

# A New Quinazolinone Alkaloid along with Known Compounds with Seed-Germination-Promoting Activity from *Rhodiola tibetica* Endophytic Fungus *Penicillium* sp. HJT-A-6

Dongliang Xiao <sup>1,†</sup>, Yan Wang <sup>1,†</sup>, Congcong Gao <sup>1</sup>, Xuemei Zhang <sup>1</sup>, Weixing Feng <sup>1</sup>, Xuan Lu <sup>1,\*</sup>,  
Baomin Feng <sup>1,\*</sup>

<sup>1</sup> College of life and health, Dalian University, Dalian 116622, China; xdl120318@163.com (D.X.); wangyan\_9910@163.com (Y.W.); gcc1125@163.com (C.G.); zxuemei2024@163.com (X.Z.); fwx\_0910@163.com (W.F.);

\* Correspondence: luxuan\_232@163.com (X.L.); fbmdlu@163.com (B.F.)

<sup>†</sup> These authors contributed equally to this work.

## Supplementary Materials

### Table of Contents

<b>Figure S1.</b> Positive mode HRESIMS spectrum of <b>1</b>	<b>3</b>
<b>Figure S2.</b> UV spectrum of <b>1</b>	<b>3</b>
<b>Figure S3.</b> <sup>1</sup> H NMR (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>1</b>	<b>4</b>
<b>Figure S4.</b> <sup>1</sup> H NMR (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>1a</b>	<b>4</b>
<b>Figure S5.</b> <sup>1</sup> H NMR (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>1b</b>	<b>5</b>
<b>Figure S6.</b> <sup>13</sup> C NMR (DMSO- <i>d</i> <sub>6</sub> , 125 MHz) spectrum of <b>1</b>	<b>5</b>
<b>Figure S7.</b> HSQC (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>1</b>	<b>6</b>
<b>Figure S8.</b> HMBC (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>1</b>	<b>6</b>
<b>Figure S9.</b> <sup>1</sup> H- <sup>1</sup> H COSY (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>1</b>	<b>7</b>
<b>Figure S10.</b> NOESY (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>1</b>	<b>7</b>
<b>Figure S11.</b> CD spectrum of <b>1</b>	<b>8</b>
<b>Figure S12.</b> <sup>1</sup> H NMR (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>2</b>	<b>9</b>
<b>Figure S13.</b> <sup>13</sup> C NMR (DMSO- <i>d</i> <sub>6</sub> , 125 MHz) spectrum of <b>2</b>	<b>9</b>
<b>Figure S14.</b> <sup>1</sup> H NMR (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>3</b>	<b>10</b>
<b>Figure S15.</b> <sup>13</sup> C NMR (DMSO- <i>d</i> <sub>6</sub> , 125 MHz) spectrum of <b>3</b>	<b>10</b>
<b>Figure S16.</b> <sup>1</sup> H NMR (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>4</b>	<b>11</b>
<b>Figure S17.</b> <sup>13</sup> C NMR (DMSO- <i>d</i> <sub>6</sub> , 125 MHz) spectrum of <b>4</b>	<b>11</b>
<b>Figure S18.</b> <sup>1</sup> H NMR (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>5a/5b</b>	<b>12</b>
<b>Figure S19.</b> <sup>13</sup> C NMR (DMSO- <i>d</i> <sub>6</sub> , 125 MHz) spectrum of <b>5a/5b</b>	<b>12</b>
<b>Figure S20.</b> <sup>1</sup> H NMR (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>6</b>	<b>13</b>
<b>Figure S21.</b> <sup>13</sup> C NMR (DMSO- <i>d</i> <sub>6</sub> , 125 MHz) spectrum of <b>6</b>	<b>13</b>
<b>Figure S22.</b> <sup>1</sup> H NMR (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>7</b>	<b>14</b>
<b>Figure S23.</b> <sup>13</sup> C NMR (DMSO- <i>d</i> <sub>6</sub> , 125 MHz) spectrum of <b>7</b>	<b>14</b>
<b>Figure S24.</b> <sup>1</sup> H NMR (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>8</b>	<b>15</b>
<b>Figure S25.</b> <sup>13</sup> C NMR (DMSO- <i>d</i> <sub>6</sub> , 125 MHz) spectrum of <b>8</b>	<b>15</b>
<b>Figure S26.</b> <sup>1</sup> H NMR (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>9</b>	<b>16</b>
<b>Figure S27.</b> <sup>1</sup> H NMR (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>10</b>	<b>17</b>
<b>Figure S28.</b> <sup>13</sup> C NMR (DMSO- <i>d</i> <sub>6</sub> , 125 MHz) spectrum of <b>10</b>	<b>17</b>
<b>Figure S29.</b> <sup>1</sup> H NMR (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>11</b>	<b>18</b>
<b>Figure S30.</b> <sup>13</sup> C NMR (DMSO- <i>d</i> <sub>6</sub> , 125 MHz) spectrum of <b>11</b>	<b>18</b>
<b>Figure S31.</b> <sup>1</sup> H NMR (DMSO- <i>d</i> <sub>6</sub> , 500 MHz) spectrum of <b>12</b>	<b>19</b>
<b>Figure S32.</b> <sup>13</sup> C NMR (DMSO- <i>d</i> <sub>6</sub> , 125 MHz) spectrum of <b>12</b>	<b>19</b>

