

# Supporting Information

## **COUMARINS WITH ANTI-MELANOGENESIS ACTIVITIES FROM A CHEMICALLY ENGINEERED EXTRACT OF A MARINE-DERIVED FUNGUS**

**Hitoshi Kamauchi, Kaoru Kinoshita, and Kiyotaka Koyama\***

Department of Pharmacognosy and Phytochemistry Meiji Pharmaceutical University, Noshio 2-522-1, Kiyose-shi, Tokyo 204-8588, Japan

\* To whom correspondence should be addressed. Tel: +81-42-495-8913; Fax: +81-42-495-8912; E-mail: [kiyotaka@my-pharm.ac.jp](mailto:kiyotaka@my-pharm.ac.jp).

## Notes

**Figure S1.**  $^{13}\text{C}$ -NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of crude  $\text{CHCl}_3$  extract of *E. rubrum*.

**Figure S2.** HPLC analysis of *E. rubrum*  $\text{CHCl}_3$  ext., chemically engineered extract and isolated compounds.

**Figure S3.**  $^1\text{H}$ -NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of **1**.

**Figure S4.**  $^{13}\text{C}$ -NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of **1**.

**Figure S5.**  $^1\text{H}$ - $^1\text{H}$  COSY spectrum ( $\text{CDCl}_3$ ) of **1**.

**Figure S6.** HMQC spectrum ( $\text{CDCl}_3$ ) of **1**.

**Figure S7.** HMBC spectrum ( $\text{CDCl}_3$ ) of **1**.

**Figure S8.**  $^1\text{H}$ -NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of **2**.

**Figure S9.**  $^{13}\text{C}$ -NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of **2**.

**Figure S10.**  $^1\text{H}$ - $^1\text{H}$  COSY spectrum ( $\text{CDCl}_3$ ) of **2**.

**Figure S11.** HMQC spectrum ( $\text{CDCl}_3$ ) of **2**.

**Figure S12.** HMBC spectrum ( $\text{CDCl}_3$ ) of **2**.

**Figure S13.**  $^1\text{H}$ -NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of **3**.

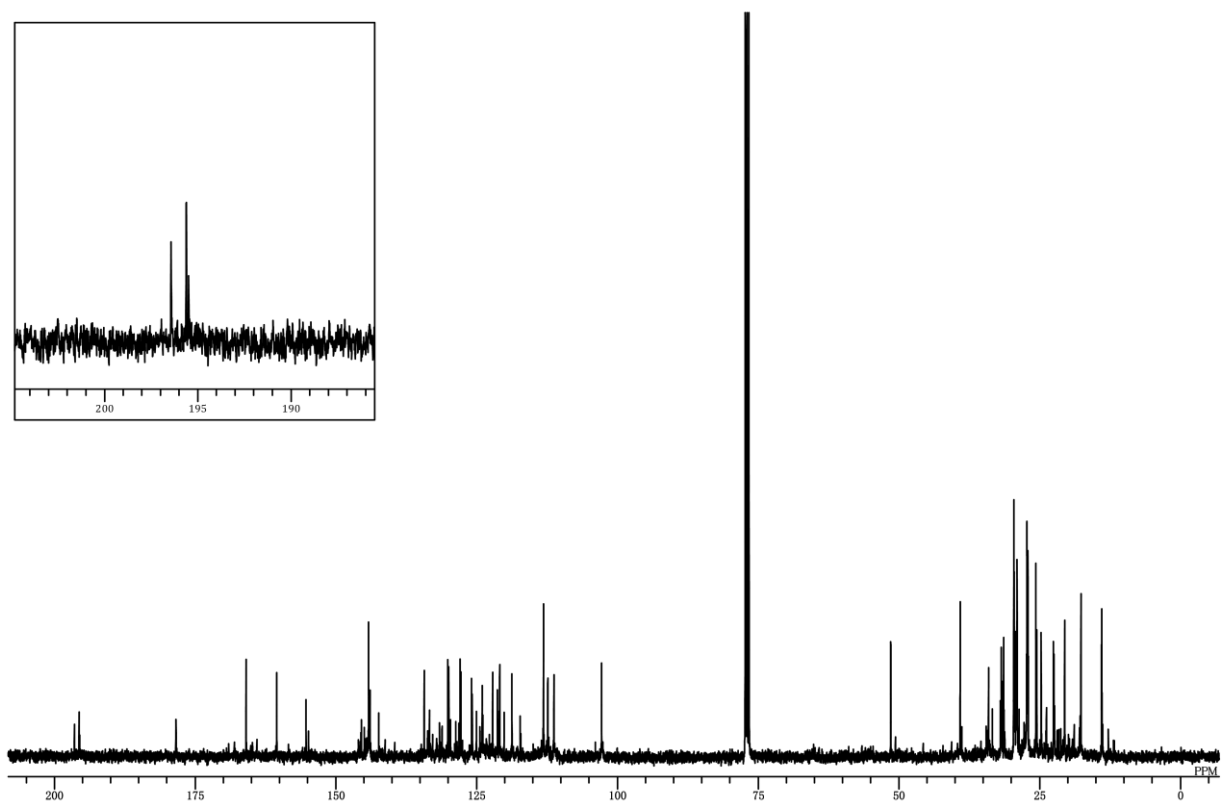
**Figure S14.**  $^{13}\text{C}$ -NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of **3**.

**Figure S15.**  $^1\text{H}$ - $^1\text{H}$  COSY spectrum ( $\text{CDCl}_3$ ) of **3**.

**Figure S16.** HMQC spectrum ( $\text{CDCl}_3$ ) of **3**.

**Figure S17.** HMBC spectrum ( $\text{CDCl}_3$ ) of **3**.

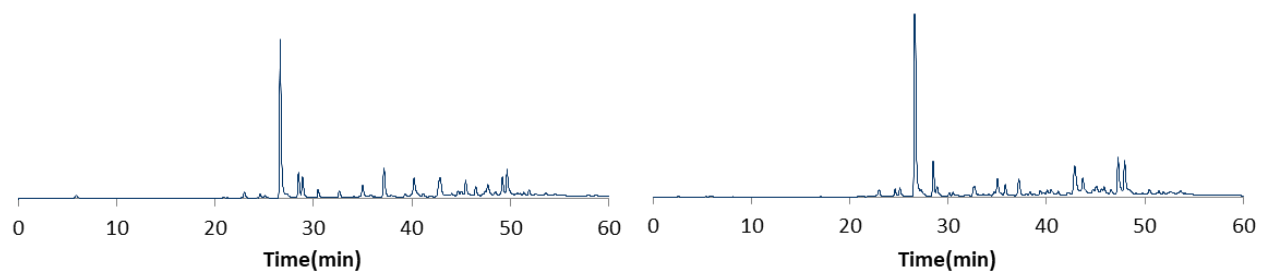
**Figure S1.**  $^{13}\text{C}$ -NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of crude  $\text{CHCl}_3$  extract of *E. rubrum*.



