

Isolation and Identification of Flavonoids from the Saudi Arabian Plant *Retama raetam* which Stimulate Secretion of Insulin and Inhibit α -Glucosidase

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Fig. S75: CD spectrum of **8**

Table S1: ^1H and ^{13}C NMR spectroscopic data for **4,9,10** in $(\text{CD}_3)_2\text{SO}$ [δ_{H} , multiplicity (J (Hz)); δ_{C} , type]

Table S2: Insulin secretion data

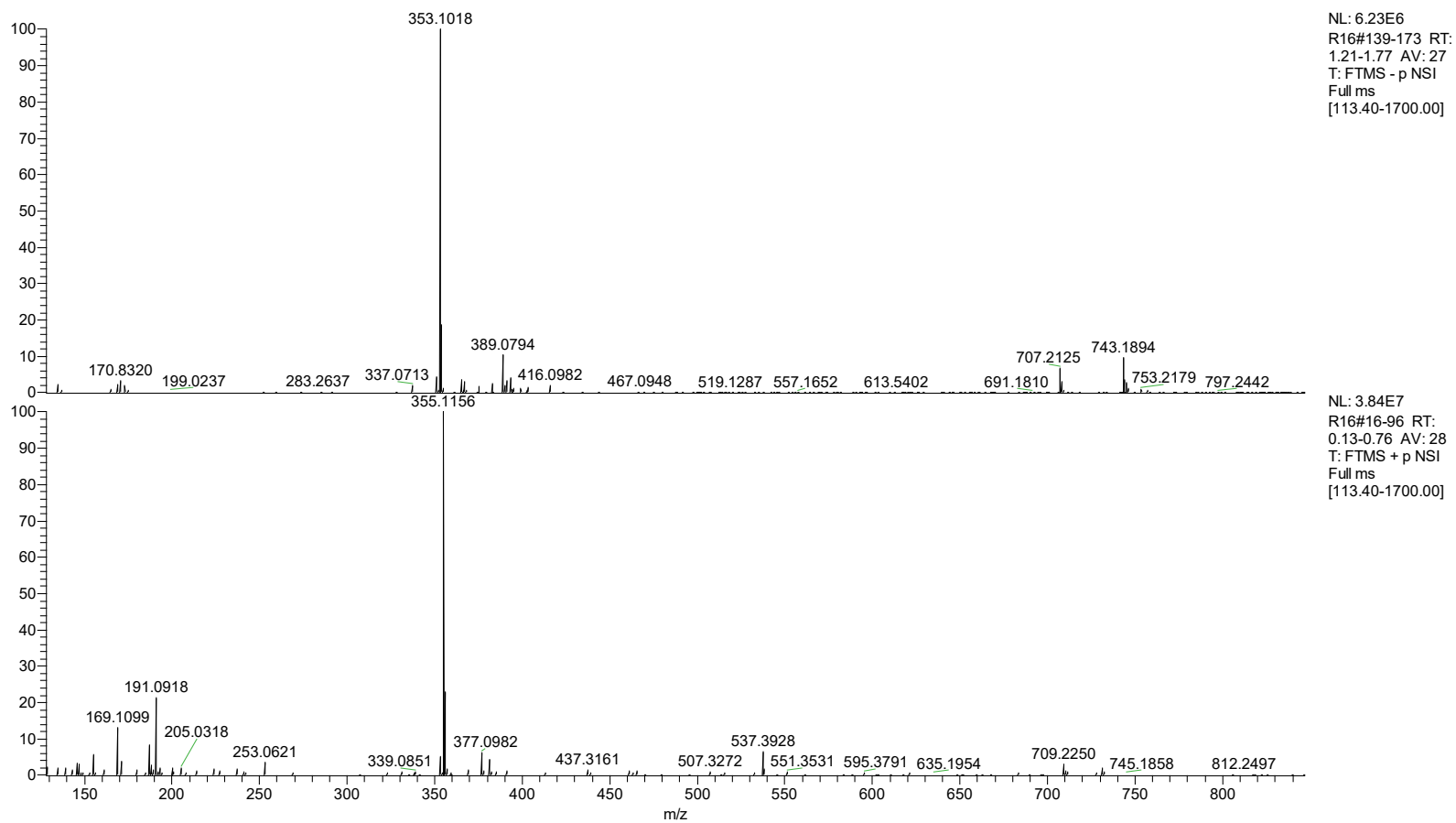


Fig. S1. HRMS of 1

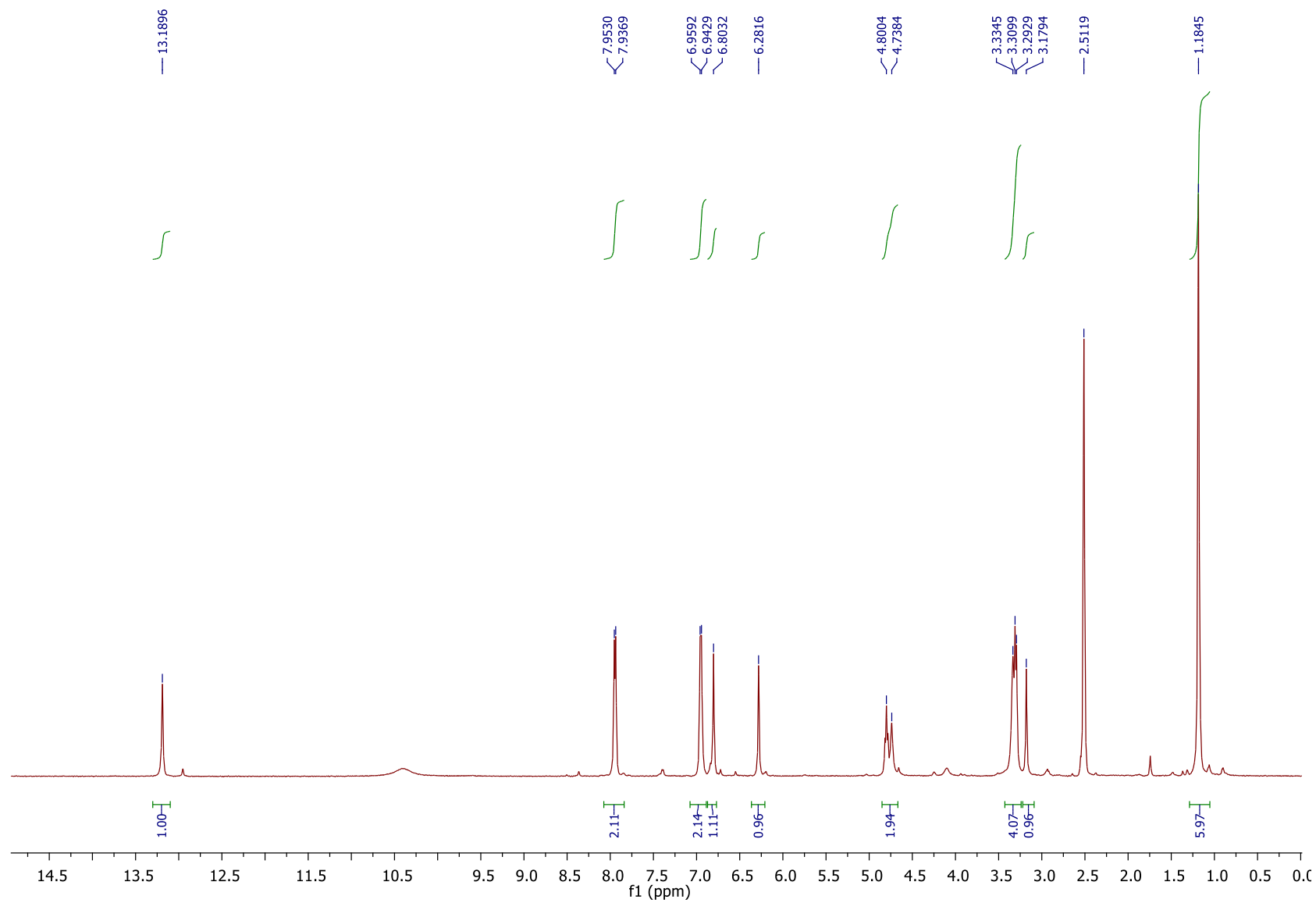


Fig. S2. ¹H NMR spectrum of **1**

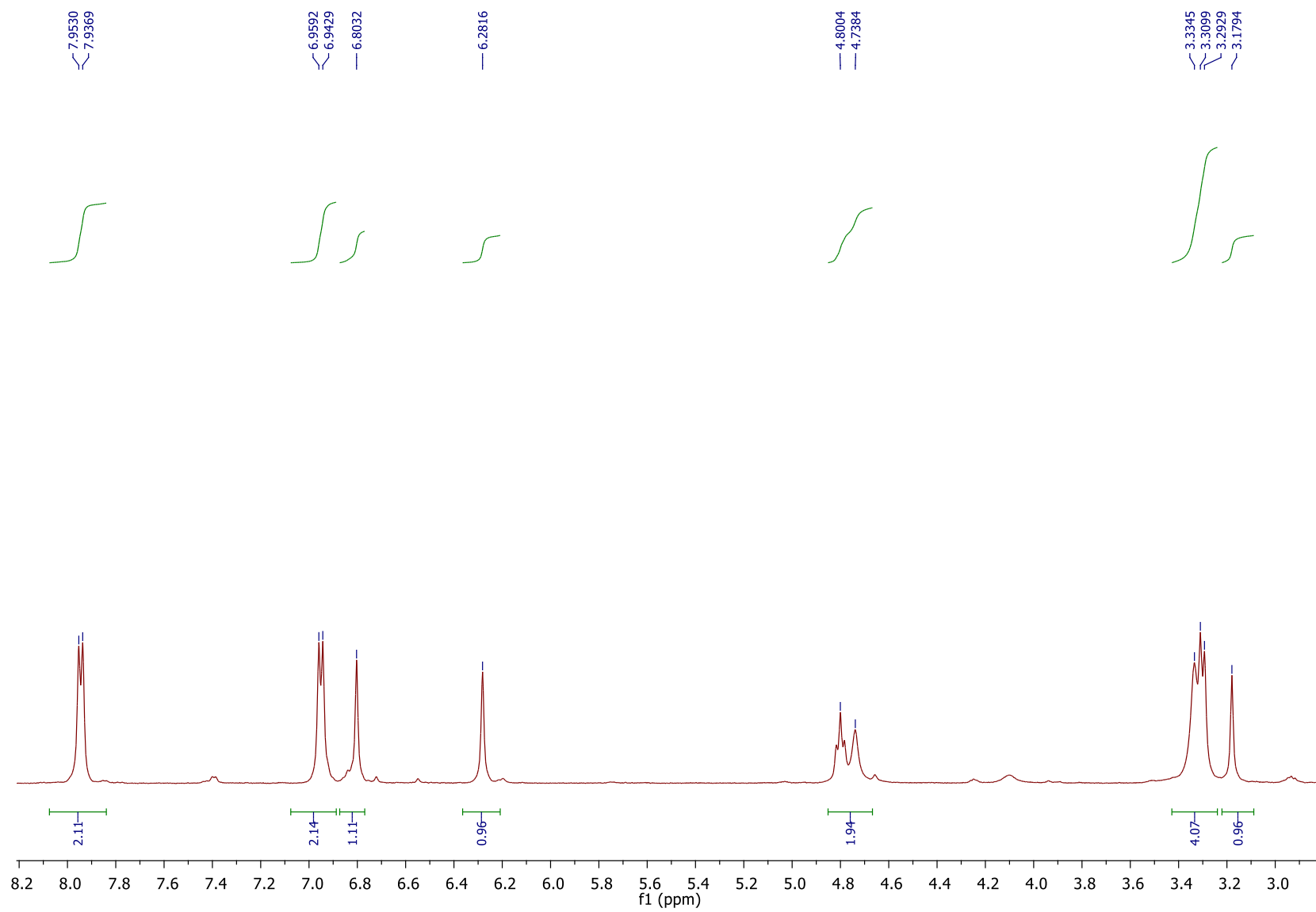


Fig. S3. Expansion of ^1H NMR spectrum of **1**

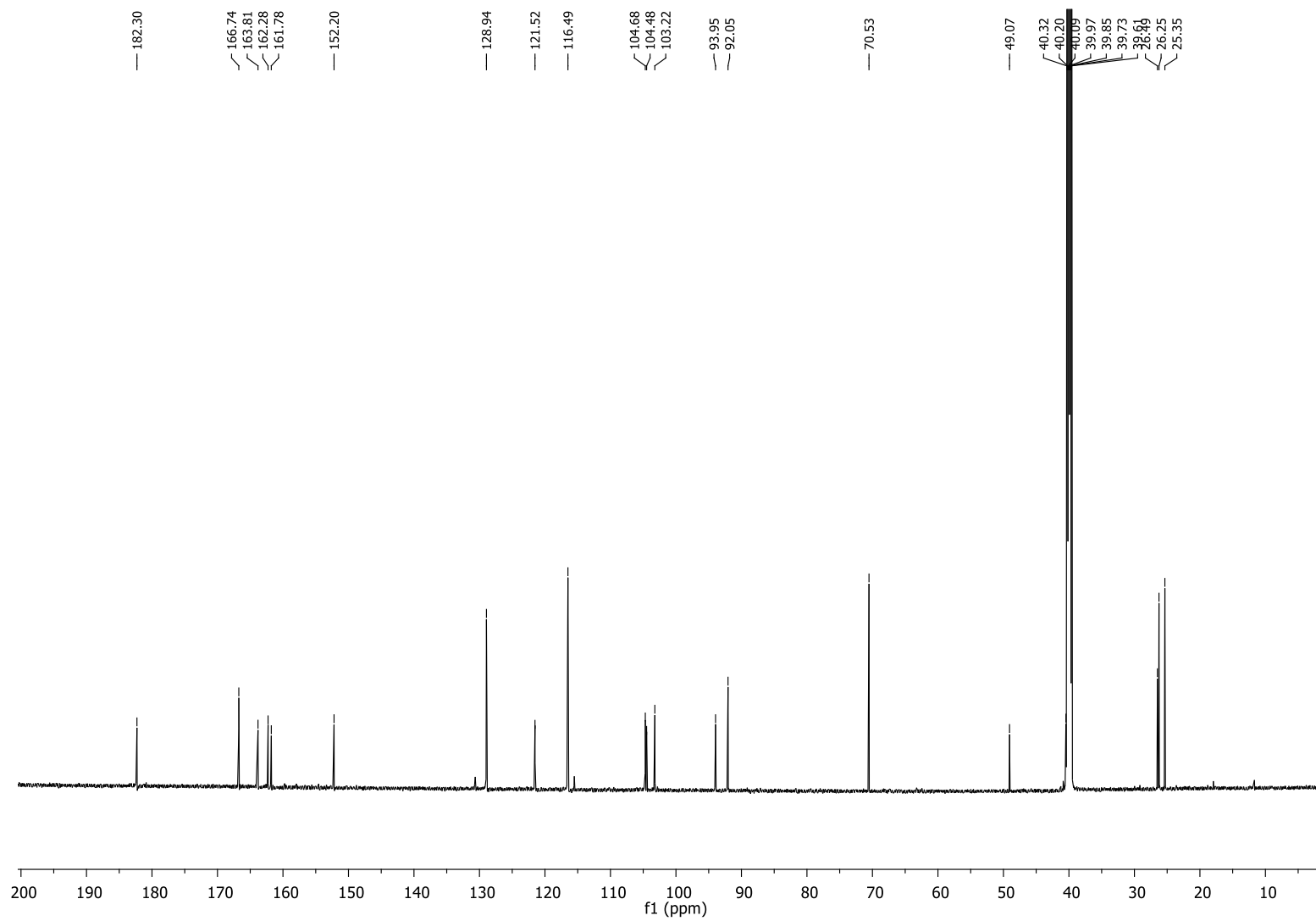


Fig. S4. ^{13}C NMR spectrum of **1**

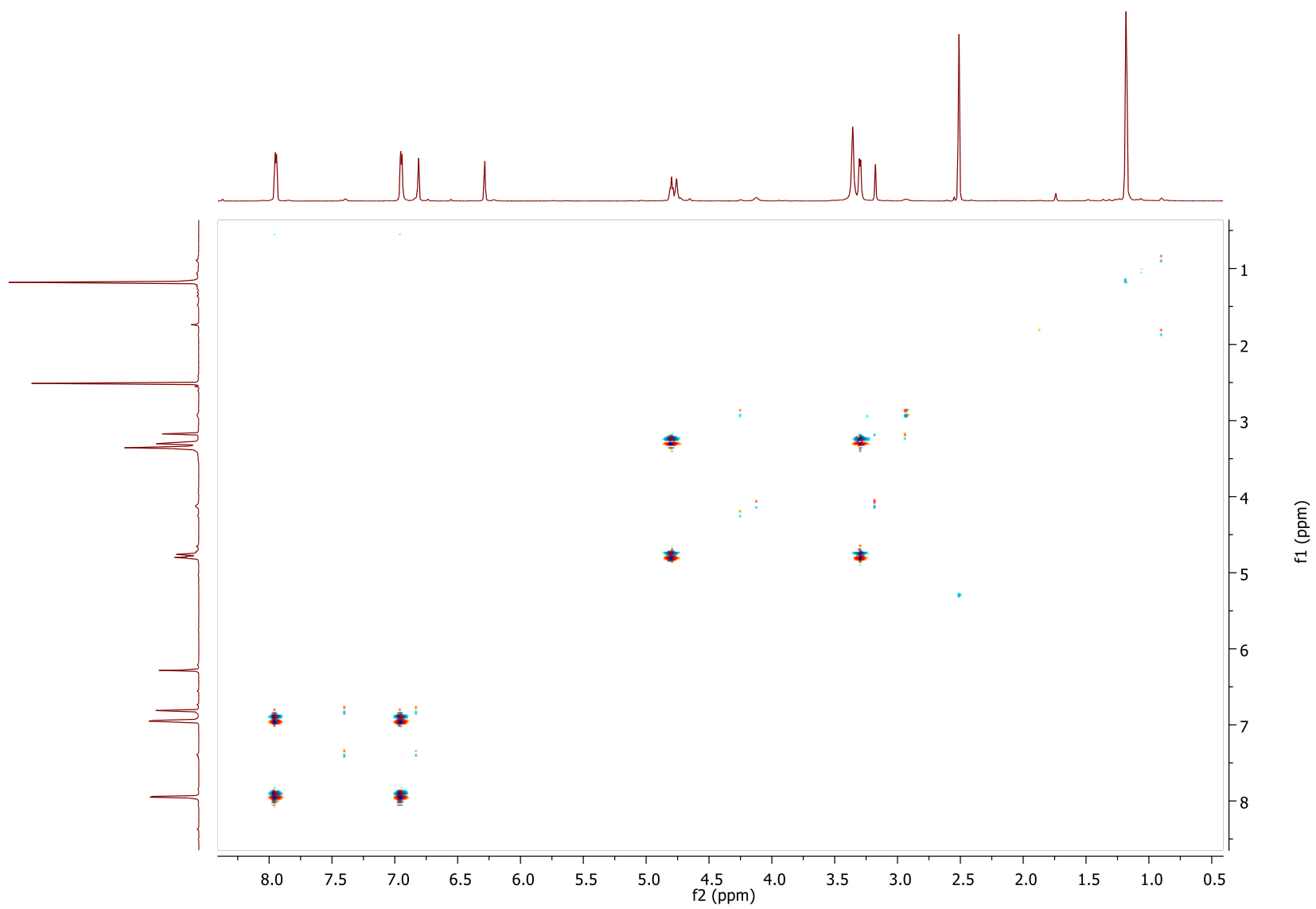


