

## Supplementary information for

### Secondary metabolites from *Aspergillus sparsus* NBERC\_28952 and their herbicidal activities

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Figure S1 Mass spectrum of compound **1** (determined as C<sub>23</sub>H<sub>30</sub>O<sub>5</sub> by HR-ESI-MS: *m/z* 387.2170, [M+H]<sup>+</sup>, calcd for C<sub>23</sub>H<sub>31</sub>NaO<sub>5</sub>, 387.2166)

Figure S2 <sup>1</sup>H-NMR spectrum of compound **1**

Figure S3 <sup>13</sup>C-NMR spectrum of compound **1**

Figure S4 <sup>1</sup>H-<sup>13</sup>C HSQC spectrum of compound **1**

Figure S5 <sup>1</sup>H-<sup>1</sup>H COSY spectrum of compound **1**

Figure S6 <sup>1</sup>H-<sup>13</sup>C HMBC spectrum of compound **1**

Figure S7 <sup>1</sup>H-<sup>1</sup>H NOESY spectrum of compound **1**

Figure S8 Mass spectrum of compound **2** (determined as C<sub>23</sub>H<sub>30</sub>O<sub>5</sub> by HR-ESI-MS: *m/z* 387.2163, [M+H]<sup>+</sup>, calcd for C<sub>23</sub>H<sub>31</sub>O<sub>5</sub>, 387.2166)

Figure S9 <sup>1</sup>H-NMR spectrum of compound **2**

Figure S10 <sup>13</sup>C-NMR spectrum of compound **2**

Figure S11 <sup>1</sup>H-<sup>13</sup>C HSQC spectrum of compound **2**

Figure S12 <sup>1</sup>H-<sup>1</sup>H COSY spectrum of compound **2**

Figure S13 <sup>1</sup>H-<sup>13</sup>C HMBC spectrum of compound **2**

Figure S14 <sup>1</sup>H-<sup>1</sup>H ROESY spectrum of compound **2**

Figure S15 Mass spectrum of compound **3** (determined as C<sub>23</sub>H<sub>30</sub>O<sub>5</sub> by HR-ESI-MS: *m/z* 387.2167, [M+H]<sup>+</sup>, calcd for C<sub>23</sub>H<sub>31</sub>O<sub>5</sub>, 387.2166)

Figure S16 <sup>1</sup>H-NMR spectrum of compound **3**

Figure S17 <sup>13</sup>C-NMR spectrum of compound **3**

Figure S18 <sup>1</sup>H-<sup>13</sup>C HSQC spectrum of compound **3**

Figure S19 <sup>1</sup>H-<sup>1</sup>H COSY spectrum of compound **3**

Figure S20 <sup>1</sup>H-<sup>13</sup>C HMBC spectrum of compound **3**

Figure S21 <sup>1</sup>H-<sup>1</sup>H ROESY spectrum of compound **3**

Figure S22 Mass spectrum of compound **4** (determined as C<sub>25</sub>H<sub>34</sub>O<sub>6</sub> by HR-ESI-MS: *m/z* 453.2255, [M+Na]<sup>+</sup>, calcd for C<sub>25</sub>H<sub>34</sub>NaO<sub>6</sub>, 453.2248)

Figure S23 <sup>1</sup>H-NMR spectrum of compound **4**

Figure S24 <sup>13</sup>C-NMR spectrum of compound **4**

Figure S25 <sup>1</sup>H-<sup>13</sup>C HSQC spectrum of compound **4**

Figure S26  $^1\text{H}$ - $^1\text{H}$  COSY spectrum of compound **4**

Figure S27  $^1\text{H}$ - $^{13}\text{C}$  HMBC spectrum of compound **4**

Figure S28  $^1\text{H}$ - $^1\text{H}$  ROESY spectrum of compound **4**

Figure S29 Mass spectrum of compound **5** (determined as  $\text{C}_{22}\text{H}_{26}\text{O}_5$  by HR-ESI-MS:  $m/z$  371.1857,  $[\text{M}+\text{Na}]^+$ , calcd for  $\text{C}_{22}\text{H}_{27}\text{O}_5$ , 371.1853)

Figure S30  $^1\text{H}$ -NMR spectrum of compound **5**

Figure S31  $^{13}\text{C}$ -NMR spectrum of compound **5**

Figure S32  $^1\text{H}$ - $^{13}\text{C}$  HSQC spectrum of compound **5**

Figure S33  $^1\text{H}$ - $^1\text{H}$  COSY spectrum of compound **5**

Figure S34  $^1\text{H}$ - $^{13}\text{C}$  HMBC spectrum of compound **5**

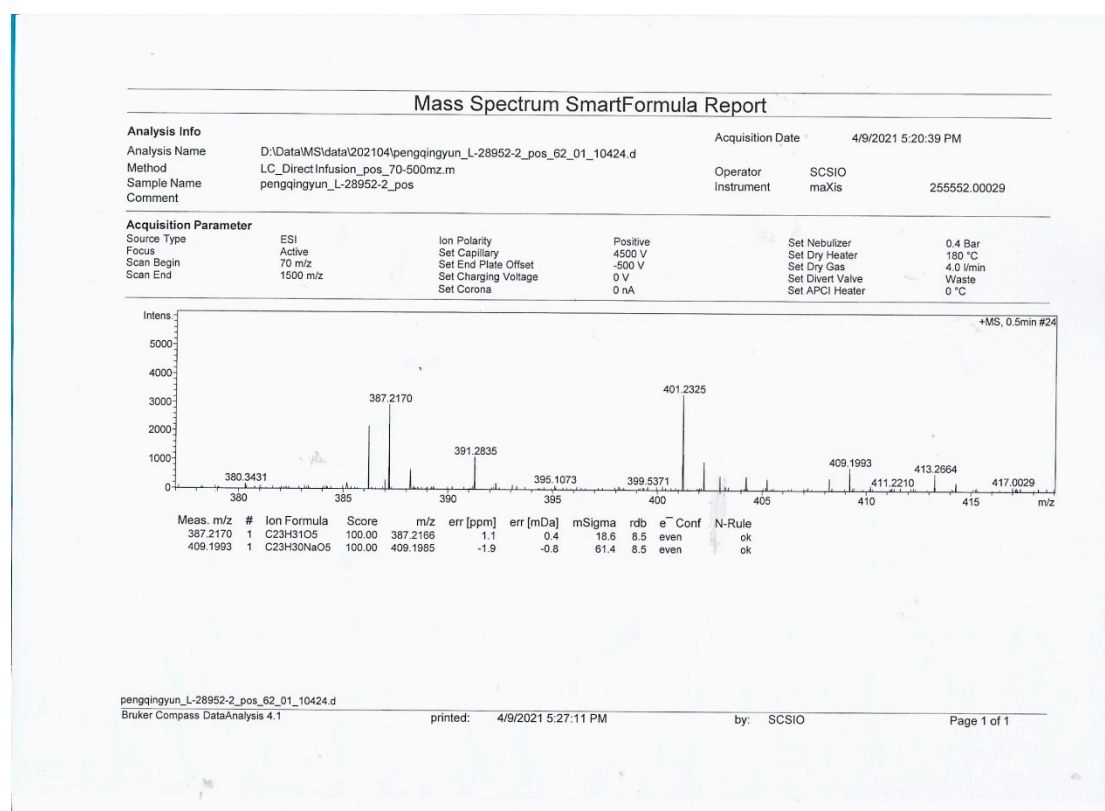


Figure S1 Mass spectrum of compound **1** (determined as  $\text{C}_{23}\text{H}_{30}\text{O}_5$  by HR-ESI-MS:  $m/z$  387.2170,  $[\text{M}+\text{H}]^+$ , calcd for  $\text{C}_{23}\text{H}_{31}\text{NaO}_5$ , 387.2166)

