Supporting Information

Phenalenones from a Marine-Derived Fungus *Penicillium* sp.

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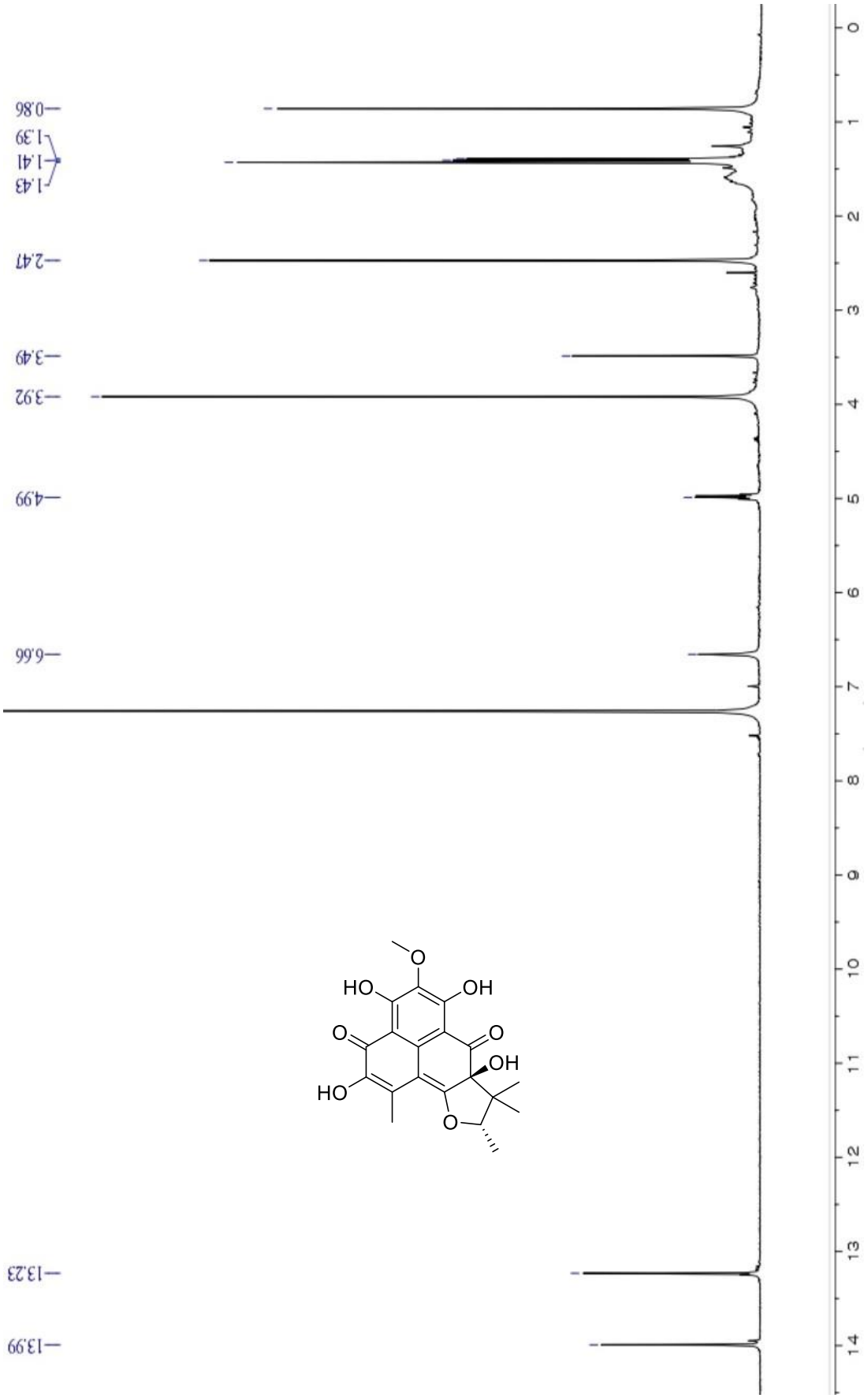


Figure S1. The ^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **1**

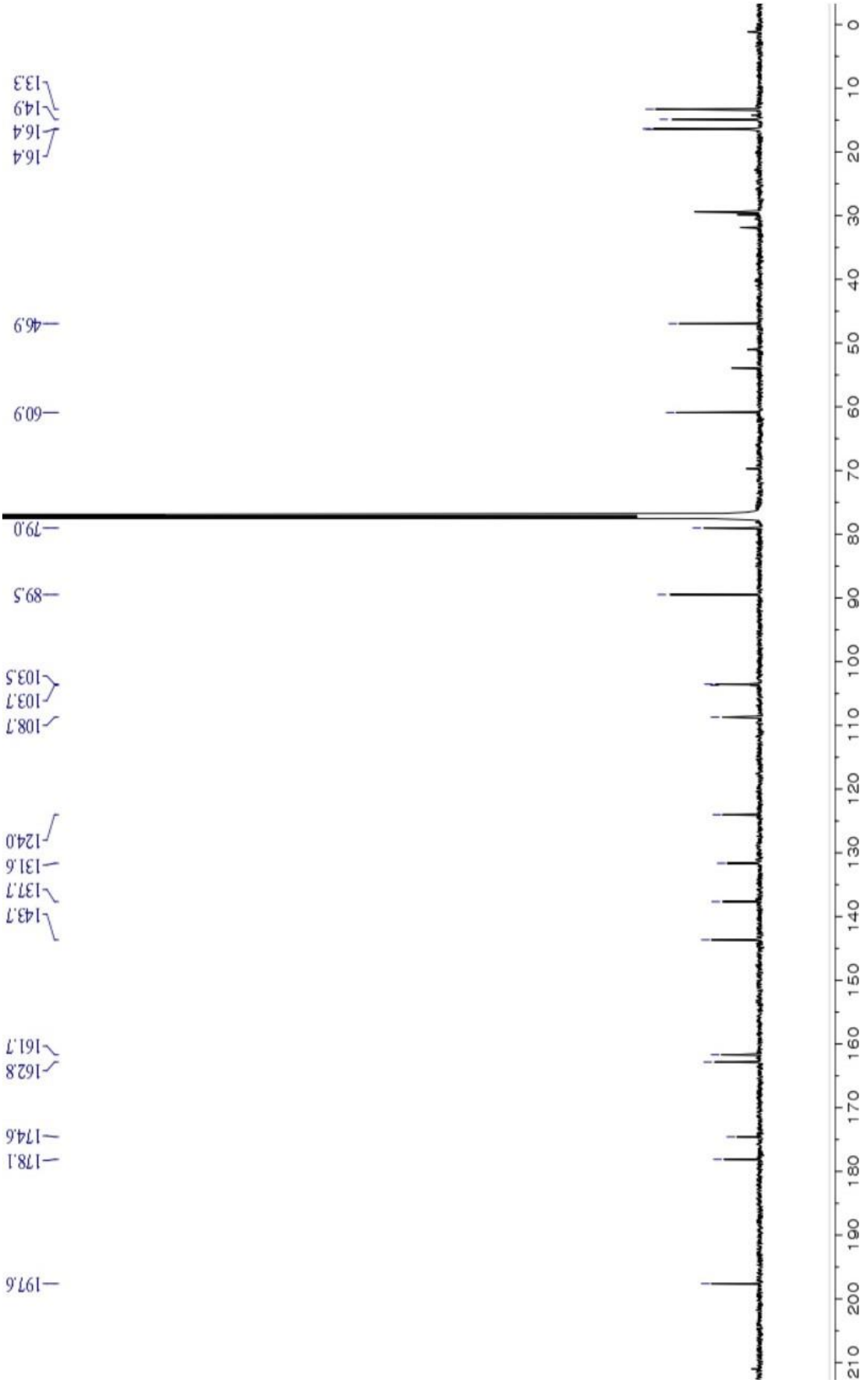


Figure S2. The ^{13}C NMR (125 MHz, $CDCl_3$) spectrum of **1**

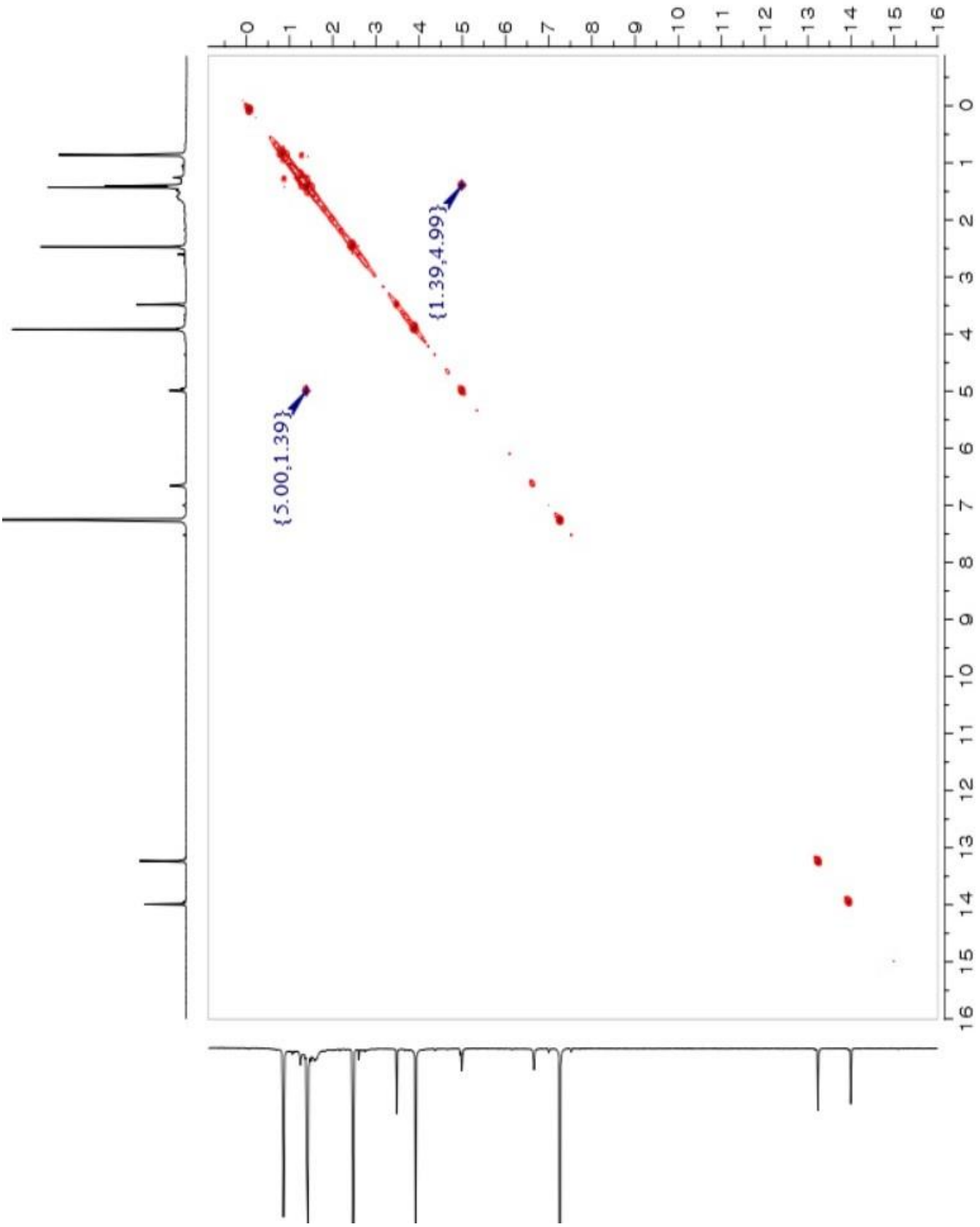


Figure S3. The COSY (400 MHz, $CDCl_3$) spectrum of **1**

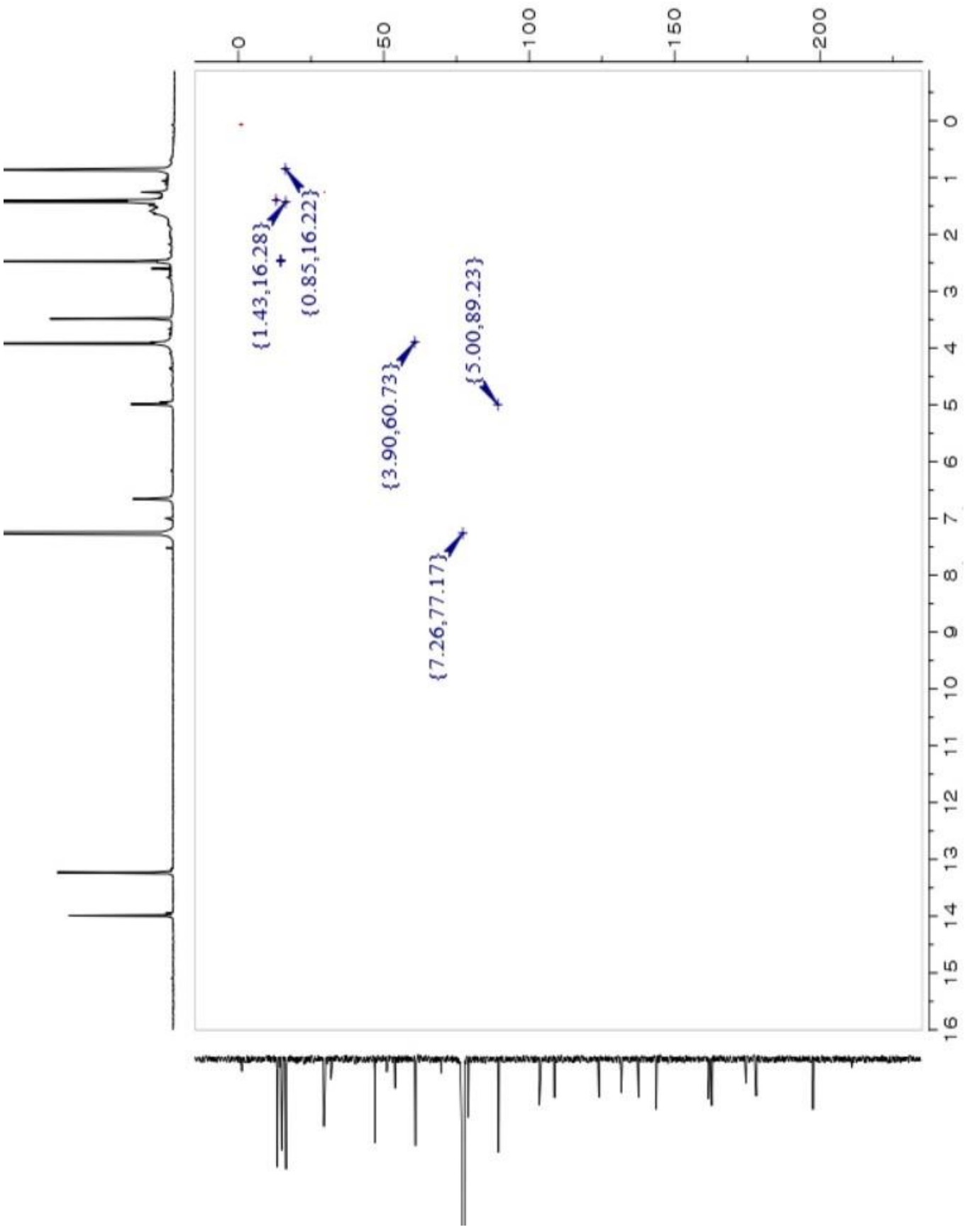


Figure S4. The HSQC (400 MHz, $CDCl_3$) spectrum of **1**

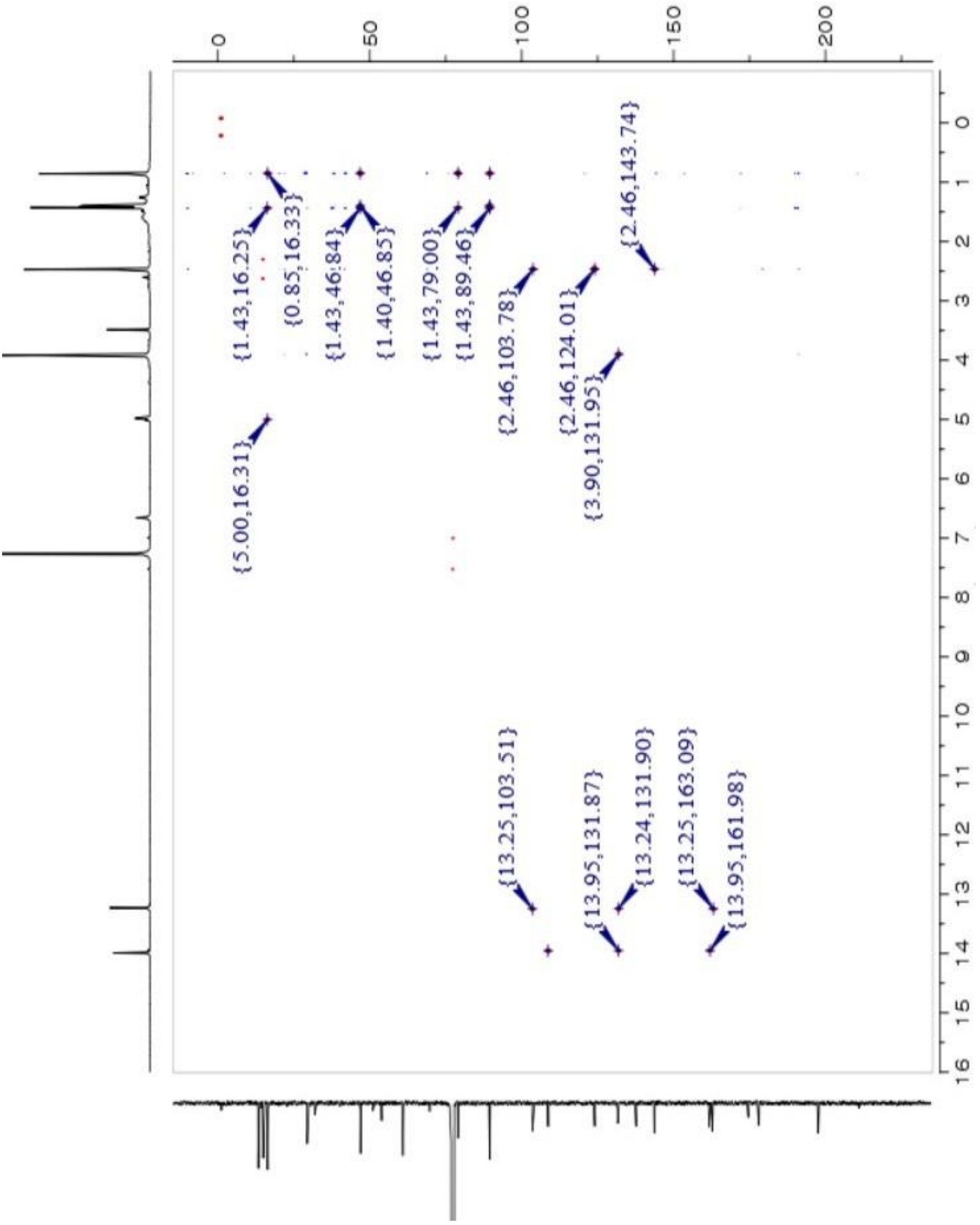


Figure S5. The HMBC (400 MHz, $CDCl_3$) spectrum of **1**

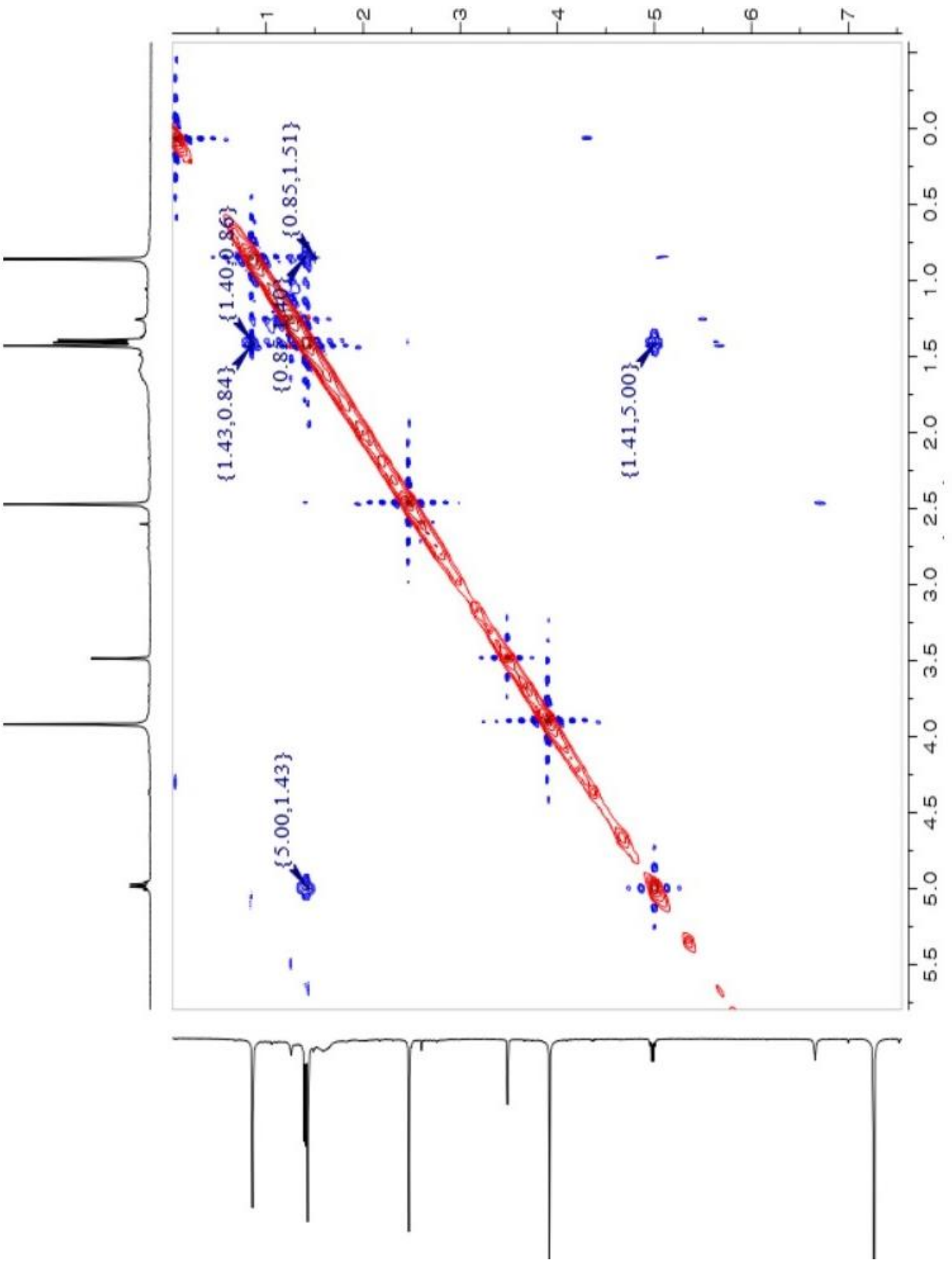
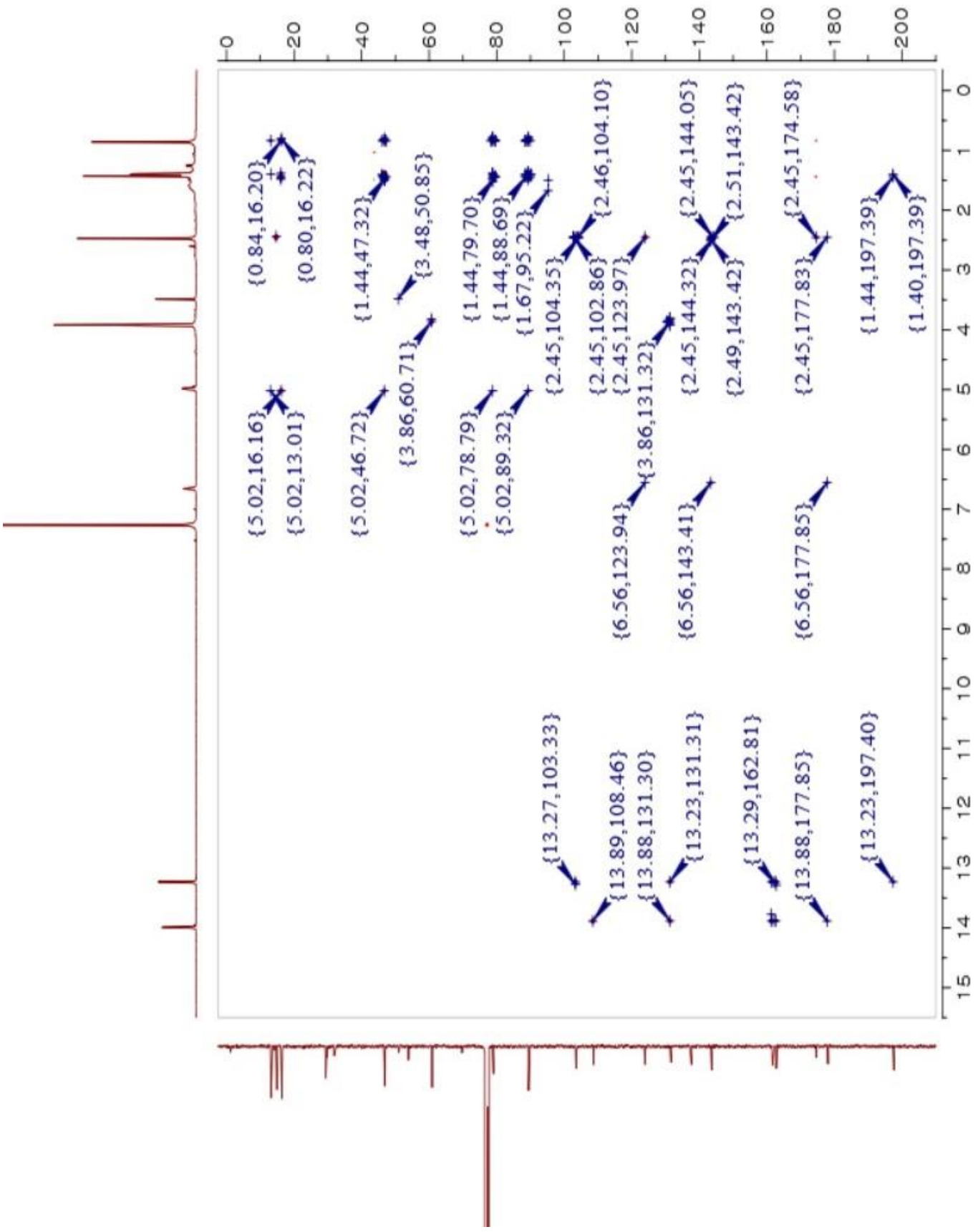