Fig. S5. COSY spectrum of **1**

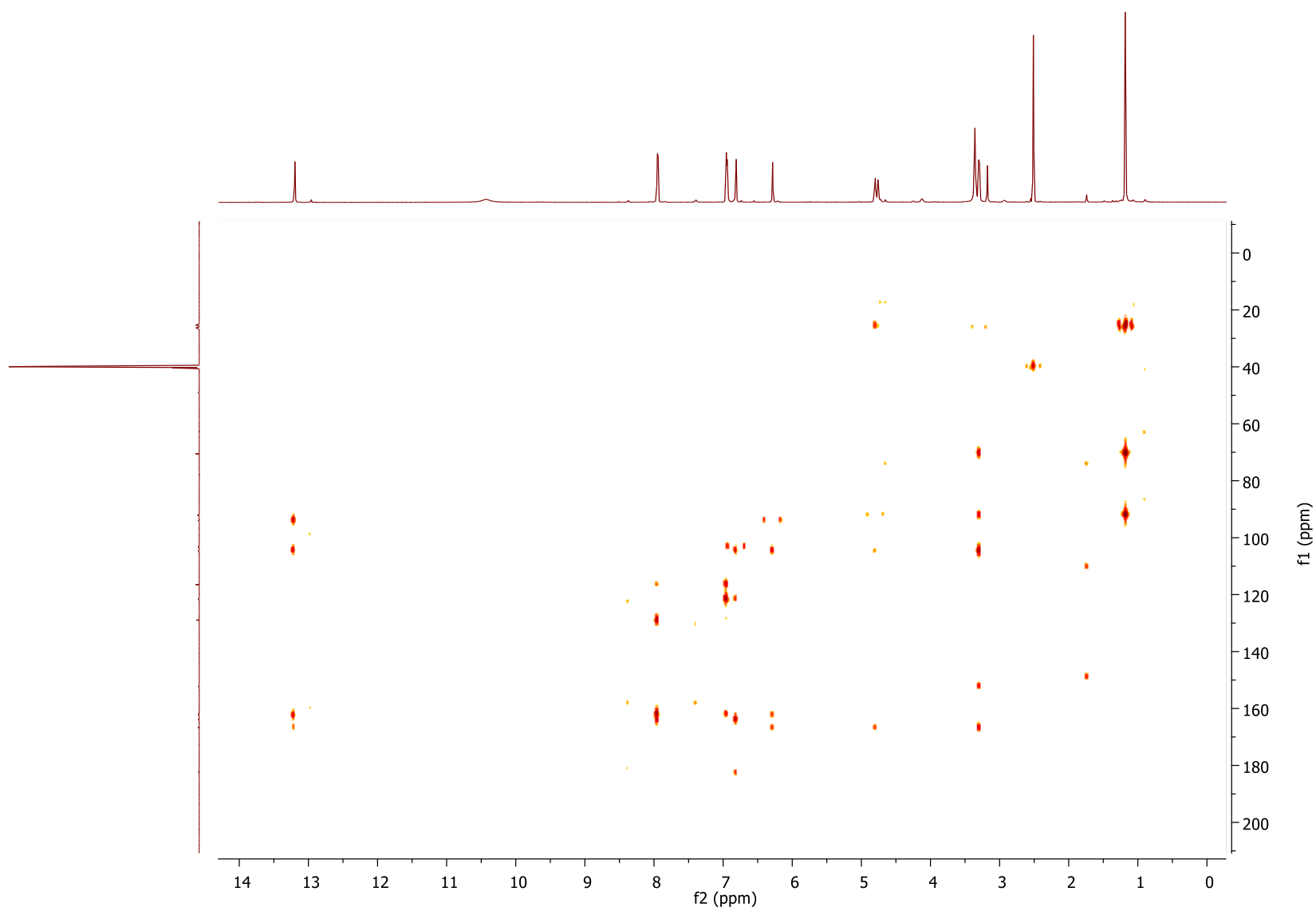


Fig. S6. HMBC spectrum of **1**

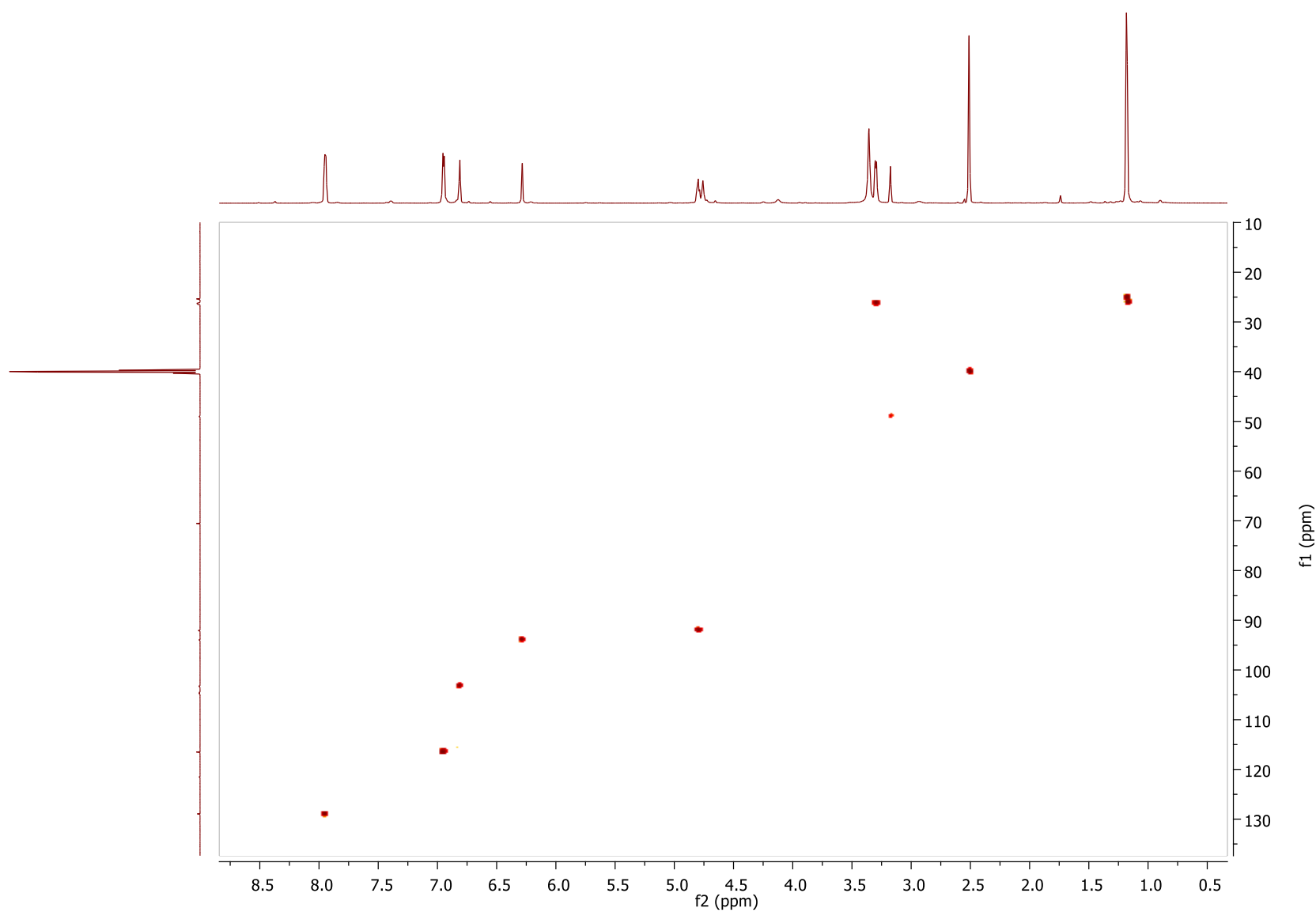


Fig. S7. HSQC spectrum of **1**

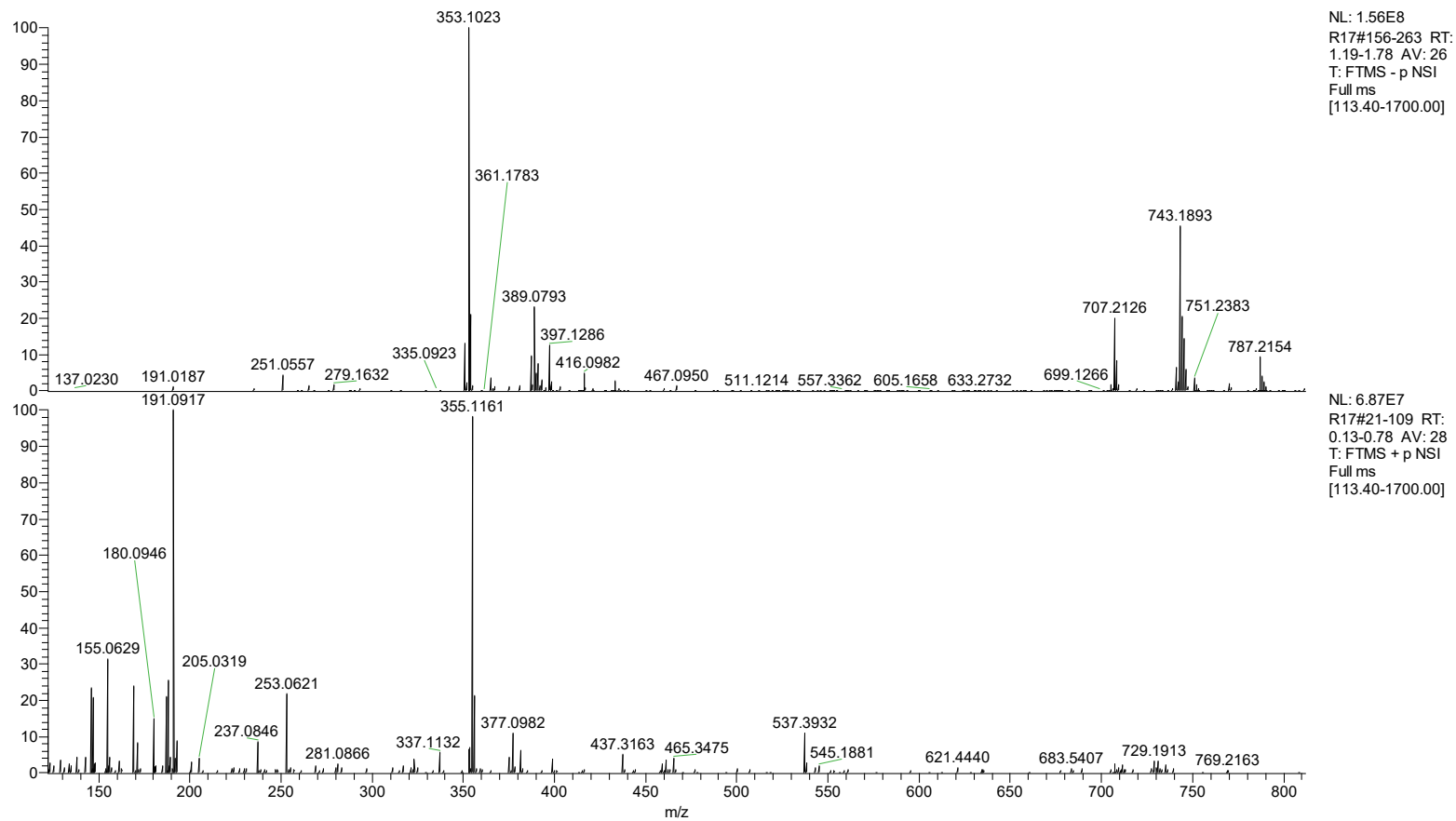


Fig. S8. HRMS of 2

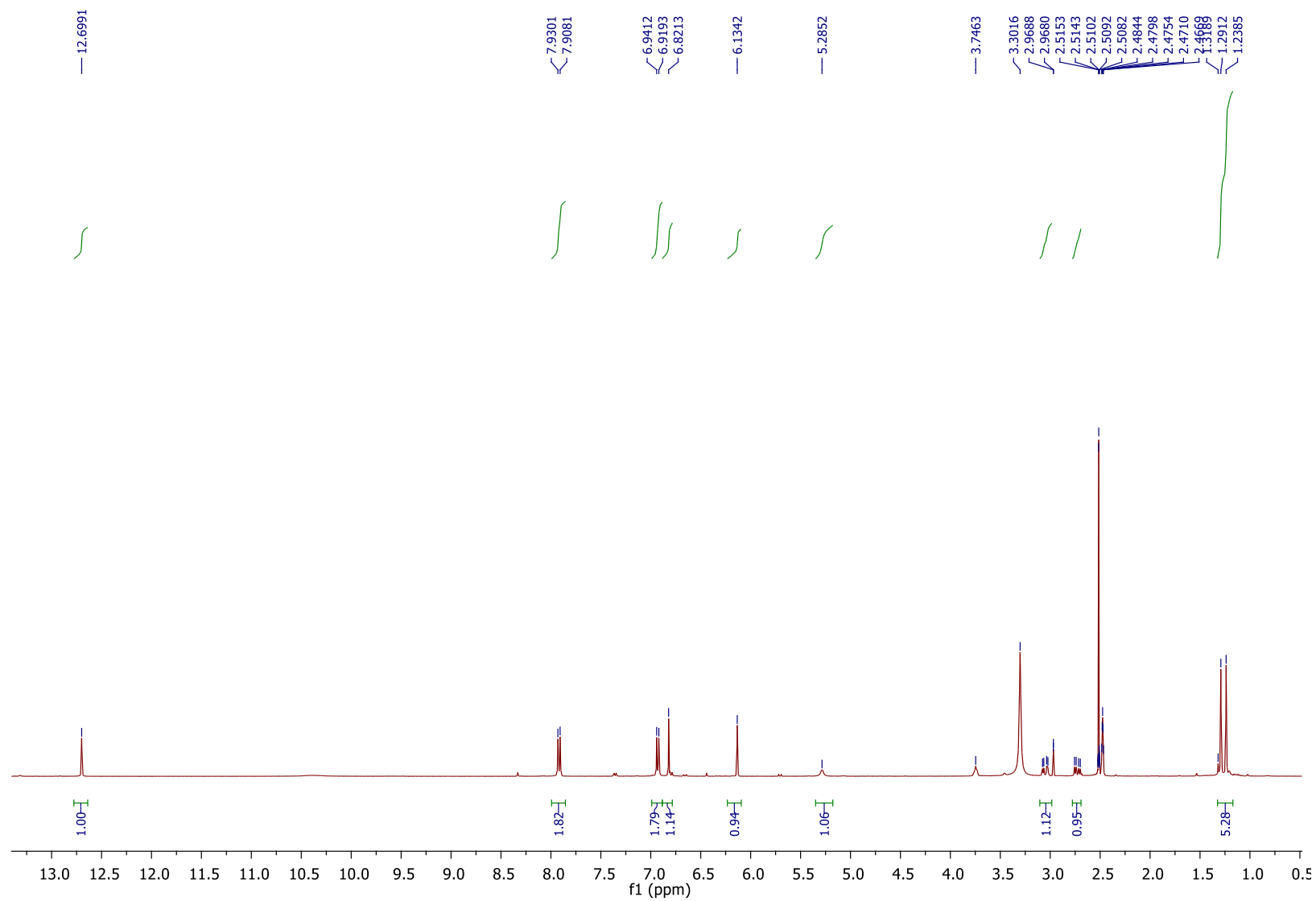


Fig. S9. ^1H NMR spectrum of 2

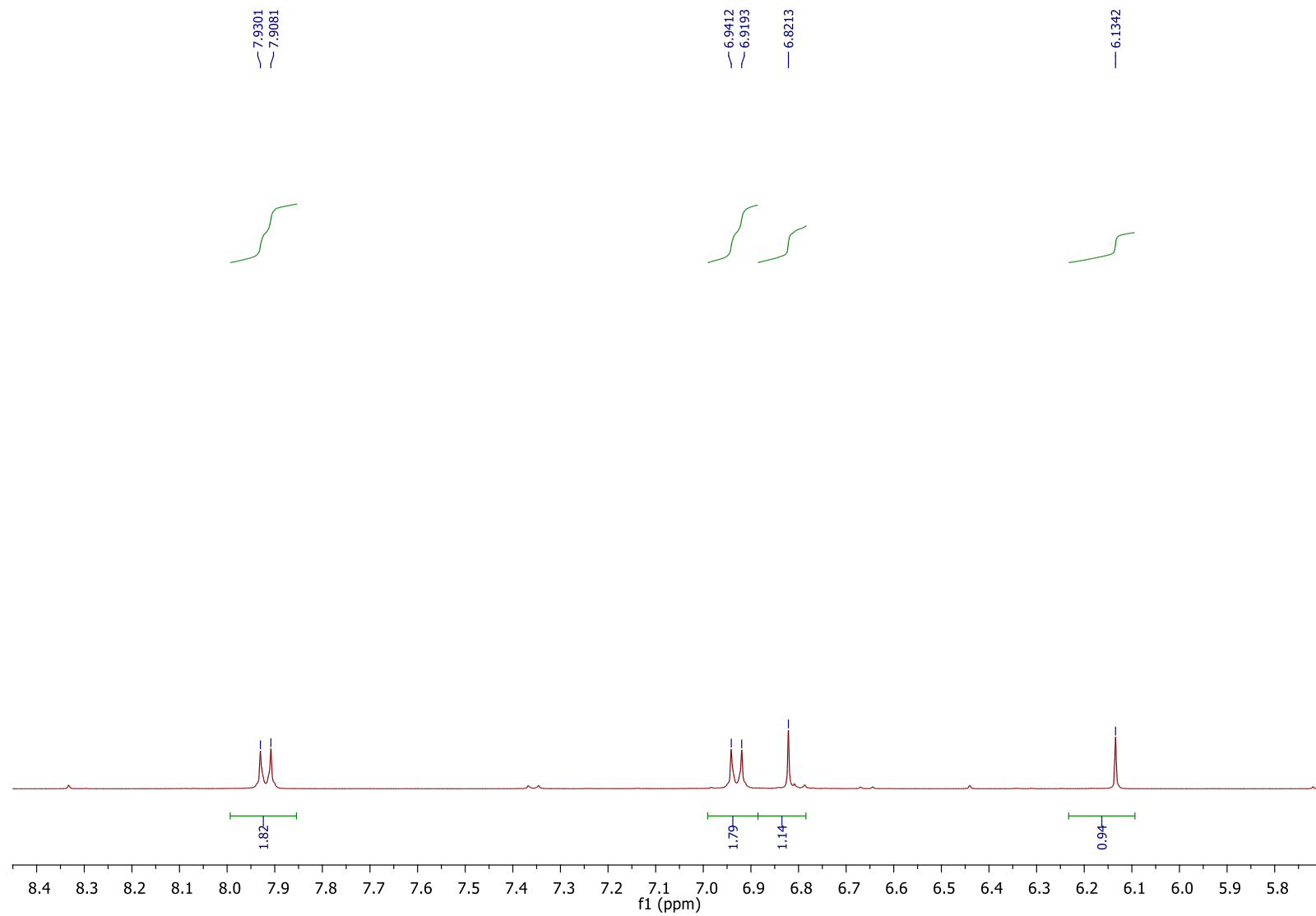


Fig. S10. Expansion A of ^1H NMR spectrum of **2**

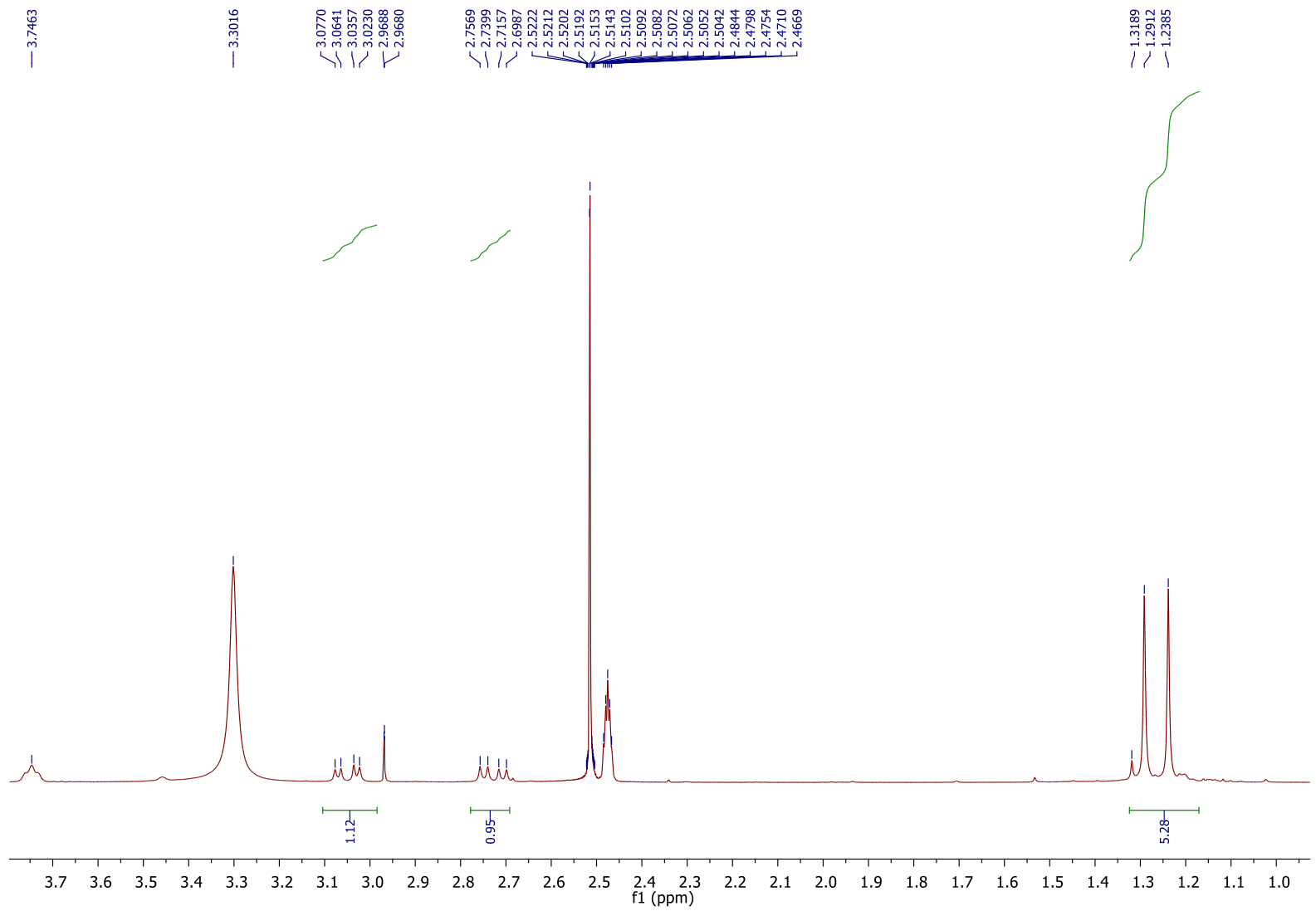


Fig. S11. Expansion B of ¹H NMR of 2

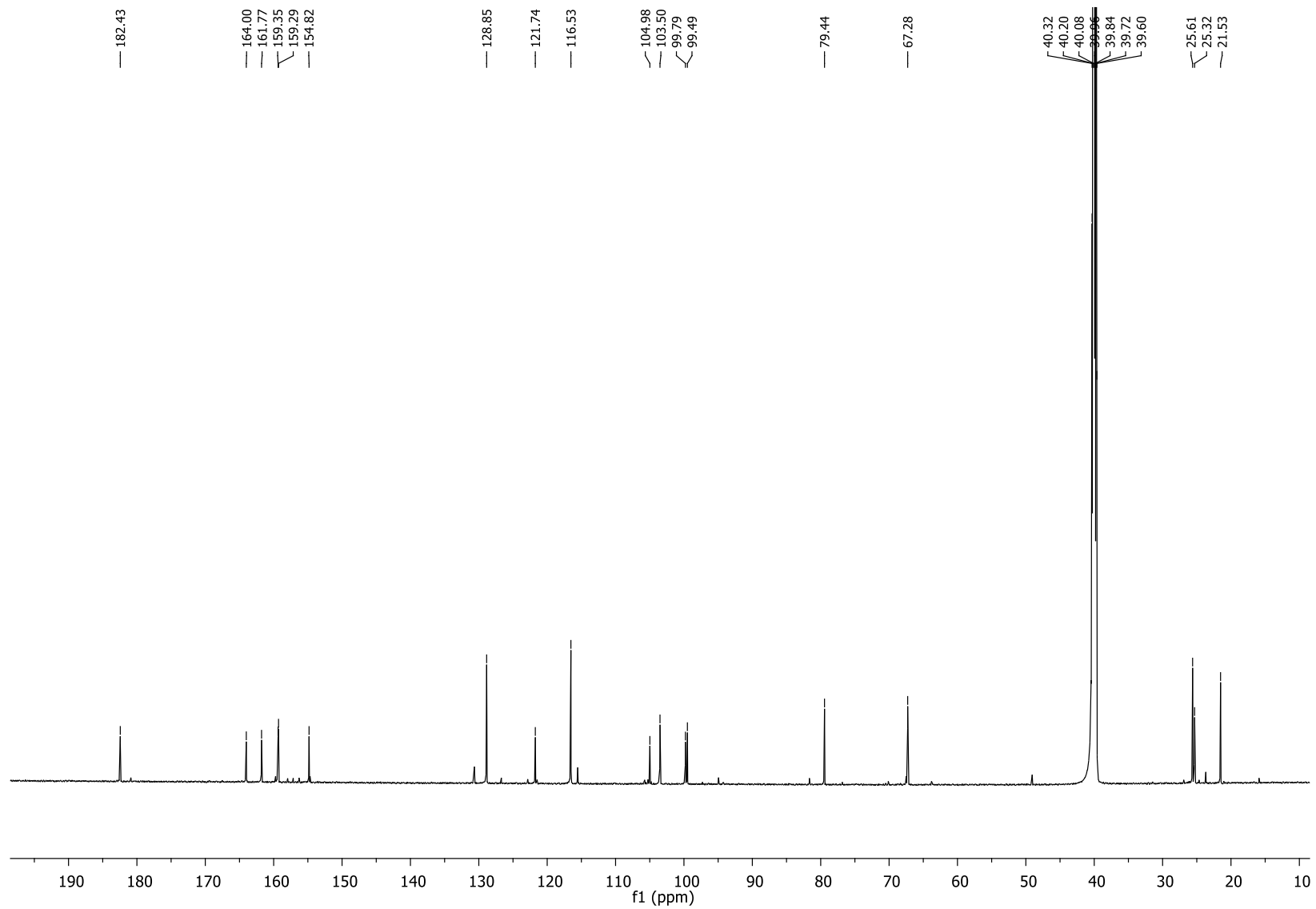


Fig. S12. ^{13}C NMR spectrum of 2

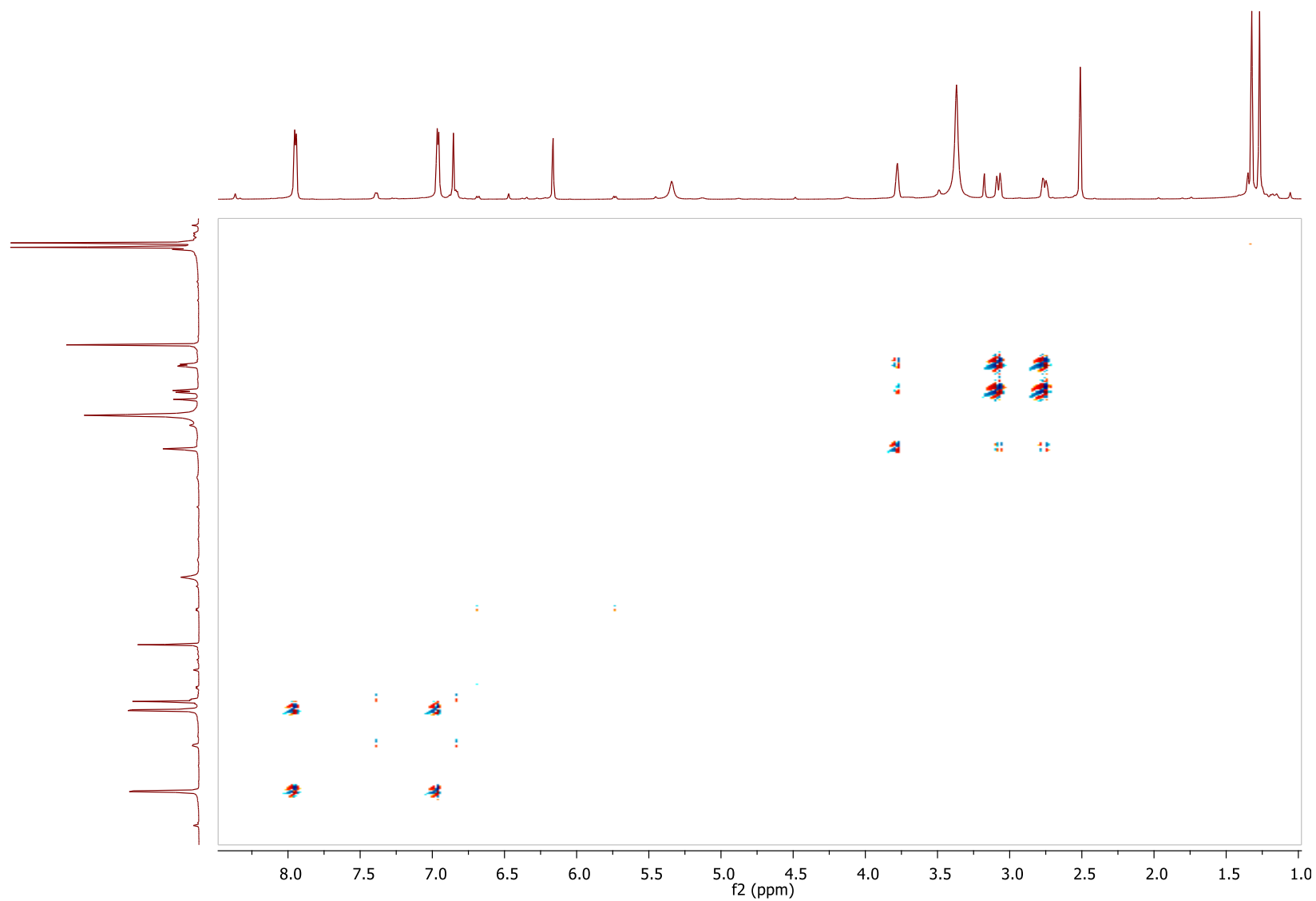


Fig. S13. COSY spectrum of **2**

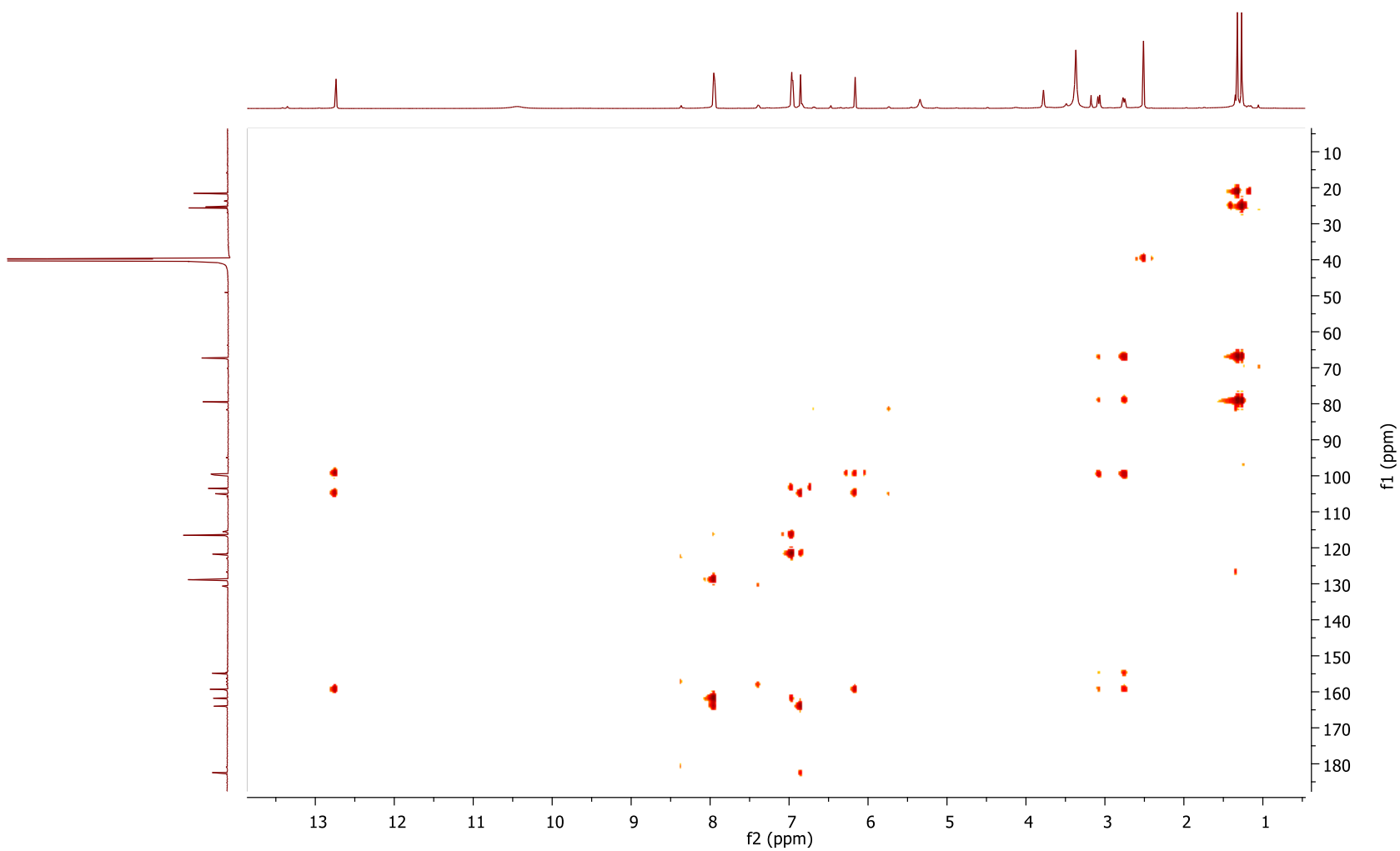


Fig. S14. HMBC spectrum of 2

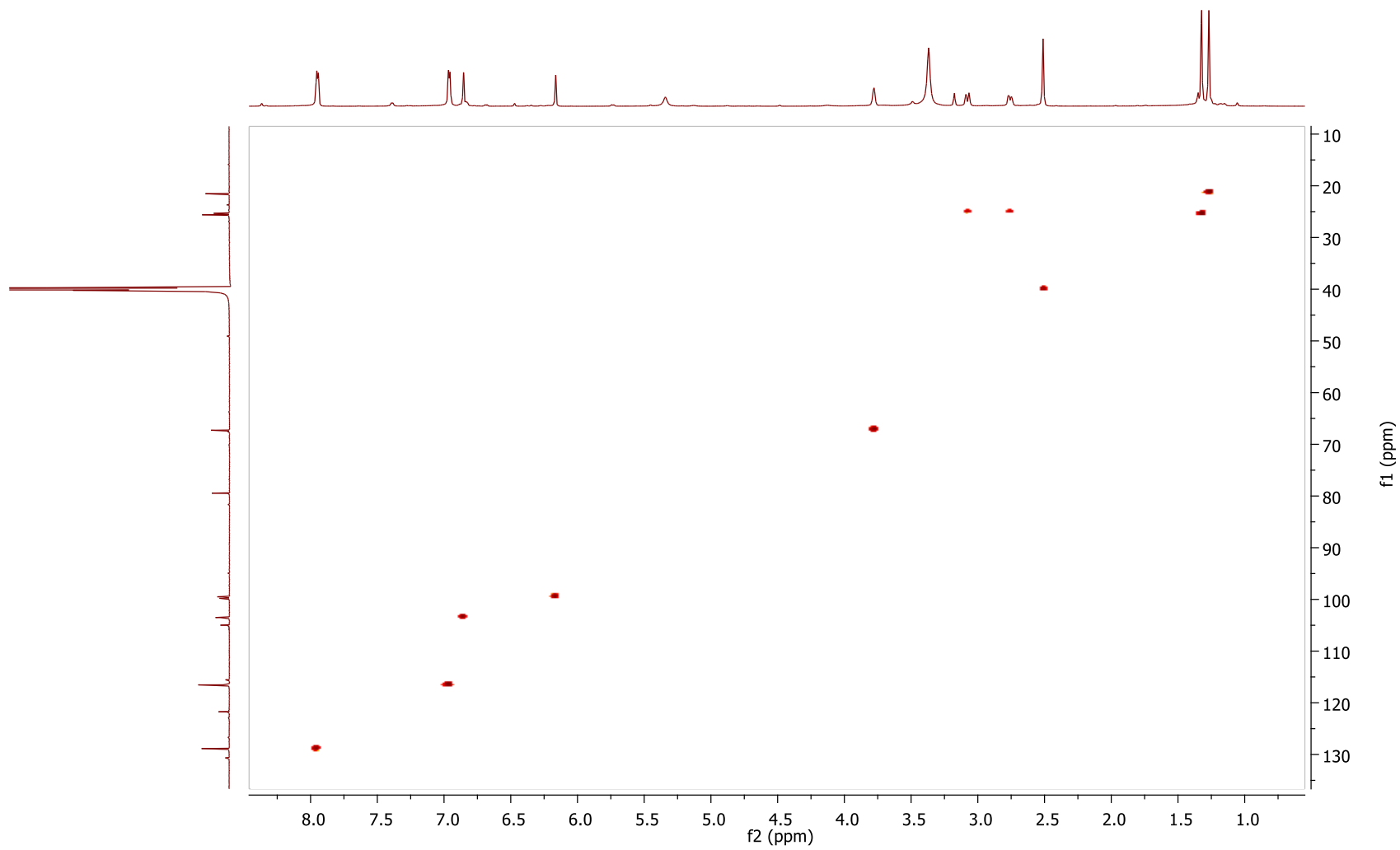