**Figure S2.** HPLC analysis of *E. rubrum* CHCl<sub>3</sub> ext., chemically engineered extract and isolated compounds.

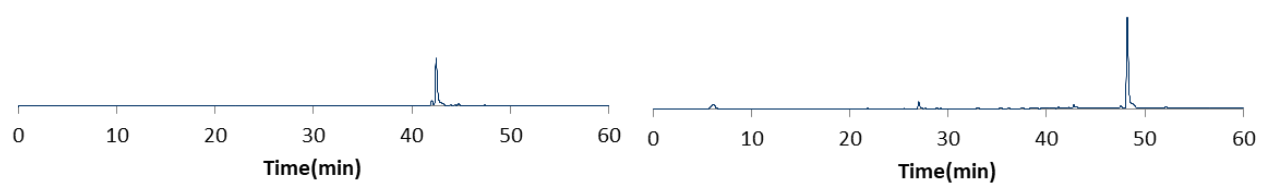
*E. rubrum* CHCl<sub>3</sub> ext.

Chemically engineered extract



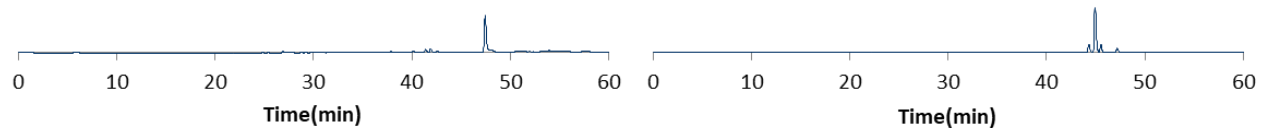