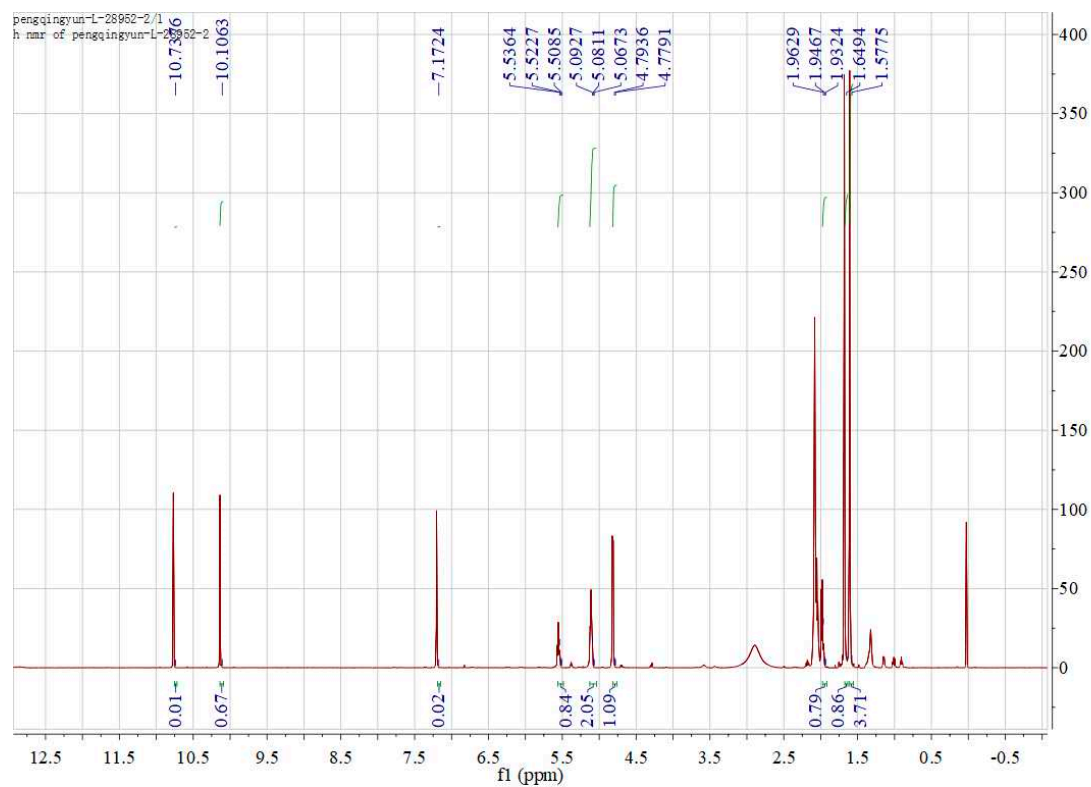


Figure S2  $^1\text{H}$ -NMR spectrum of compound **1**

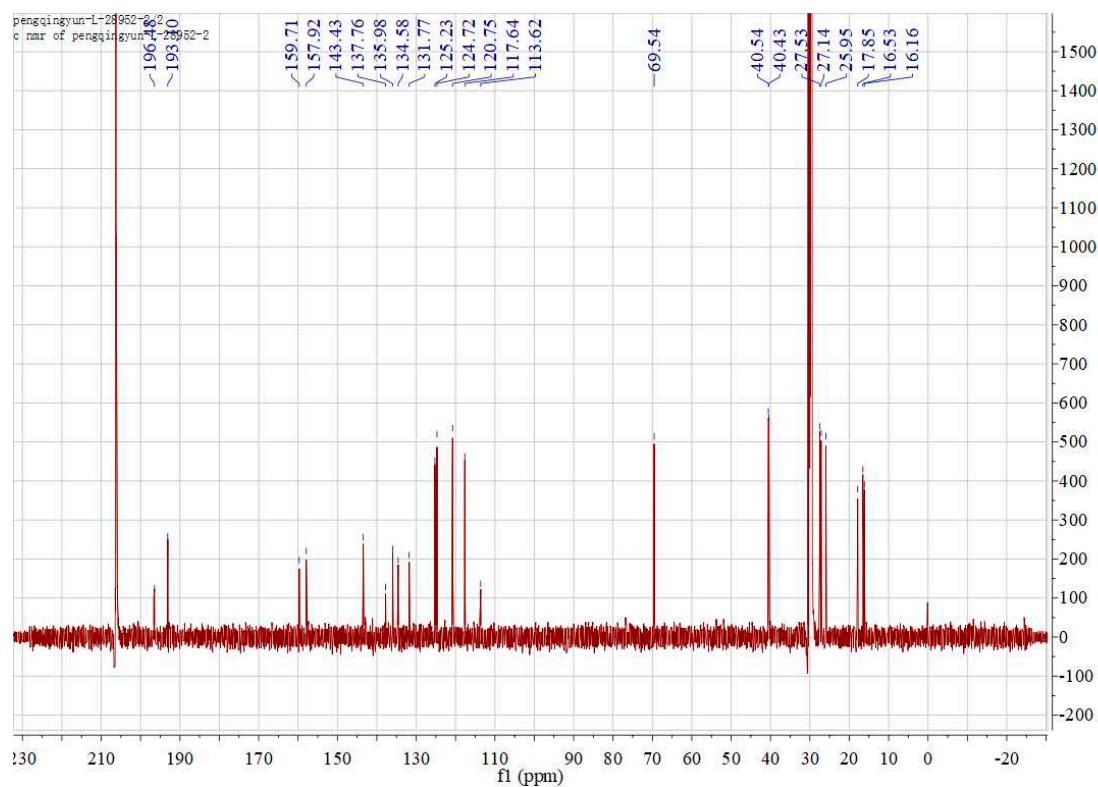


Figure S3  $^{13}\text{C}$ -NMR spectrum of compound **1**

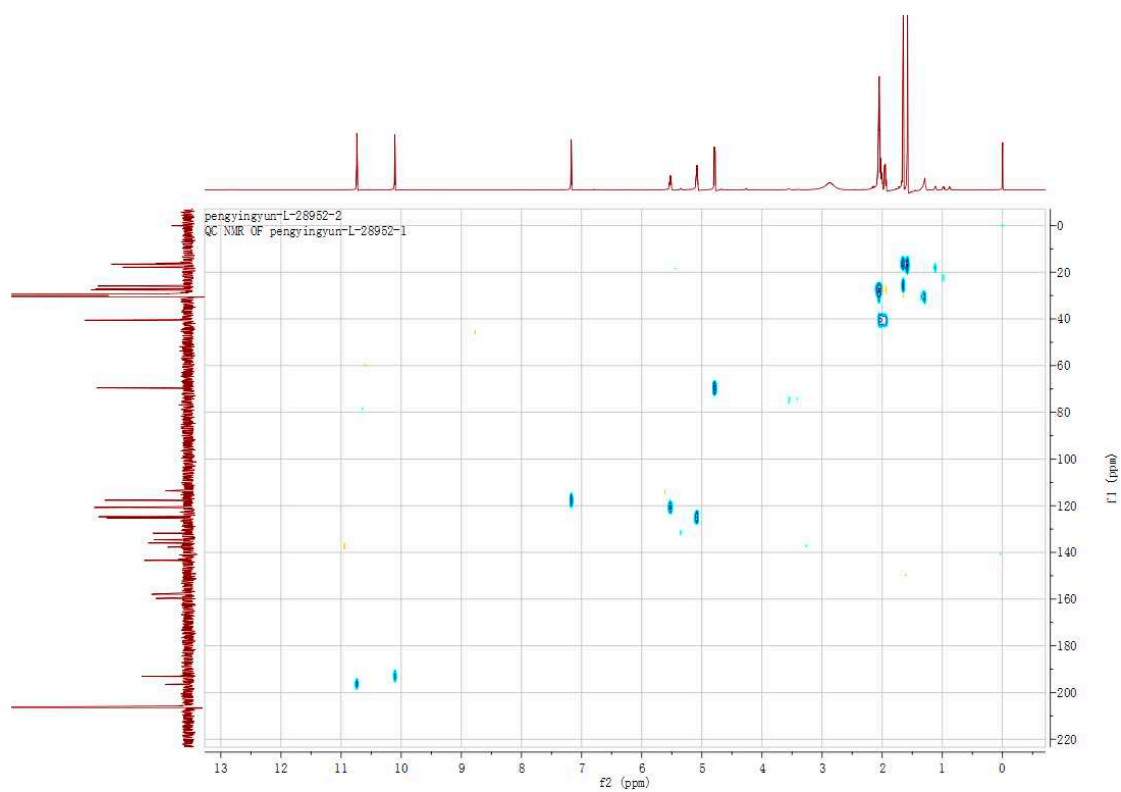


Figure S4 HSQC spectrum of compound **1**

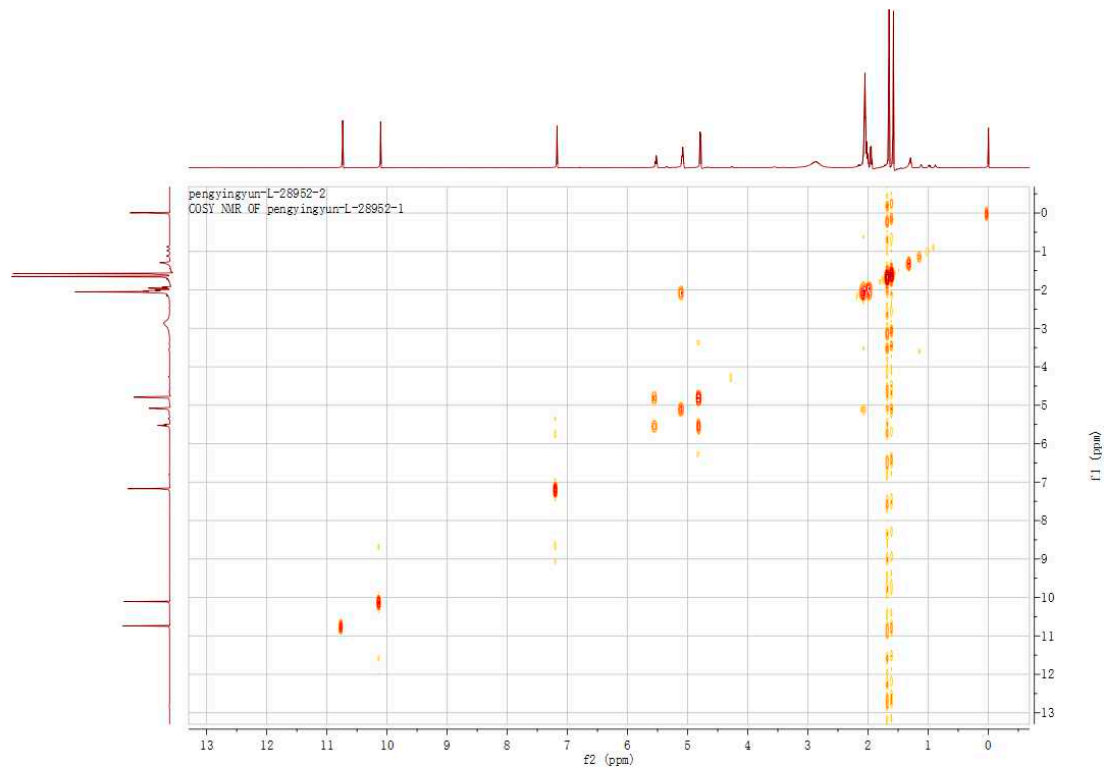


Figure S5  $^1\text{H}$ - $^1\text{H}$  COSY spectrum of compound **1**

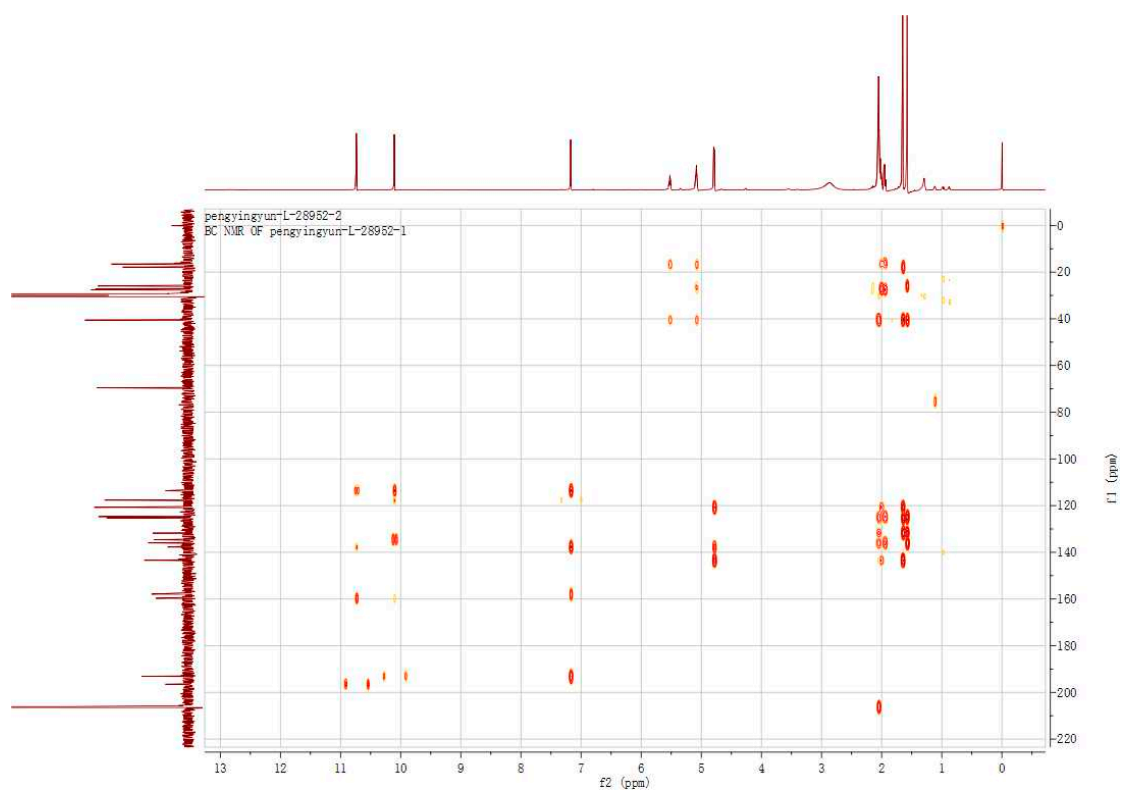


