Supporting Information

Antimicrobial Spirotetronate Metabolites from Marine-derived *Micromonospora harpali* SCSIO GJ089

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Table S1. ^{1}H (500 MHz) and ^{13}C (125 MHz) NMR data for compounds **3**, **6** and **10**.

position	**3**[a]		**6**[b]		**10**[a] **(**tetrocarcin A**)**	
	δ_C type	δ_H mult. (*J* in Hz)	δ_C type	δ_H mult. (*J* in Hz)	δ_C type	δ_H mult. (*J* in Hz)
1	166.8, C		177.2, C		177.3, C	
2	100.9, C		98.9, C		98.8, C	
3	206.6, C		199.5, C		200.2, C	
4	51.3, C		52.8, C		52.8, C	
5	43.3, CH	2.0, m	45.5, CH	2.10, m	40.3, CH	2.04, m
6	31.3, CH	1.58, overlapped	32.6, CH	1.49, overlapped	32.6, CH	1.49, m
7α	41.7, CH_2	1.52, overlapped	43.3, CH_2	1.49, overlapped	43.2, CH_2	1.59, m
7β		1.56, overlapped		1.59, m		1.47, m
8	34.7, CH	2.20, m	36.2, CH	2.20, m	36.2, CH	2.20, m
9	84.4, CH	3.45, m	86.6, CH	3.43, dd (10.1, 4.4)	86.7, CH	3.42, dd (10.9, 5.2)
10	38.6, CH	2.08, overlapped	40.4, CH	2.04, m	45.5, CH	2.1, t (9.7)
11	126.5, CH	5.75, d (10.5)	127.0, CH	5.76, d (10.1)	129.0, CH	5.39,ddd (10.0, 5.1, 2.4)
12	126.1, CH	5.41, ddd (9.8, 4.8, 2.1)	128.9, CH	5.40, m	126.9, CH	5.73, d (10.4)
13	54.3, CH	3.25, m	53.0, CH	3.64, overlapped	52.9, CH	3.64, m
14	136.1, C		138.4, C		138.2, C	
15	123.1, CH	5.15, d (9.1)	123.0, CH	5.21, d (5.3)	123.2, CH	5.23, m
16	30.8, CH_2	2.22, m; 2.31, m	32.1, CH_2	2.23, m; 2.32, m	32.2, CH_2	2.22, m; 2.29, m
17	78.0, CH	4.27, br s	80.0, CH	4.27, br s	79.9, CH	4.20, br s
18	141.3, C		139.4, C		139.2, C	
19	118.7, CH	5.21, d (10.0)	122.3, CH	5.15, d (9.3)	122.0, CH	5.23, m
20	44.9, CH	3.0, t (9.7)	46.6, CH	2.80, t (9.5)	46.5, CH	2.81, t (9.5)
21	69.7, CH	4.72, dm (8.7)	72.2, CH	4.38, d (9.3)	71.4, CH	4.58,dm (9.3)
22	139.6, CH	6.35, s	140.8, CH	6.3, s	151.9, CH	6.87, s
23	130.9, C		134.3, C		139.3, C	
24α	32.3, CH_2	2.43, d (17.7)	33.4, CH_2	2.26, overlapped	30.7, CH_2	2.24, d (18.5)
24β		2.88, d (17.7)		2.87, d (18.0)		2.75, dd (18.7, 2.6)
25	84.5, C		85.8, C		85.4, C	
26	201.9, C		200.5, C		200.8, C	
27	15.6, CH_3	1.63, s	15.5, CH_3	1.49, s	15.6, CH_3	1.48, s
28	22.2, CH_3	0.65, d (4.5)	23.2, CH_3	0.66, d (3.9)	23.0, CH_3	0.64, d (5.9)
29	14.1, CH_3	1.08, d (7.0)	14.7, CH_3	1.11, d (8.4)	14.7, CH_3	1.10, d (7.0)
30	14.5, CH_3	1.35, s	15.2, CH_3	1.38, s	15.0, CH_3	1.36, s
31	16.2, CH_3	1.52, s	16.4, CH_3	1.50, s	16.3, CH_3	1.47, s
32	143.8, CH	7.18, d (16.2)	146.3, CH	7.30, d (16.0)	195.3, C	9.52, s
33	127.2, CH	6.07, d (16.2)	127.6, CH	6.22, d (16.1)		
34	198.4, C		201.2, C			
35	27.7, CH_3	2.29, s	27.9, CH_3	2.29, s		
NS1	96.6, CH	4.44, dd (9.8, 1.6)	96.6, CH	4.79, d (10.0)	98.1, CH	4.63, dd (9.6, 2.0)
NS2	36.1, CH_2	1.64, m; 2.69, d (14.7)	37.8, CH_2	1.79, m; 1.92, m	36.7, CH_2	1.74, m; 2.72, m

NS3	91.6, C		58.0, C		92.2, C	
NS4	53.8, CH	4.36, d (9.8)	55.4, CH	3.62, br s	55.2, CH	4.34, br s
NS5	69.4, CH	3.48, m	68.9, CH	3.93, m	70.0, CH	3.57, m
NS6	17.9, CH_3	1.16, d (6.1)	17.3, CH_3	1.17, d (6.0)	17.9, CH_3	1.12, d (6.1)
NS3-CH_3	25.4, CH_3	1.58, s	24.7, CH_3	1.35, s	26.0, CH_3	1.52, s
NS4-NH*C*O_2-	157.4, C		160.0, C		160.1, C	
NS4-NHCO$_2$*C*H$_3$	52.9, CH_3	3.70, s	52.9, CH_3	3.68, s	53.0, CH_3	3.68, s
DG1	98.6, CH	4.83, d (4.1)	99.9, CH	4.83, d (3.7)	99.9, CH	4.82, d (4.4)
DG2	31.6, CH_2	1.77, m; 2.23, m	32.1, CH_2	1.75, m; 2.30, m	32.2, CH_2	1.75, m; 2.20, dd (15.1, 2.5)
DG3	66.8, CH	4.15, dt (3.0, 2.9)	67.8, CH	4.16, m	67.8, CH	4.16, dt (3.1, 3.0)
DG4	74.5, CH	4.58, dd (9.8, 2.8)	76.1, CH	4.54, dd (9.8, 2.3)	76.1, CH	4.53, dd (9.6, 3.1)
DG5	62.2, CH	4.35, dd (9.8, 1.4)	63.5, CH	4.39, m	63.5, CH	4.39, dq (9.6, 6.4)
DG6	18.2, CH_3	1.13, d (6.3)	18.3, CH_3	1.13, overlapped	18.2, CH_3	1.13, d (6.4)
DG4-O_2*C*-	170.6, C		172.1, C		172.1, C	
DG4-O_2C*C*H$_3$	21.2, CH_3	2.08, s	21.1, CH_3	2.09, s	21.0, CH_3	2.08, s
AM/DG′1	92.7, CH	4.88, d (2.8)	93.7, CH	4.93, overlapped	92.9, CH	4.92, d (3.5)
AM/DG′2	29.7, CH_2	1.75, m; 1.87, m	27.5, CH_2	1.87, m; 1.99, m	28.3, CH_2	1.73, m; 1.80, m
AM/DG′3	26.4, CH_2	1.95, m; 2.0, m	30.4, CH_2	1.86, m; 1.89, m	30.4, CH_2	1.86, m; 1.89, m
AM/DG′4	81.3, CH	3.20, ddd (10.4, 4.7)	82.1, CH	3.21, ddd (9.8, 5.4)	82.1, CH	3.21, ddd (9.4, 4.5)
AM/DG′5	68.0, CH	3.70, m	69.3, CH	3.66, overlapped	69.3, CH	3.66, m
AM/DG′6	17.6, CH_3	1.13, d (6.3)	17.4, CH_3	1.13, overlapped	17.3, CH_3	1.11, d (6.3)
DG″1	99.5, CH	4.89, dd (9.8, 1.8)	100.6, CH	4.93, overlapped	100.6, CH	4.93, d (9.0)
DG″2	37.1, CH_2	1.67, m; 2.14, m	39.2, CH_2	1.62, m; 2.01, m	39.2, CH_2	1.62, m; 2.01, m
DG″3	64.0, CH	4.25, dt (3.1, 2.7)	64.0, CH	4.26, overlapped	64.0, CH	4.26, dt (3.1, 2.9)
DG″4	75.3, CH	3.44, m	76.4, CH	3.28, dd (9.5, 2.0)	76.4, CH	3.27, dd (9.5, 2.7)
DG″5	67.9, CH	3.85, dq (9.5, 6.3)	69.5, CH	3.91, m	69.5, CH	3.91, dq (9.5, 6.2)
DG″6	19.0, CH_3	1.31, d (6.2)	19.3, CH_3	1.29, d (6.2)	19.3, CH_3	1.29, d (6.1)
AM′1	92.0, CH	4.92, br s	92.9, CH	4.92, br s	93.7, CH	4.93, br s
AM′2	27.5, CH_2	1.72, m; 1.88, m	28.3, CH_2	1.73,m; 1.80, m	27.5, CH_2	1.87, m; 1.99, m
AM′3	29.8, CH_2	1.80, m; 1.87, m	30.4, CH_2	1.72, m; 1.75, m	30.4, CH_2	1.72, m; 1.75, m
AM′4	71.8, CH	3.28, dd (4.3, 10.5)	72.6, CH	3.13, dd (9.7, 4.9)	72.6, CH	3.13, ddd (9.8, 4.5)
AM′5	70.4, CH	3.62, dq (9.1, 6.3)	71.4, CH	3.59, m	71.4, CH	3.59, m
AM′6	17.8, CH_3	1.23, d (6.2)	18.4, CH_3	1.20, d (6.1)	18.4, CH_3	1.19, d (6.1)

[a] Recorded in $CDCl_3$; [b] recorded in CD_3OD.

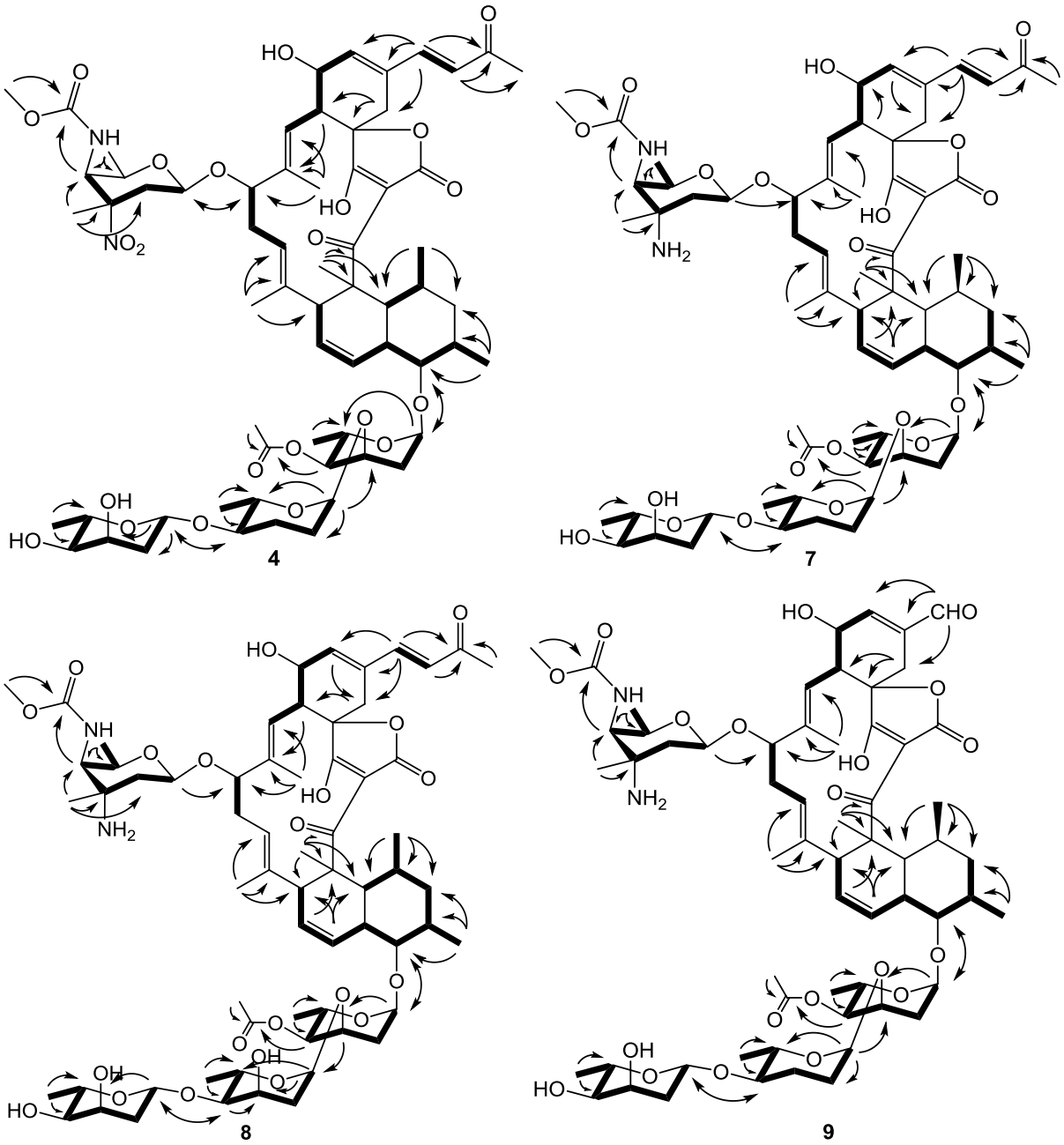


Figure S1. COSY (bold) and selected HMBC (arrow) correlations for microsporanates B, E–F, and tetrocarcin P (**4**, **7**–**8**, and **9**, respectively).

Figure S2.[1]H NMR (500 MHz) spectrum of compound **1** in $CDCl_3$.

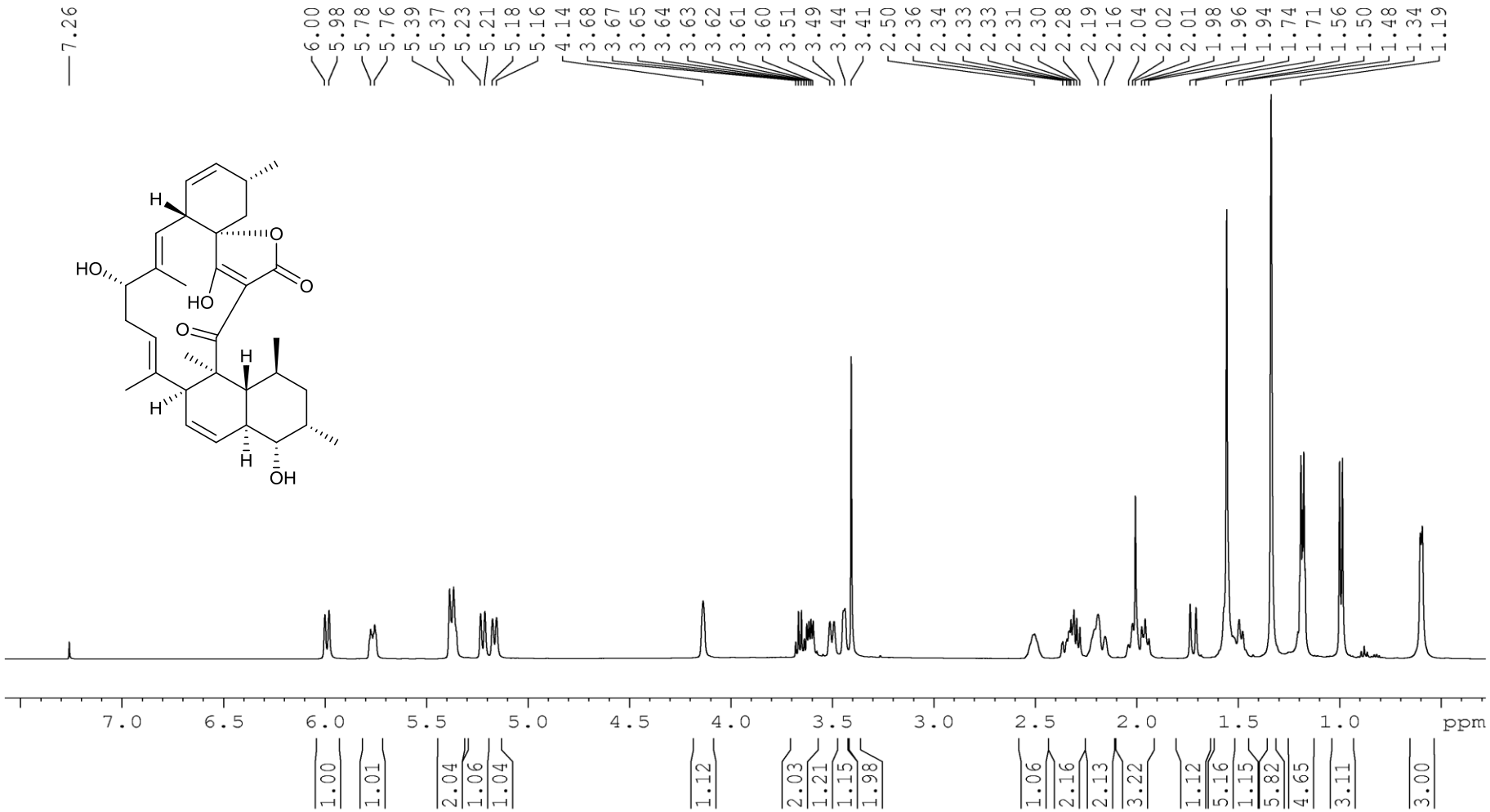


Figure S3.[13]C NMR (125 MHz) spectrum of compound **1** in $CDCl_3$.

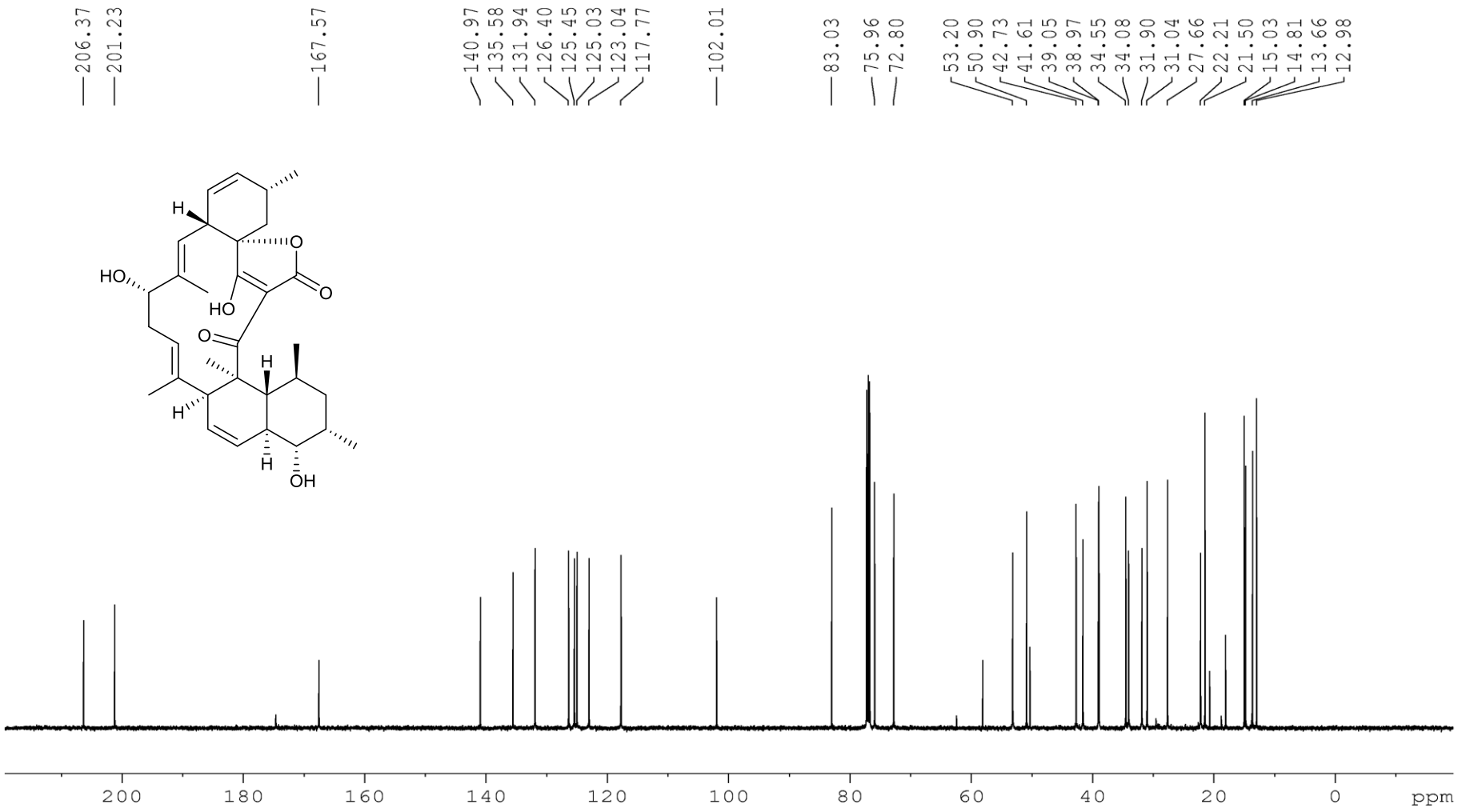


Figure S4. ^{13}C DEPT spectrum of compound **1** in $CDCl_3$.

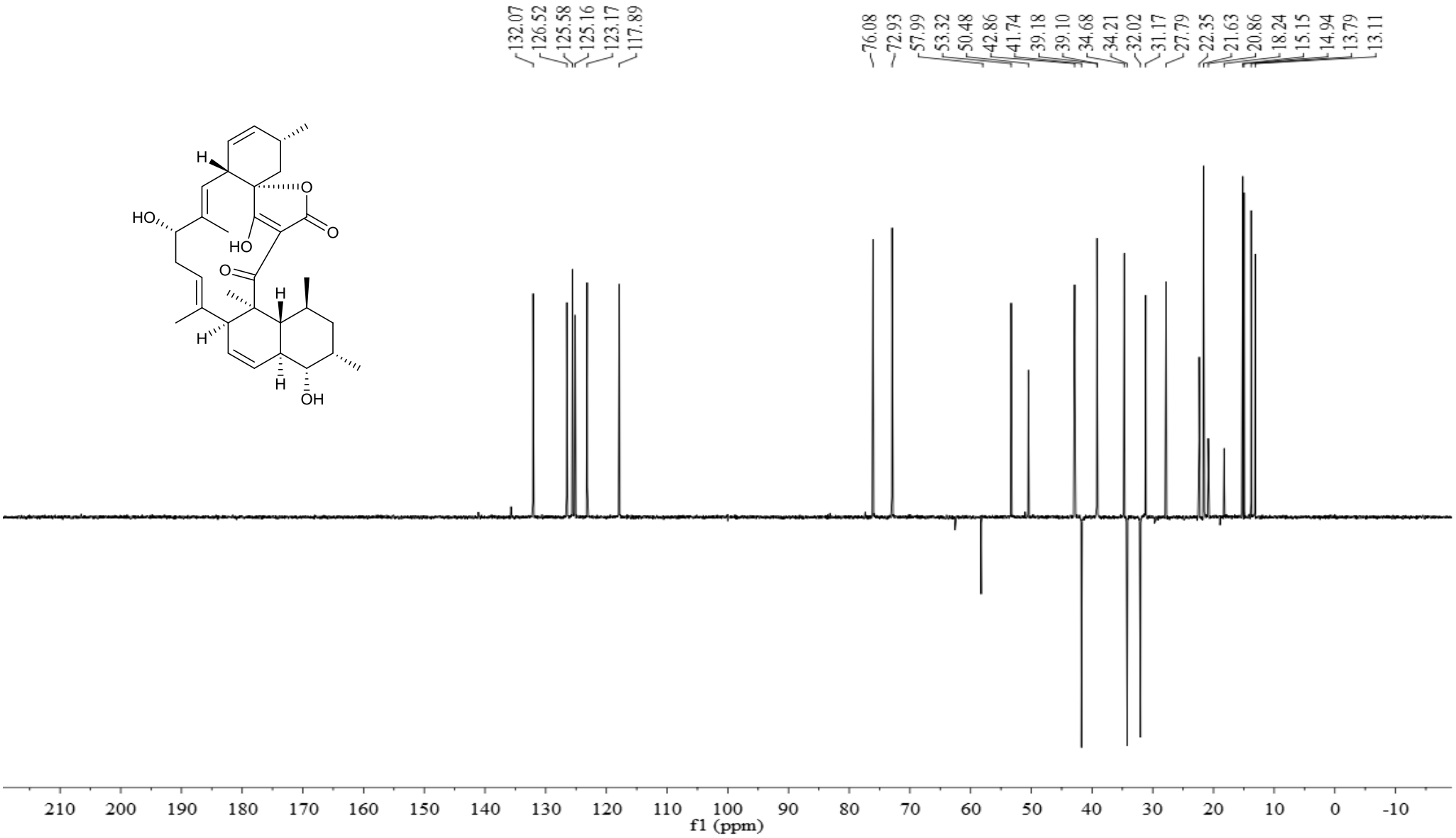


Figure S5. ^{1}H-^{1}H COSY spectrum of compound **1** in $CDCl_3$.

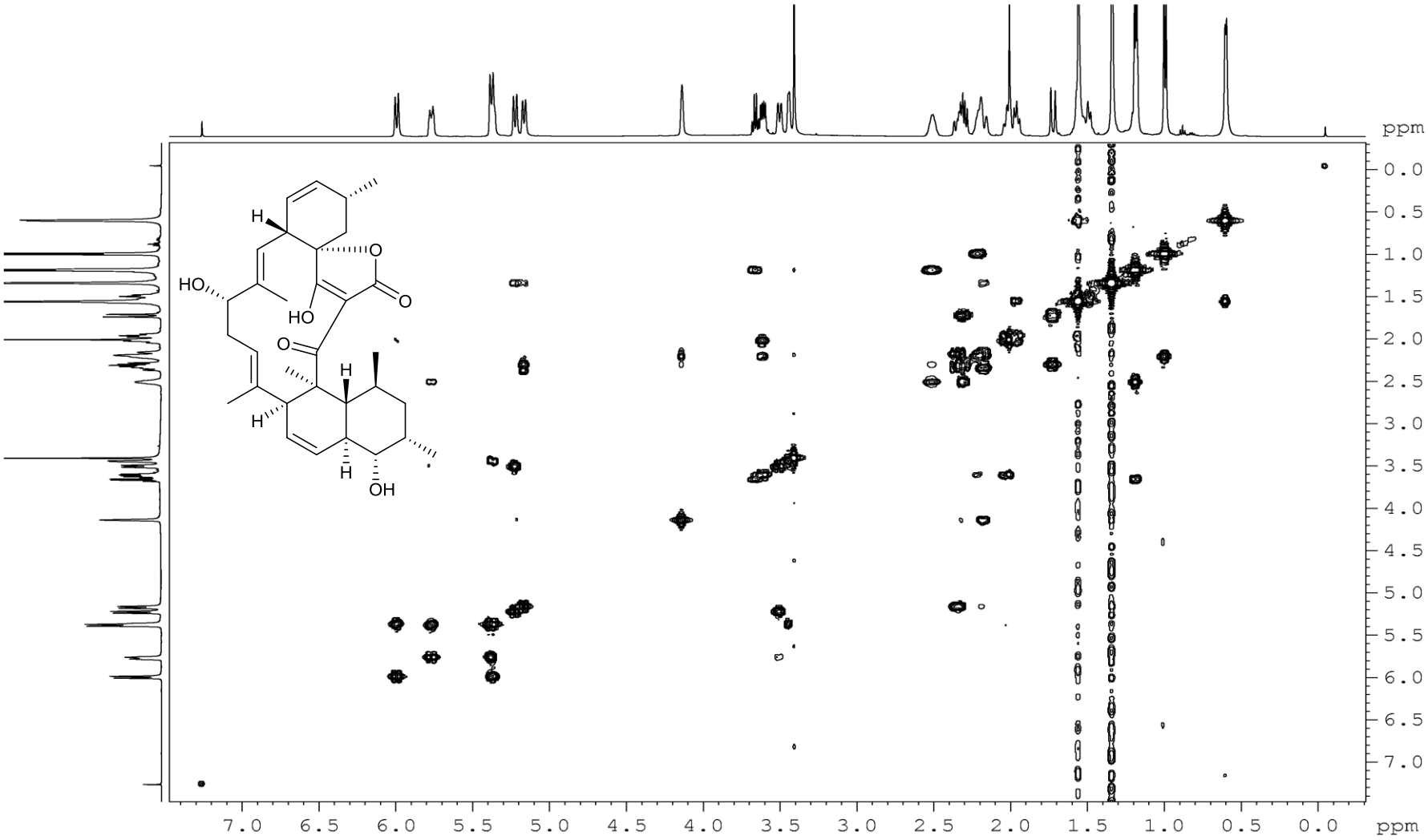


Figure S6. HSQC spectrum of compound **1** in $CDCl_3$.

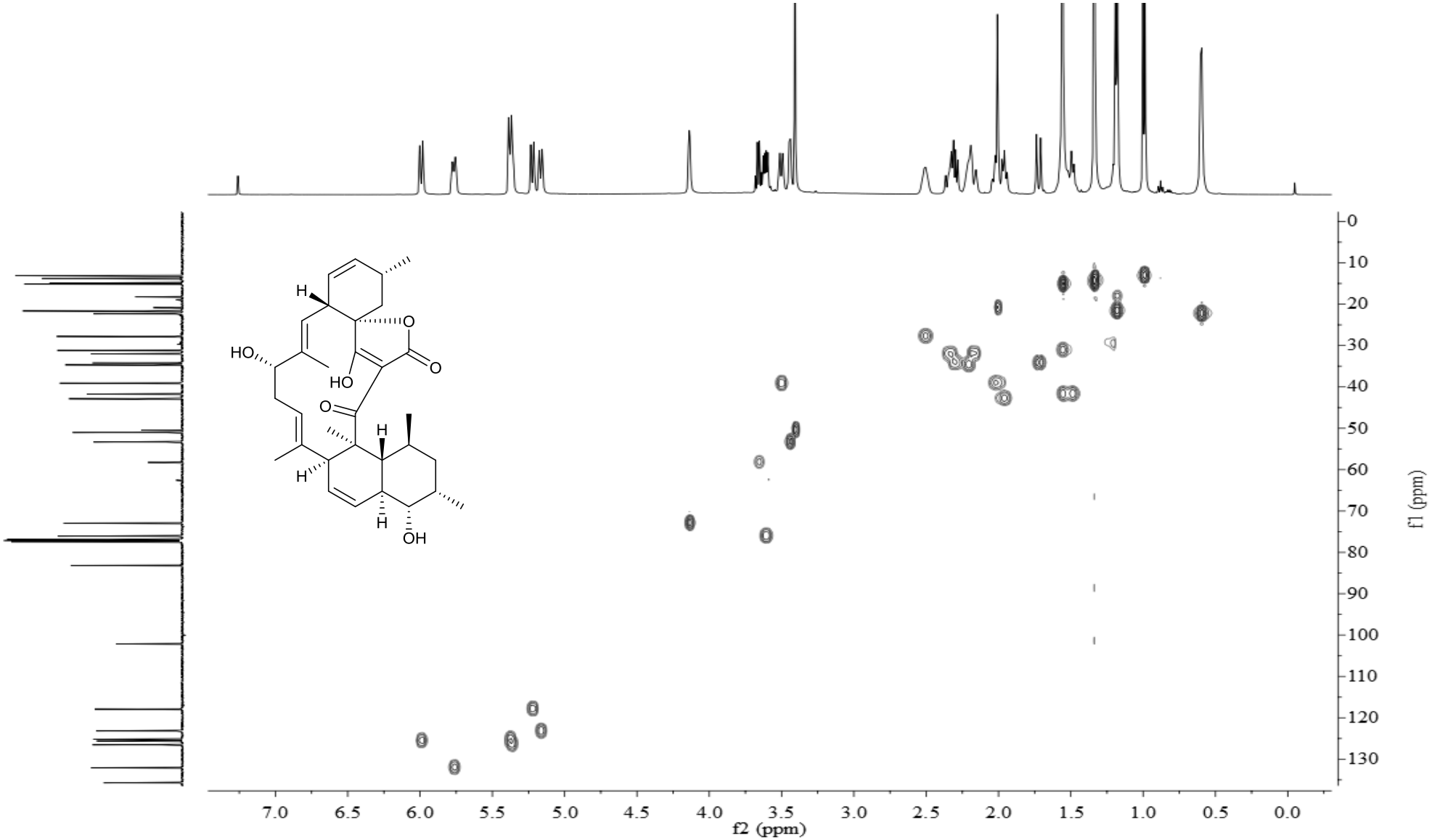


Figure S7. HMBC spectrum of compound **1** in $CDCl_3$.