Fig. S15. HSQC spectrum of 2

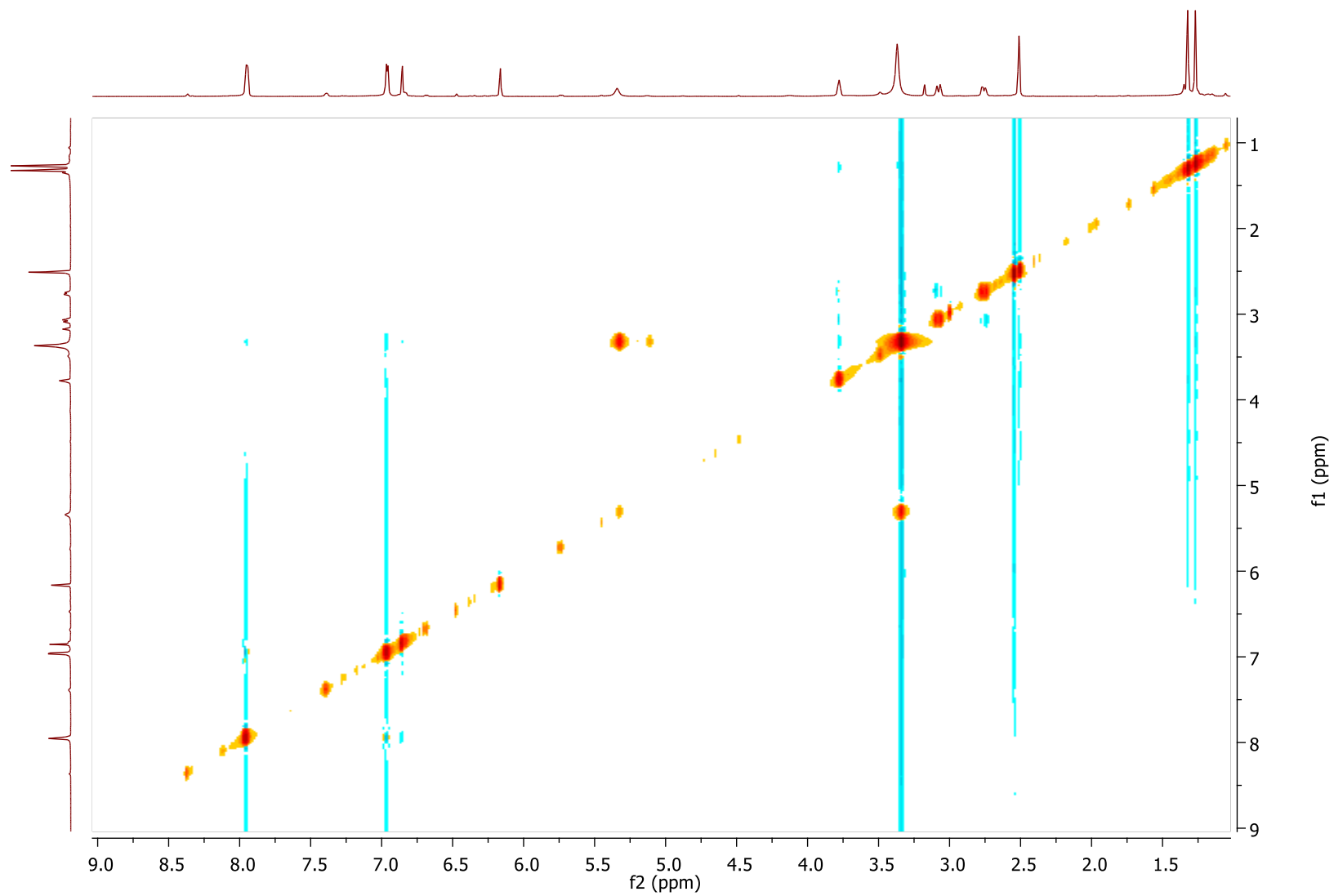


Fig. S16. NOESY spectrum of **2**

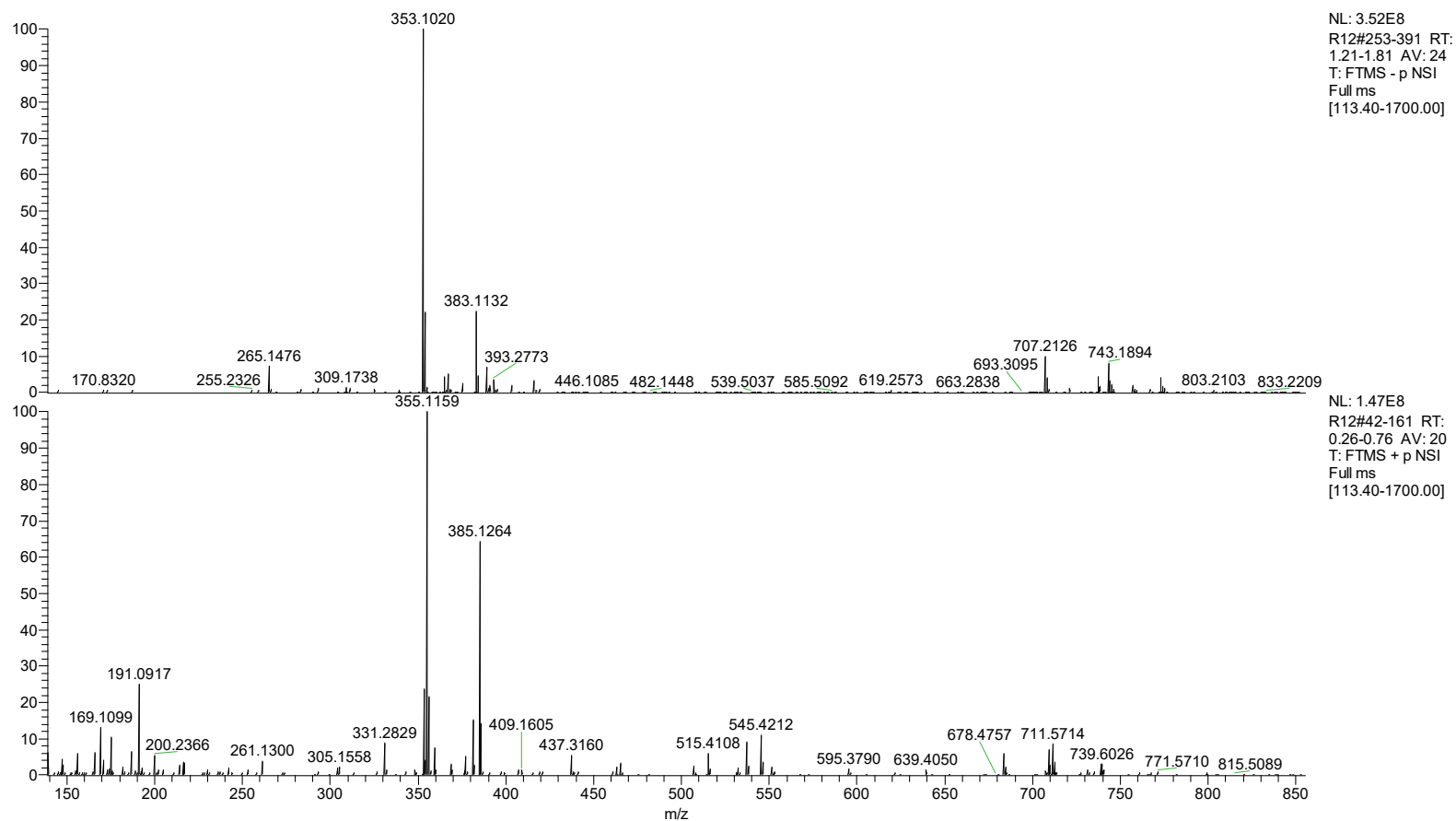


Fig. S17. HRMS of 3

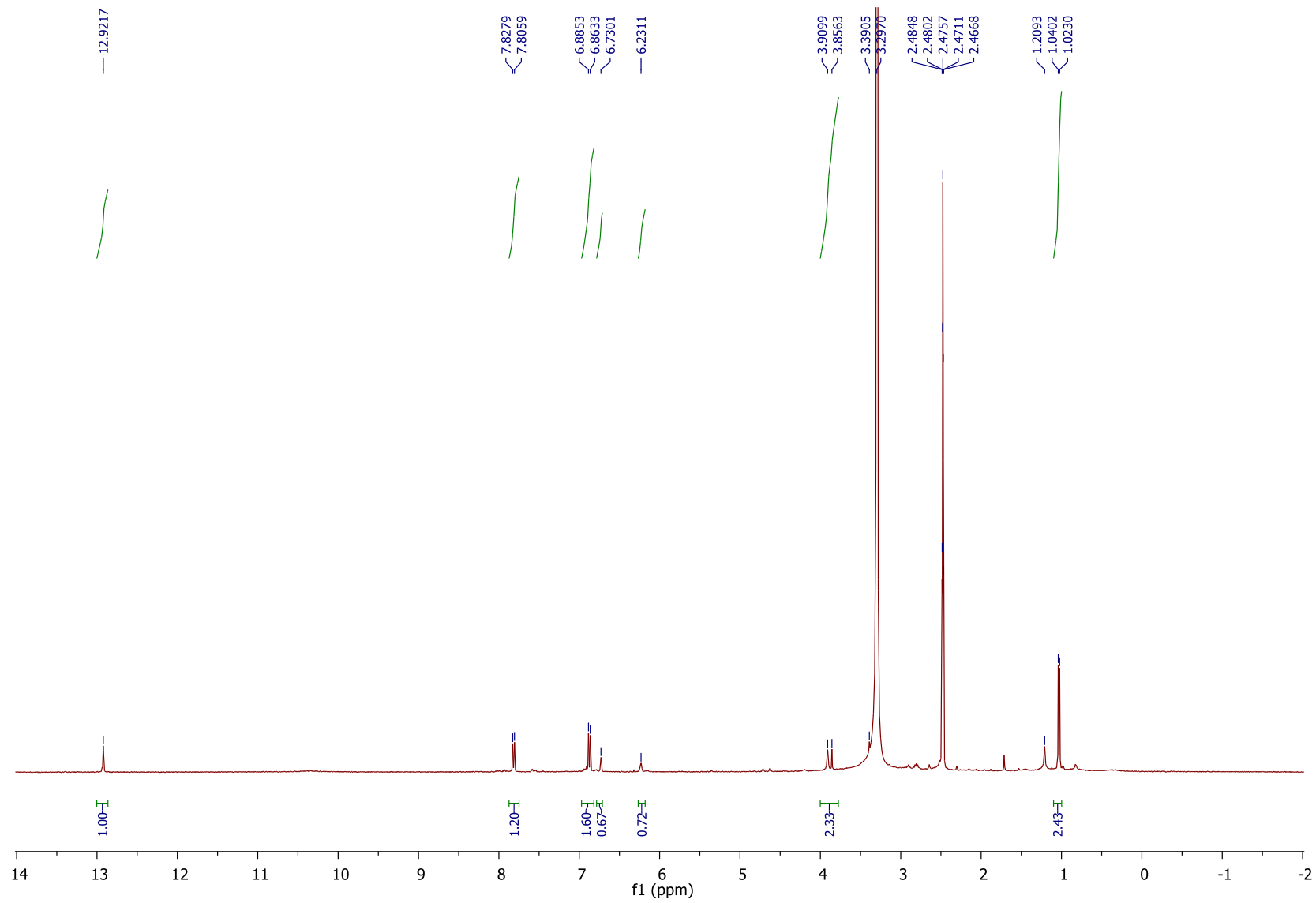


Fig. S18. ¹H NMR spectrum of **3**

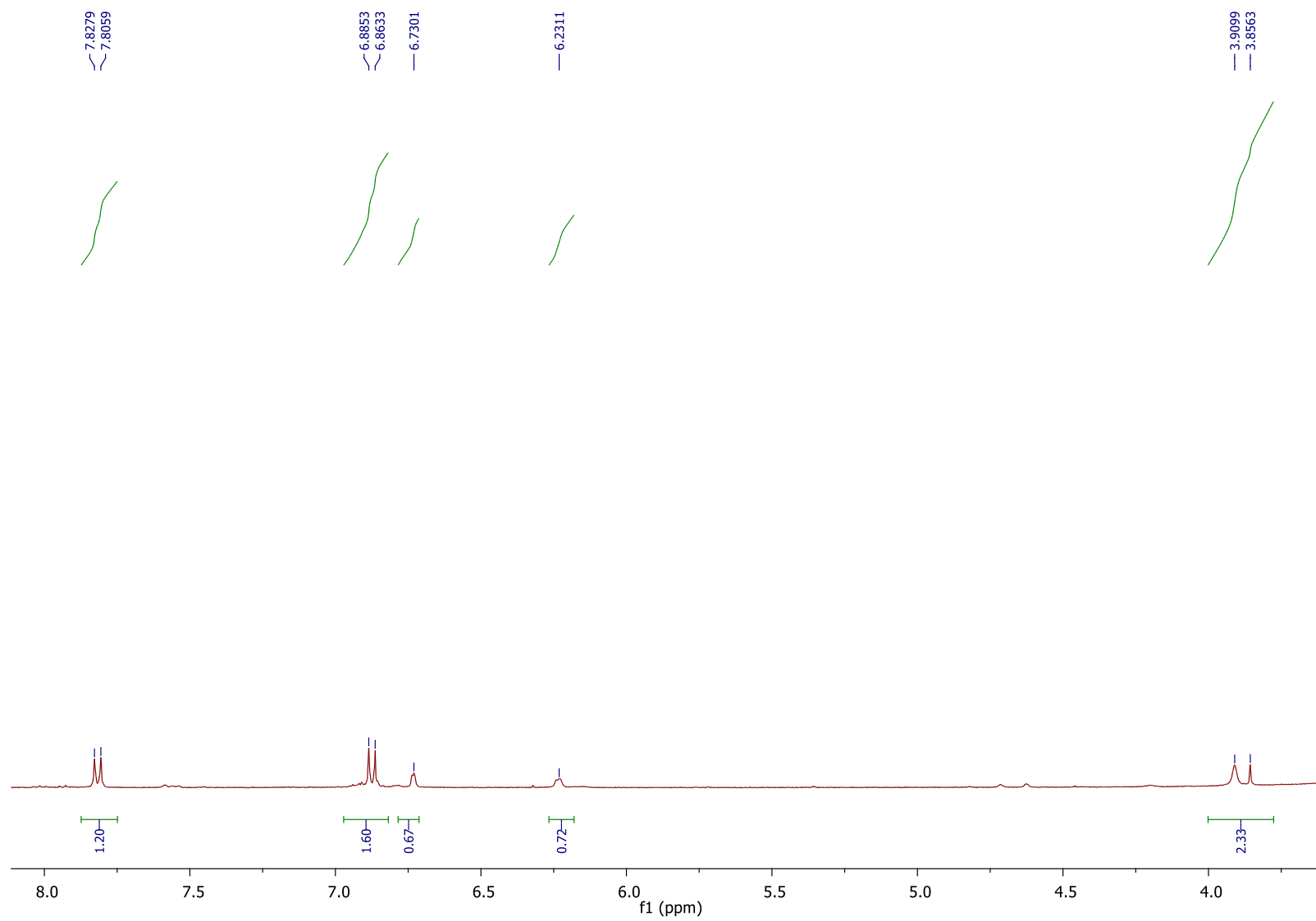


Fig. S19. Expansion of ^1H NMR spectrum of **3**

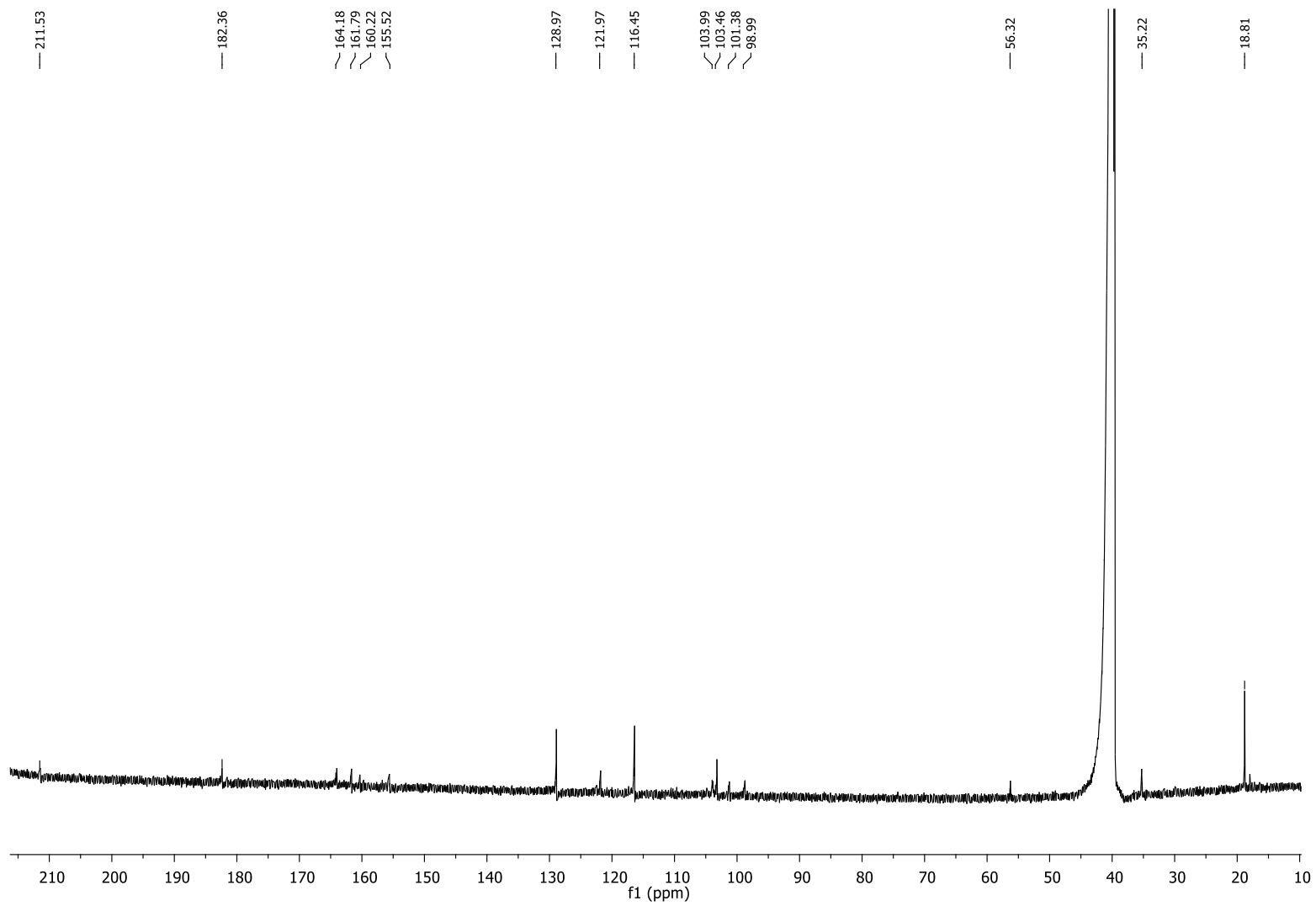


Fig. S20. ^{13}C NMR spectrum of **3**

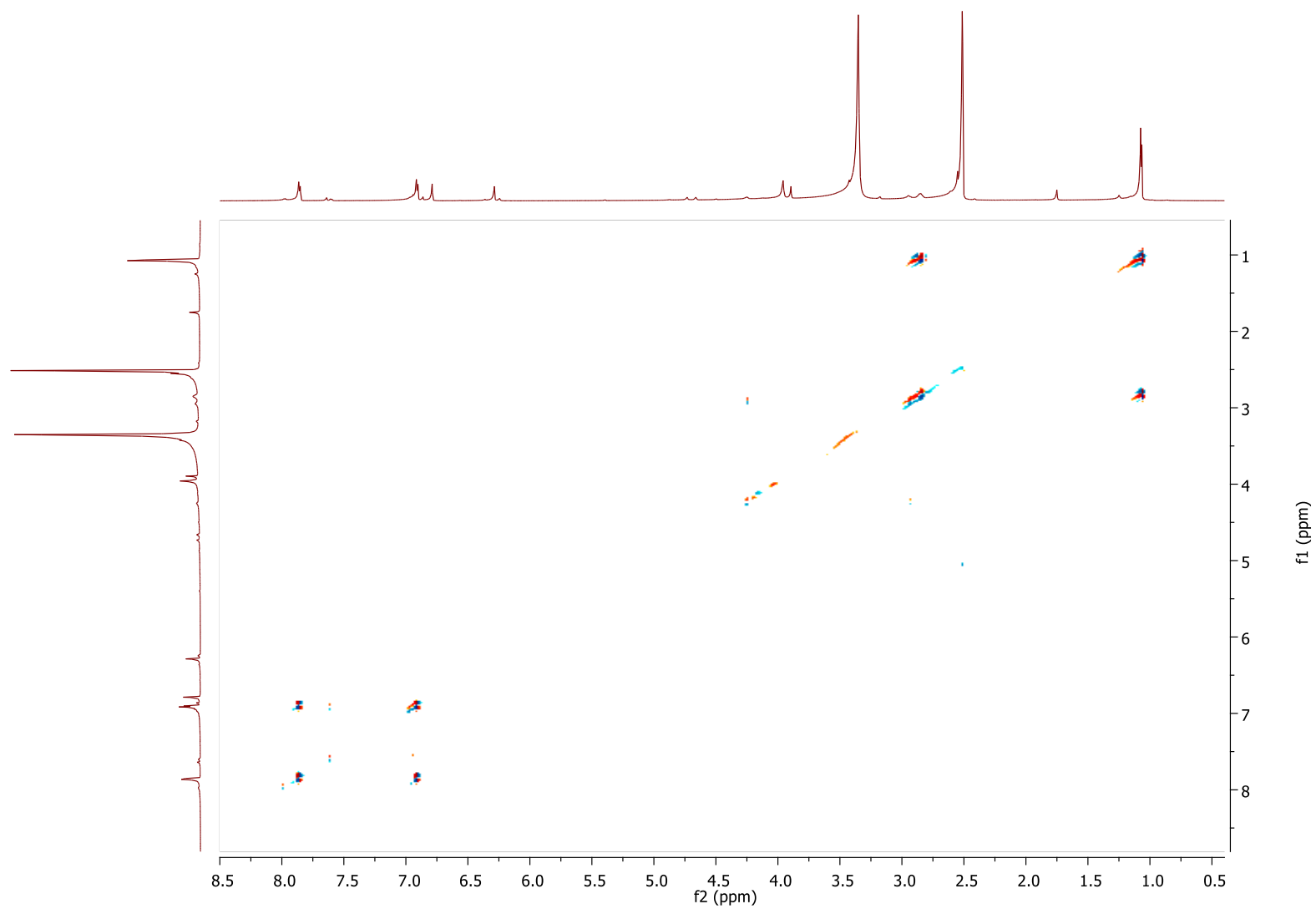


Fig. S21. COSY spectrum of **3**

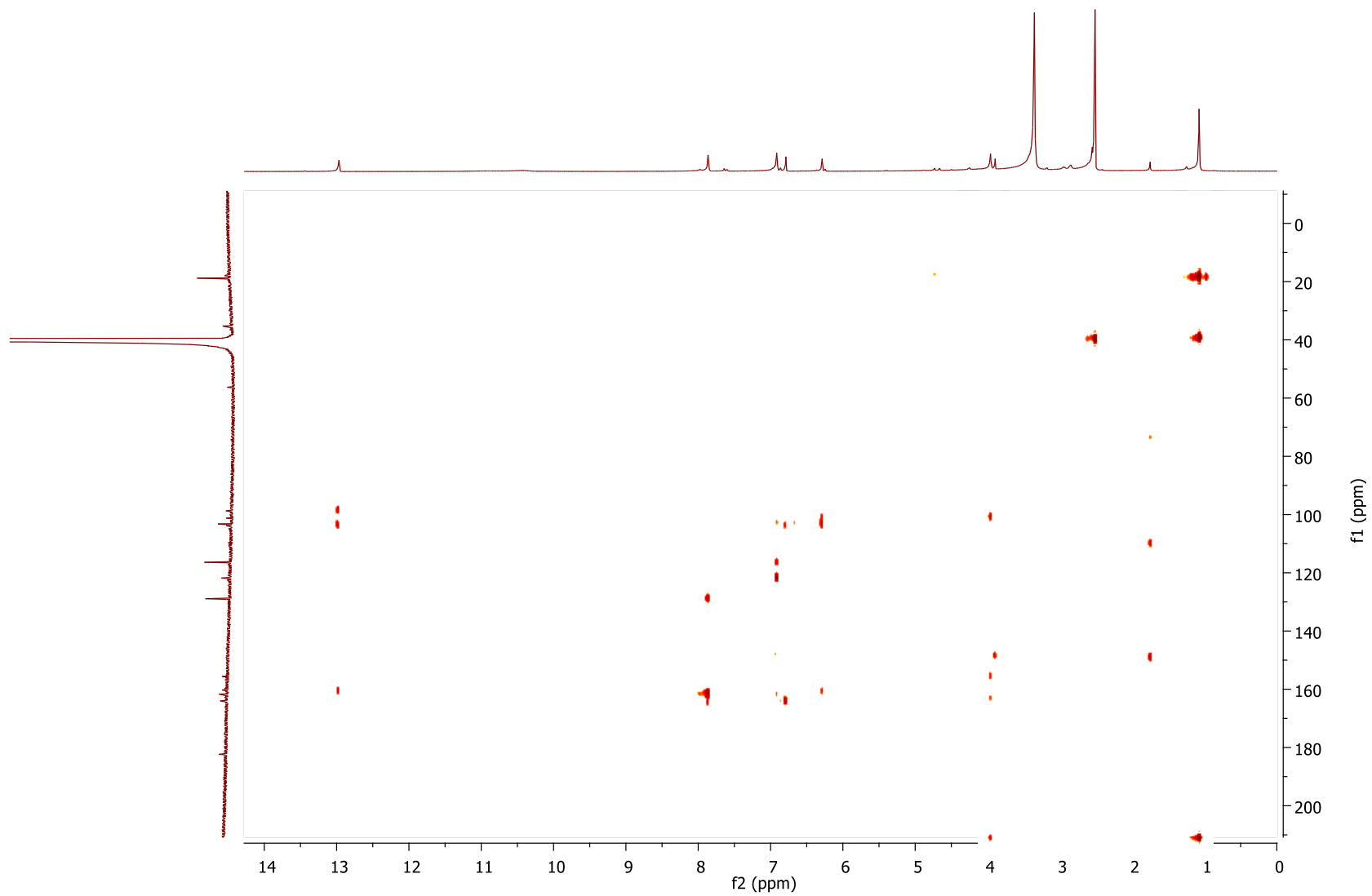


Fig. S22. HMBC spectrum of 3

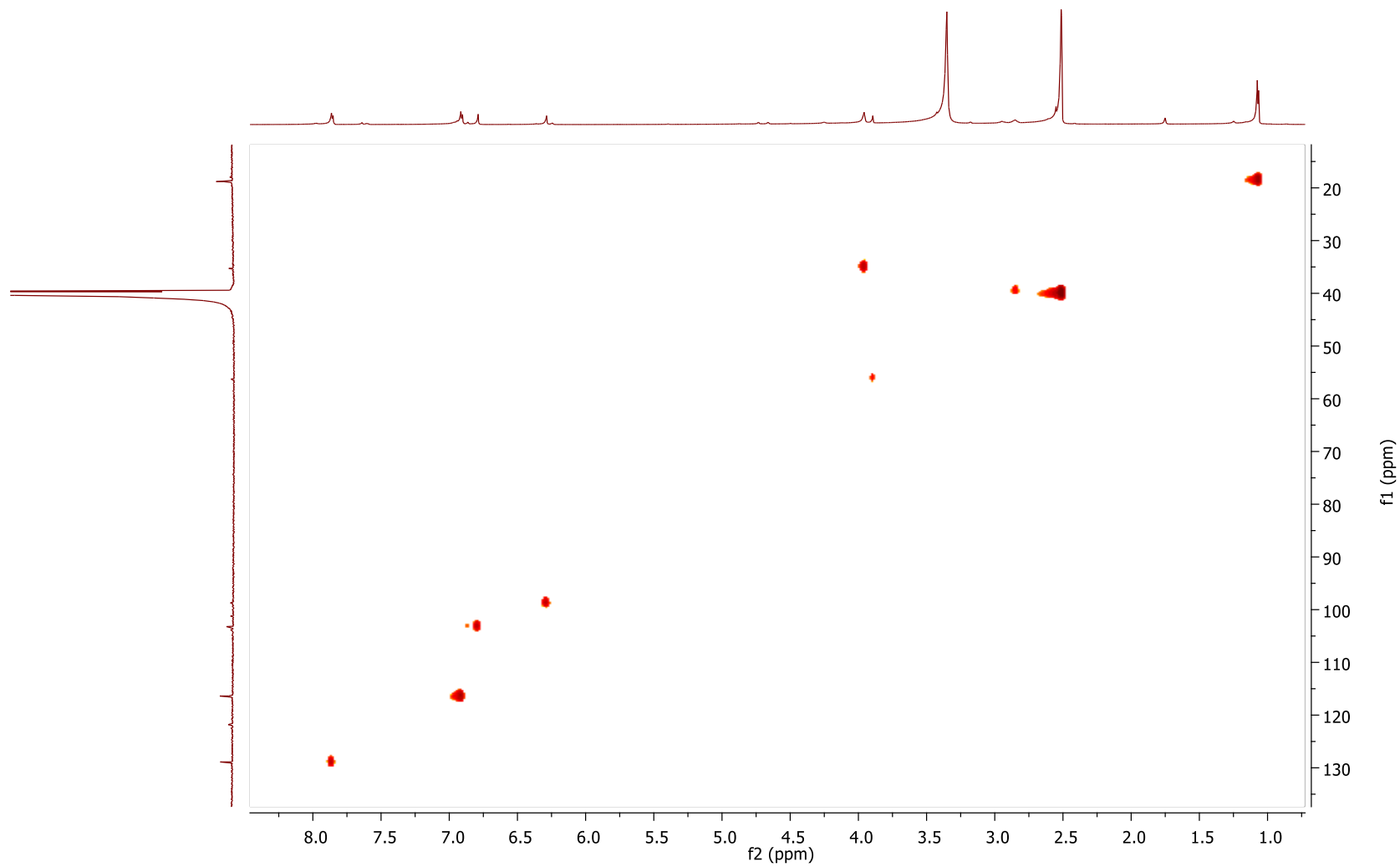


Fig. S23. HSQC spectrum of **3**

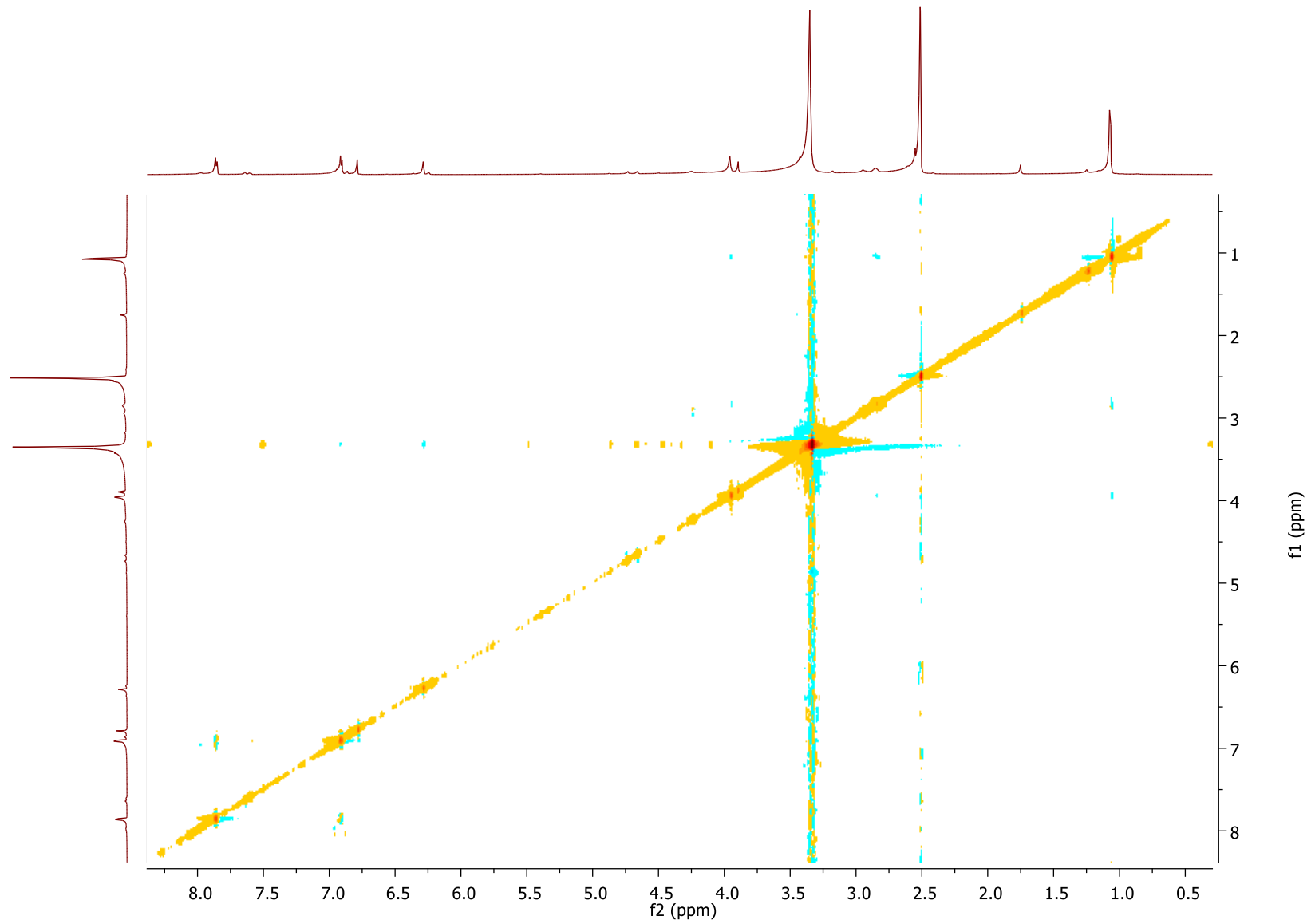


Fig. S24. NOESY spectrum of **3**

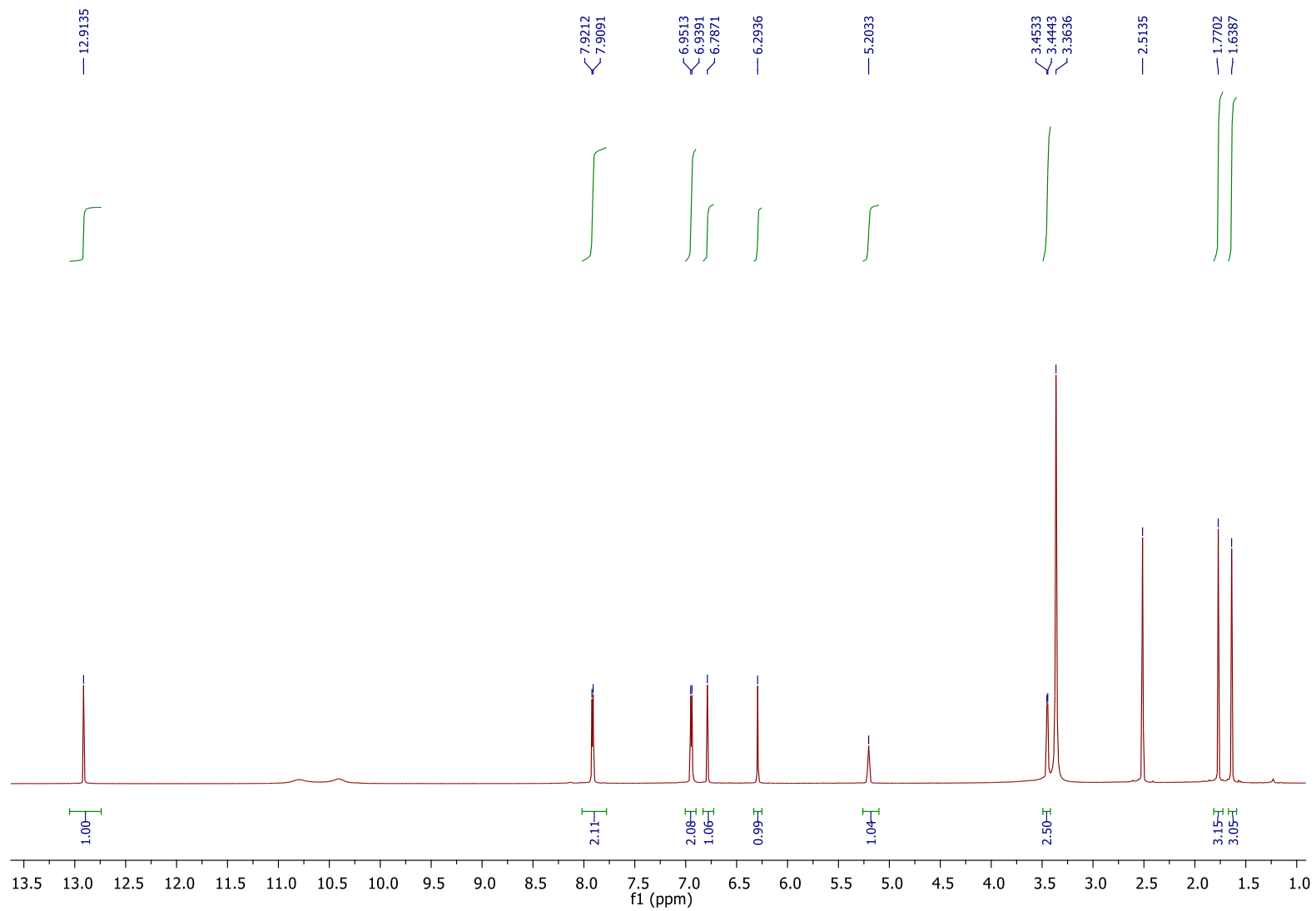


