

Supplementary Information

Synthesis and evaluation of analogs of tetracyclic *Ganoderma* alkaloids as inhibitors of the enzyme α -glucosidase

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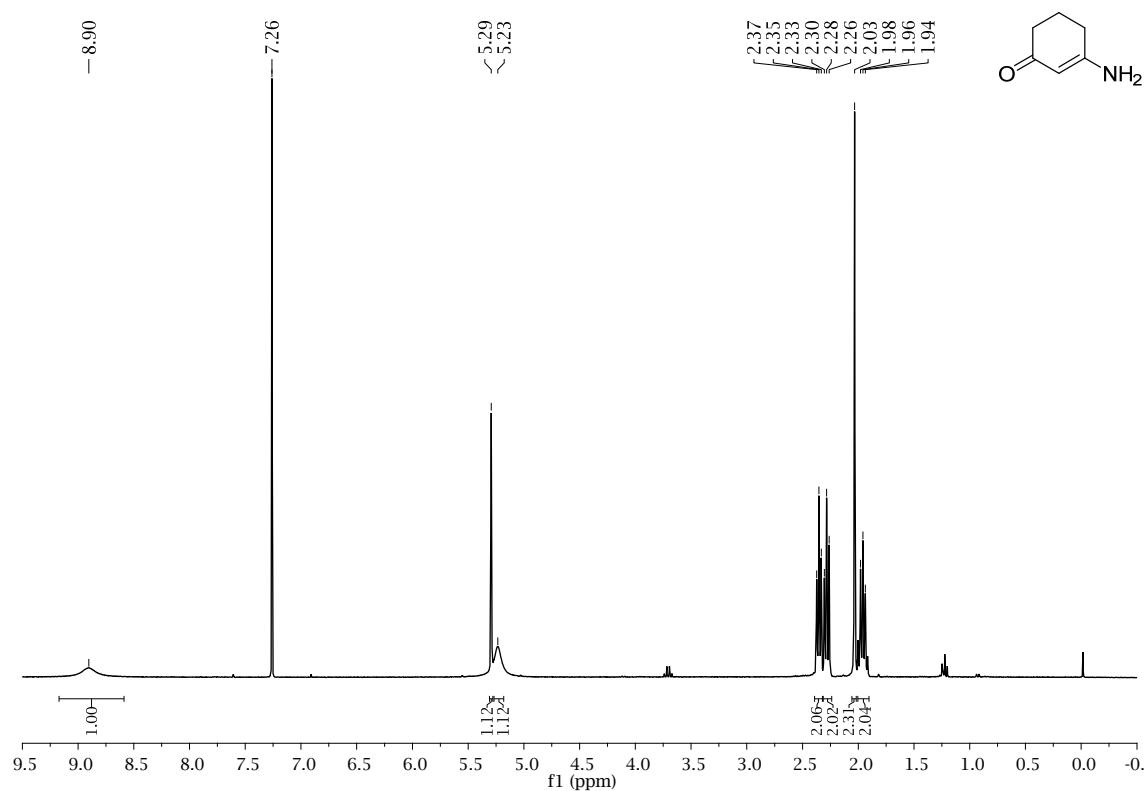


Figure S1. ¹H NMR (300 MHz) spectrum of **3** in CDCl₃.

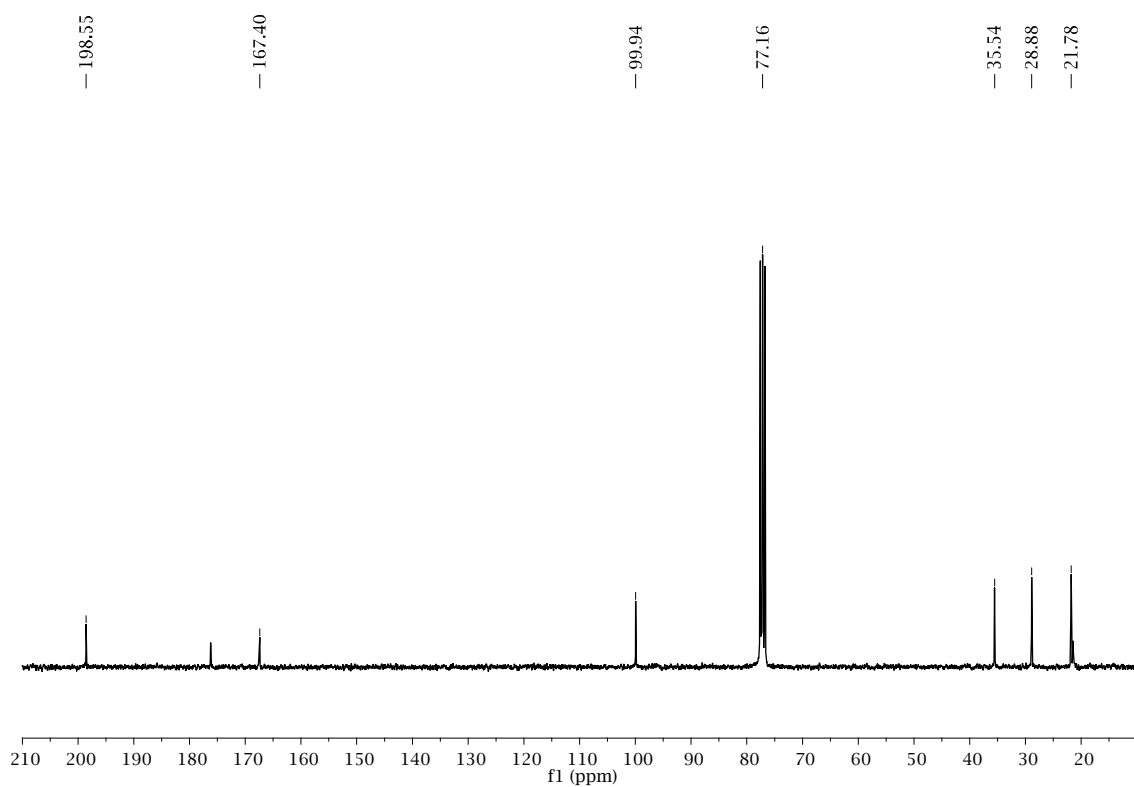


Figure S2. ¹³C NMR (75 MHz) spectrum of **3** in CDCl₃.

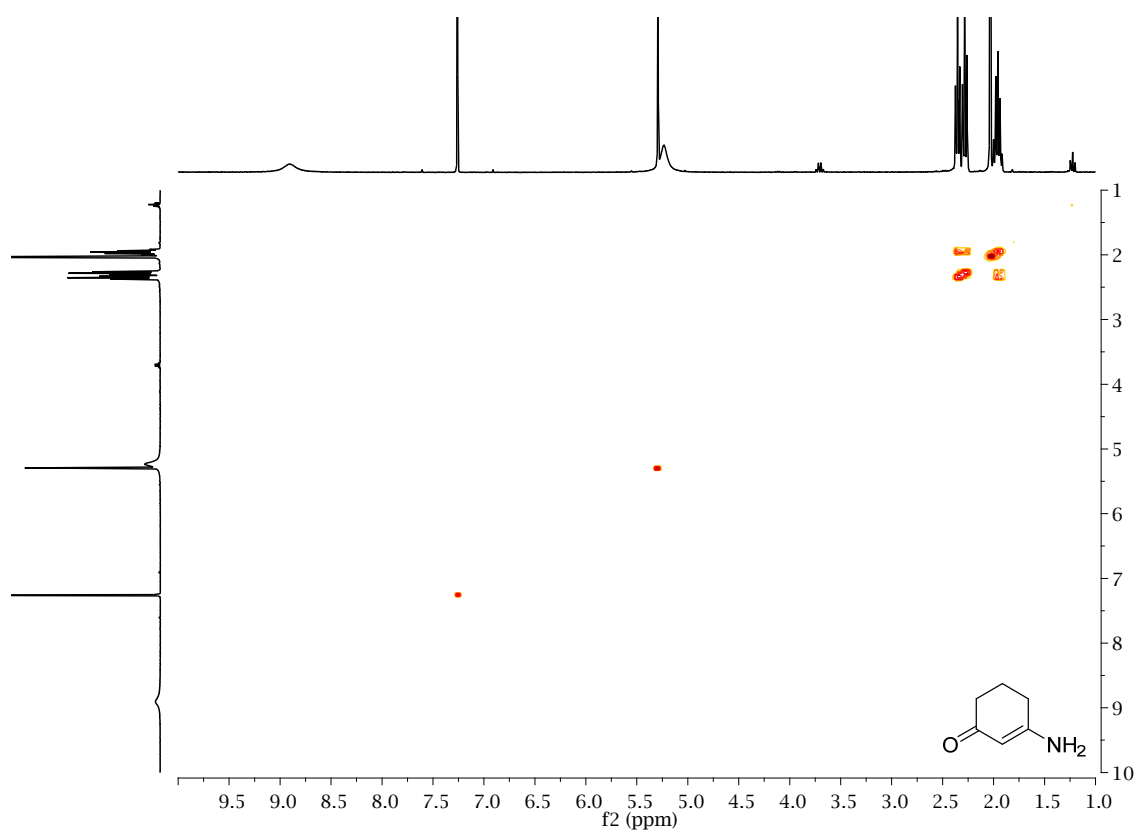


Figure S3. COSY spectrum of **3** in CDCl₃.

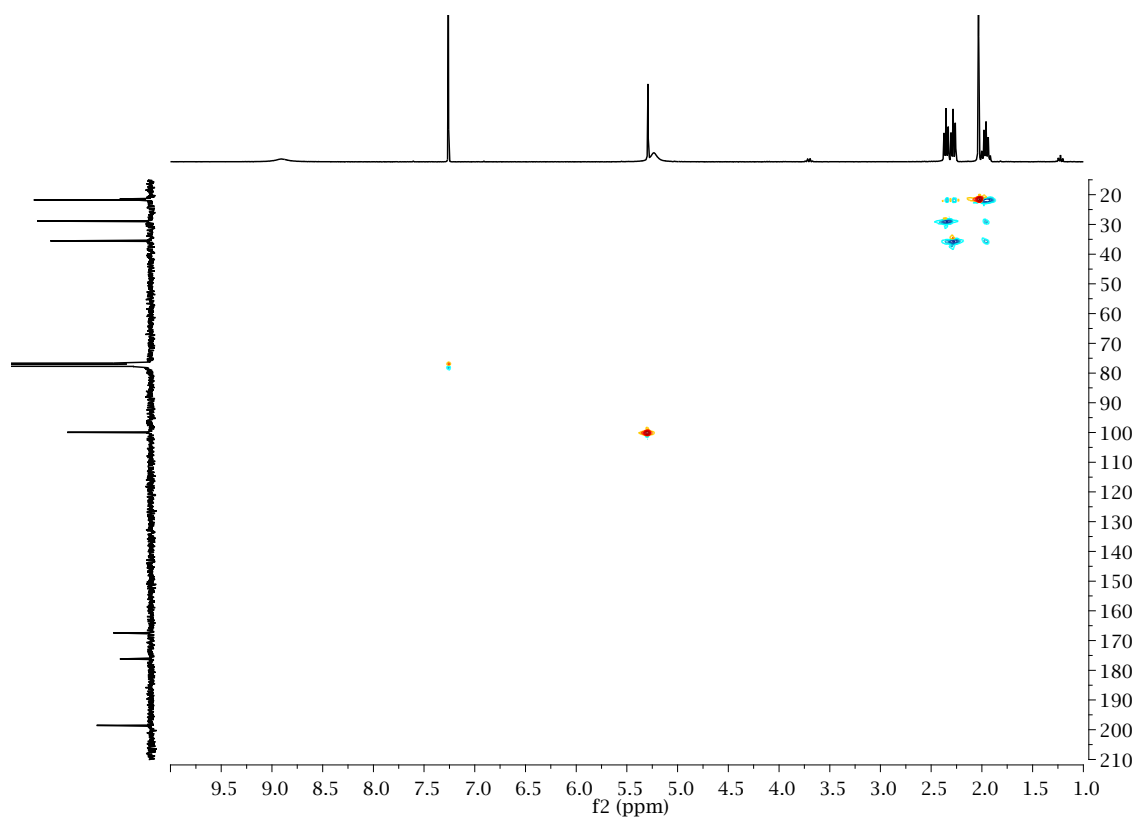


Figure S4. HSQC spectrum of **3** in CDCl₃.

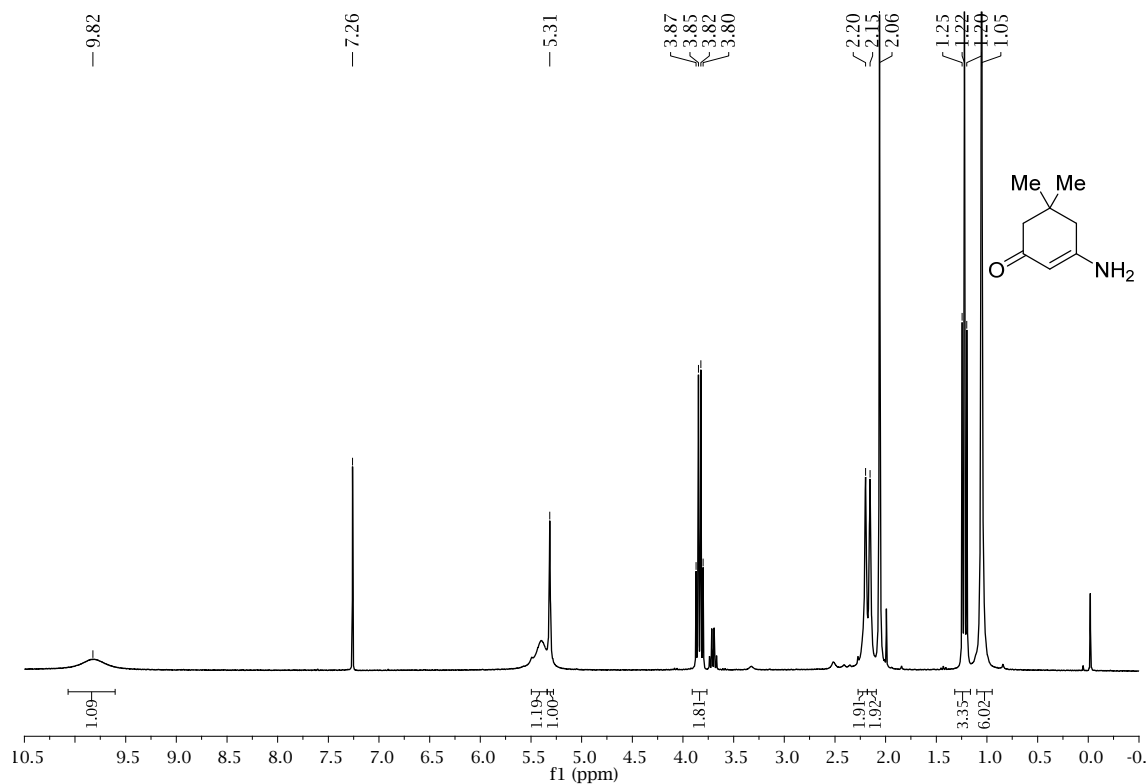


Figure S5. ^1H NMR (300 MHz) spectrum of **3a** in CDCl_3 .

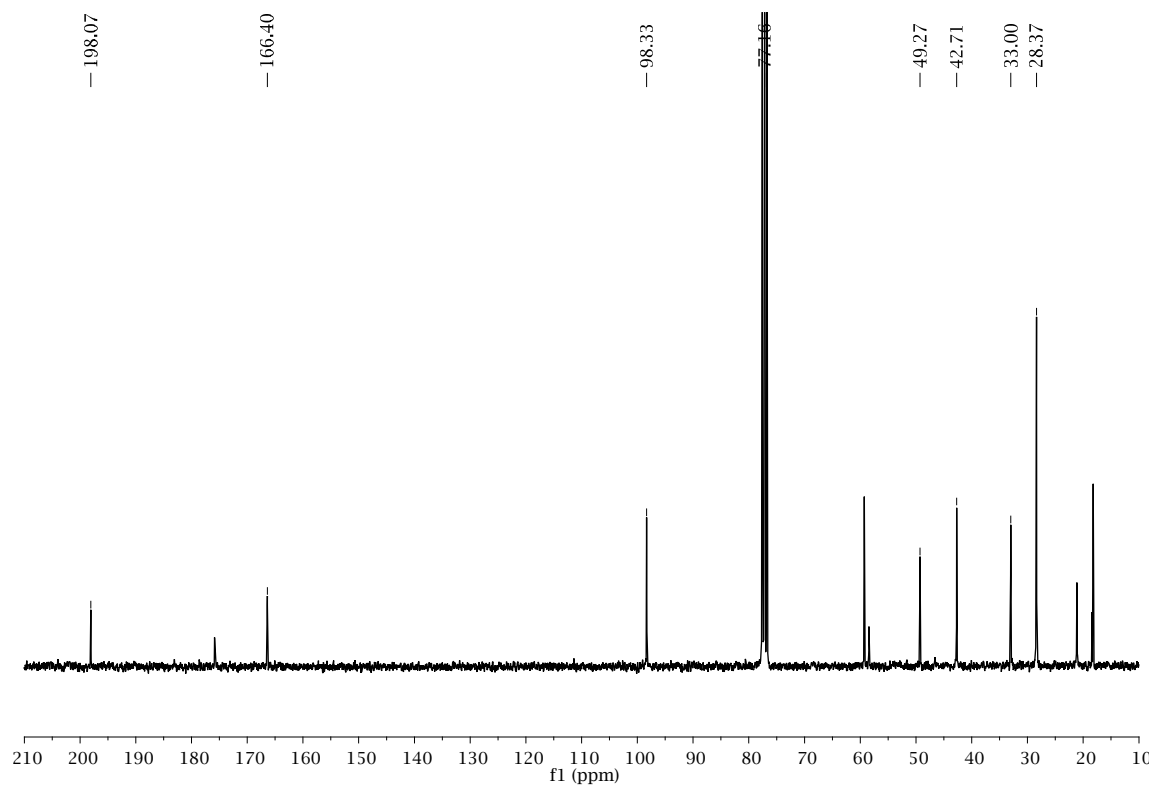


Figure S6. ^{13}C NMR (75 MHz) spectrum of **3a** in CDCl_3 .

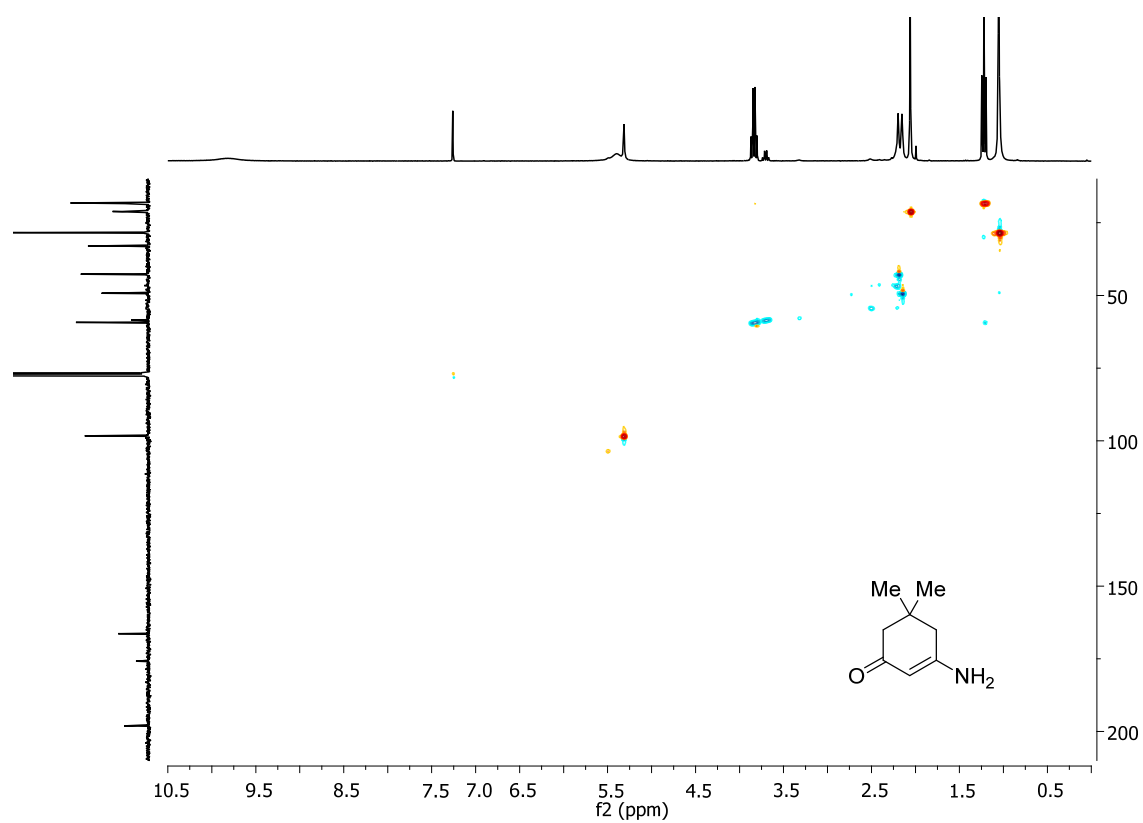


Figure S7. HSQC spectrum of **3a** in CDCl_3 .

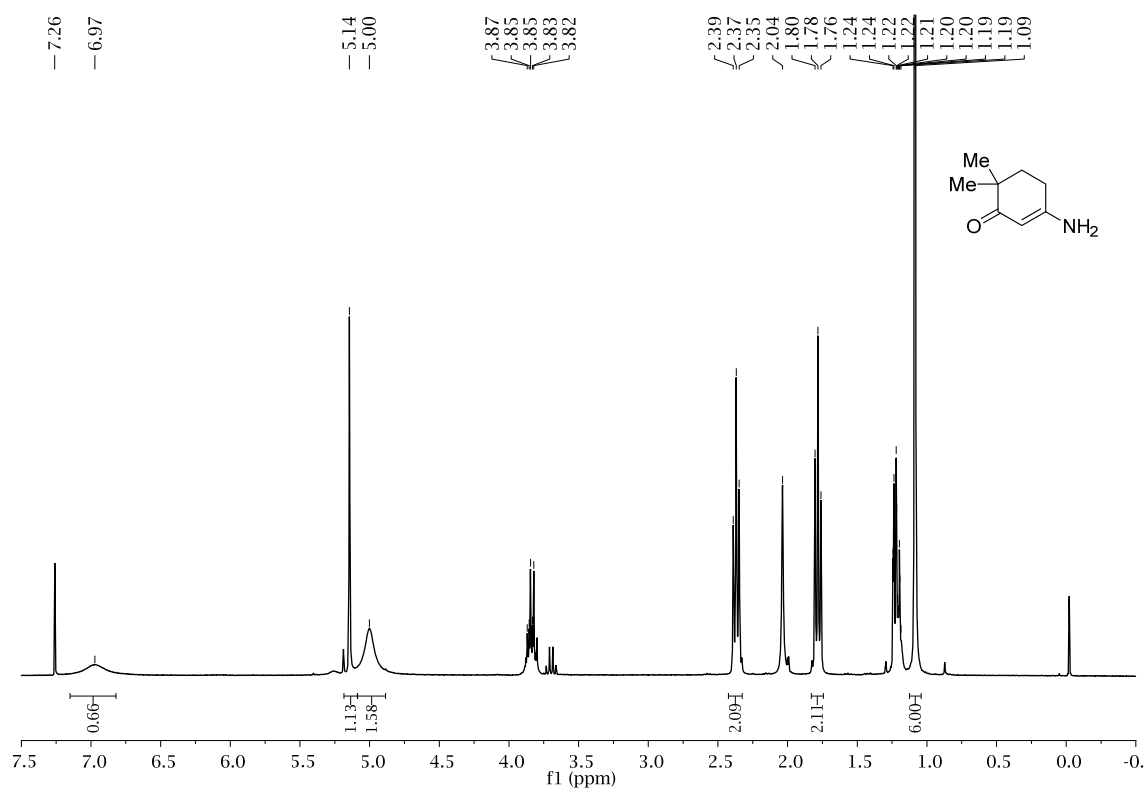


Figure S8. ¹H NMR (300 MHz) spectrum of **3b** in CDCl₃.

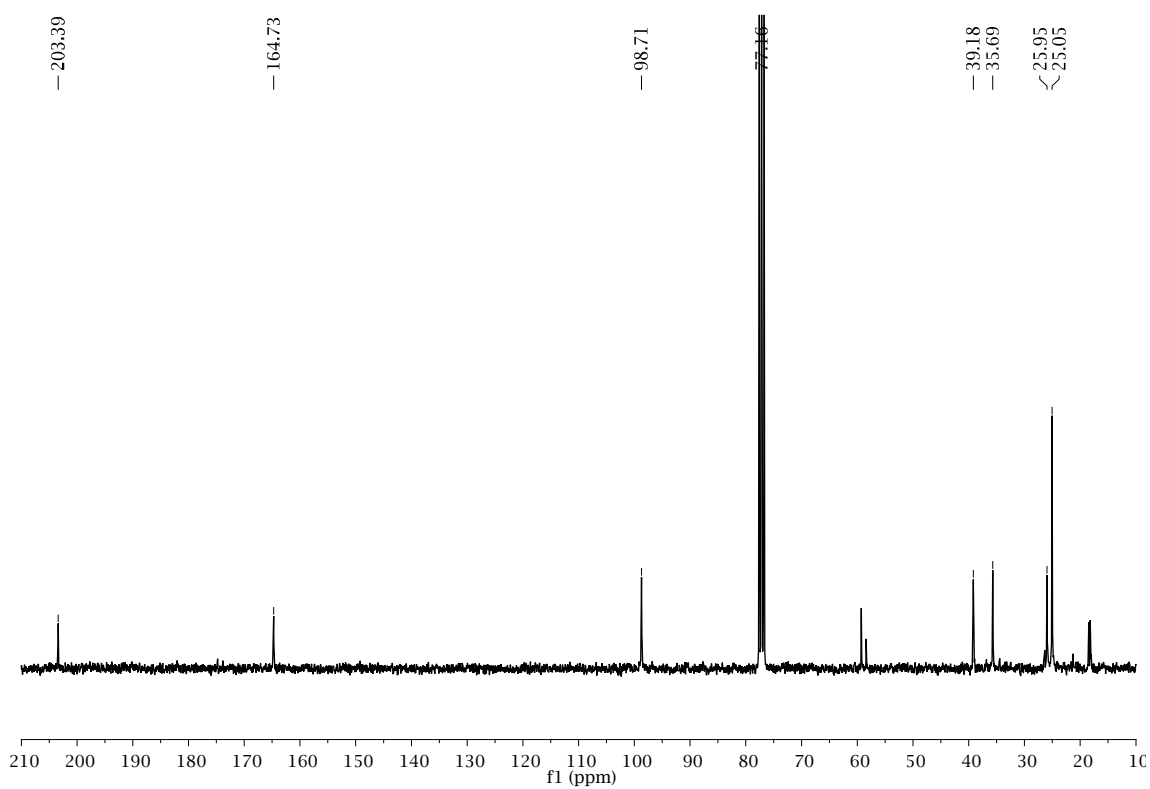


Figure S9. ¹³C NMR (75 MHz) spectrum of **3b** in CDCl₃.

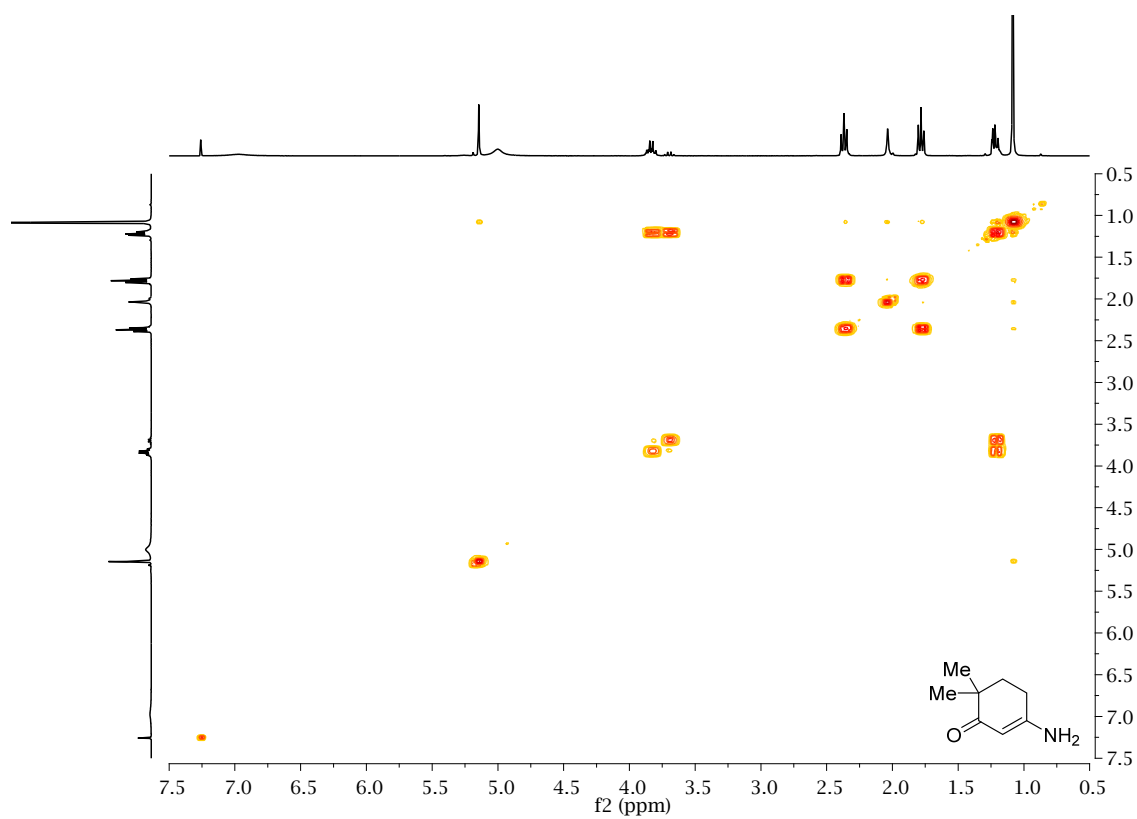


Figure S10. COSY spectrum of **3b** in CDCl₃.

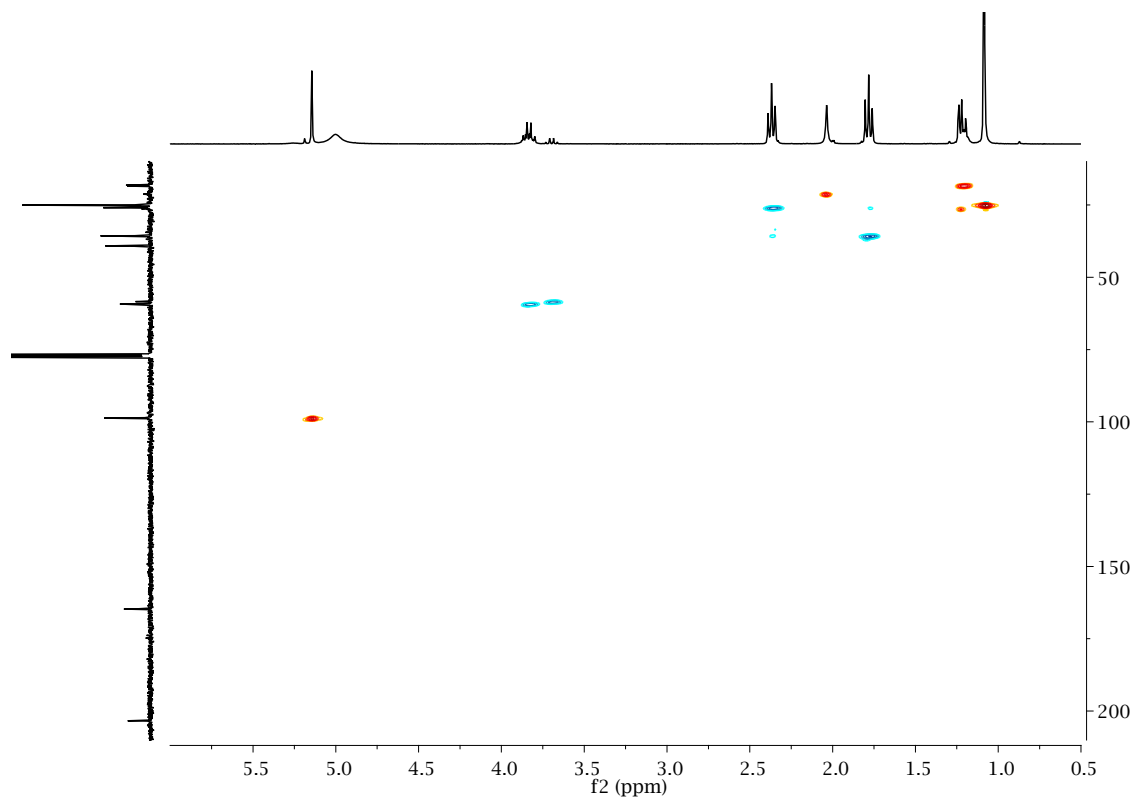


Figure S11. HSQC spectrum of **3b** in CDCl₃.

