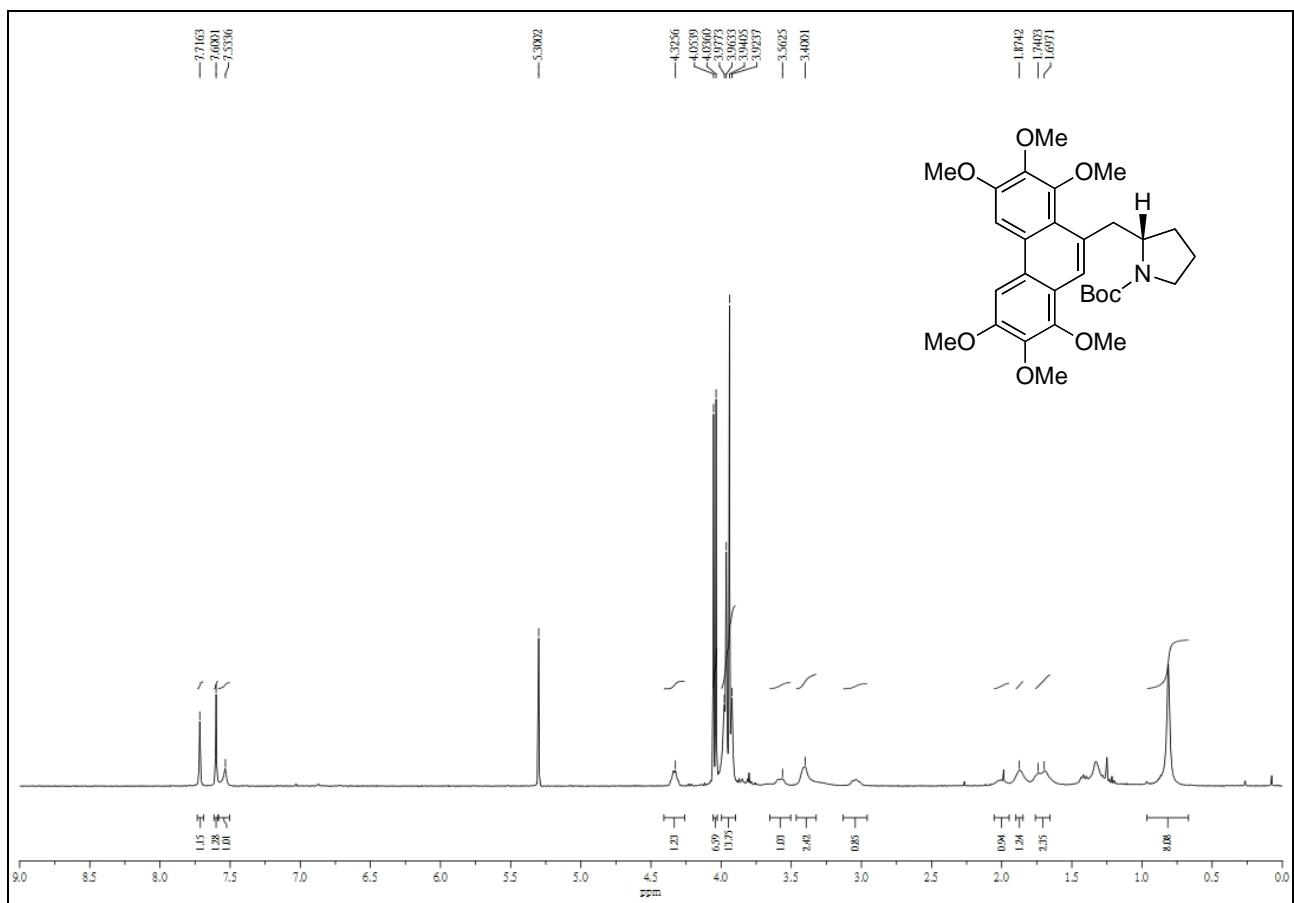
<sup>1</sup>H and <sup>13</sup>C NMR spectra of (*S*)-8ck (400 MHz, CDCl<sub>3</sub>):