**1**

**2**



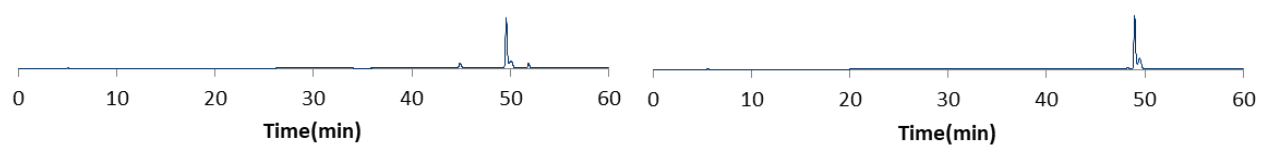
**3**

**4**

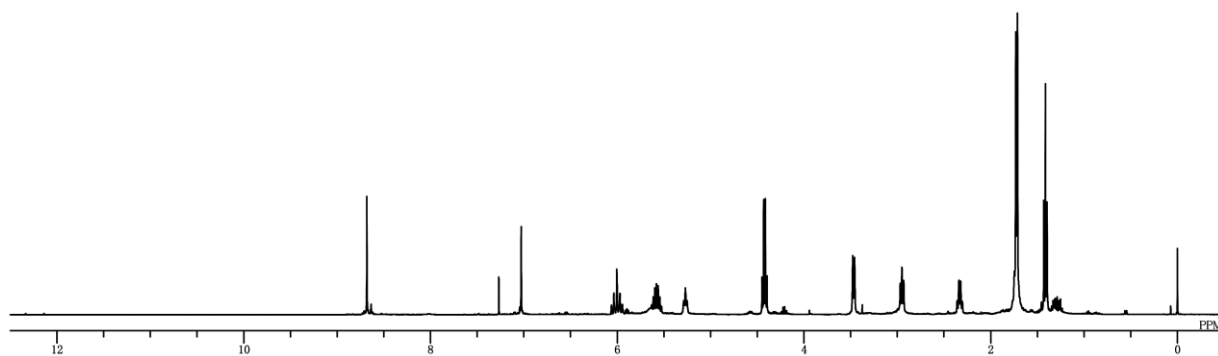


**5**

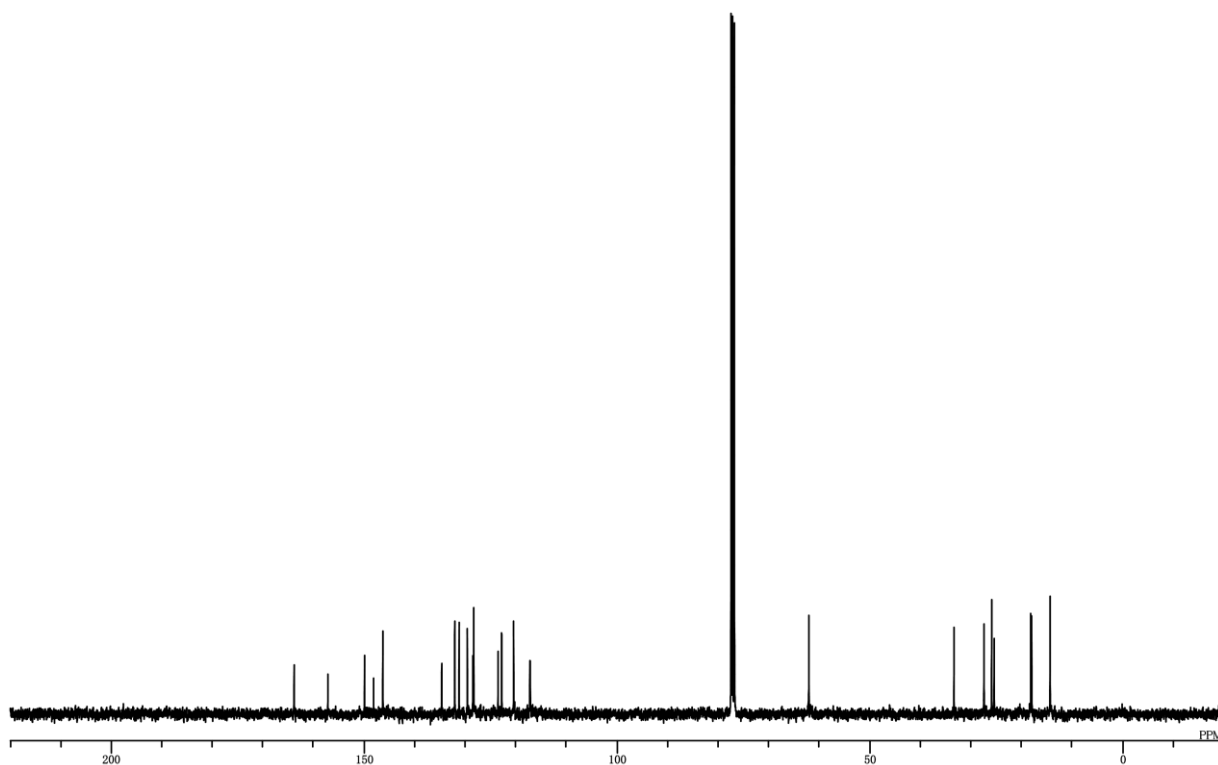
**6**



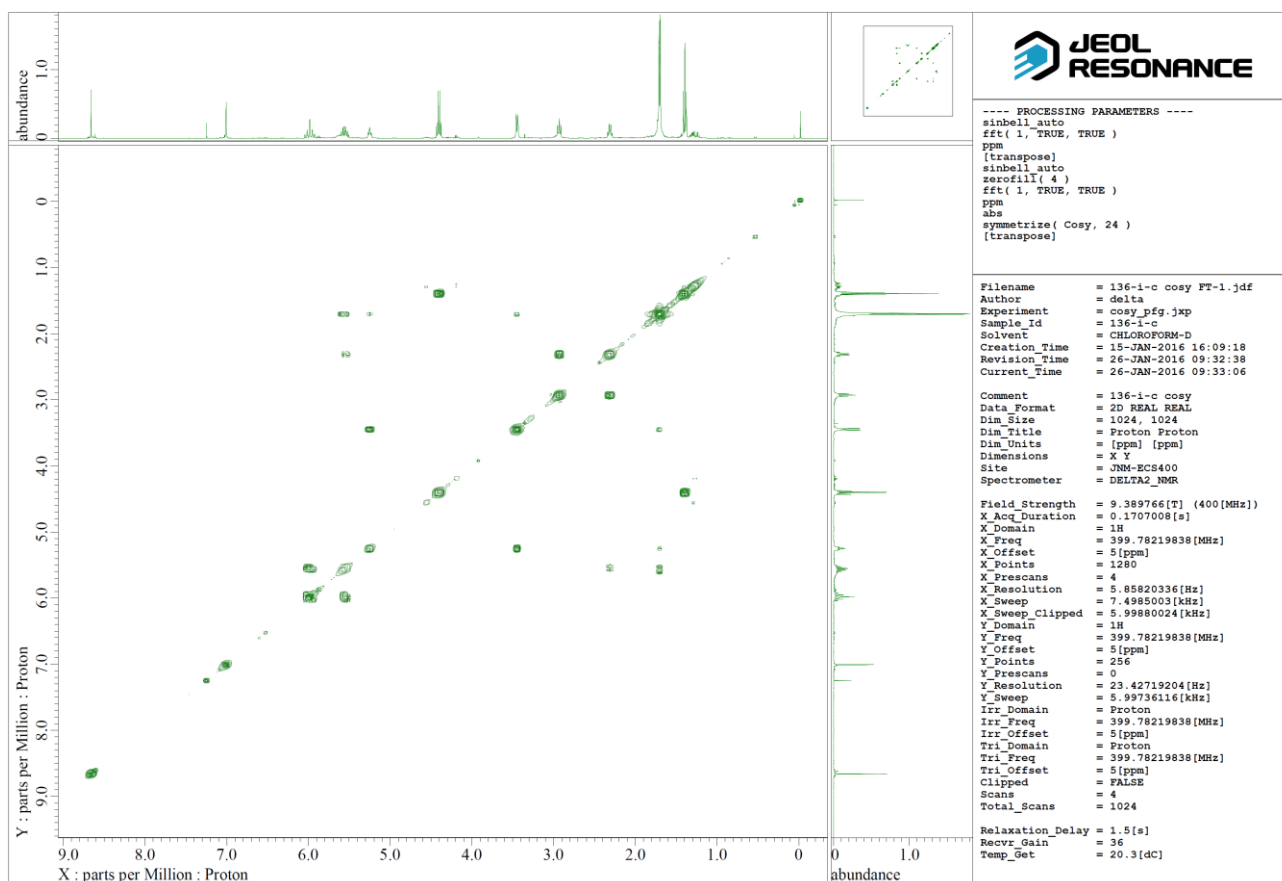
**Figure S3.**  $^1\text{H-NMR}$  (400 MHz,  $\text{CDCl}_3$ ) spectrum of **1**.