Figure S6  $^1\text{H}$ - $^{13}\text{C}$  HMBC spectrum of compound **1**

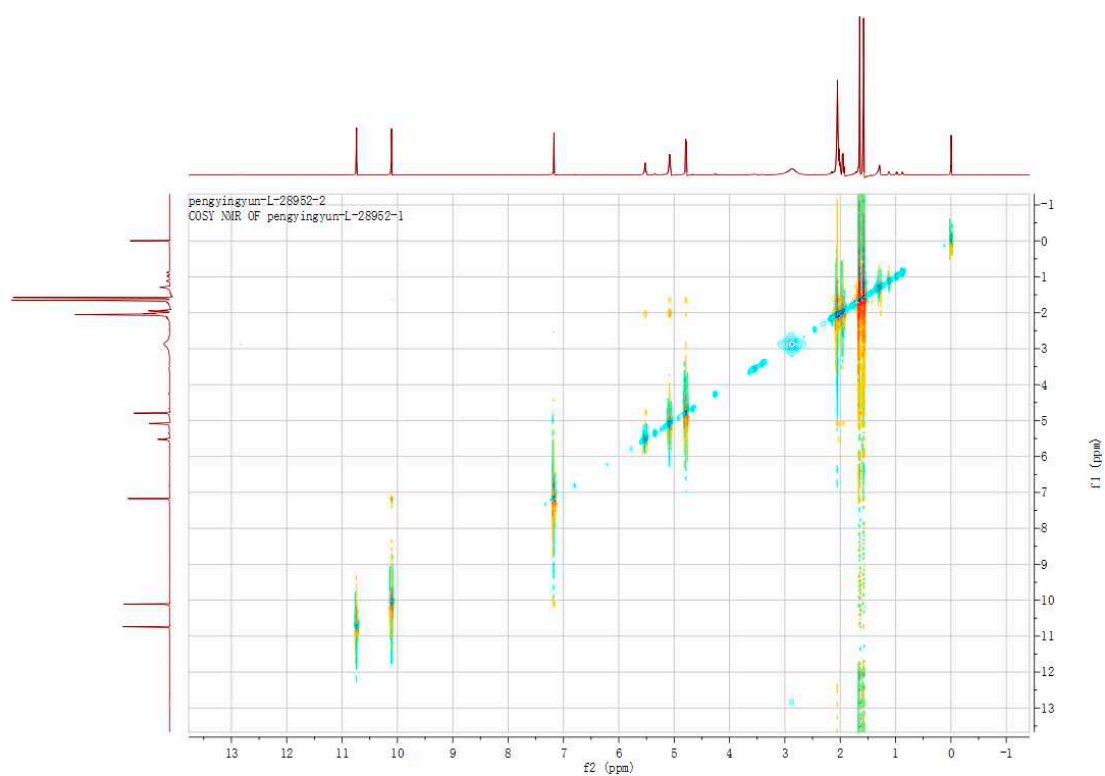


Figure S7  $^1\text{H}$ - $^1\text{H}$  NOESY spectrum of compound **1**

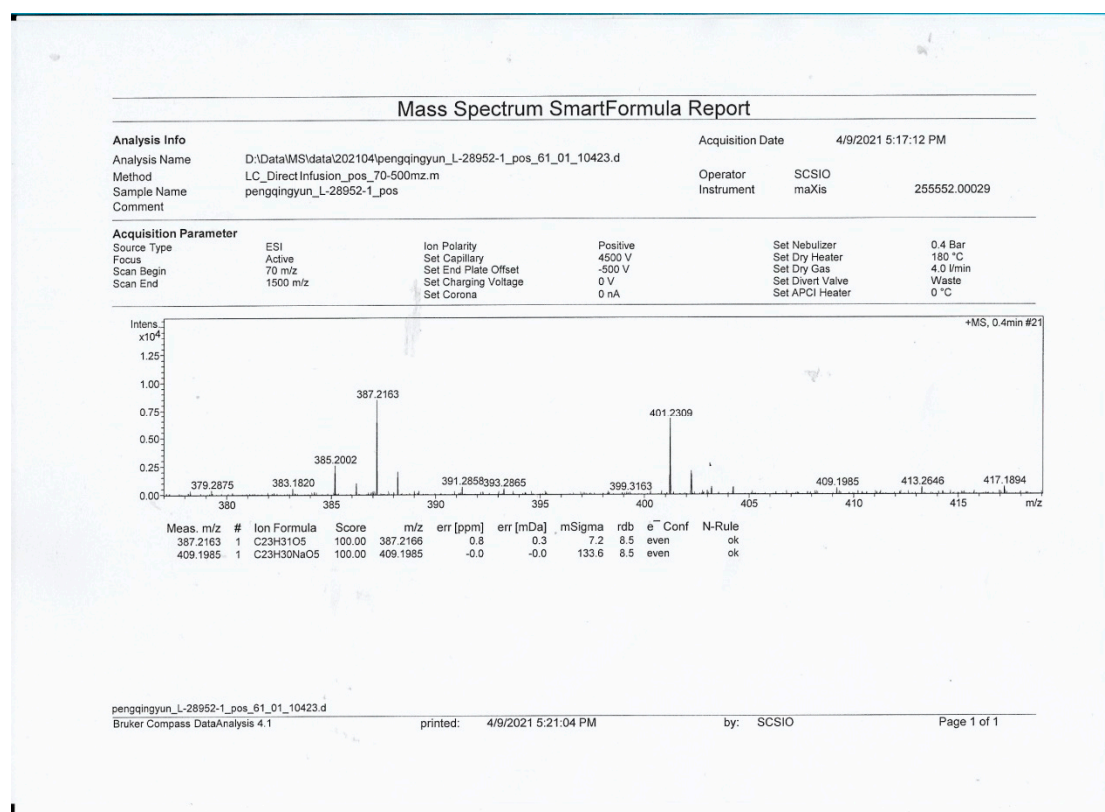
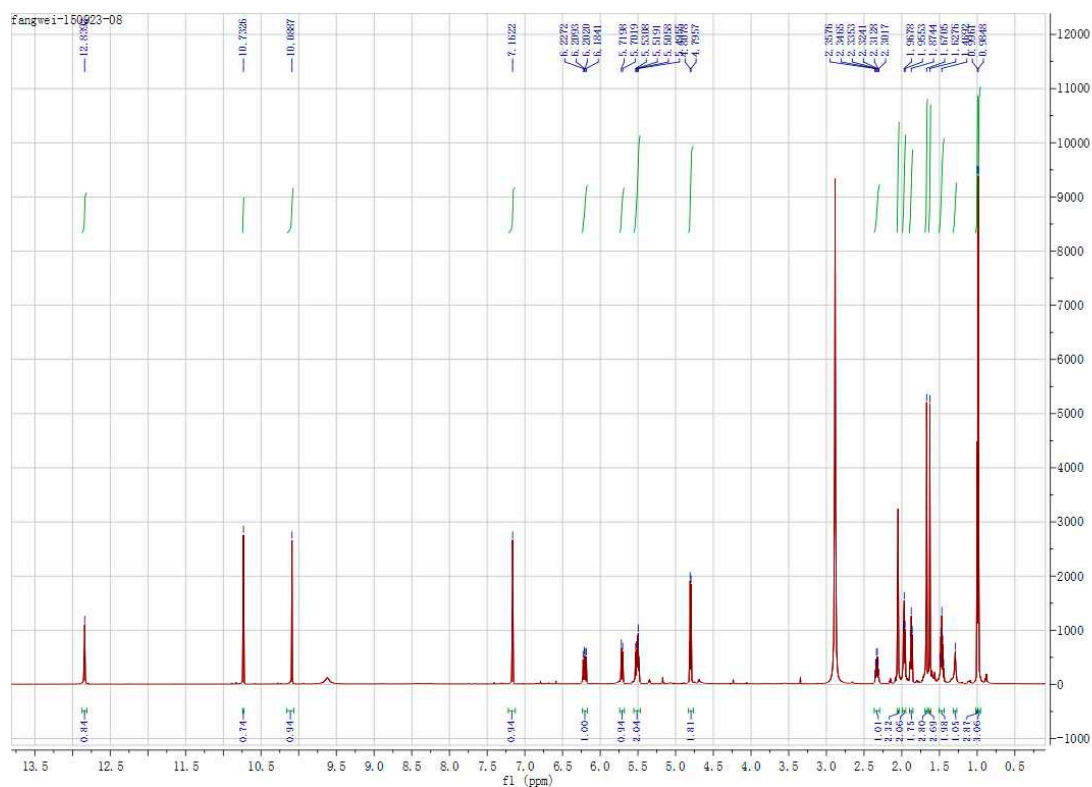


Figure S8 Mass spectrum of compound **2** (determined as C<sub>23</sub>H<sub>30</sub>O<sub>5</sub> by HR-ESI-MS:  $m/z$  387.2163, [M+H]<sup>+</sup>, calcd for C<sub>23</sub>H<sub>31</sub>O<sub>5</sub>, 387.2166)