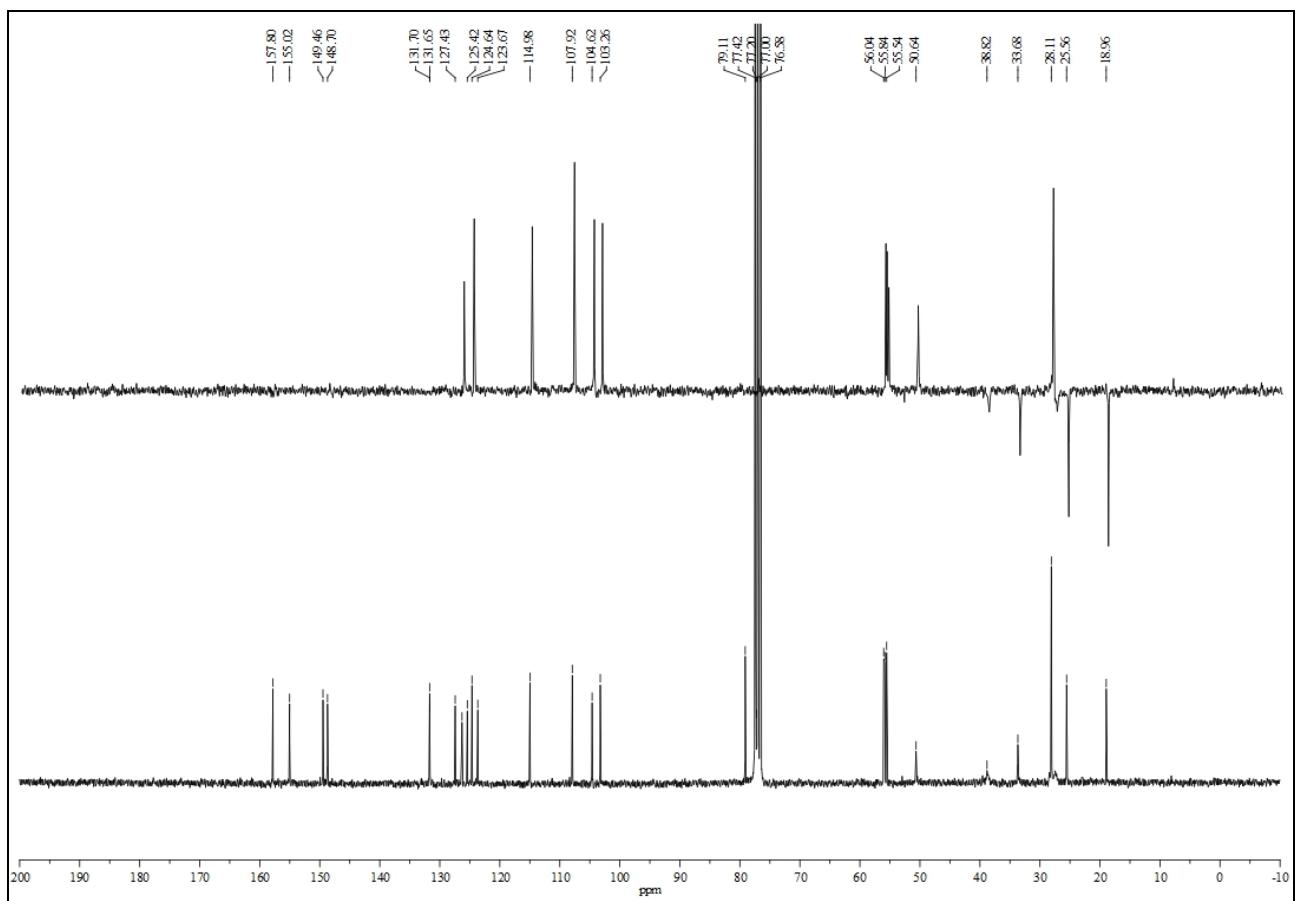
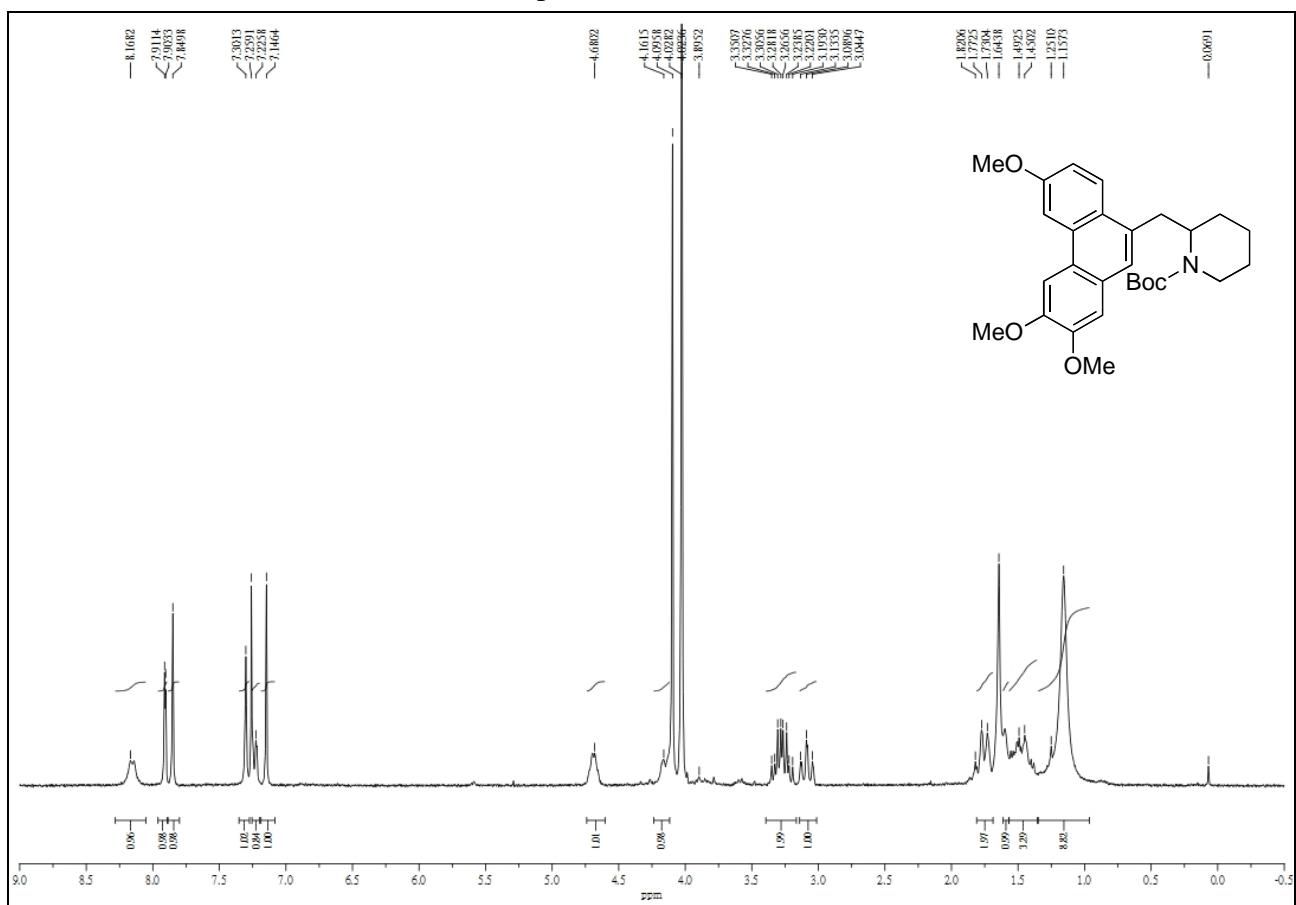
<sup>1</sup>H and <sup>13</sup>C NMR spectra of (*S*)-**8ej** (400 