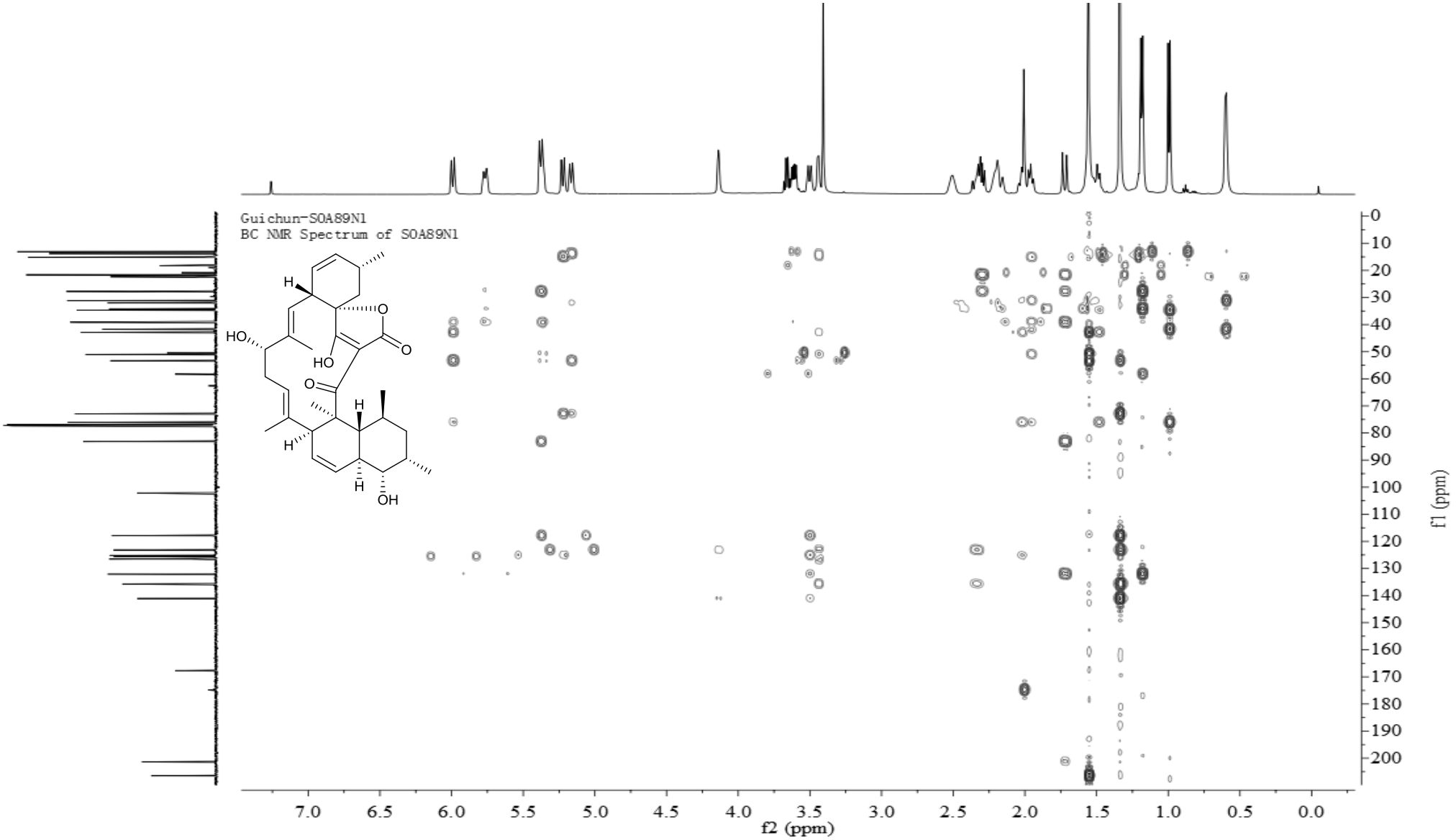


Figure S8. NOESY spectrum of compound **1** in $CDCl_3$.

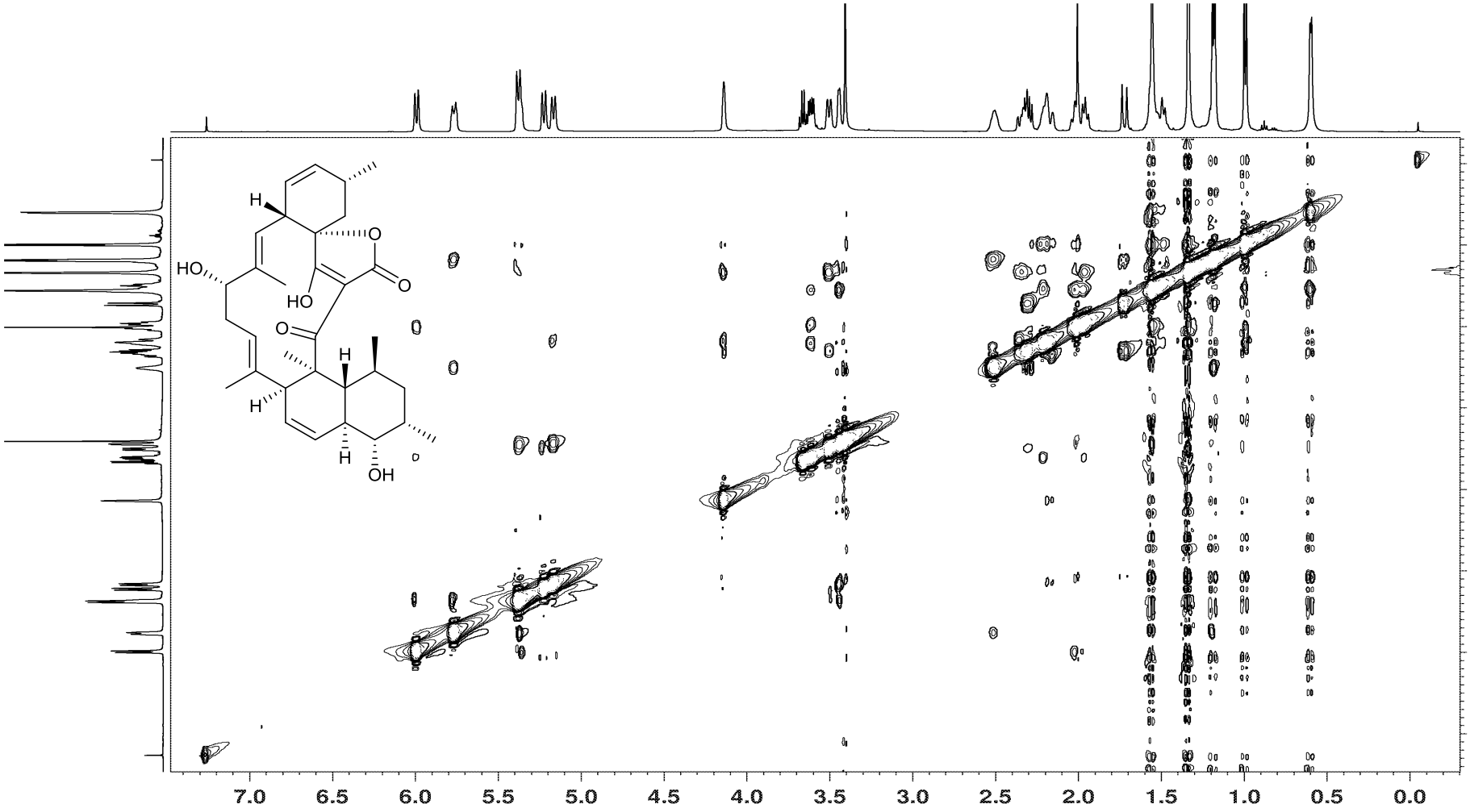


Figure S9.[1]H NMR (500 MHz) spectrum of compound **2** in $CDCl_3$ / CD_3OD.

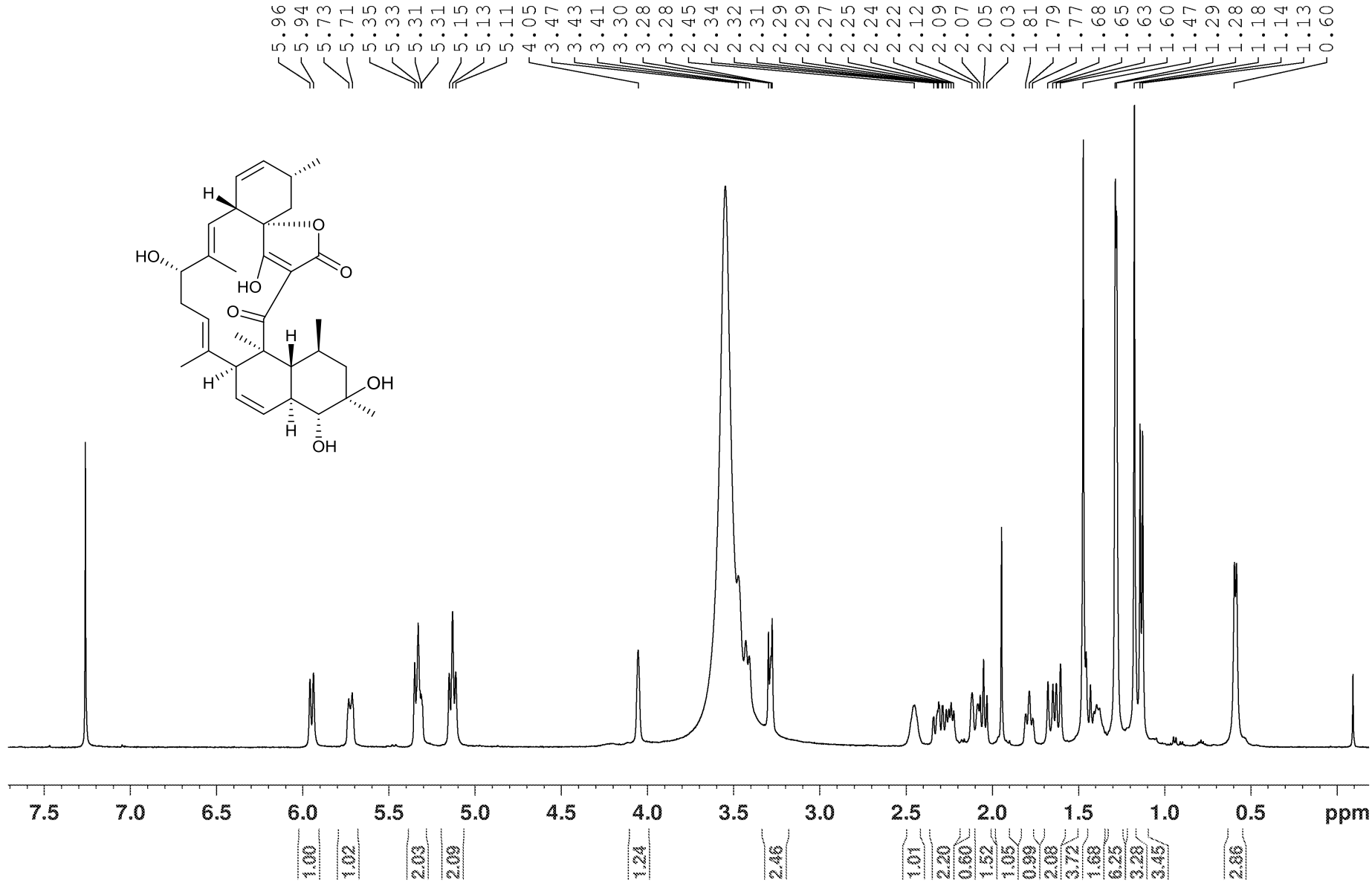


Figure S10.[13]C NMR (125 MHz) spectrum of compound **2** in $CDCl_3/CD_3OD$.

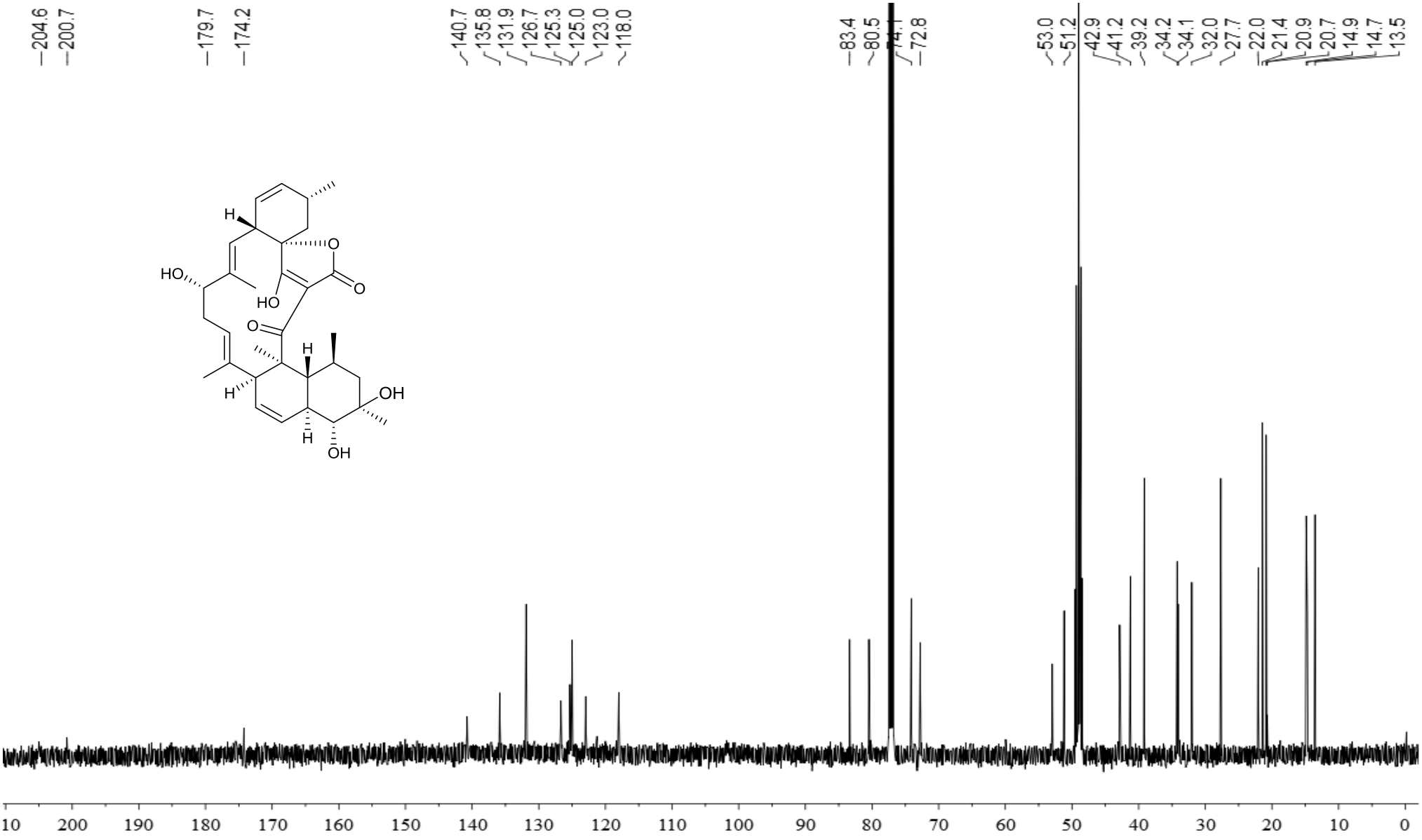


Figure S11. ^{13}C DEPT spectrum of compound **2** in $CDCl_3/CD_3OD$.

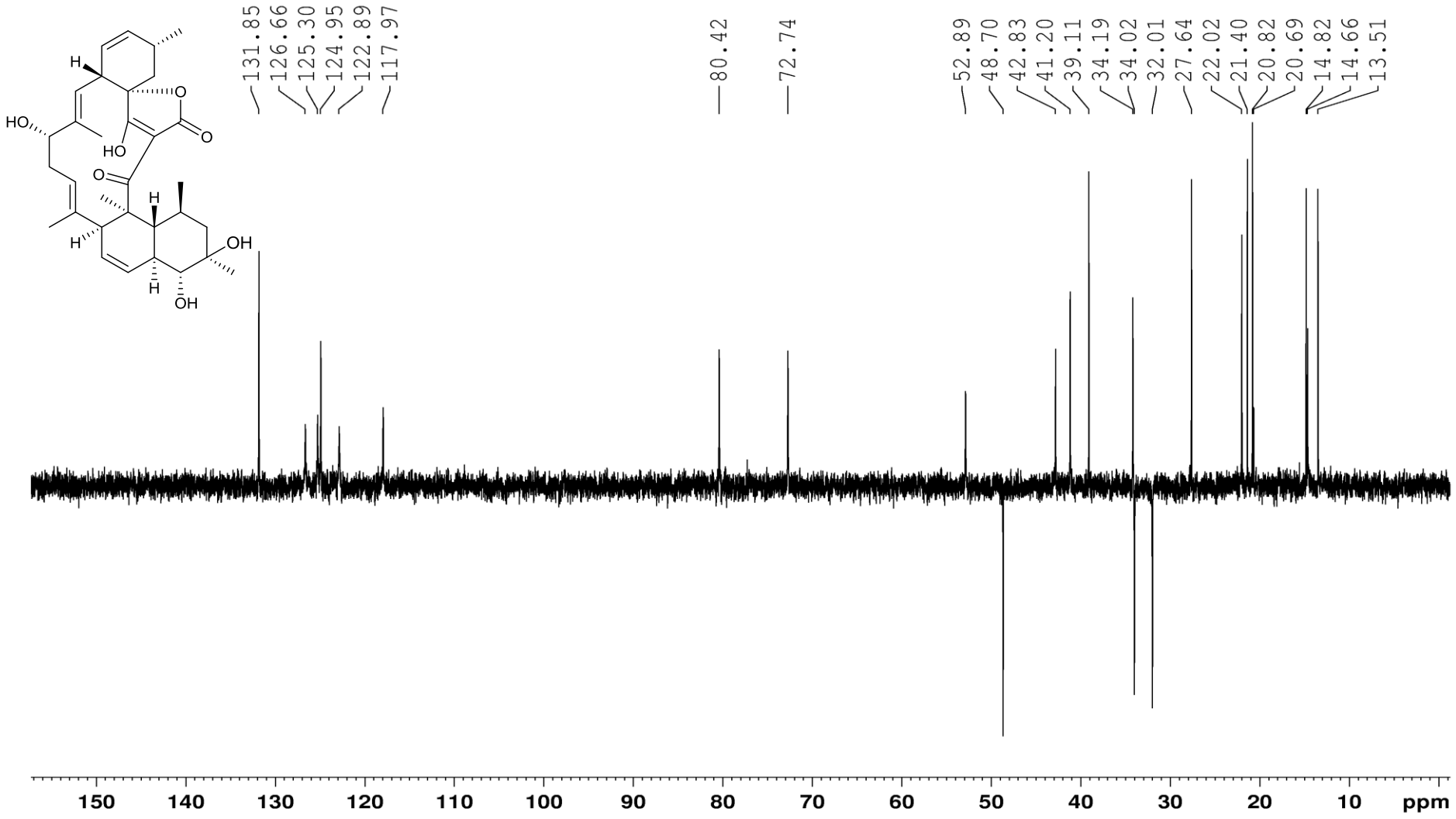


Figure S12. ^{1}H-^{1}H COSY spectrum of compound **2** in $CDCl_3/CD_3OD$.

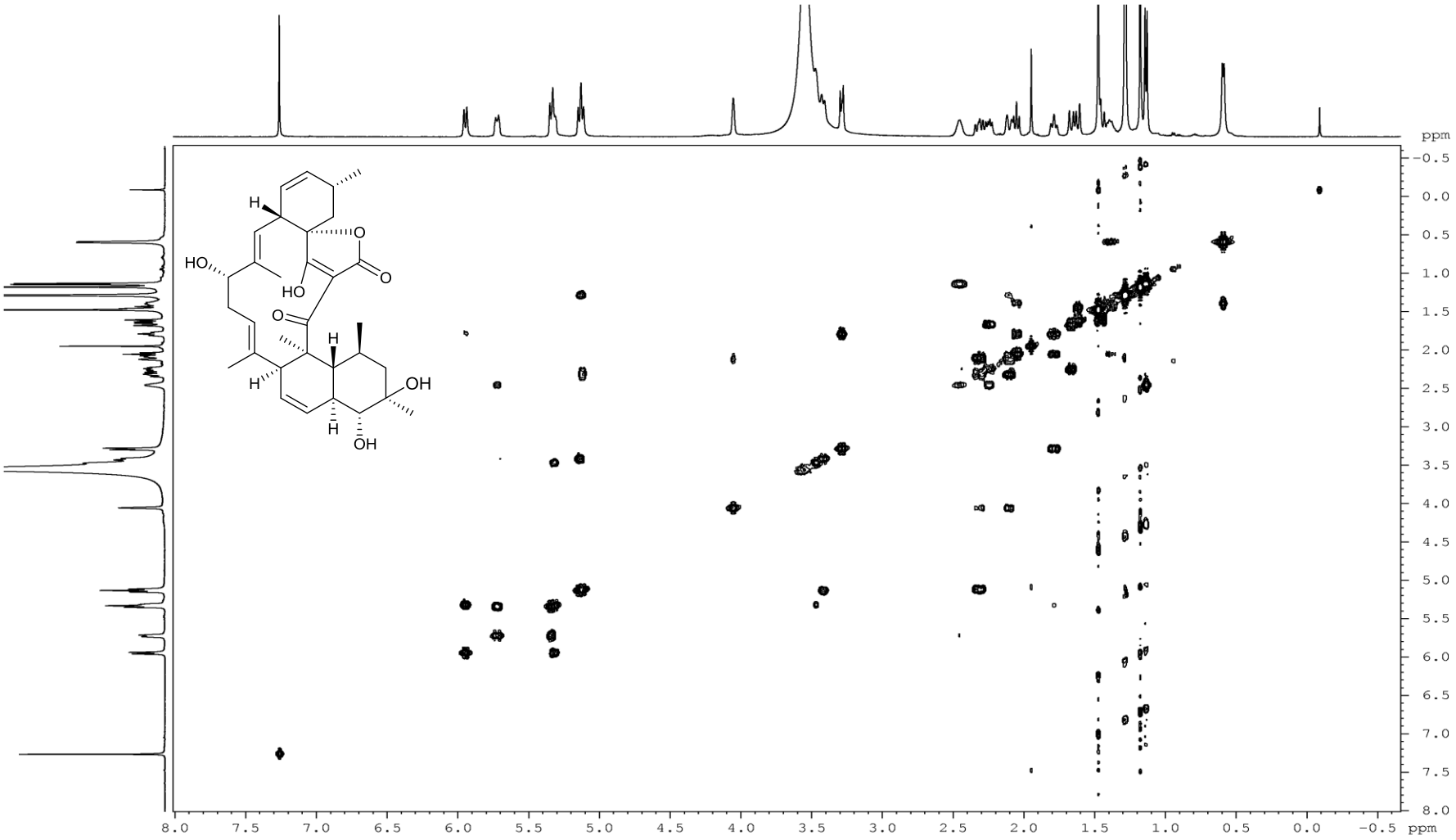


Figure S13. HSQC spectrum of compound **2** in $CDCl_3/CD_3OD$.

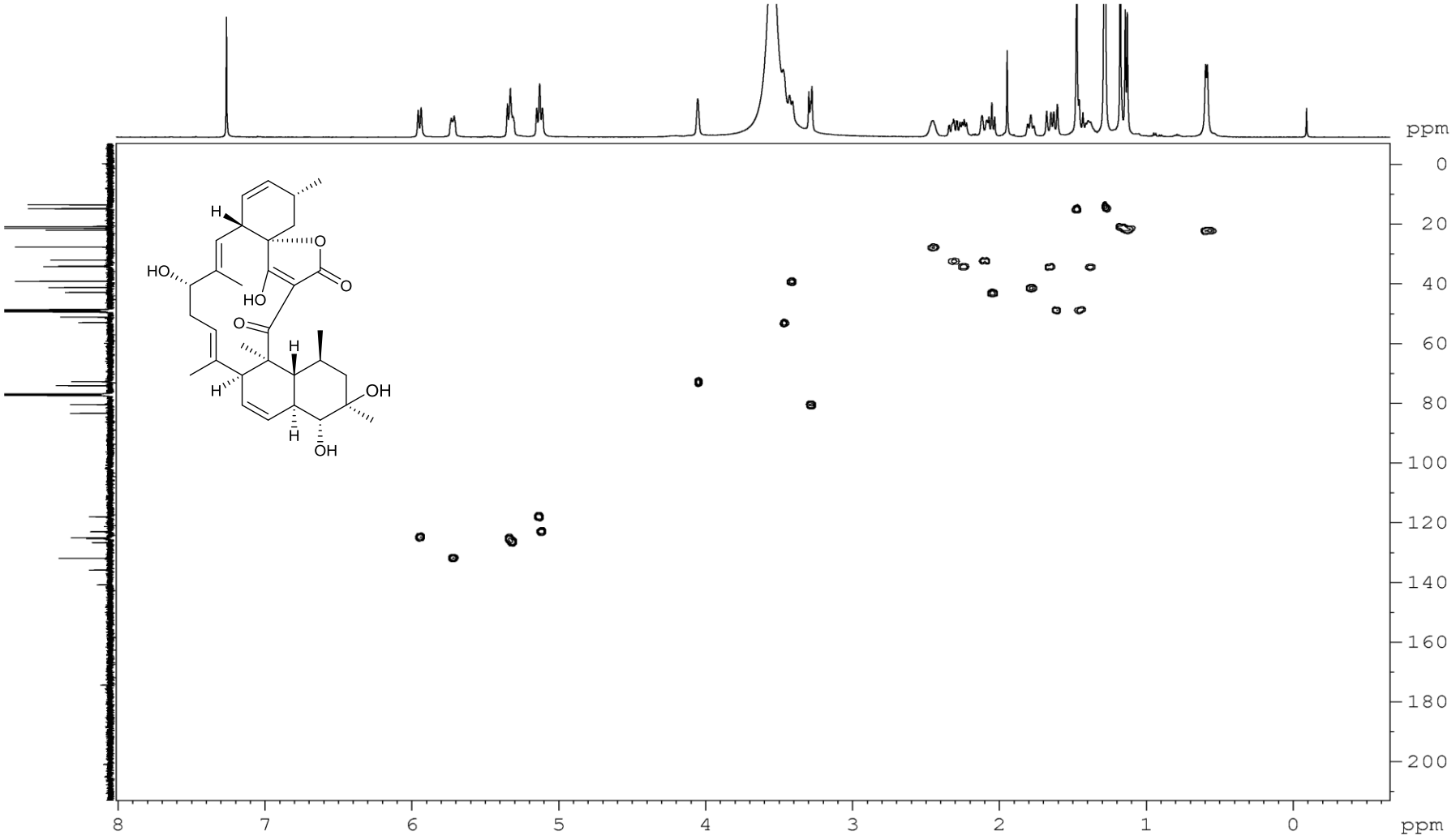


Figure S14. HMBC spectrum of compound **2** in $CDCl_3/CD_3OD$.

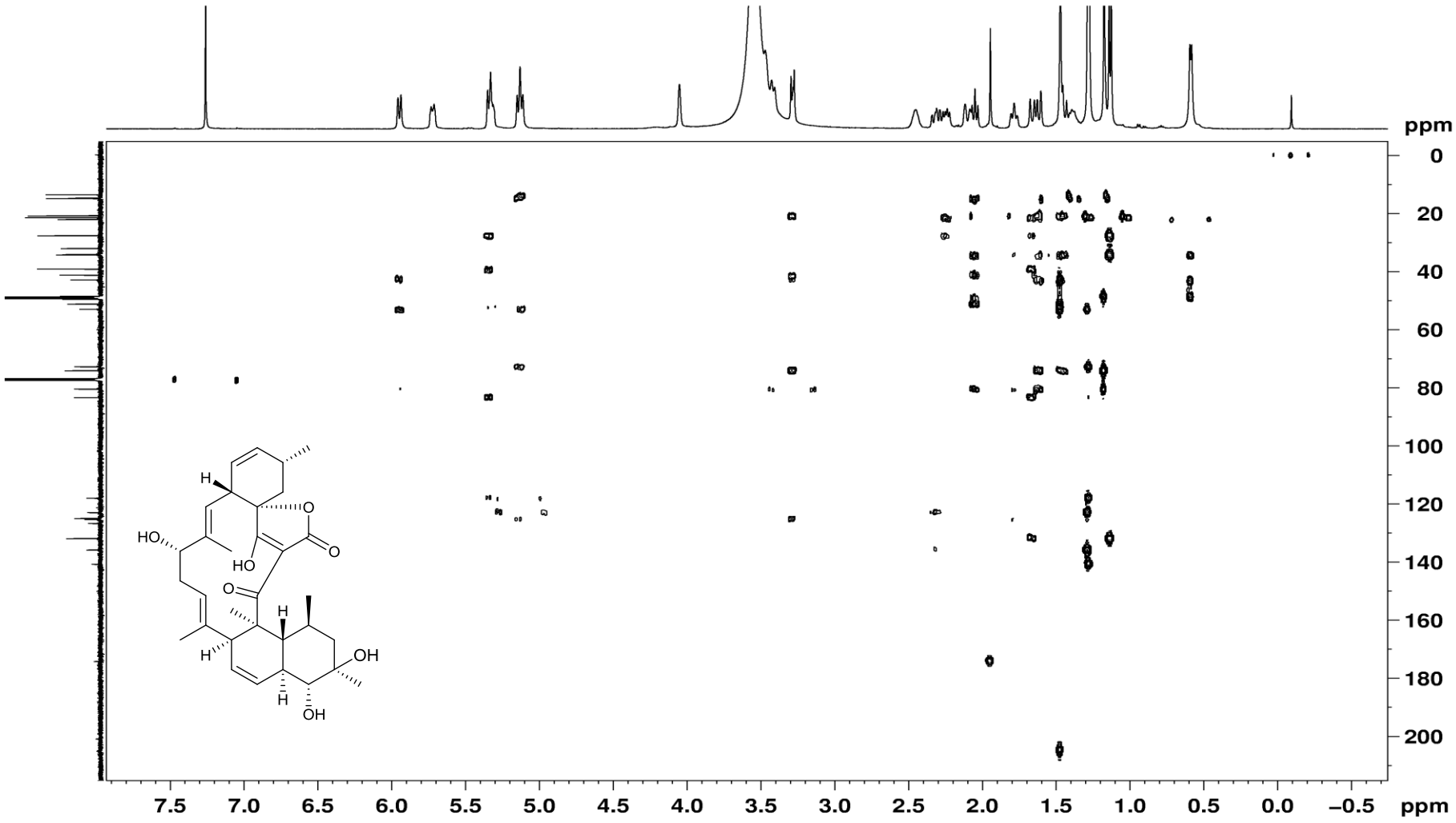


Figure S15. NOESY spectrum of compound **2** in $CDCl_3/CD_3OD$.

