

Electronic Supplementary Material (ESI)

## **A new, convenient way to fully substituted $\alpha,\beta$ -unsaturated $\gamma$ -hydroxy butyrolactams**

Alexander V. Aksenov \*, Dmitrii A. Aksenov, Igor A. Kurenkov, Alexander V. Leontiev, and Nicolai A. Aksenov

*Department of Chemistry, North Caucasus Federal University, 1a Pushkin St., 355009 Stavropol, Russia*

\* Correspondence: [aaksenov@ncfu.ru](mailto:aaksenov@ncfu.ru) (A.V.A.)

### **Supporting Information**

NMR Spectral Charts.....	S2
$^1\text{H}$ and $^{13}\text{C}$ NMR spectral charts for chalcones <b>5</b> .....	S2
$^1\text{H}$ and $^{13}\text{C}$ NMR spectral charts for 2,4-diaryl-4-oxobutanenitriles <b>2</b> .....	S8
$^1\text{H}$ and $^{13}\text{C}$ NMR spectral charts for 4-benzyl-5-hydroxy-3,5-diaryl-1 <i>H</i> -pyrrol-2(5 <i>H</i> )-ones <b>4</b> .....	S14

**$^1\text{H}$  and  $^{13}\text{C}$  NMR spectral charts for chalcones 5**

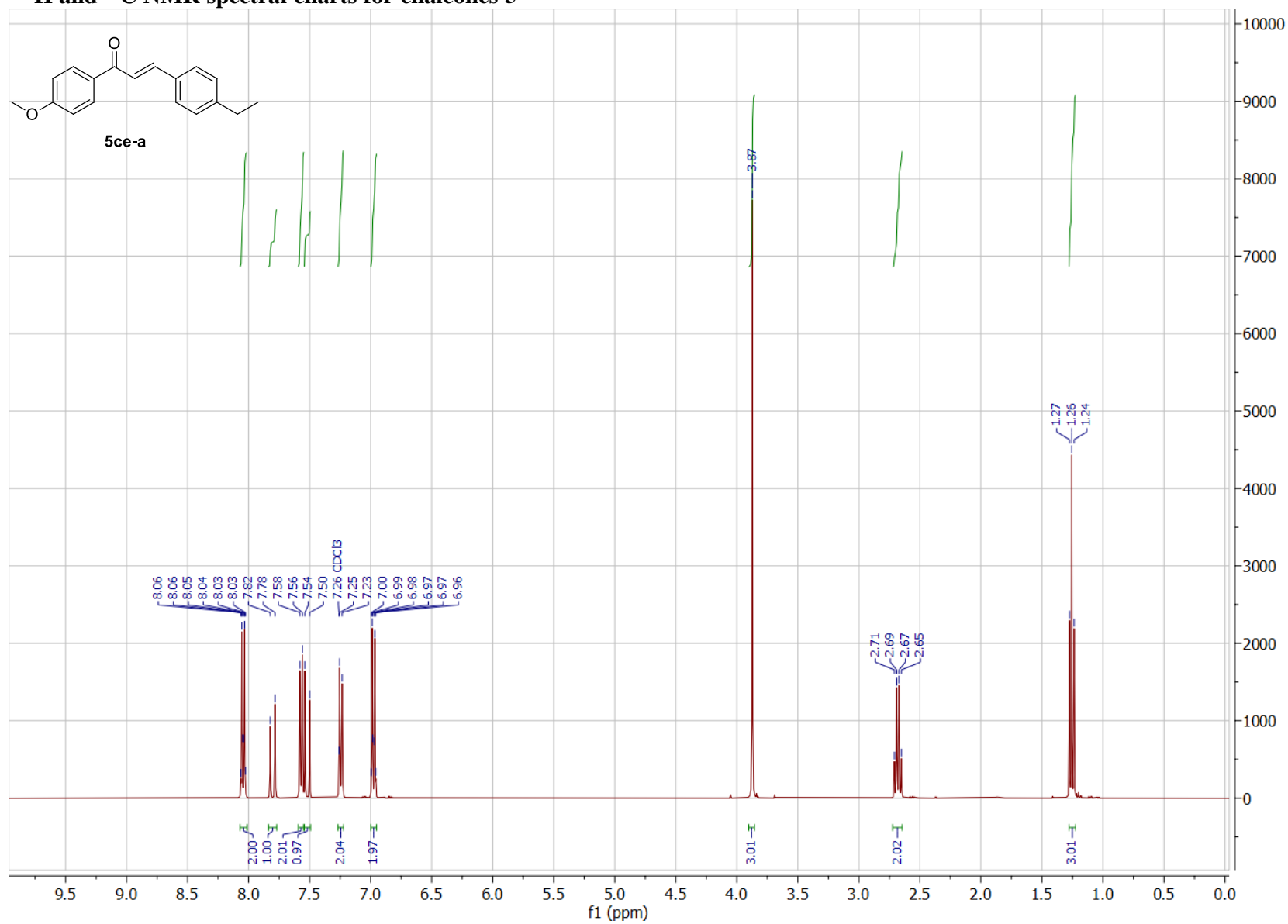


Figure S1.  $^1\text{H}$  NMR spectrum of **5ce-a** in  $\text{CDCl}_3$  (400 MHz)

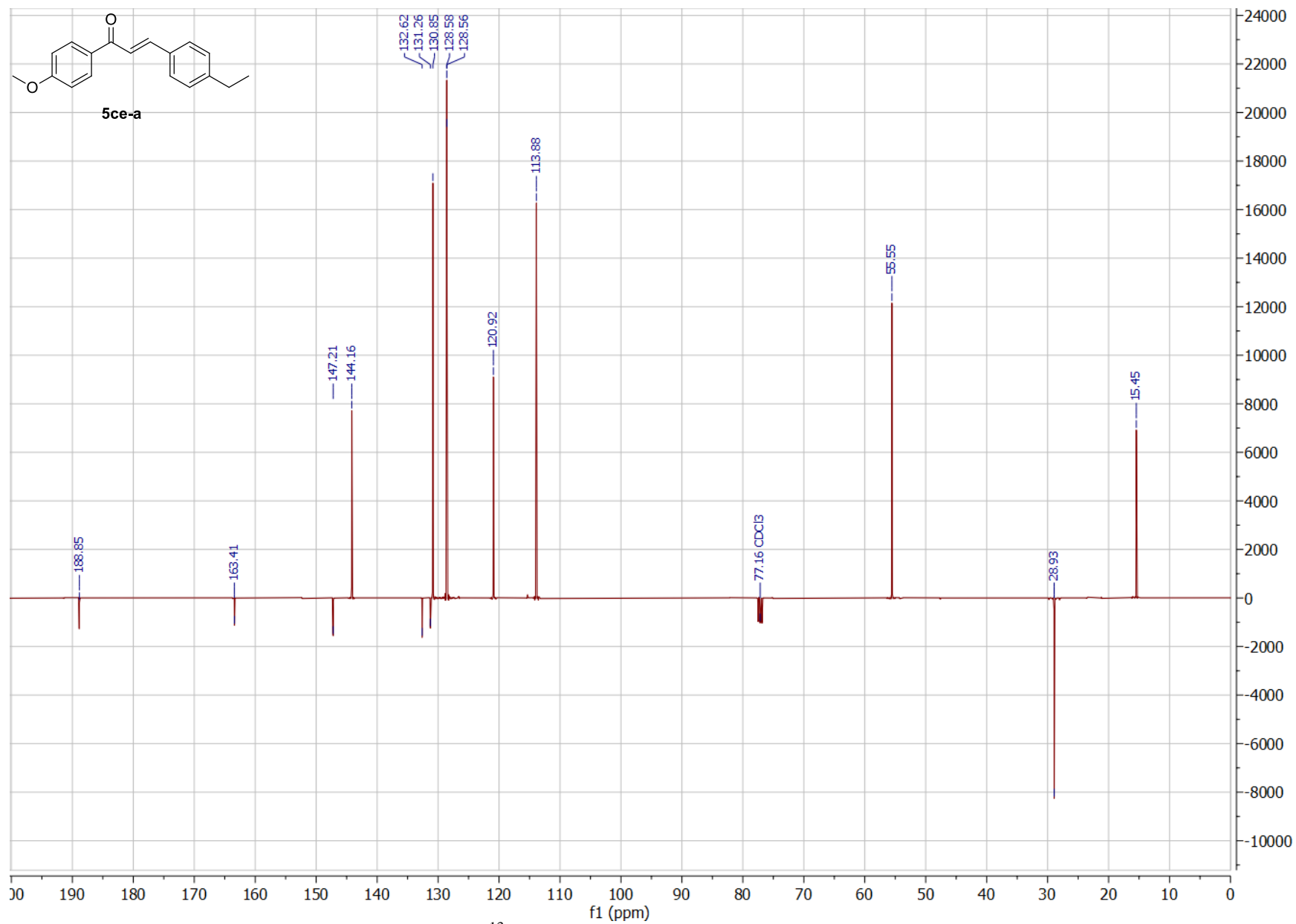


Figure S2.  $^{13}\text{C}$  NMR spectrum of **5ce-a** in  $\text{CDCl}_3$  (101 MHz)

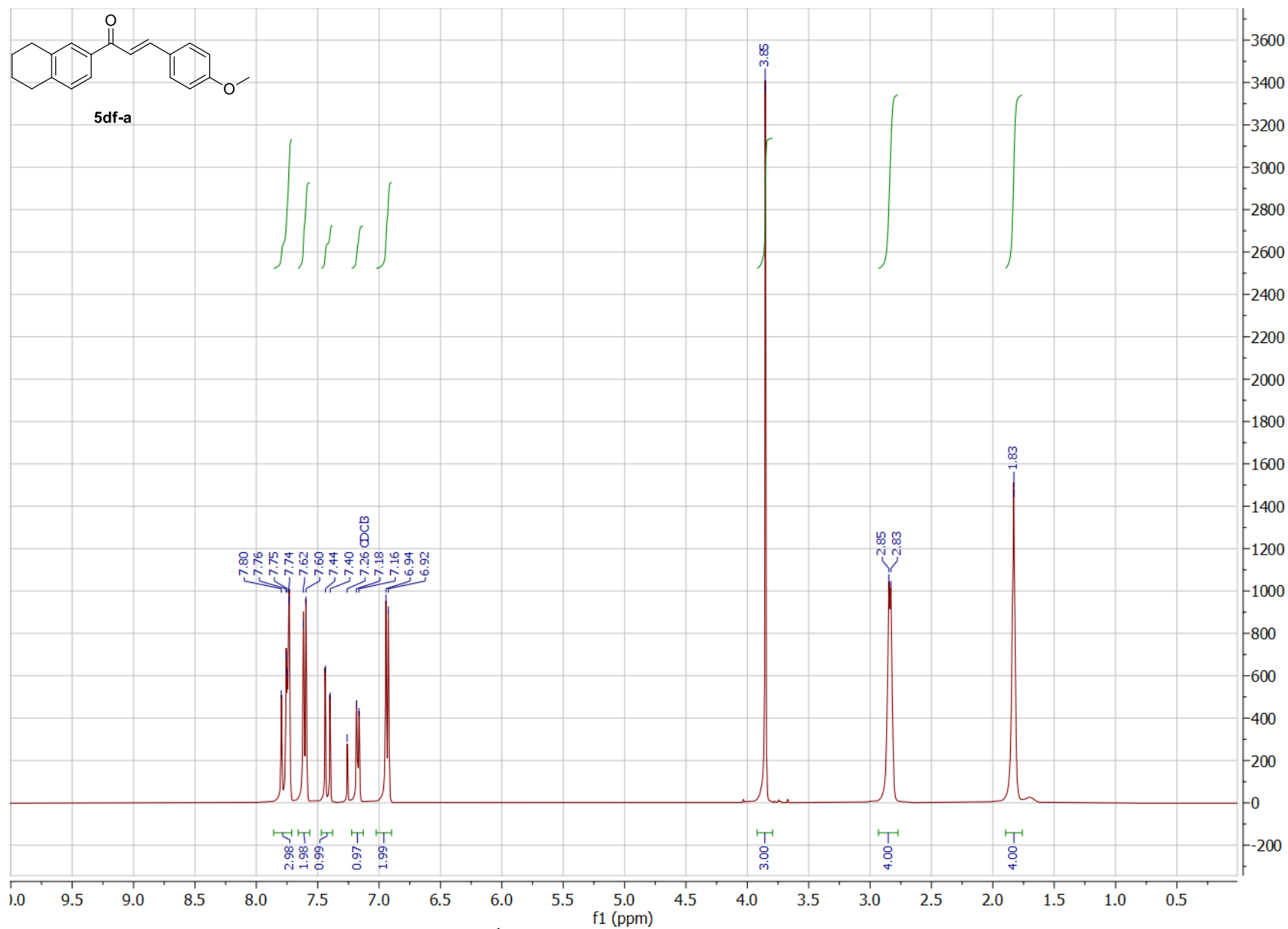


Figure S3. <sup>1</sup>H NMR spectrum of **5df-a** in CDCl<sub>3</sub> (400 MHz)

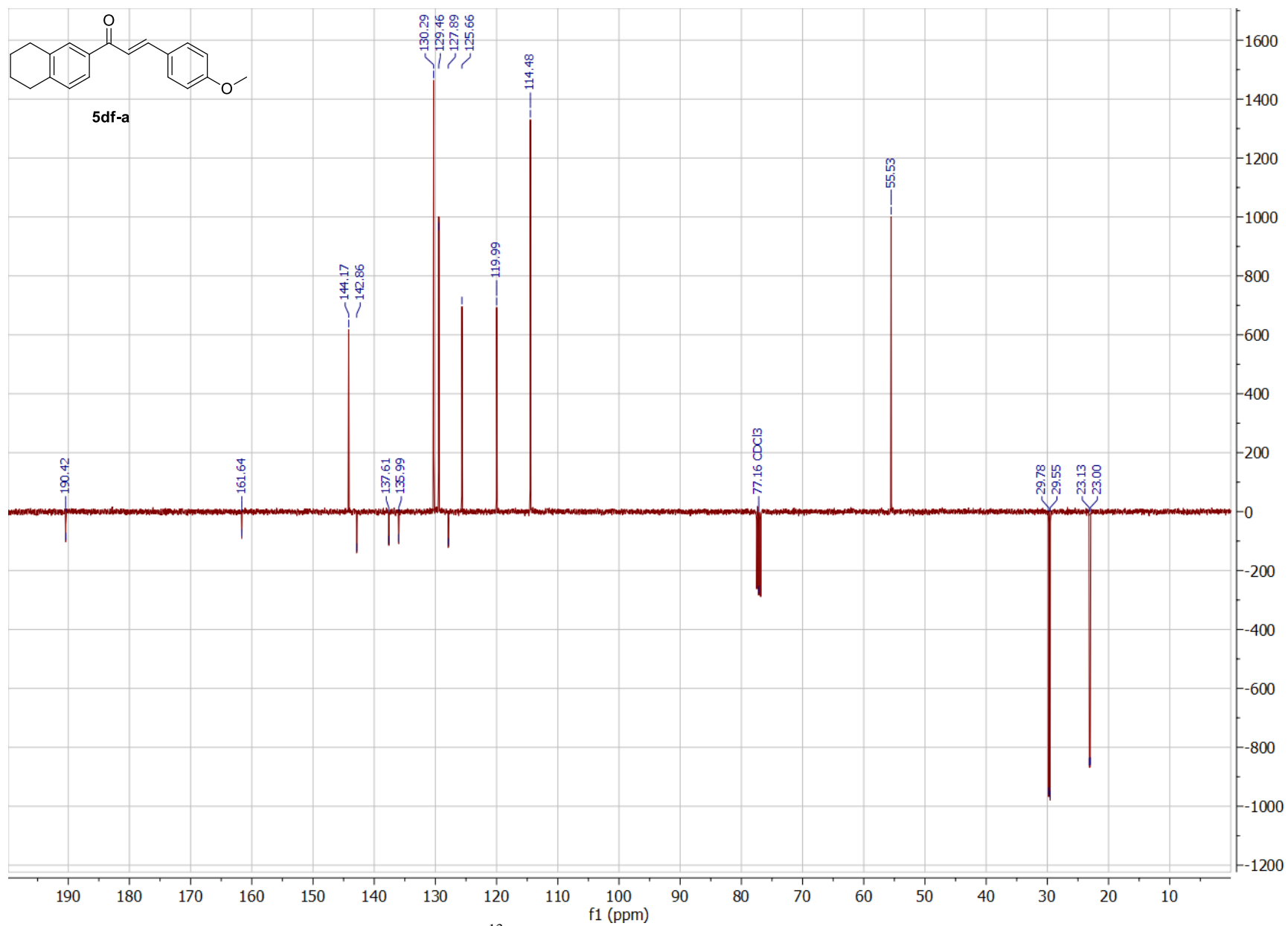


Figure S4.  $^{13}\text{C}$  NMR spectrum of **5df-a** in  $\text{CDCl}_3$  (101 MHz)

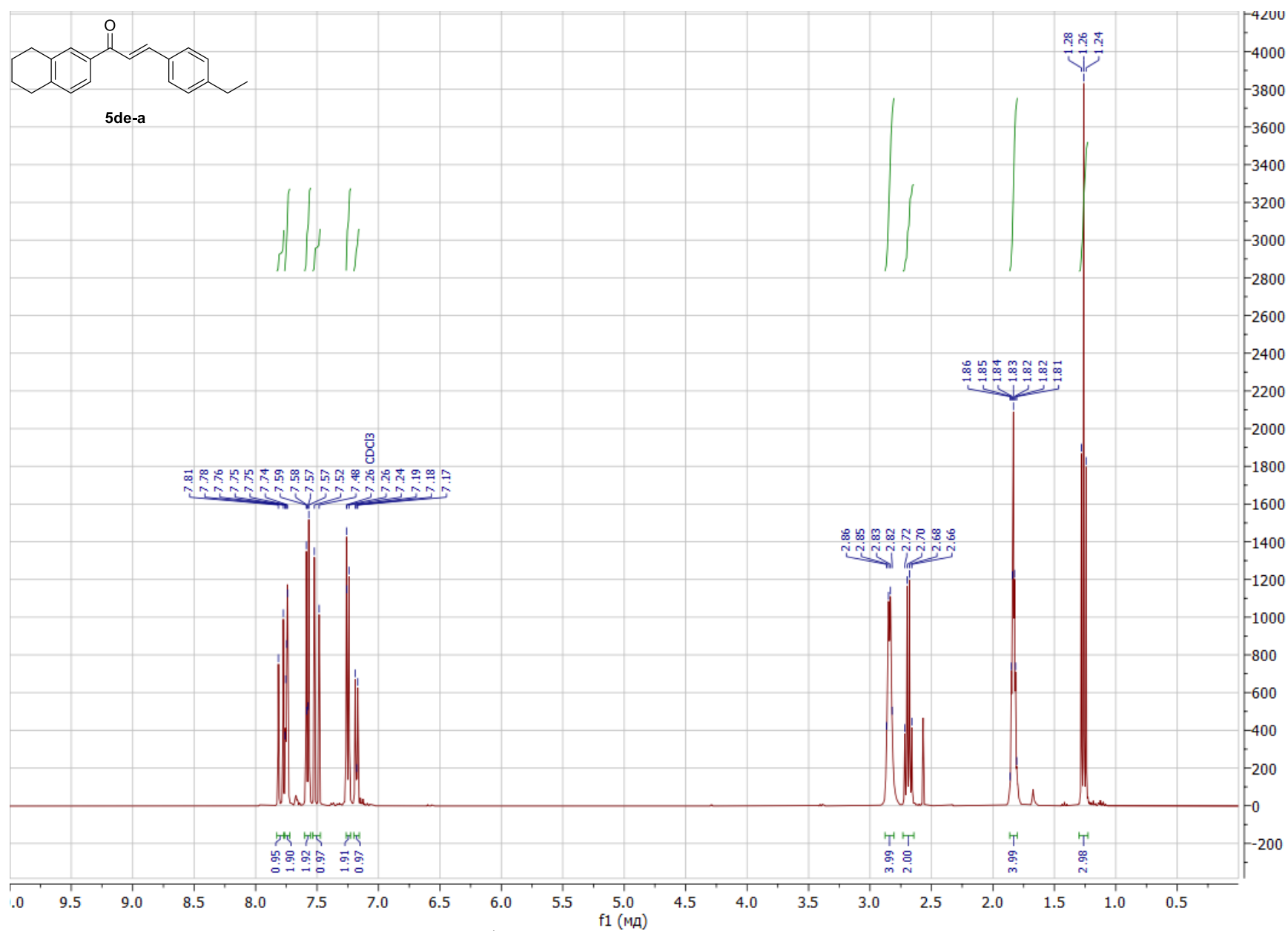


Figure S5. <sup>1</sup>H NMR spectrum of **5de-a** in CDCl<sub>3</sub> (400 MHz)

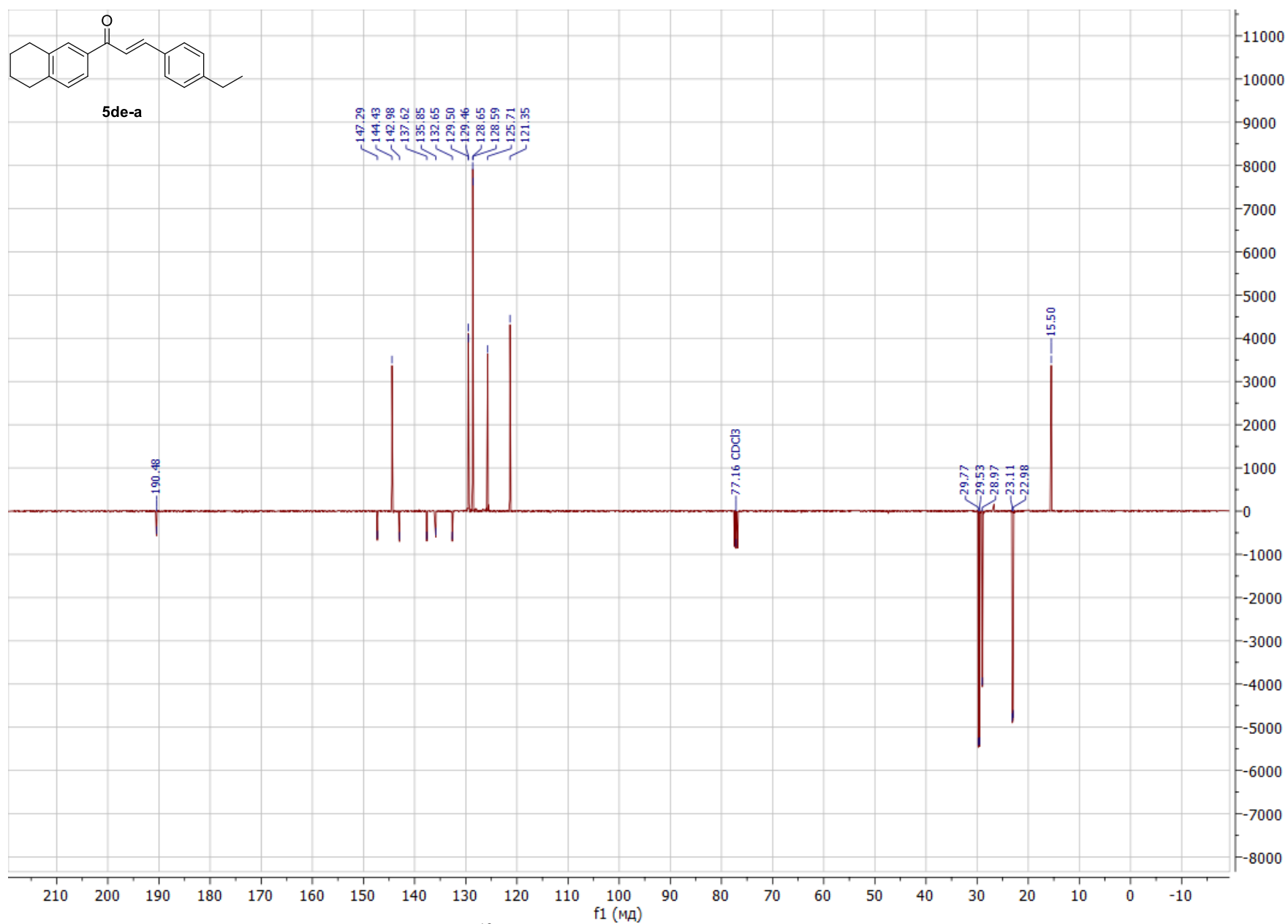


Figure S6.  $^{13}\text{C}$  NMR spectrum of **5de-a** in  $\text{CDCl}_3$  (101 MHz)

<sup>1</sup>H and <sup>13</sup>C NMR spectral charts for 2,4-diaryl-4-oxobutanenitriles **2**

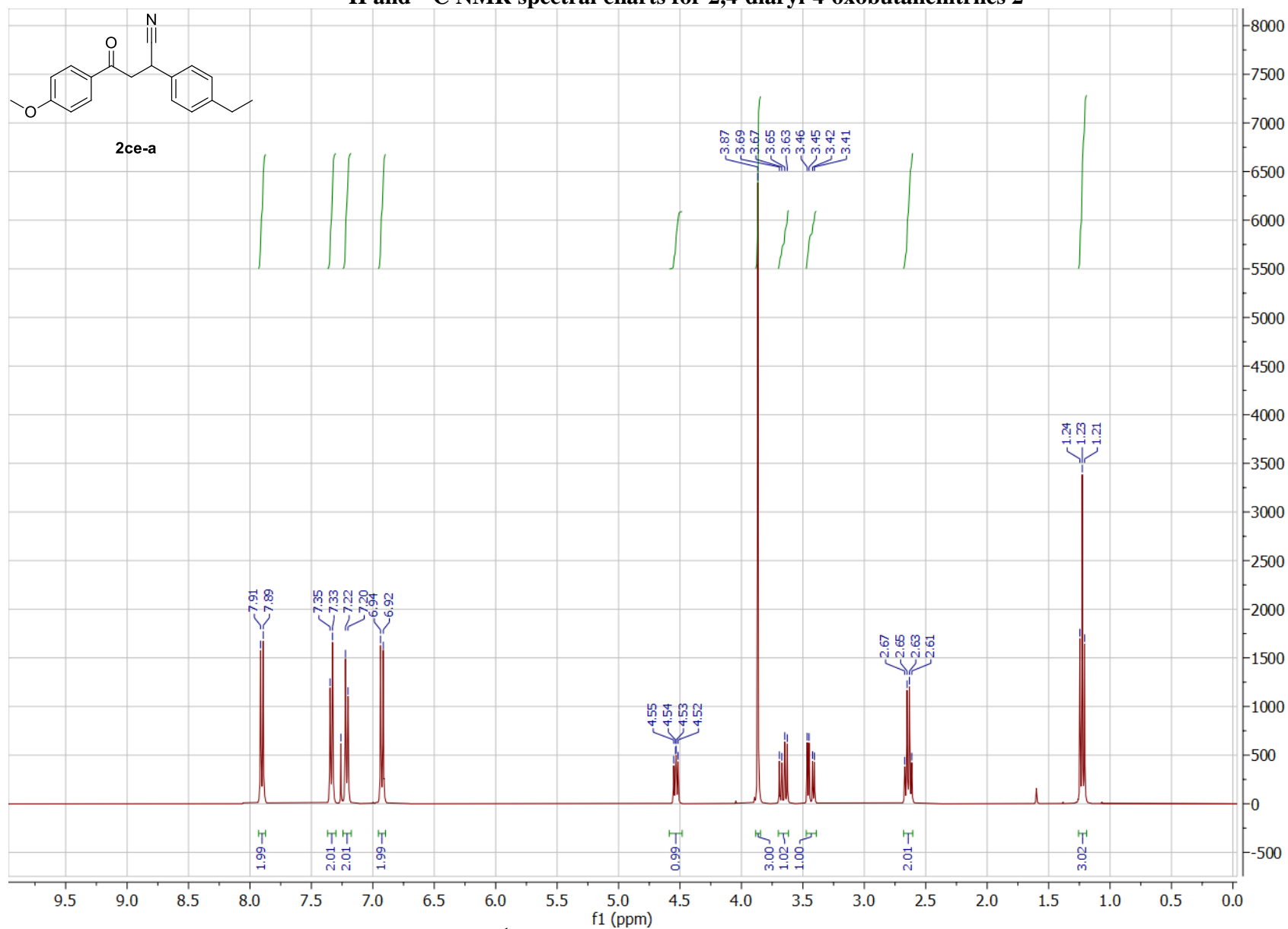


Figure S7. <sup>1</sup>H NMR spectrum of **2ce-a** in CDCl<sub>3</sub> (400 MHz)



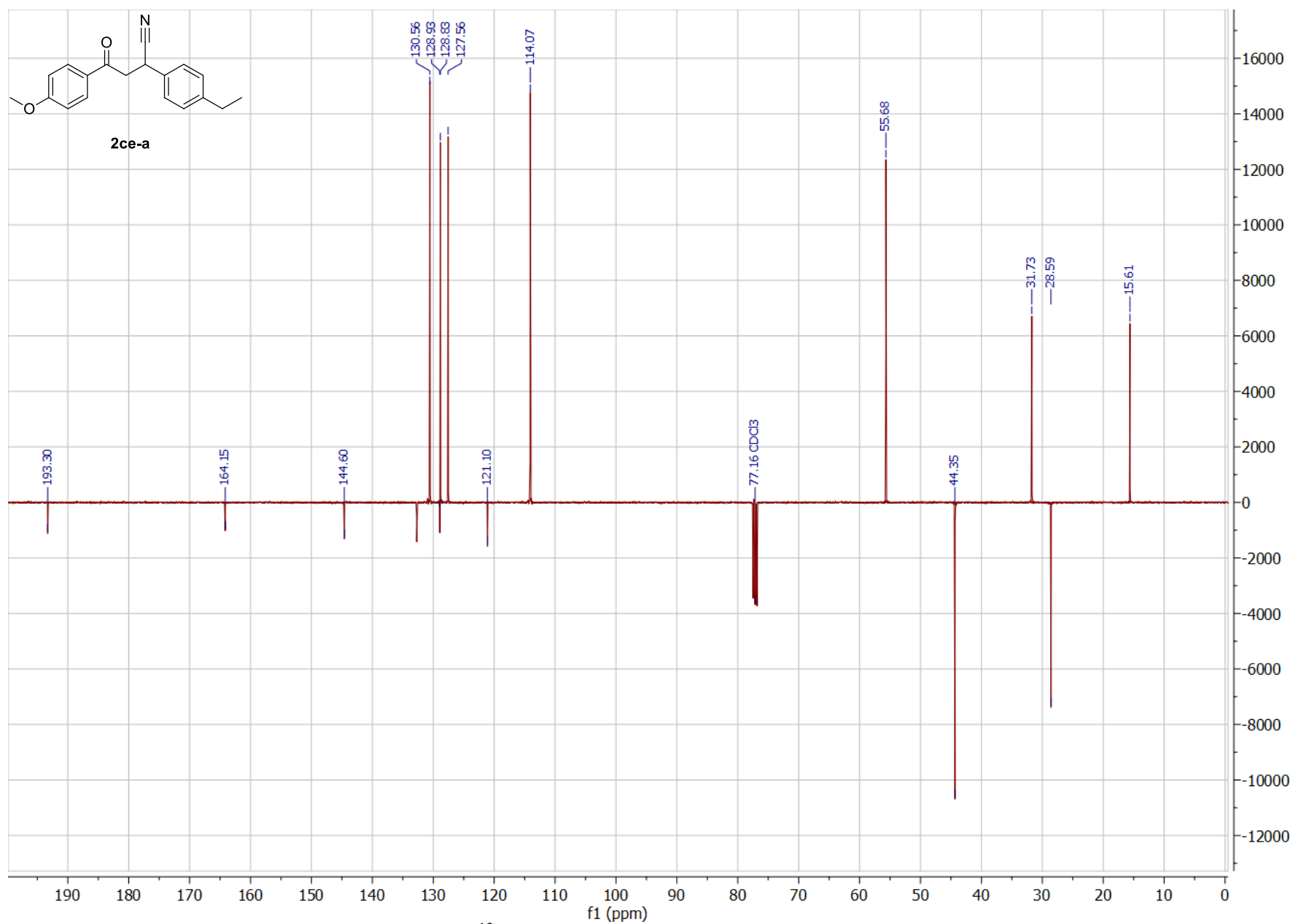


Figure S8. <sup>13</sup>C NMR spectrum of **2ce-a** in CDCl<sub>3</sub> (101 MHz)

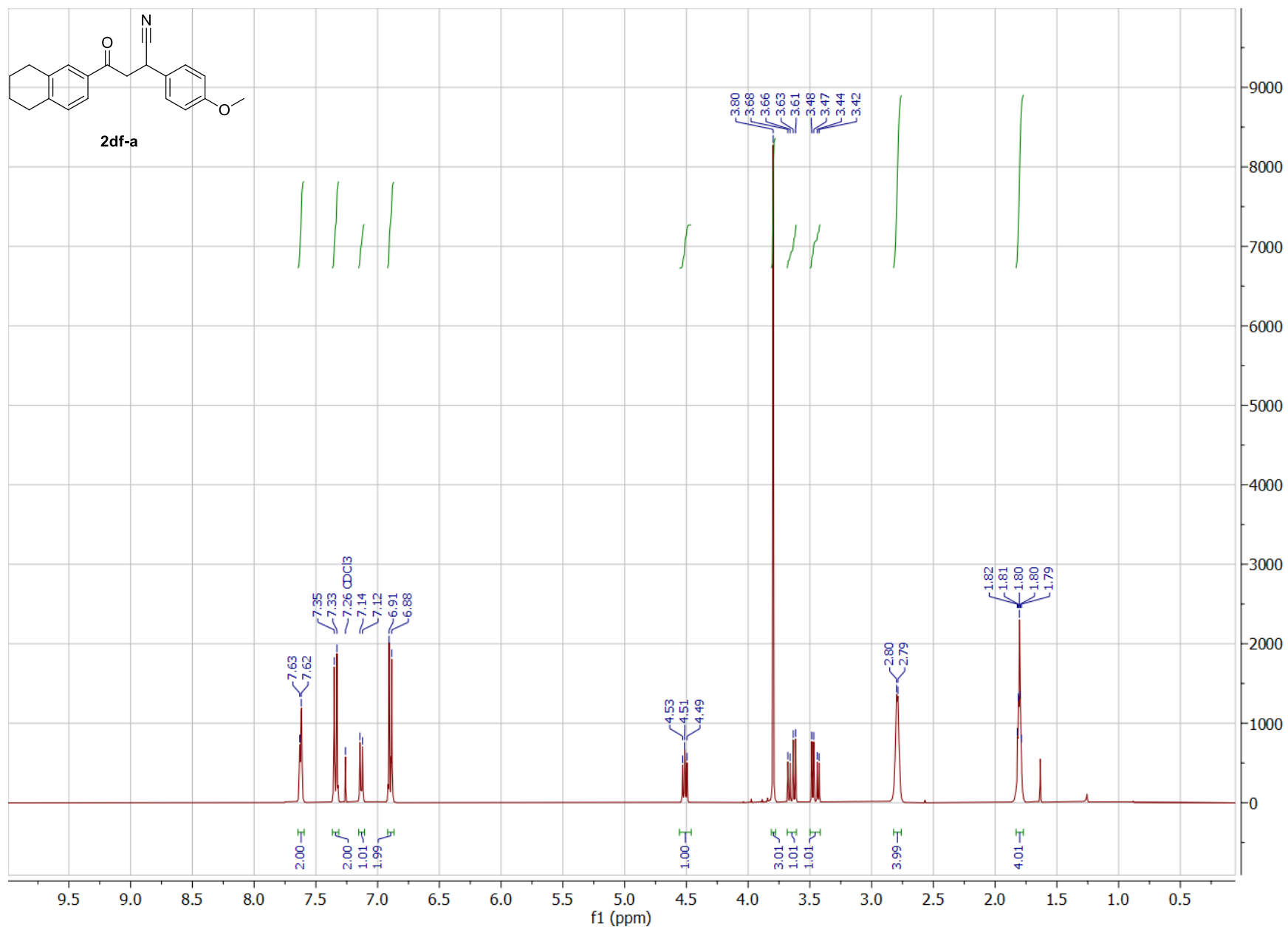


Figure S9. <sup>1</sup>H NMR spectrum of **2df-a** in CDCl<sub>3</sub> (400 MHz)