Figure S6. The NOESY (400 MHz, $CDCl_3$) spectrum of **1**



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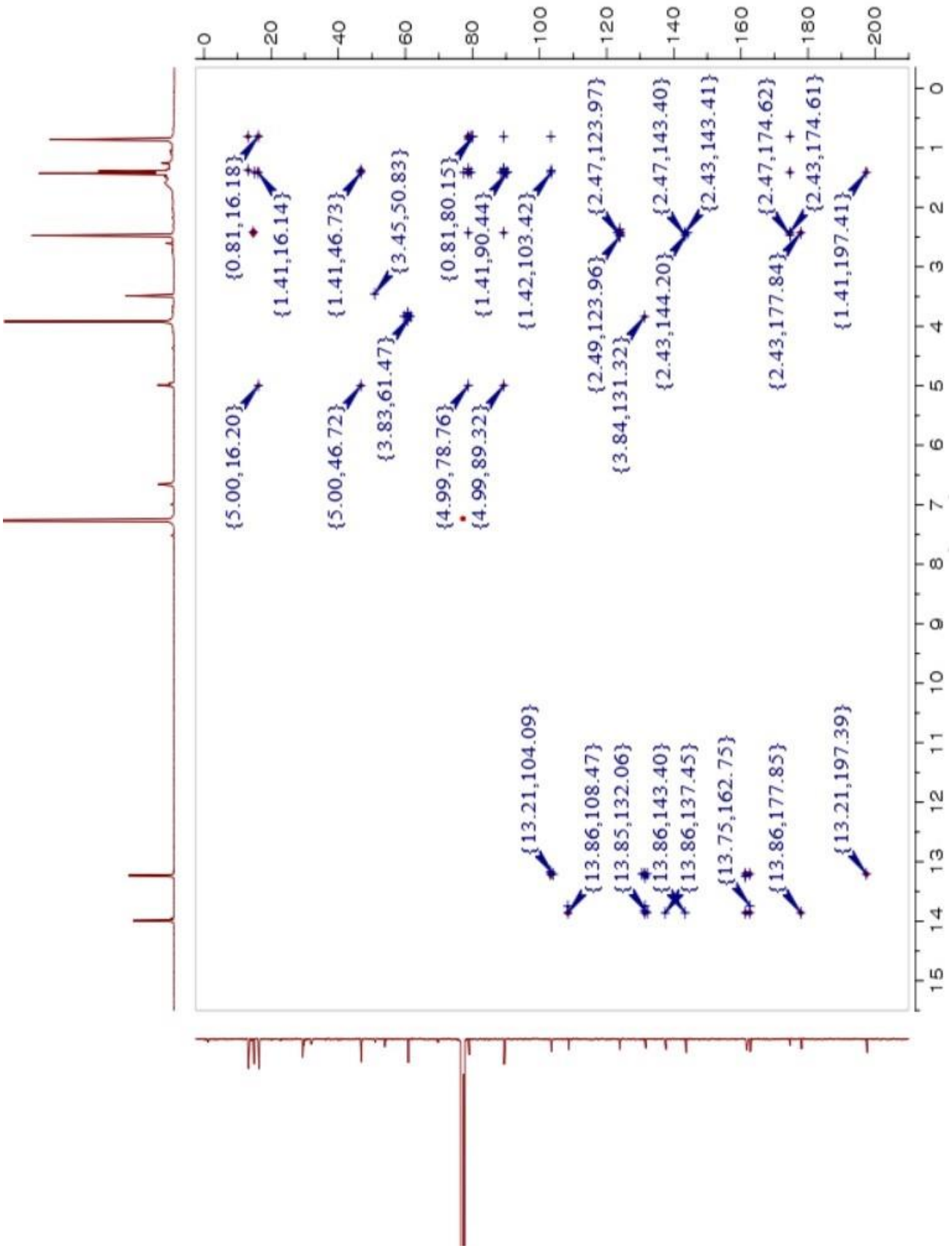

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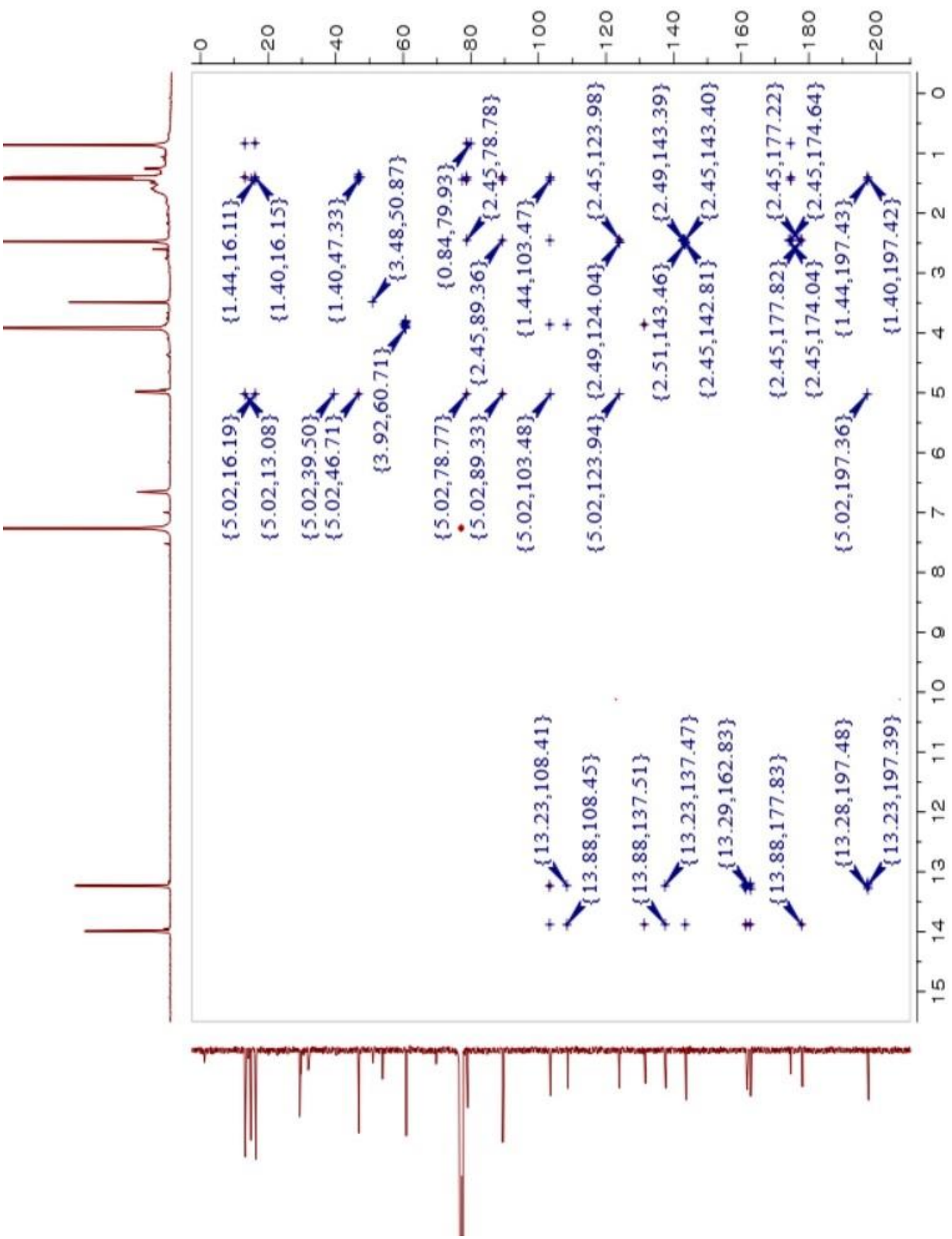

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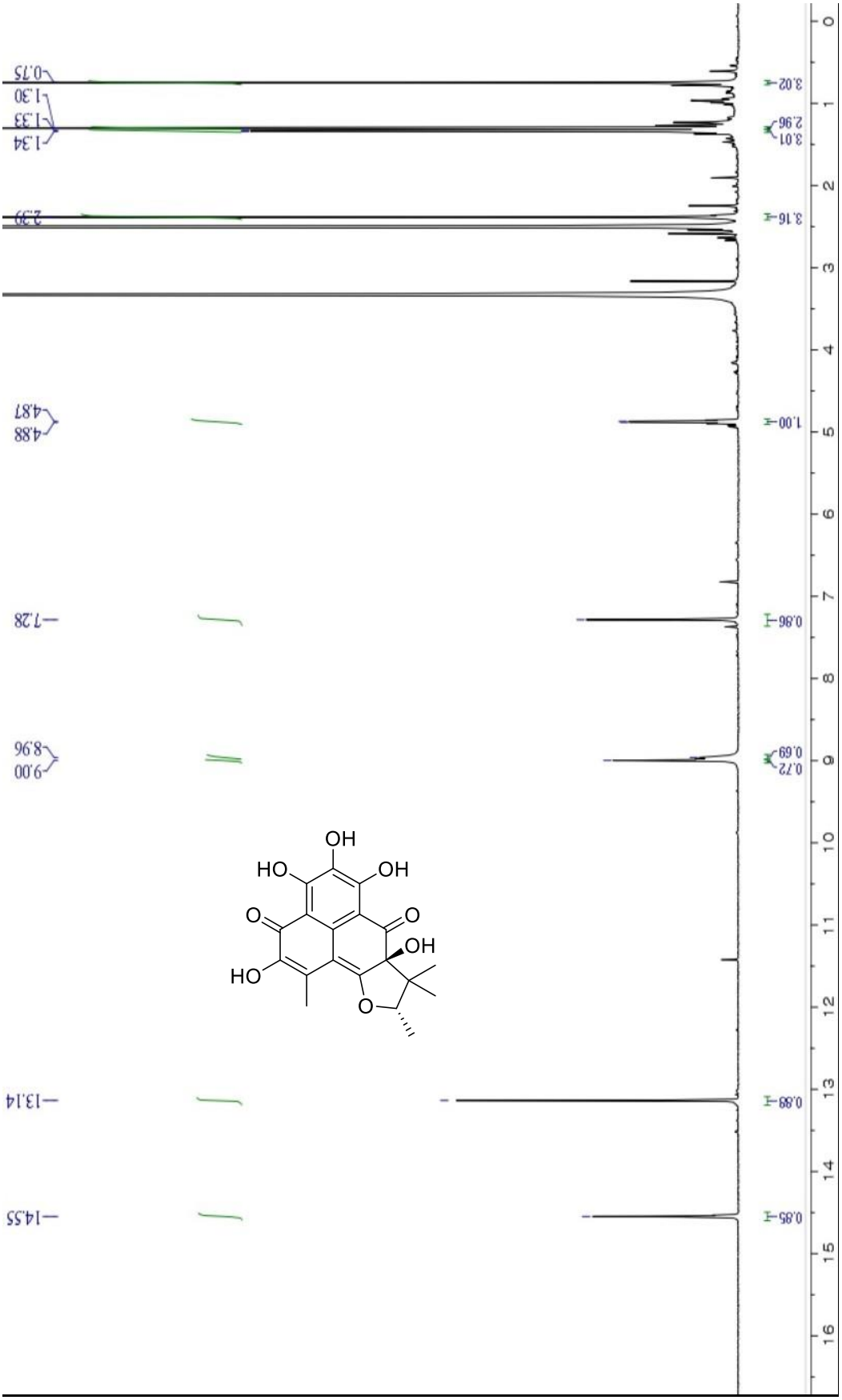
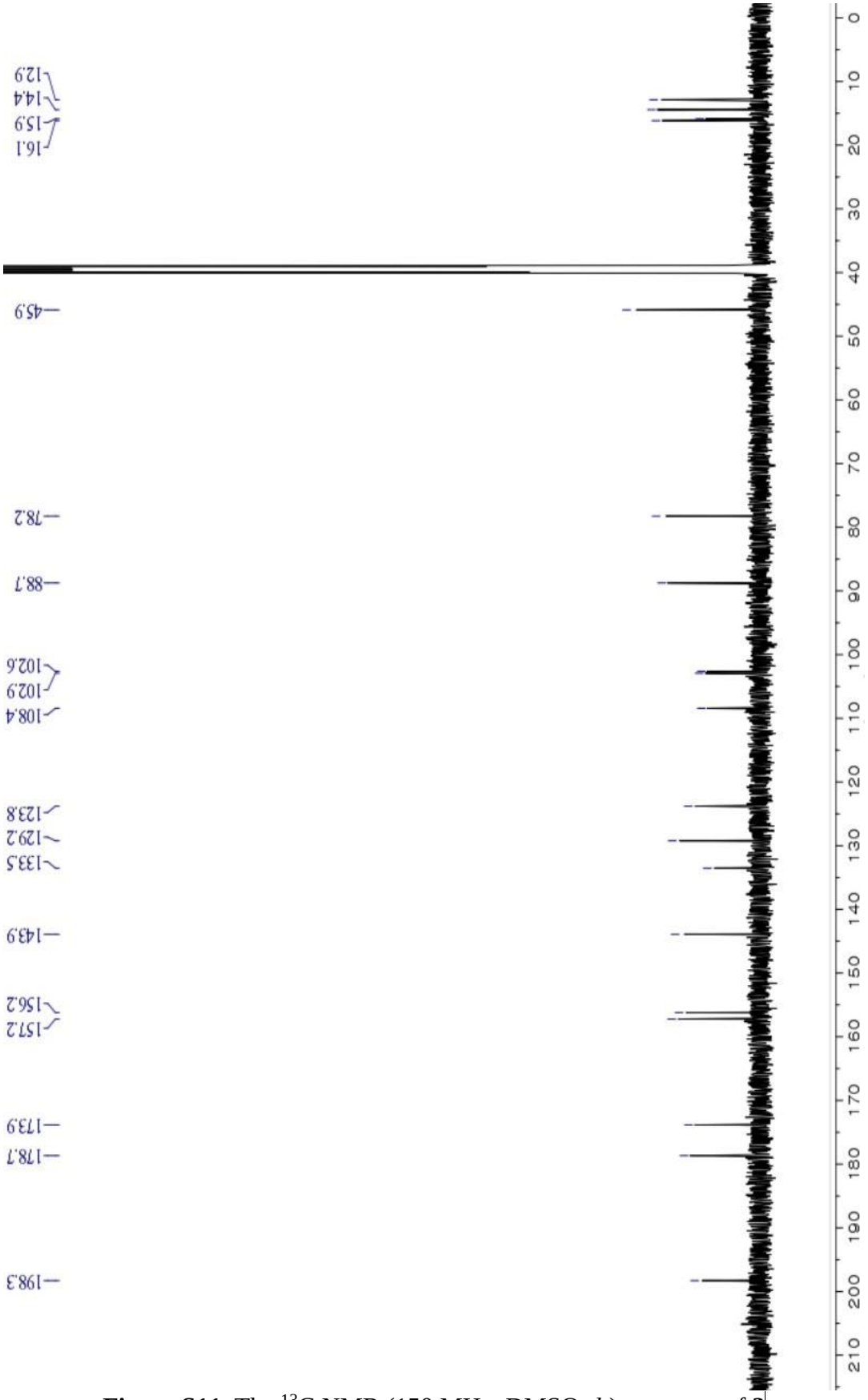


Figure S10. The ^{1}H NMR (600 MHz, DMSO-d_6) spectrum of **2**



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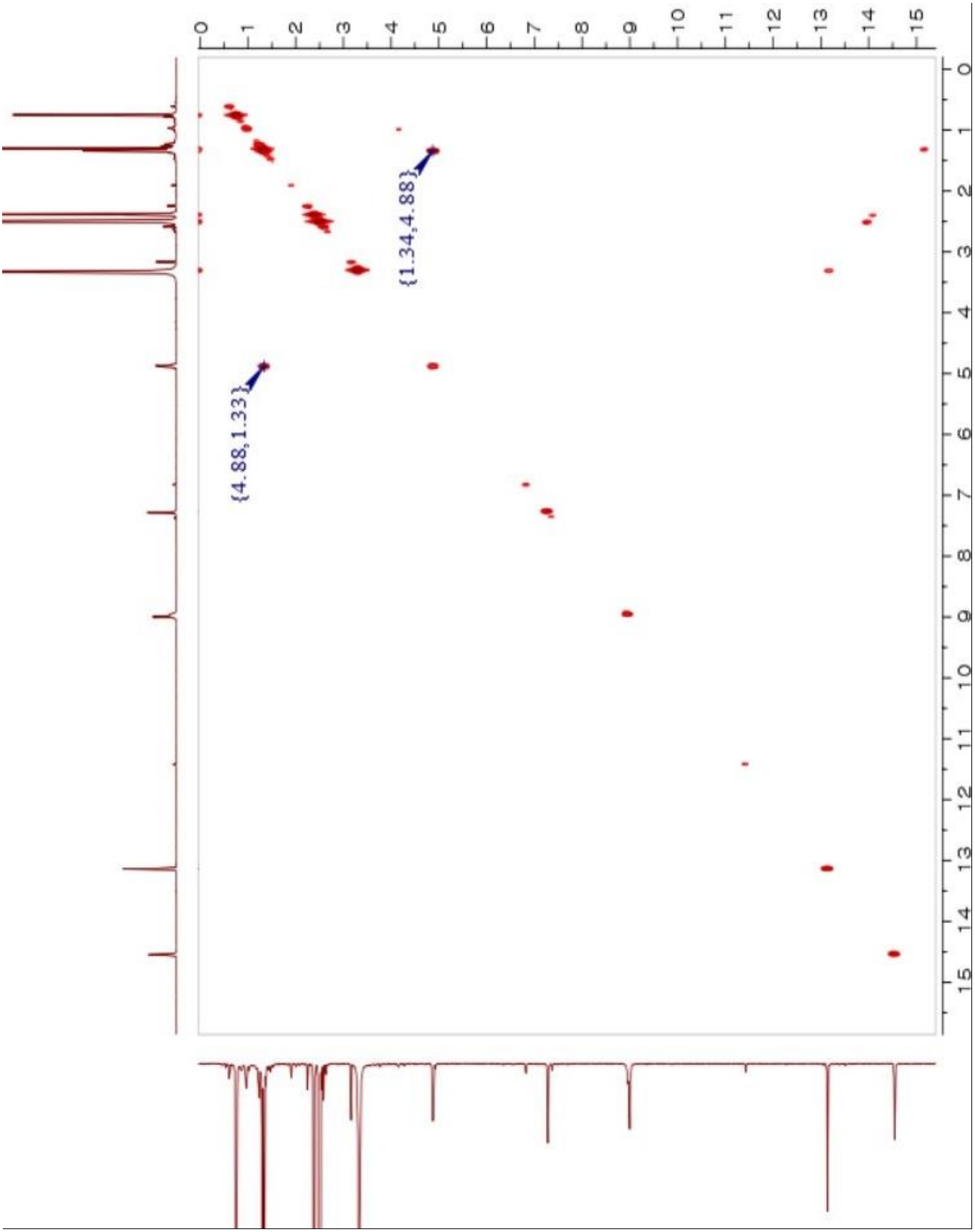

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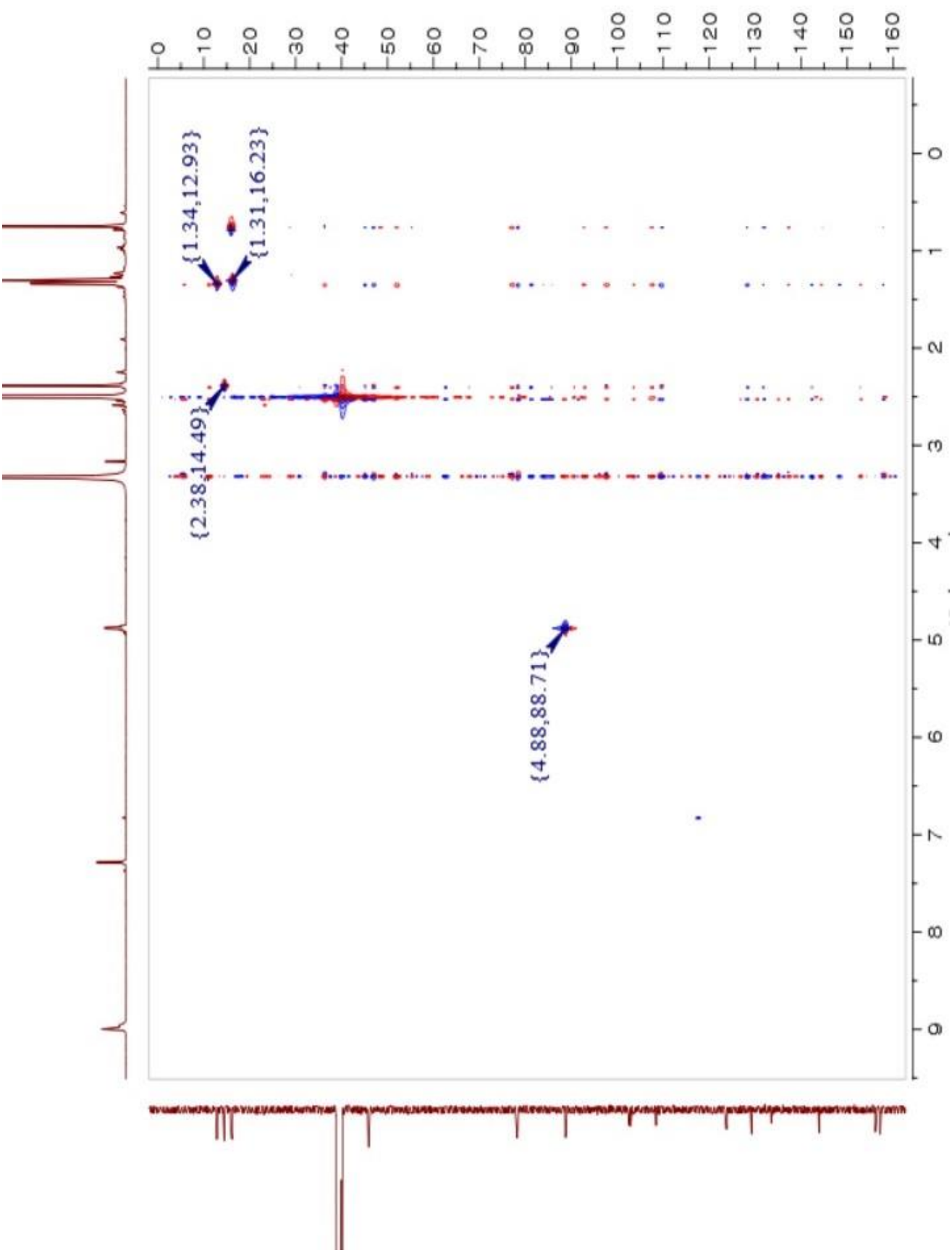

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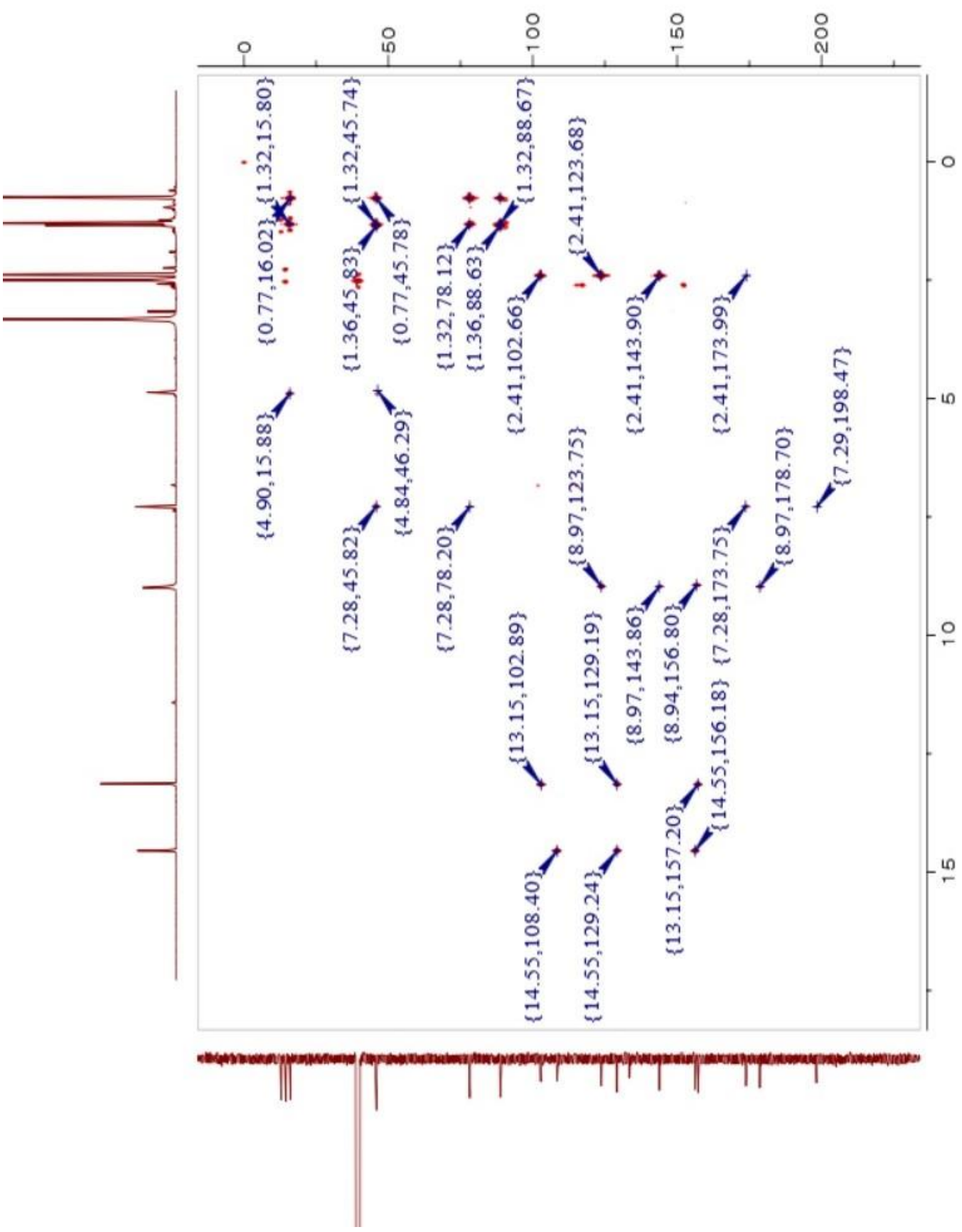