MHz, CD<sub>2</sub>Cl<sub>2</sub>):



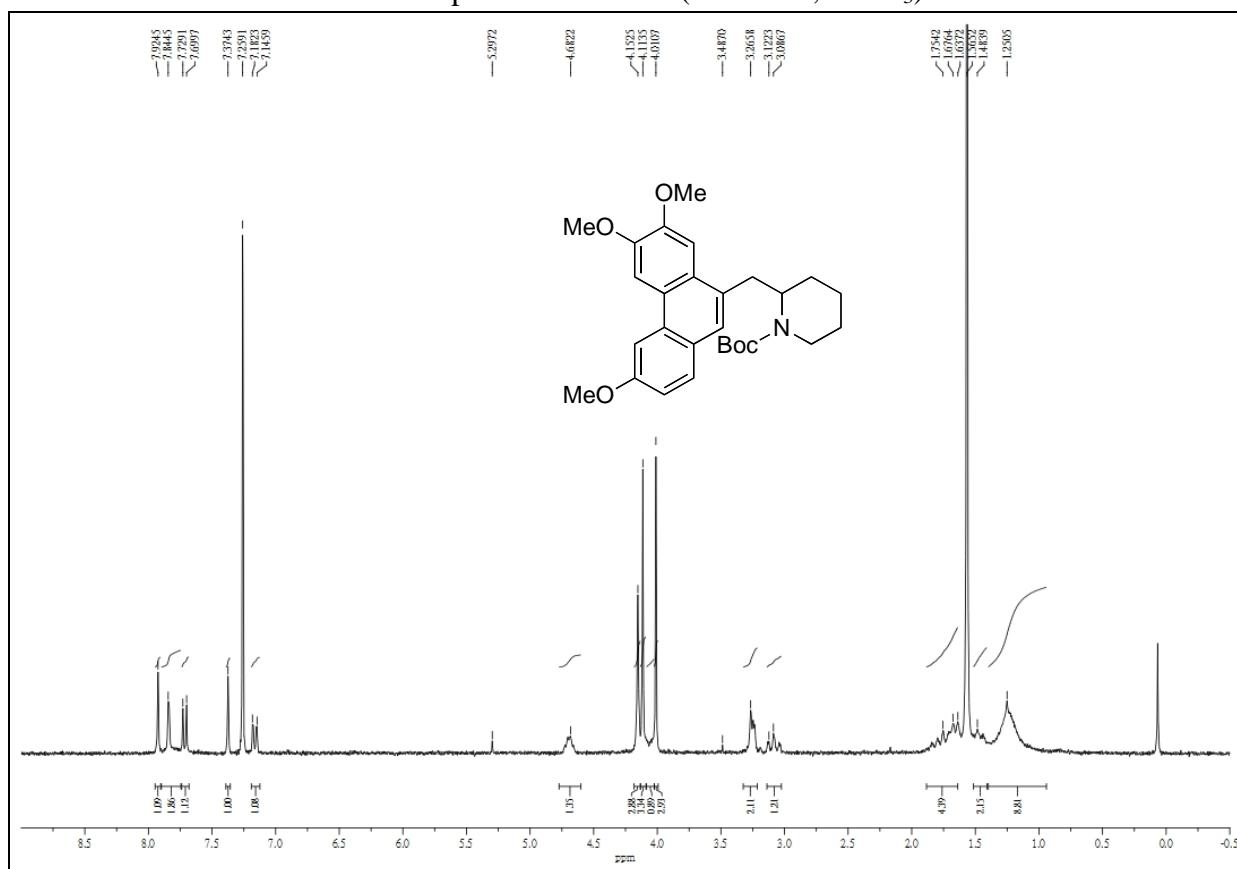
<sup>1</sup>H and <sup>13</sup>C NMR spectra of (*S*)-**8fj** (300 