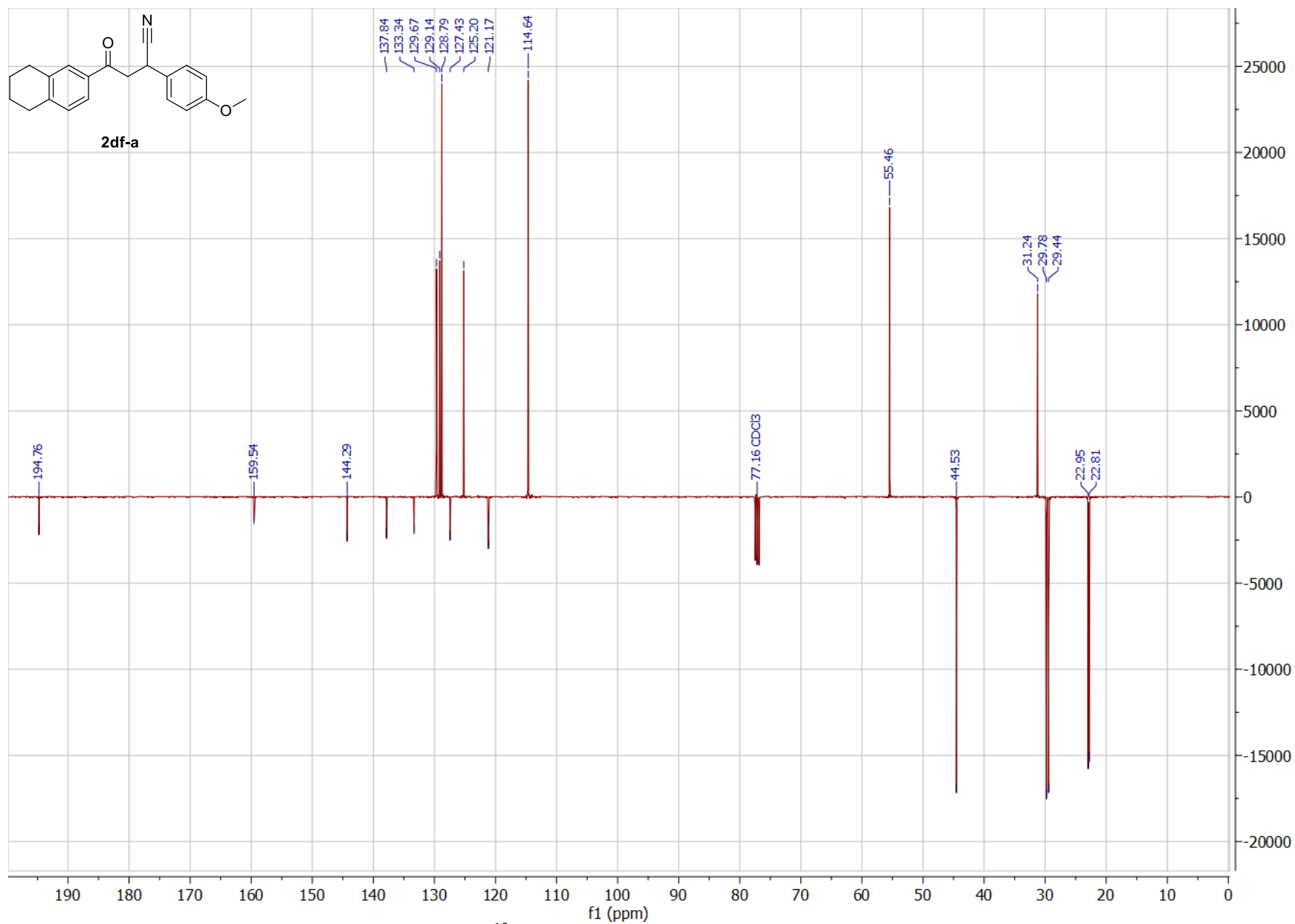


Figure S10. <sup>13</sup>C NMR spectrum of **2df-a** in CDCl<sub>3</sub> (101 MHz)

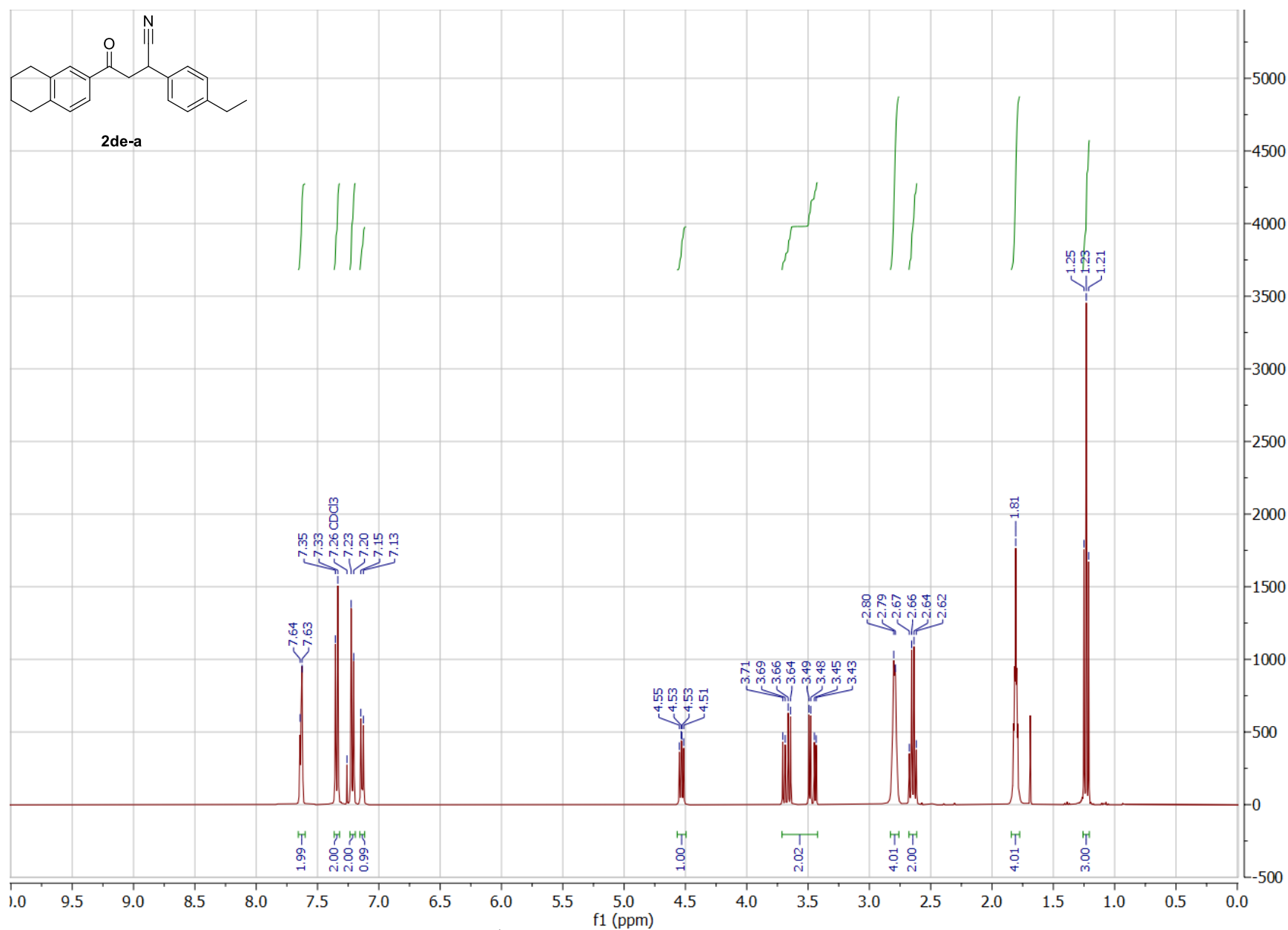


Figure S11.  $^1\text{H}$  NMR spectrum of **2de-a** in  $\text{CDCl}_3$  (400 MHz)

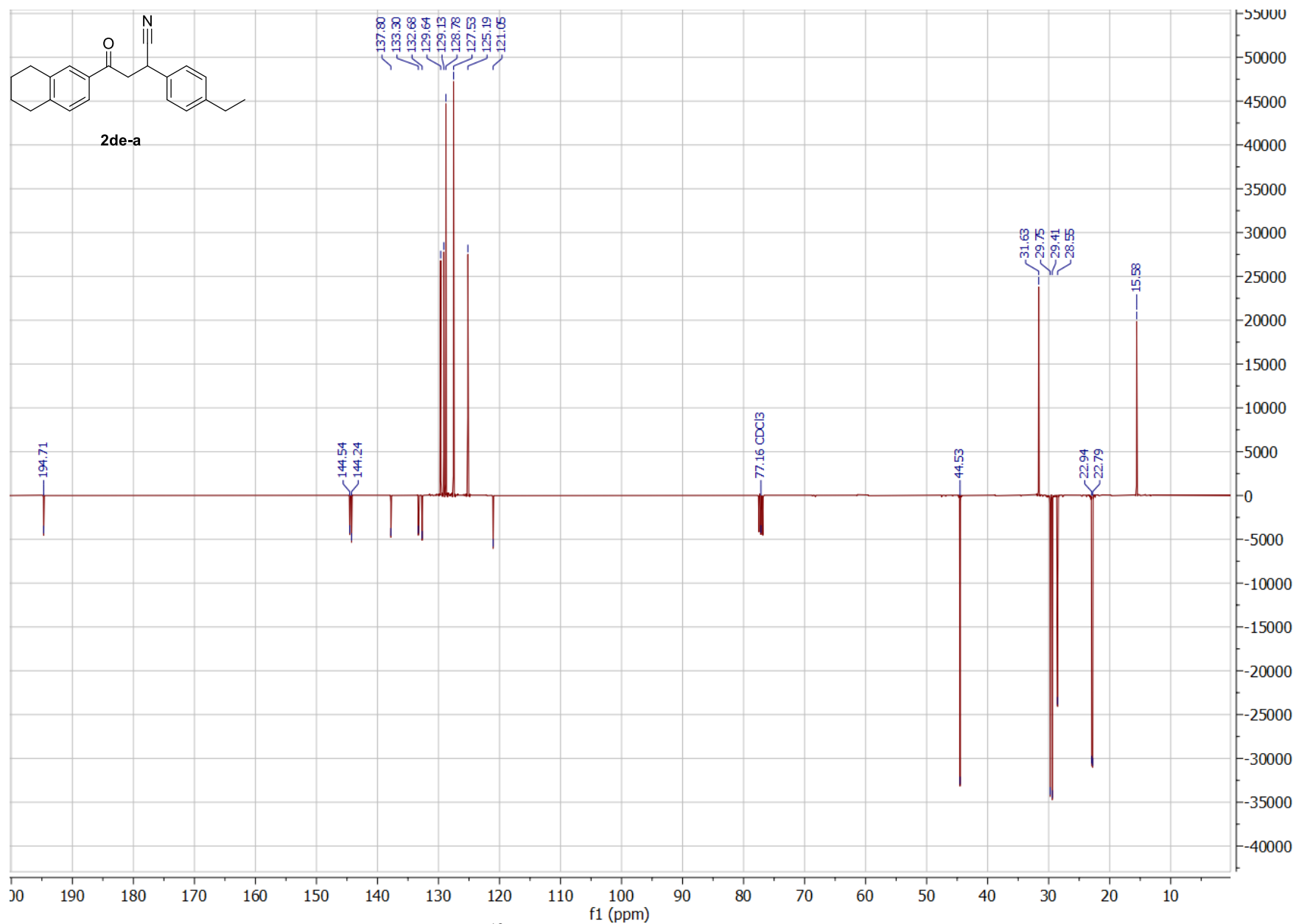


Figure S12.  $^{13}\text{C}$  NMR spectrum of **2de-a** in  $\text{CDCl}_3$  (101 MHz)

**$^1\text{H}$  and  $^{13}\text{C}$  NMR spectral charts for 4-benzyl-5-hydroxy-3,5-diaryl-1*H*-pyrrol-2(5*H*)-ones 4**

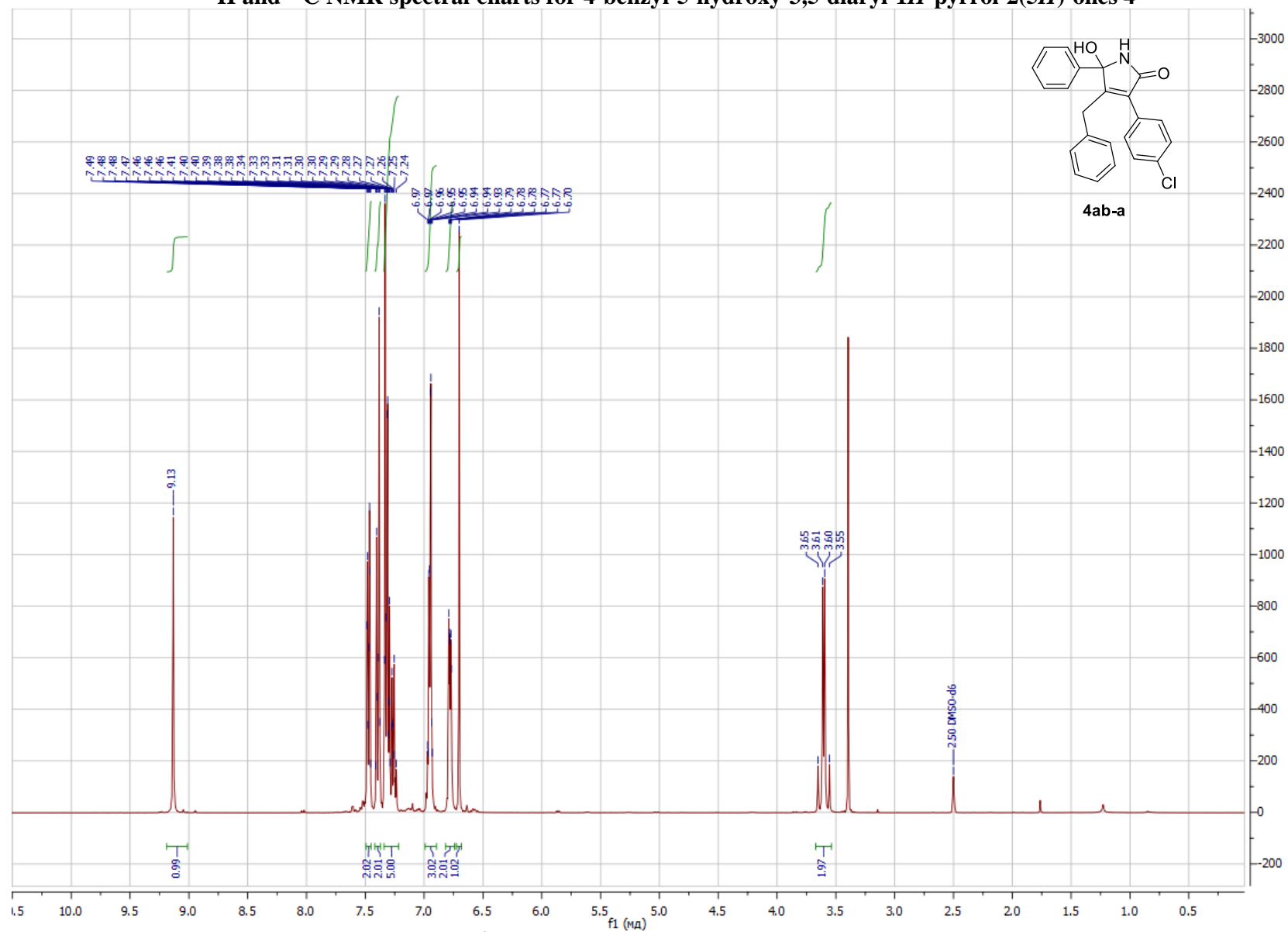


Figure S13.  $^1\text{H}$  NMR spectrum of **4ab-a** in  $\text{DMSO-}d_6$  (400 MHz)

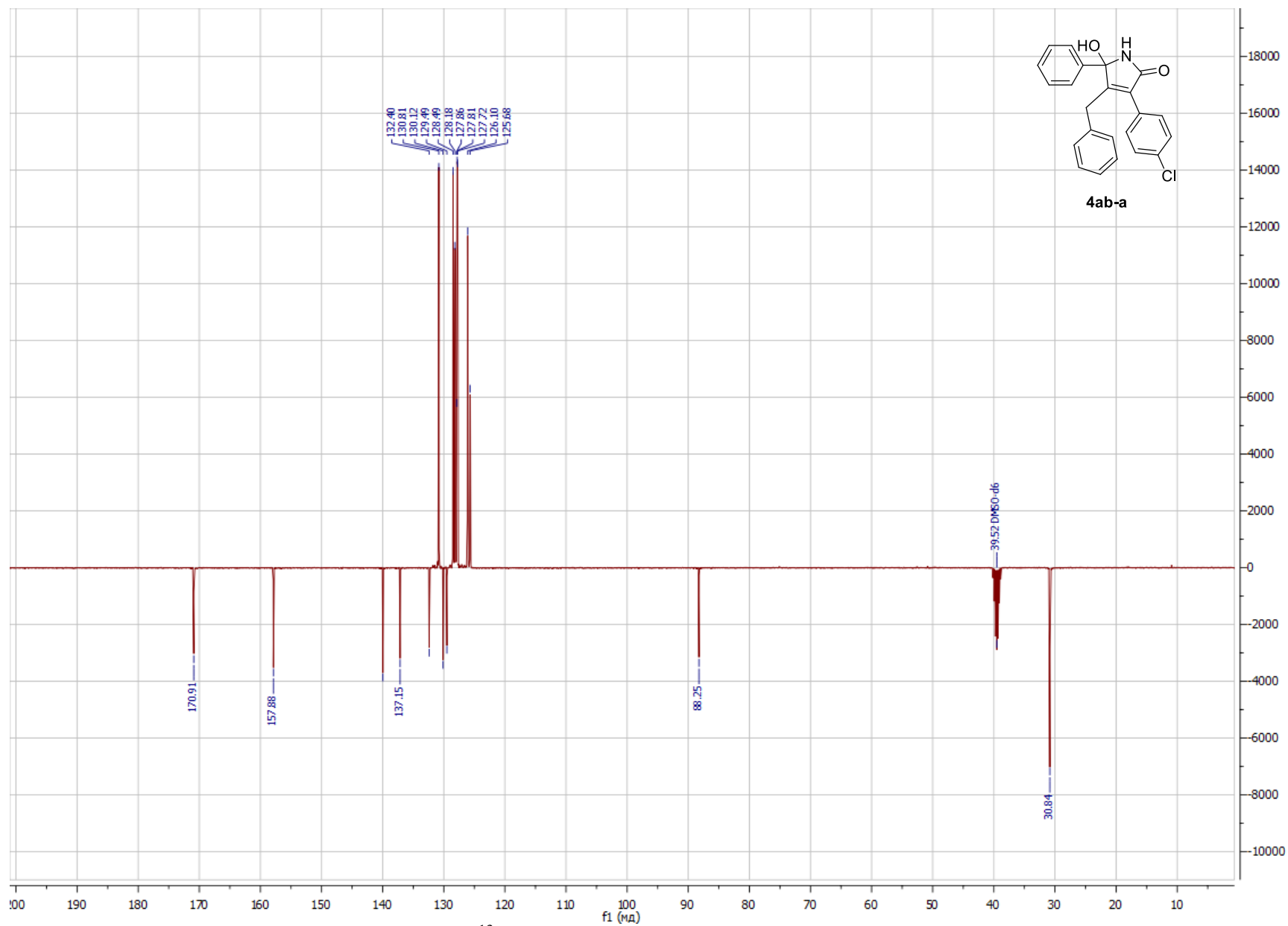


Figure S14.  $^{13}\text{C}$  NMR spectrum of **4ab-a** in  $\text{DMSO-}d_6$  (101 MHz)

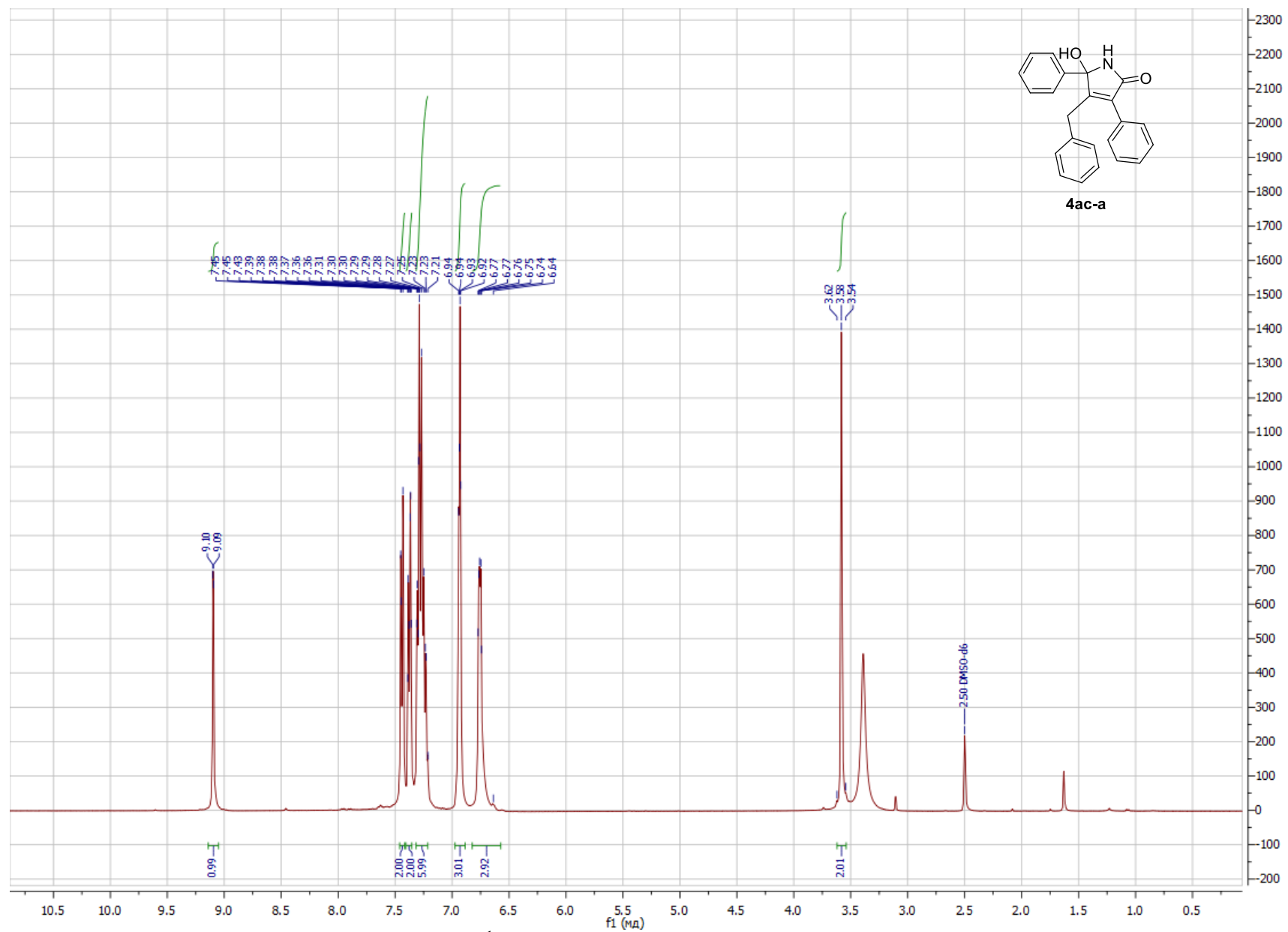


Figure S15. <sup>1</sup>H NMR spectrum of **4ac-a** in DMSO-*d*<sub>6</sub> (400 MHz)



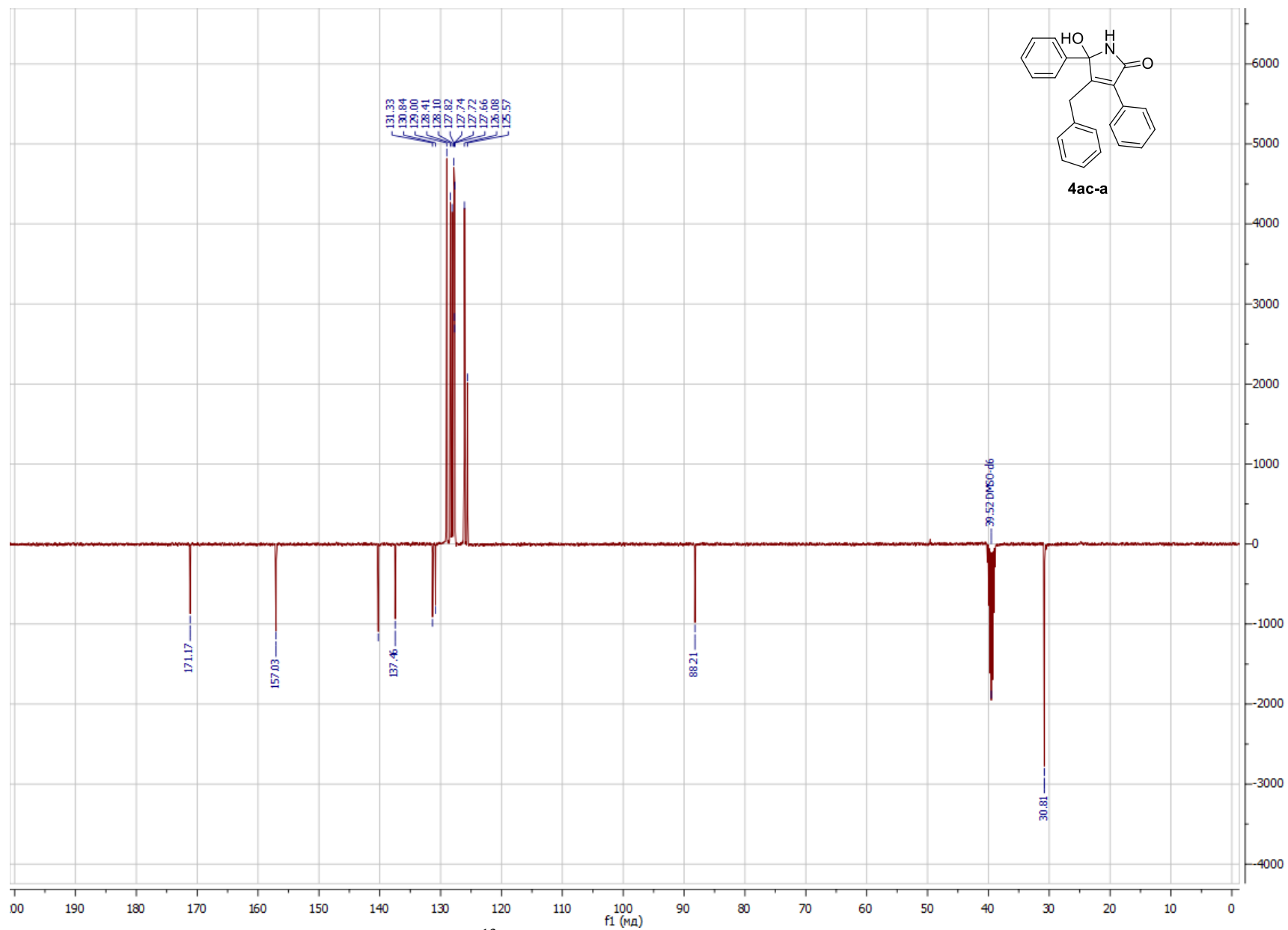


Figure S16.  $^{13}\text{C}$  NMR spectrum of **4ac-a** in  $\text{DMSO-}d_6$  (101 MHz)

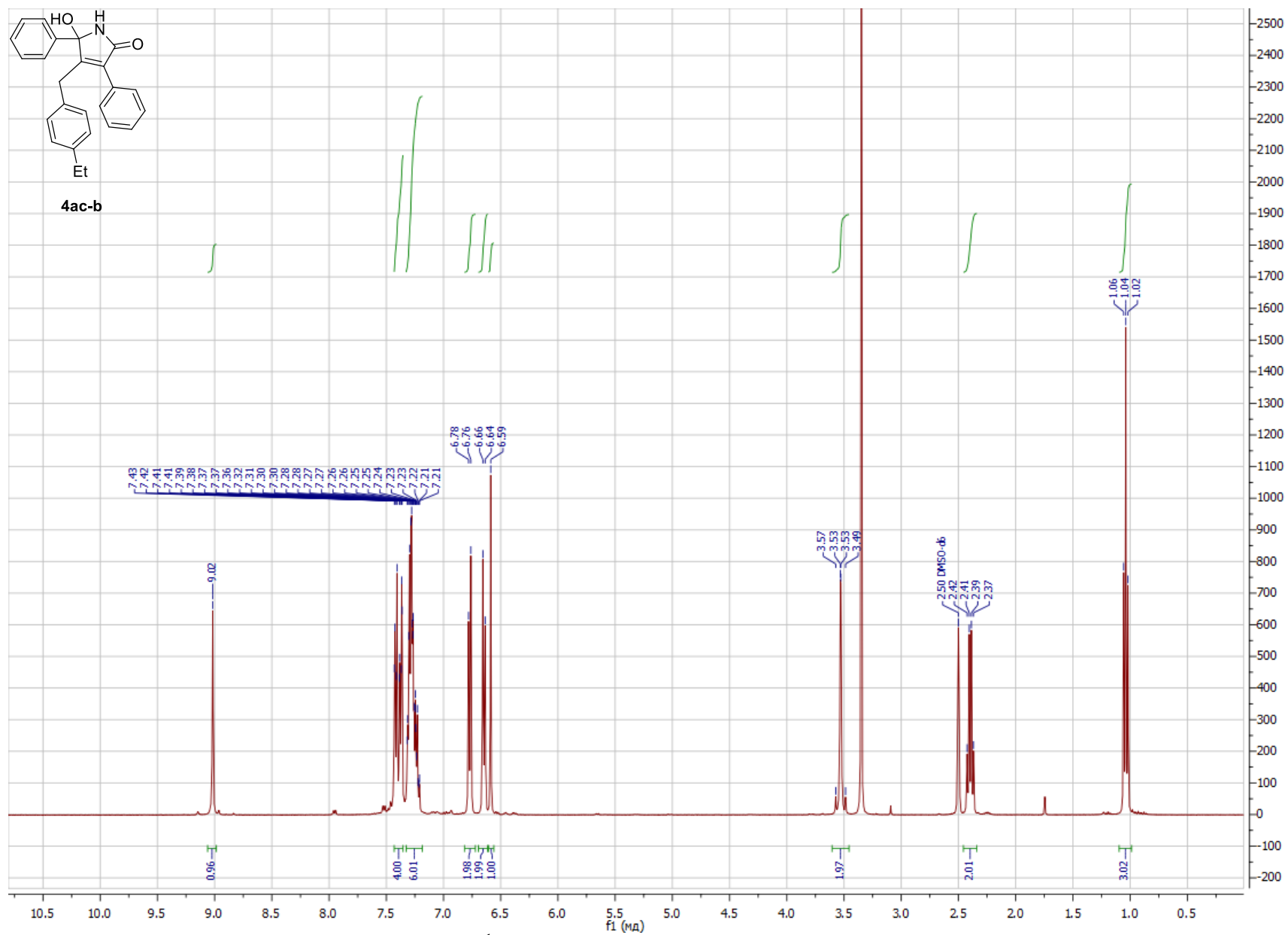


Figure S17.  $^1\text{H}$  NMR spectrum of **4ac-b** in  $\text{DMSO-}d_6$  (400 MHz)

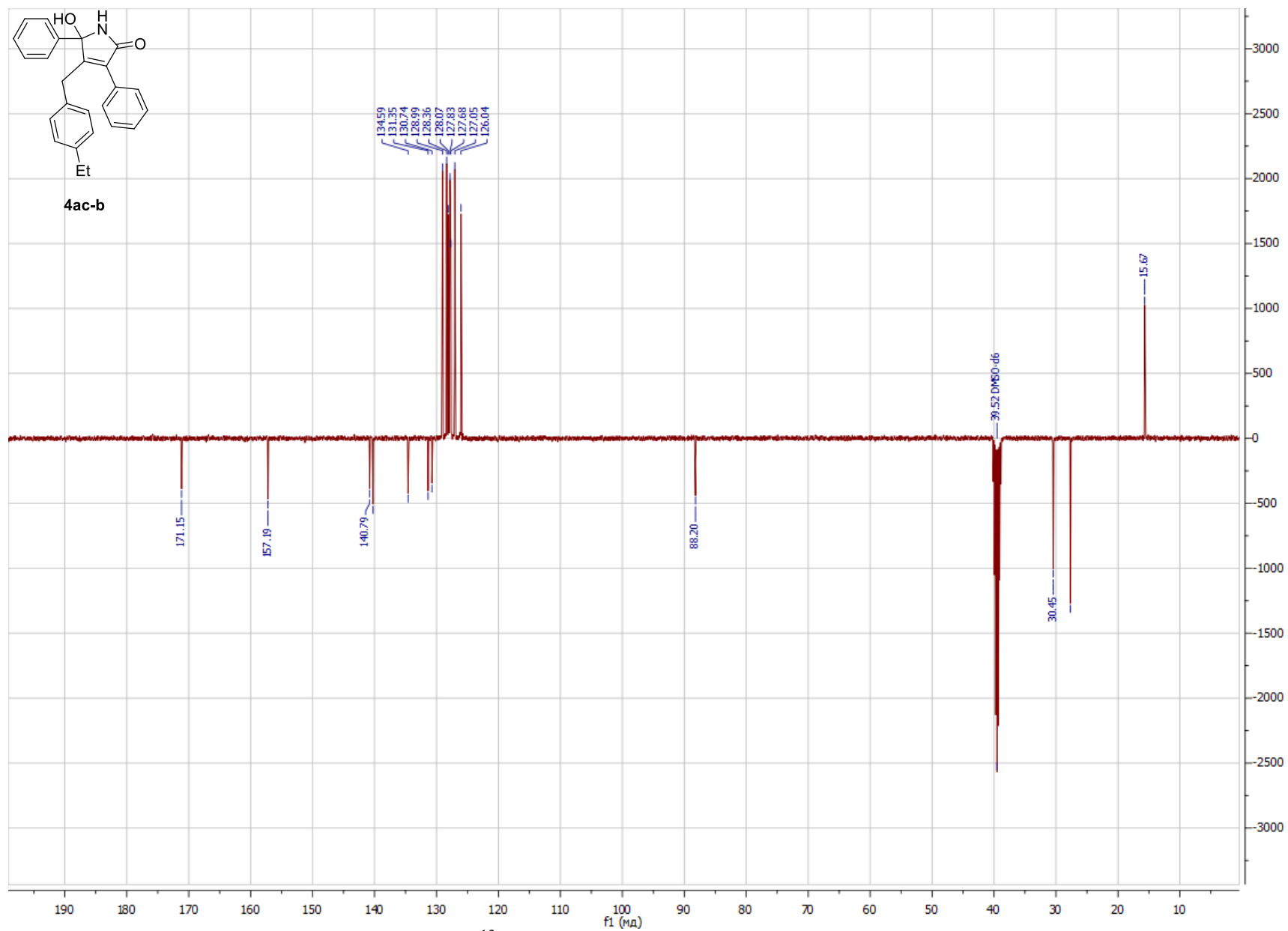


Figure S18.  $^{13}\text{C}$  NMR spectrum of **4ac-b** in  $\text{DMSO-}d_6$  (101 MHz)