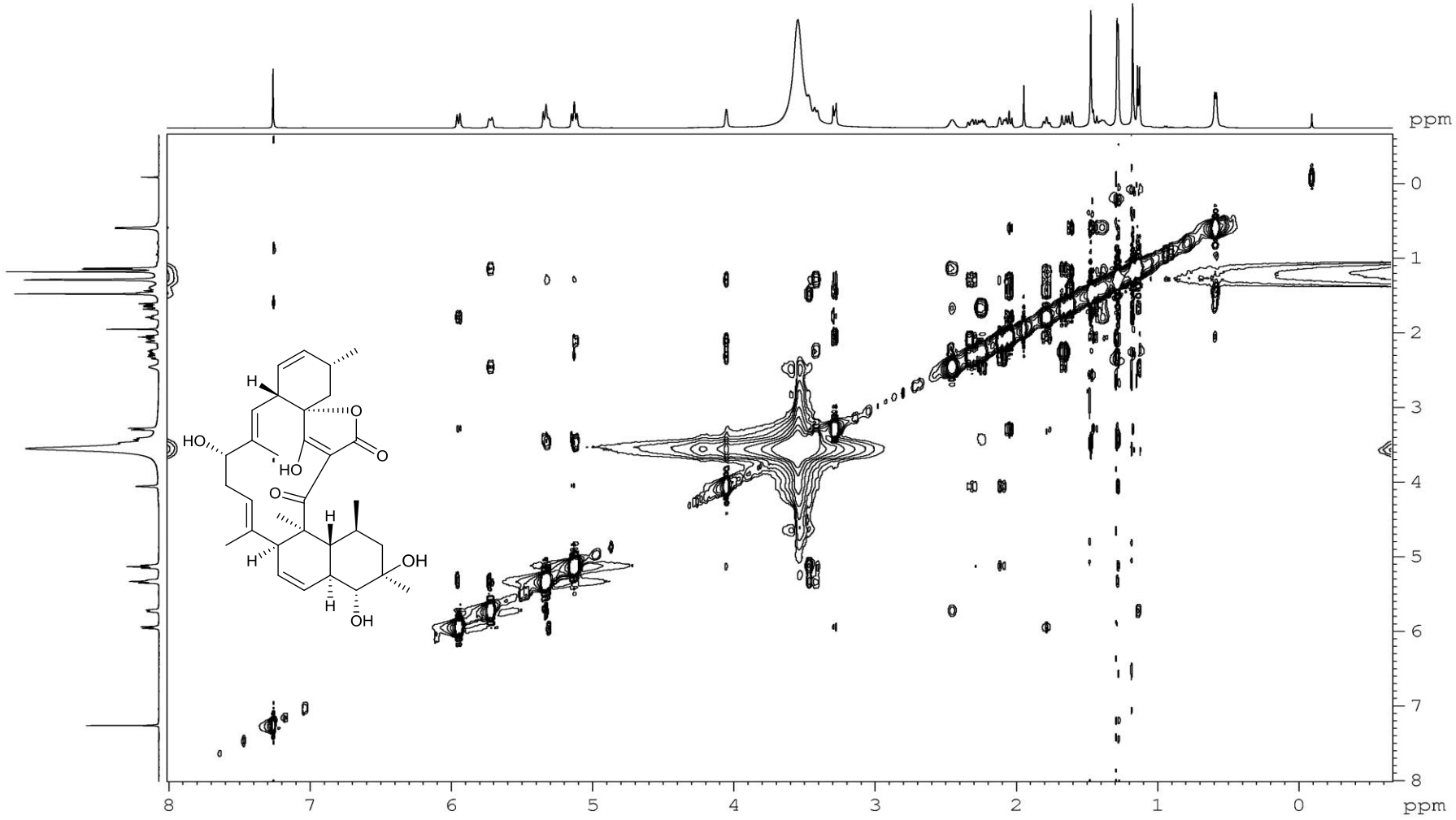


Figure S16.[1]H NMR (500 MHz) spectrum of compound **3** in $CDCl_3$.

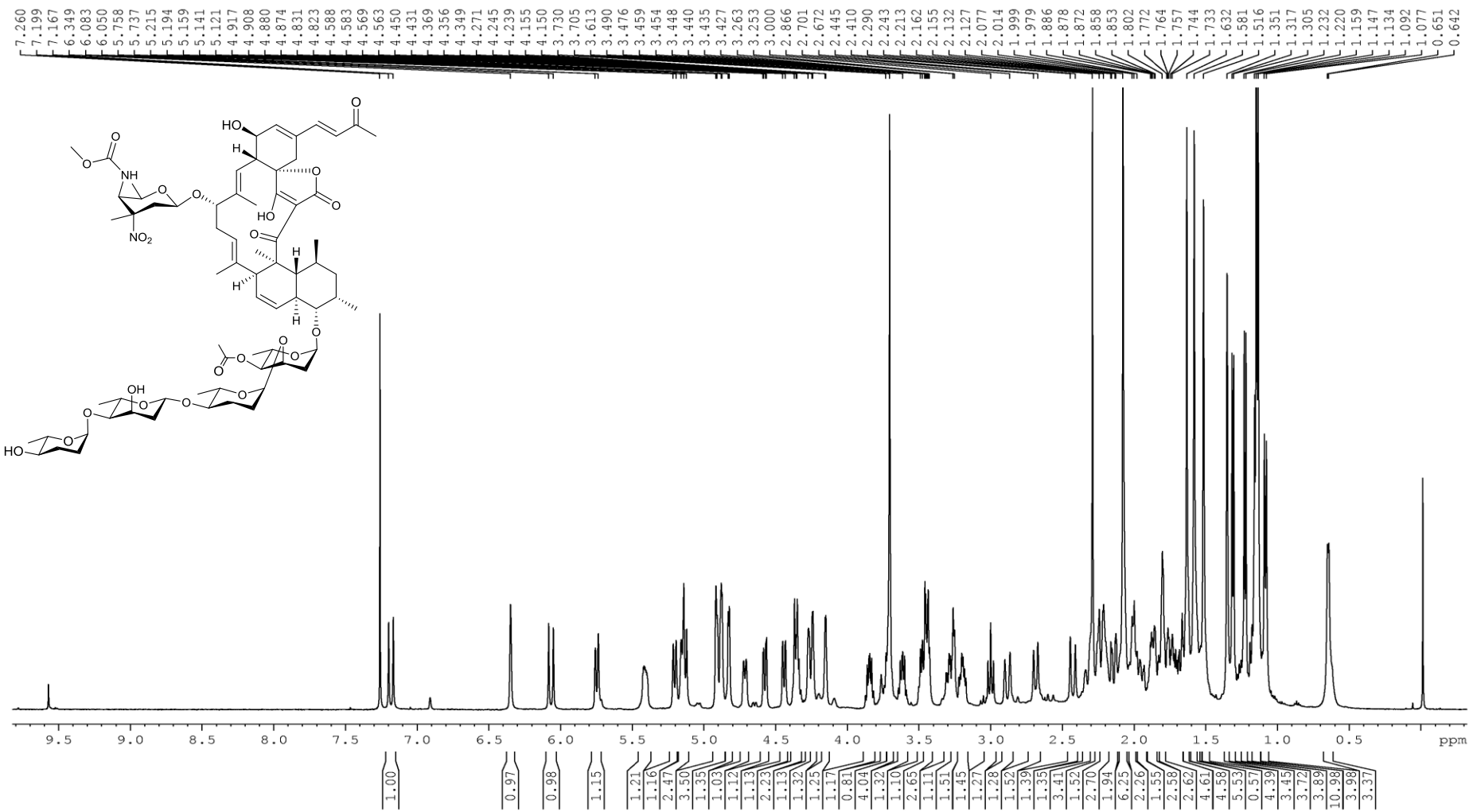


Figure S17.[13]C NMR (125 MHz) spectrum of compound **3** in $CDCl_3$.

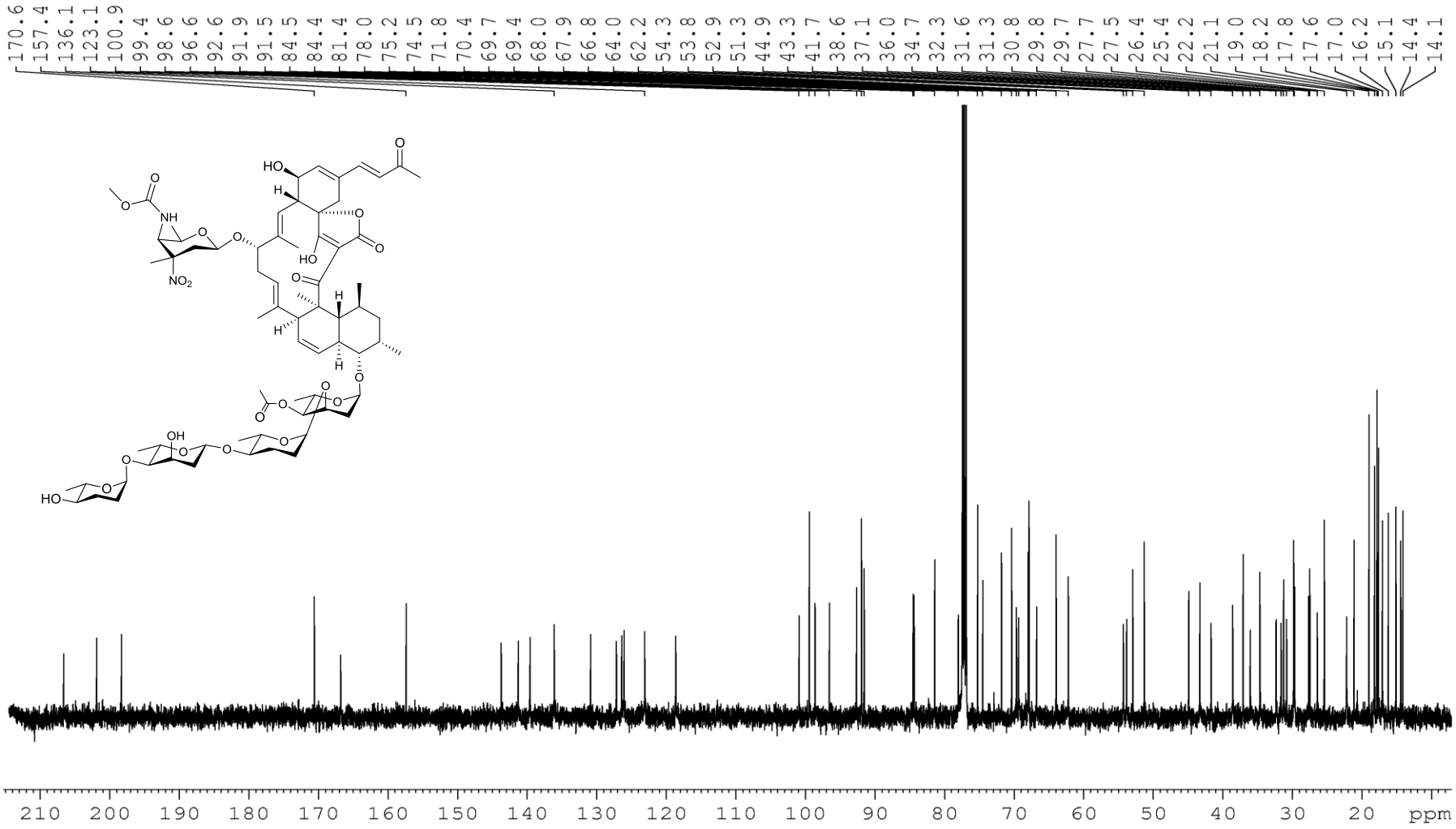


Figure S18. ^{13}C DEPT spectrum of compound **3** in $CDCl_3$.

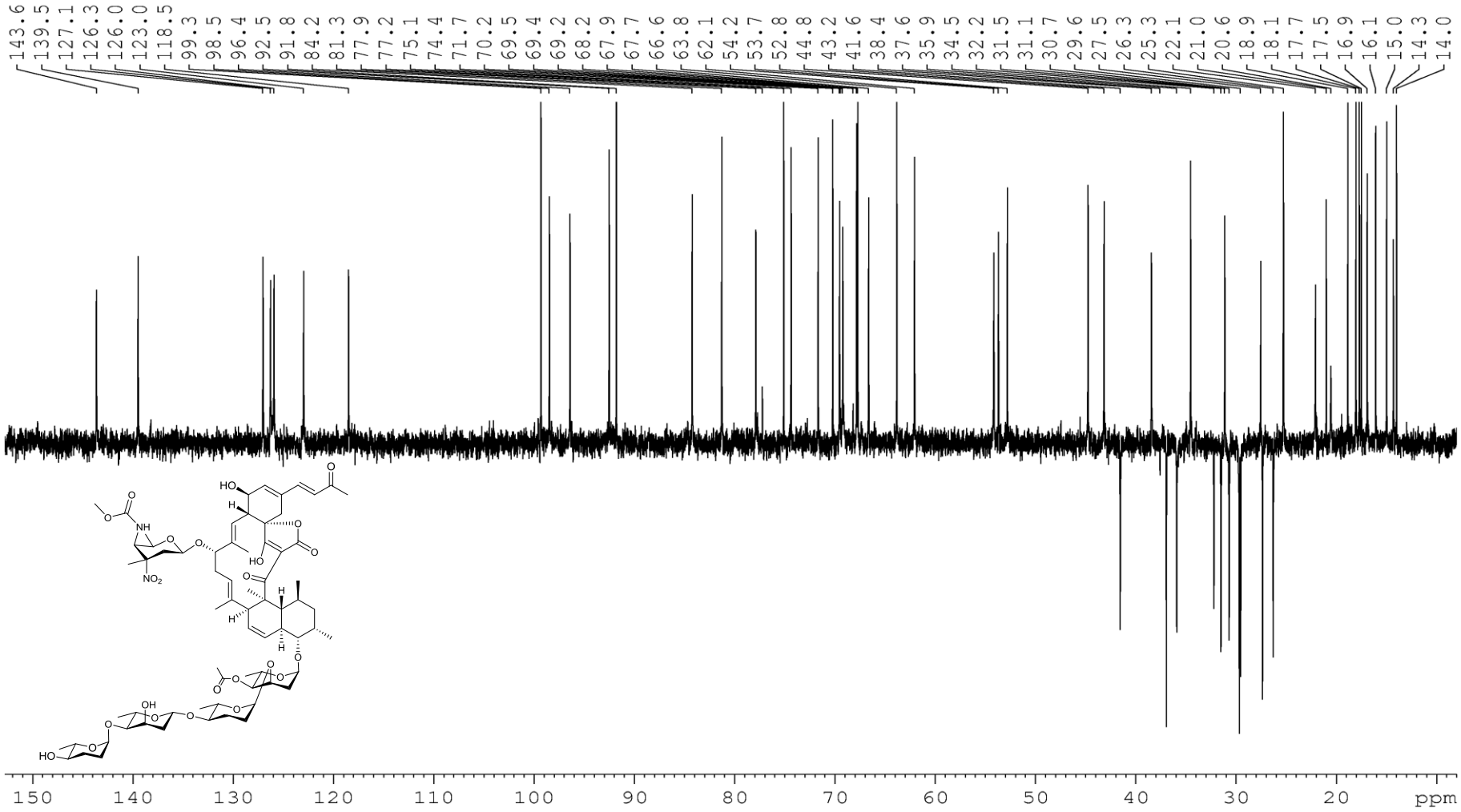


Figure S19. ^{1}H-^{1}H COSY spectrum of compound **3** in $CDCl_3$.

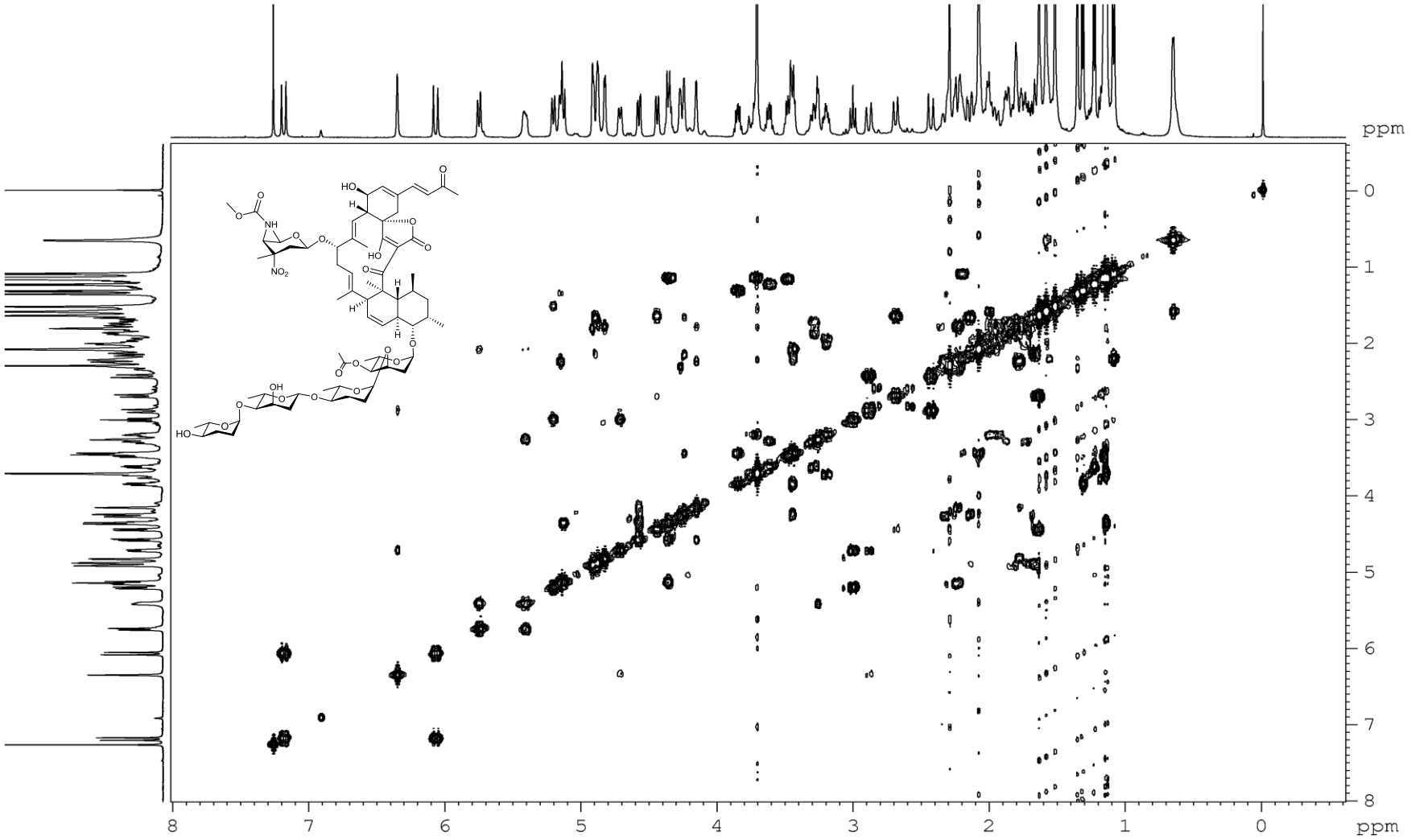


Figure S20. HSQC spectrum of compound **3** in $CDCl_3$.

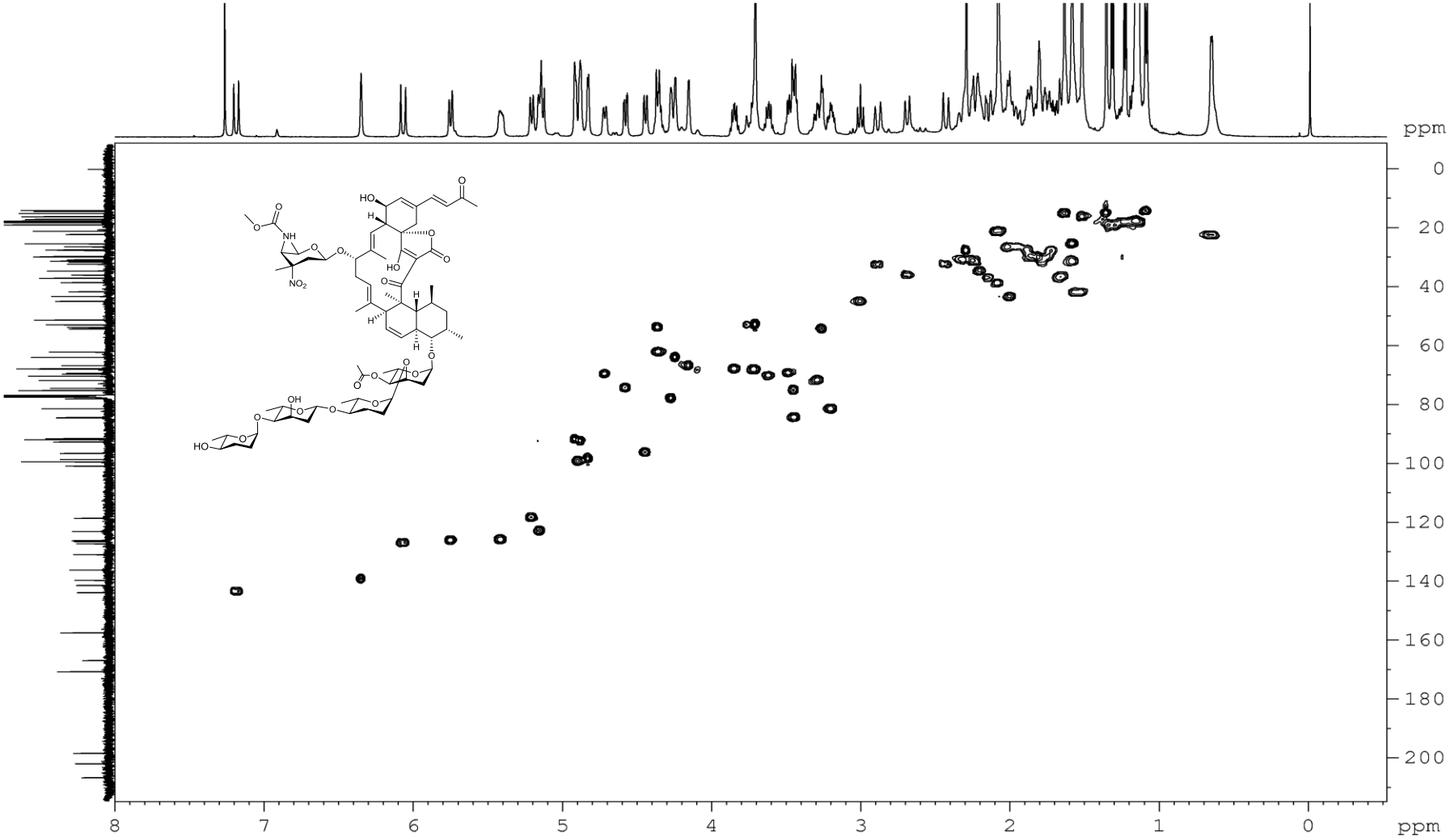


Figure S21. HMBC spectrum of compound **3** in $CDCl_3$.

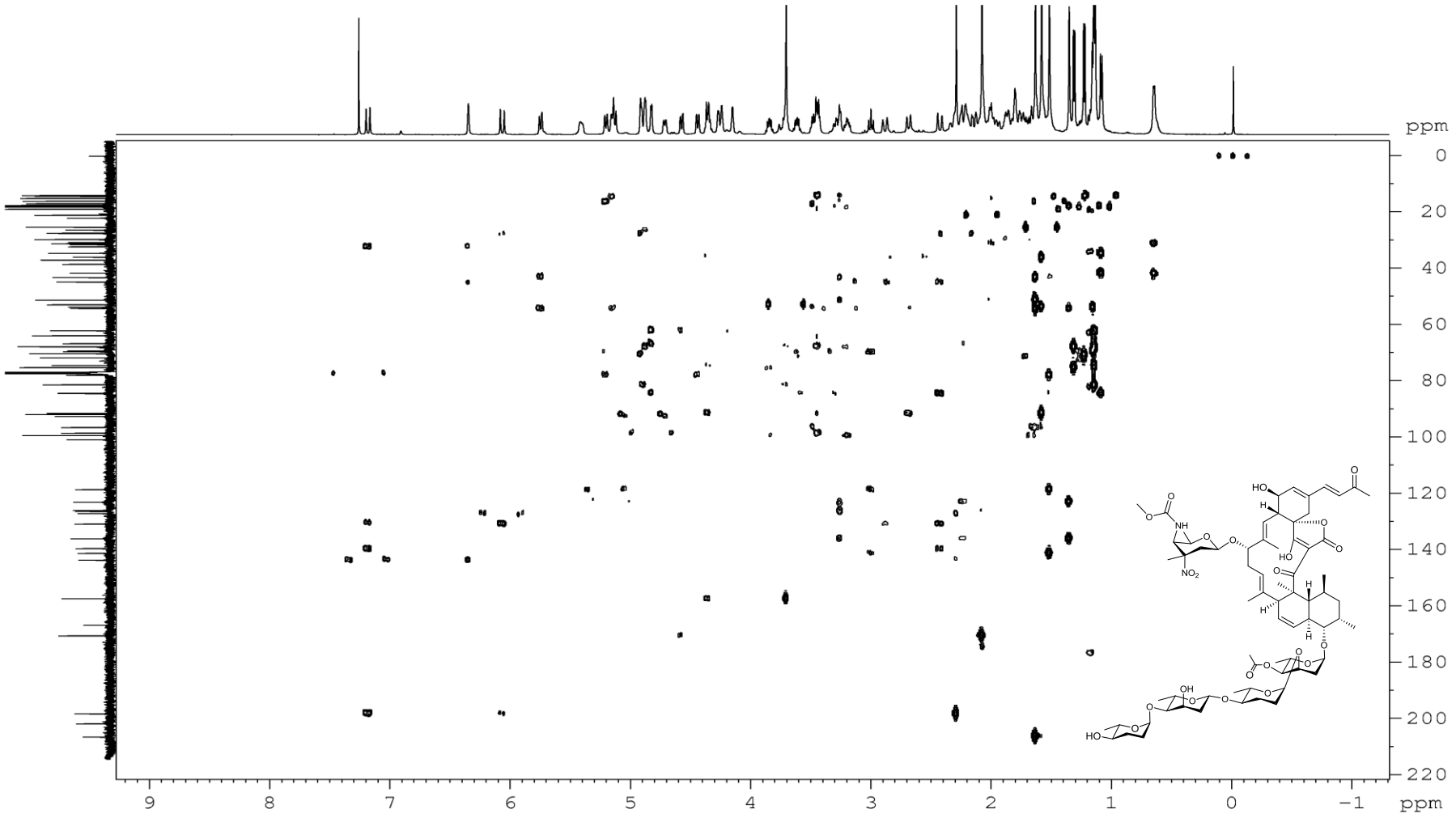


Figure S22. NOESY spectrum of compound **3** in $CDCl_3$.

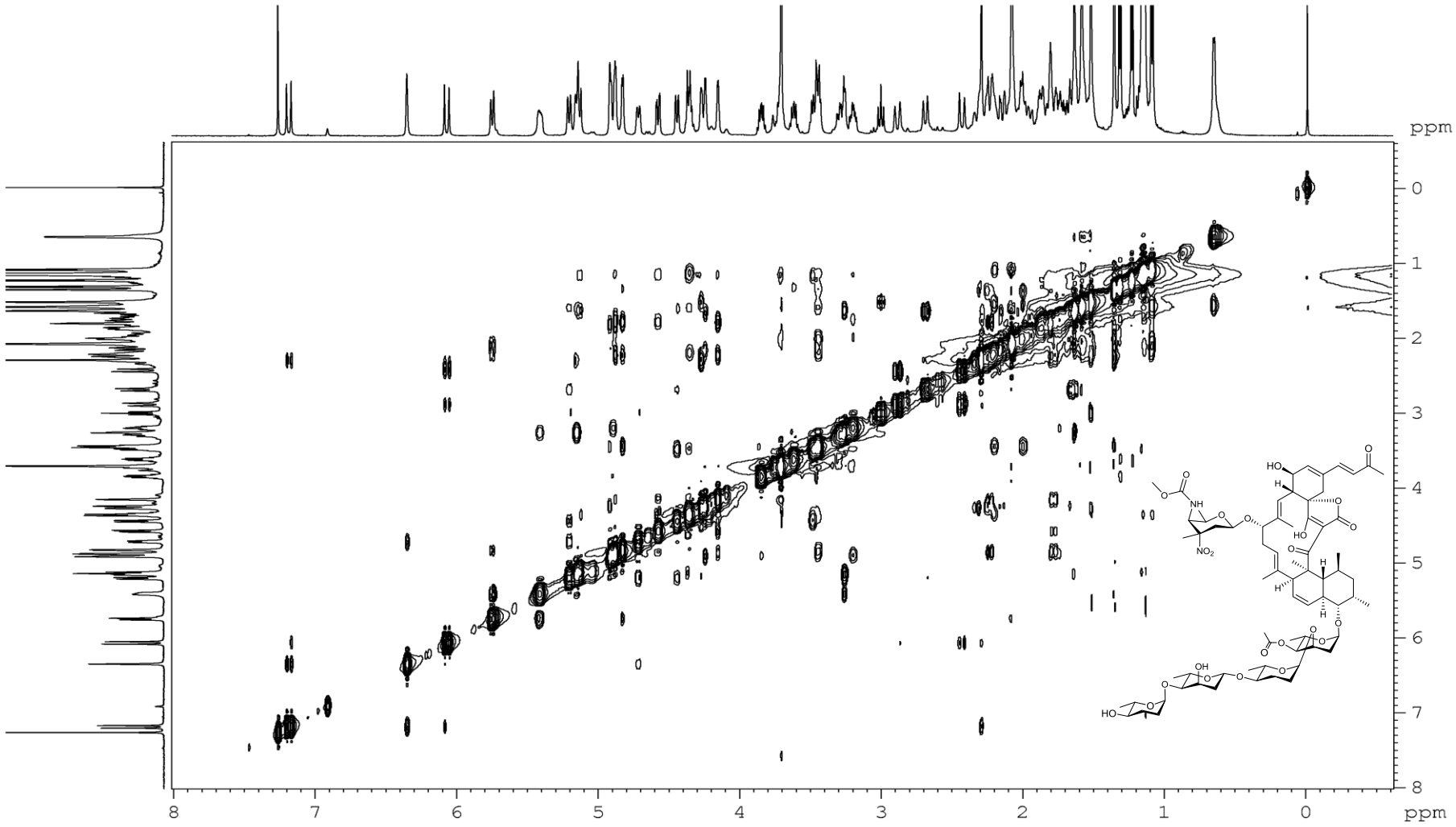


Figure S23.[1]H NMR (500 MHz) spectrum of compound **4** in $CDCl_3$.