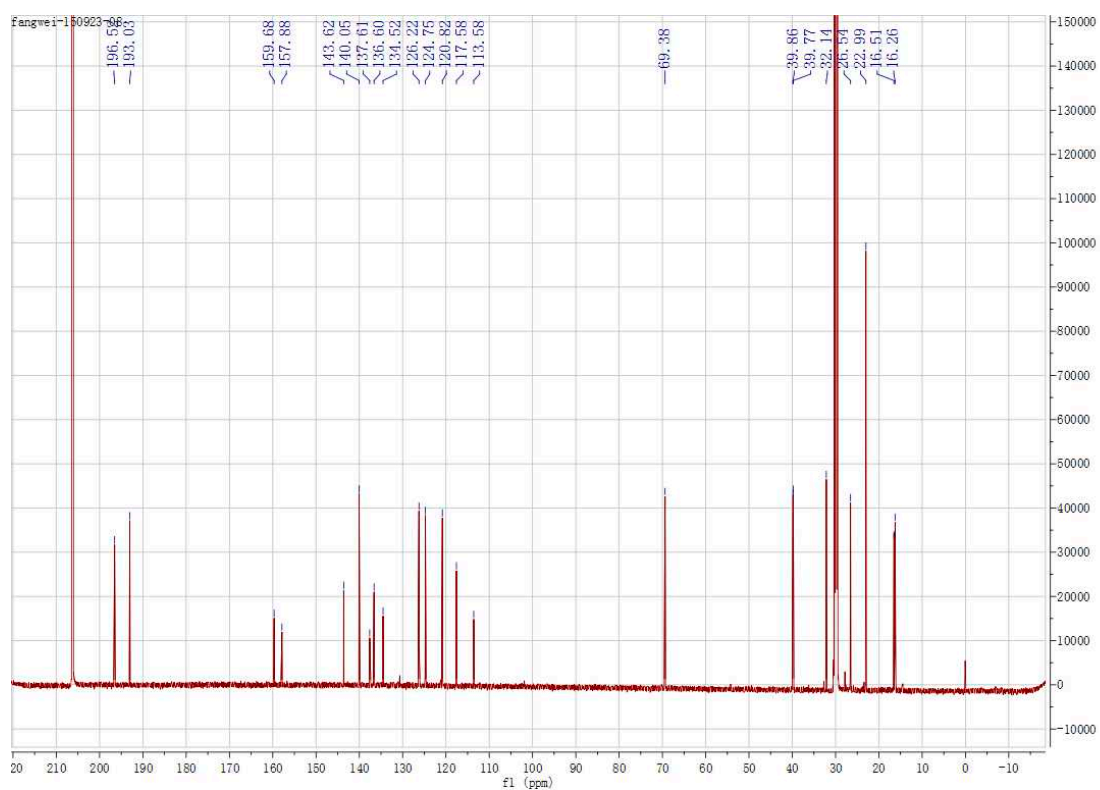


Figure S10  $^{13}\text{C}$ -NMR spectrum of compound 2

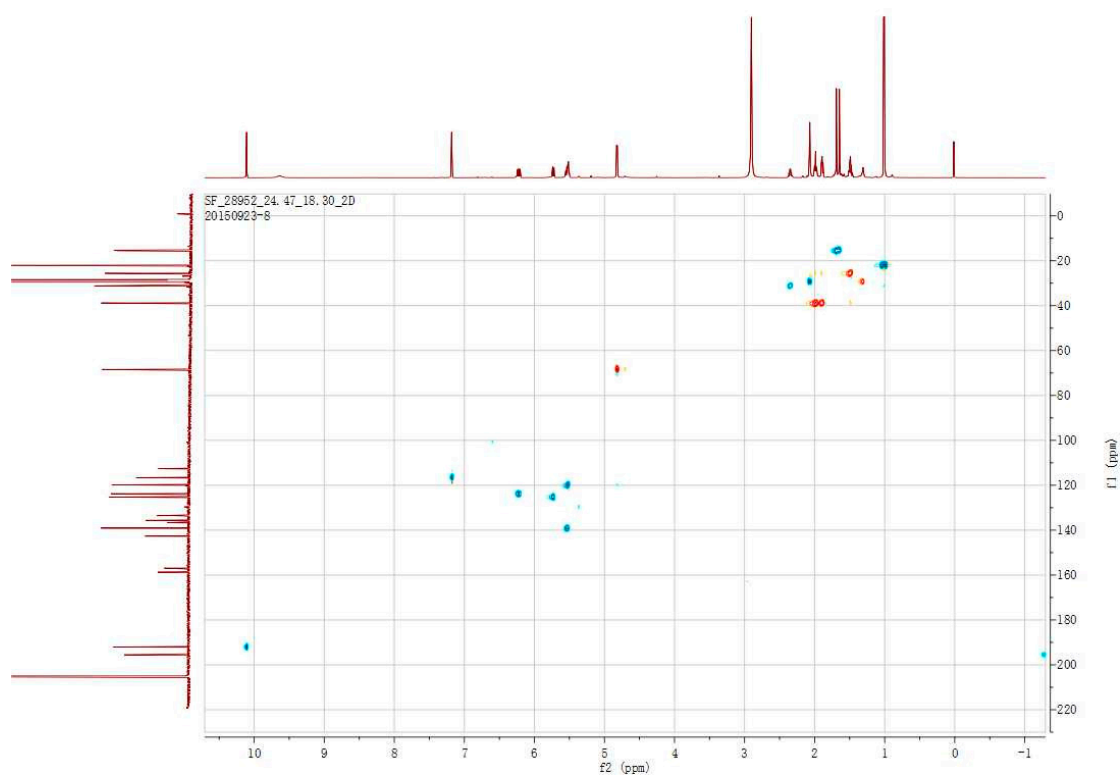


Figure S11  $^1\text{H}$ - $^{13}\text{C}$  HSQC spectrum of compound 2



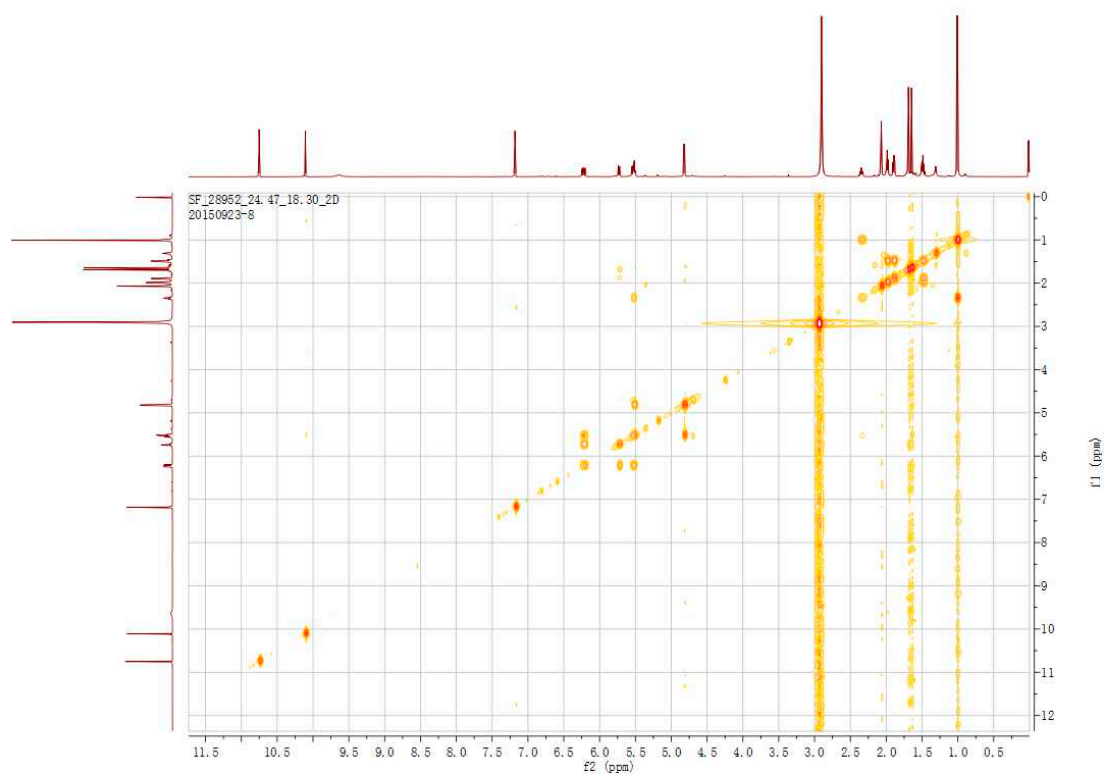


Figure S12  $^1\text{H}$ - $^1\text{H}$  COSY spectrum of compound **2**

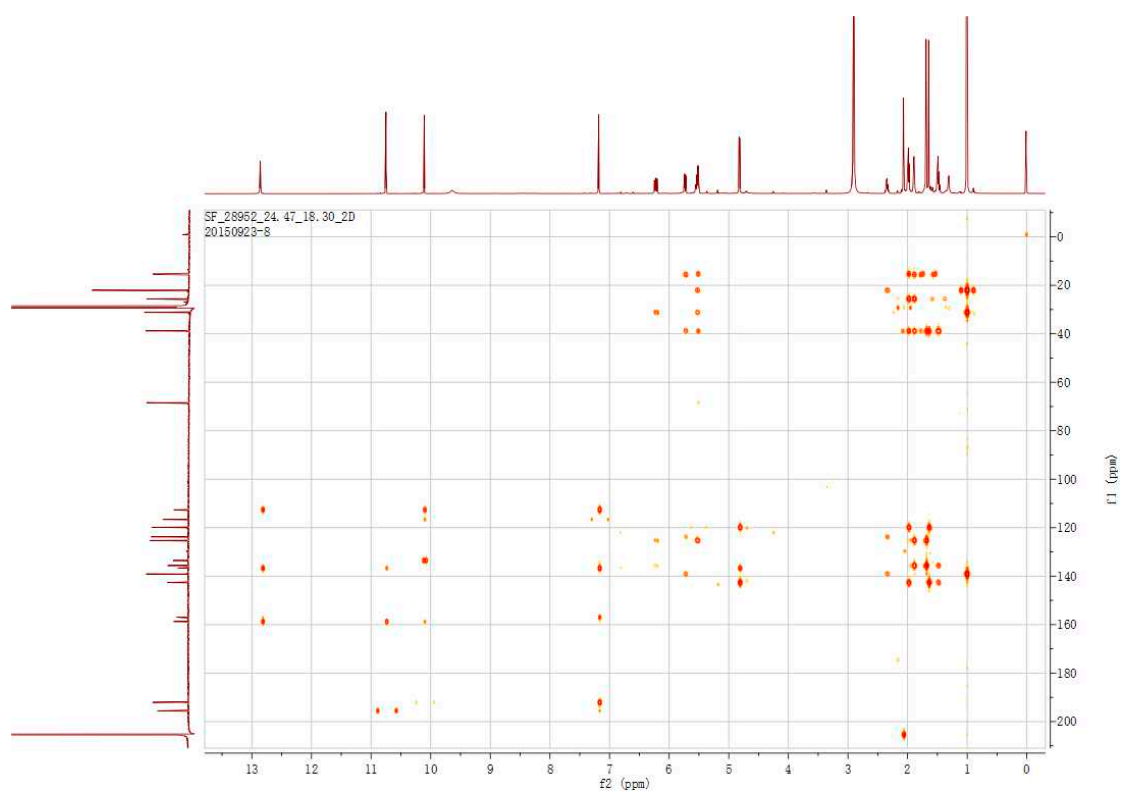


Figure S13  $^1\text{H}$ - $^{13}\text{C}$  HMBC spectrum of compound **2**



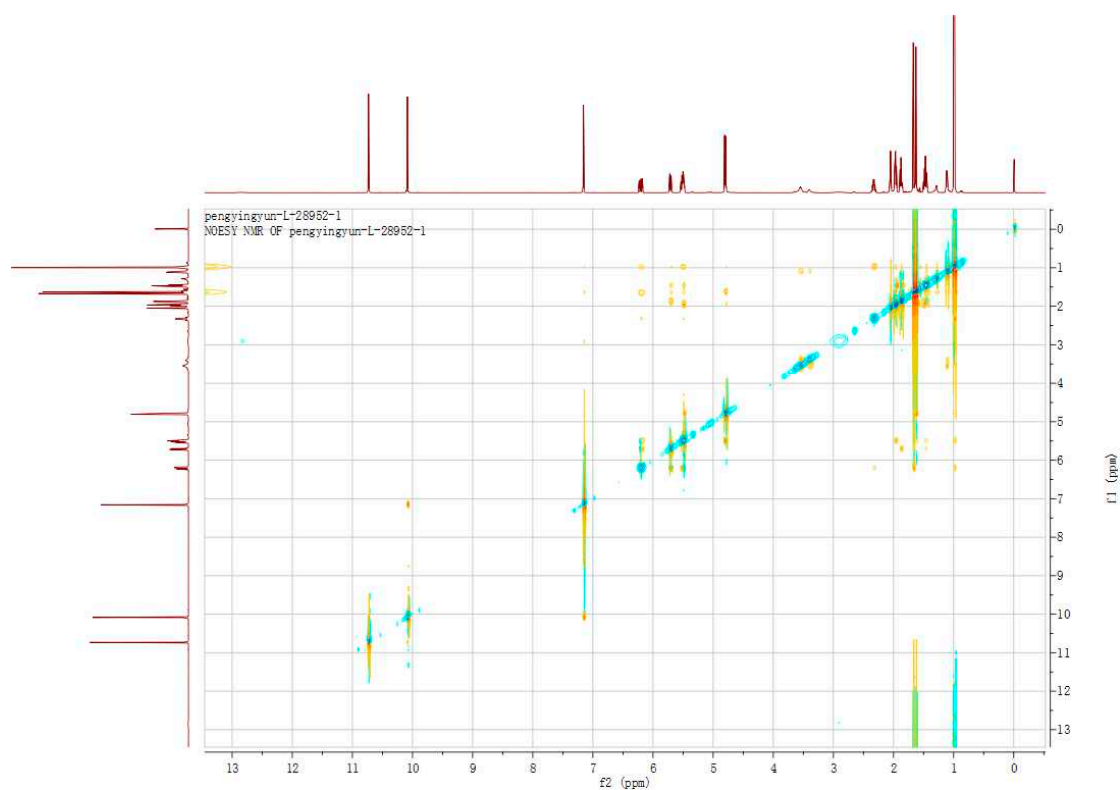


Figure S14  $^1\text{H}$ - $^1\text{H}$  NOESY spectrum of compound 2

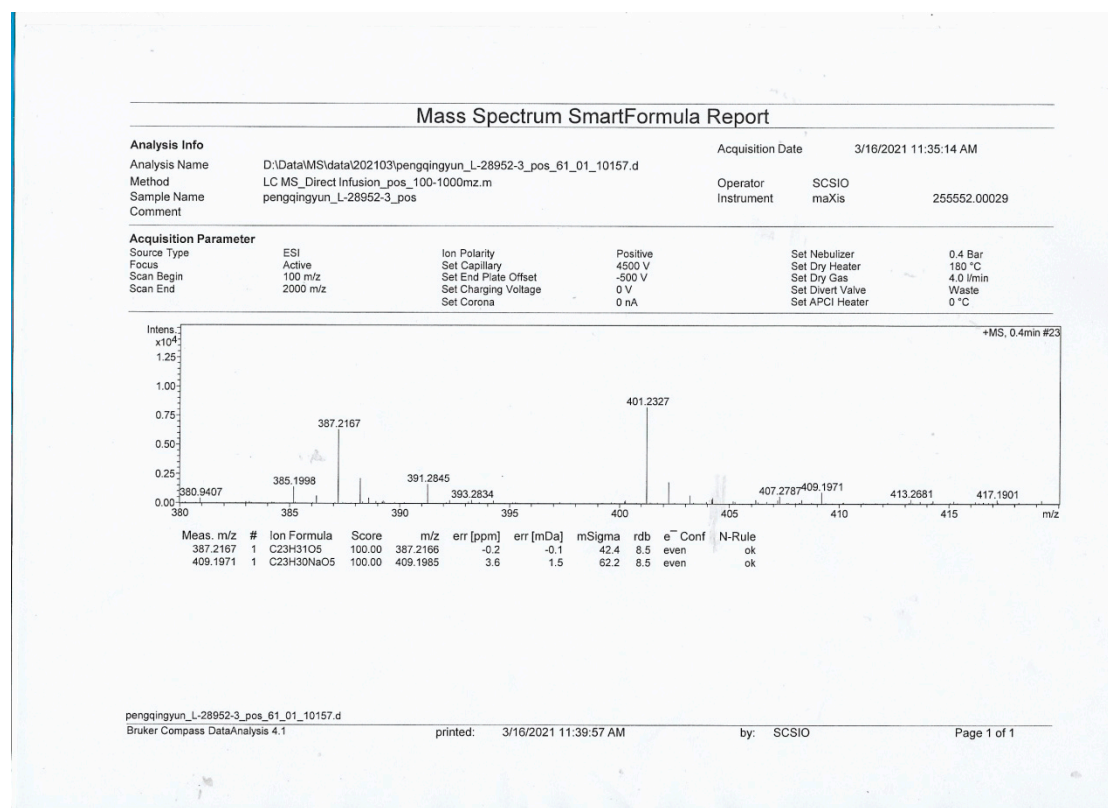


Figure S15 Mass spectrum of compound 3 (determined as  $\text{C}_{23}\text{H}_{30}\text{O}_5$  by HR-ESI-MS:  $m/z$  387.2167,  $[\text{M}+\text{H}]^+$ , calcd for  $\text{C}_{23}\text{H}_{31}\text{O}_5$ , 387.2166)