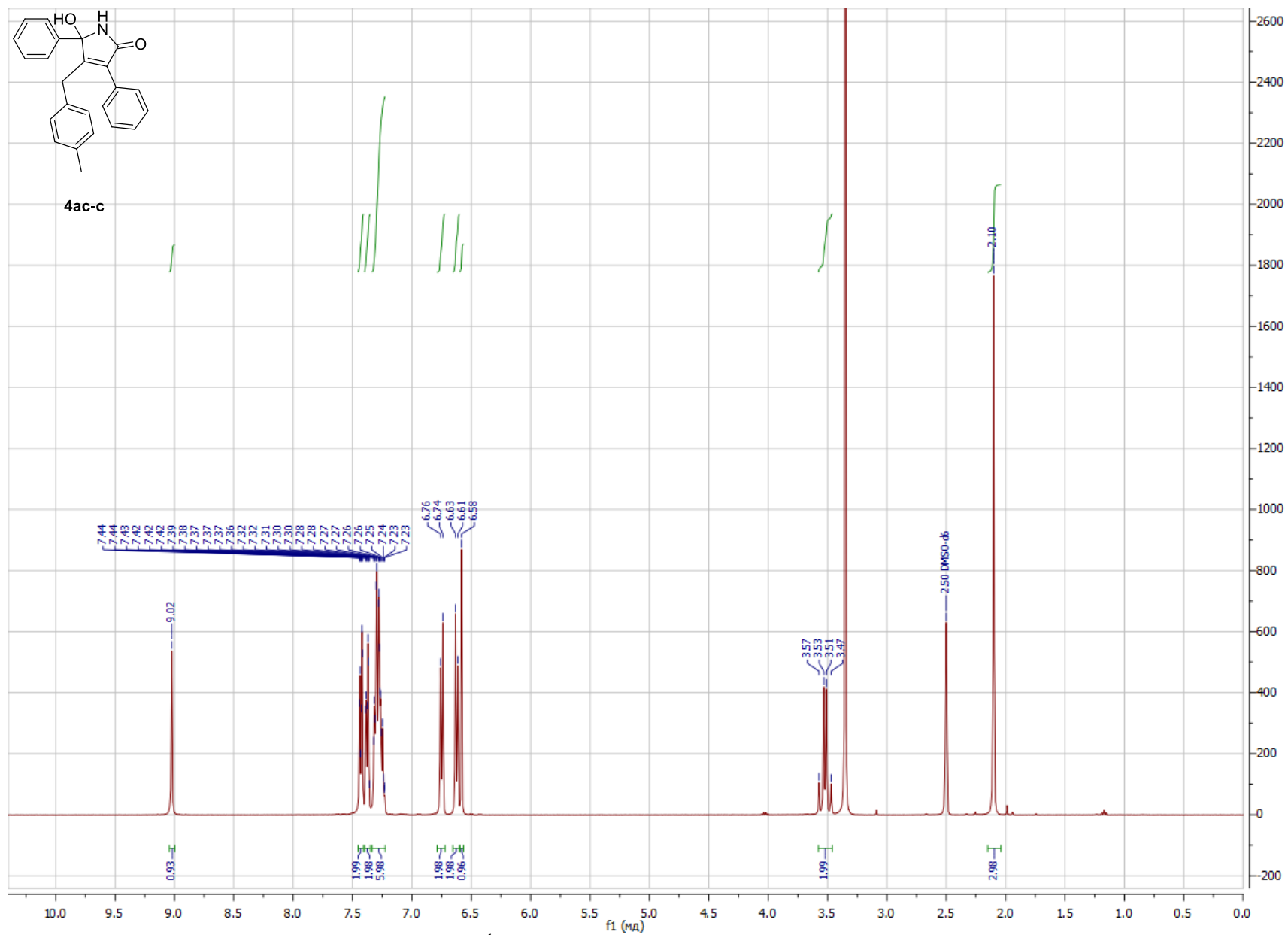


Figure S19. <sup>1</sup>H NMR spectrum of **4ac-c** in DMSO-*d*<sub>6</sub> (400 MHz)

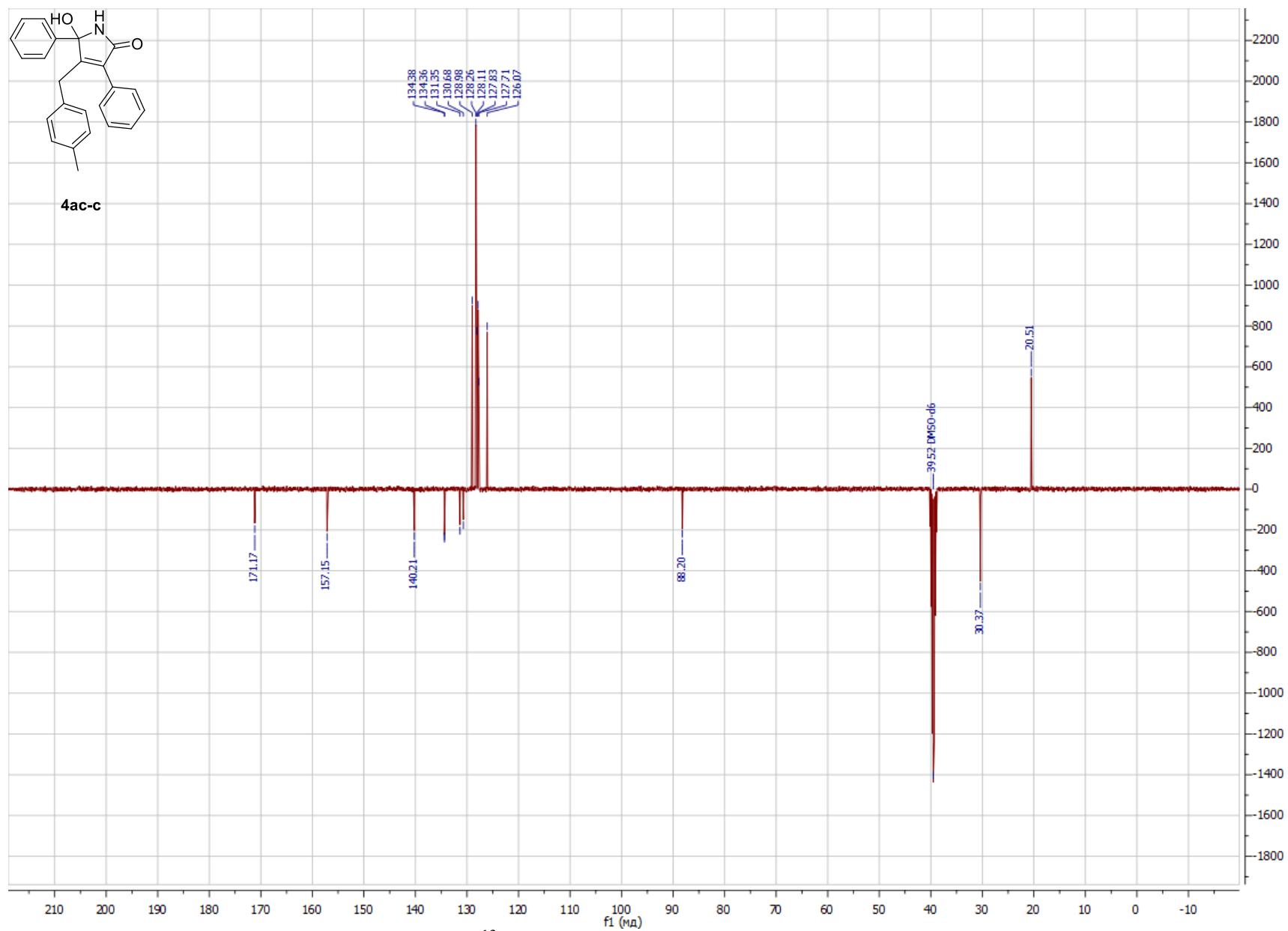


Figure S20.  $^{13}\text{C}$  NMR spectrum of **4ac-c** in  $\text{DMSO-}d_6$  (101 MHz)

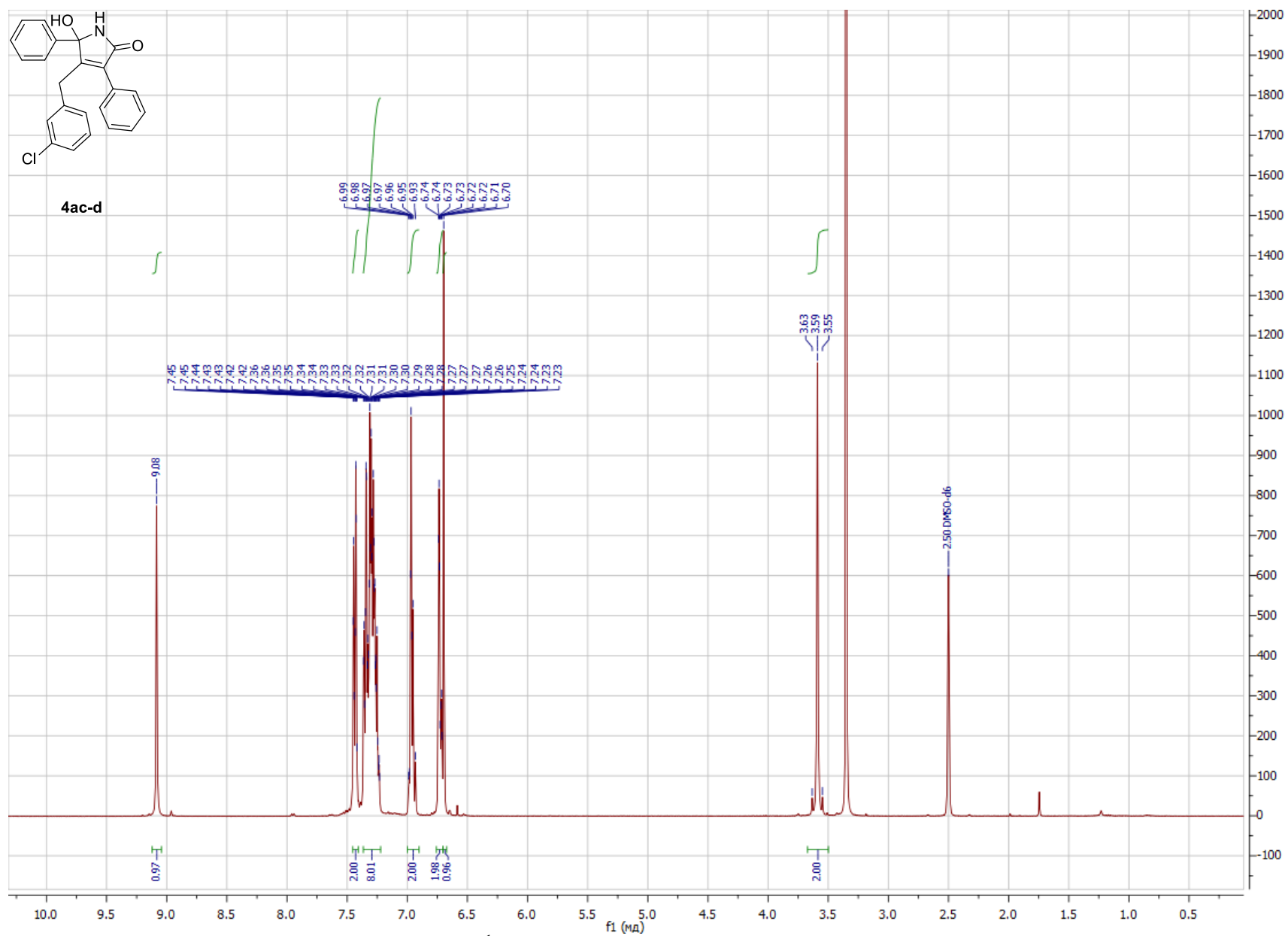


Figure S21. <sup>1</sup>H NMR spectrum of **4ac-d** in DMSO-*d*<sub>6</sub> (400 MHz)

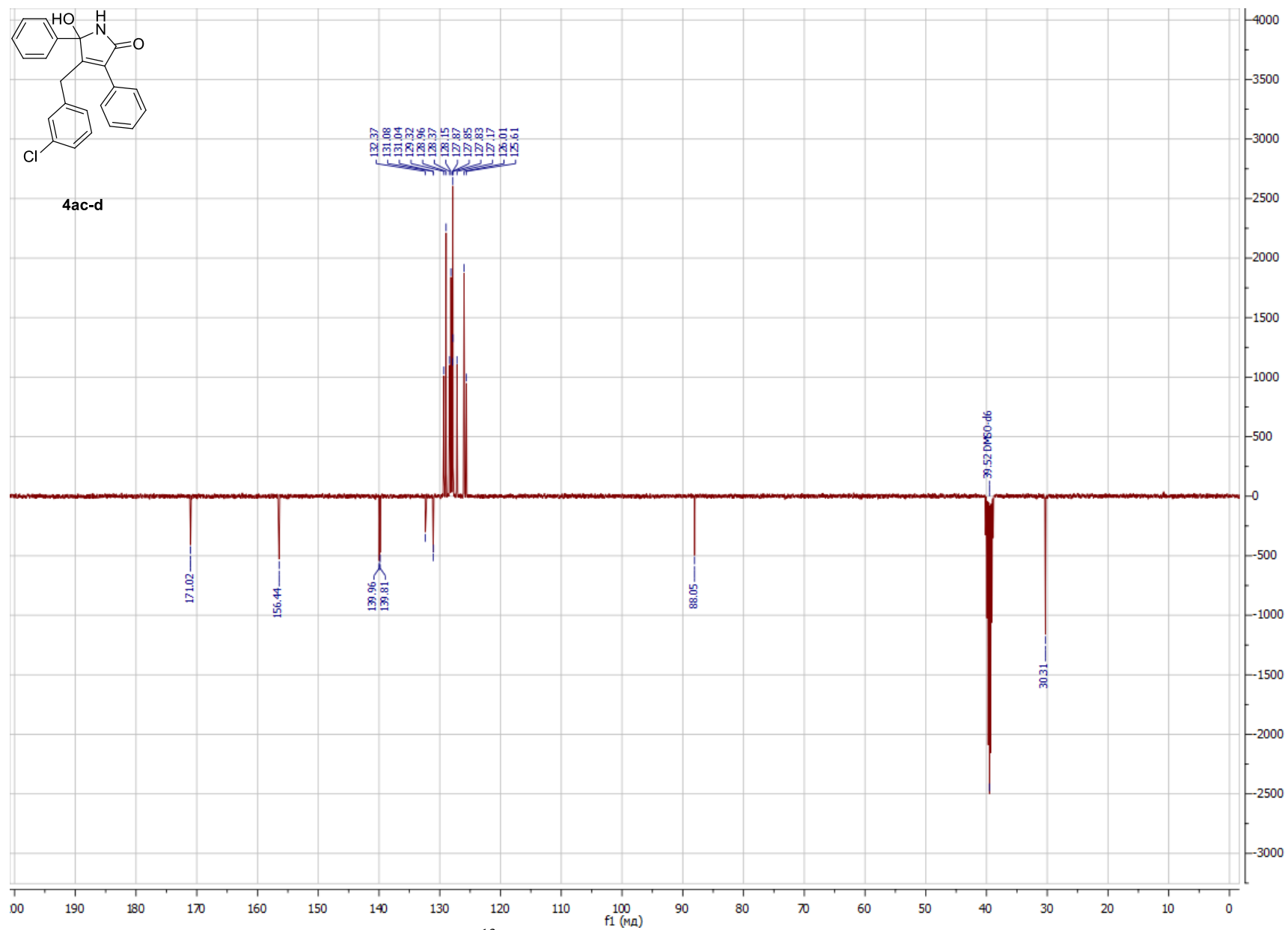


Figure S22.  $^{13}\text{C}$  NMR spectrum of **4ac-d** in DMSO- $d_6$  (101 MHz)

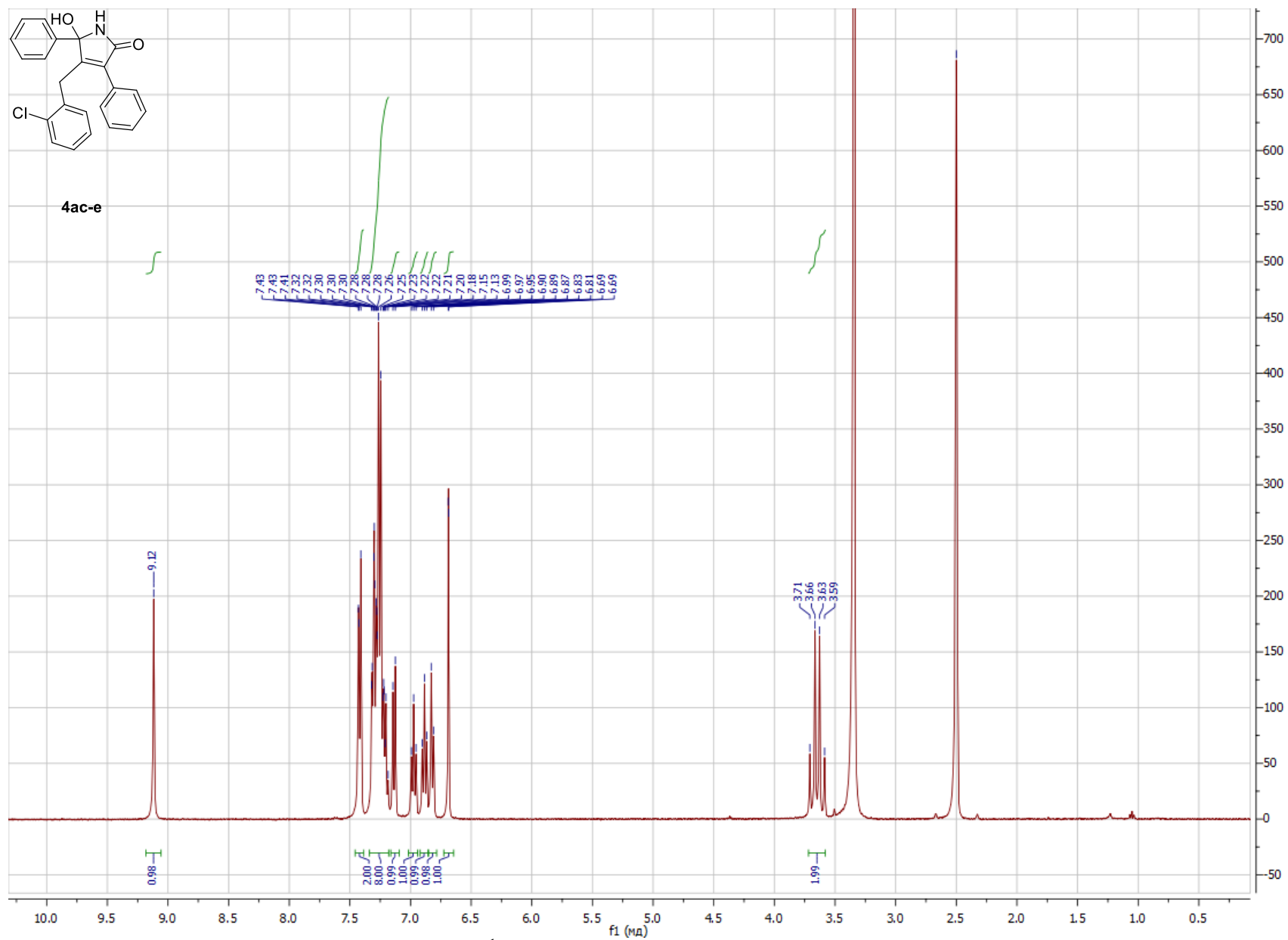


Figure S23.  $^1\text{H}$  NMR spectrum of **4ac-e** in  $\text{DMSO}-d_6$  (400 MHz)



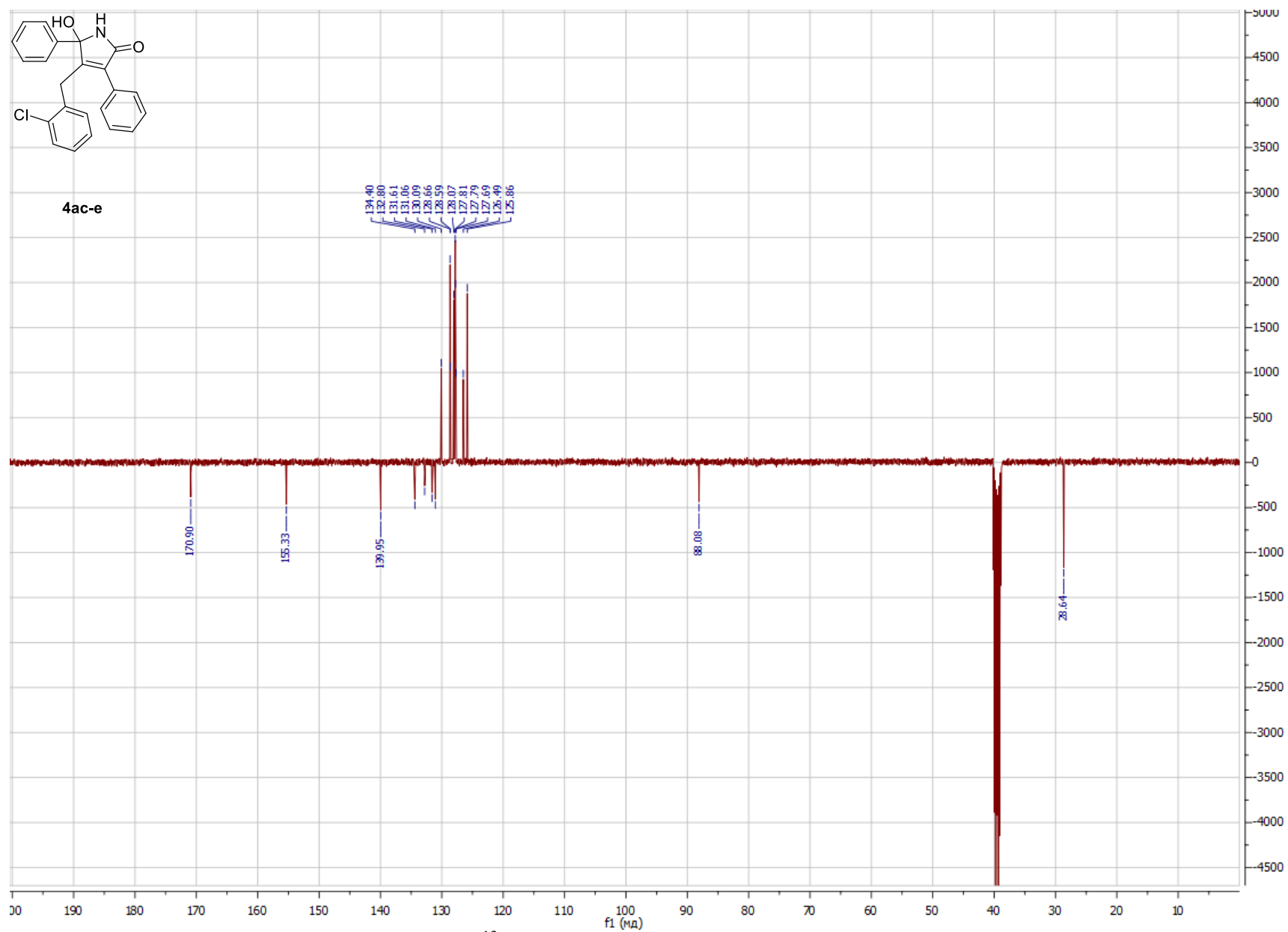


Figure S24.  $^{13}\text{C}$  NMR spectrum of **4ac-e** in  $\text{DMSO-}d_6$  (101 MHz)

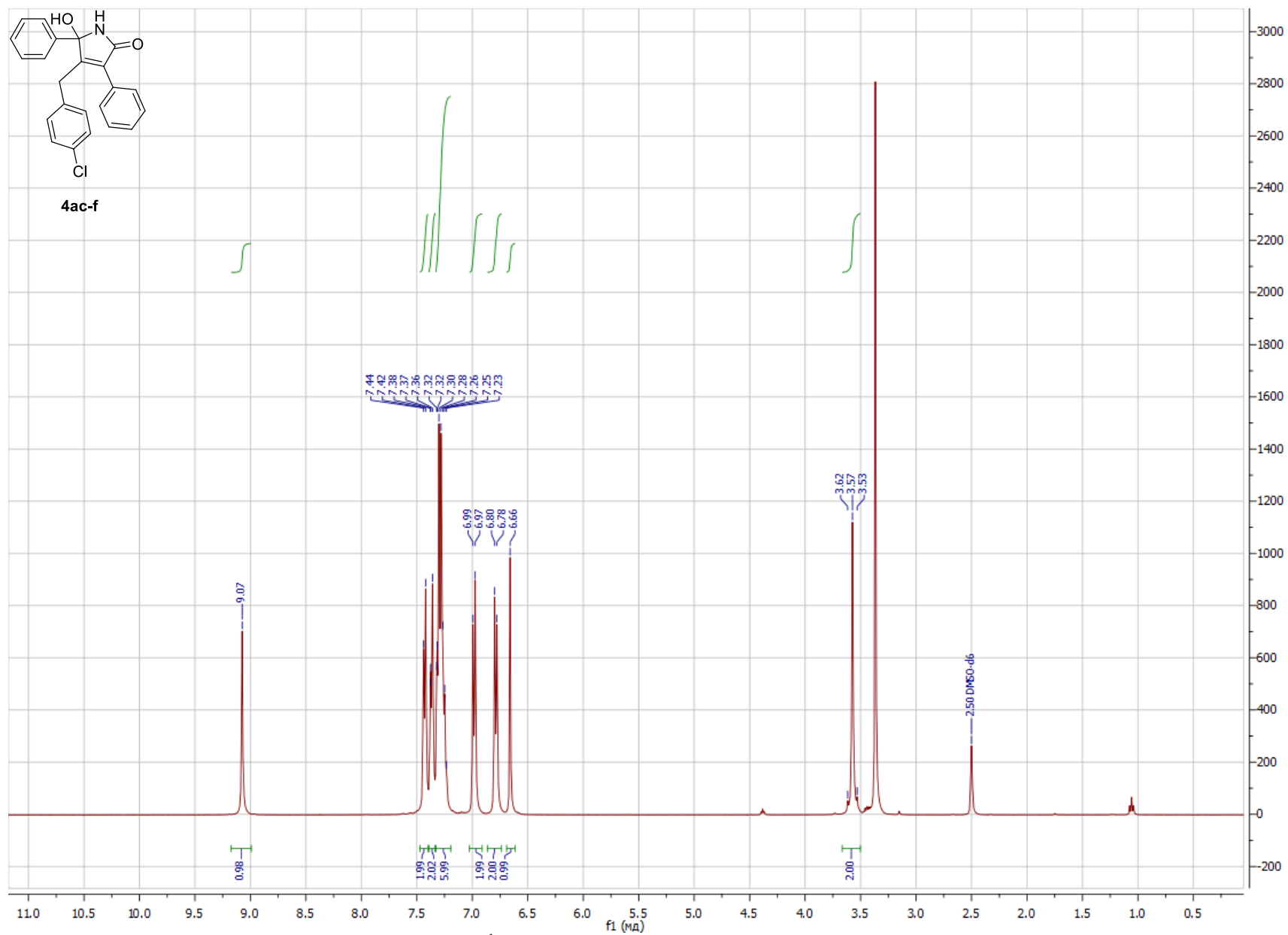


Figure S25.  $^1\text{H}$  NMR spectrum of **4ac-f** in  $\text{DMSO}-d_6$  (400 MHz)

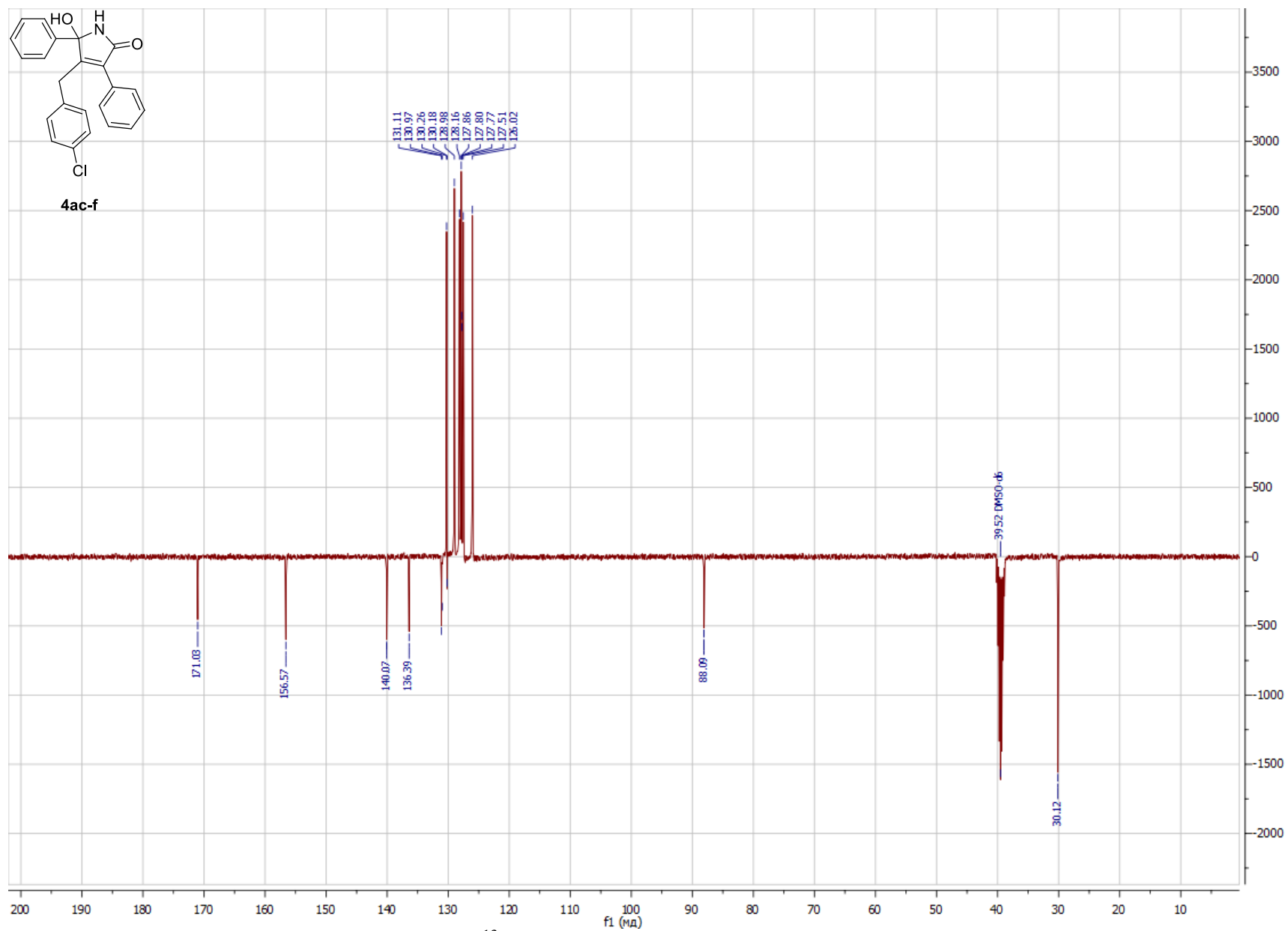


Figure S26.  $^{13}\text{C}$  NMR spectrum of **4ac-f** in  $\text{DMSO-}d_6$  (101 MHz)

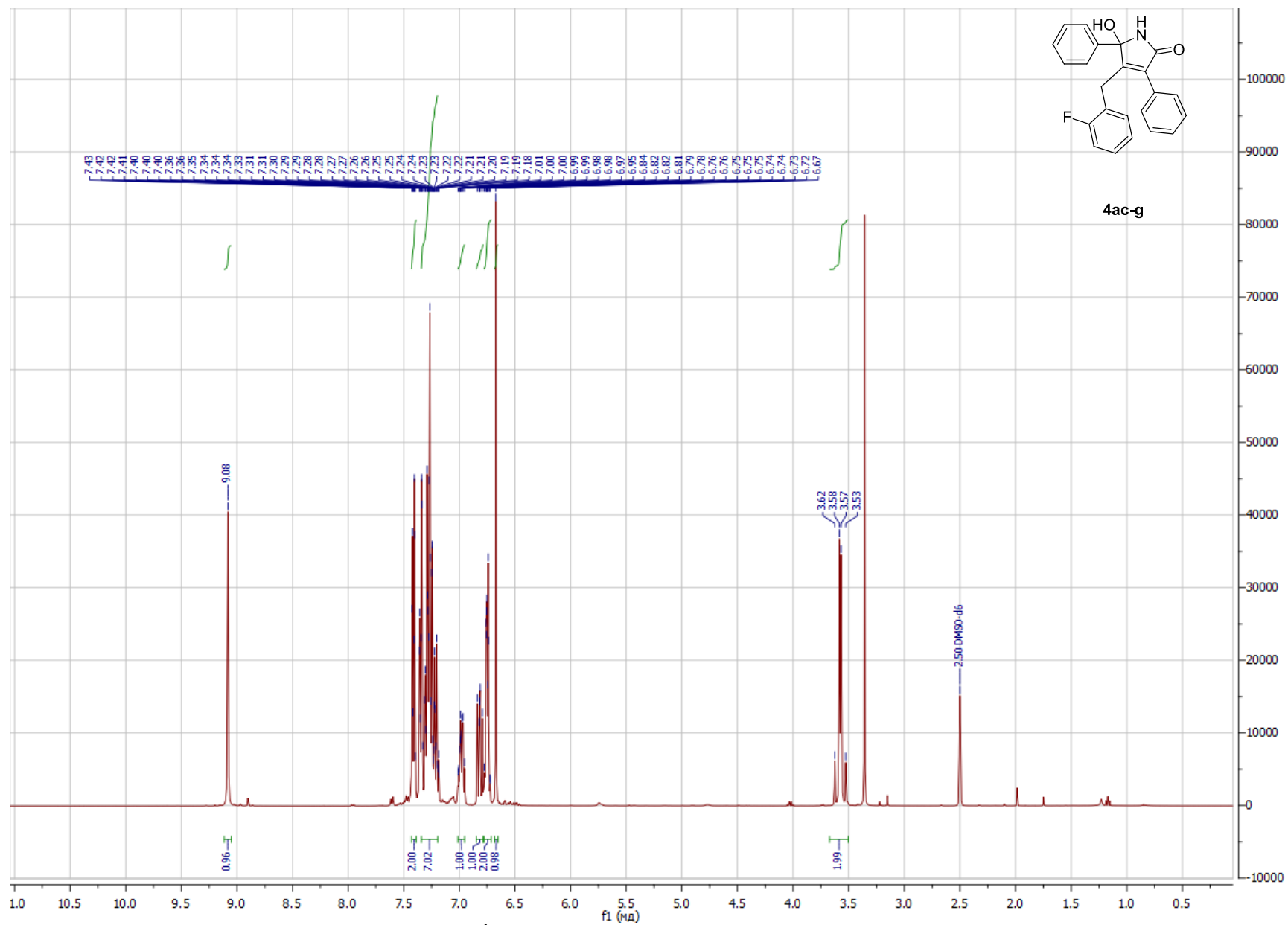


Figure S27.  $^1\text{H}$  NMR spectrum of **4ac-g** in  $\text{DMSO}-d_6$  (400 MHz)