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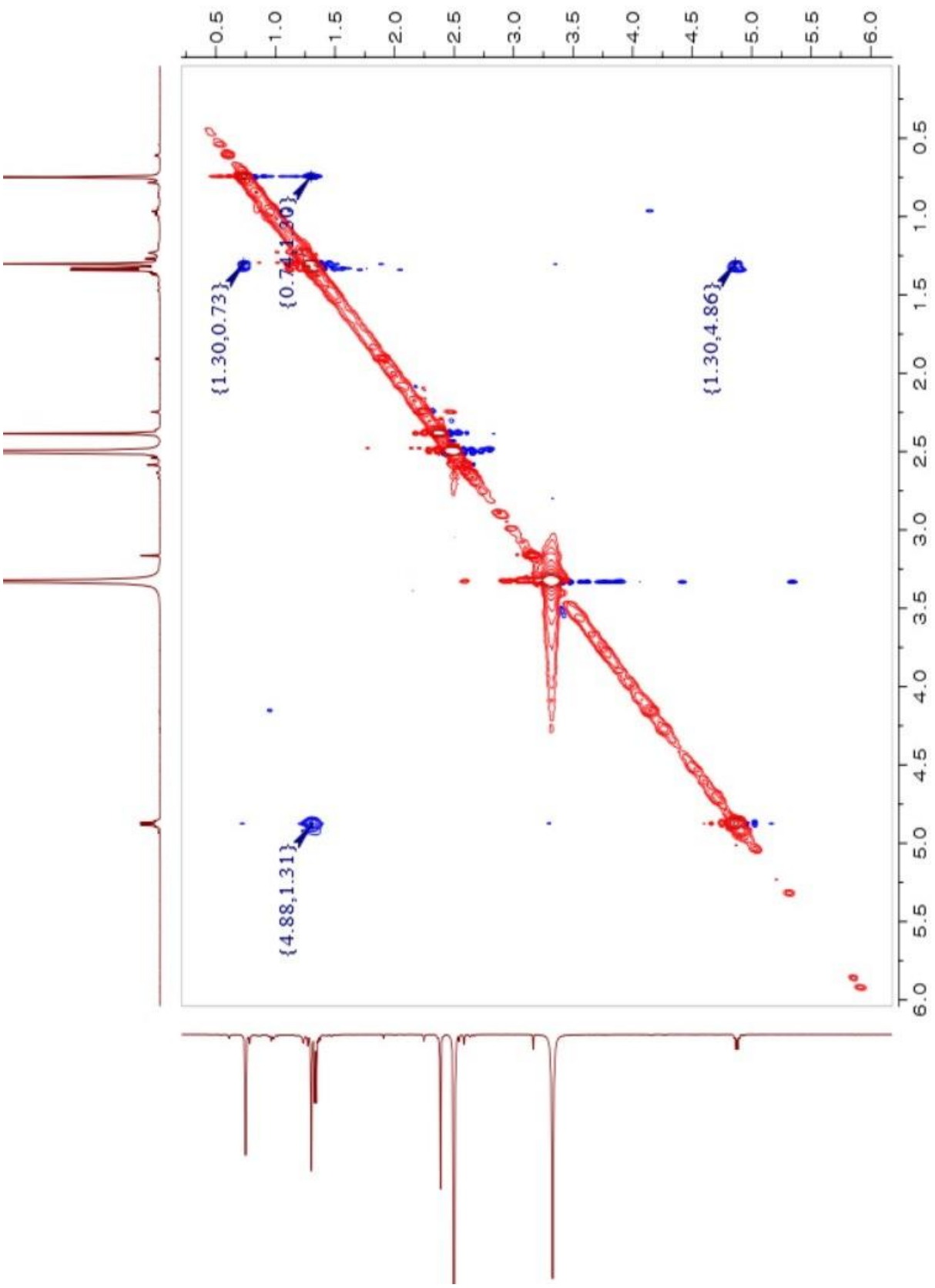

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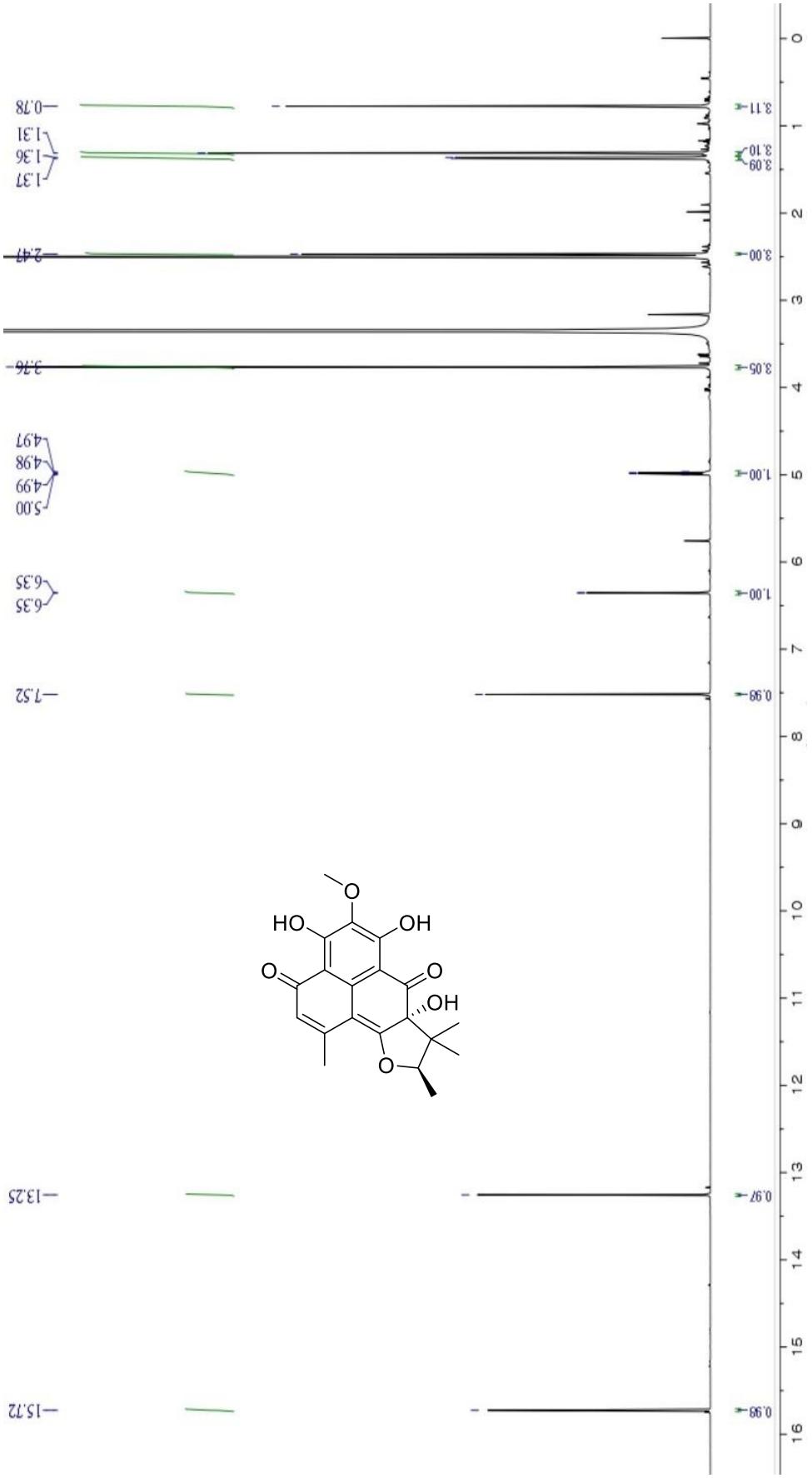

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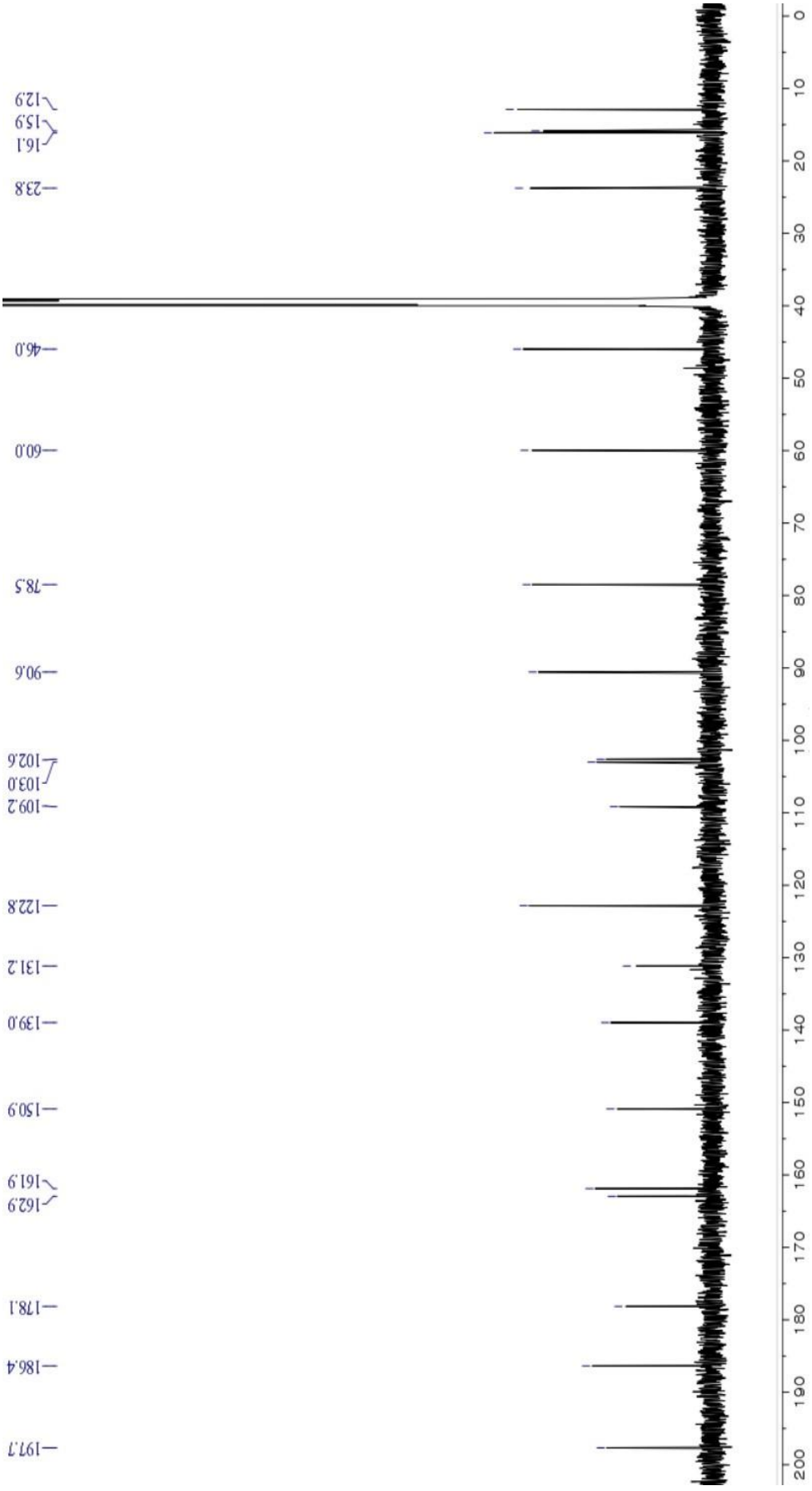

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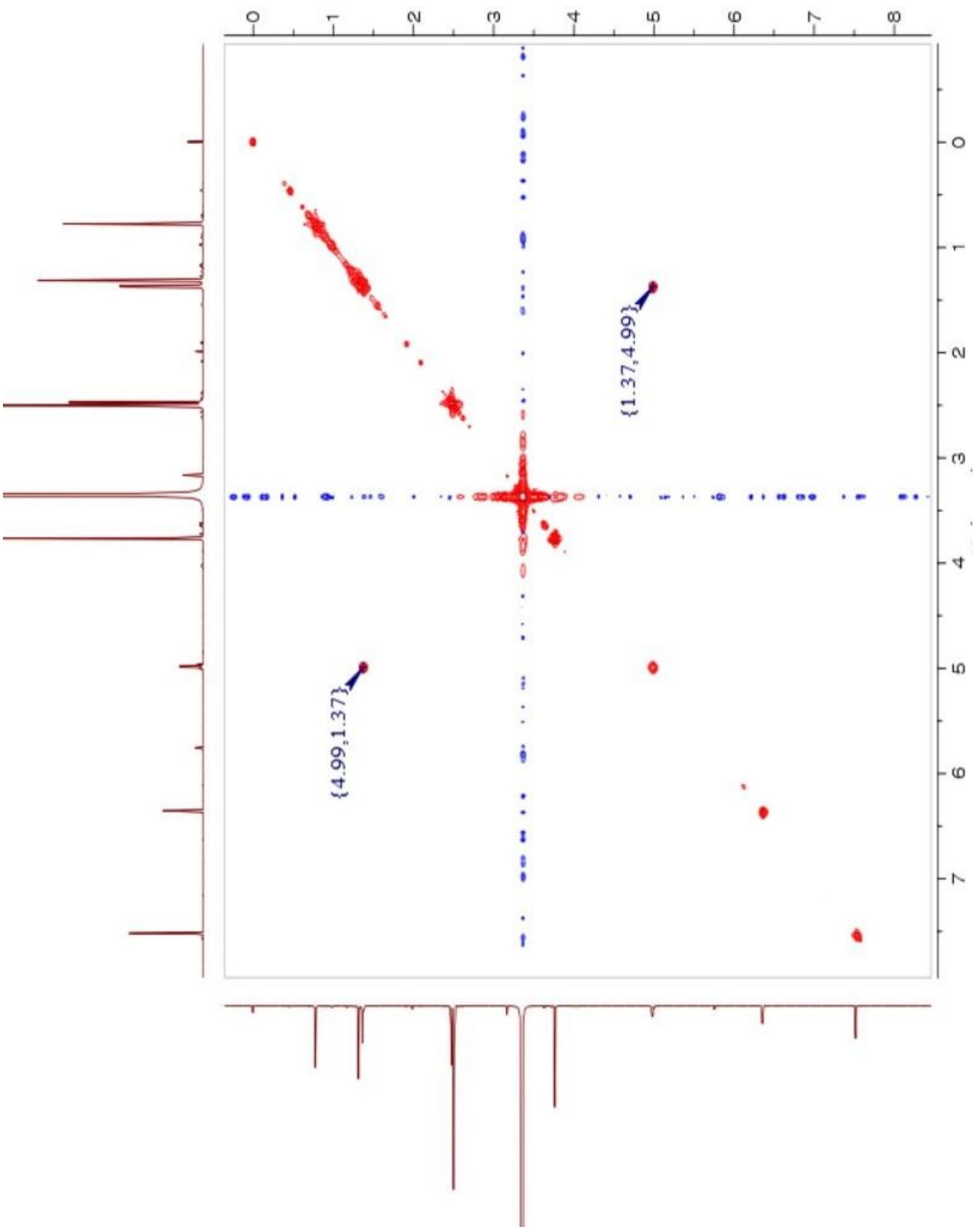

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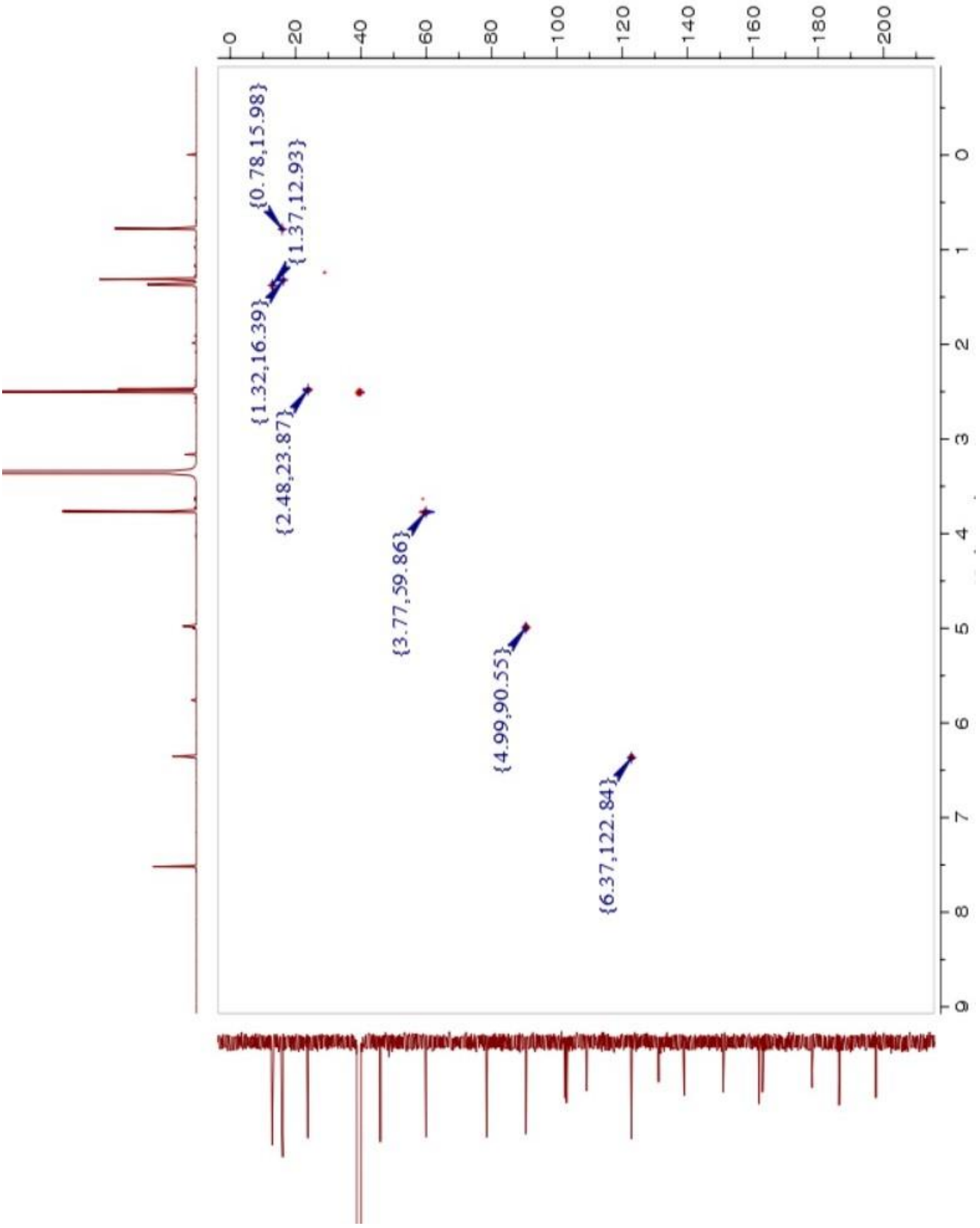

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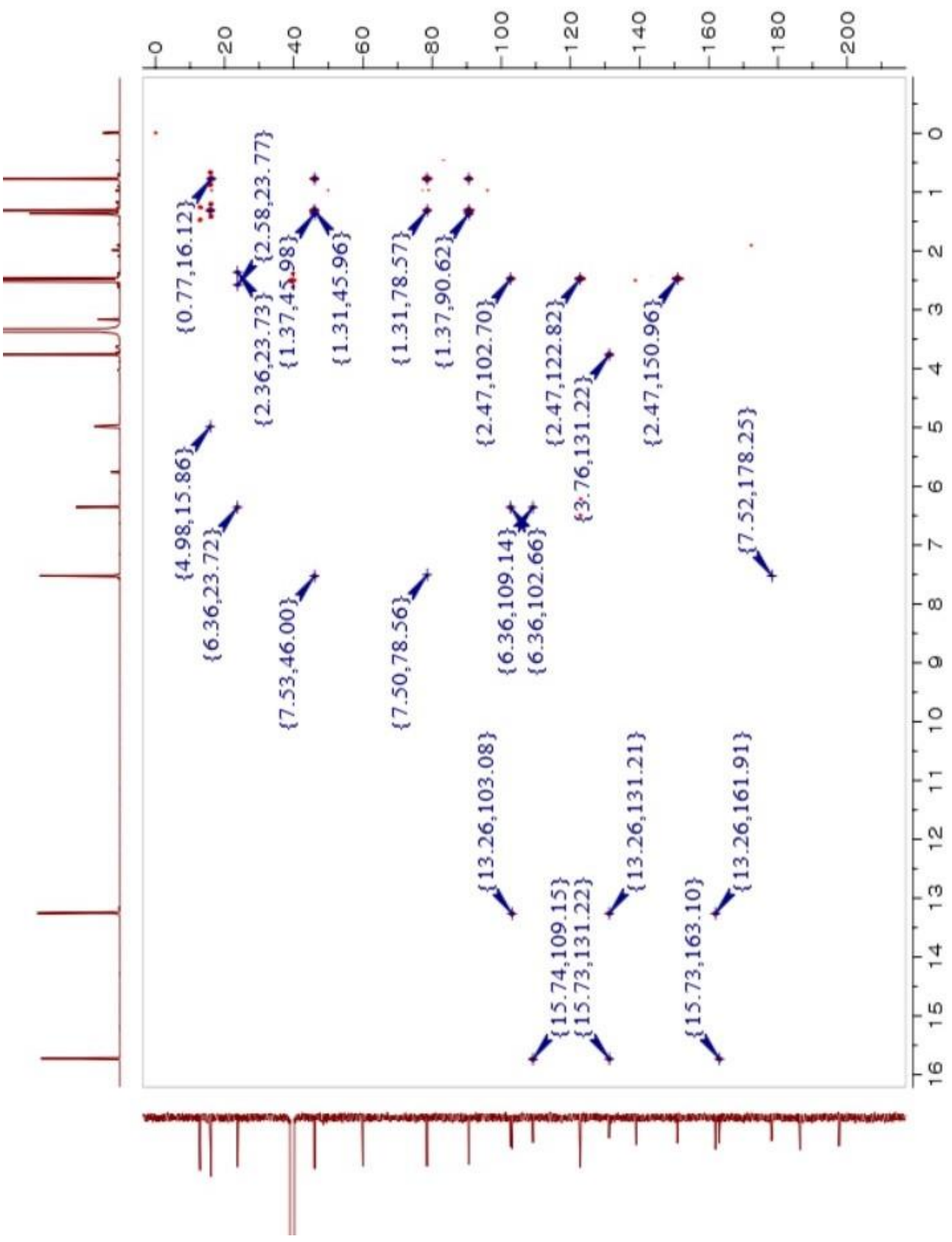

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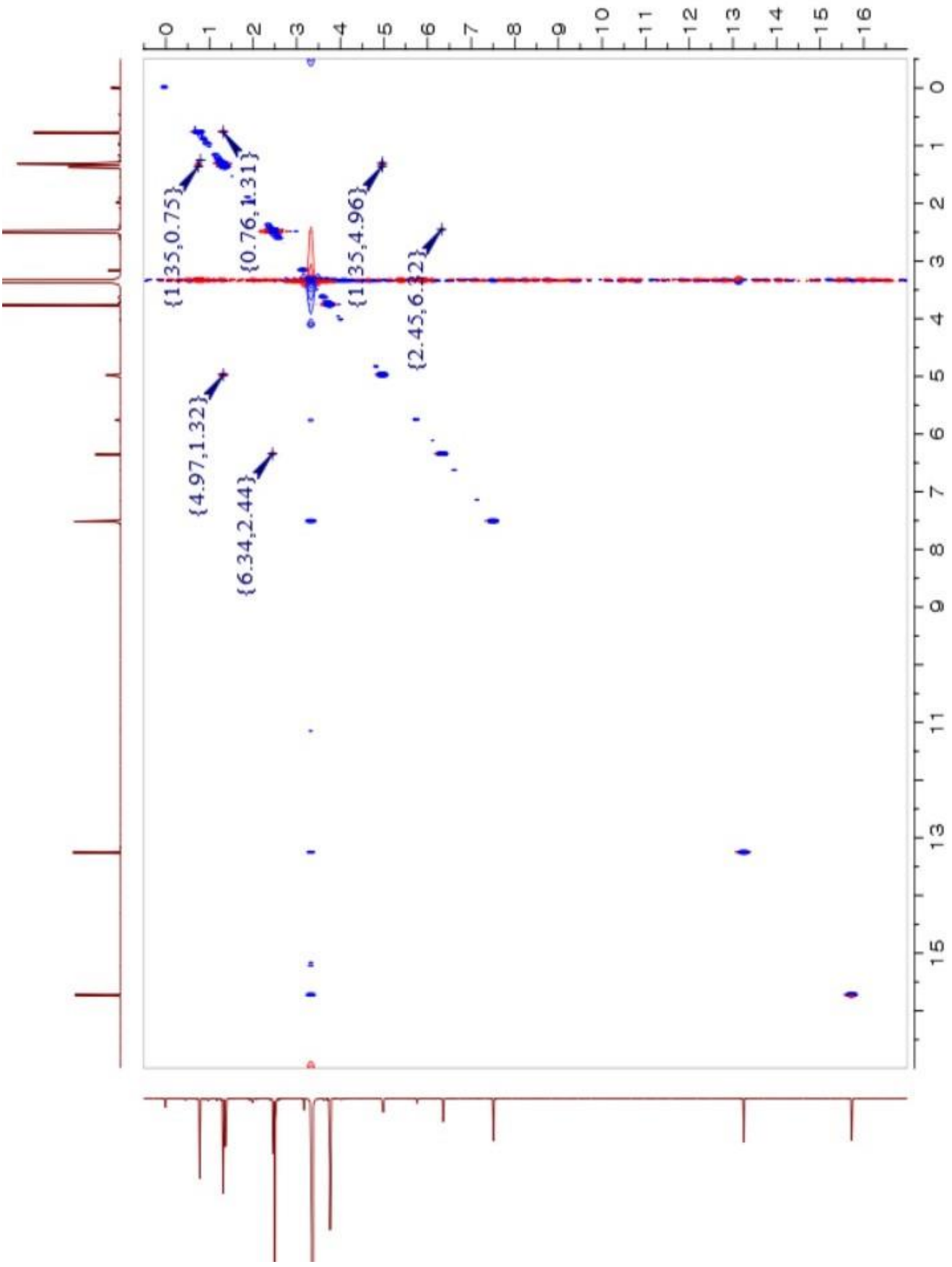