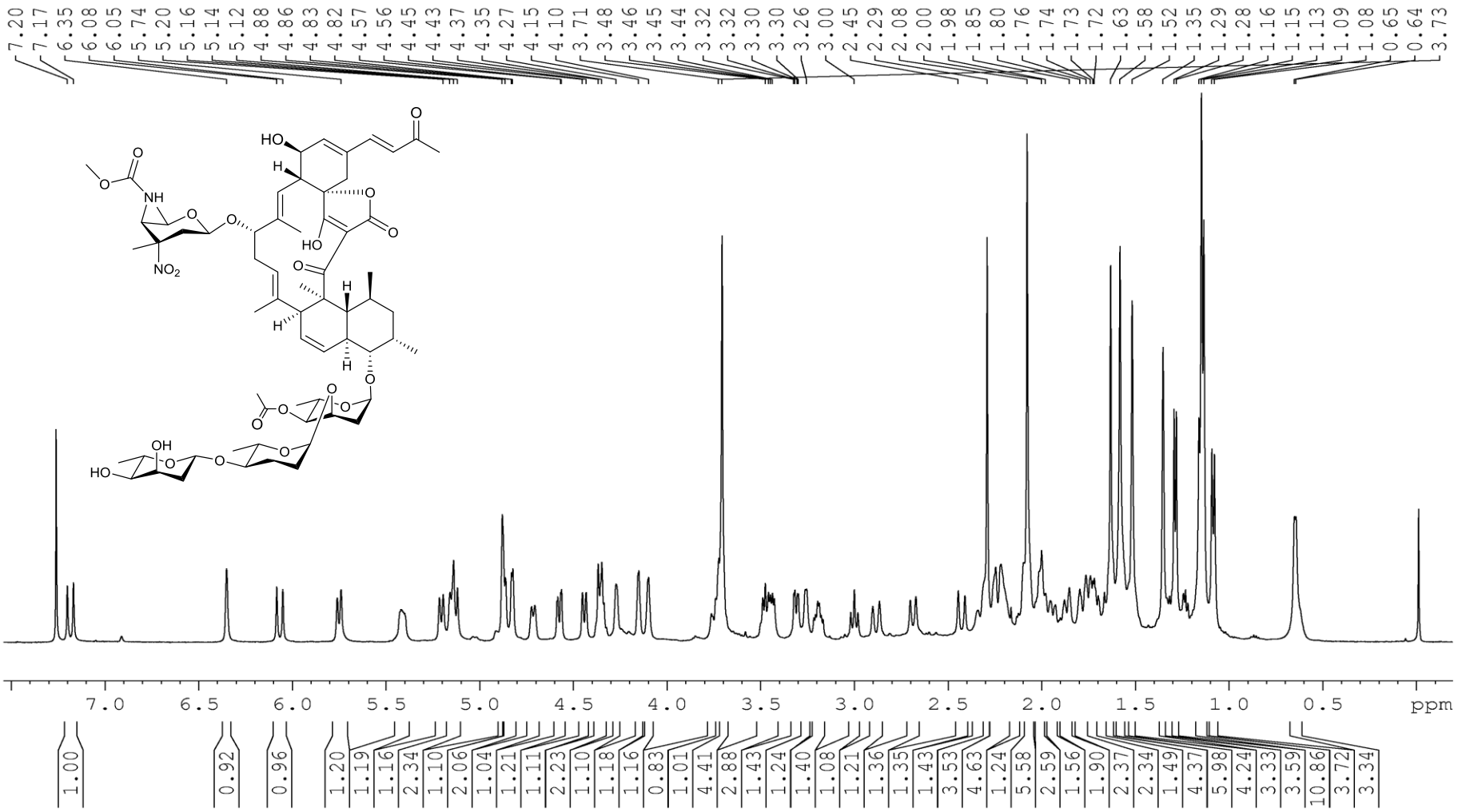


Figure S24.[13]C NMR (125 MHz) spectrum of compound **4** in $CDCl_3$.

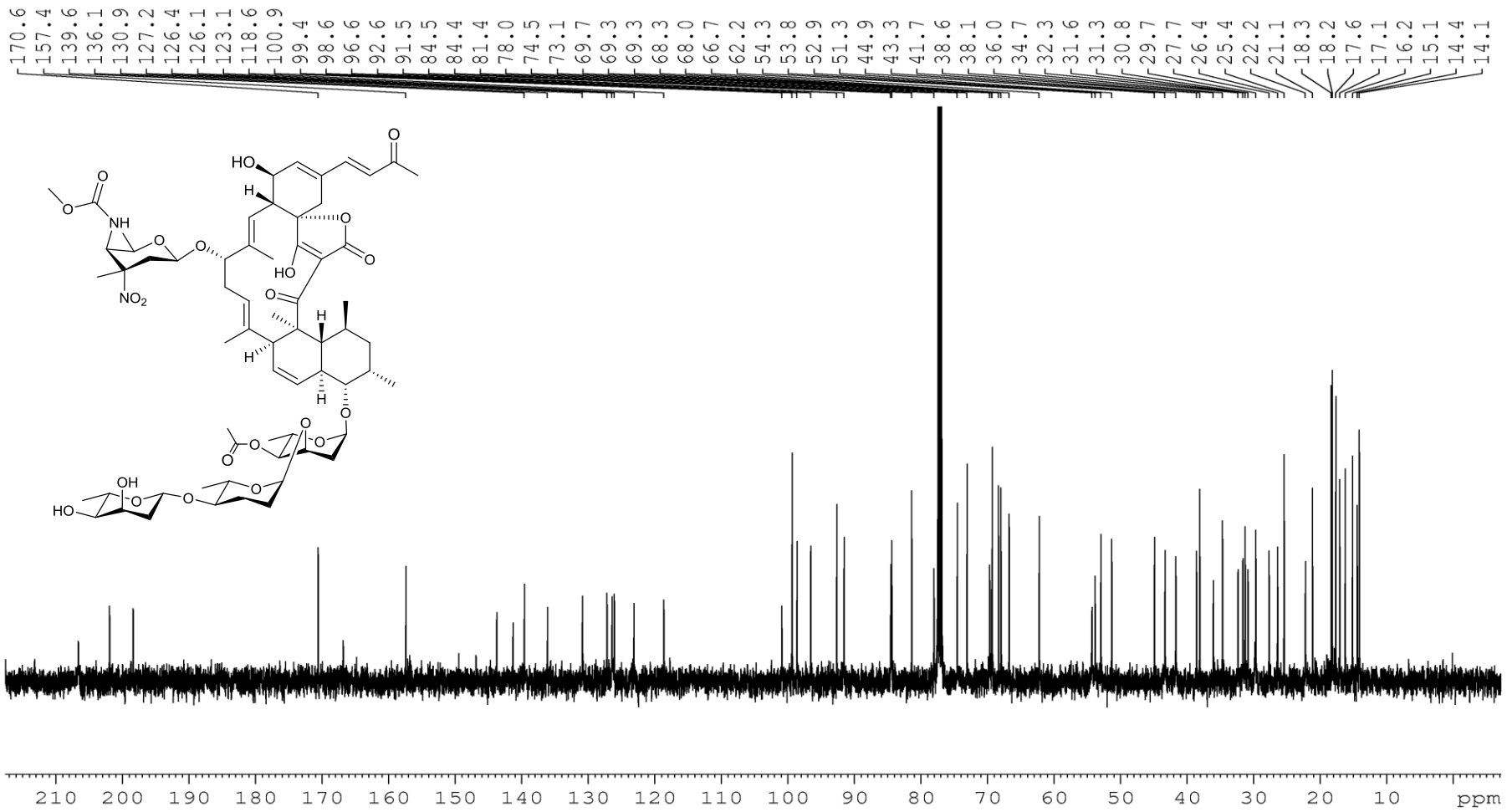


Figure S25. ^{13}C DEPT spectrum of compound **4** in $CDCl_3$.

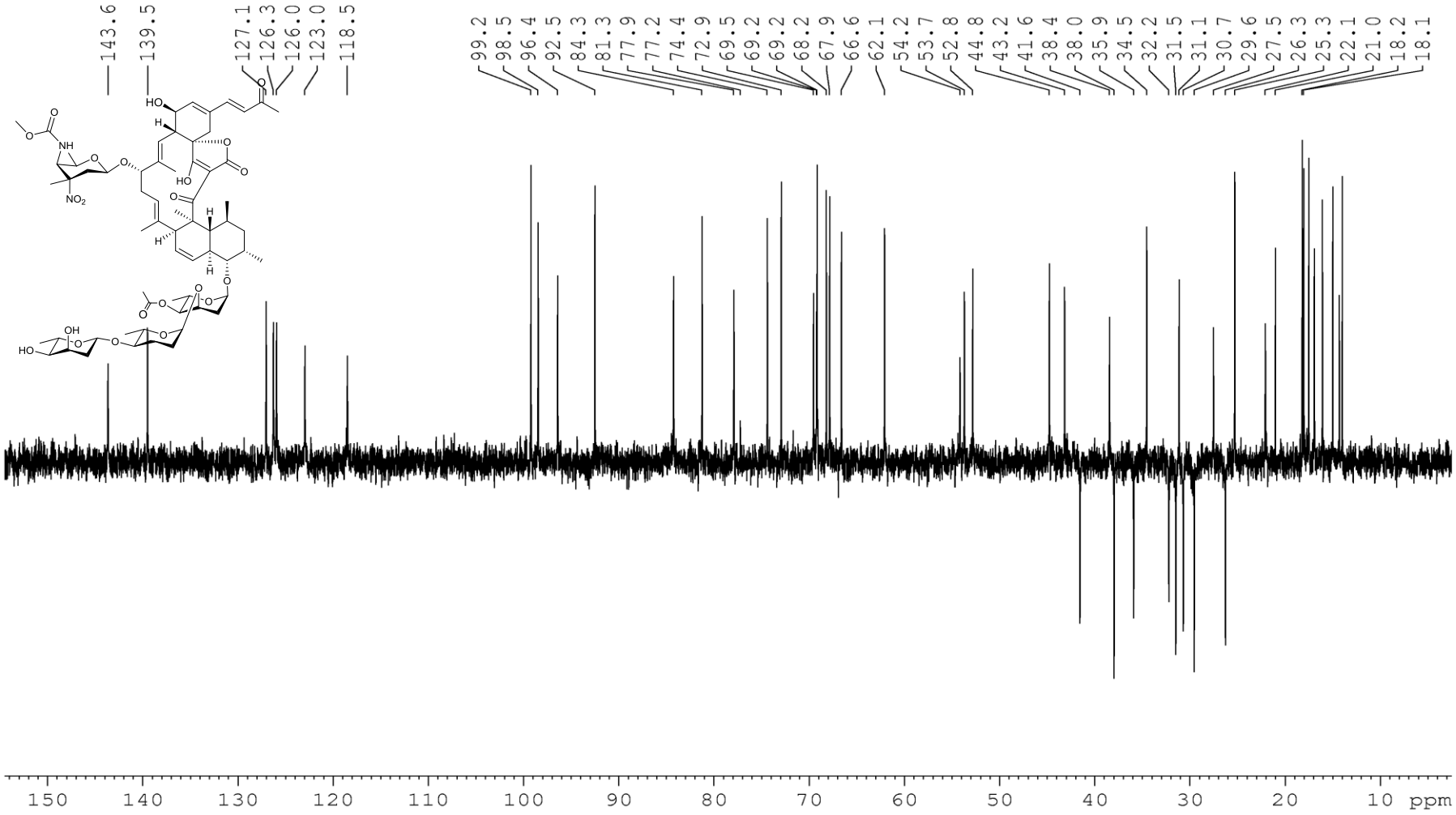


Figure S26. ^{1}H-^{1}H COSY spectrum of compound **4** in $CDCl_3$.

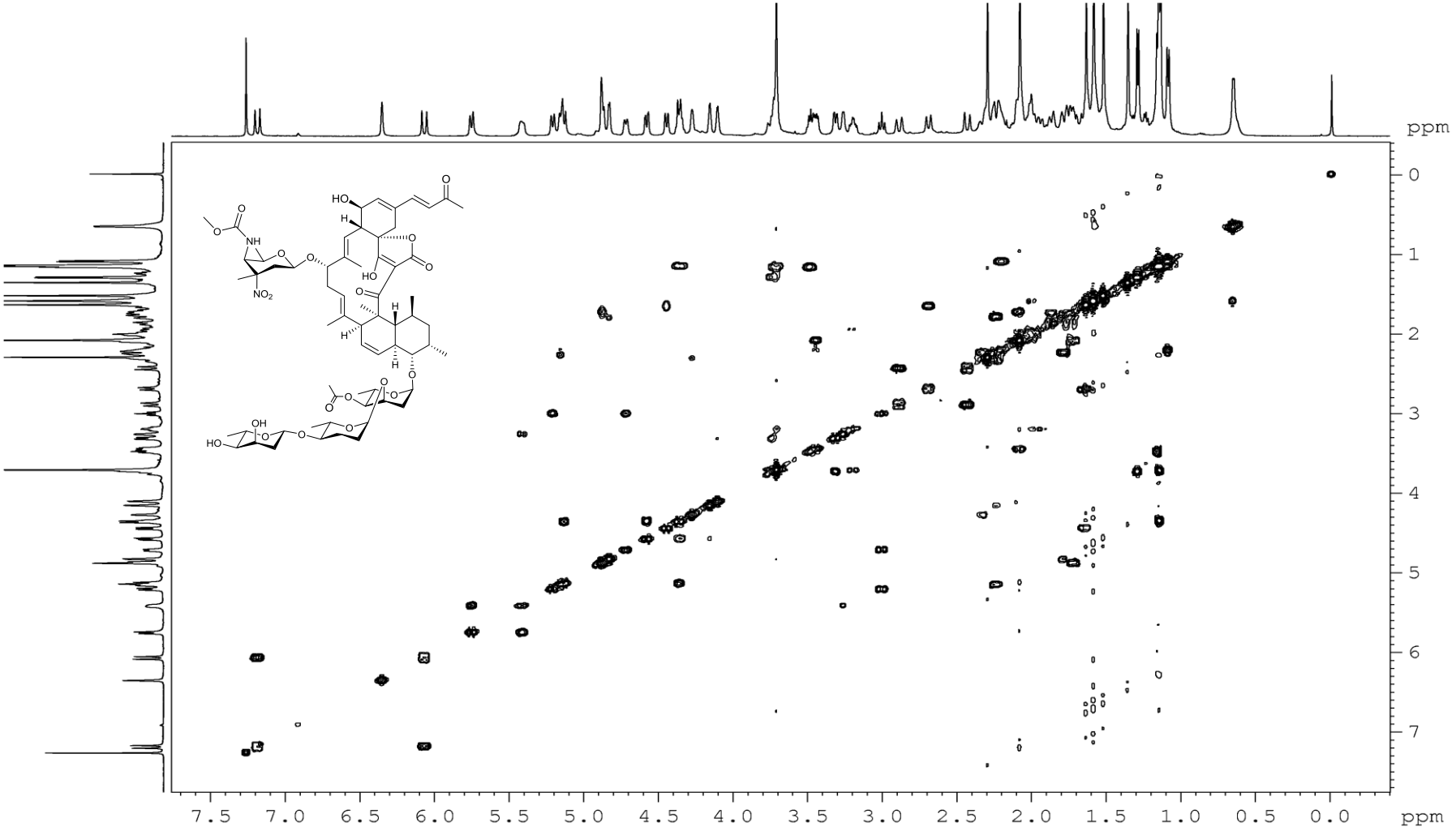


Figure S27. HSQC spectrum of compound **4** in $CDCl_3$.

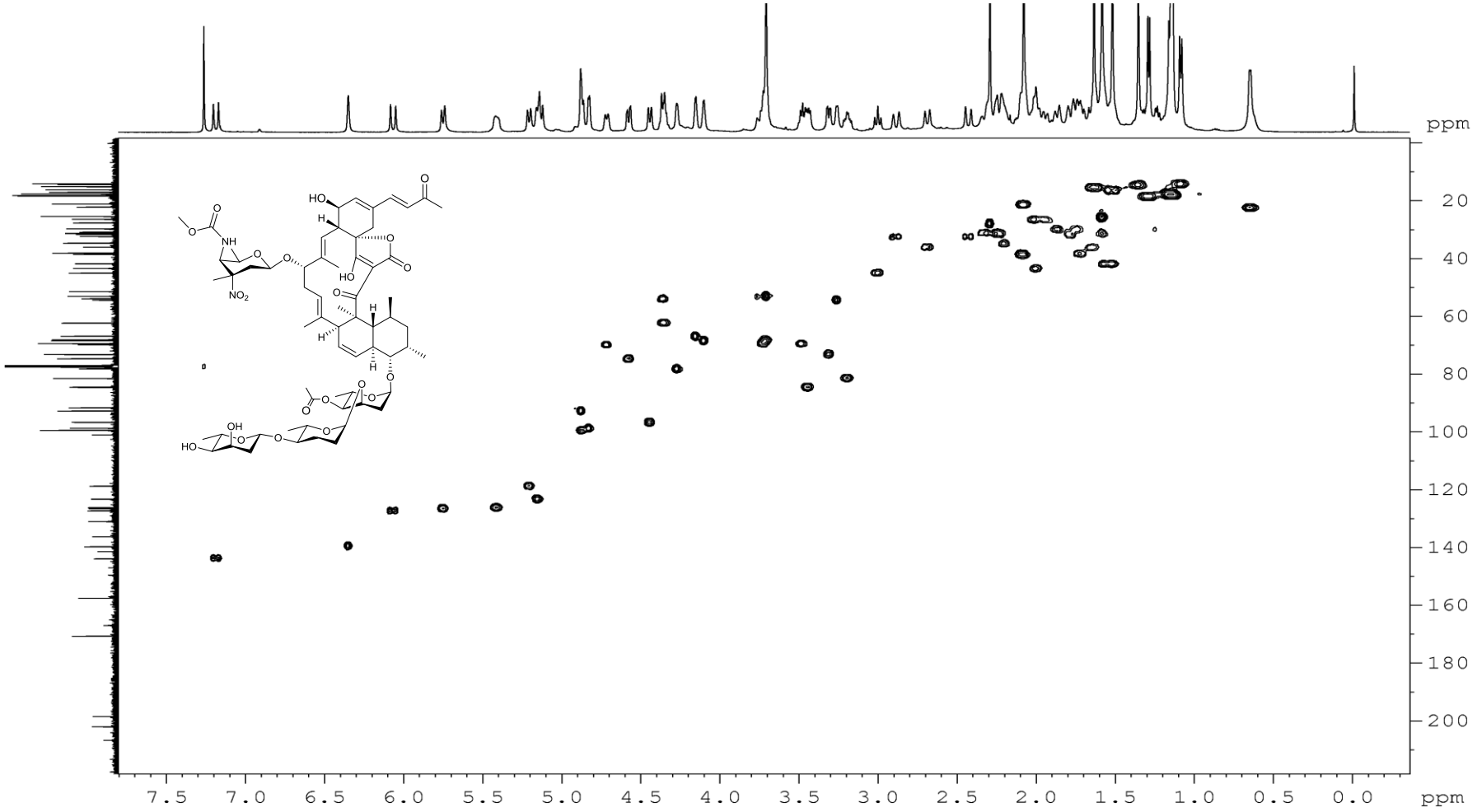


Figure S28. HMBC spectrum of compound **4** in $CDCl_3$.

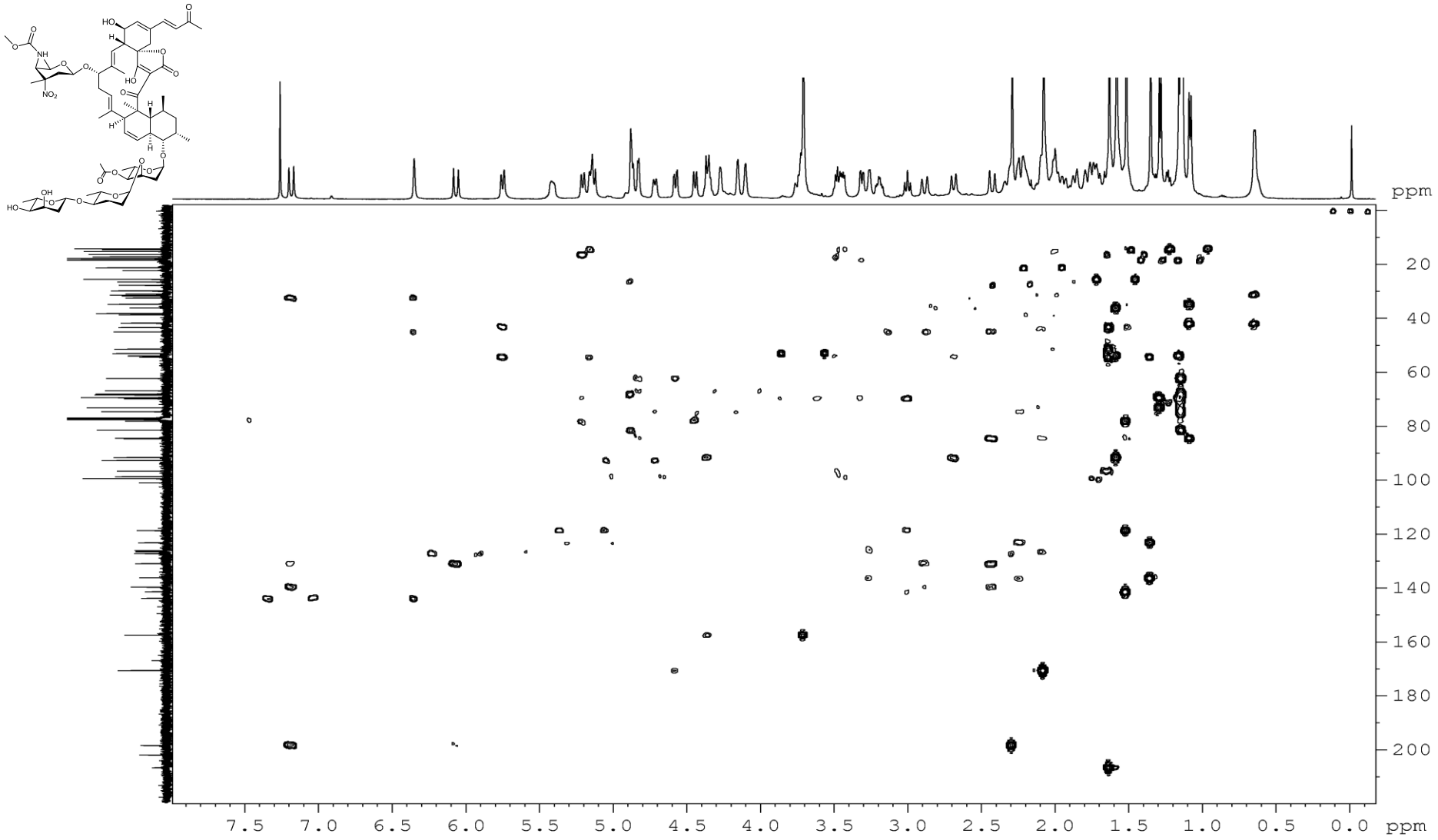


Figure S29. NOESY spectrum of compound **4** in $CDCl_3$.

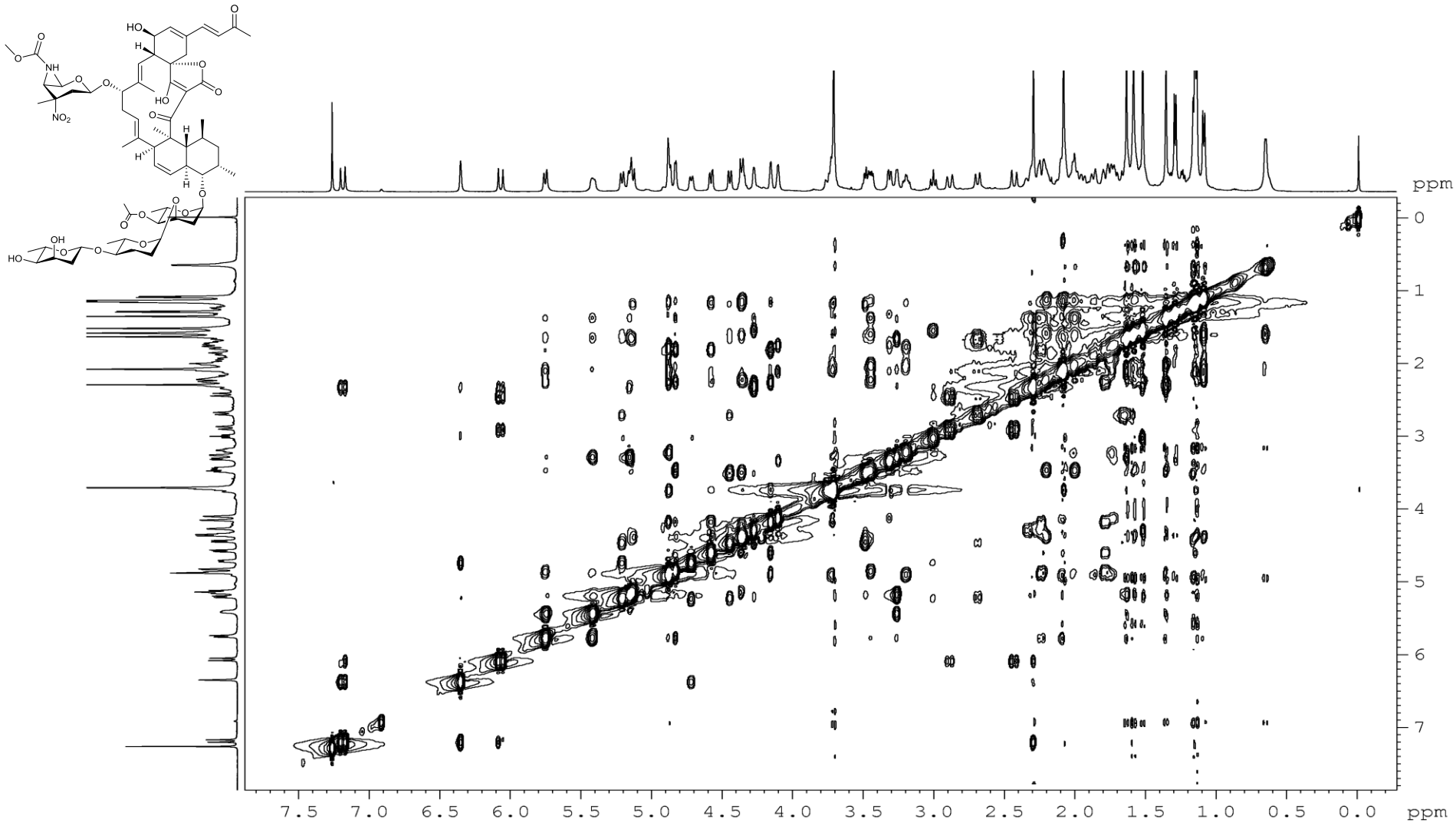


Figure S30.[1]H NMR (500 MHz) spectrum of compound **5** in $CDCl_3$.

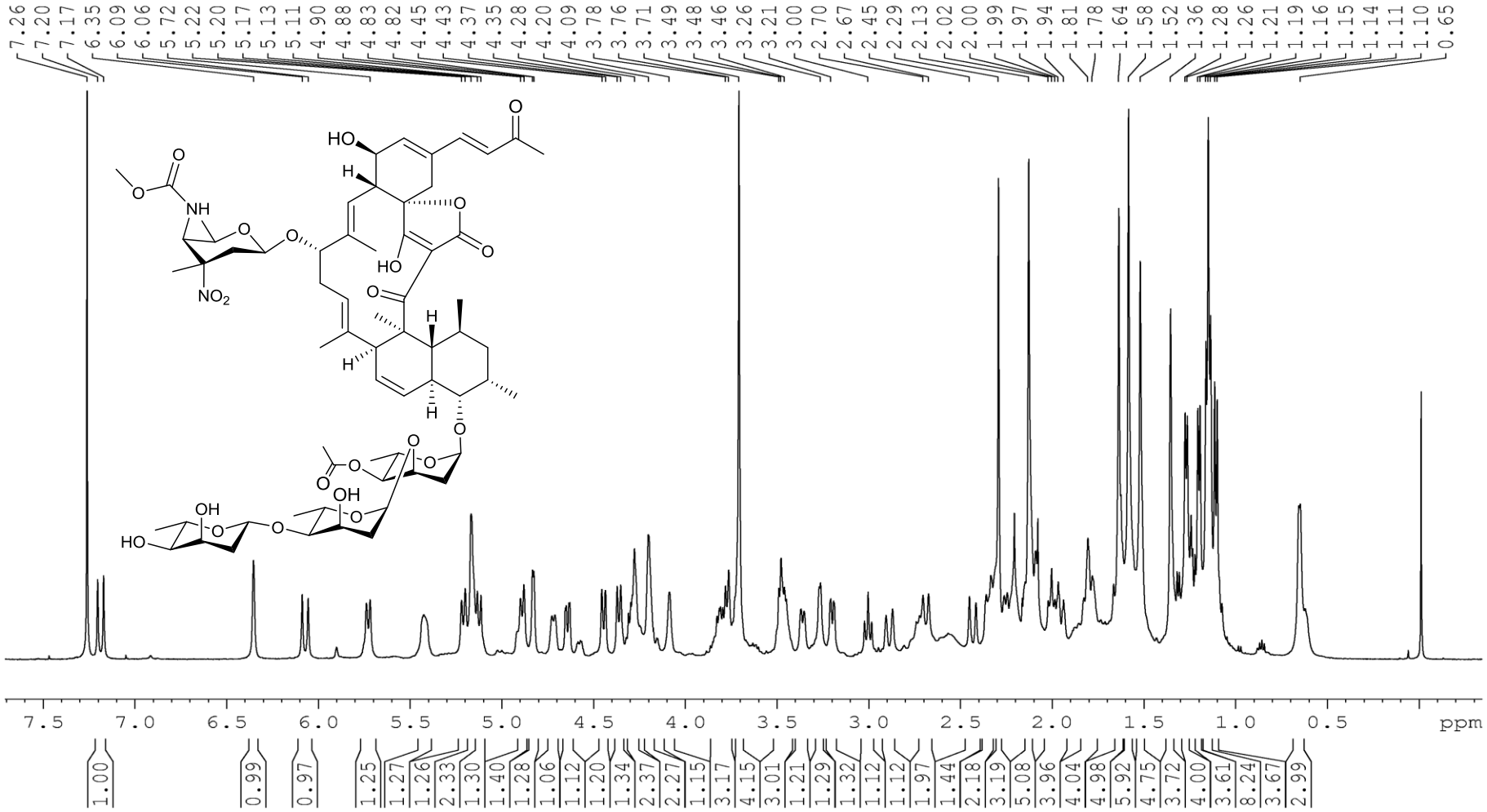


Figure S31.[13]C NMR (125 MHz) spectrum of compound **5** in $CDCl_3$.

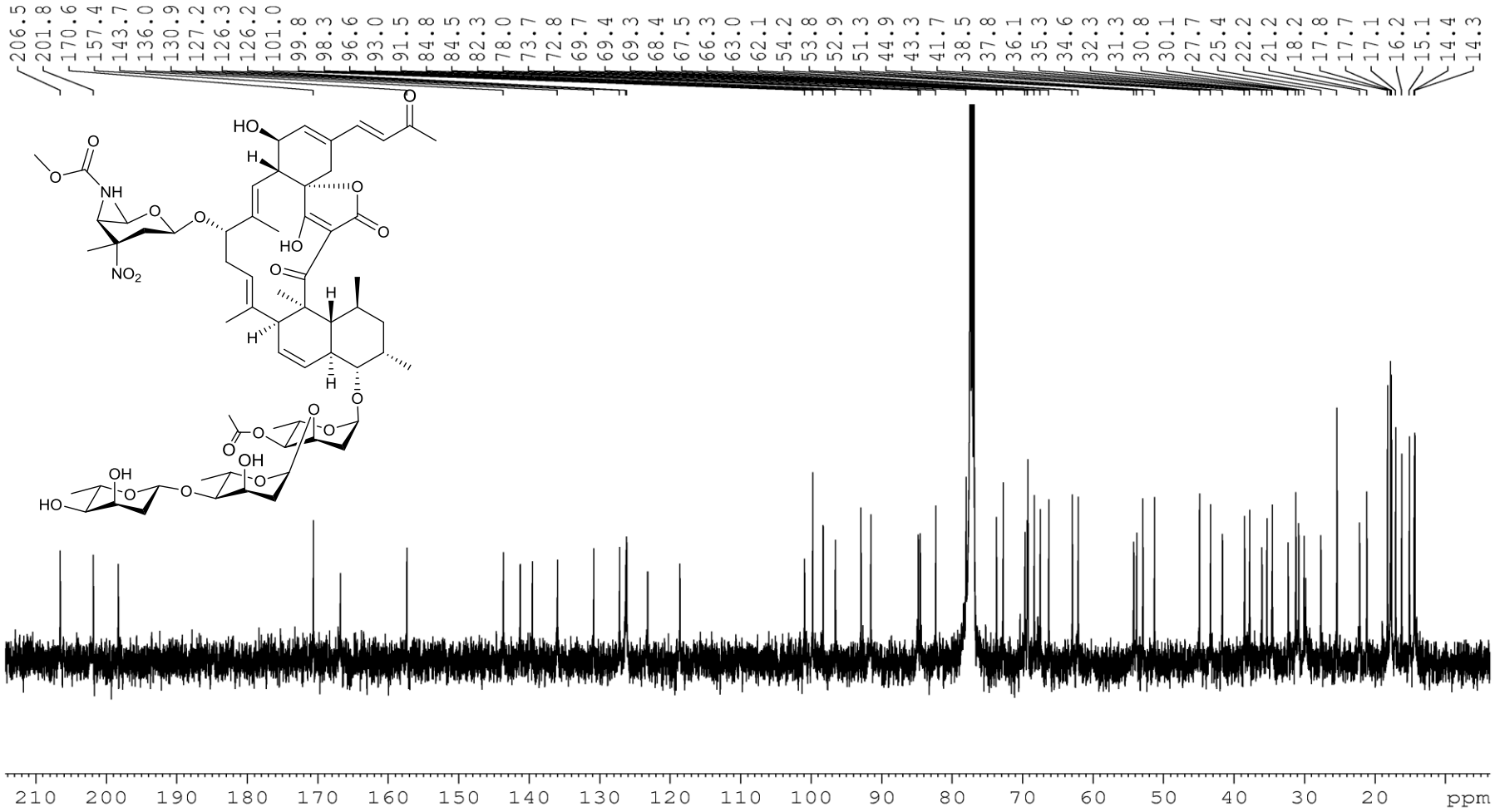


Figure S32. ^{13}C DEPT spectrum of compound **5** in $CDCl_3$.