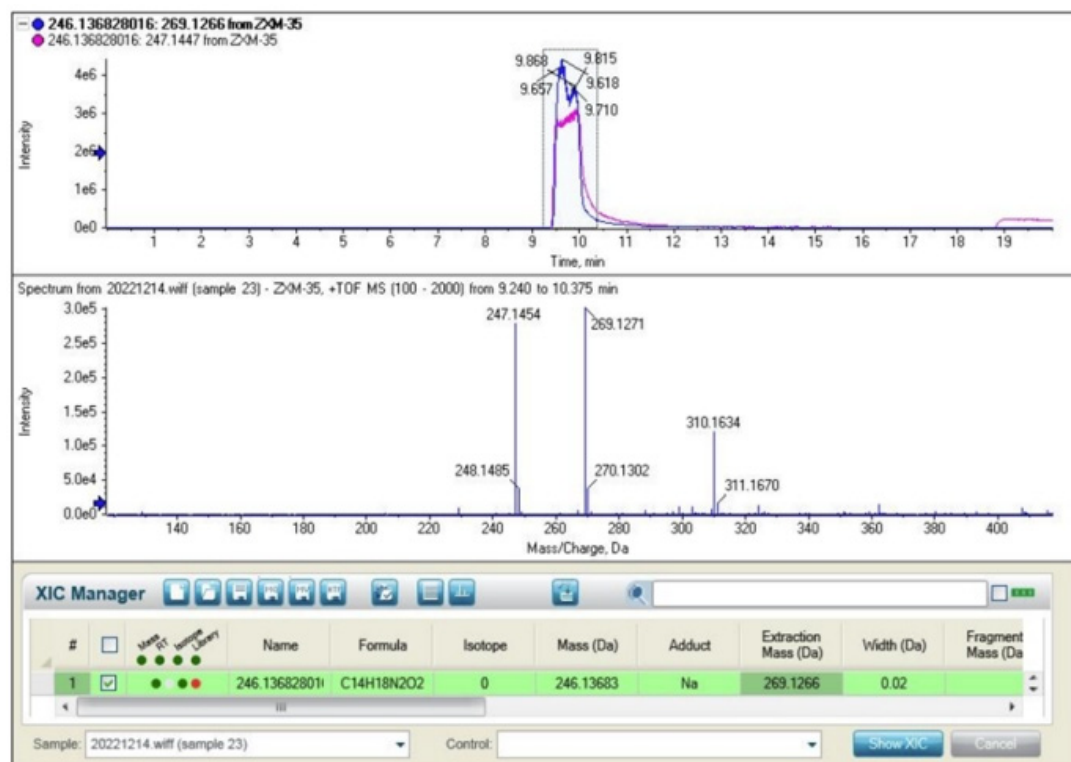


Figure S1. Positive mode HRESIMS spectrum of 1

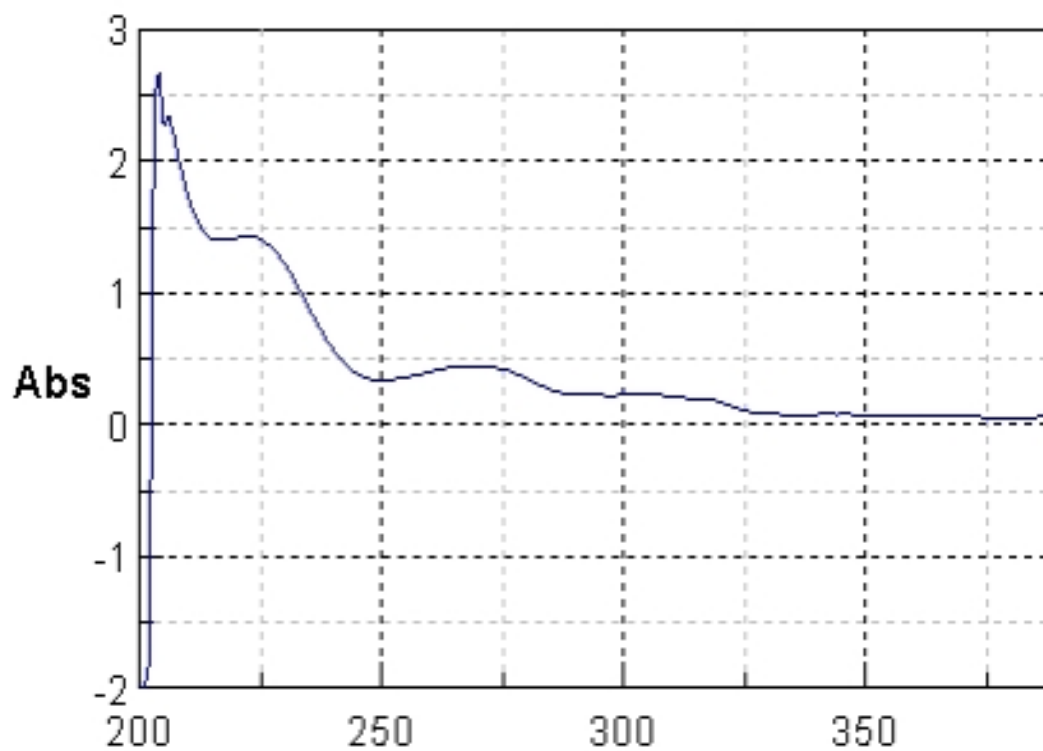


Figure S2. UV spectrum of 1

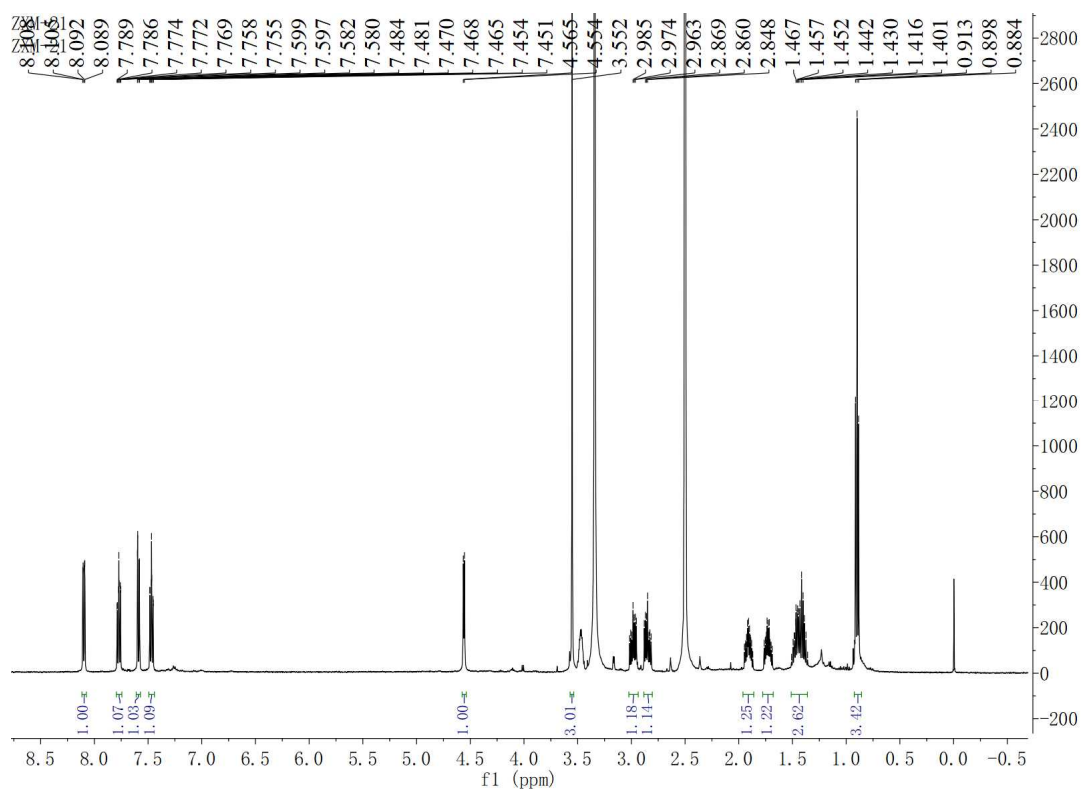
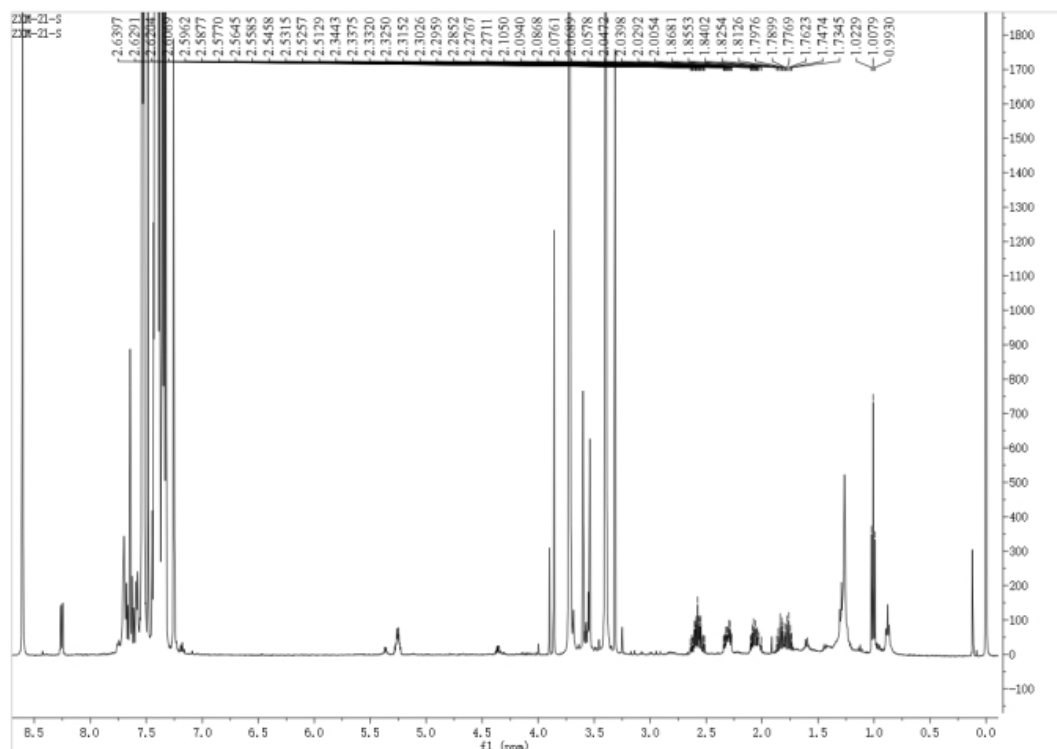
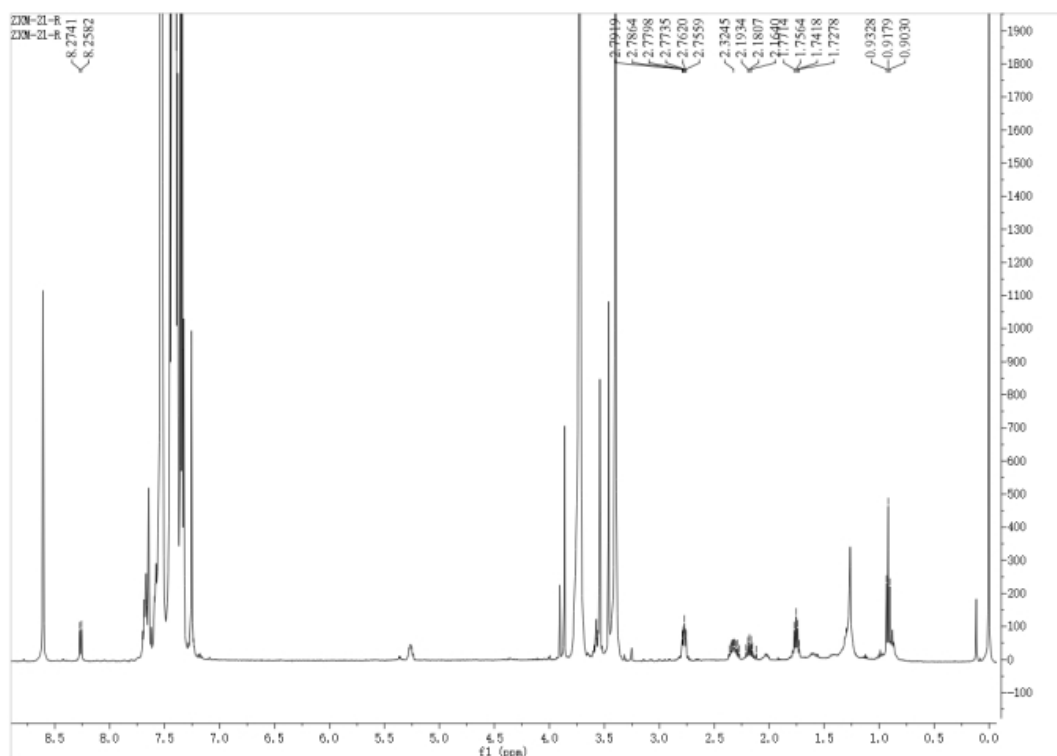
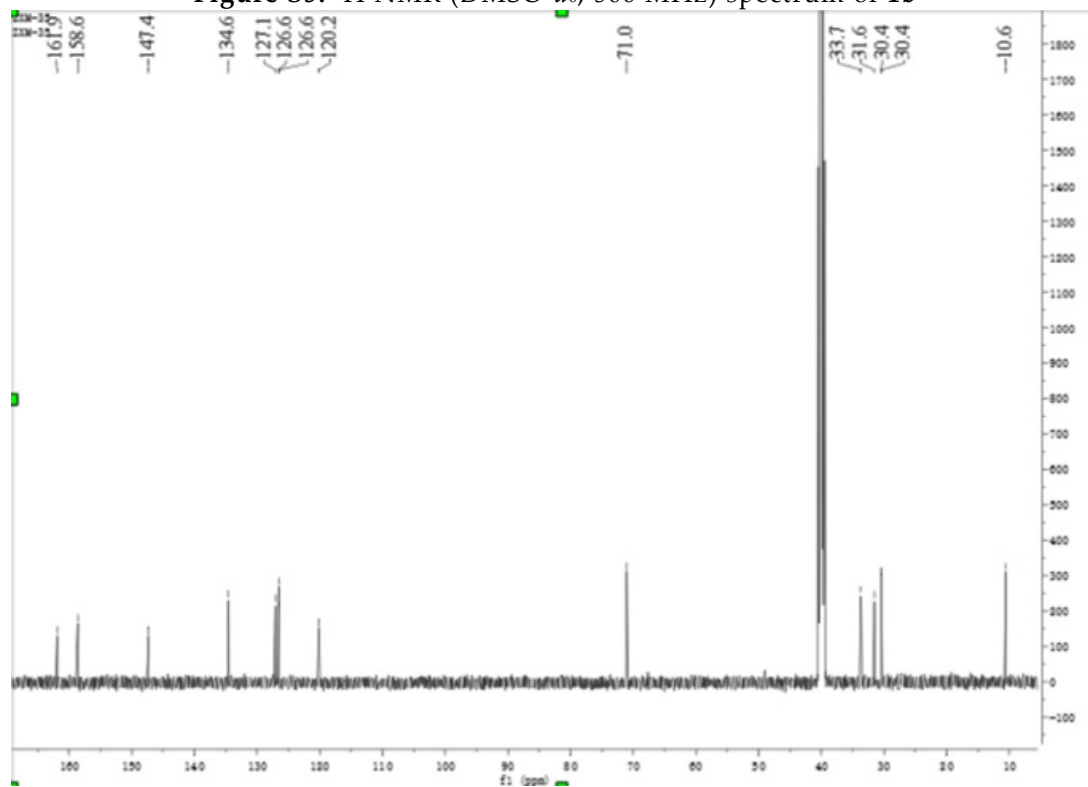


Figure S3. <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 500 MHz) spectrum of **1**