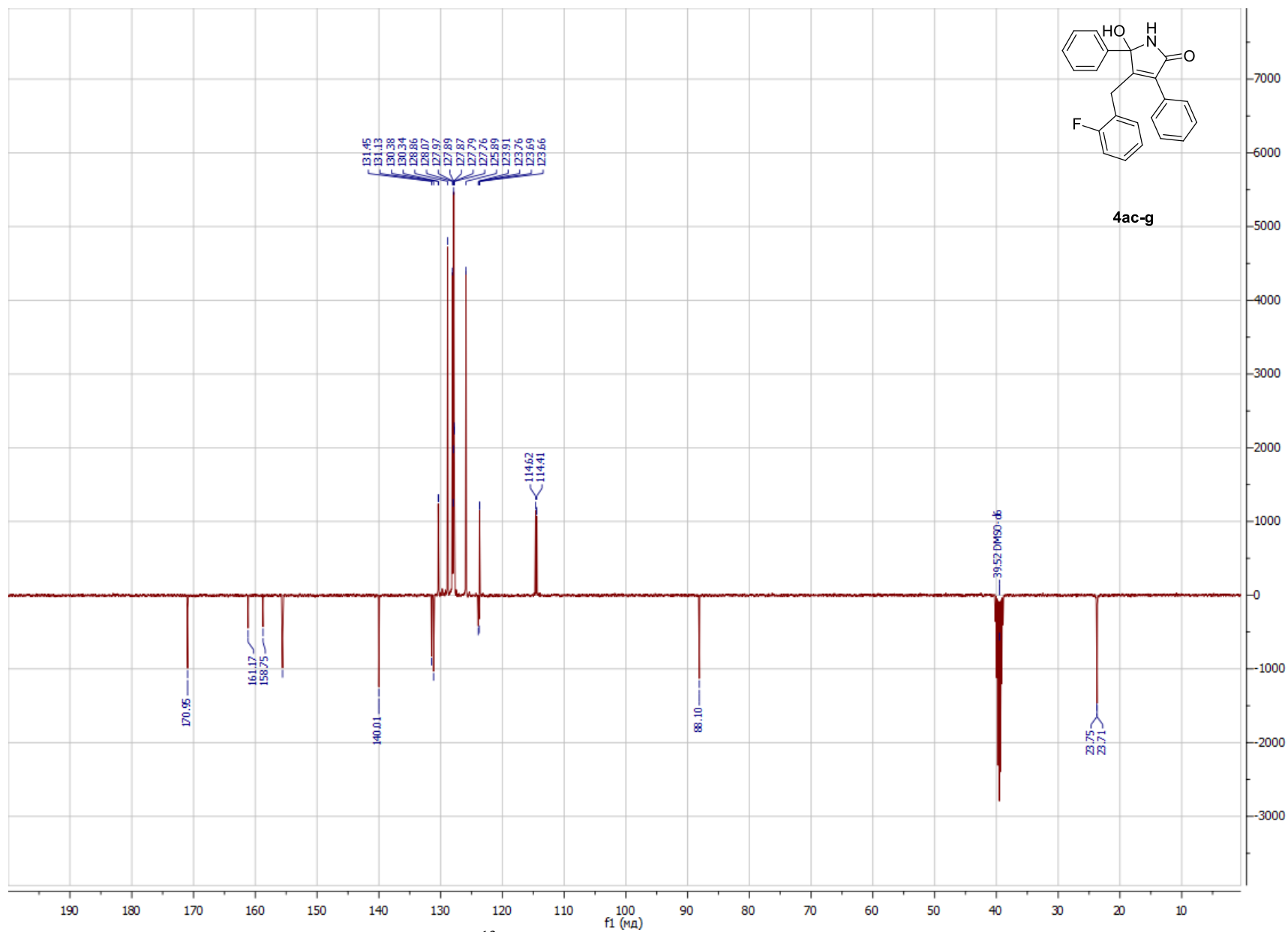


Figure S28.  $^{13}\text{C}$  NMR spectrum of **4ac-g** in  $\text{DMSO-}d_6$  (101 MHz)

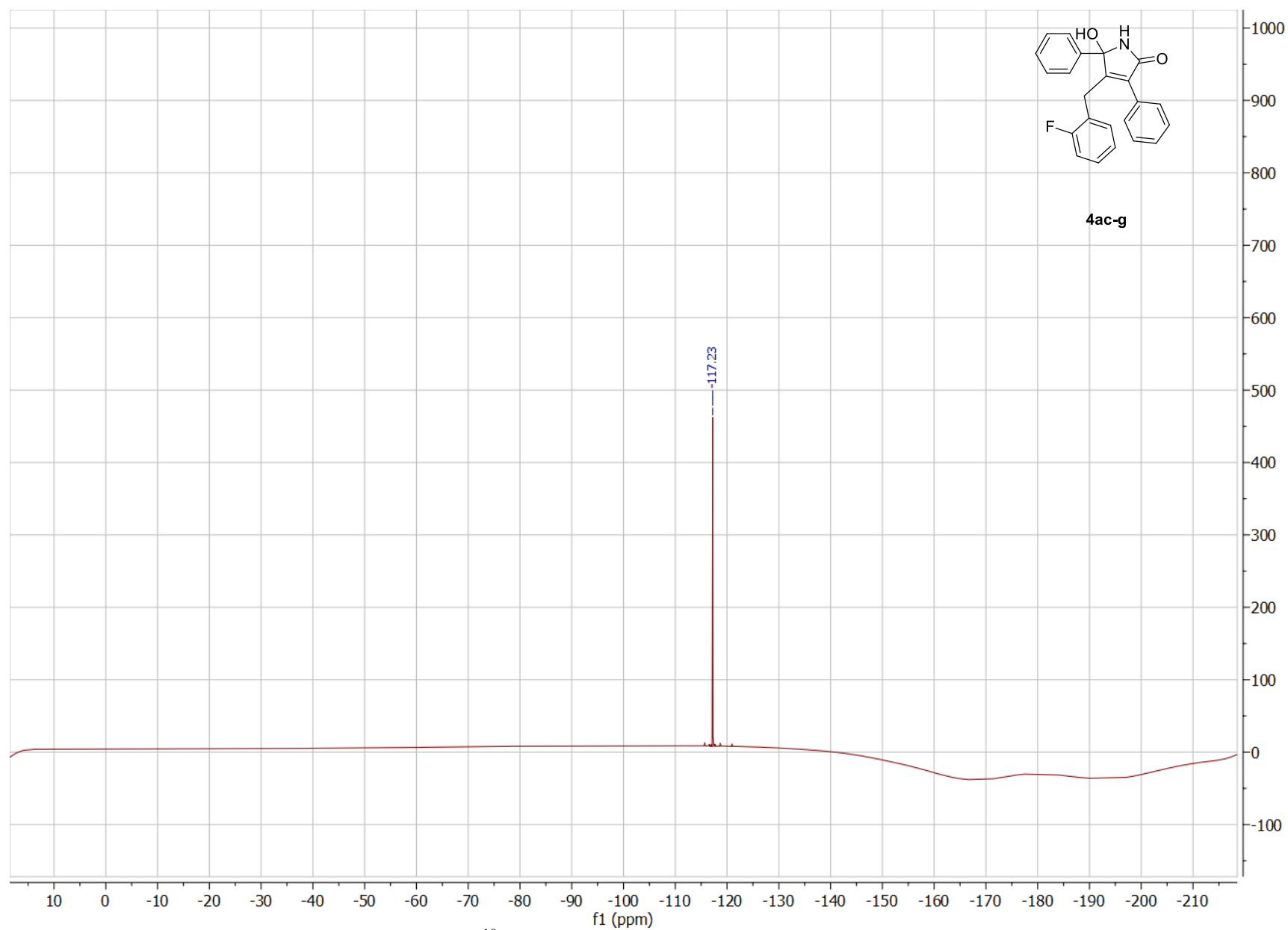


Figure S29.  $^{19}\text{F}$  NMR spectrum of **4ac-g** in  $\text{DMSO-}d_6$  (376 MHz)

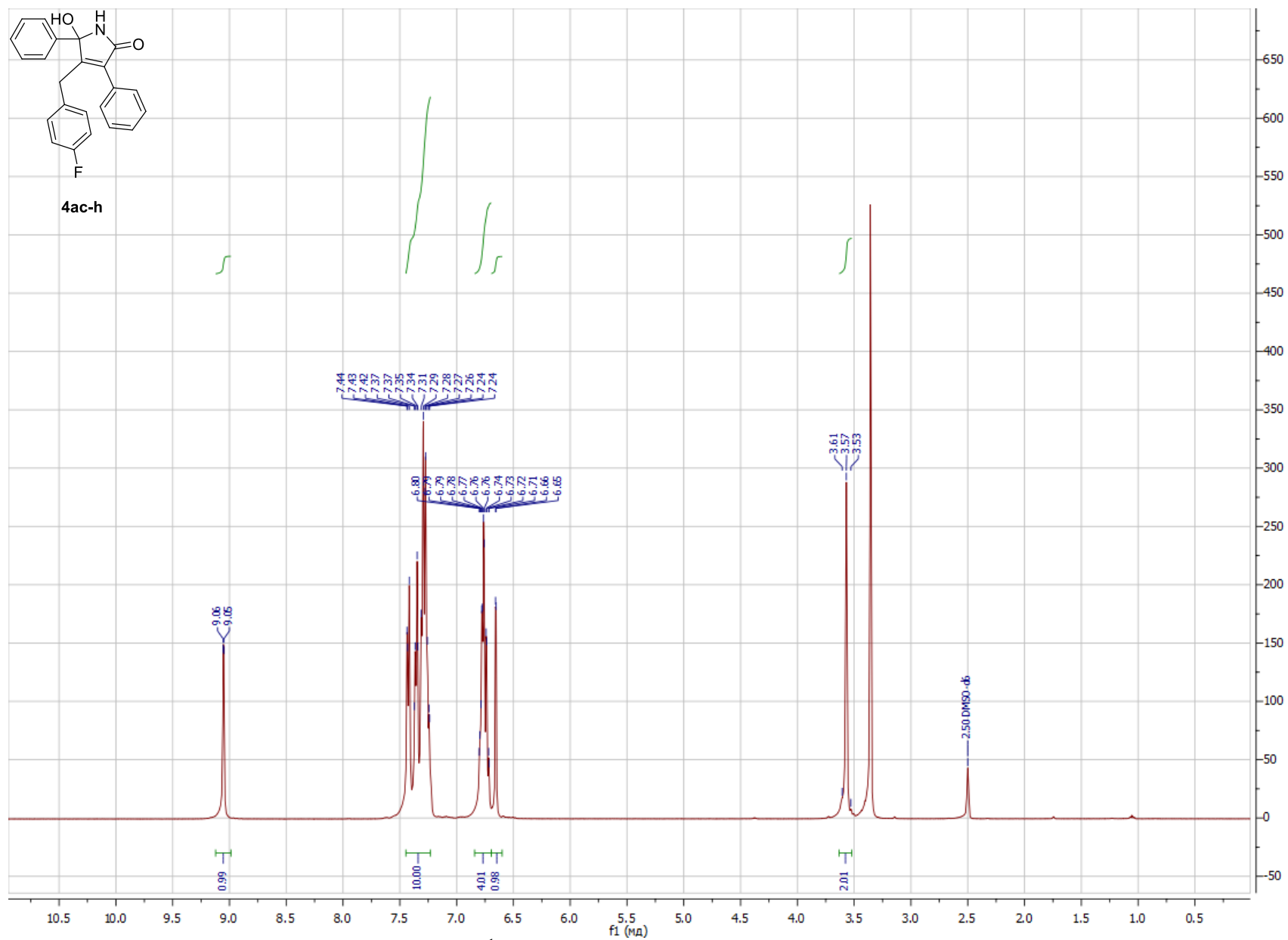


Figure S30.  $^1\text{H}$  NMR spectrum of **4ac-h** in  $\text{DMSO}-d_6$  (400 MHz)

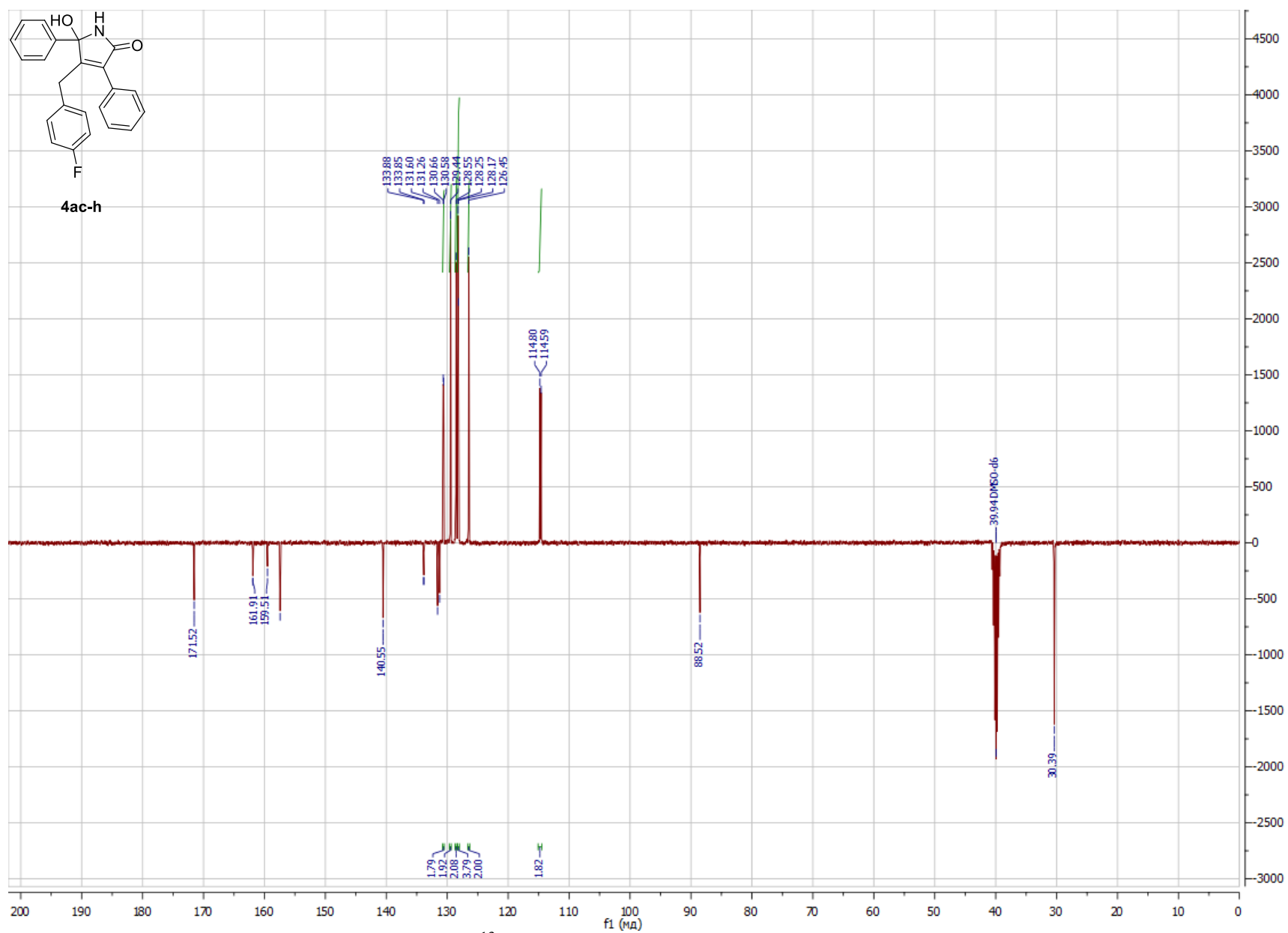


Figure S31.  $^{13}\text{C}$  NMR spectrum of **4ac-h** in DMSO- $d_6$  (101 MHz)



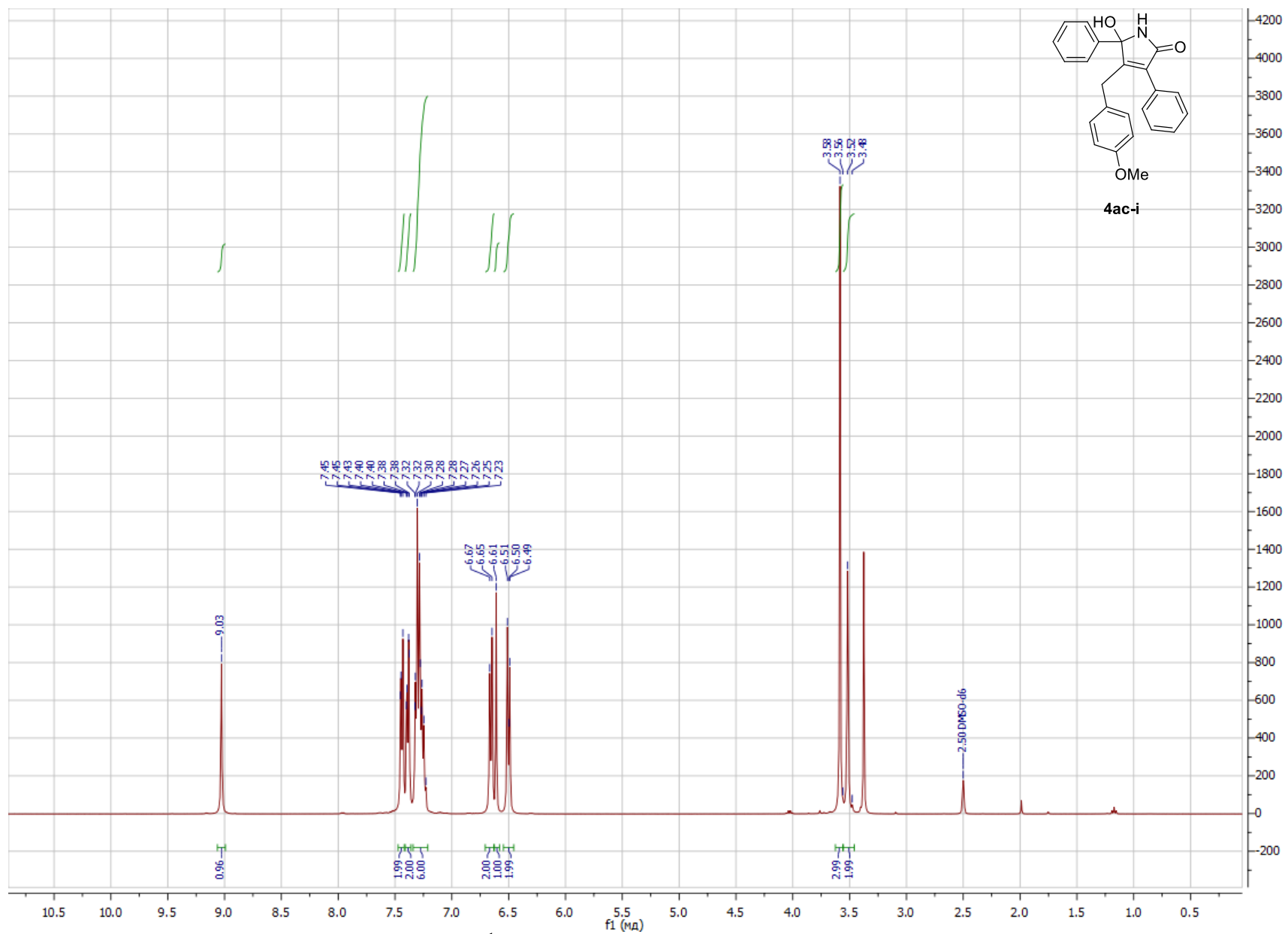


Figure S32.  $^1\text{H}$  NMR spectrum of **4ac-i** in  $\text{DMSO-}d_6$  (400 MHz)

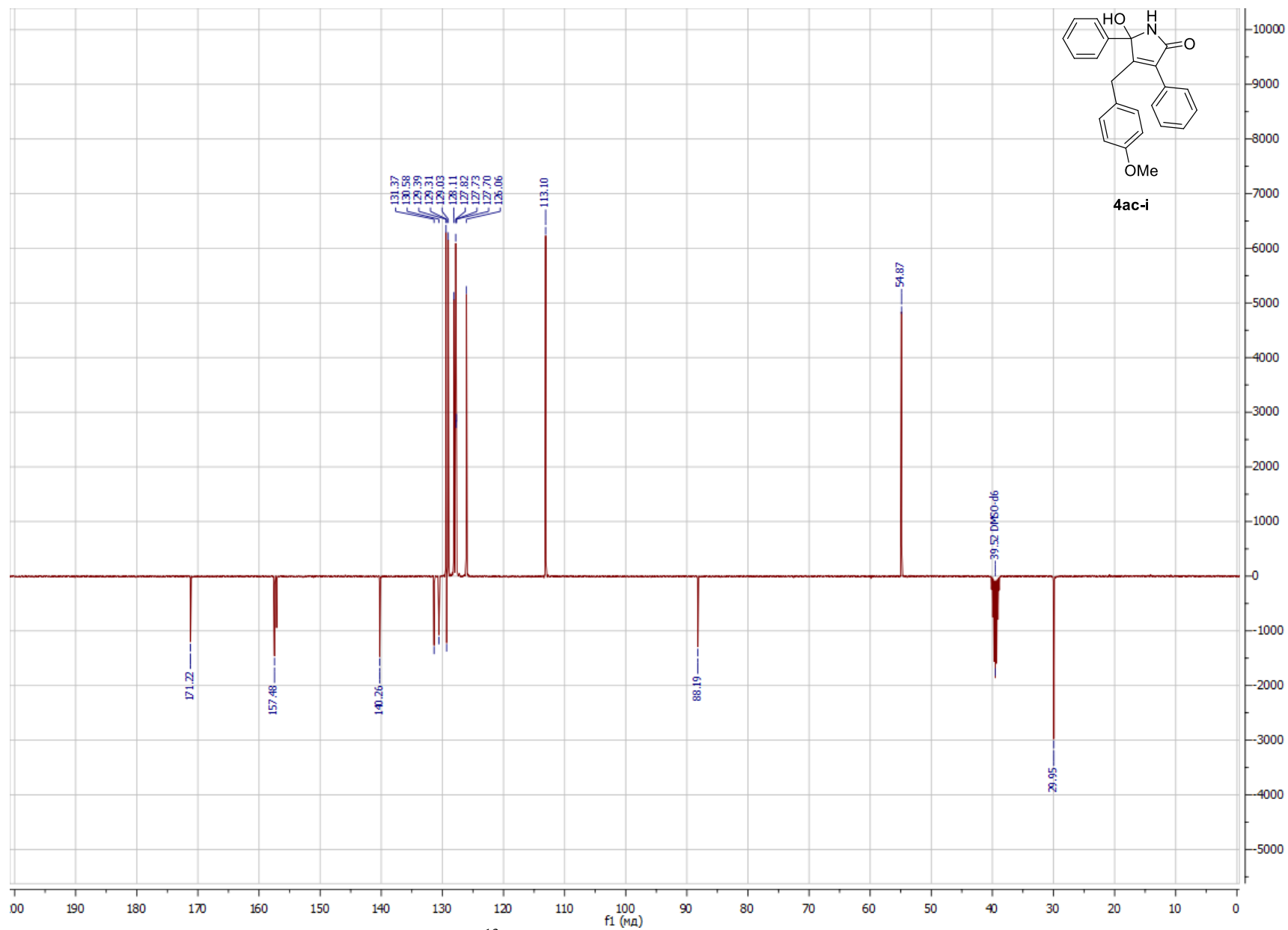


Figure S33.  $^{13}\text{C}$  NMR spectrum of **4ac-i** in  $\text{DMSO-}d_6$  (101 MHz)

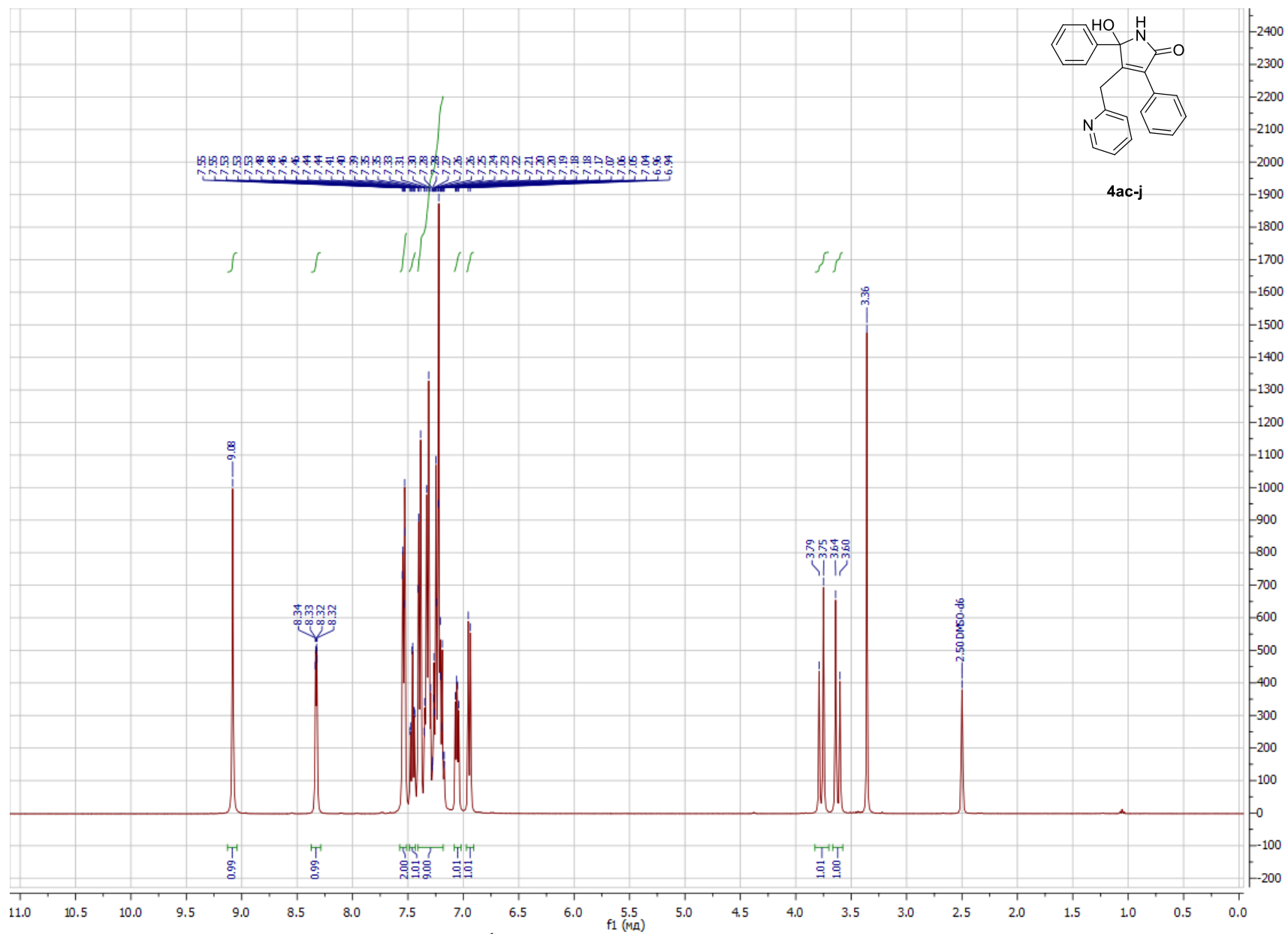


Figure S34.  $^1\text{H}$  NMR spectrum of **4ac-j** in  $\text{DMSO}-d_6$  (400 MHz)

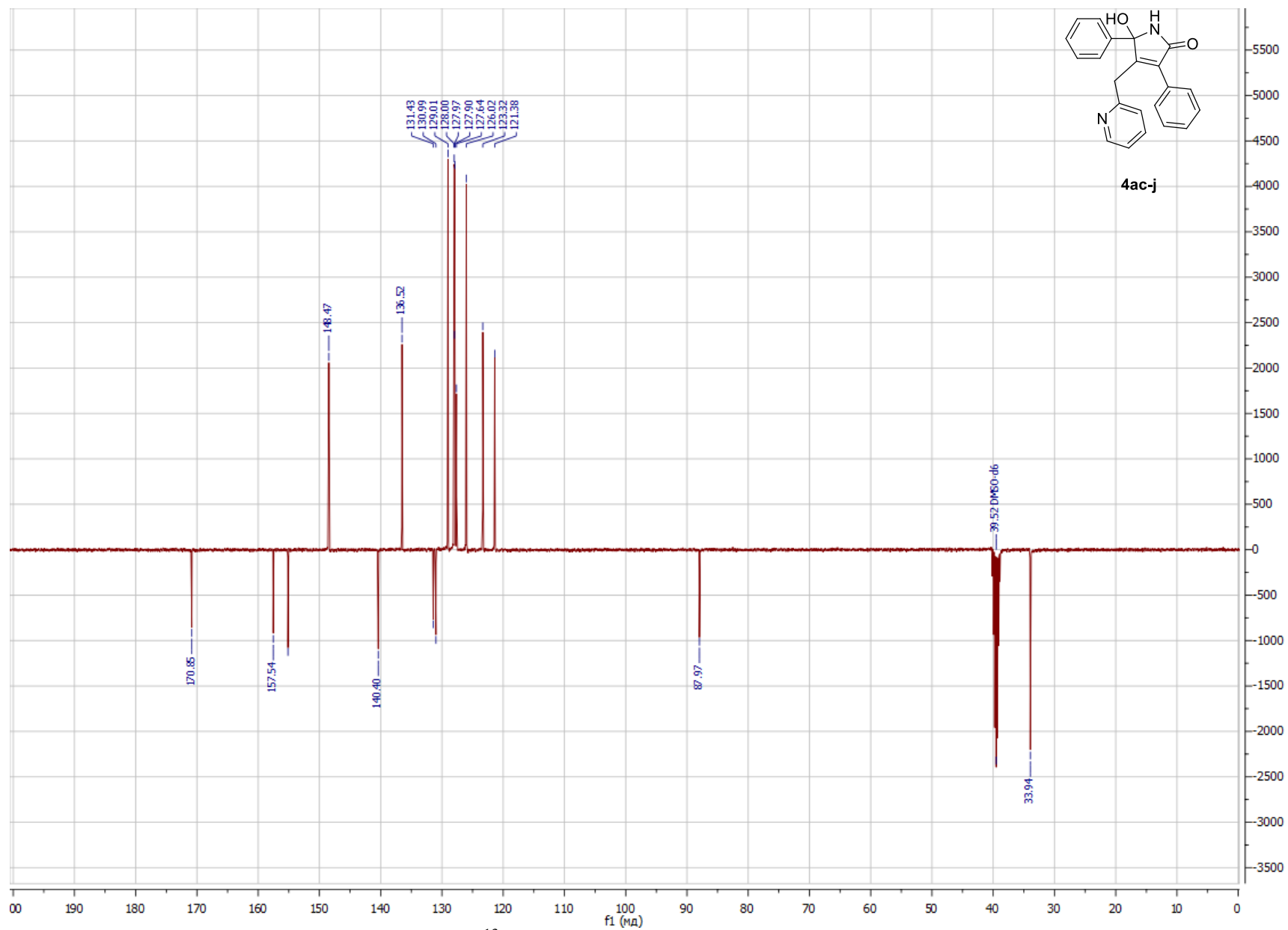


Figure S35.  $^{13}\text{C}$  NMR spectrum of **4ac-j** in  $\text{DMSO}-d_6$  (101 MHz)

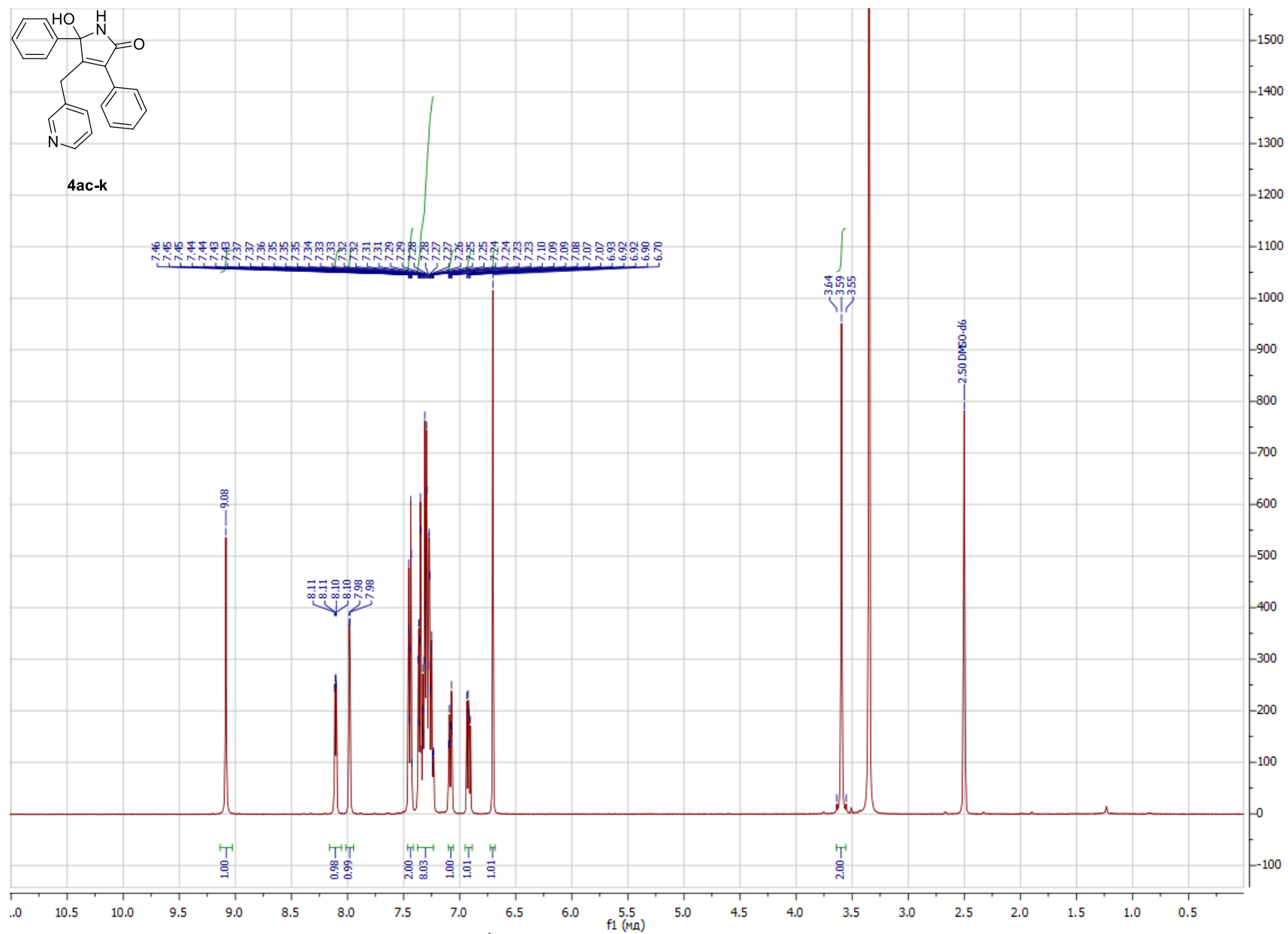


Figure S36.  $^1\text{H}$  NMR spectrum of **4ac-k** in  $\text{DMSO-}d_6$  (400 MHz)