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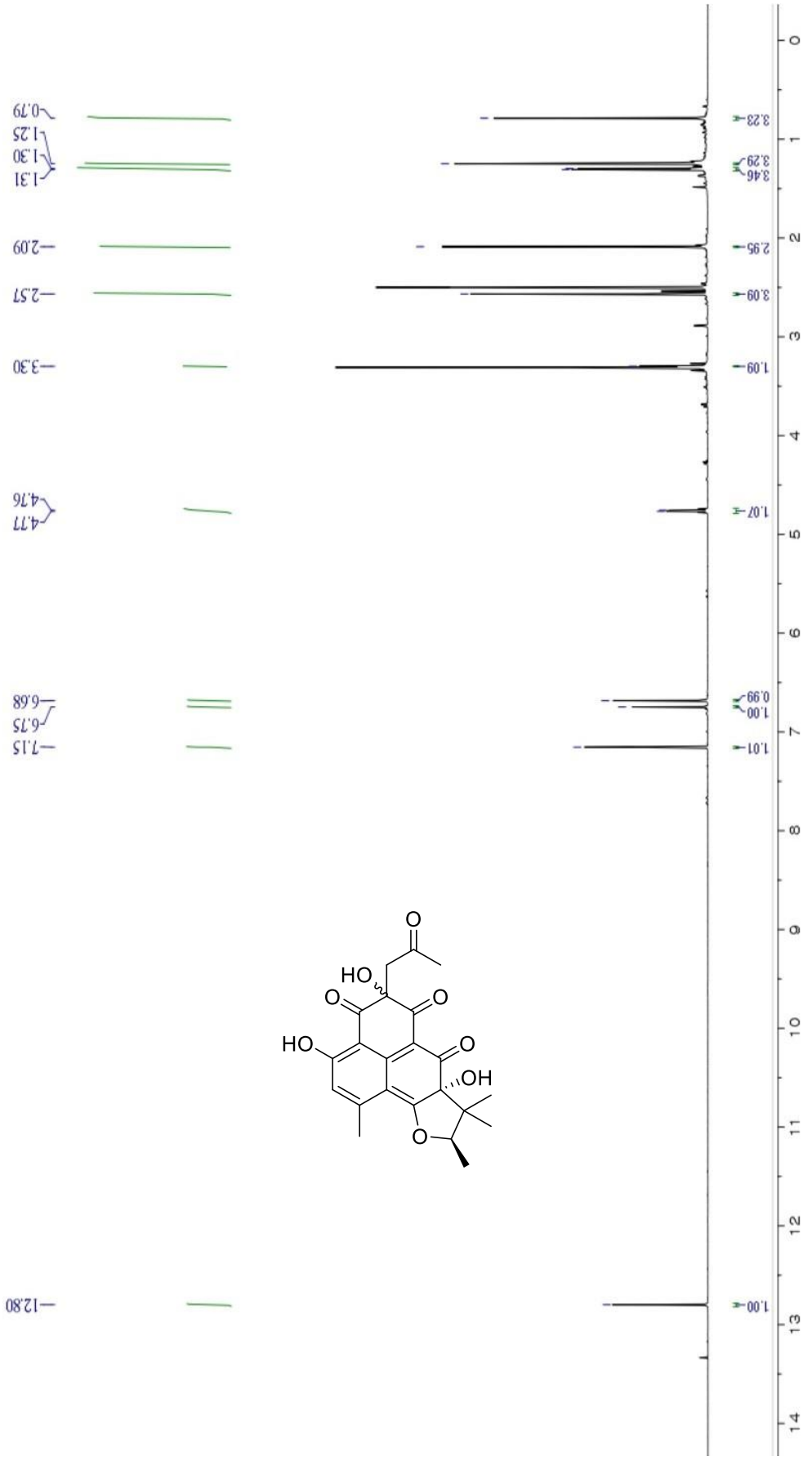

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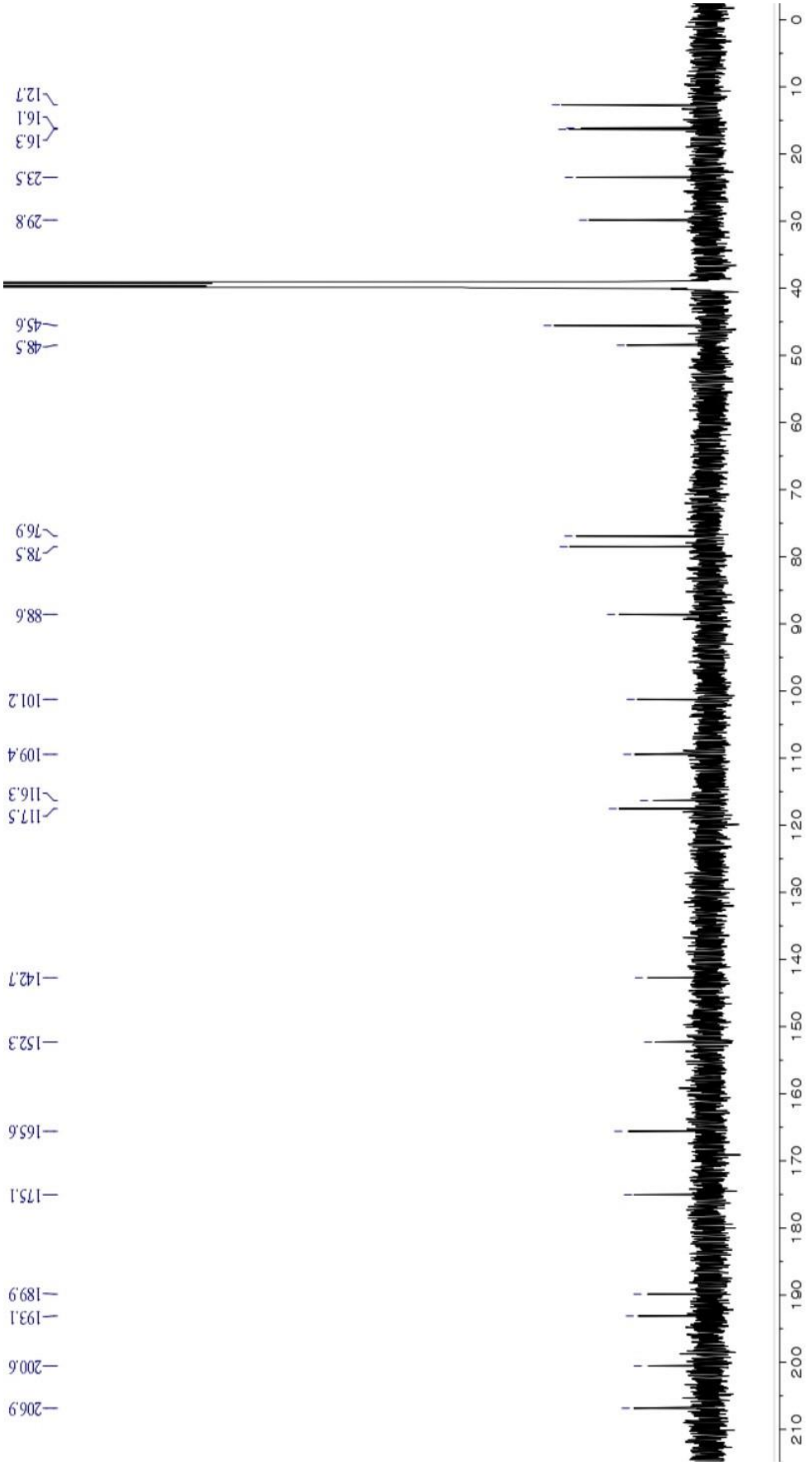

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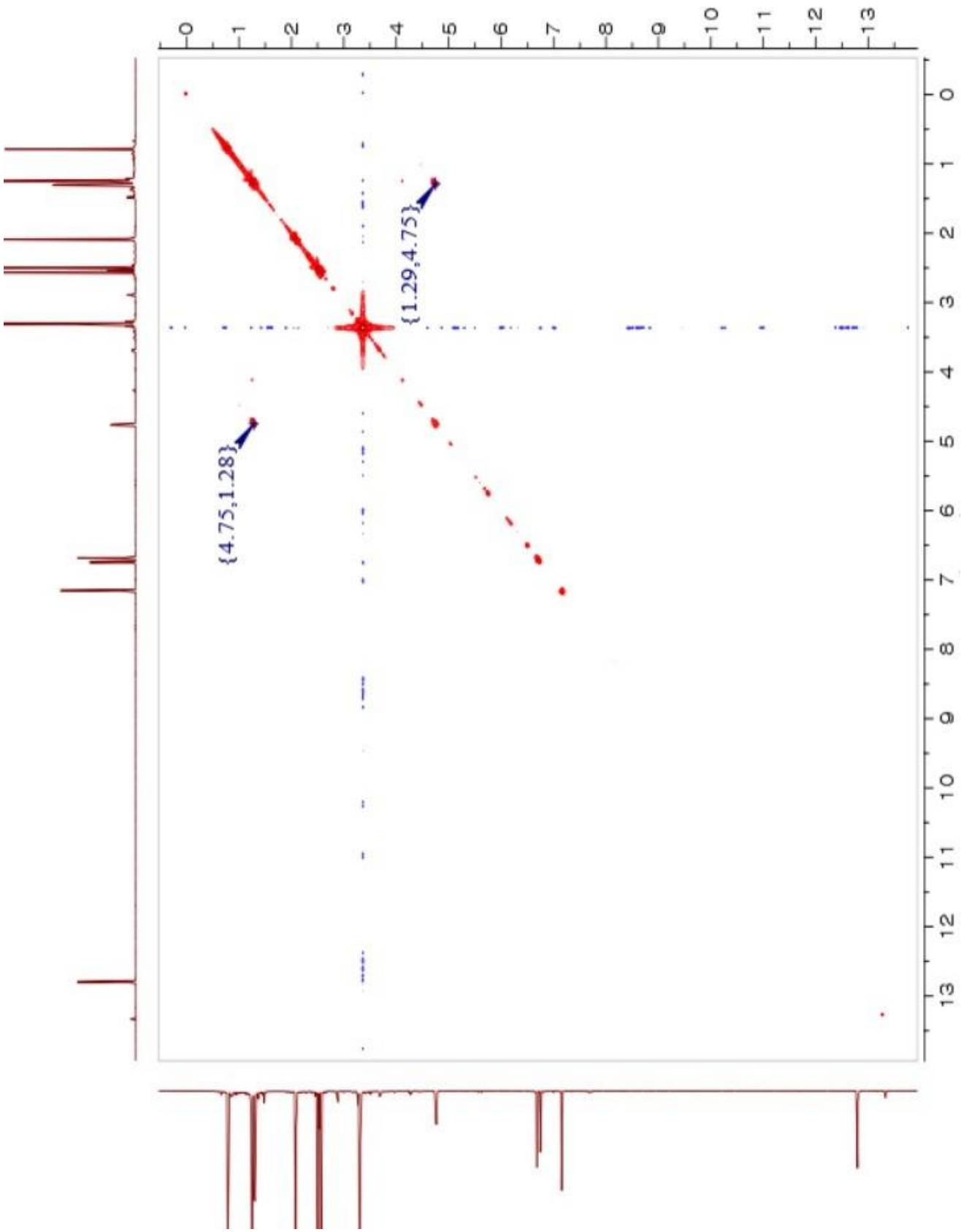

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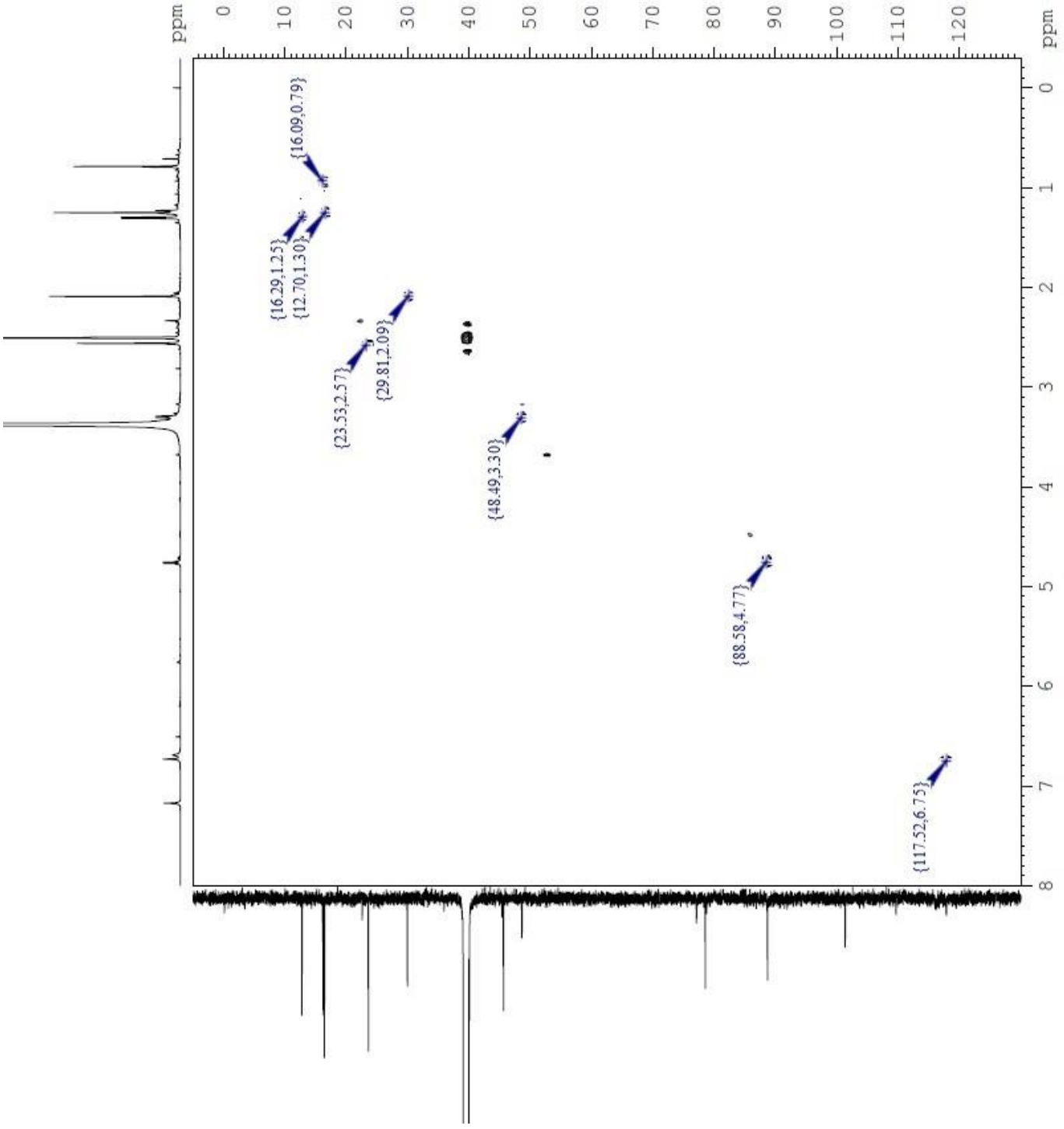

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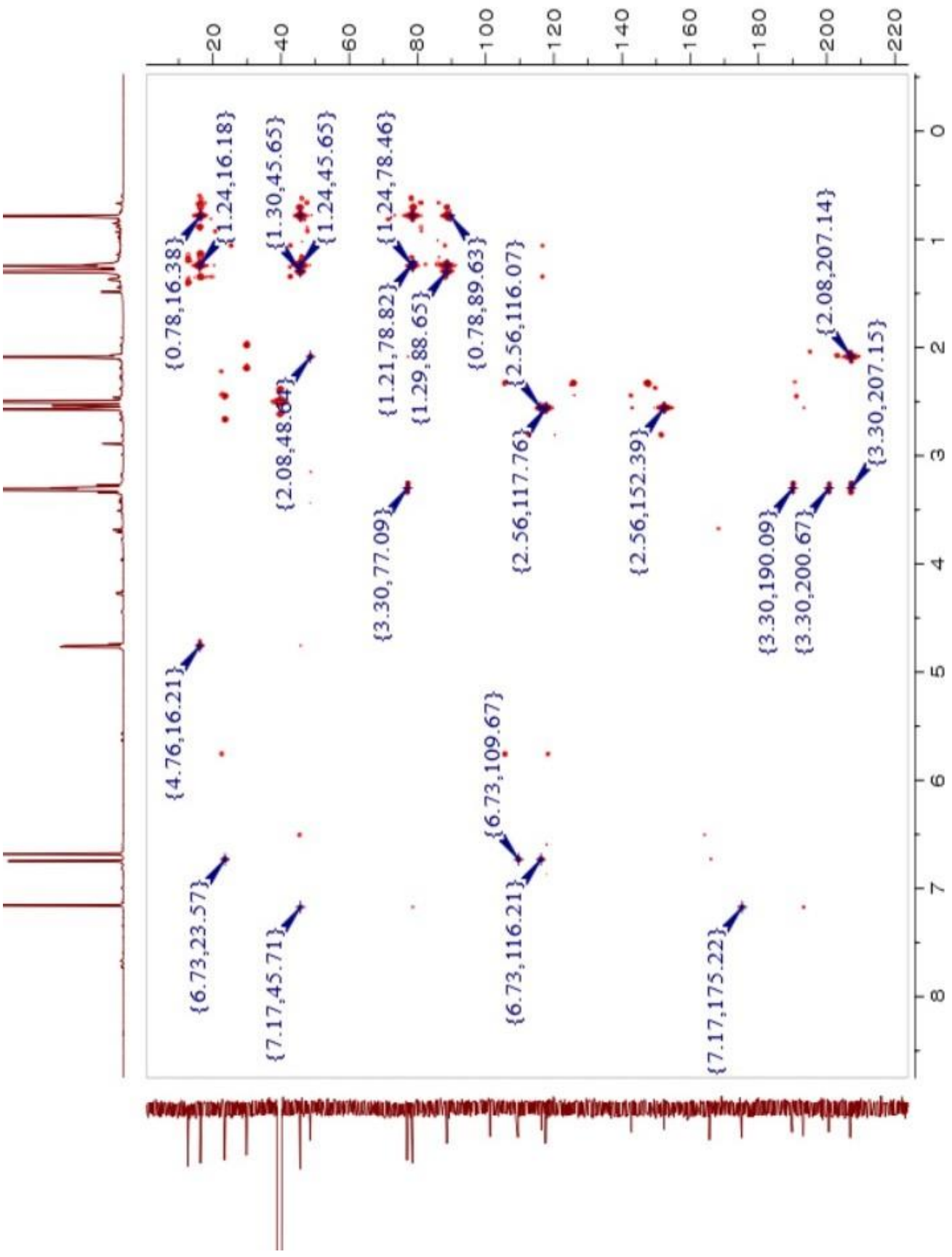

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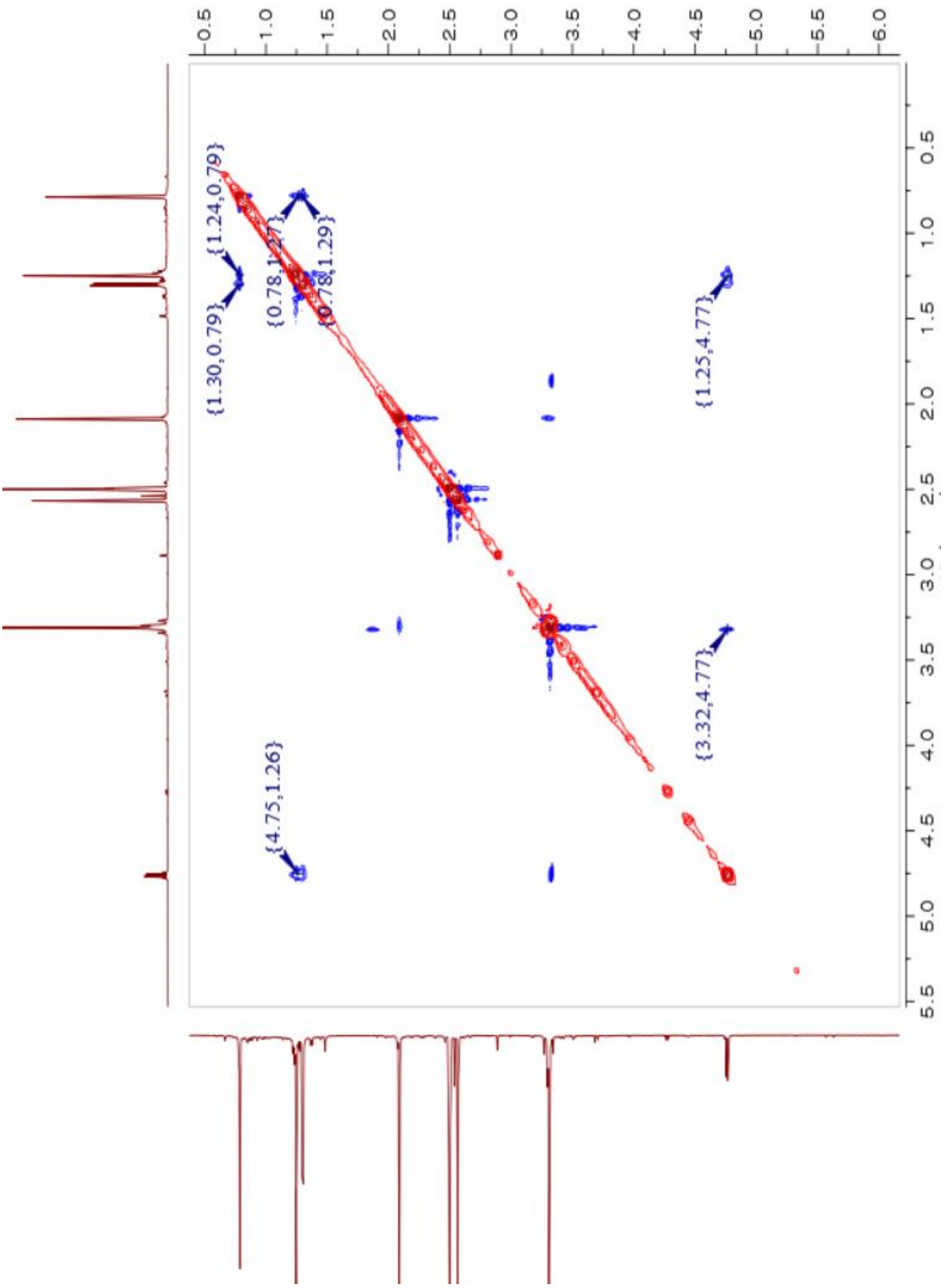

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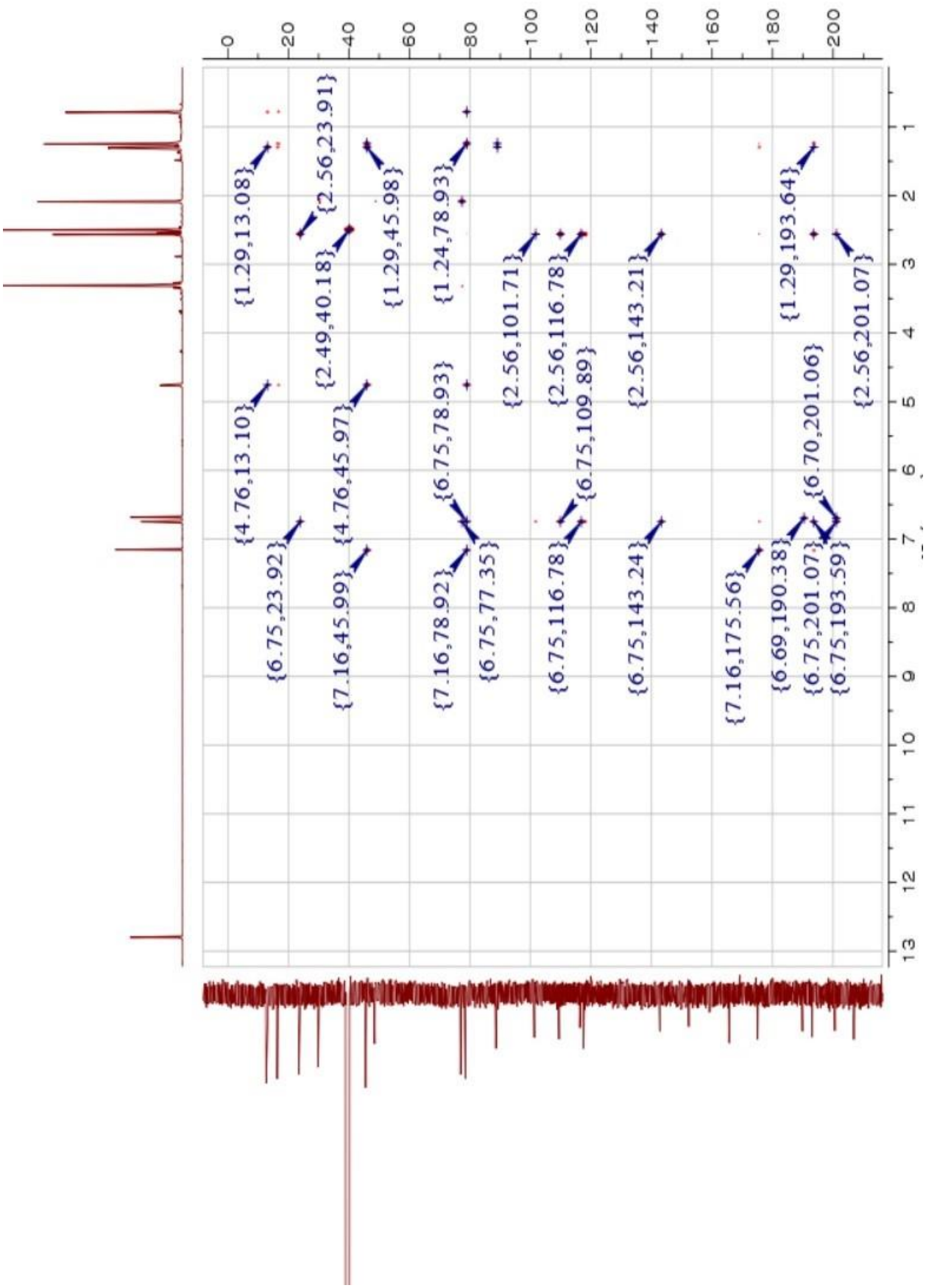