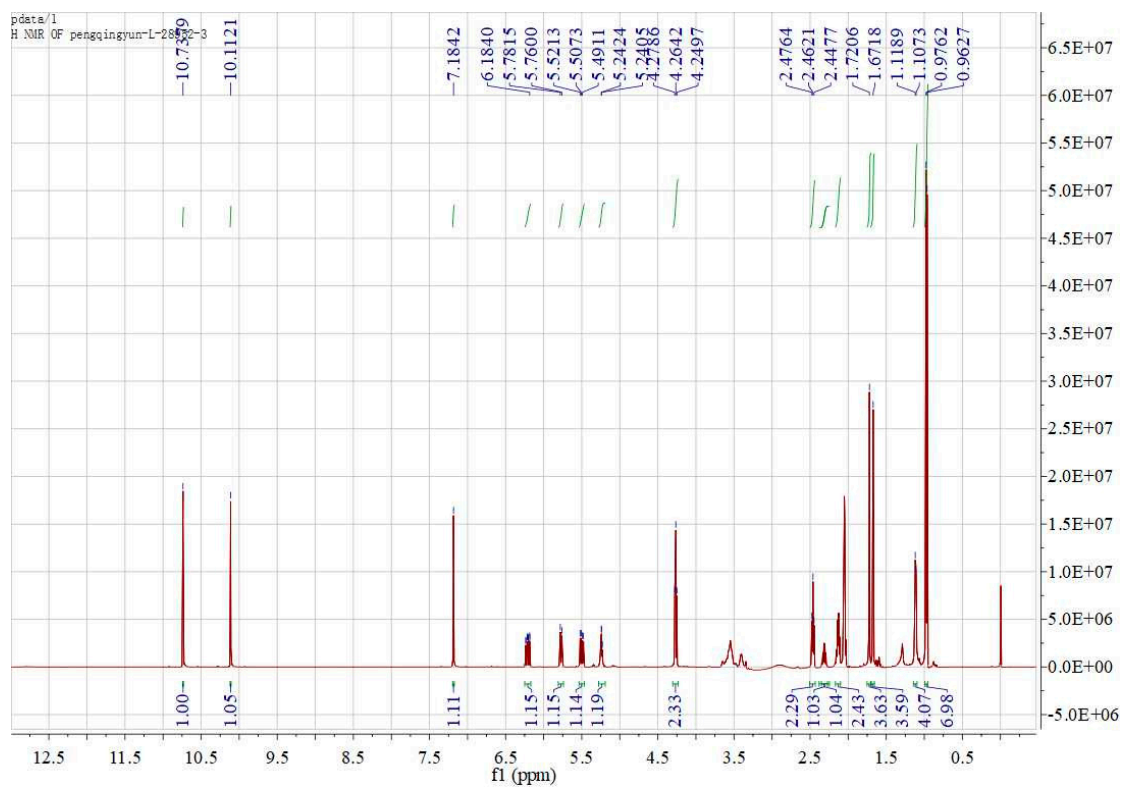


Figure S16  $^1\text{H}$ -NMR spectrum of compound **3**

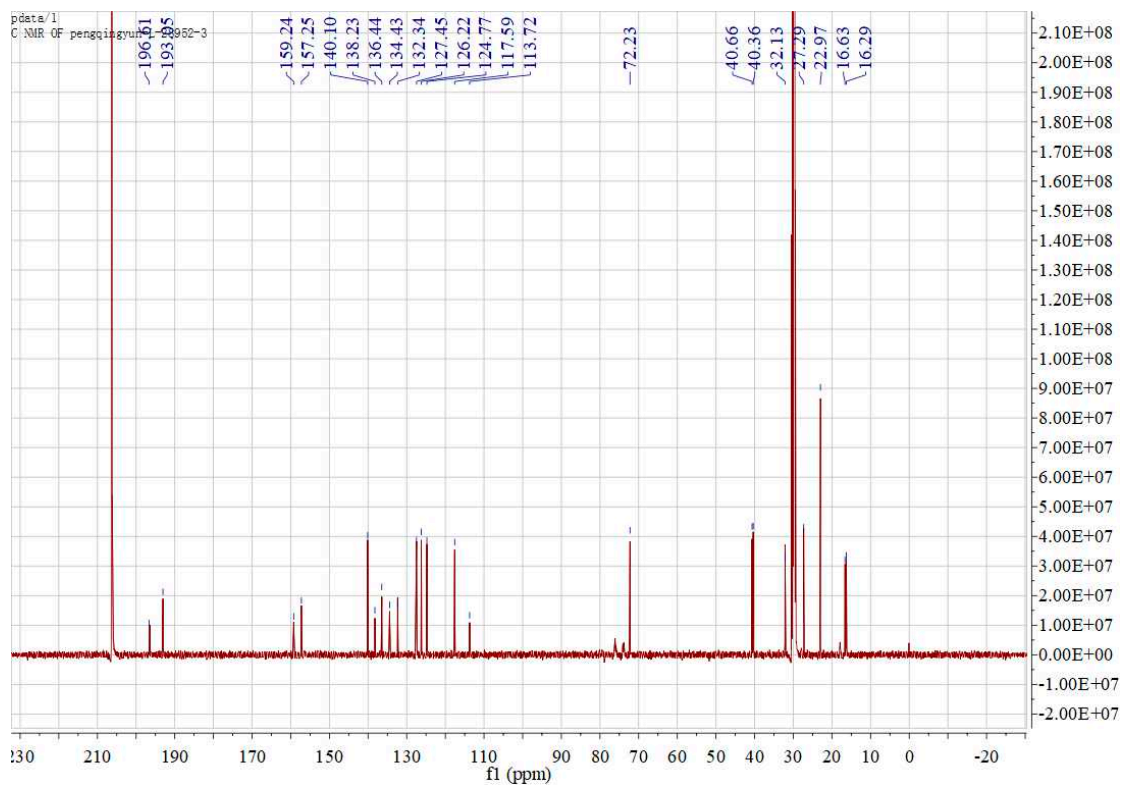


Figure S17  $^{13}\text{C}$ -NMR spectrum of compound **3**

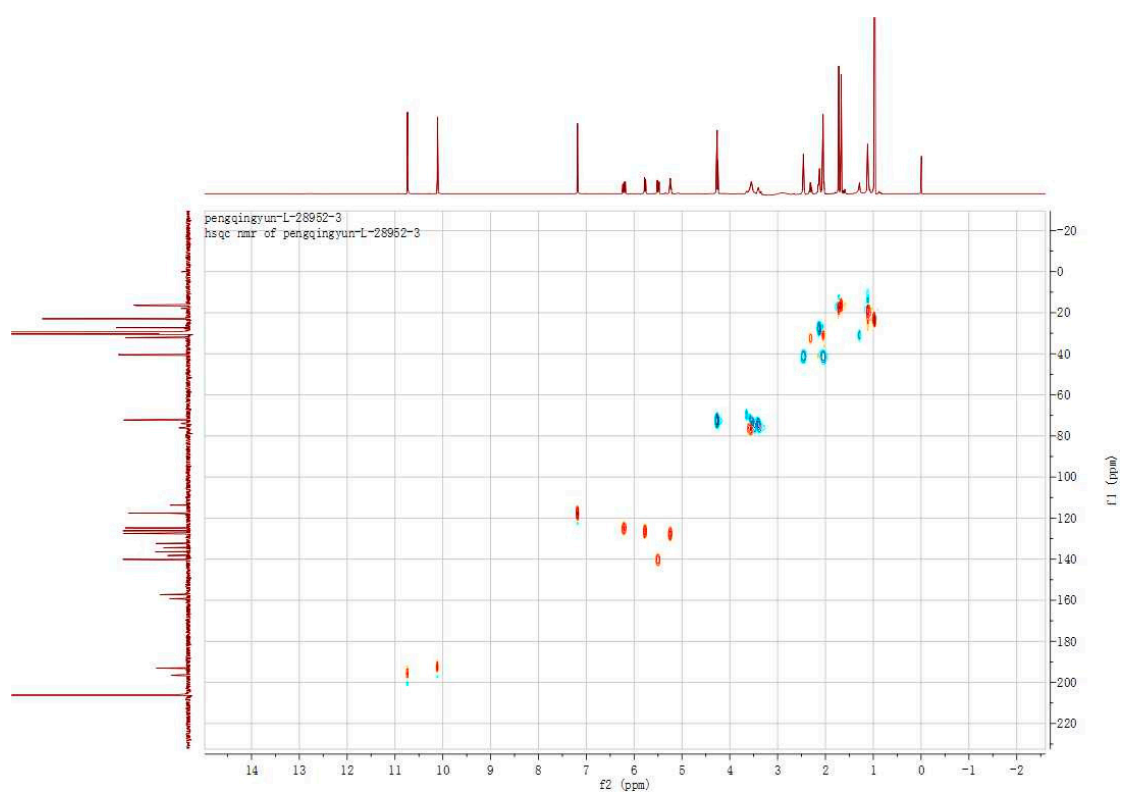


Figure S18  $^1\text{H}$ - $^{13}\text{C}$  HSQC spectrum of compound 3

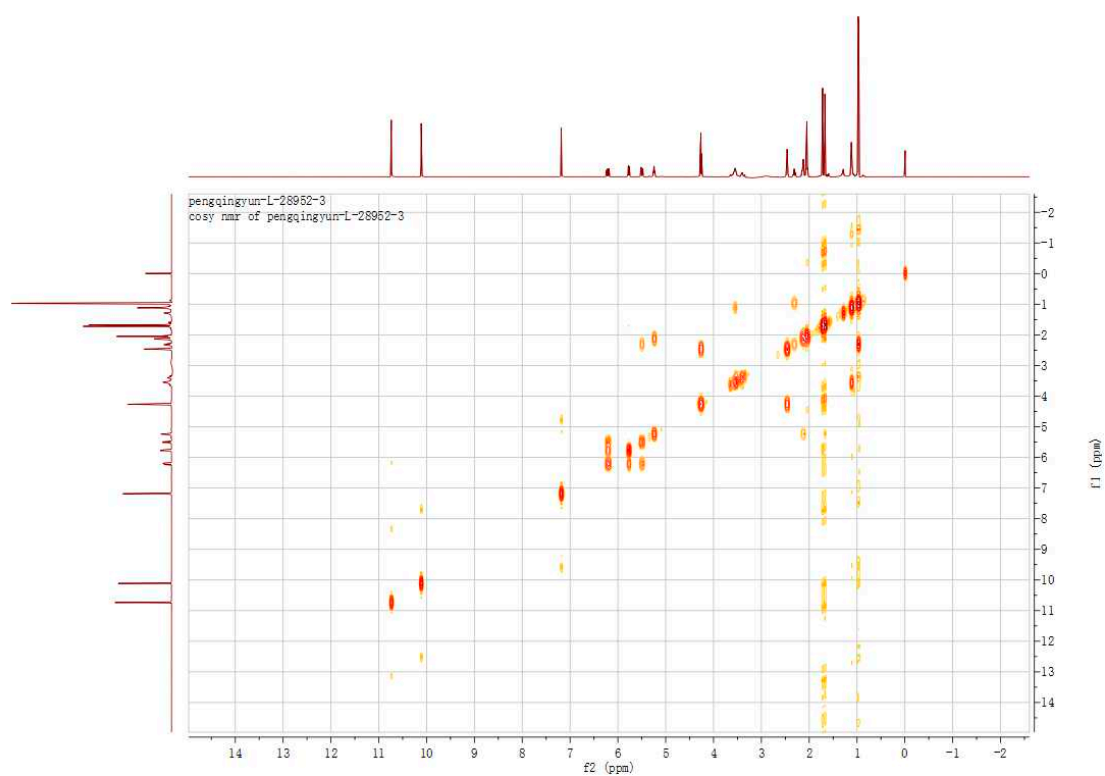


Figure S19  $^1\text{H}$ - $^1\text{H}$  COSY spectrum of compound 3

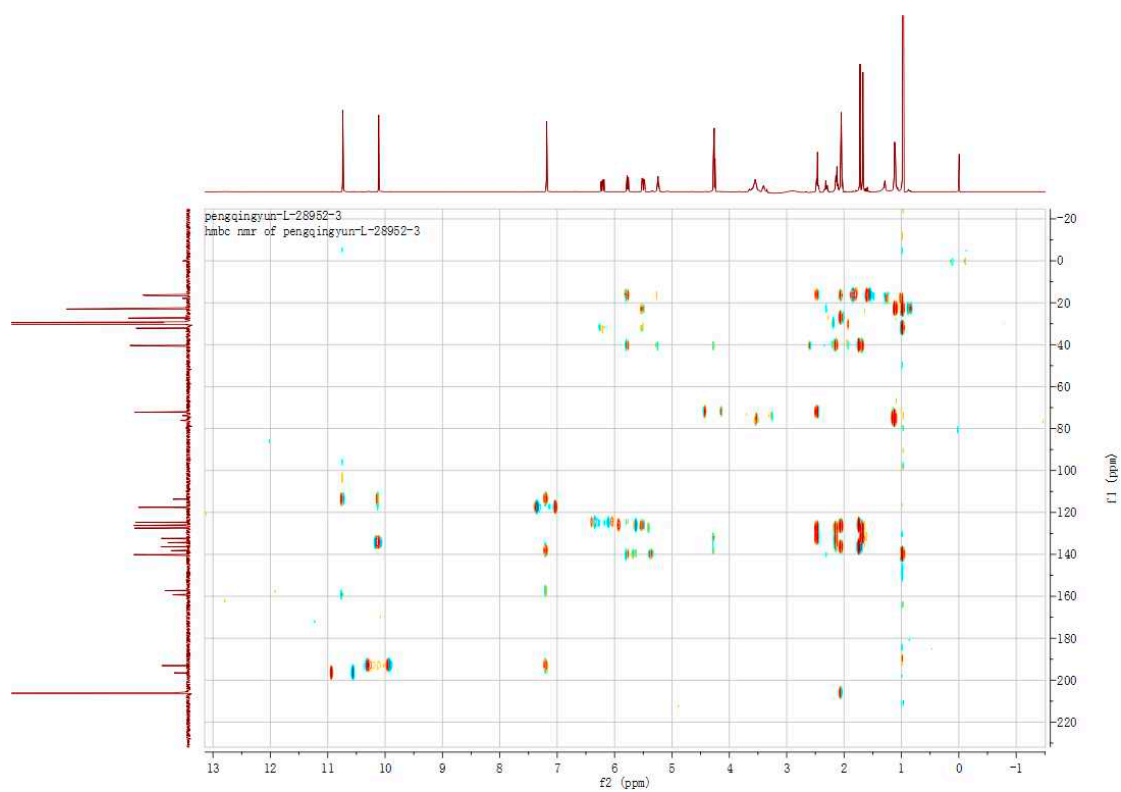