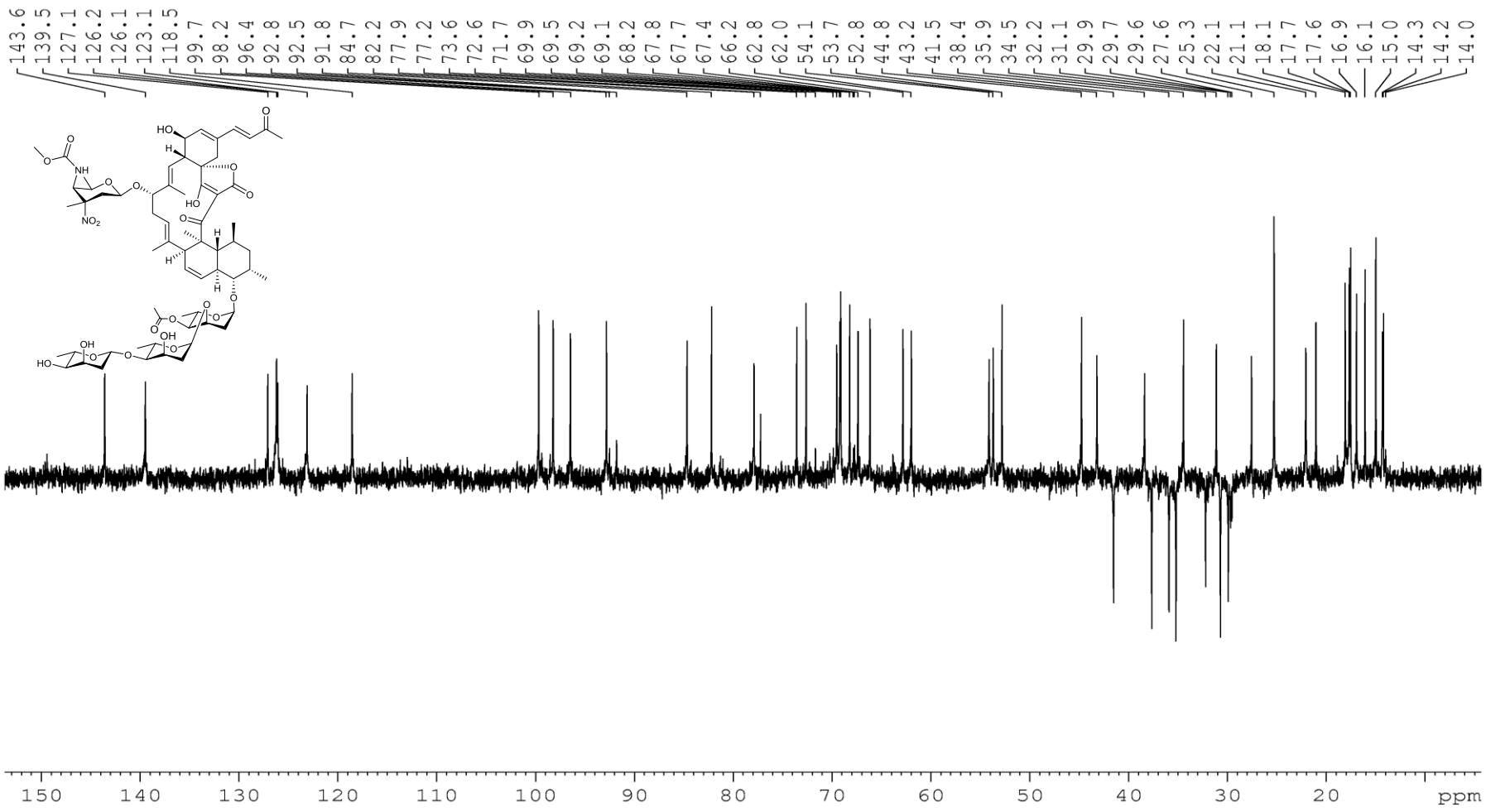


Figure S33. ^{1}H-^{1}H COSY spectrum of compound **5** in $CDCl_3$.

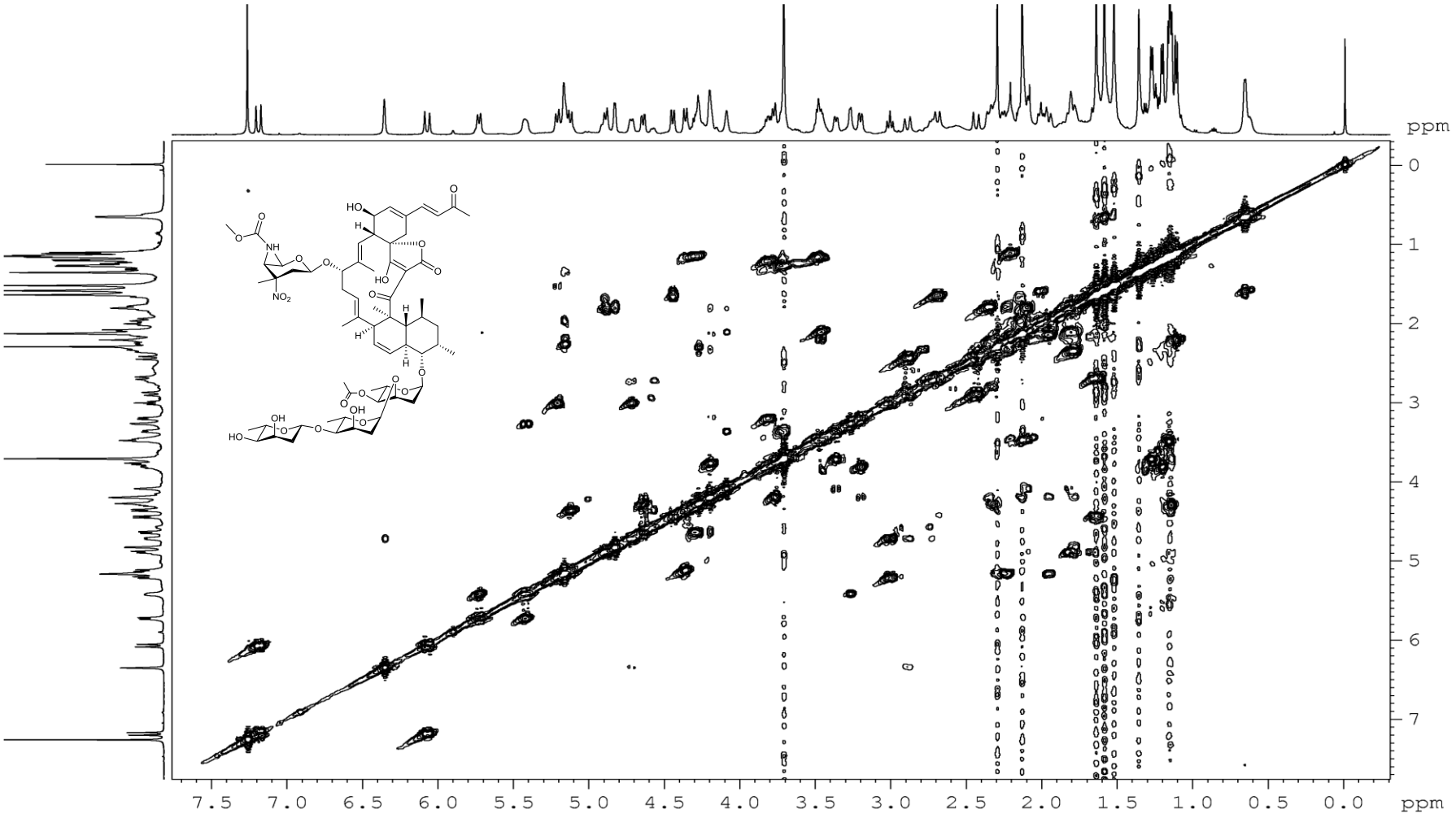


Figure S34. HSQC spectrum of compound **5** in $CDCl_3$.

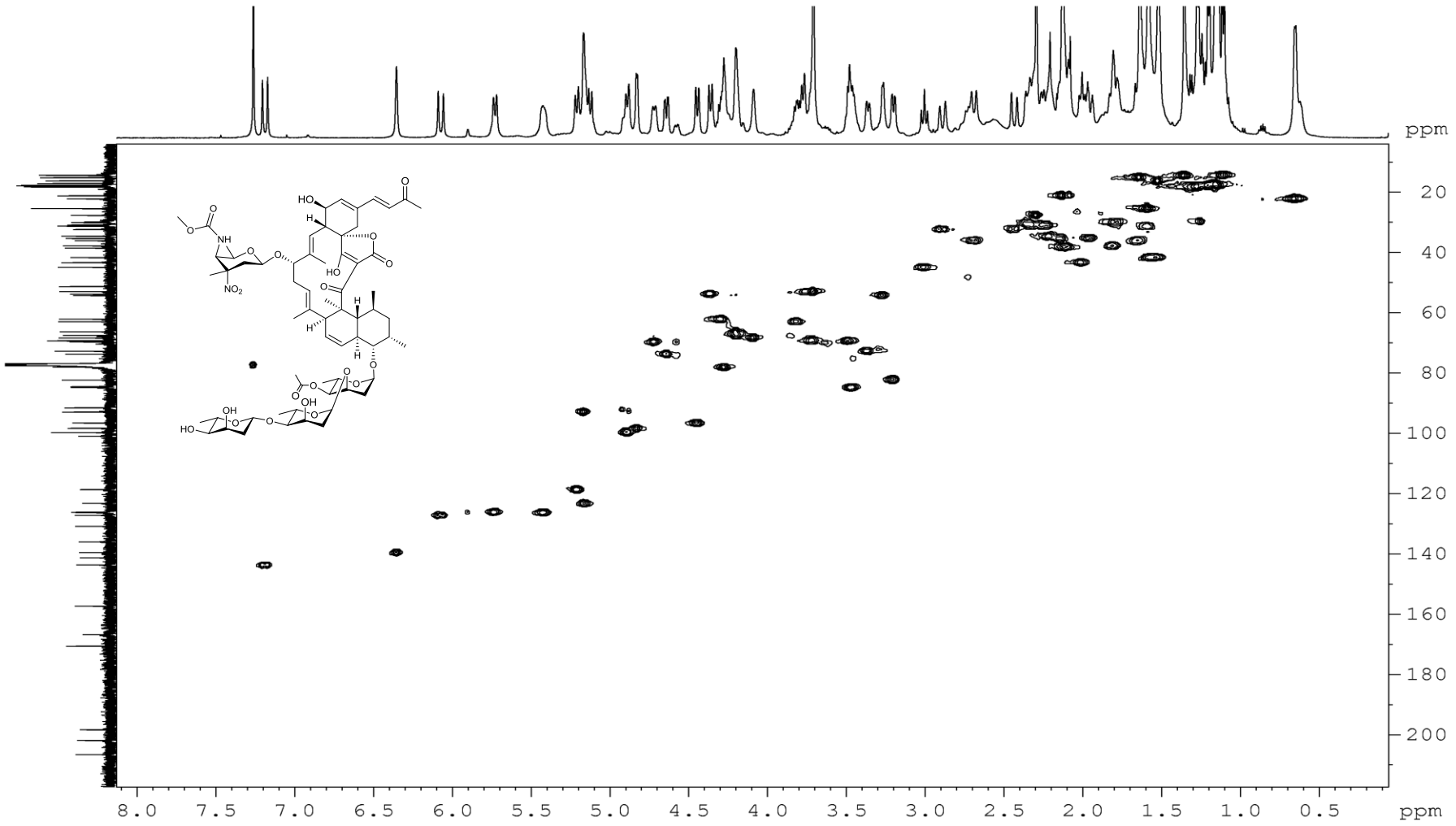


Figure S35. HMBC spectrum of compound **5** in $CDCl_3$.

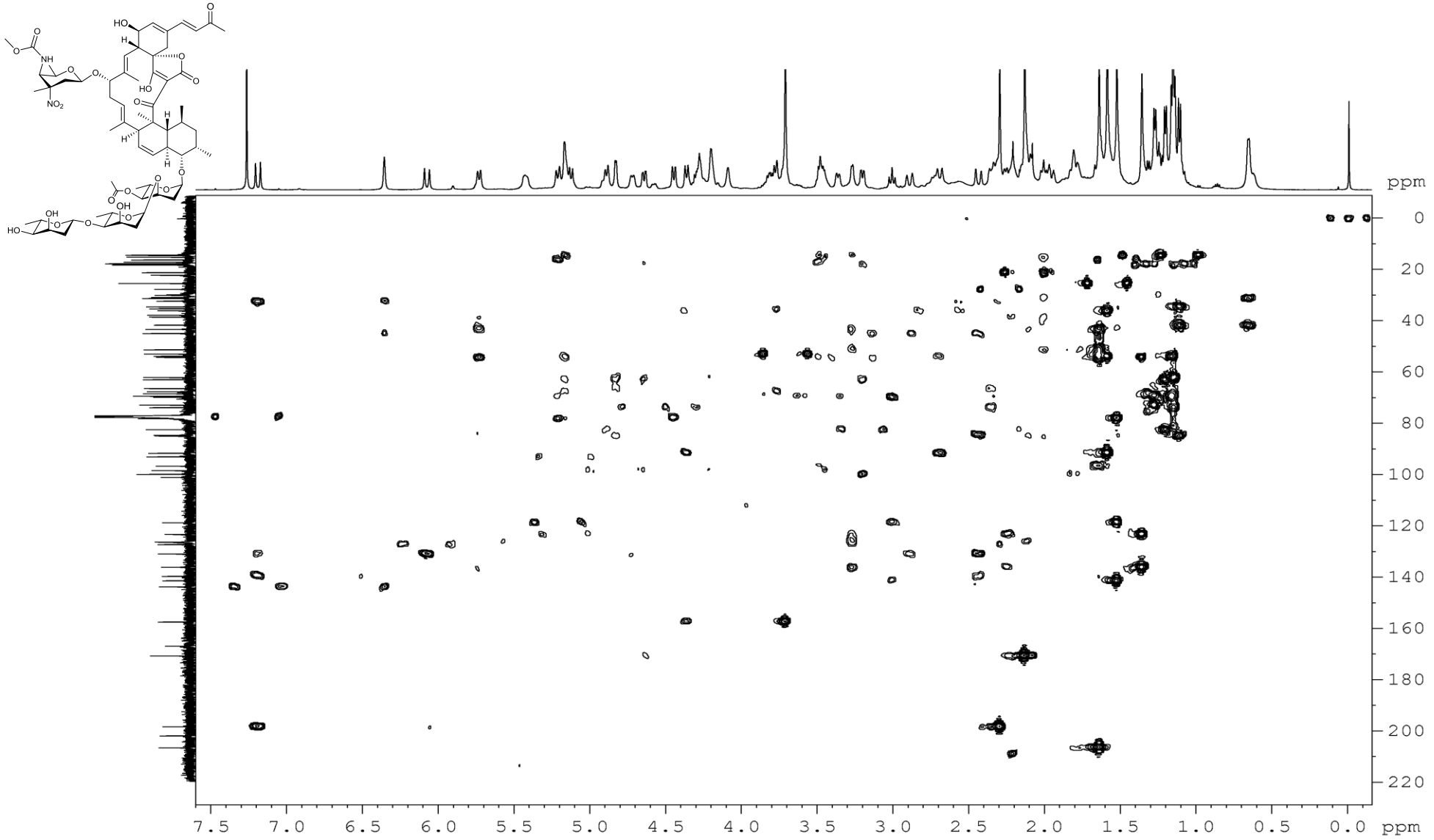


Figure S36. NOESY spectrum of compound **5** in $CDCl_3$.

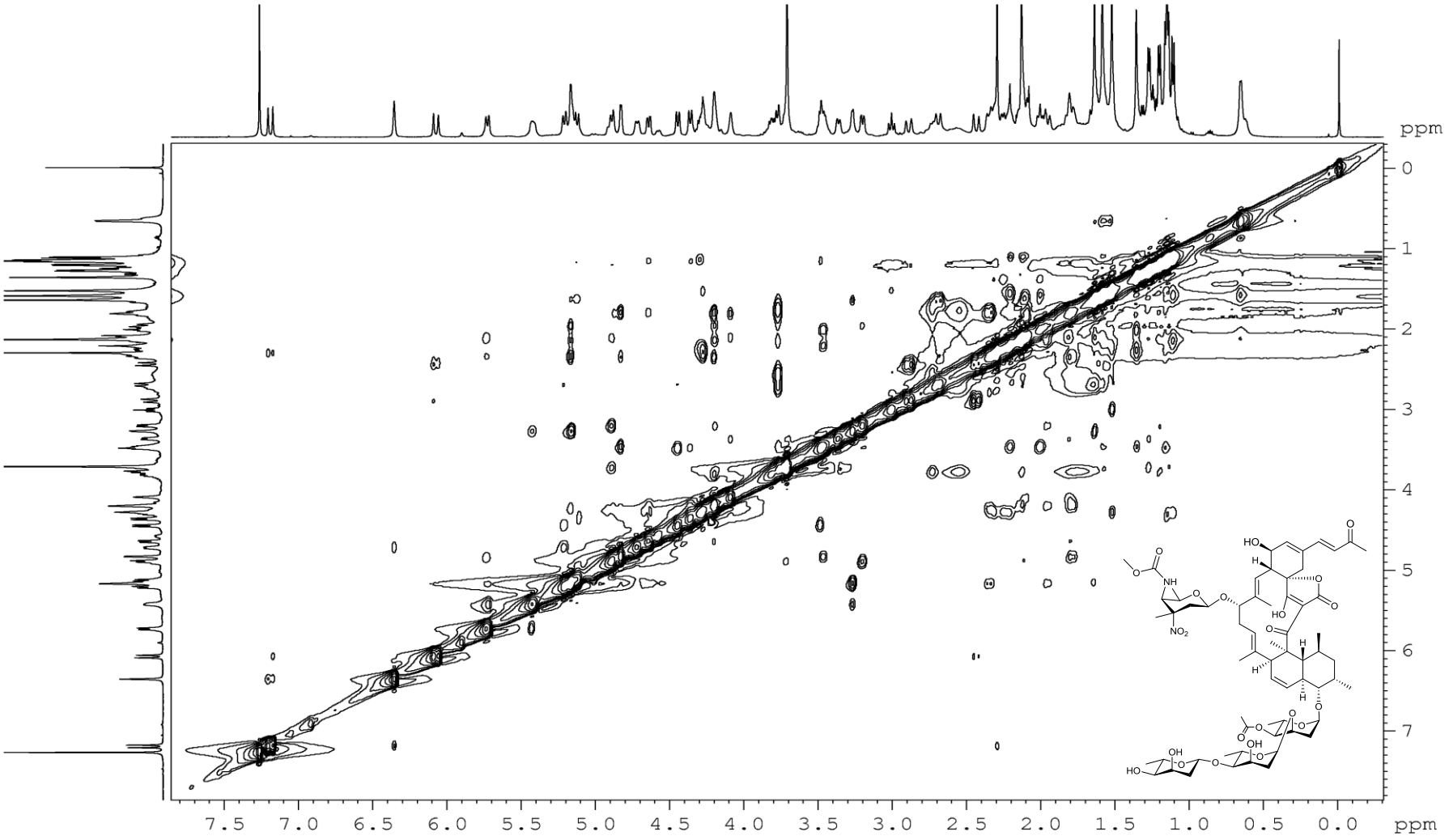


Figure S37.[1]H NMR (500 MHz) spectrum of compound **6** in CD_3OD.

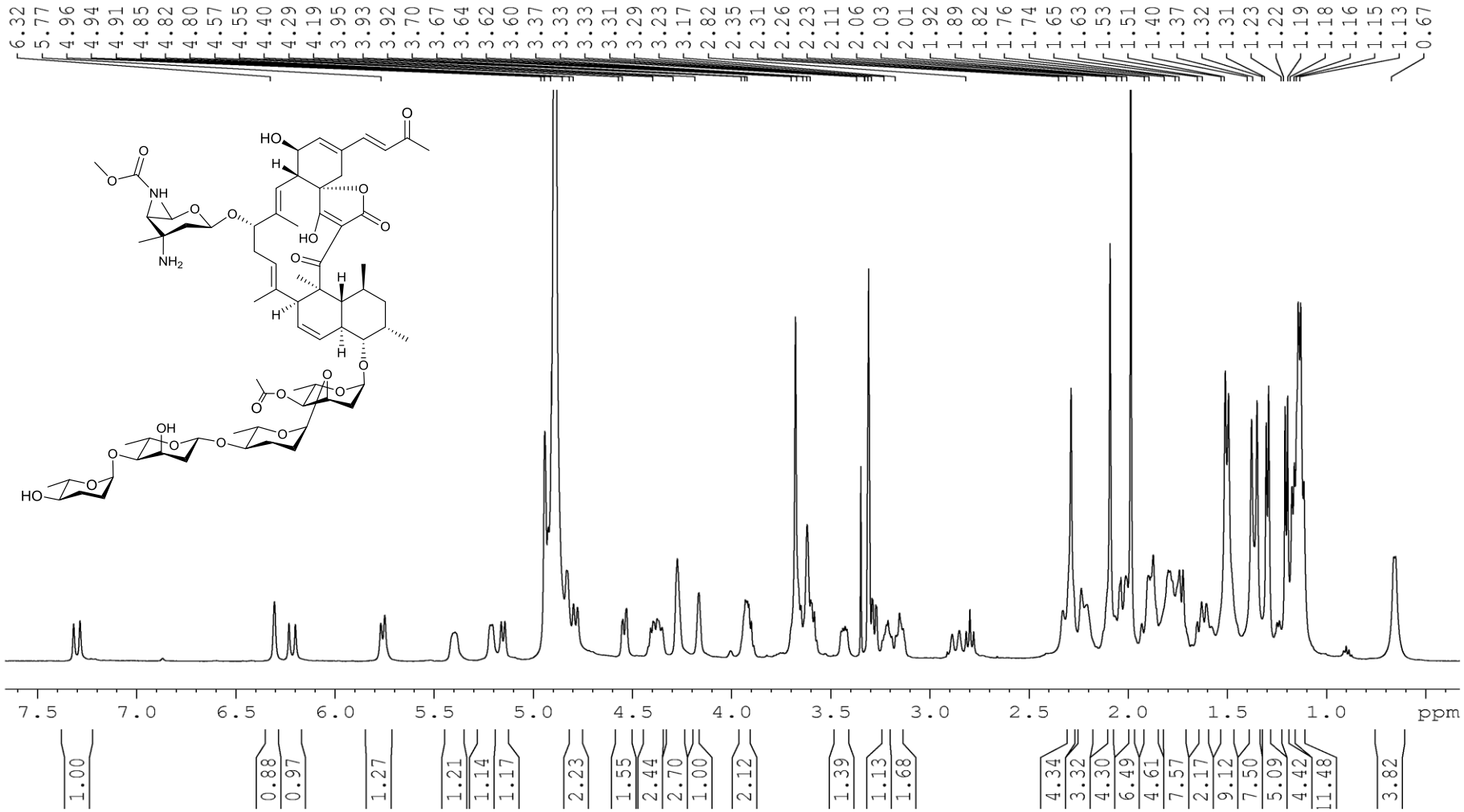


Figure S38.[13]C NMR (125 MHz) spectrum of compound **6** in CD_3OD.

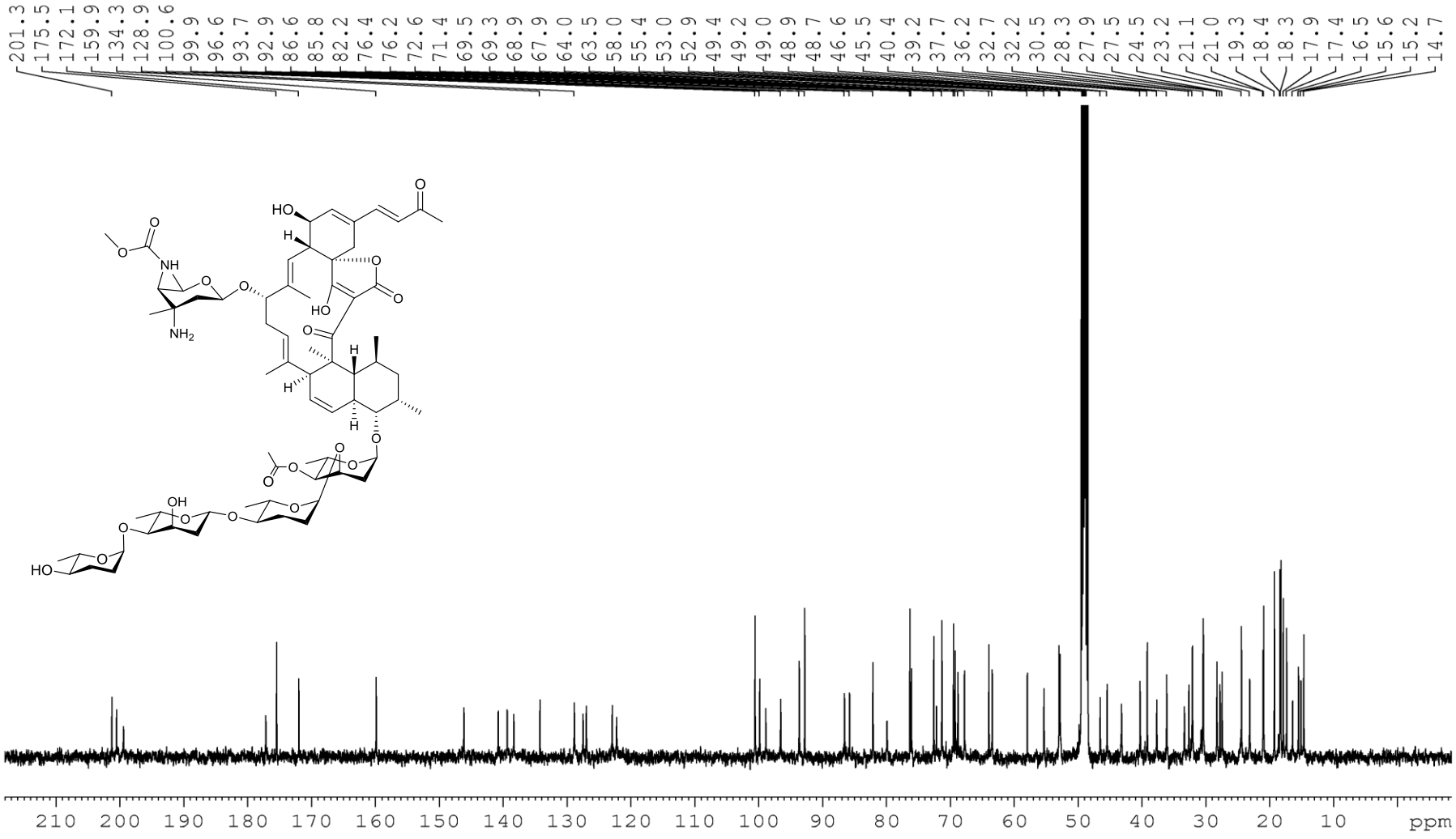


Figure S39. ^{13}C DEPT spectrum of compound **6** in CD_3OD.

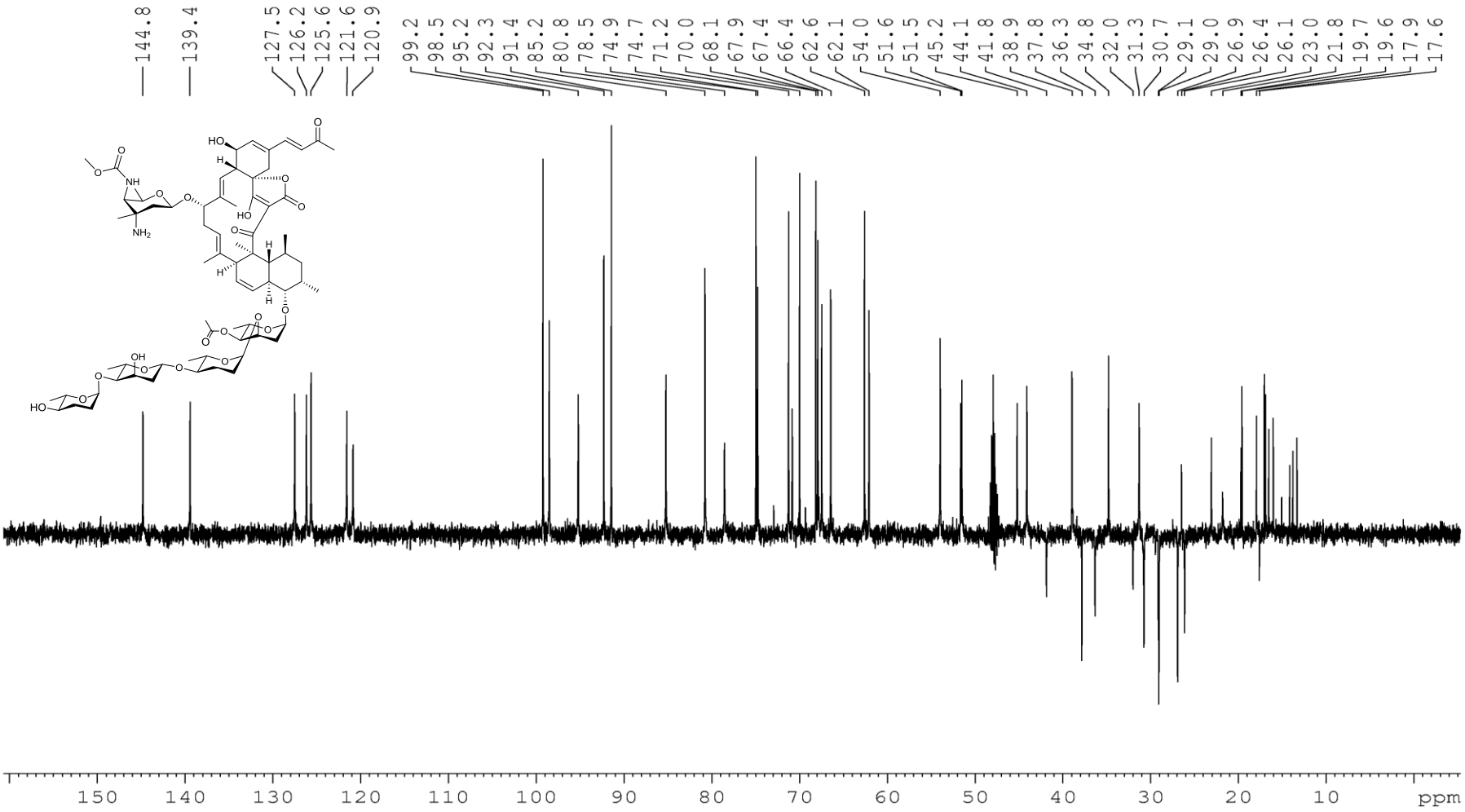


Figure S40. ^{1}H-^{1}H COSY spectrum of compound **6** in CD_3OD.