**Figure S4.**  $^{13}\text{C-NMR}$  (100 MHz,  $\text{CDCl}_3$ ) spectrum of **1**.



**Figure S5.**  $^1\text{H}$ - $^1\text{H}$  COSY spectrum ( $\text{CDCl}_3$ ) of **1**.



**Figure S6.** HMQC spectrum ( $\text{CDCl}_3$ ) of **1**.

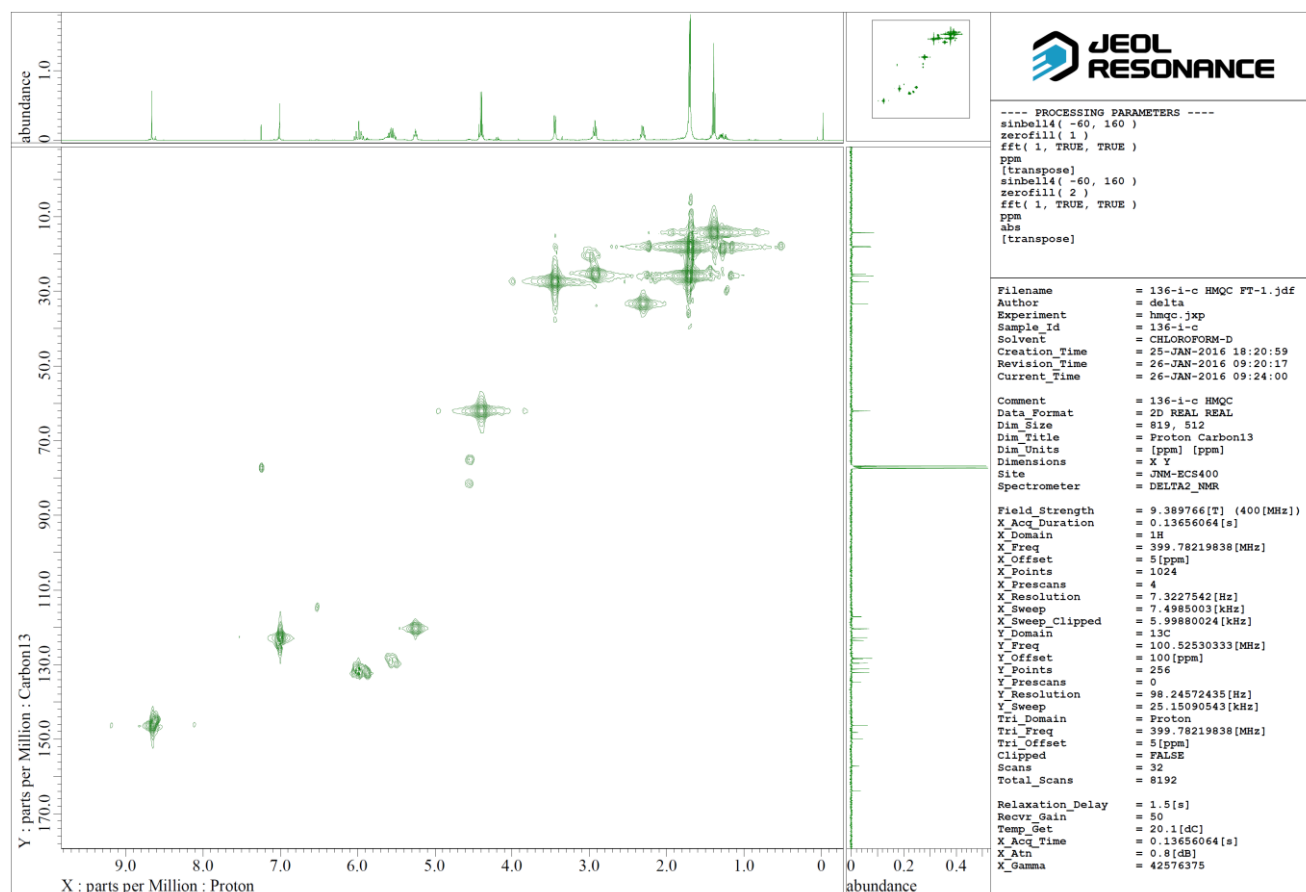
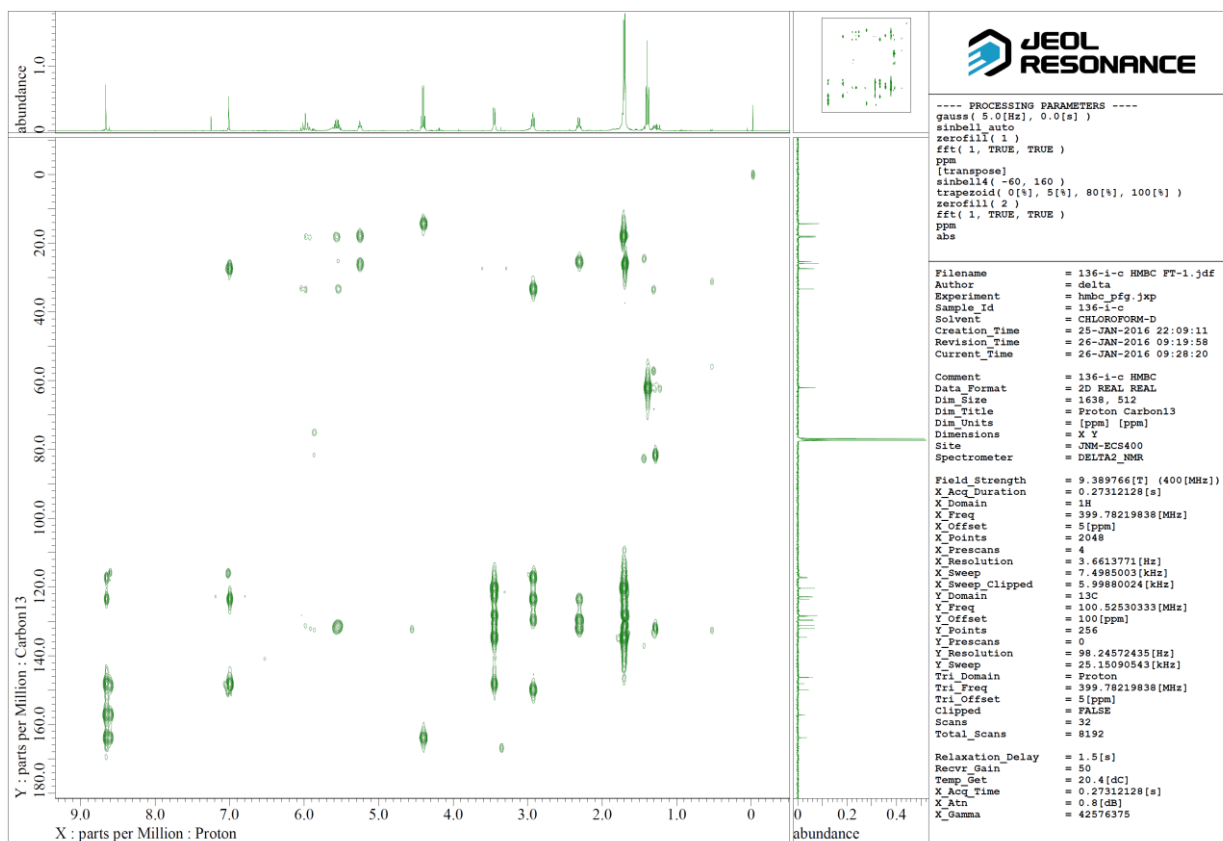
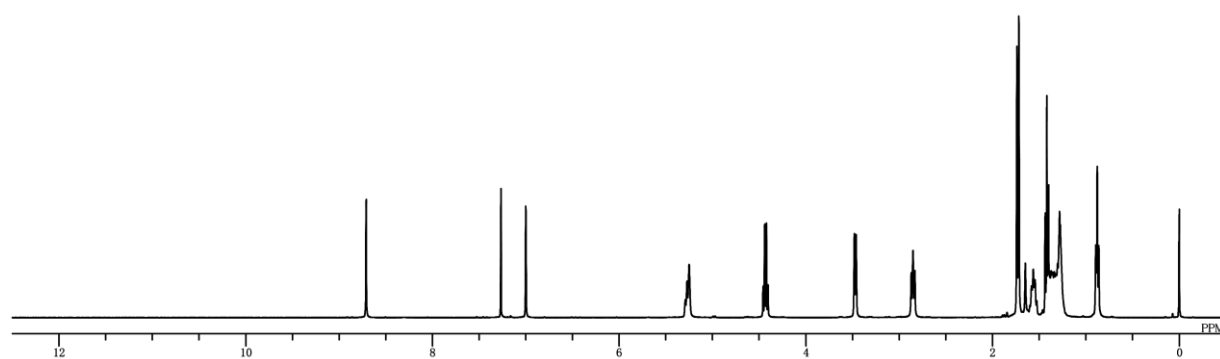


Figure S7. HMBC spectrum (CDCl<sub>3</sub>) of 1.