Figure S20  $^1\text{H}$ - $^{13}\text{C}$  HMBC spectrum of compound 3

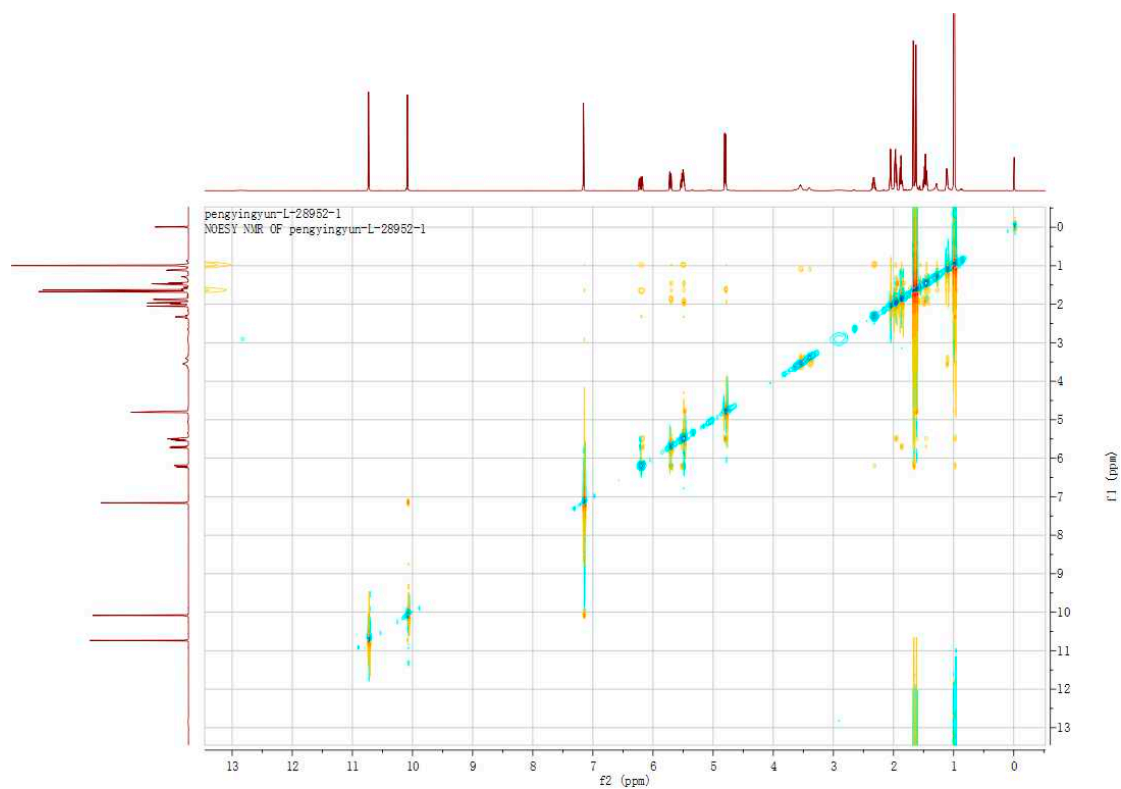


Figure S21  $^1\text{H}$ - $^1\text{H}$  NOESY spectrum of compound 3

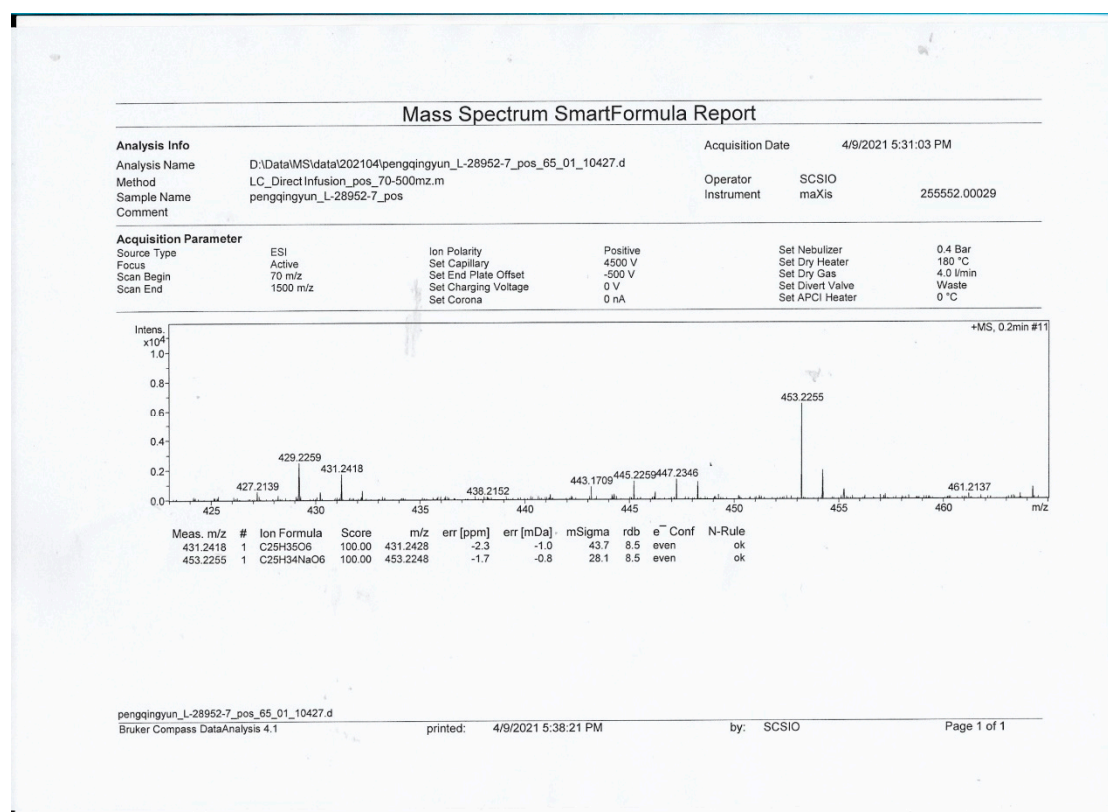


Figure S22 Mass spectrum of compound **4** (determined as C<sub>25</sub>H<sub>34</sub>O<sub>6</sub> by HR-ESI-MS: *m/z* 453.2255, [M+Na]<sup>+</sup>, calcd for C<sub>25</sub>H<sub>34</sub>NaO<sub>6</sub>, 453.2248)

