Zhang, C-Y, Luo, L, Xia, J, Song, Y-N, Zhang, L-J, Zhang, M, Rahman, K, Ye, Y, Zhang, H and Zhu, J-Y

Sesquiterpenes and lignans from the flower buds of Daphne genkwa and their nitric oxide inhibitory activities.

SUPPLEMENTARY MATERIAL

Sesquiterpenes and lignans from the flower buds of *Daphne genkwa* and their nitric oxide inhibitory activities

Chun-Yang Zhang [a], Lan-Luo[b,*], Jing Xia[c], Ya-Nan Song [a], Li-Jun Zhang [a], Miao Zhang[a], Khalid Rahman[d], Yin Ye [a], Hong Zhang [a], and Jian-Yong Zhu [a,*]

[a]*Central Laboratory, Seventh People's Hospital of Shanghai University of TCM, Shanghai 200137, P. R. China*

[b]*Department of pharmacy, Seventh People's Hospital of Shanghai University of TCM, Shanghai 200137, P. R. China*

[c]*Research Institute of Chinese Materia Medica, Guangzhou Baiyun Mountain and Hutchison Whampoa Ltd.Guangzhou 51000, P. R. China*

[d]*Faculty of Science, School of Biomolecular Sciences, Liverpool John Moores University, Liverpool L3 3AF, U.K.*

* Corresponding author

E-mail address: Lan-Luo: LL4820703@163.com

Jian-Yong Zhu: jyzhu@foxmail.com

Abstract: Chemical investigation of the *Daphne genkwa* has led to the isolation of four sesquiterpenes (**1a**/**1b**, **2**, and **3**), including one pair of sesquiterpene enantiomers (**1a**/**1b**), **1a** is a new compound (+)-*4-Hydroxy-10-epirotundone*, and twelve lignans (**4**–**15**). Their structures were elucidated by spectroscopic analysis, and the absolute configurations of **1a**/**1b** were determined by CD analysis. All compounds were examined for their inhibitory effects on the nitric oxide (NO) production induced by lipopolysaccharide (LPS) in BV-2 microglial cells, and compounds **7**–**10** exhibited pronounced inhibition on NO production with IC_{50} values in the range of 5.8–10.2 μM, being more active than the positive control, quercetin (IC_{50} = 17.0 μM).

Keywords: *Daphne genkwa*; Sesquiterpene; Lignan; Nitric Oxide

List of content

Table S1. ^{1}H NMR (400 MHz) and ^{13}C NMR (100 MHz) data of compound **1** in $CDCl_3$ (δ_C in ppm, *J* in Hz).

Table S1. ^{1}H NMR (400 MHz) and ^{13}C NMR (100 MHz) data of compound **1** in $CDCl_3$ (δ_C in ppm, *J* in Hz).

No.	δ_H	δ_C	No.	δ_H	δ_C
1		145.0, C	8b	1.61, m	
2		204.8, C	9a	1.97, m	29.1, CH_2
3a	2.54, 1H, d (3.5)	51.5, CH	9b	1.70, m	
3b	2.55, 1H, d (3.5)		10	2.80, m	29.1, CH
4		76.4, C	11		149.4, C
5		173.8, C	12a	4.78, d (1.4)	110.2, CH_2
6a	2.63, m	28.6, CH_2	12b	4.75, d (1.4, 1.4)	
6b	2.50, m		13	1.76, s	21.0, CH_3
7a	2.51, m	44.5, CH	14	1.12, d (7.2)	18.1, CH_3
8a	1.86, m	29.0, CH_2	15	1.46, s	26.9, CH_3

Figure S1. Selected ^{1}H–^{1}H COSY (▬) and HMBC (→) correlations of **1**

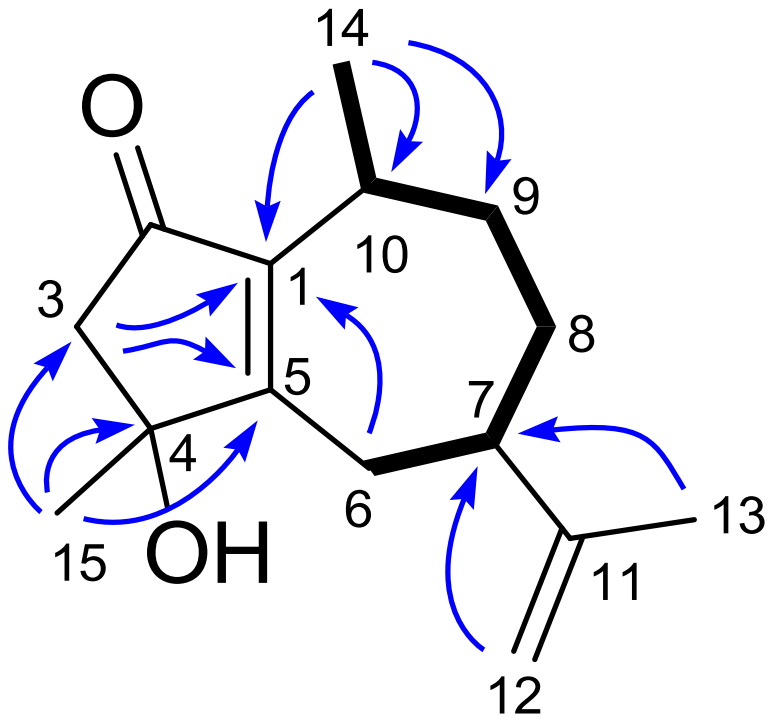

Figure S2. Key NOE correlations (⟷) of **1**.