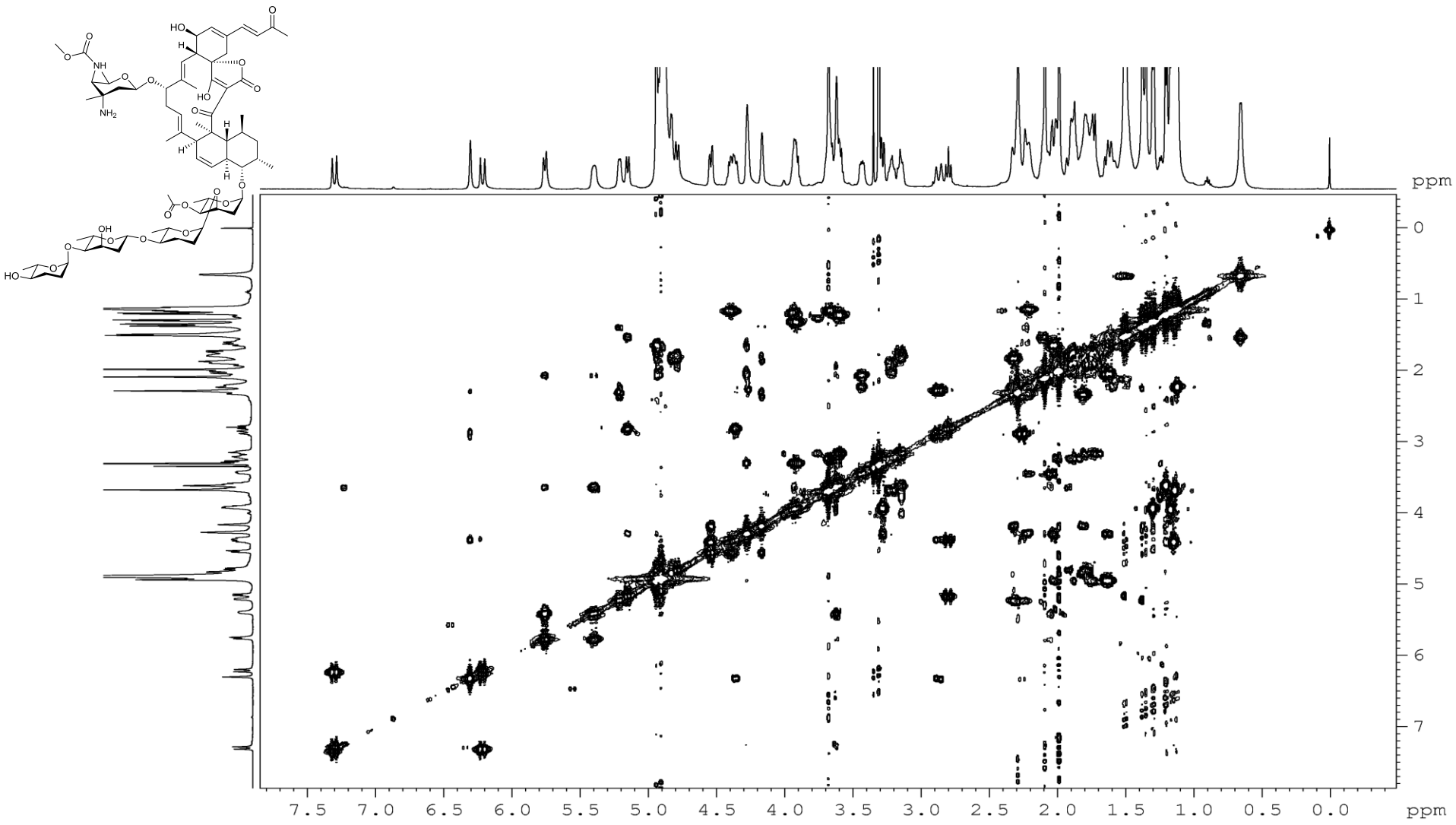


Figure S41. HSQC spectrum of compound **6** in CD_3OD.

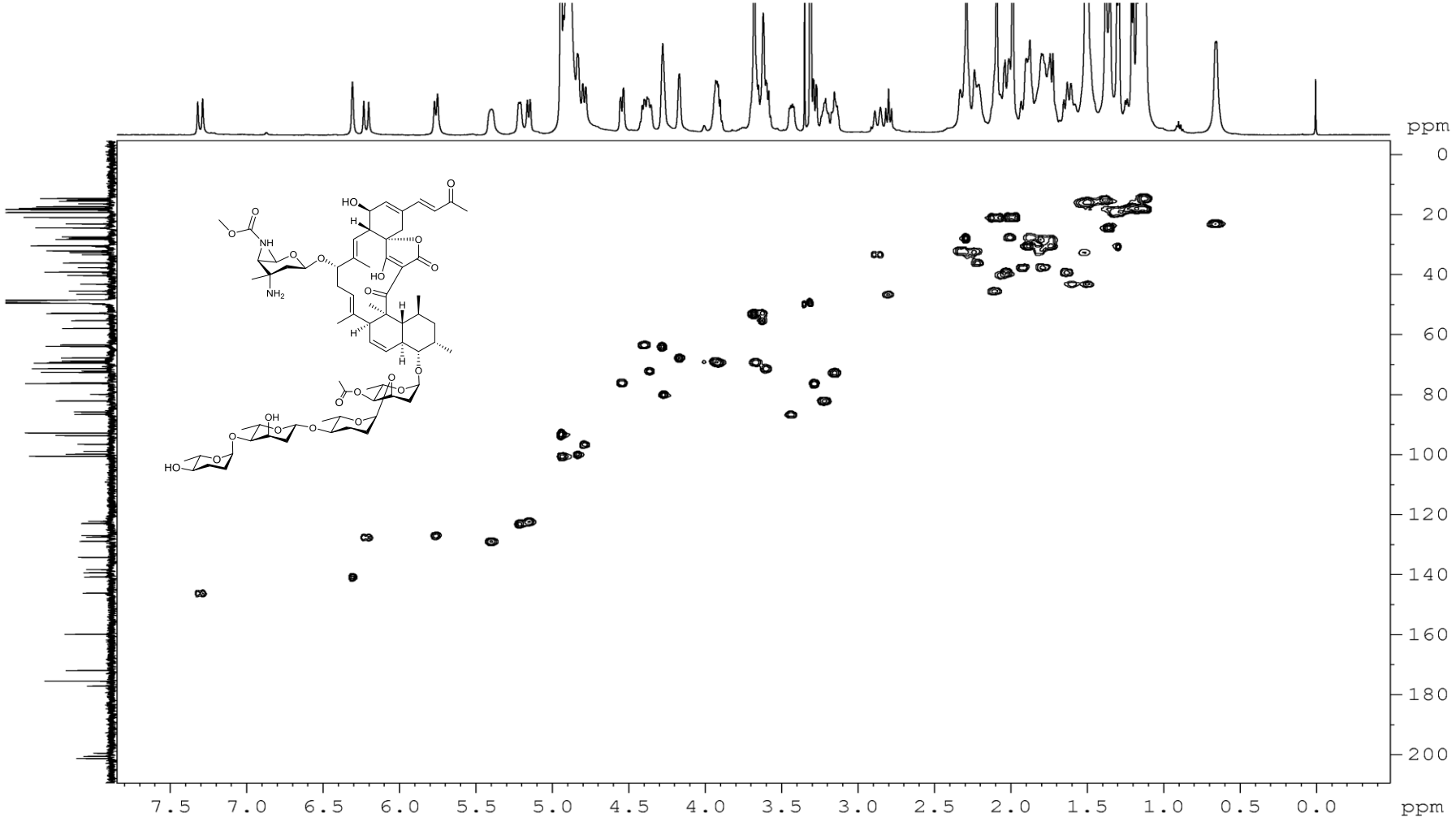


Figure S42. HMBC spectrum of compound **6** in CD_3OD.

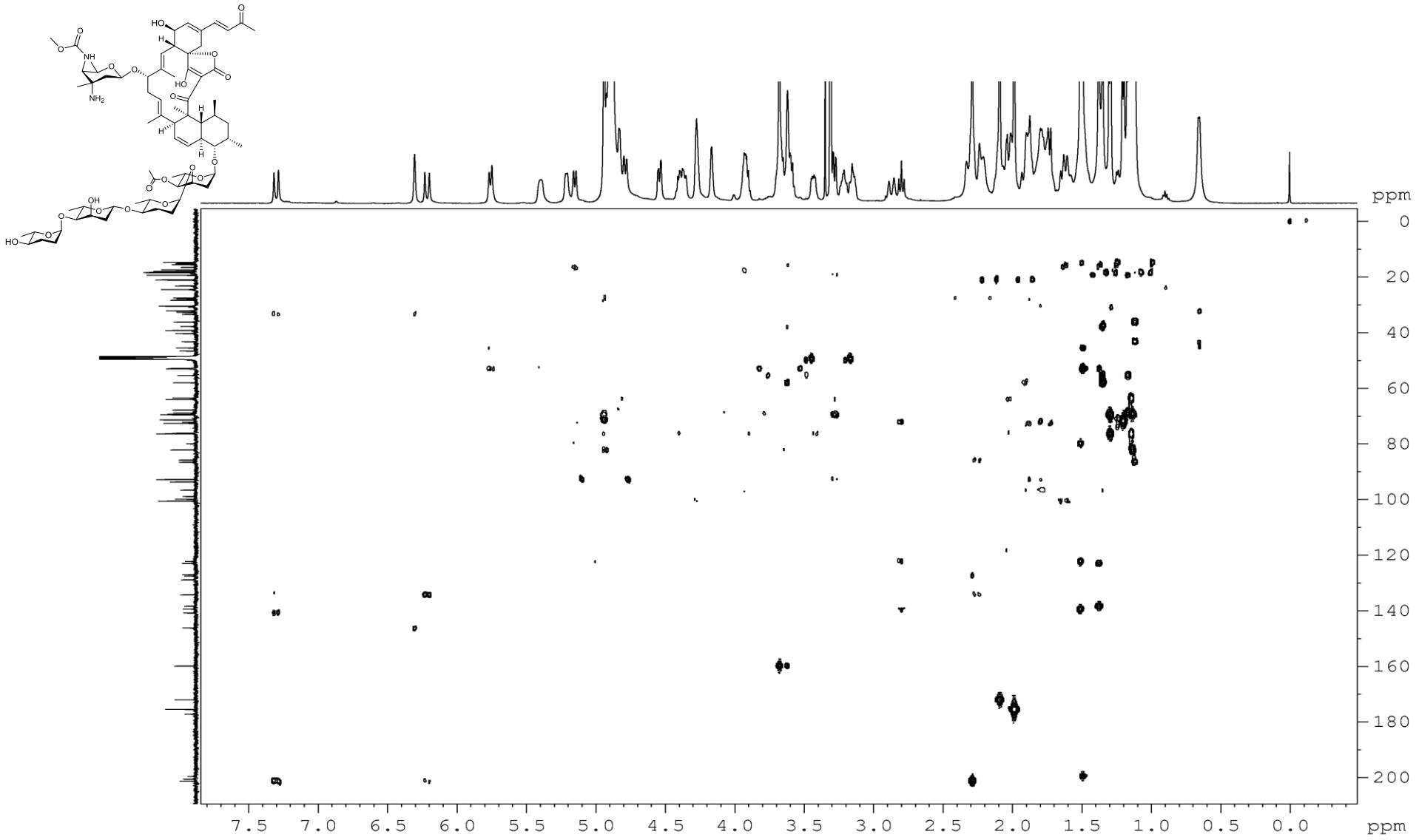


Figure S43.[1]H NMR (500 MHz) spectrum of compound **7** in CD_3OD.

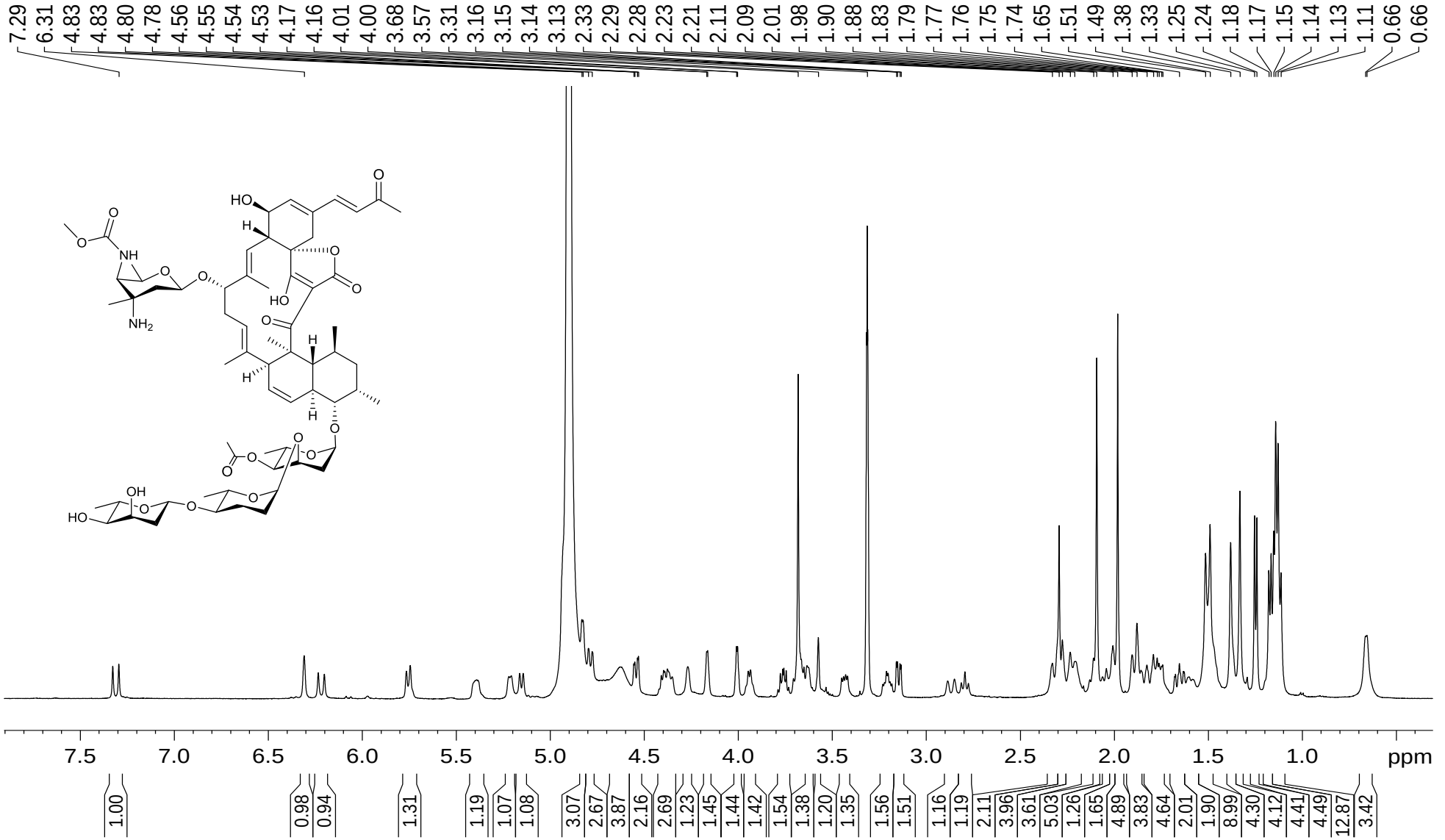


Figure S44.[13]C NMR (125 MHz) spectrum of compound **7** in CD_3OD.

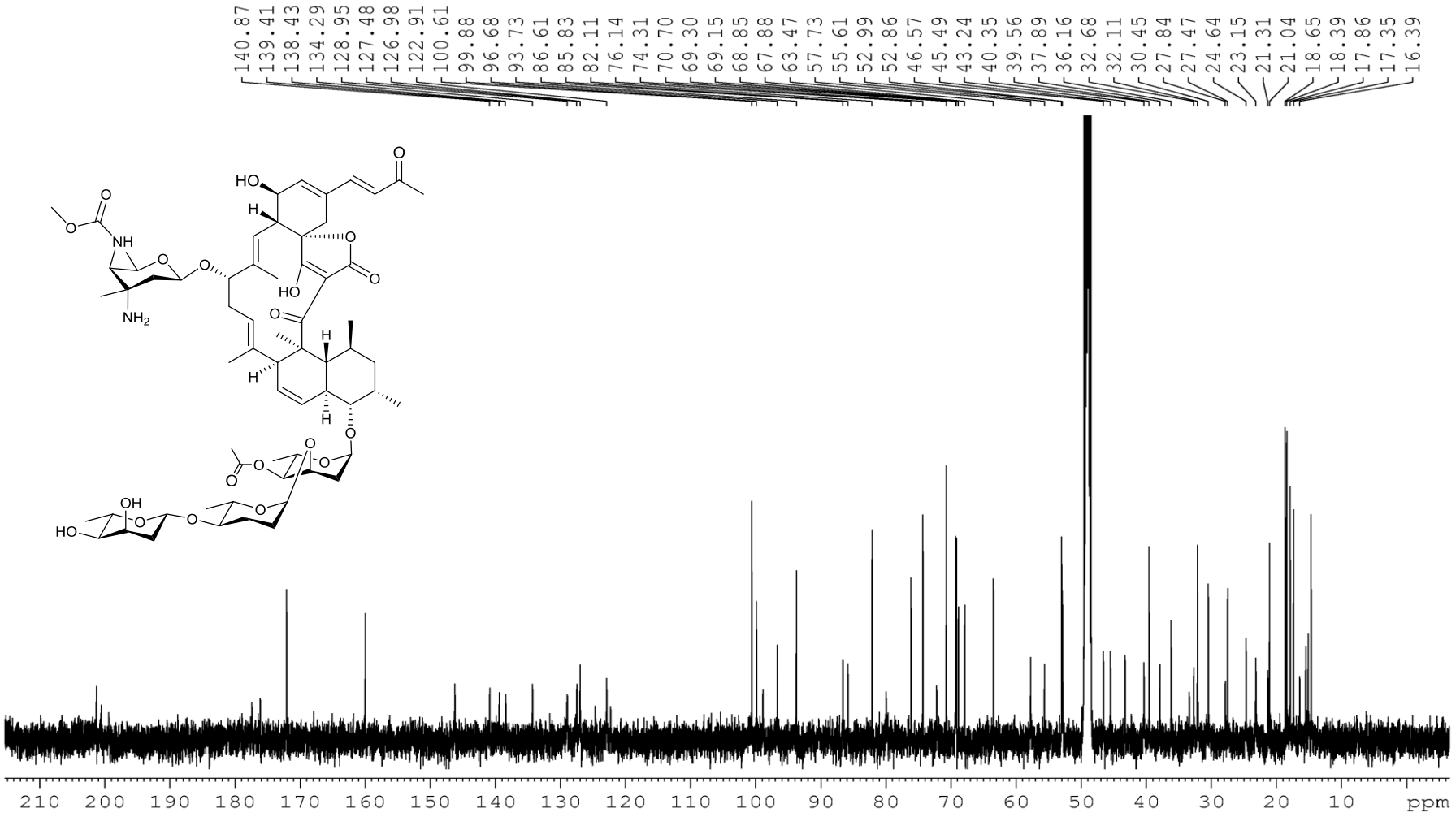


Figure S45. ^{13}C DEPT spectrum of compound **7** in CD_3OD.

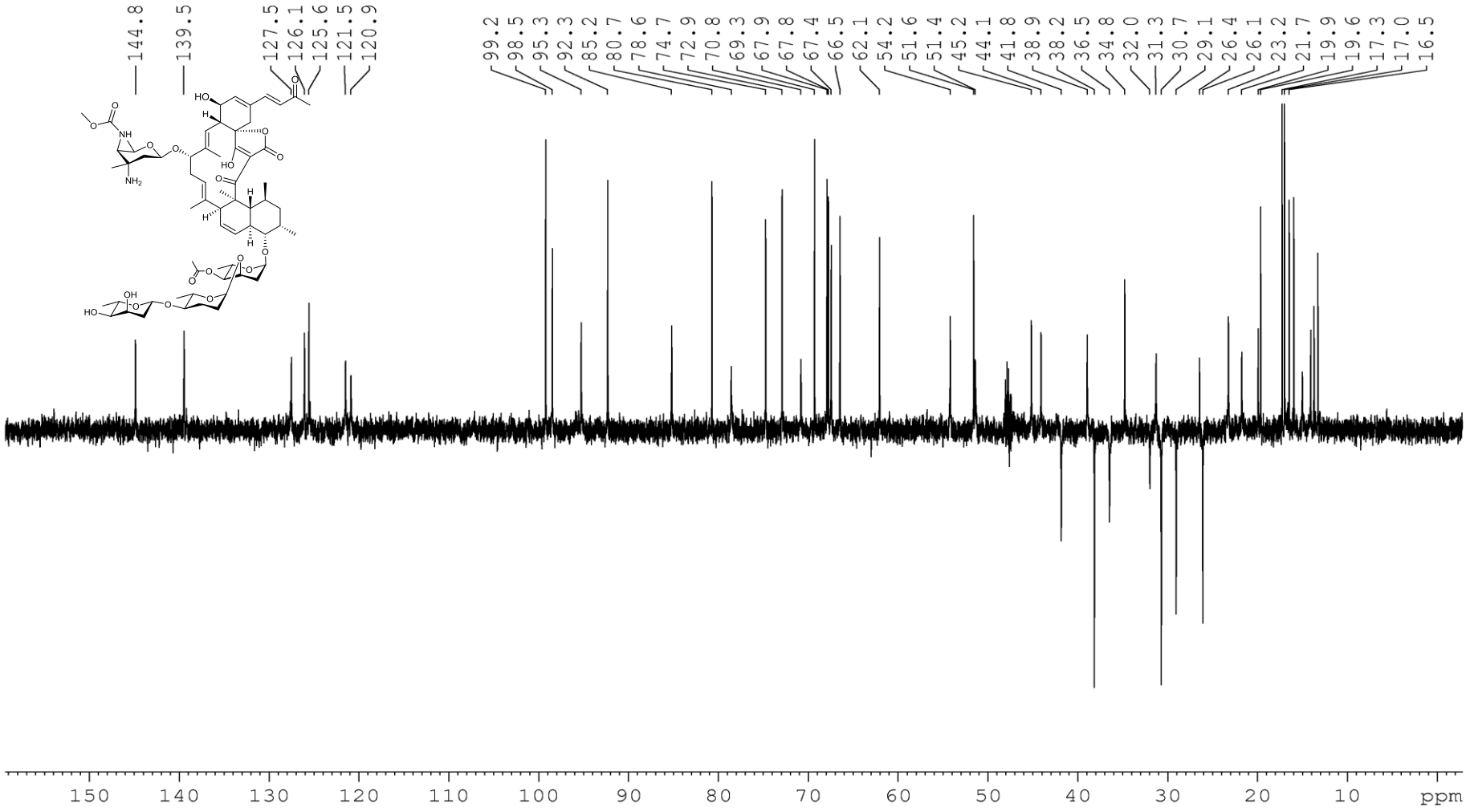


Figure S46. ^{1}H-^{1}H COSY spectrum of compound **7** in CD_3OD.

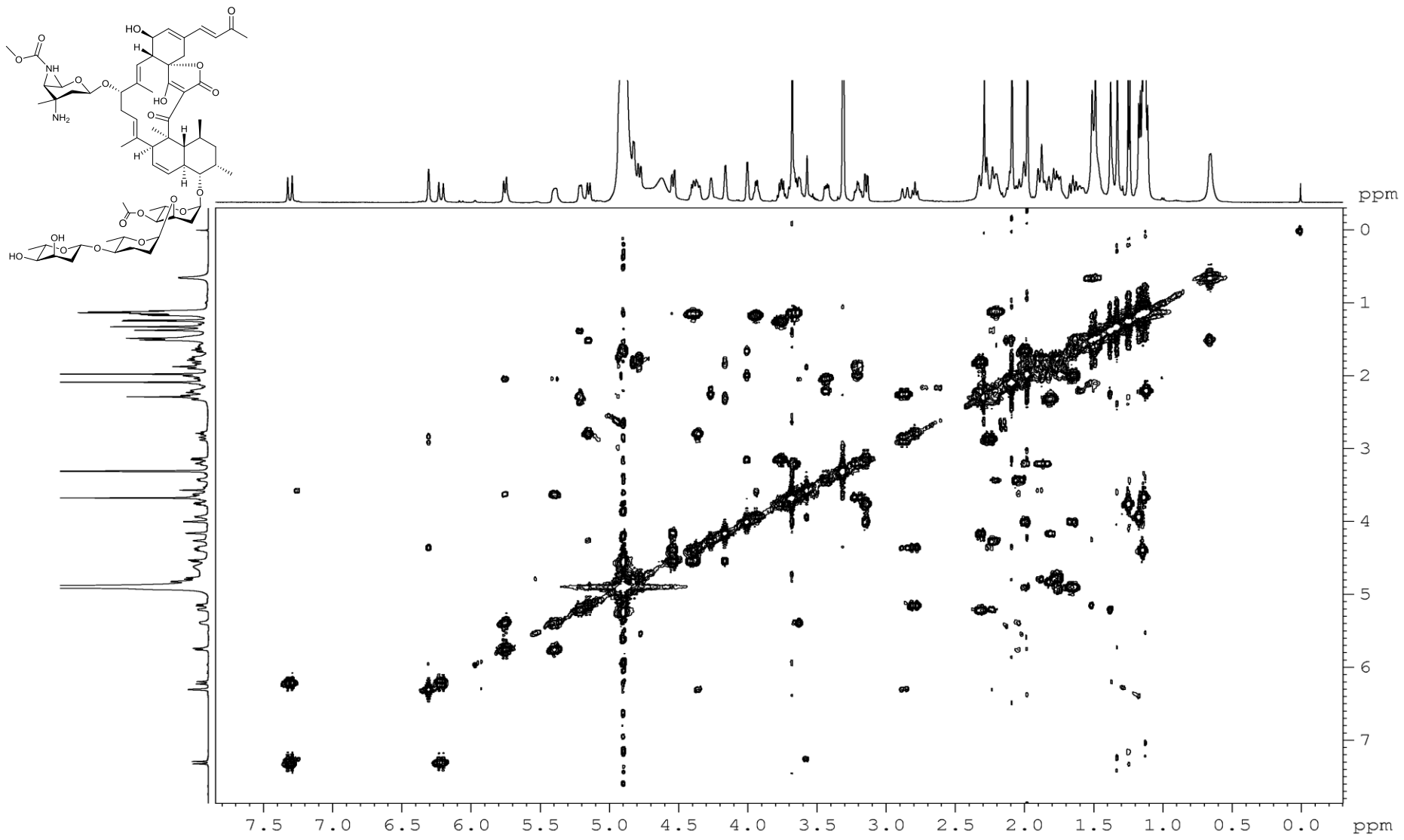


Figure S47. HSQC spectrum of compound **7** in CD_3OD.

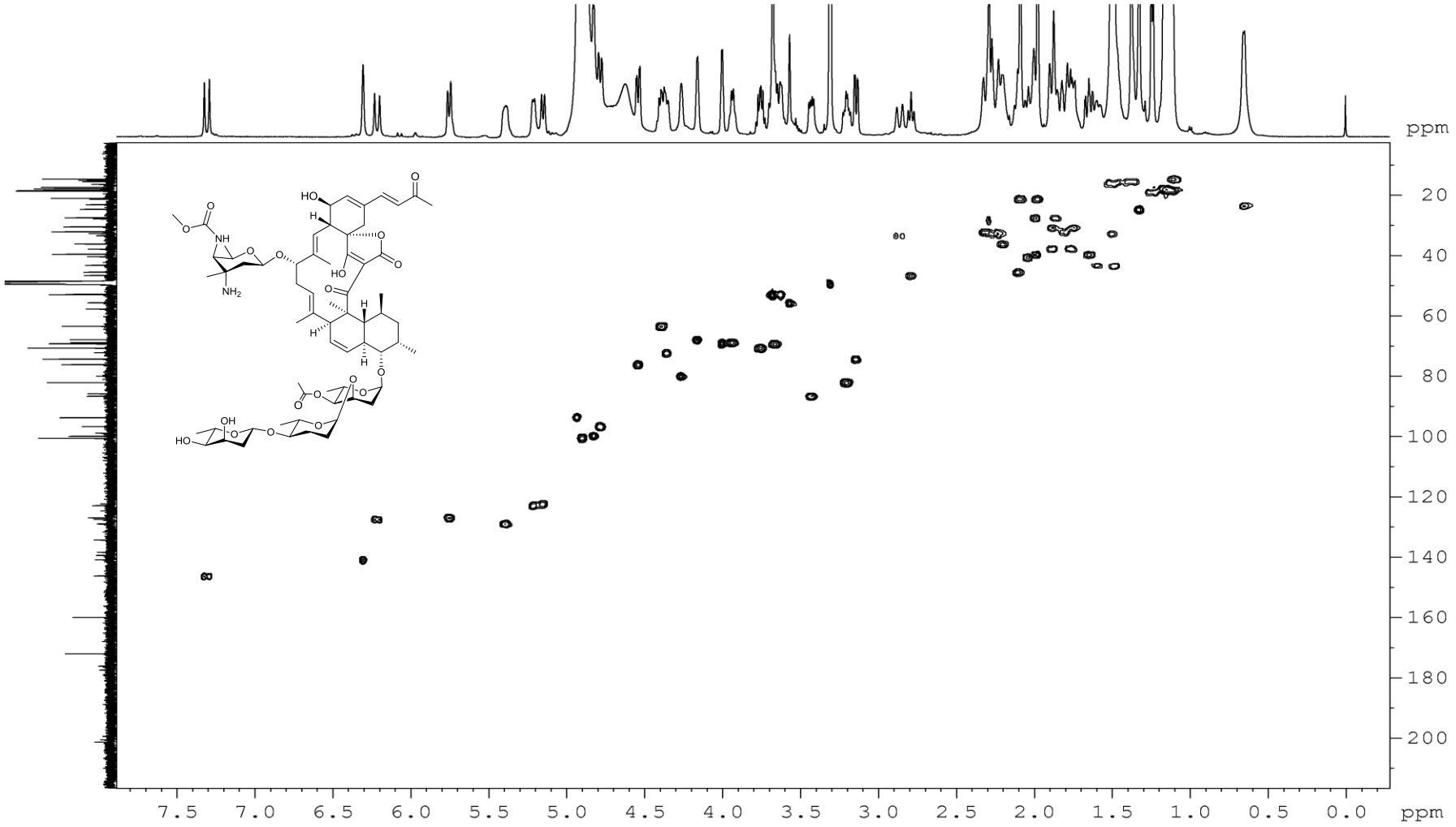


Figure S48. HMBC spectrum of compound **7** in CD_3OD.