**Figure S8.**  $^1\text{H}$ -NMR (400 MHz,  $\text{CDCl}_3$ ) spectrum of **2**.



**Figure S9.**  $^{13}\text{C}$ -NMR (100 MHz,  $\text{CDCl}_3$ ) spectrum of **2**.

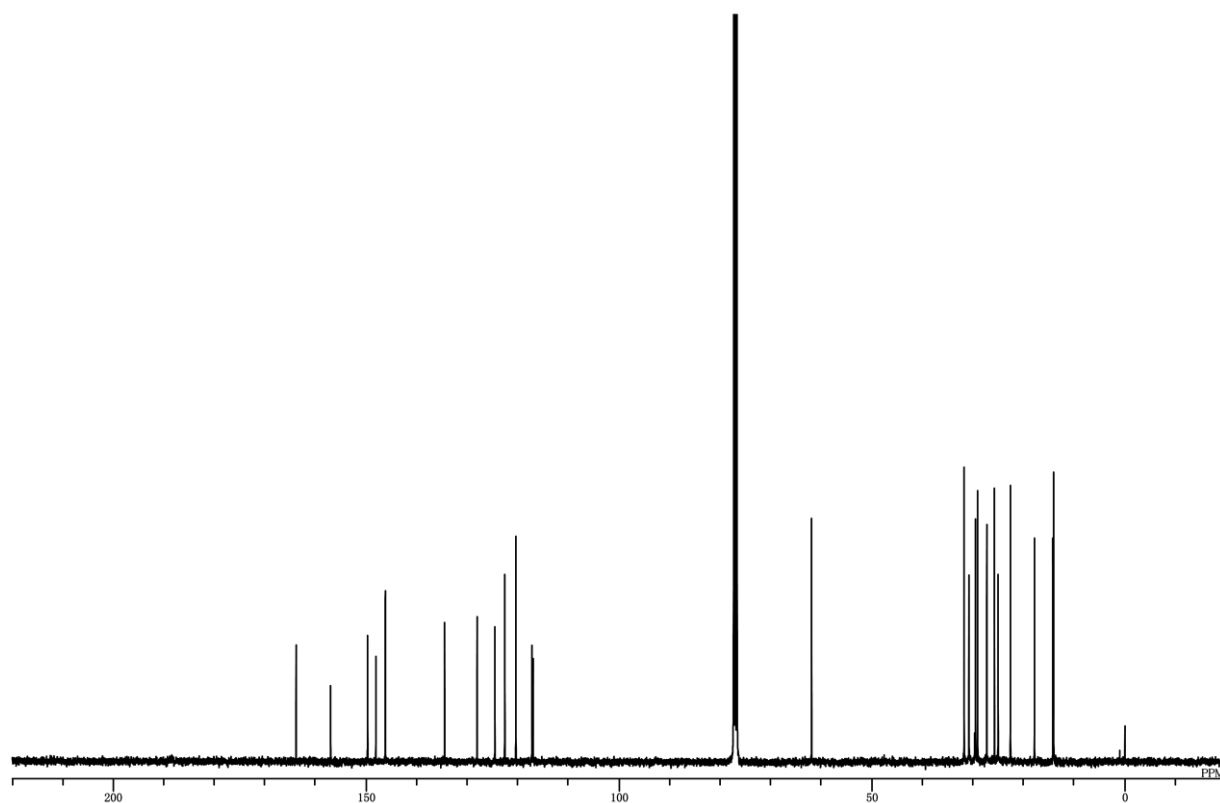


Figure S10.  $^1\text{H}$ - $^1\text{H}$  COSY spectrum ( $\text{CDCl}_3$ ) of **2**.

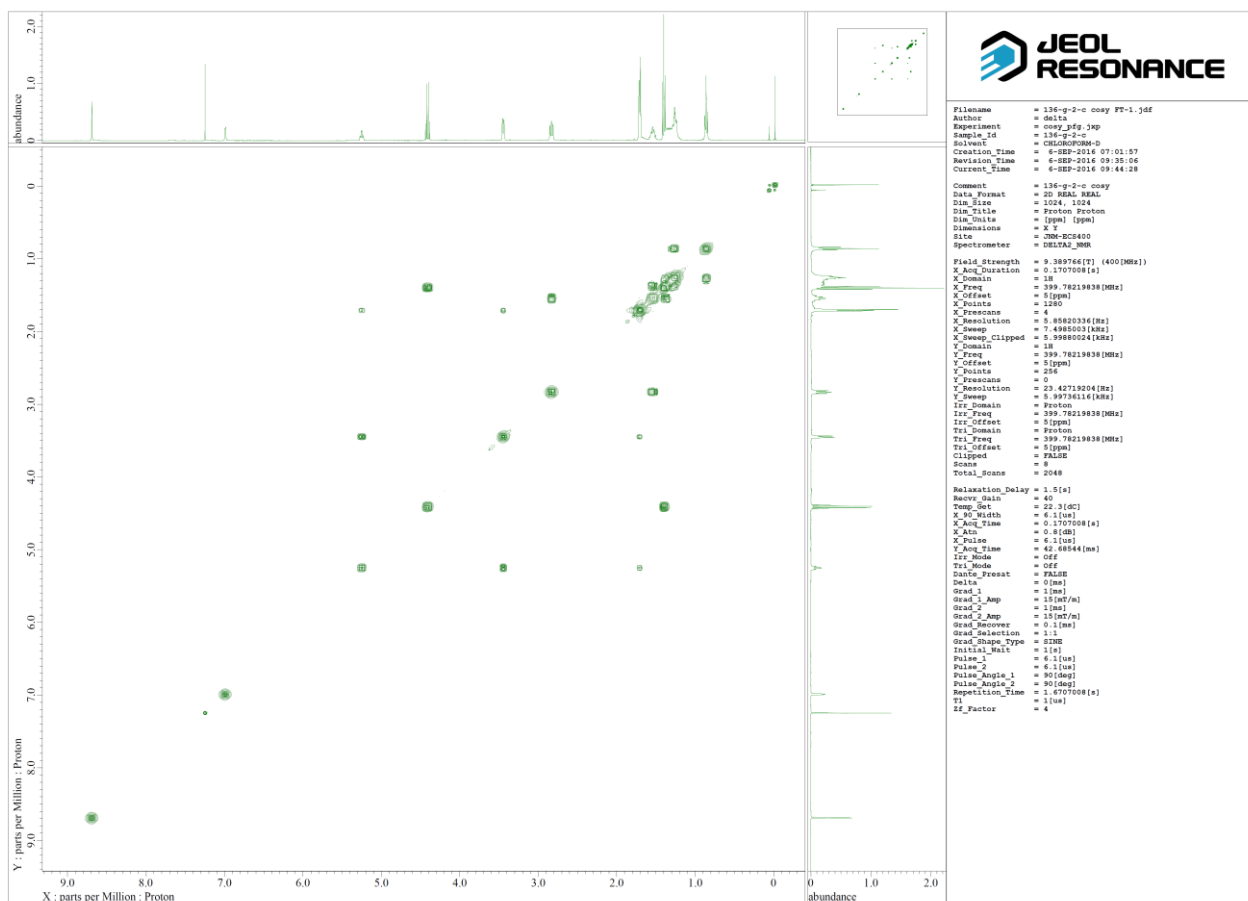


Figure S11. HMQC spectrum ( $\text{CDCl}_3$ ) of **2**.