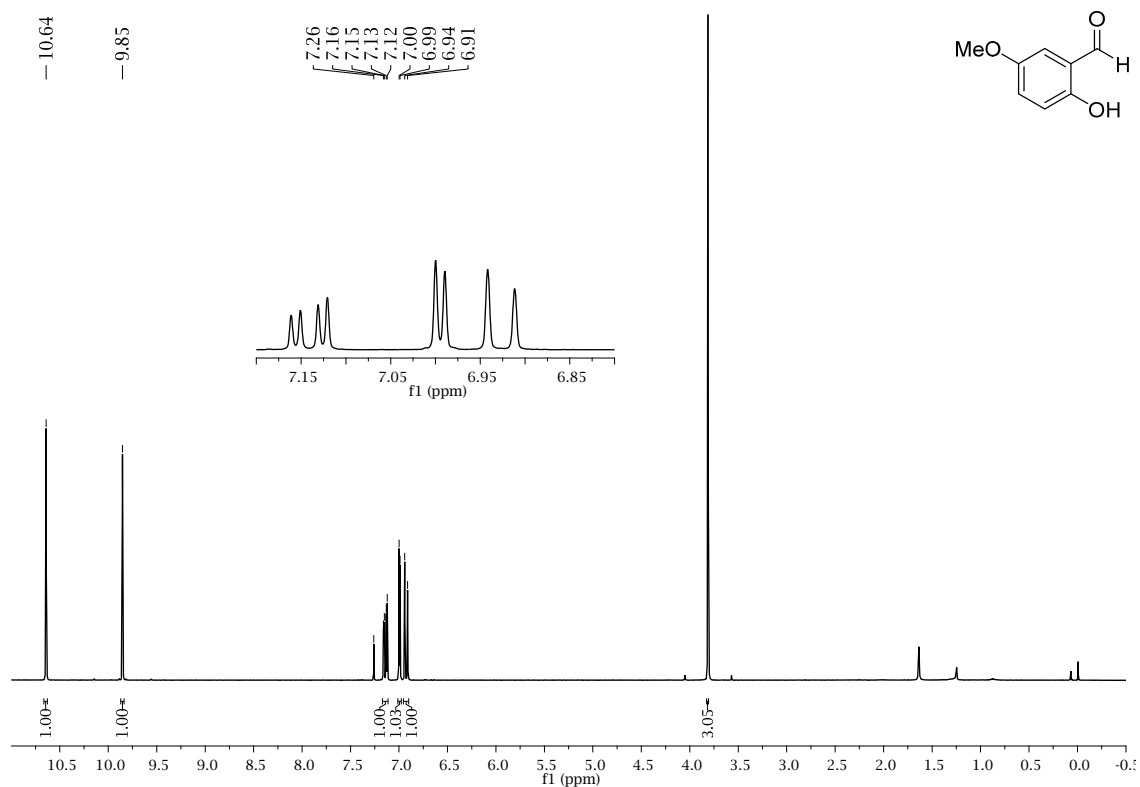


Figure S12. ¹H NMR (300 MHz) spectrum of **9** in CDCl₃.

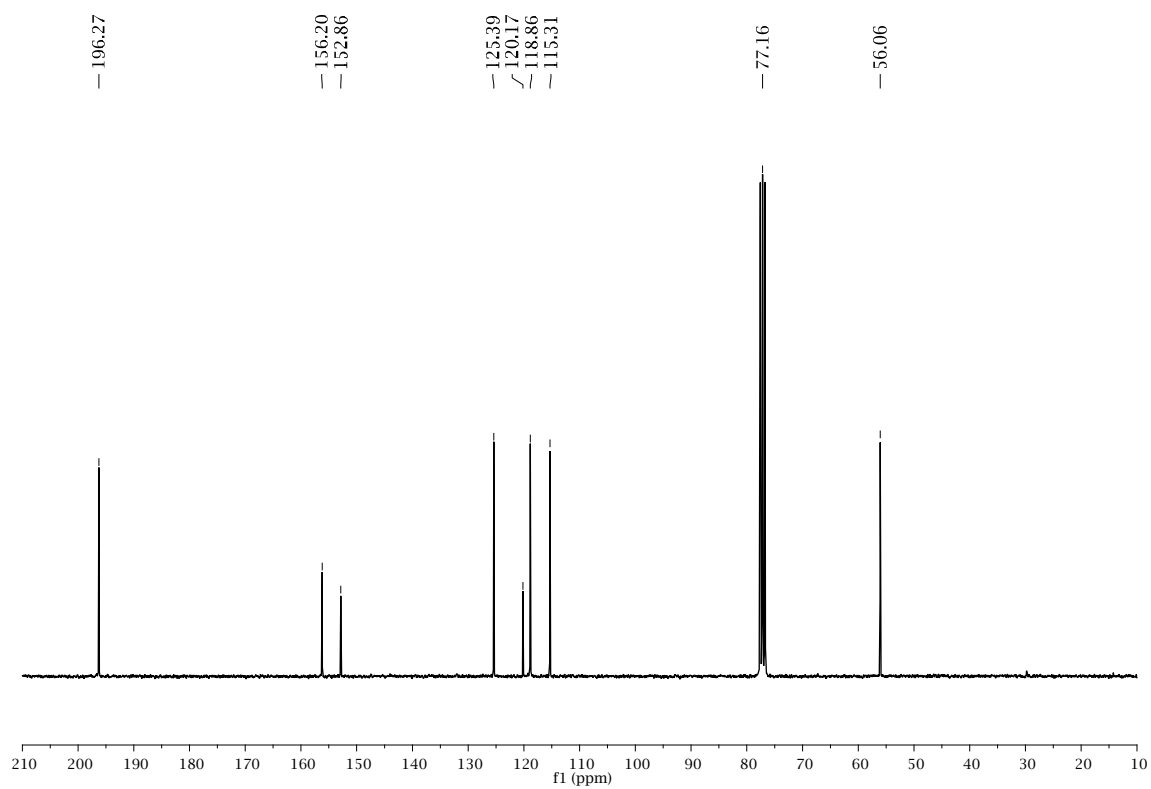


Figure S13. ¹³C NMR (75 MHz) spectrum of **9** in CDCl₃.

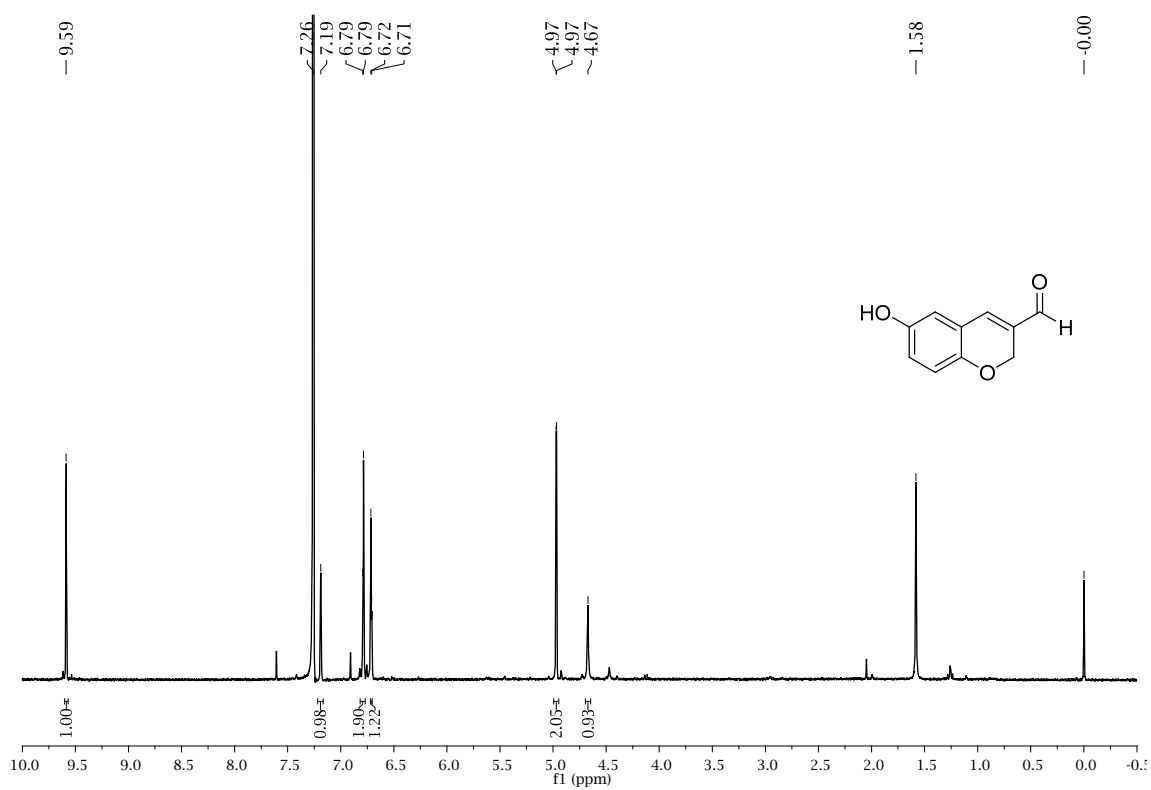


Figure S14. ^1H NMR (300 MHz) spectrum of **11** in CDCl_3 .

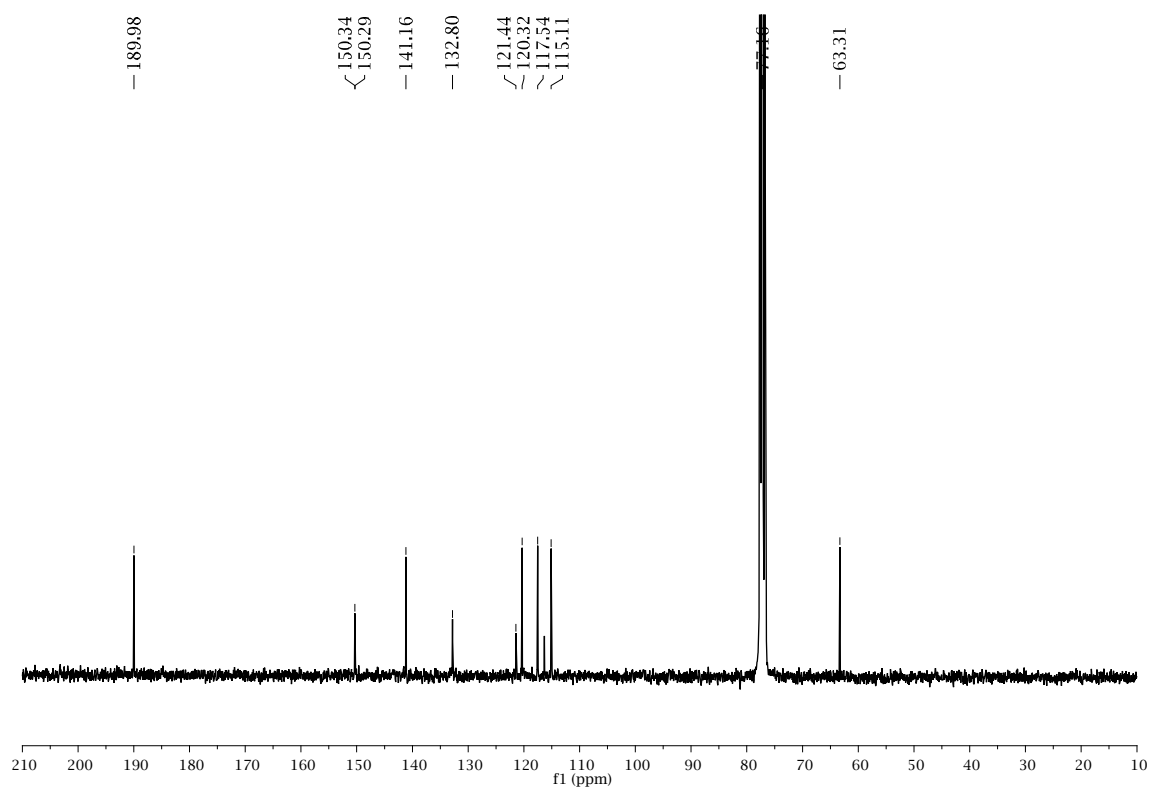


Figure S15. ^{13}C NMR (75 MHz) spectrum of **11** in CDCl_3 .

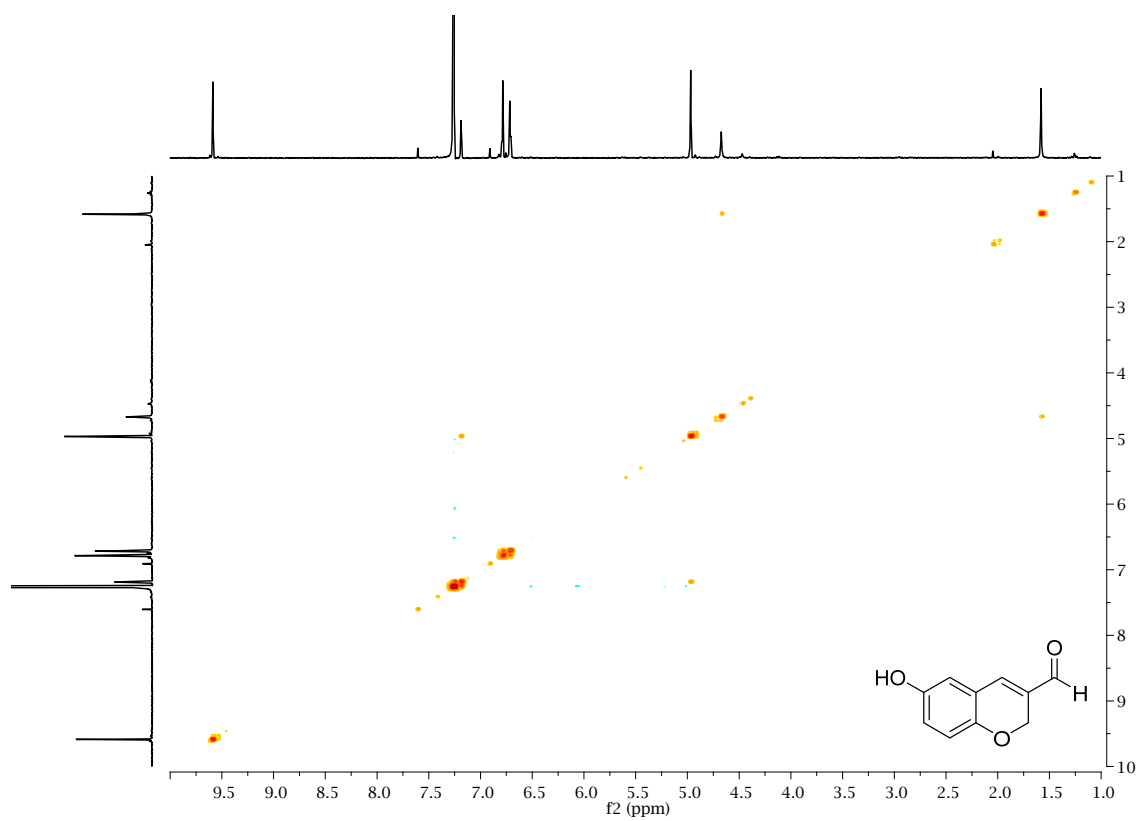


Figure S16. COSY spectrum of **11** in CDCl₃.

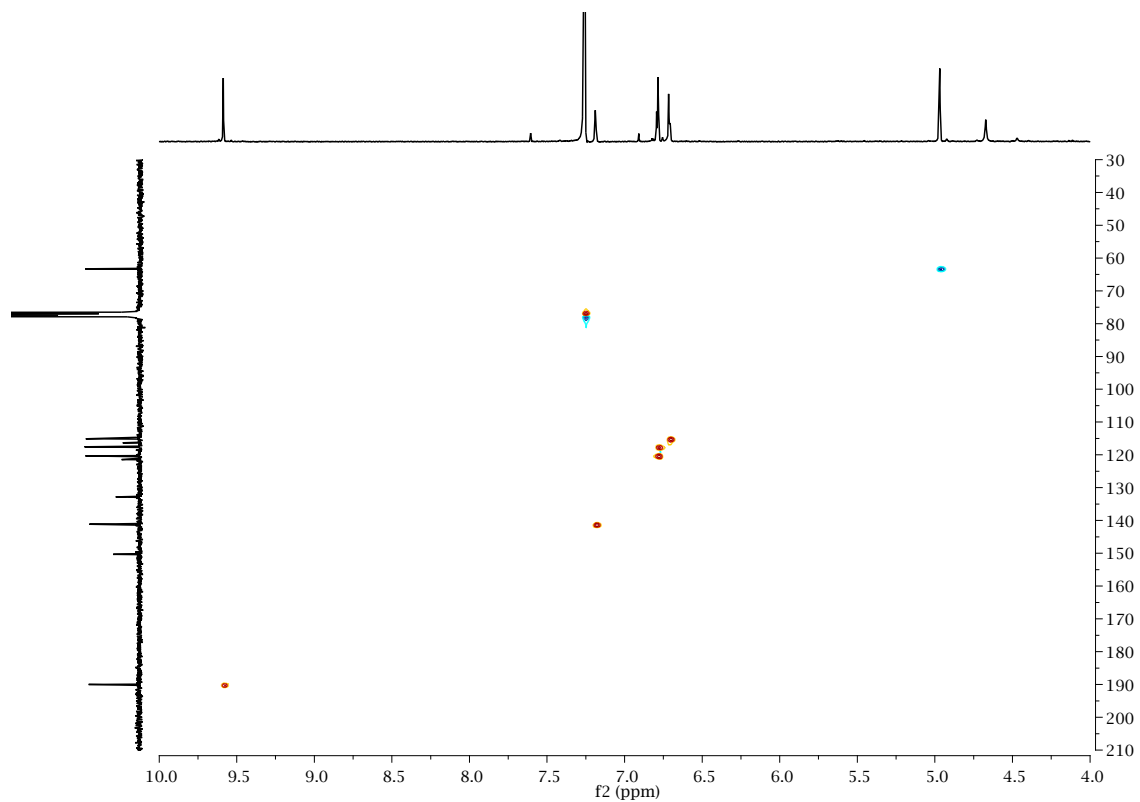


Figure S17. HSQC spectrum of **11** in CDCl₃.

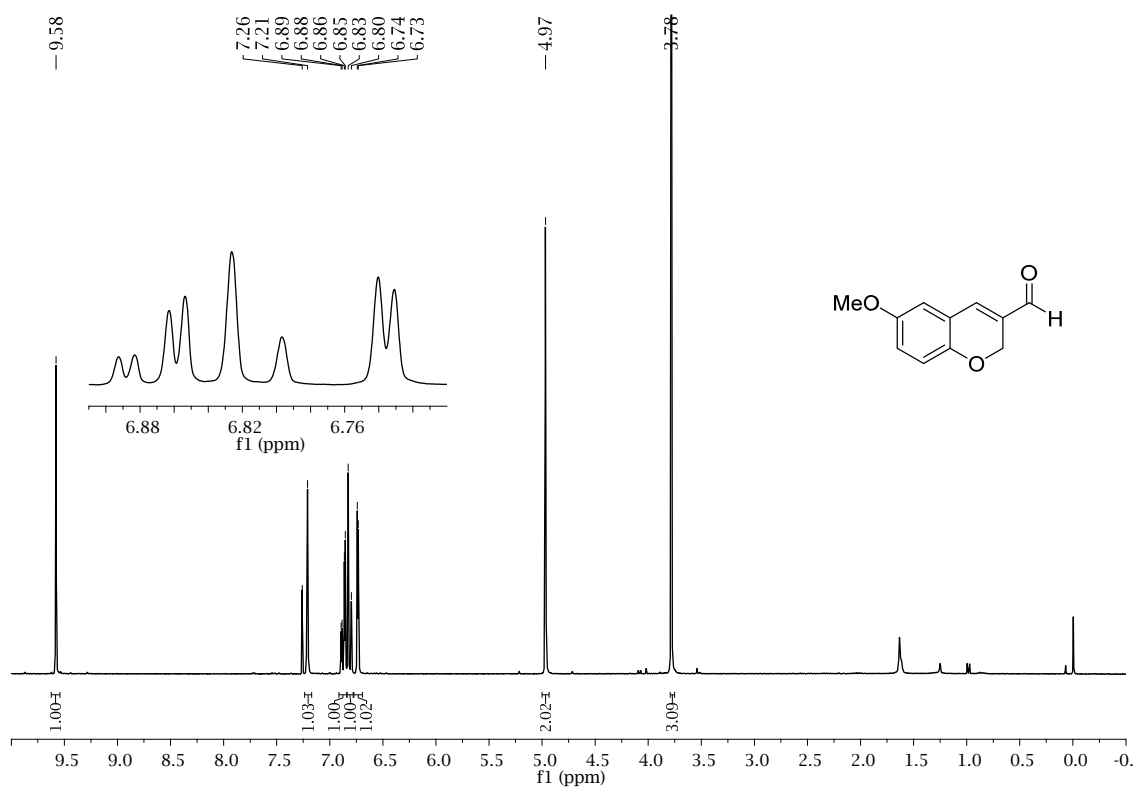


Figure S18. ^1H NMR (300 MHz) spectrum of **12** in CDCl_3 .

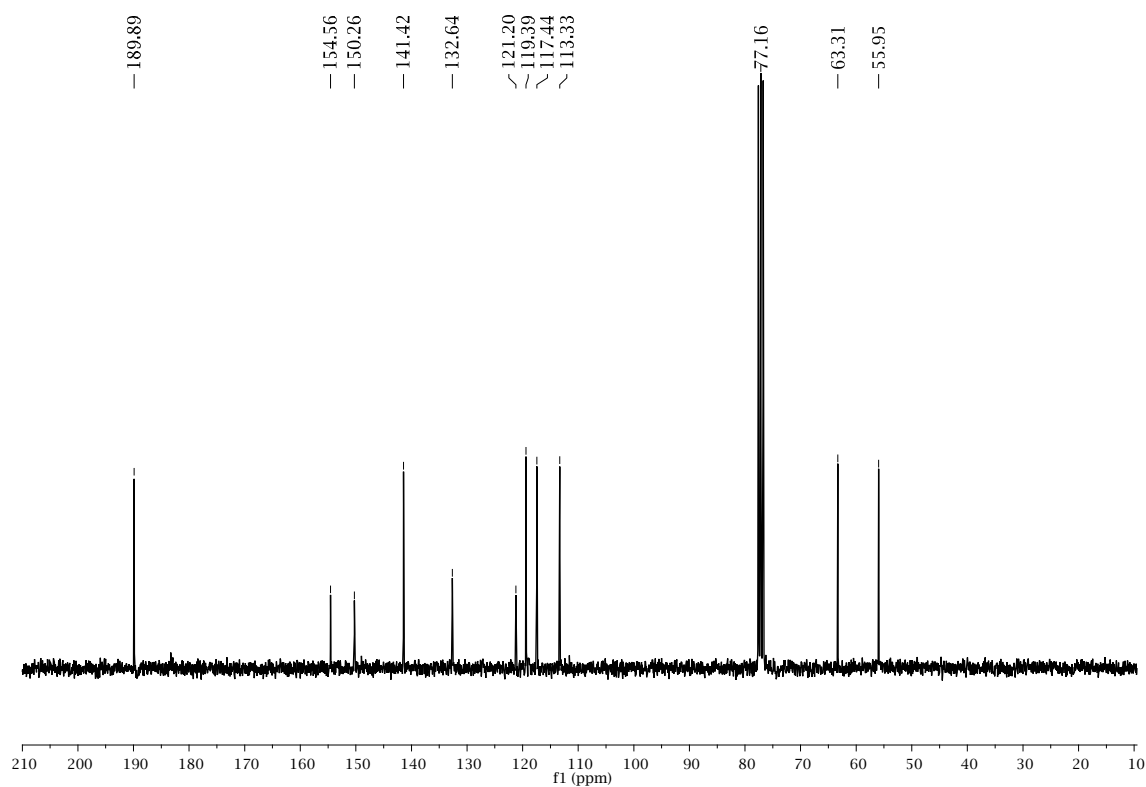


Figure S19. ^{13}C NMR (75 MHz) spectrum of **12** in CDCl_3 .

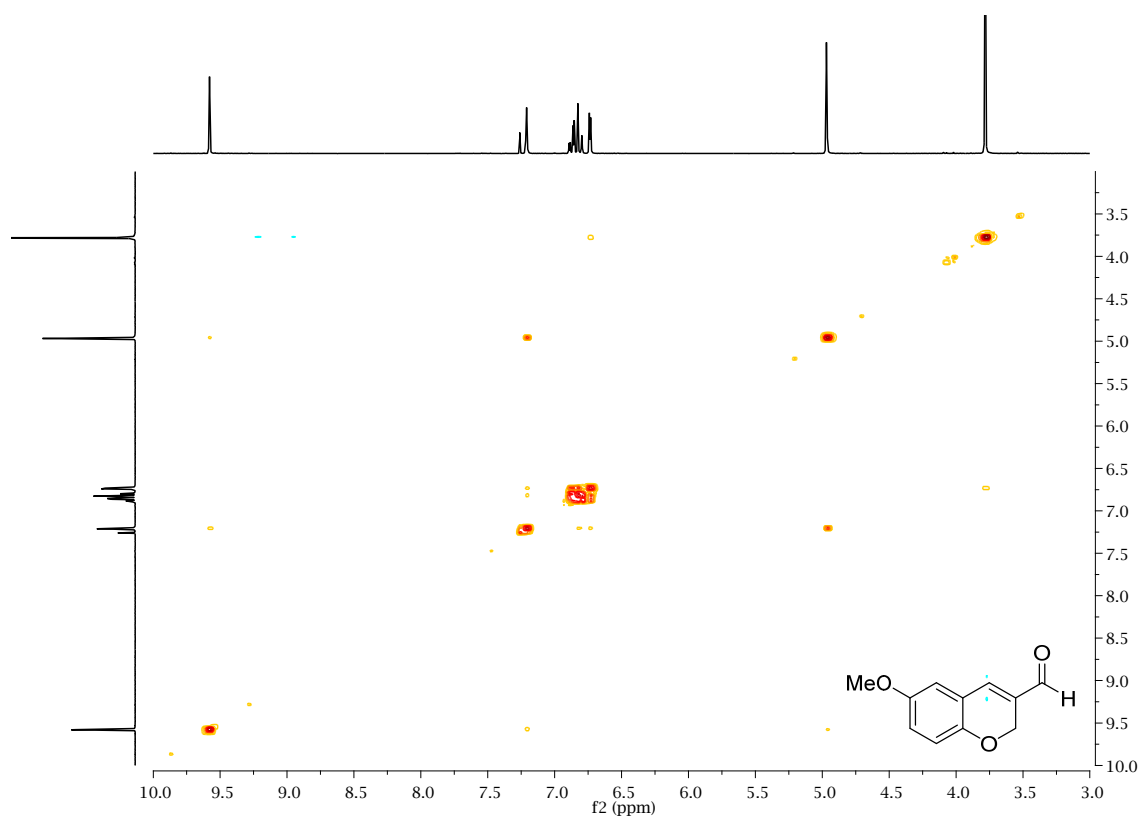


Figure S20. COSY spectrum of **12** in CDCl_3 .

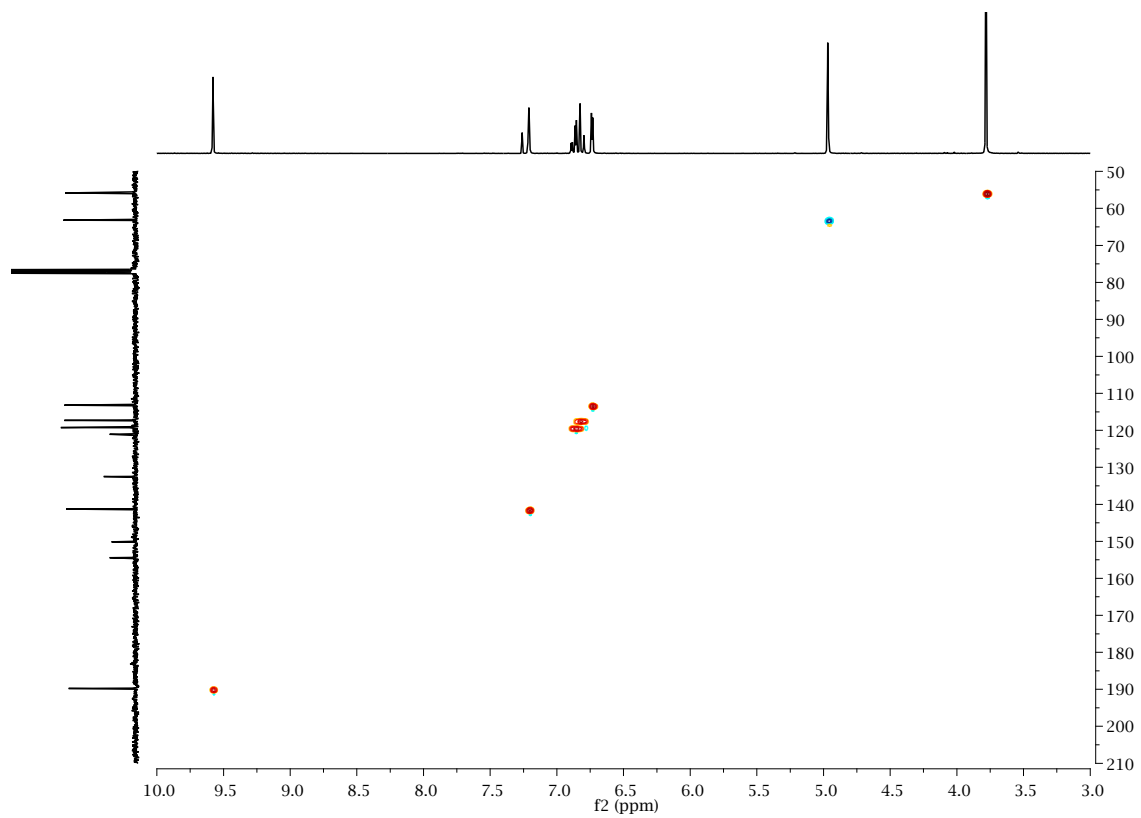


Figure S21. HSQC spectrum of **12** in CDCl_3 .

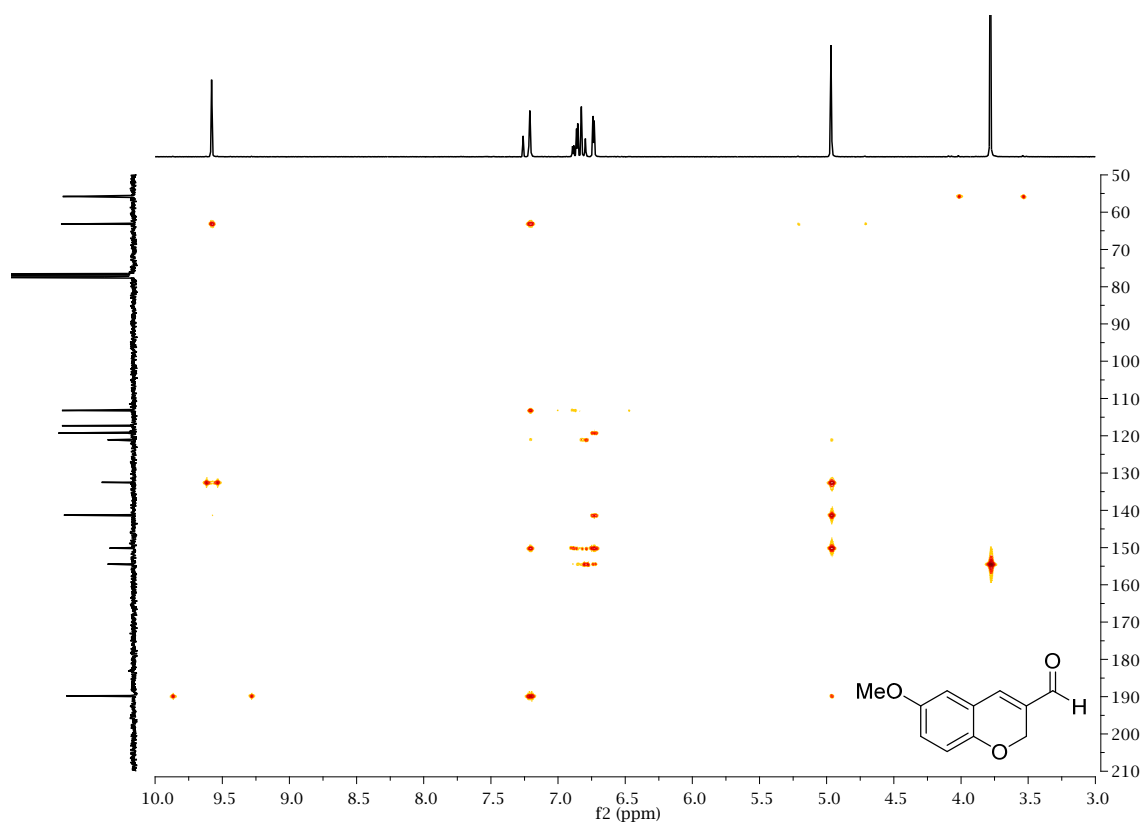


Figure S22. HMBC spectrum of **12** in CDCl₃.

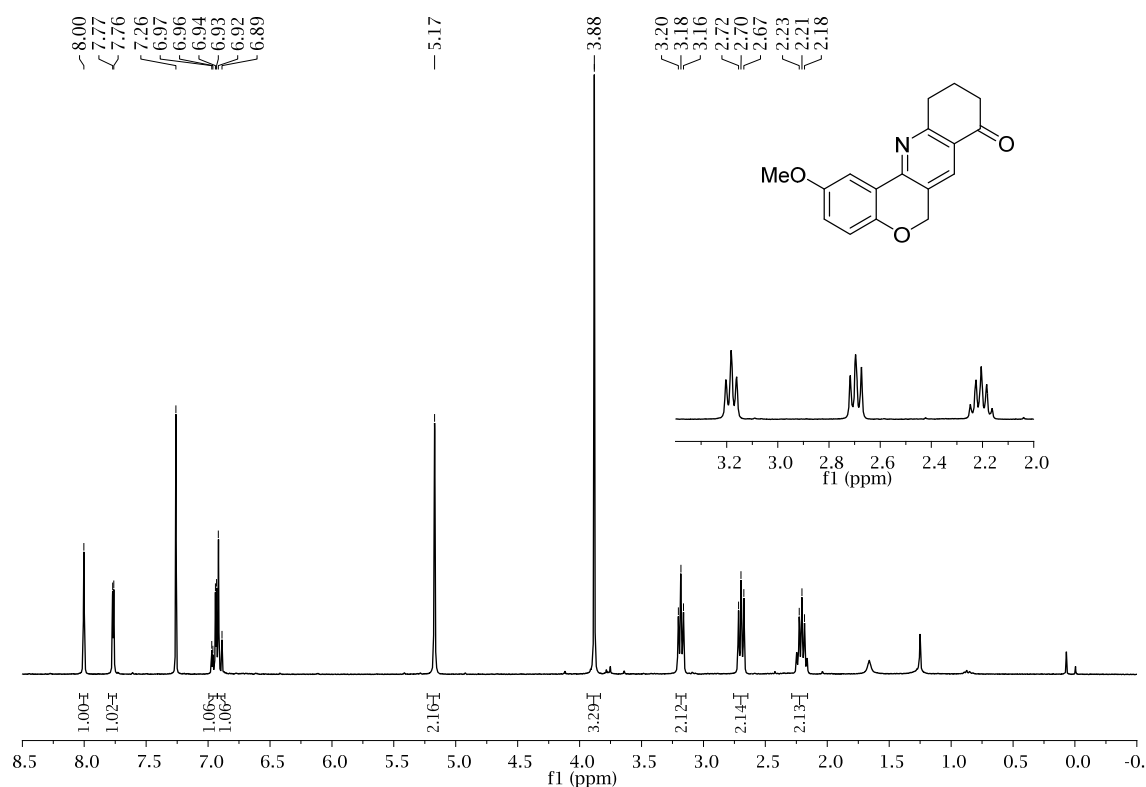


Figure S23. ¹H NMR (300 MHz) spectrum of **13** in CDCl₃.