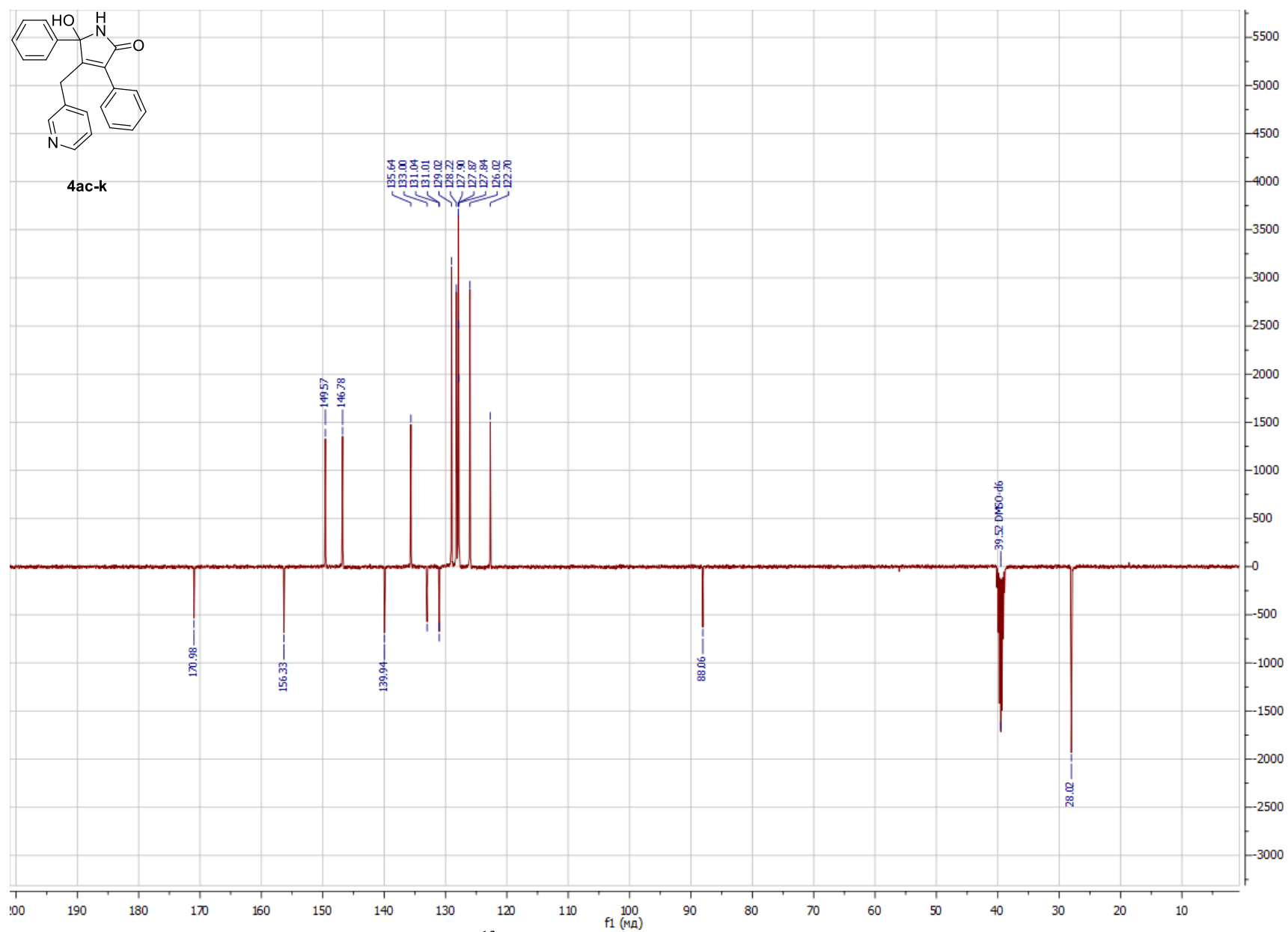


Figure S37.  $^{13}\text{C}$  NMR spectrum of **4ac-k** in  $\text{DMSO-}d_6$  (101 MHz)

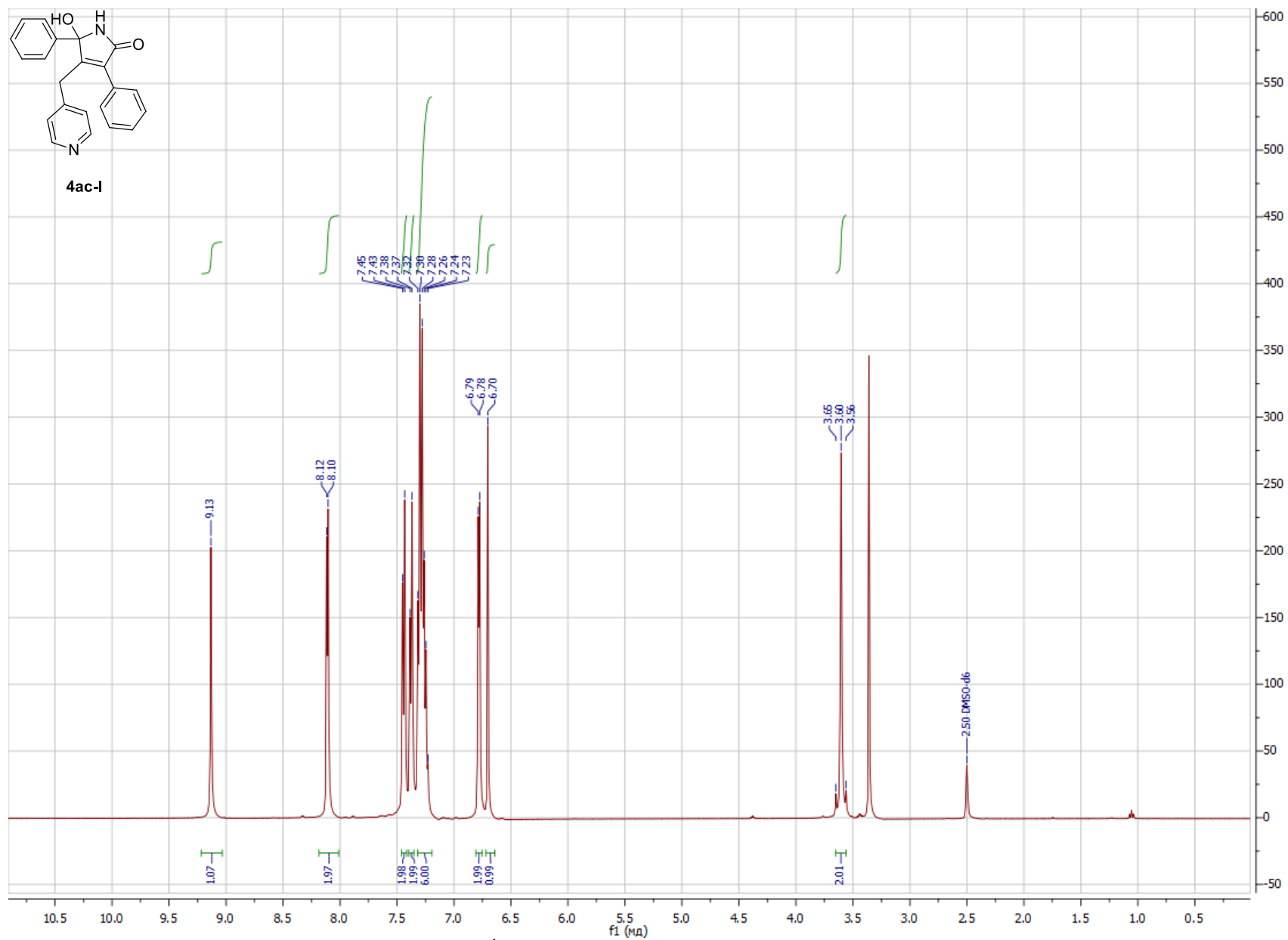


Figure S38. <sup>1</sup>H NMR spectrum of **4ac-1** in DMSO-*d*<sub>6</sub> (400 MHz)

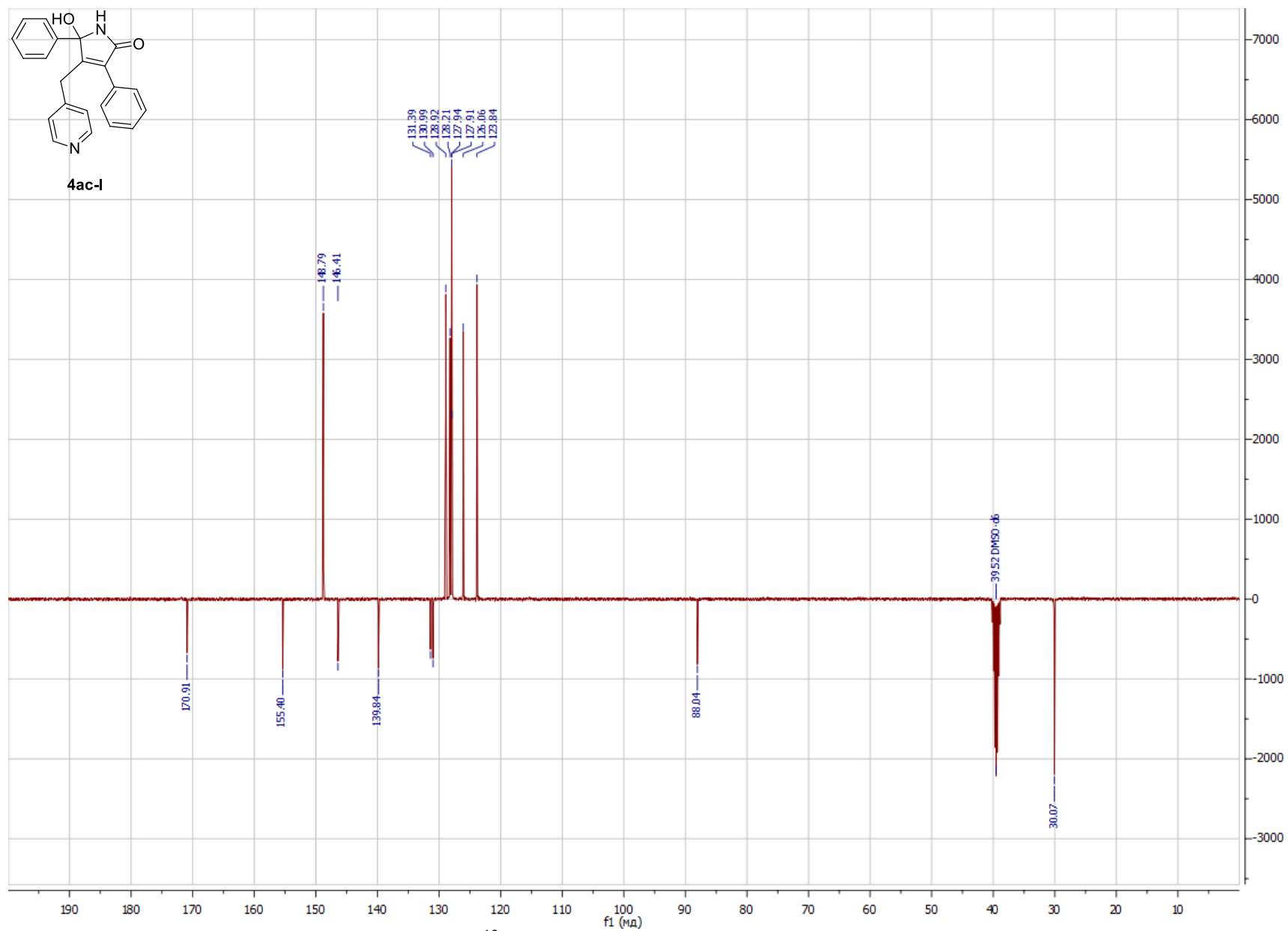


Figure S39.  $^{13}\text{C}$  NMR spectrum of **4ac-I** in  $\text{DMSO-}d_6$  (101 MHz)



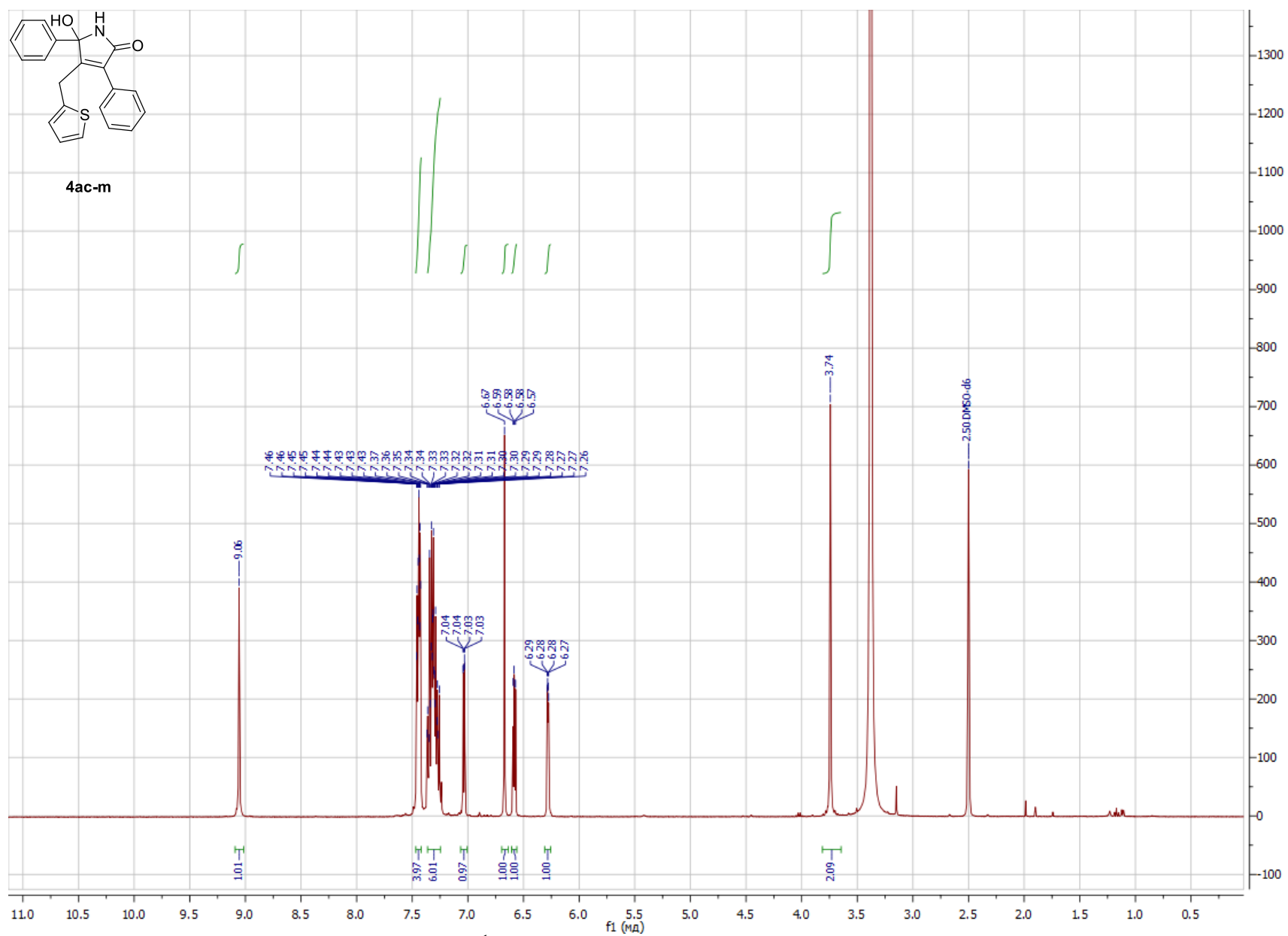


Figure S40.  $^1\text{H}$  NMR spectrum of **4ac-m** in  $\text{DMSO-}d_6$  (400 MHz)

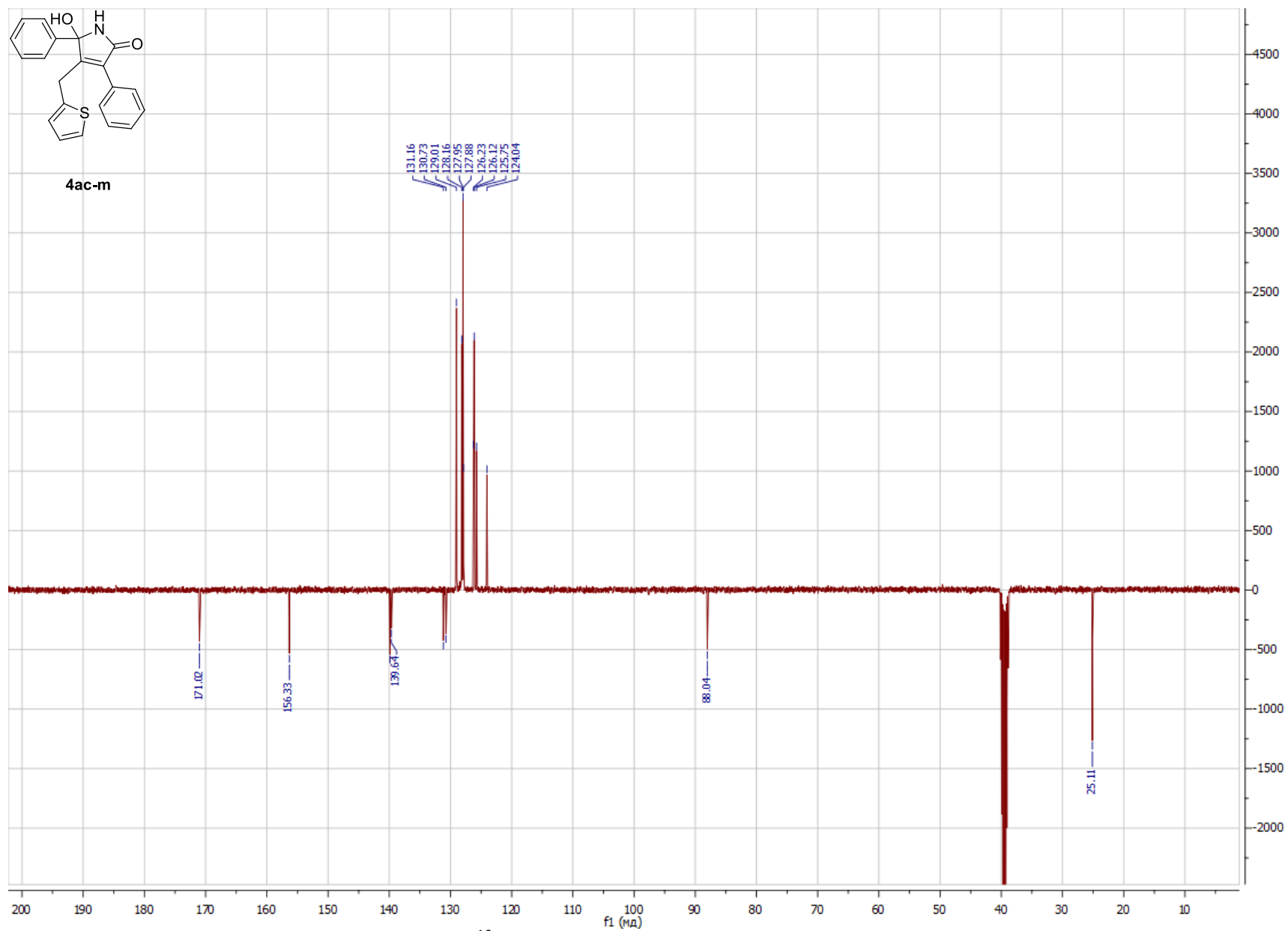


Figure S41.  $^{13}\text{C}$  NMR spectrum of **4ac-m** in  $\text{DMSO}-d_6$  (101 MHz)

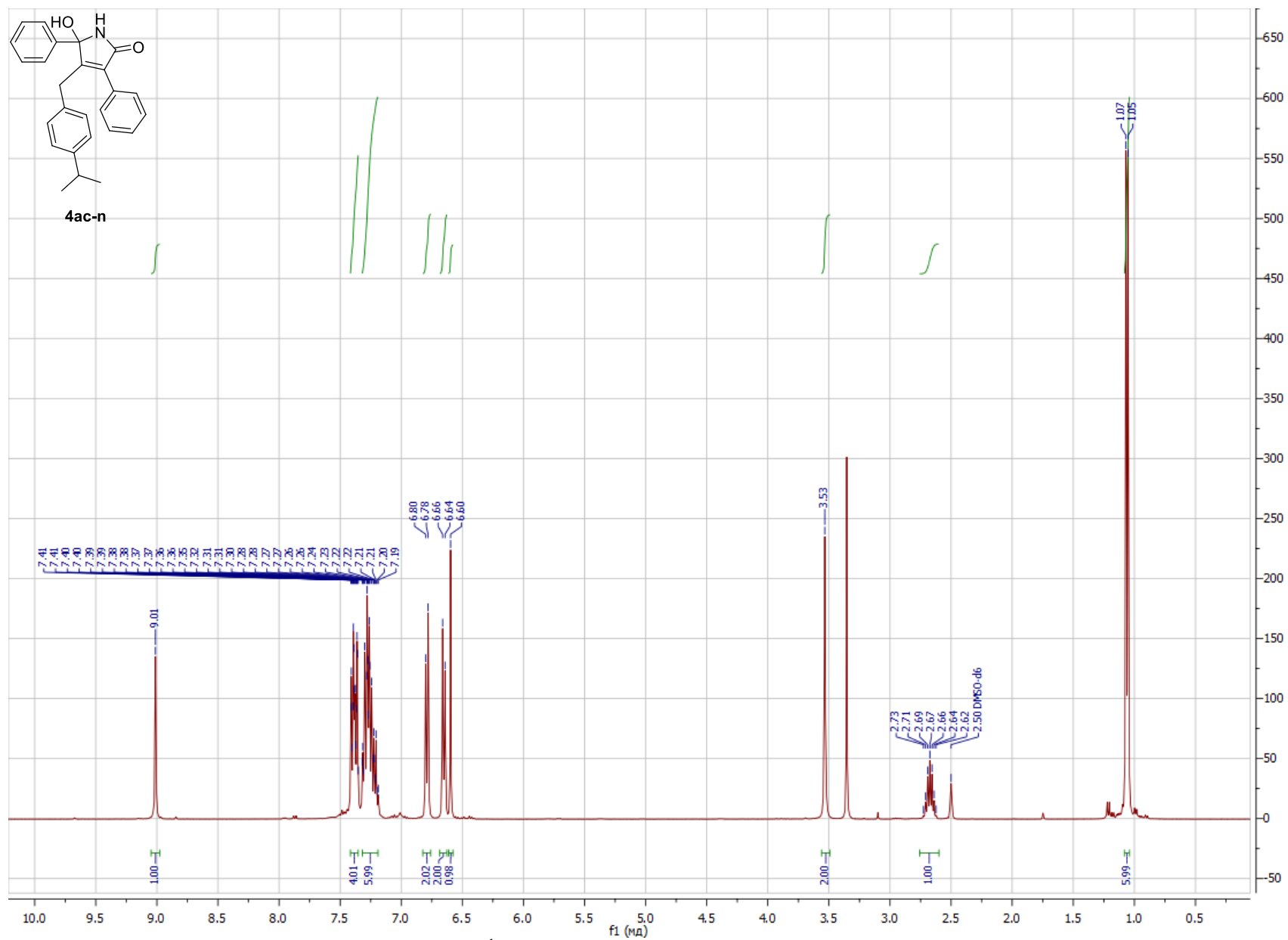


Figure S42.  $^1\text{H}$  NMR spectrum of **4ac-n** in  $\text{DMSO-}d_6$  (400 MHz)

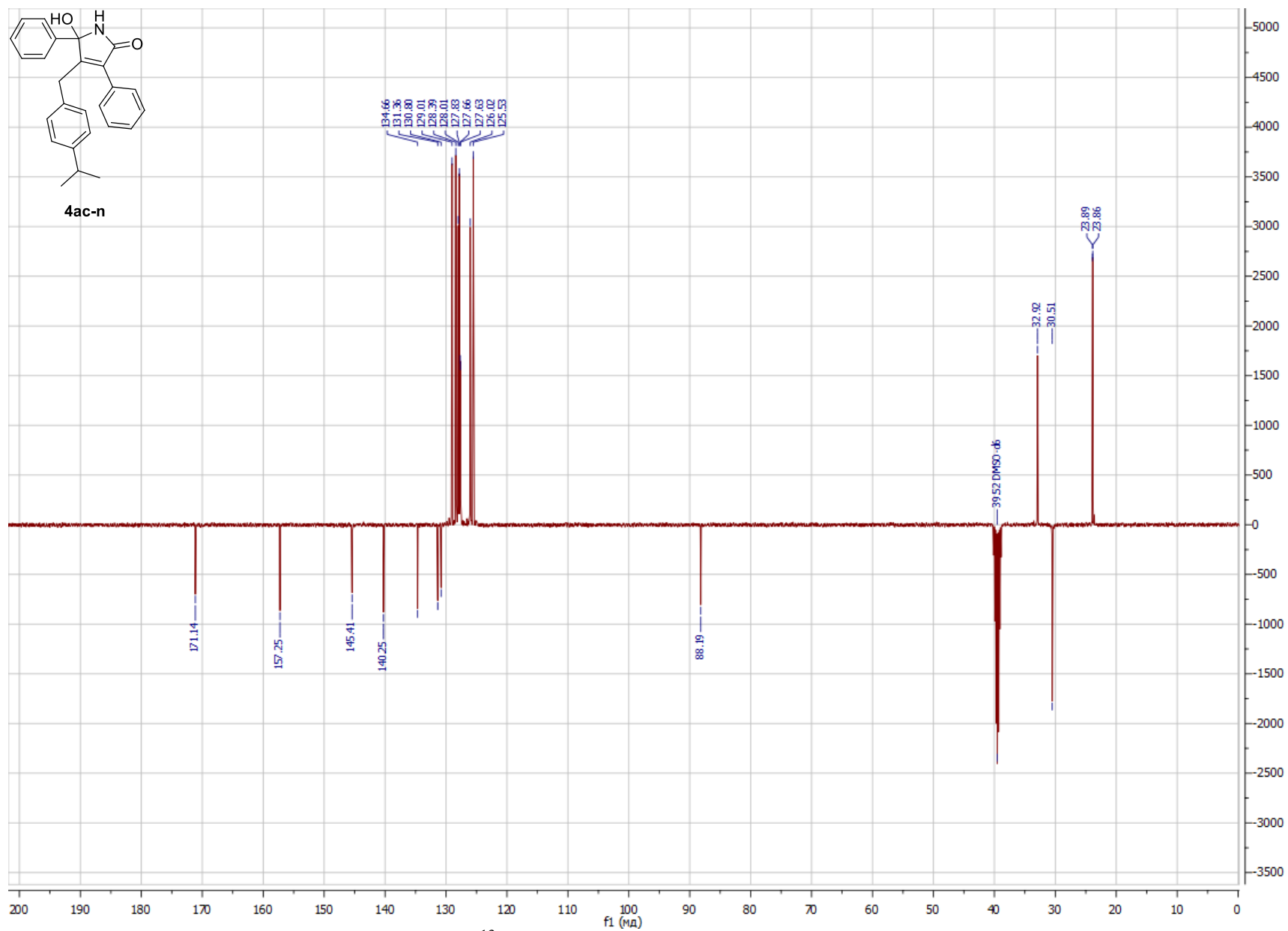


Figure S43.  $^{13}\text{C}$  NMR spectrum of **4ac-n** in  $\text{DMSO-}d_6$  (101 MHz)

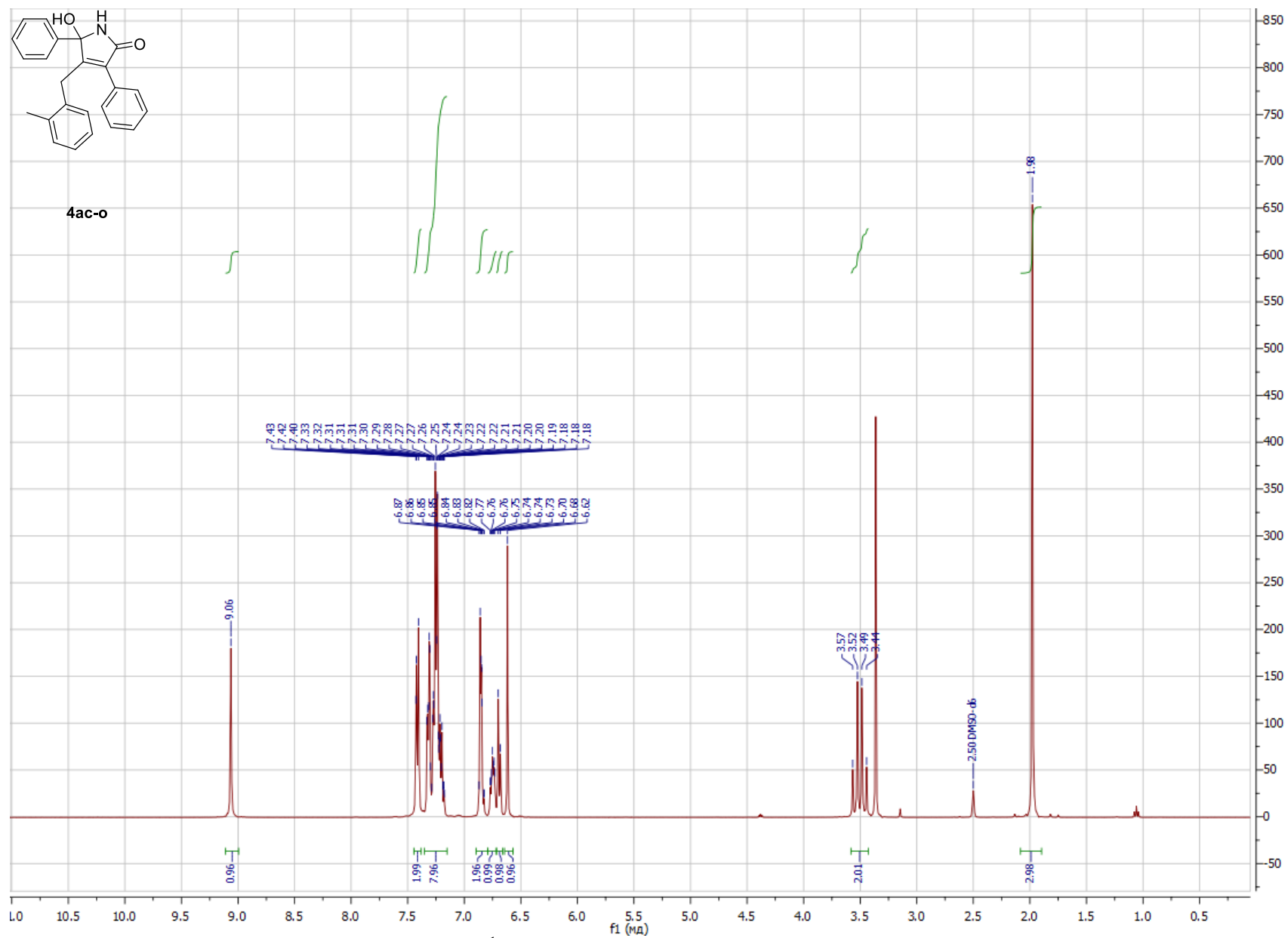


Figure S44.  $^1\text{H}$  NMR spectrum of **4ac-o** in  $\text{DMSO}-d_6$  (400 MHz)

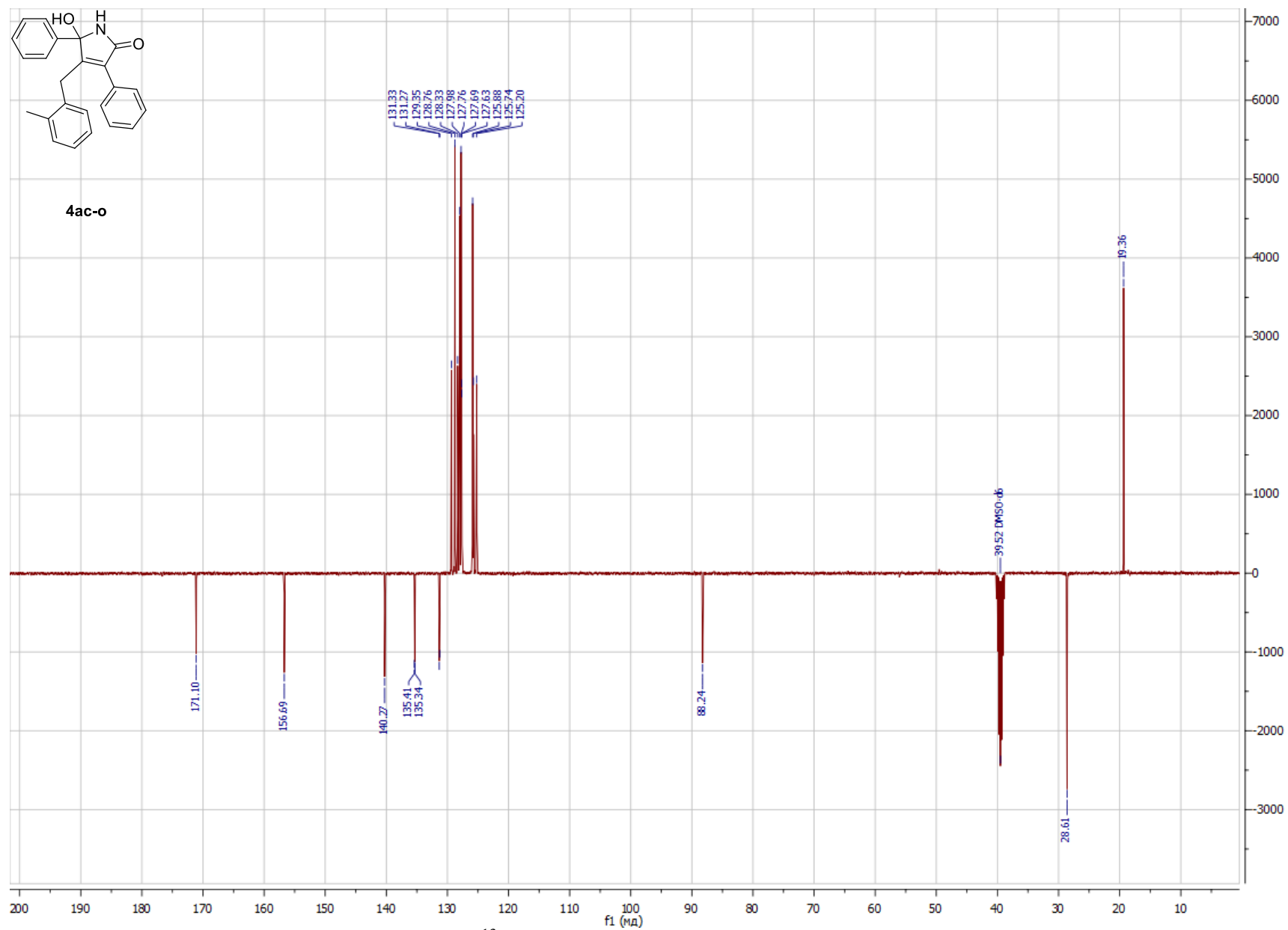


Figure S45.  $^{13}\text{C}$  NMR spectrum of **4ac-o** in  $\text{DMSO-}d_6$  (101 MHz)