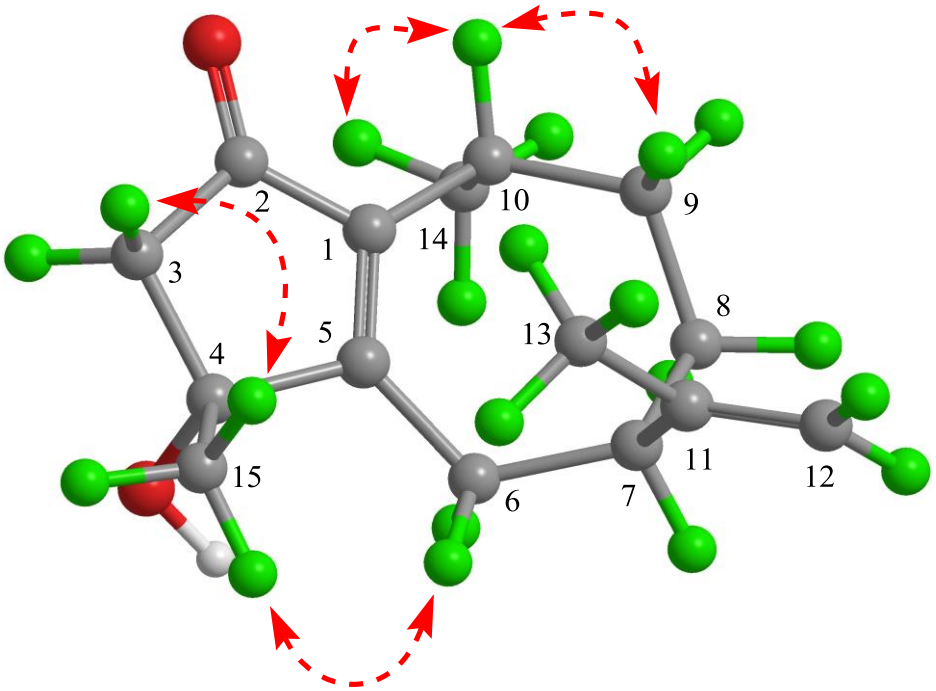

Figure S3. The CD spectrum of **1a** and **1b**

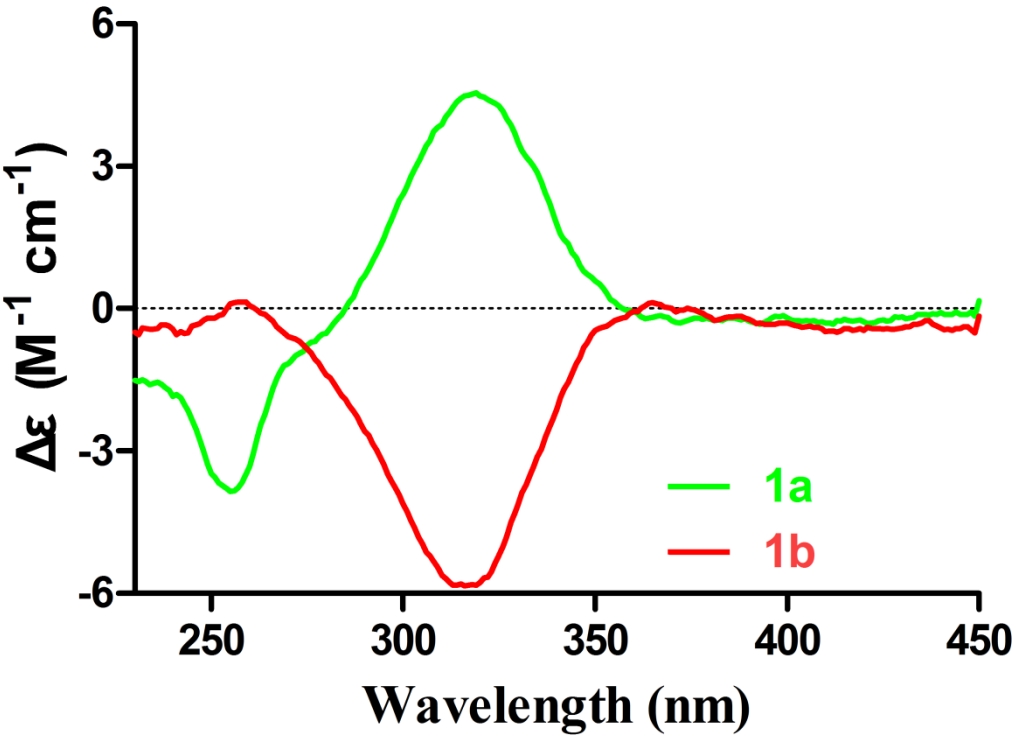

Figure S4. ^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **1**

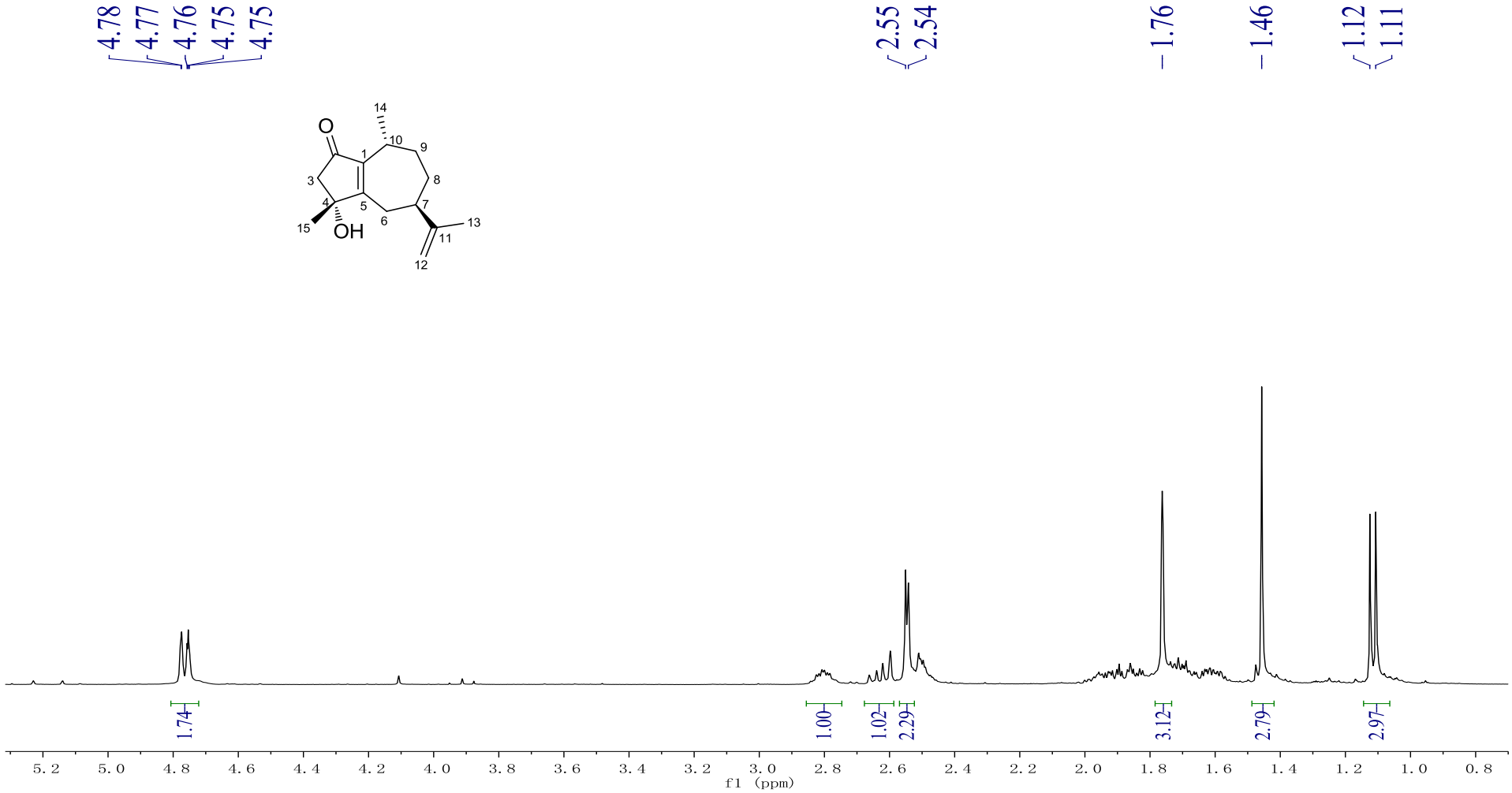

Figure S5. ^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **1**

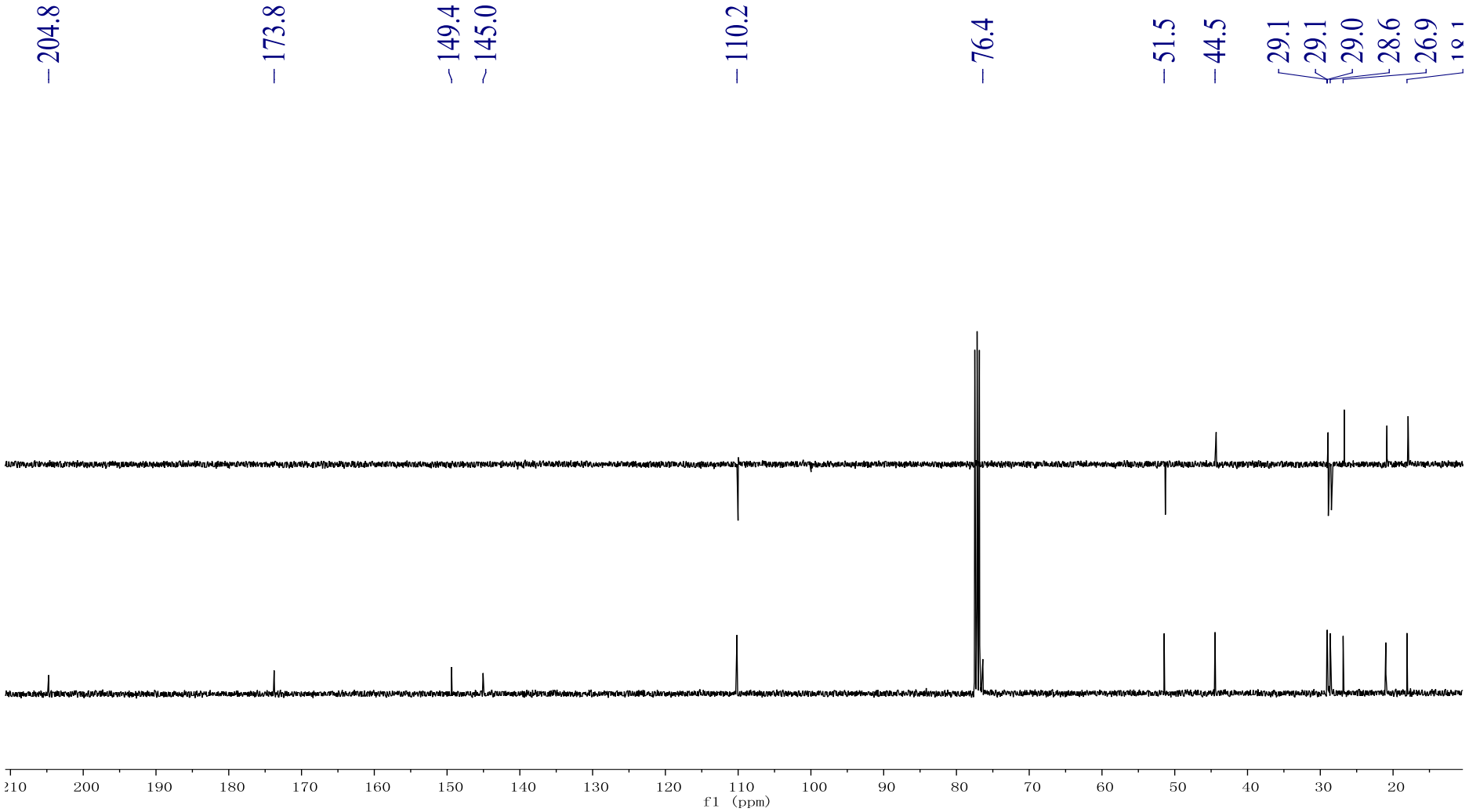

Figure S6. ^{1}H-^{1}H COSY spectrum of **1** in $CDCl_3$

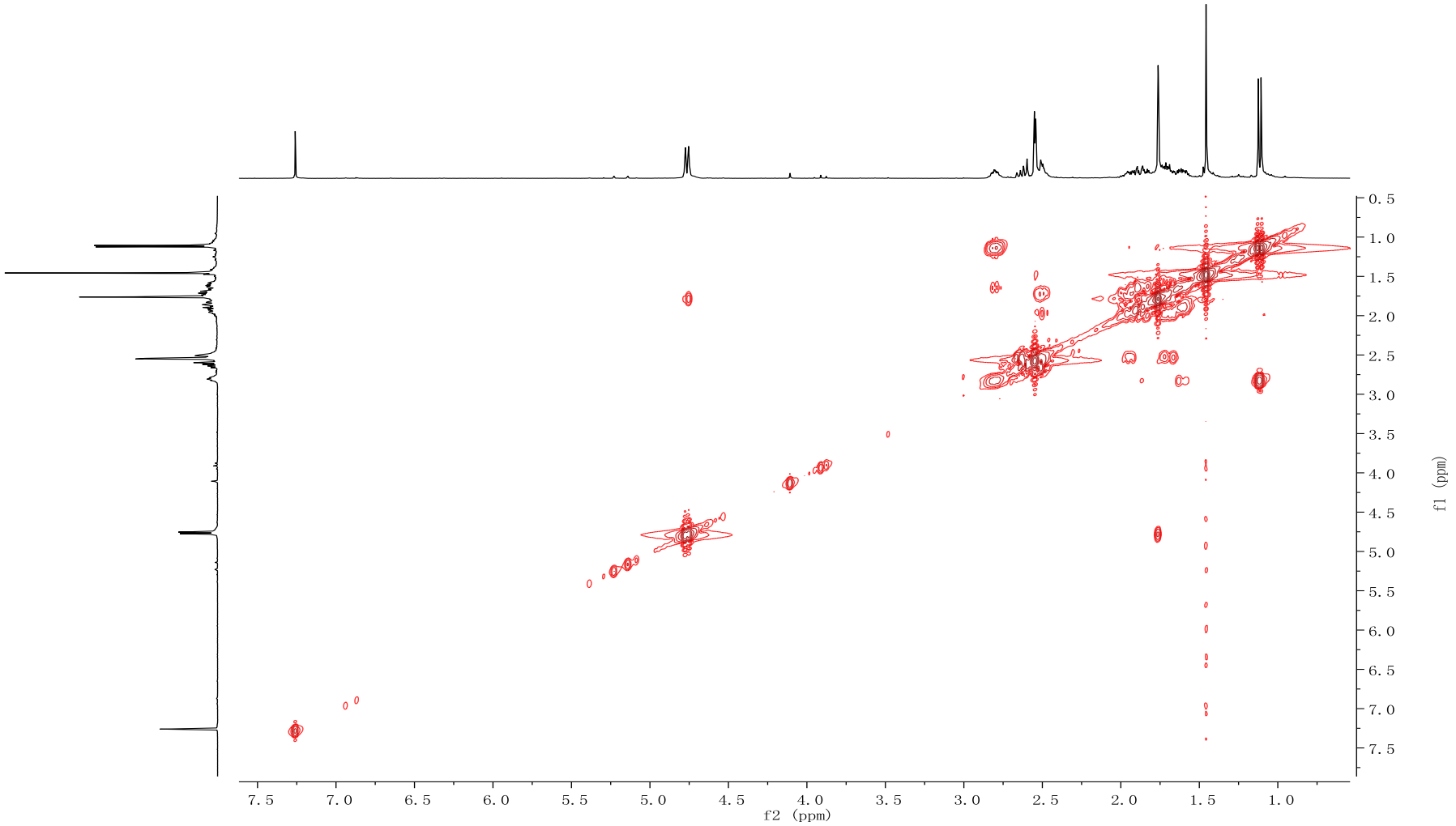

Figure S7. HSQC spectrum of **1** in $CDCl_3$

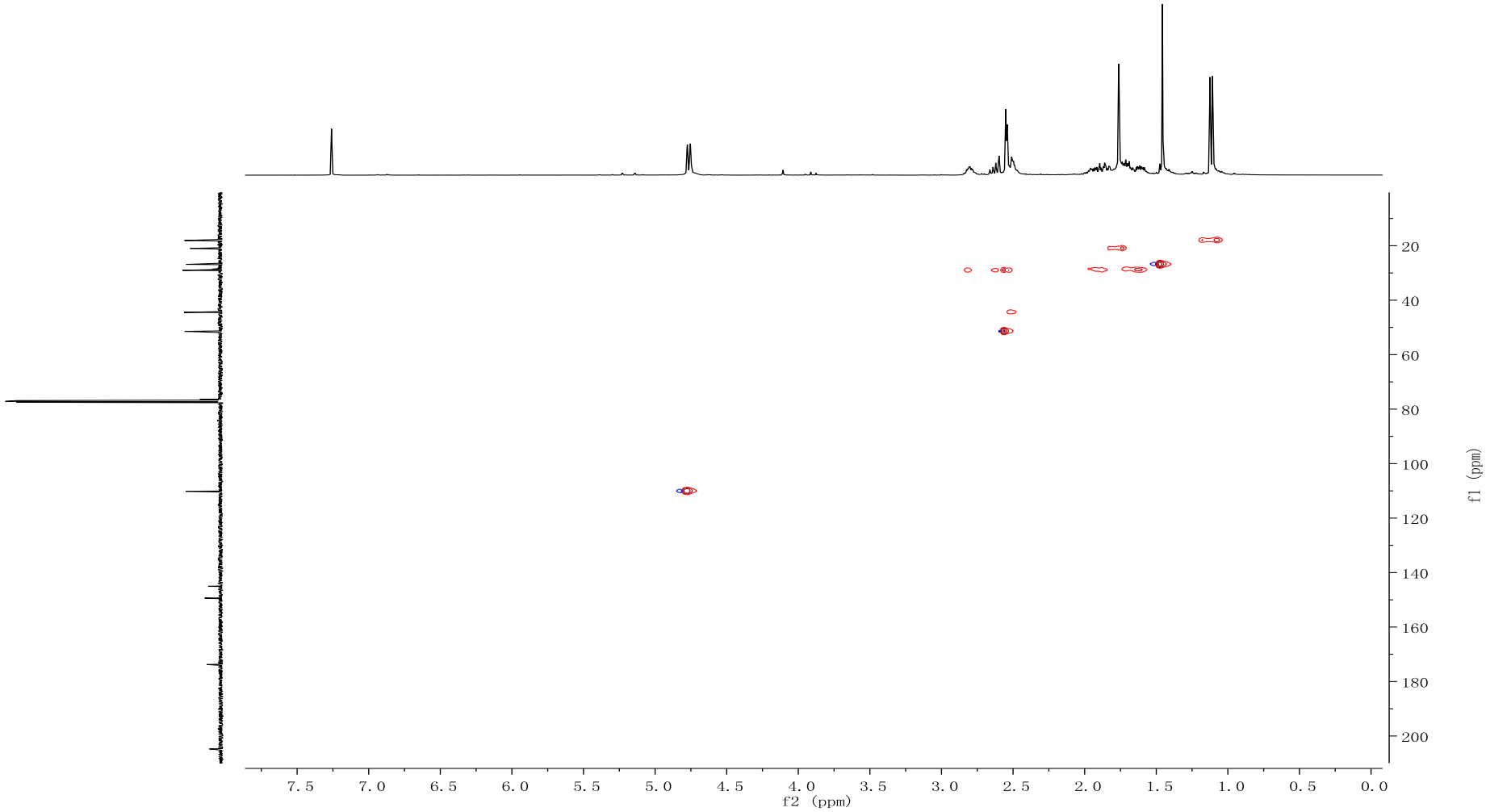