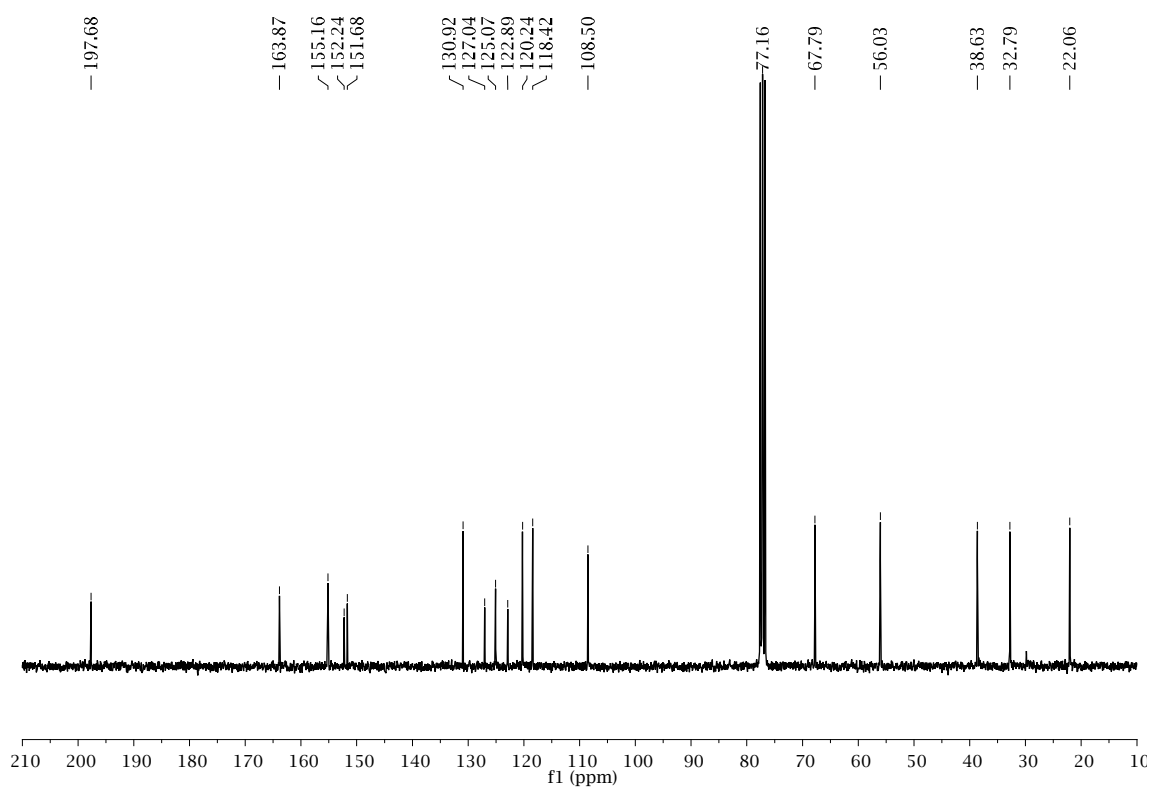


Figure S24. ¹³C NMR (75 MHz) spectrum of **13** in CDCl₃.

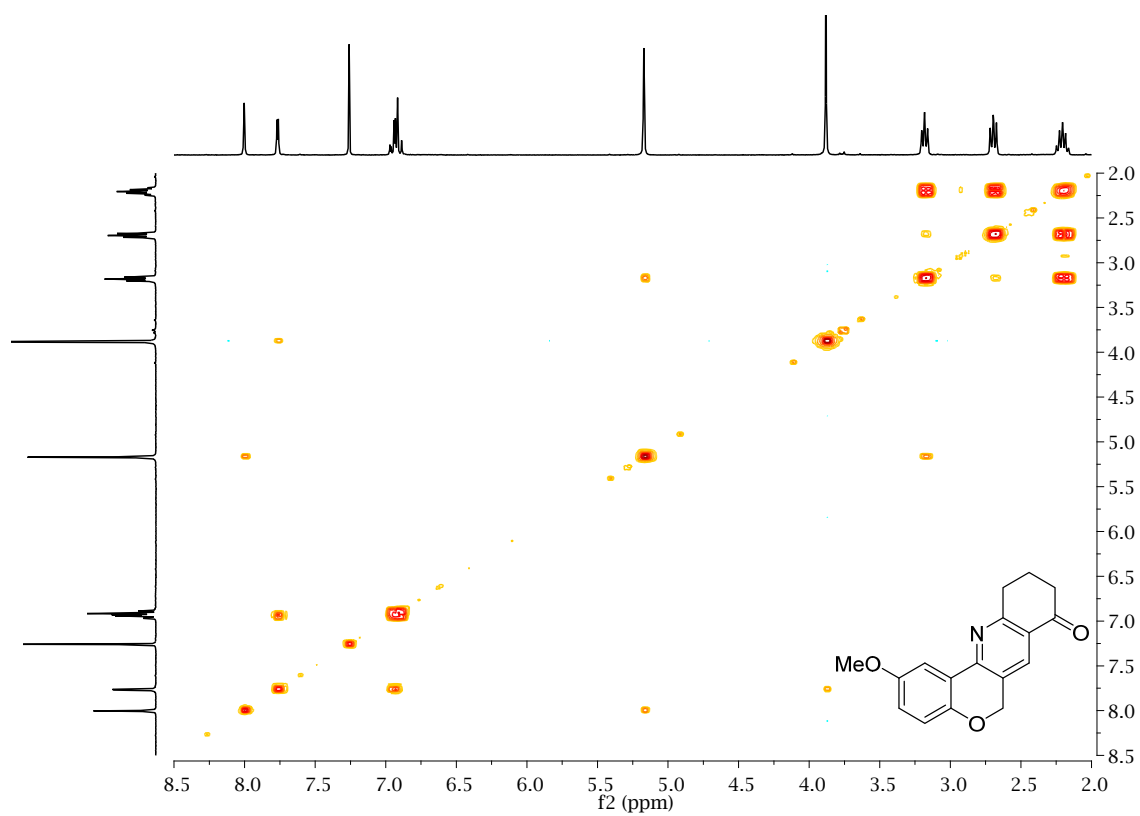


Figure S25. COSY spectrum of **13** in CDCl₃.

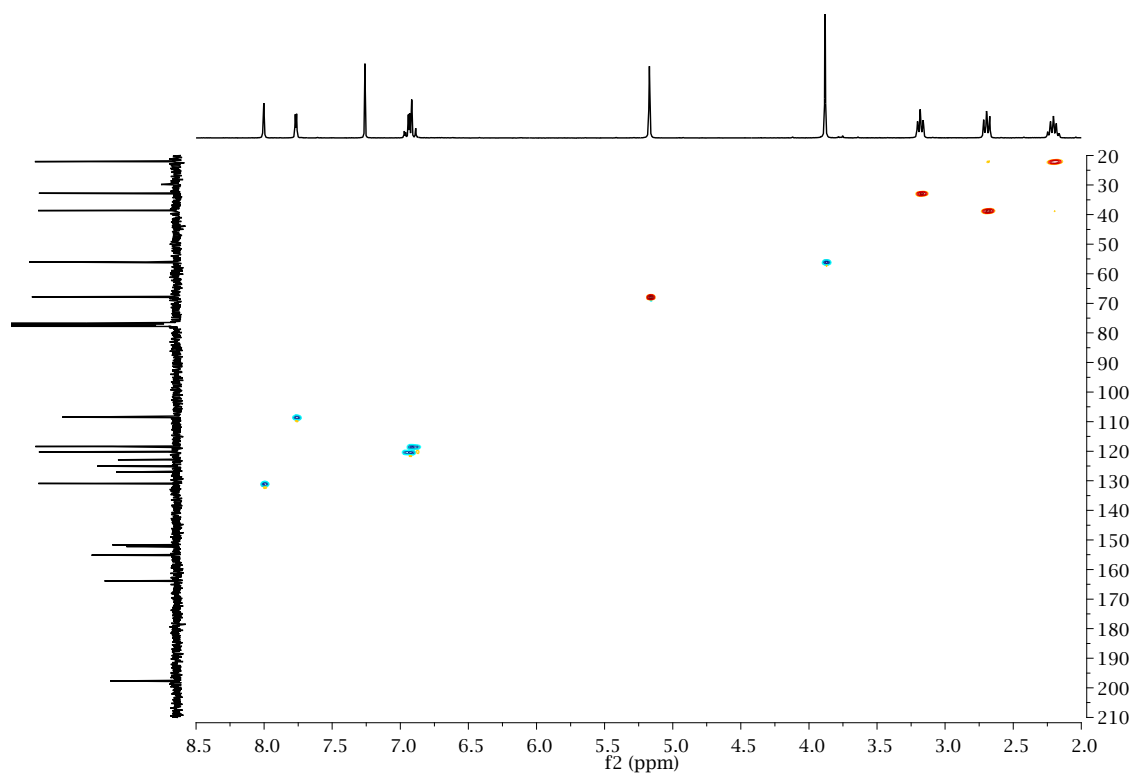


Figure S26. HSQC spectrum of **13** in CDCl₃.

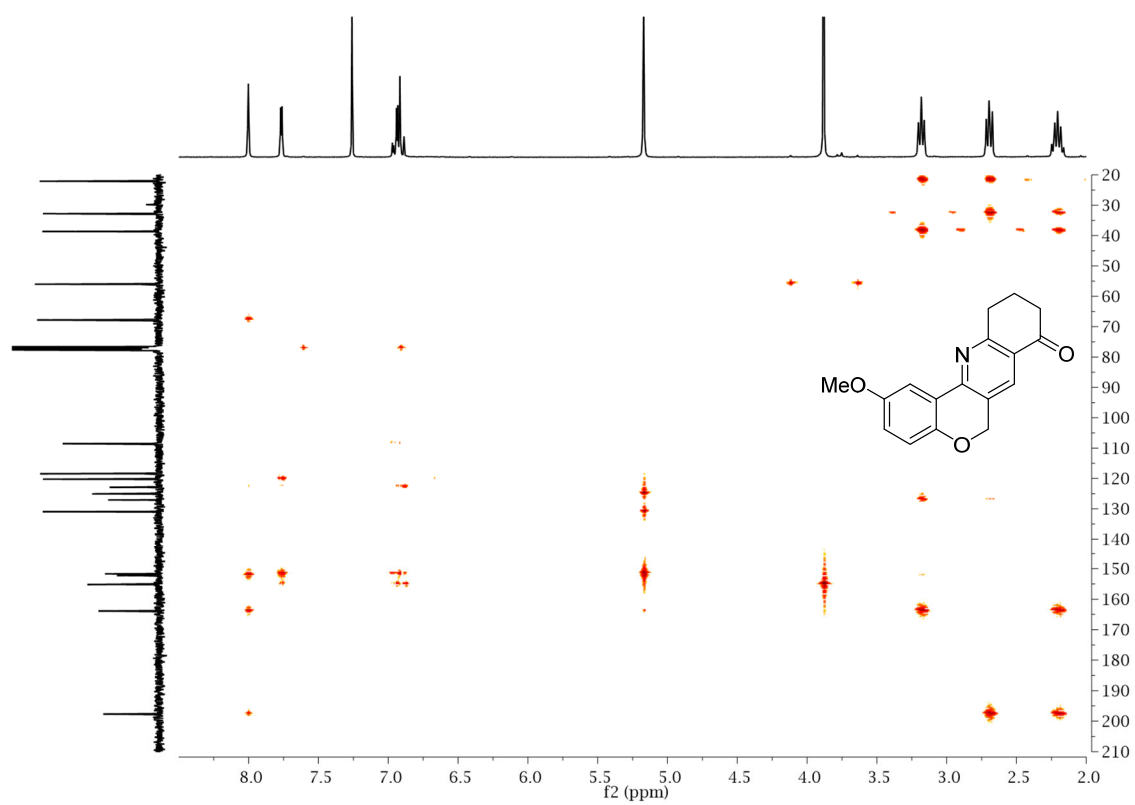


Figure S27. HMBC spectrum of **13** in CDCl₃.

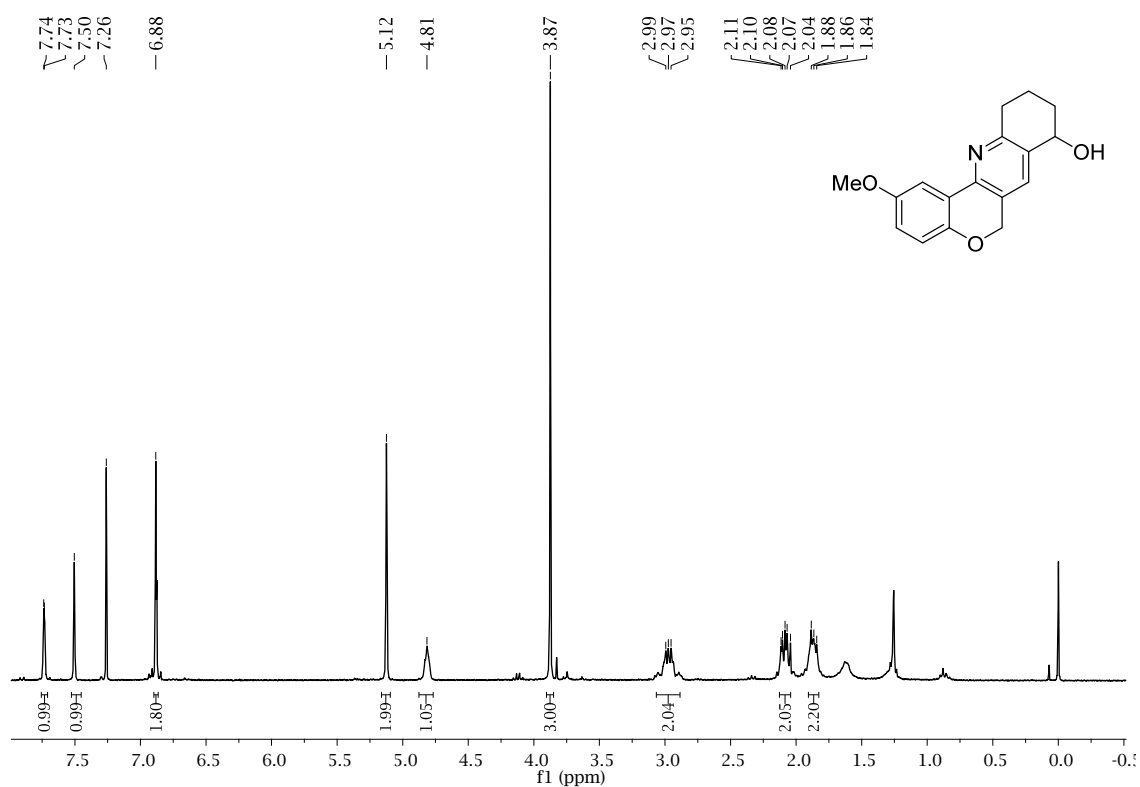


Figure S28. ¹H NMR (300 MHz) spectrum of **14** in CDCl₃.

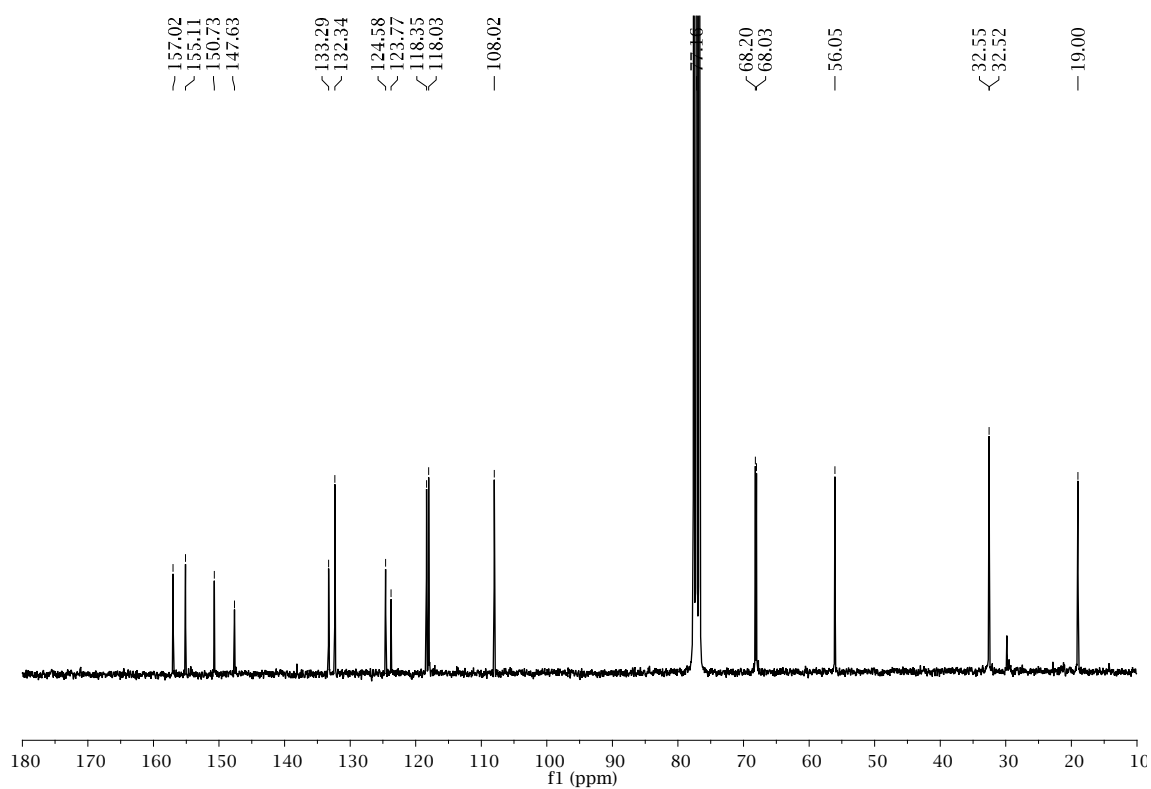


Figure S29. ¹³C NMR (75 MHz) spectrum of **14** in CDCl₃.

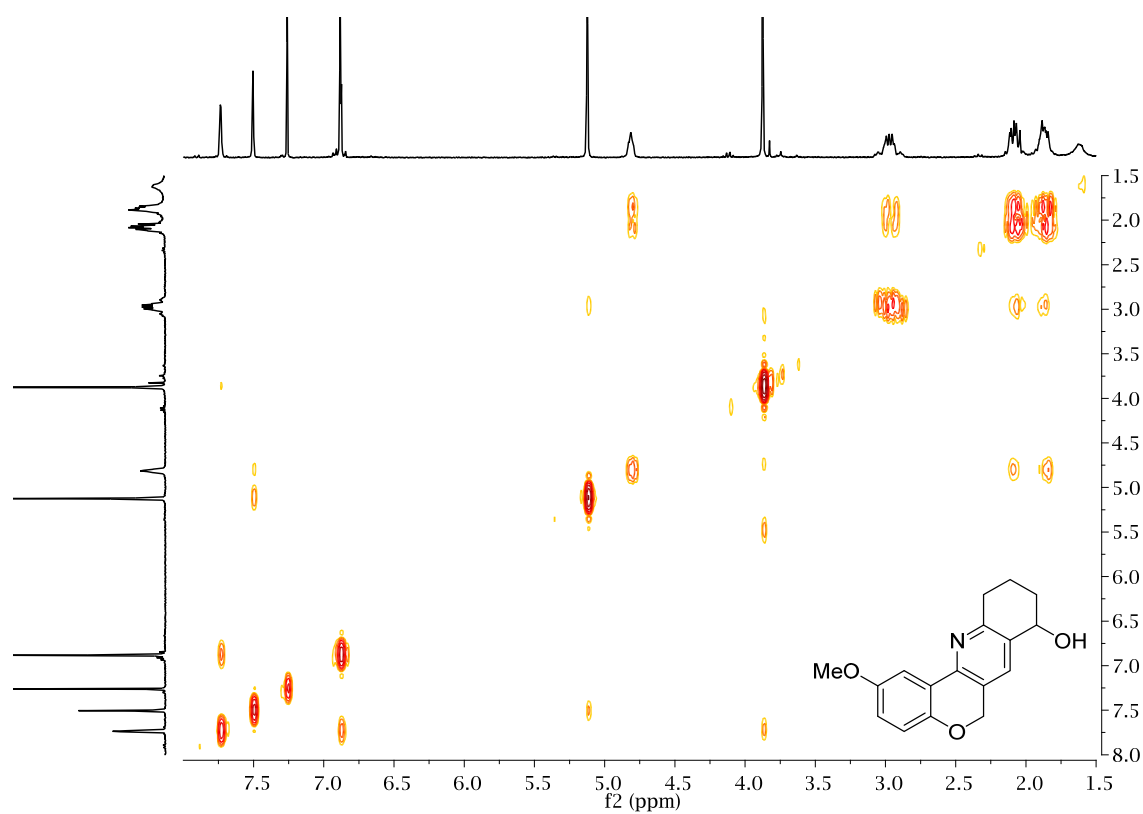


Figure S30. COSY spectrum of **14** in CDCl_3 .

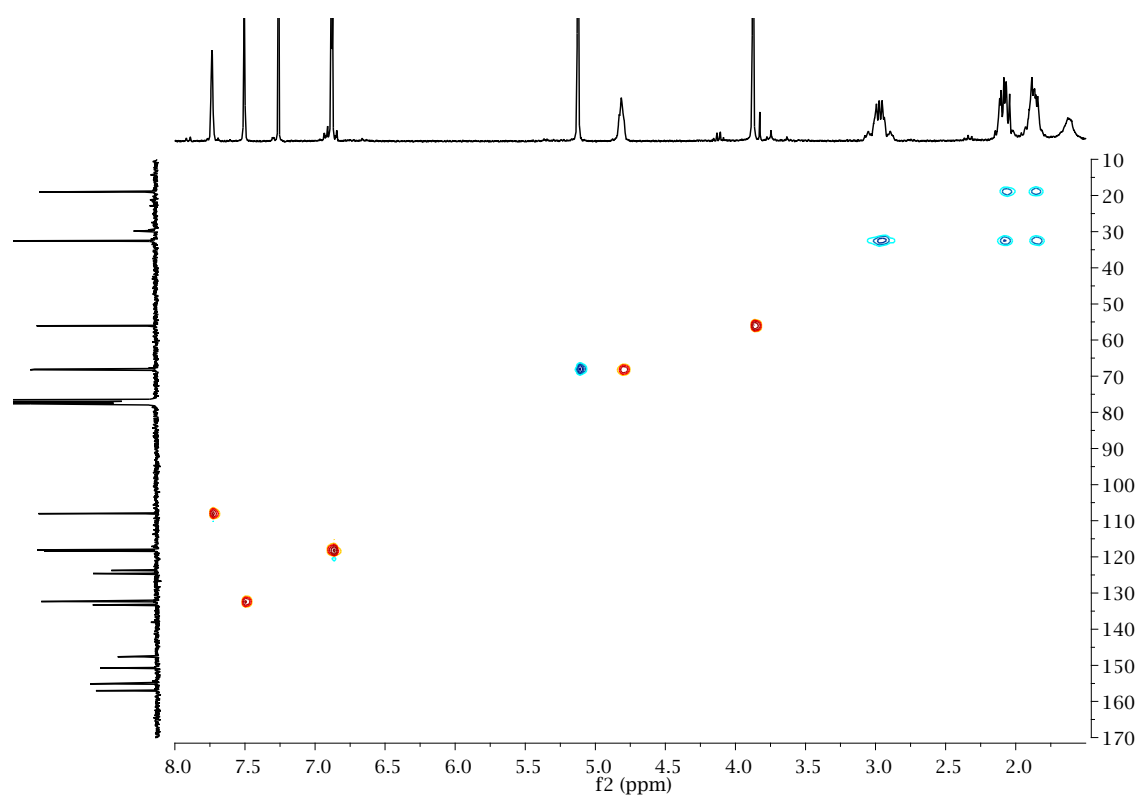


Figure S31. HSQC spectrum of **14** in CDCl_3 .

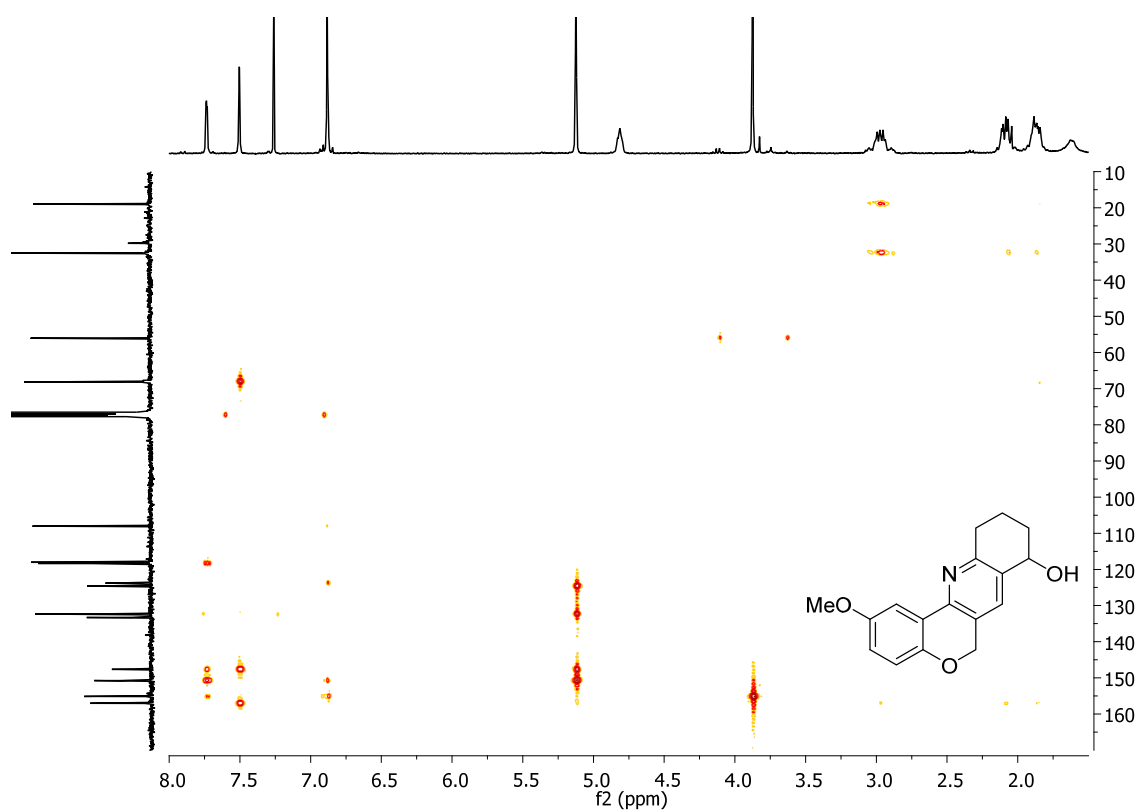


Figure S32. HMBC spectrum of **14** in CDCl₃.

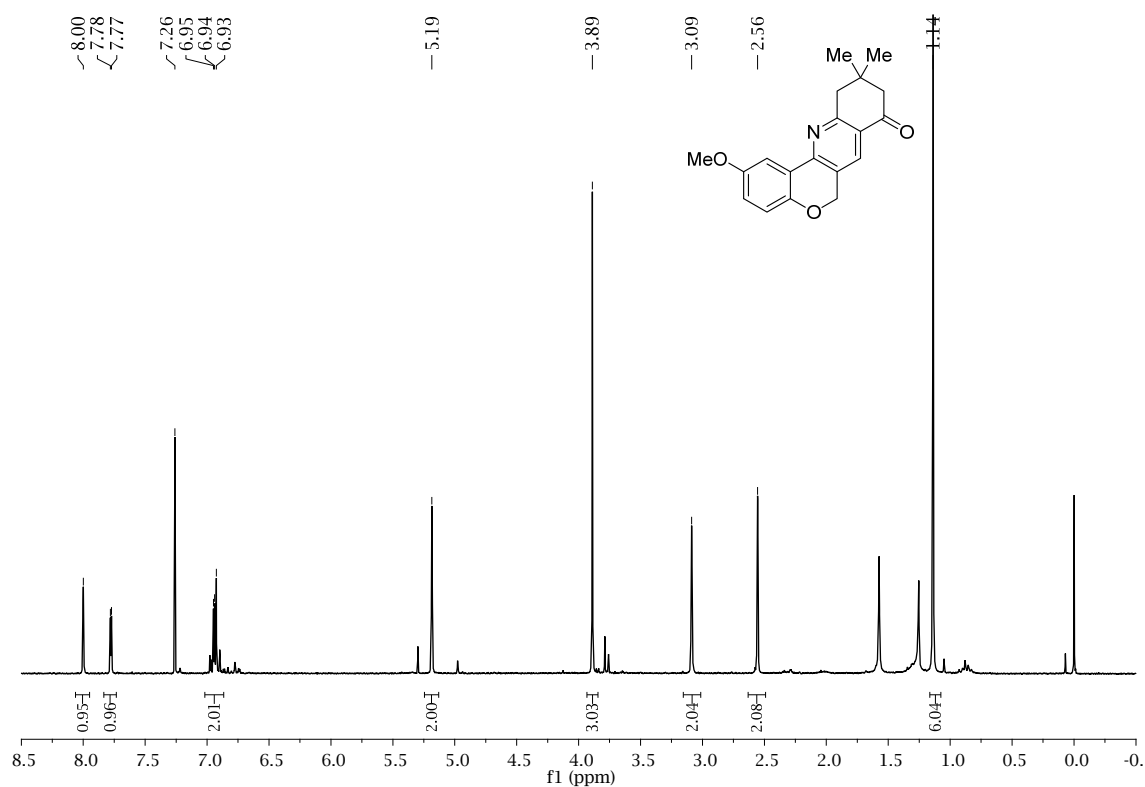


Figure S33. ^1H NMR (300 MHz) spectrum of **16** in CDCl_3 .

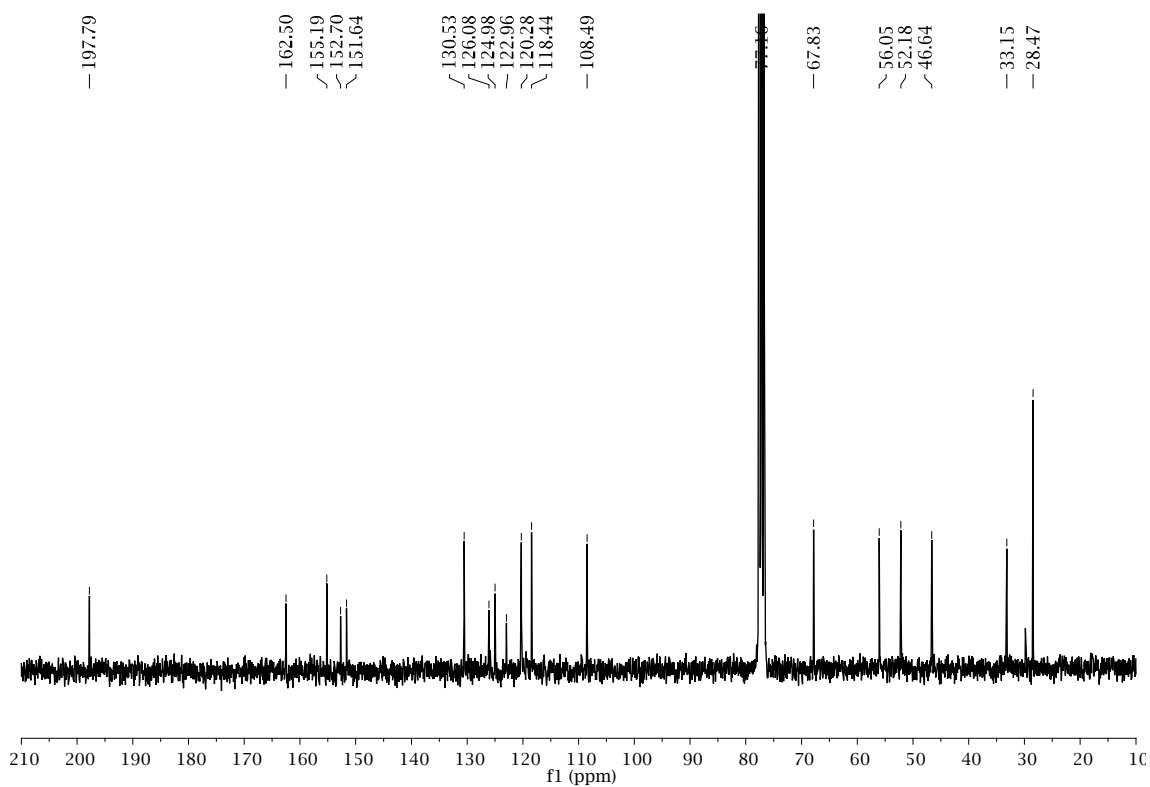


Figure S34. ^{13}C NMR (75 MHz) spectrum of **16** in CDCl_3 .