Fig. S25. ^1H NMR spectrum of 4

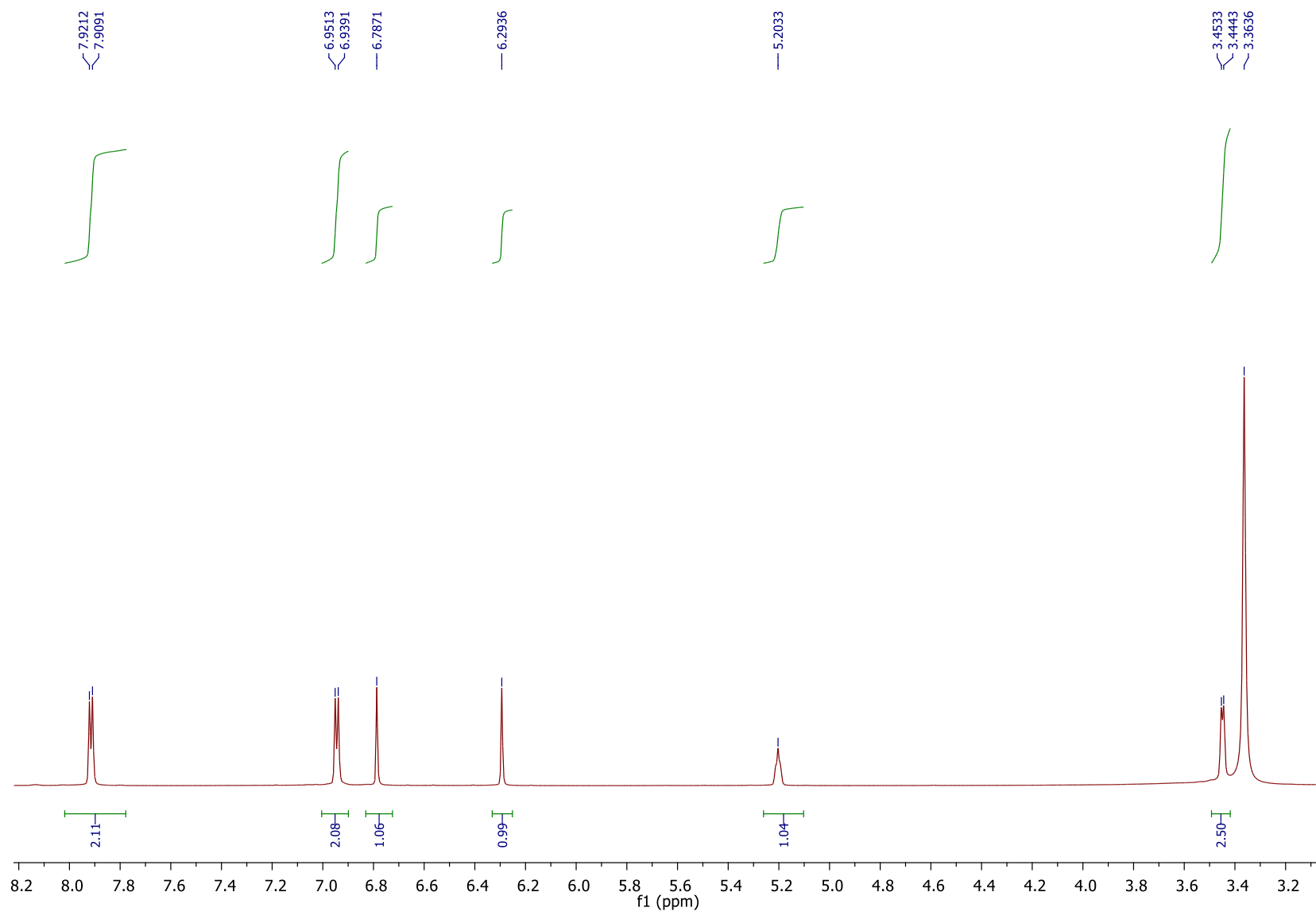


Fig. S26. Expansion of ^1H NMR spectrum of **4**

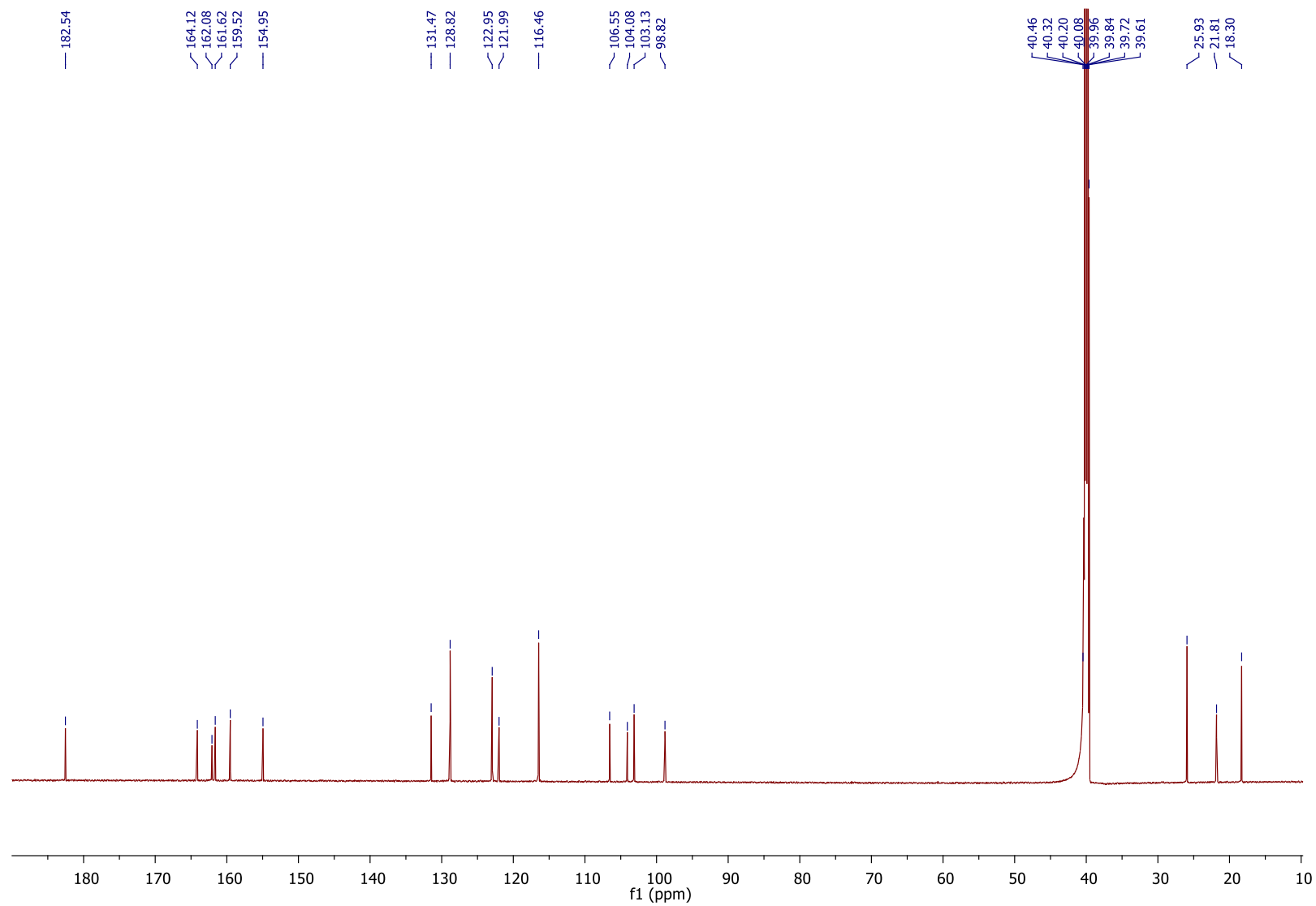


Fig. S27. ^{13}C NMR spectrum of **4**

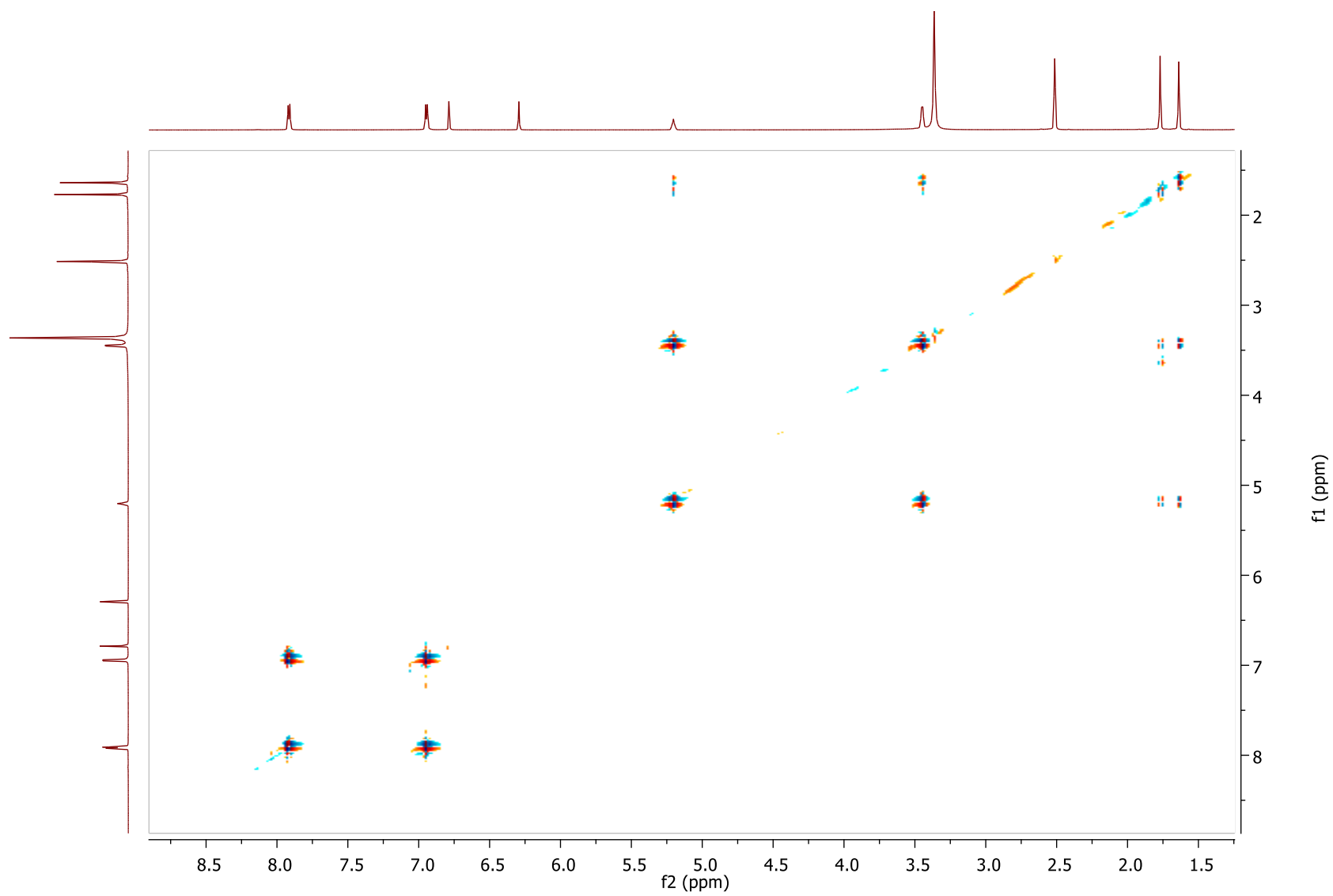


Fig. S28. COSY spectrum of **4**

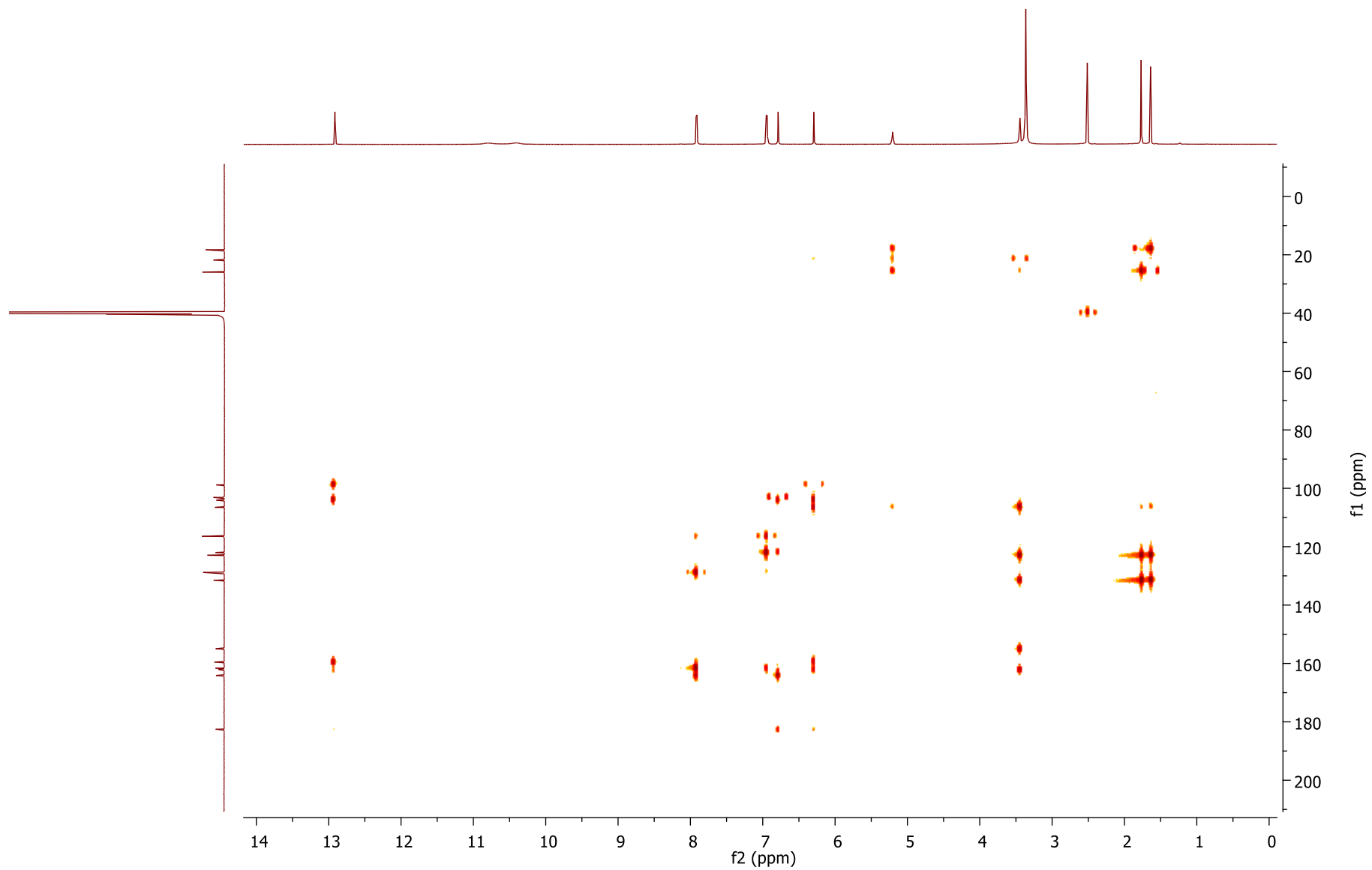


Fig. S29. HMBC spectrum of 4

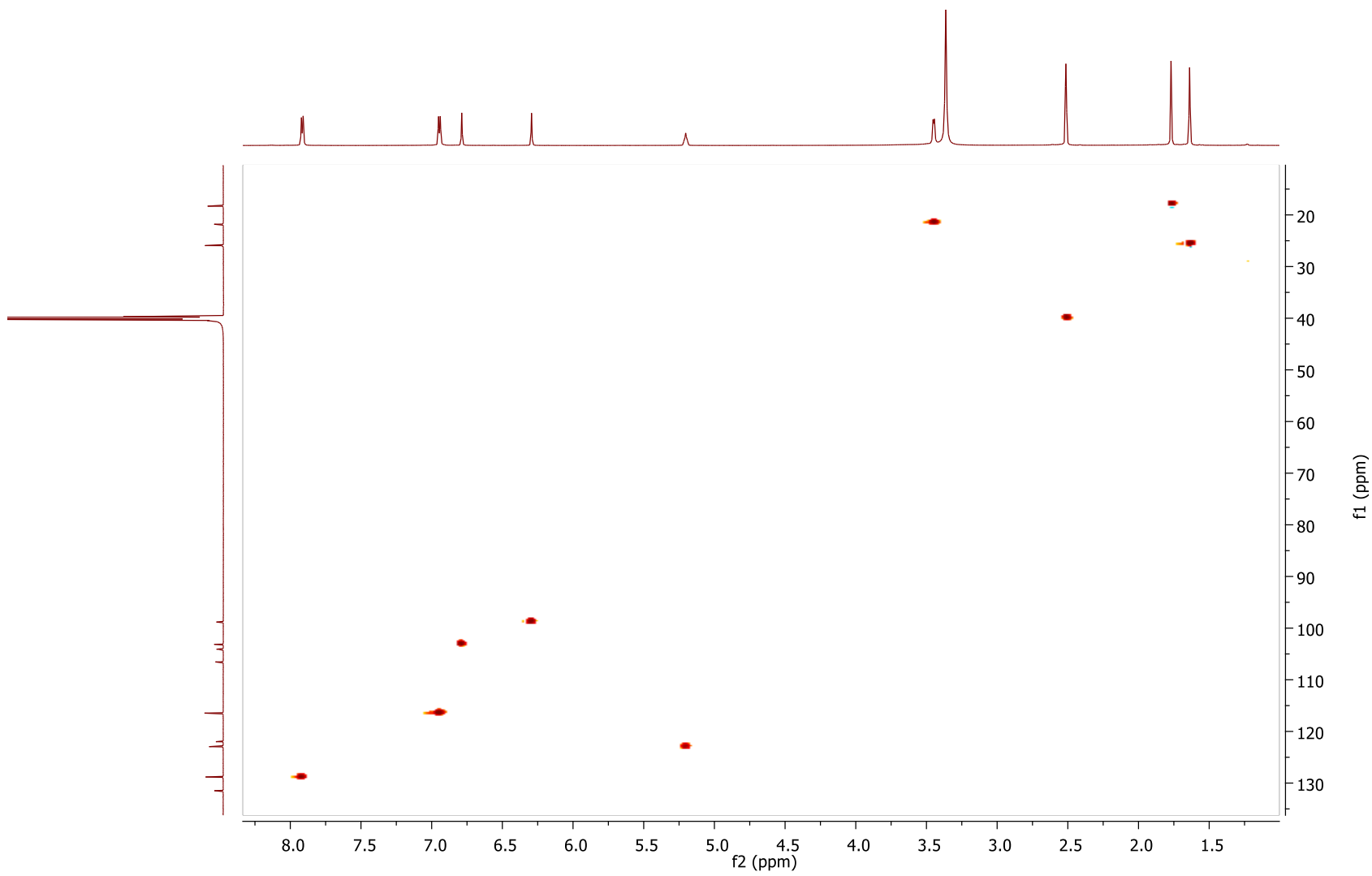


Fig. S30. HSQC spectrum of 4

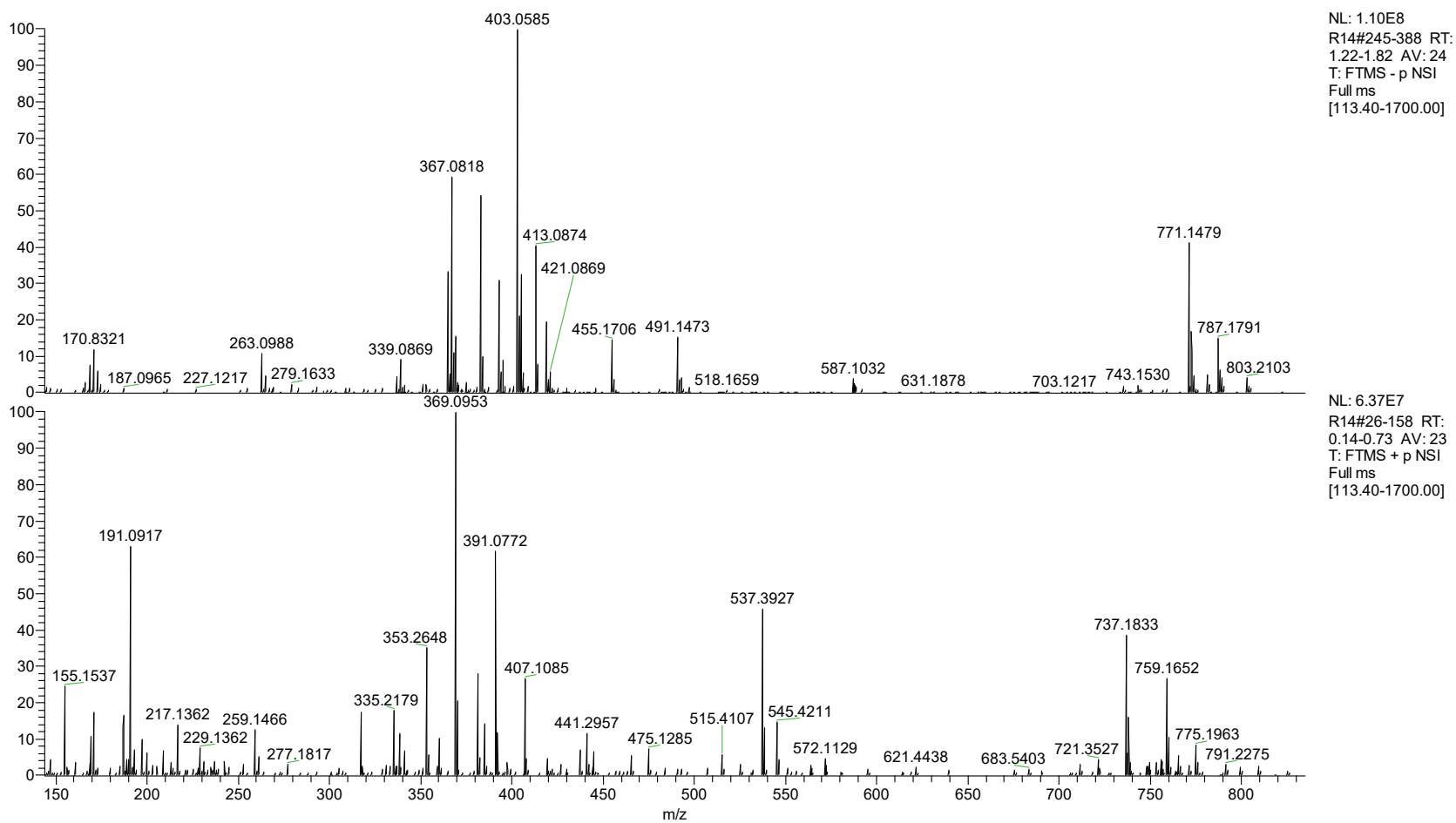


Fig. S31. HRMS of 5

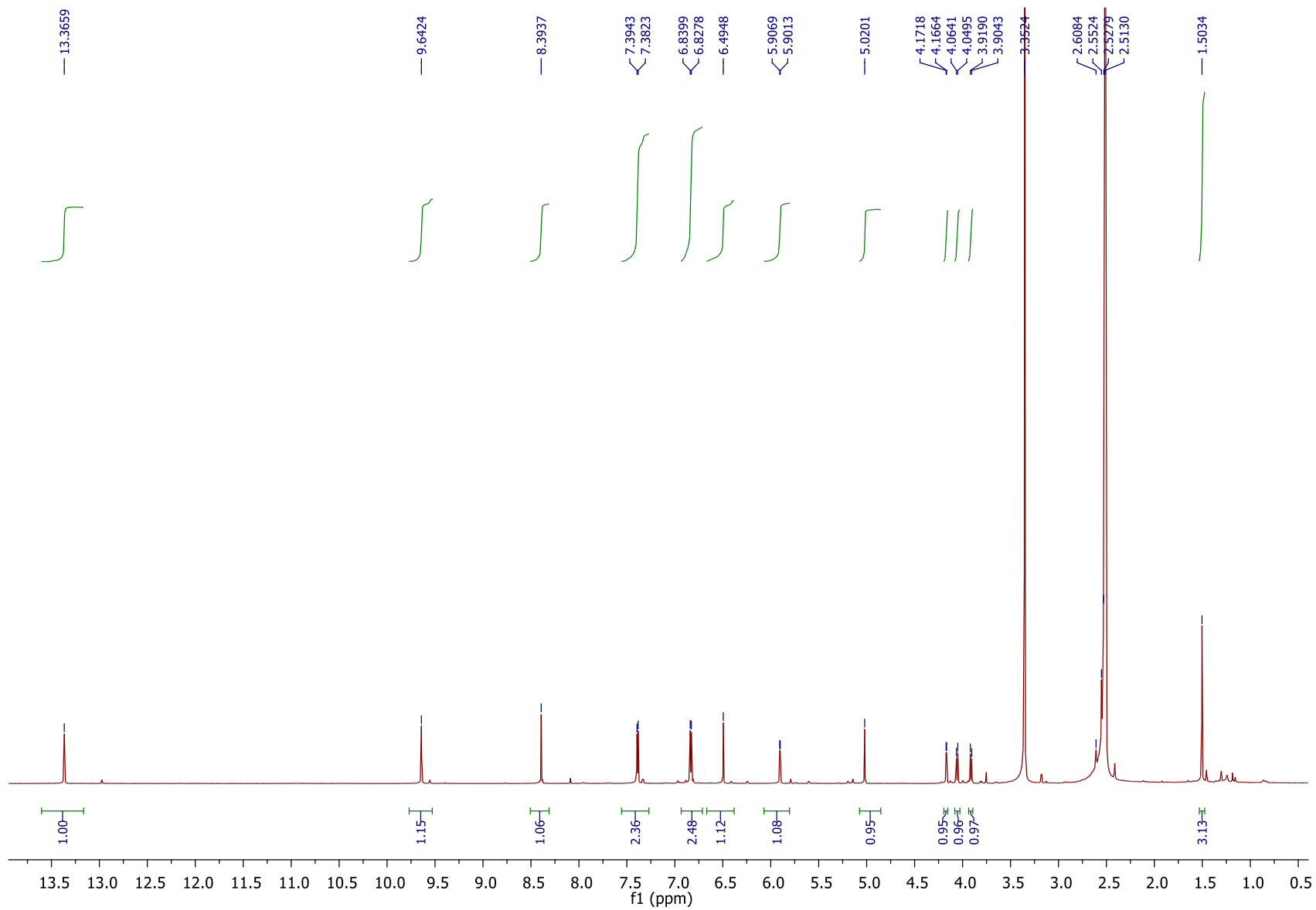


Fig. S32. ^1H NMR spectrum of 5

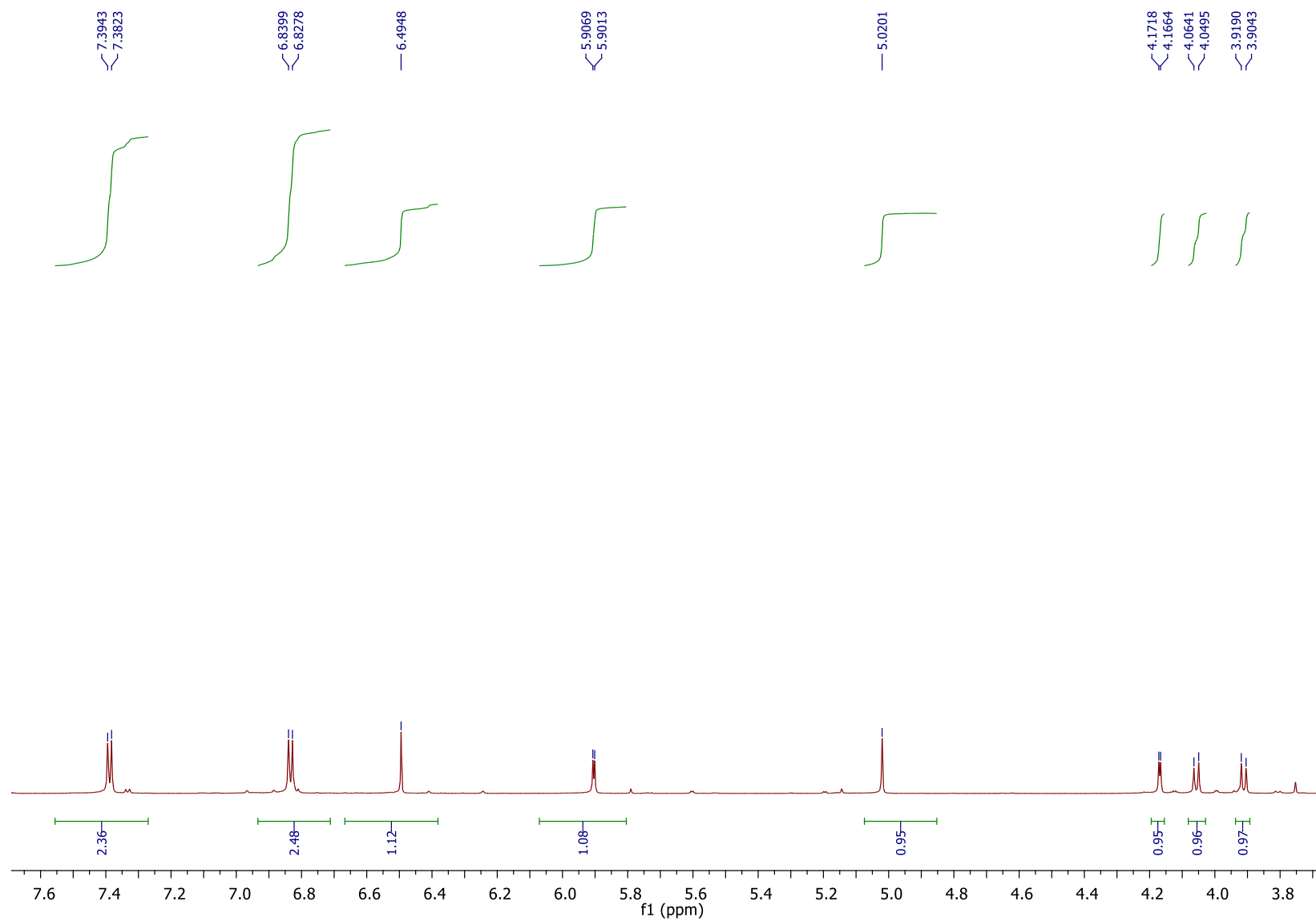


Fig. S33. Expansion of $^1\text{H-NMR}$ spectrum of **5**

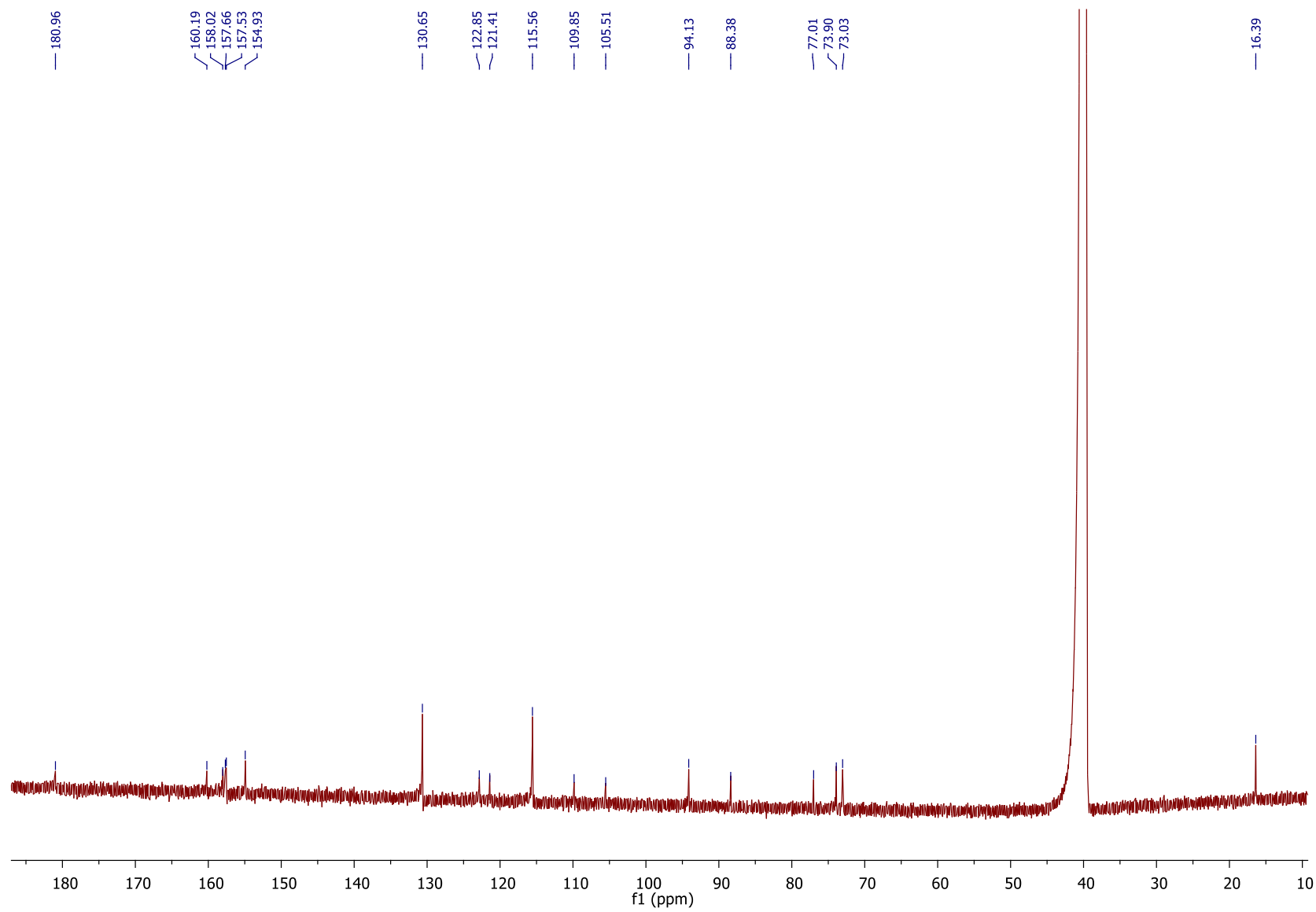


Fig. S34. ^{13}C NMR spectrum of 5