MHz, CDCl<sub>3</sub>):



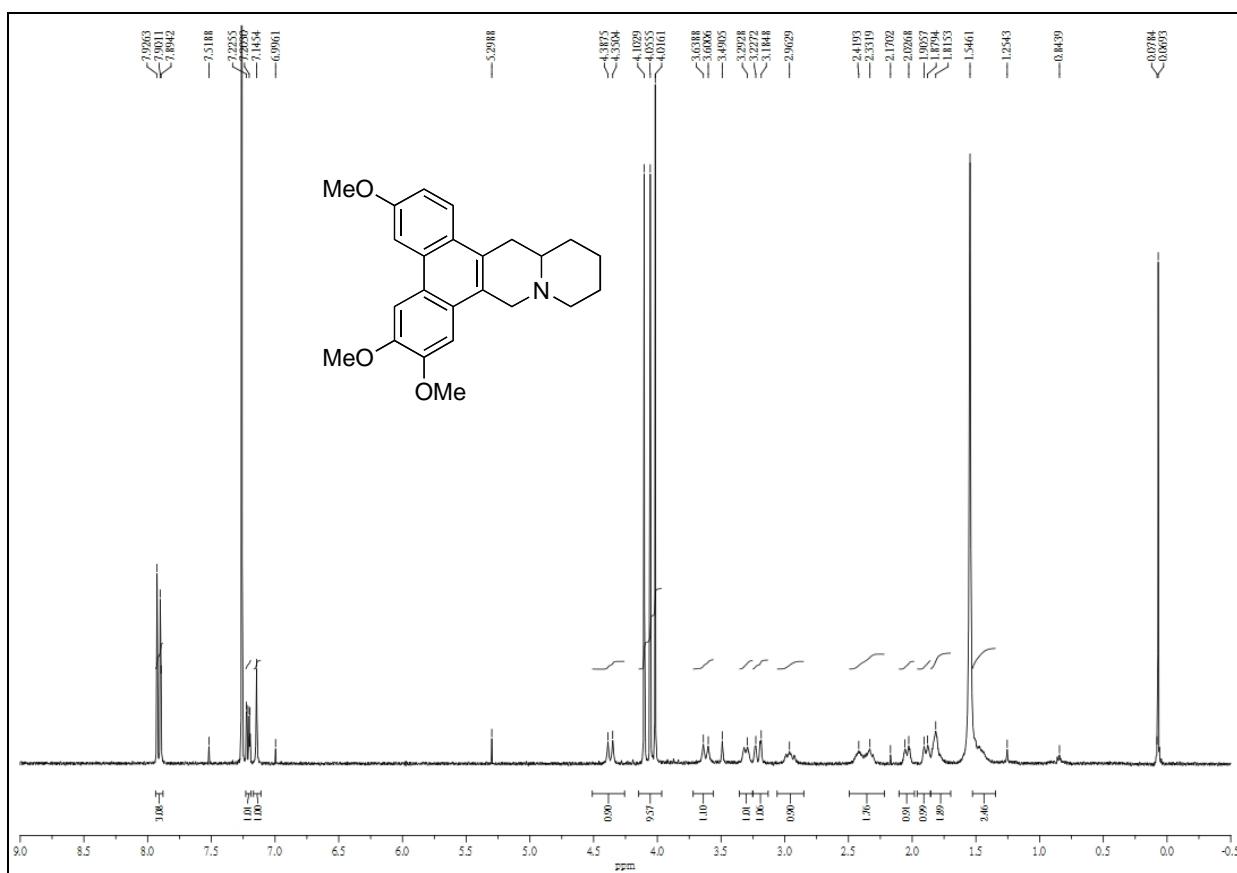
<sup>1</sup>H and <sup>13</sup>C NMR spectra of **8hk-II** (300 MHz, CDCl<sub>3</sub>):