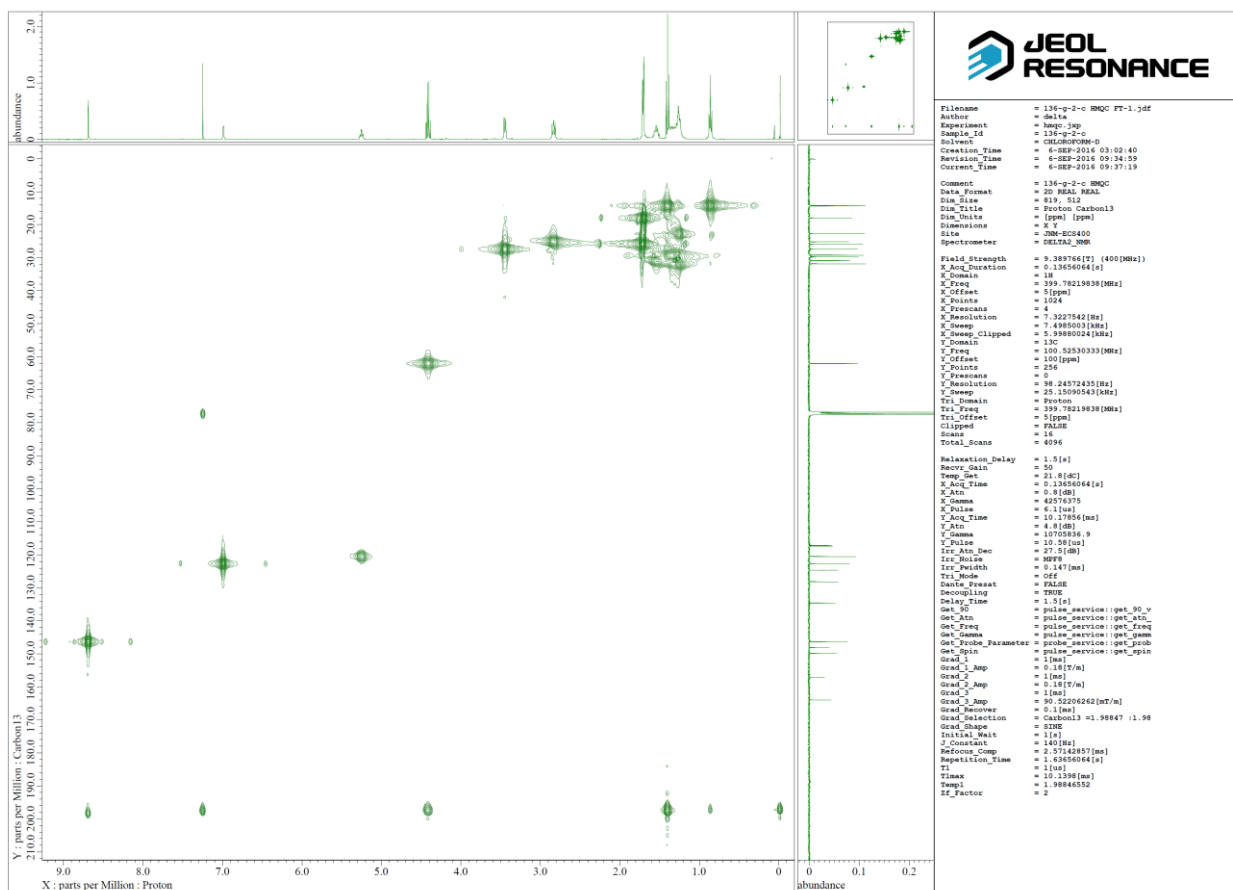
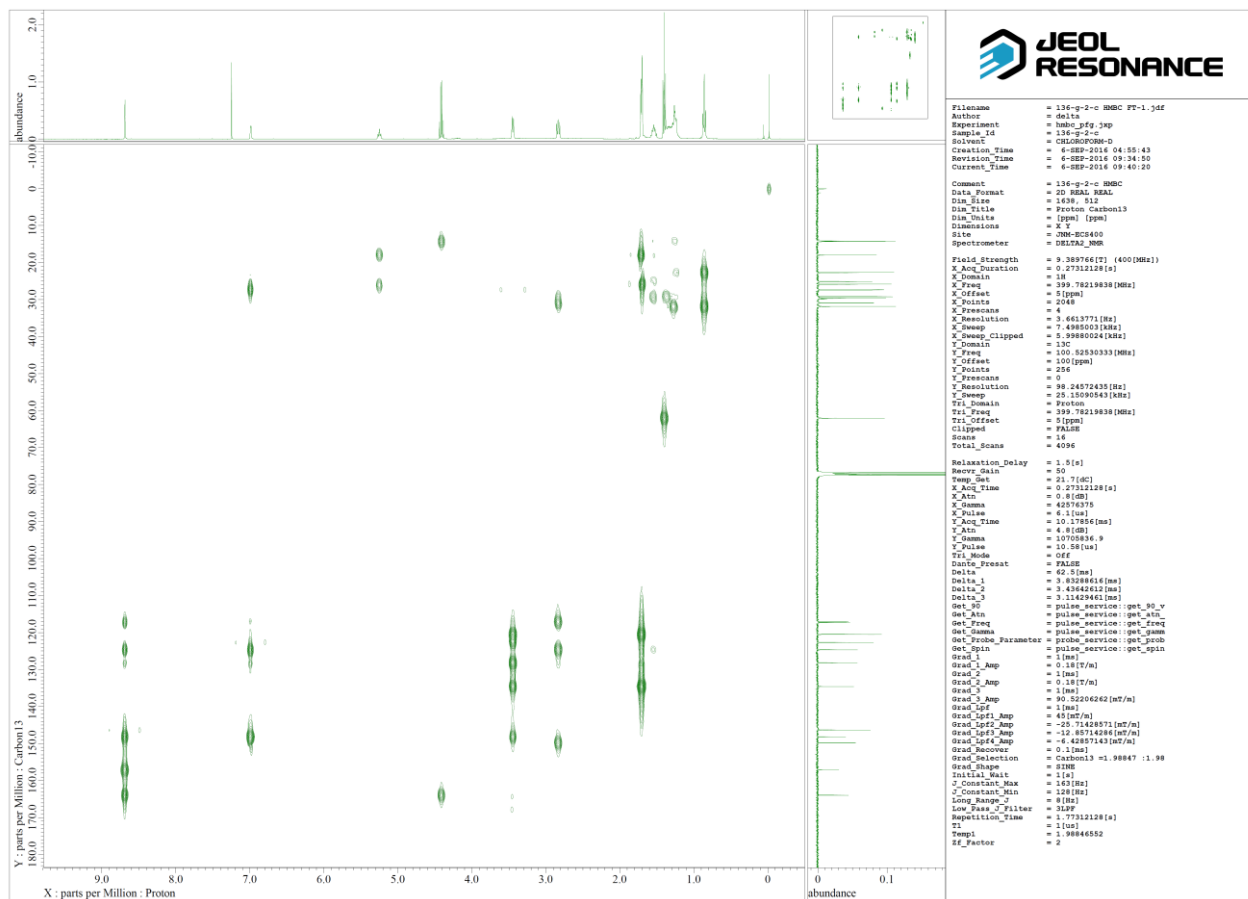
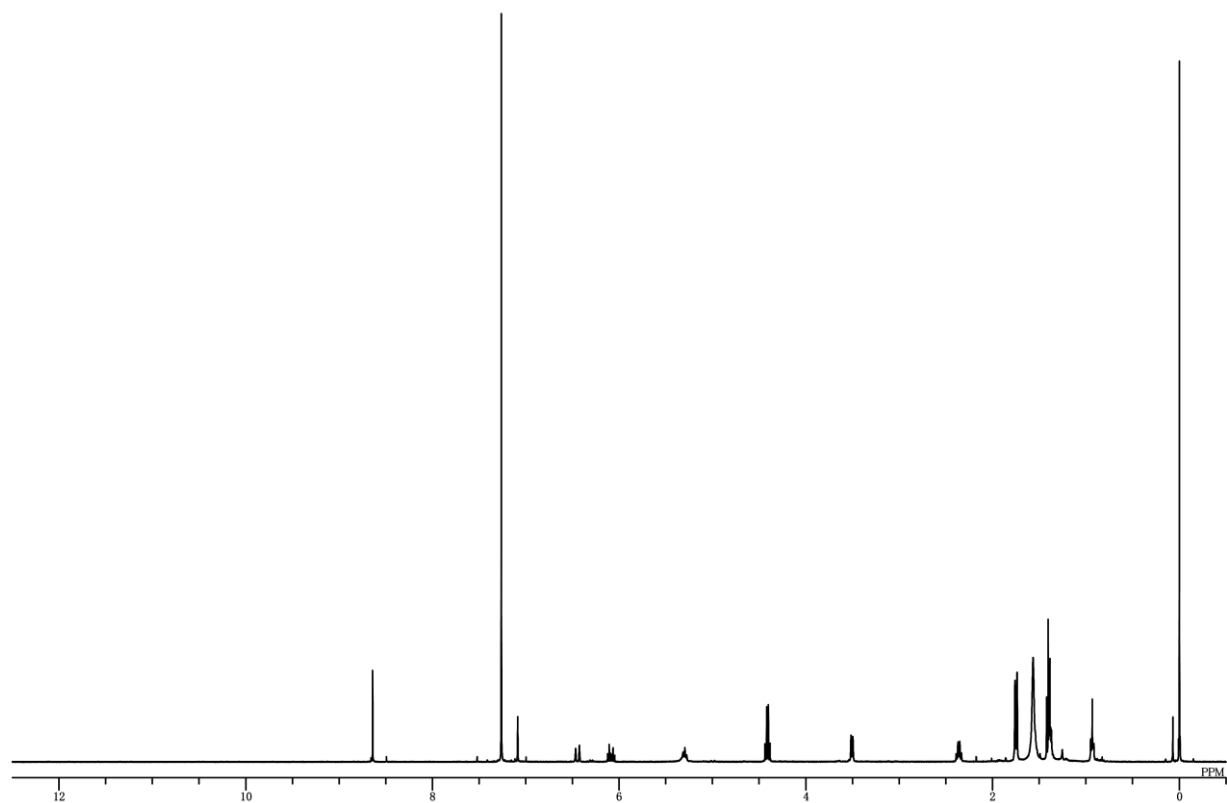