**Figure S5.**  $^1\text{H}$  NMR ( $\text{DMSO}-d_6$ , 500 MHz) spectrum of **1b**



**Figure S6.**  $^{13}\text{C}$  NMR ( $\text{DMSO}-d_6$ , 125 MHz) spectrum of **1**

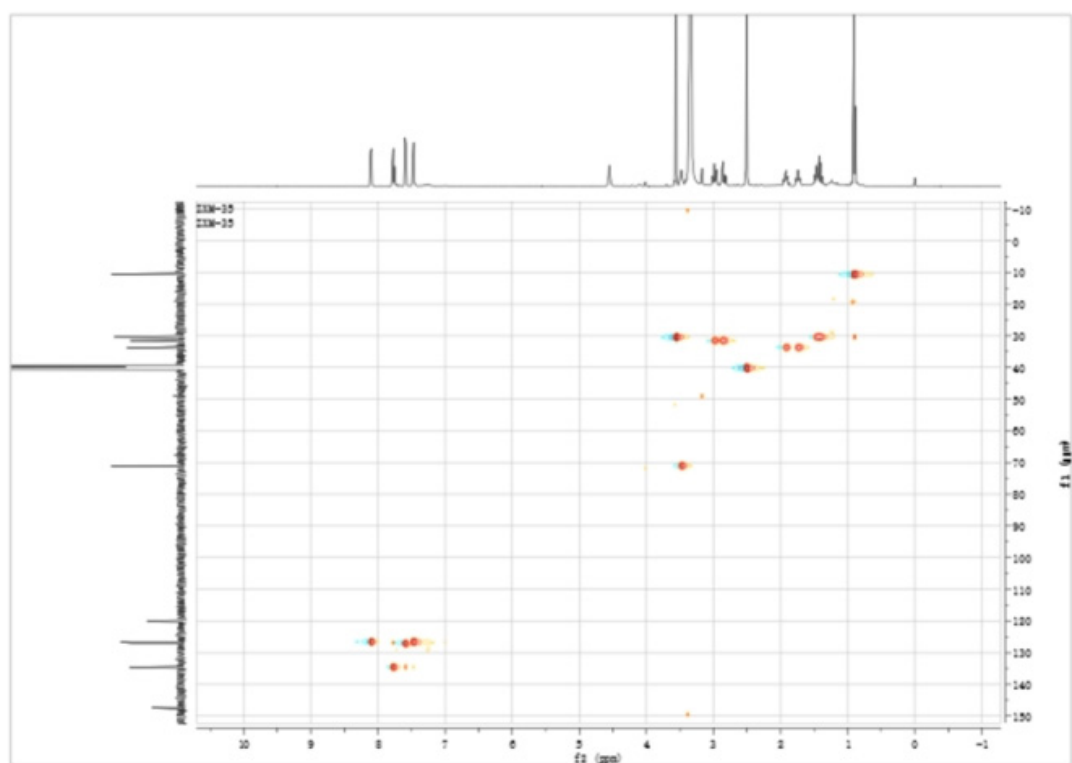


Figure S7. HSQC (DMSO-*d*<sub>6</sub>, 500 MHz) spectrum of **1**

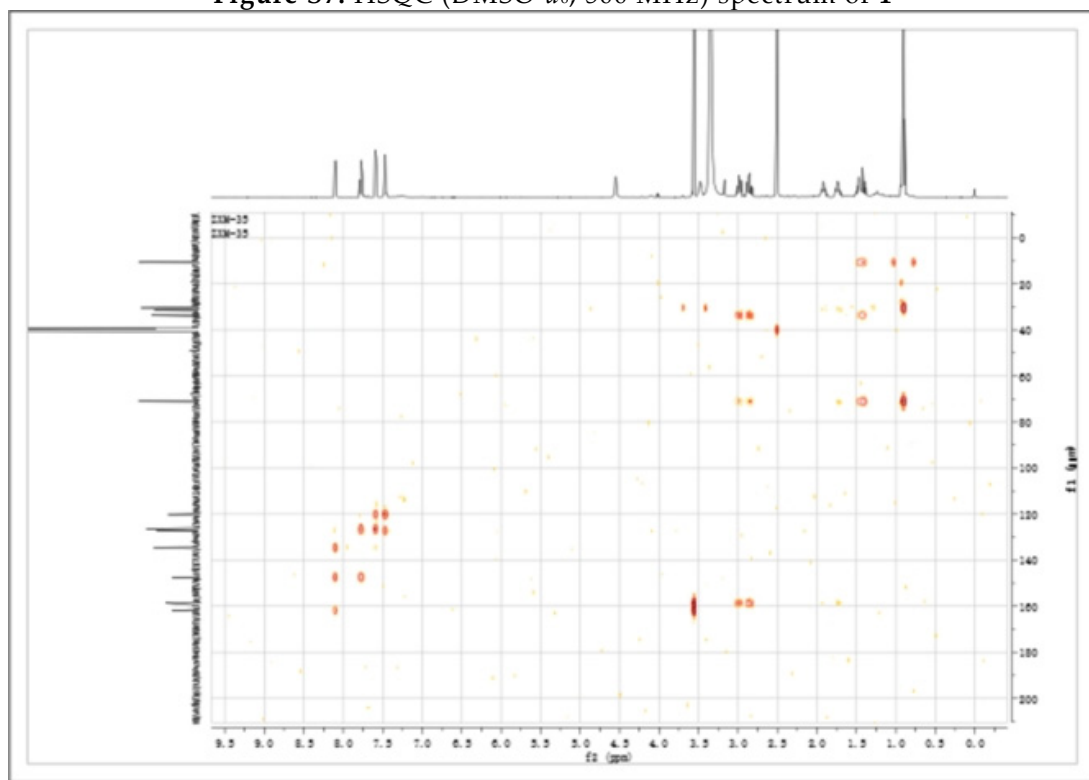
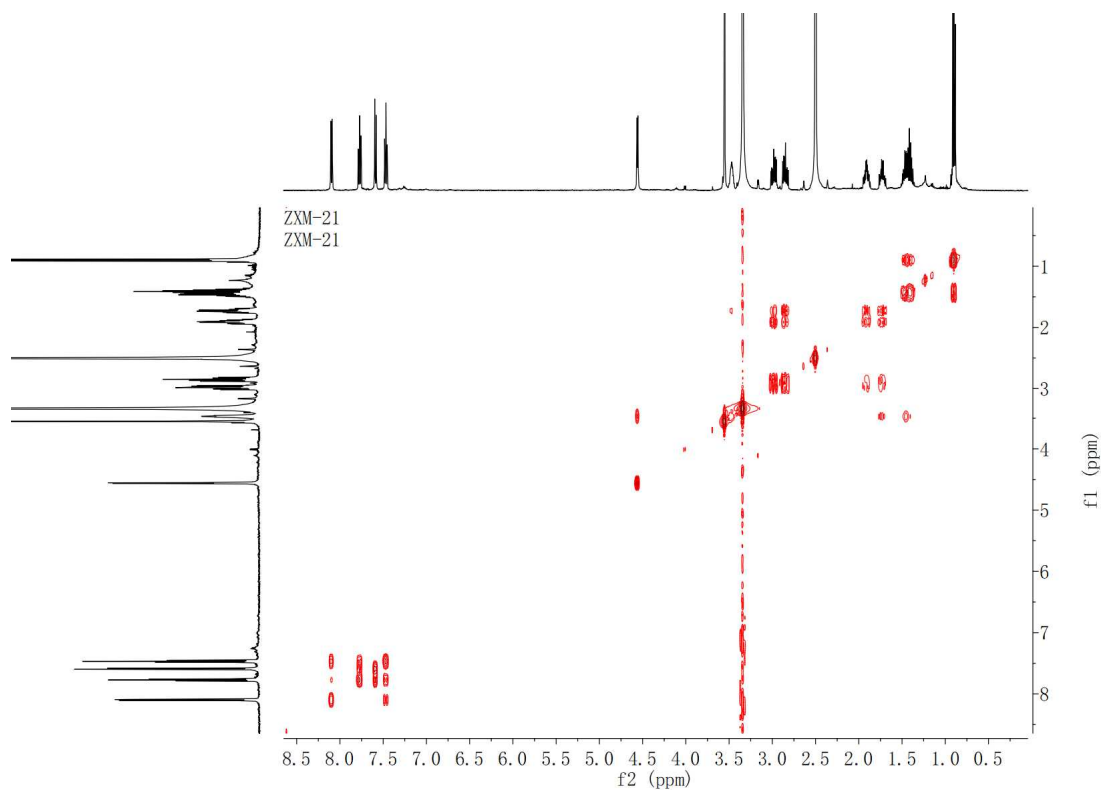
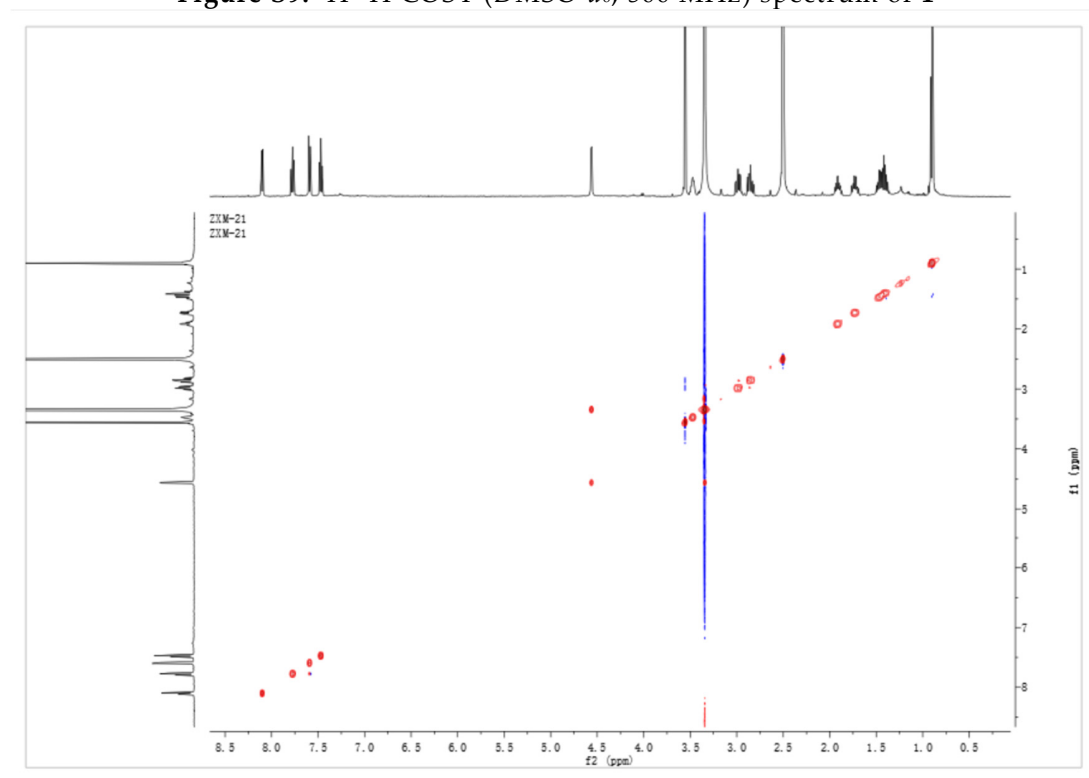