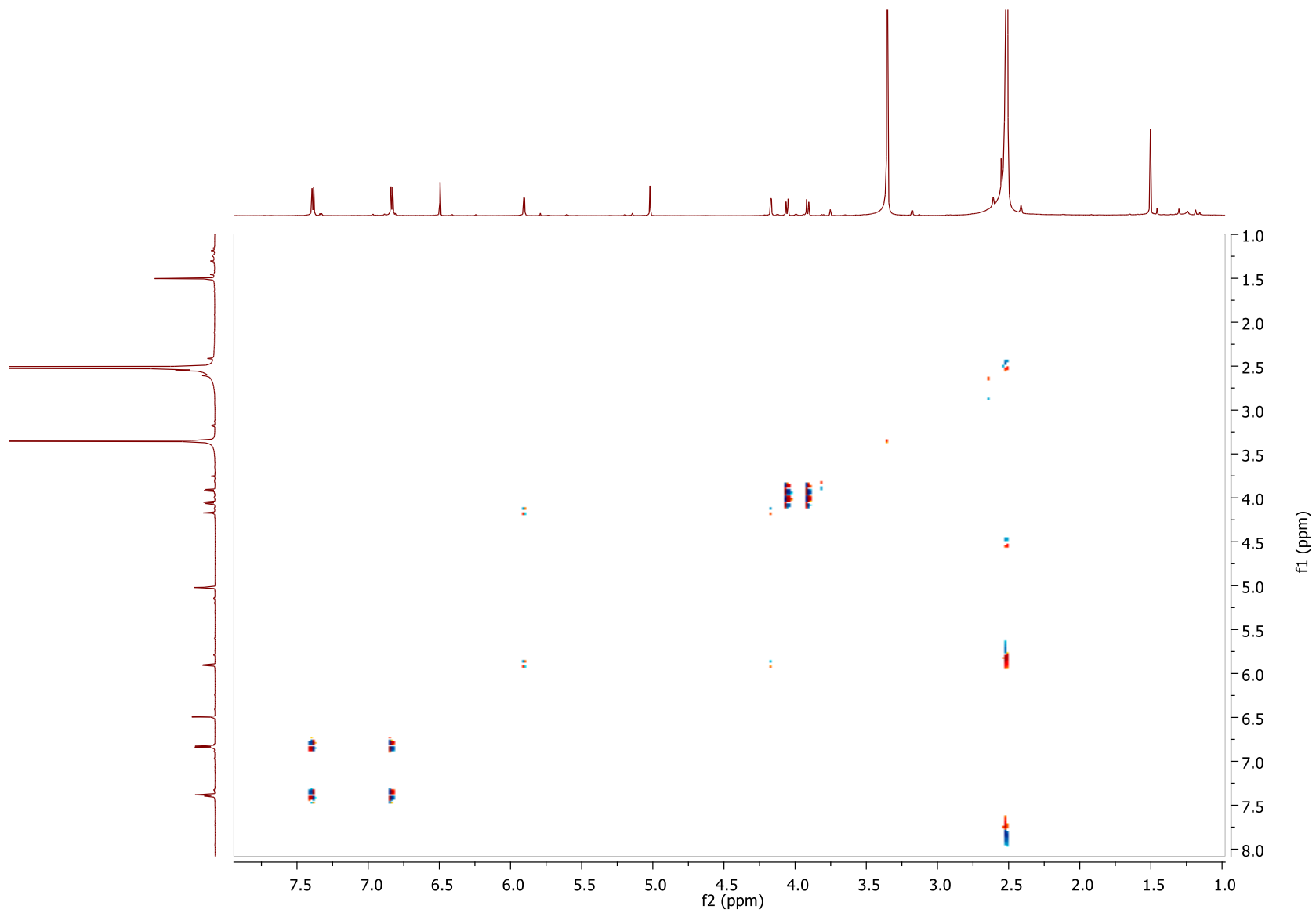


Fig. S35. COSY spectrum of **5**

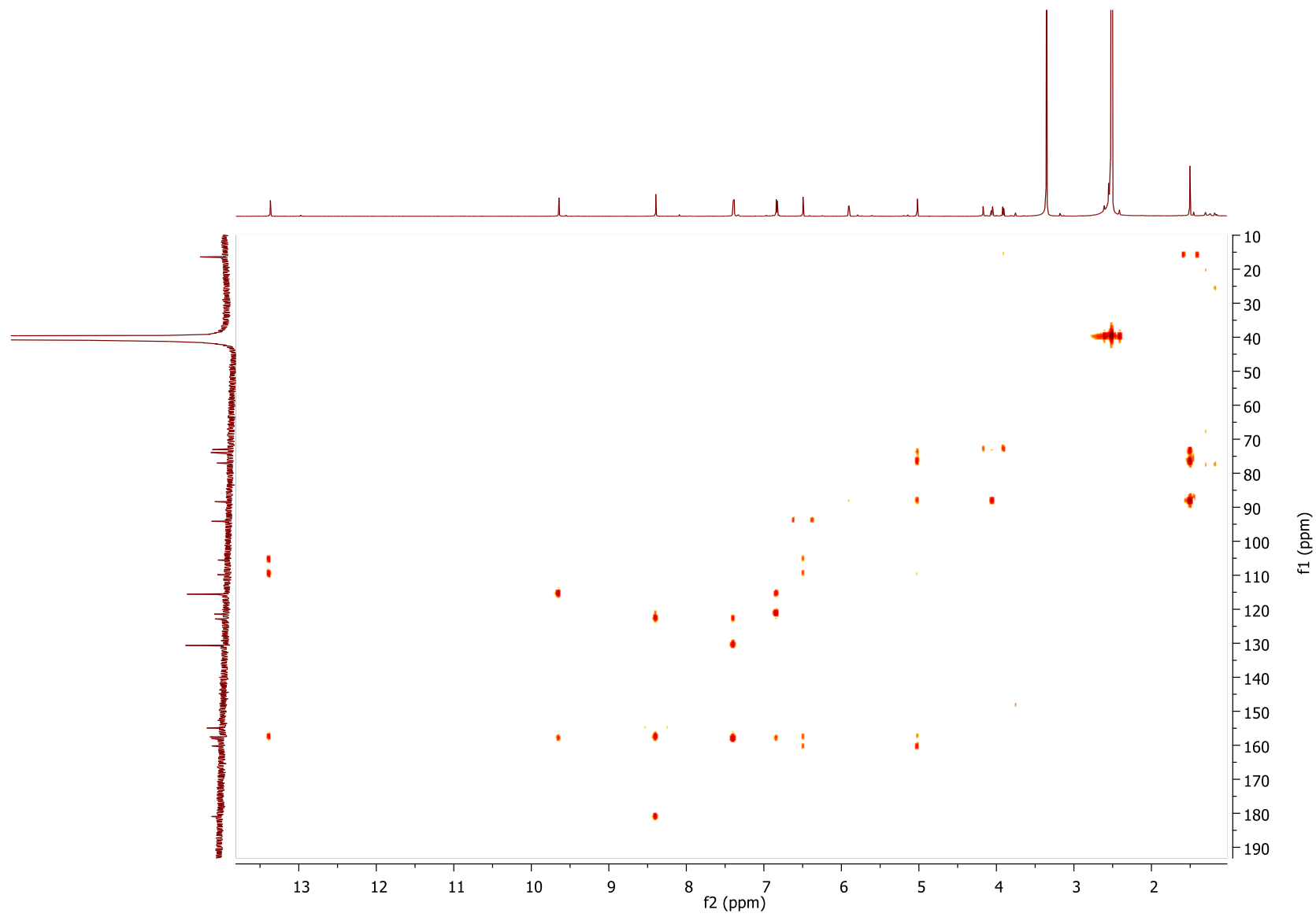


Fig. S36. HMBC spectrum of 5

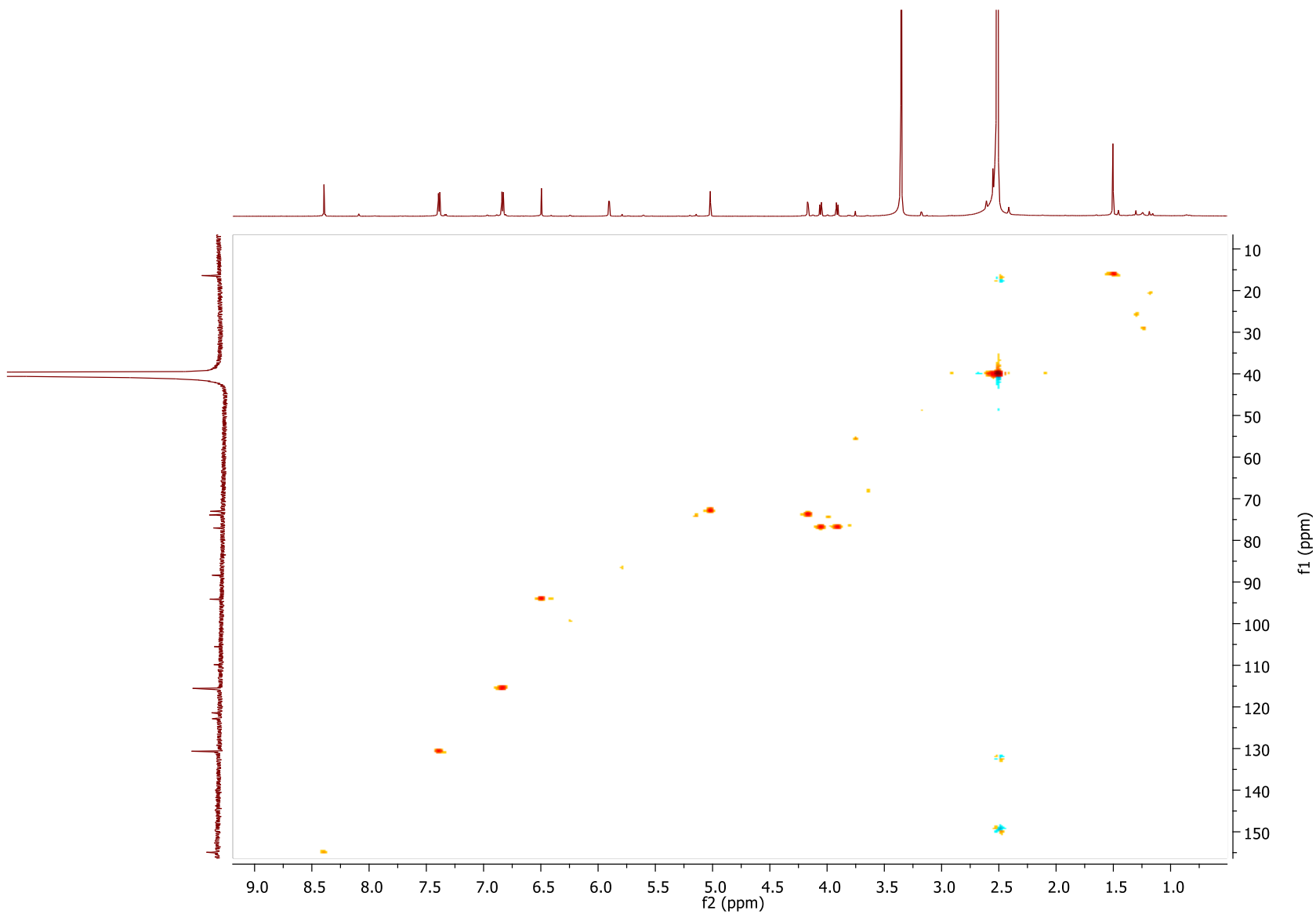


Fig. S37. HSQC spectrum of **5**

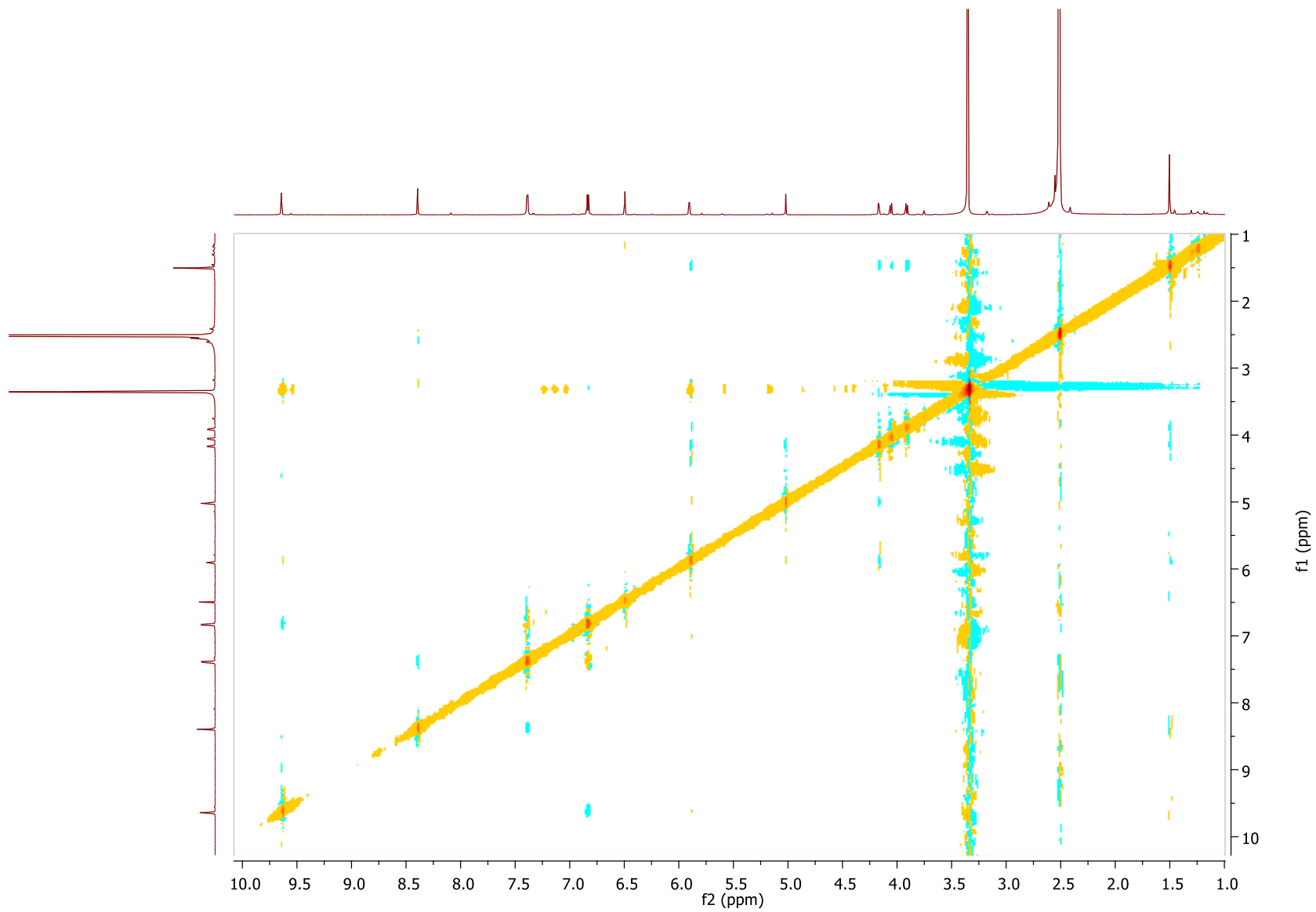


Fig. S38. NOESY spectrum of 5

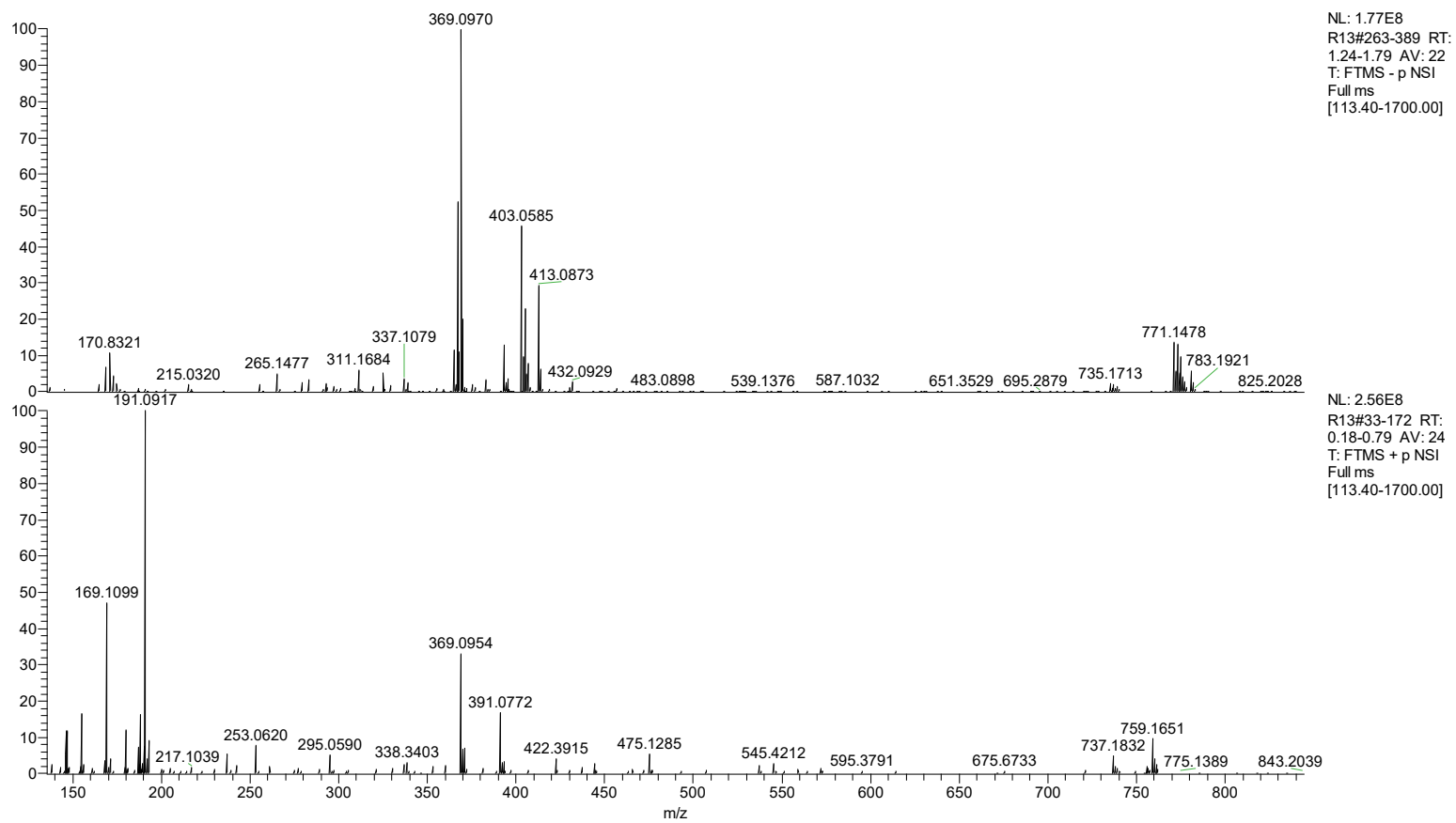


Fig. S39. HRMS of 6

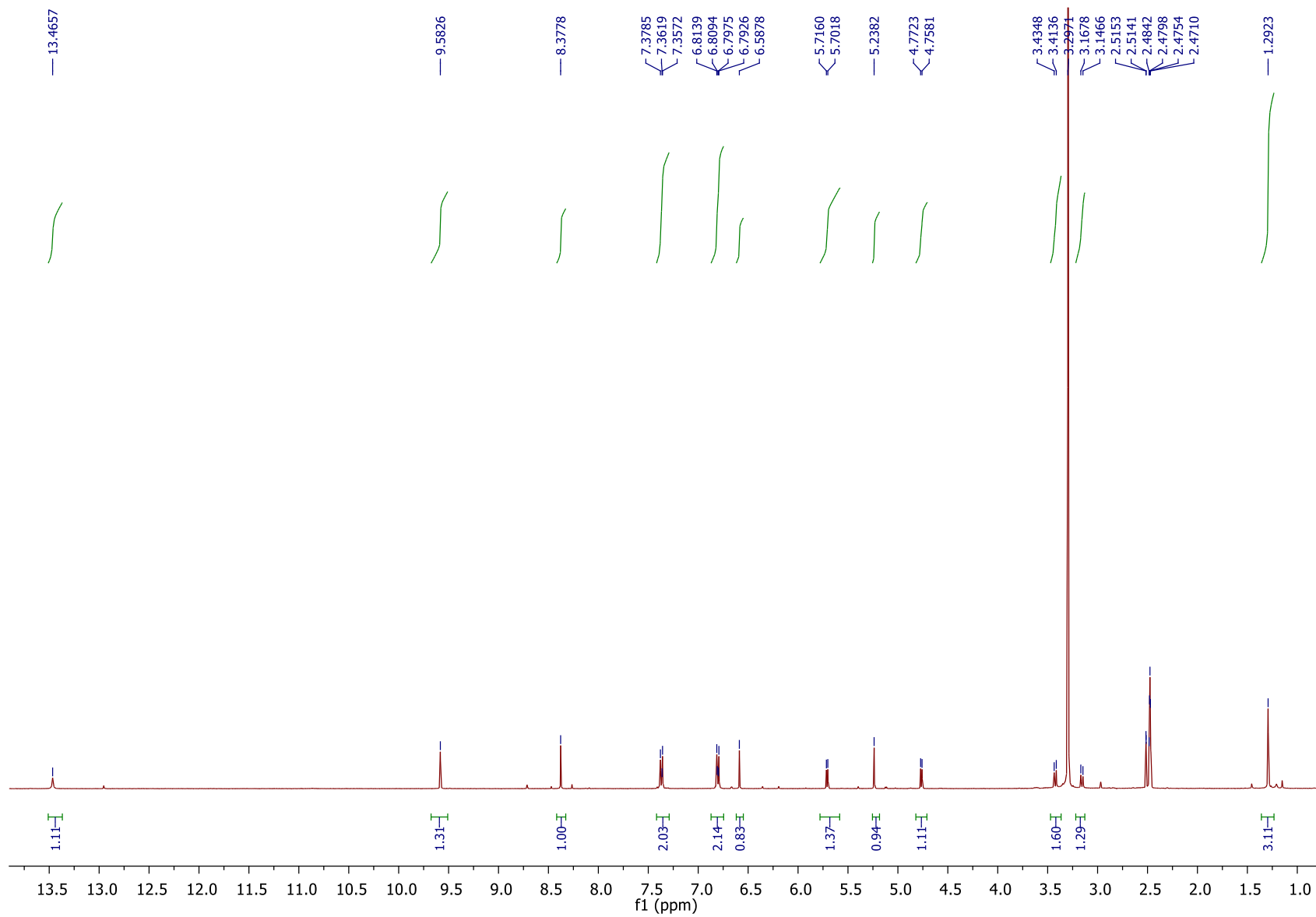


Fig. S40. ¹H NMR spectrum of **6**

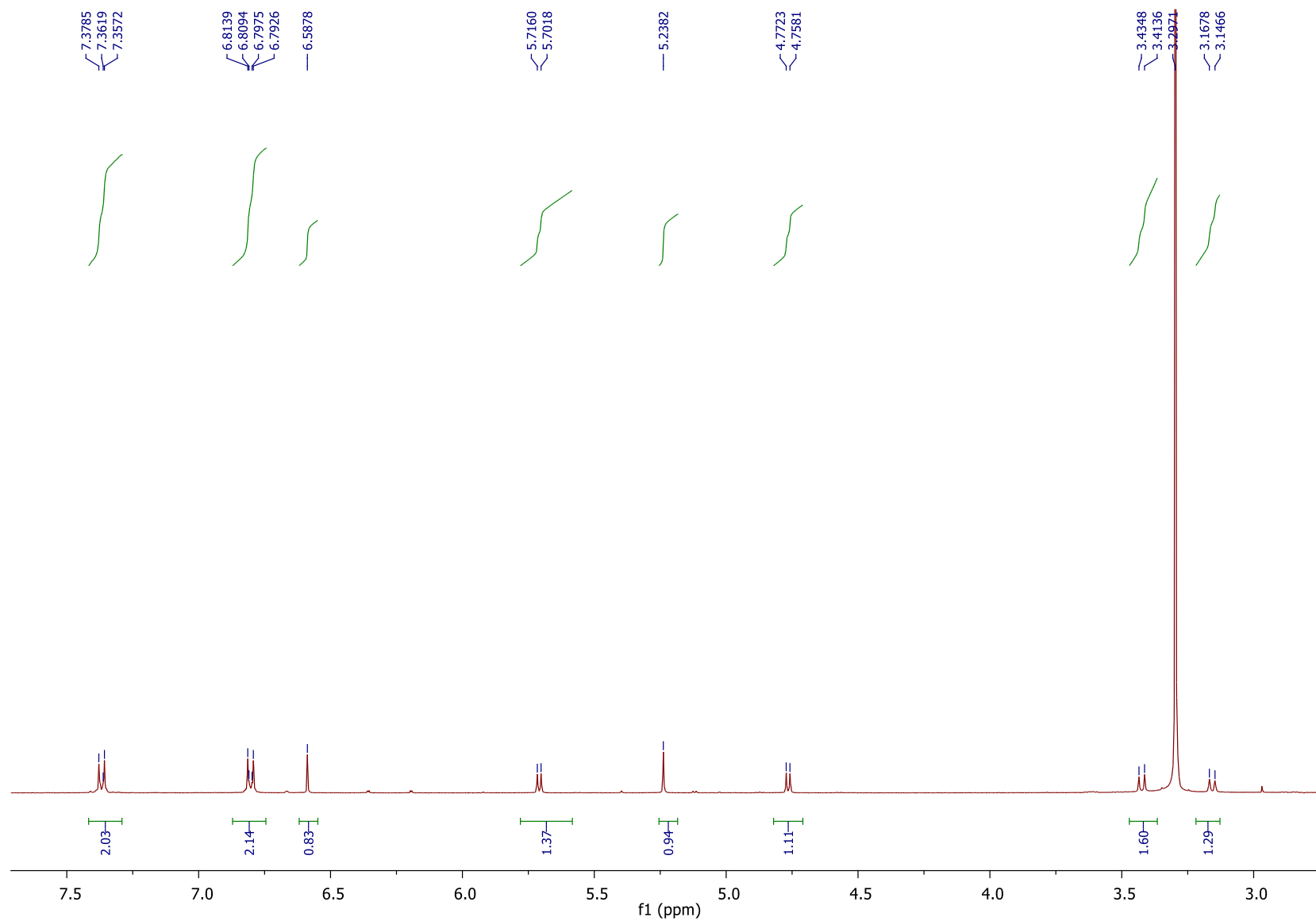


Fig. S41. Expansion of ¹H NMR of 6

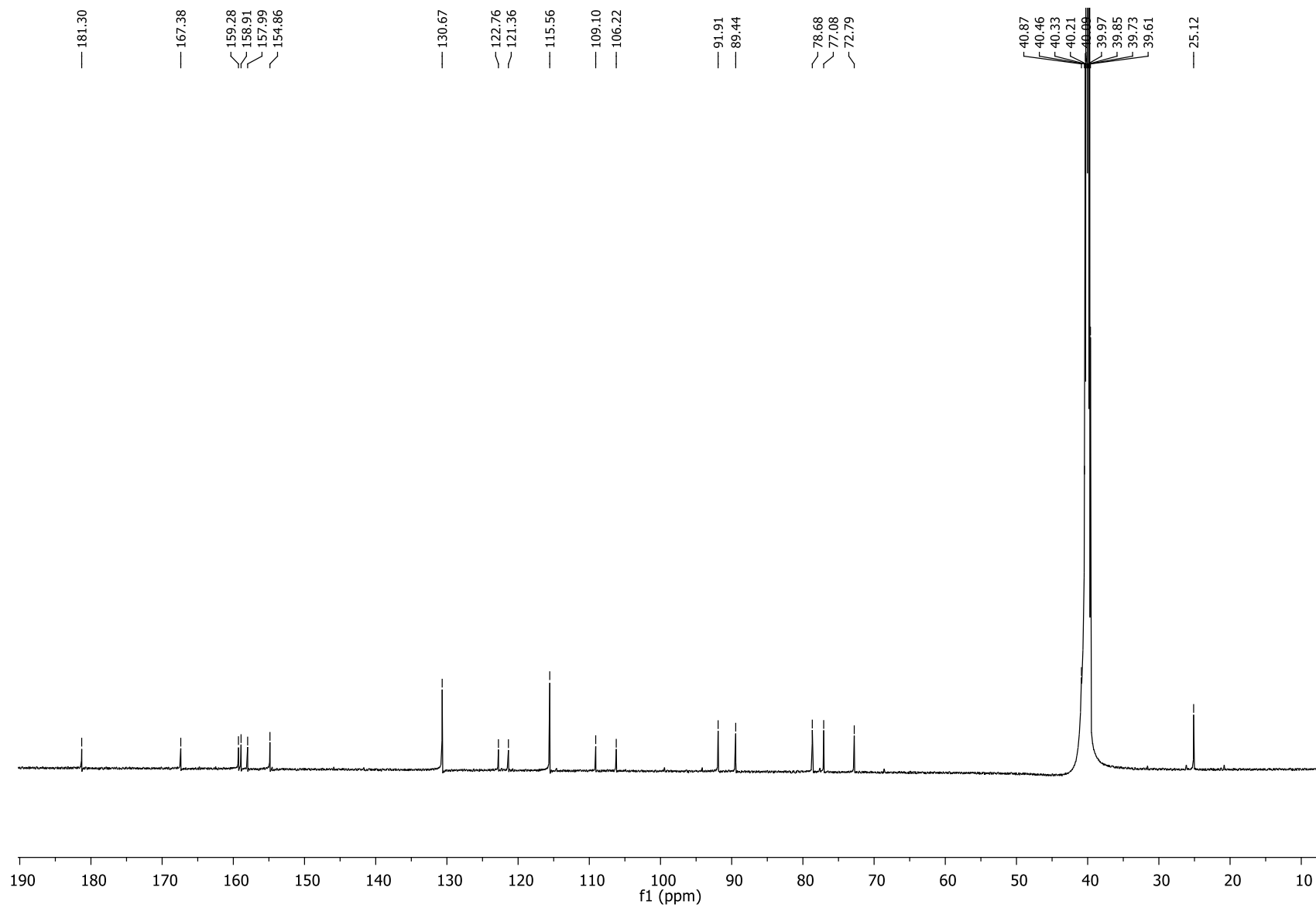


Fig. S42. ^{13}C NMR spectrum of **6**

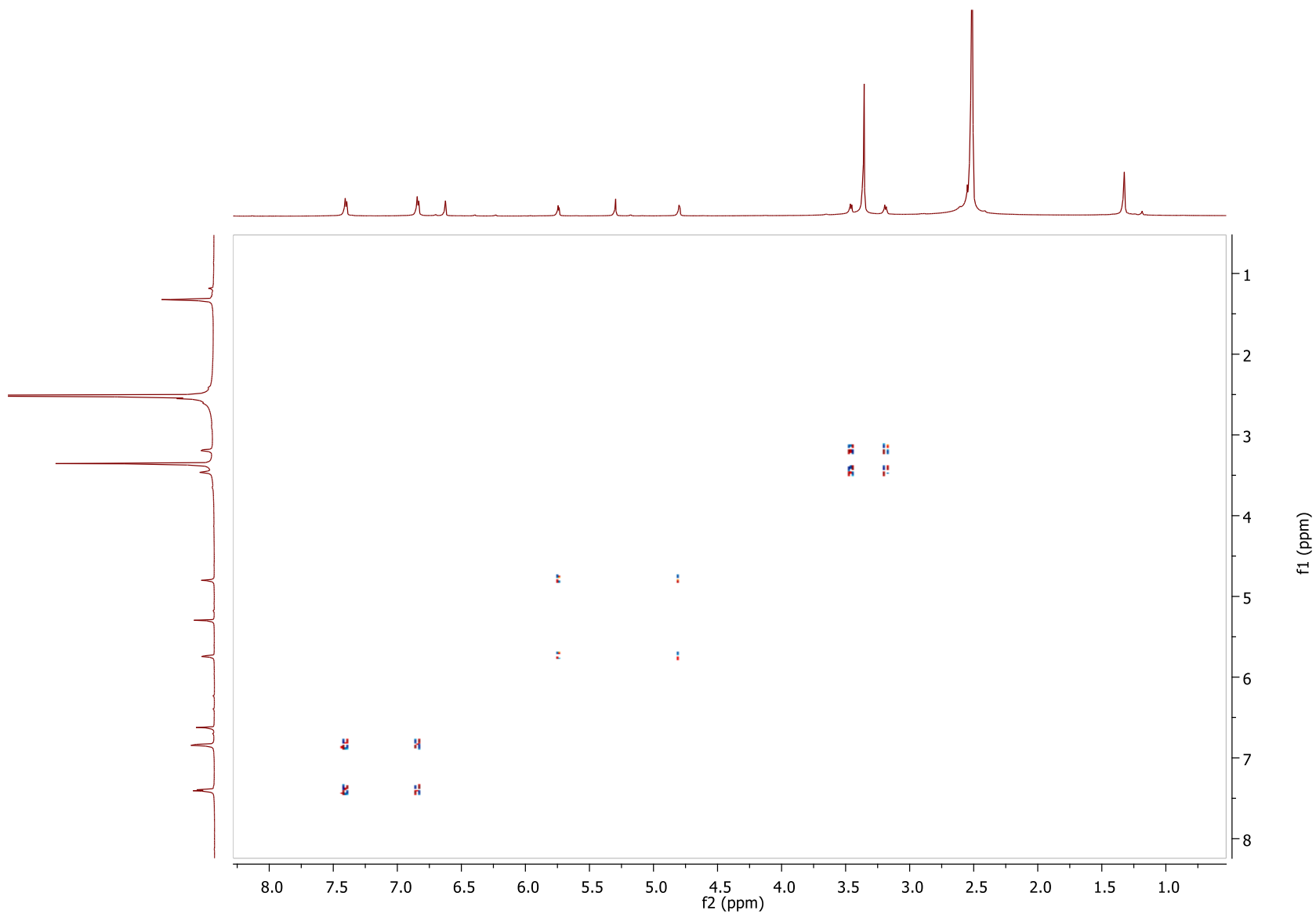


Fig. S43. COSY spectrum of **6**

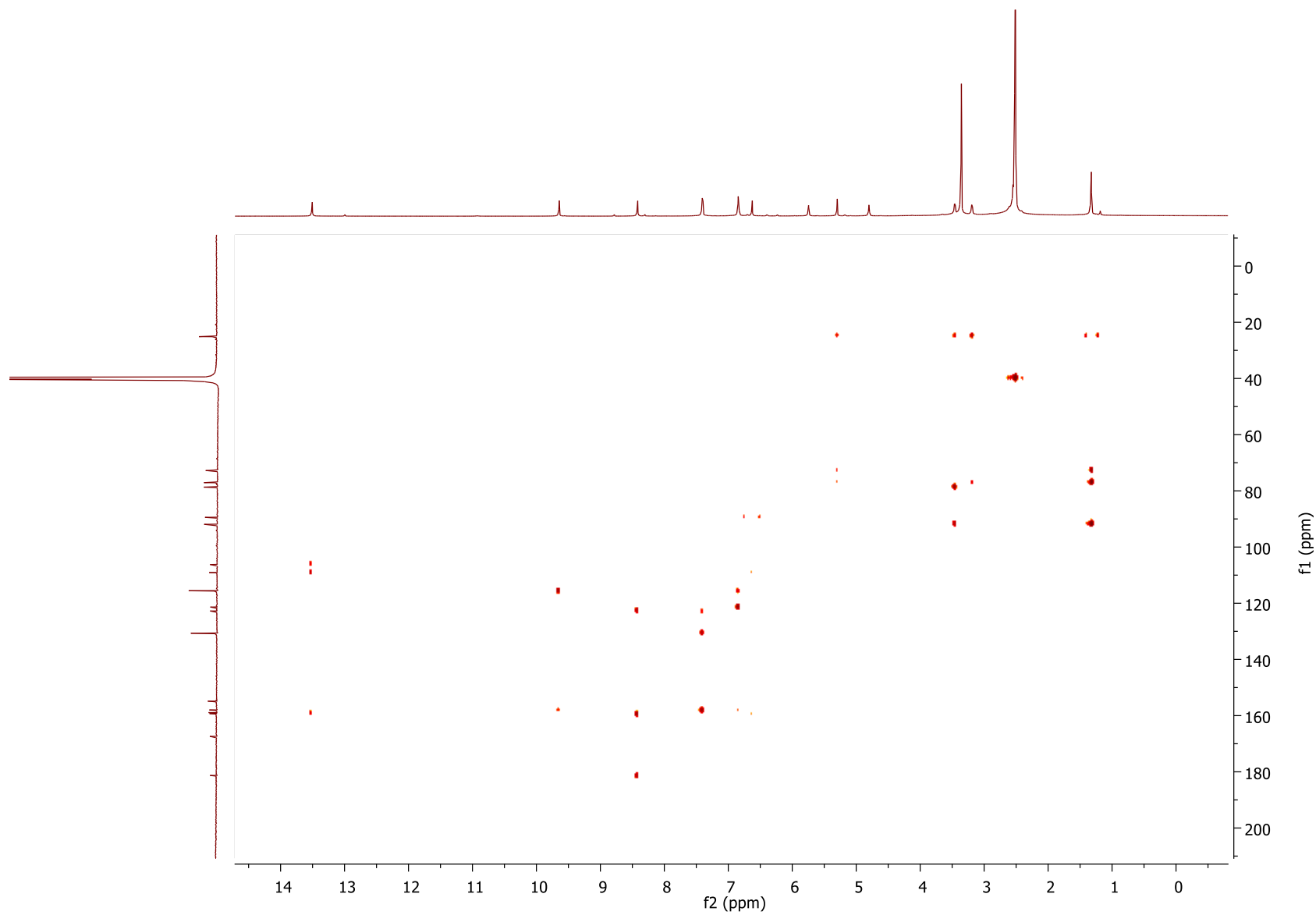


Fig. S44. HMBC spectrum of **6**

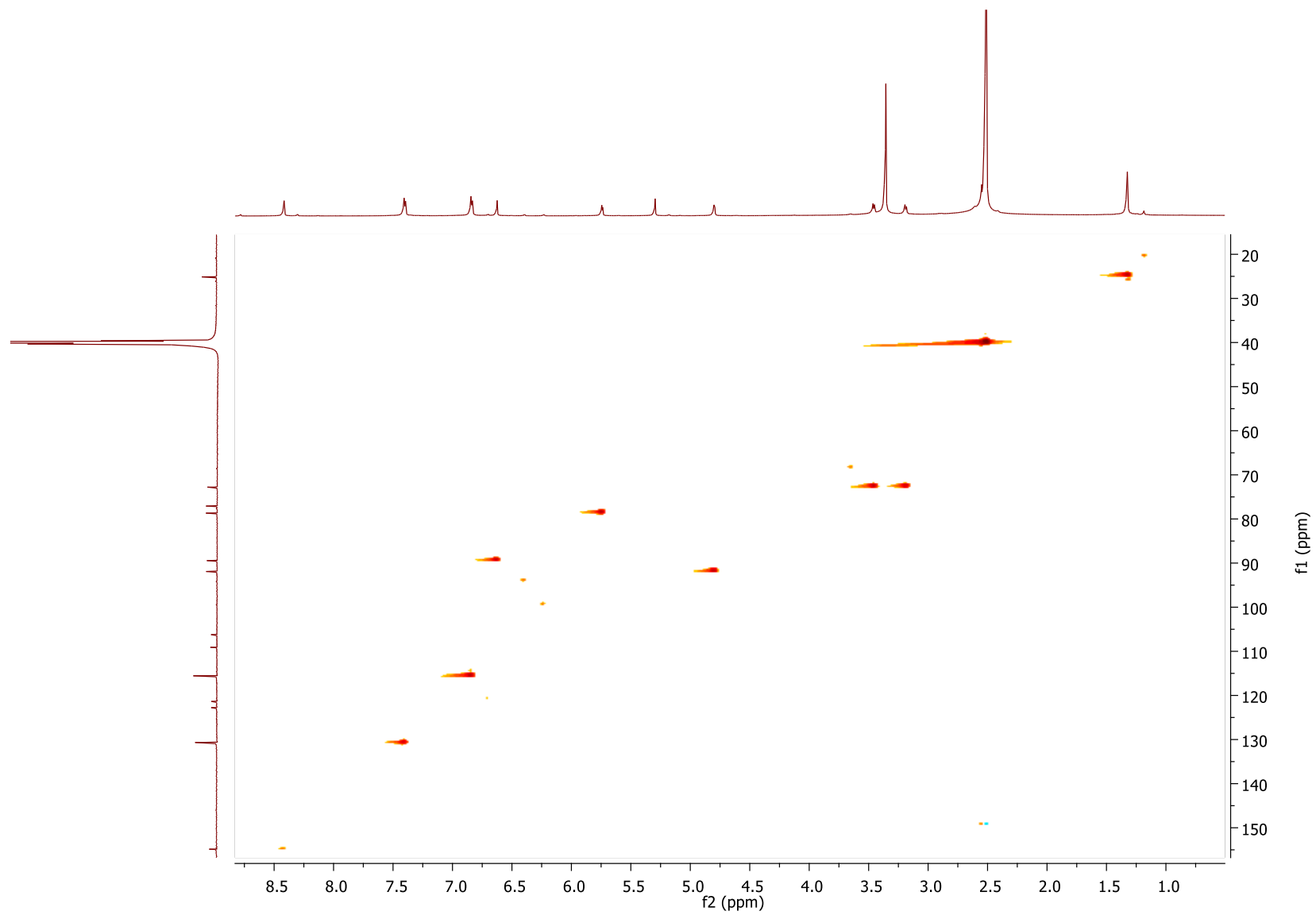