Figure S8. HMBC spectrum of **1** in $CDCl_3$

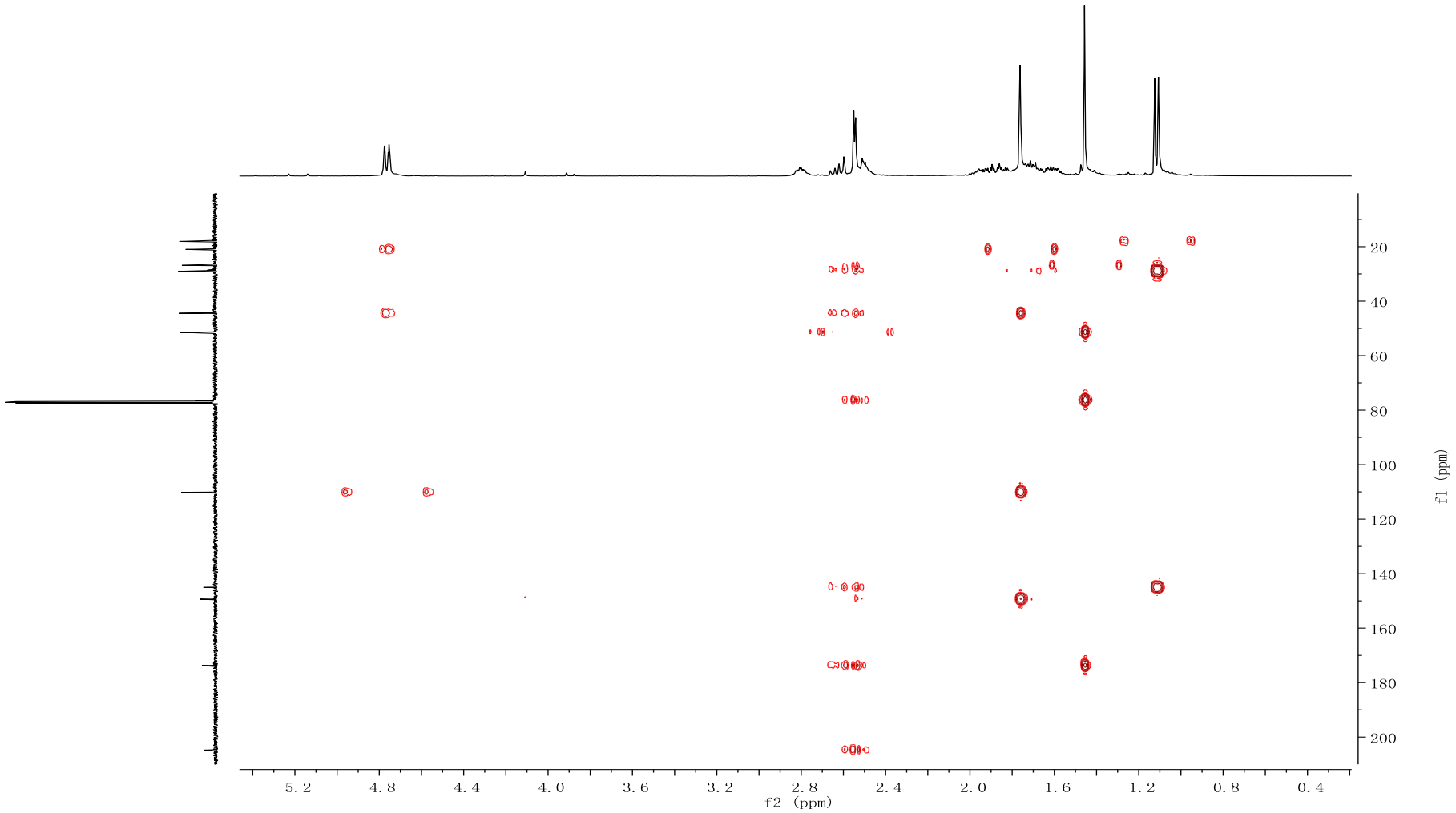

Figure S9. NOESY spectrum of **1** in $CDCl_3$

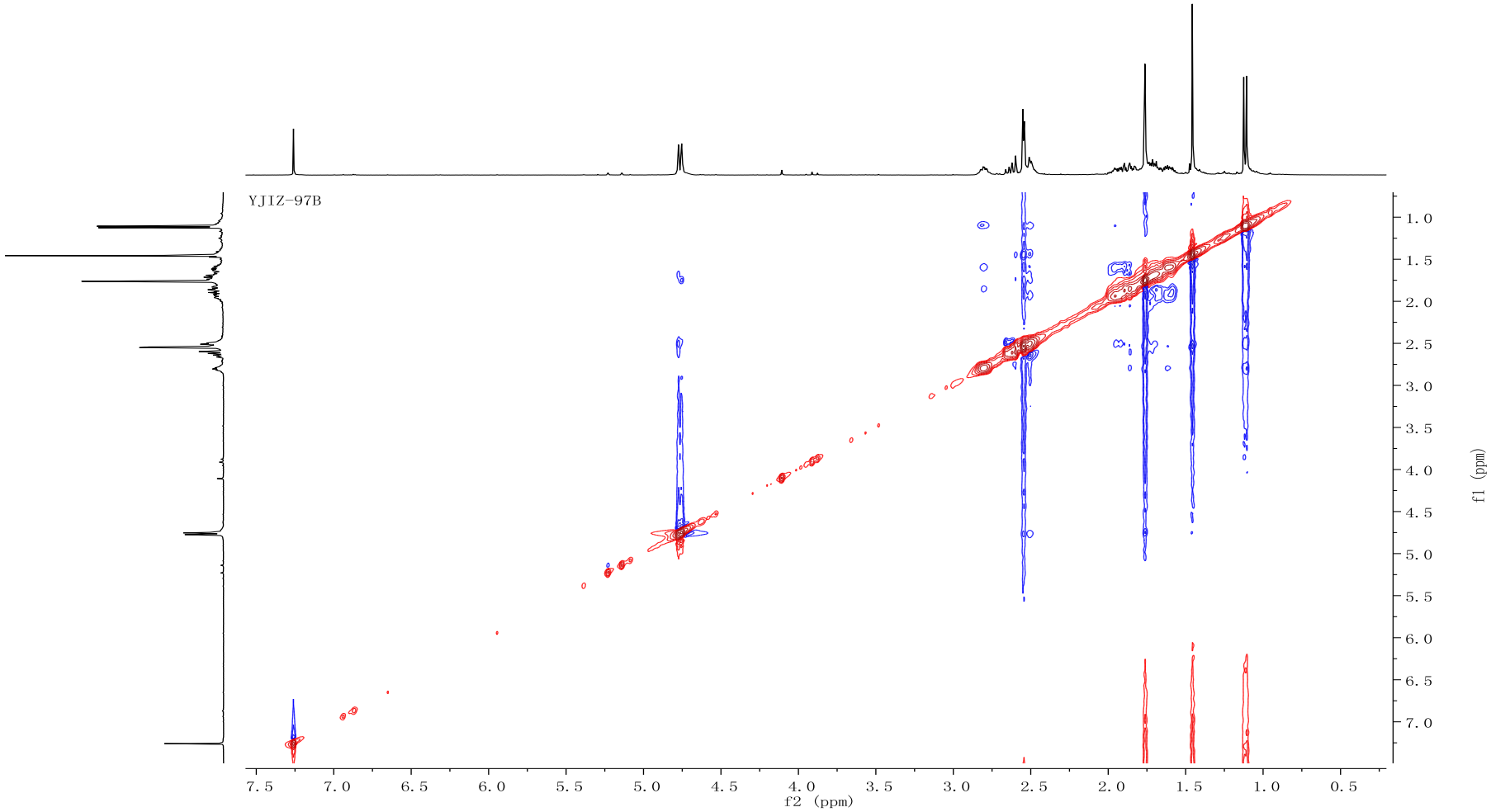

Figure S10. HRESIMS spectrum of **1**

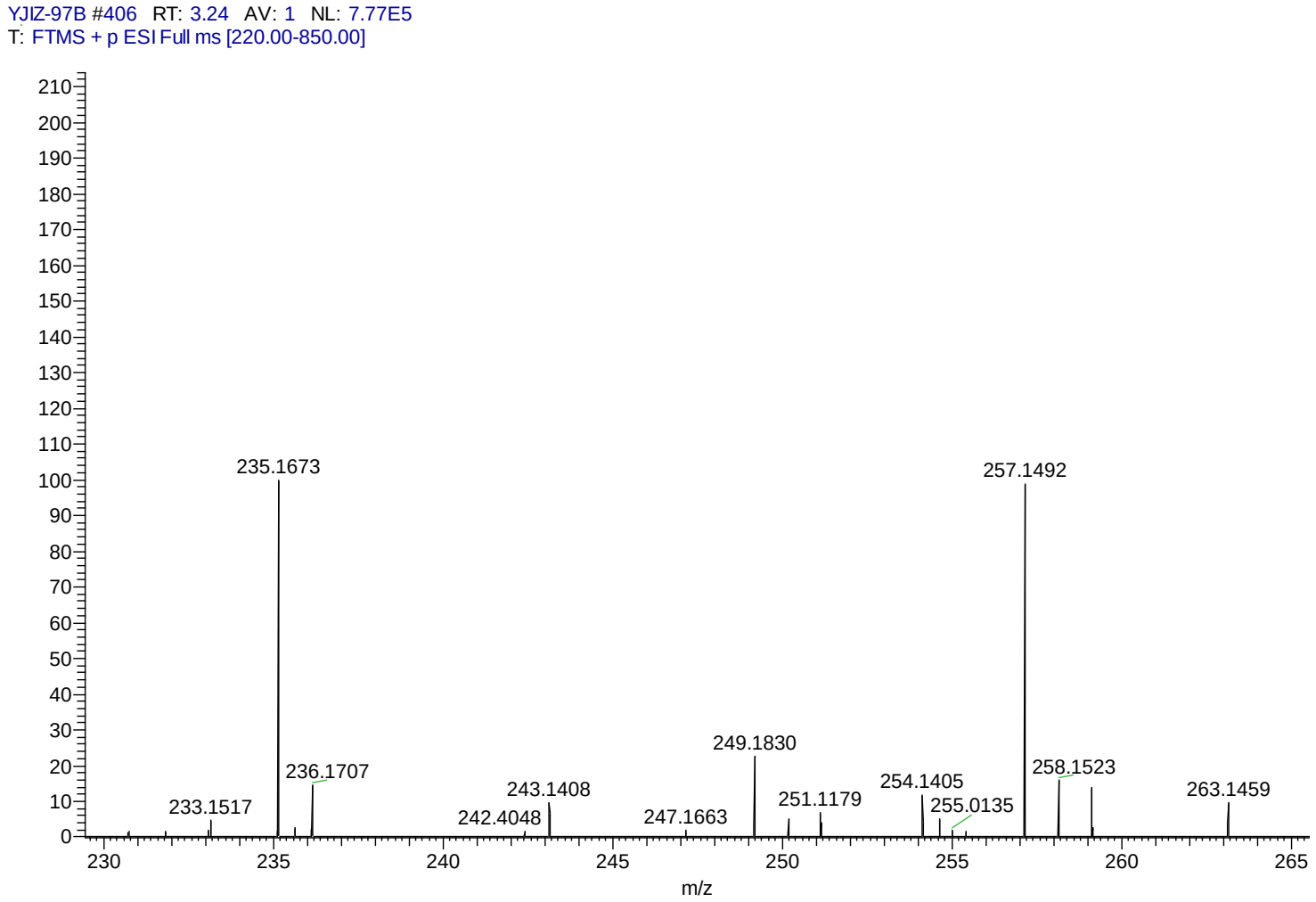

Figure S11. IR (KBr disc) spectrum of **1**

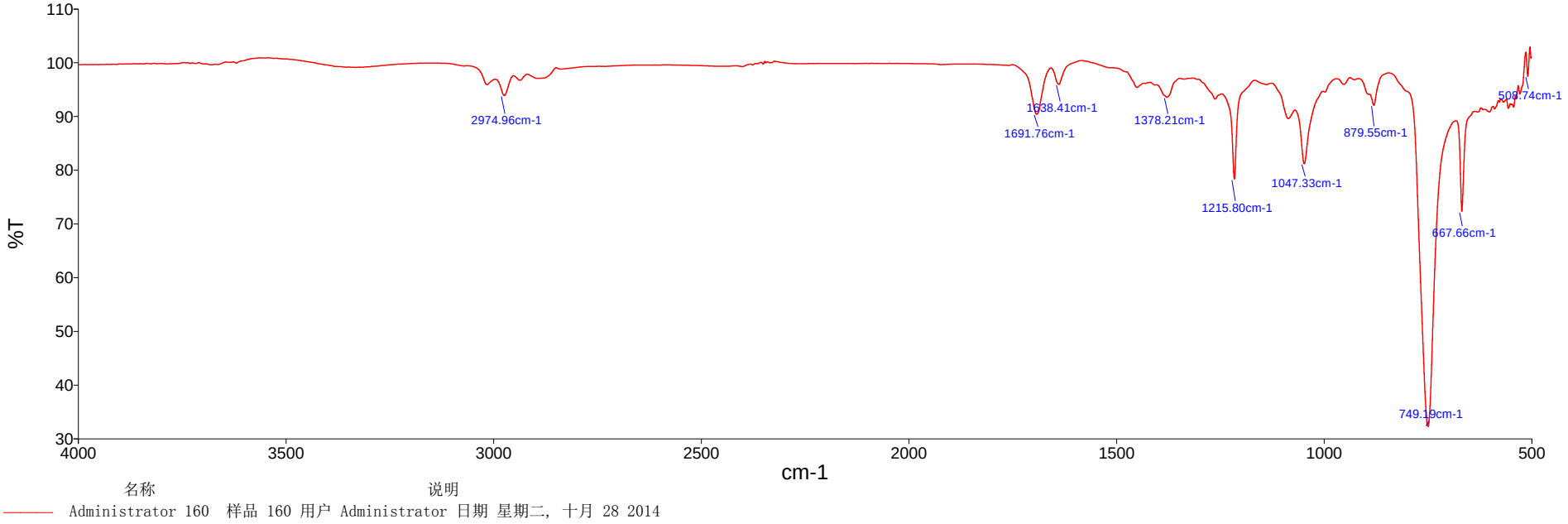

Figure S12. ^{1}H NMR (600 MHz, $CDCl_3$) spectrum of **2**

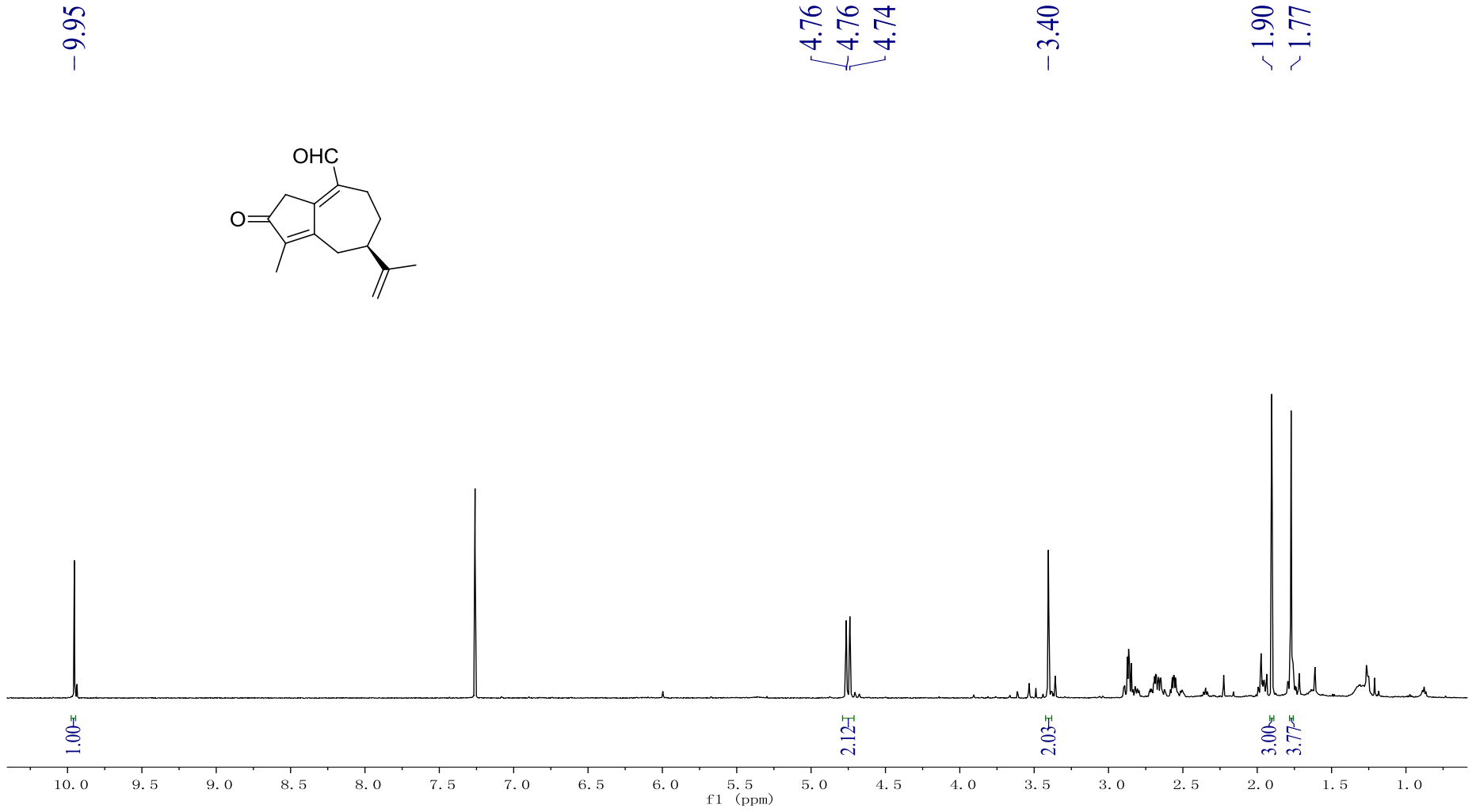

Figure S13. ^{13}C NMR (150 MHz, $CDCl_3$) spectrum of **2**