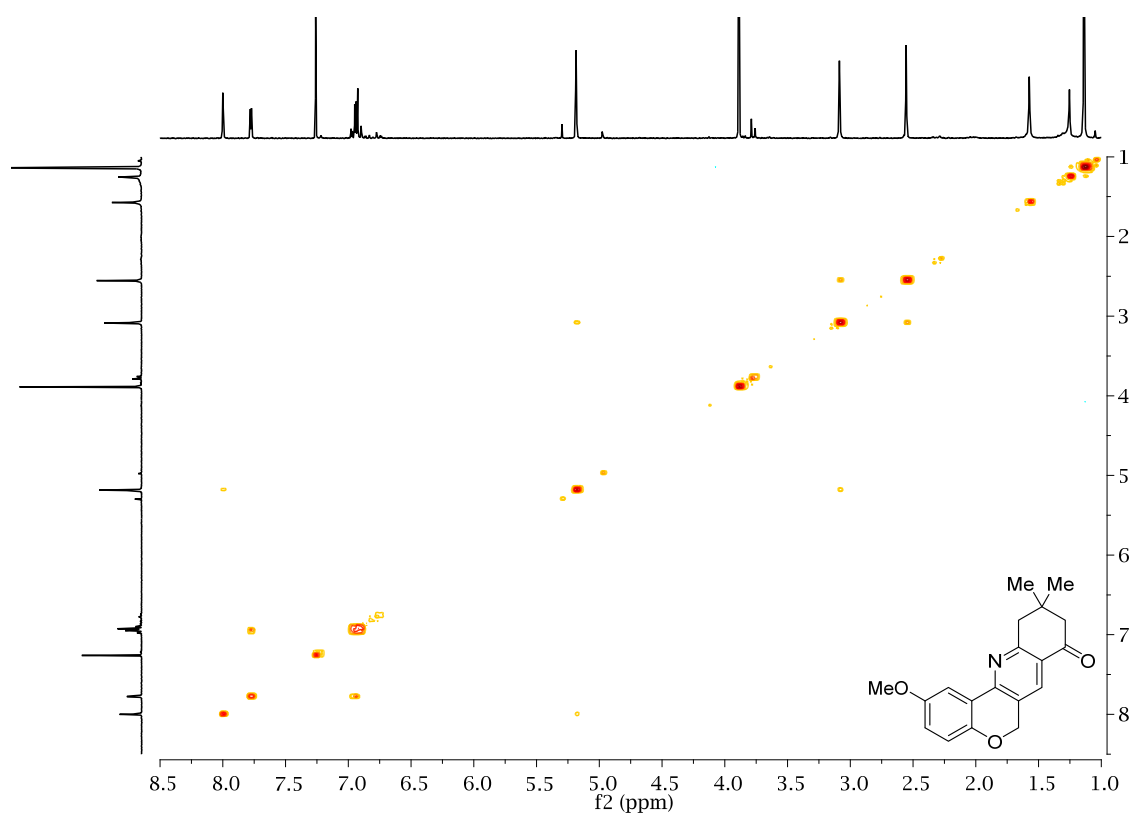


Figure S35. COSY spectrum of **16** in CDCl₃.

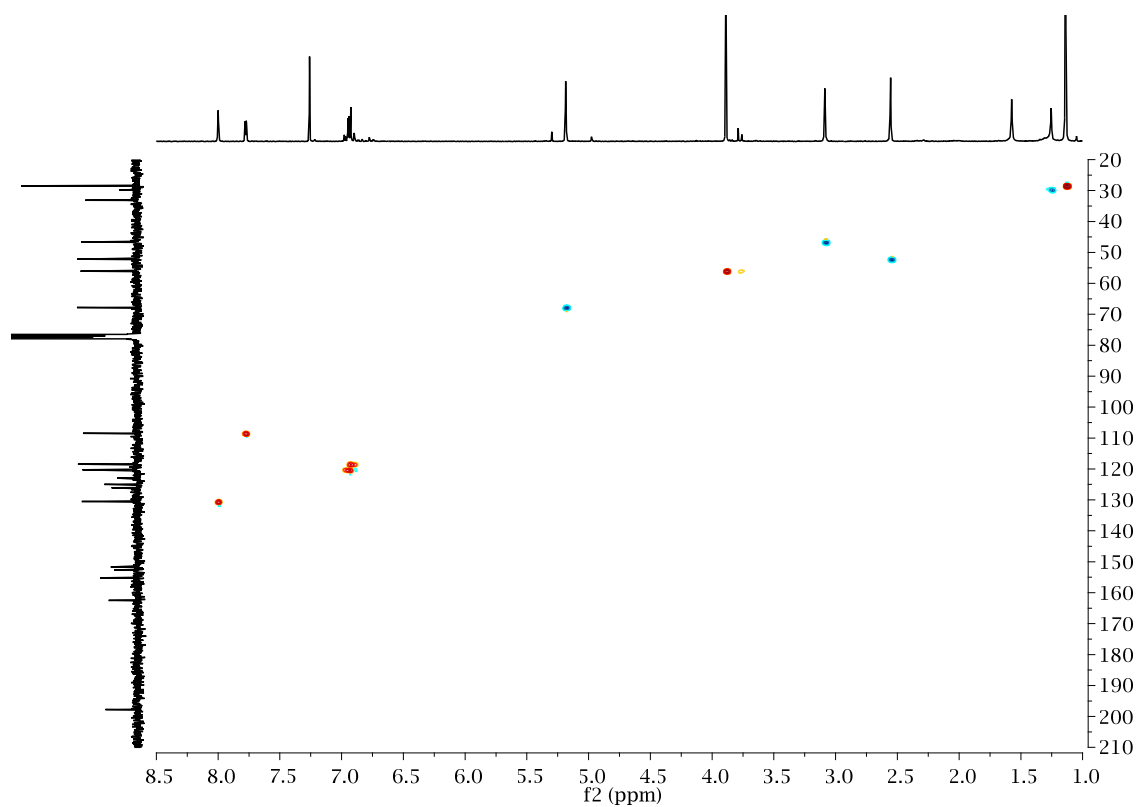


Figure S36. HSQC spectrum of **16** in CDCl₃.

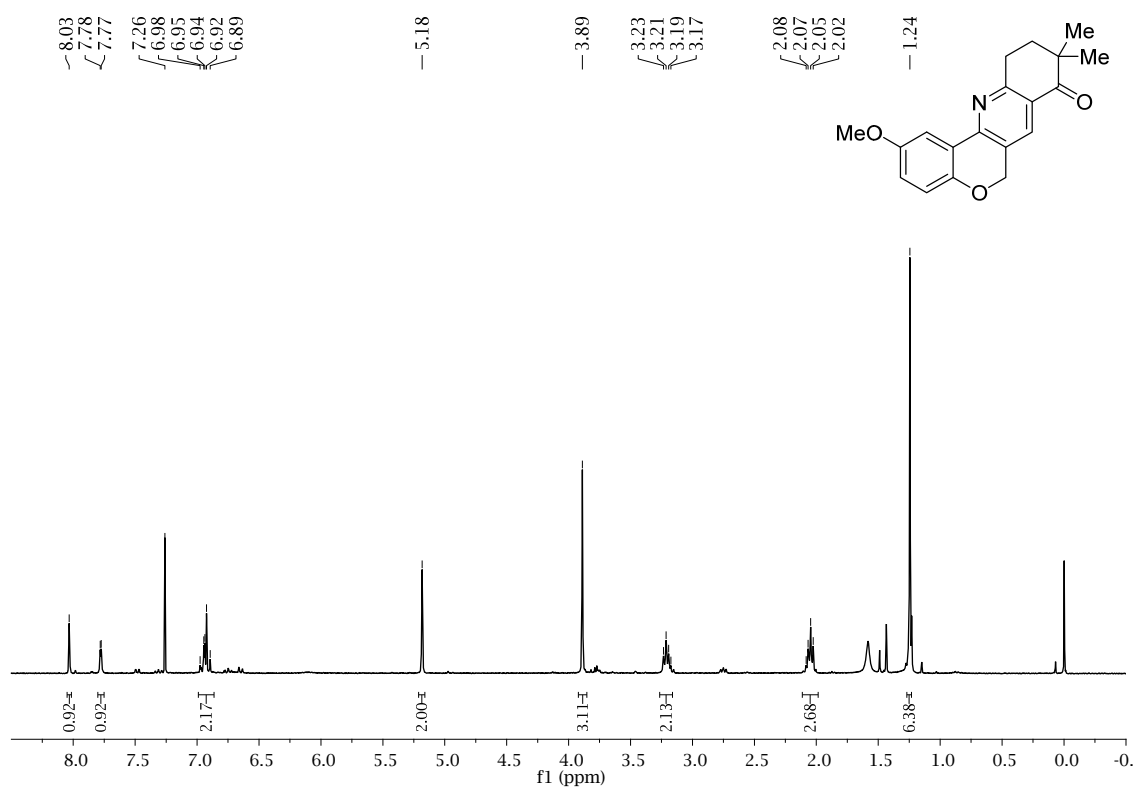


Figure S37. ¹H NMR (300 MHz) spectrum of **17** in CDCl₃.

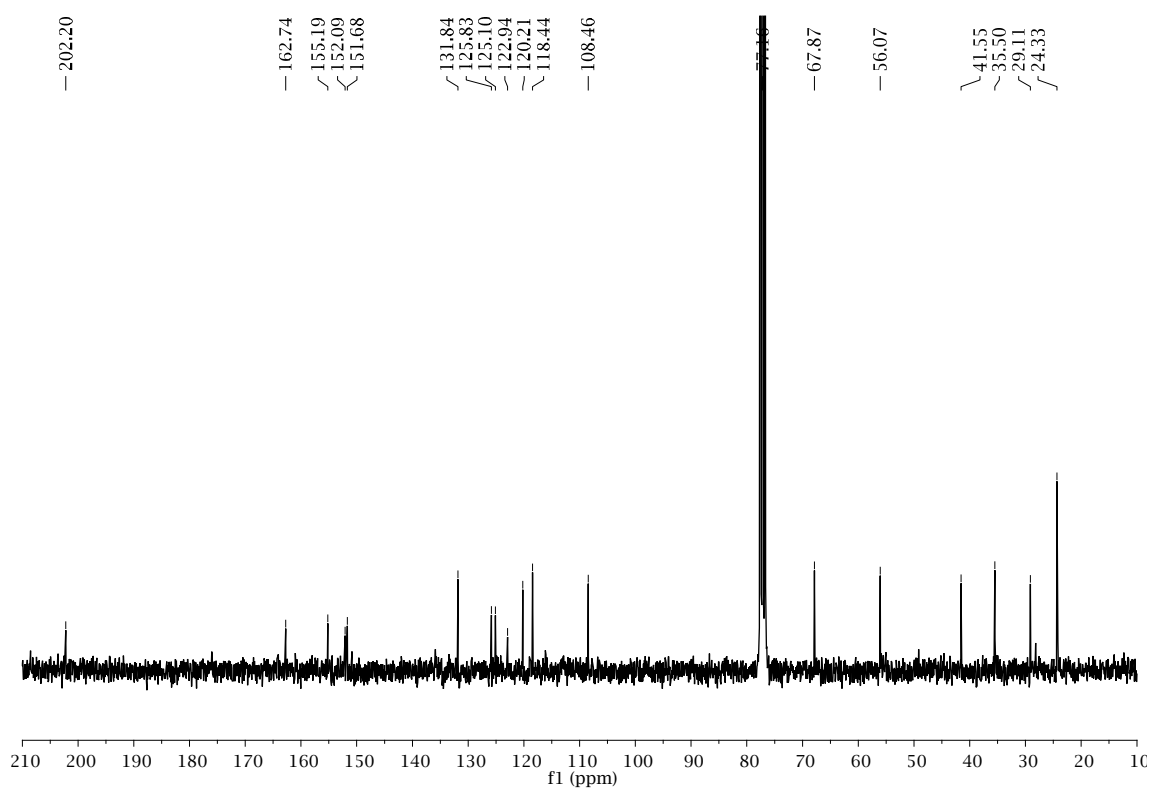


Figure S38. ¹³C NMR (75 MHz) spectrum of **17** in CDCl₃.

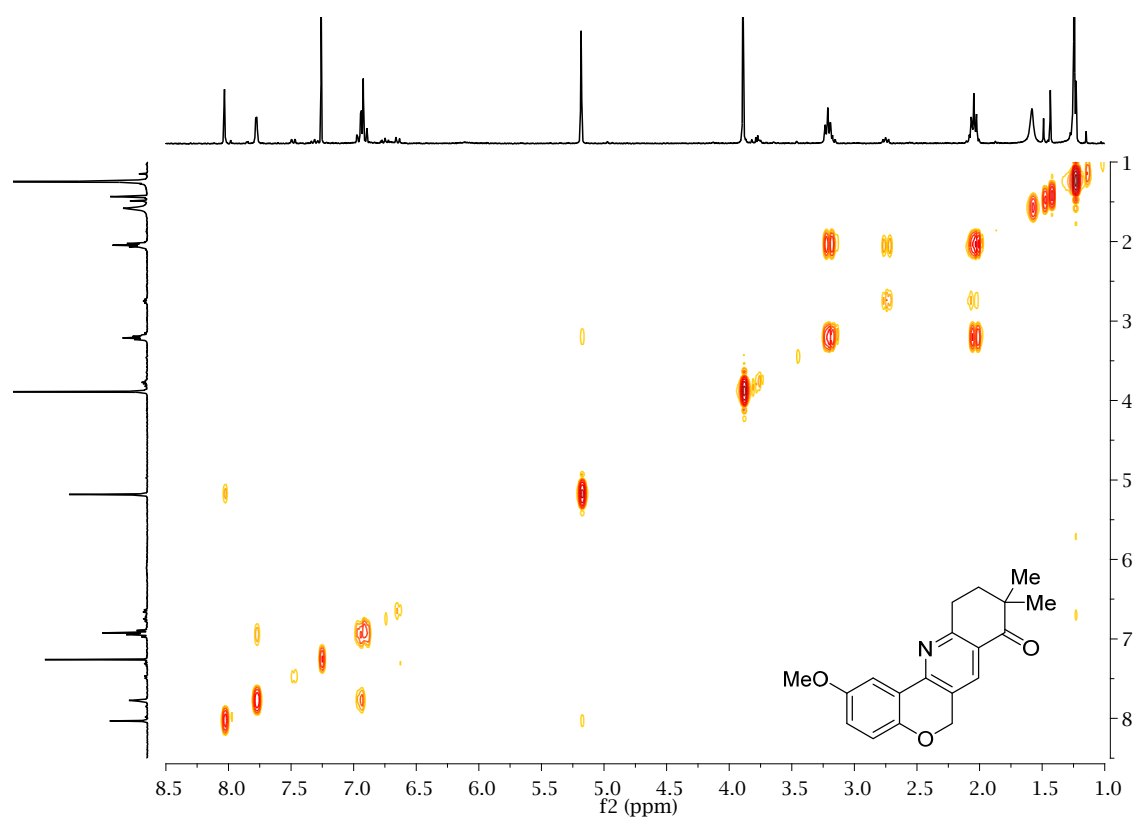


Figure S39. COSY spectrum of **17** in CDCl_3 .

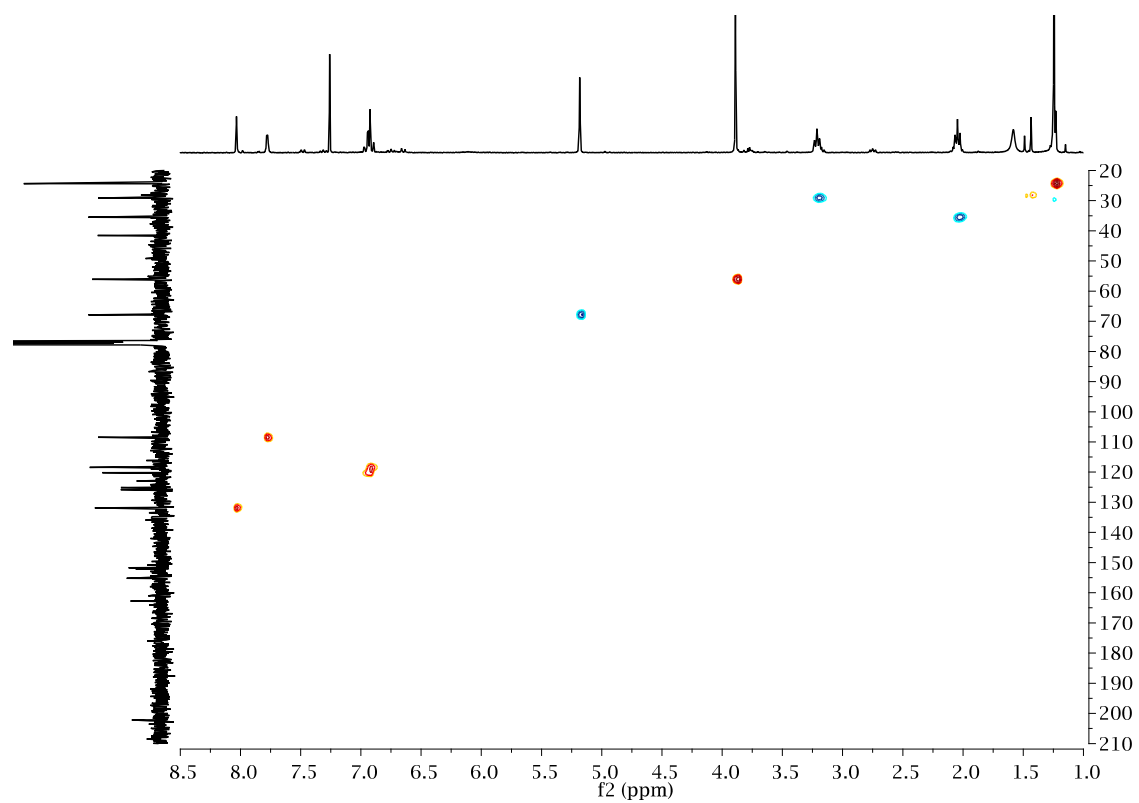


Figure S40. HSQC spectrum of **17** in CDCl_3 .

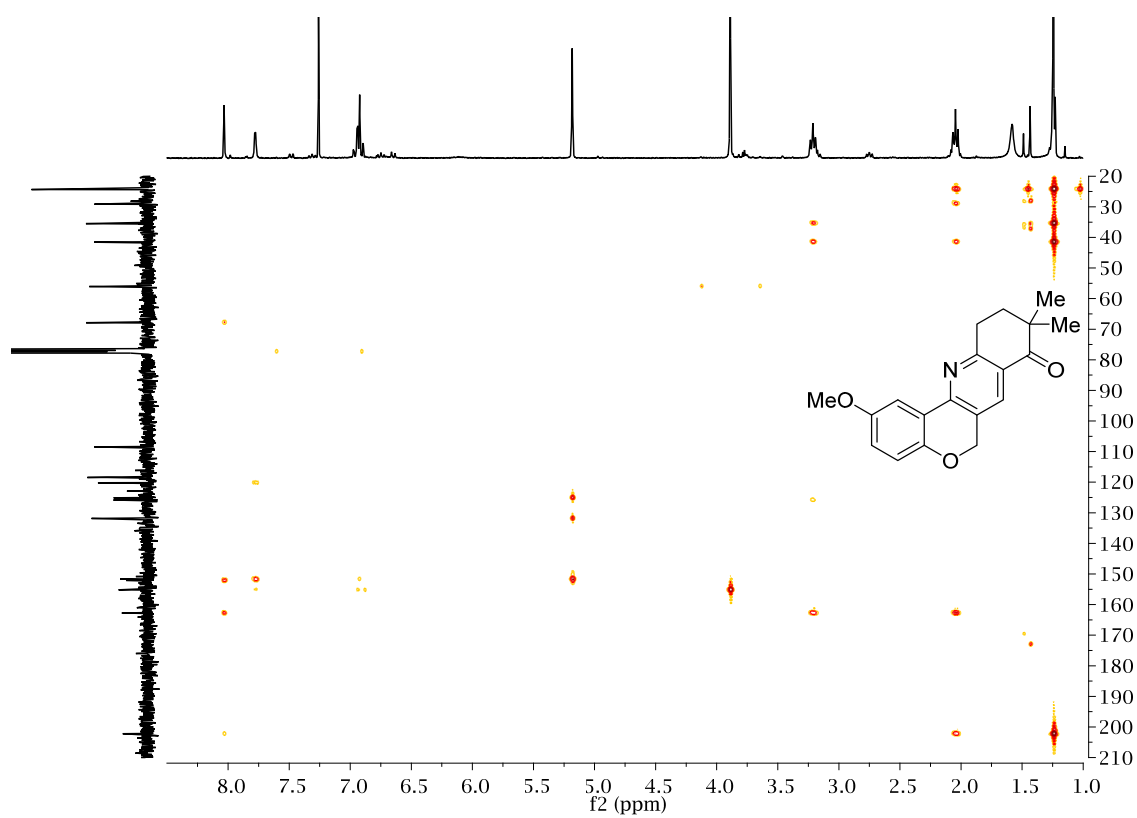


Figure S41. HMBC spectrum of **17** in CDCl₃.

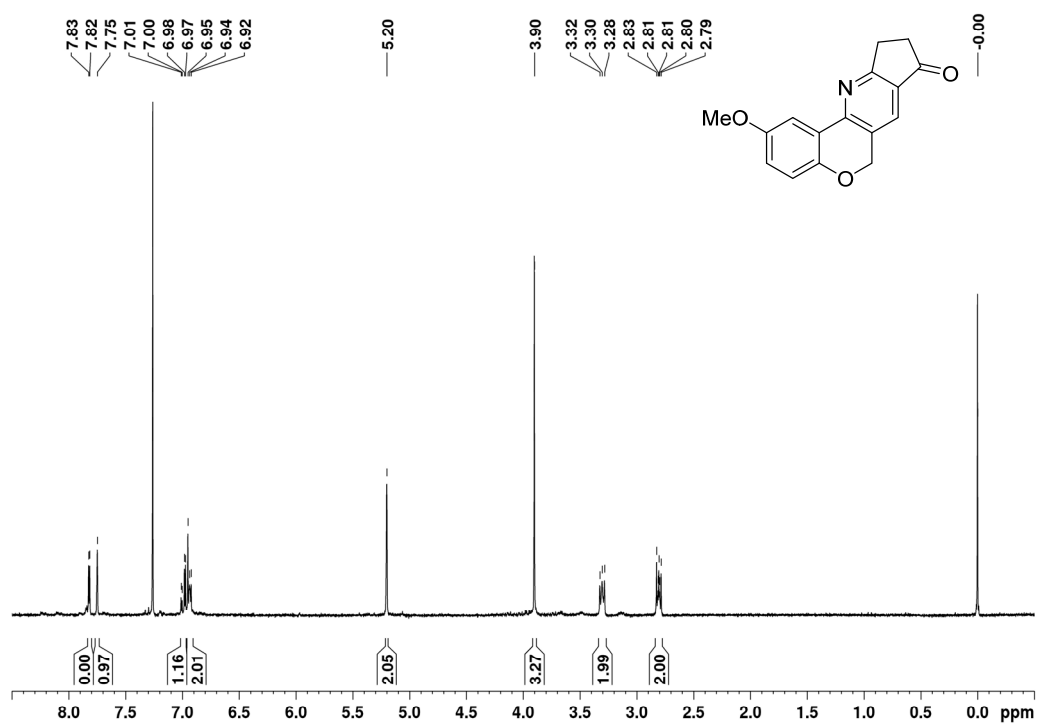


Figure S42. ^1H NMR (300 MHz) spectrum of **18** in CDCl_3 .

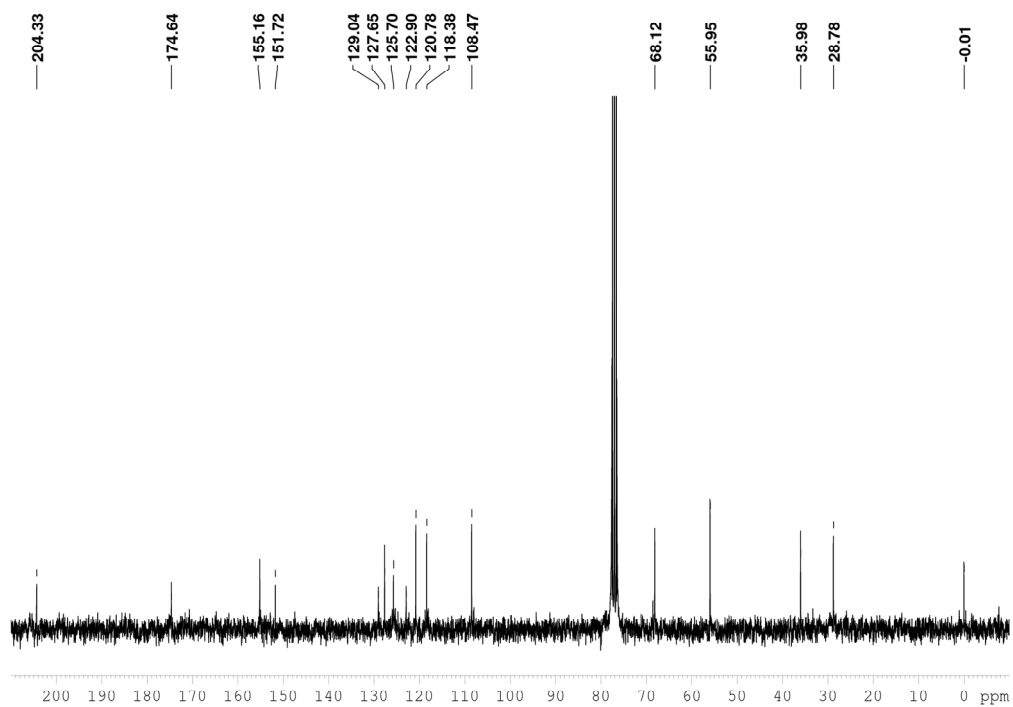


Figure S43. ^{13}C NMR (75 MHz) spectrum of **18** in CDCl_3 .

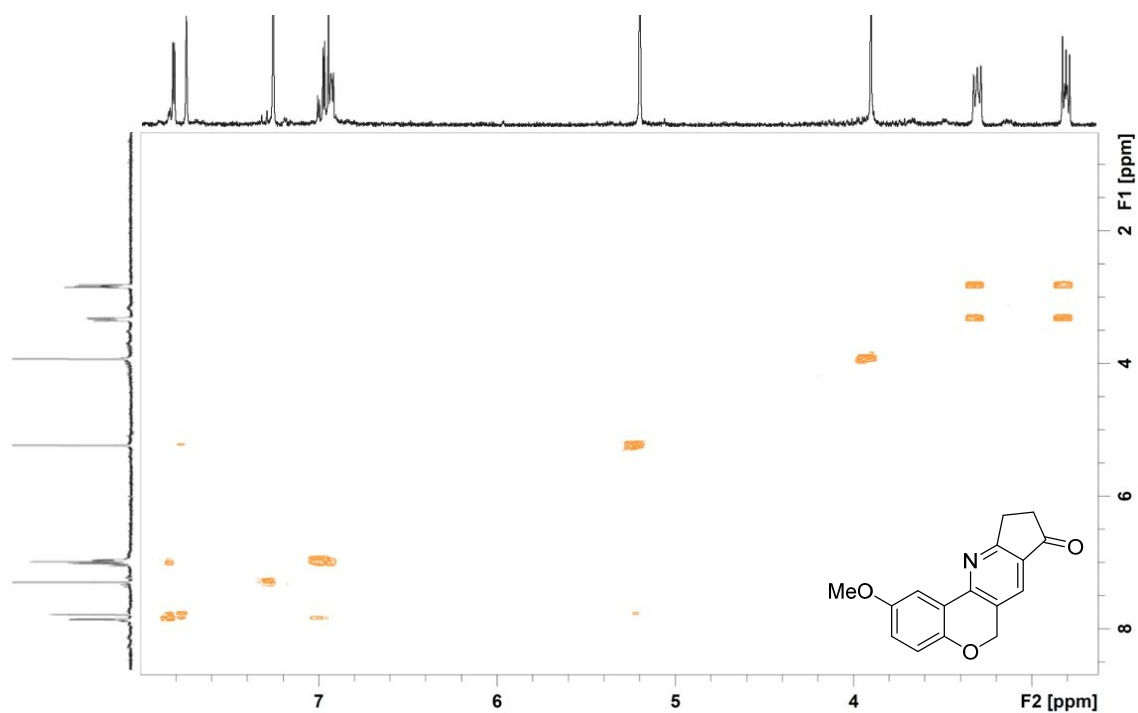


Figure S44. COSY spectrum of **18** in CDCl₃.

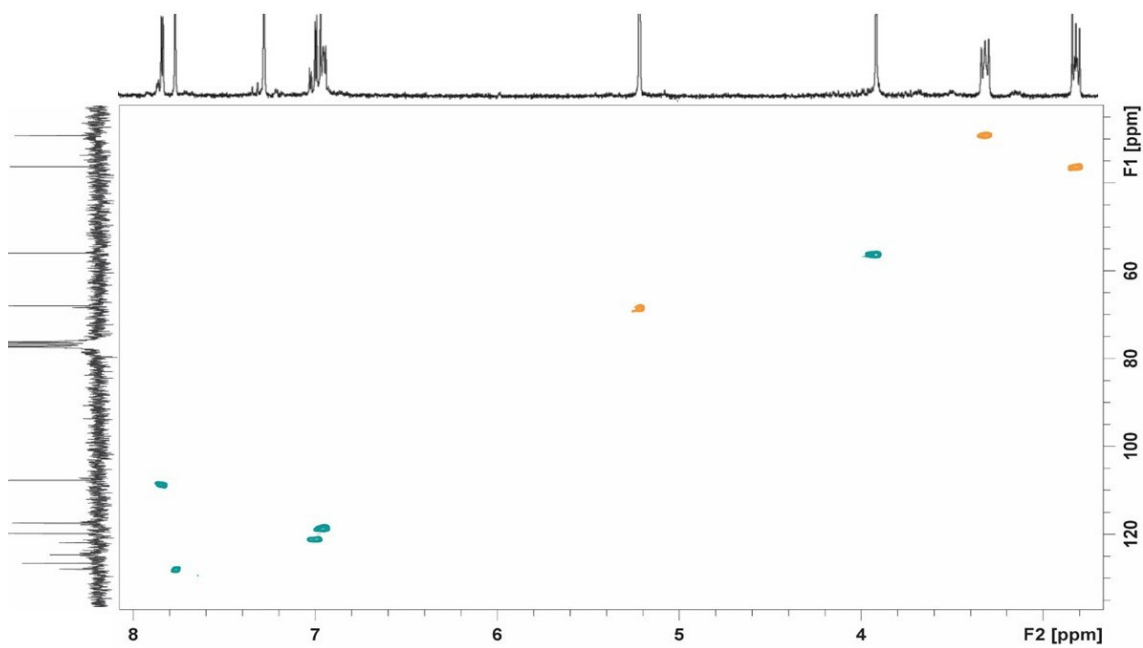


Figure S45. HSQC spectrum of **18** in CDCl₃.

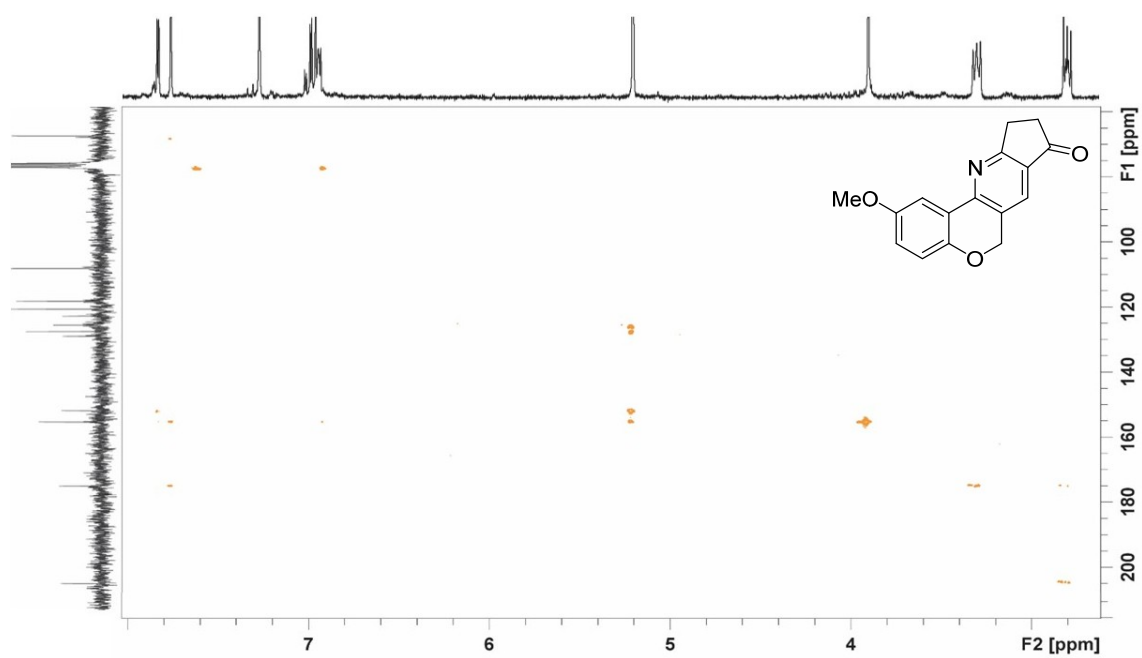


Figure S46. HMBC spectrum of **18** in CDCl₃.

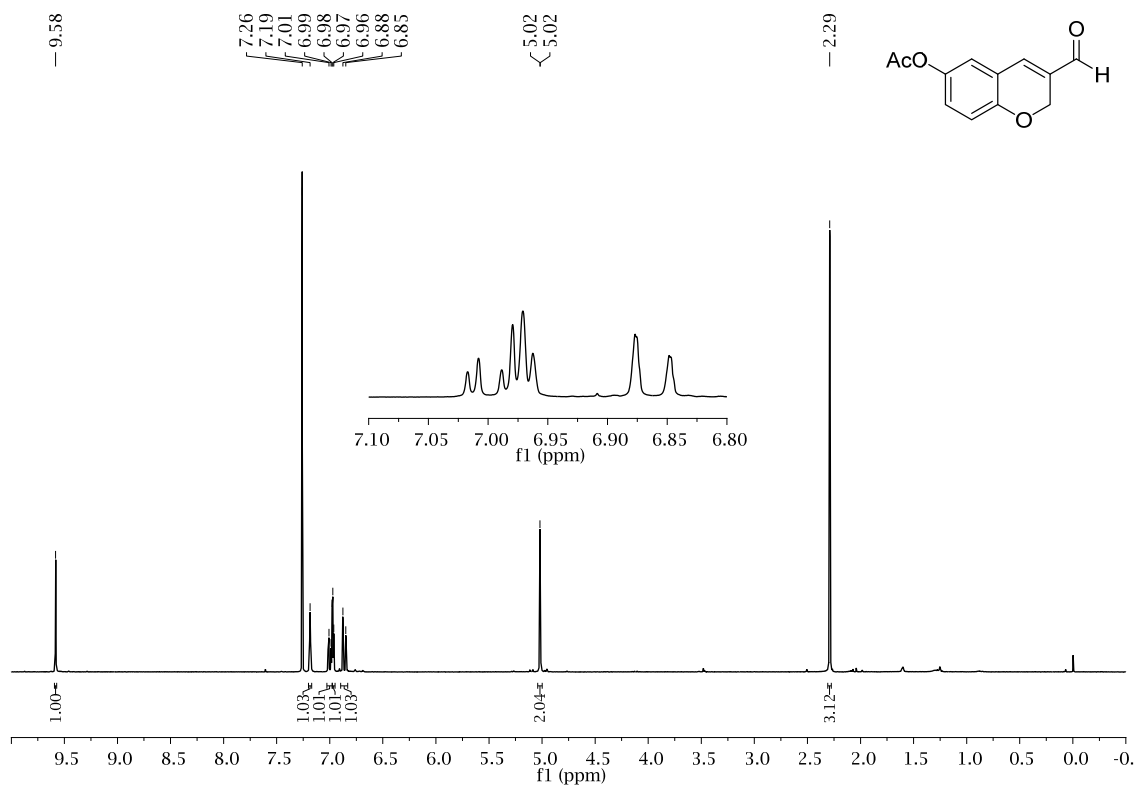


Figure S47. ¹H NMR (300 MHz) spectrum of **20** in CDCl₃.