Fig. S45. HSQC spectrum of 6

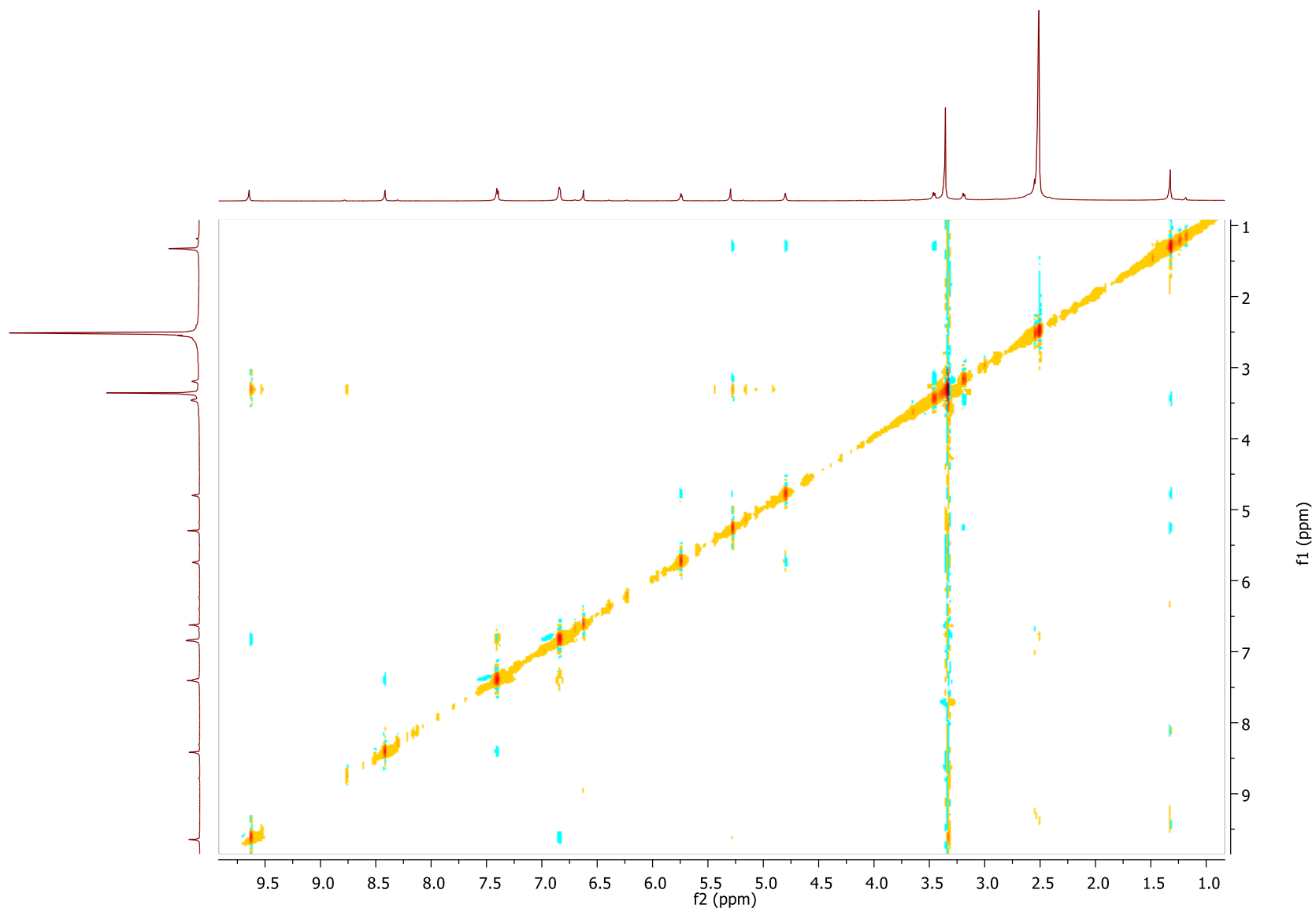


Fig. S46. NOESY of 6

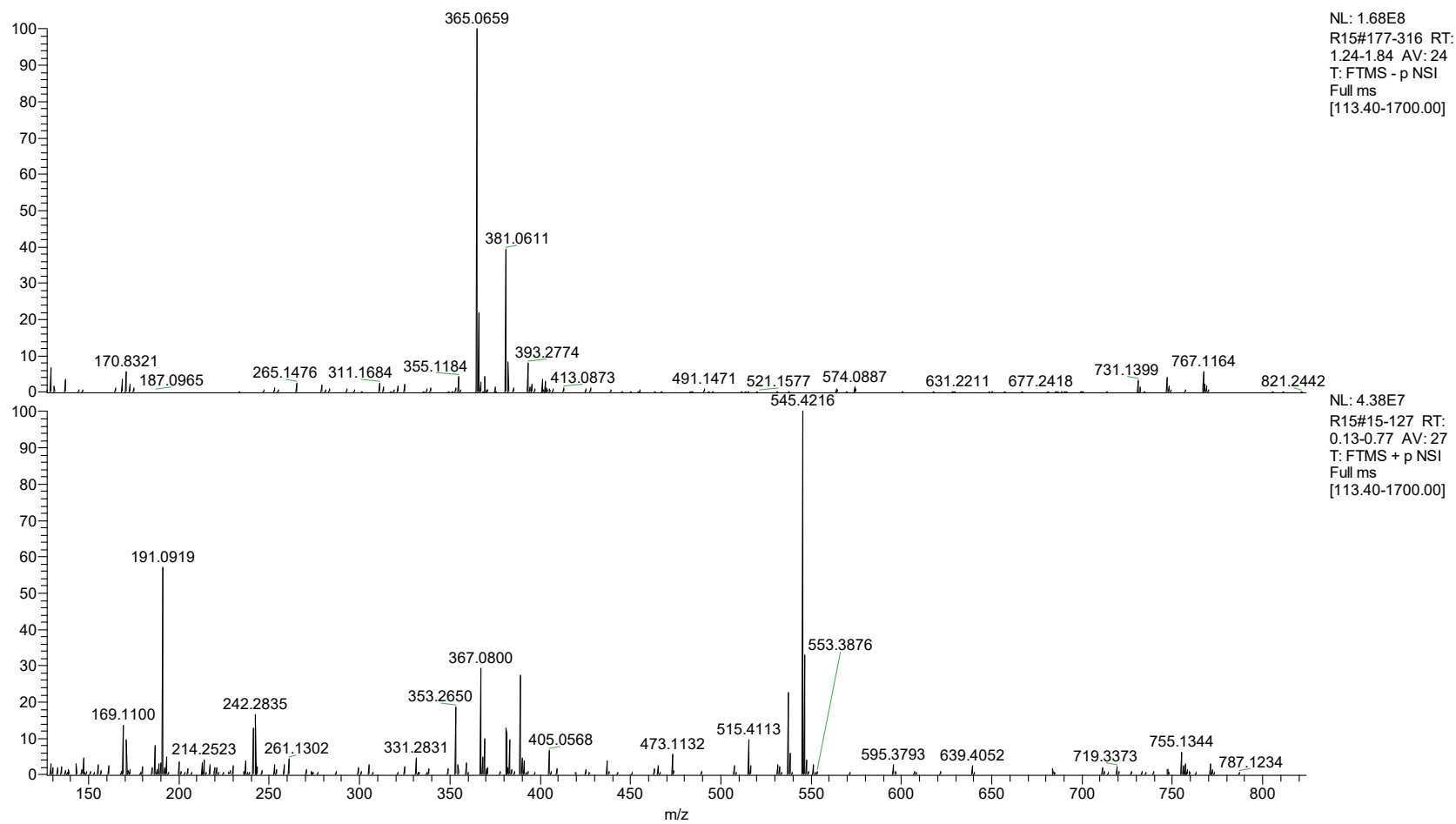


Fig. S47. HRMS of 7

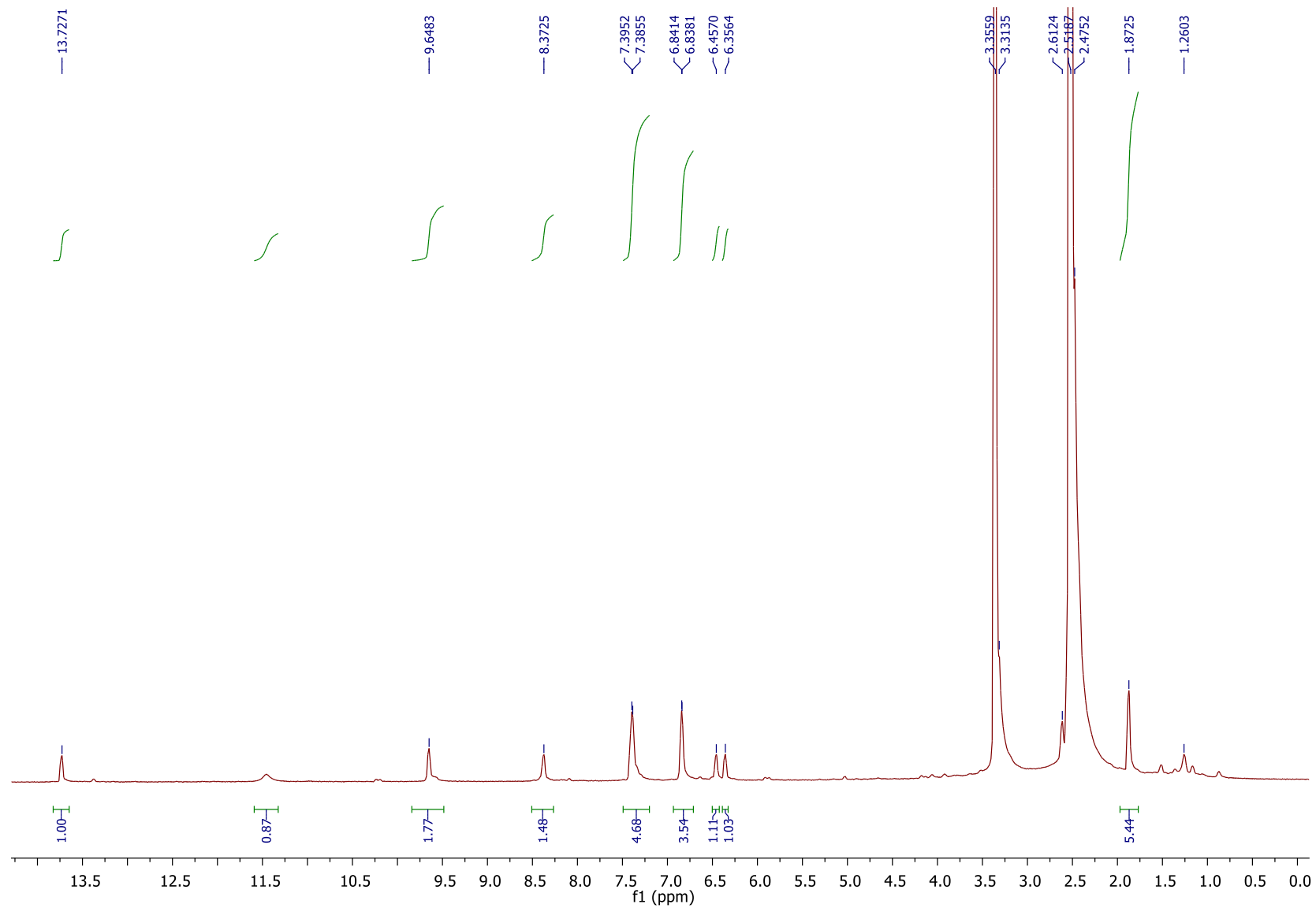


Fig. S48. ¹H NMR spectrum of 7

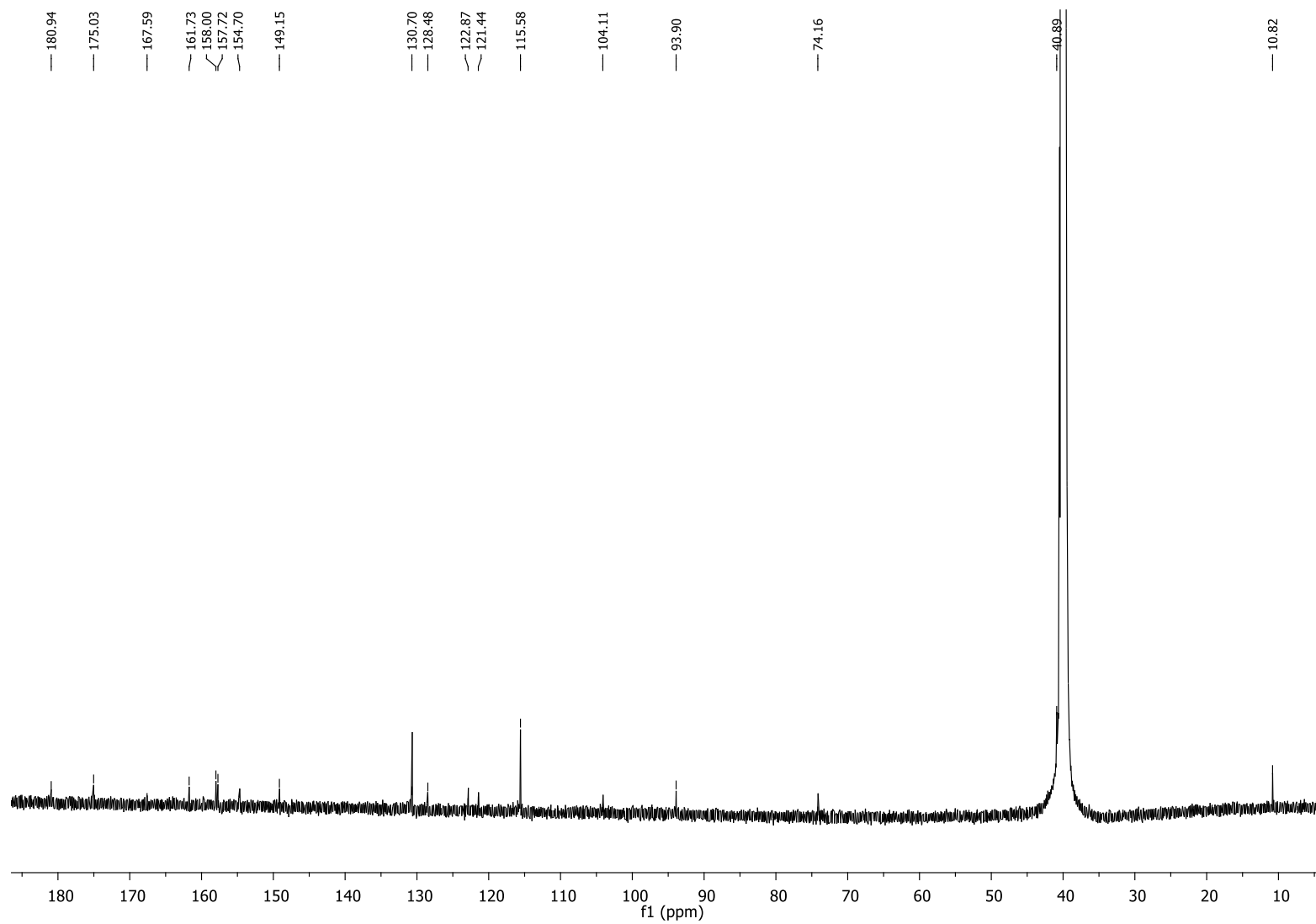


Fig. S49. ^{13}C NMR spectrum of **7**

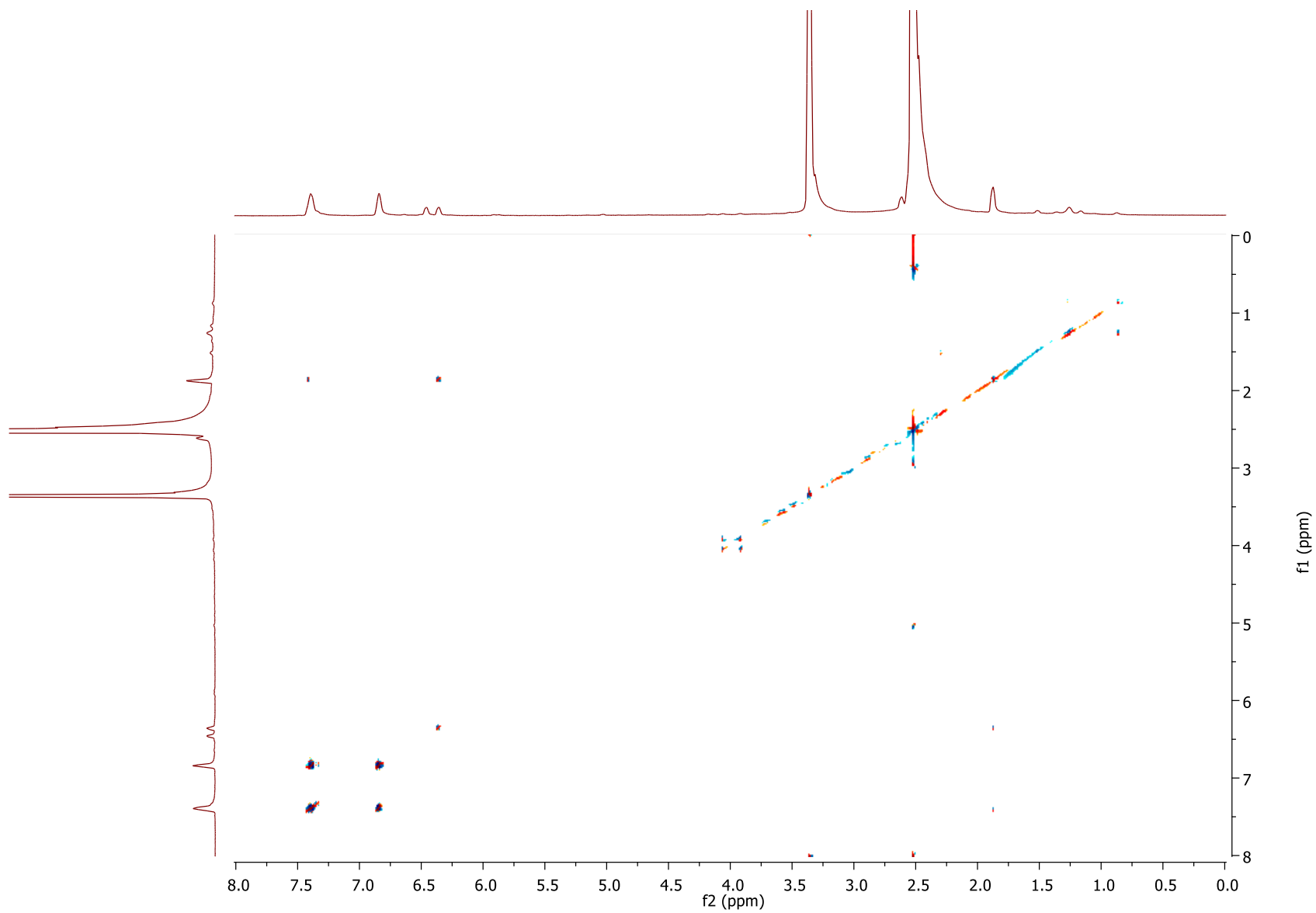


Fig. S50. COSY spectrum of **7**

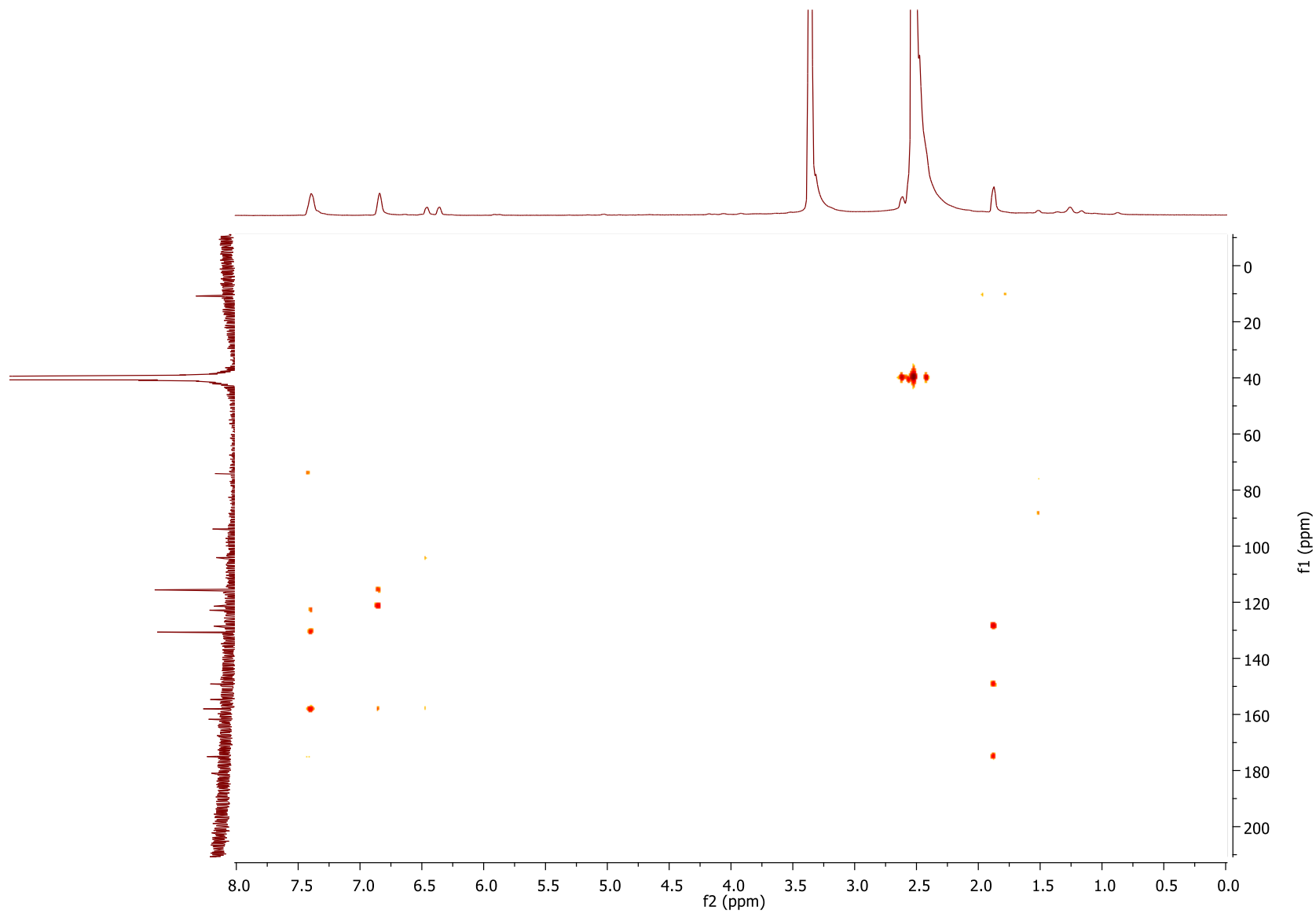


Fig. S51. HMBC spectrum of 7

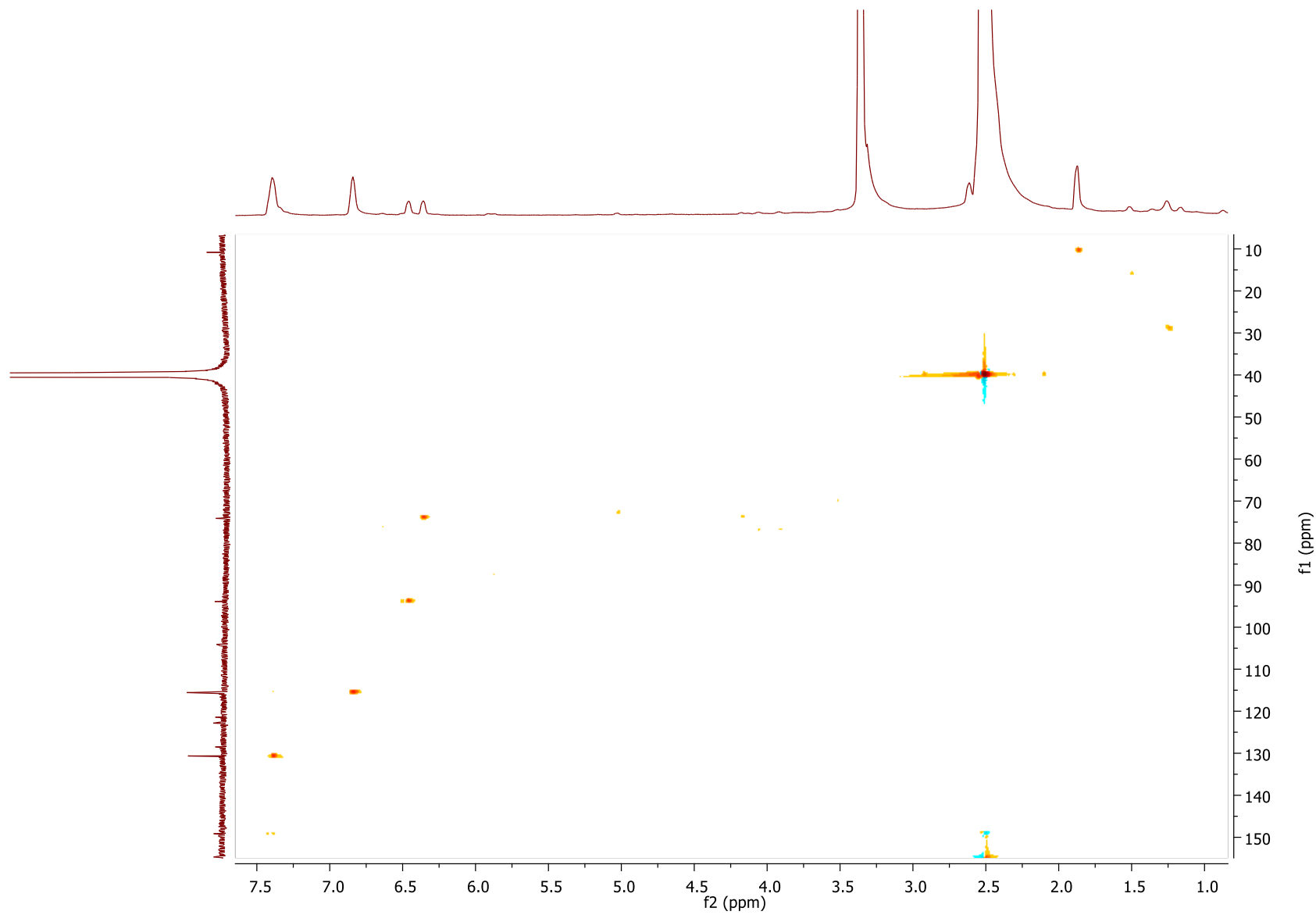
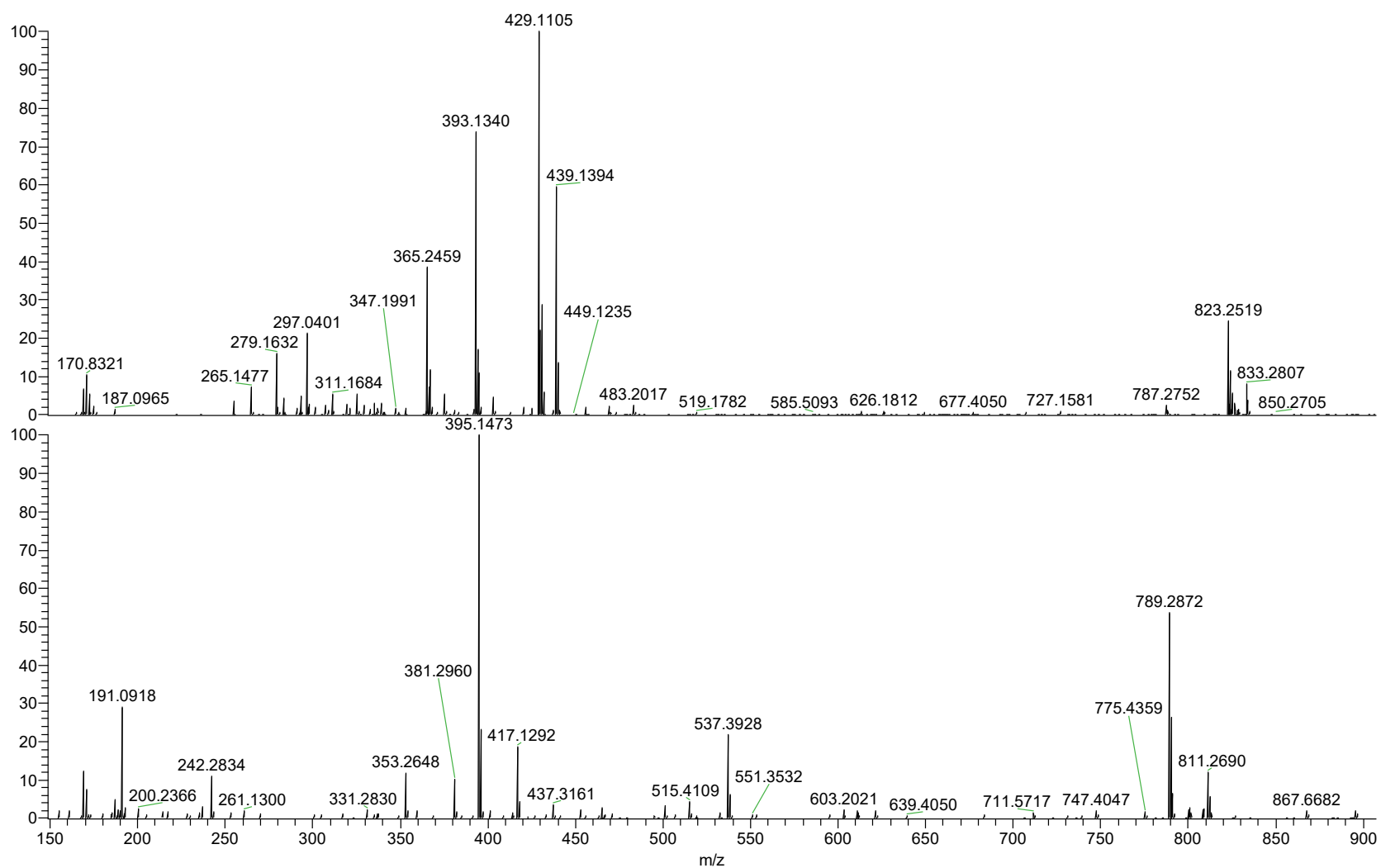


Fig. S52. HSQC spectrum of **7**



NL: 1.01E8
R10#183-321 RT:
1.24-1.81 AV: 23
T: FTMS - p NSI
Full ms
[113.40-1700.00]

NL: 1.04E8
R10#23-128 RT:
0.18-0.81 AV: 27
T: FTMS + p NSI
Full ms
[113.40-1700.00]