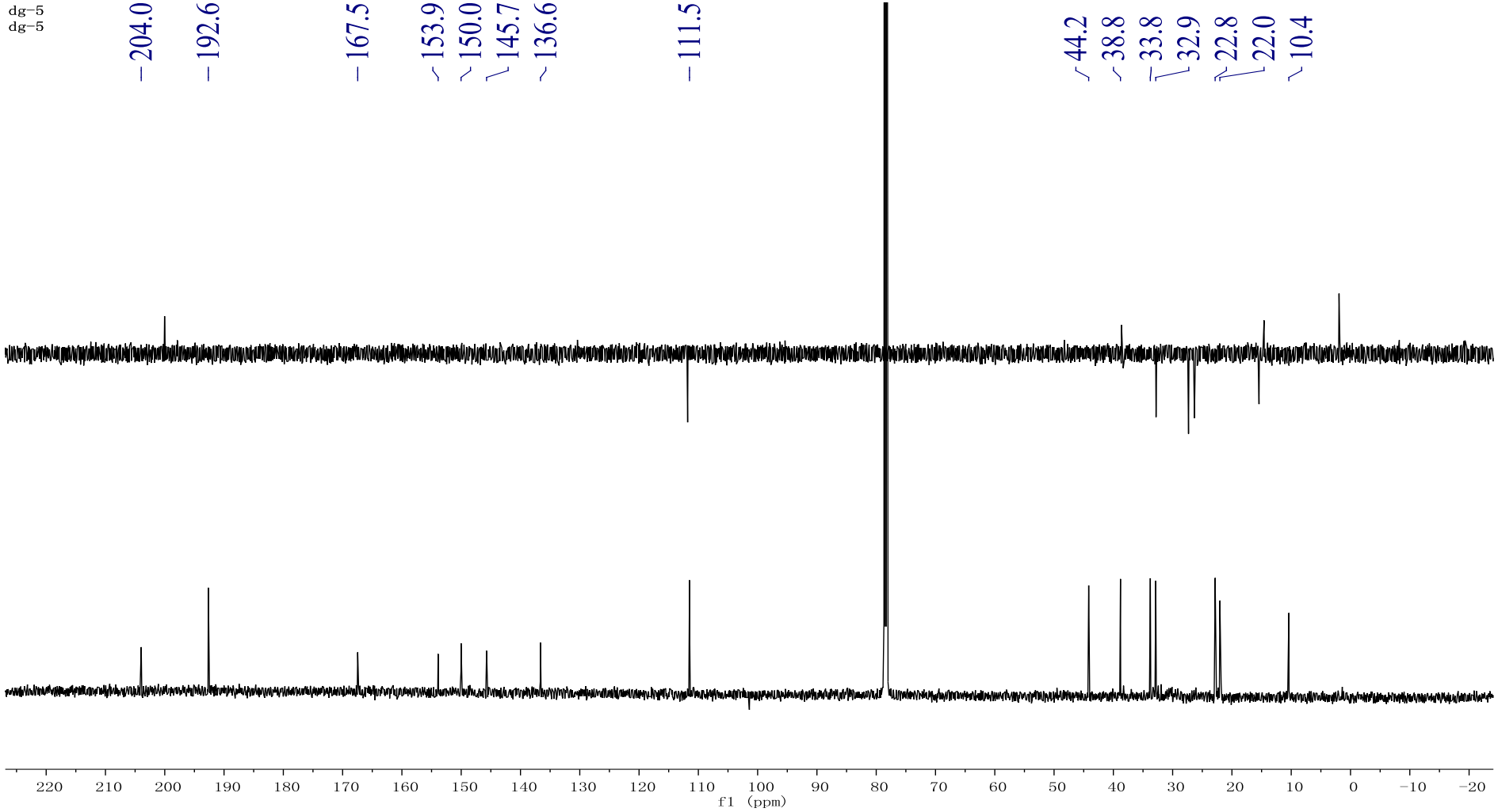

Figure S14. ^{1}H NMR (400 MHz, $CDCl_3$) spectrum of **3**

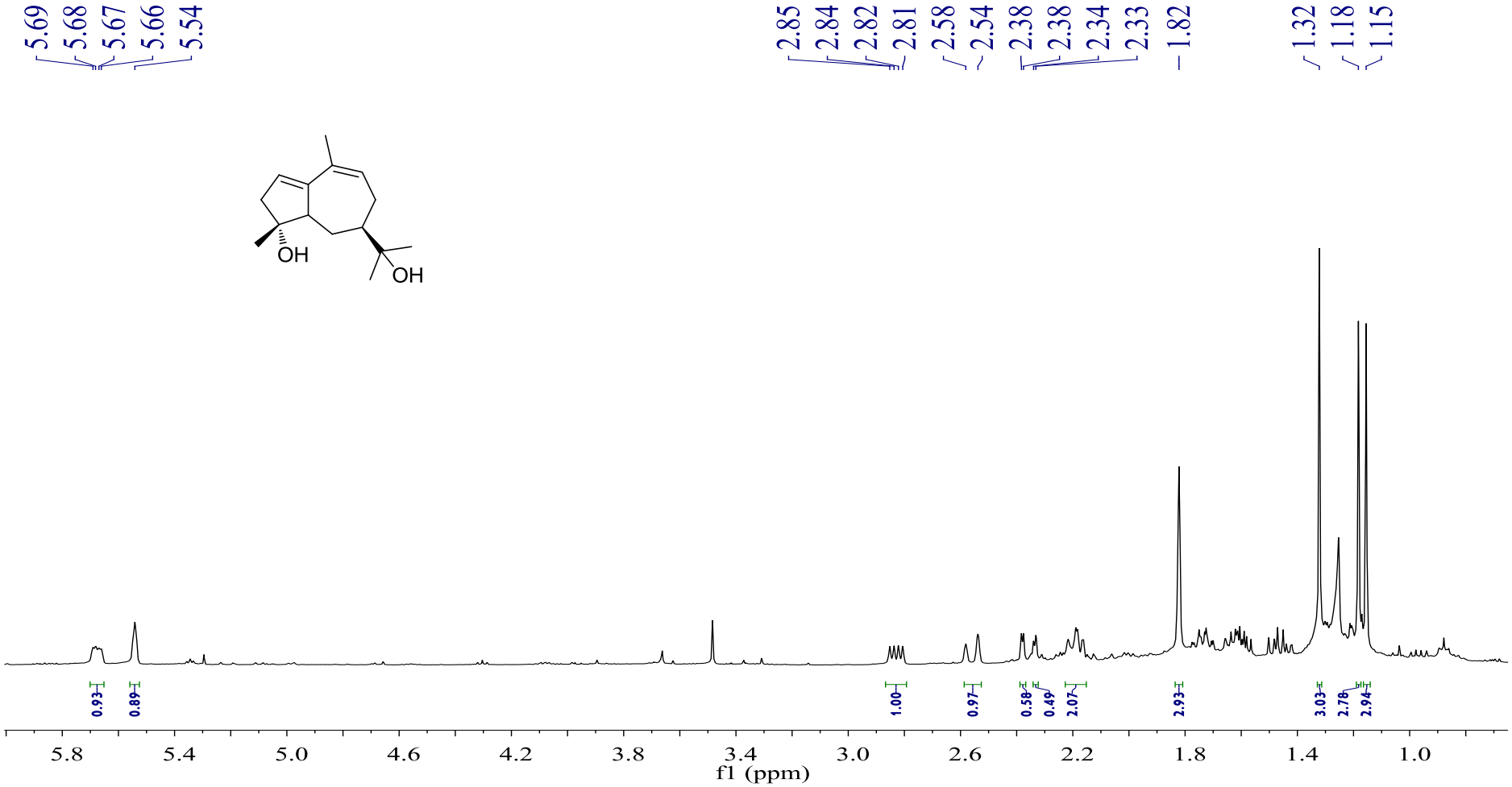

Figure S15. ^{13}C NMR (100 MHz, $CDCl_3$) spectrum of **3**

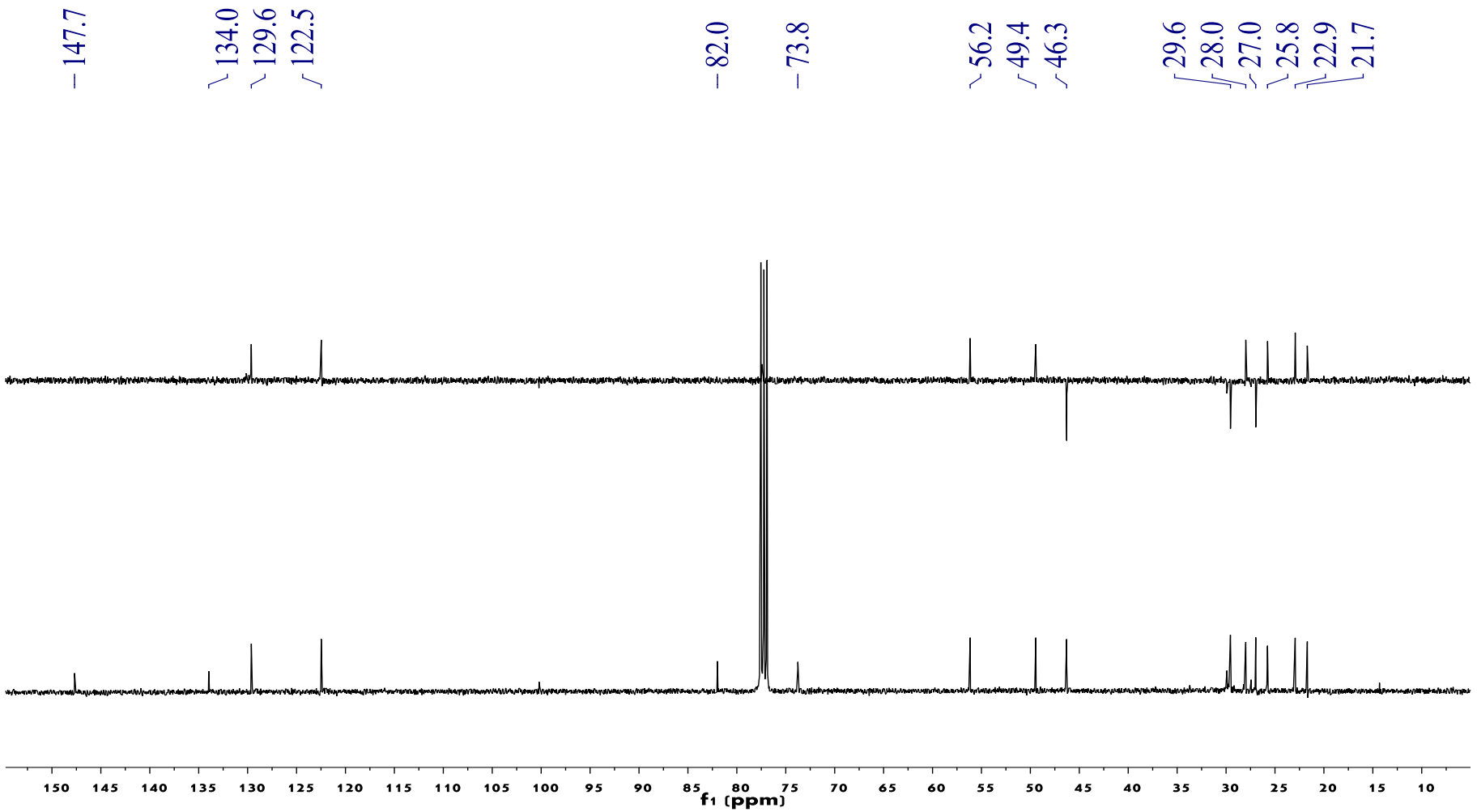

Figure S16. ^{1}H NMR (600 MHz, CD_3OD) spectrum of **4**

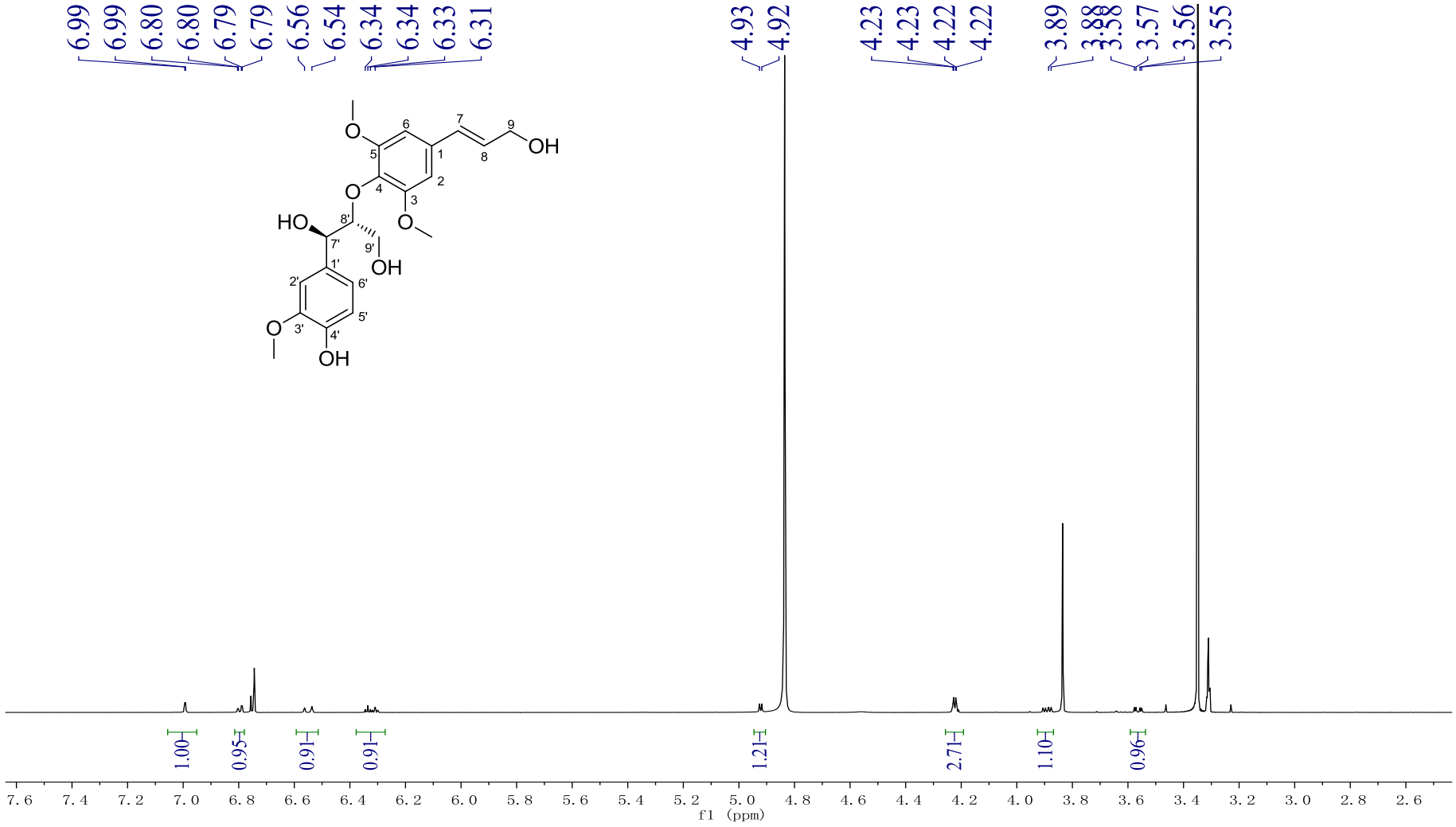

Figure S17. ^{13}C NMR (150 MHz, CD_3OD) spectrum of **4**

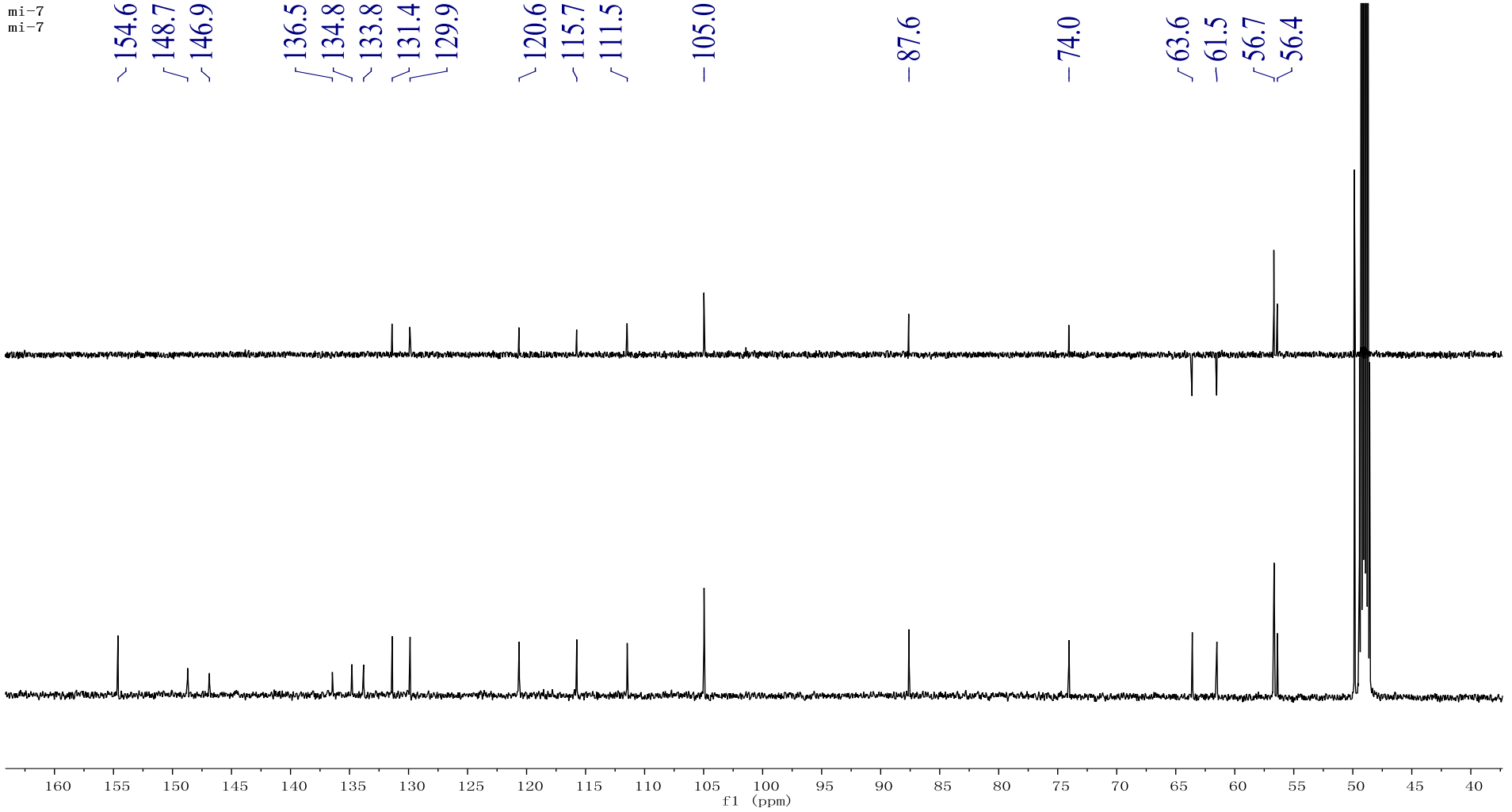

Figure S18. ^{1}H NMR (600 MHz, $CDCl_3$) spectrum of **5**

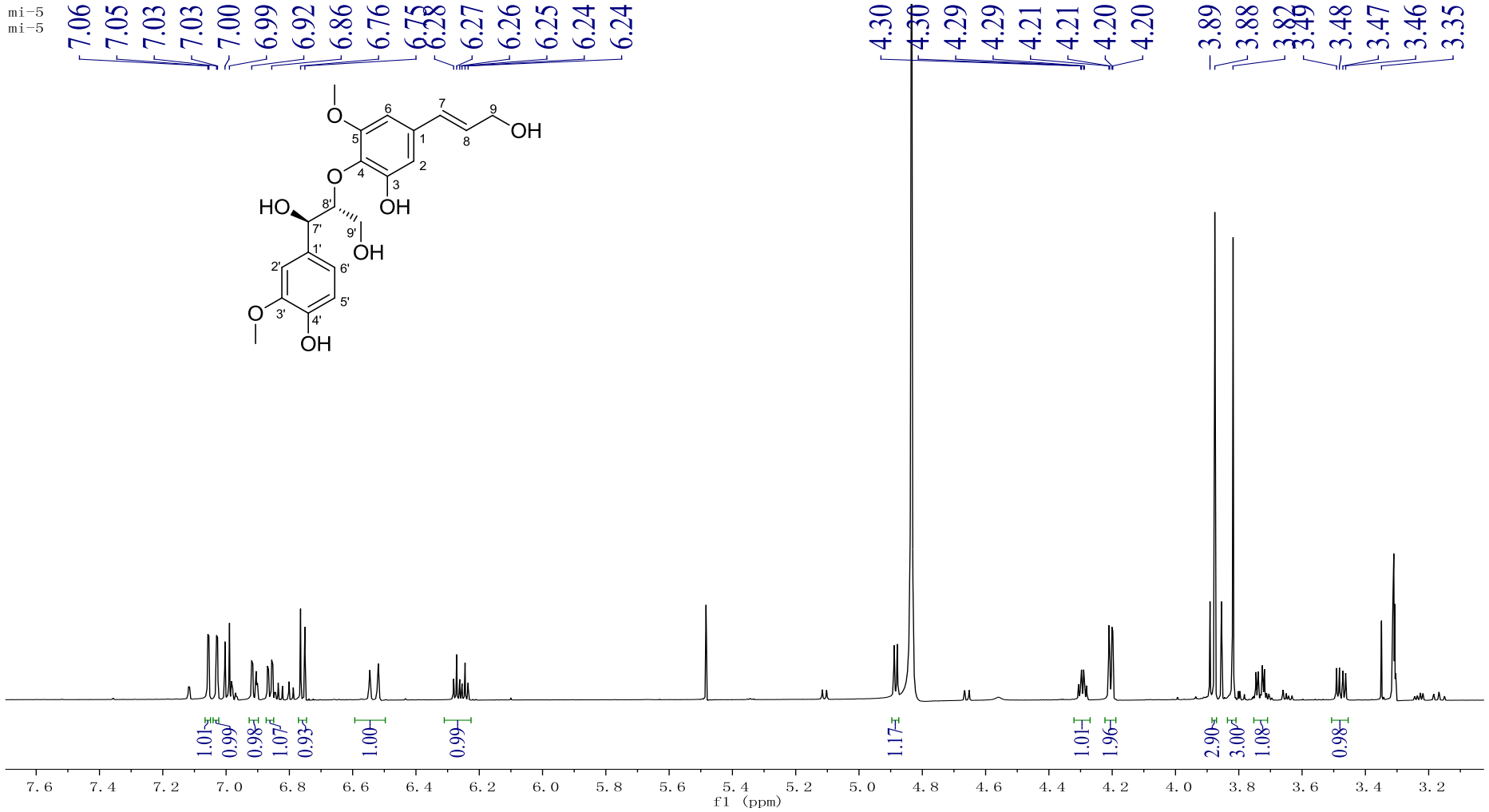