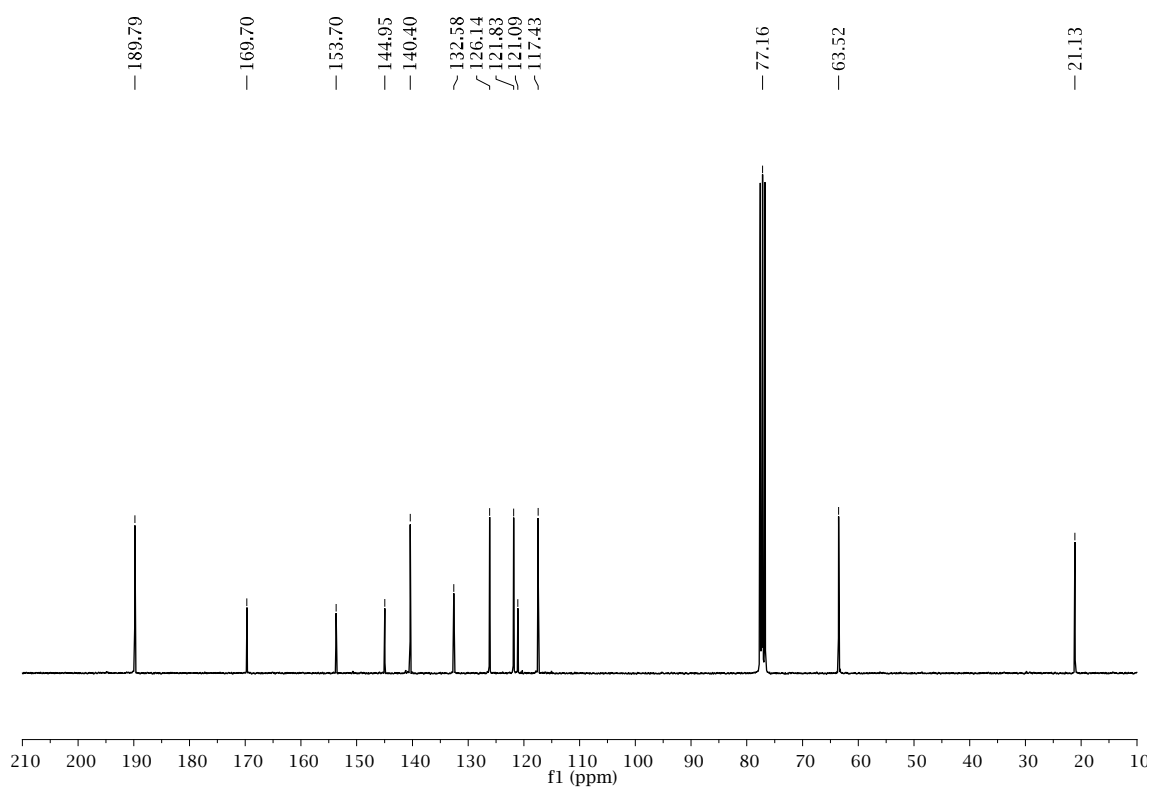


Figure S48. ¹³C NMR (75 MHz) spectrum of **20** in CDCl₃.

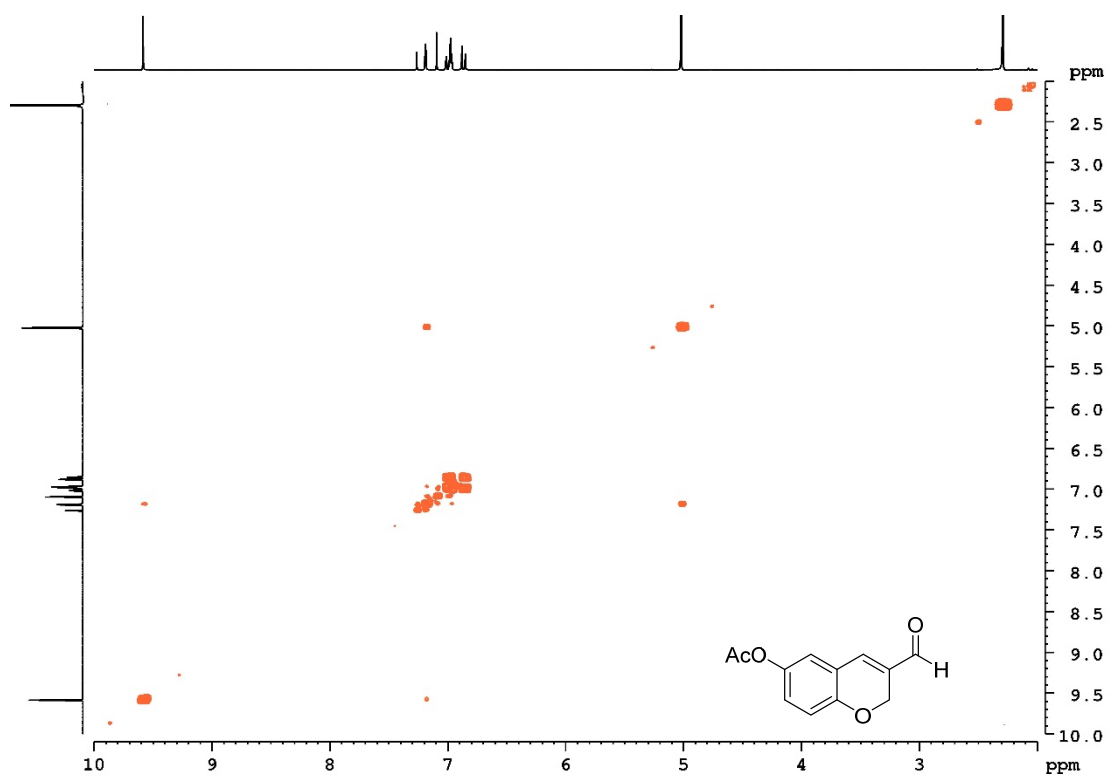


Figure S49. COSY spectrum of **20** in CDCl₃.

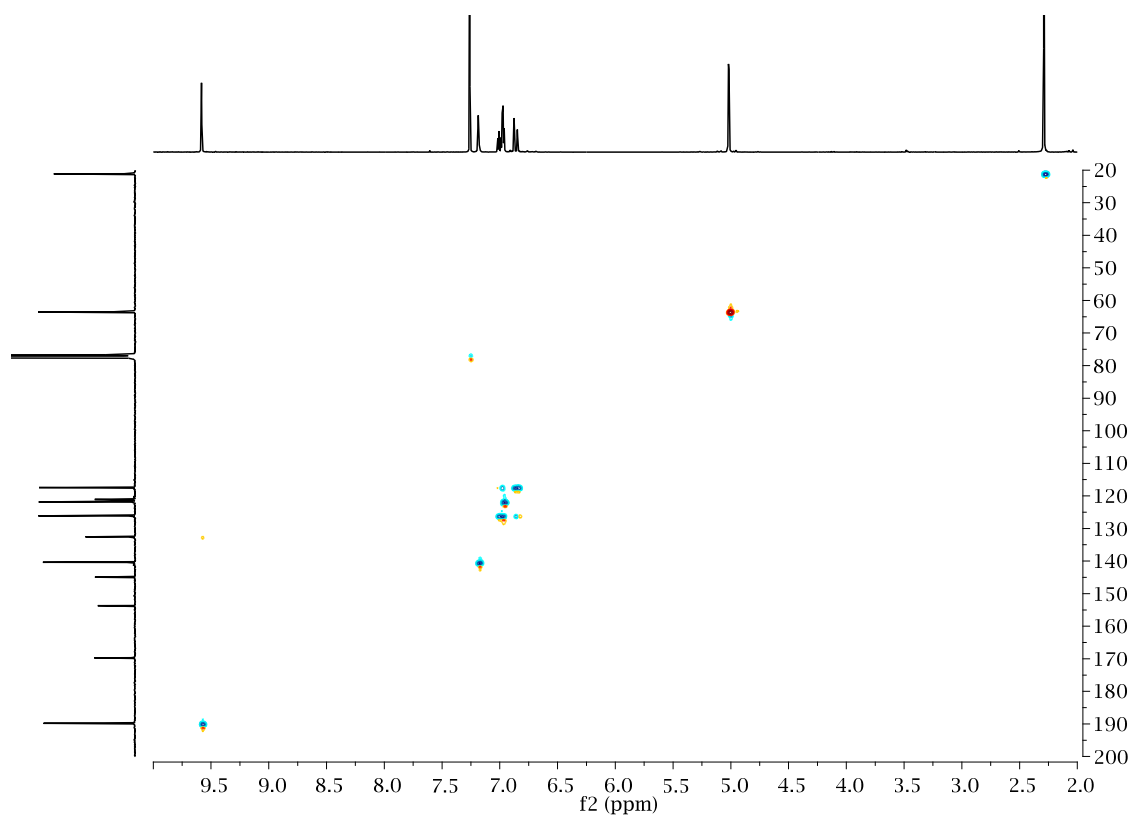


Figure S50. HSQC spectrum of **20** in CDCl₃.

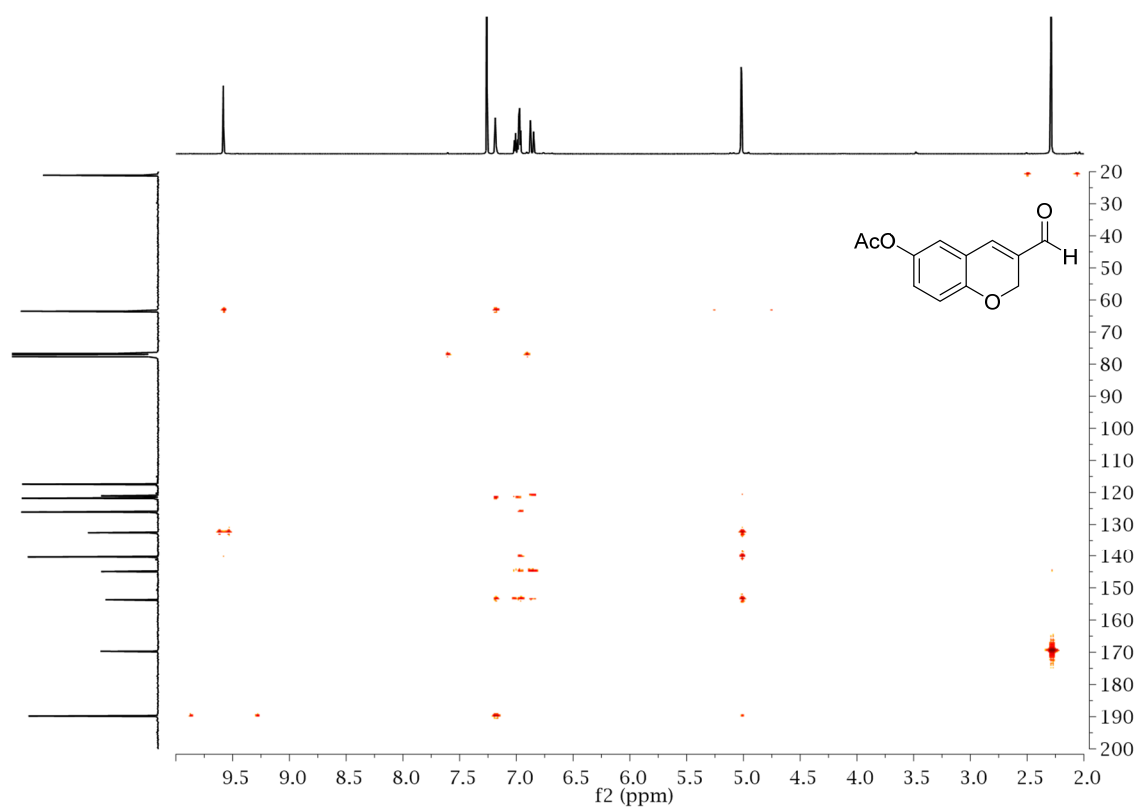


Figure S51. HMBC spectrum of **20** in CDCl_3 .

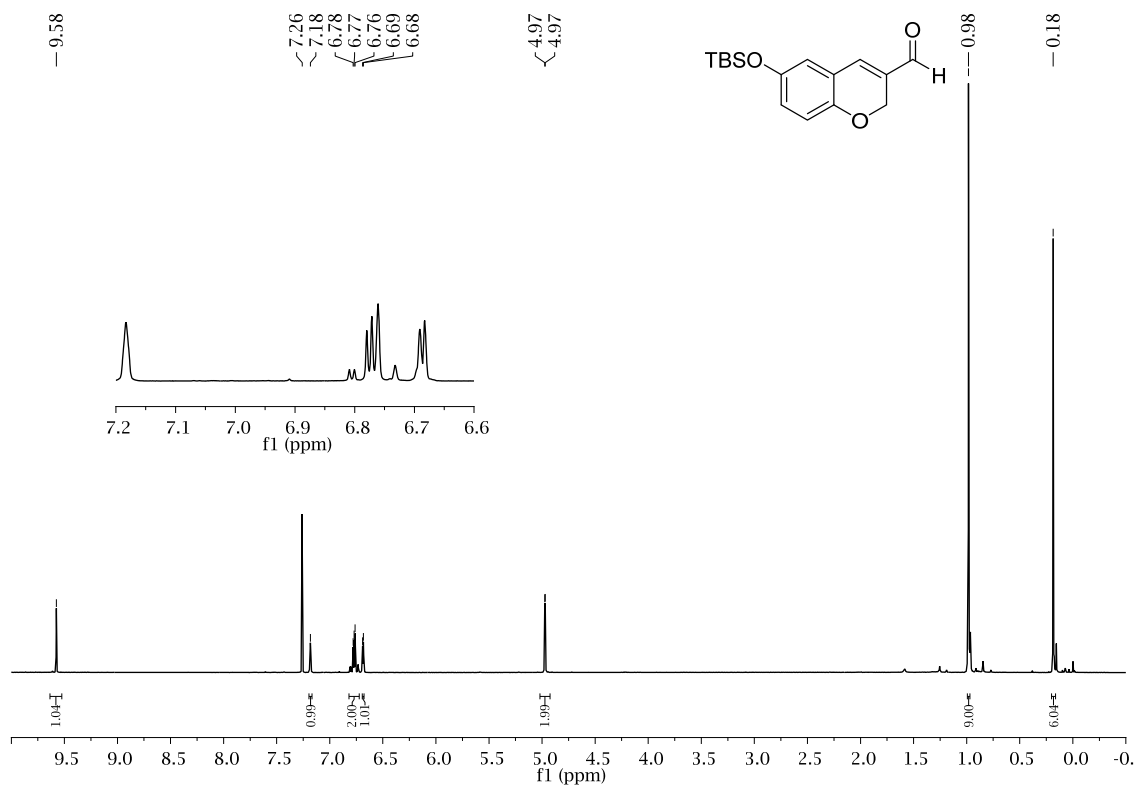


Figure S52. ¹H NMR (300 MHz) spectrum of **21** in CDCl₃.

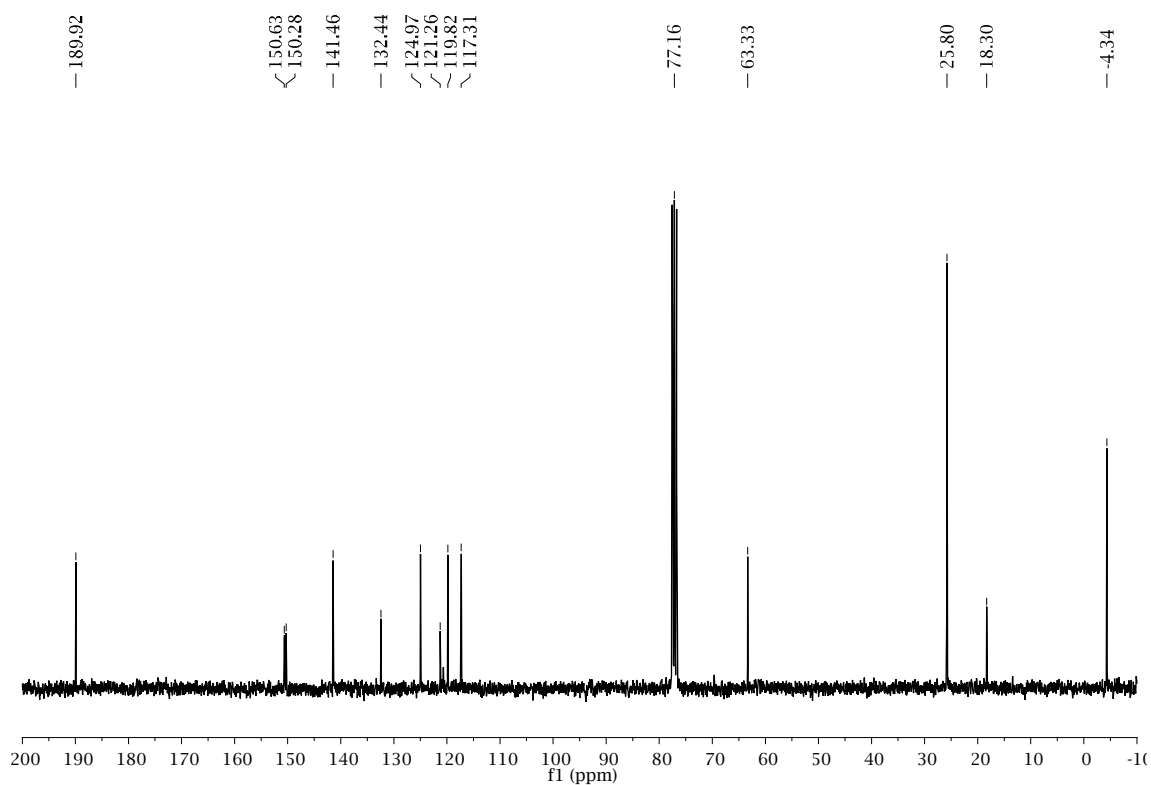


Figure S53. ¹³C NMR (75 MHz) spectrum of **21** in CDCl₃.

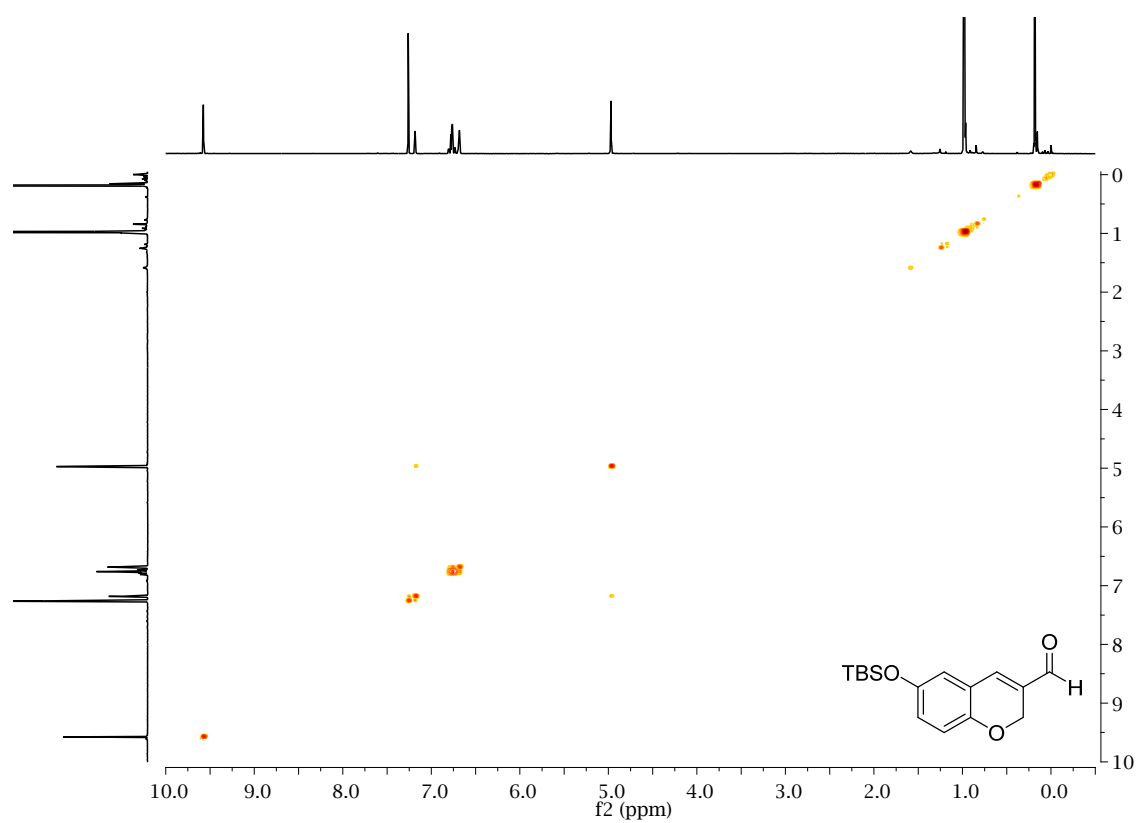


Figure S54. COSY spectrum of **21** in CDCl₃.

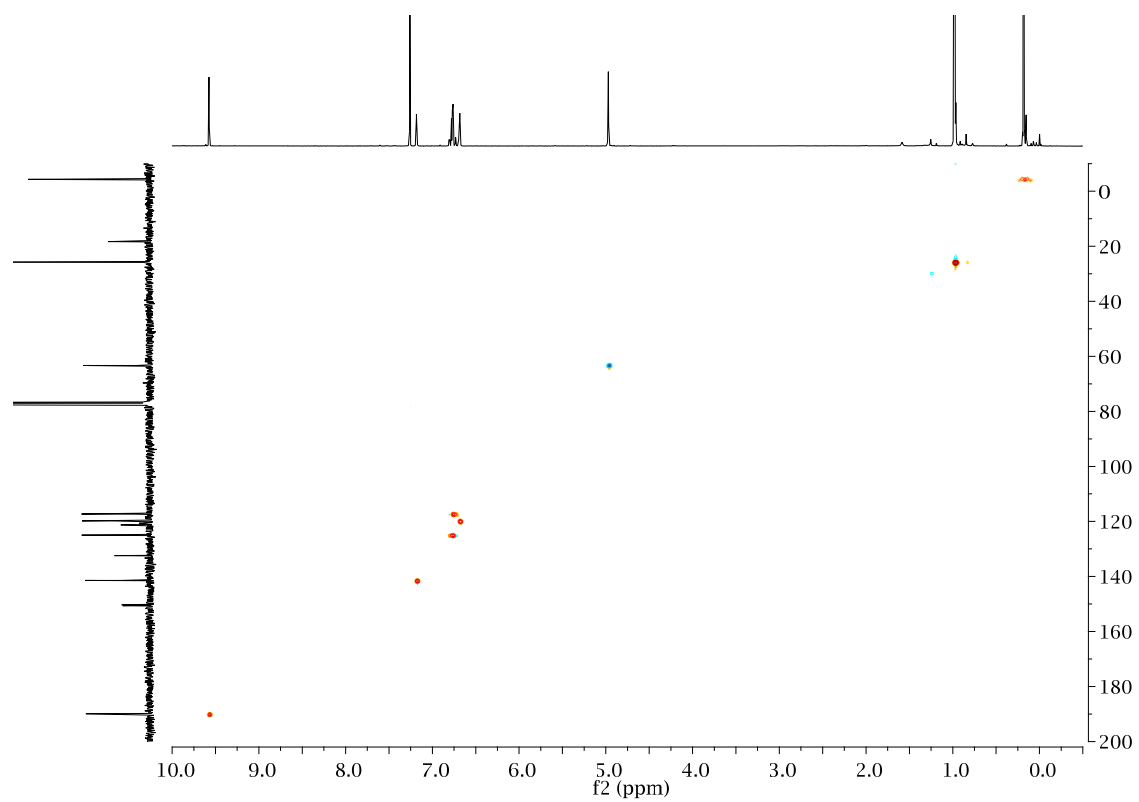


Figure S55. HSQC spectrum of **21** in CDCl₃.

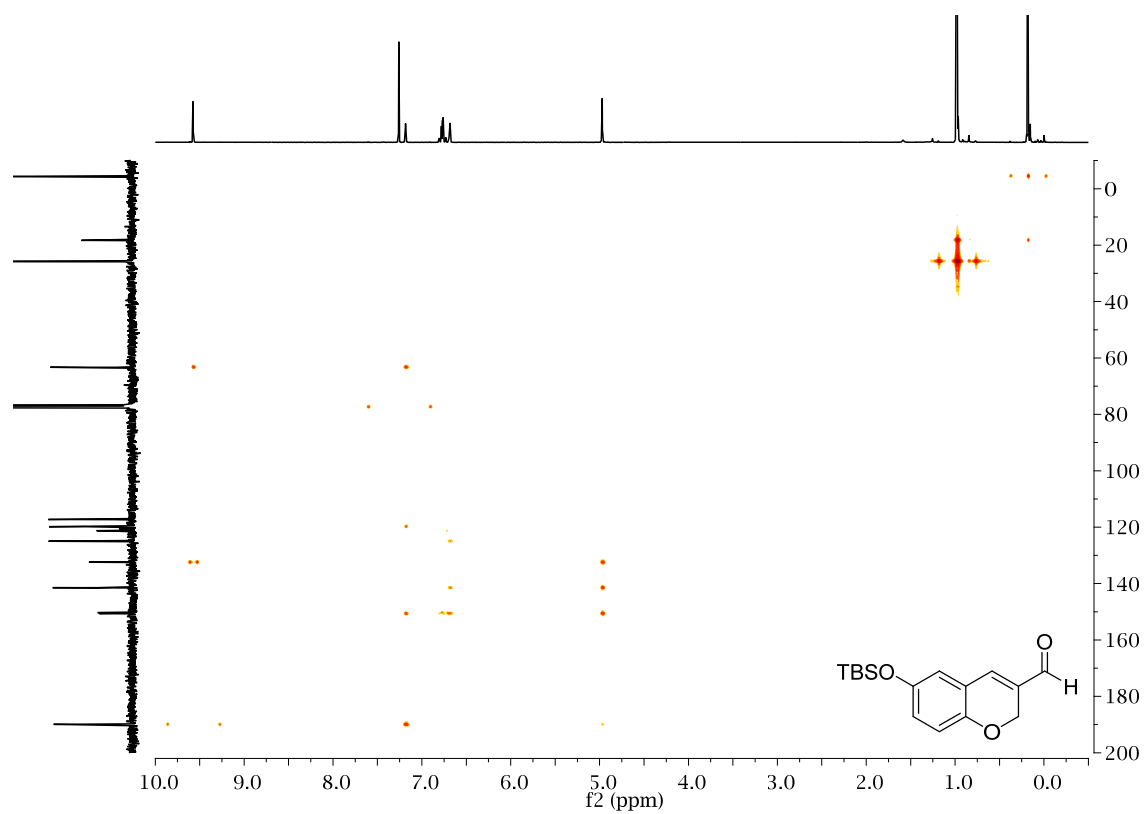


Figure S56. HMBC spectrum of **21** in CDCl_3 .

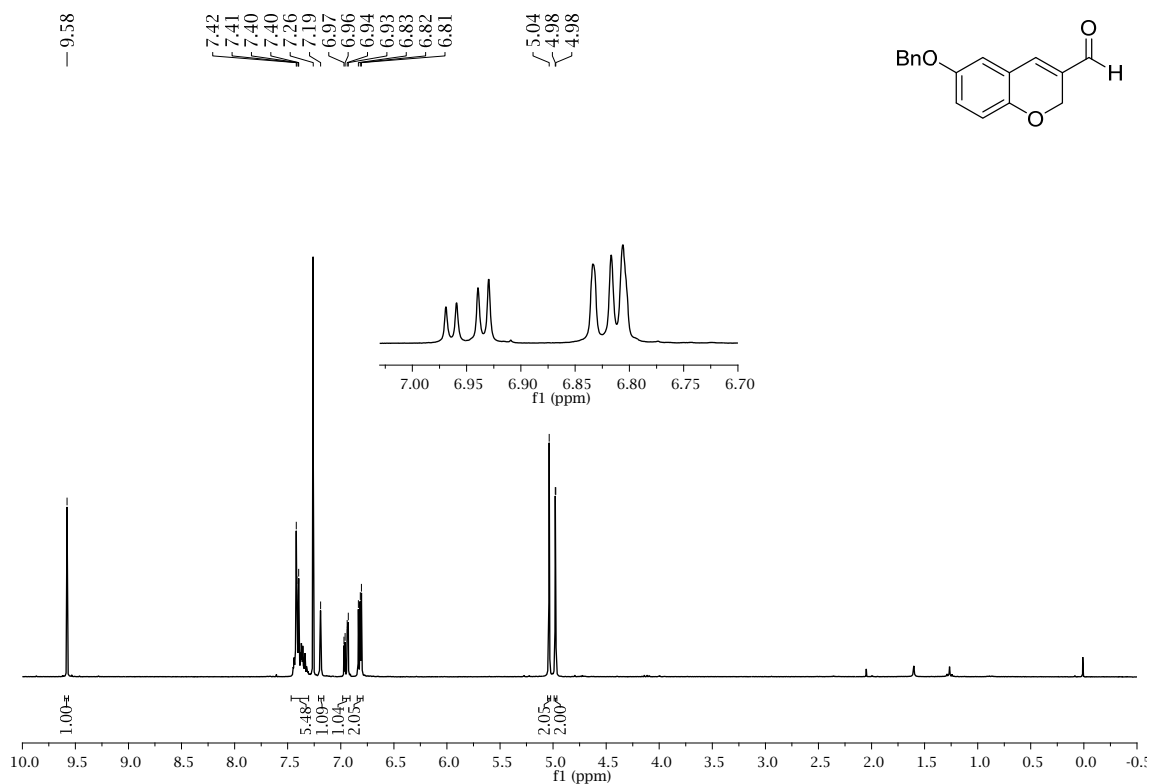


Figure S57. ¹H NMR (300 MHz) spectrum of **22** in CDCl₃.

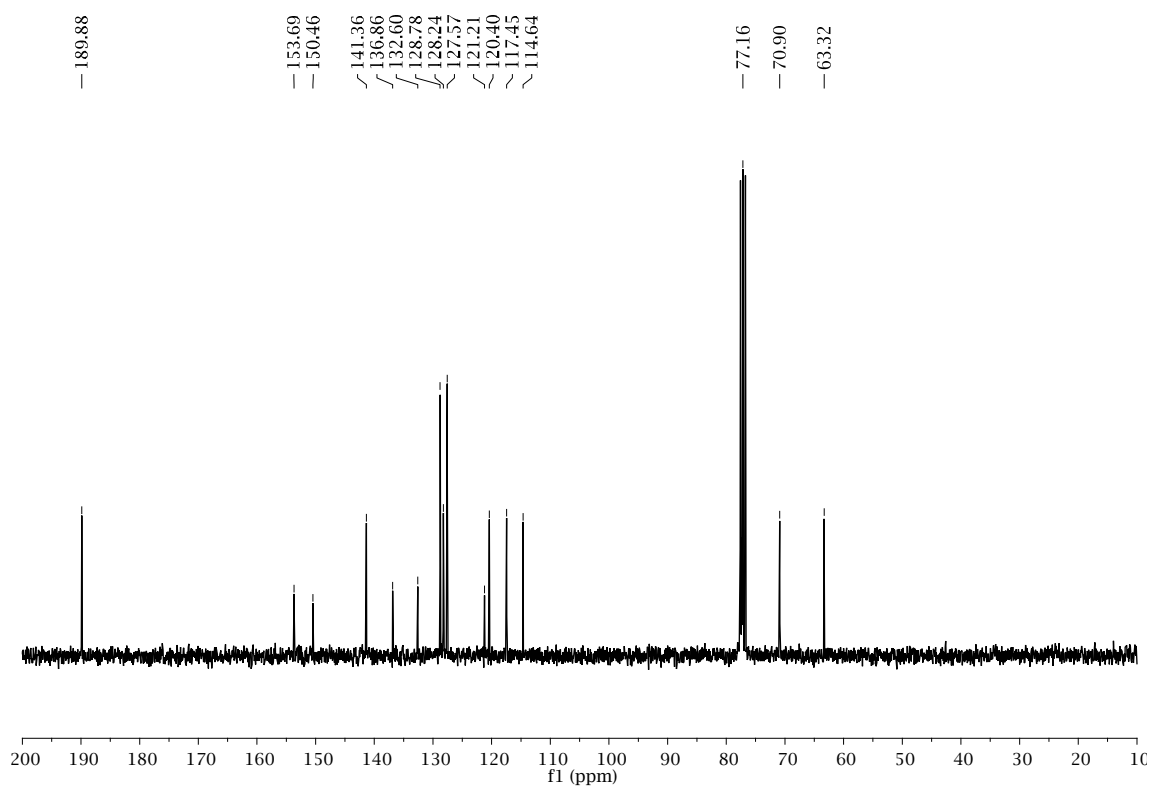


Figure S58. ¹³C NMR (75 MHz) spectrum of **22** in CDCl₃.