Figure S28. The D-HMBC (800 MHz, J_{CH} = 1 Hz, DMSO-d_6) spectrum of **4**

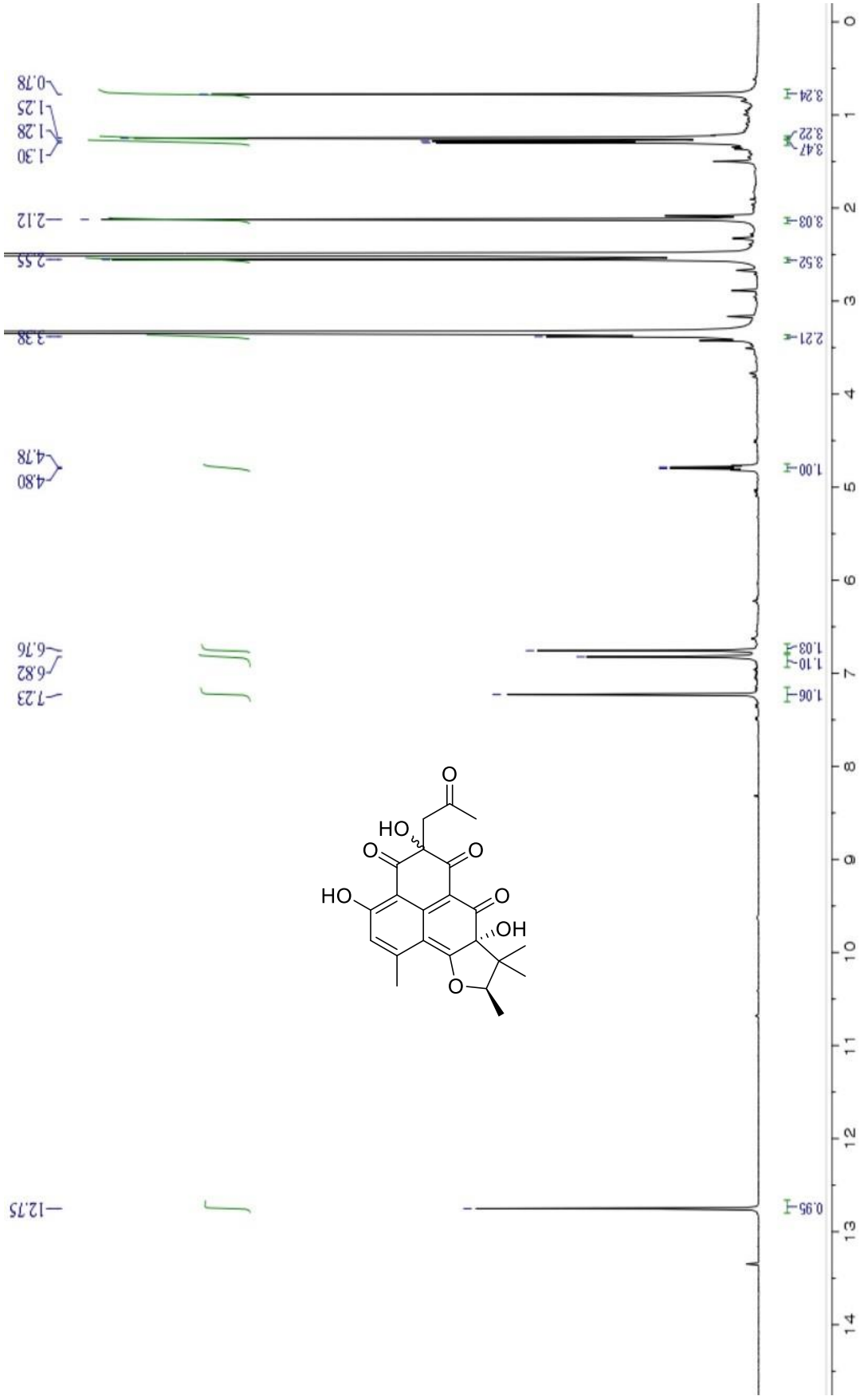


Figure S29. The ^{1}H NMR (600 MHz, DMSO-d_6) spectrum of **5**

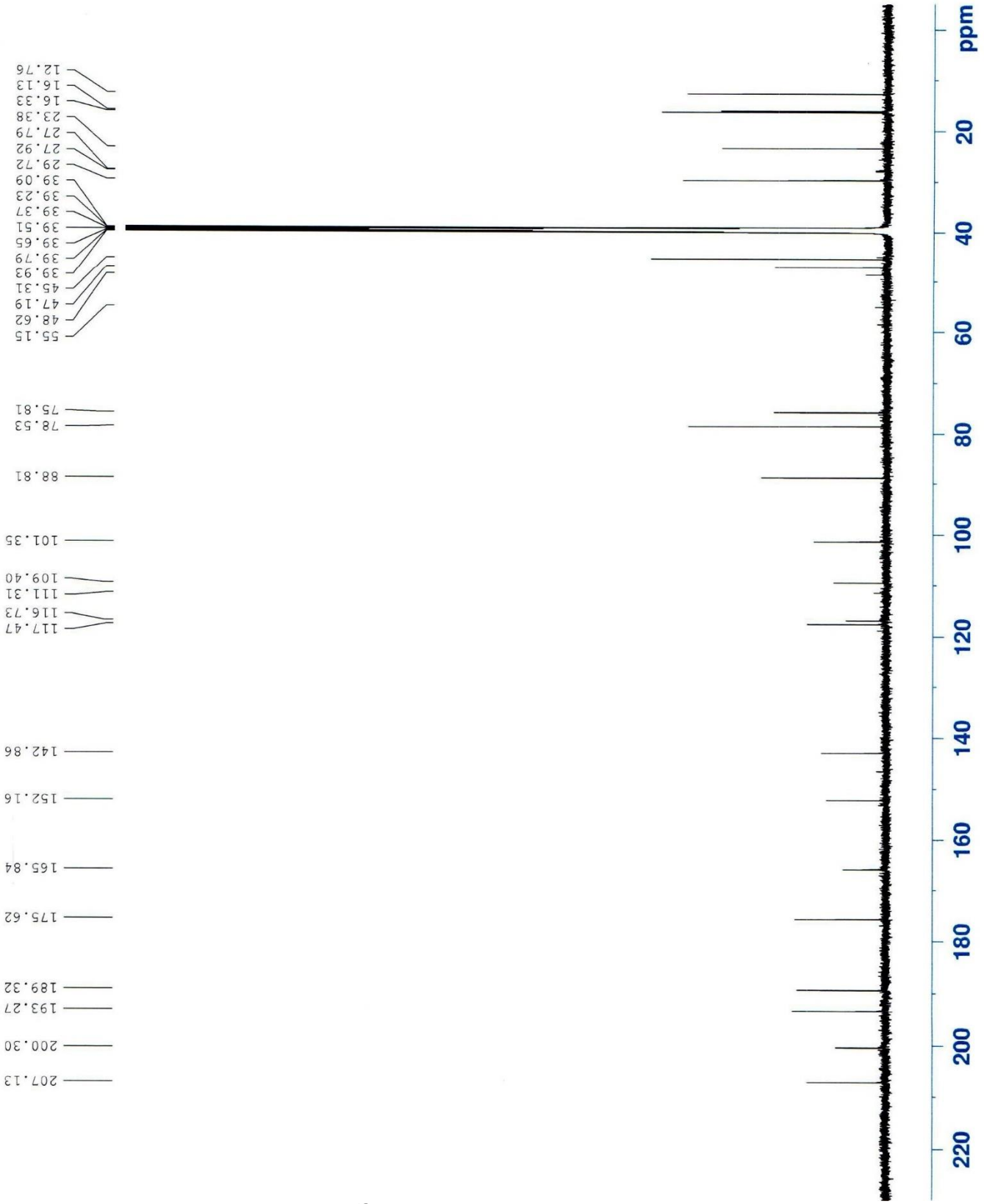
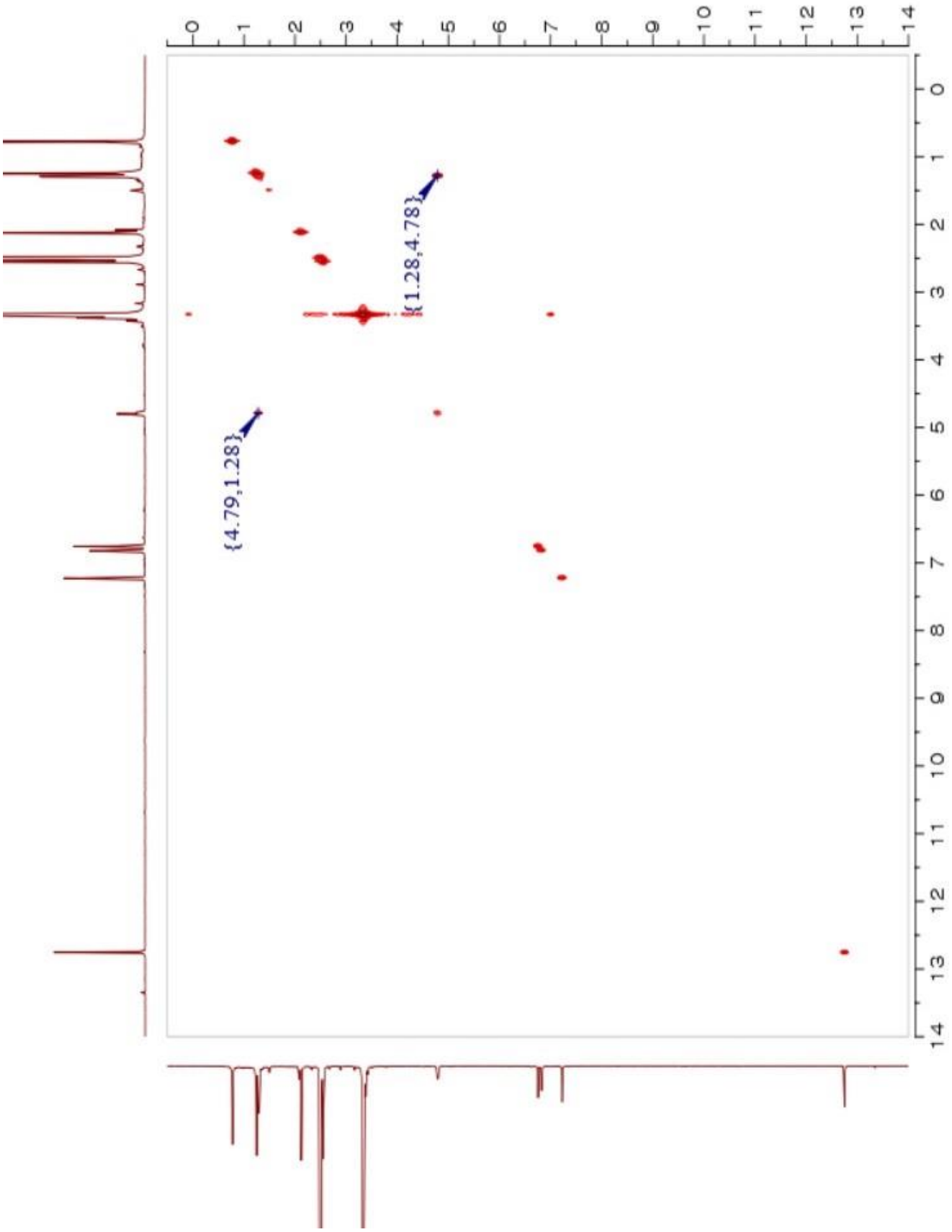


Figure S30. The ^{13}C NMR (150 MHz, DMSO-d_6) spectrum of **5**



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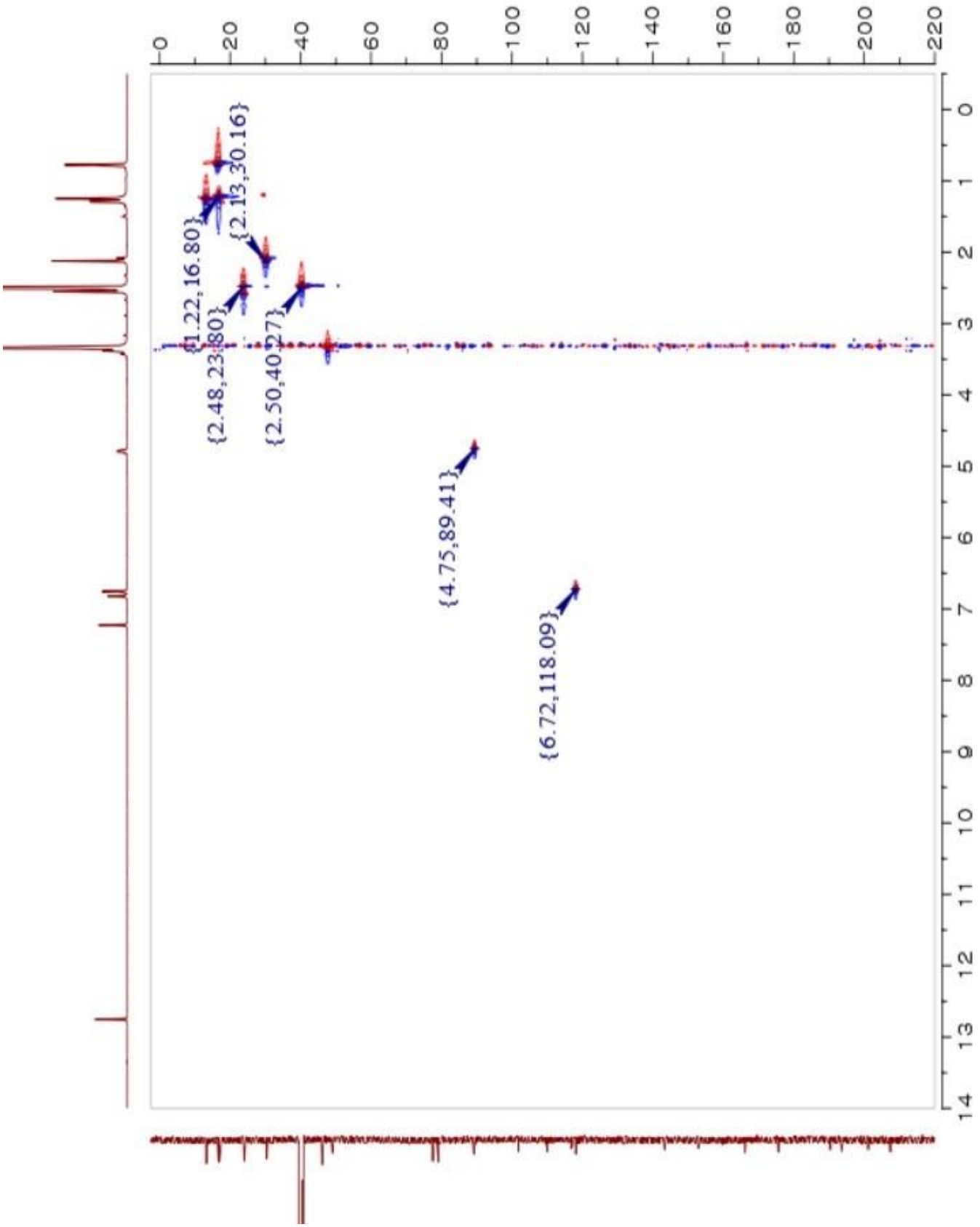
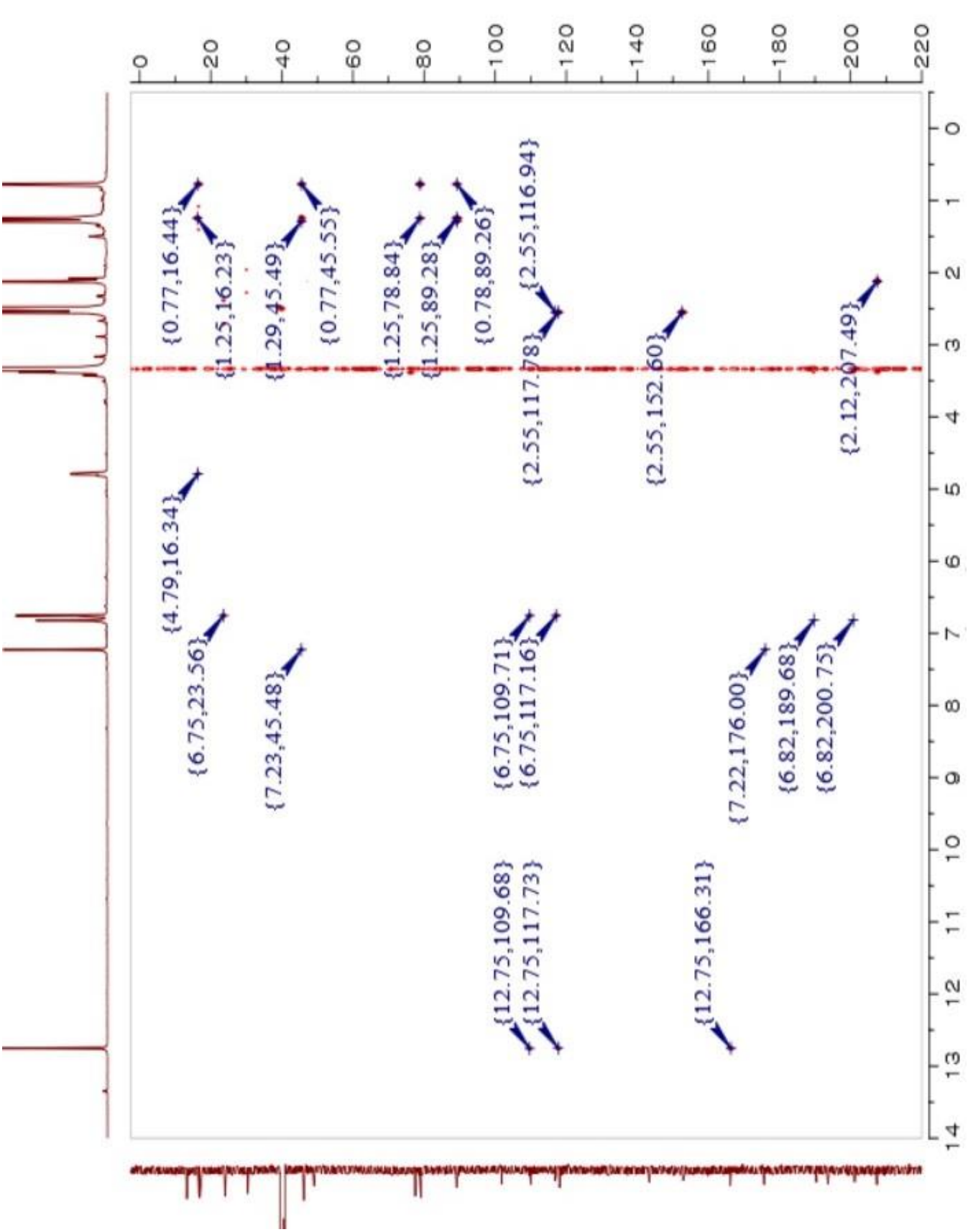


Figure S32. The HSQC (600 MHz, DMSO-d_6) spectrum of **5**



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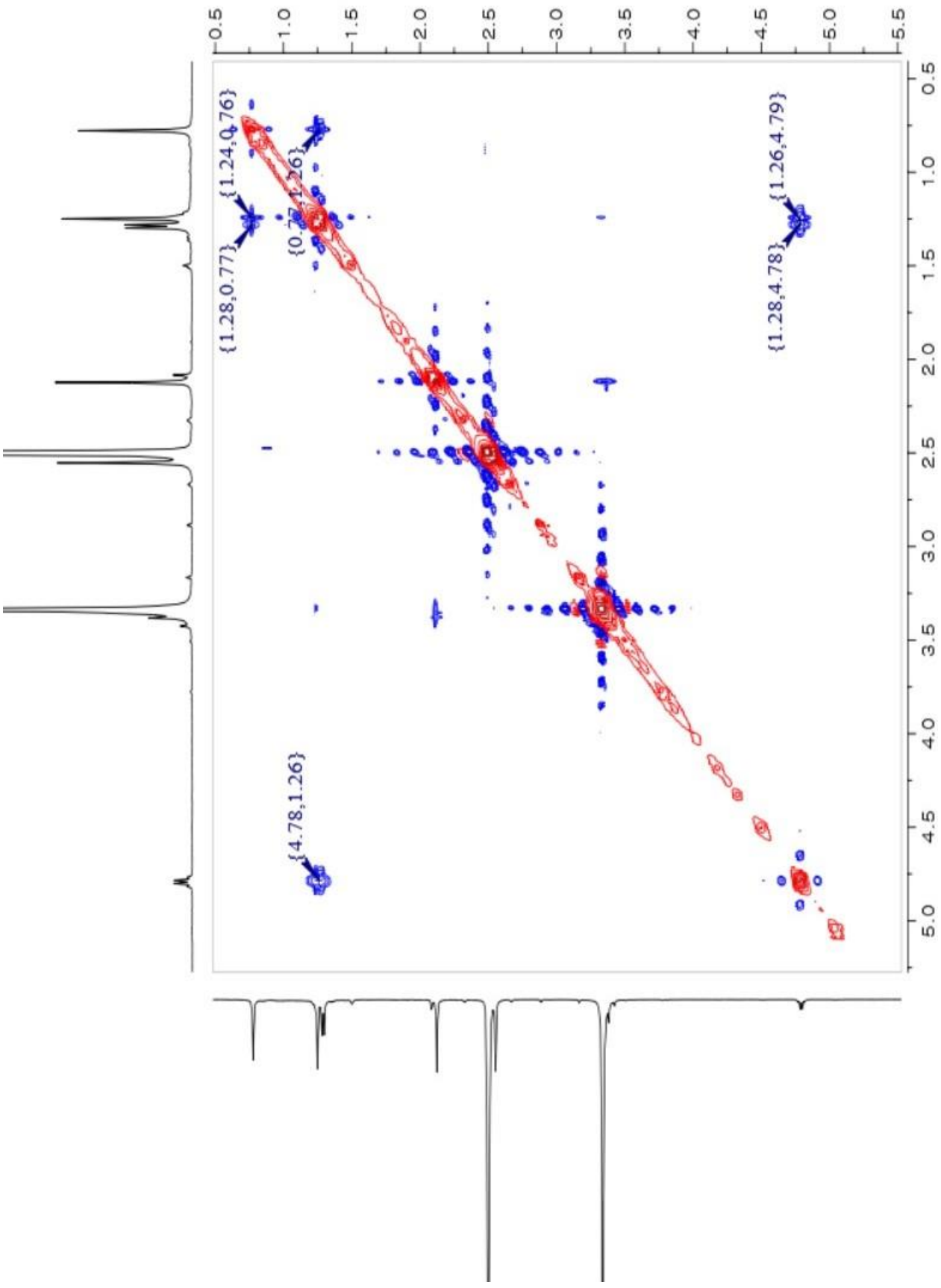