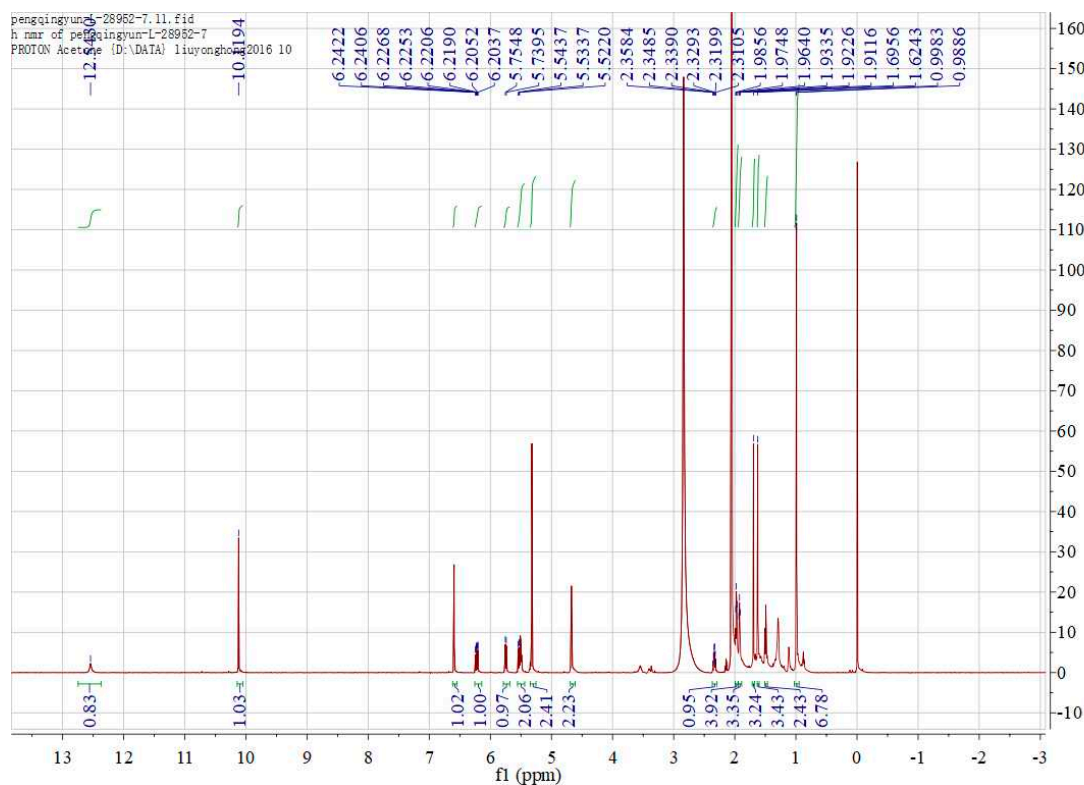


Figure S23 <sup>1</sup>H-NMR spectrum of compound **4**

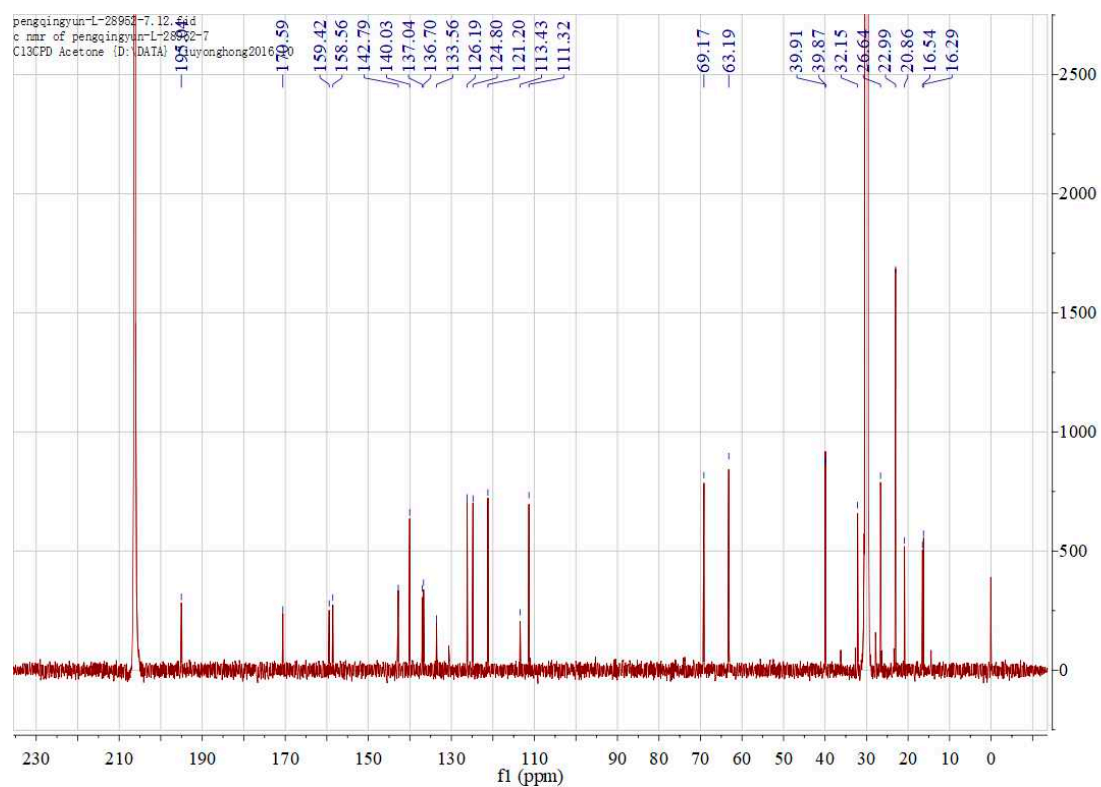


Figure S24  $^{13}\text{C}$ -NMR spectrum of compound **4**

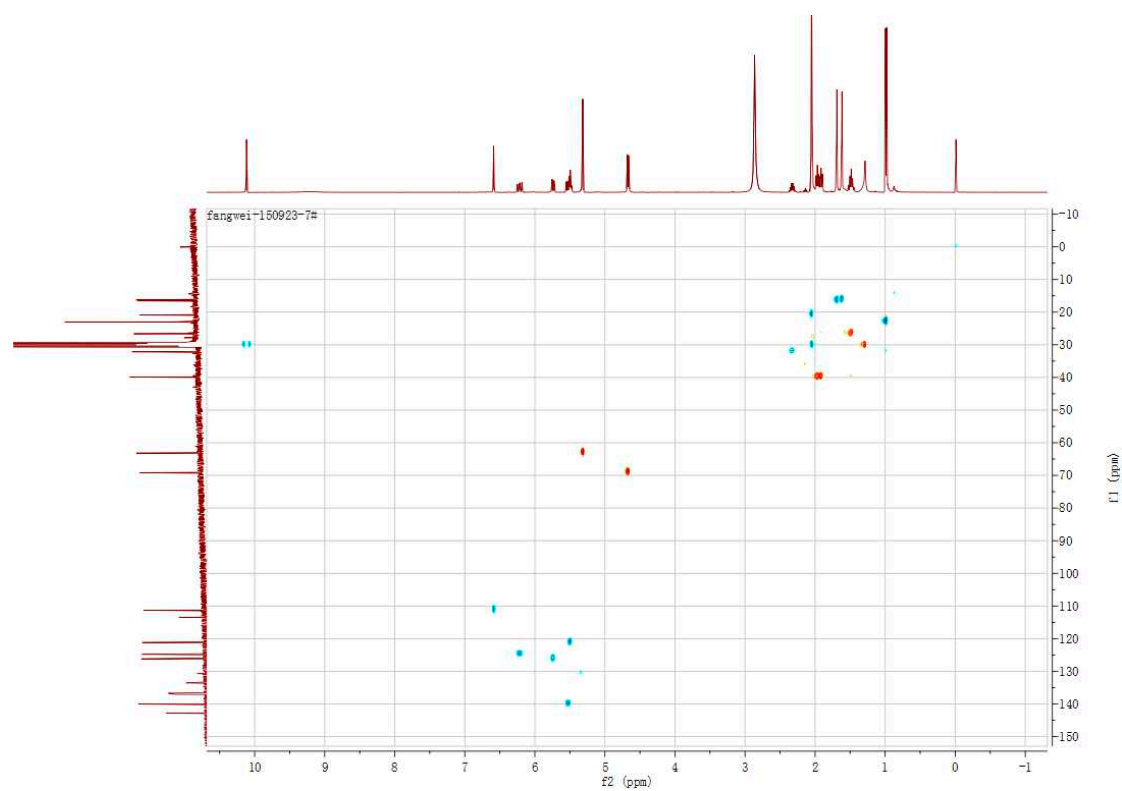


Figure S25  $^1\text{H}$ - $^{13}\text{C}$  HSQC spectrum of compound **4**



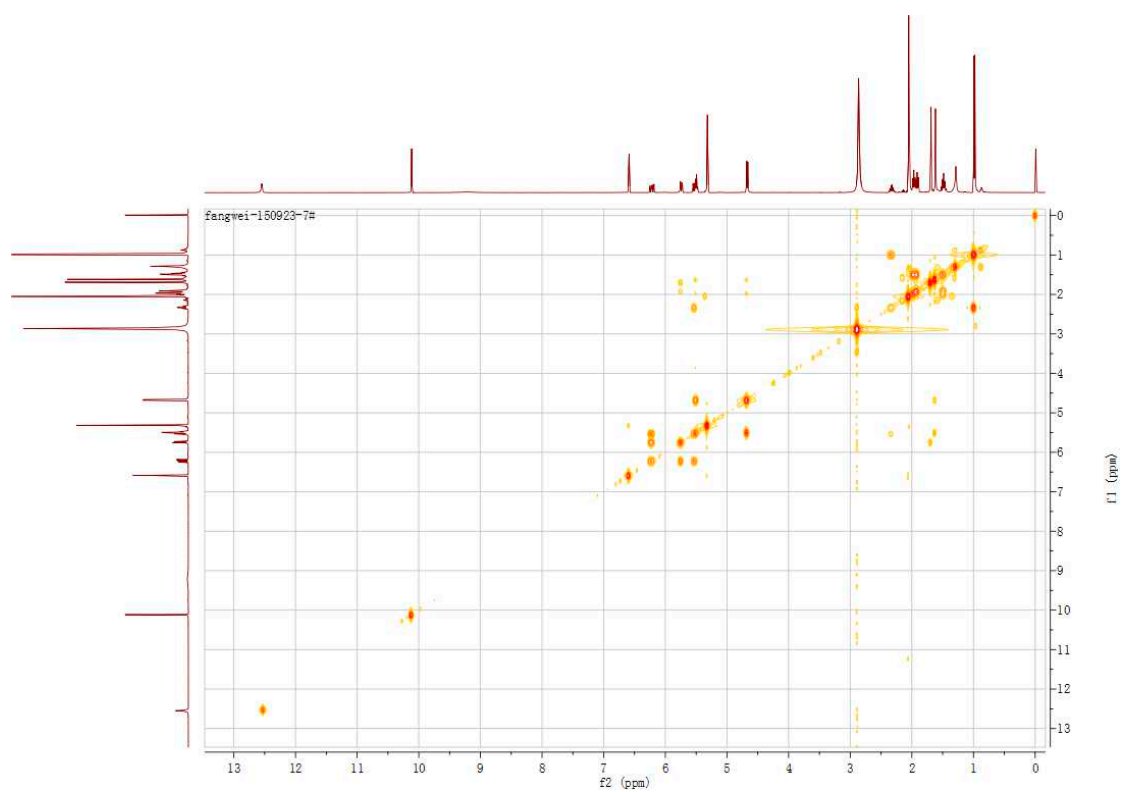


Figure S26  $^1\text{H}$ - $^1\text{H}$  COSY spectrum of compound **4**

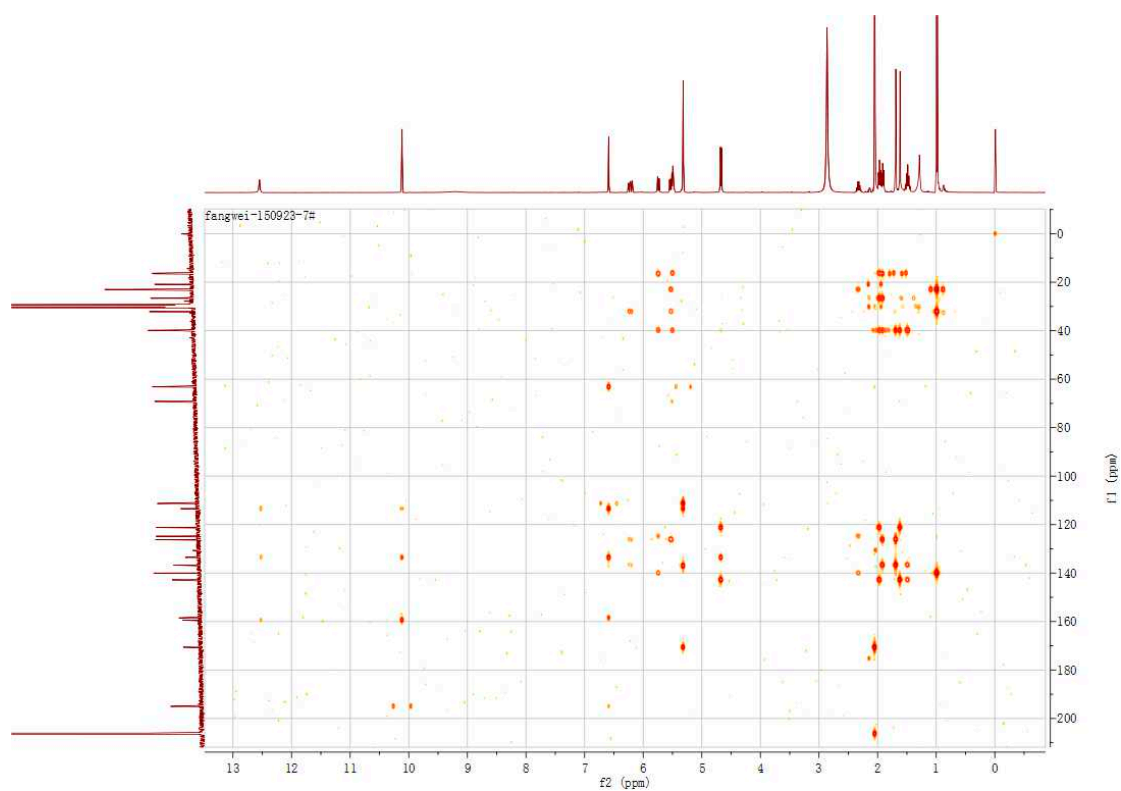


Figure S27  $^1\text{H}$ - $^{13}\text{C}$  HMBC spectrum of compound **4**



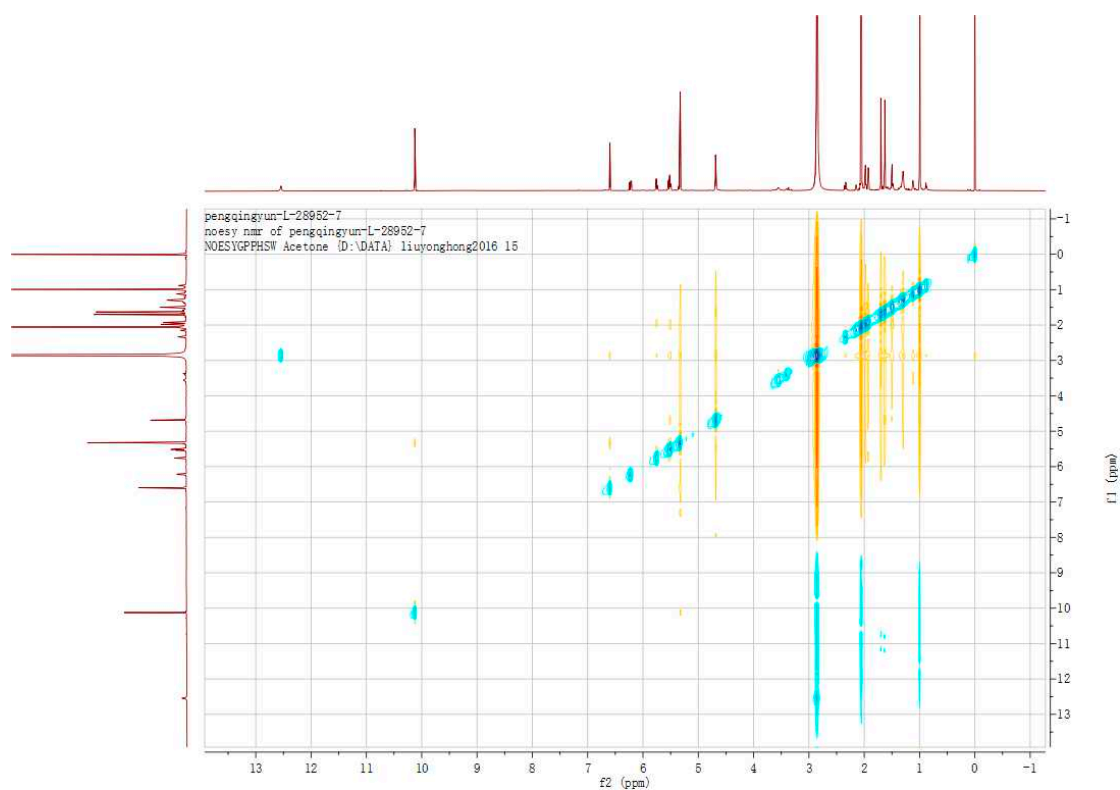


Figure S28  $^1\text{H}$ - $^1\text{H}$  NOESY spectrum of compound **4**

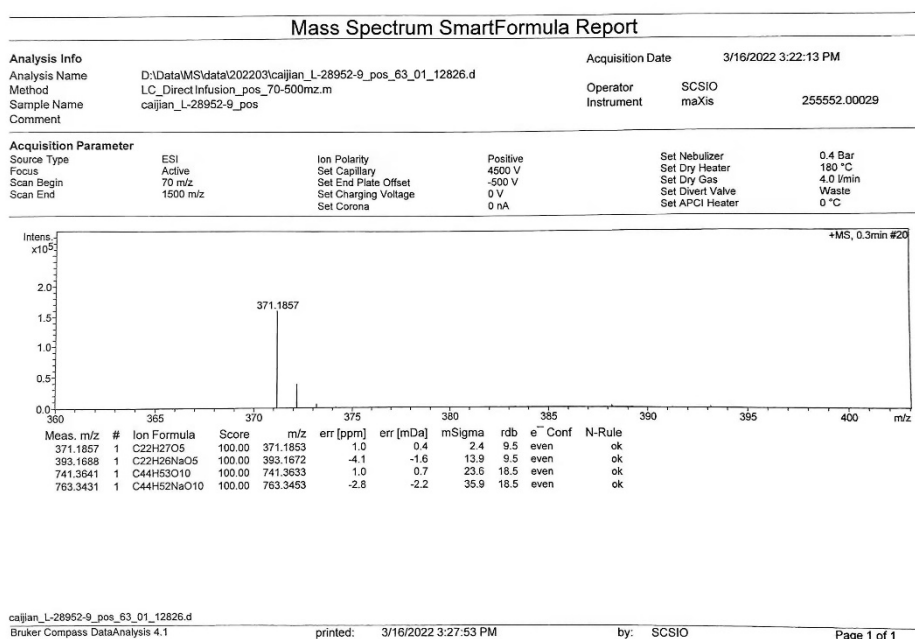


Figure S29 Mass spectrum of compound **5** (determined as  $\text{C}_{22}\text{H}_{26}\text{O}_5$  by HR-ESI-MS:  $m/z$  371.1857,  $[\text{M}+\text{Na}]^+$ , calcd for  $\text{C}_{22}\text{H}_{27}\text{O}_5$ , 371.1853)