Figure S8. HMBC (DMSO-*d*<sub>6</sub>, 500 MHz) spectrum of **1**



**Figure S9.**  $^1\text{H}$ - $^1\text{H}$  COSY (DMSO- $d_6$ , 500 MHz) spectrum of **1**



**Figure S10.** NOESY (DMSO- $d_6$ , 500 MHz) spectrum of **1**

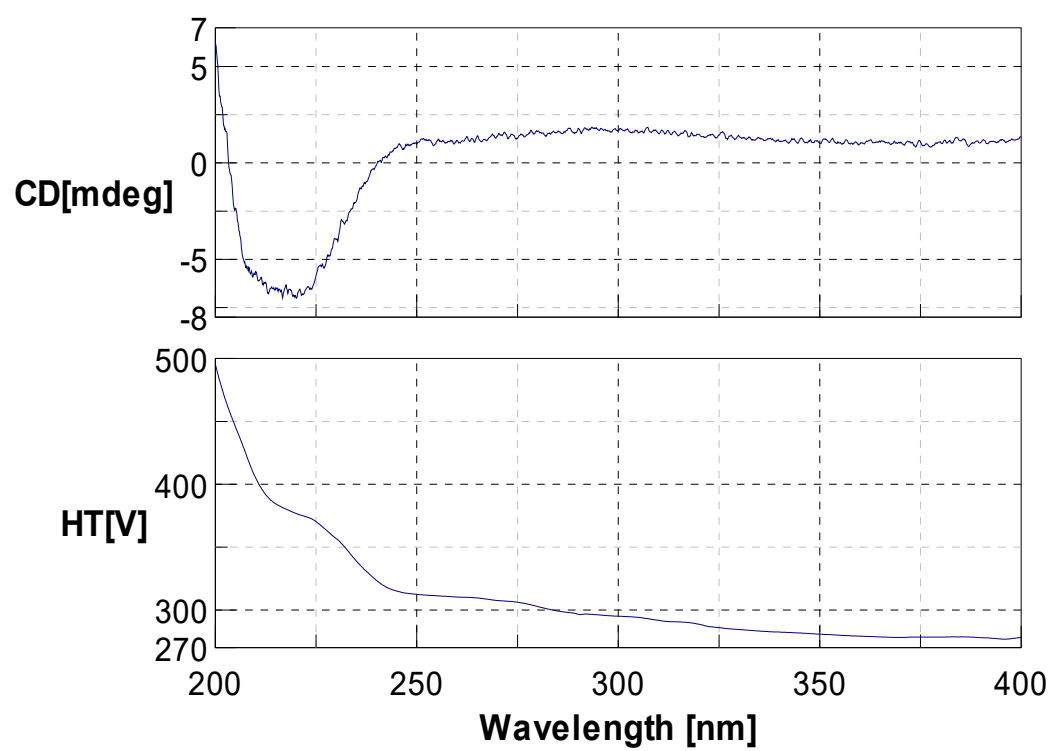


Figure S11. CD spectrum of **1**



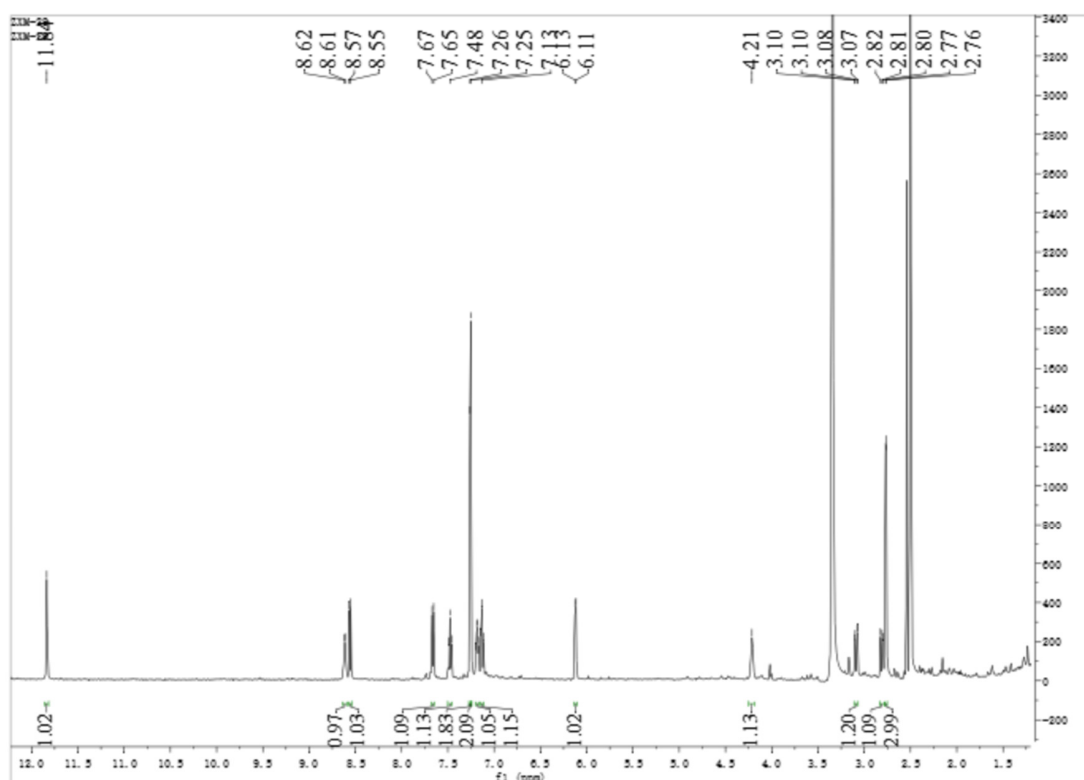


Figure S12. <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 500 MHz) spectrum of **2**

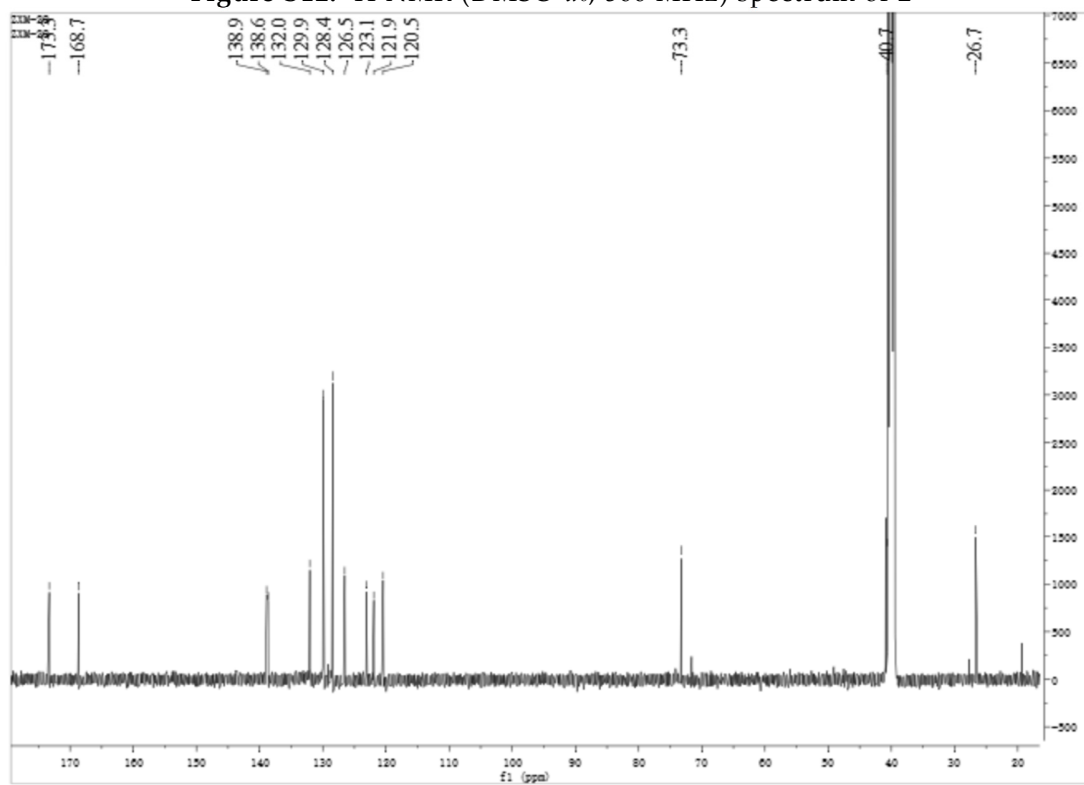
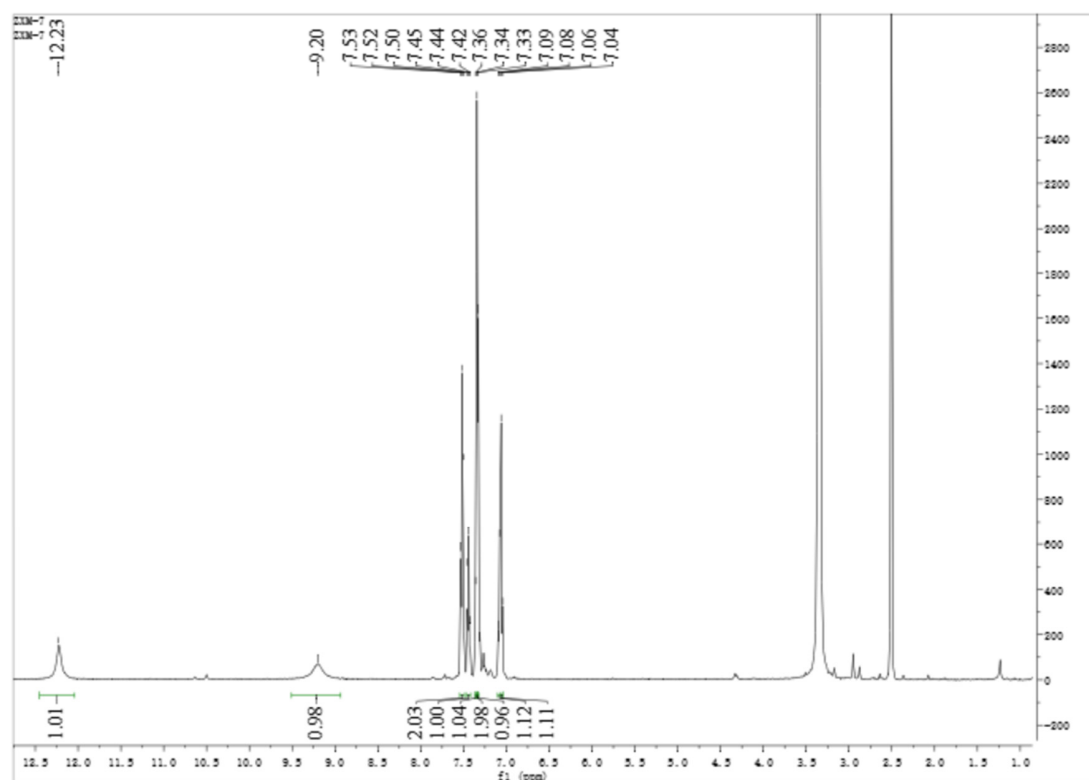
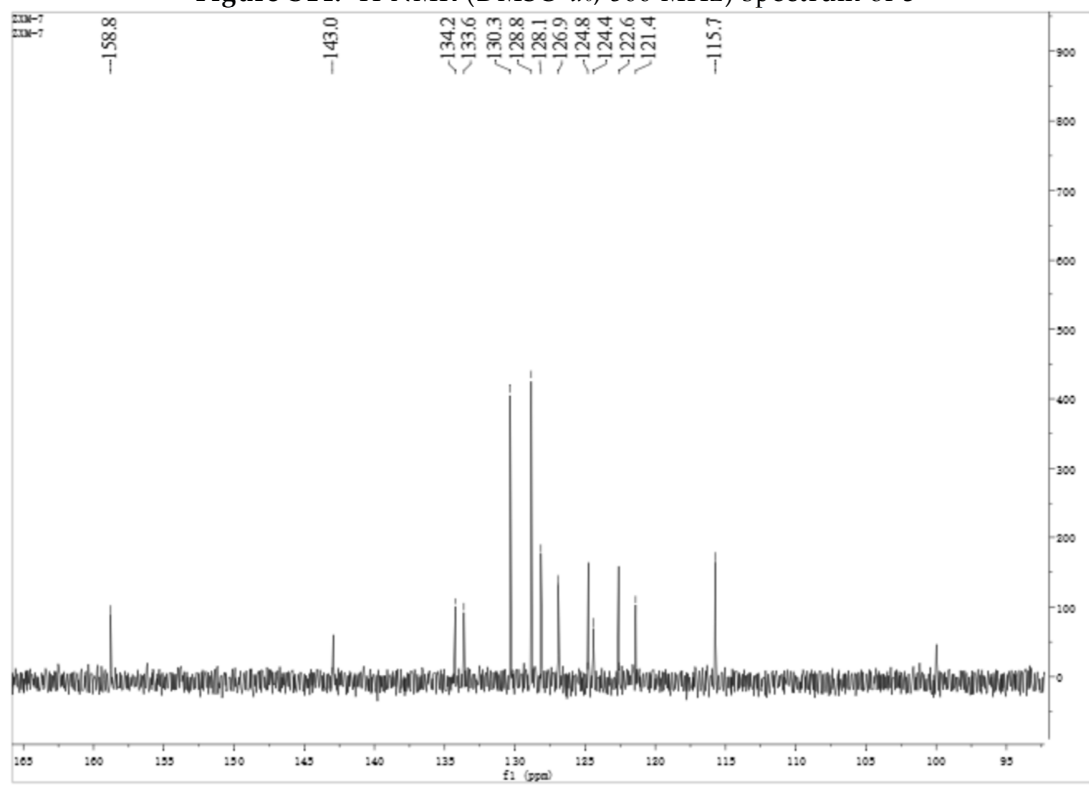


Figure S13. <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 125 MHz) spectrum of **2**