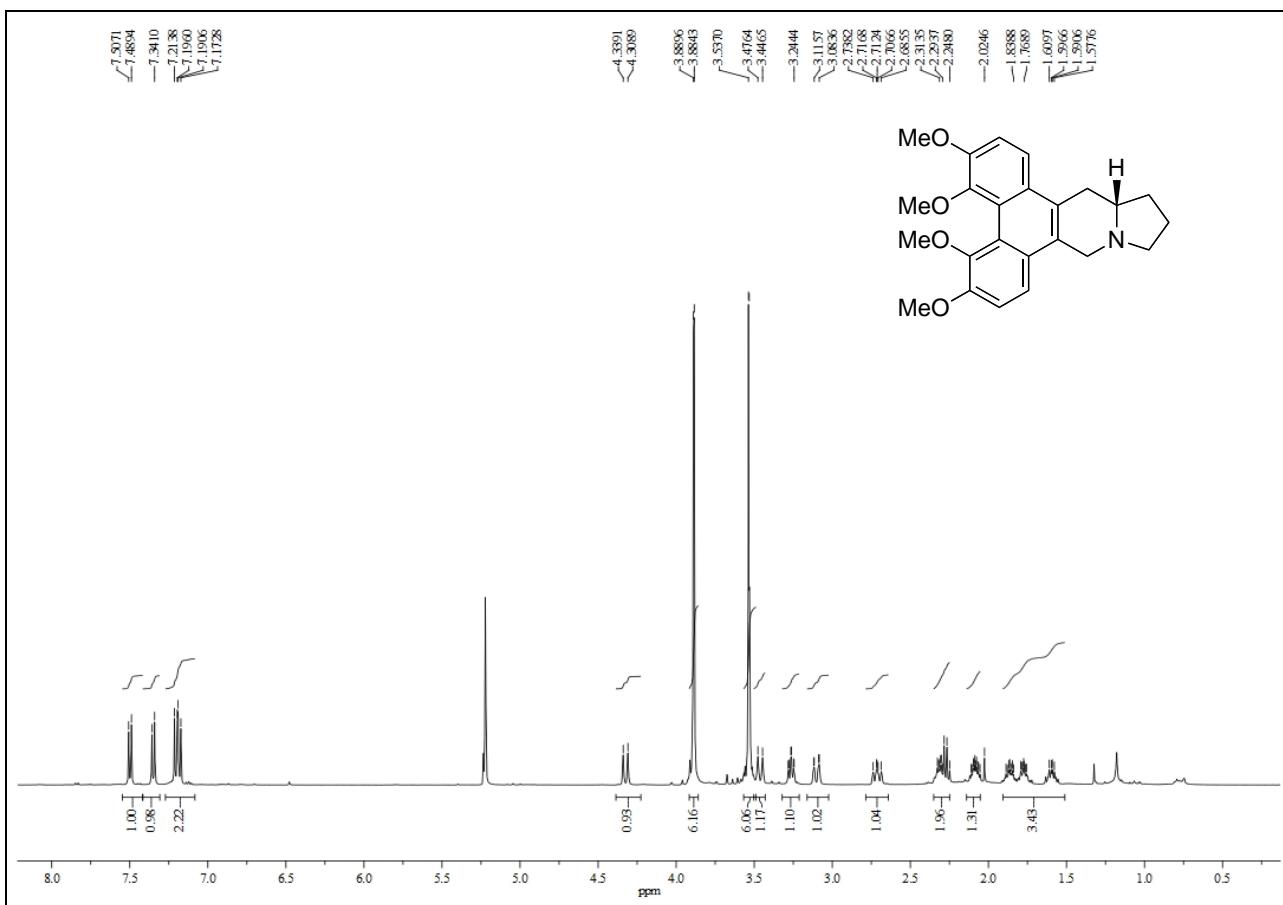
<sup>1</sup>H NMR spectrum of **8hk-I** (300 MHz, CDCl<sub>3</sub>):