Fig. S53. HRMS of 8

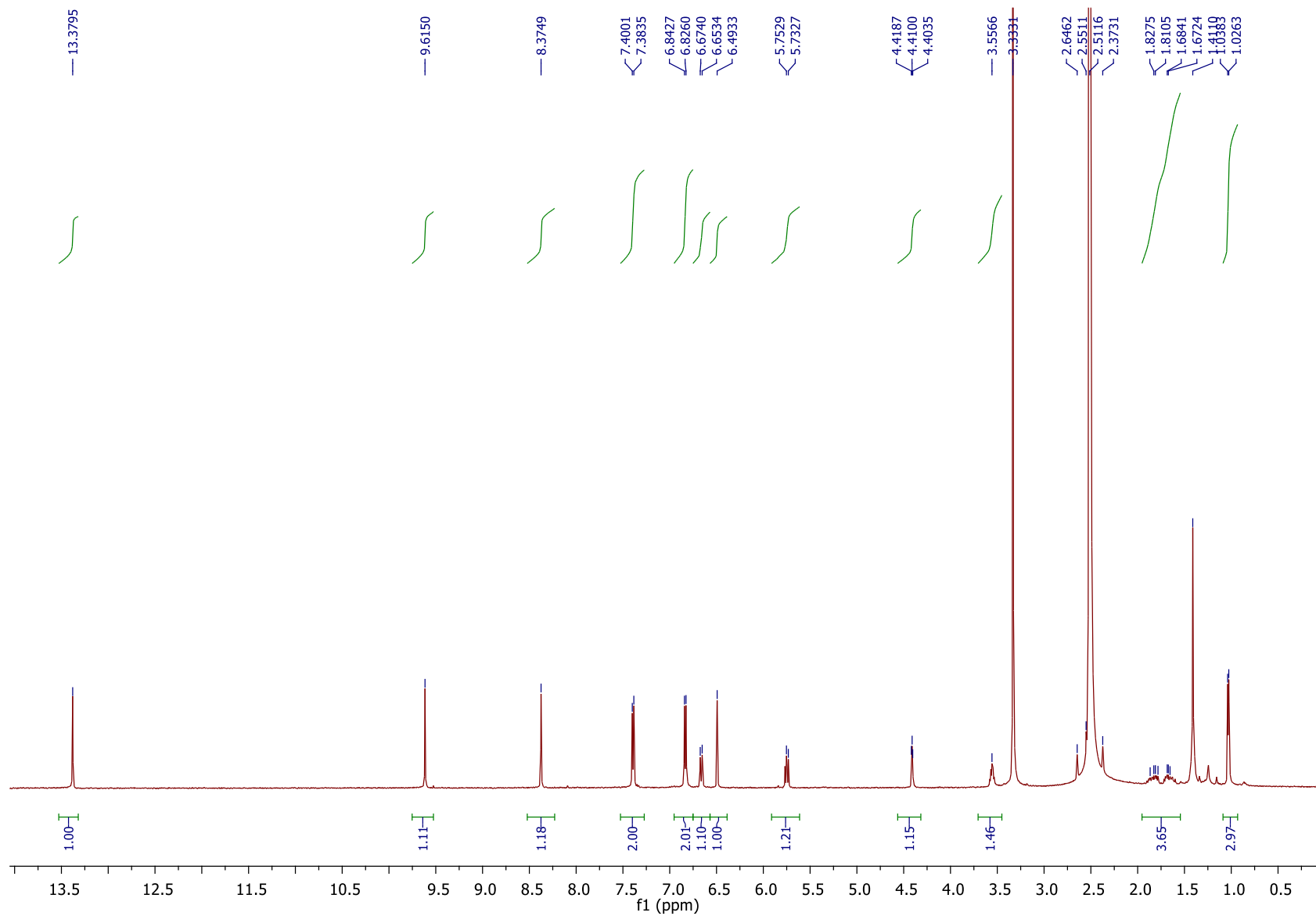


Fig. S54. ¹H NMR spectrum of 8

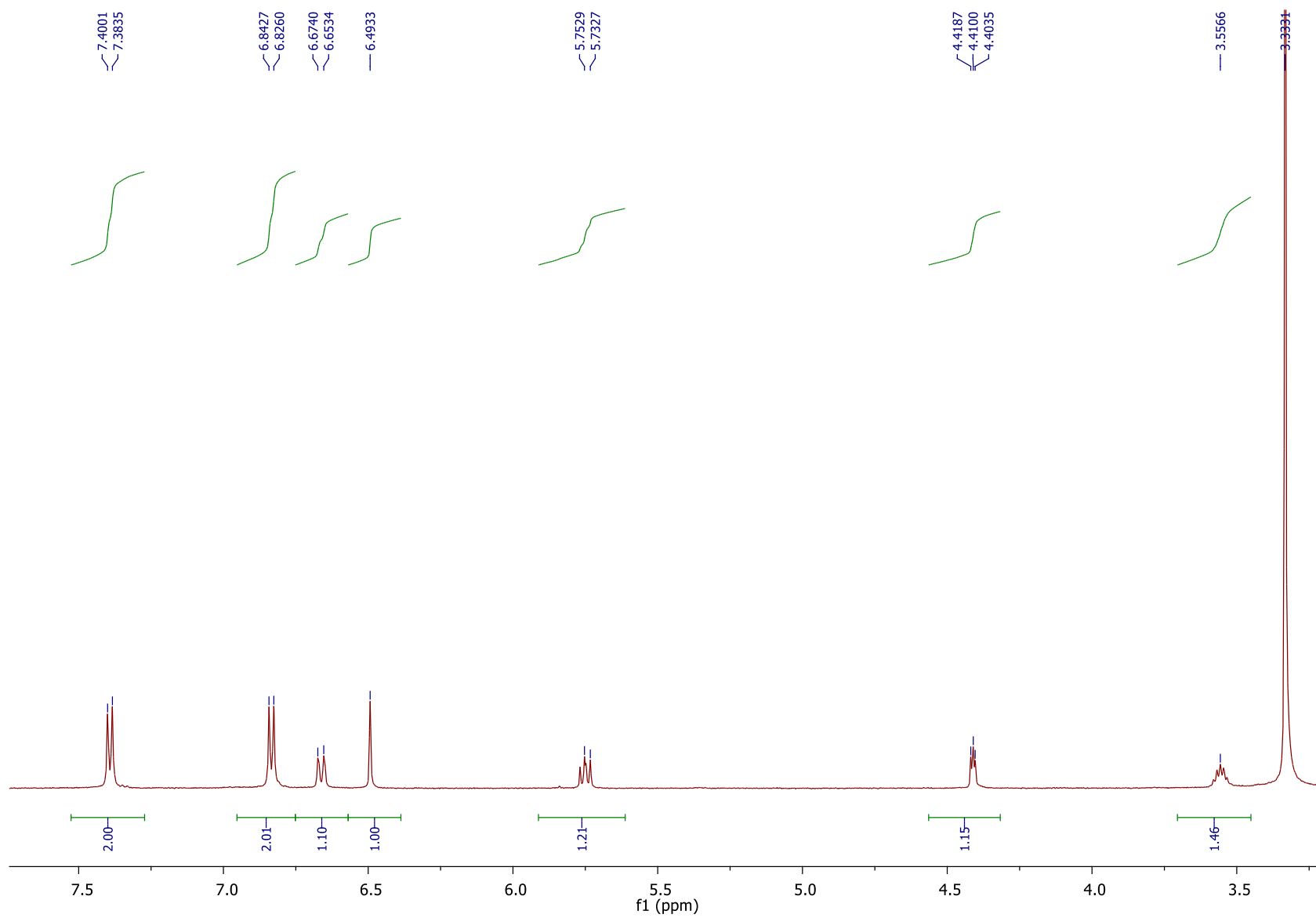


Fig. S55. Expansion A of ¹H NMR spectrum of **8**

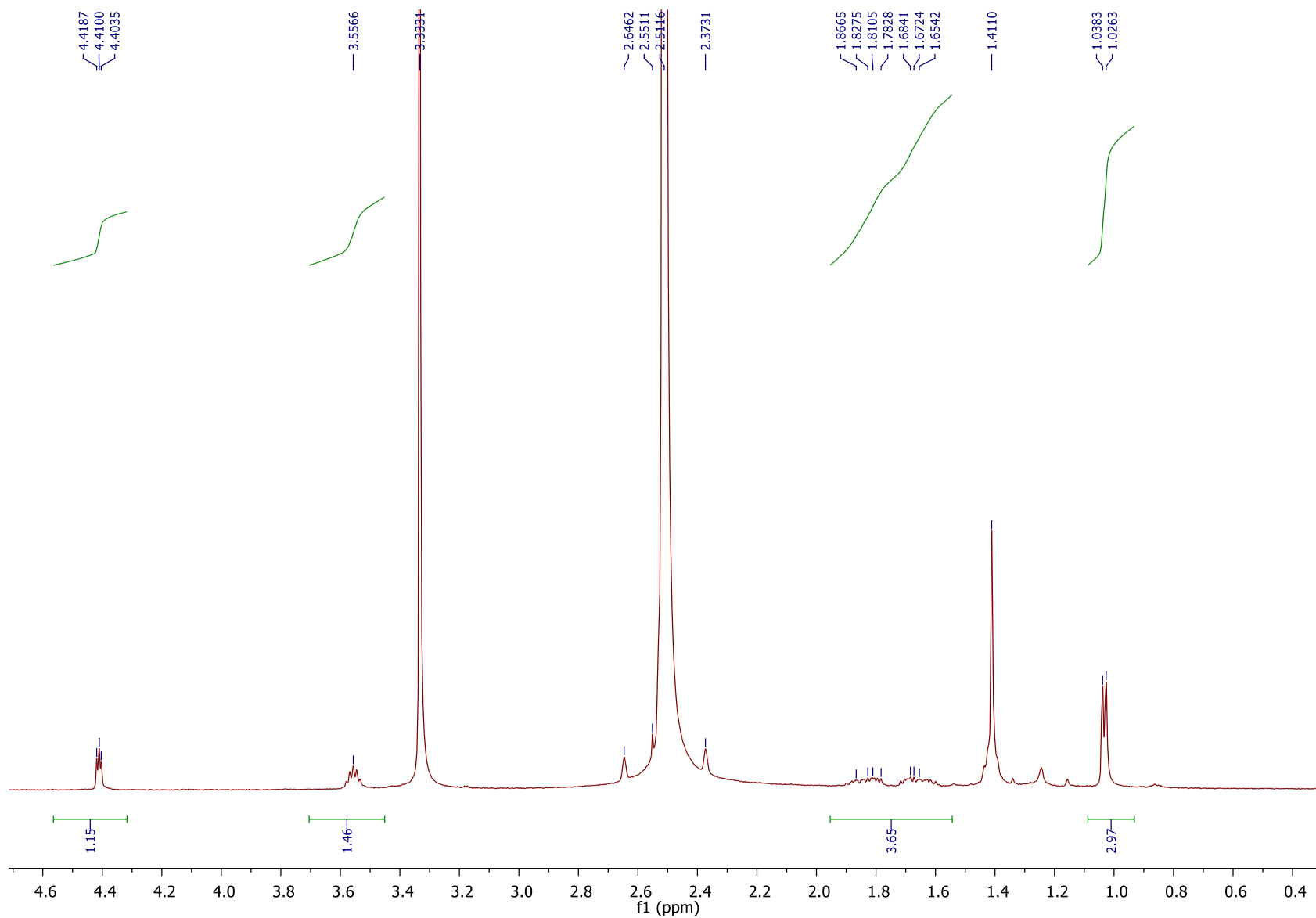


Fig. S56. Expansion B of ^1H NMR spectrum of **8**

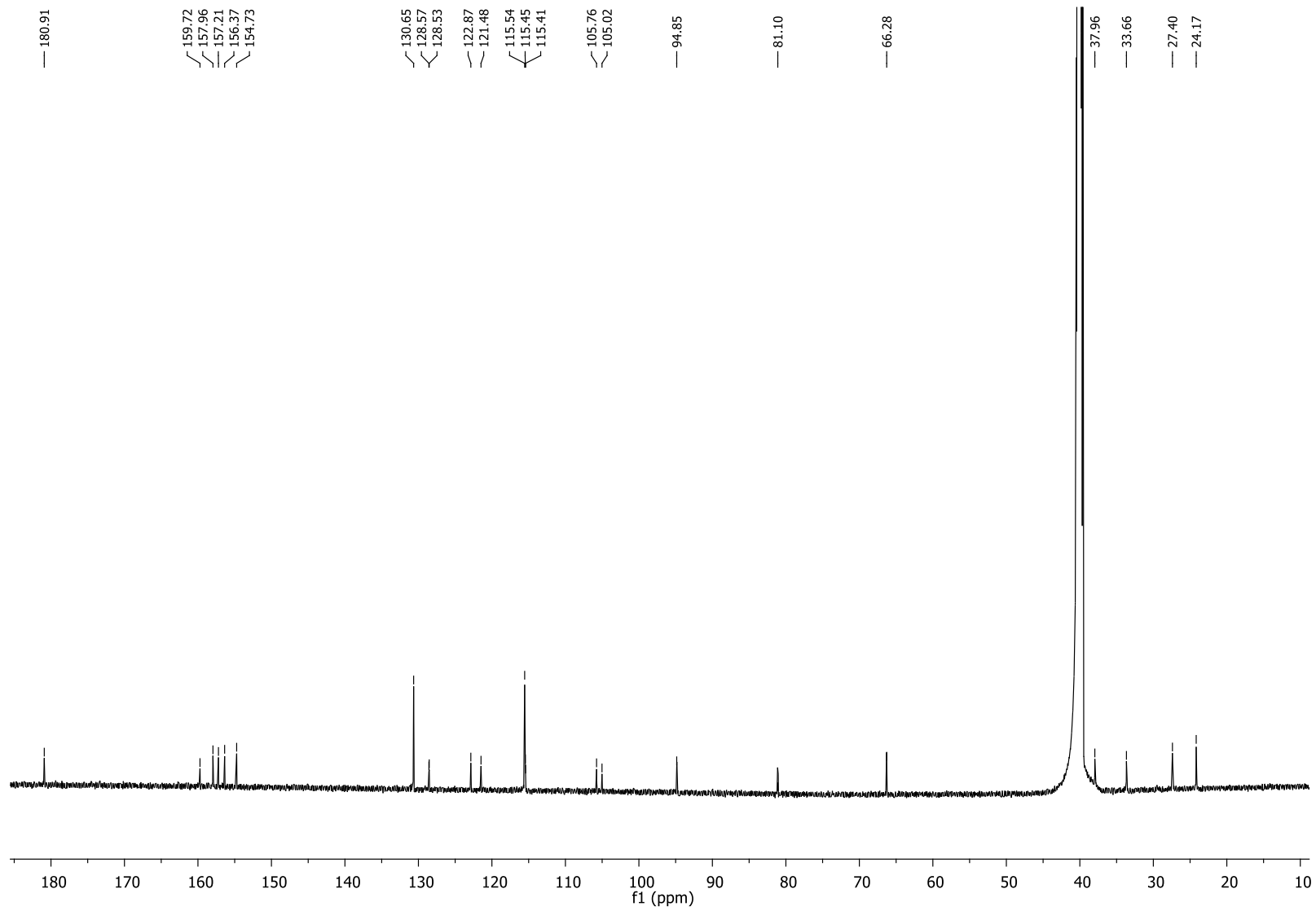


Fig. S57. ¹³C NMR spectrum of **8**

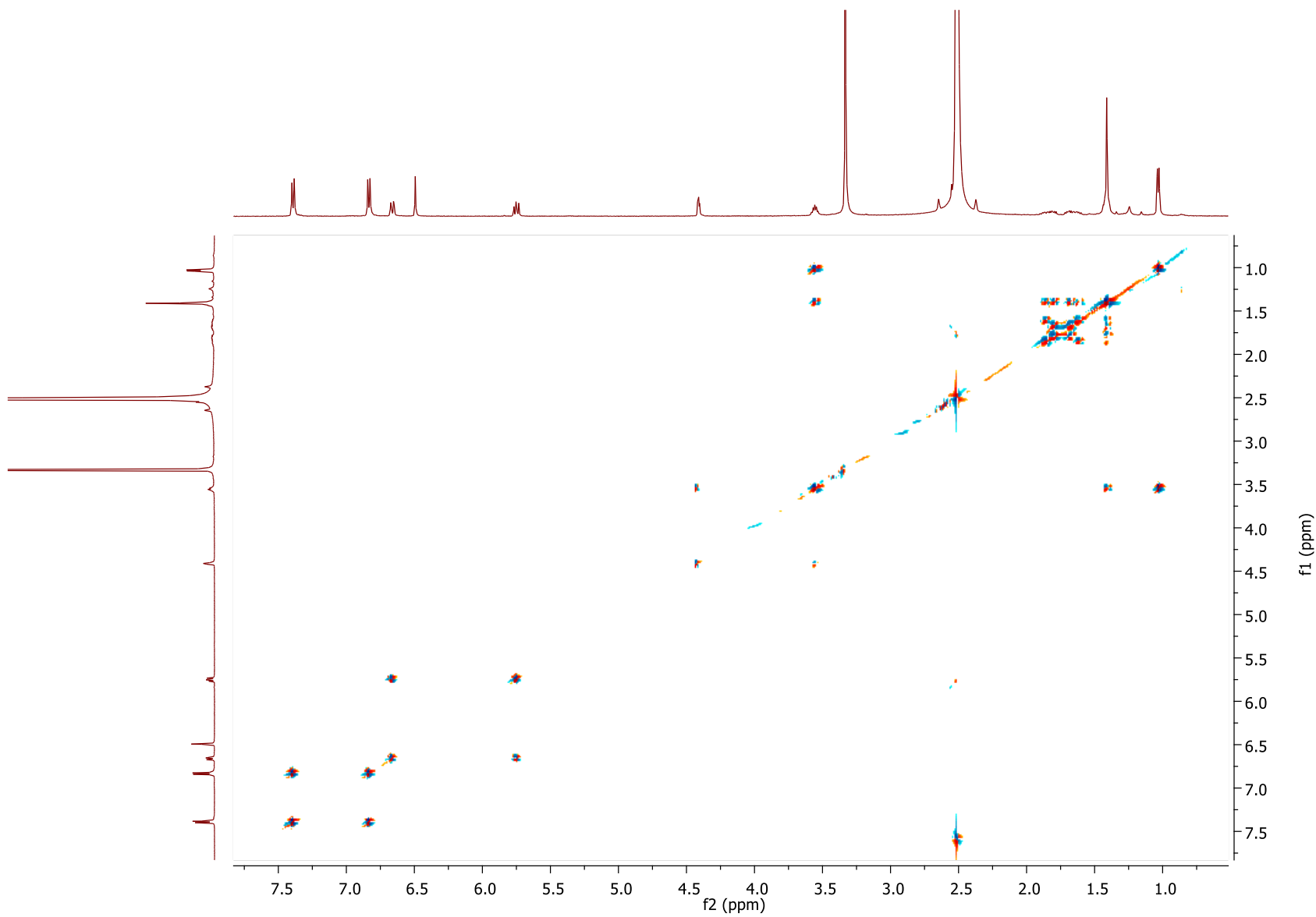


Fig. S58. COSY spectrum of **8**

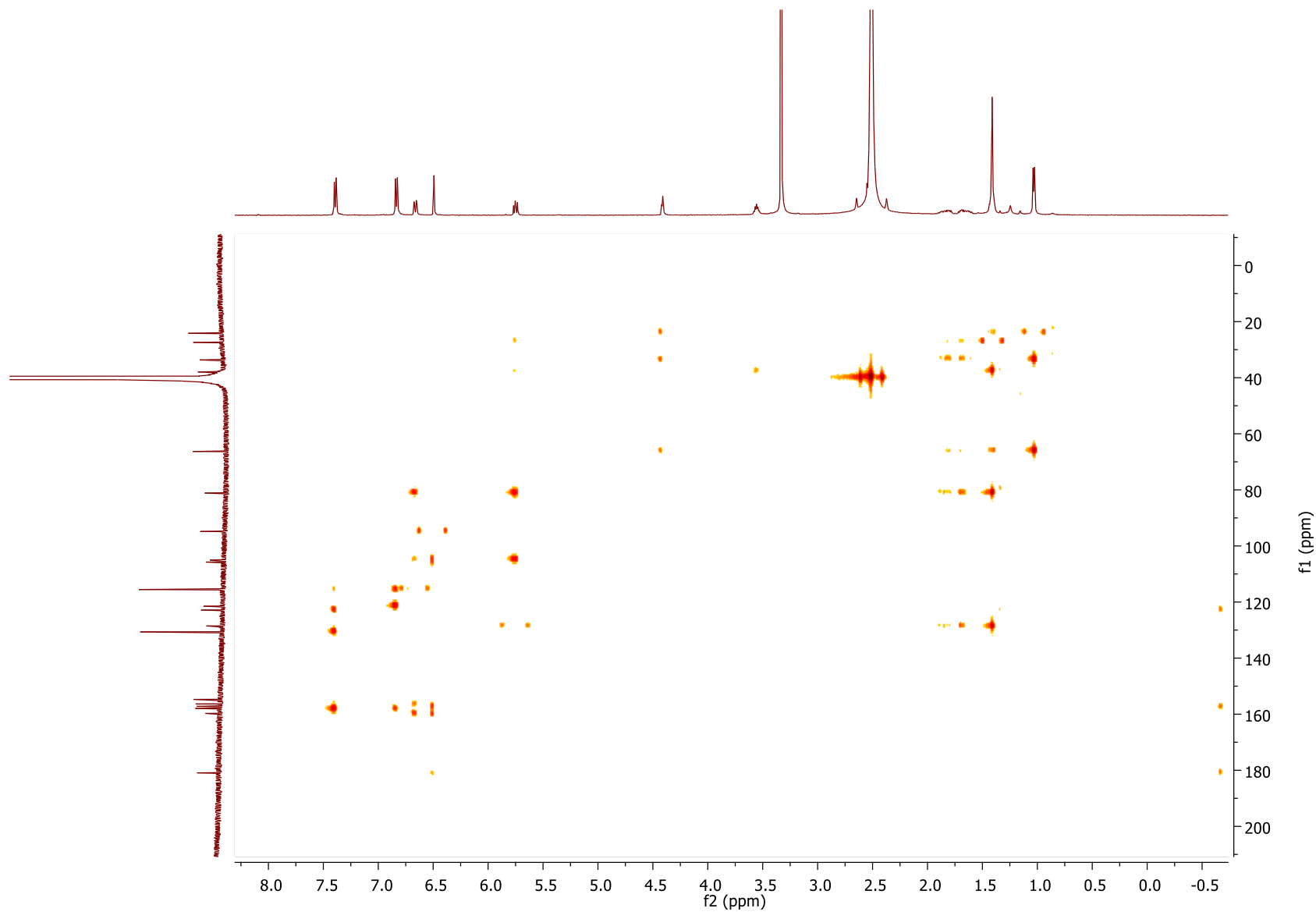


Fig. S59. HMBC spectrum of 8

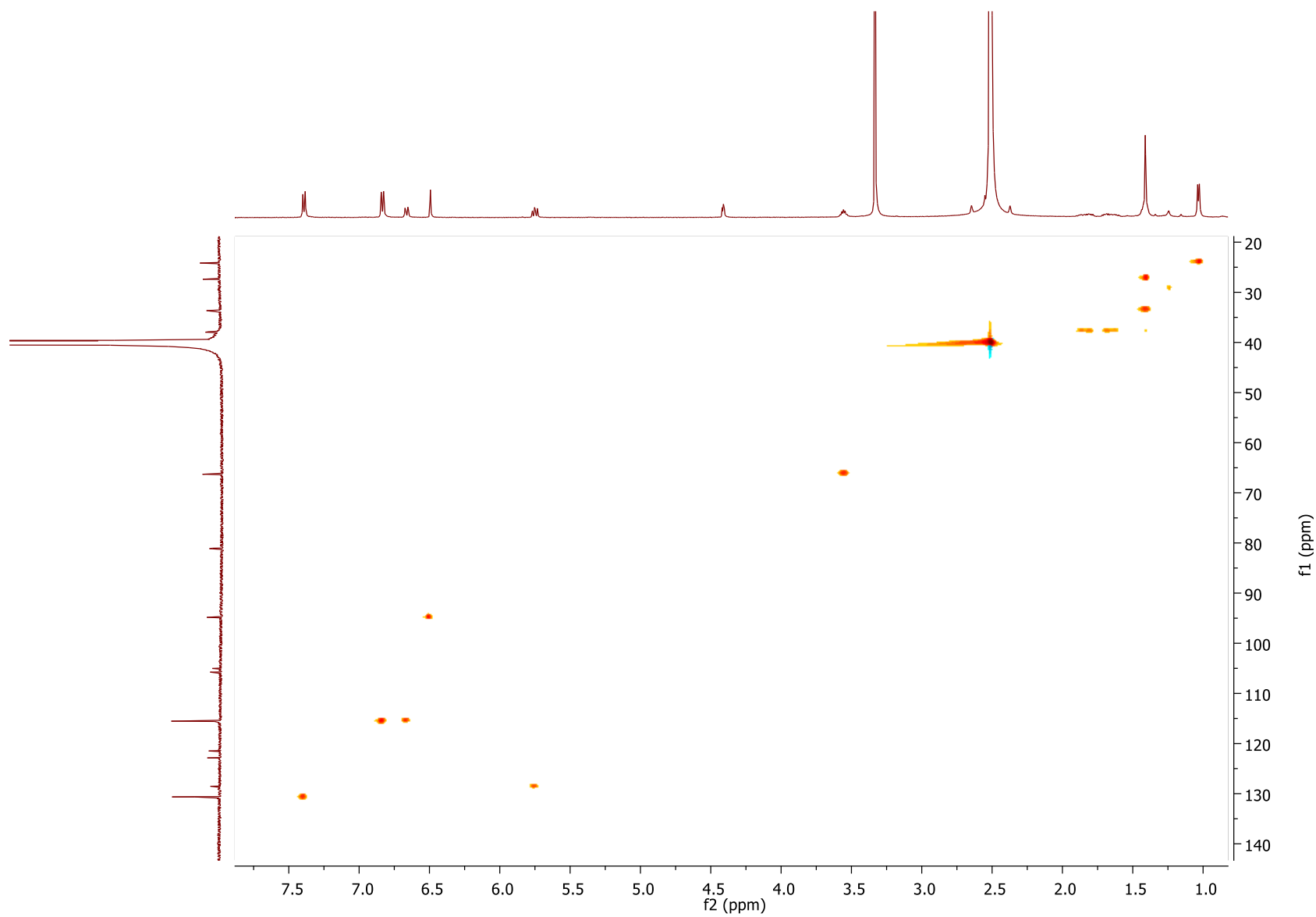


Fig. S60. HSQC spectrum of **8**

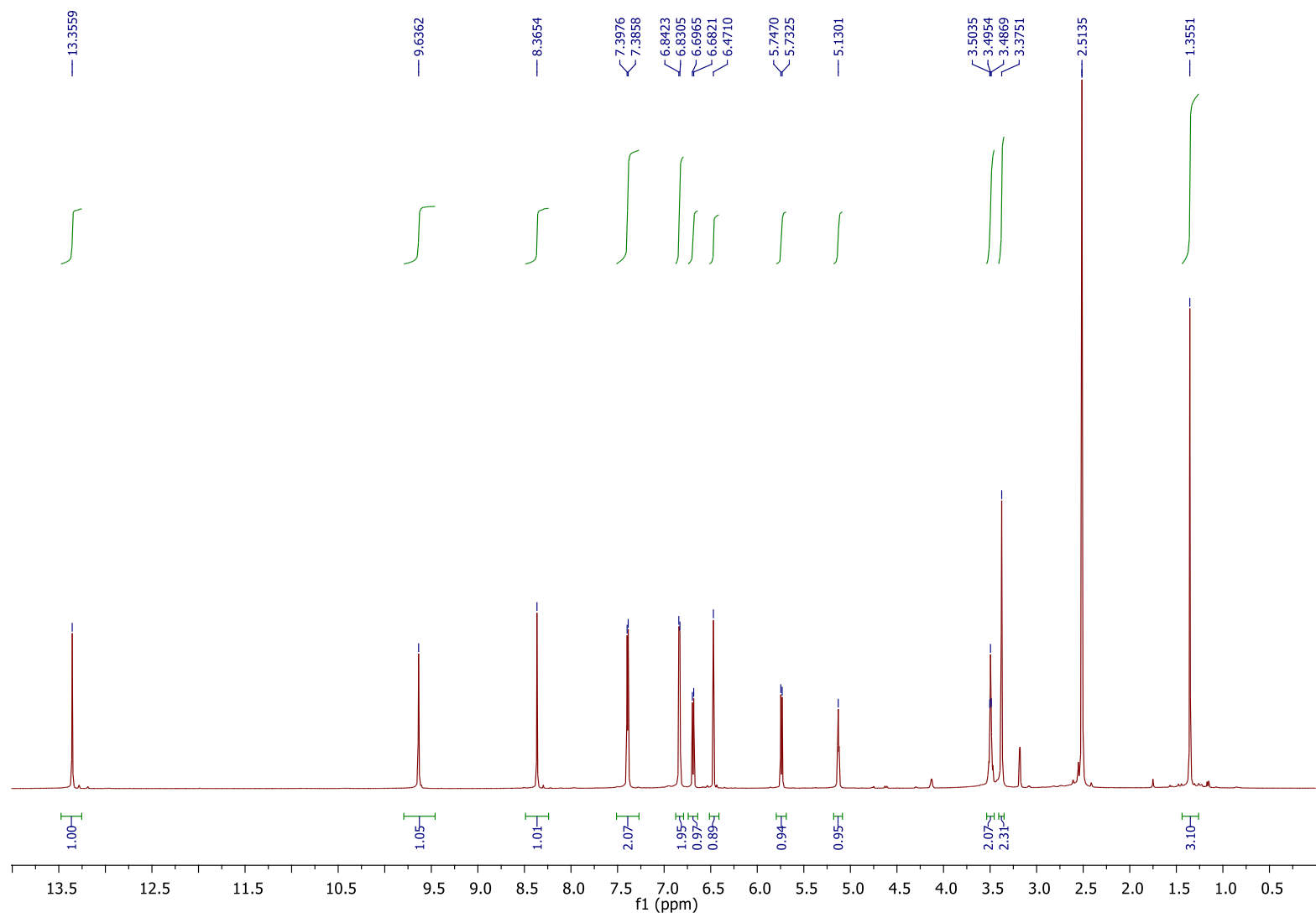


Fig. S61. ¹H NMR spectrum of 9

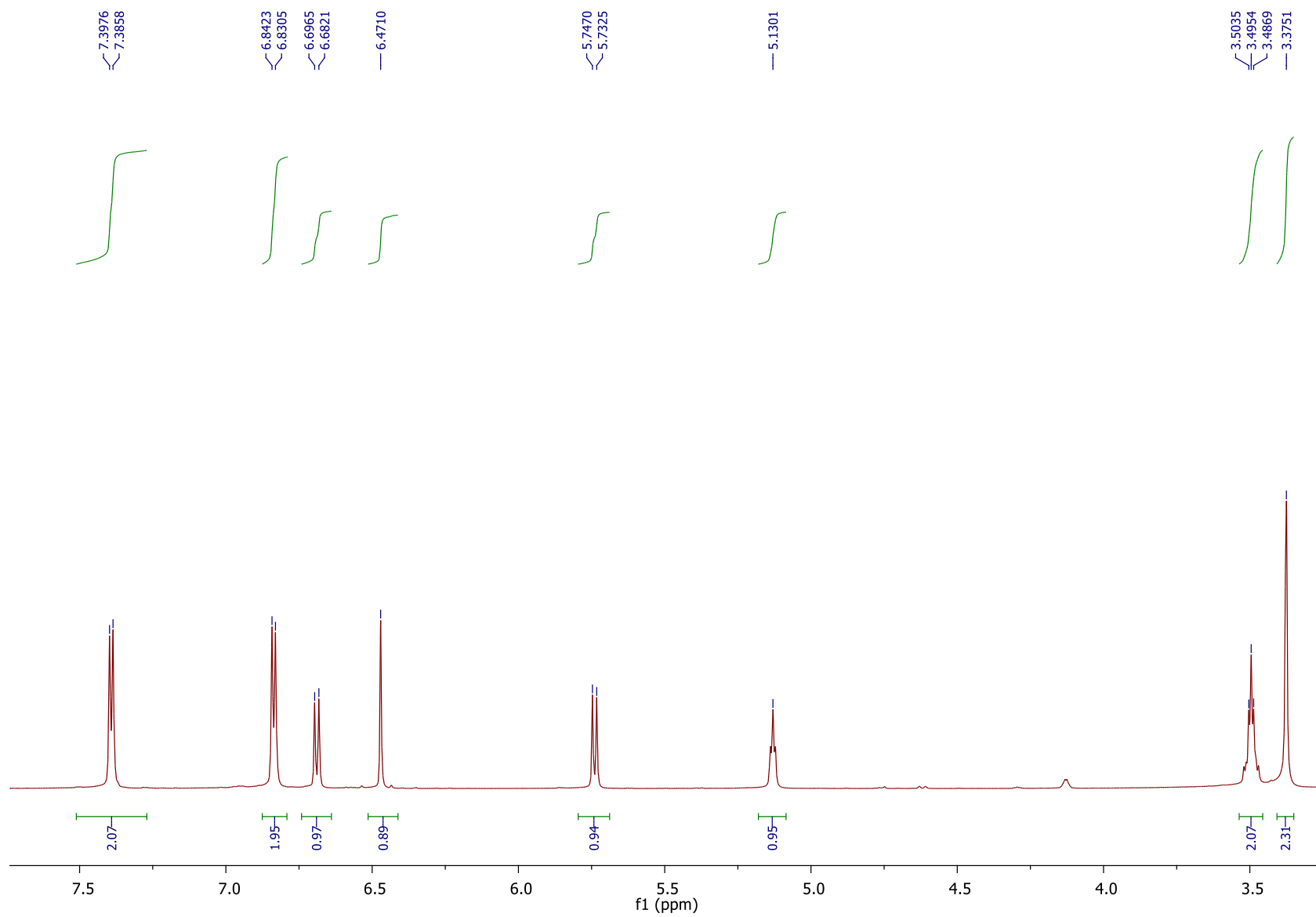


Fig. S62. Expansion of ^1H NMR spectrum of **9**

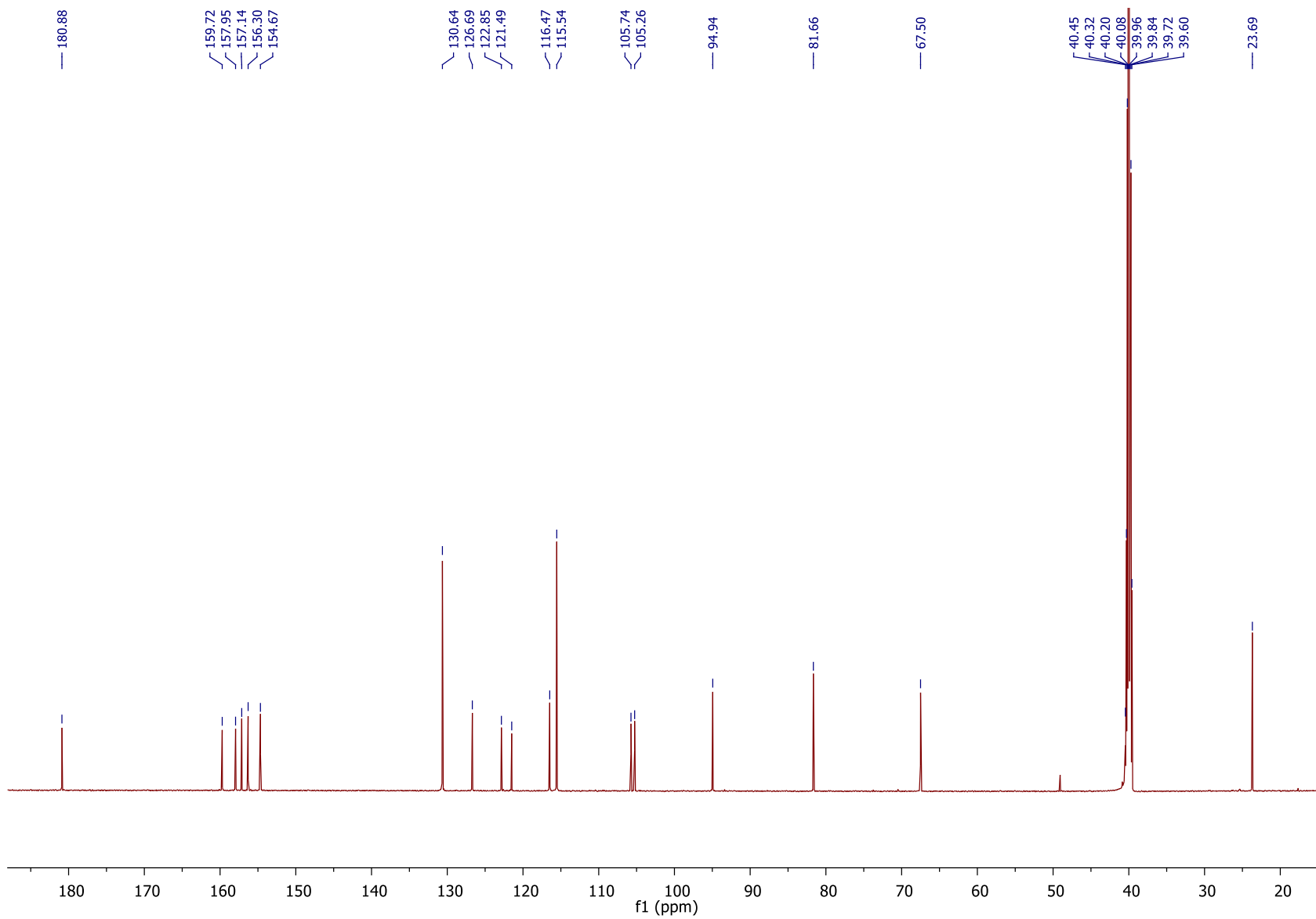


Fig. S63. ^{13}C NMR spectrum of **9**

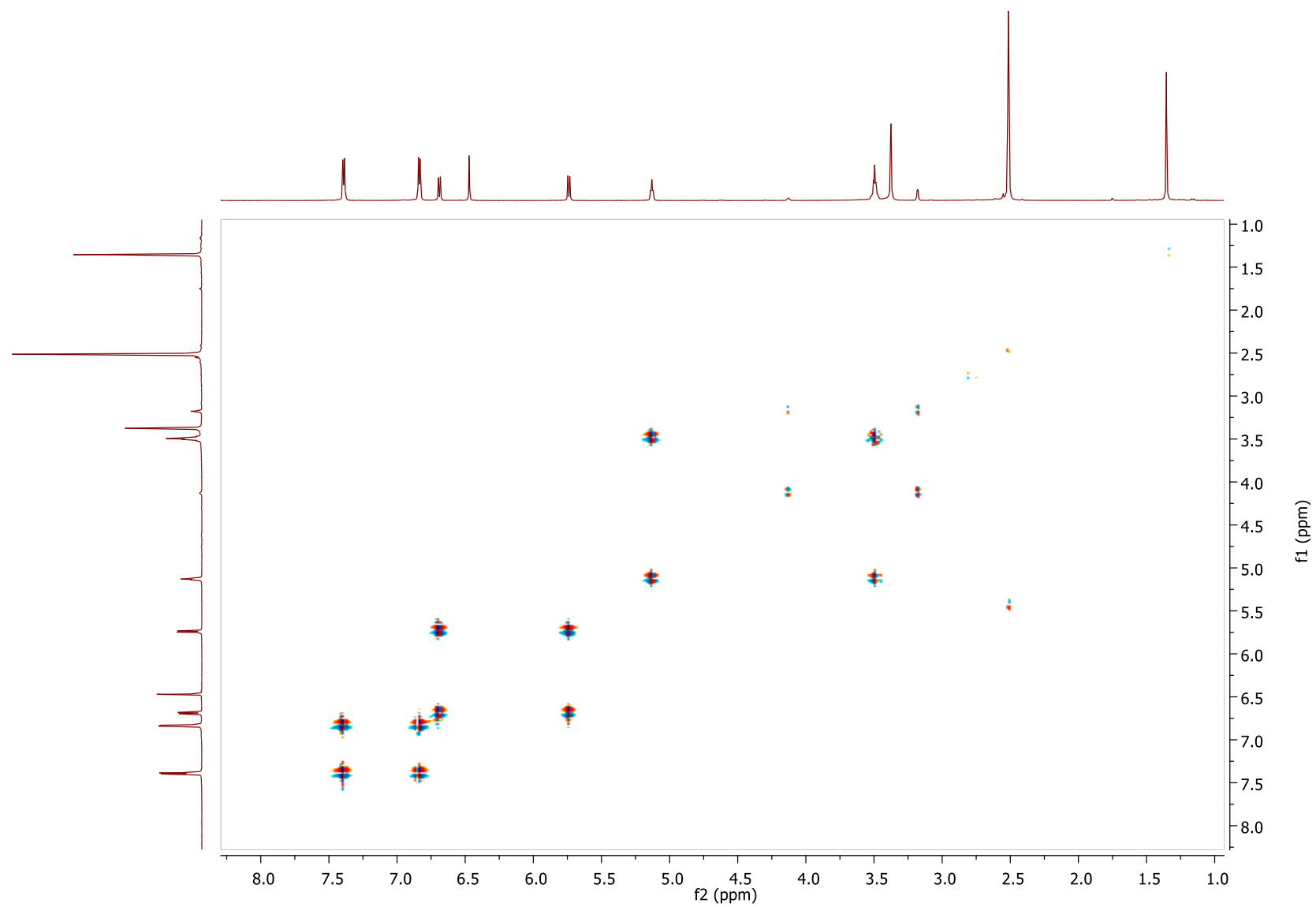


Fig. S64. COSY spectrum of **9**

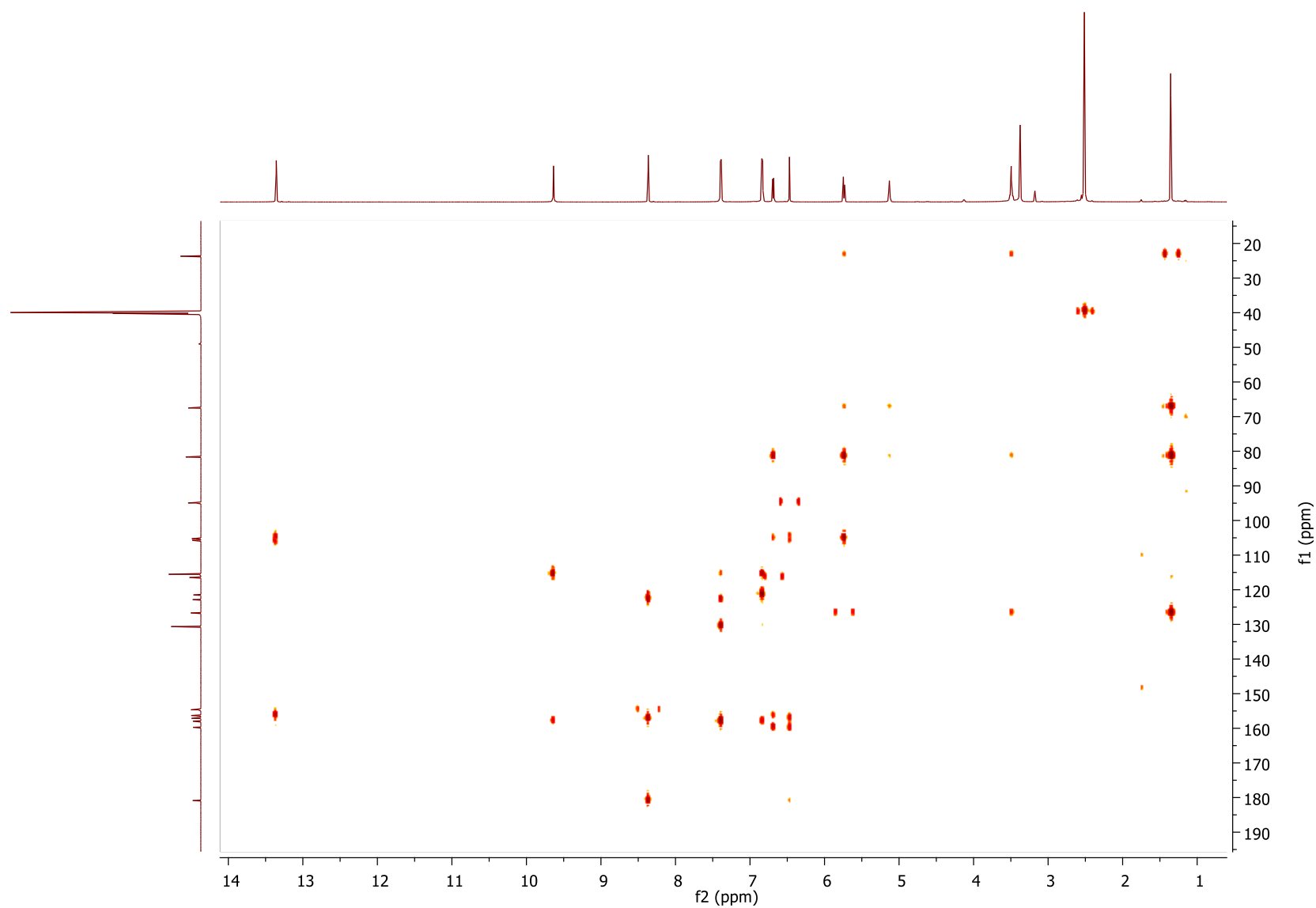


Fig. S65. HMBC spectrum of **9**

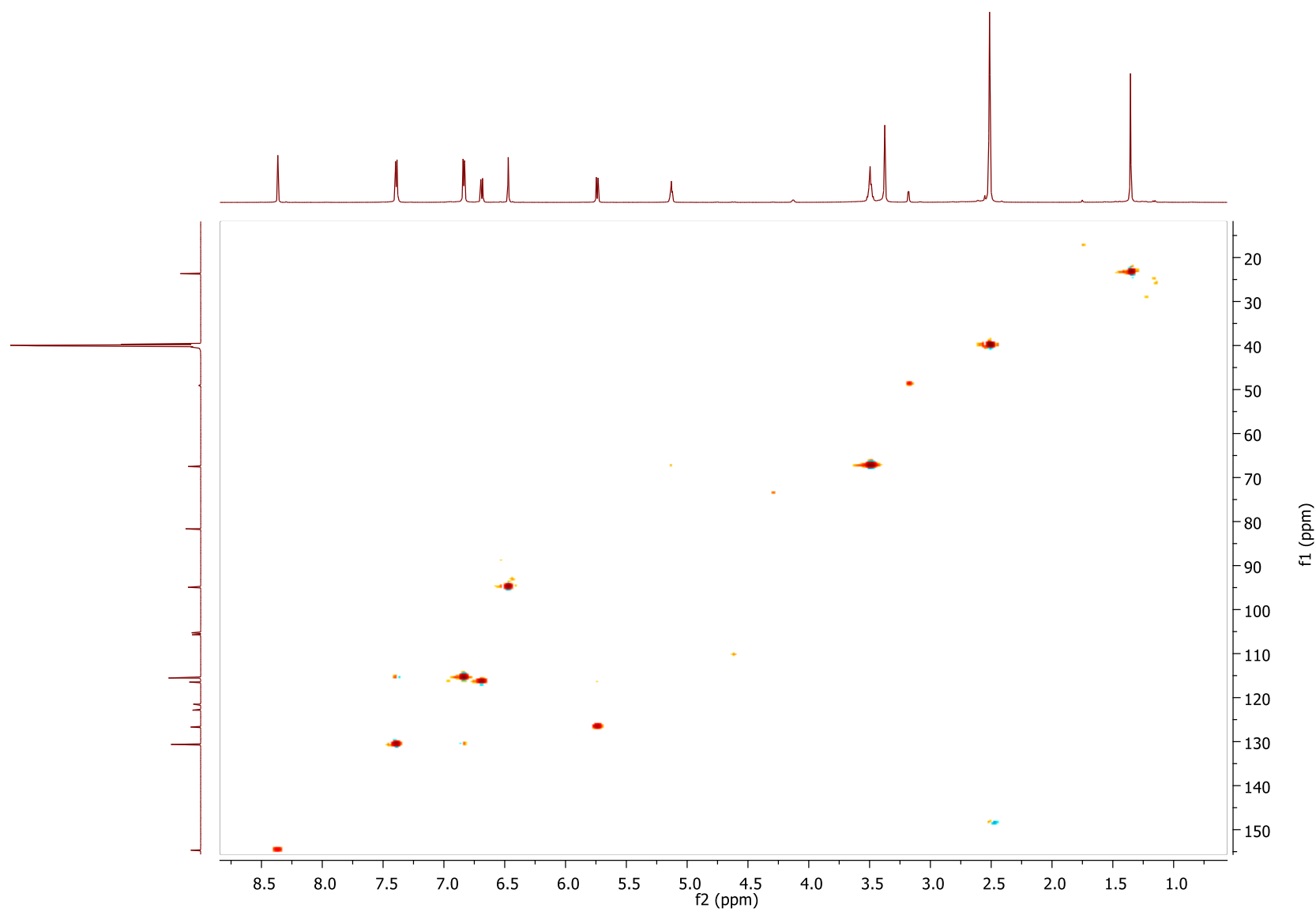


Fig. S66. HSQC spectrum of **9**

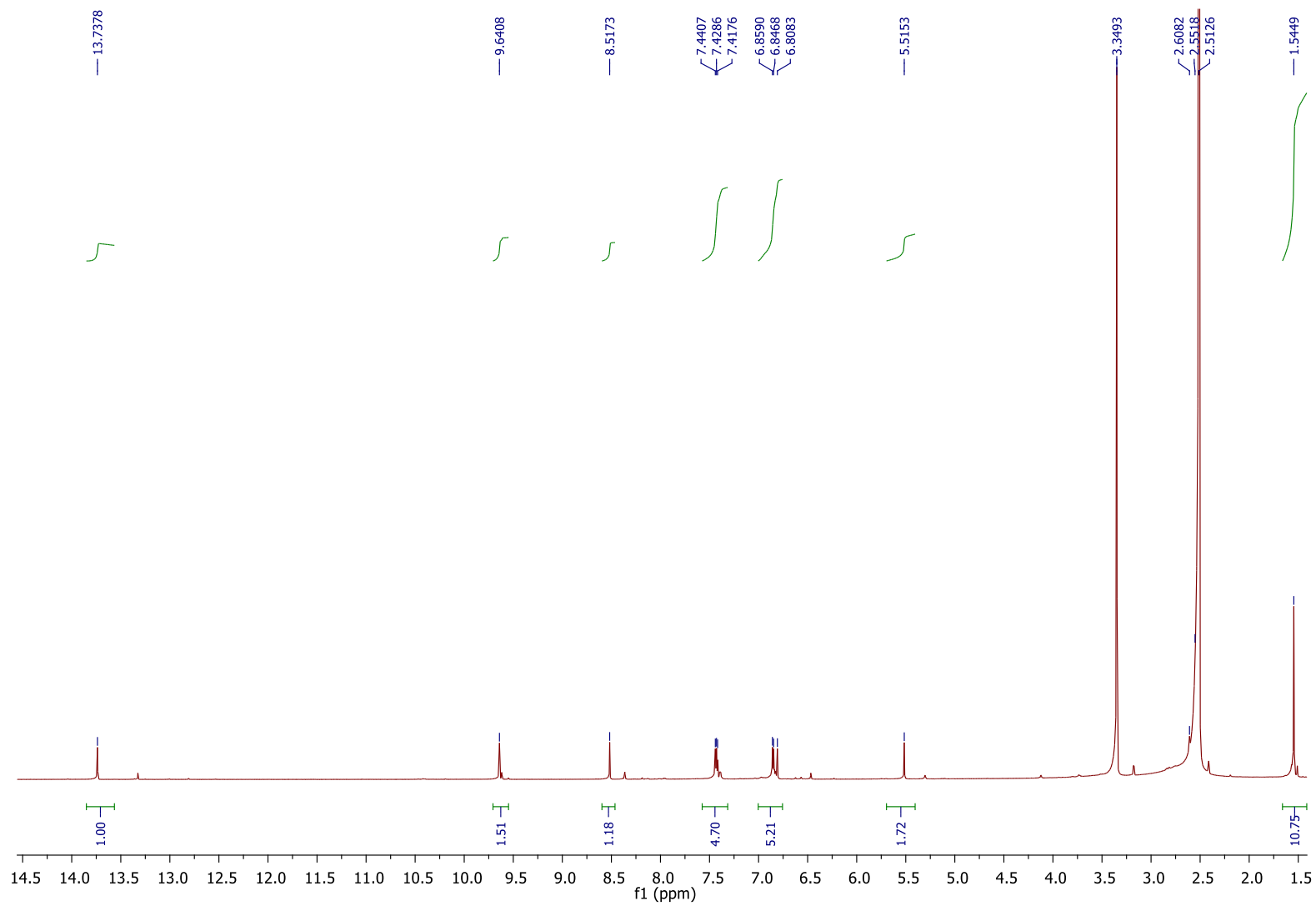


Fig. S67. ^1H NMR spectrum of **10**

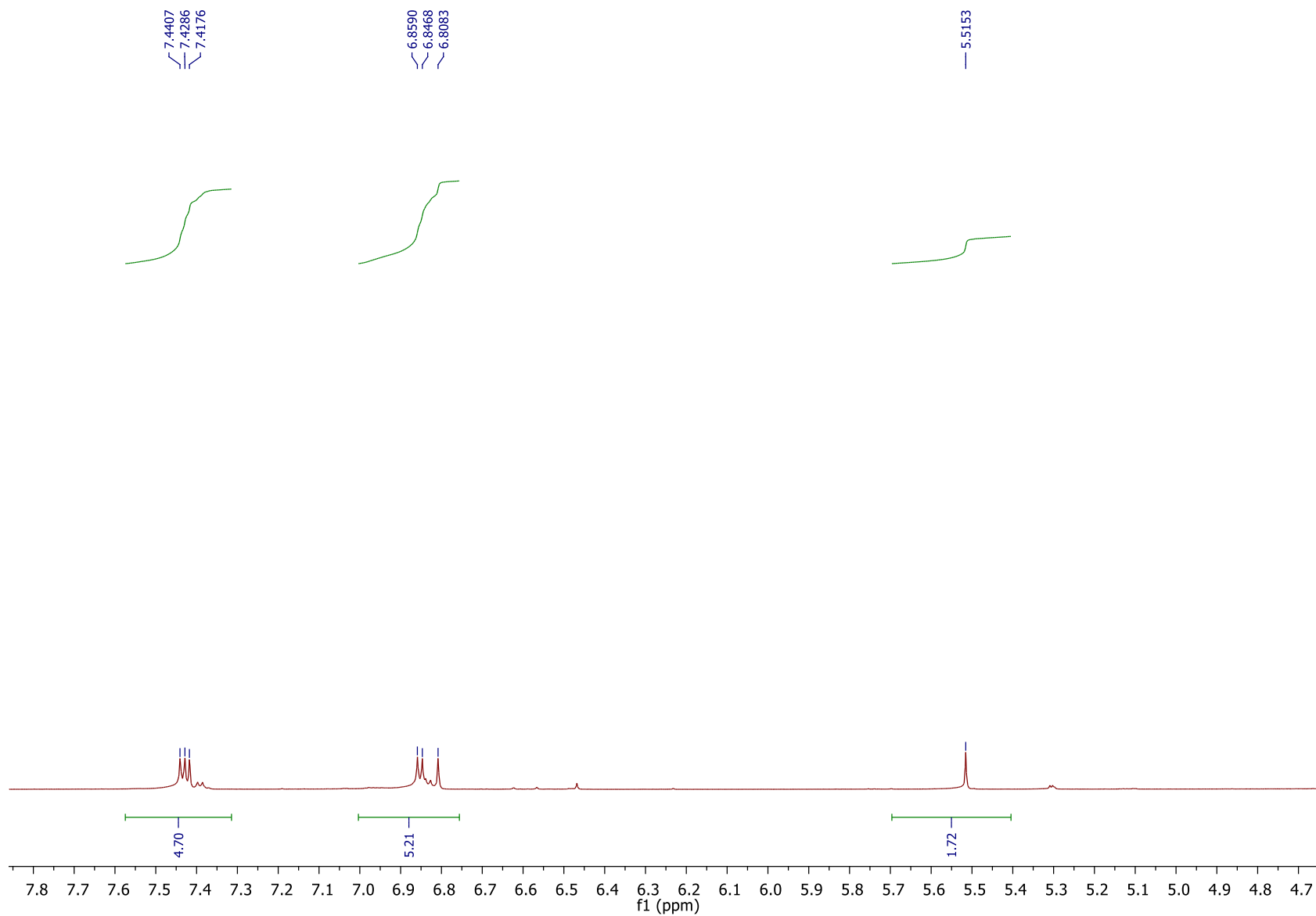


Fig. S68. Expansion of ^1H NMR spectrum of **10**

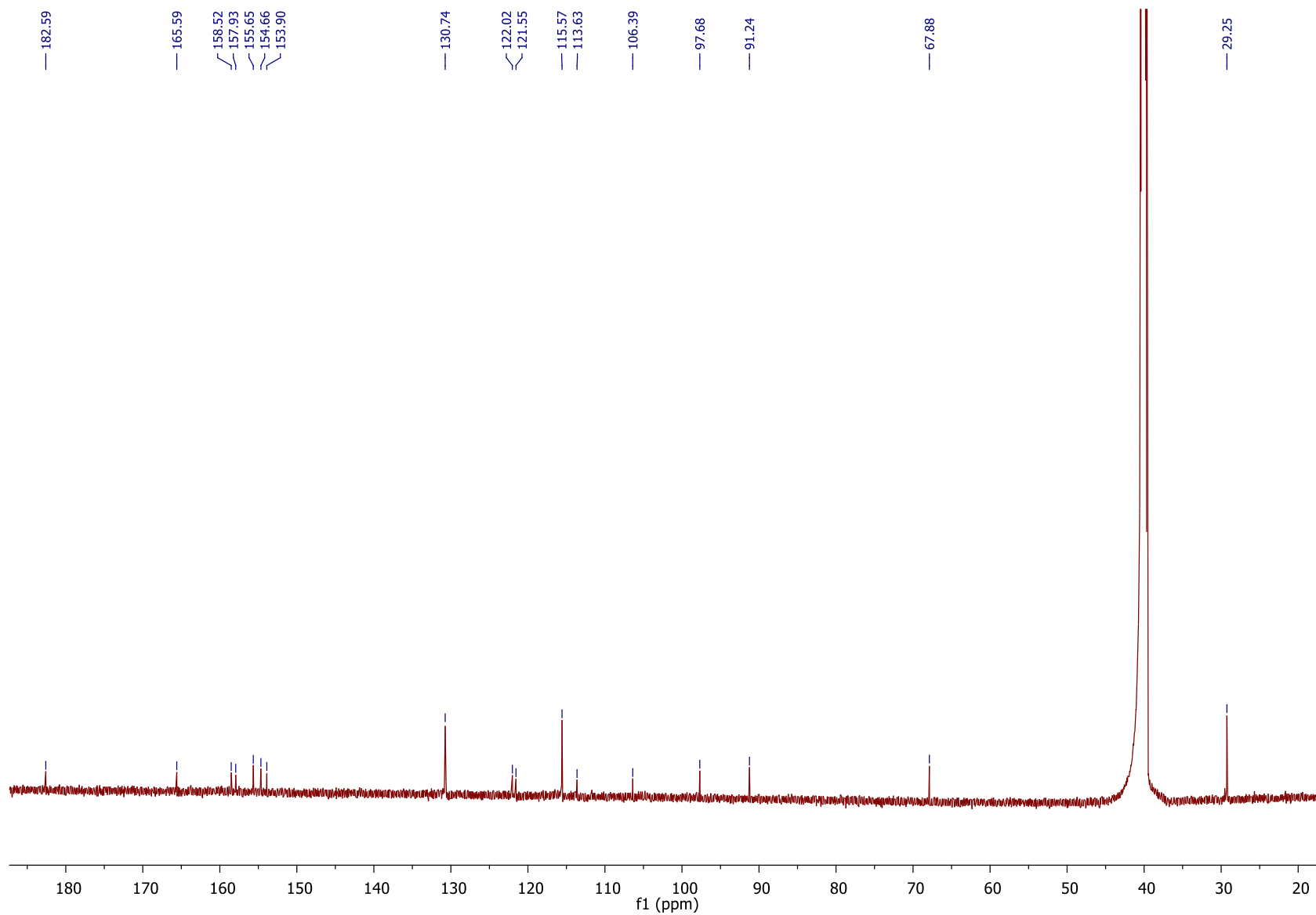


Fig. S69. ^{13}C NMR spectrum of **10**

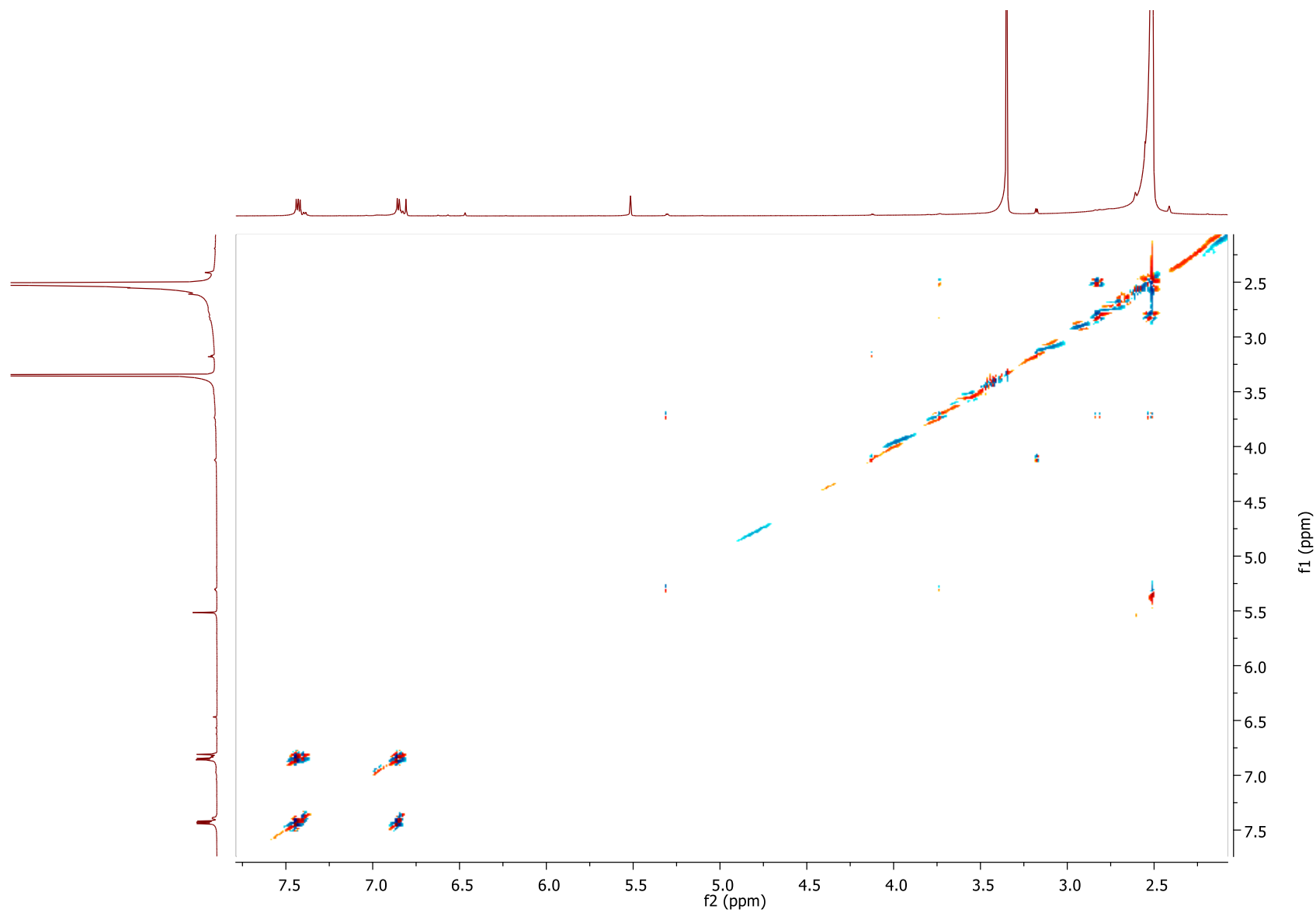


Fig. S70. COSY spectrum of **10**

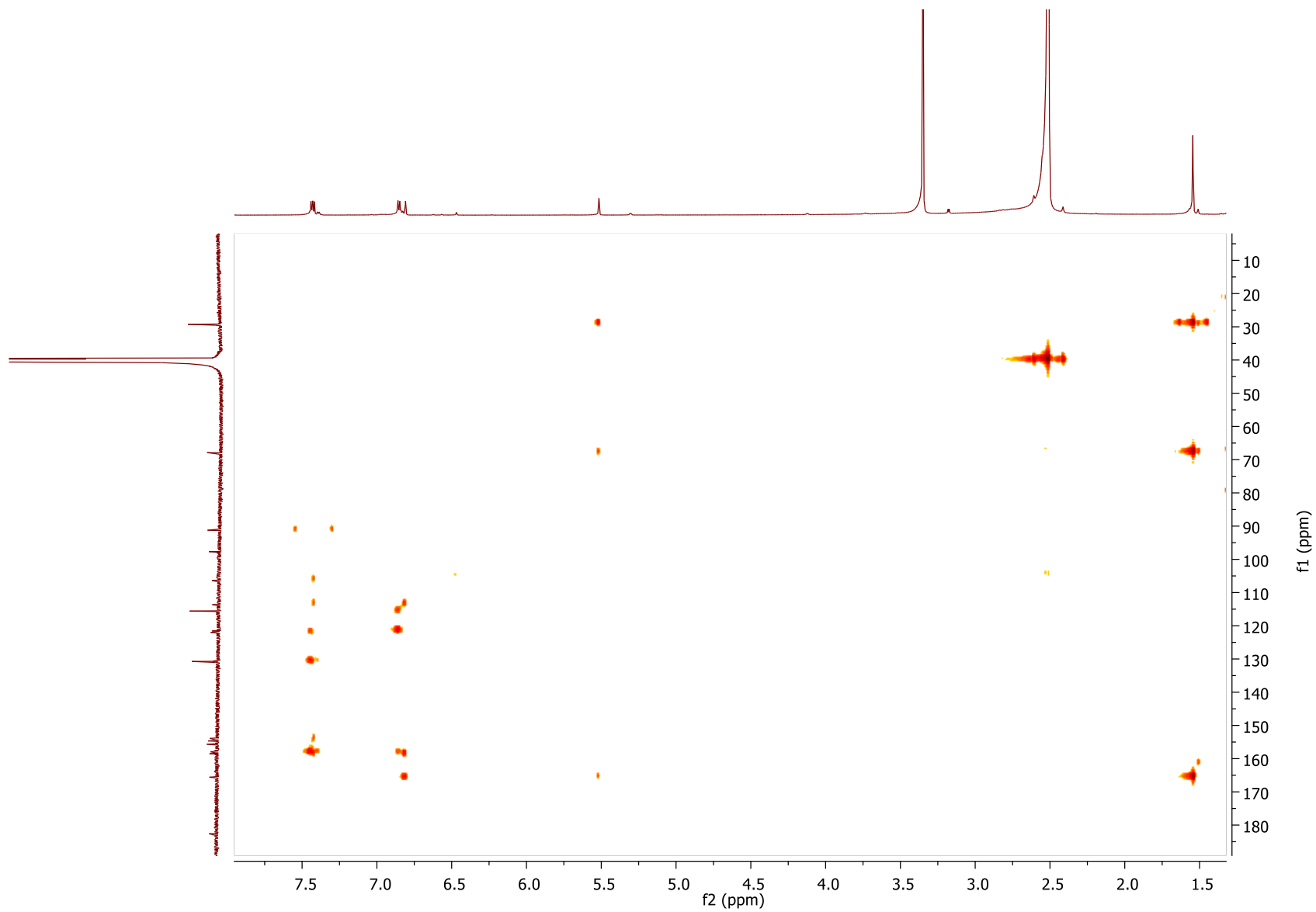


Fig. S71. HMBC spectrum of **10**

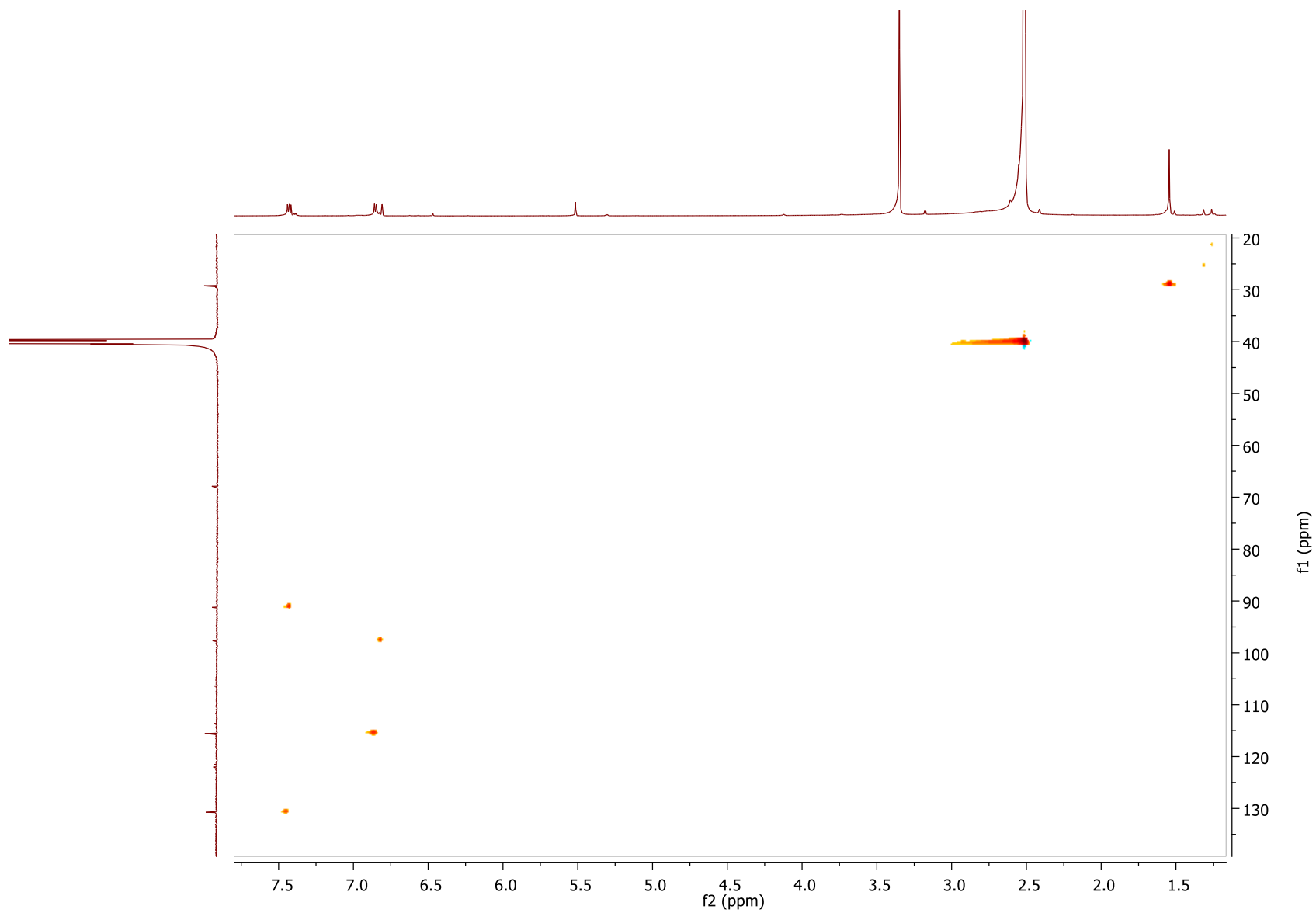


Fig. S72. HSQC spectrum of **10**

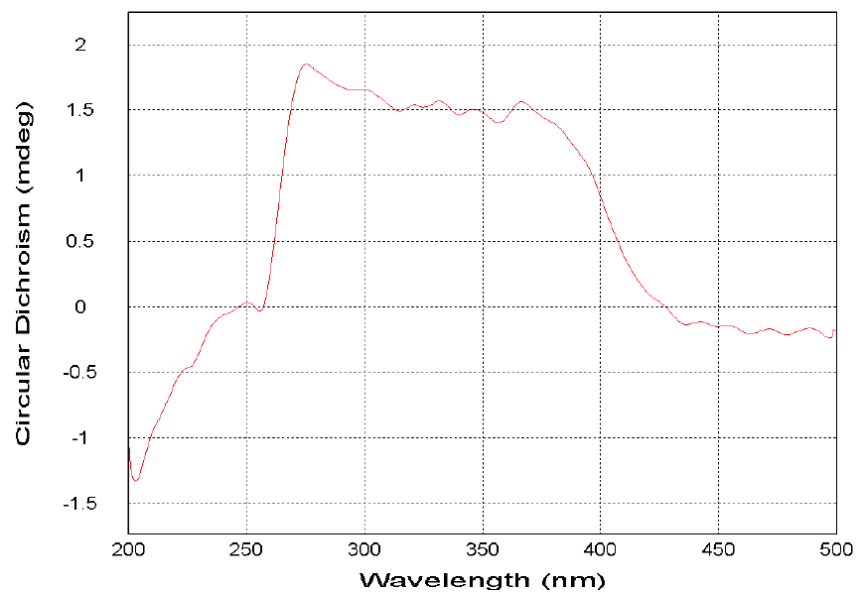


Fig. S73. CD spectrum of **2**. Concentration $857 \mu\text{g mL}^{-1}$.

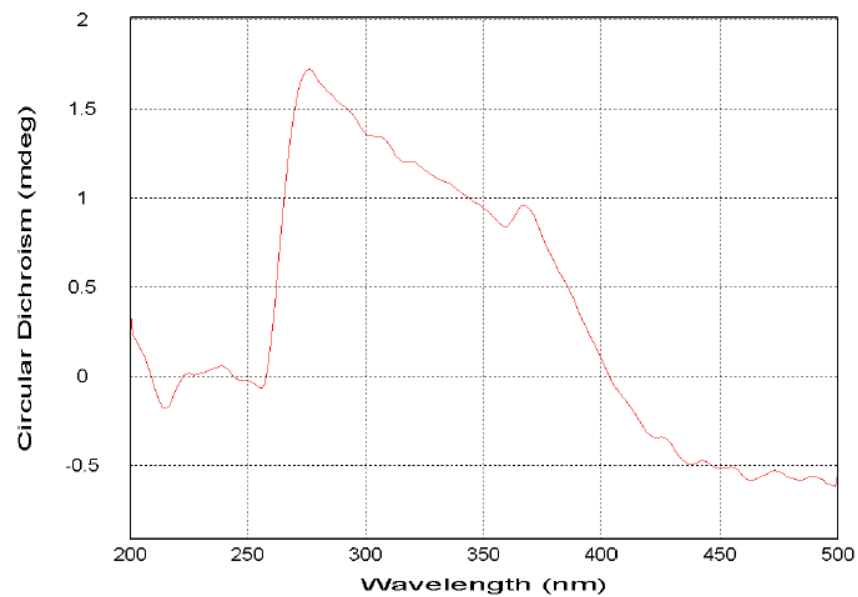


Fig. S74. CD spectrum of **5**. Concentration $857 \mu\text{g mL}^{-1}$.

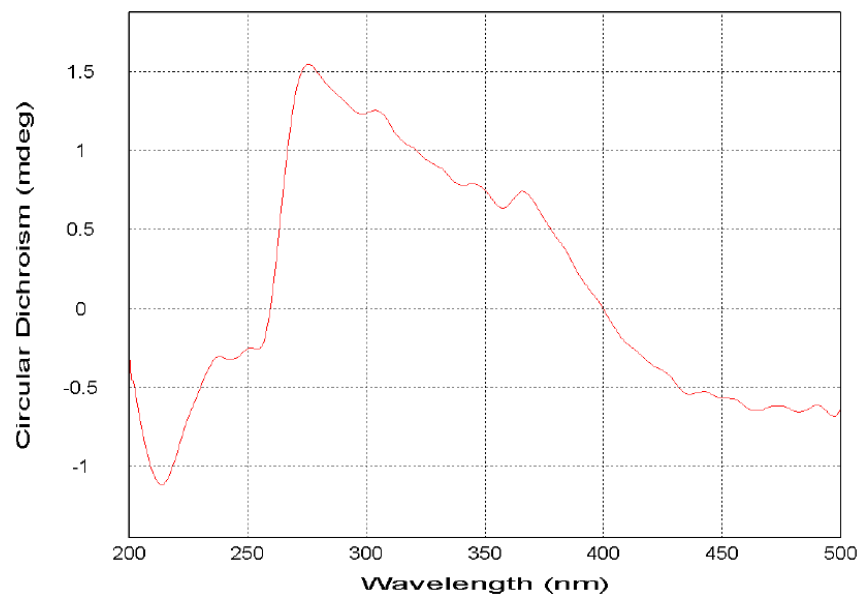


Fig. S75. CD spectrum of **8**. Concentration $857 \mu\text{g mL}^{-1}$.

Table S1. ^1H and ^{13}C NMR spectroscopic data for **4,9,10** in $(\text{CD}_3)_2\text{SO}$ [δ_{H} , multiplicity (J (Hz))]; δ_{C} , type]