**Figure S14.** <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 500 MHz) spectrum of **3**



**Figure S15.** <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 125 MHz) spectrum of **3**

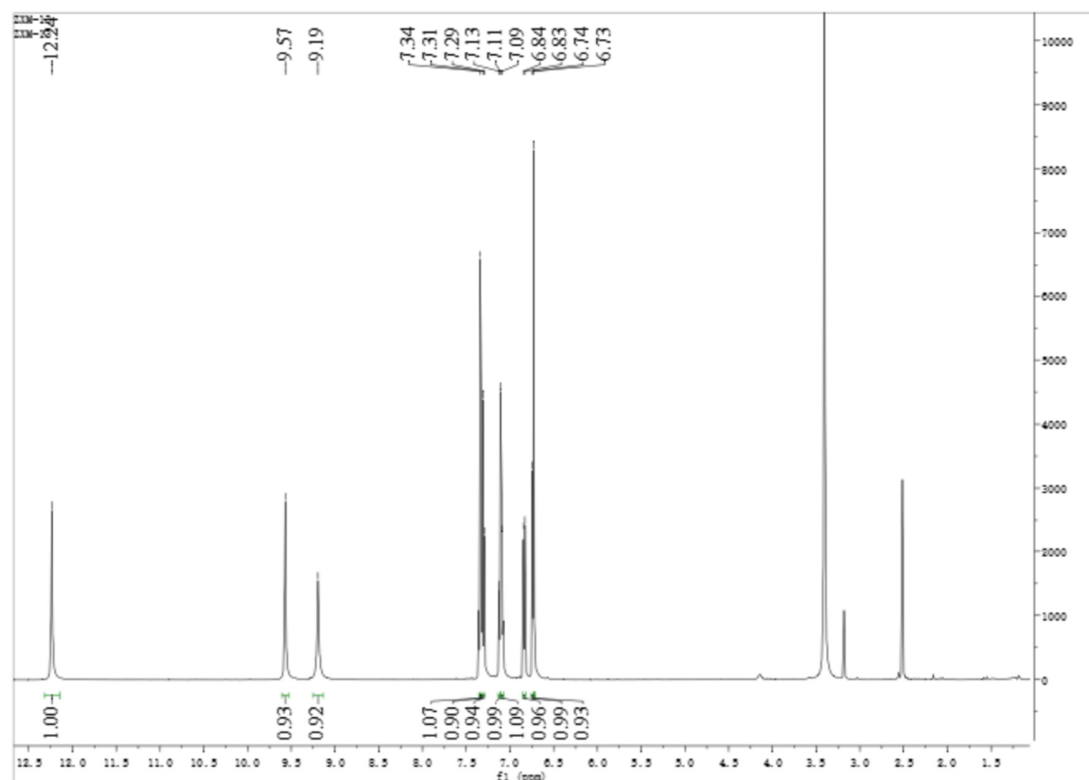


Figure S16. <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 500 MHz) spectrum of **4**

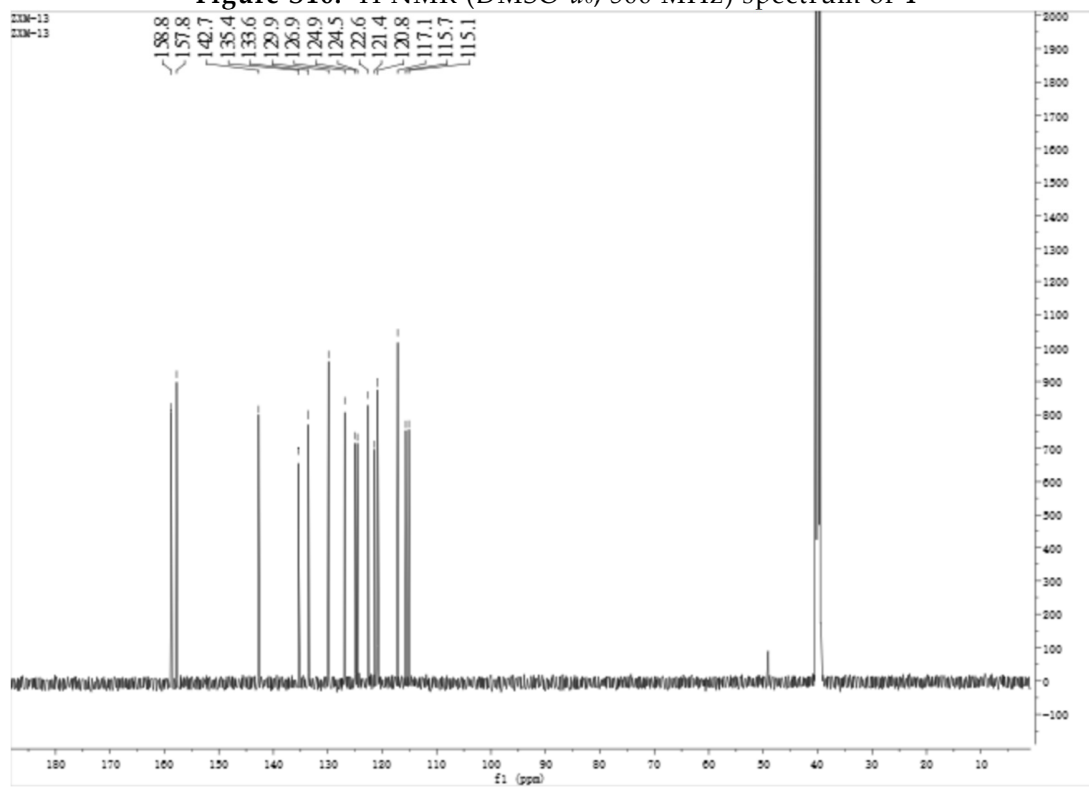


Figure S17. <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 125 MHz) spectrum of **4**

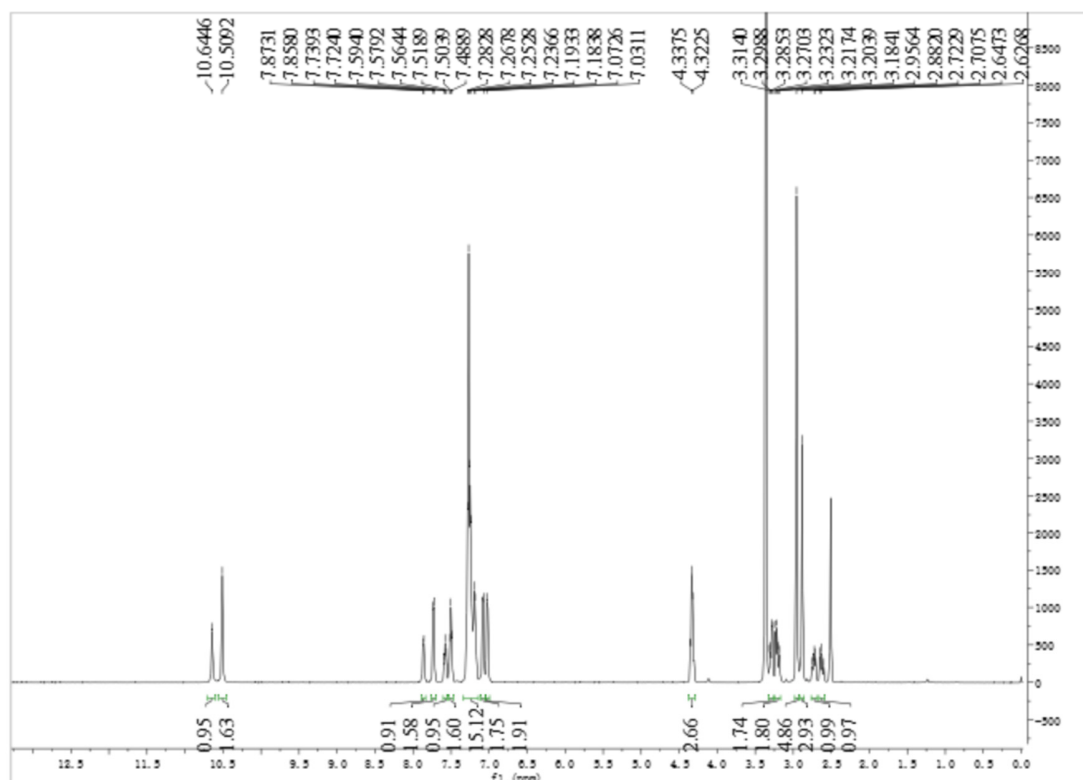


Figure S18. <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 500 MHz) spectrum of 5a/5b

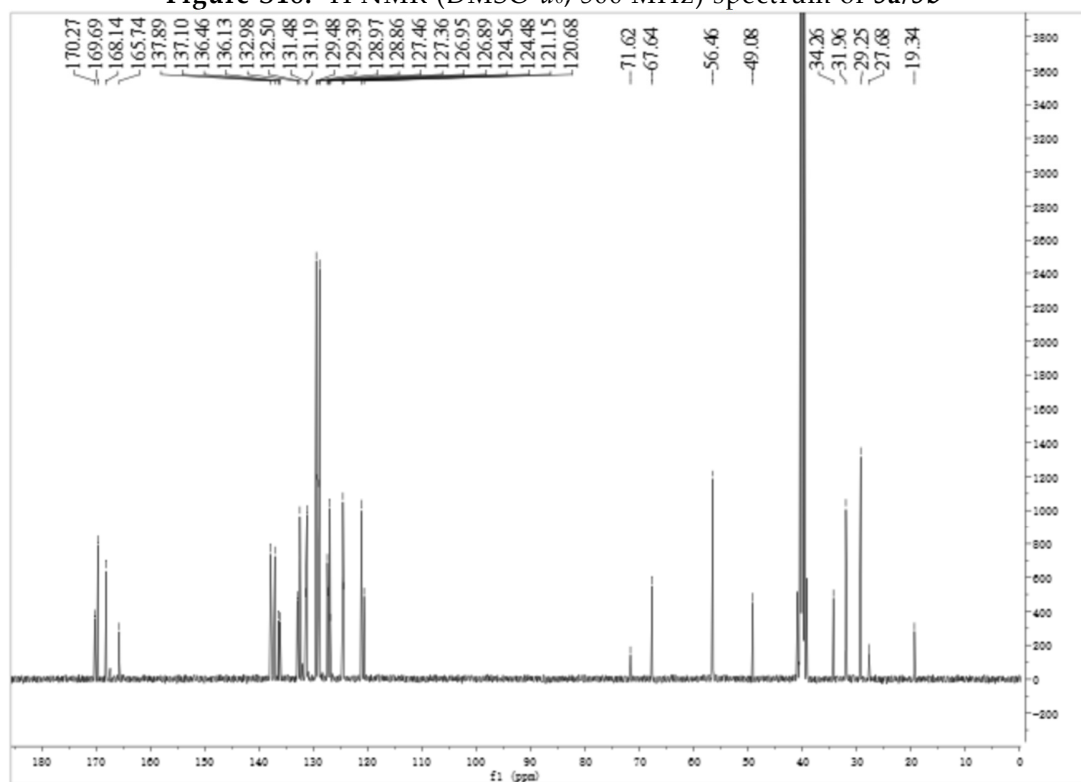


Figure S19. <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 125 MHz) spectrum of 5a/5b