Figure S34. The NOESY (400 MHz, DMSO-d_6) spectrum of **5**

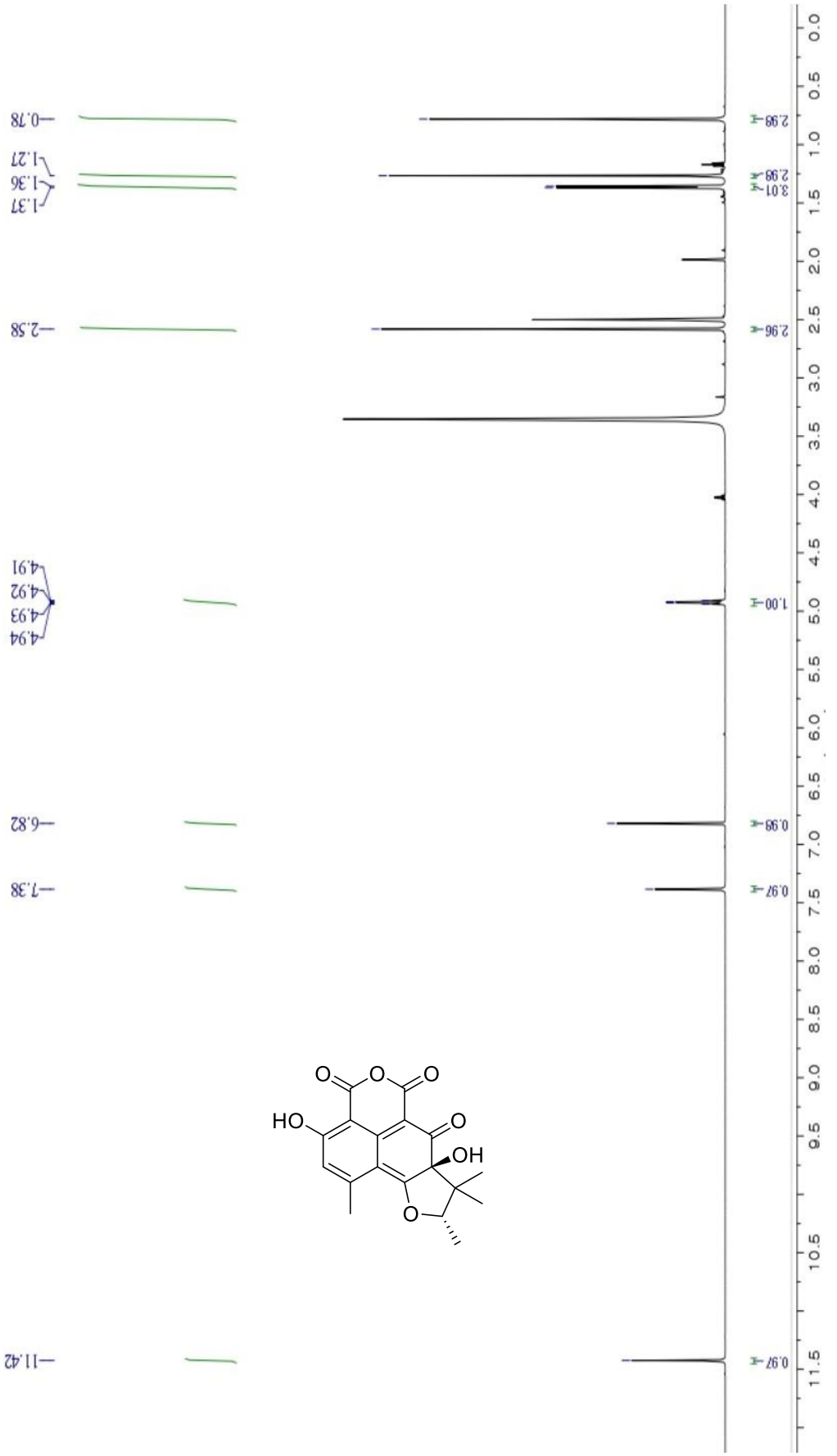

Figure S35. The ^{1}H NMR (600 MHz, DMSO-d_6) spectrum of **6**

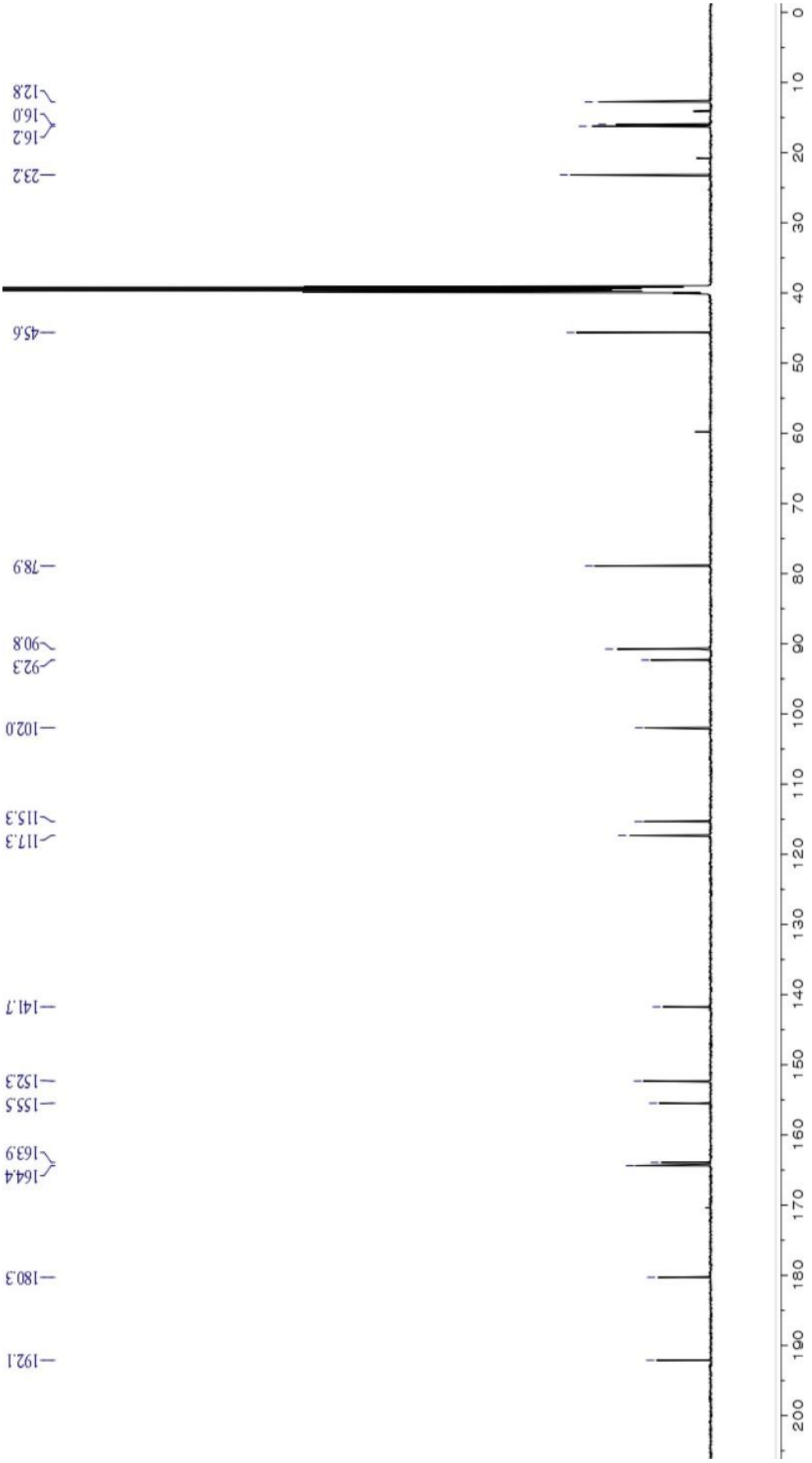

Figure S36. The ^{13}C NMR (150 MHz, DMSO-d_6) spectrum of **6**

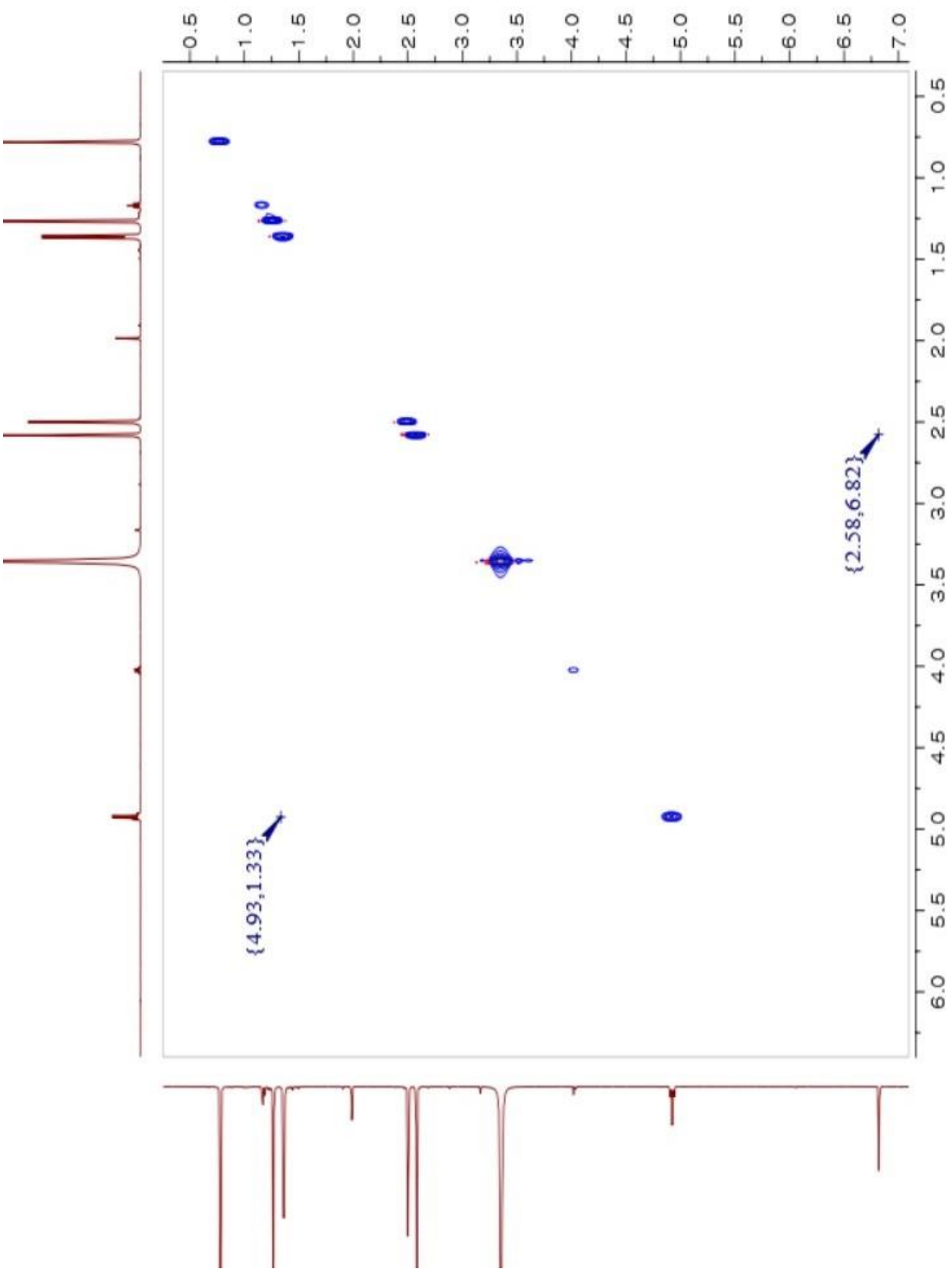

Figure S37. The COSY (600 MHz, DMSO-d_6) spectrum of **6**

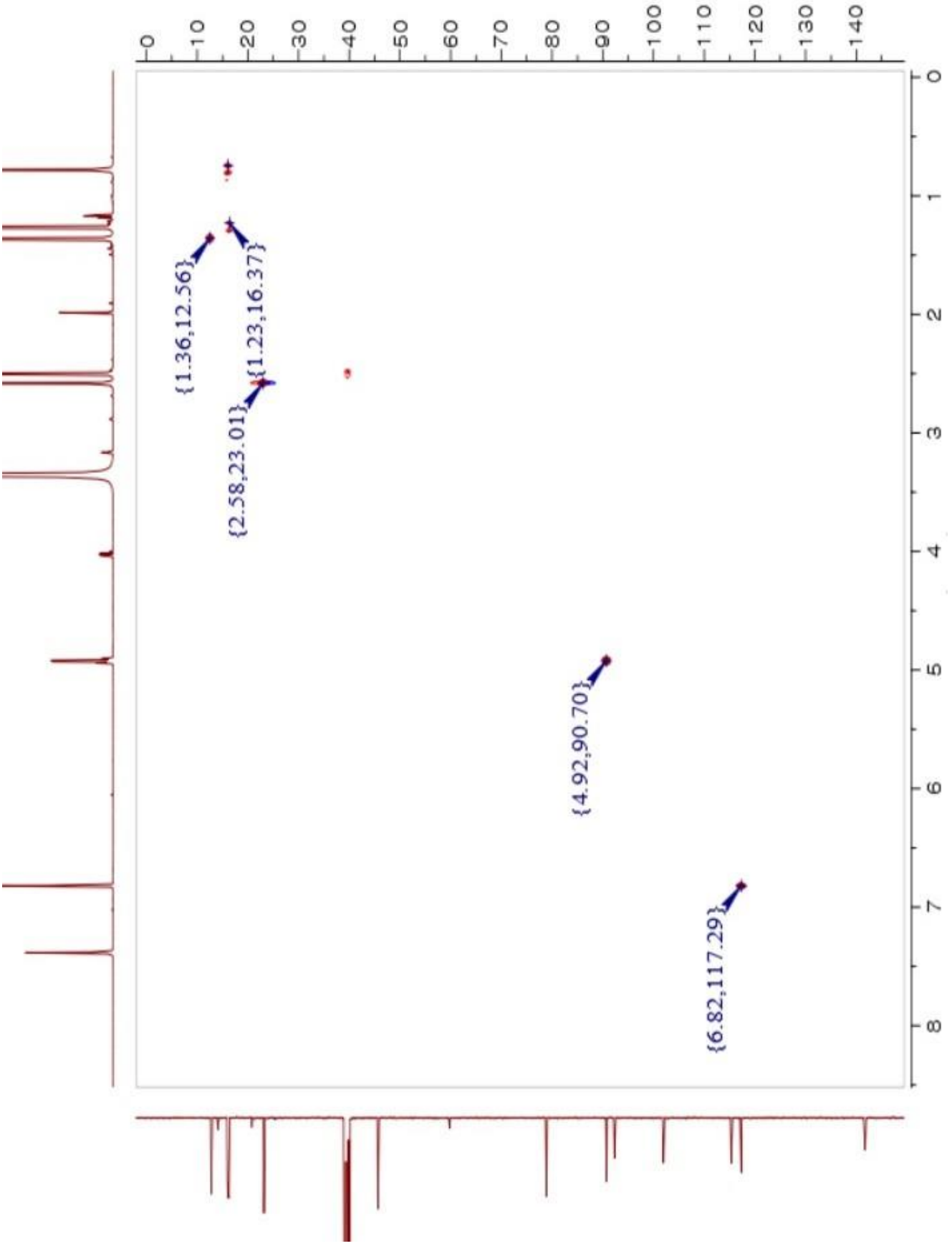

Figure S38. The HSQC (600 MHz, DMSO-d_6) spectrum of **6**

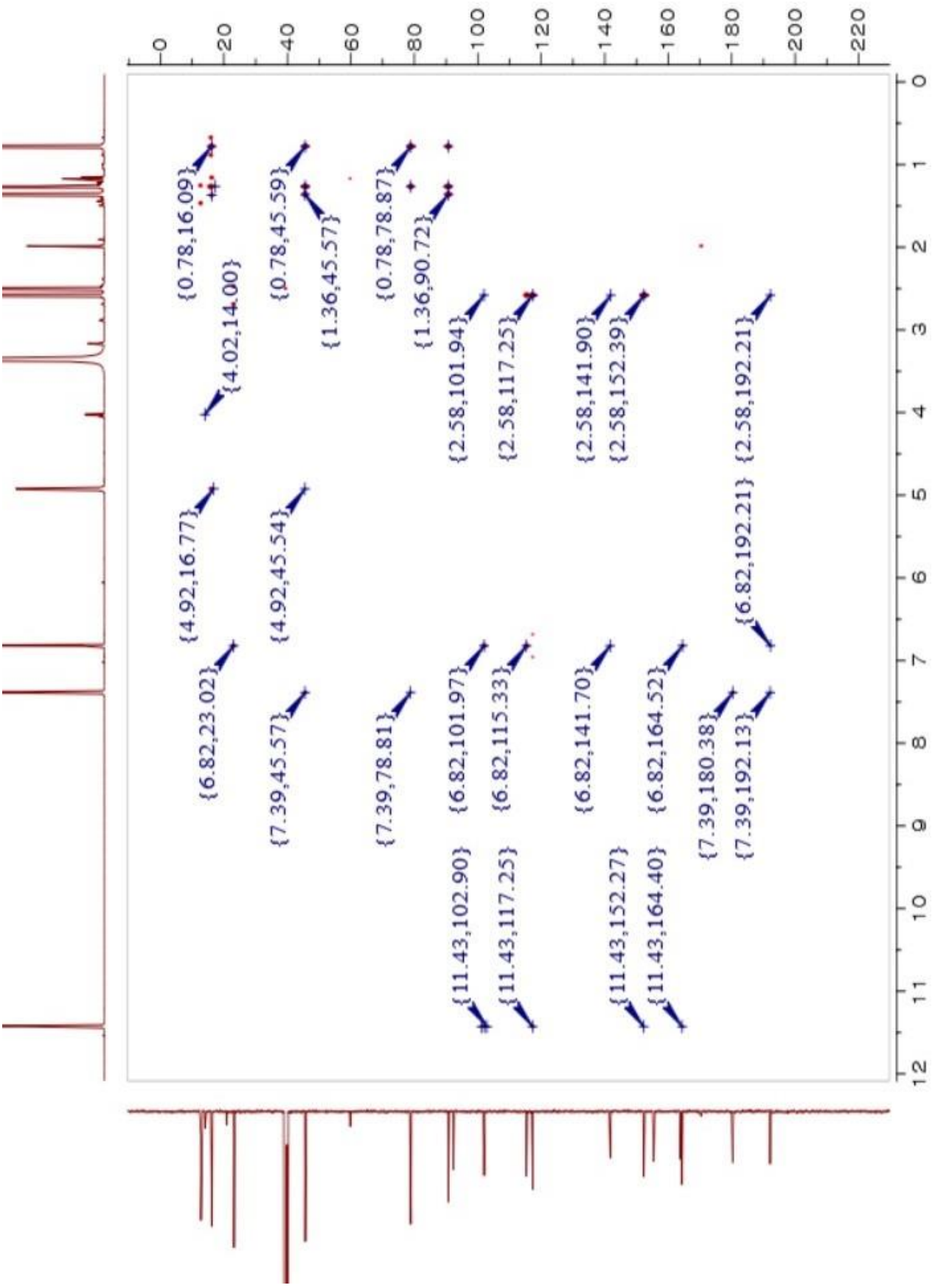

Figure S39. The HMBC (600 MHz, DMSO-d_6) spectrum of **6**

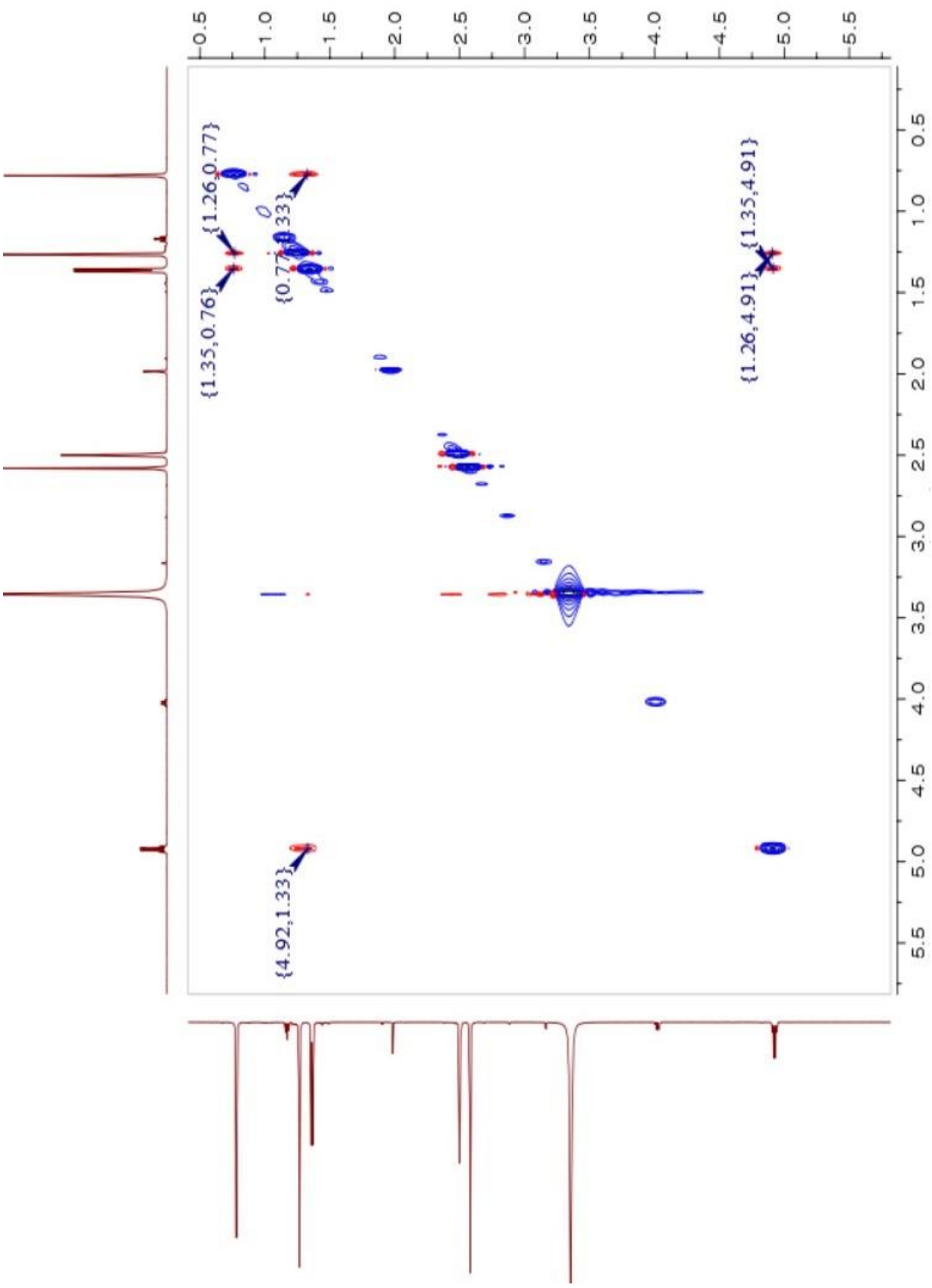

Figure S40. The NOESY (600 MHz, DMSO-d_6) spectrum of **6**

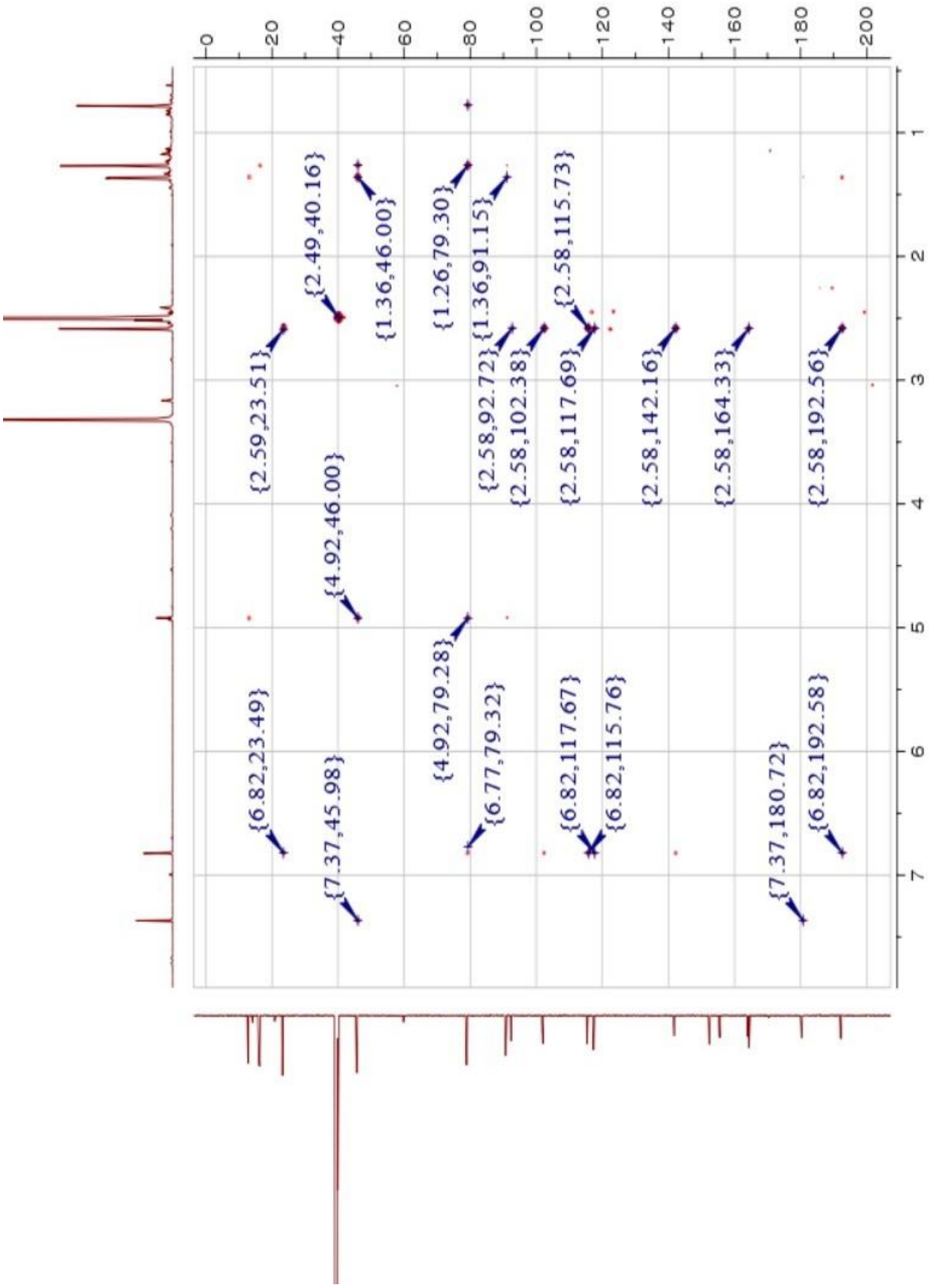

Figure S41. The D-HMBC (800 MHz, J_{CH} = 1 Hz, DMSO-d_6) spectrum of **6**

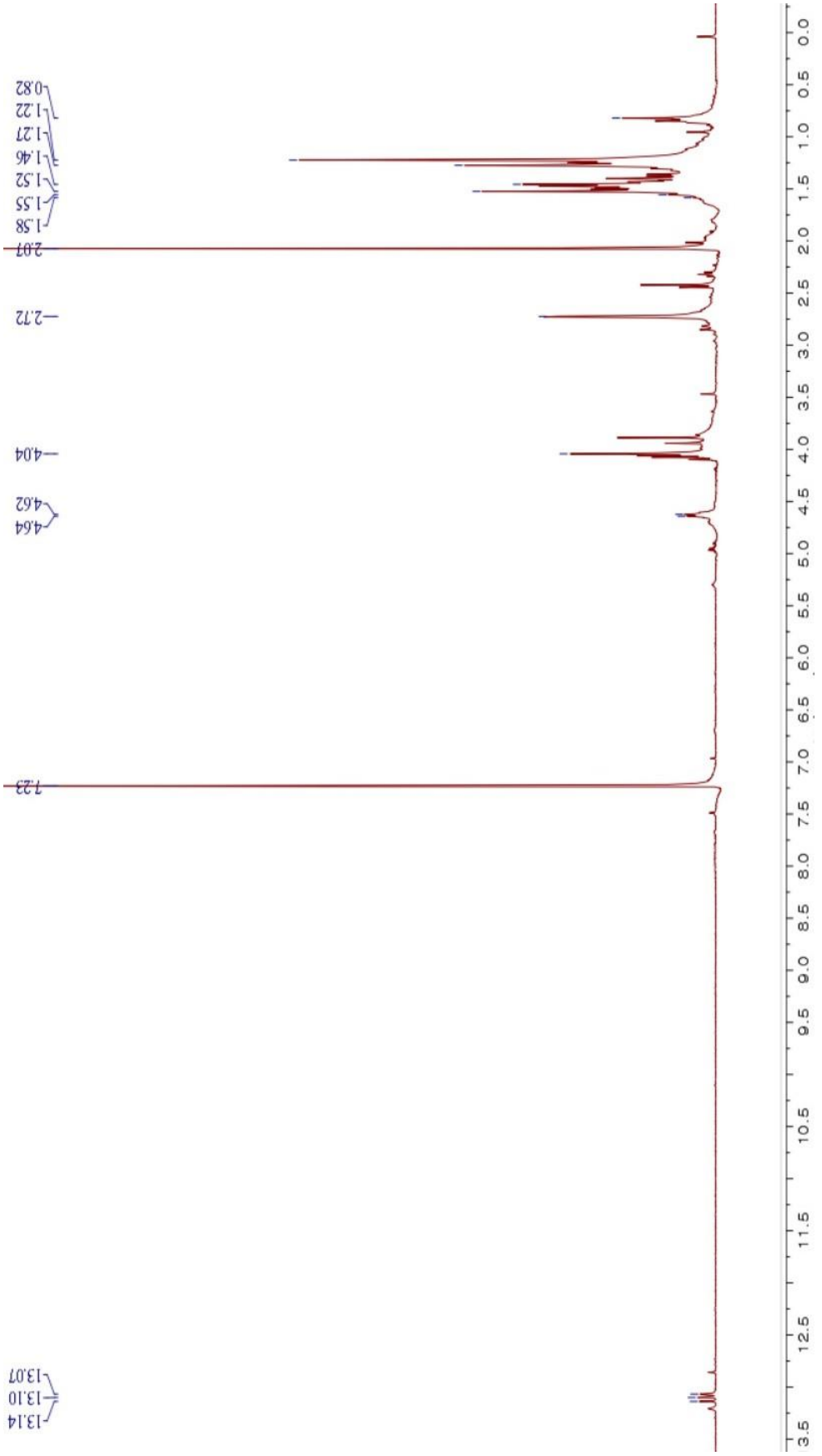

Figure S42. The ^{1}H NMR (400 MHz, $CDCl_3$) spectrum **1a**

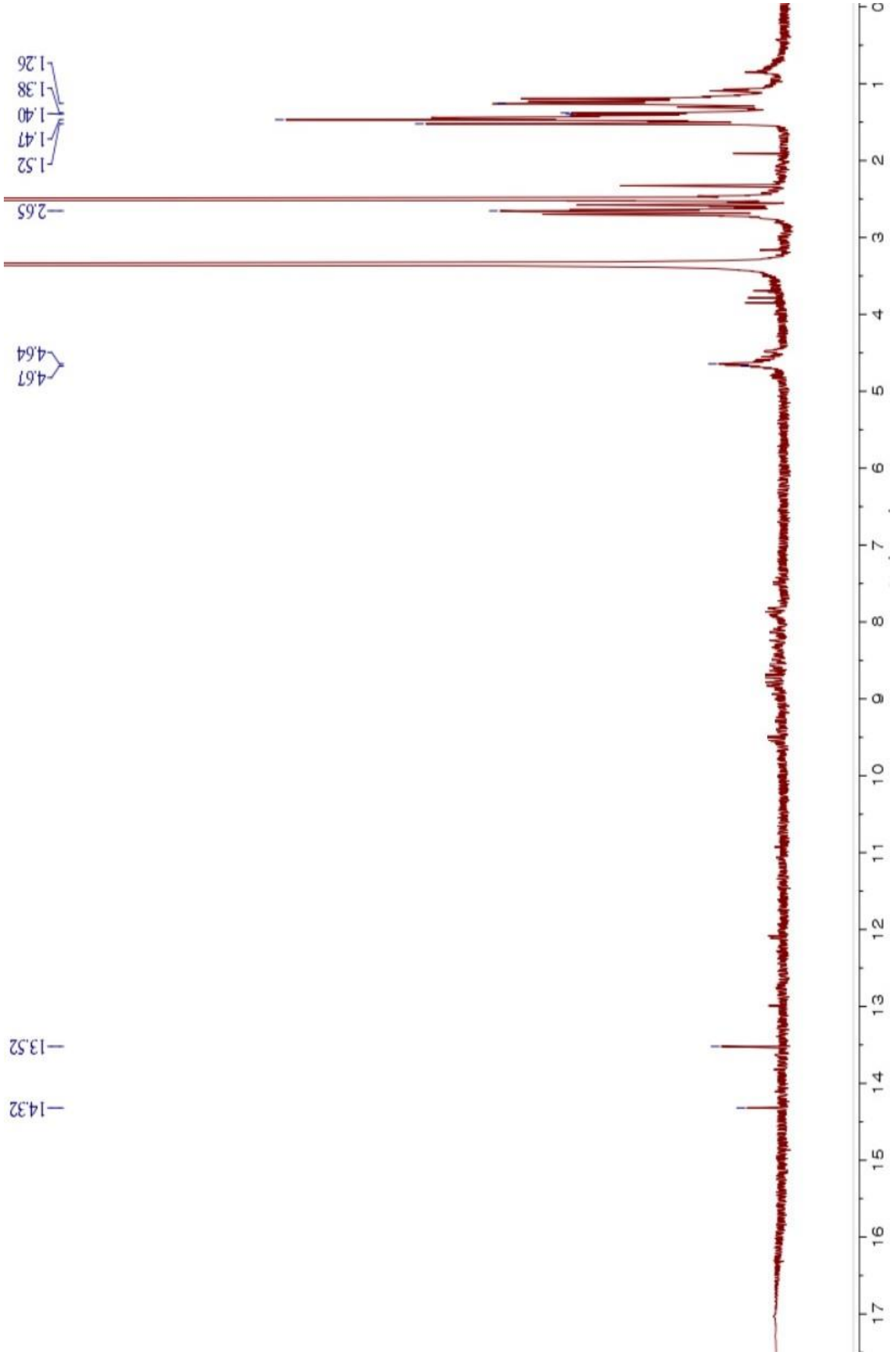

Figure S43. The ^{1}H NMR (400 MHz, DMSO-d_6) spectrum **2a**

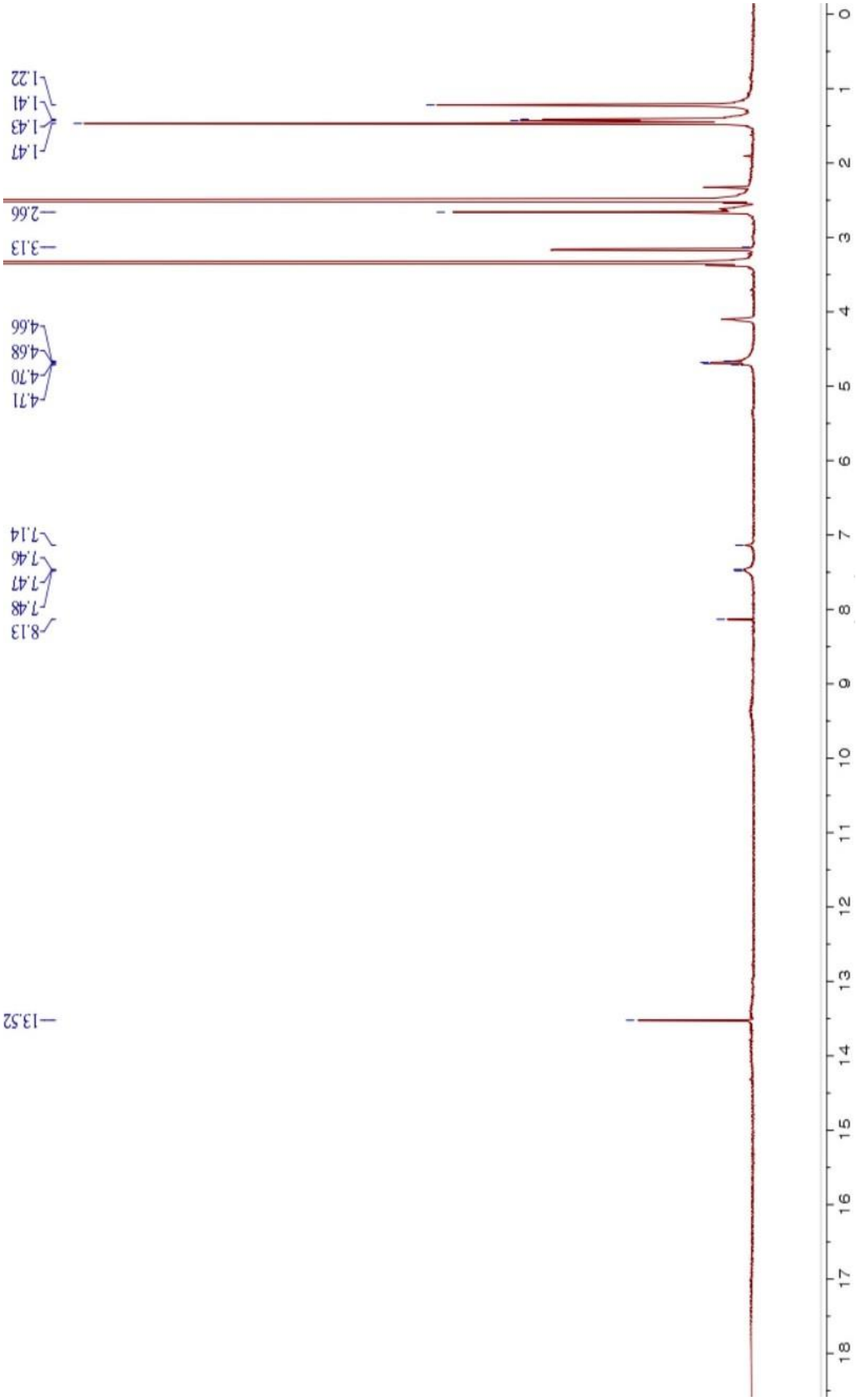

Figure S44. The ^{1}H NMR (400 MHz, DMSO-d_6) spectrum **3a**

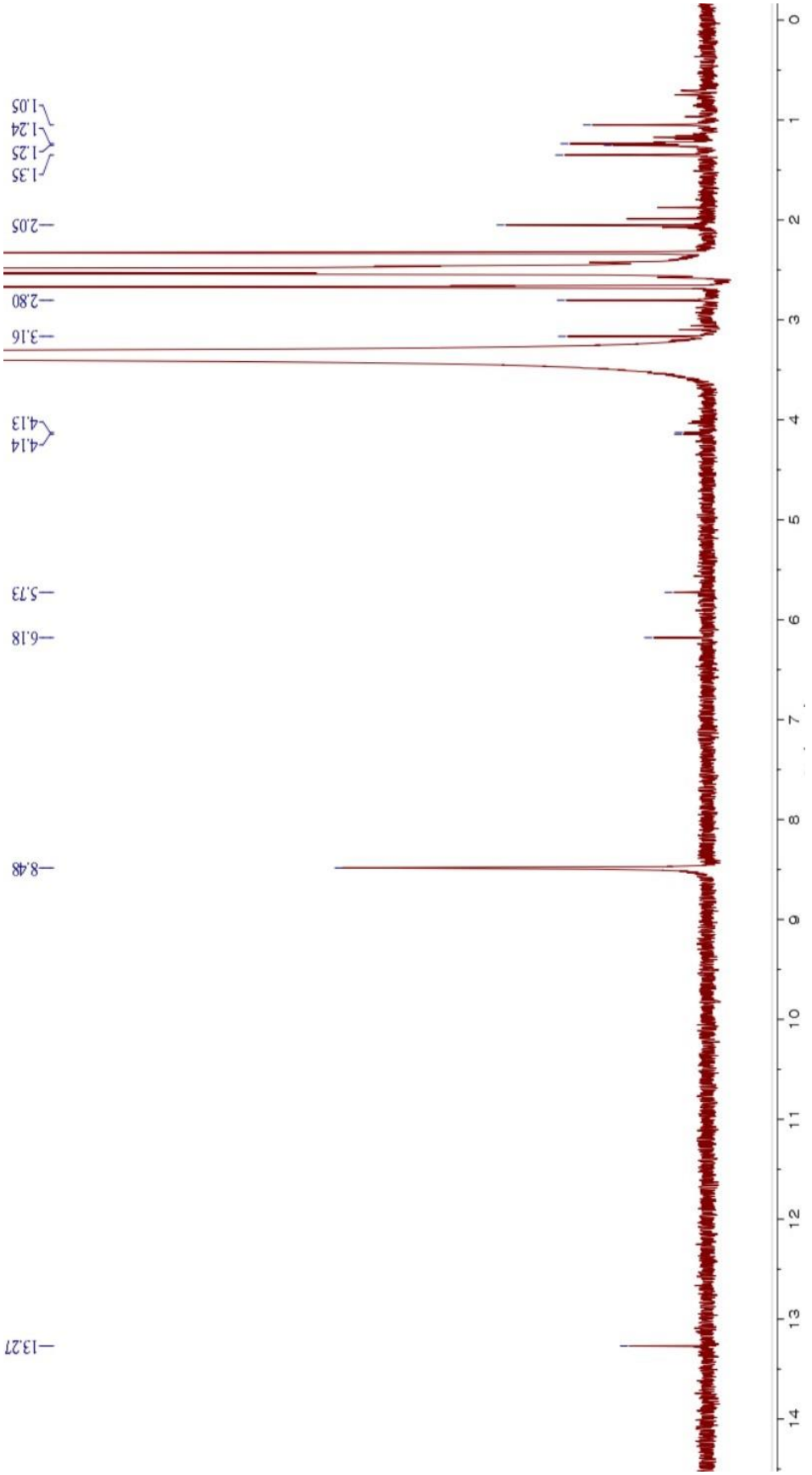

Figure S45. The ^{1}H NMR (400 MHz, DMSO-d_6) spectrum **4a**

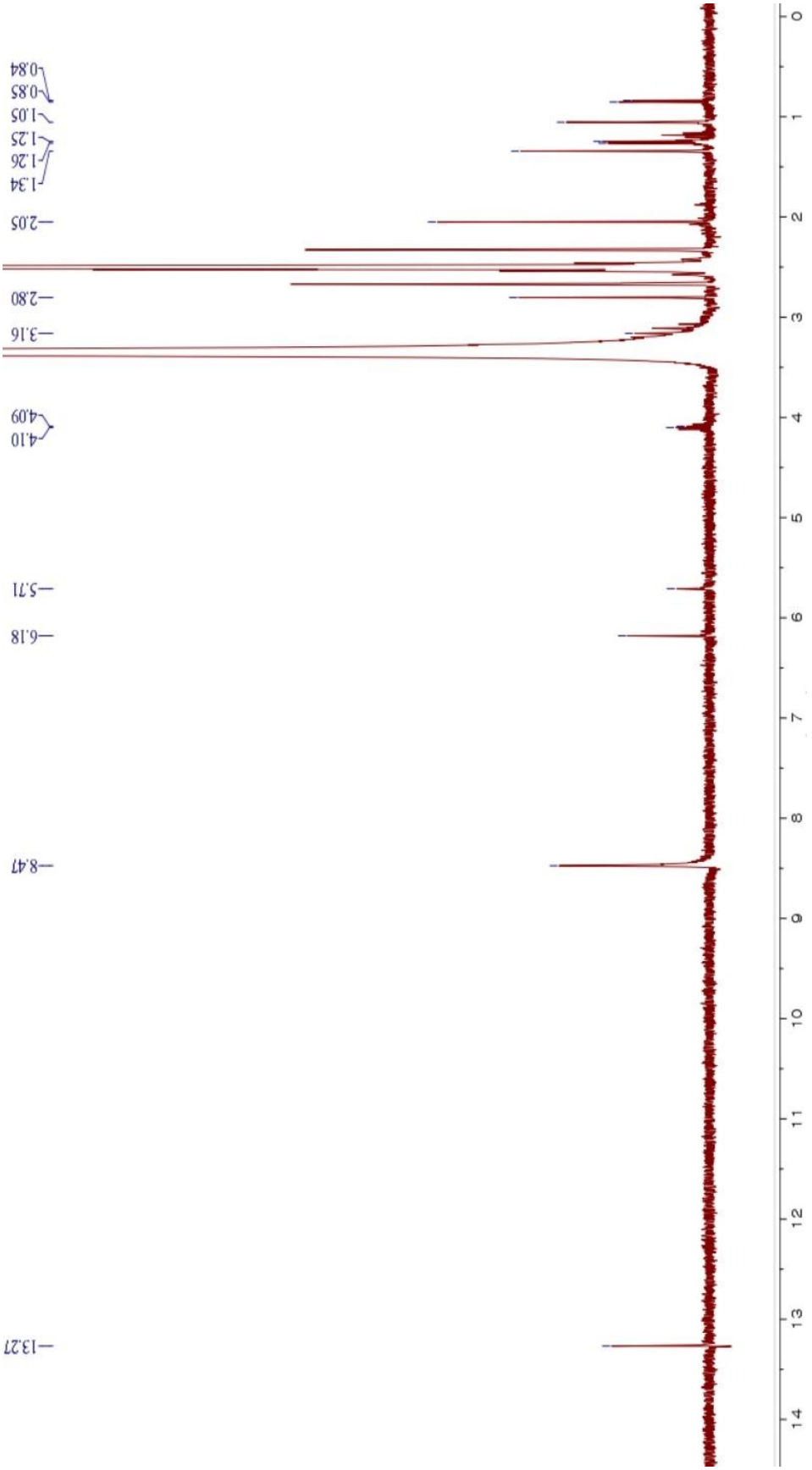

Figure S46. The ^{1}H NMR (400 MHz, DMSO-d_6) spectrum **5a**

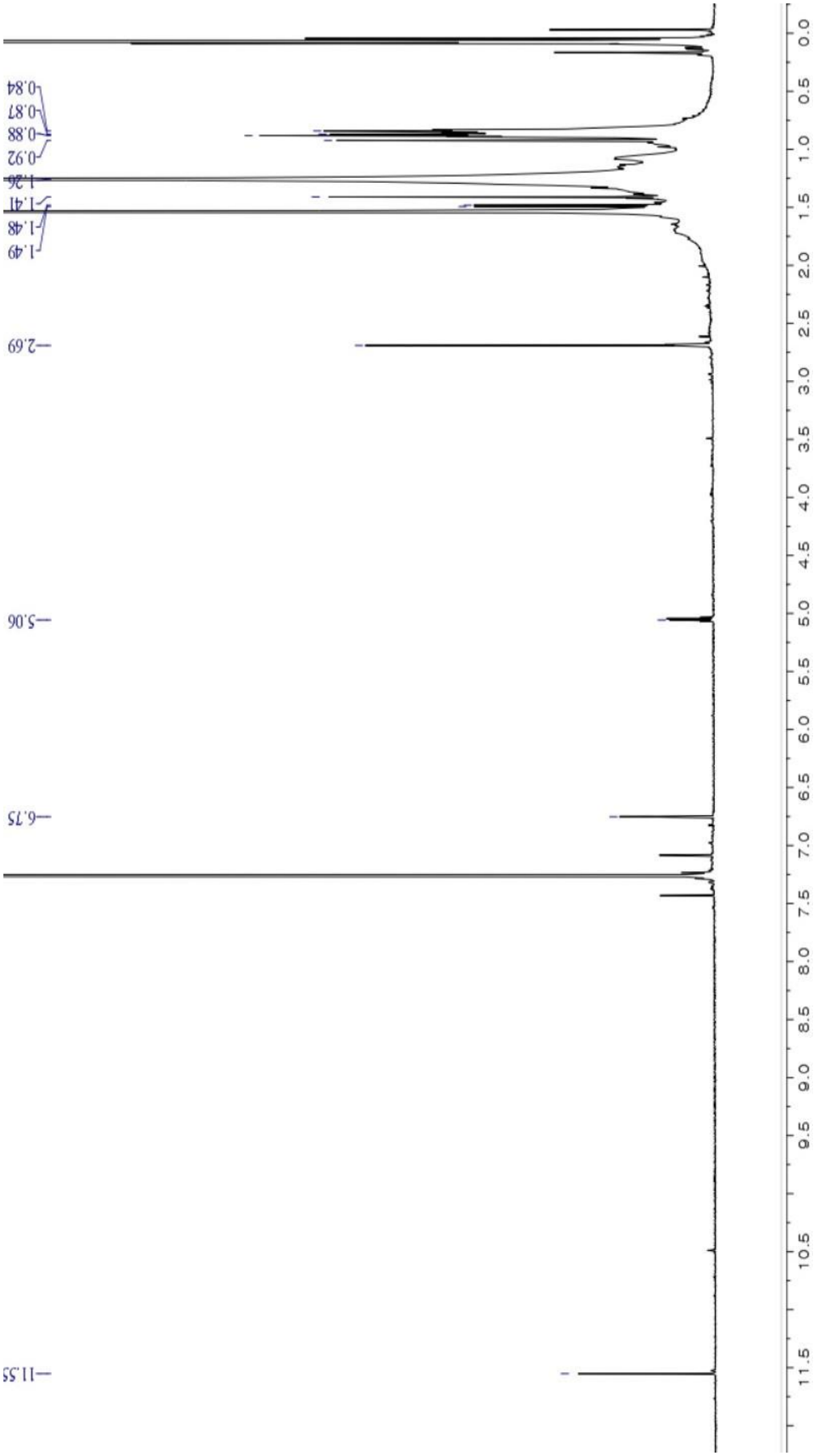

Figure S47. The ^{1}H NMR (400 MHz, $CDCl_3$) spectrum **6a**

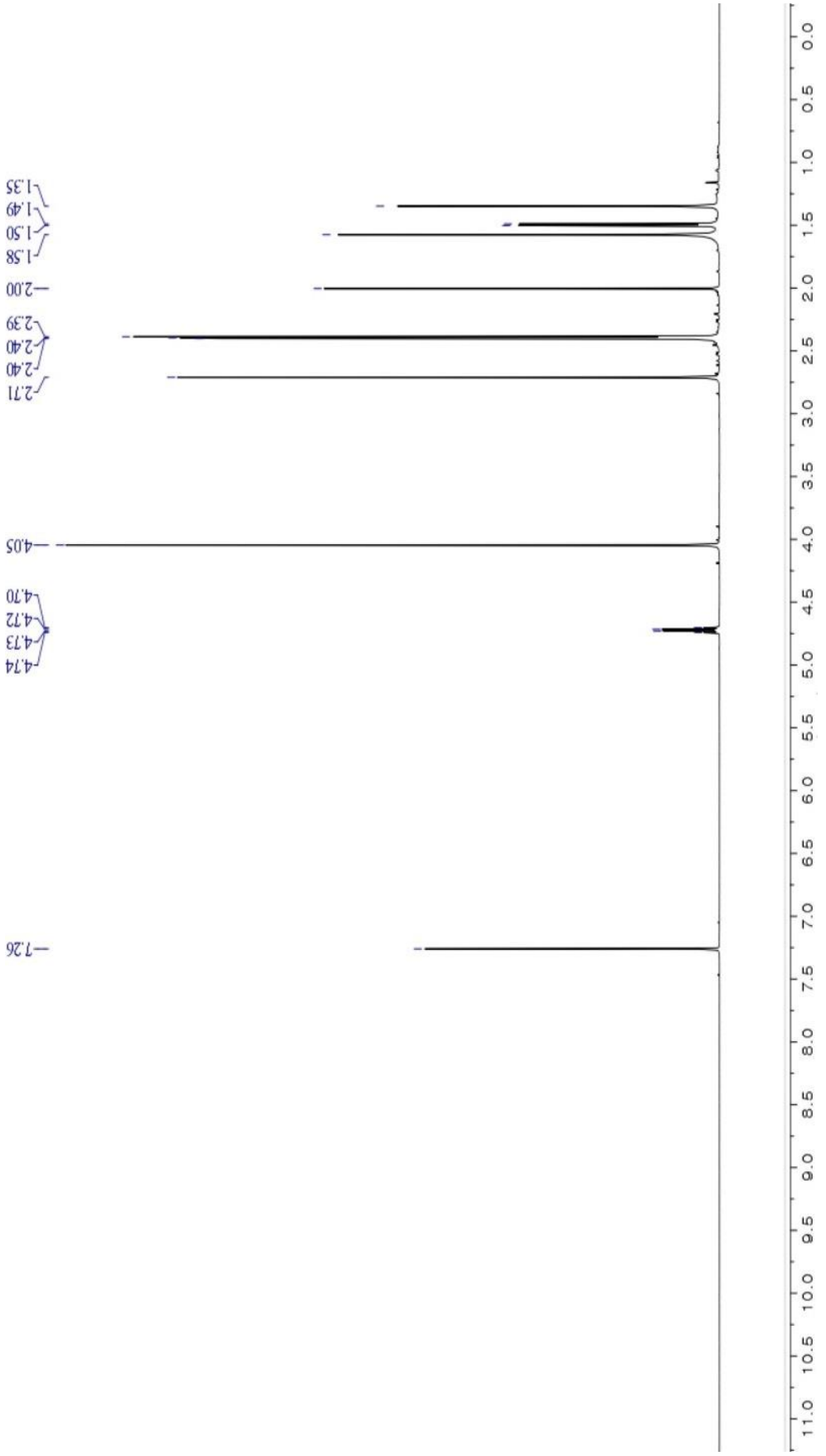

Figure S48. The ^{1}H NMR (600 MHz, $CDCl_3$) spectrum of **1b**

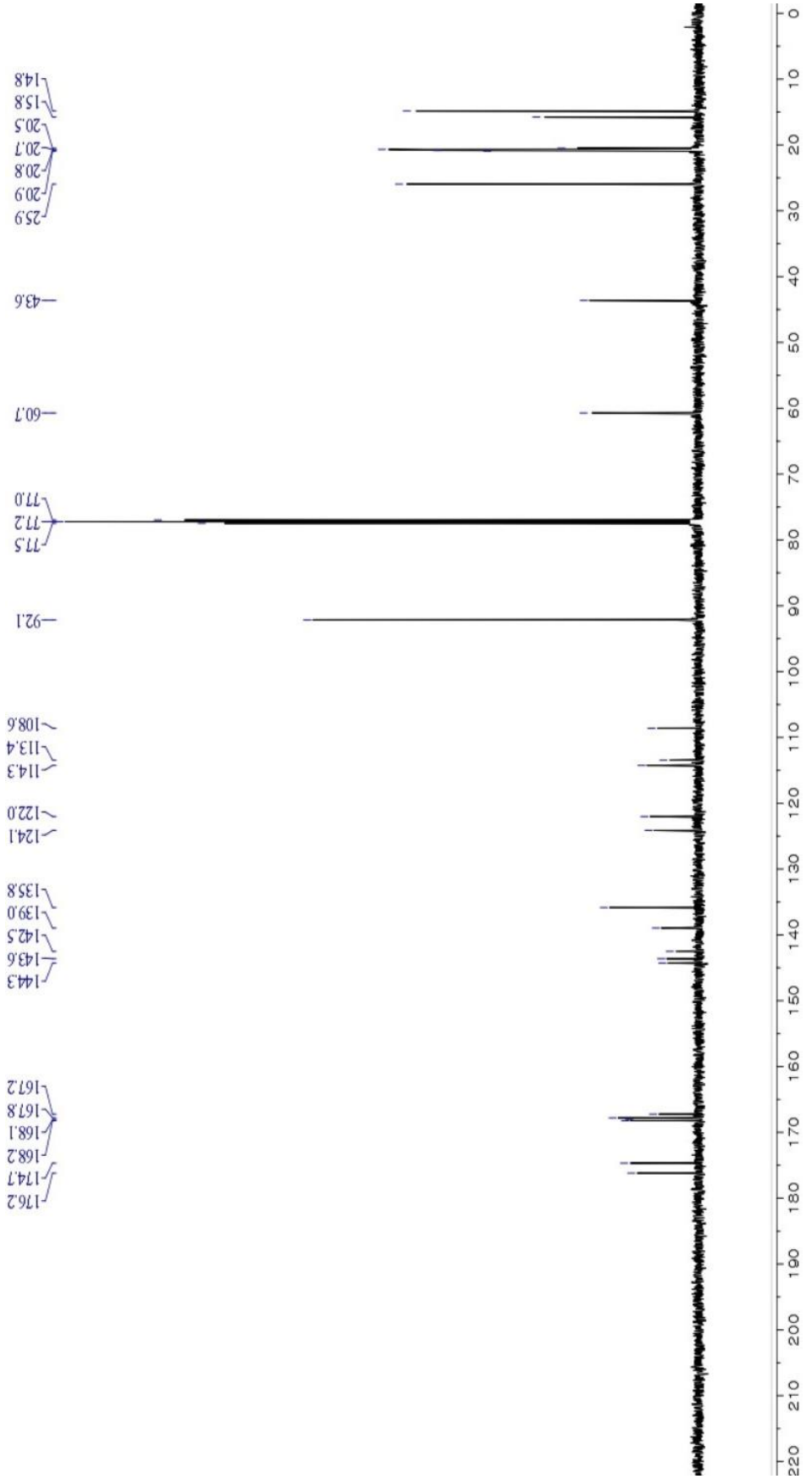

Figure S49. The ^{13}C NMR (150 MHz, $CDCl_3$) spectrum of **1b**