<sup>1</sup>H NMR spectrum of **5** (400 MHz, CDCl<sub>3</sub>):

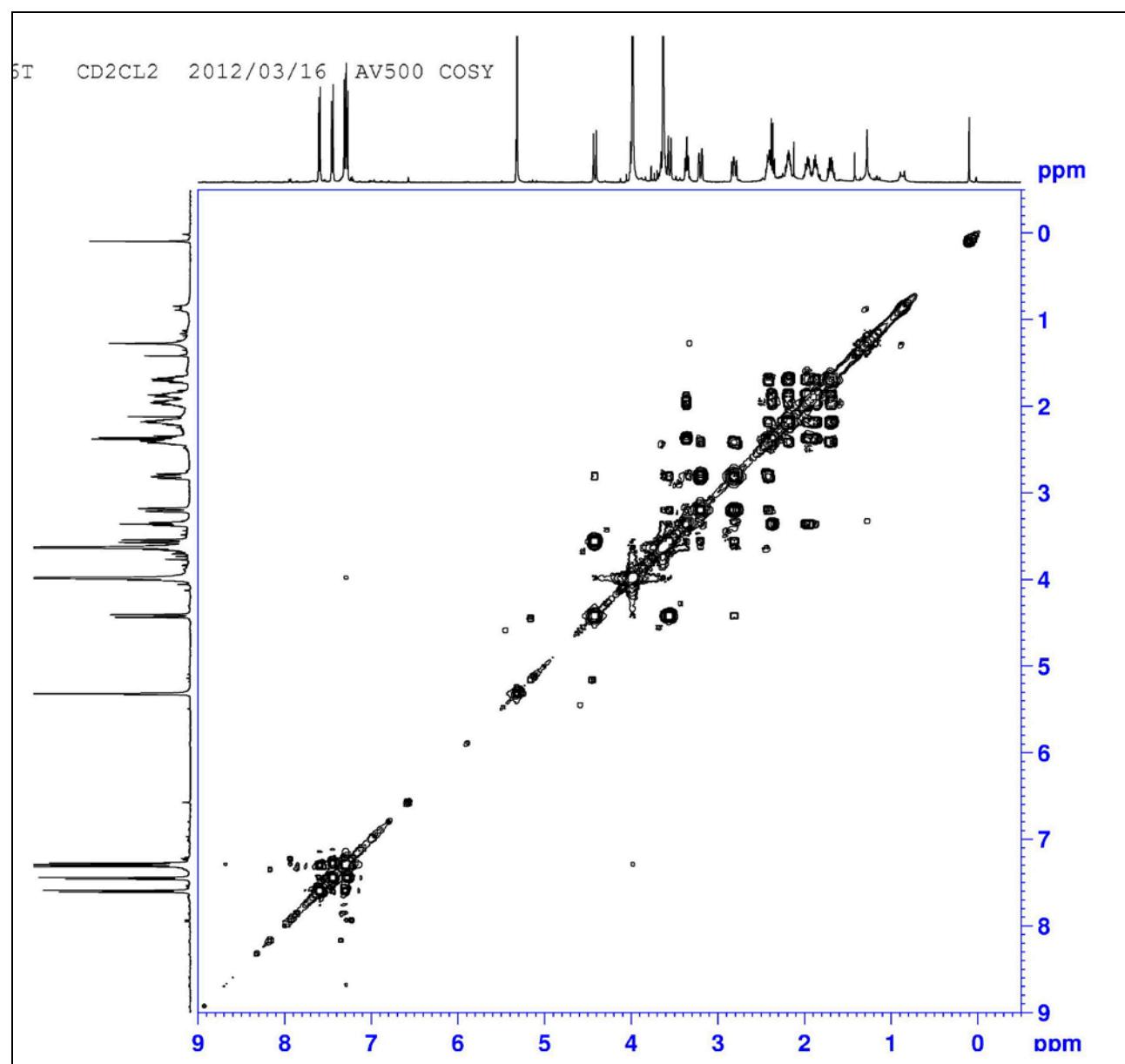


<sup>1</sup>H and <sup>13</sup>C NMR