Figure S12. HMBC spectrum (CDCl<sub>3</sub>) of 2.



**Figure S13.**  $^1\text{H-NMR}$  (400 MHz,  $\text{CDCl}_3$ ) spectrum of **3**.



**Figure S14.**  $^{13}\text{C-NMR}$  (100 MHz,  $\text{CDCl}_3$ ) spectrum of **3**.

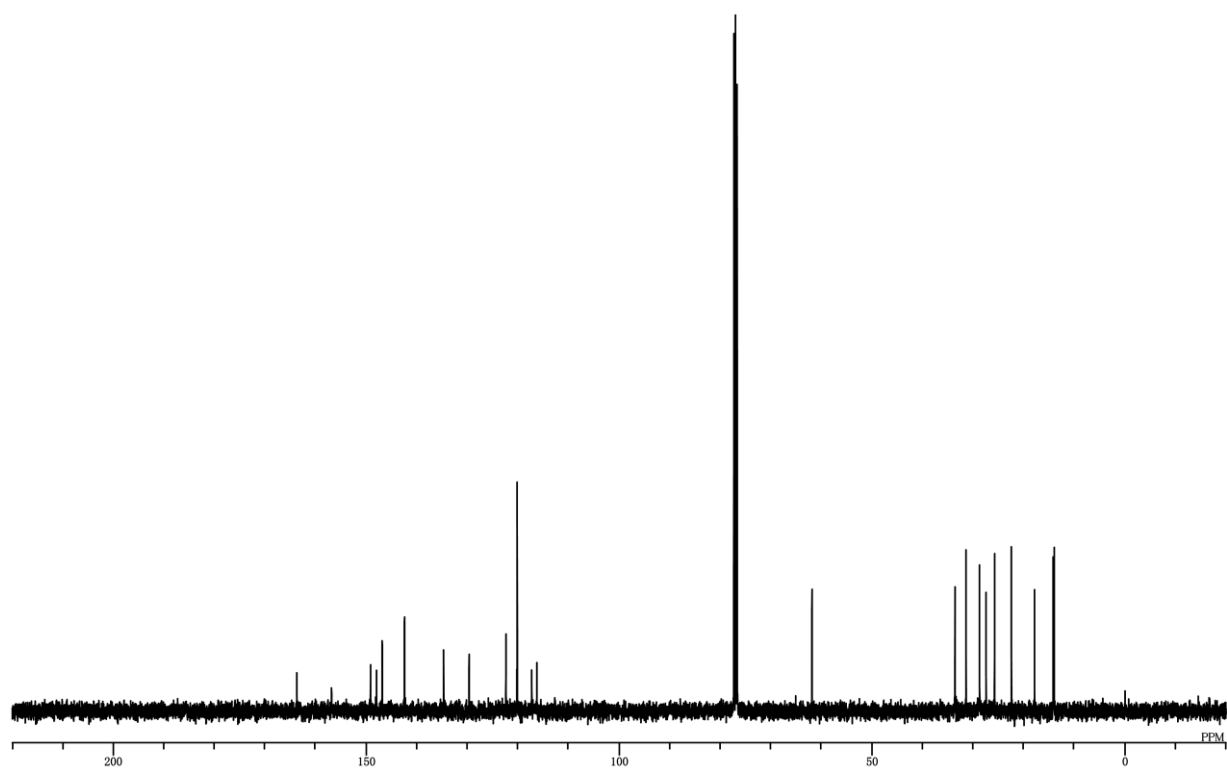


Figure S15.  $^1\text{H}$ - $^1\text{H}$  COSY spectrum ( $\text{CDCl}_3$ ) of 3.