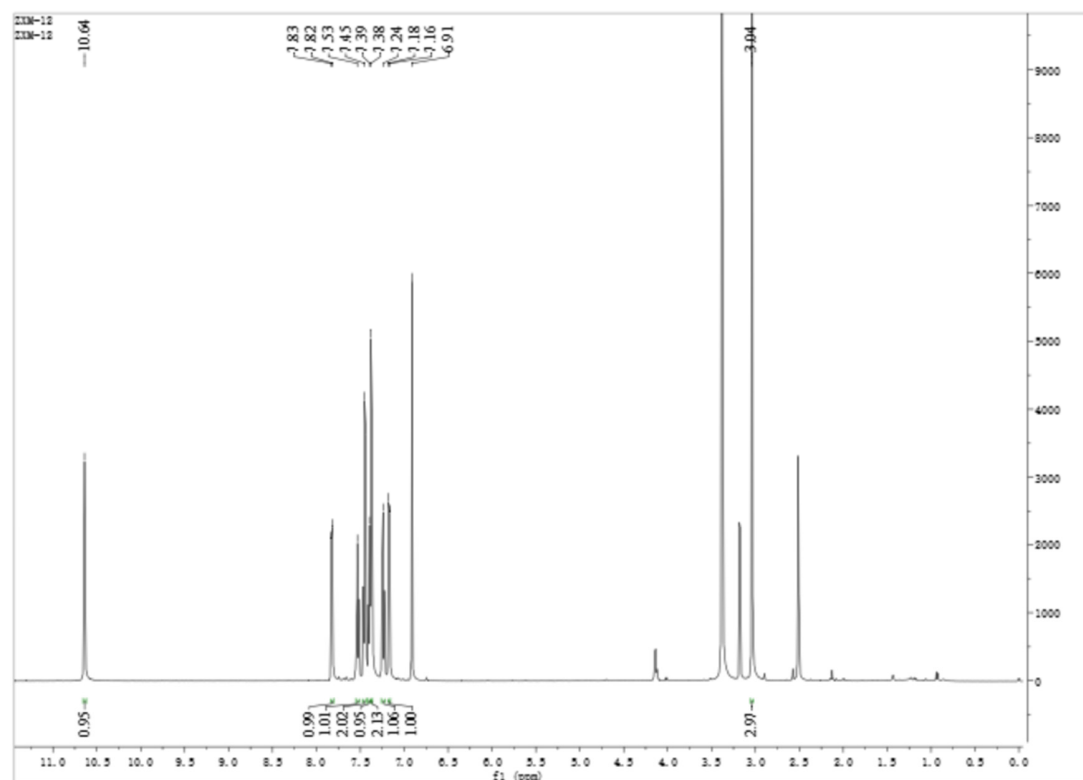


Figure S20. <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 500 MHz) spectrum of 6

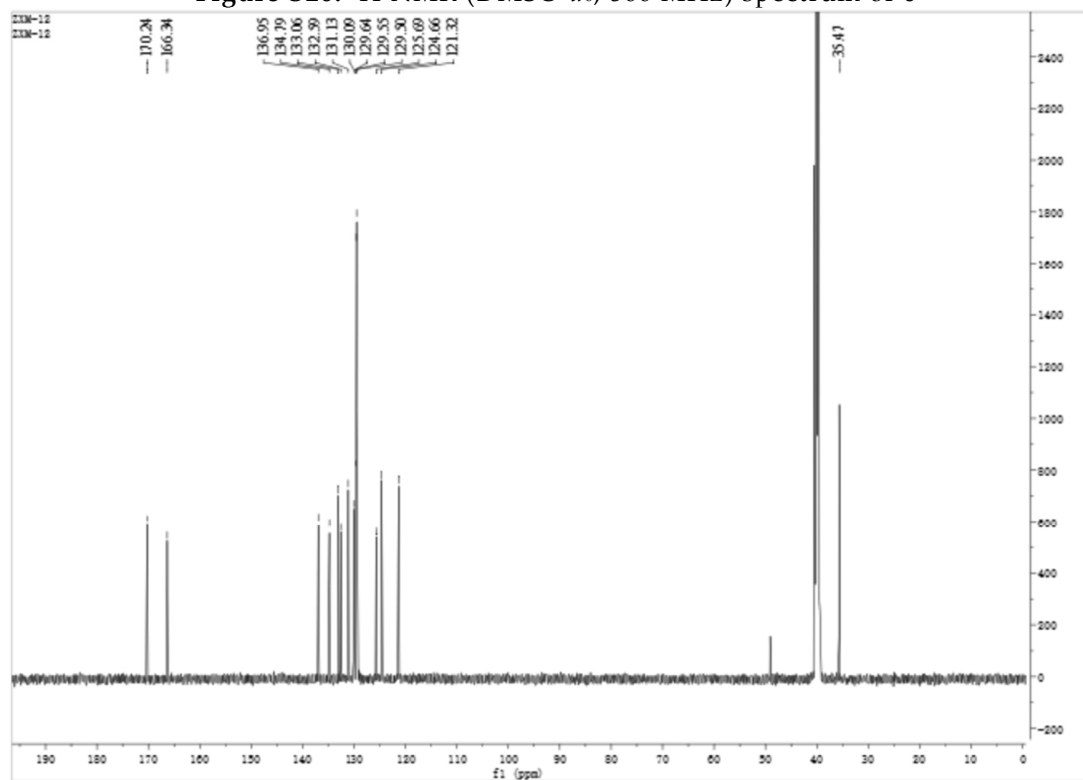


Figure S21. <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 125 MHz) spectrum of 6

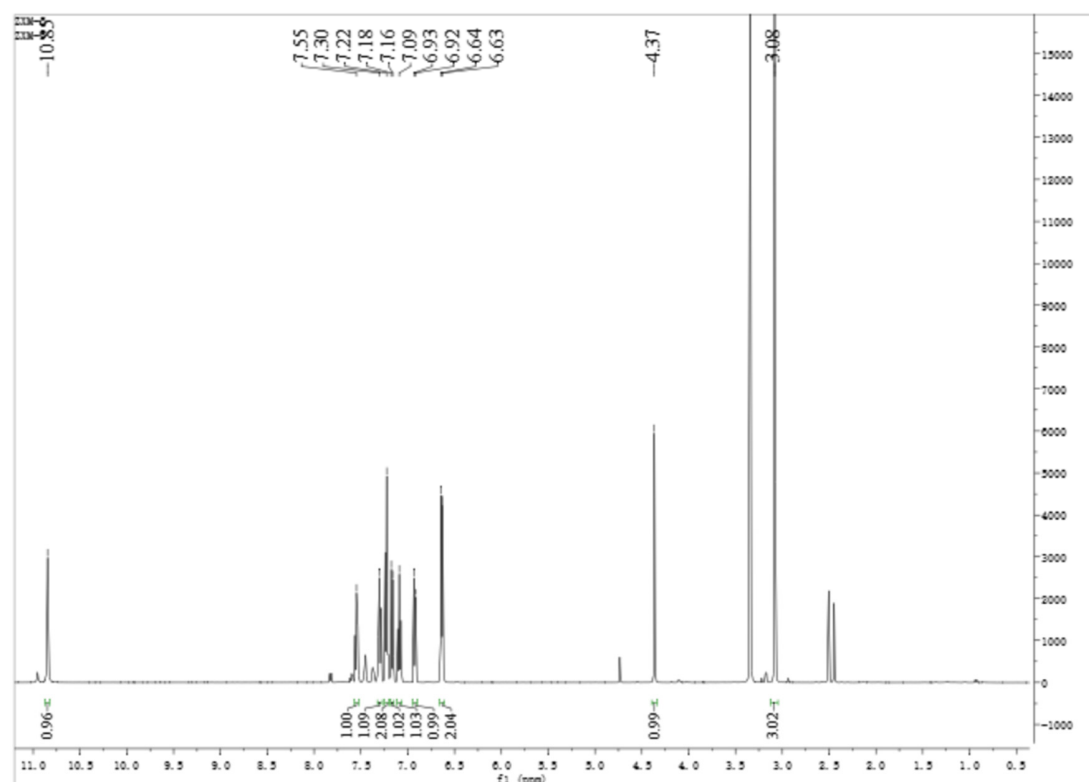


Figure S22. <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 500 MHz) spectrum of 7

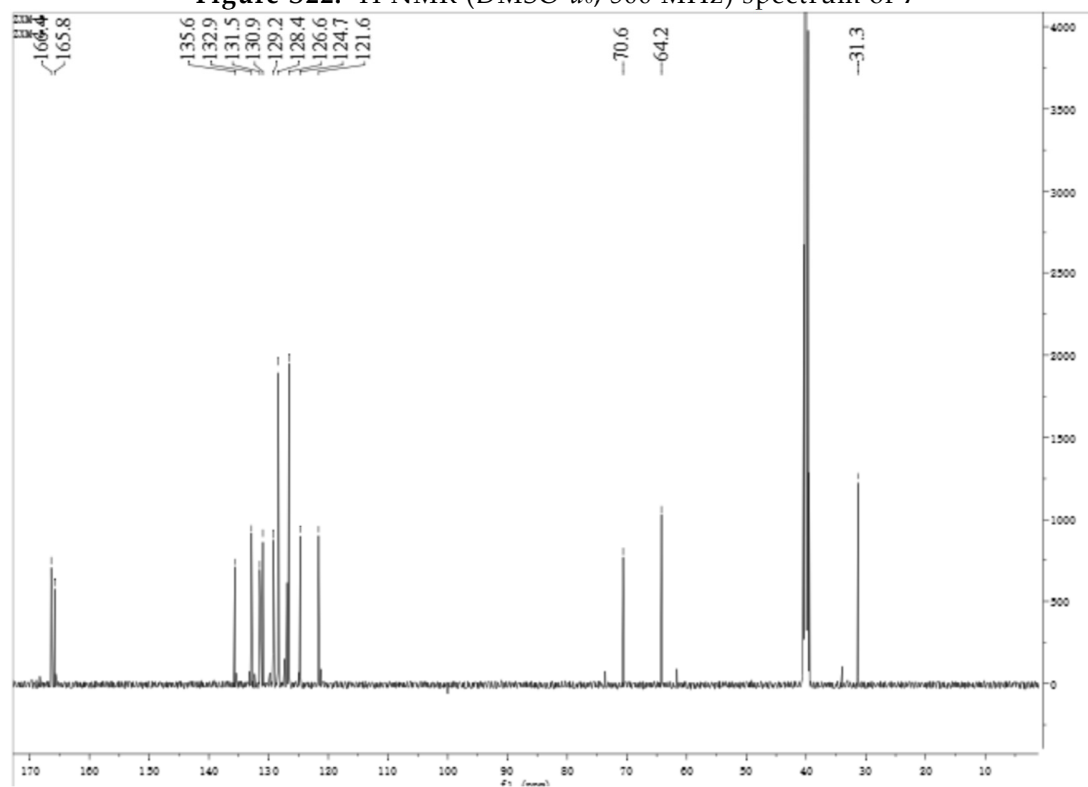


Figure S23. <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 125 MHz) spectrum of 7

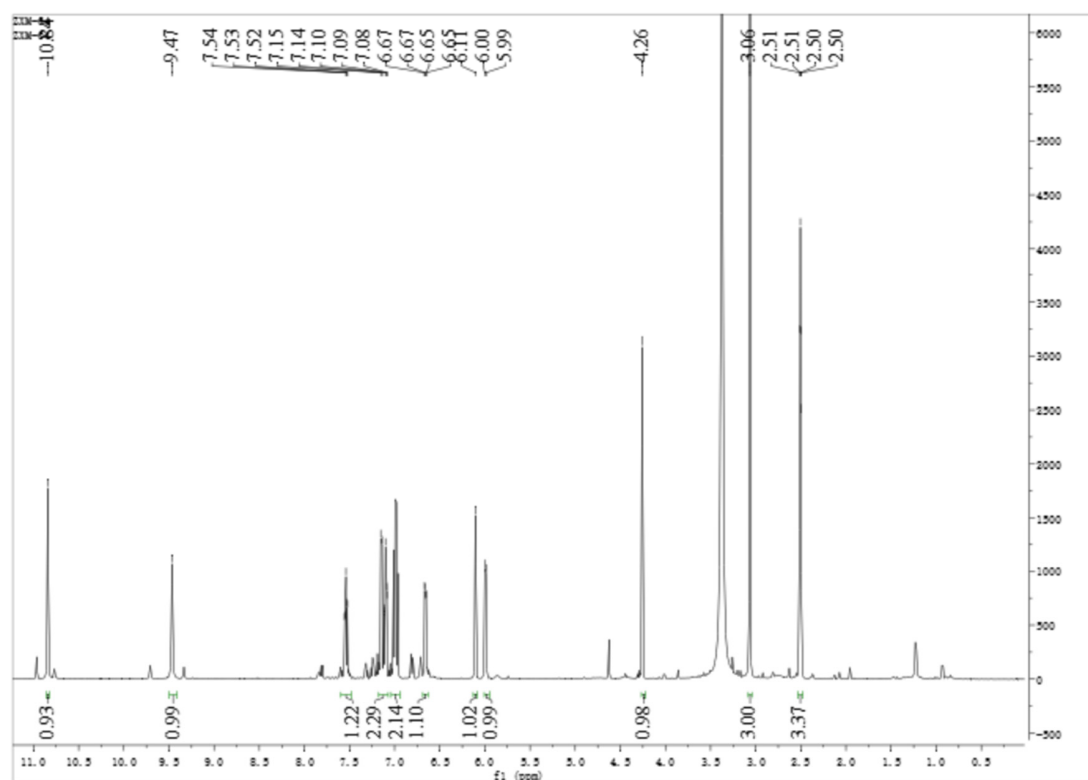


Figure S24. <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 500 MHz) spectrum of 8