Figure S19. ^{13}C NMR (600 MHz, $CDCl_3$) spectrum of **5**

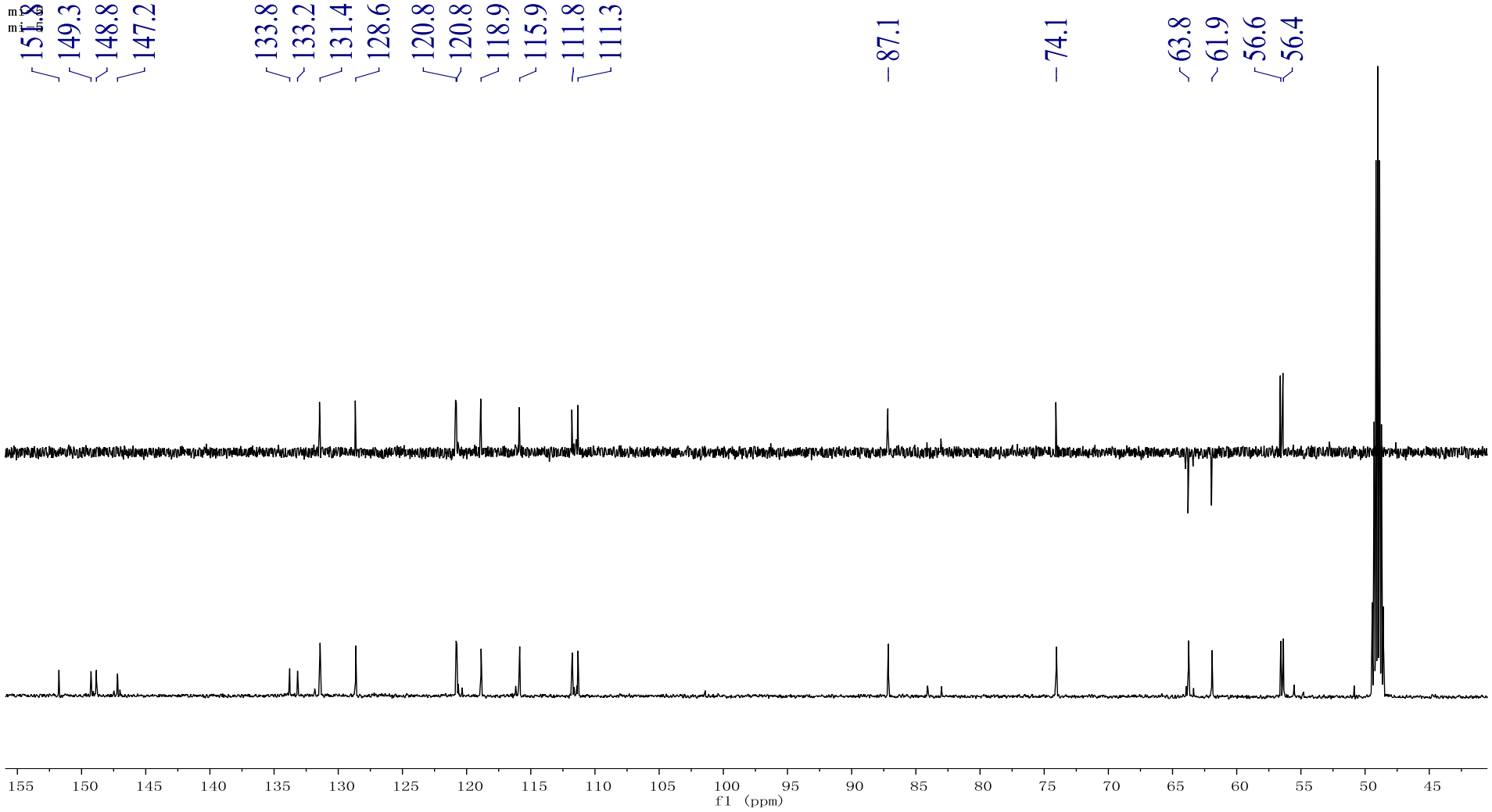

Figure S20. ^{1}H NMR (150 MHz, $CDCl_3$) spectrum of **6**

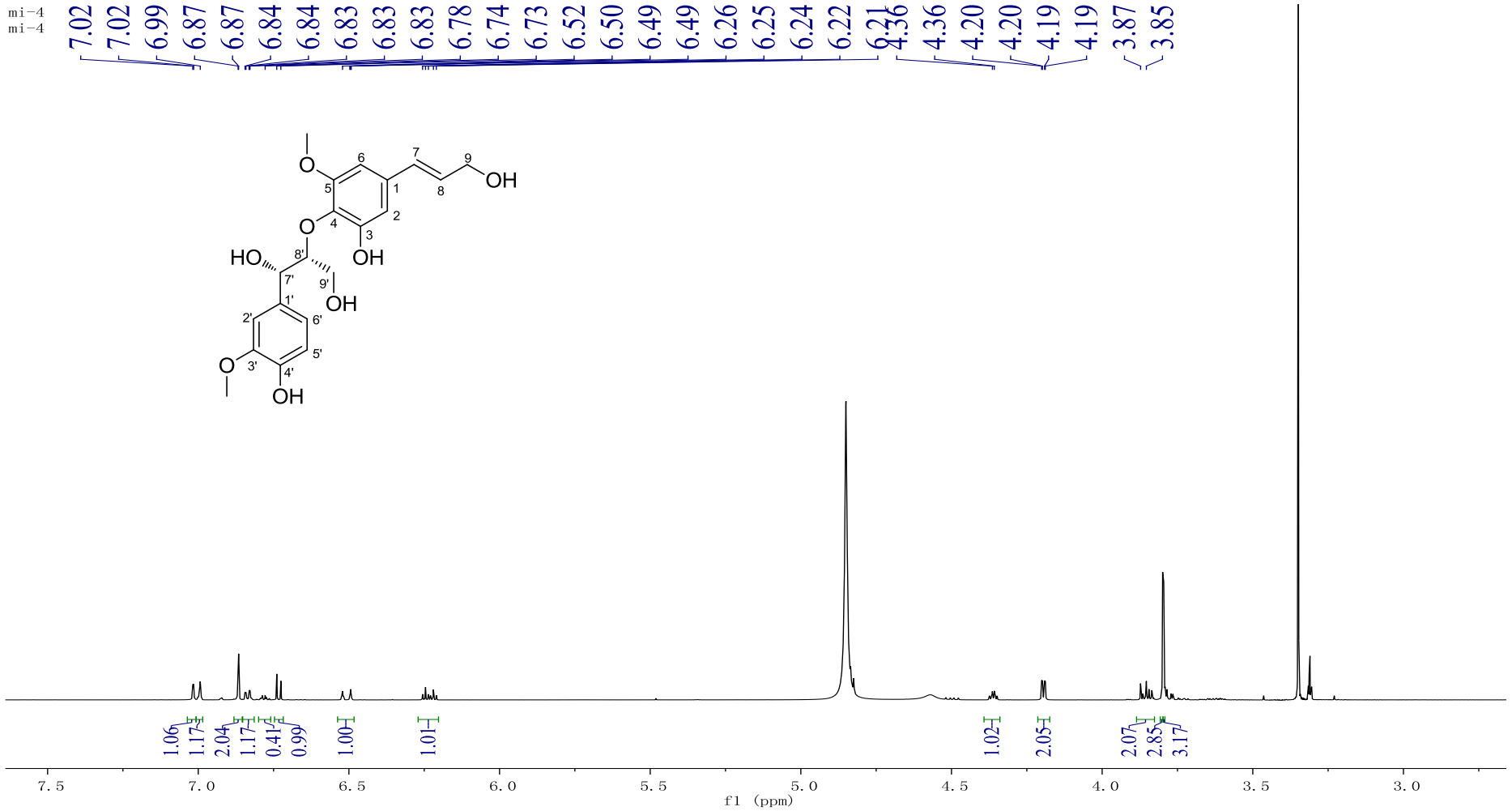

Figure S21. ^{13}C NMR (150 MHz, $CDCl_3$) spectrum of **6**

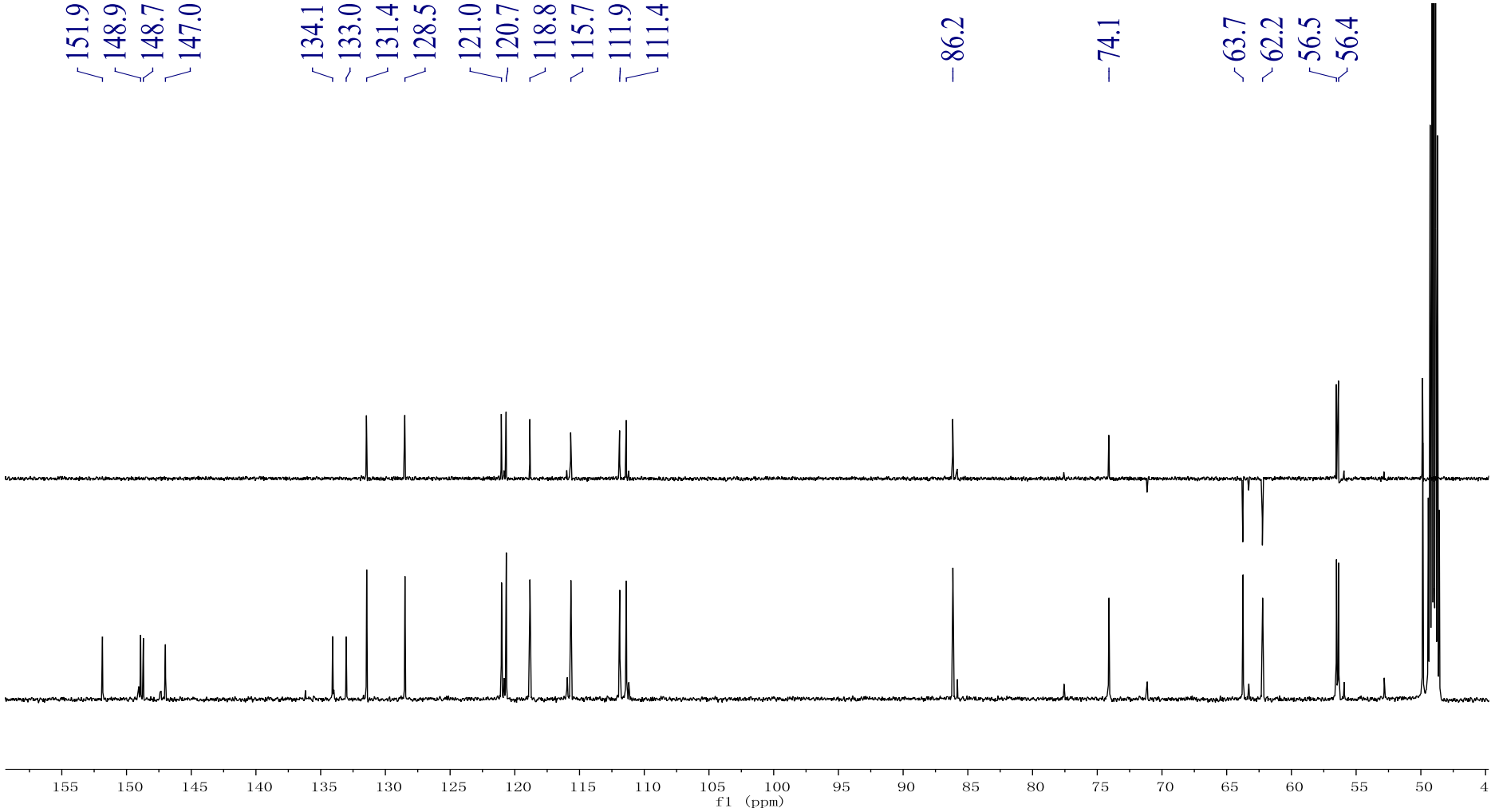

Figure S22. ^{1}H NMR (600 MHz, $CDCl_3$) spectrum of **7**

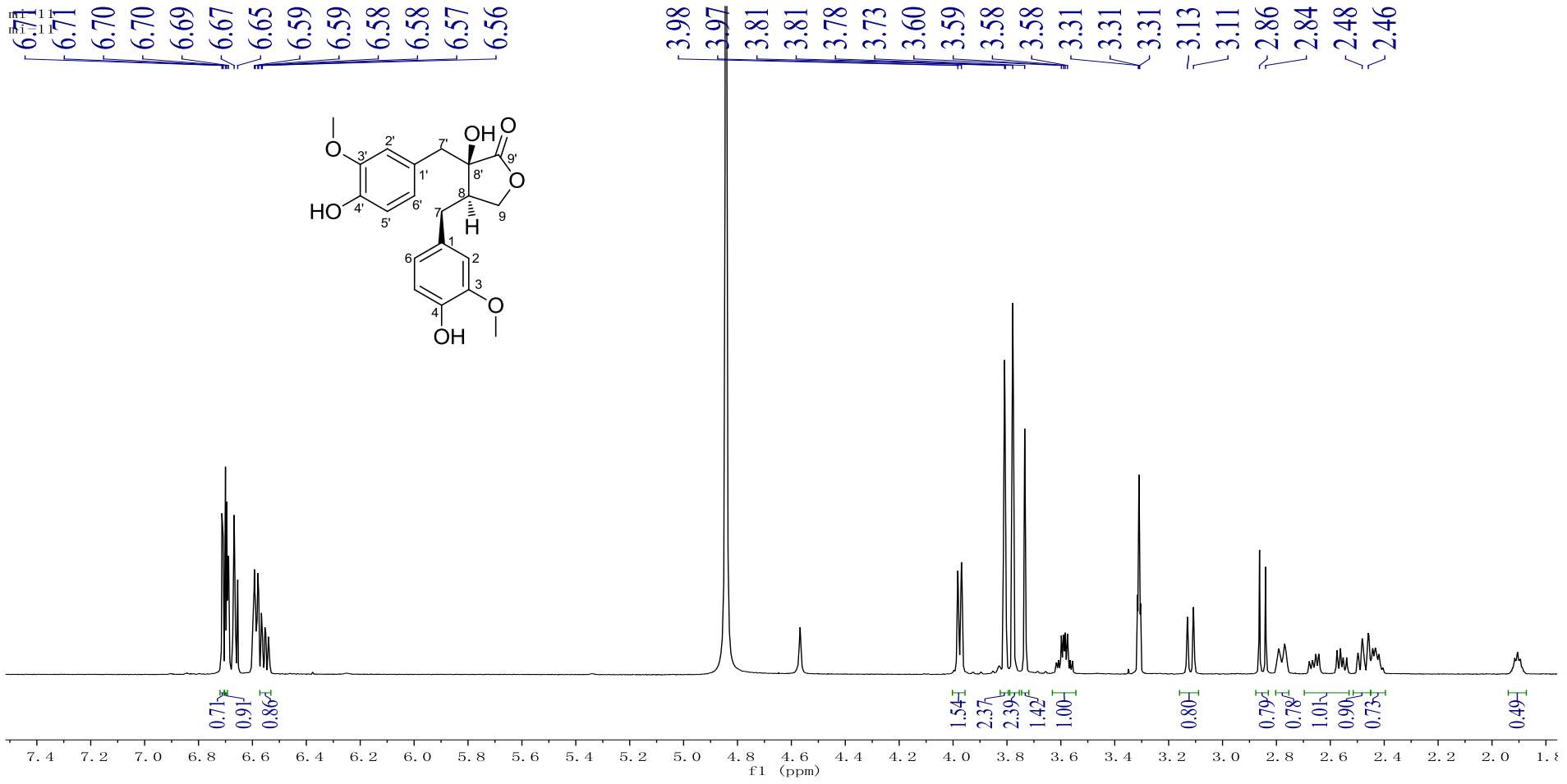

Figure S23. ^{13}C NMR (150 MHz, $CDCl_3$) spectrum of **7**

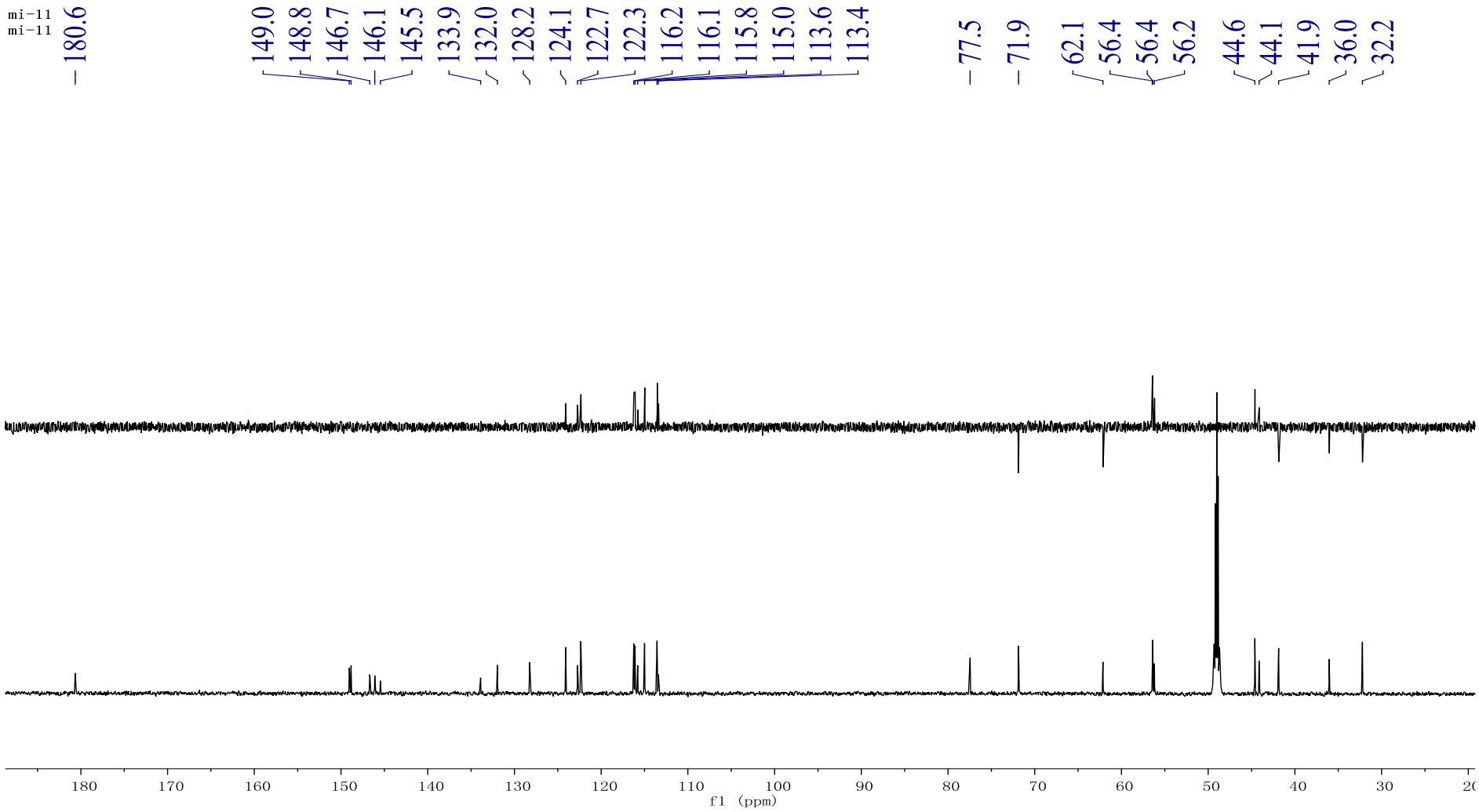