spectra of (*S*)-**10** (500 MHz, CD<sub>2</sub>Cl<sub>2</sub>):

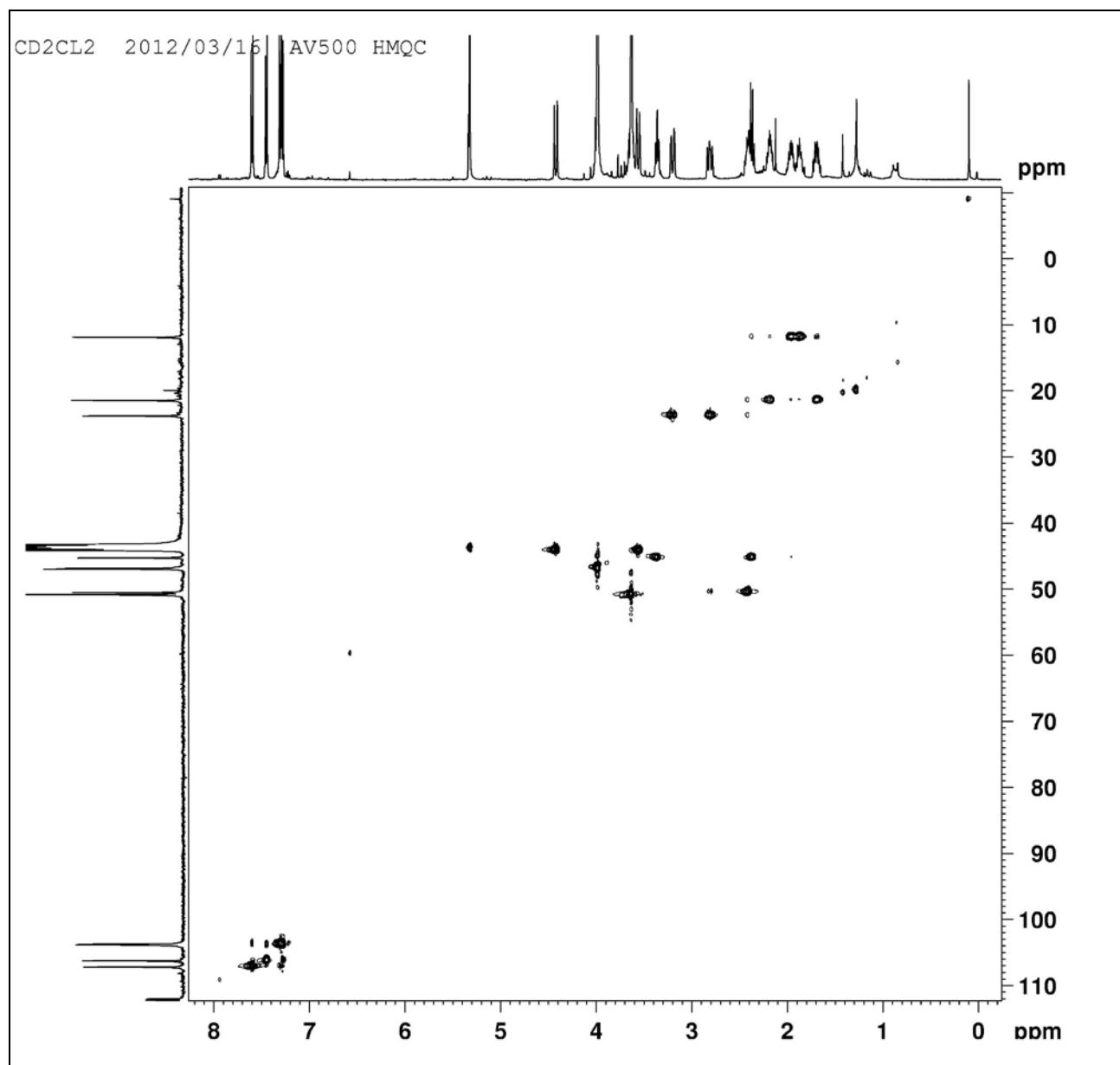


## B. 2D NMR of Alkaloid (S)-10