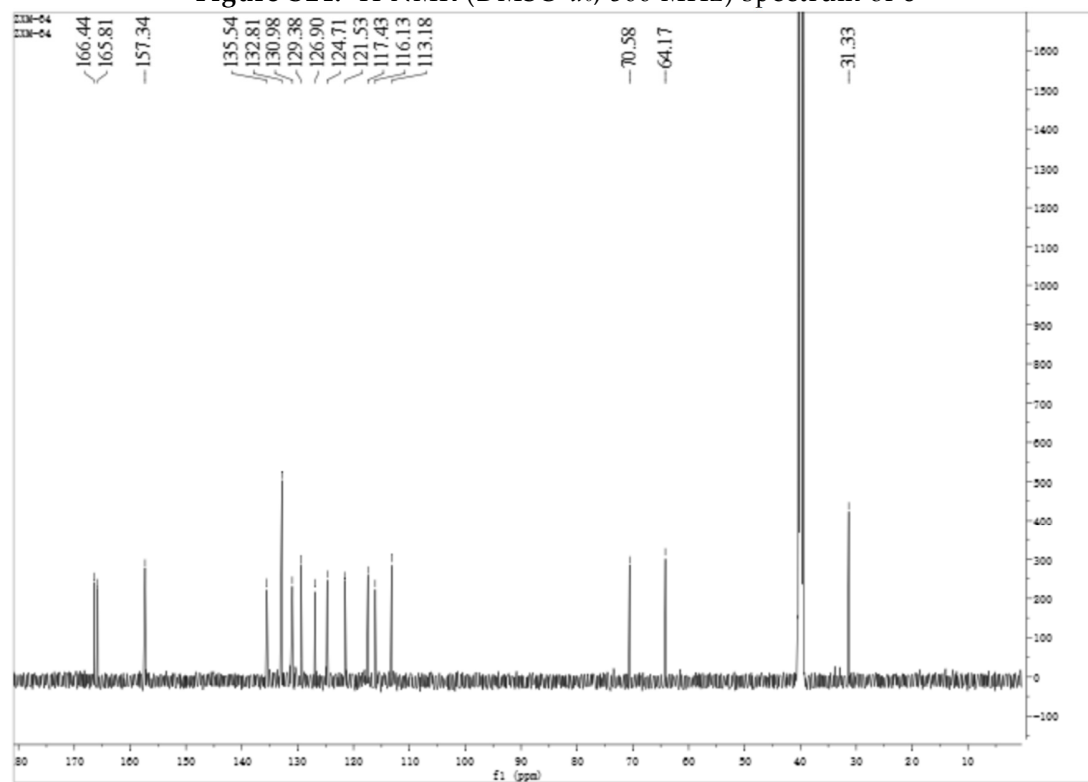
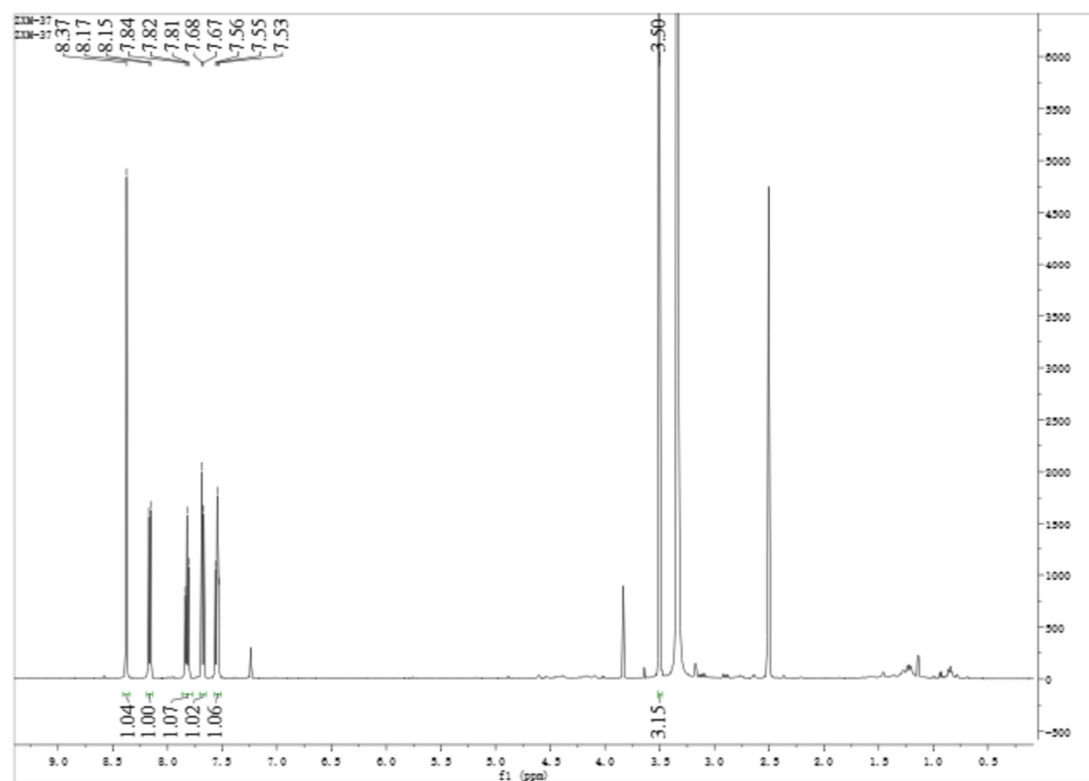
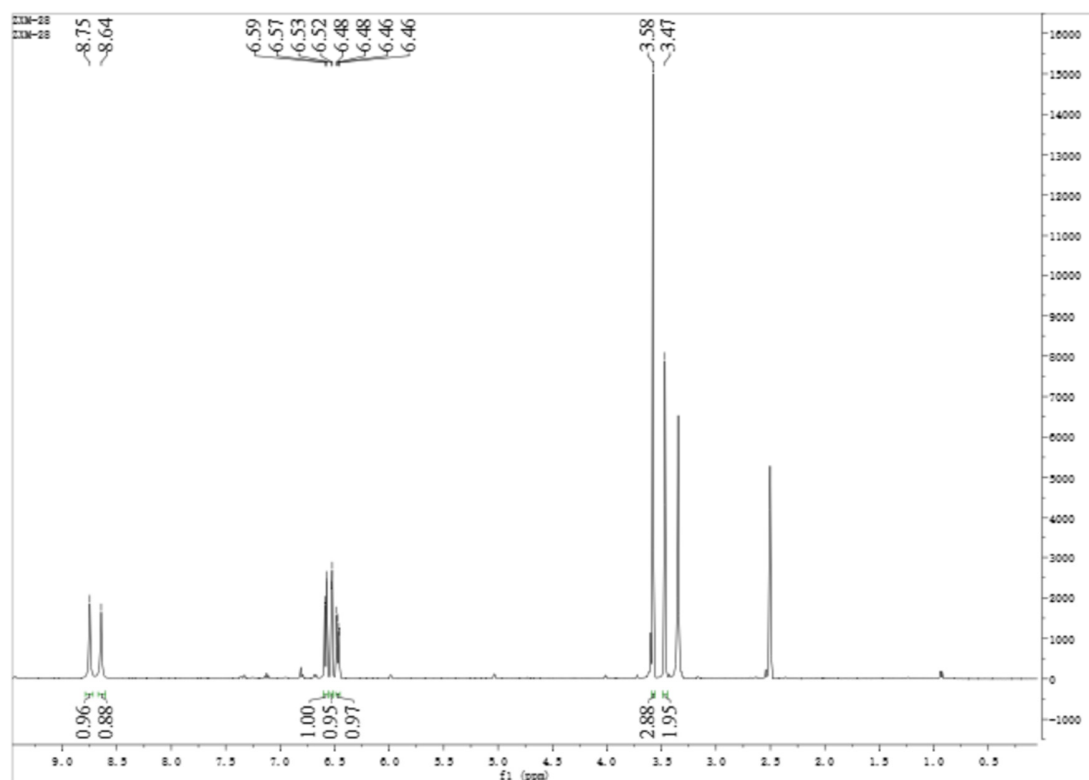


Figure S25. <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 125 MHz) spectrum of 8