Figure S24. ^{1}H NMR (600 MHz, $CDCl_3$) spectrum of **8**

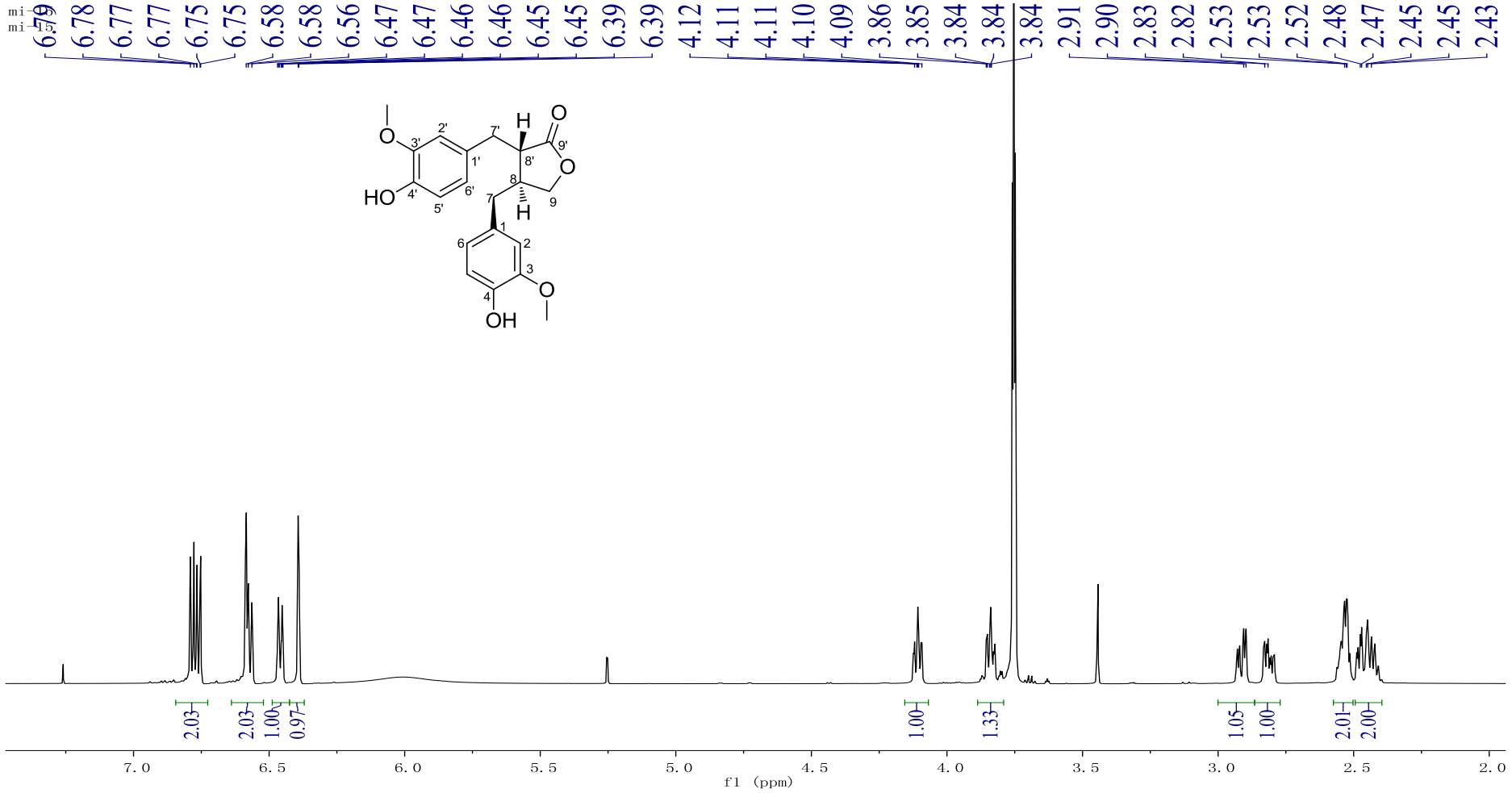

Figure S25. ^{13}C NMR (150 MHz, $CDCl_3$) spectrum of **8**

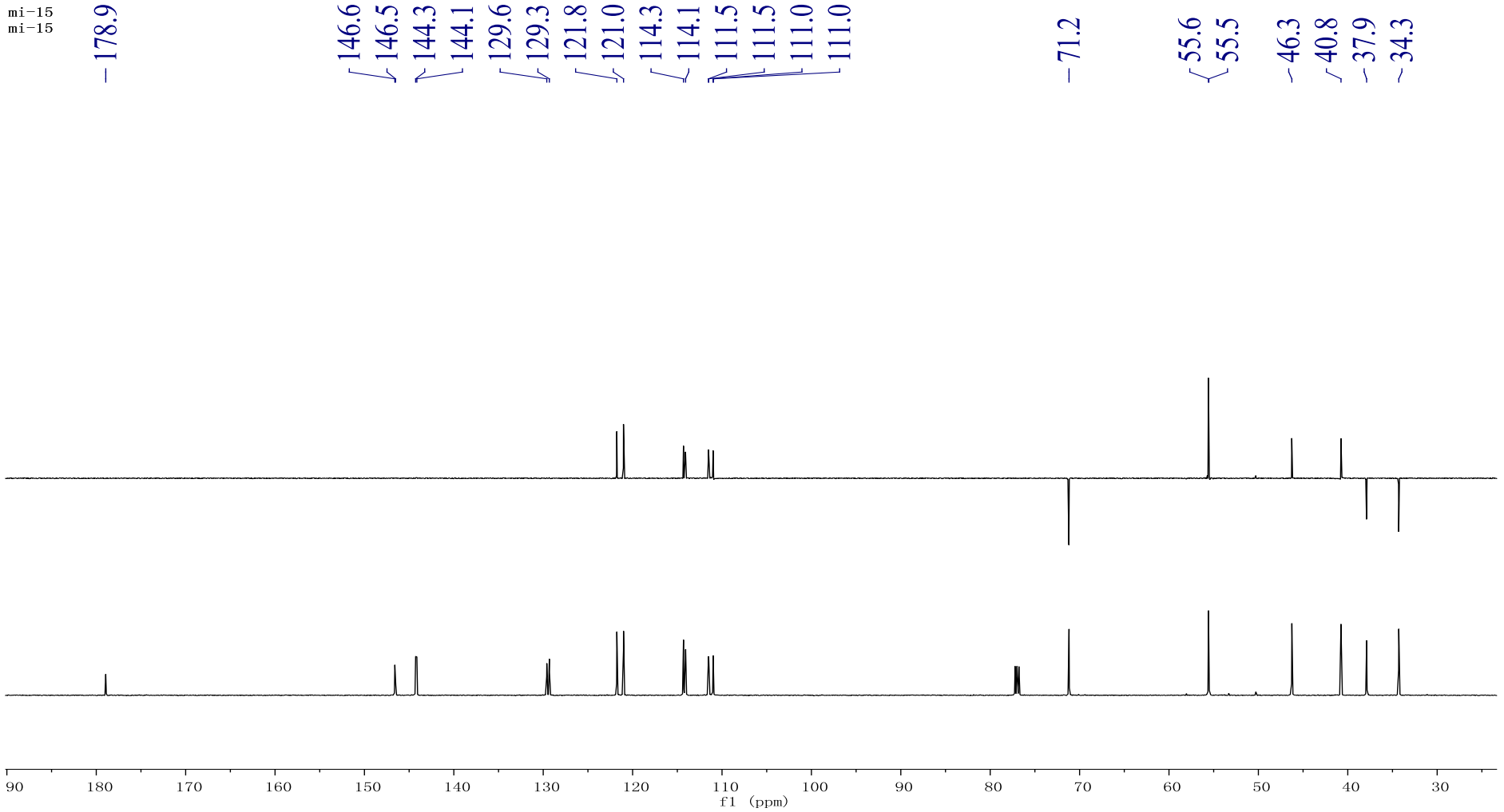

Figure S26. ^{1}H NMR (600 MHz, $CDCl_3$) spectrum of **9**

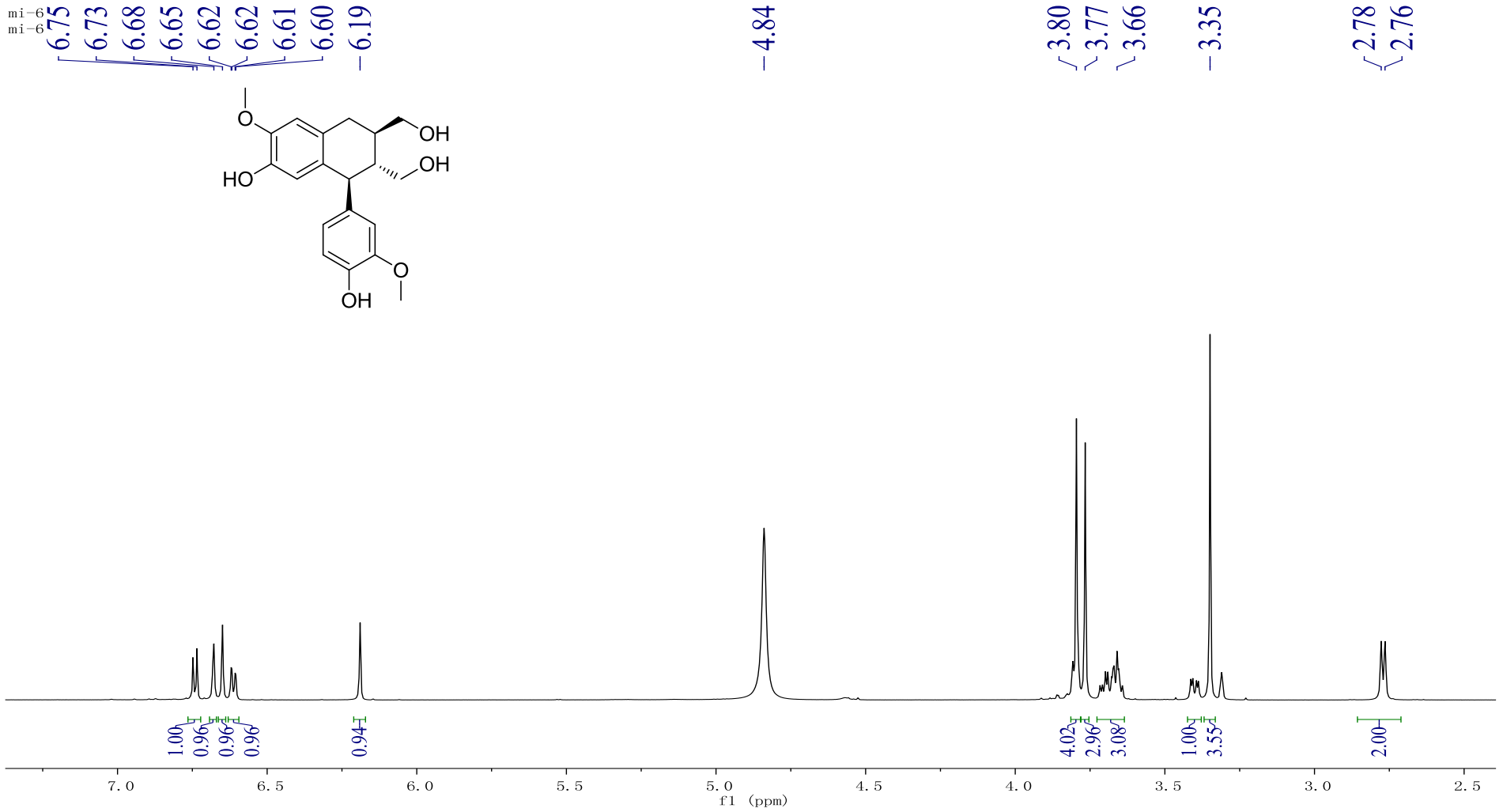

Figure S27. ^{13}C NMR (150 MHz, $CDCl_3$) spectrum of **9**

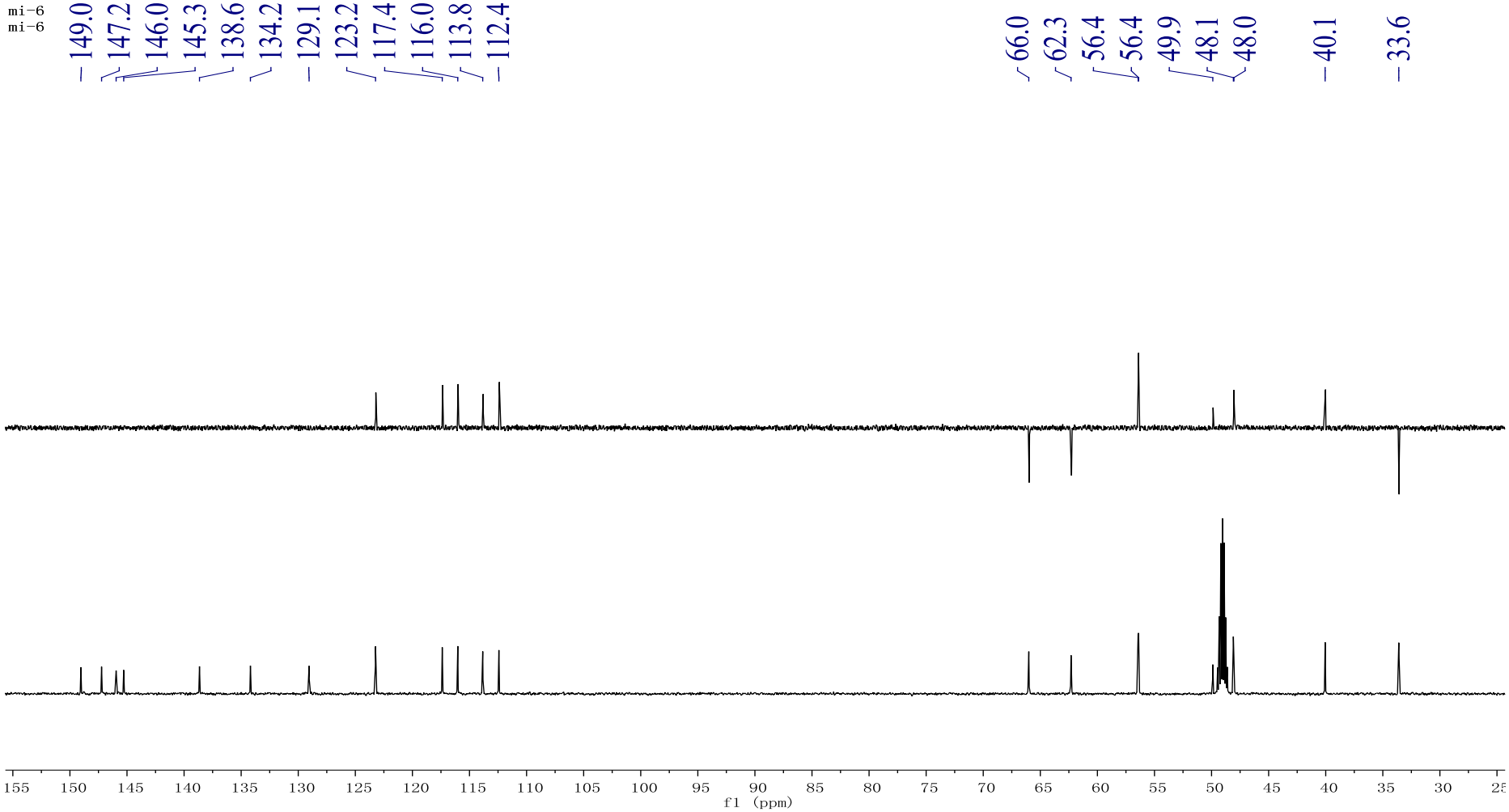

Figure S28. ^{1}H NMR (600 MHz, $CDCl_3$) spectrum of **10**

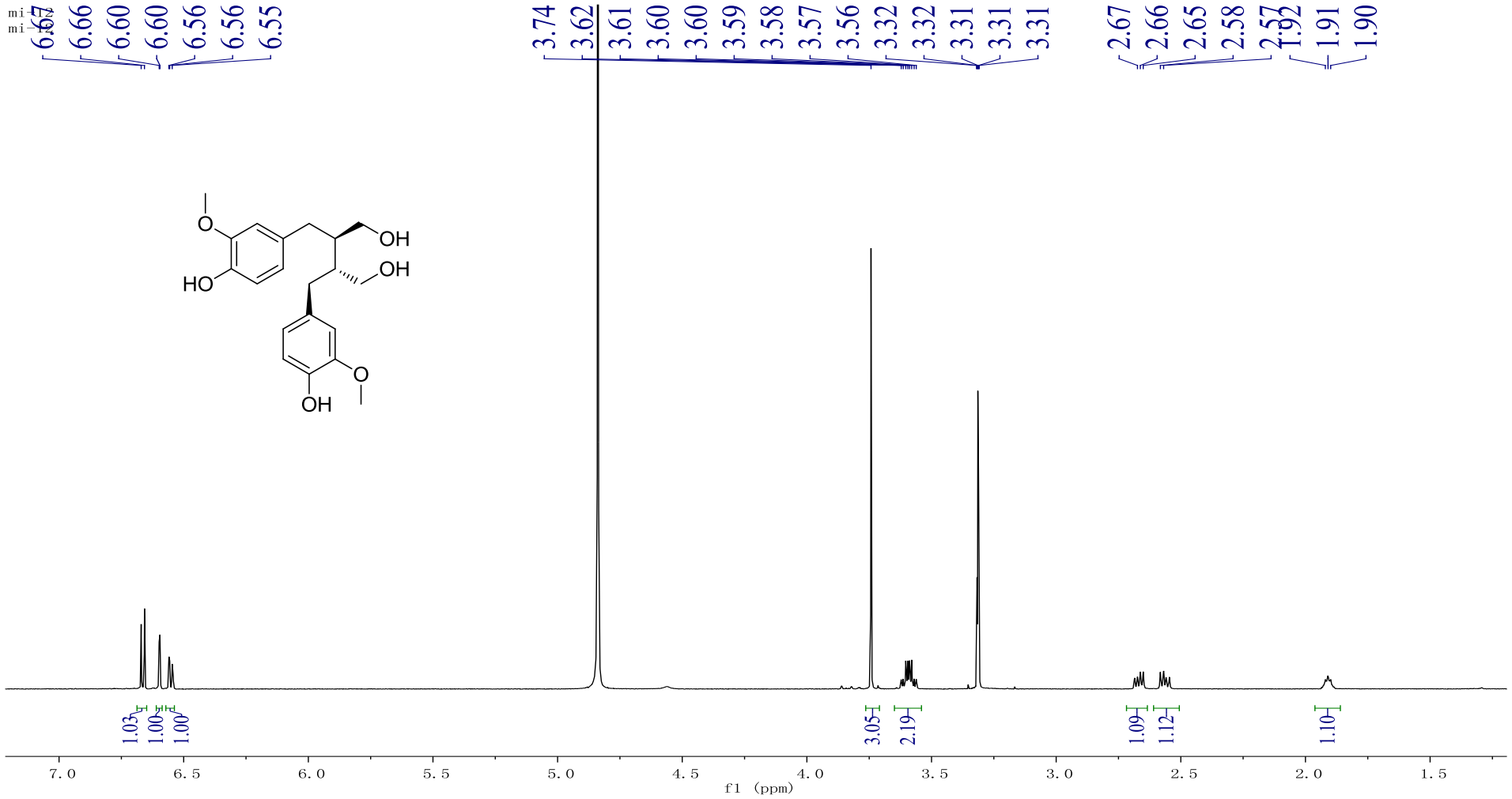

Figure S29. ^{13}C NMR (150 MHz, $CDCl_3$) spectrum of **10**