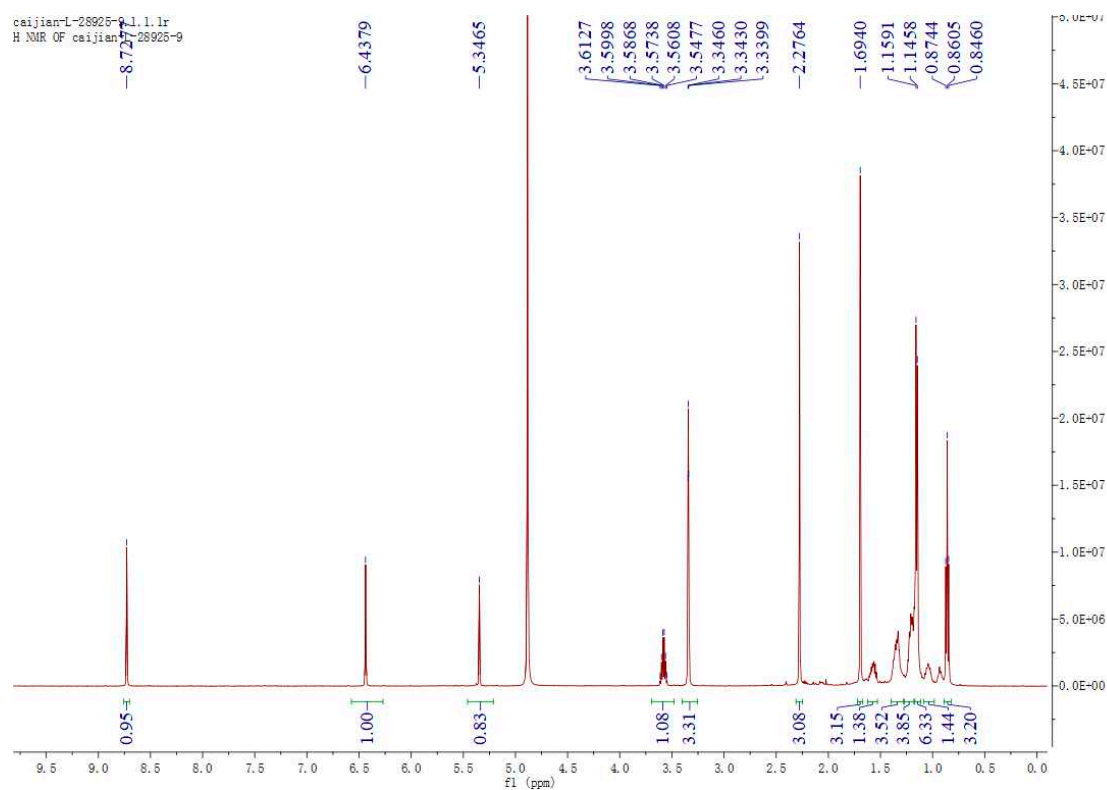


Figure S30  $^1\text{H}$ -NMR spectrum of compound **5**

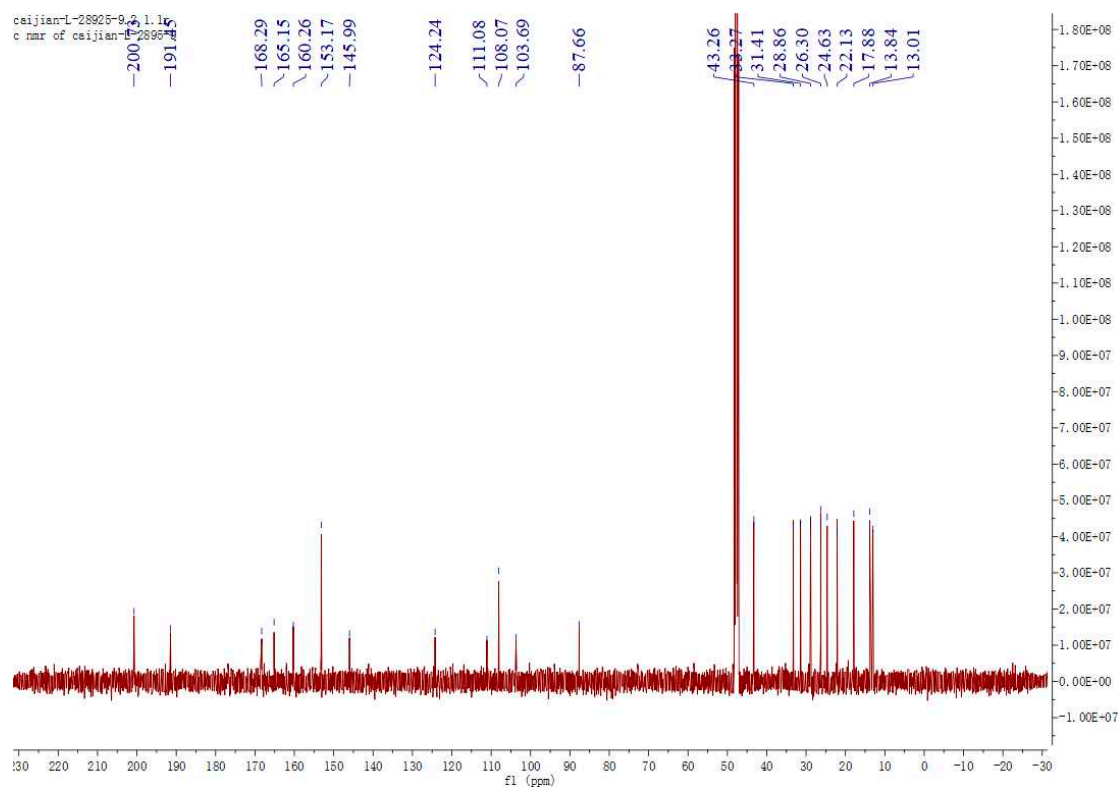


Figure S31  $^{13}\text{C}$ -NMR spectrum of compound **5**

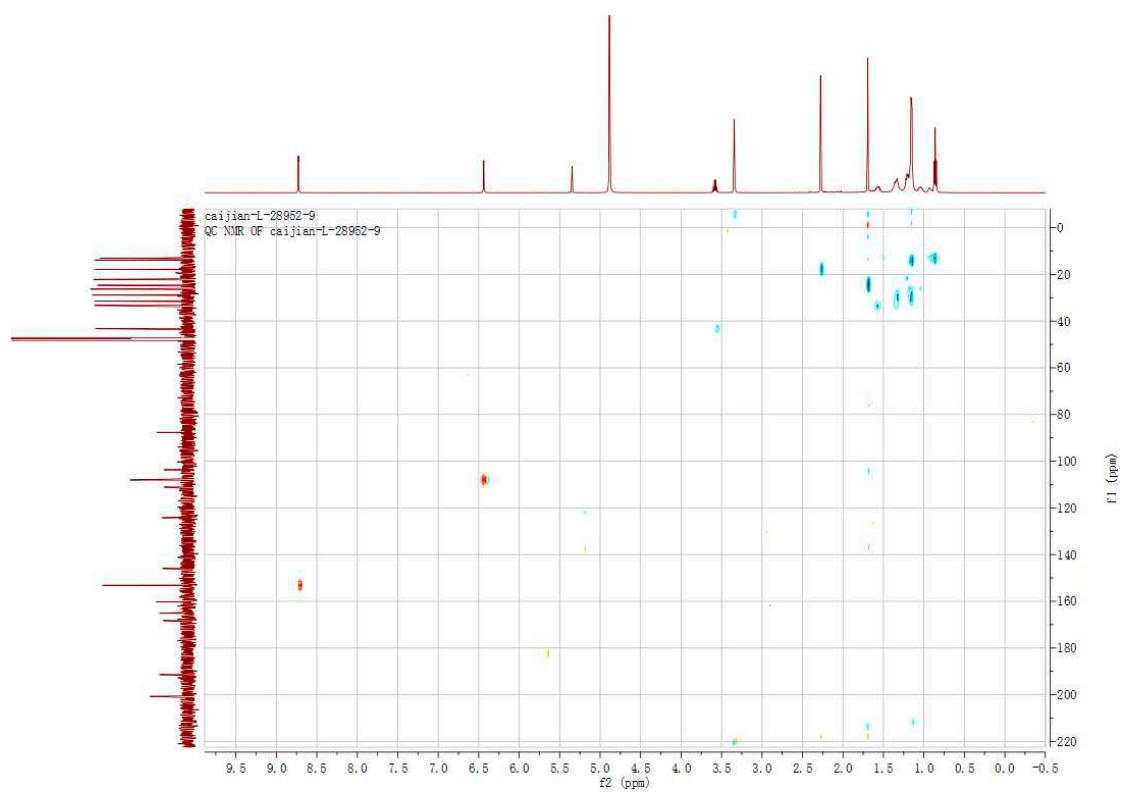


Figure S32  $^1\text{H}$ - $^{13}\text{C}$  HSQC spectrum of compound **5**

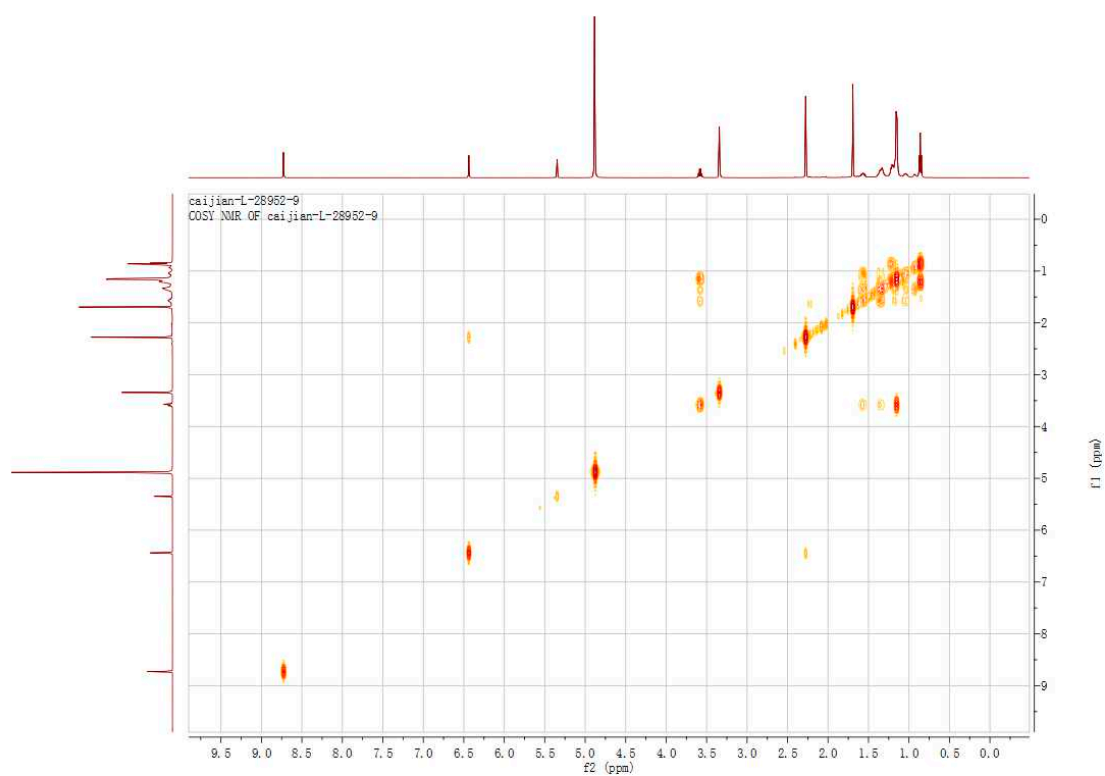


Figure S33  $^1\text{H}$ - $^1\text{H}$  COSY spectrum of compound **5**

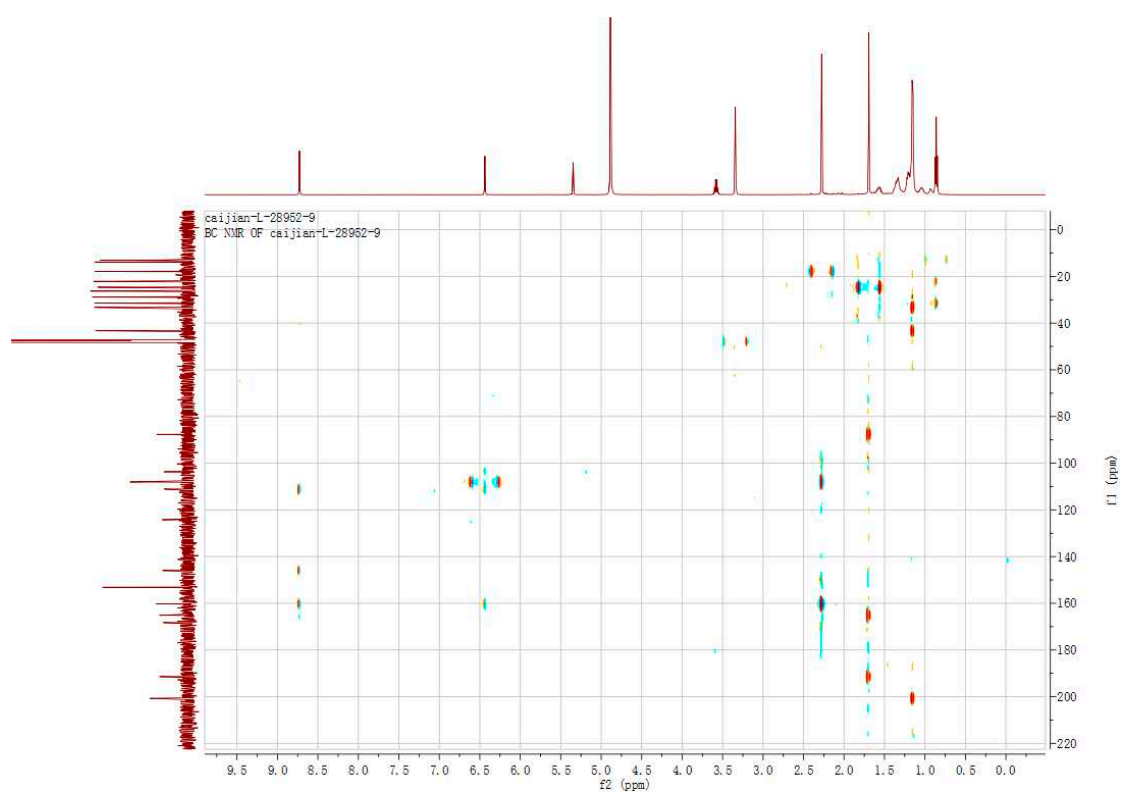


Figure S34  $^1\text{H}$ - $^{13}\text{C}$  HMBC spectrum of compound **5**