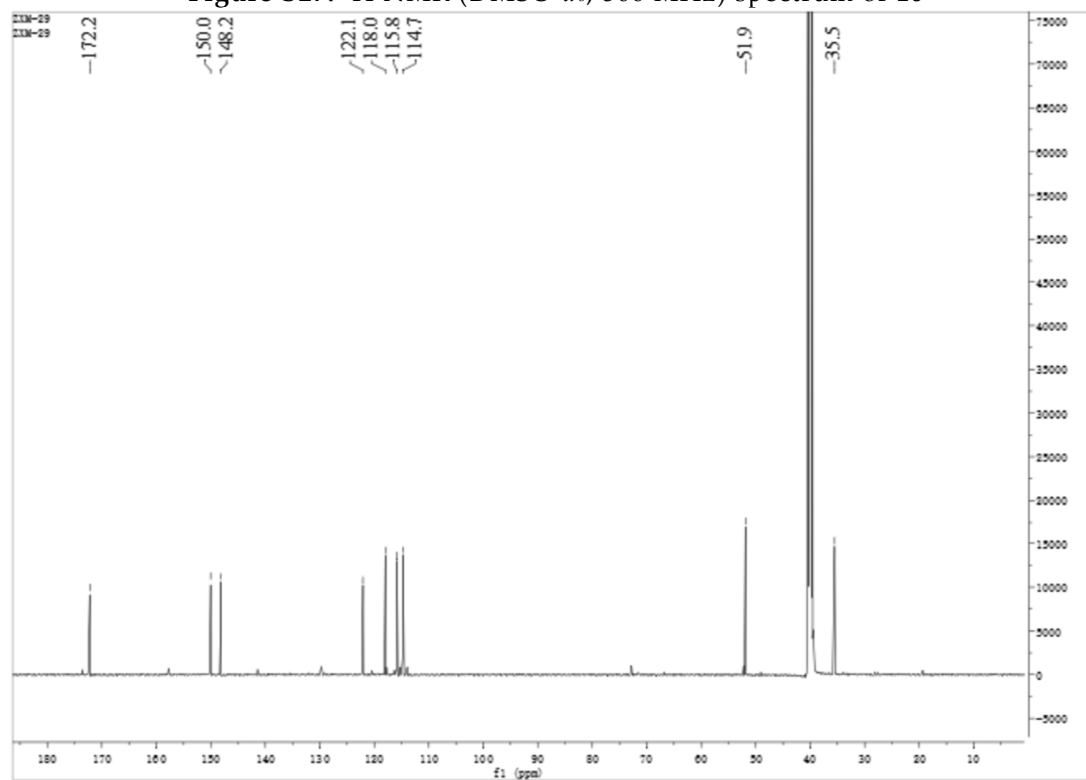


**Figure S26.**  $^1\text{H}$  NMR ( $\text{DMSO-}d_6$ , 500 MHz) spectrum of **9**

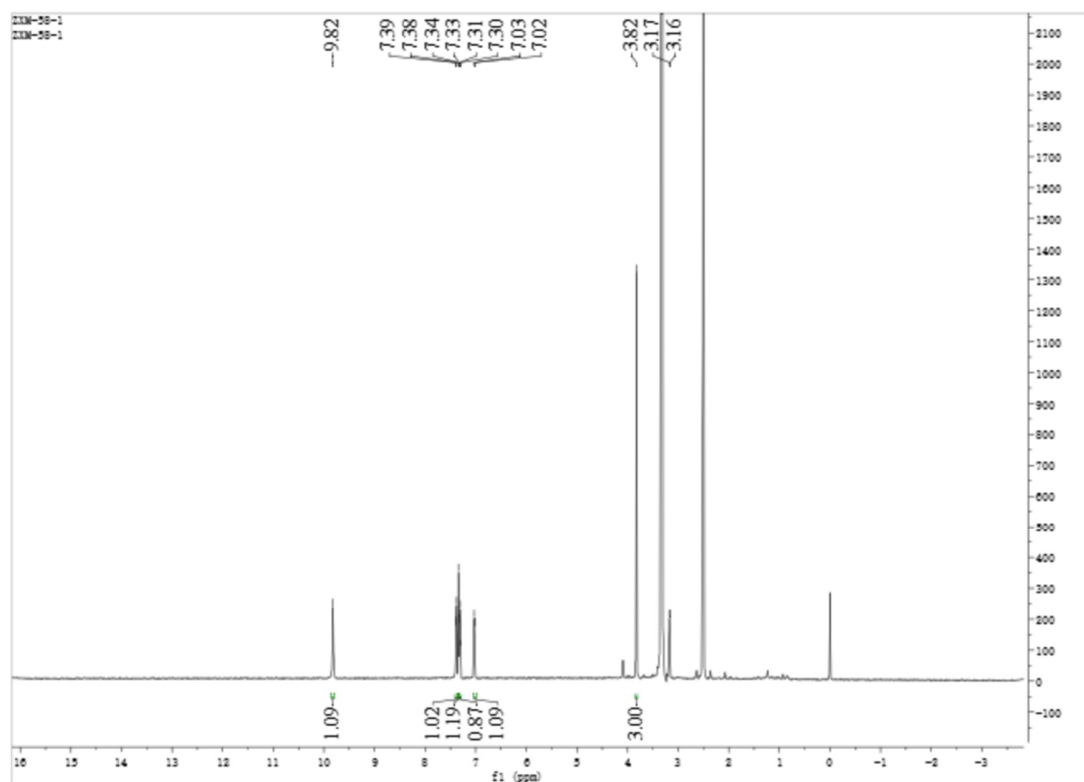




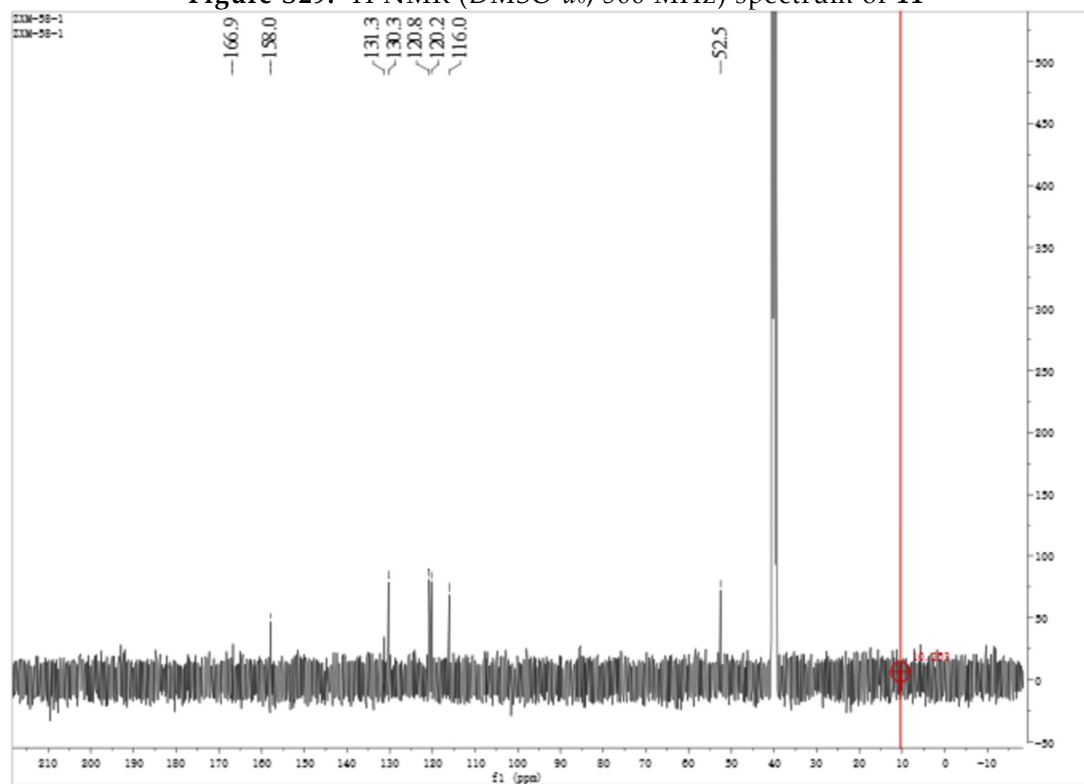
**Figure S27.** <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 500 MHz) spectrum of **10**



**Figure S28.** <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 125 MHz) spectrum of **10**



**Figure S29.** <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 500 MHz) spectrum of **11**



**Figure S30.** <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 125 MHz) spectrum of **11**

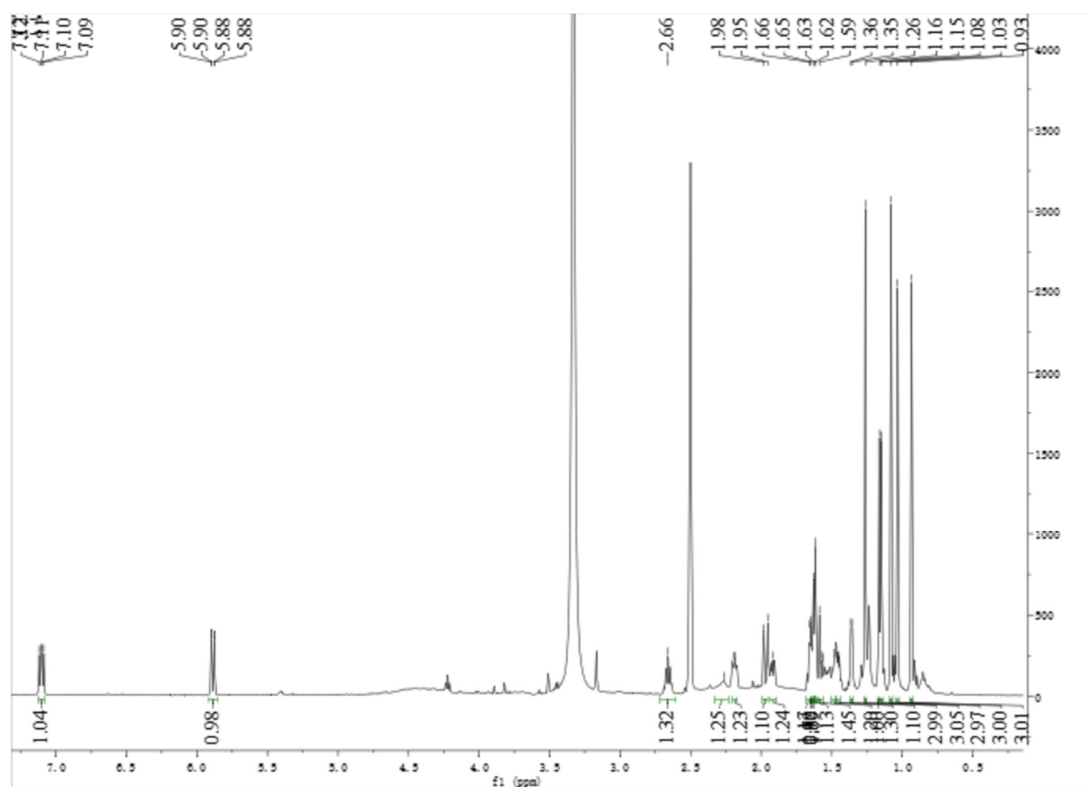


Figure S31. <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 500 MHz) spectrum of 12

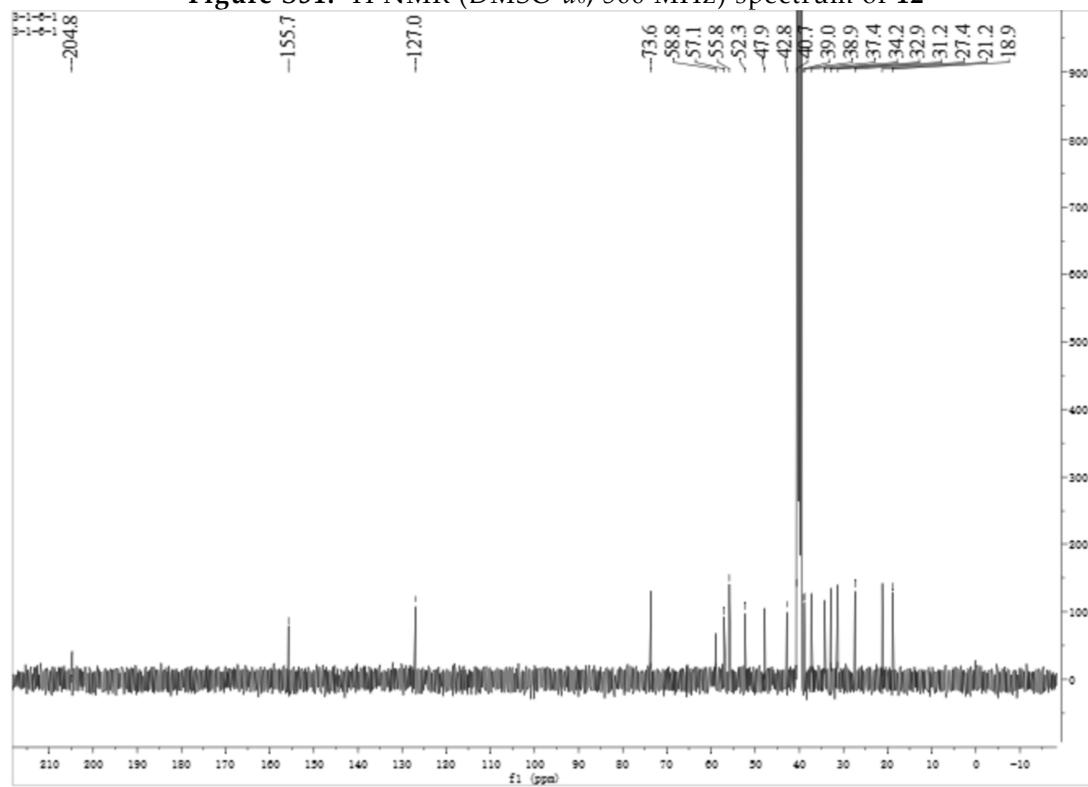


Figure S32. <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 125 MHz) spectrum of 12