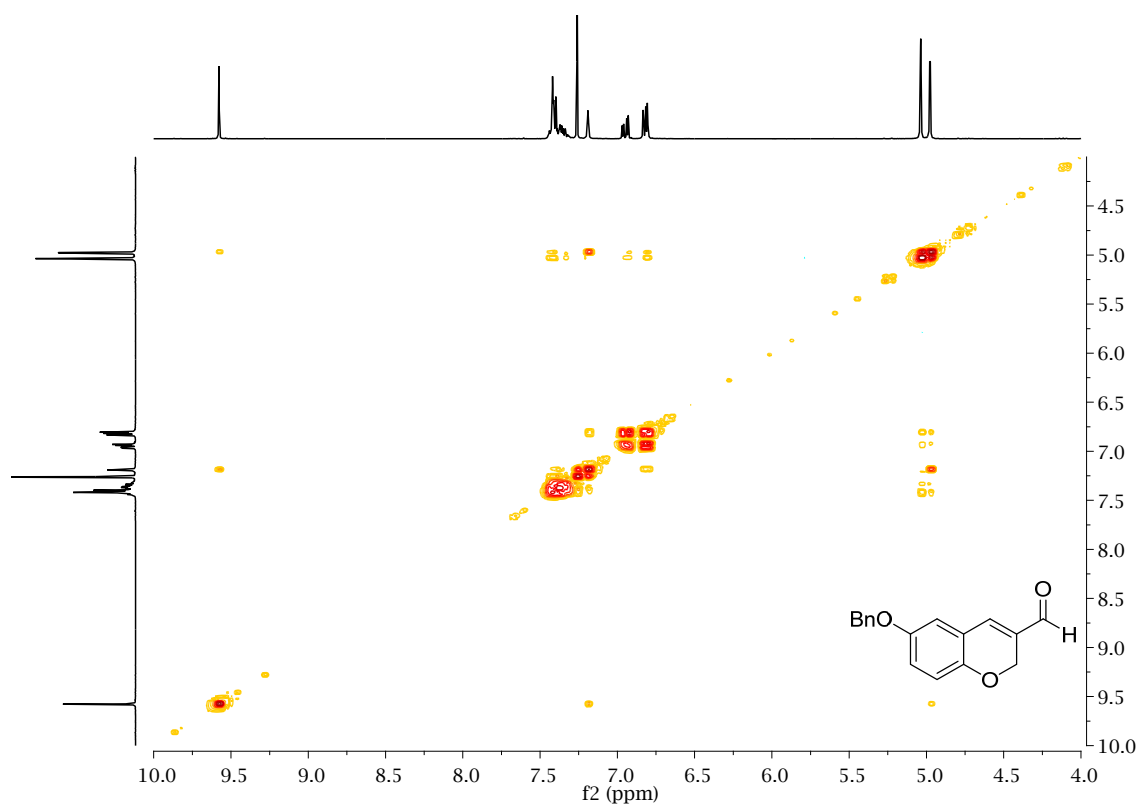


Figure S59. COSY spectrum of **22** in CDCl₃.

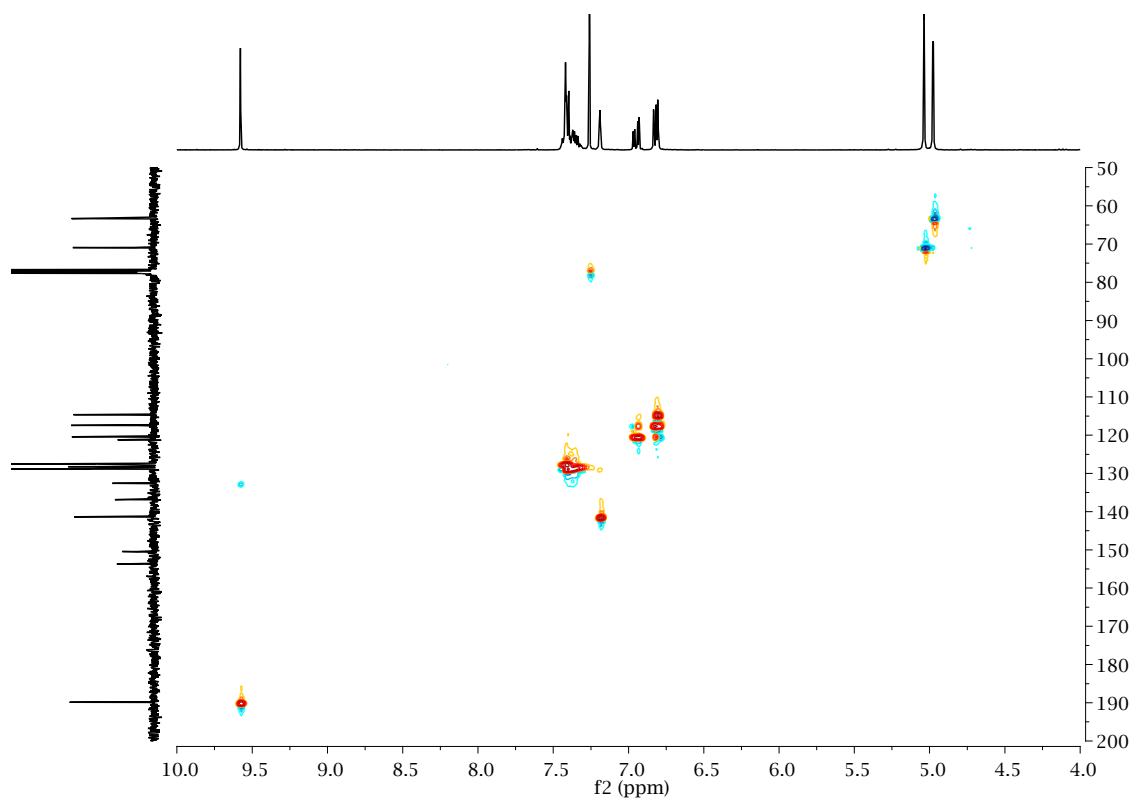


Figure S60. HSQC spectrum of **22** in CDCl₃.

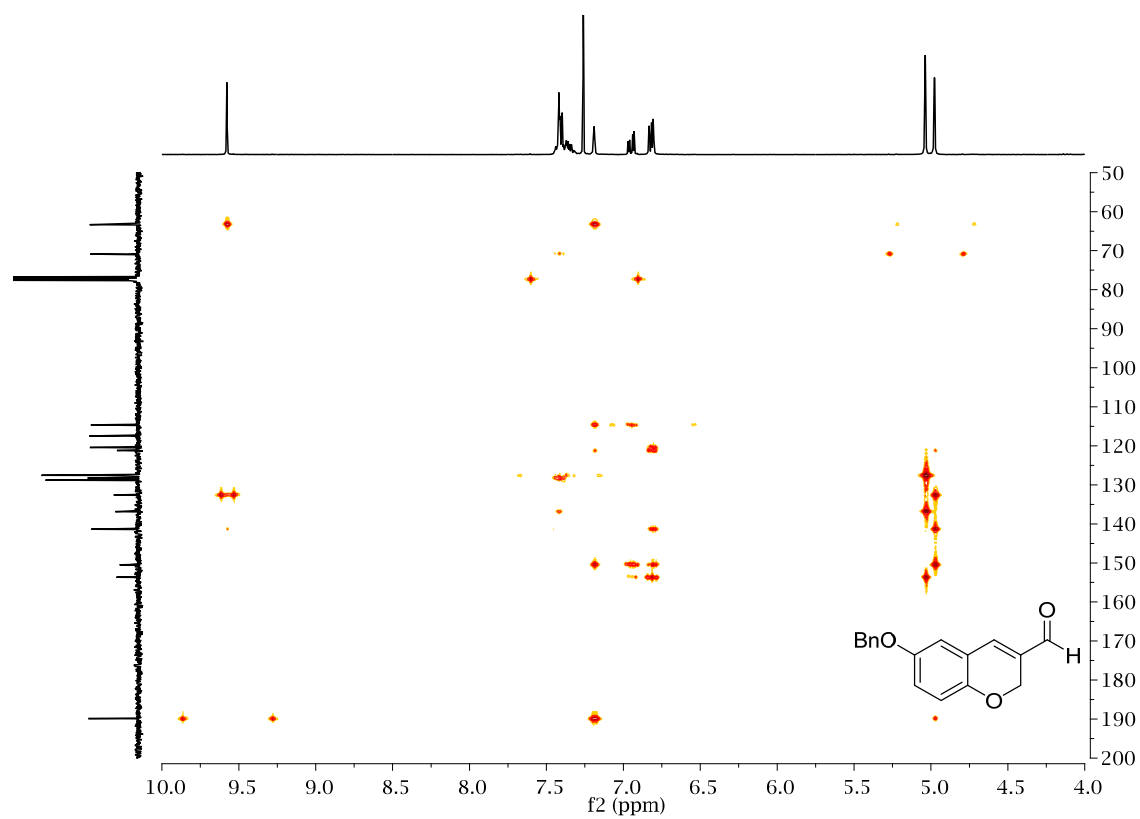


Figure S61. HMBC spectrum of **22** in CDCl₃.

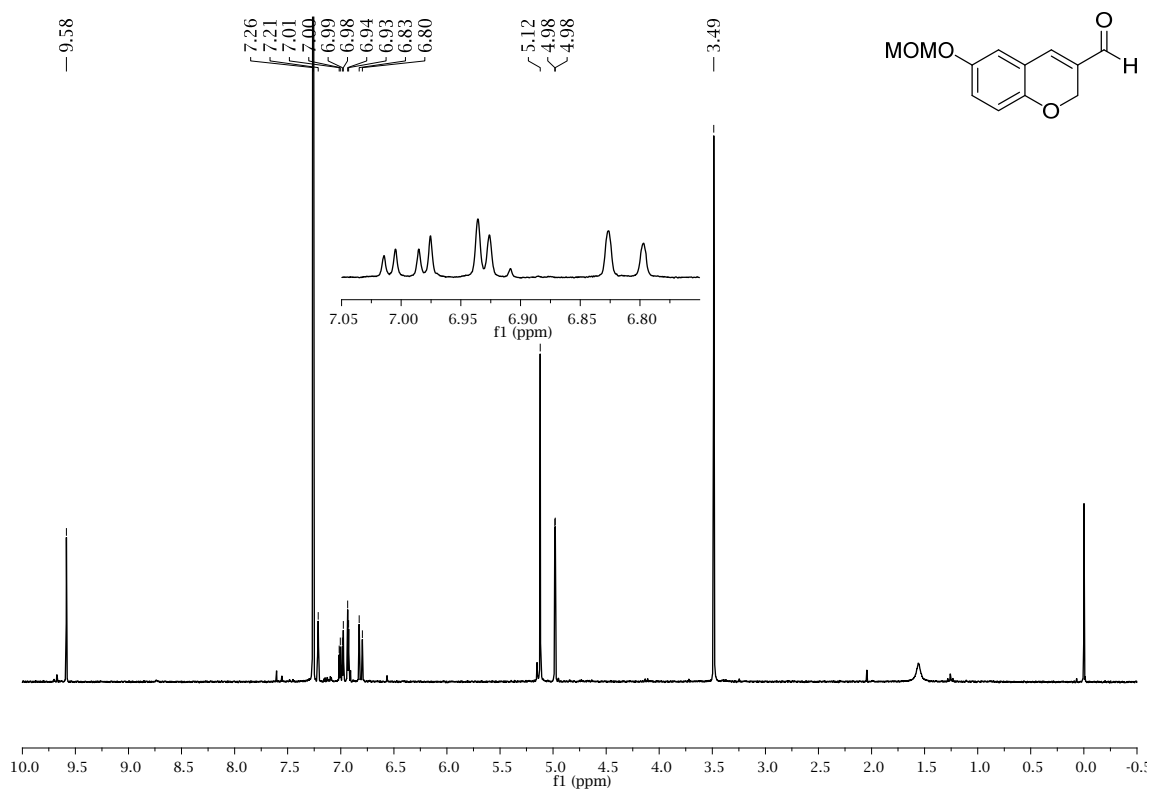


Figure S62. ¹H NMR (300 MHz) spectrum of **23** in CDCl₃.

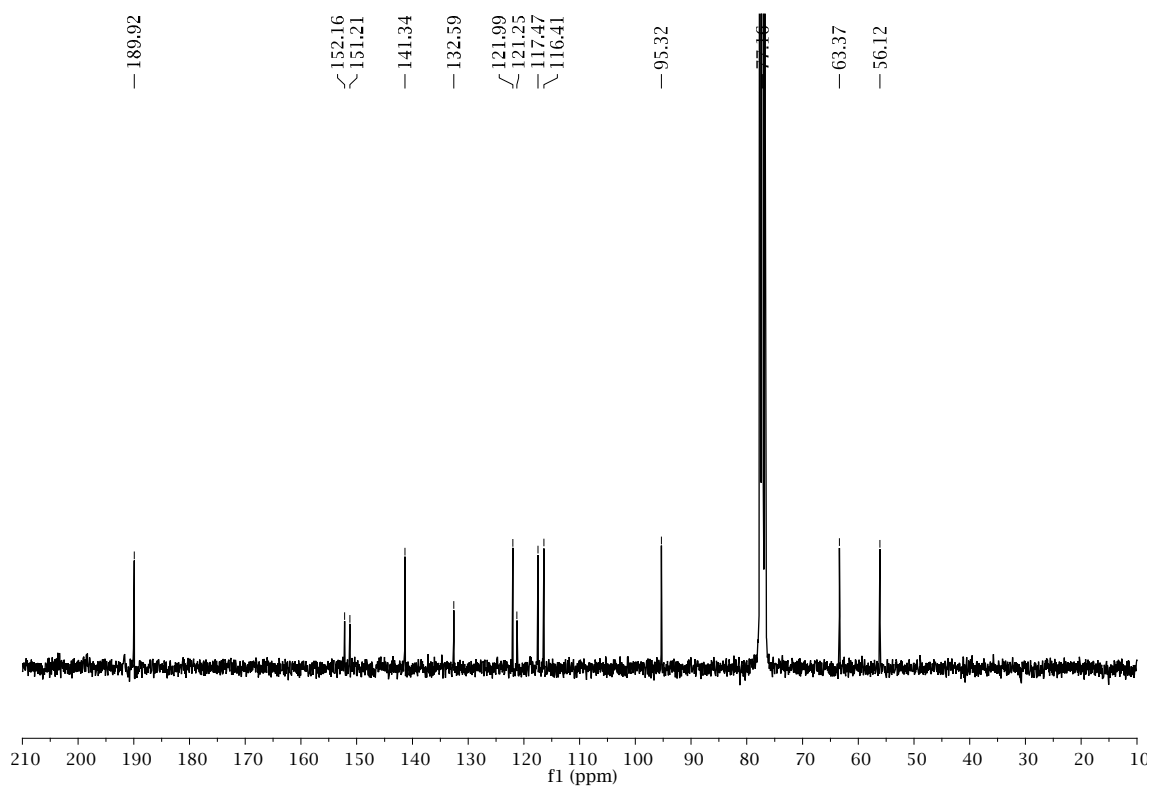


Figure S63. ¹³C NMR (75 MHz) spectrum of **23** in CDCl₃.

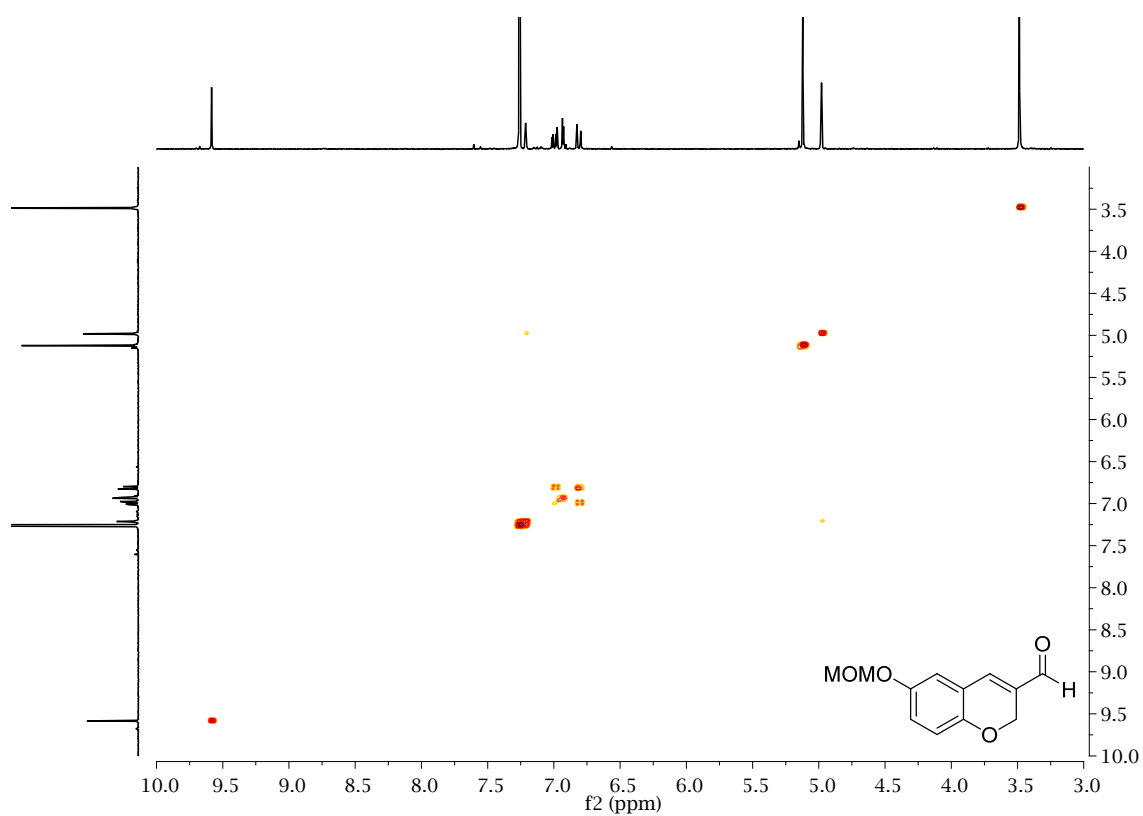


Figure S64. COSY spectrum of **23** in CDCl₃.

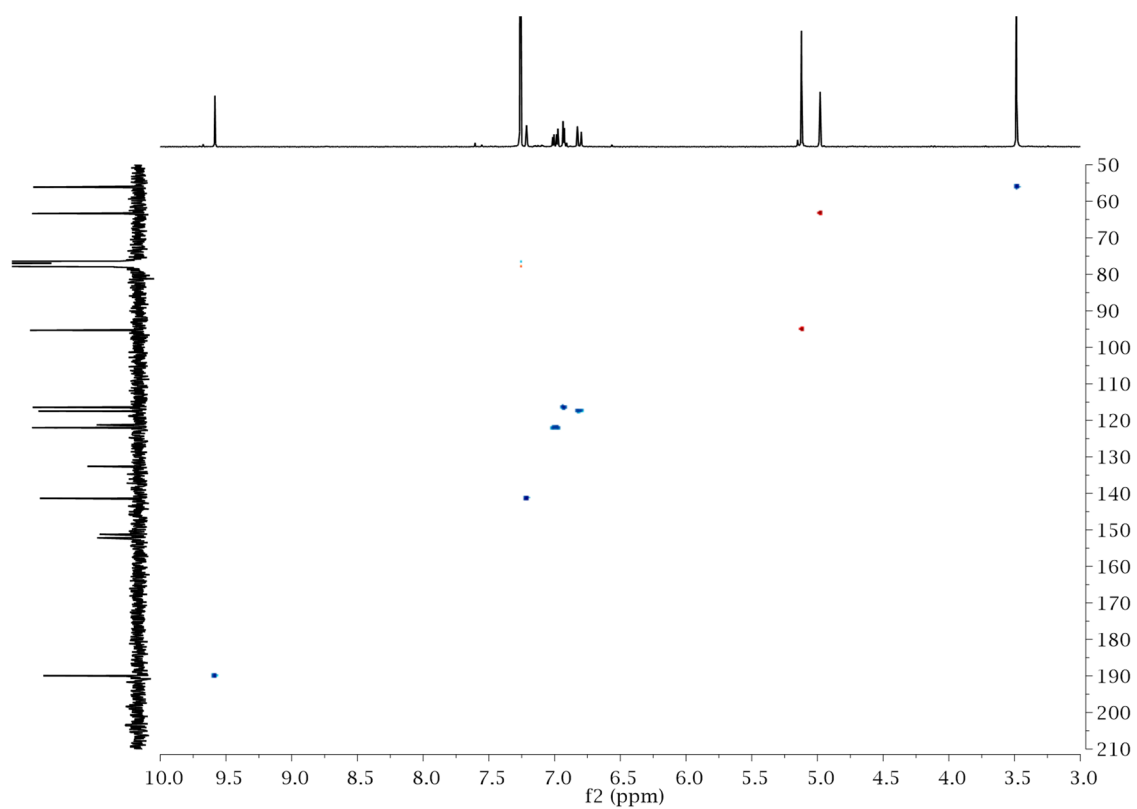


Figure S65. HSQC spectrum of **23** in CDCl₃.

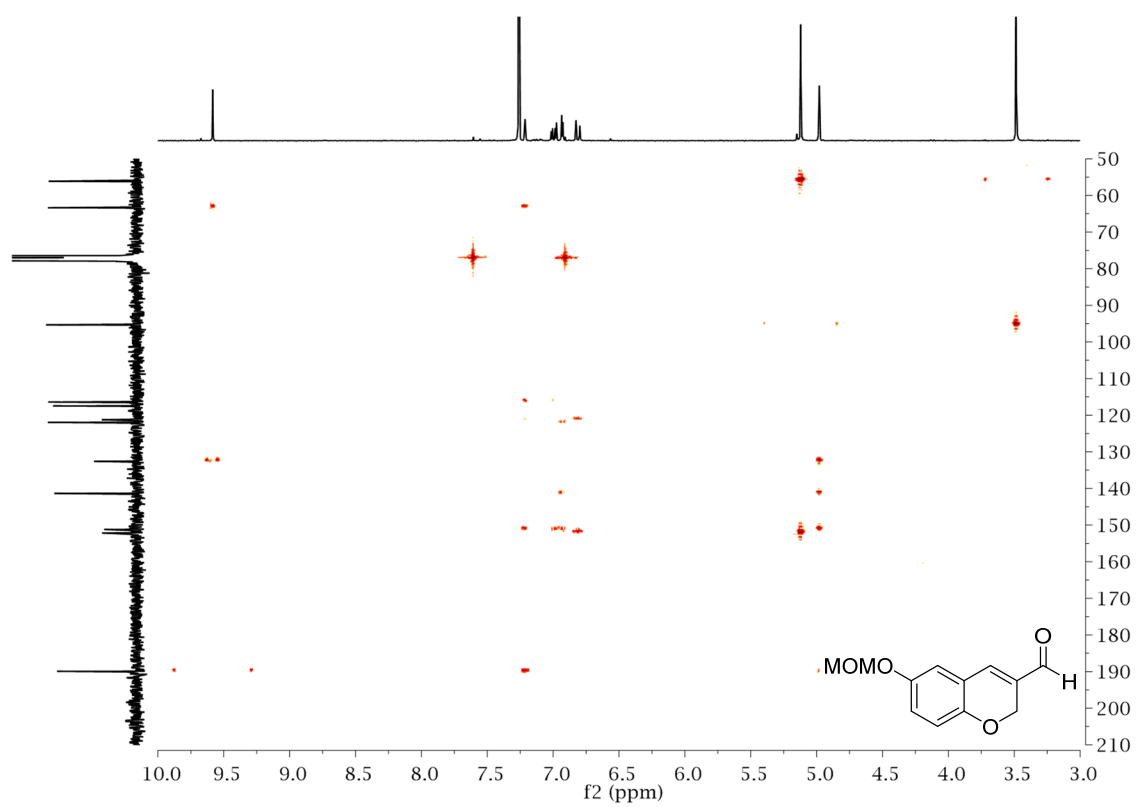


Figure S66. HMBC spectrum of **23** in CDCl₃.

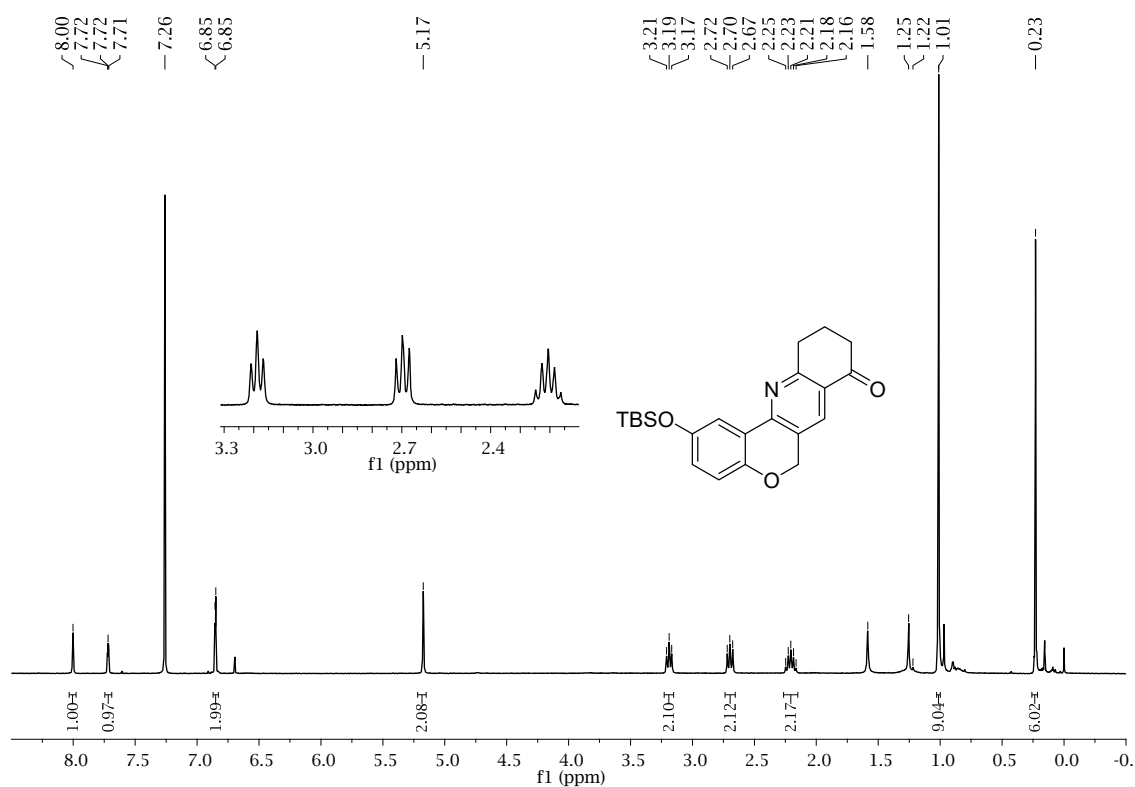


Figure S67. ¹H NMR (300 MHz) spectrum of **24** in CDCl₃.

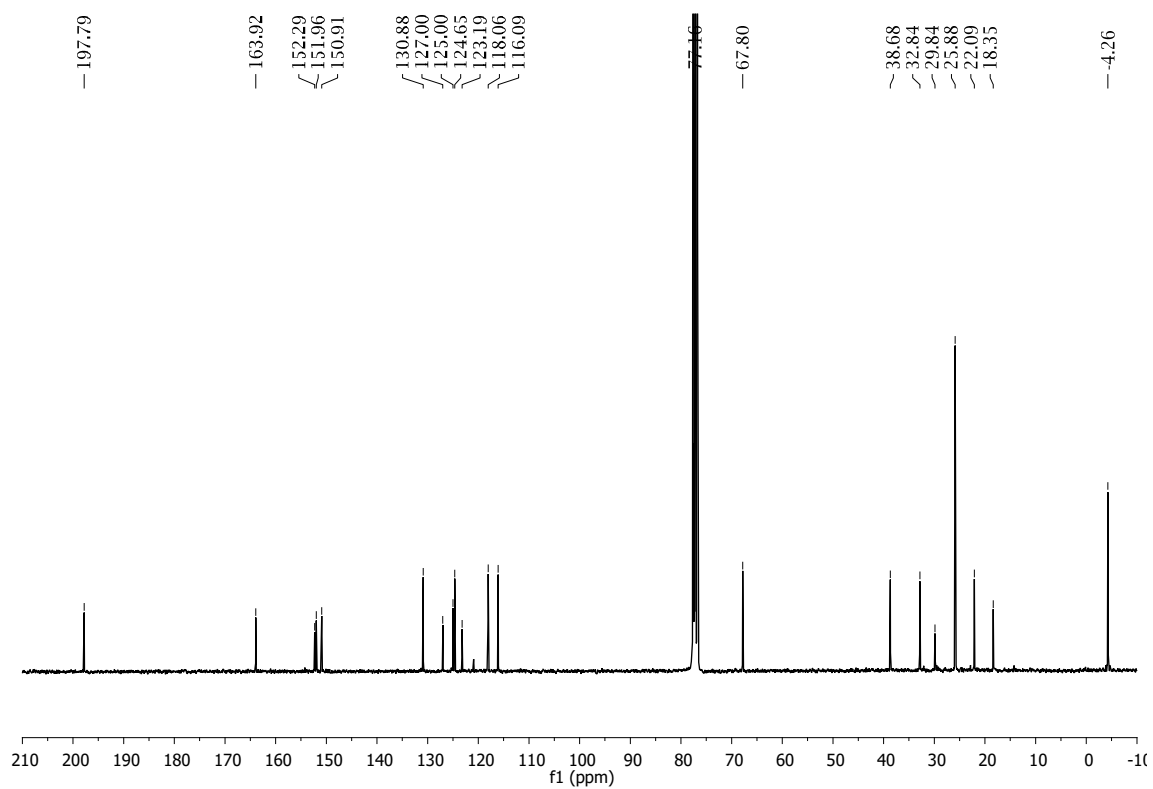


Figure S68. ¹³C NMR (75 MHz) spectrum of **24** in CDCl₃.

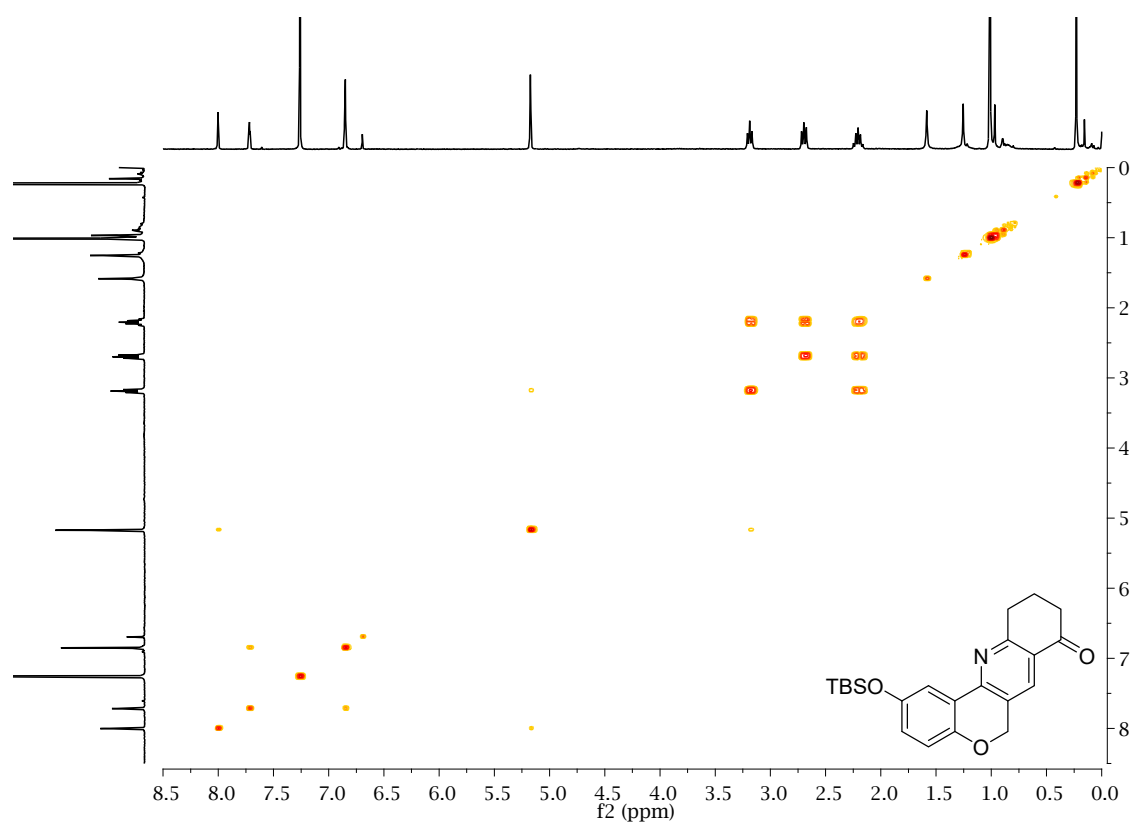


Figure S69. COSY spectrum of **24** in CDCl_3 .

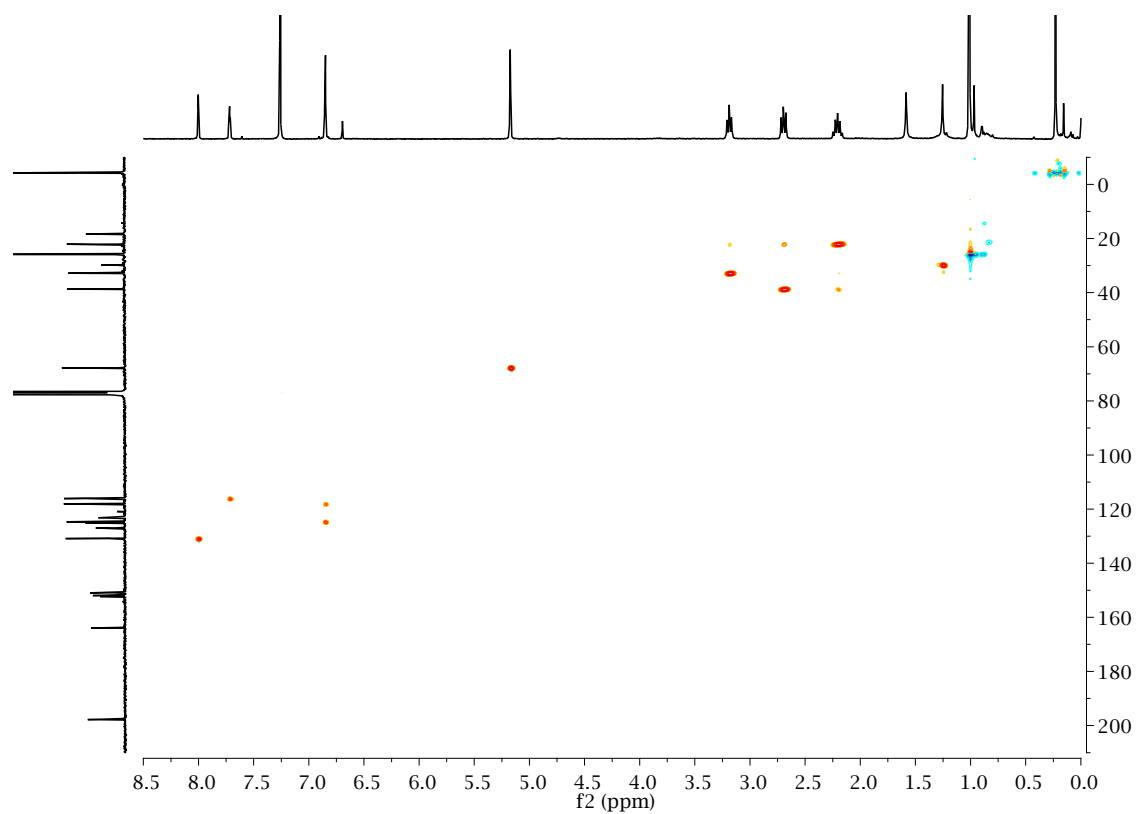


Figure S70. HSQC spectrum of **24** in CDCl_3 .