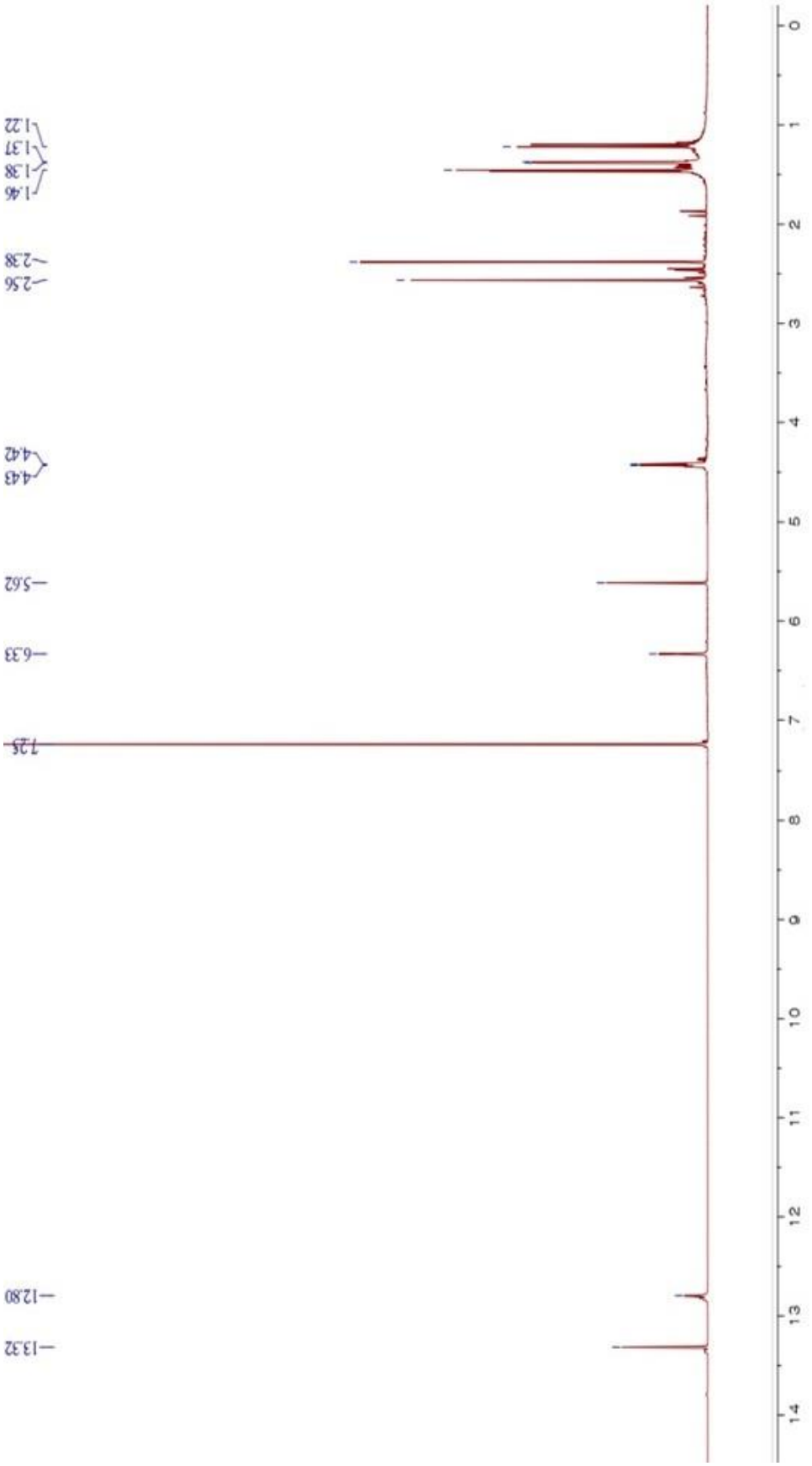

Figure S50. The ^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **4b** (**5b**, **7a**)

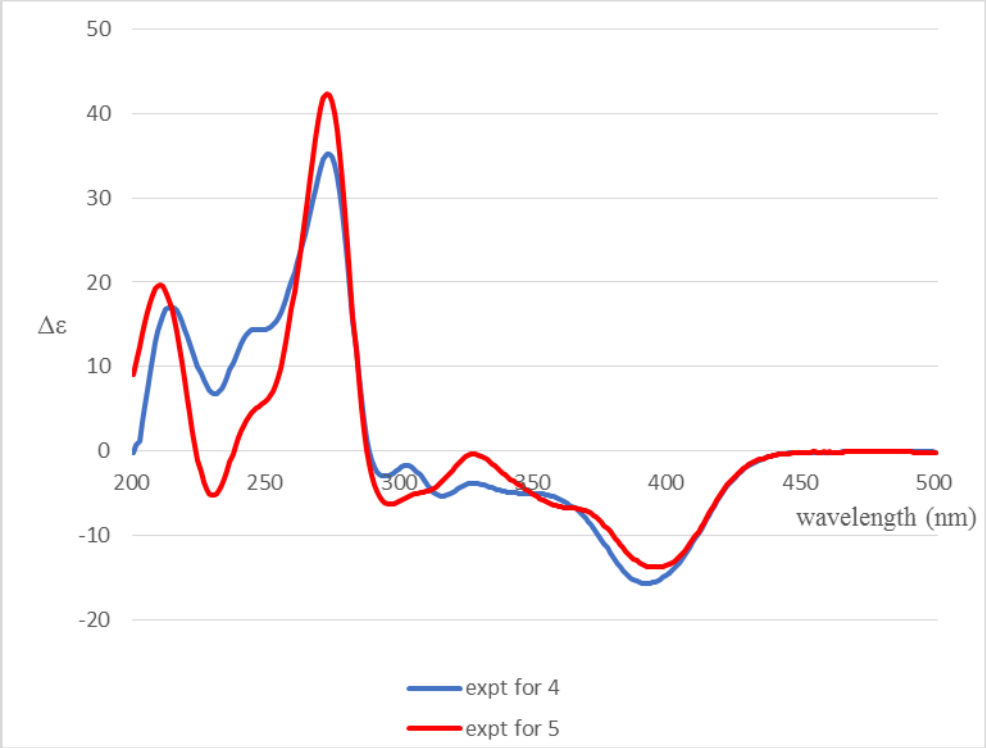

Figure S51. The CD spectra of **4** and **5**

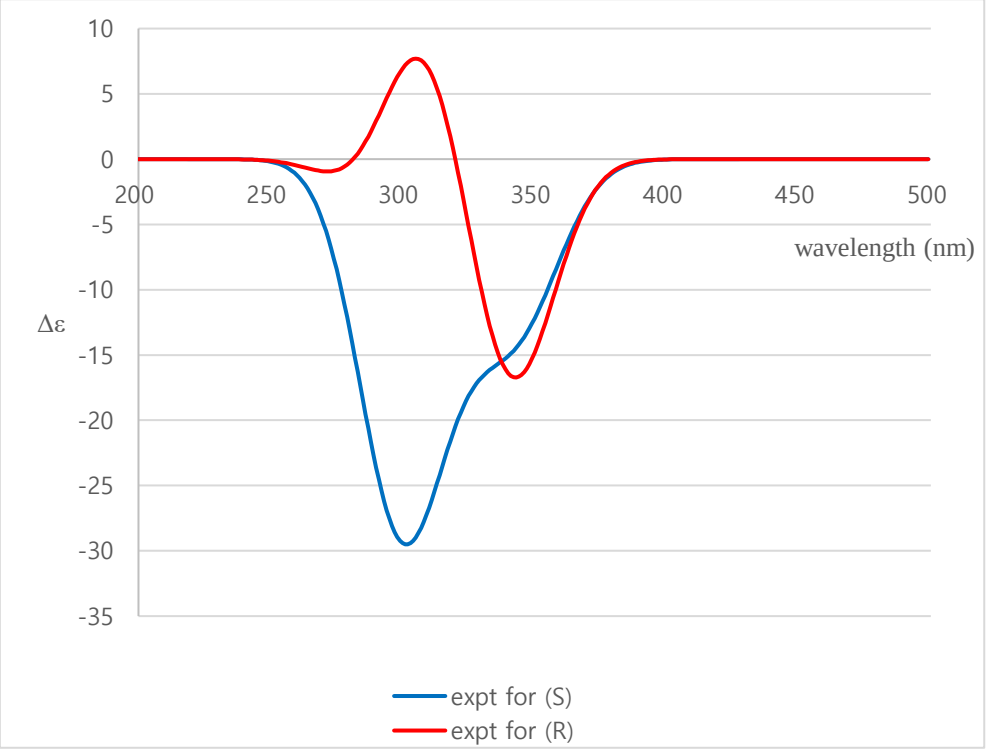

Figure S52. The ECD spectra of **4** and **5**

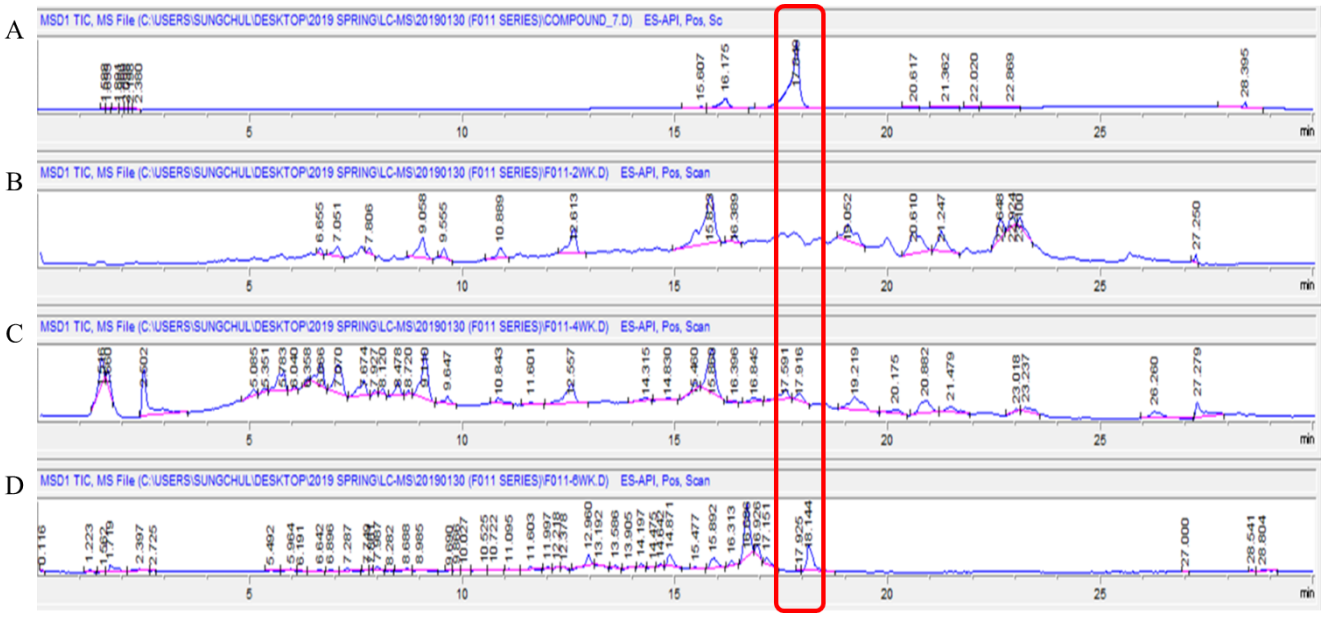

Figure S53. The time-scale LC-MS analysis of **7** (A) Compound **7** (B) Extract from 2 weeks of incubation (C) Extract from 4 weeks of incubation (D) Extract from 6 weeks of incubation

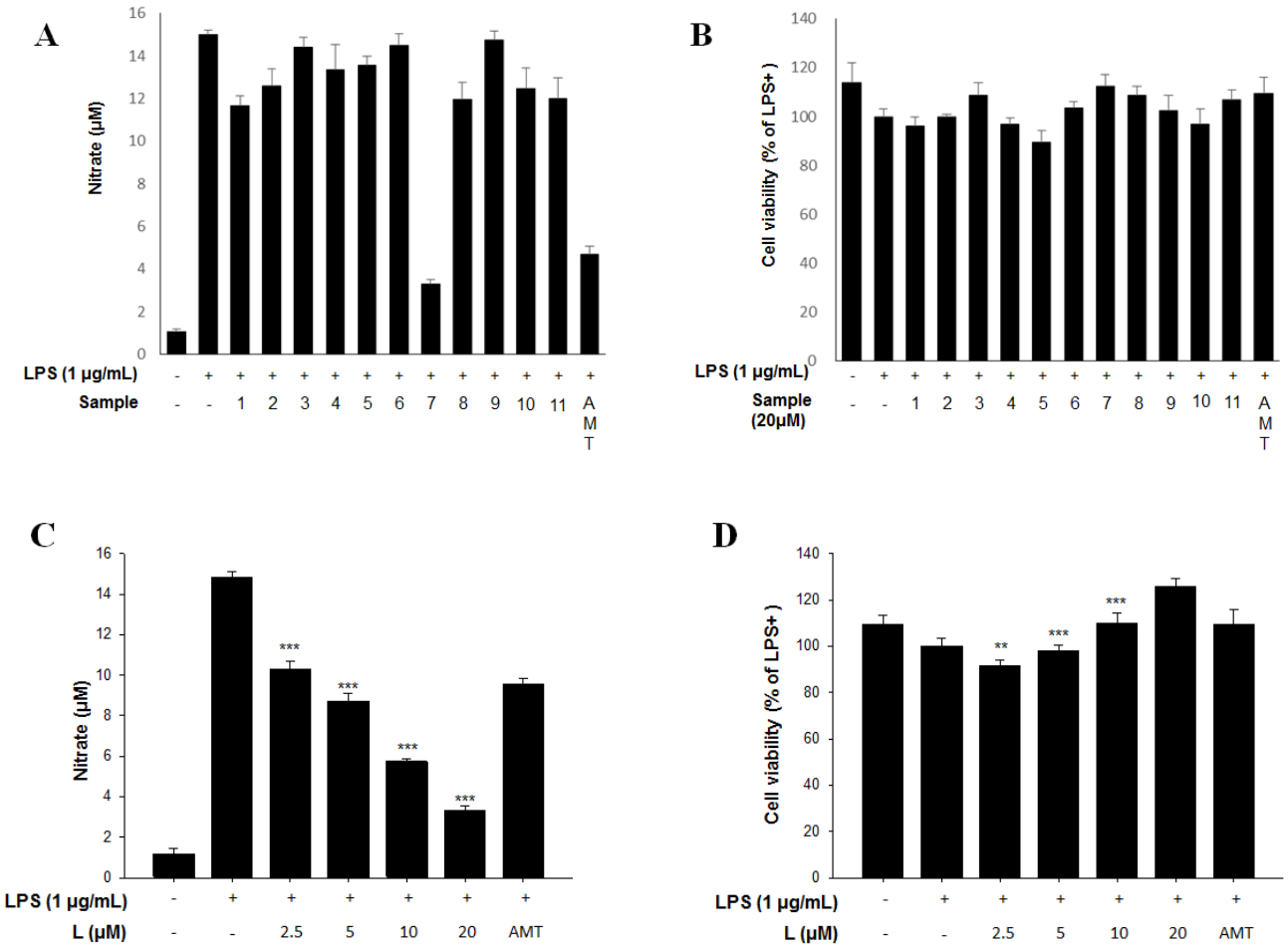

Figure S54. Inhibition of NO production of herqueinone compounds purified from *Penicillium herquei*. The effects of compounds on NO production in RAW 264.7 cells. (A) Cells were pre-treated with compounds (20 uM) and AMT (0.2 uM) for 1 h and LPS (1 ug/mL) was added further incubated for 18 h. The amount of iNOS was examined by Griess reaction. (B) After iNOS level was measured, cell viability was tested using MTT assay. The values are expressed as the means ± SD of triplicate tests. (C) RAW 264.7 cells were pretreated with various concentrations of compound **7** and AMT (0.2 uM) for 1 h, and LPS (1 ug/mL) was added further incubated for 18 h. The amount of iNOS was examined by Griess reaction. (D) Cell viability was tested by MTT assay. The values are expressed as the means ± SD of triplicate tests.

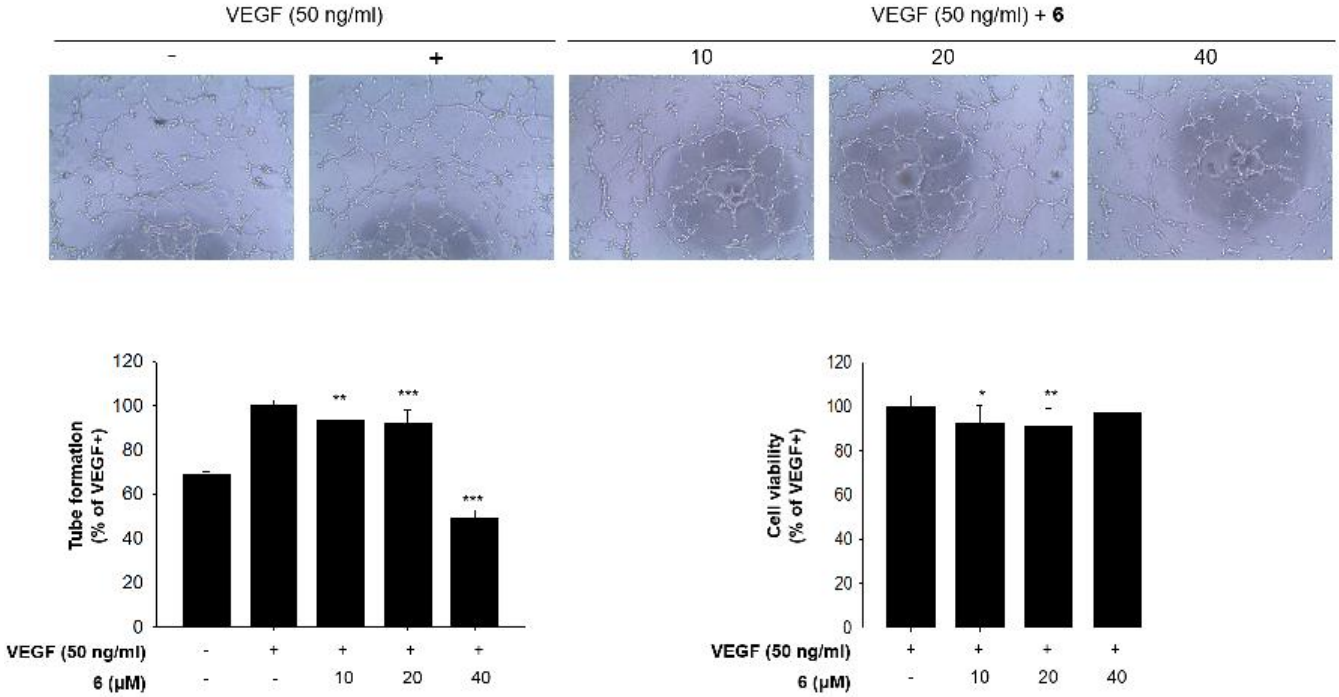