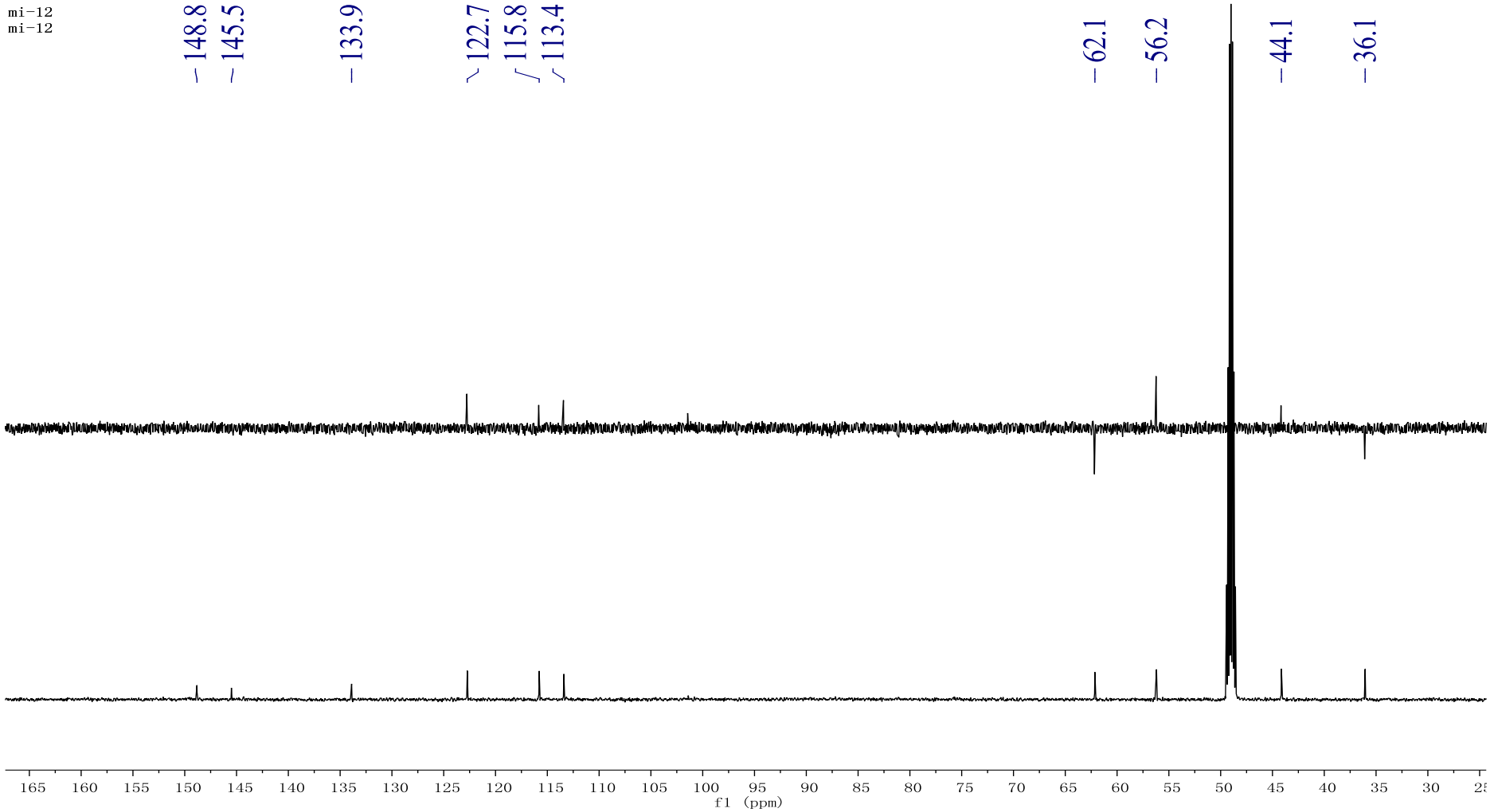

Figure S30. ^{1}H NMR (600 MHz, $CDCl_3$) spectrum of **11**

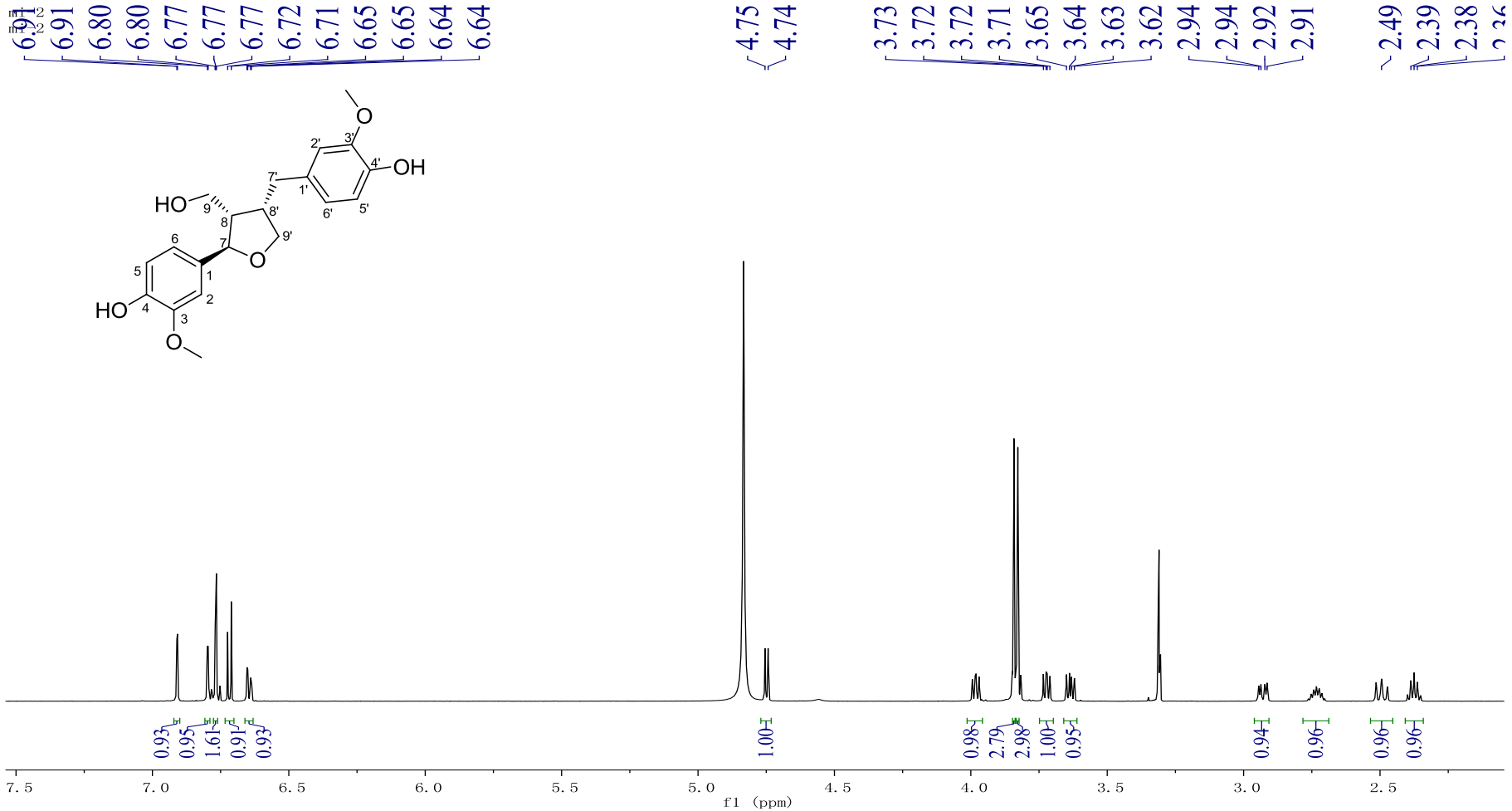

Figure S31. ^{13}C NMR (150 MHz, $CDCl_3$) spectrum of **11**

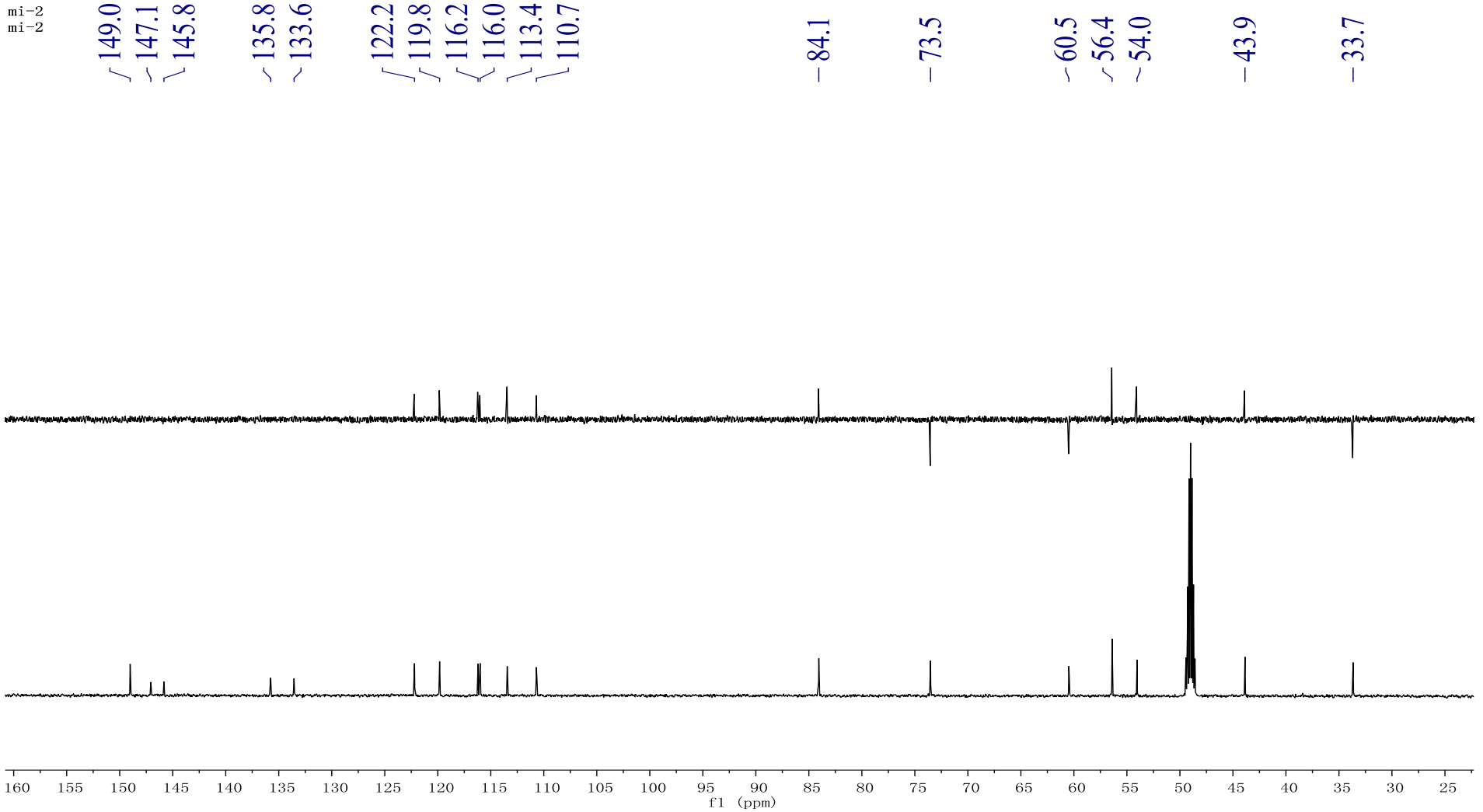

Figure S32. ^{1}H NMR (600 MHz, $CDCl_3$) spectrum of **12**

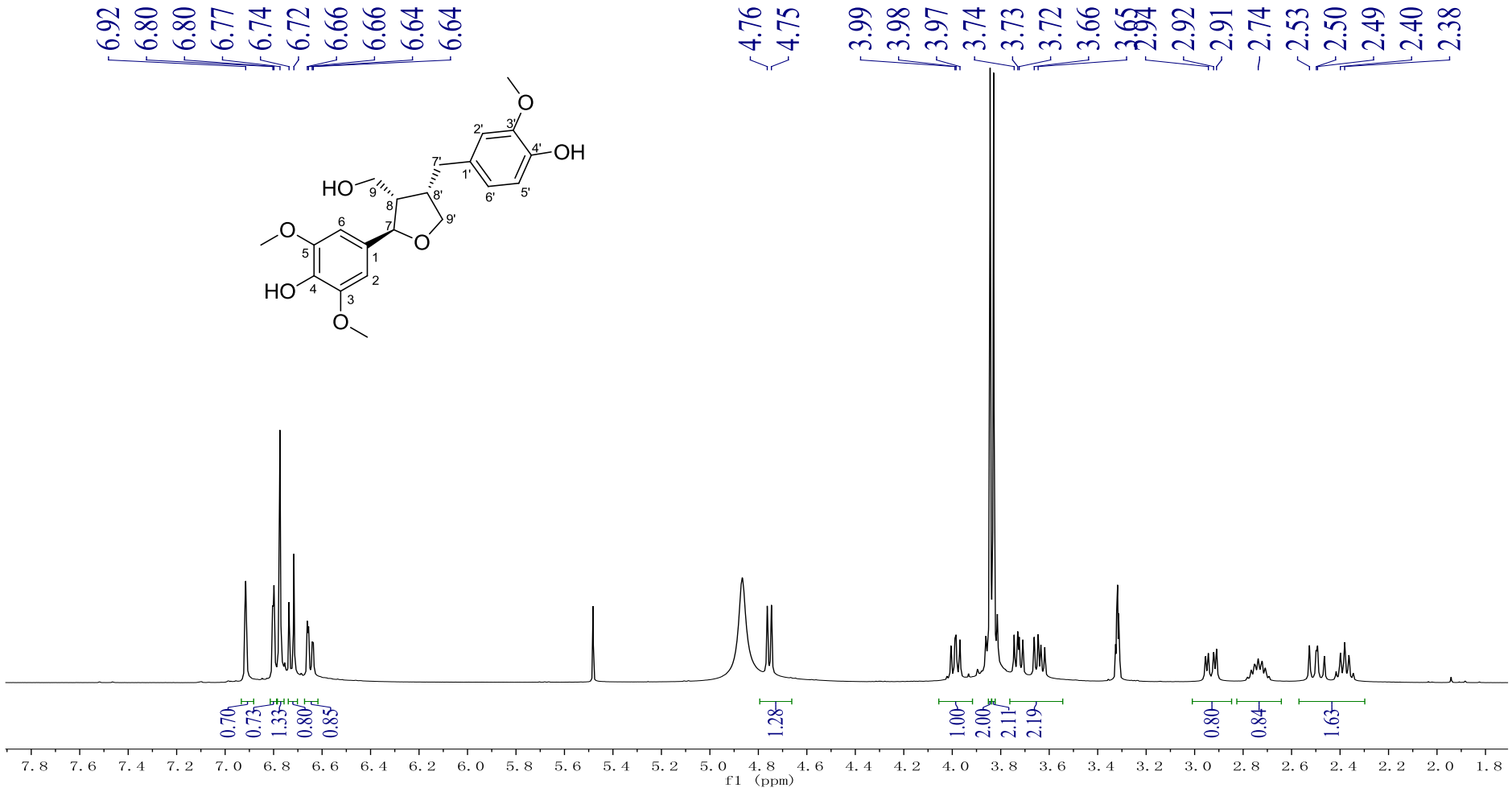

Figure S33. ^{13}C NMR (150 MHz, $CDCl_3$) spectrum of **12**

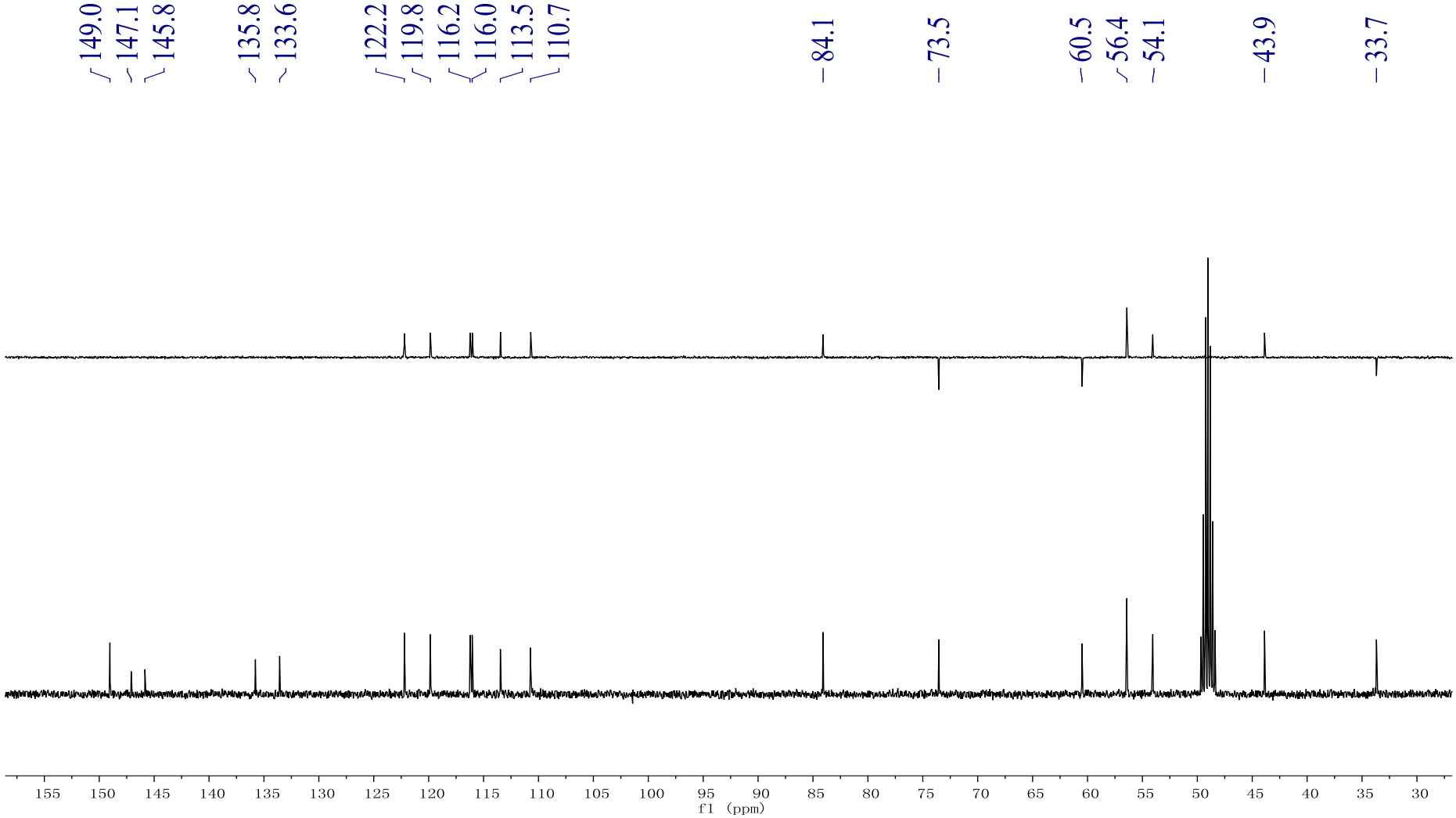

Figure S34. ^{1}H NMR (600 MHz, $CDCl_3$) spectrum of **13**