Position	4		9		10	
	δ_{H}	δ_{C}	δ_{H}	δ_{C}	δ_{H}	δ_{C}
2		164.1, C _q	8.37, s	154.67, CH	8.52, s	155.63, CH
3	6.79, s	103.1, CH		122.85, C _q		121.99, C _q
4		182.6, C _q		180.88, C _q		182.59, C _q
4a		104.1, C _q		105.74, C _q		106.41, C _q
5		162.1, C _q		157.14, C _q		158.52, C _q
6	6.29, s	98.8, CH		105.26, C _q		113.66, C _q
7		161.6, C _q		159.72, C _q		165.61, C _q
8		106.5, C _q	6.47, s	94.94, CH	6.81, CH	91.24, CH
8a		154.9, C _q		157.95, C _q		153.93, C _q
1'		122.0, C _q		121.49, C _q		121.58, C _q
2',6'	7.91, d, $J = 8.5$	128.8, CH	7.39, d, $J = 8.4$	130.64, CH	7.43, d, $J = 8.4$	130.74, CH
3',5'	6.95, d, $J = 8.5$	116.5, CH	6.84, d, $J = 8.4$	115.54, CH	6.85, d, $J = 8.4$	115.57, CH
4'		159.5, C _q		156.30, C _q		157.93, C _q
1''	3.45, d, $J = 6.3$	21.8, CH ₂				
2''	5.20, <i>ca.</i> t	122.9, CH		81.66, C _q		130.74, CH
3''		131.5, C _q	5.74, d, $J = 9.8$	126.69, CH	5.52, s	115.57, CH
4''	1.64, s or 1.77, s	18.3, CH ₃ or 25.9, CH ₃	6.69, d, $J = 9.8$	116.47, CH		67.90, C _q
5''	1.64, s or 1.77, s		3.49, dd, $J = 11.9, 5.6$; 3.50, dd, $J = 11.9.5.6$	67.50, CH ₂	1.54, s	29.25, CH ₃
6''			1.36, s	23.69, CH ₃	1.54, s	29.25, CH ₃
HO-5	12.81, s		13.36, s		13.74, s	
HO-7	10.4, br or 10.8, br		5.13, t, $J = 5.6$			
HO-4'	10.4, br or 10.8, br		9.64, s		9.64, s	

Table S2: Insulin secretion data

Insulin secretion (ng islet ⁻¹ h ⁻¹) mean ± SEM	Compound No.
8.51 ± 0.38	Control
38.51 ± 1.55	1
2.16 ± 0.95	2
32.86 ± 2.45	3
3.47 ± 0.36	4
35.23 ± 2.14	5
32.16 ± 0.69	6
12.08 ± 1.09	7
19.88 ± 0.53	8
25.85 ± 1.07	9
42.63 ± 1.48	10
19.49 ± 1.69	TB

Glucose-stimulated insulin secretion by pure compounds. Murine islets were incubated in KRB buffer containing 16.7 glucose supplemented with or without pure compound (200 μM) / TB (200 μM) and secreted insulin was measured by ELISA. All data points are an average of a minimum of $n = 3$ separate experiments and are expressed as means ± SEM. TB, (tolbutamide) was used as a positive control.