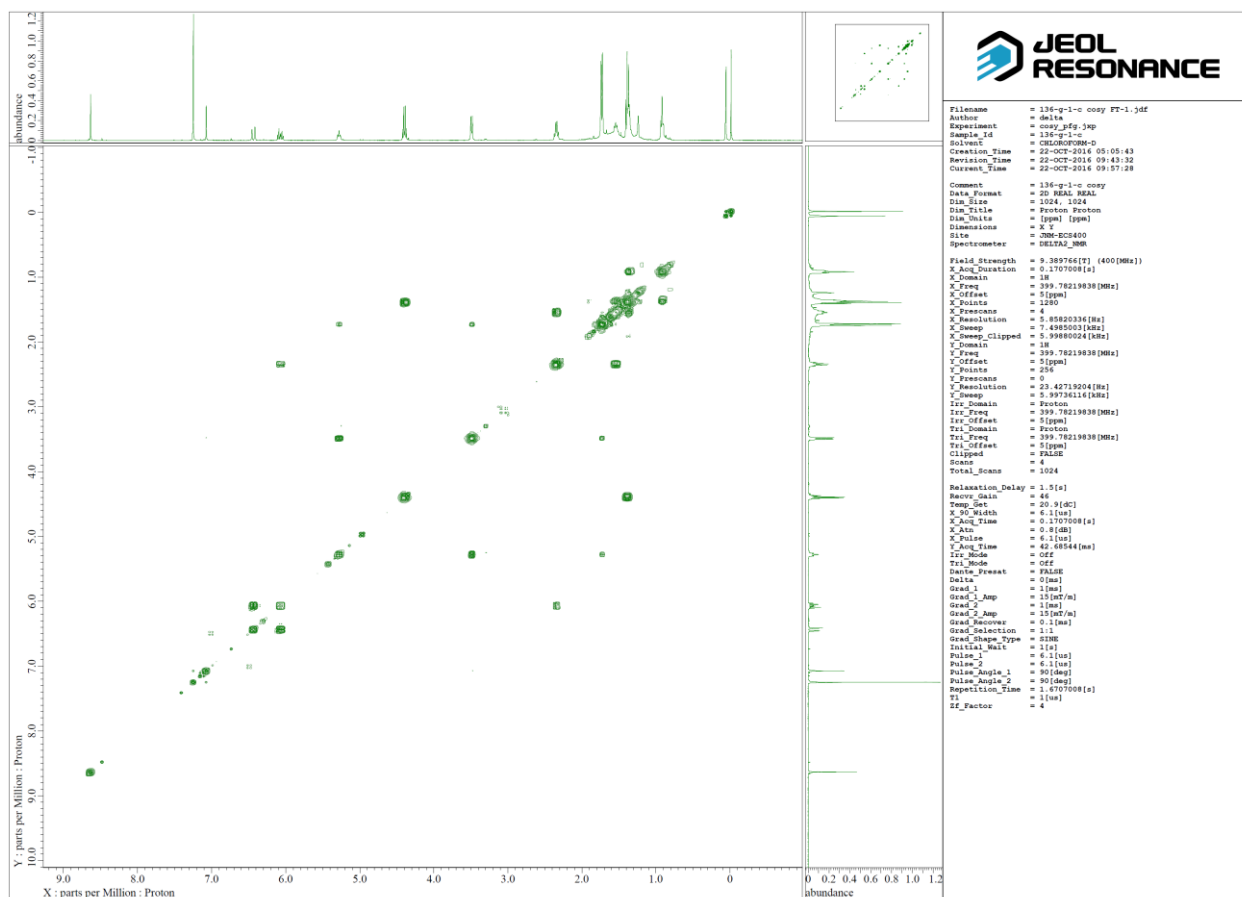


Figure S16. HMQC spectrum ( $\text{CDCl}_3$ ) of 3.

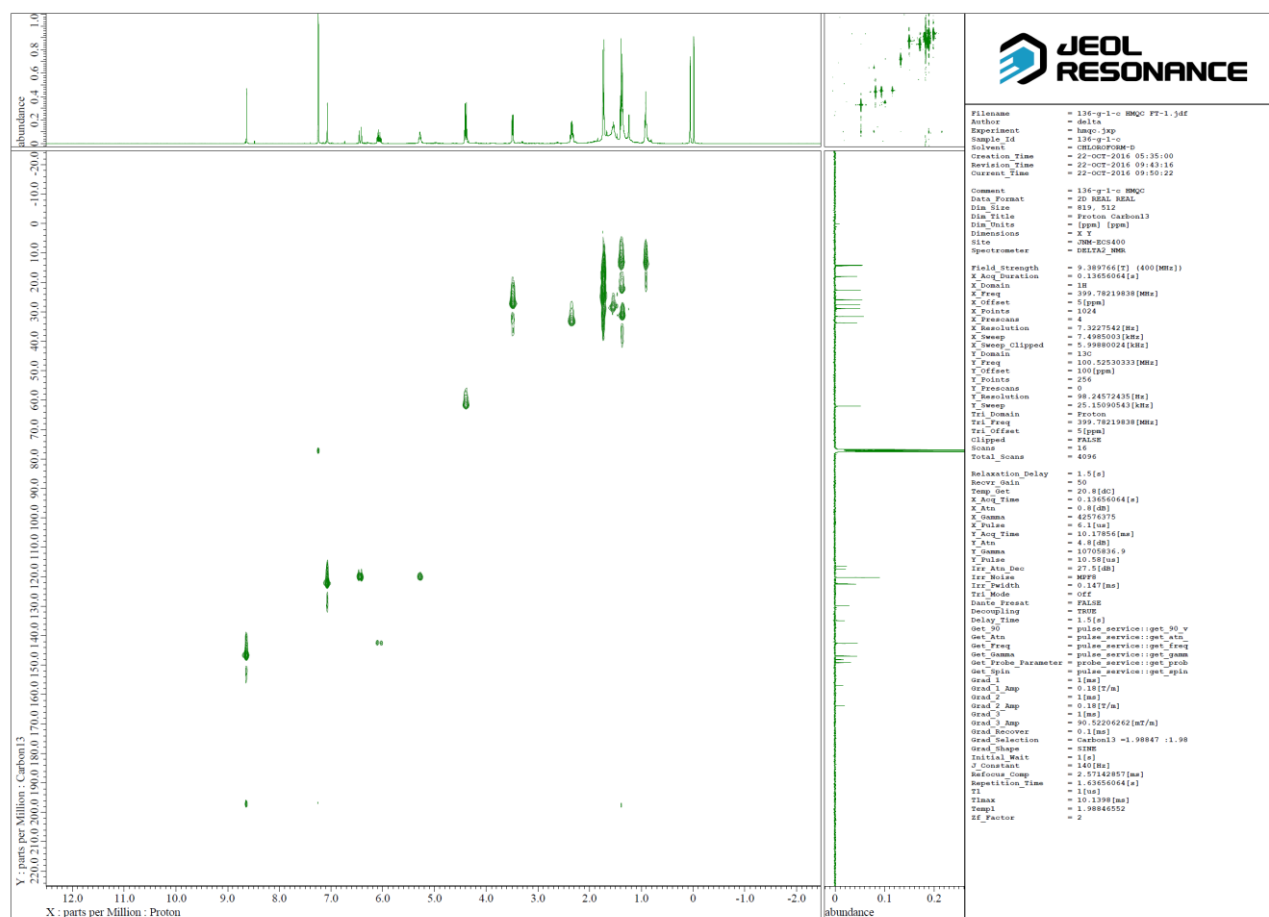


Figure S17. HMBC spectrum (CDCl<sub>3</sub>) of 3.