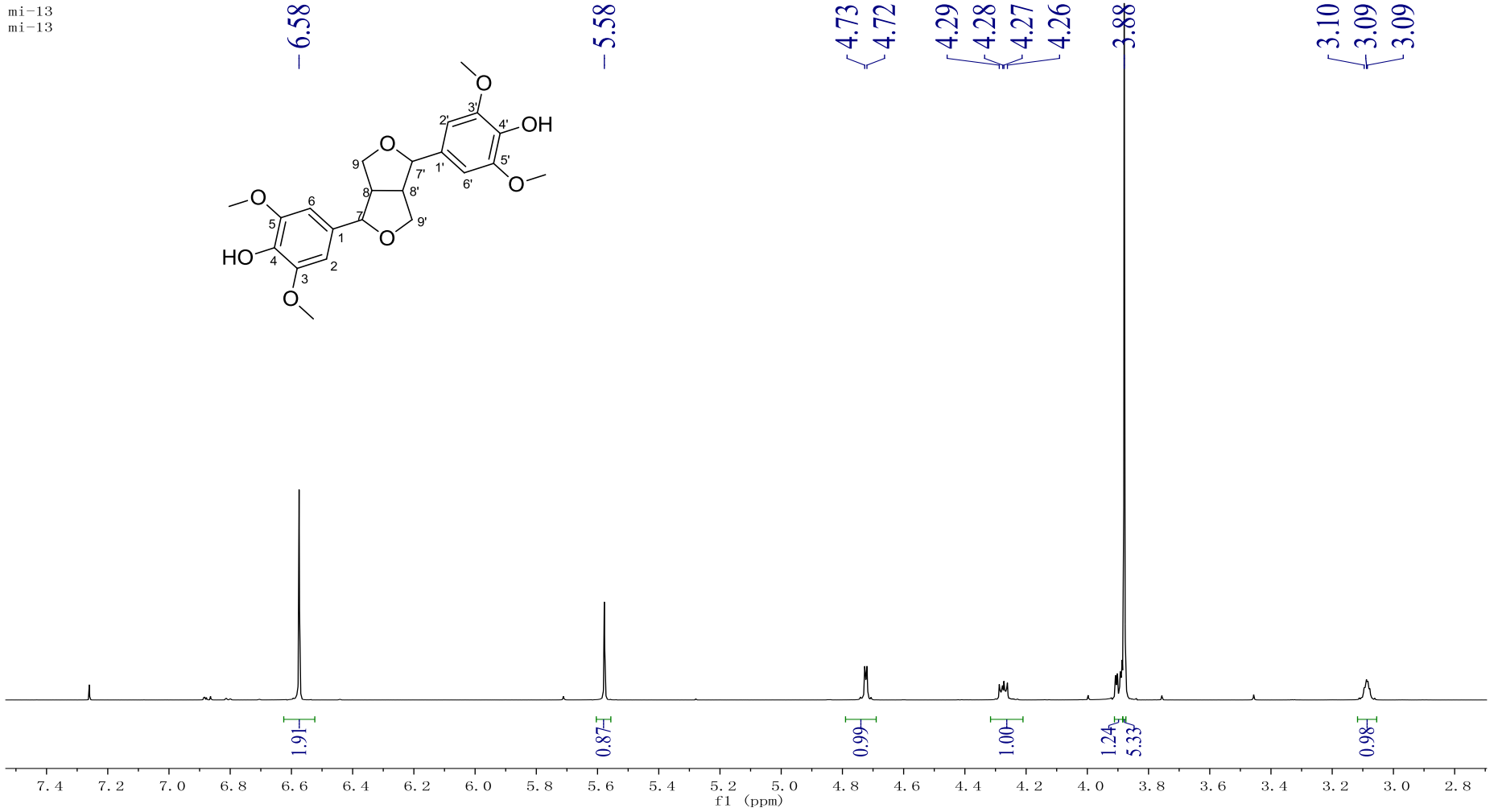

Figure S35. ^{13}C NMR (150 MHz, $CDCl_3$) spectrum of **13**

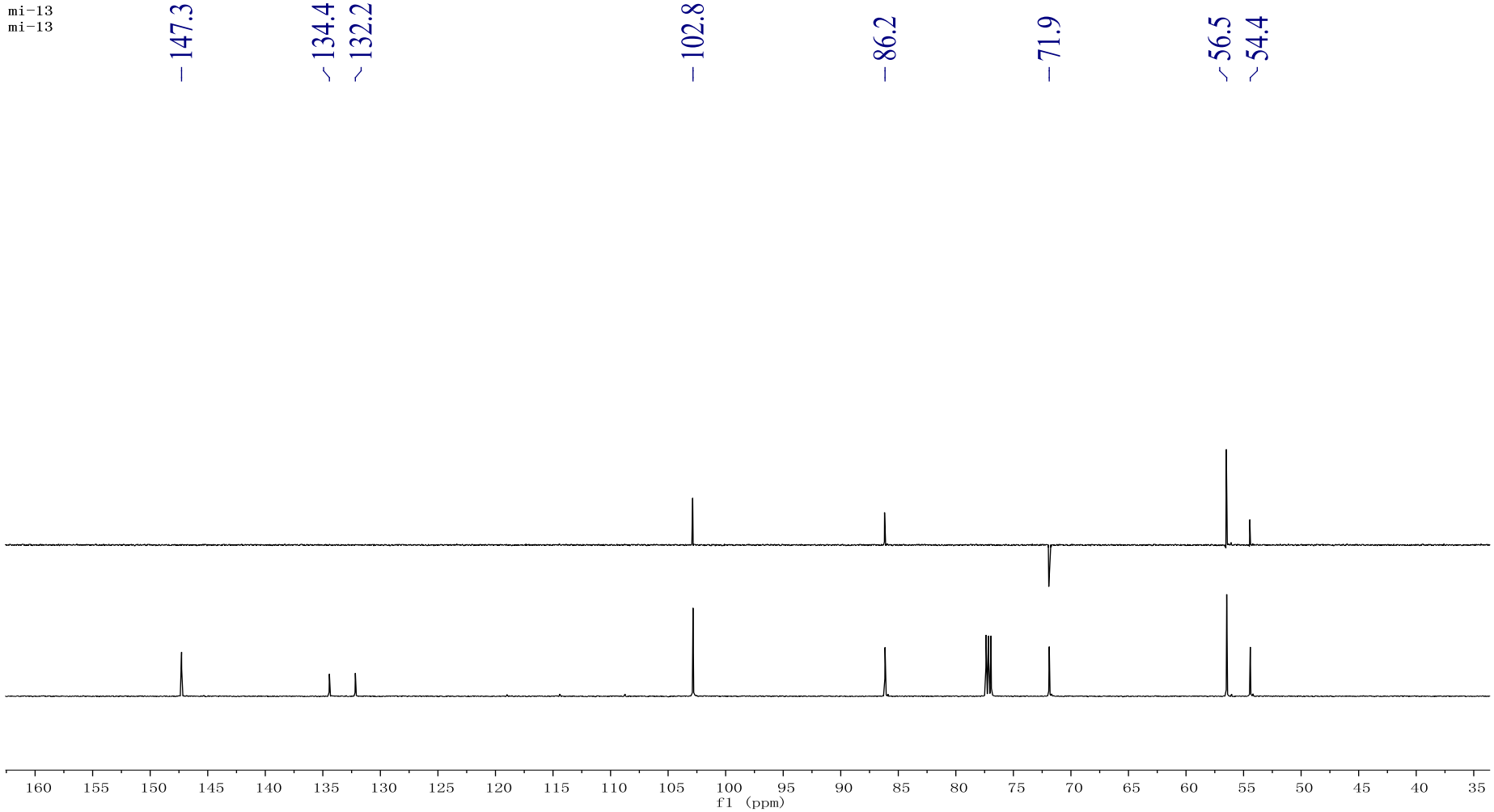

Figure S36. ^{1}H NMR (600 MHz, $CDCl_3$) spectrum of **14**

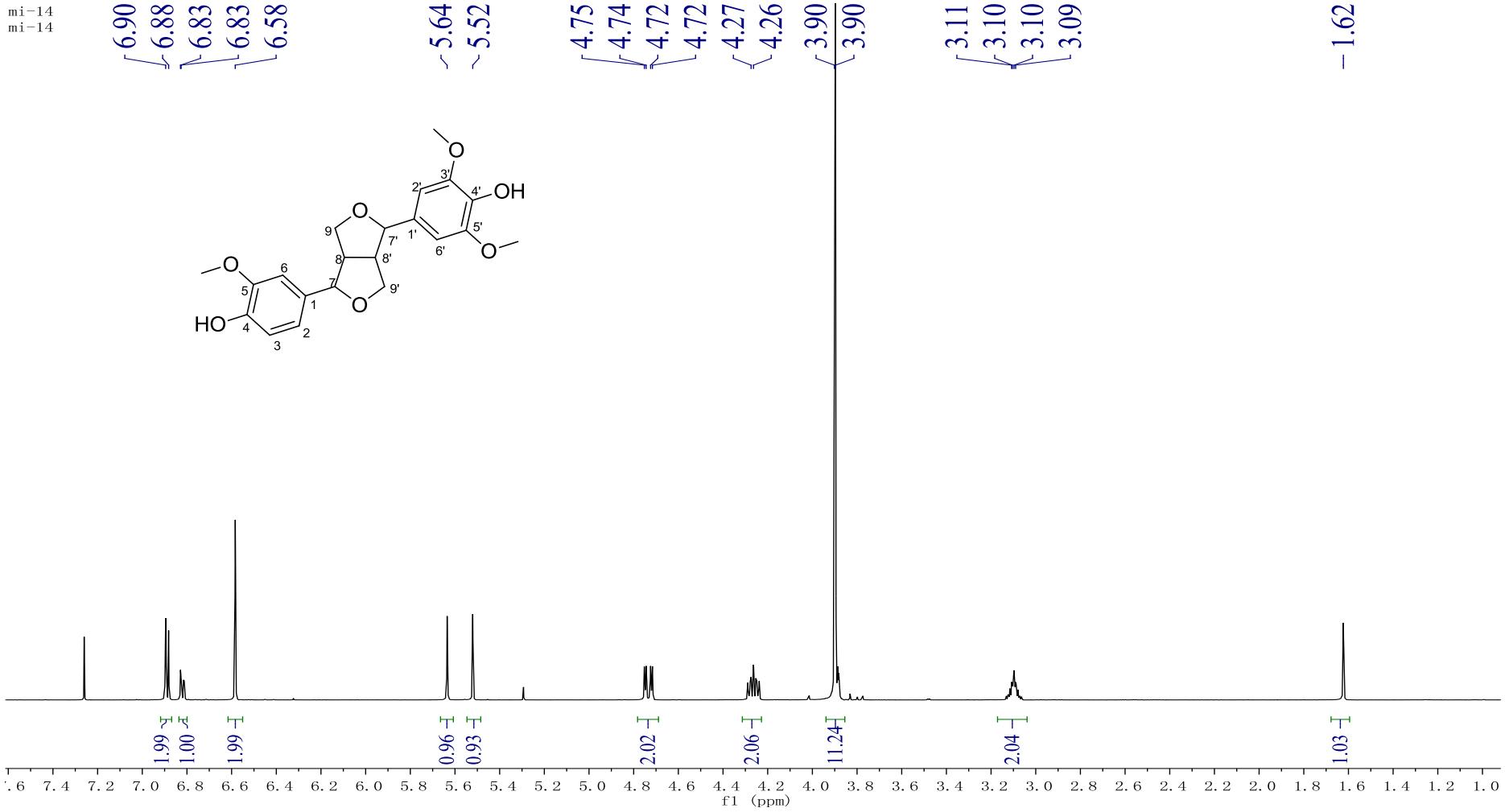

Figure S37. ^{13}C NMR (150 MHz, $CDCl_3$) spectrum of **14**

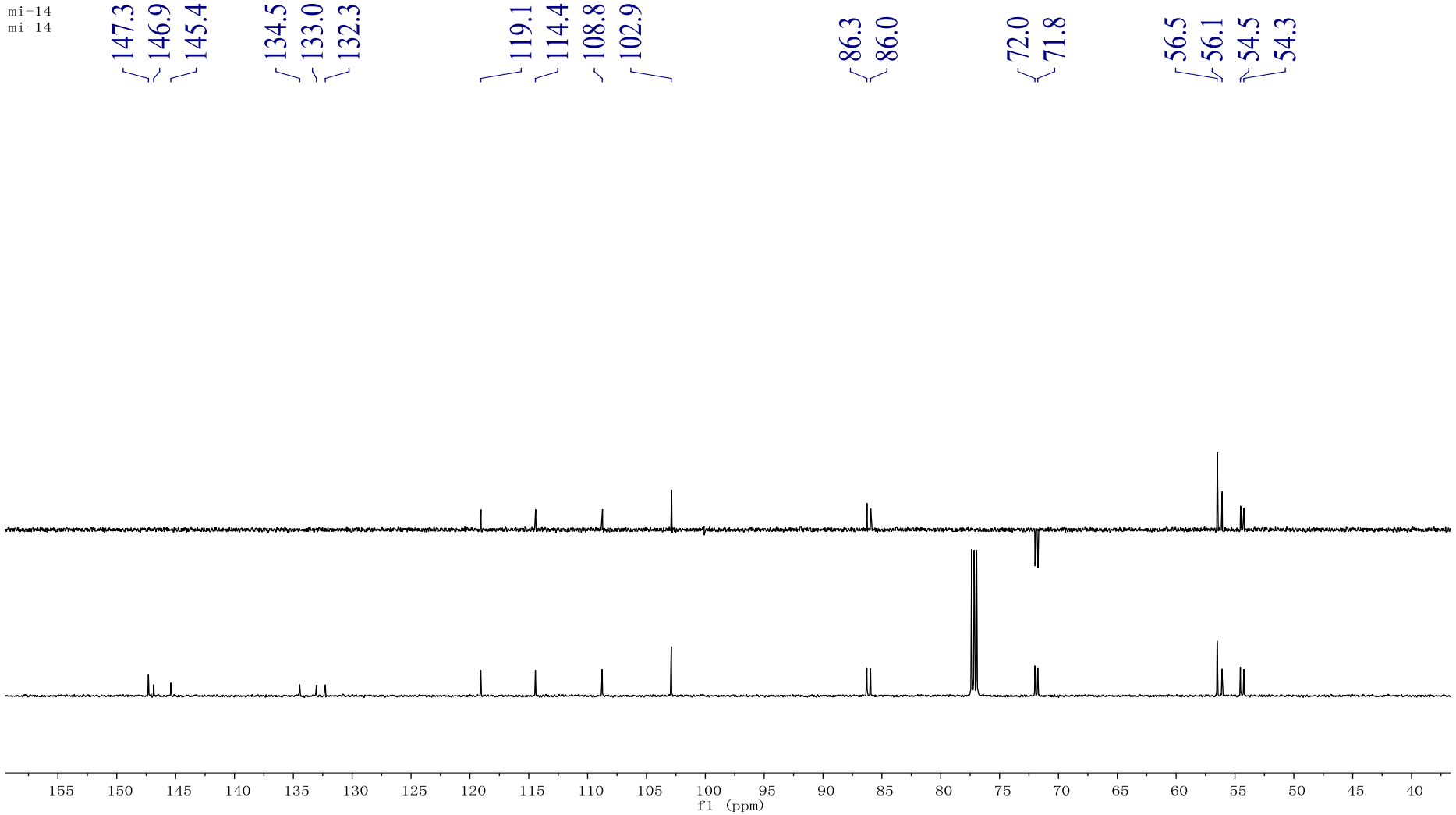

Figure S38. ^{1}H NMR (600 MHz, $CDCl_3$) spectrum of **15**

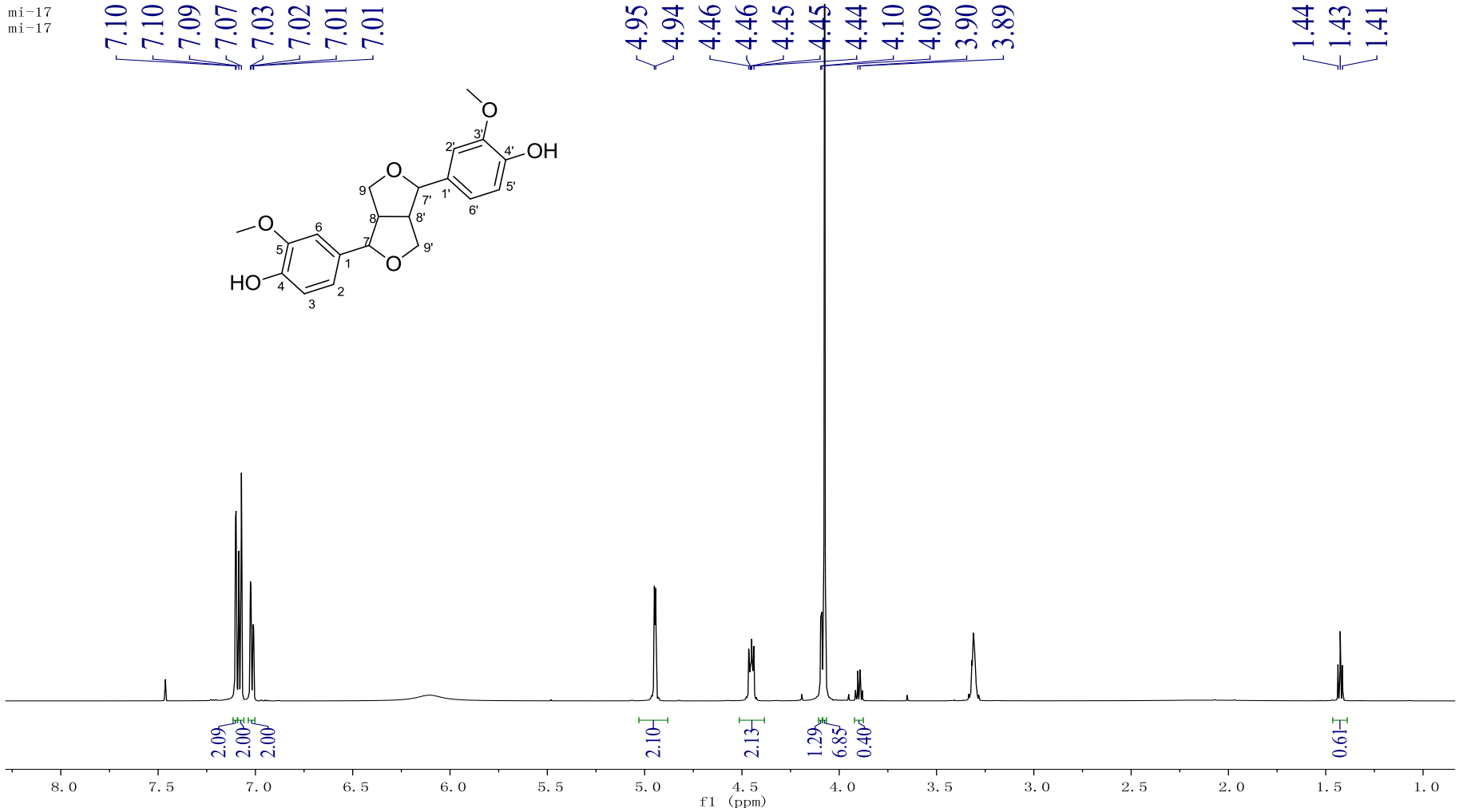

Figure S39. ^{13}C NMR (150 MHz, $CDCl_3$) spectrum of **15**