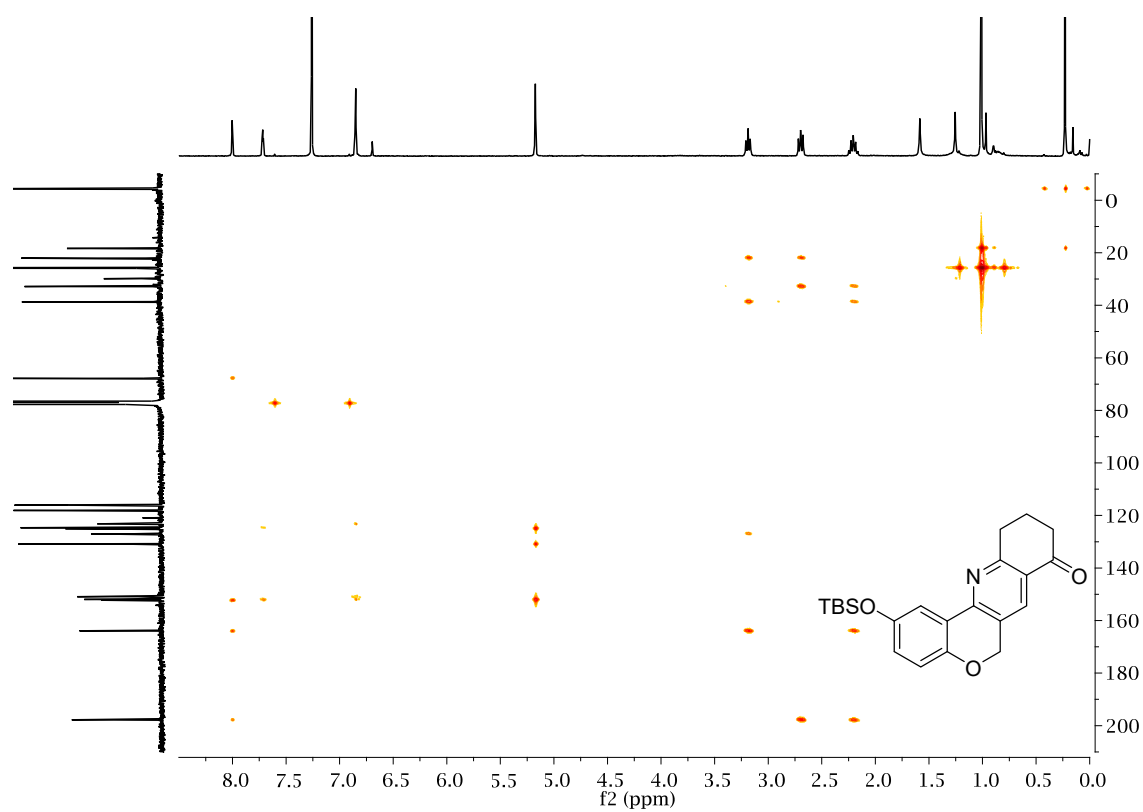


Figure S71. HMBC spectrum of **24** in CDCl₃.

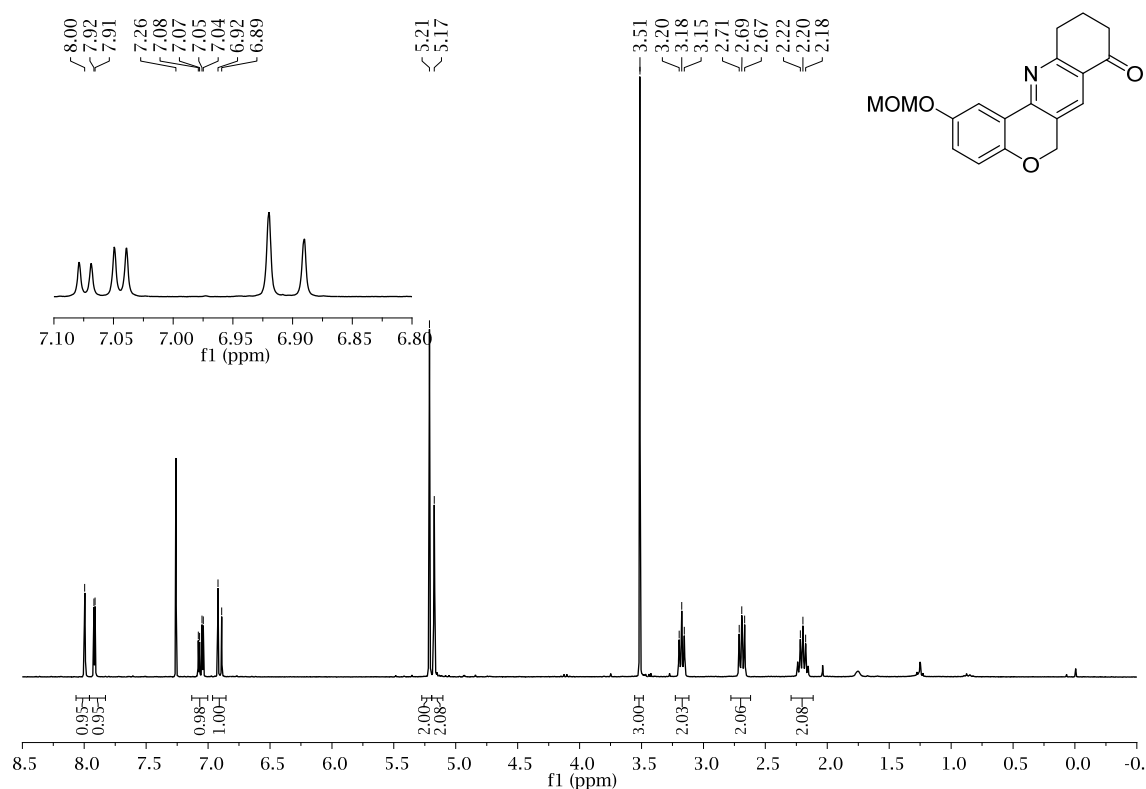


Figure S72. ¹H NMR (300 MHz) spectrum of **25** in CDCl₃.

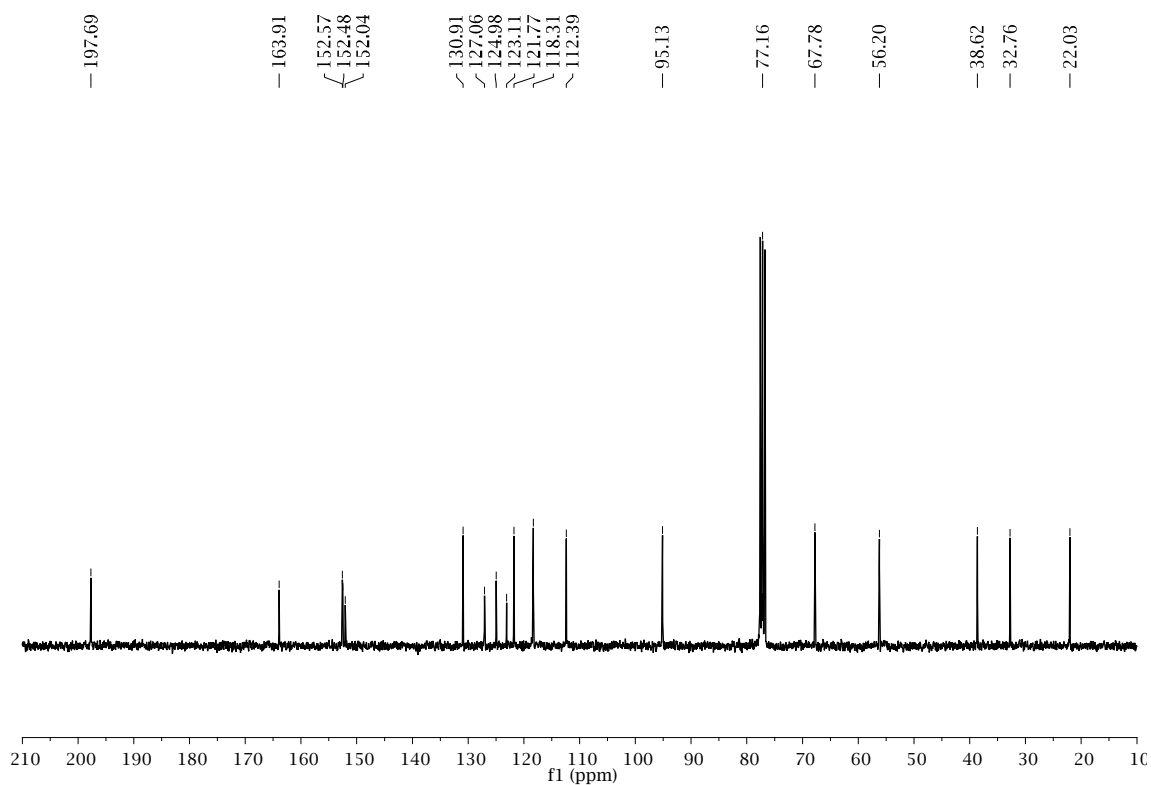


Figure 73. ¹³C NMR (75 MHz) spectrum of **25** in CDCl₃.

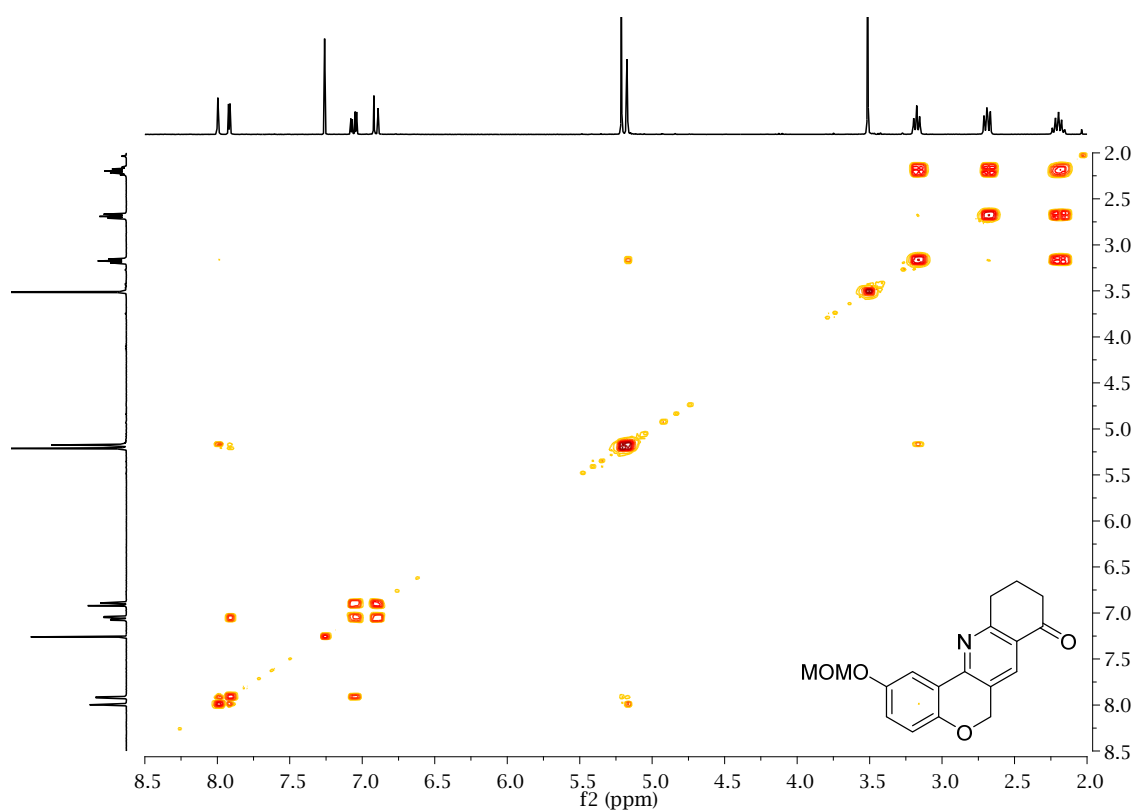


Figure S74. COSY spectrum of **25** in CDCl₃.

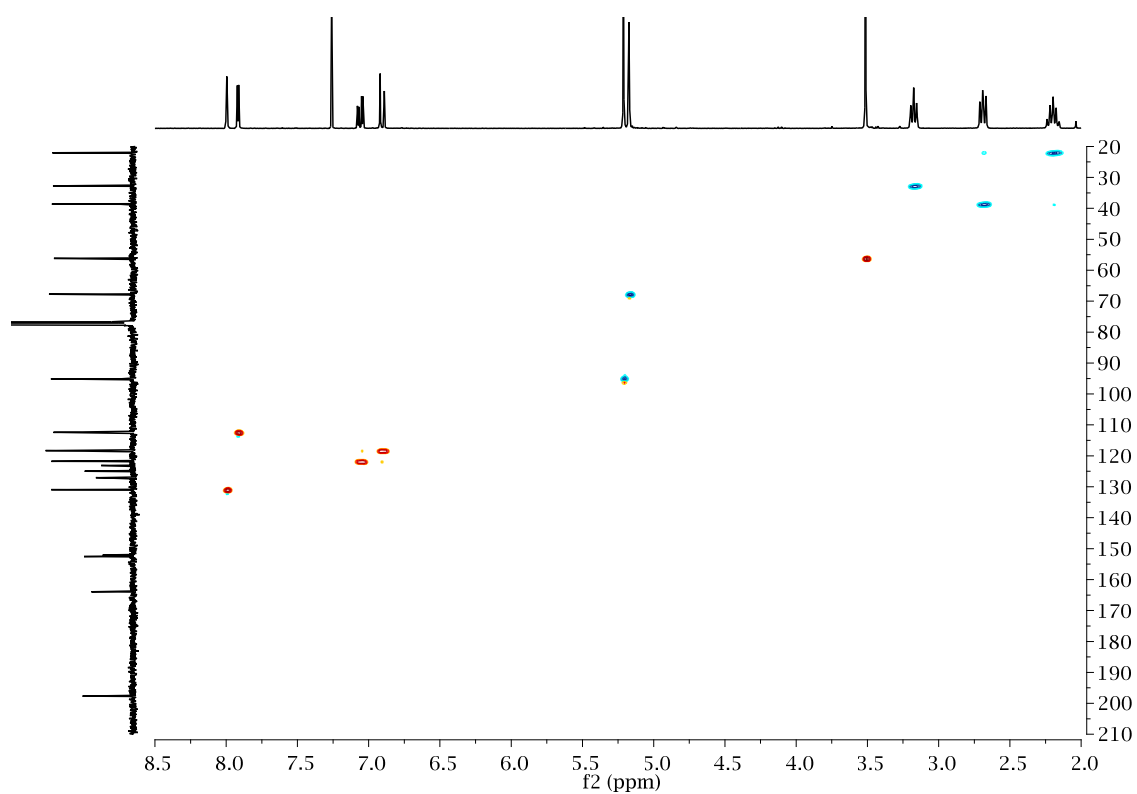


Figure S75. HSQC spectrum of **25** in CDCl₃.

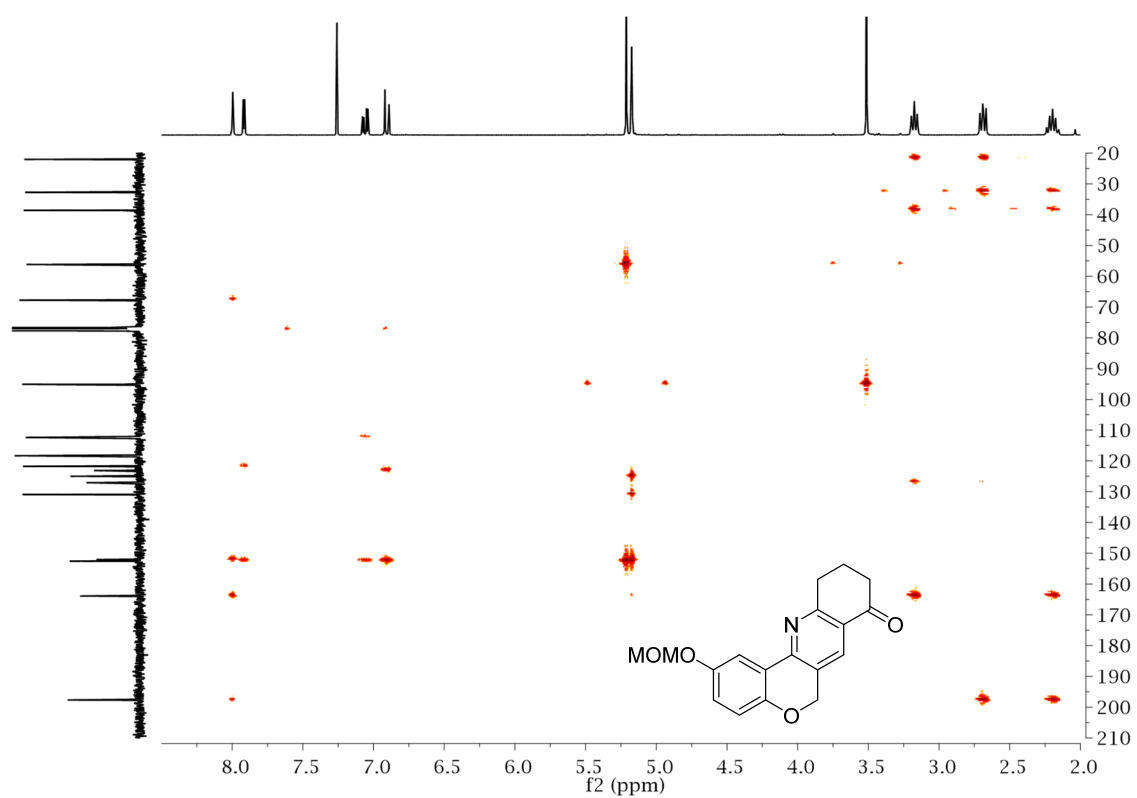


Figure S76. HMBC spectrum of **25** in CDCl₃.

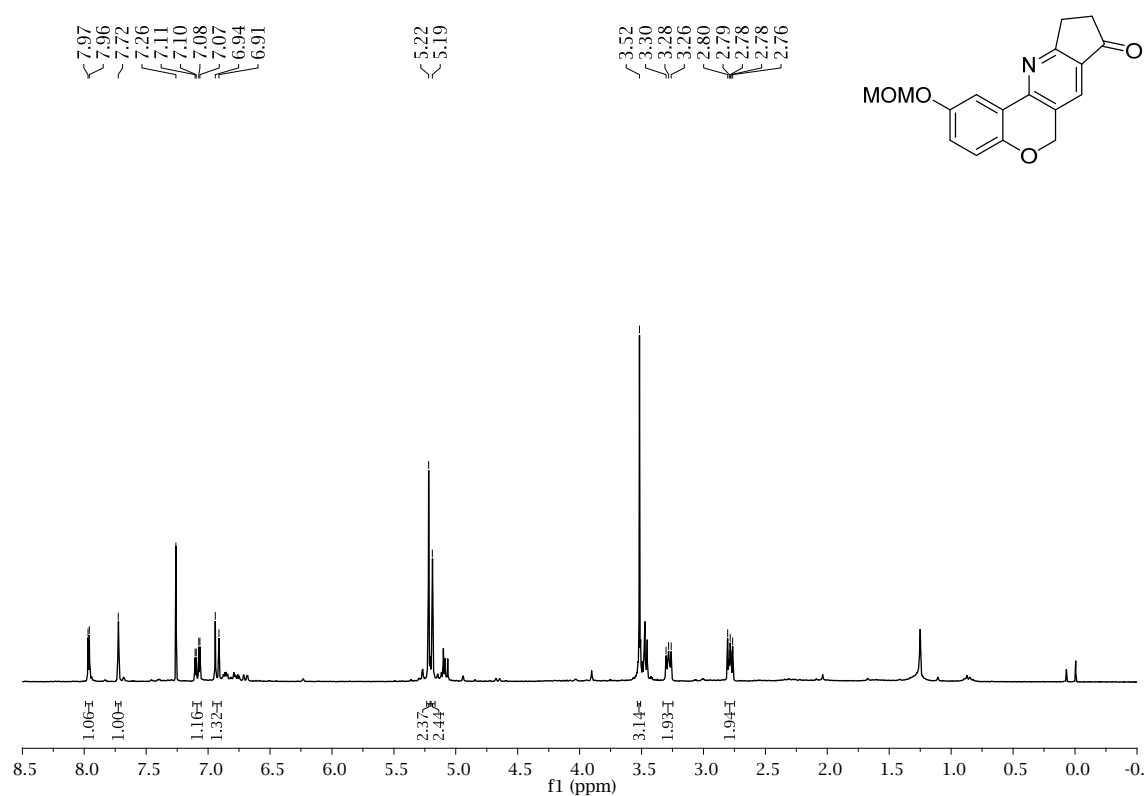


Figure S77. ¹H NMR (300 MHz) spectrum of **26** in CDCl₃.

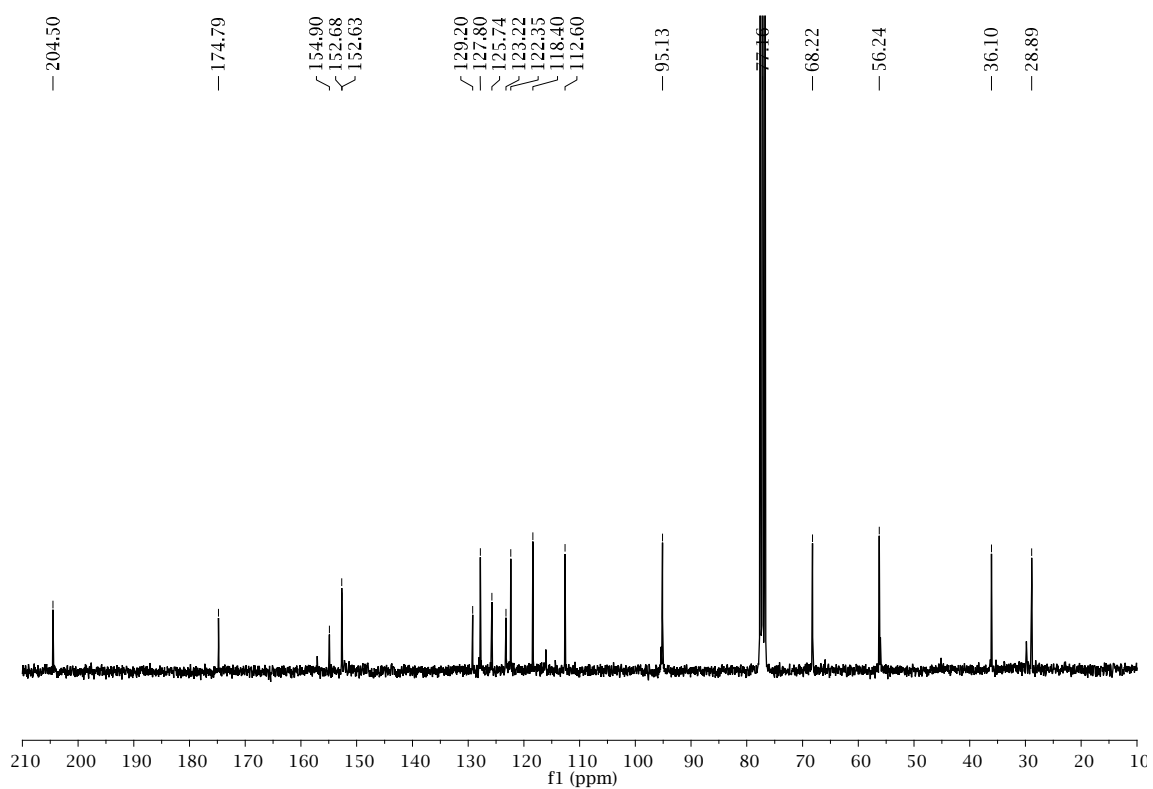


Figure S78. ¹³C NMR (75 MHz) spectrum of **26** in CDCl₃.

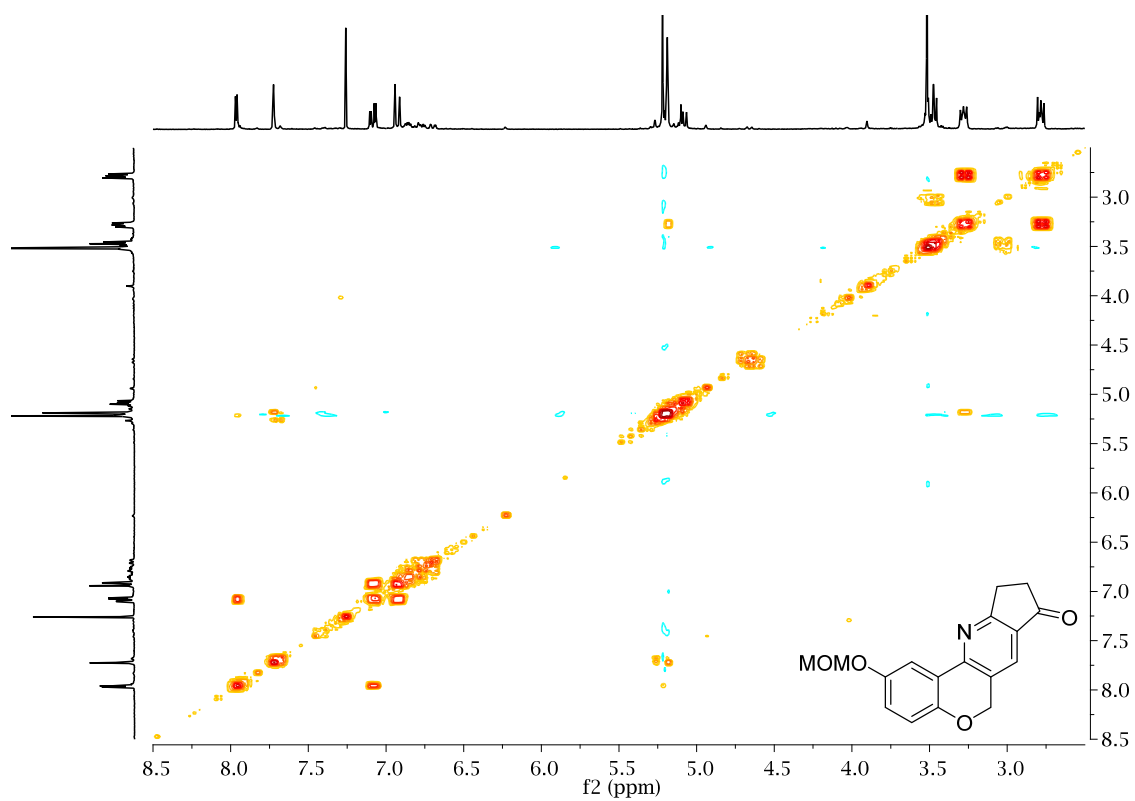


Figure S79. COSY spectrum of **26** in CDCl₃.

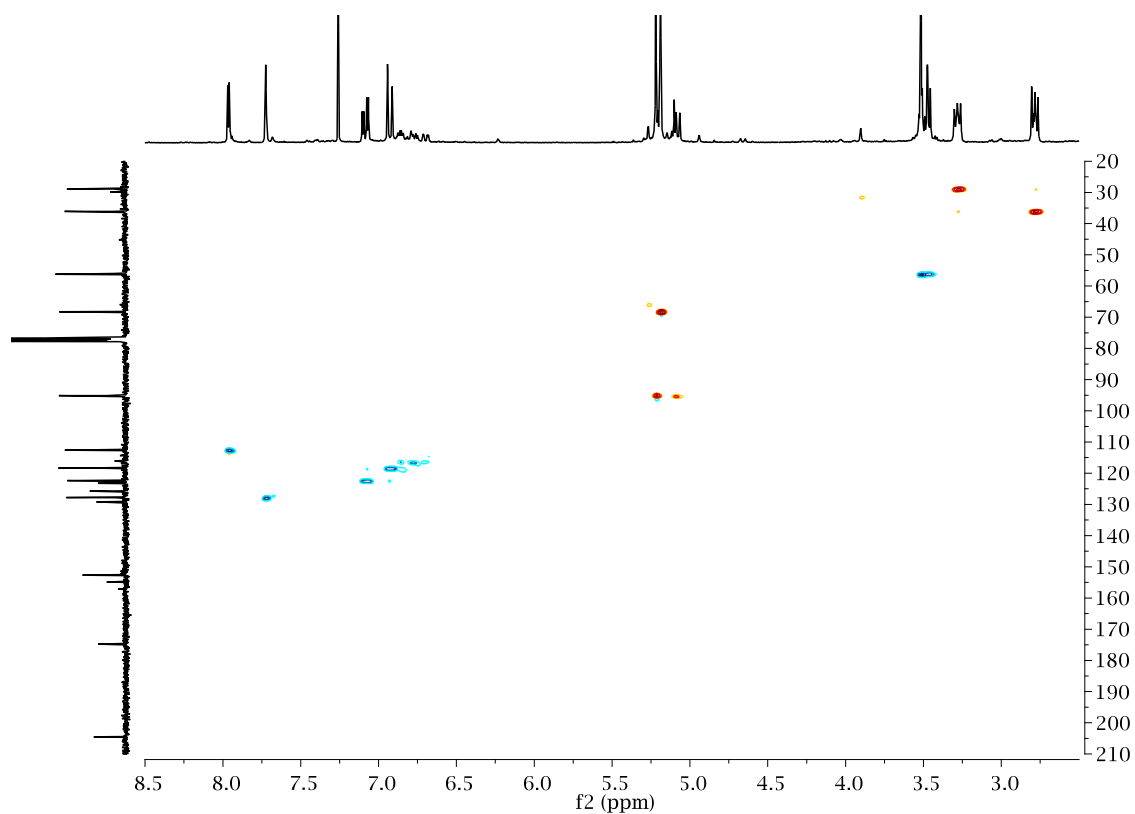


Figure S80. HSQC spectrum of **26** in CDCl₃.

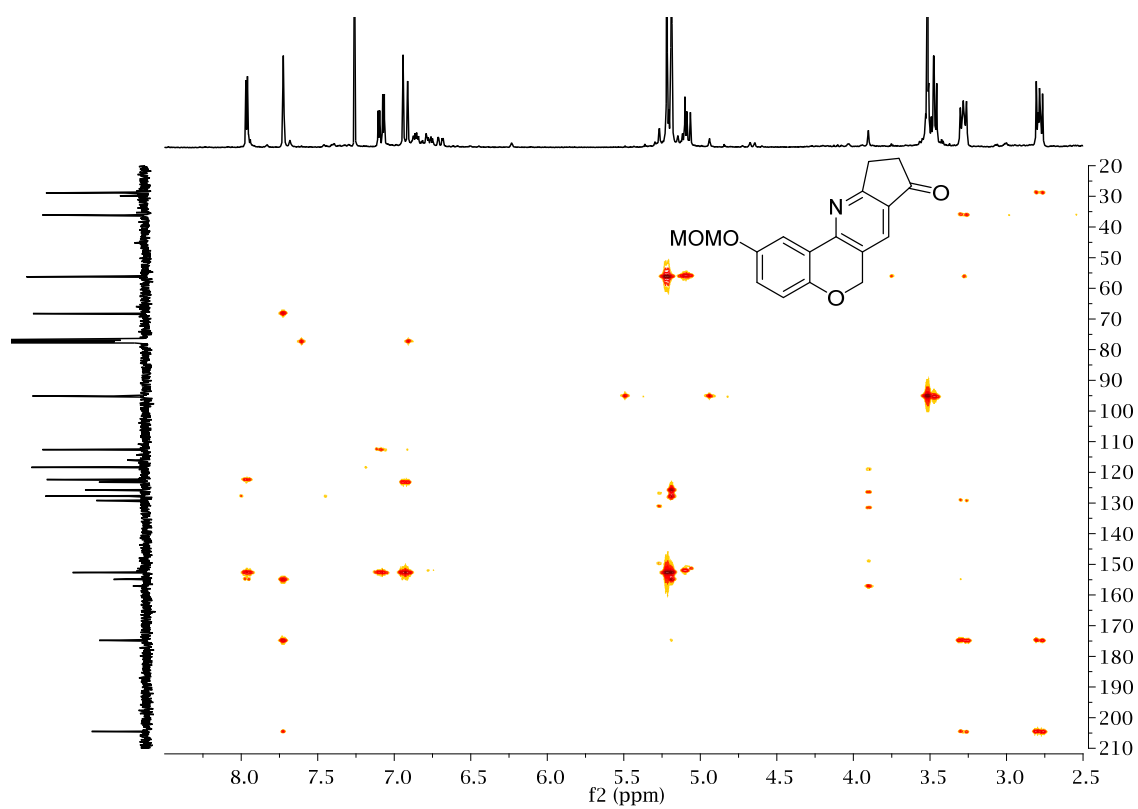


Figure S81. HMBC spectrum of **26** in CDCl_3 .