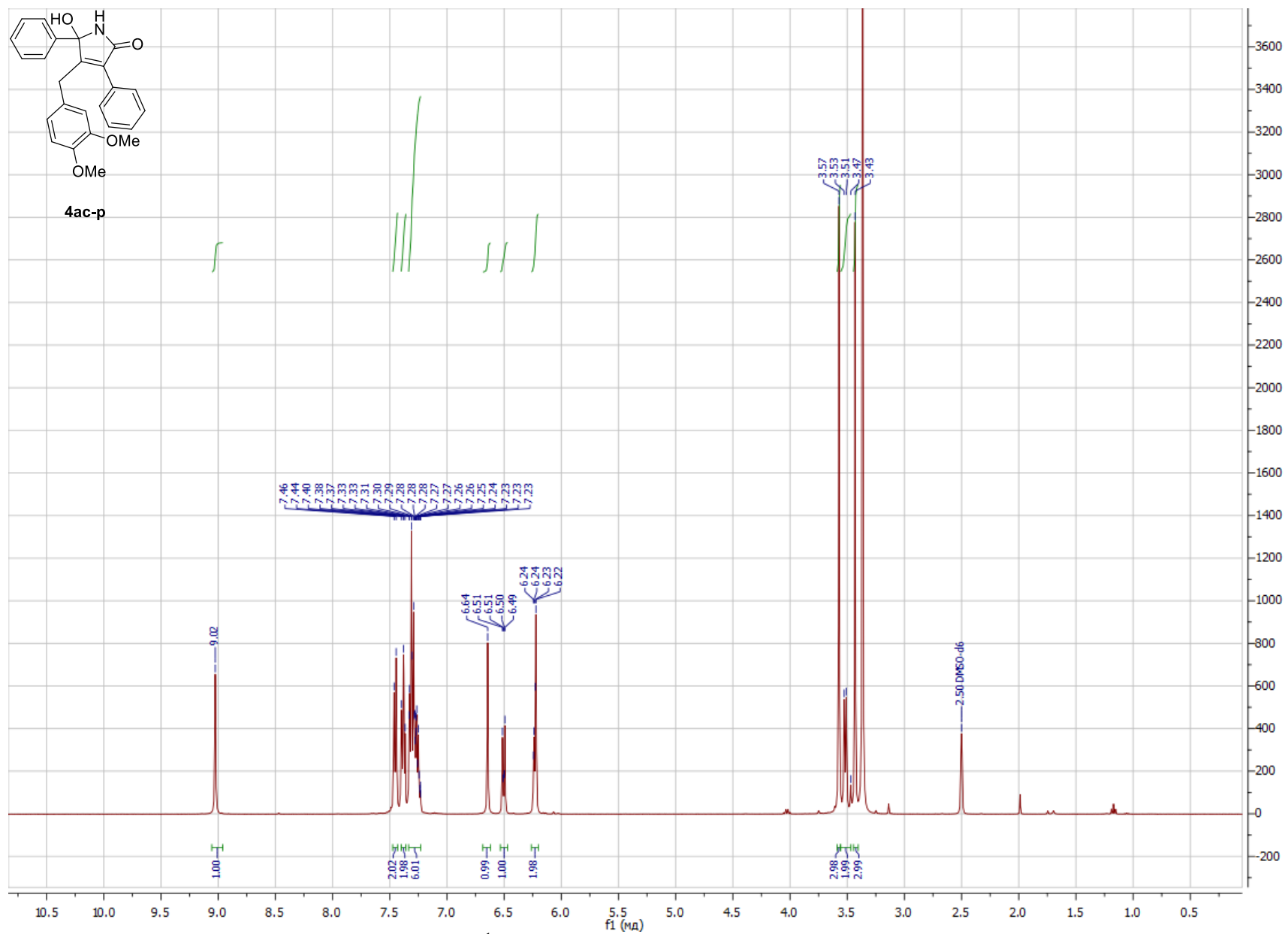


Figure S46. <sup>1</sup>H NMR spectrum of **4ac-p** in DMSO-*d*<sub>6</sub> (400 MHz)

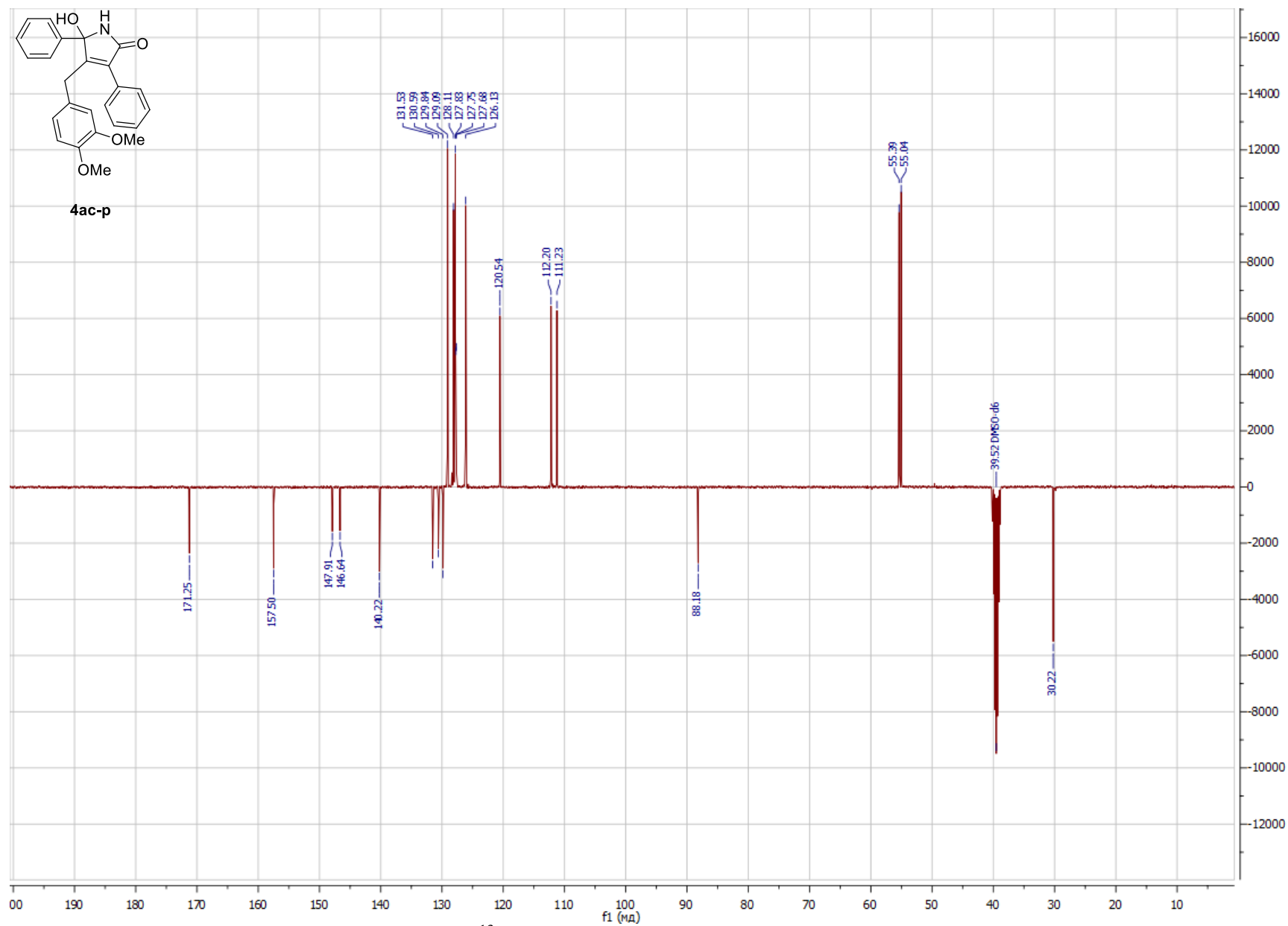


Figure S47.  $^{13}\text{C}$  NMR spectrum of **4ac-p** in  $\text{DMSO-}d_6$  (101 MHz)



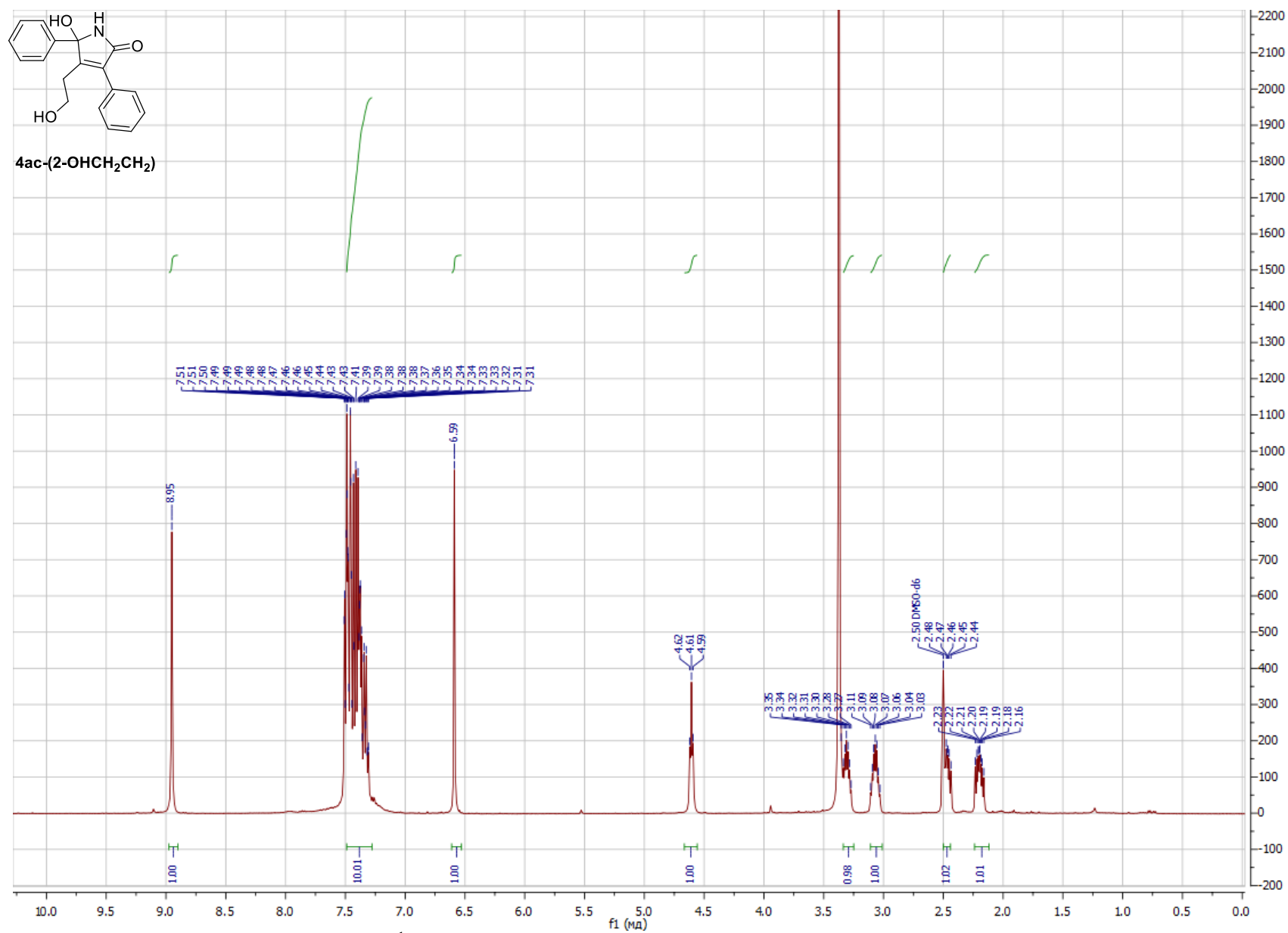


Figure S48. <sup>1</sup>H NMR spectrum of **4ac-(2OHCH<sub>2</sub>CH<sub>2</sub>)** in DMSO-*d*<sub>6</sub> (400 MHz)

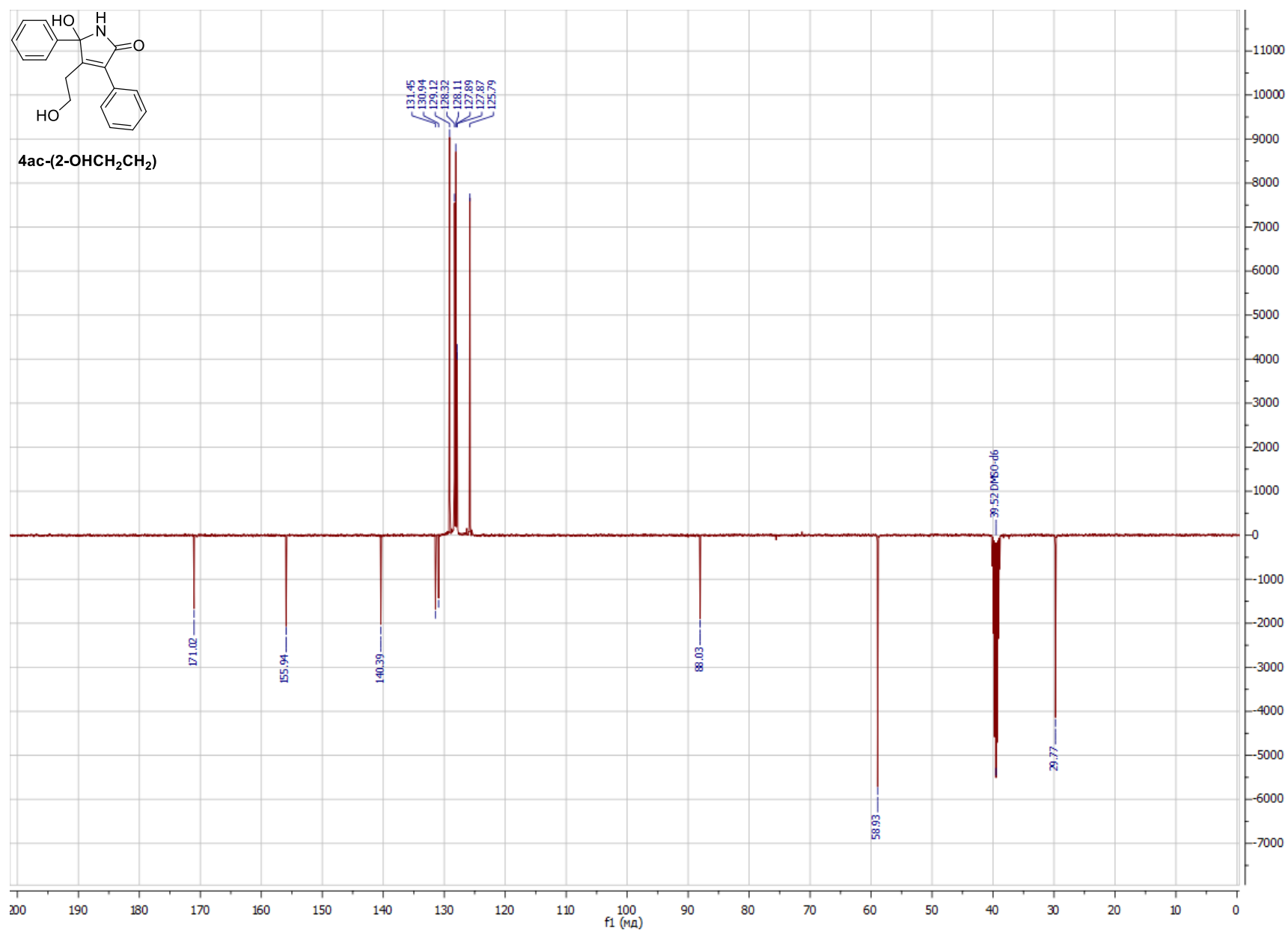


Figure S49. <sup>13</sup>C NMR spectrum of **4ac-(2OHCH<sub>2</sub>CH<sub>2</sub>)** in DMSO-*d*<sub>6</sub> (101 MHz)

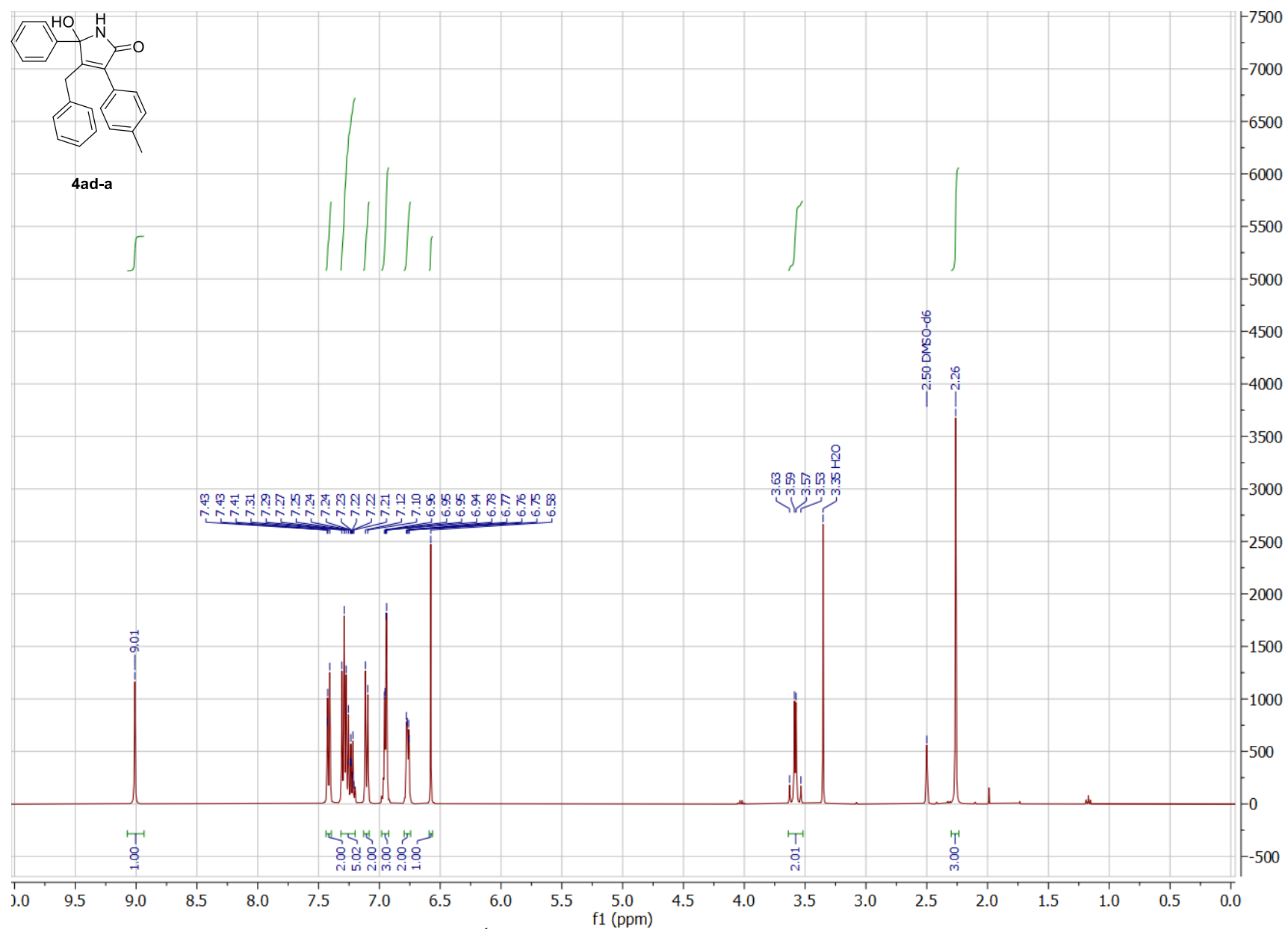


Figure S50.  $^1\text{H}$  NMR spectrum of **4ad-a** in  $\text{DMSO-}d_6$  (400 MHz)

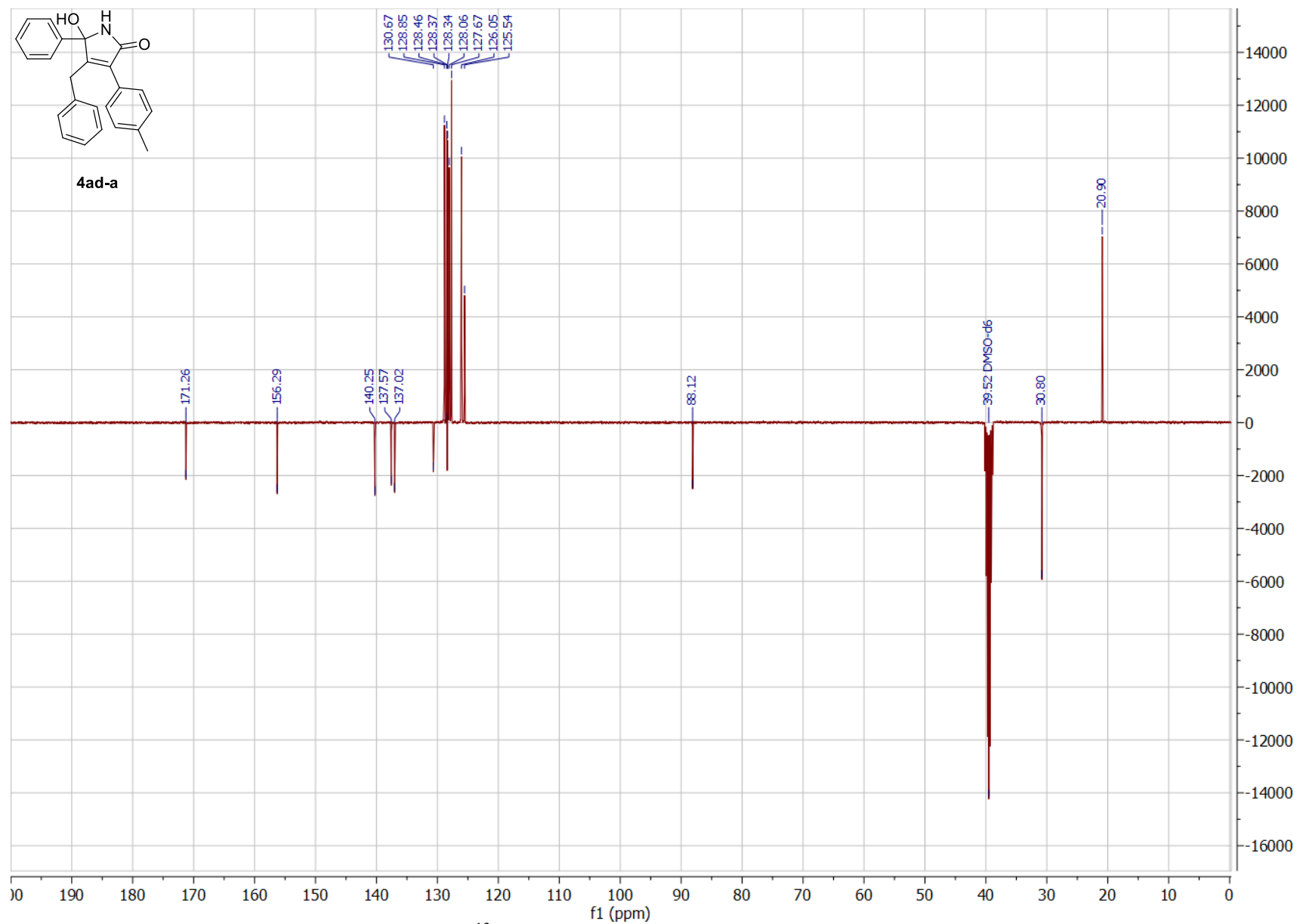


Figure S51.  $^{13}\text{C}$  NMR spectrum of **4ad-a** in DMSO- $d_6$  (101 MHz)

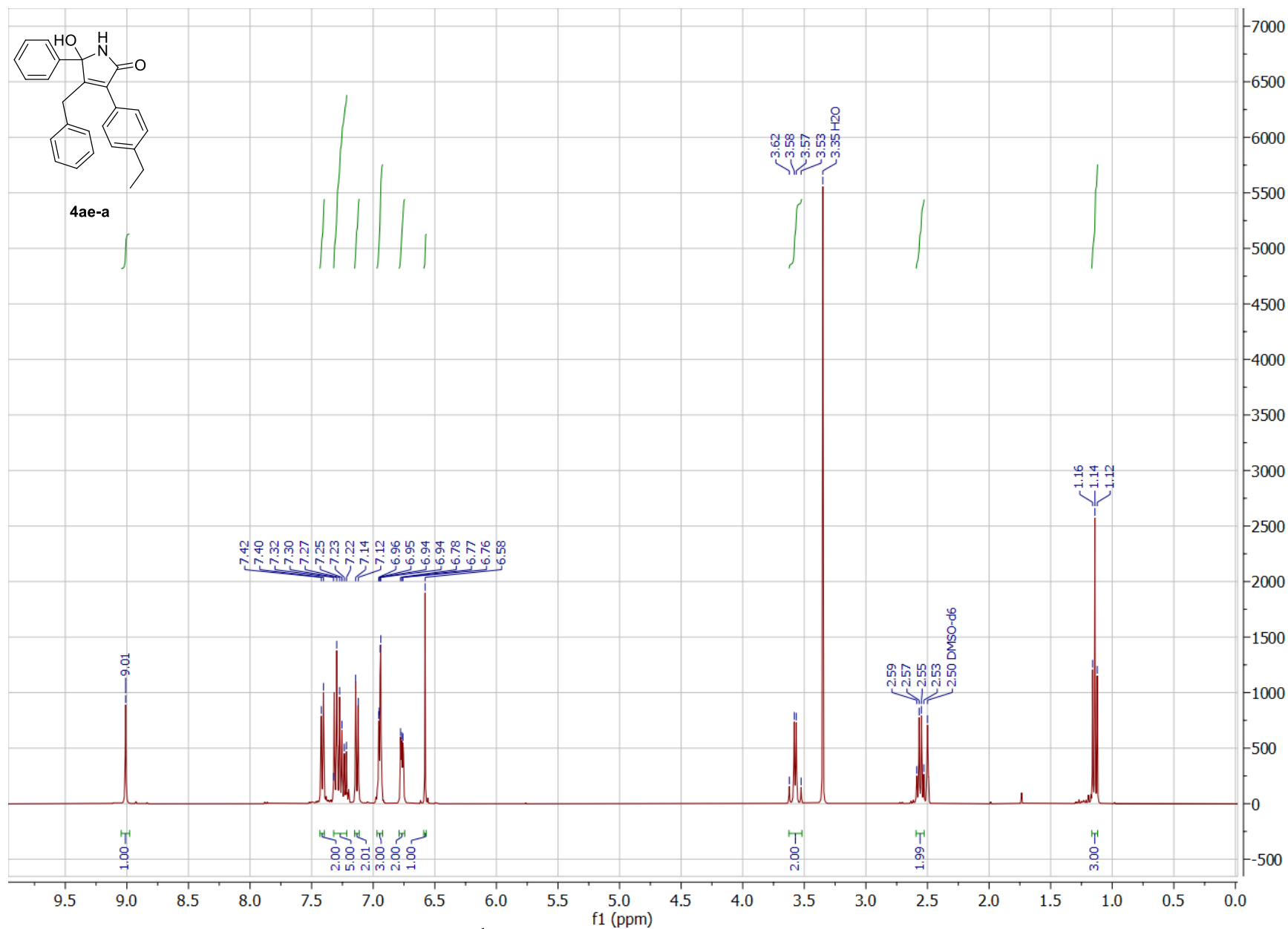


Figure S52. <sup>1</sup>H NMR spectrum of **4ae-a** in DMSO-*d*<sub>6</sub> (400 MHz)

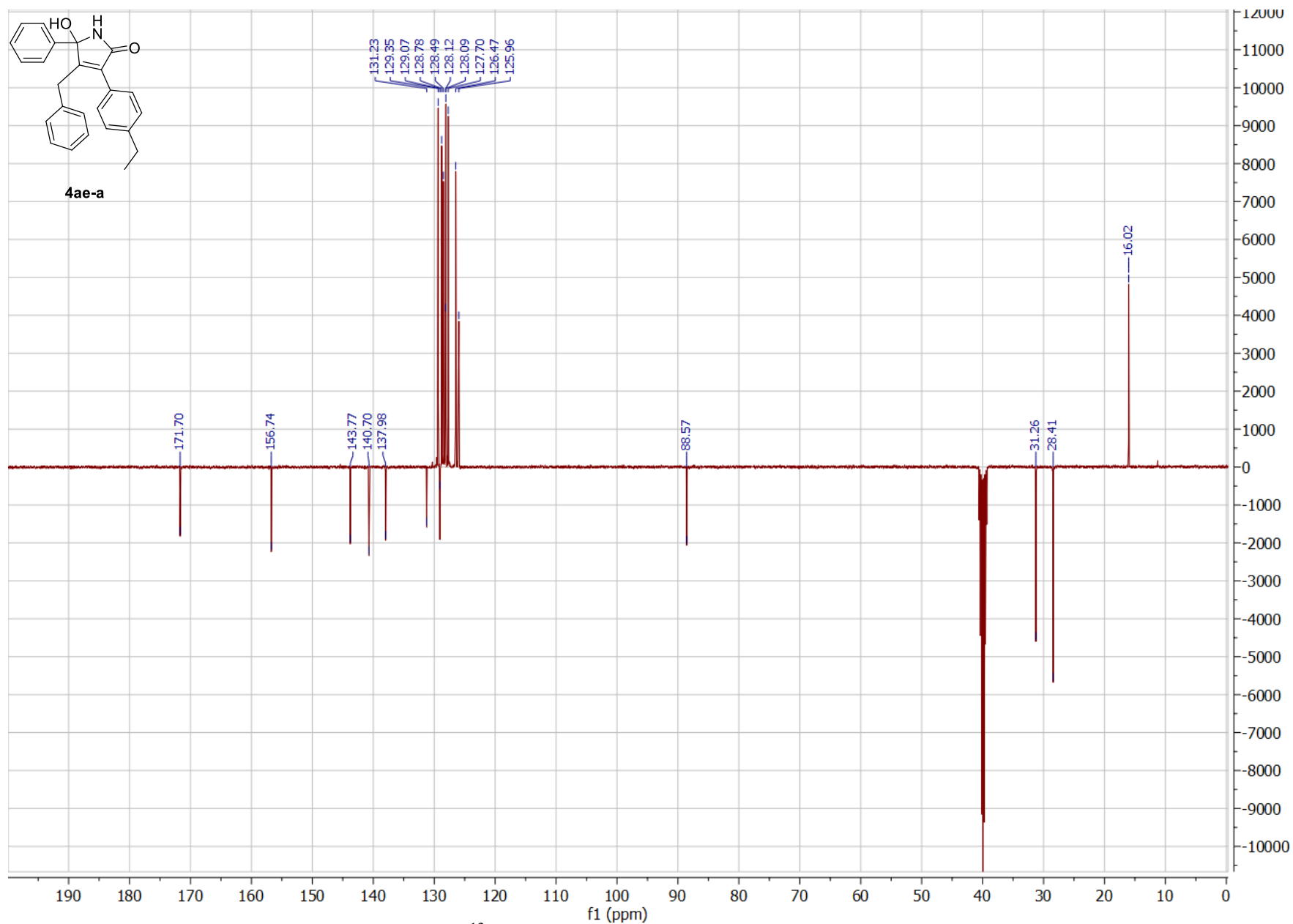


Figure S53.  $^{13}\text{C}$  NMR spectrum of **4ae-a** in  $\text{DMSO}-d_6$  (101 MHz)

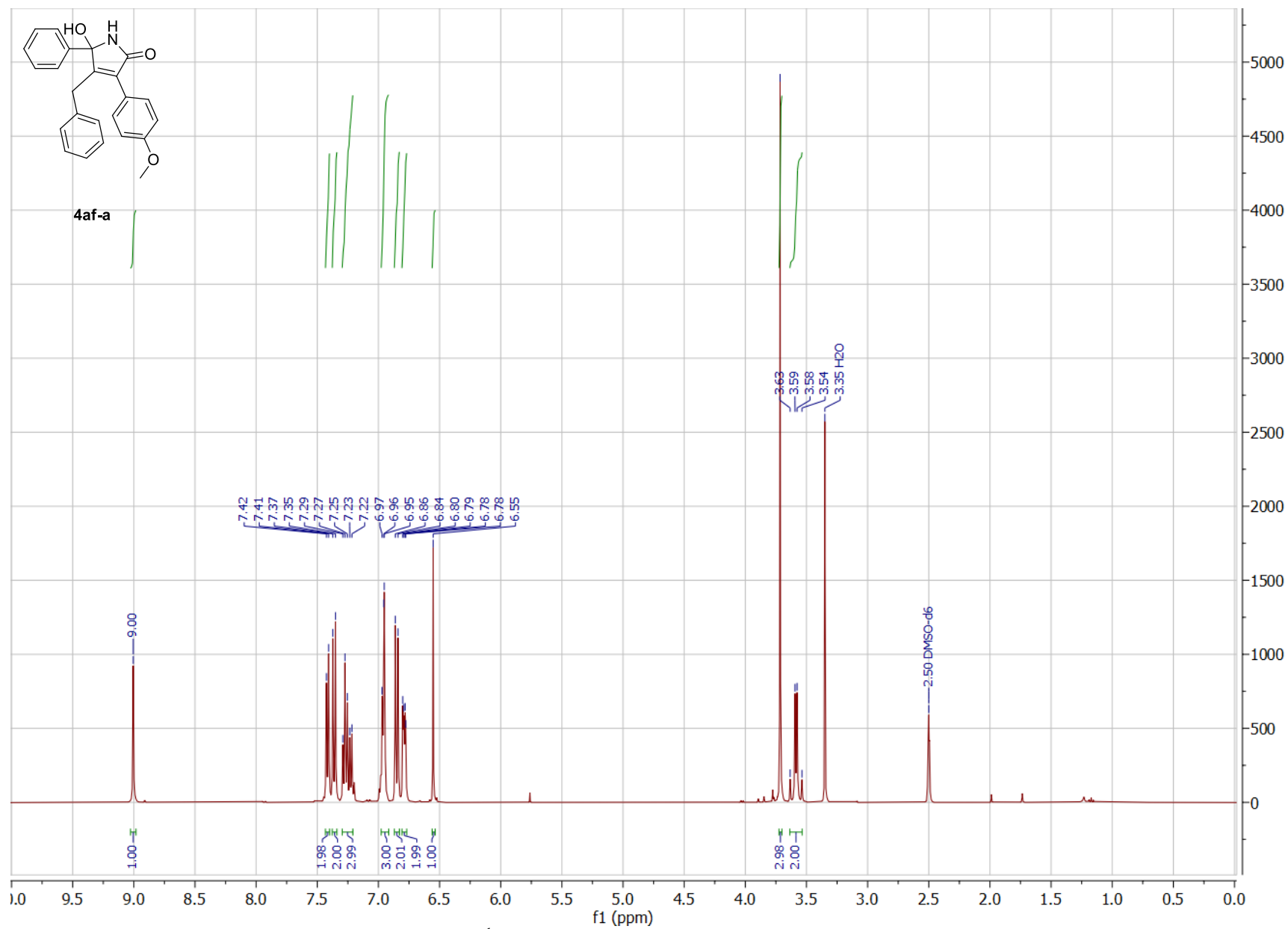


Figure S54.  $^1\text{H}$  NMR spectrum of **4af-a** in  $\text{DMSO}-d_6$  (400 MHz)