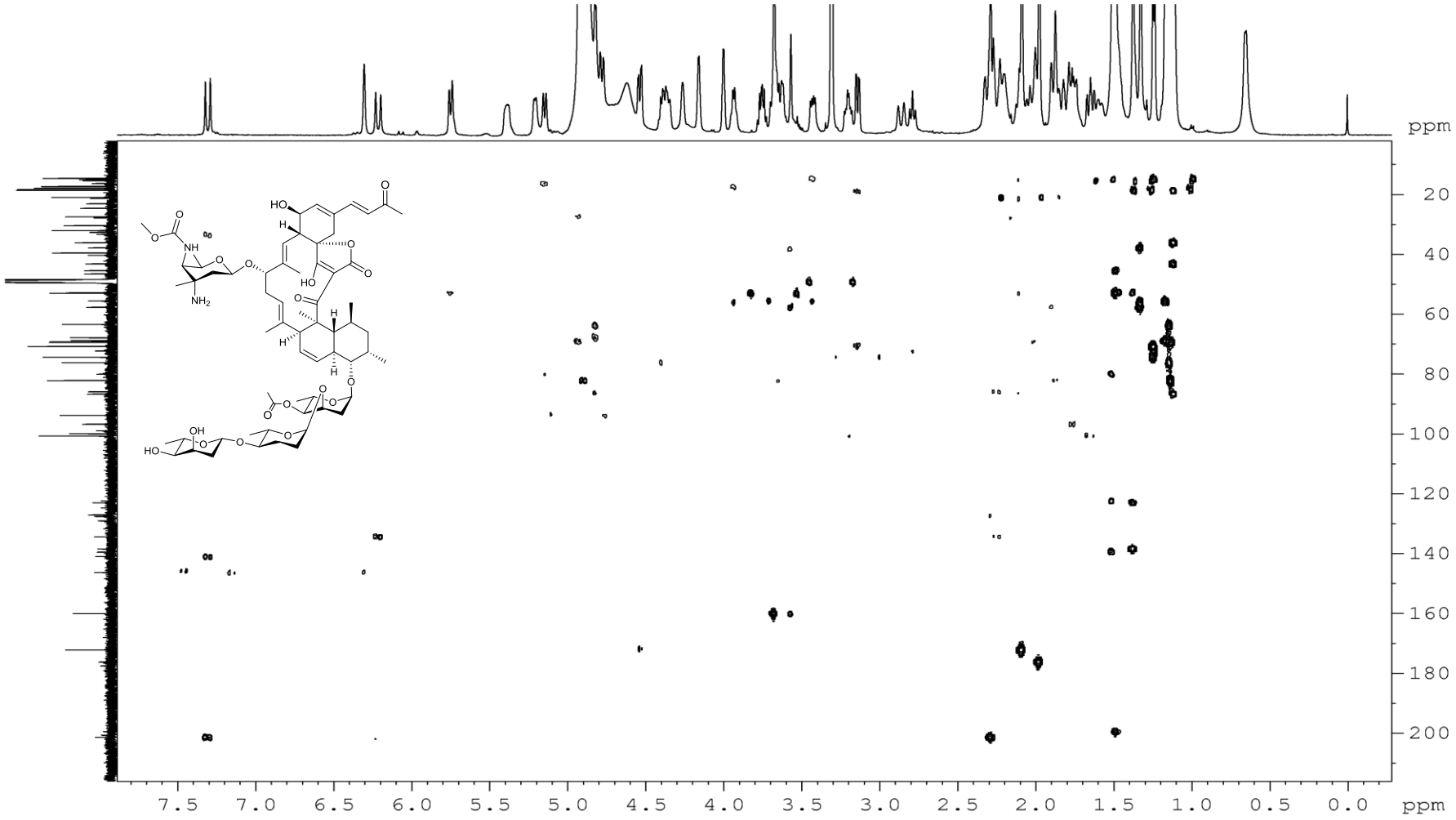


Figure S49. NOESY spectrum of compound **7** in CD_3OD.

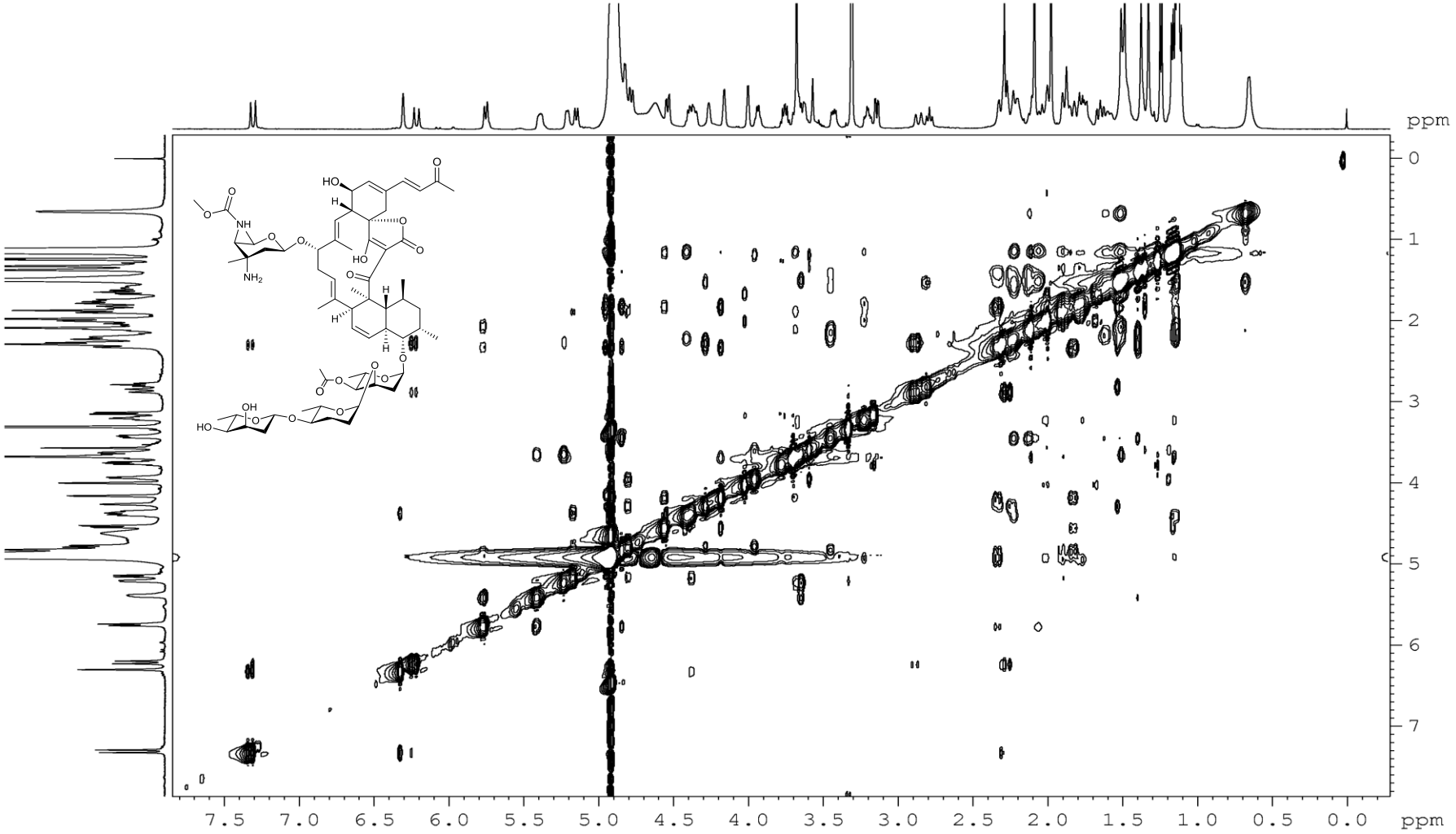


Figure S50.[1]H NMR (700 MHz) spectrum of compound **8** in CD_3OD.

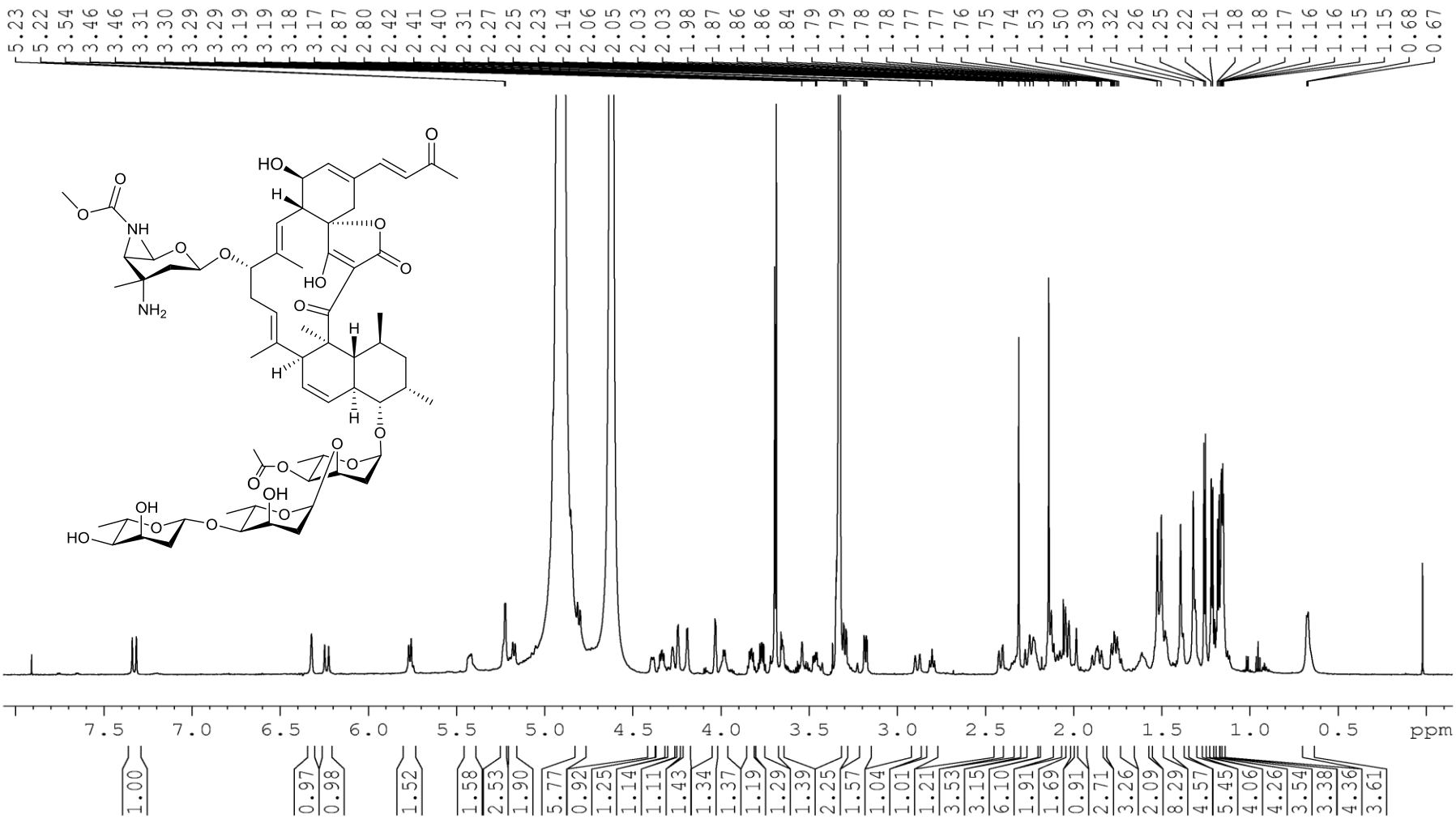


Figure S51.[13]C NMR (176 MHz) spectrum of compound **8** in CD_3OD.

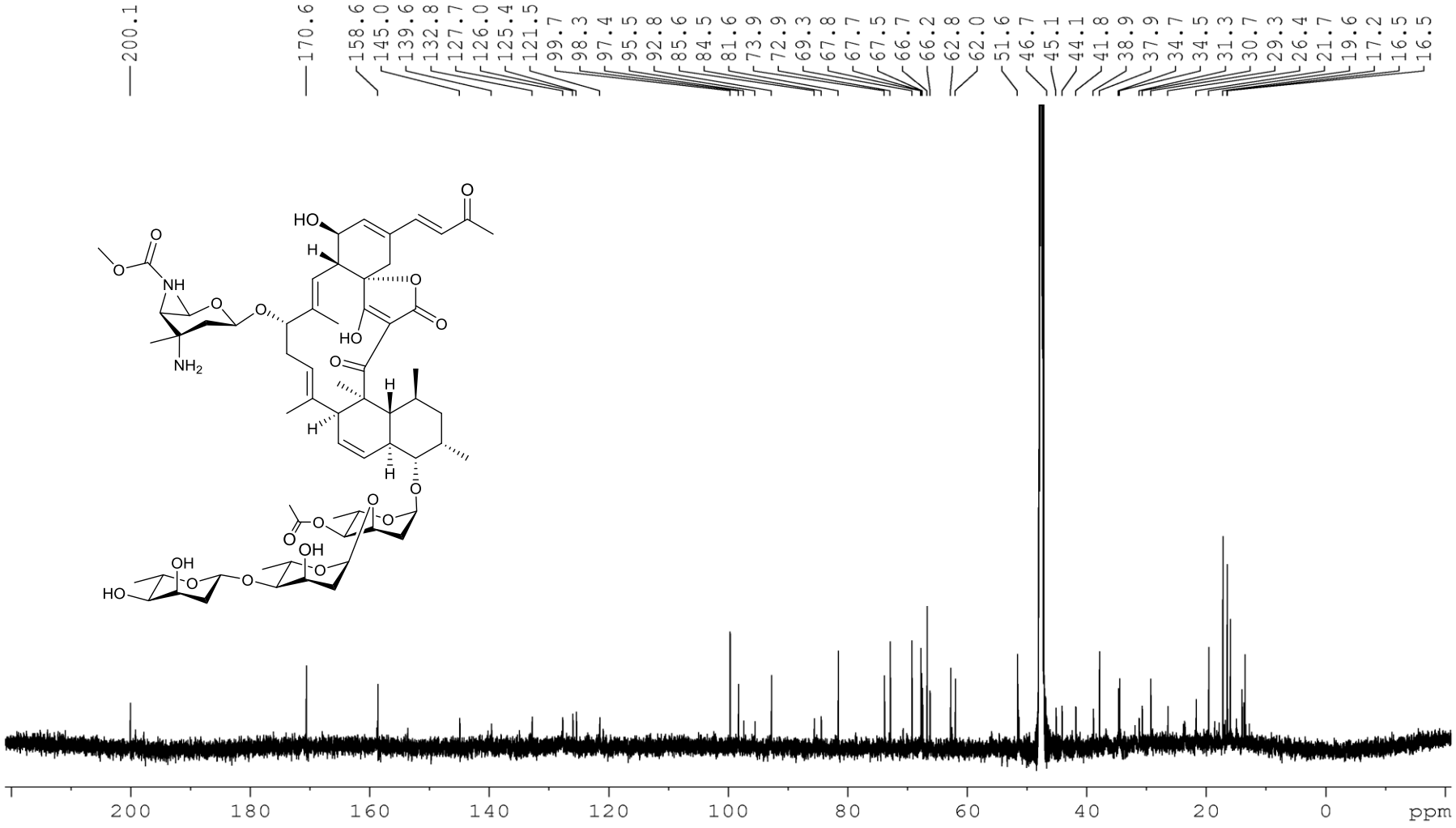


Figure S52. ^{13}C DEPT spectrum of compound **8** in CD_3OD.

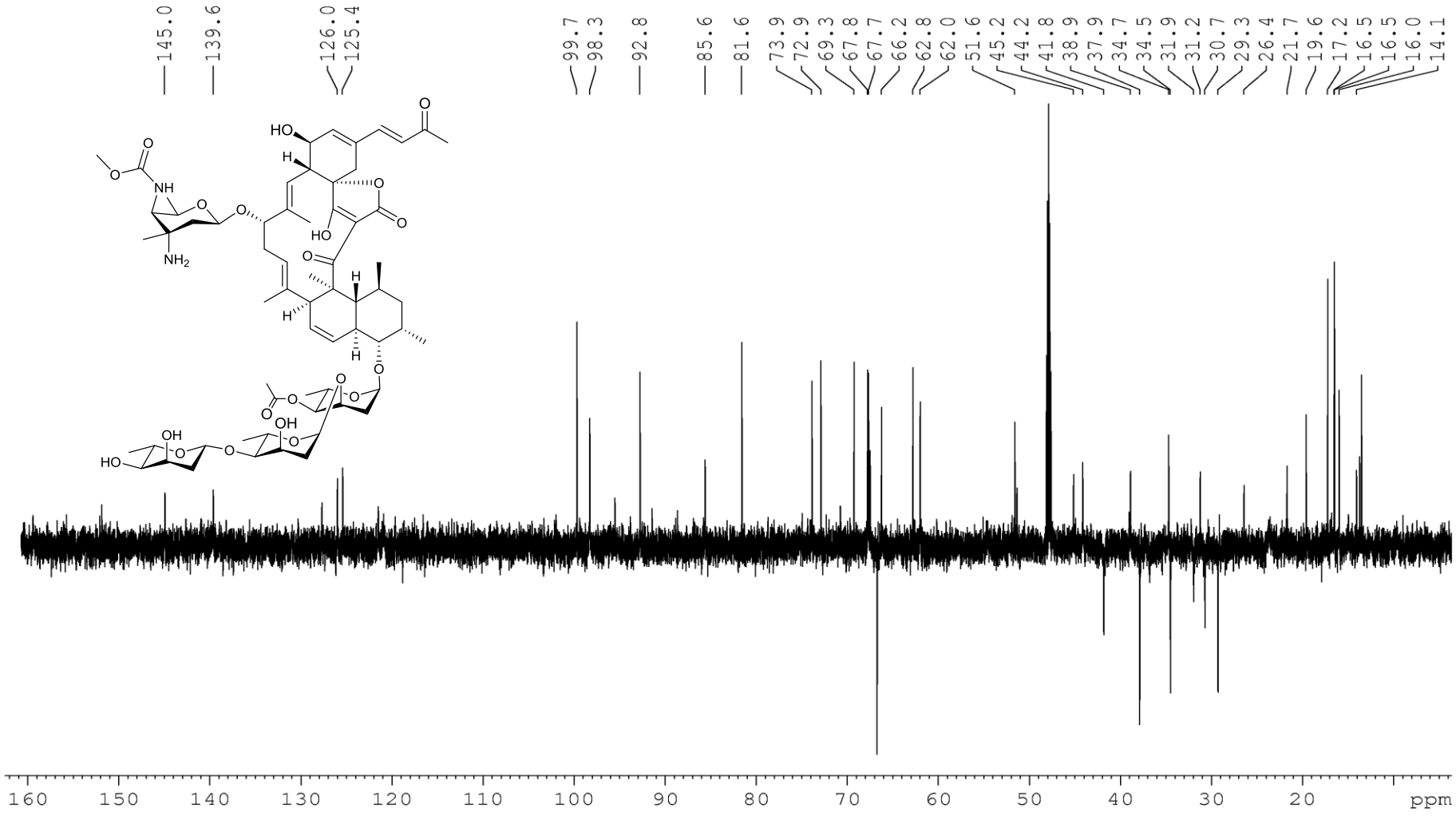


Figure S53. ^{1}H-^{1}H COSY spectrum of compound **8** in CD_3OD.

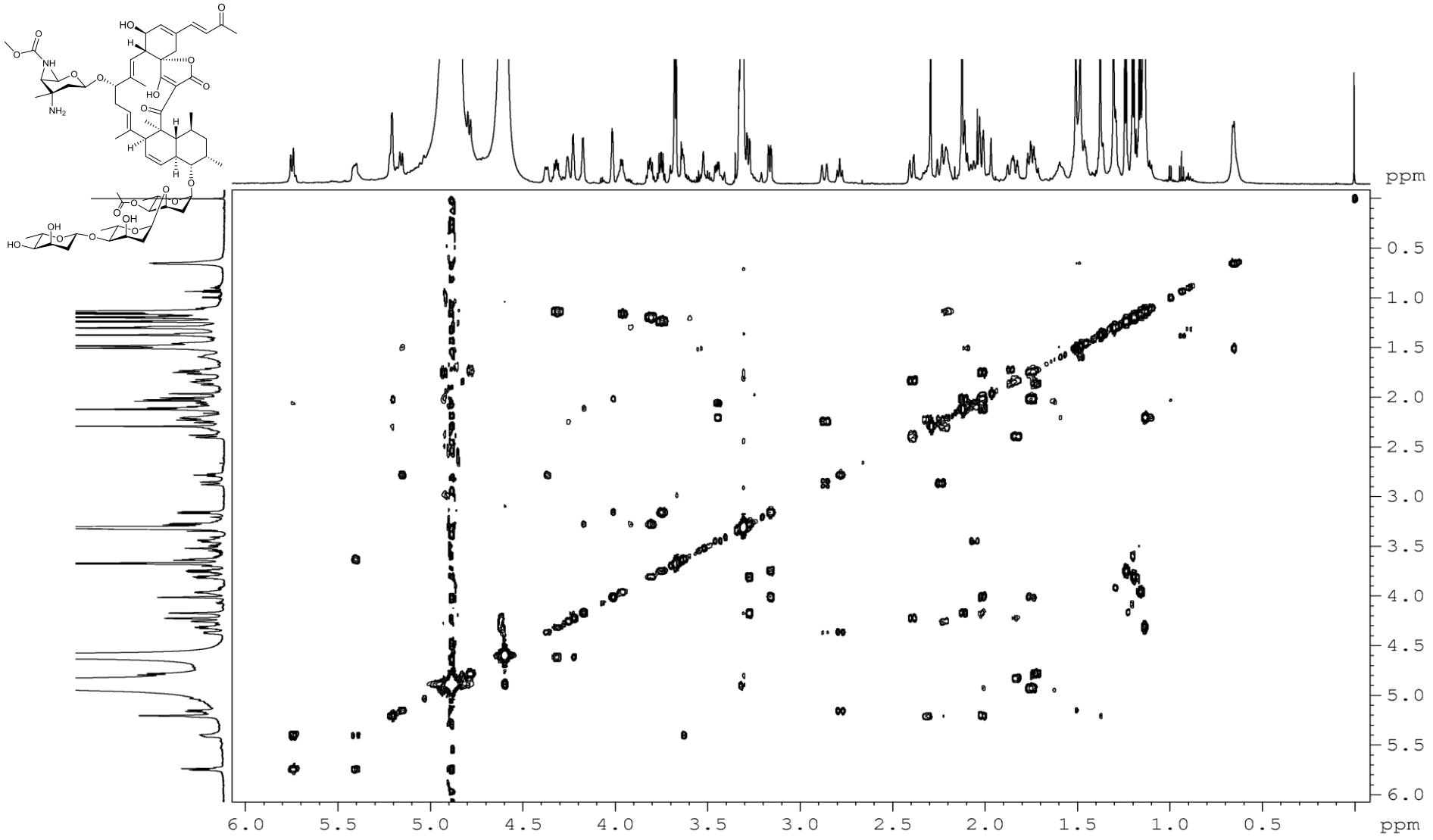


Figure S54. HSQC spectrum of compound **8** in CD_3OD.

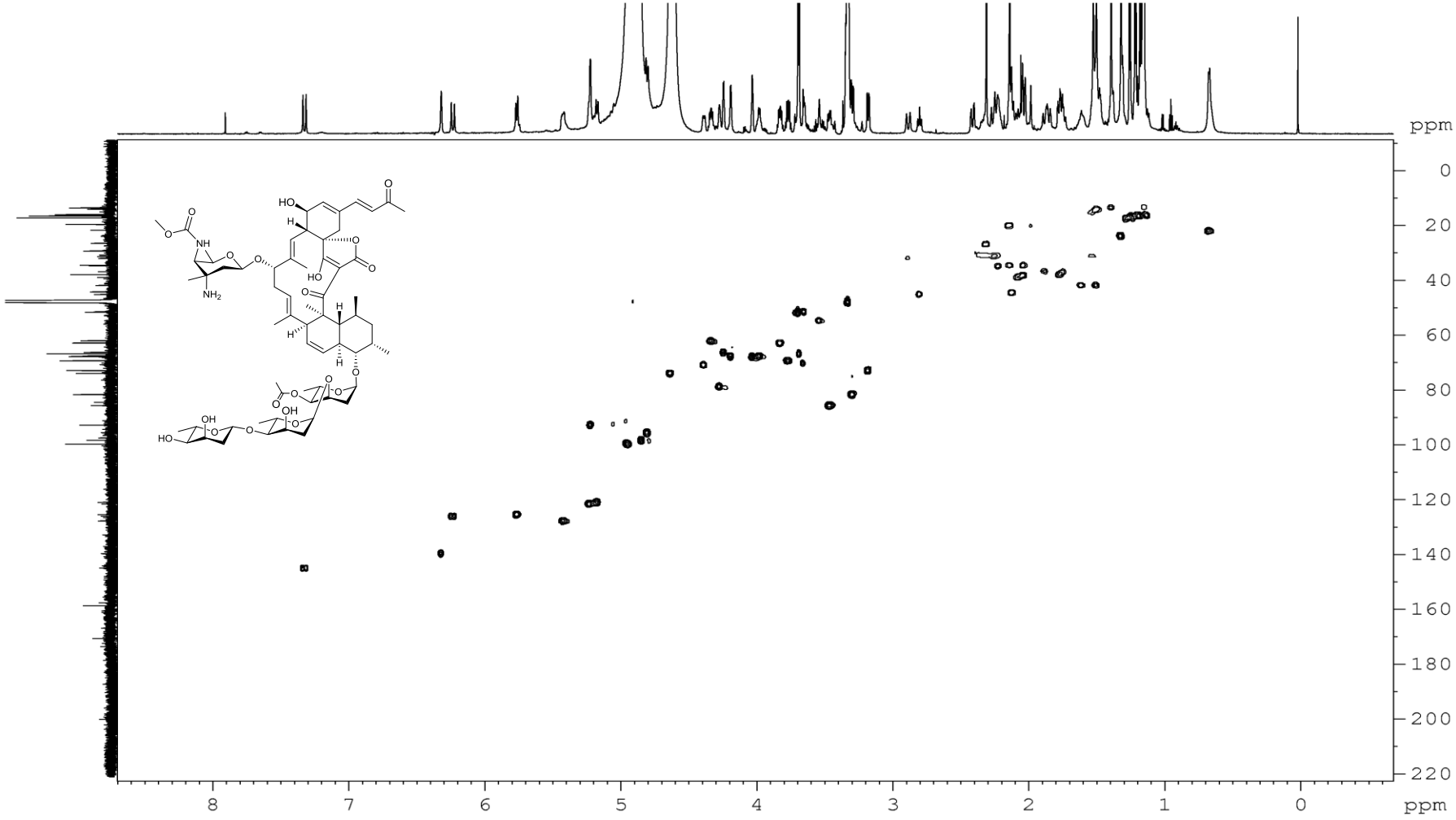


Figure S55. HMBC spectrum of compound **8** in CD_3OD.

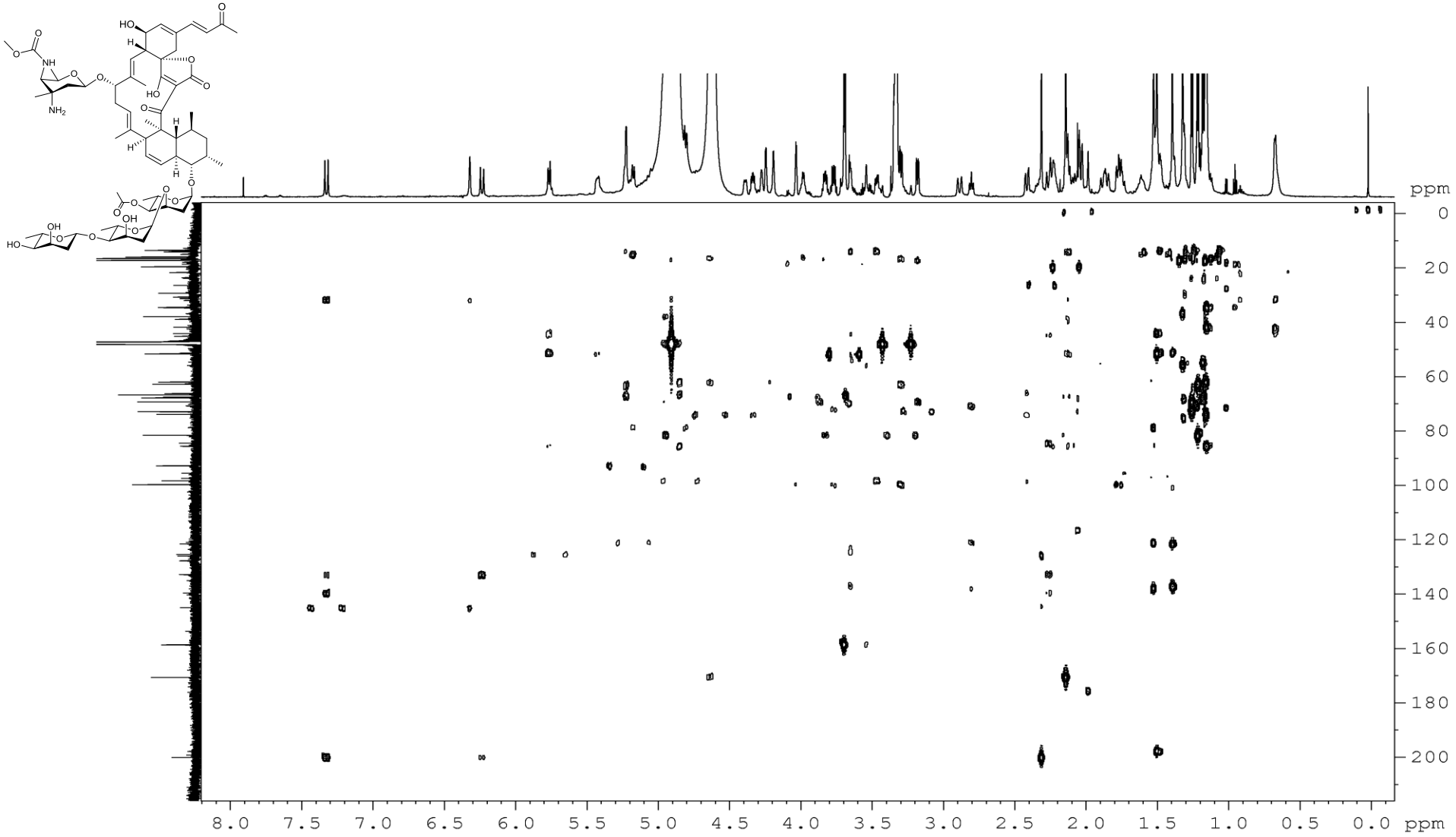


Figure S56. NOESY spectrum of compound **8** in CD_3OD.

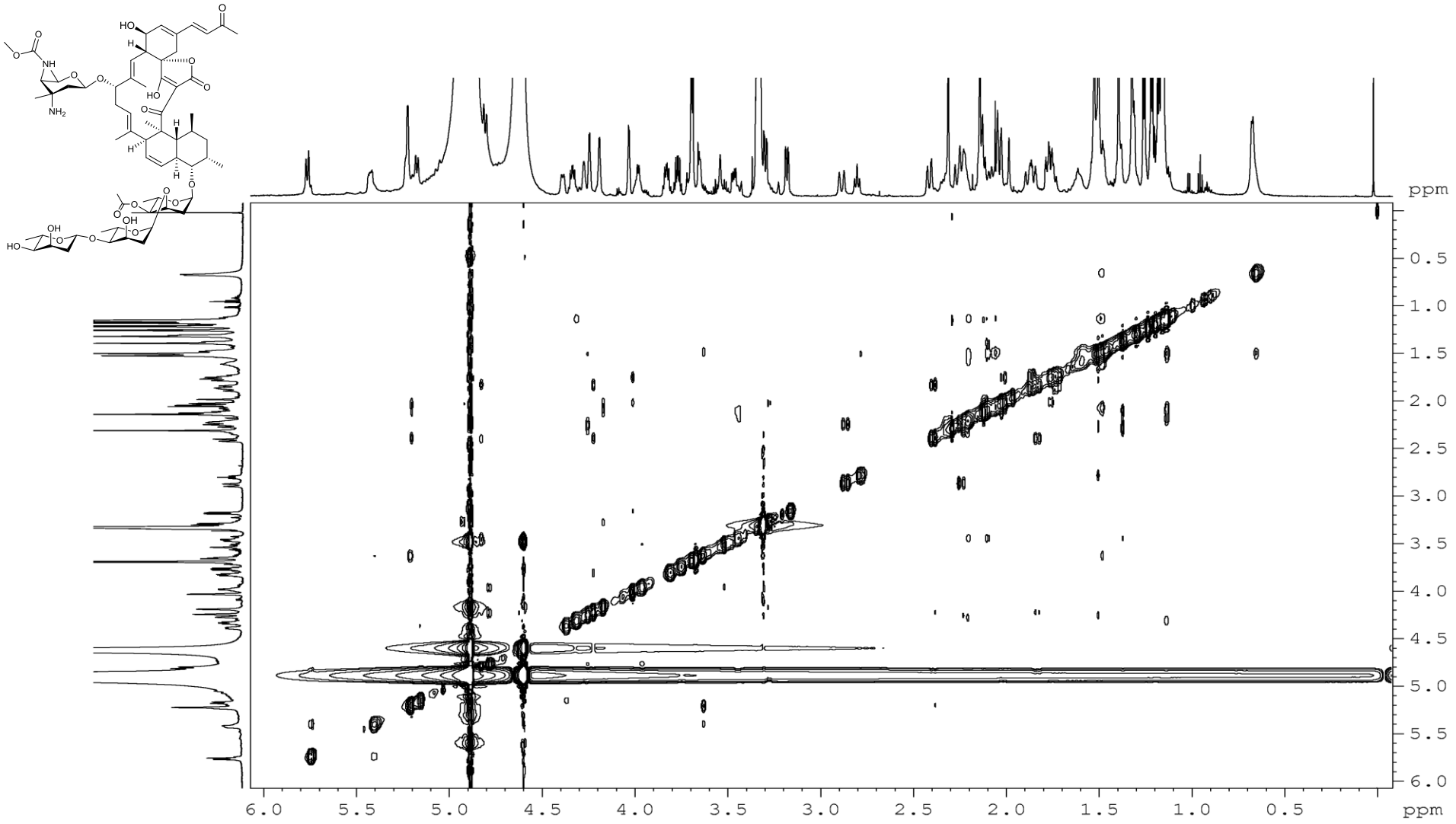


Figure S57.[1]H NMR (700 MHz) spectrum of compound **9** in CD_3OD.