Figure S55. Angiogenesis activities of herqueinone compounds purified from *Penicillium herquei*. Effects of **6** on VEGF-induced tube formation and cell viability. Tube formation activity was measured after cells were incubated with indicated concentrations of **6** on matrigel-coated 96wells for 6 h in the presence of VEGF (50 ng/mL) compared to control in the absence of VEGF. Cell viability was measured by MTT assay after treat with indicated concentrations of **6** in the presence of VEGF (50 ng/mL) for 24 h. The values are expressed as the means ± SD of triplicate tests. * $p \leq 0.05$, ** $p \leq 0.01$ and *** $p \leq 0.001$.

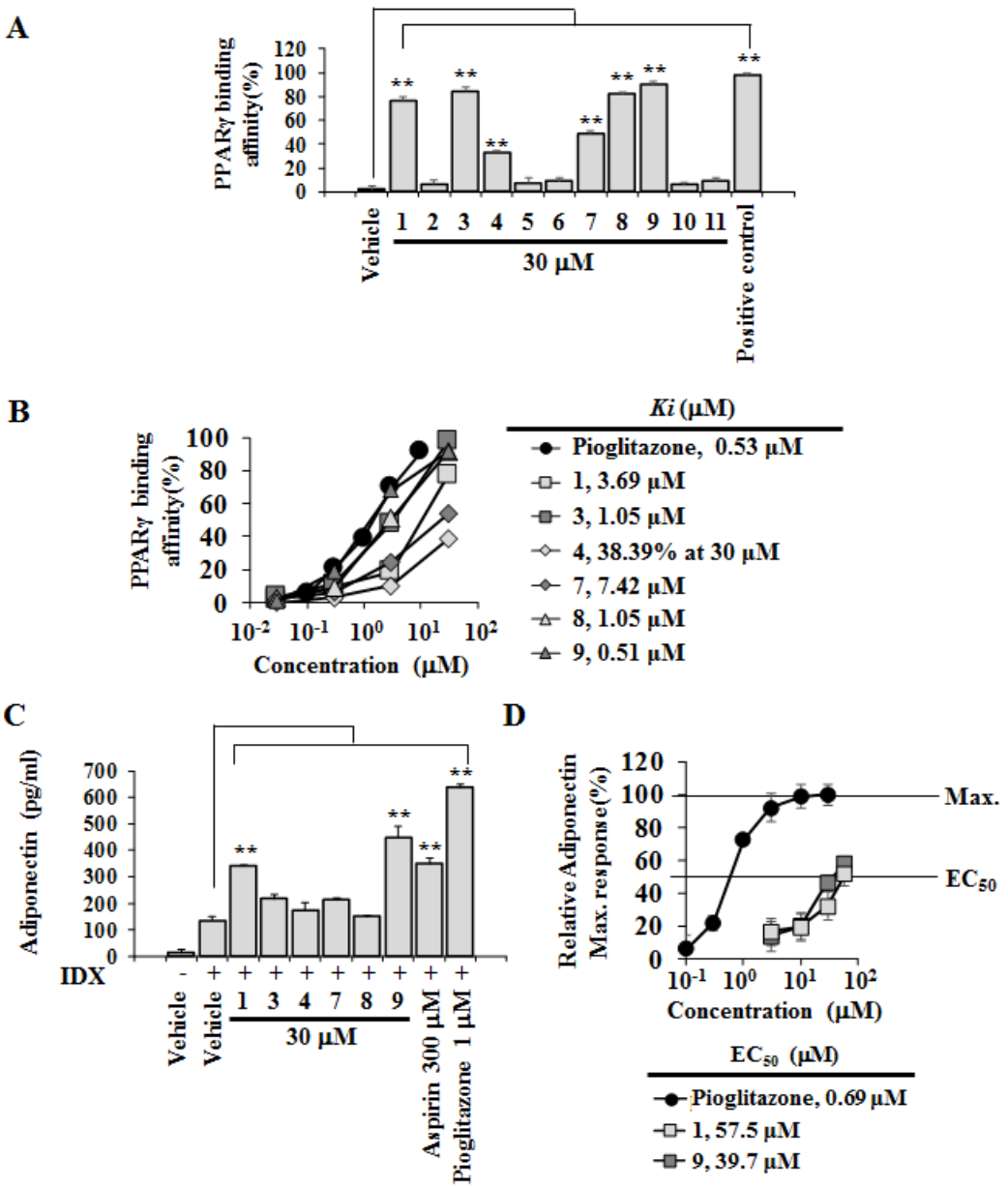

Figure S56. PPARγ binding and adiponectin secretion-promoting activities of herqueinone compounds purified from *Penicillium herquei*. (A) TR-FRET based competitive PPARγ binding assays were performed for herqueinone compounds **1**-**11**. (B) Ki values for compounds **1**, **3**, **4**, **7**, **8** and **9** were calculated based on the Cheng and Prusoff analysis. (C) Herqueinone compounds were added to the IDX condition when adipogenesis was induced in hBM-MSCs. On the fifth day, the cell culture supernatants were harvested. ELISA was performed to measure the level of adiponectin. Positive controls were pioglitazone and aspirin. (D) The concentration dependency of herqueinone compounds **1**, and **9** on adiponectin secretion-promoting activity was determined. Values represent means ± SD (n=3); * $p \leq 0.05$ and ** $p \leq 0.01$.

Table S1. Results of bioactivity tests

	IC_{50} (μM)		EC_{50} (μM)
Compound	RAW 264.7	HUVECs	hBM-MSC(B7)
1	>20	>40	57.5
2	>20	>40	ND
3	>20	>40	ND
4	>20	>40	ND
5	>20	>40	ND
6	>20	20.9	ND
7	3.2	>40	ND
8	>20	>40	ND
9	>20	>40	39.7
10	>20	>40	ND
11	>20	>40	ND
AMT	0.2		
Sunitinib		1.5	
Pioglitazone			0.69