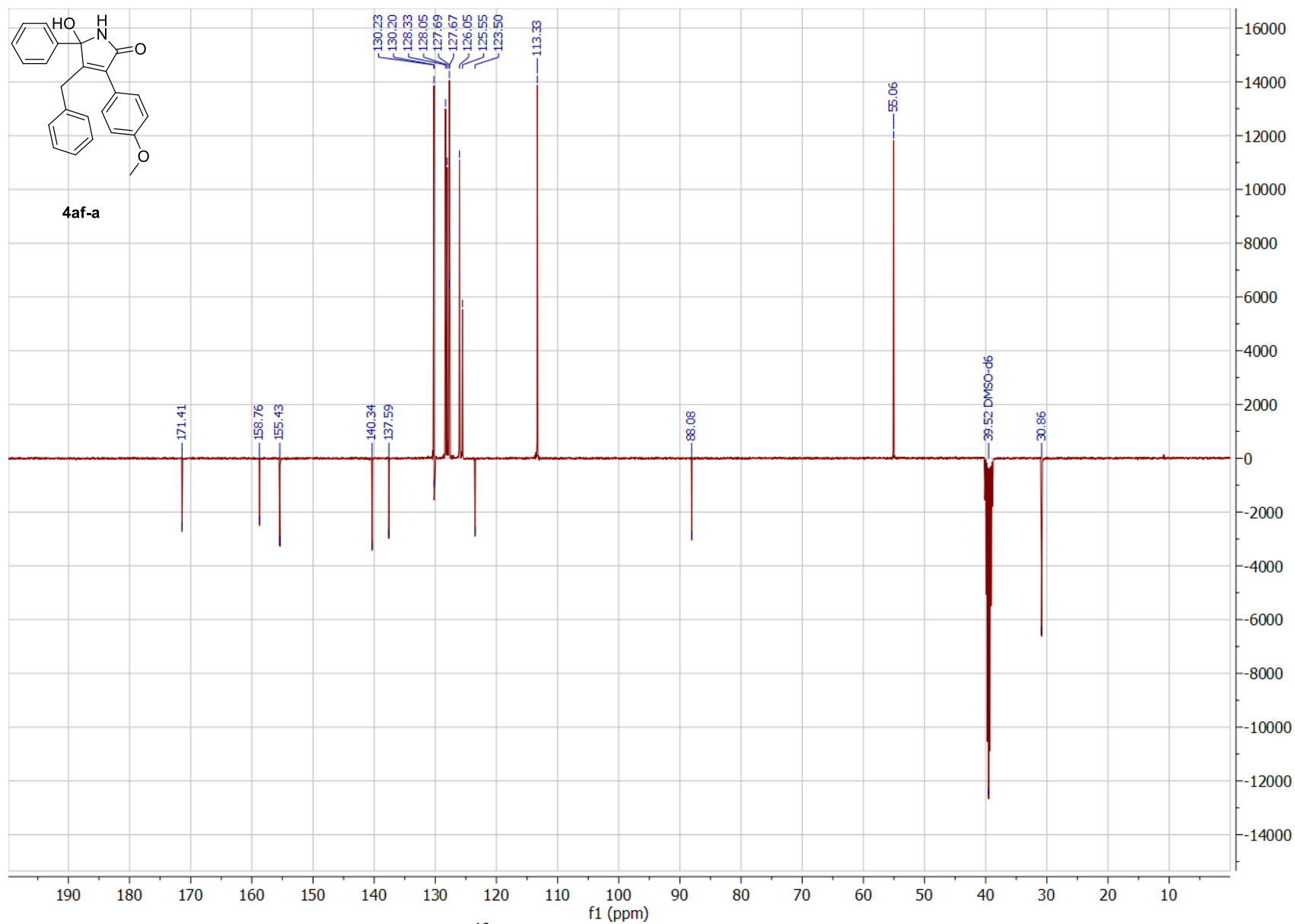


Figure S55.  $^{13}\text{C}$  NMR spectrum of **4af-a** in DMSO- $d_6$  (101 MHz)



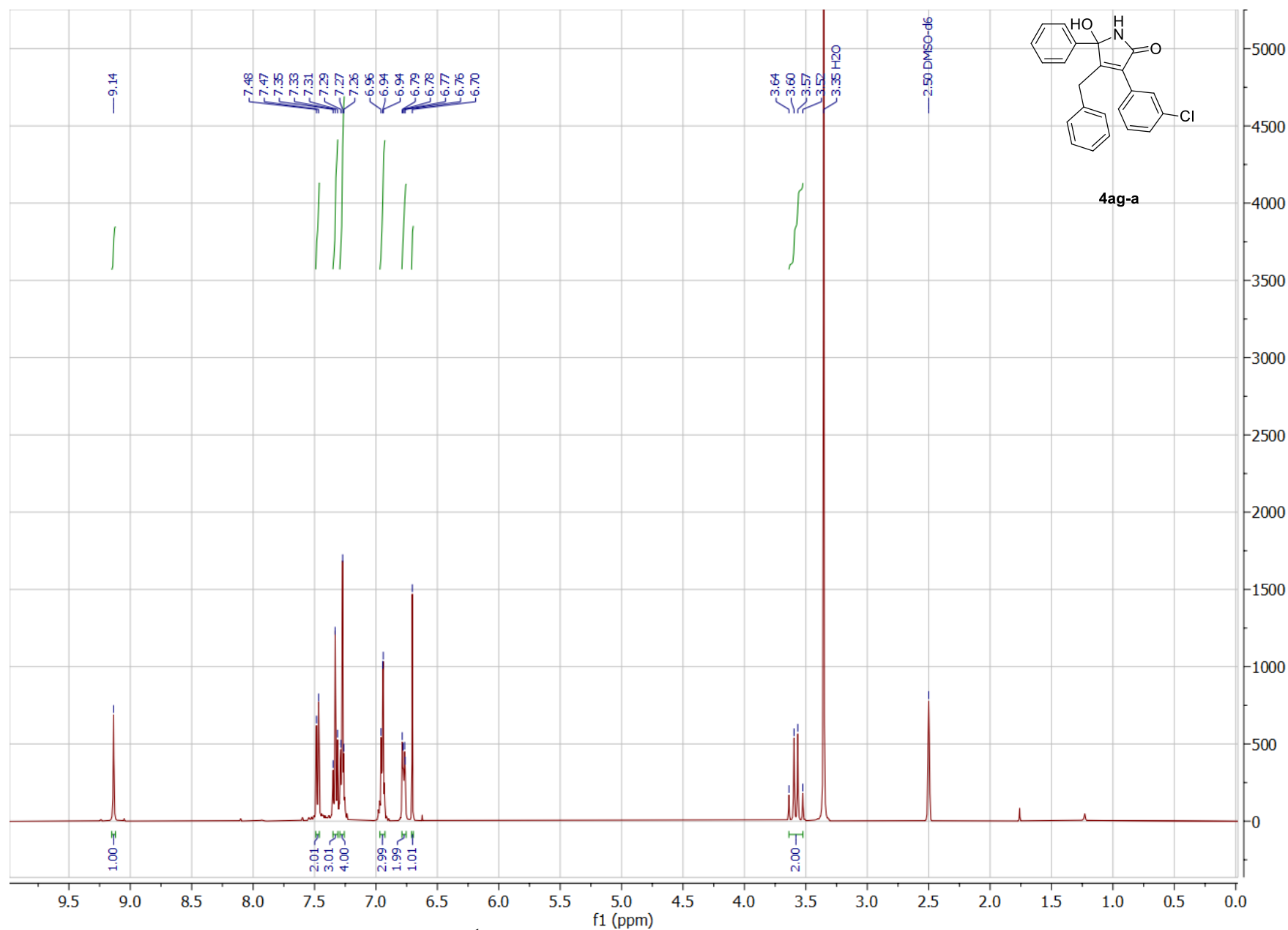


Figure S56.  $^1\text{H}$  NMR spectrum of **4ag-a** in DMSO- $d_6$  (400 MHz)

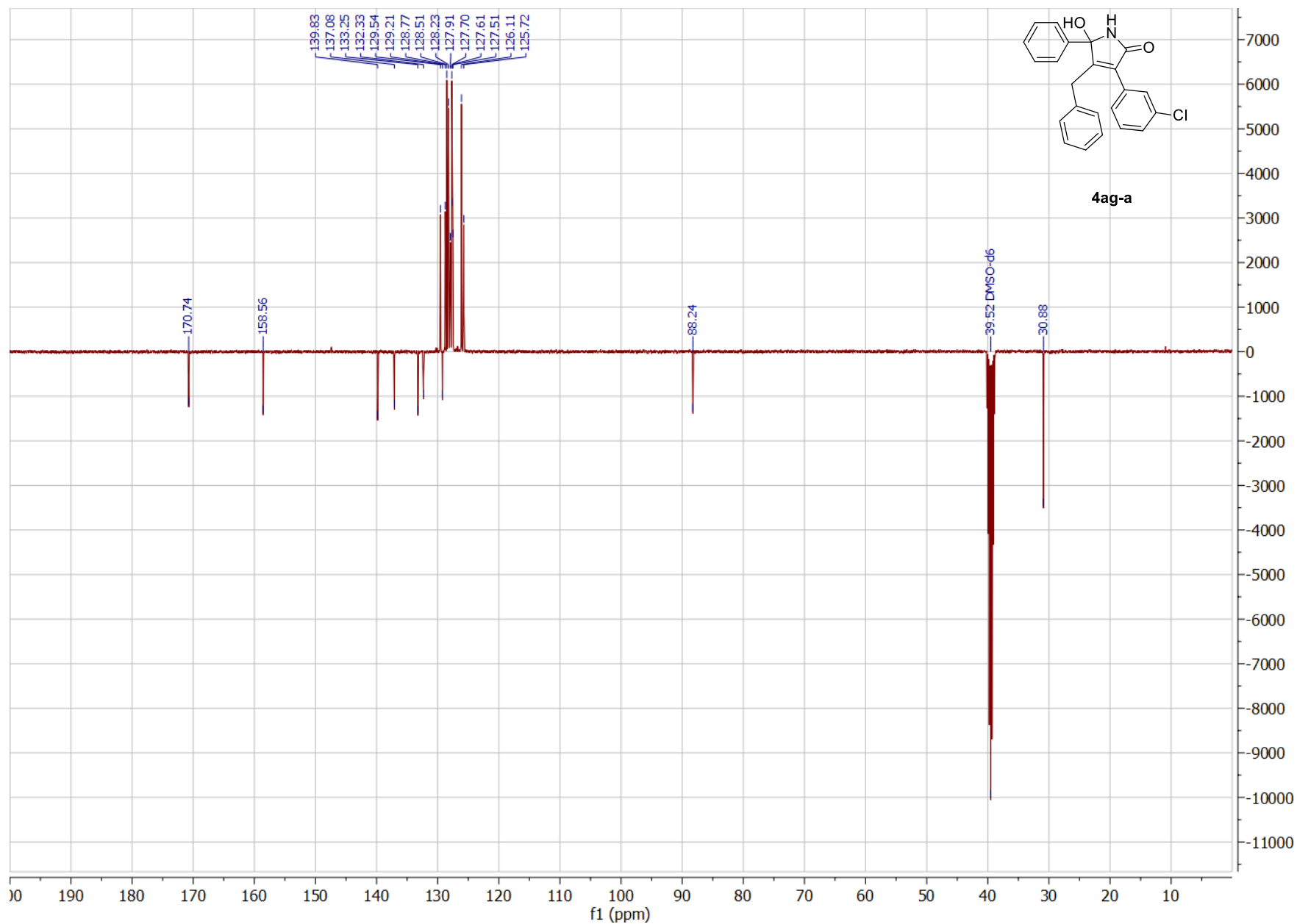


Figure S57.  $^{13}\text{C}$  NMR spectrum of **4ag-a** in  $\text{DMSO-}d_6$  (101 MHz)

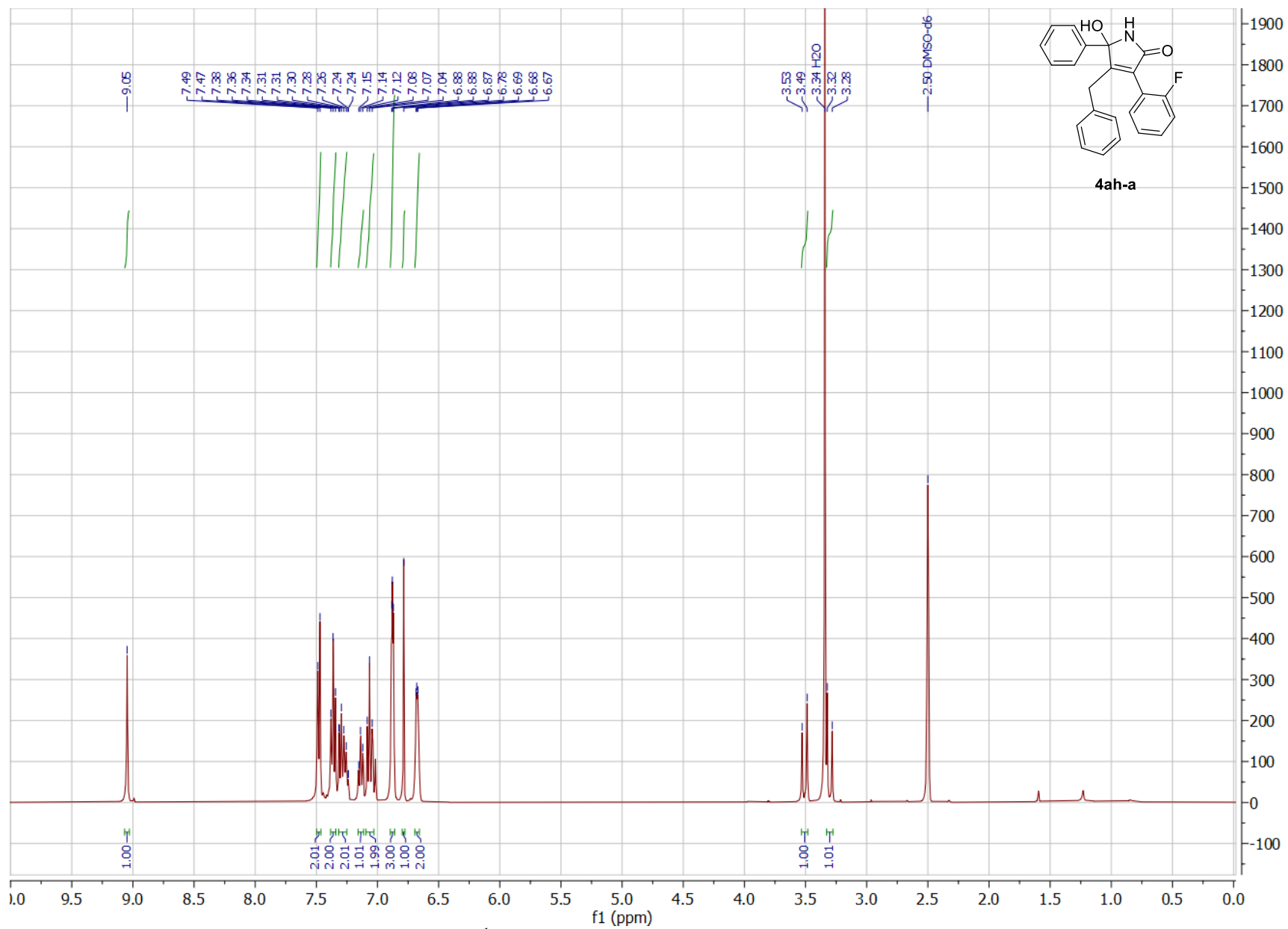


Figure S58.  $^1\text{H}$  NMR spectrum of **4ah-a** in  $\text{DMSO-}d_6$  (400 MHz)

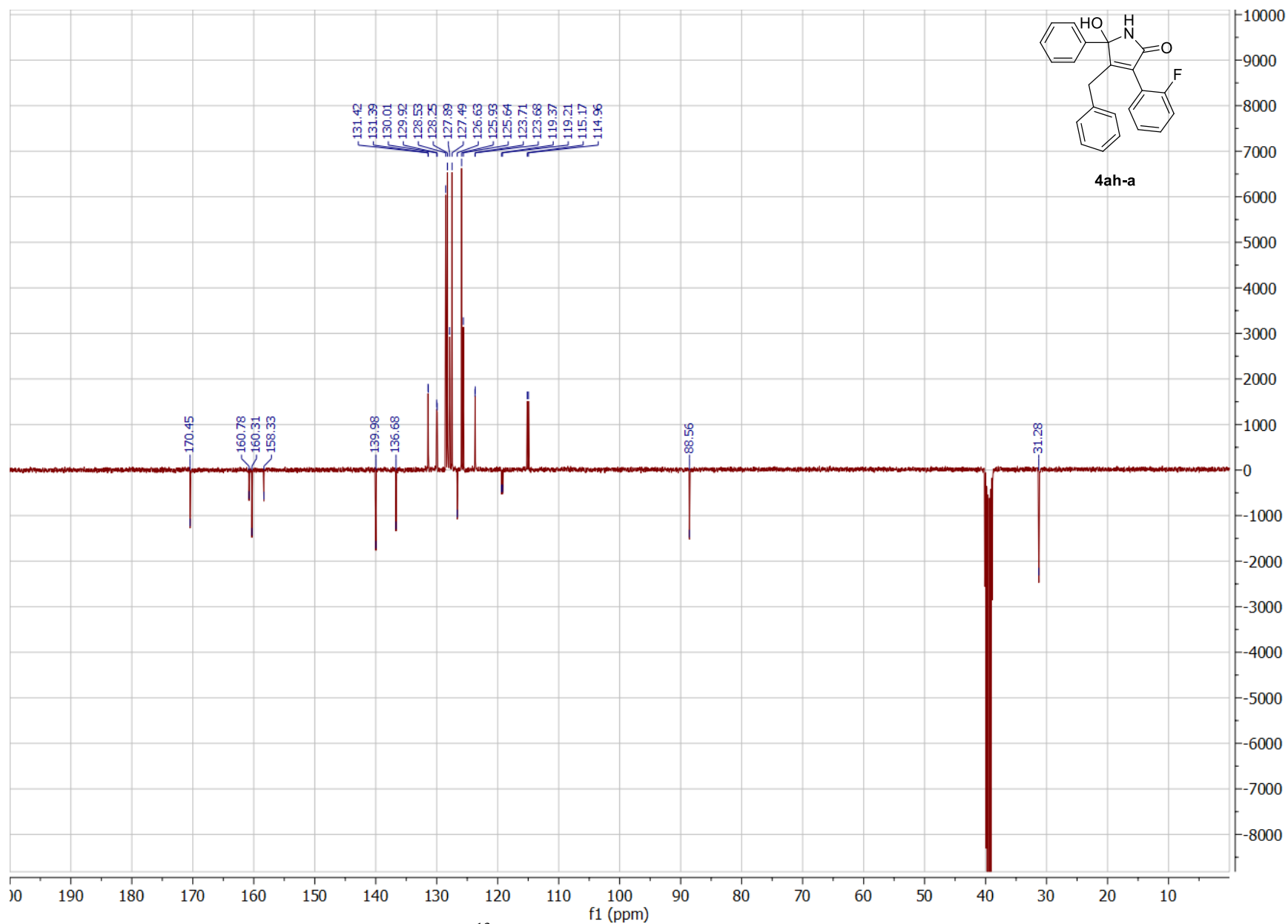


Figure S59.  $^{13}\text{C}$  NMR spectrum of **4ah-a** in  $\text{DMSO-}d_6$  (101 MHz)

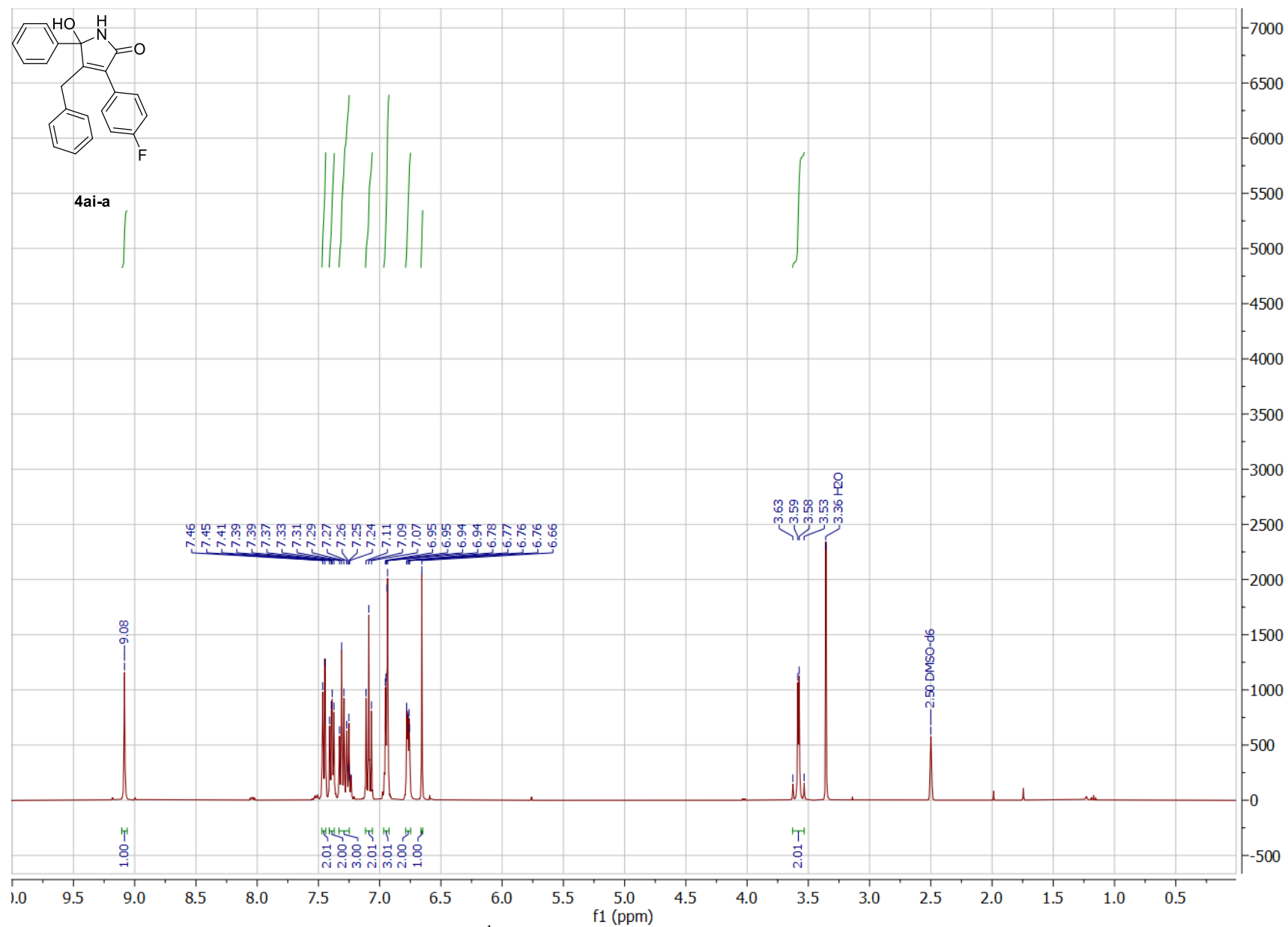


Figure S60.  $^1\text{H}$  NMR spectrum of **4ai-a** in  $\text{DMSO}-d_6$  (400 MHz)

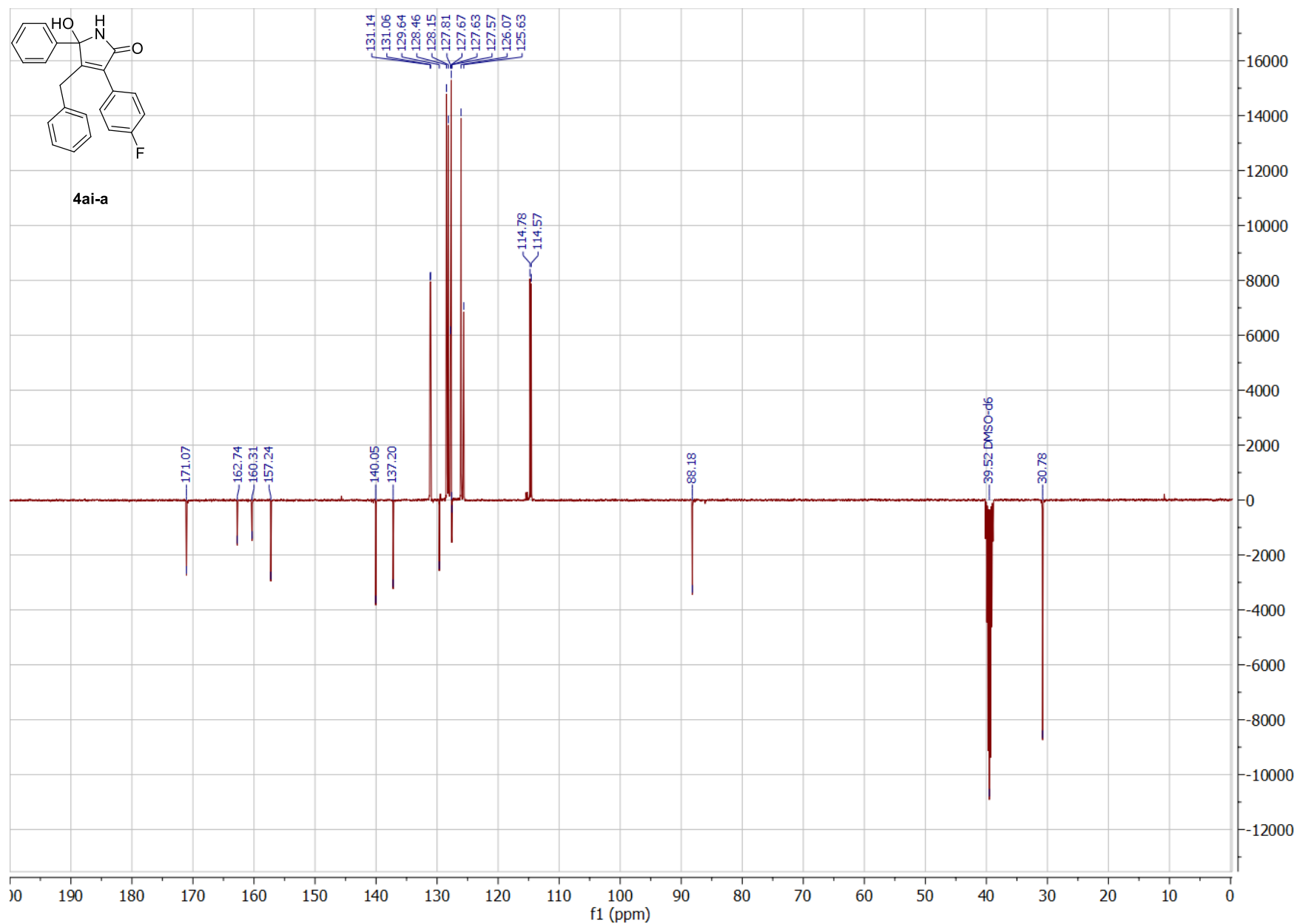


Figure S61.  $^{13}\text{C}$  NMR spectrum of **4ai-a** in DMSO- $d_6$  (101 MHz)



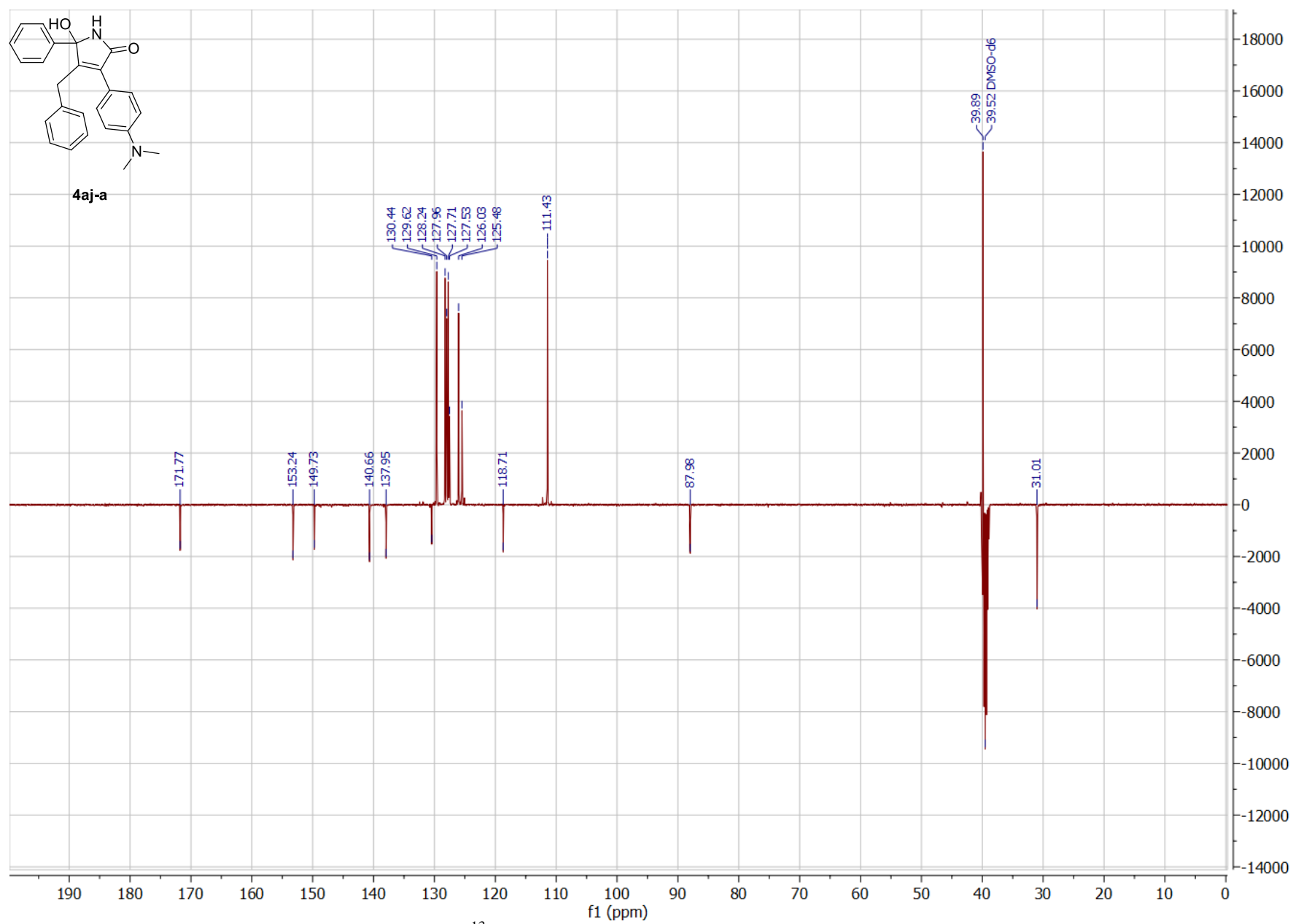


Figure S63. <sup>13</sup>C NMR spectrum of **4aj-a** in DMSO-*d*<sub>6</sub> (101 MHz)



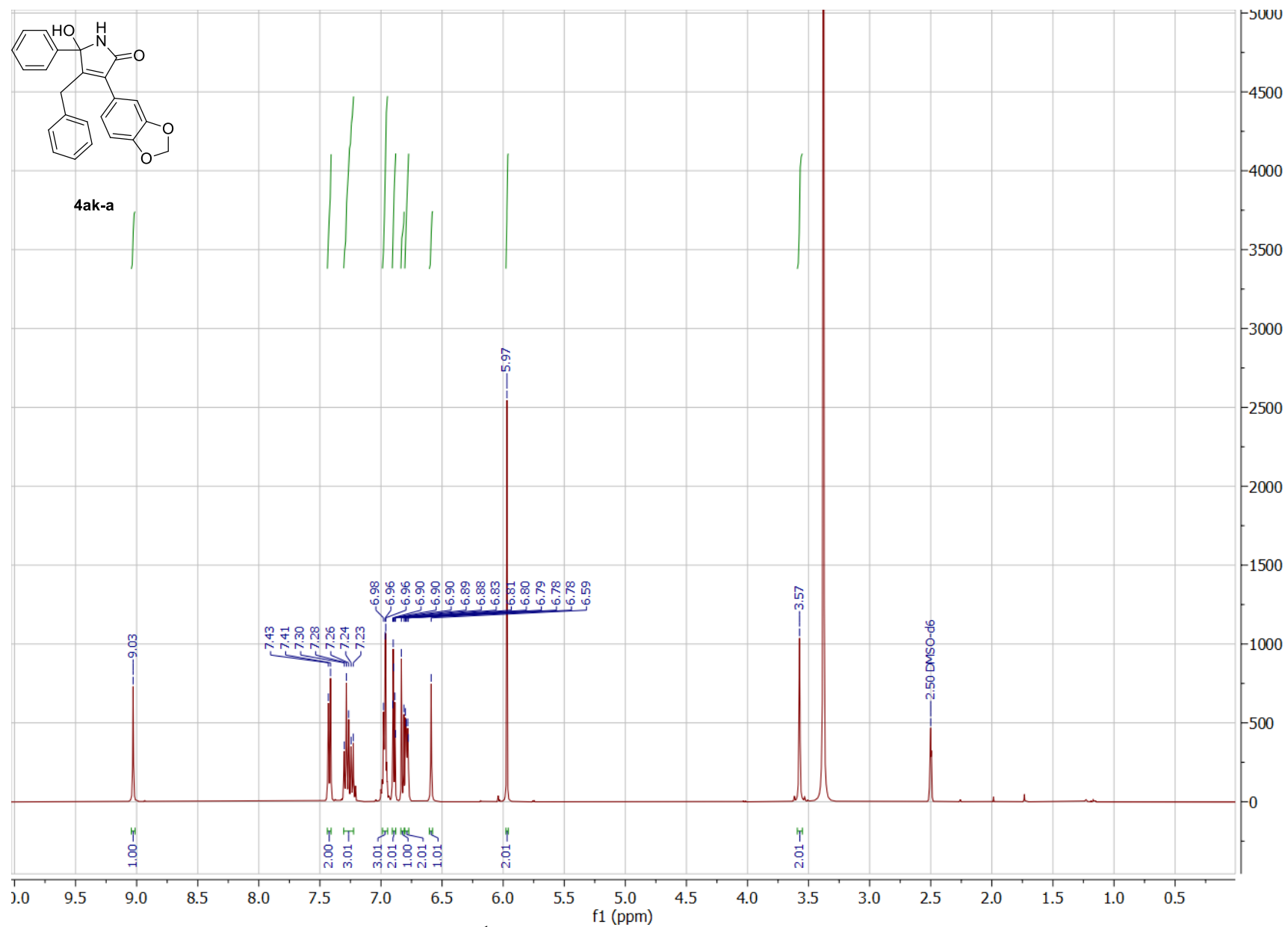


Figure S64. <sup>1</sup>H NMR spectrum of **4ak-a** in DMSO-*d*<sub>6</sub> (400 MHz)