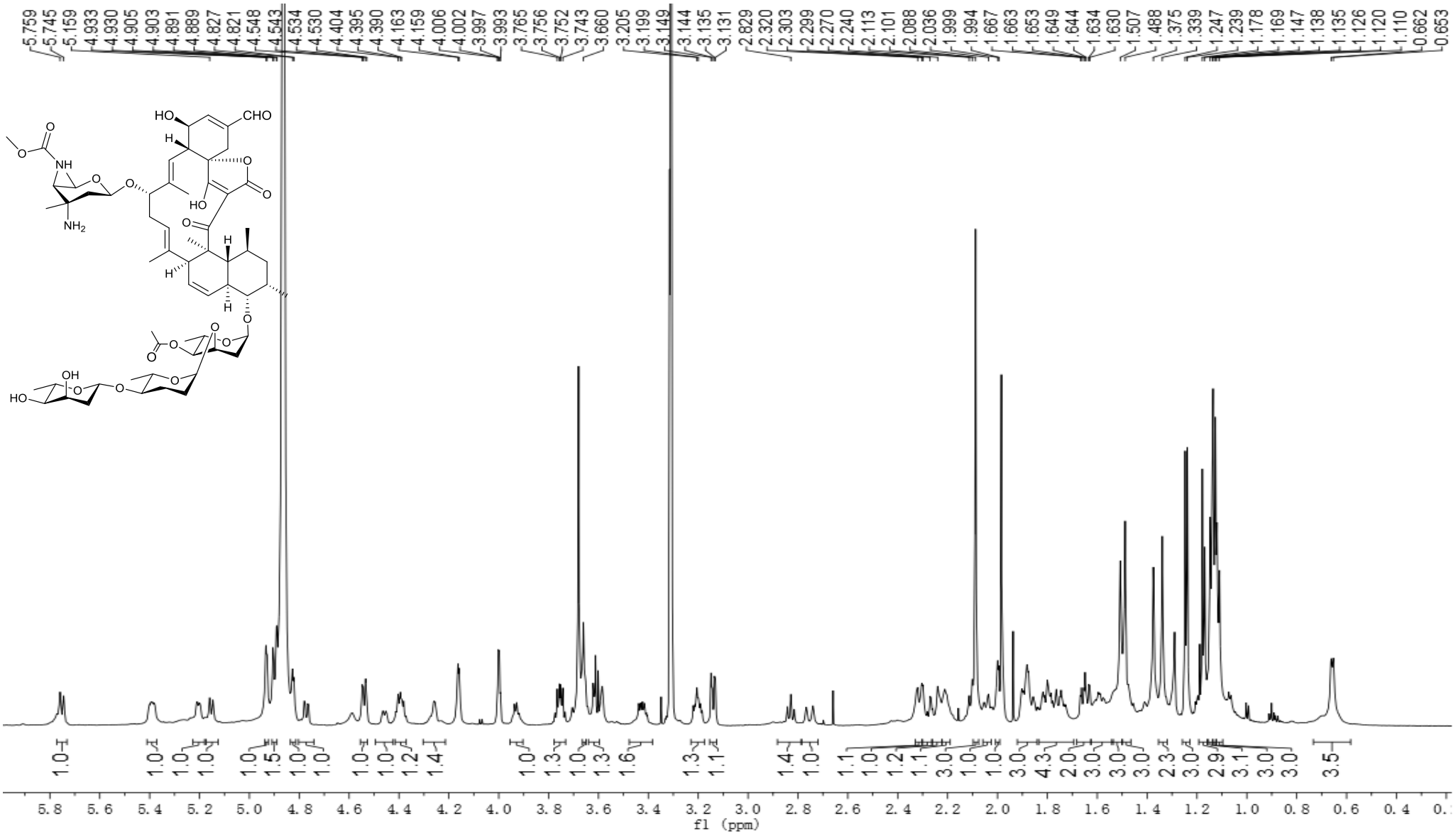


Figure S58.[13]C NMR (176 MHz) spectrum of compound **9** in CD_3OD.

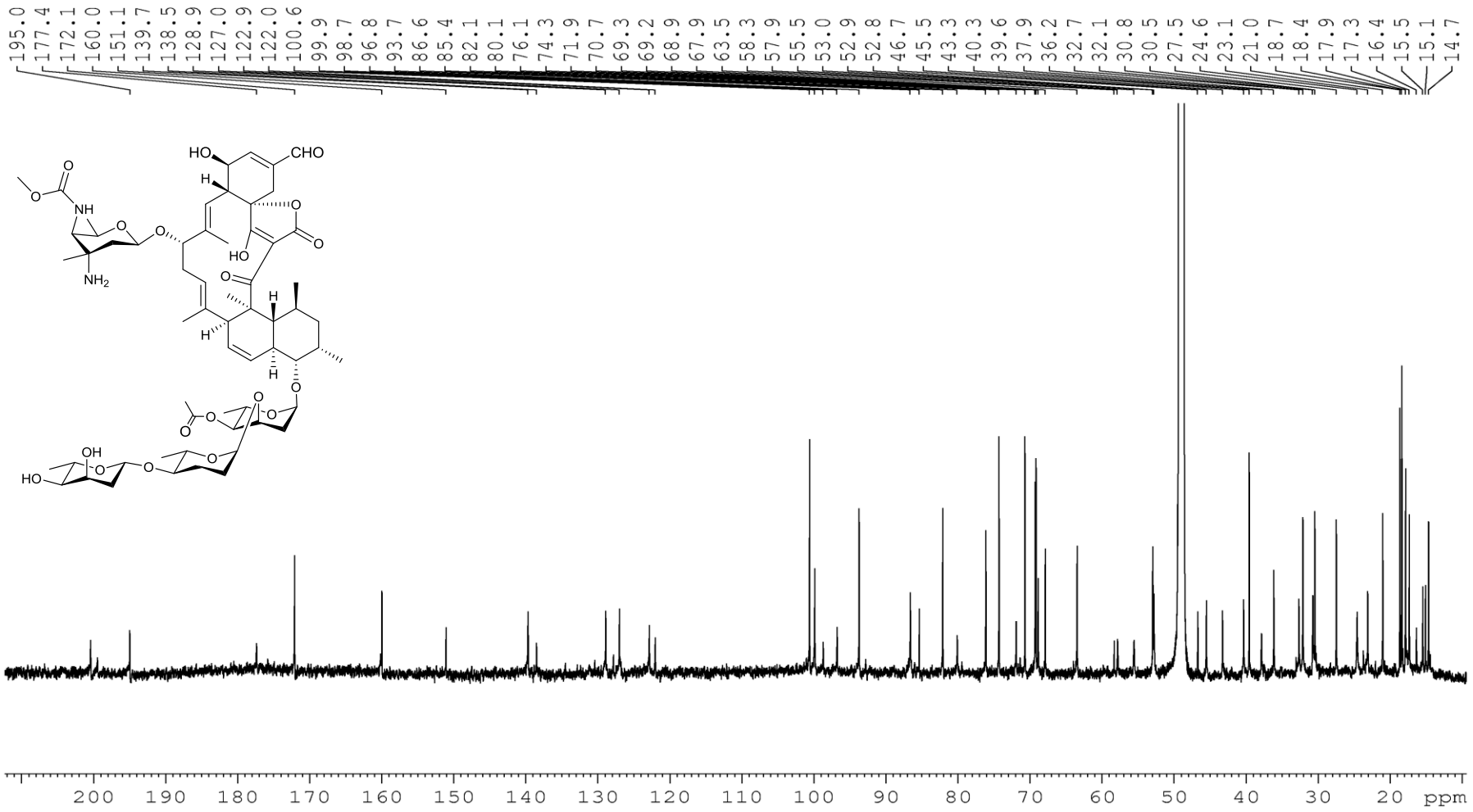


Figure S59. ^{13}C DEPT spectrum of compound **9** in CD_3OD.

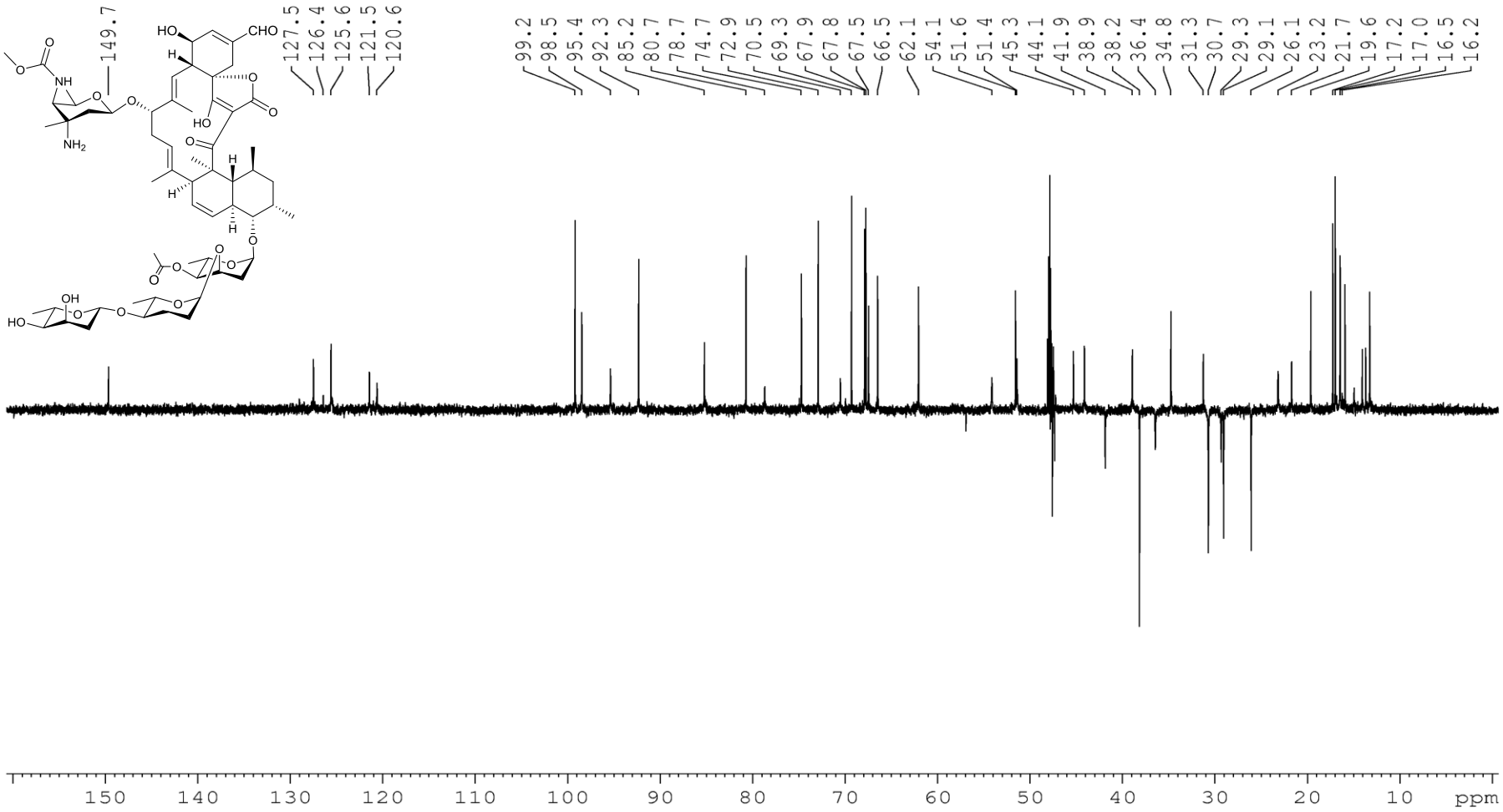


Figure S60. ^{1}H-^{1}H COSY spectrum of compound **9** in CD_3OD.

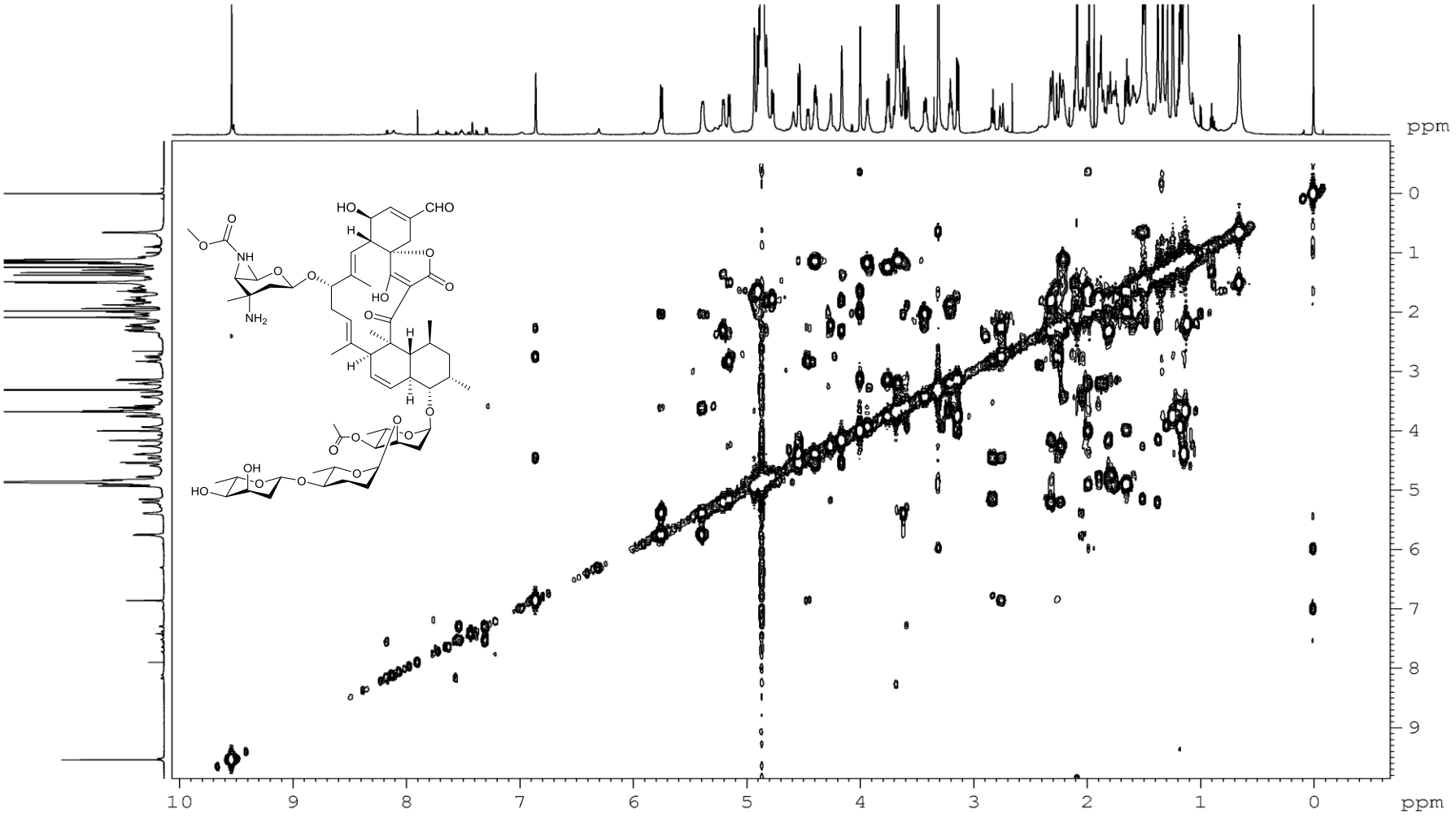


Figure S61. HSQC spectrum of compound **9** in CD_3OD.

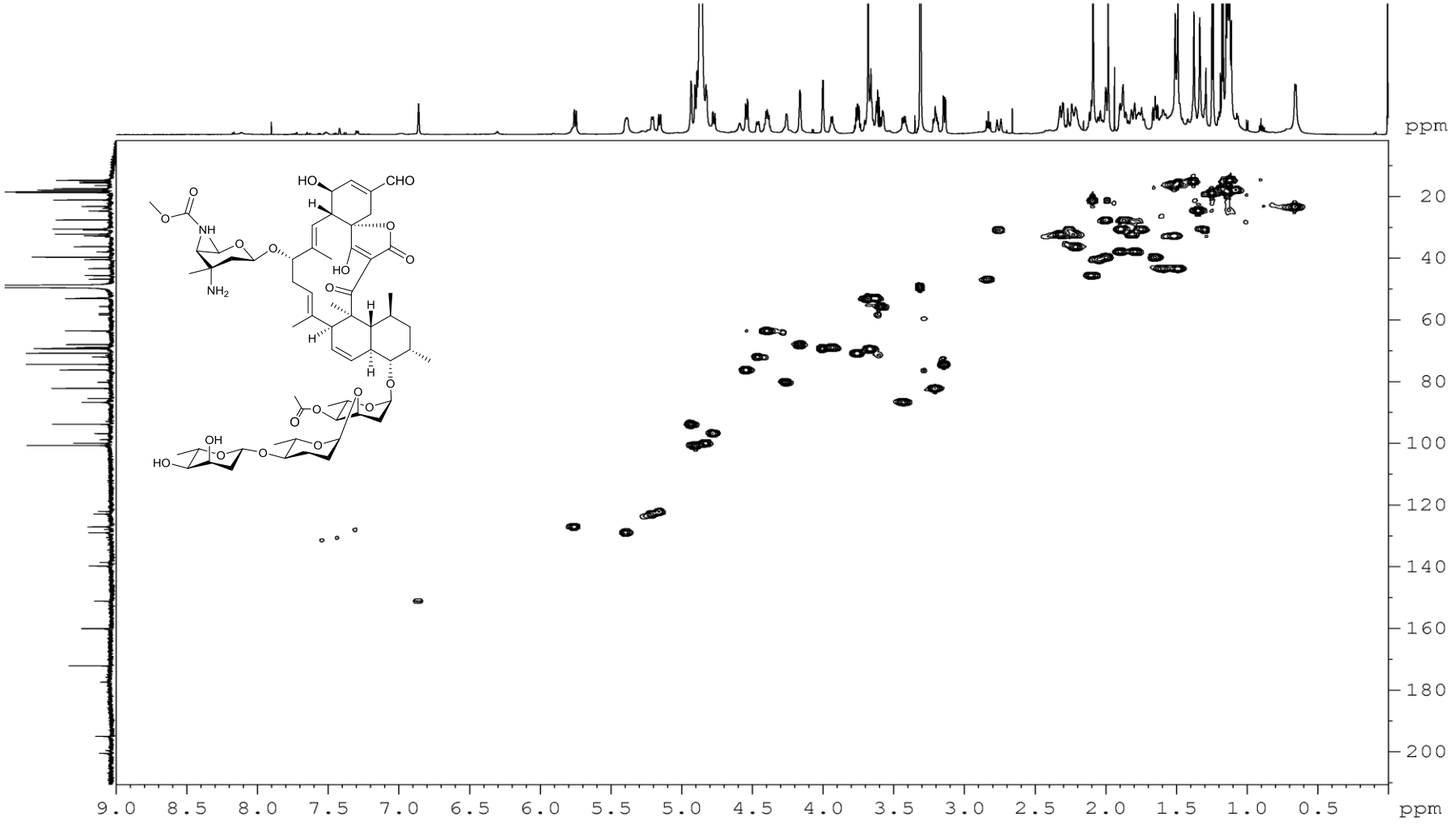


Figure S62. HMBC spectrum of compound **9** in CD_3OD.

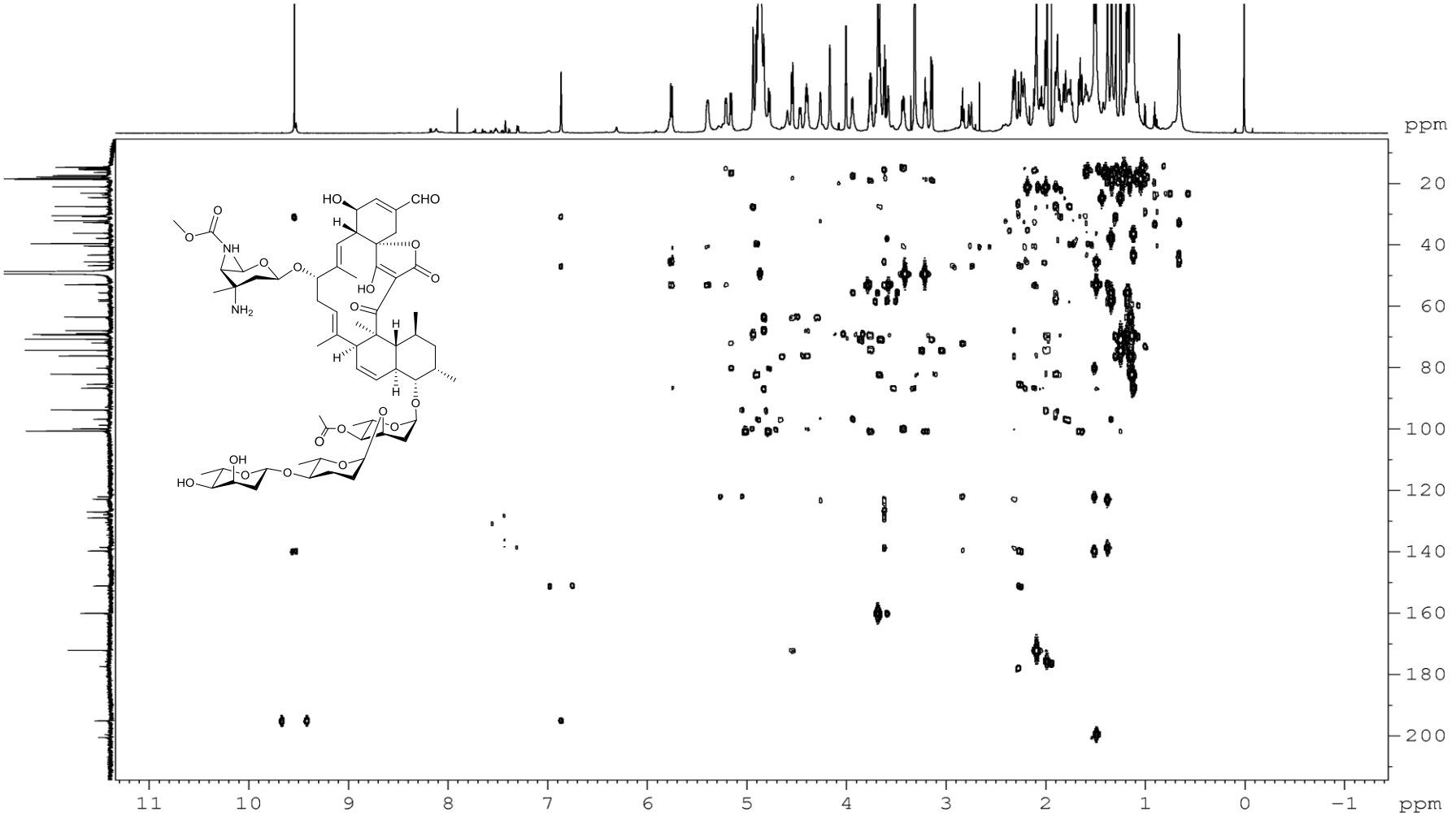
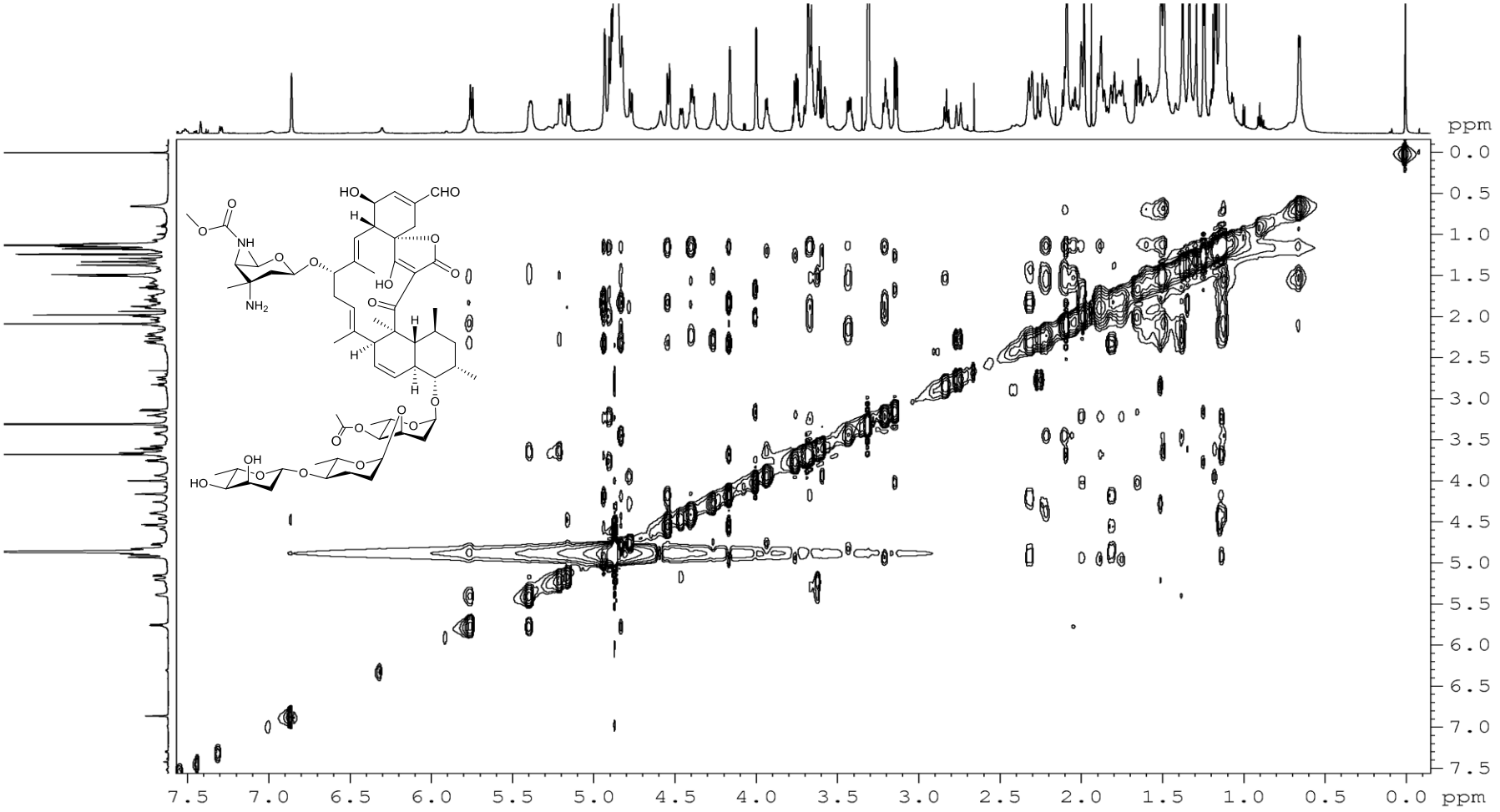
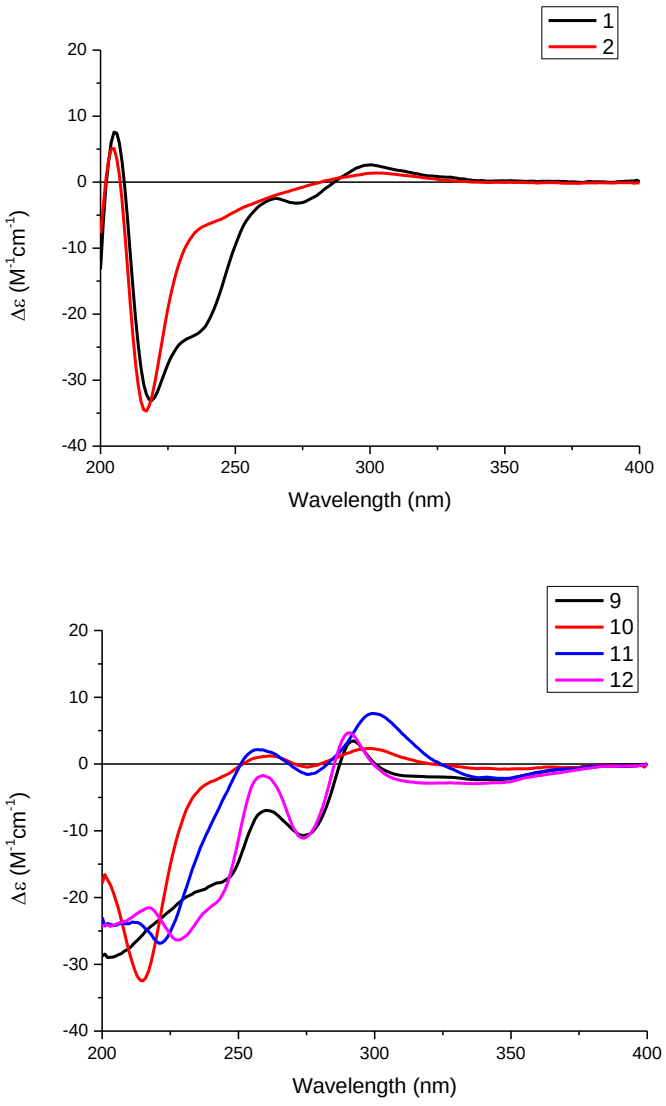


Figure S63. NOESY spectrum of compound **9** in CD_3OD.





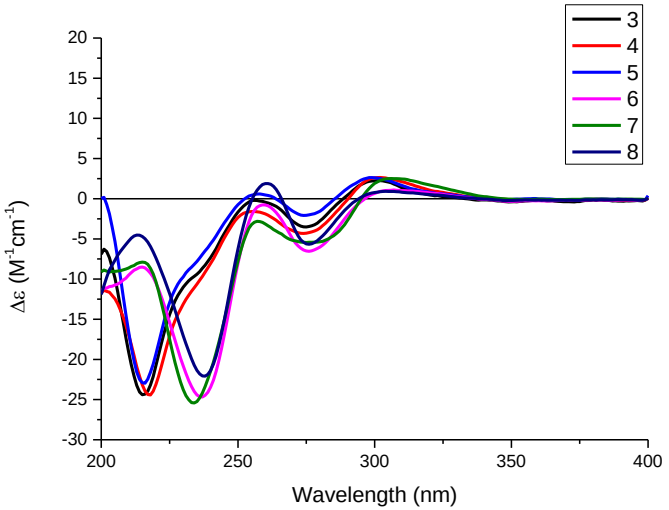


Figure S64. The CD spectra of compounds **1**–**12**.