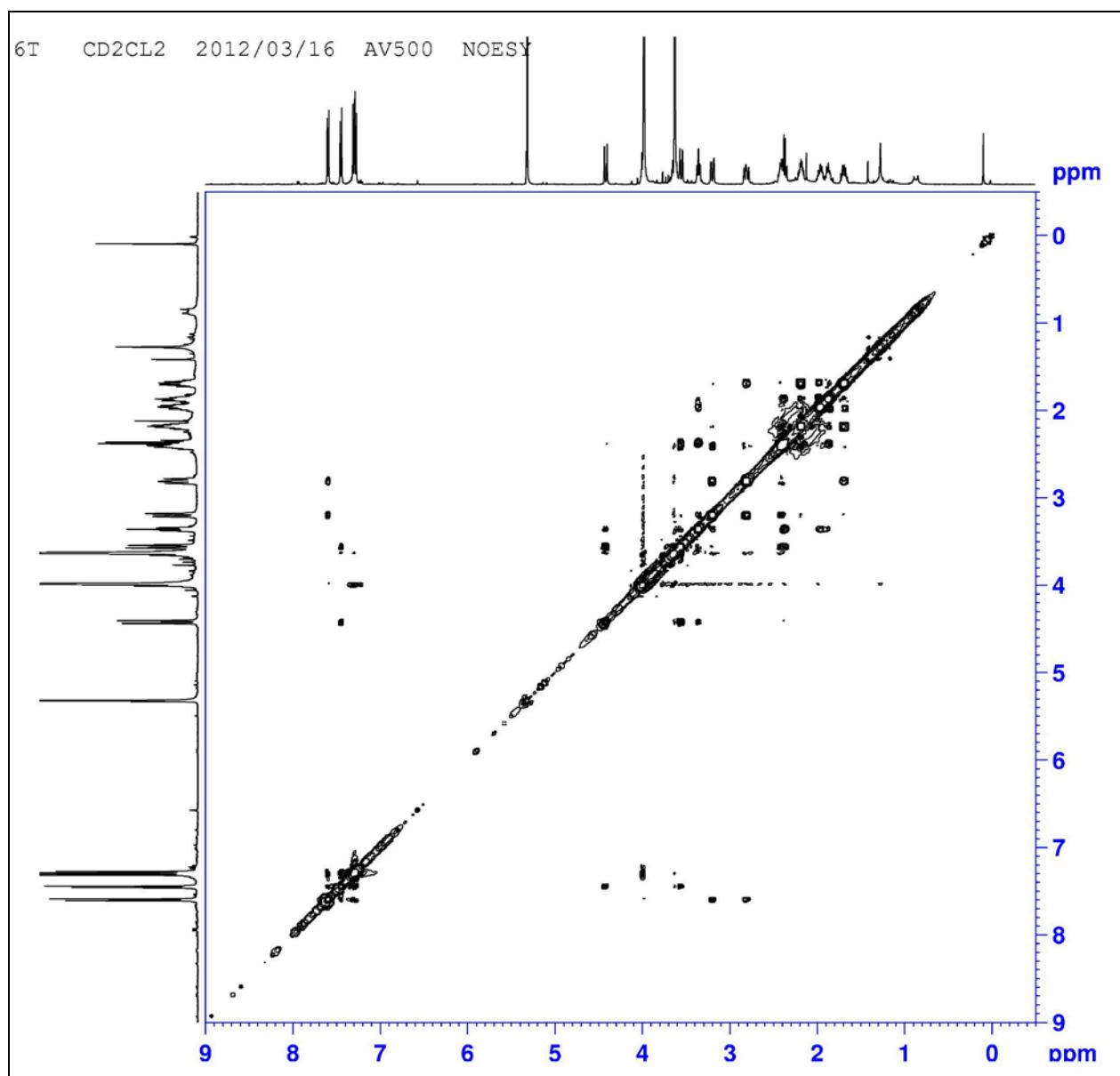
### B1. H,H-COSY Spectrum



## B2. HMQC Spectrum



### B3. NOESY Spectrum



**B4. HMBC spectrum**