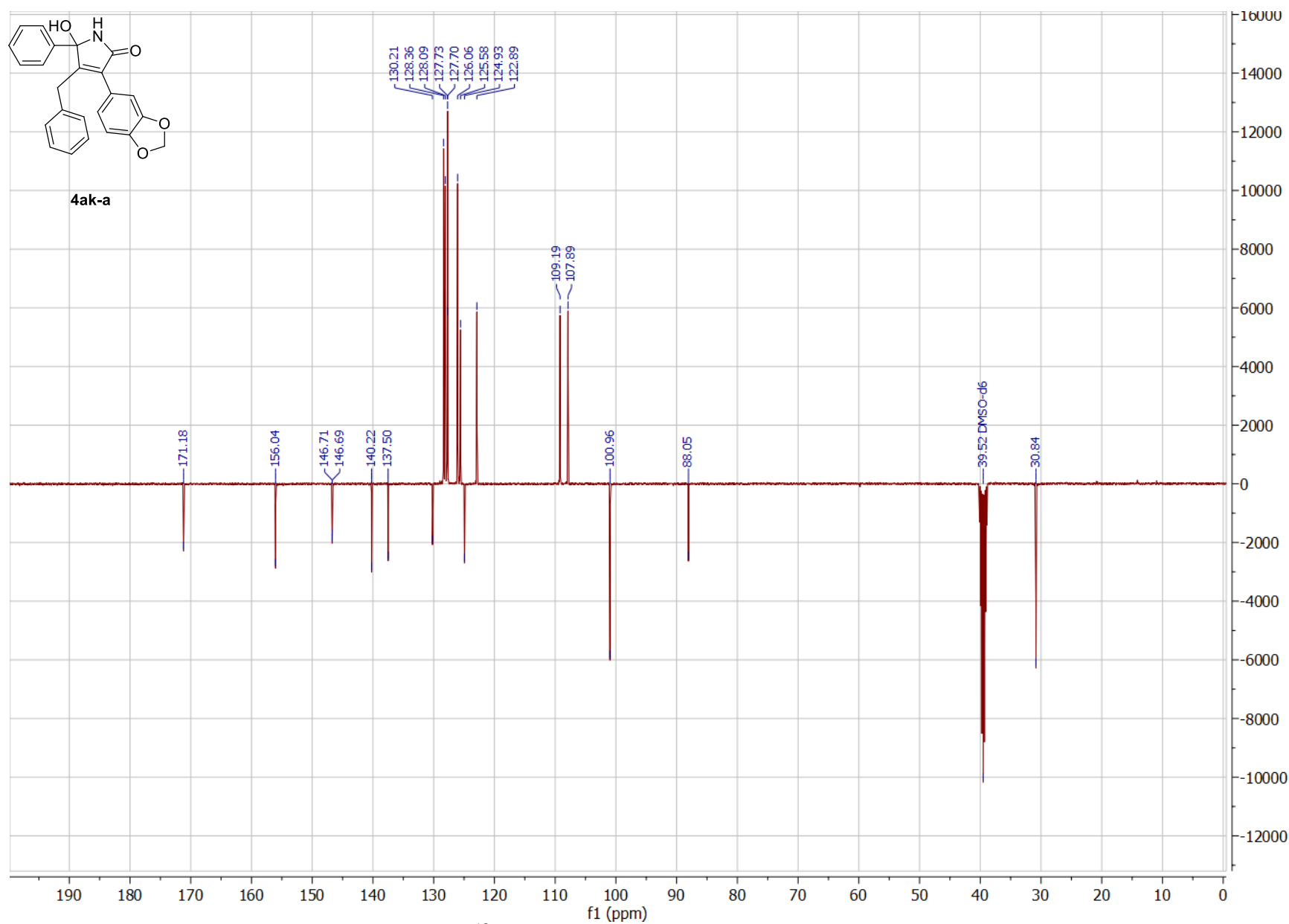


Figure S65. <sup>13</sup>C NMR spectrum of **4ak-a** in DMSO-*d*<sub>6</sub> (101 MHz)

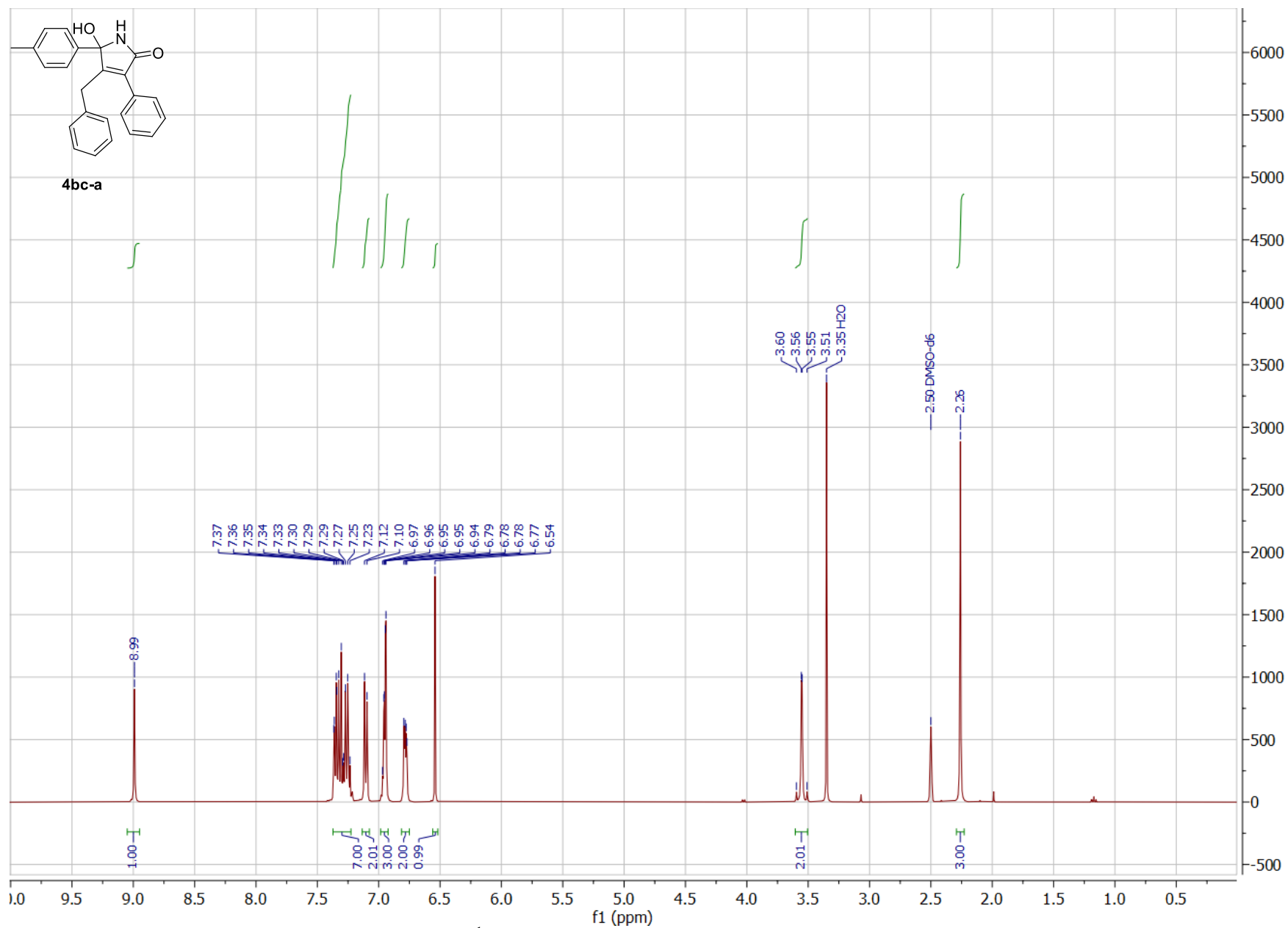


Figure S66. <sup>1</sup>H NMR spectrum of **4bc-a** in DMSO-*d*<sub>6</sub> (400 MHz)

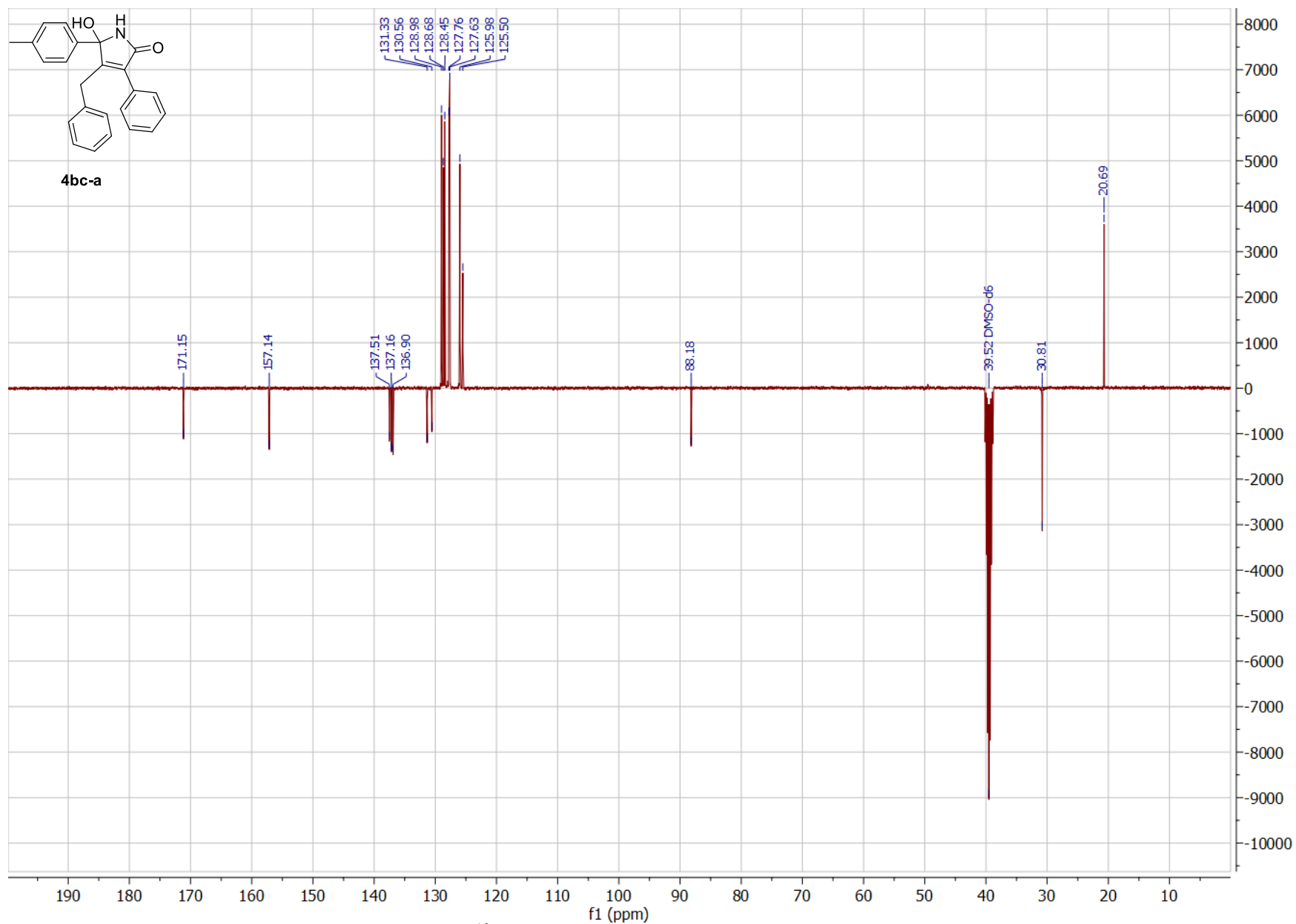


Figure S67.  $^{13}\text{C}$  NMR spectrum of **4bc-a** in  $\text{DMSO-}d_6$  (101 MHz)

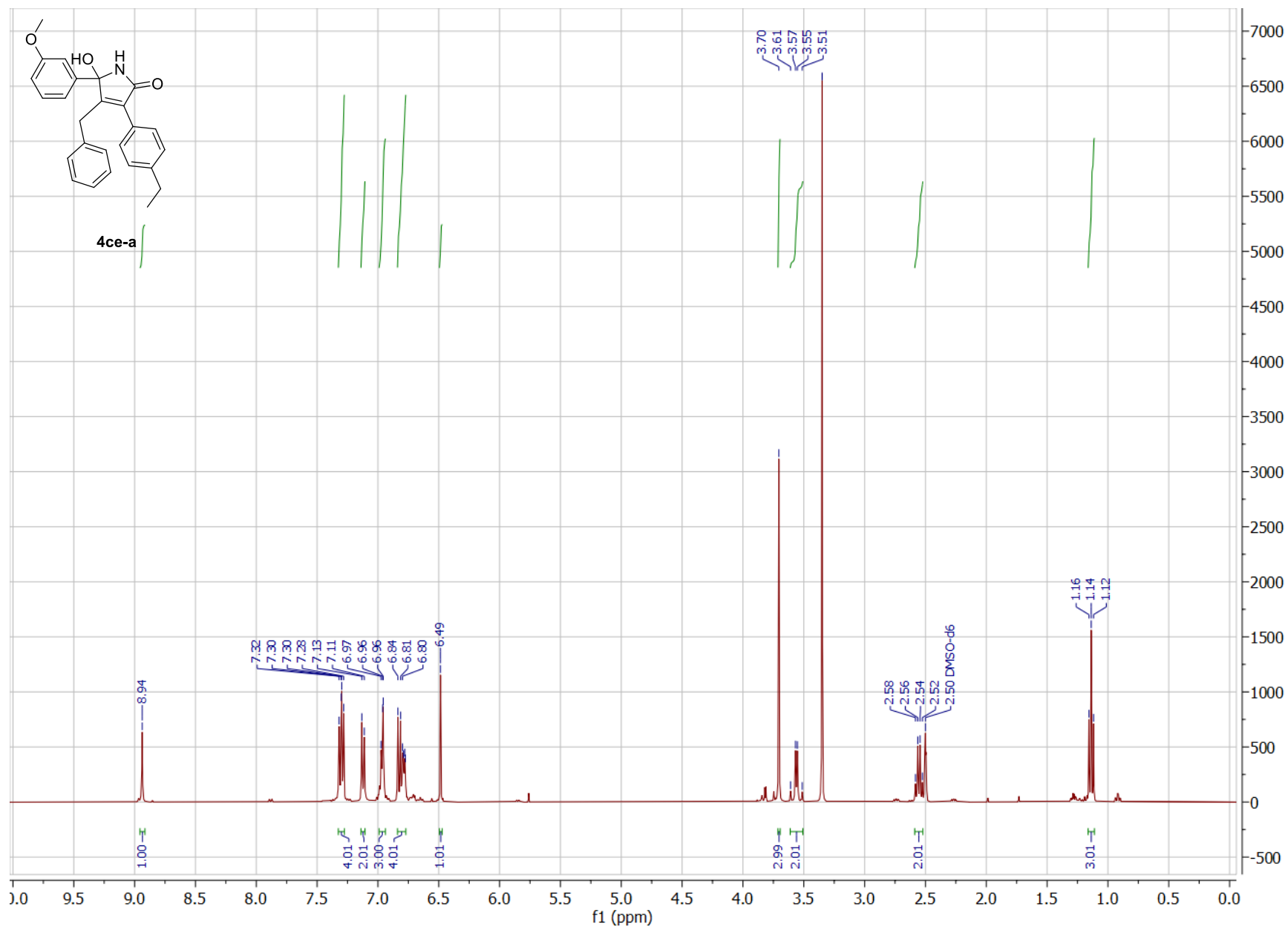


Figure S68.  $^1\text{H}$  NMR spectrum of **4ce-a** in  $\text{DMSO}-d_6$  (400 MHz)

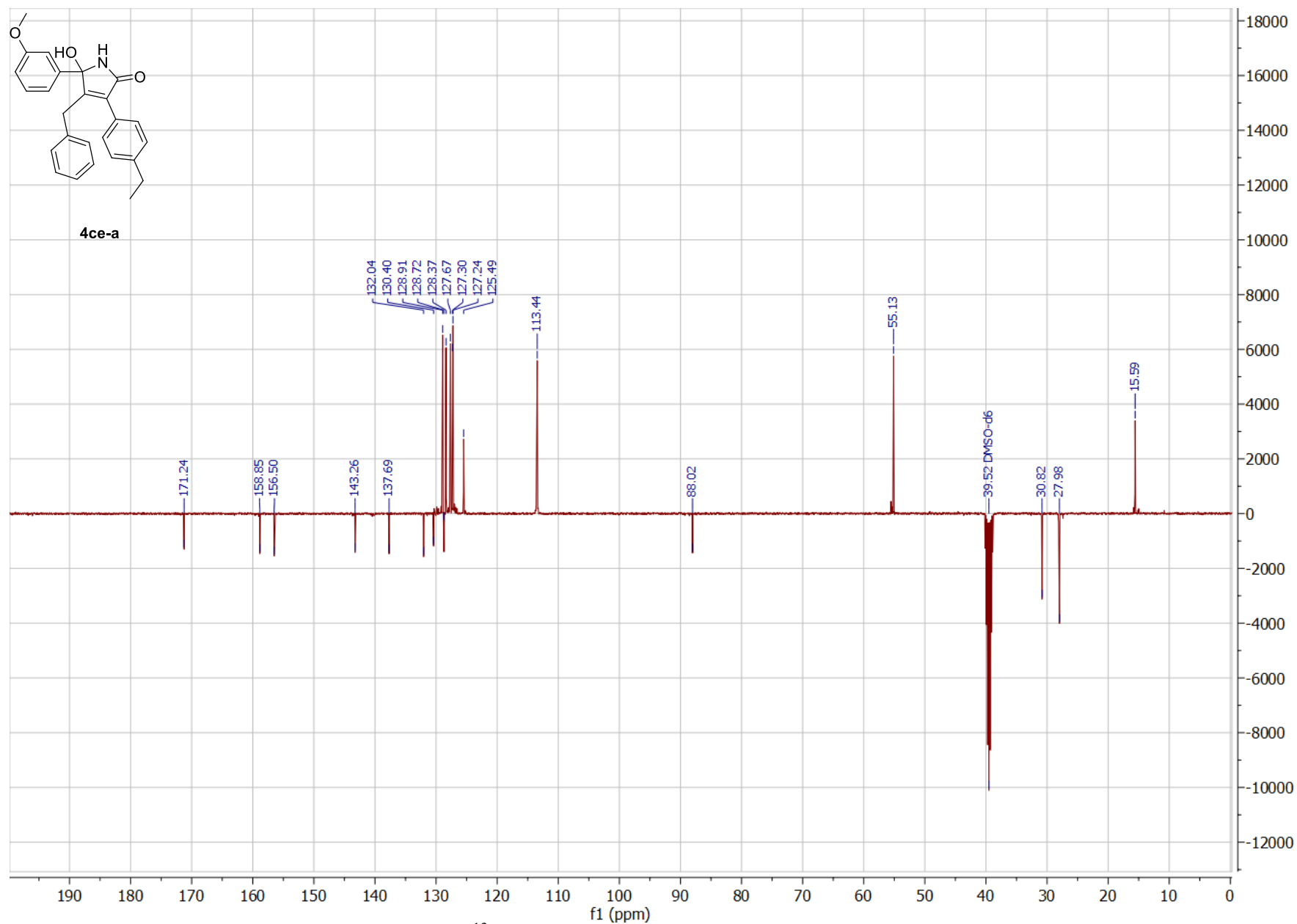


Figure S69. <sup>13</sup>C NMR spectrum of **4ce-a** in DMSO-*d*<sub>6</sub> (101 MHz)

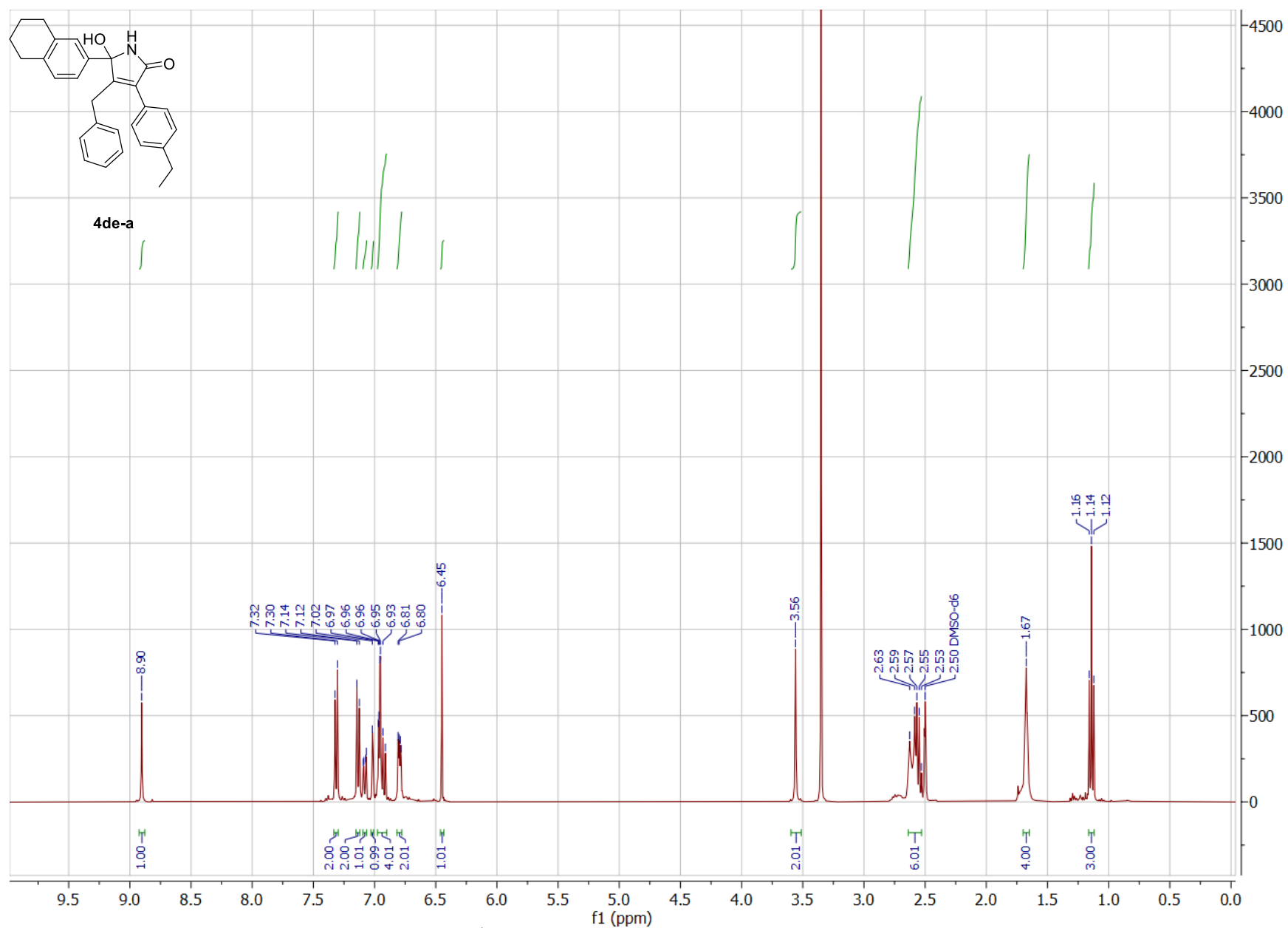


Figure S70. <sup>1</sup>H NMR spectrum of **4de-a** in DMSO-*d*<sub>6</sub> (400 MHz)

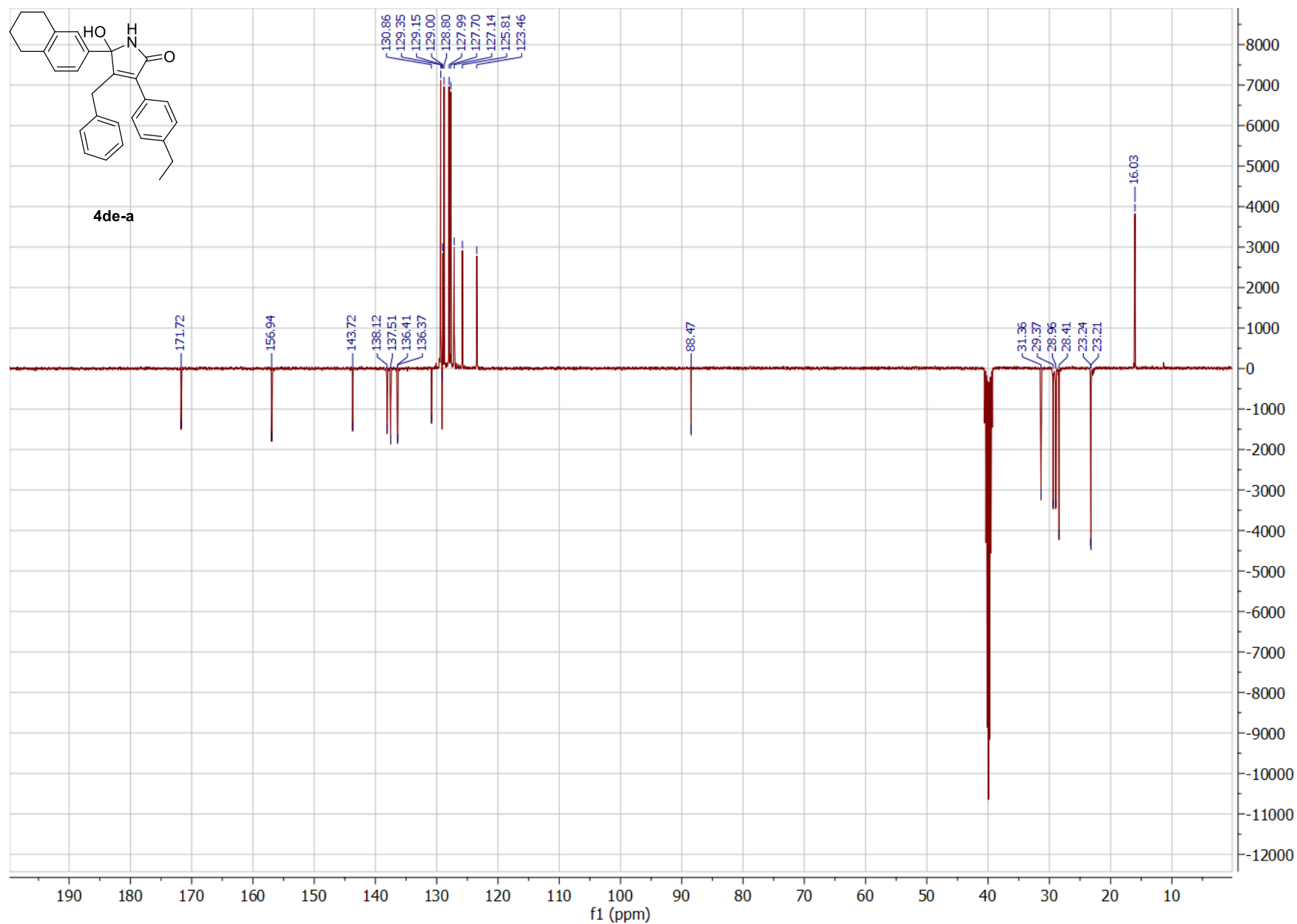


Figure S71.  $^{13}\text{C}$  NMR spectrum of **4de-a** in  $\text{DMSO}-d_6$  (101 MHz)



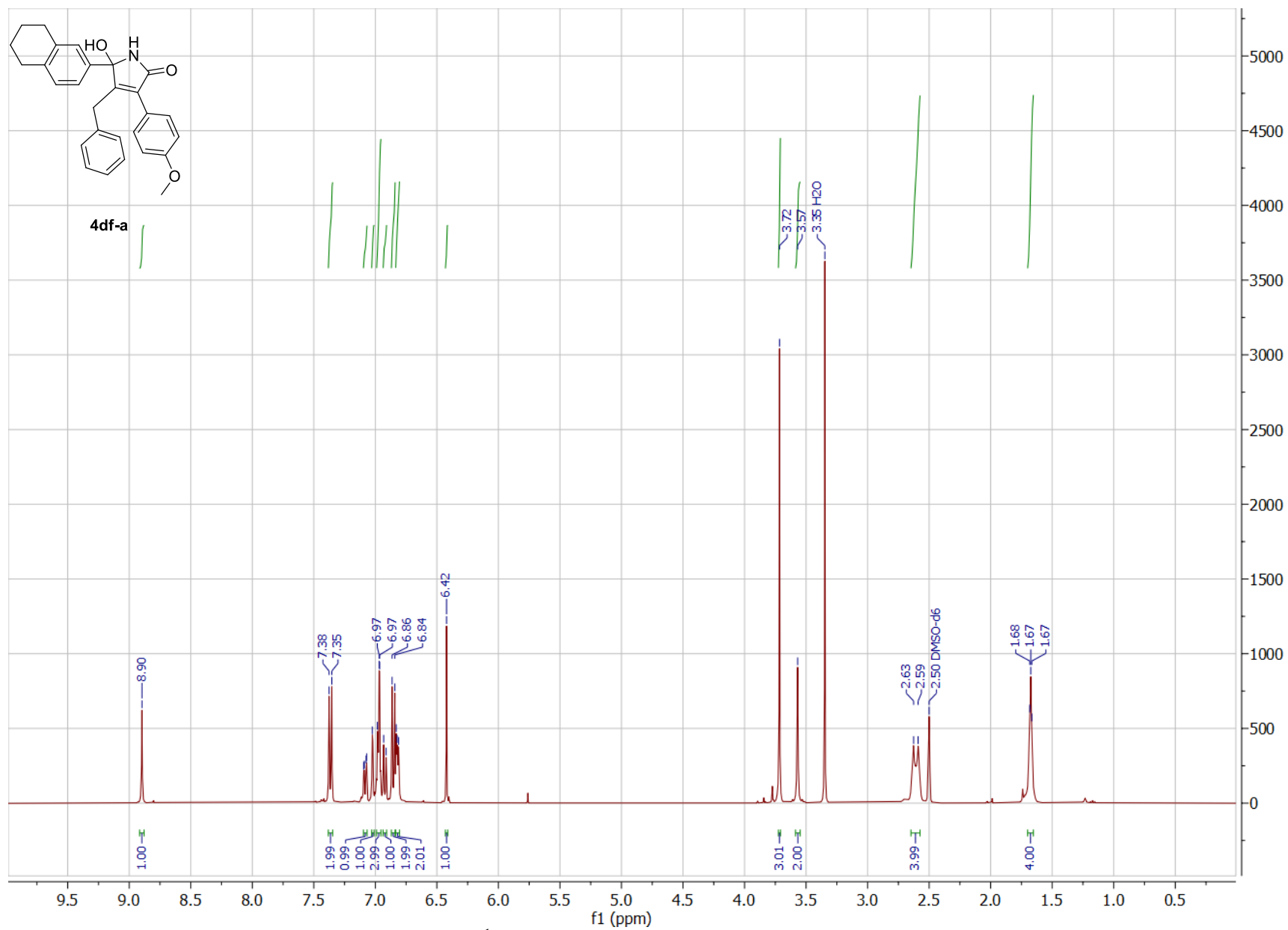


Figure S72.  $^1\text{H}$  NMR spectrum of **4df-a** in  $\text{DMSO-}d_6$  (400 MHz)

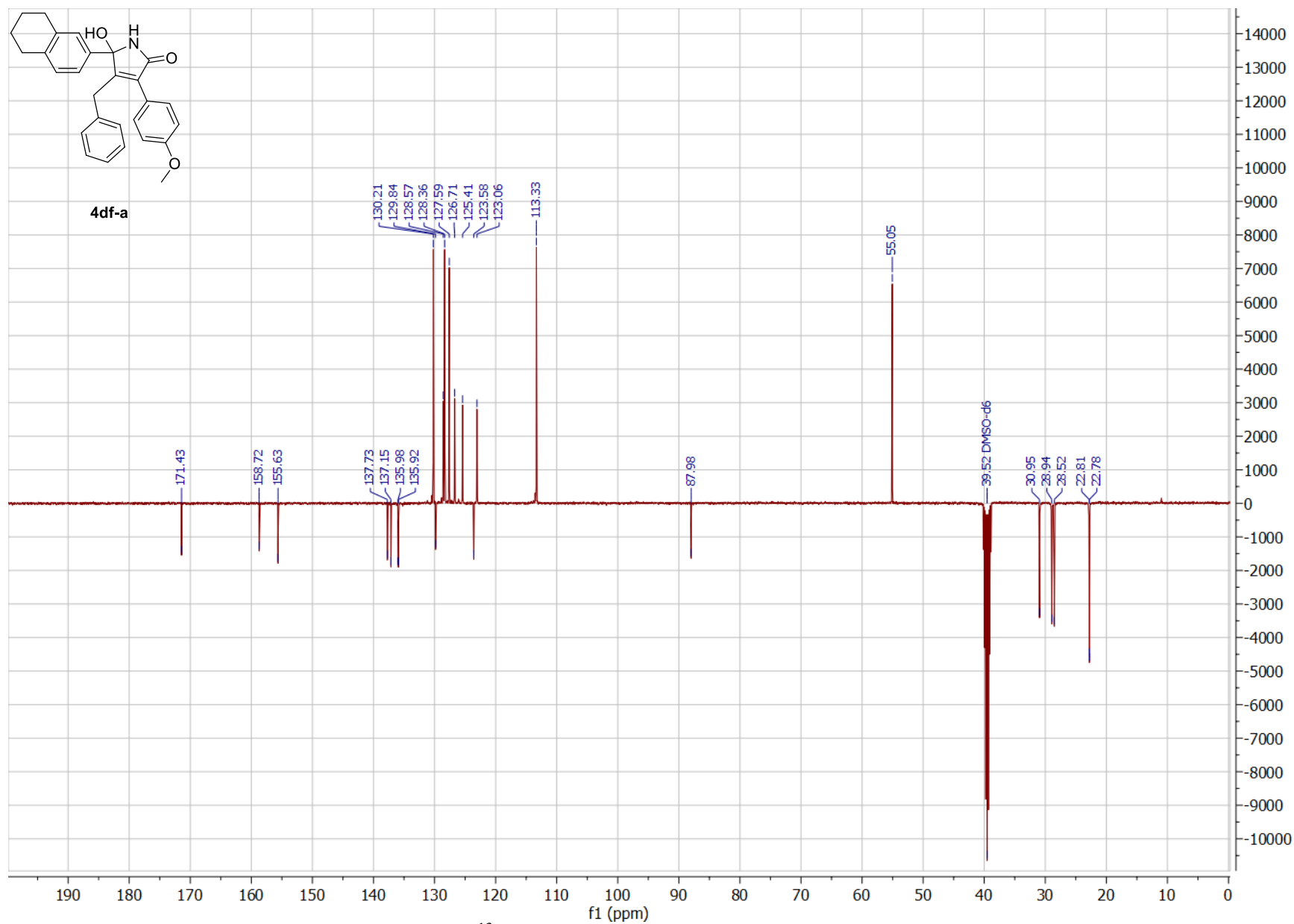


Figure S73.  $^{13}\text{C}$  NMR spectrum of **4df-a** in DMSO- $d_6$  (101 MHz)