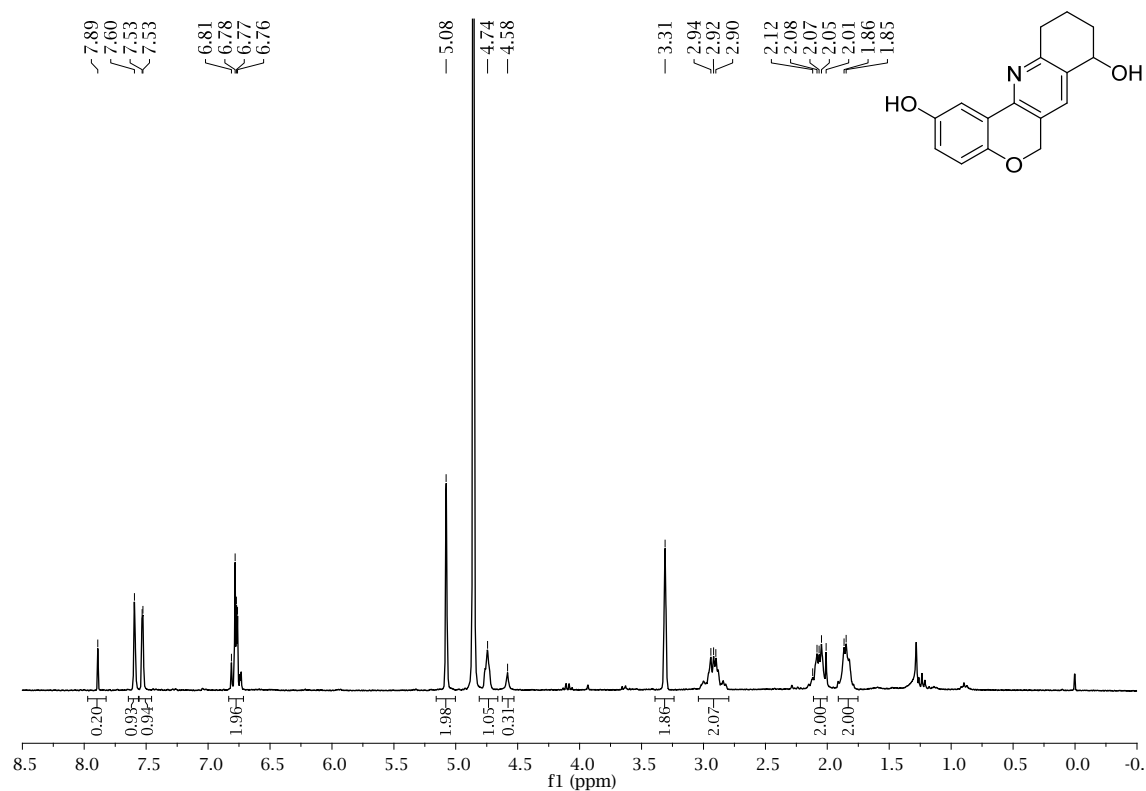


Figure S82. ¹H NMR (300 MHz) spectrum of **28** in MeOH-*d*₄.

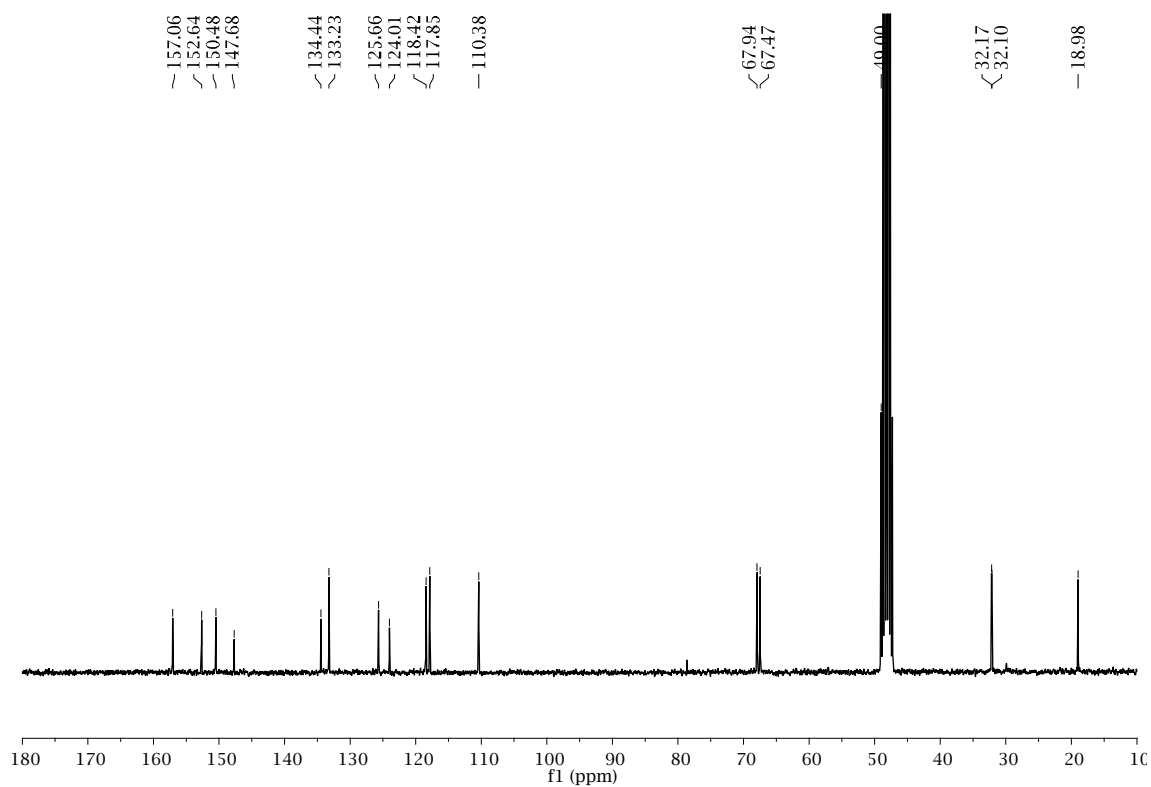


Figure S83. ¹³C NMR (75 MHz) spectrum of **28** in MeOH-*d*₄.

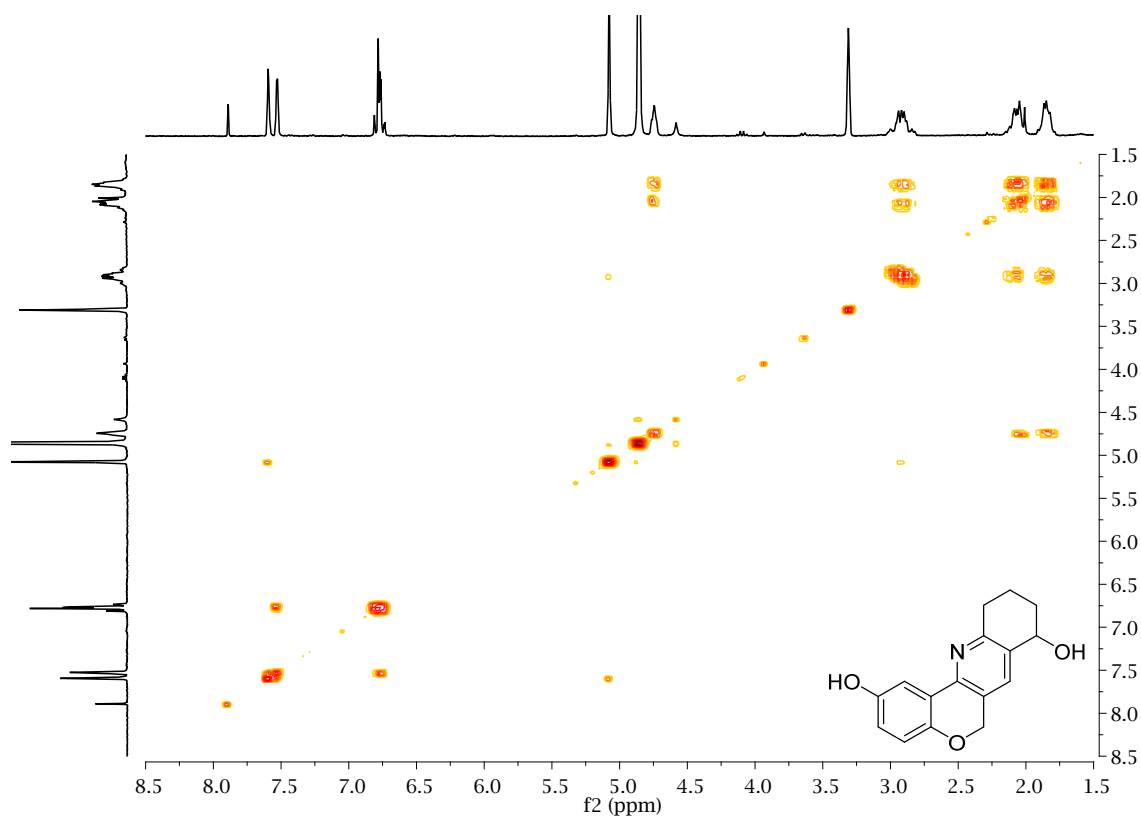


Figure S84. COSY spectrum of **28** in MeOH- d_4 .

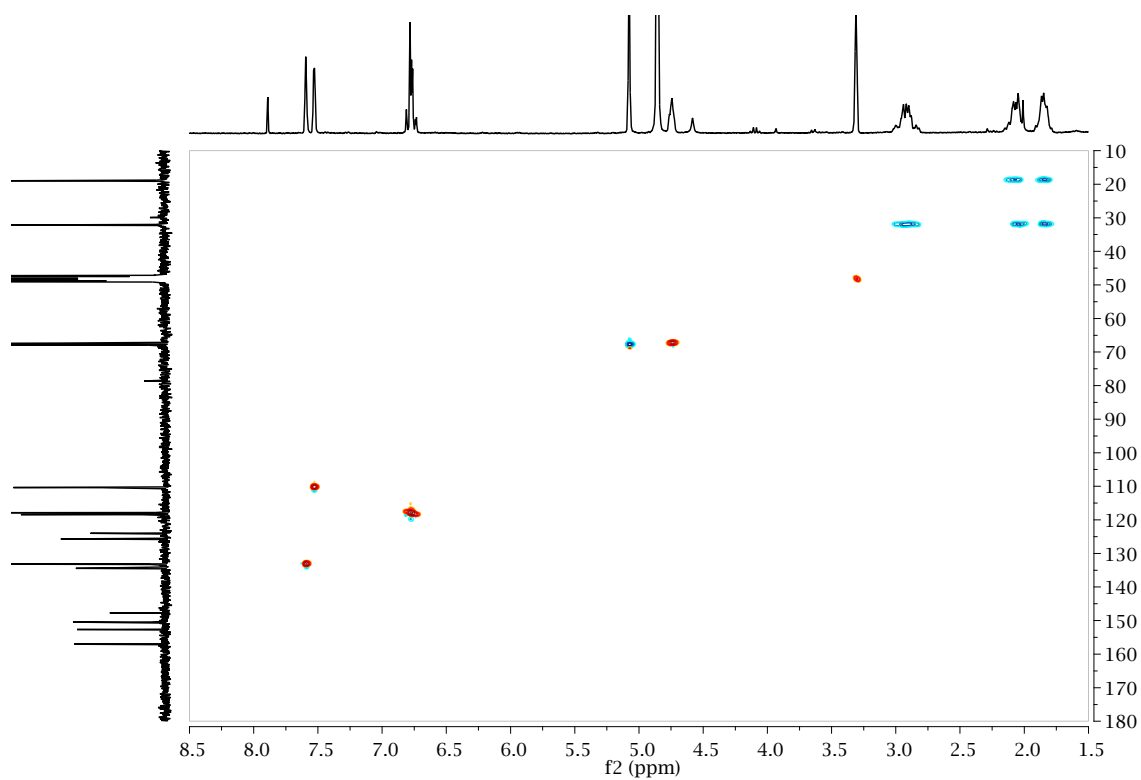


Figure S85. HSQC spectrum of **28** in MeOH- d_4 .

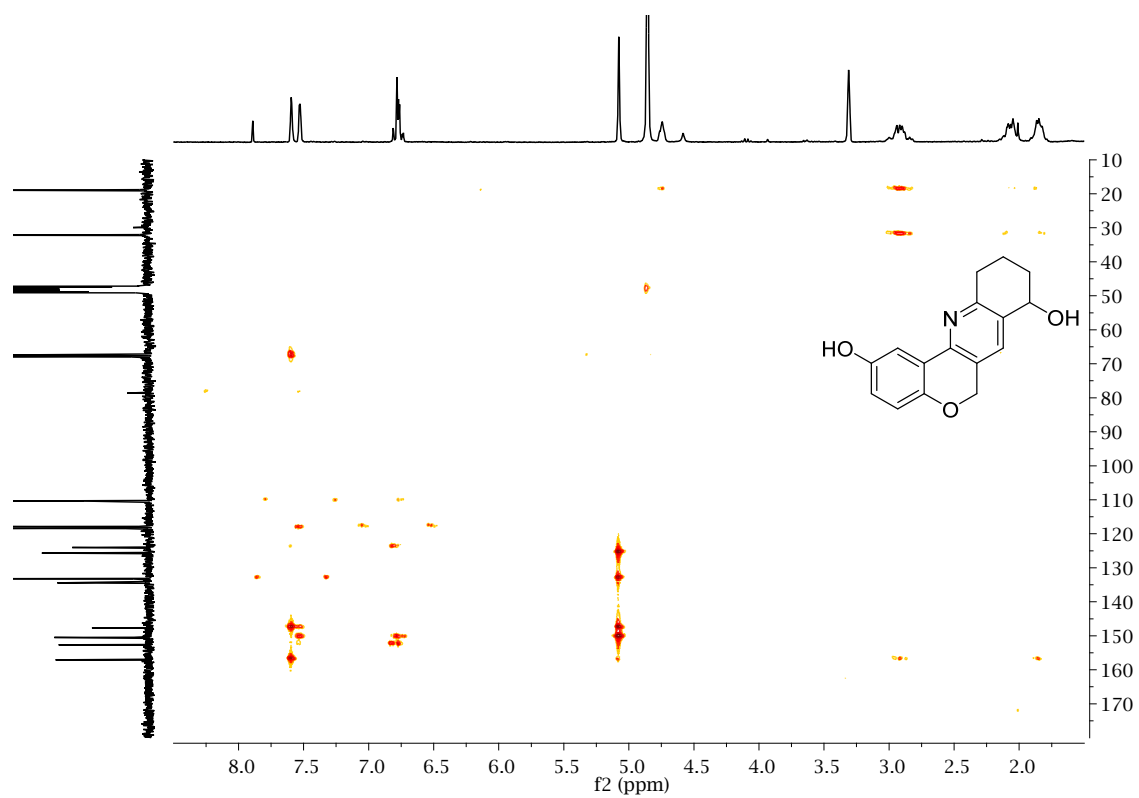


Figure S86. HMBC spectrum of **28** in $\text{MeOH-}d_4$.

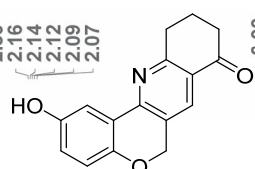


Figure S87. ^1H NMR (300 MHz) spectrum of **29** in DMSO- d_6 .

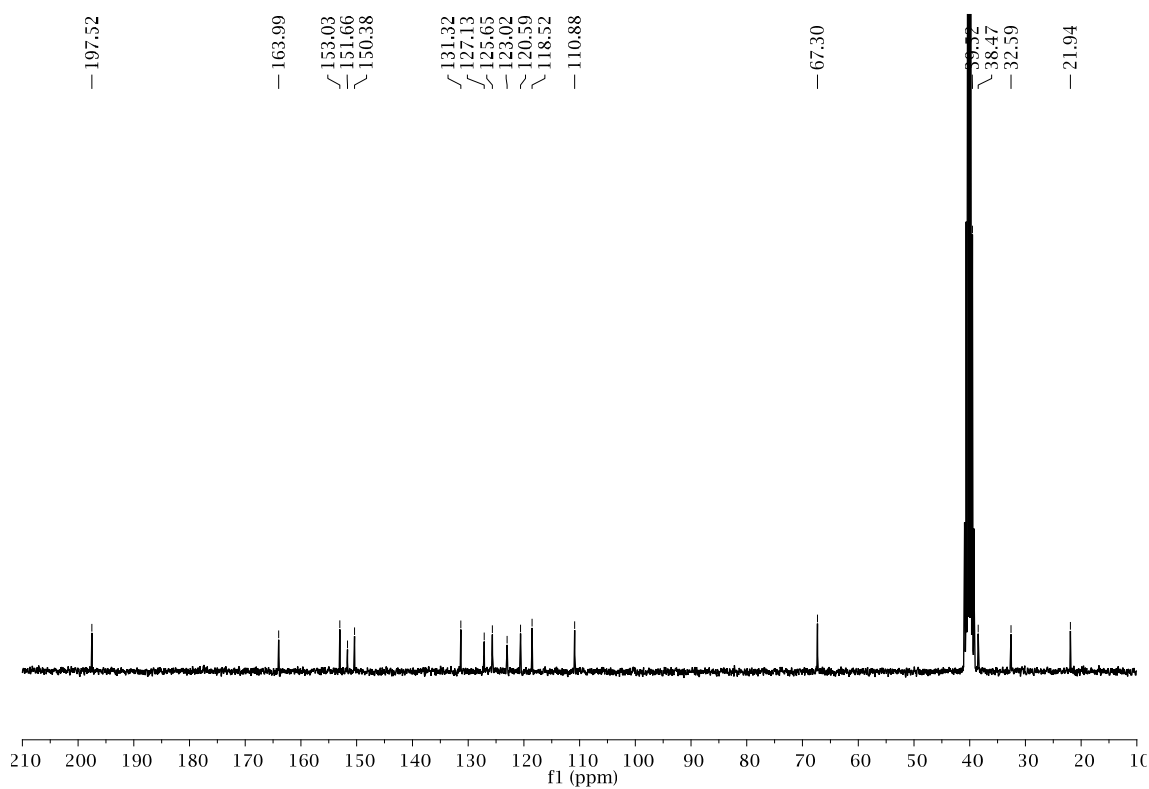


Figure S88. ^{13}C NMR (75 MHz) spectrum of **29** in DMSO- d_6 .

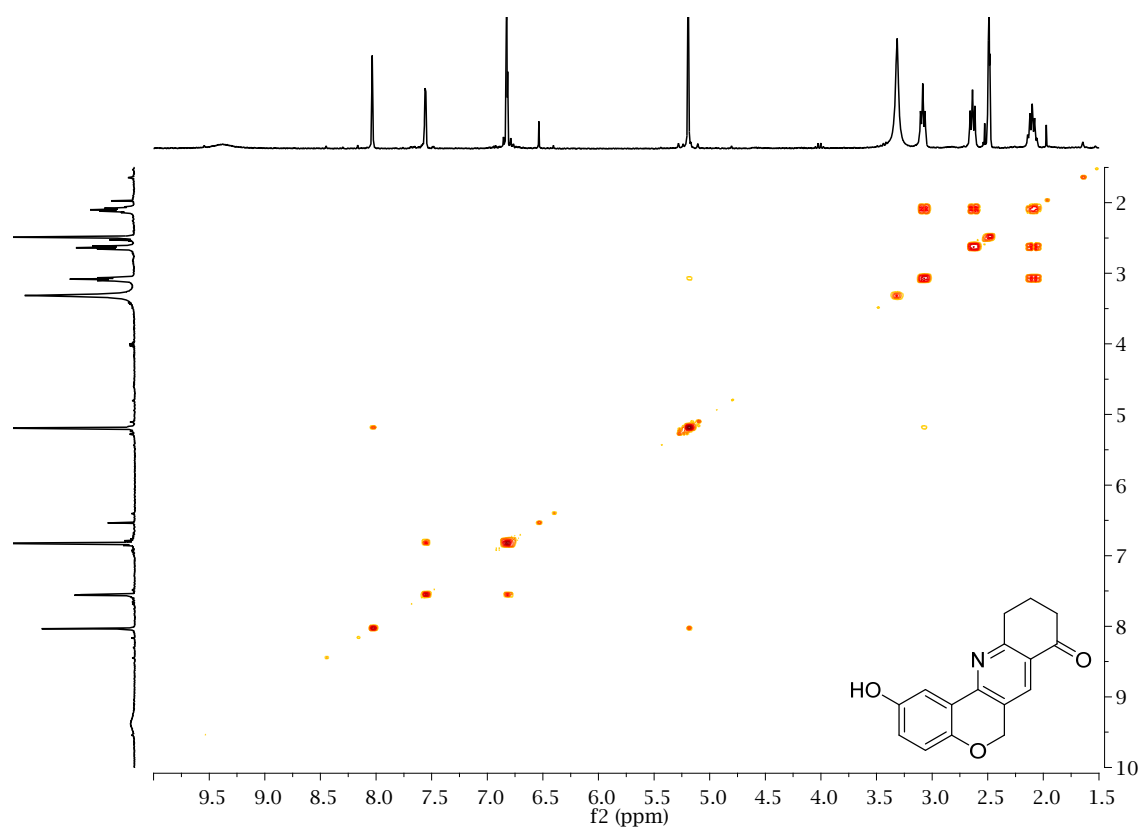


Figure S89. COSY spectrum of **29** in DMSO- d_6 .

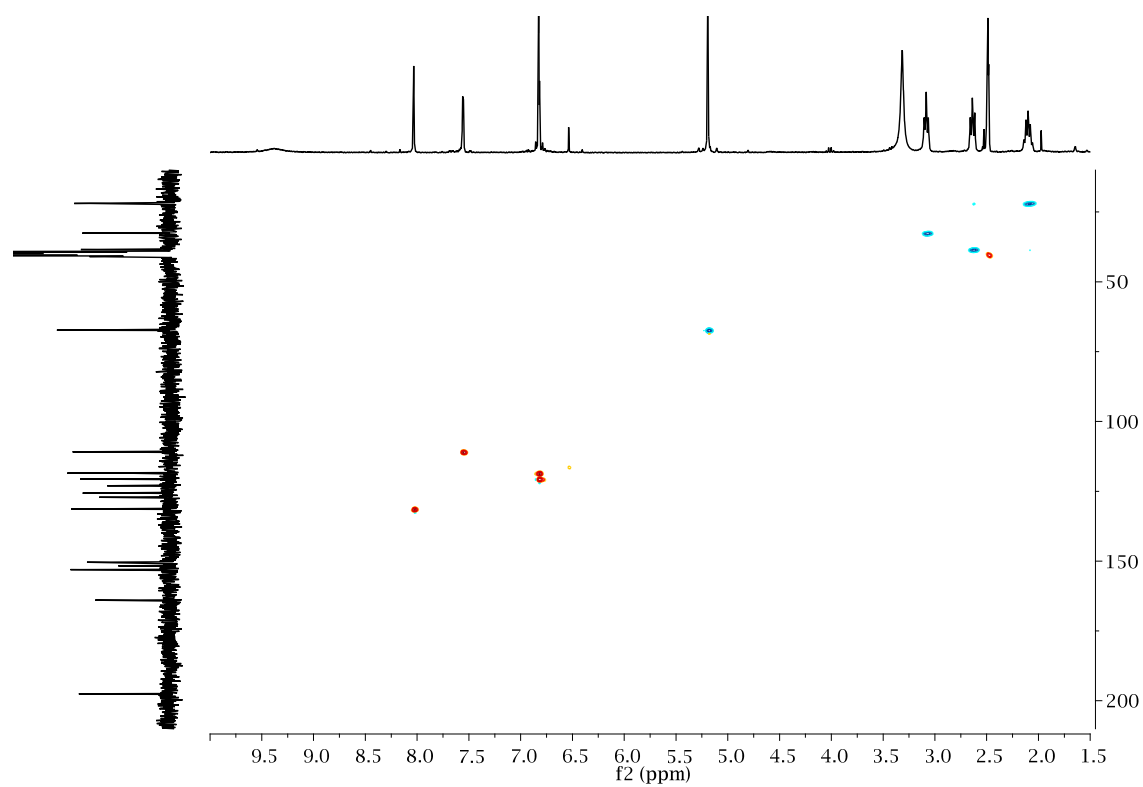


Figure S90. HSQC spectrum of **29** in DMSO- d_6 .

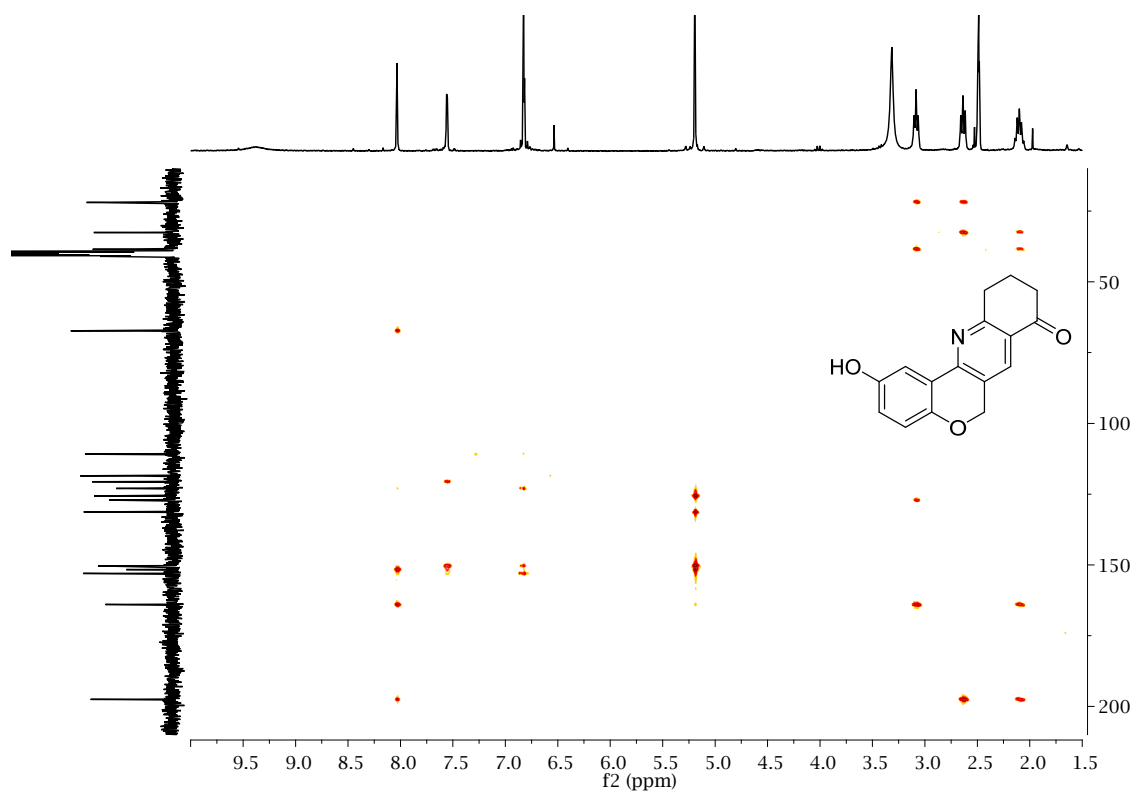


Figure S91. HMBC spectrum of **29** in DMSO-*d*₆.

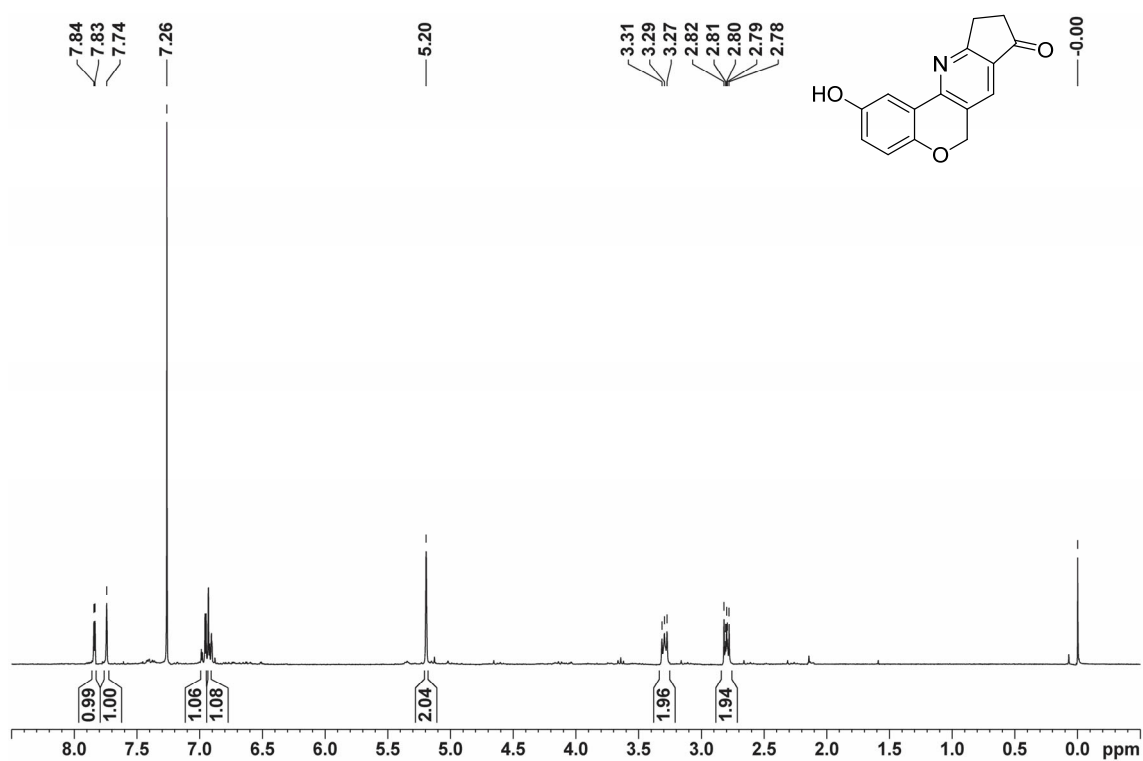


Figure S92. ^1H NMR (300 MHz) spectrum of **30** in CDCl_3 .

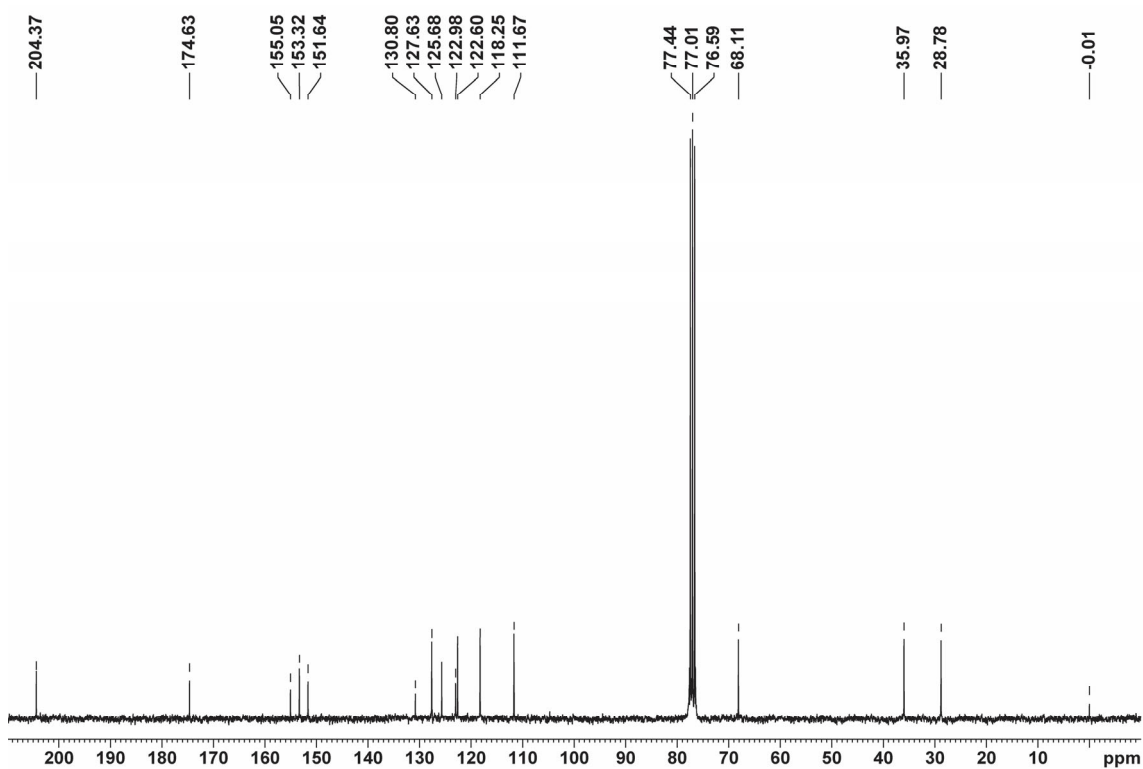


Figure S93. ^{13}C NMR (75 MHz) spectrum of **30** in CDCl_3 .

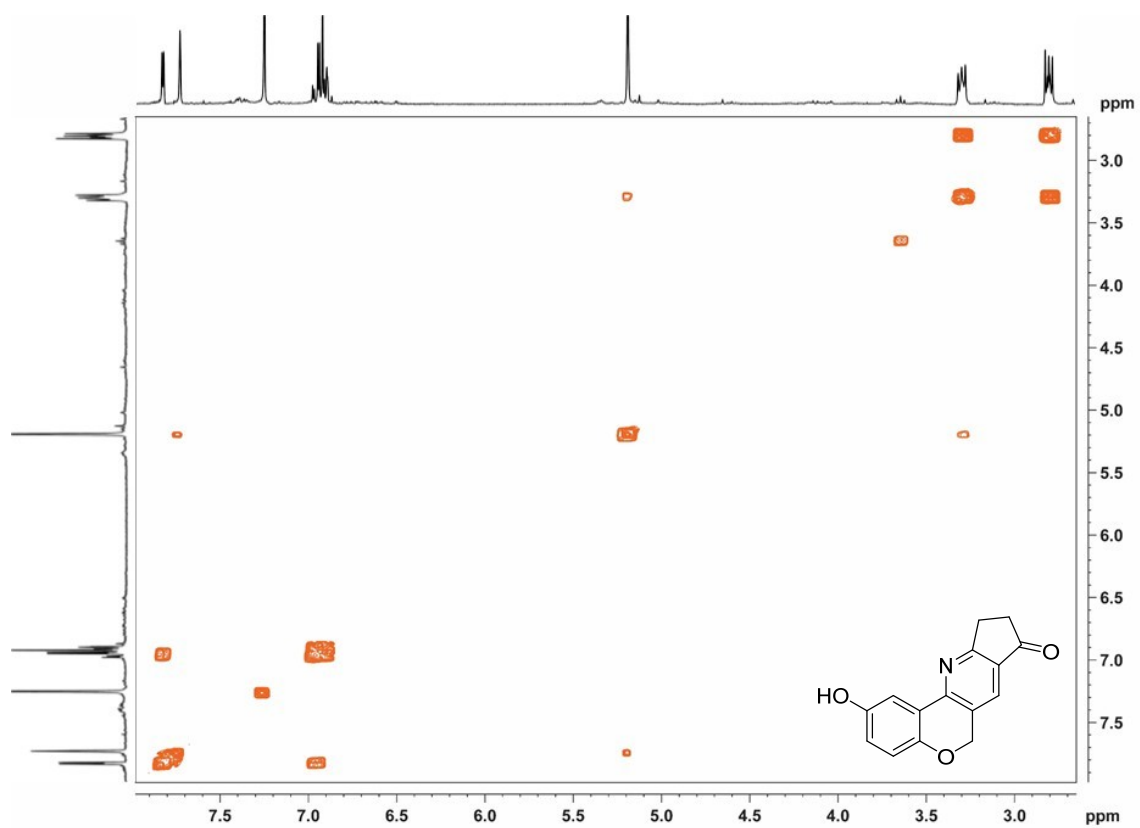


Figure S94. COSY spectrum of **30** in CDCl₃.

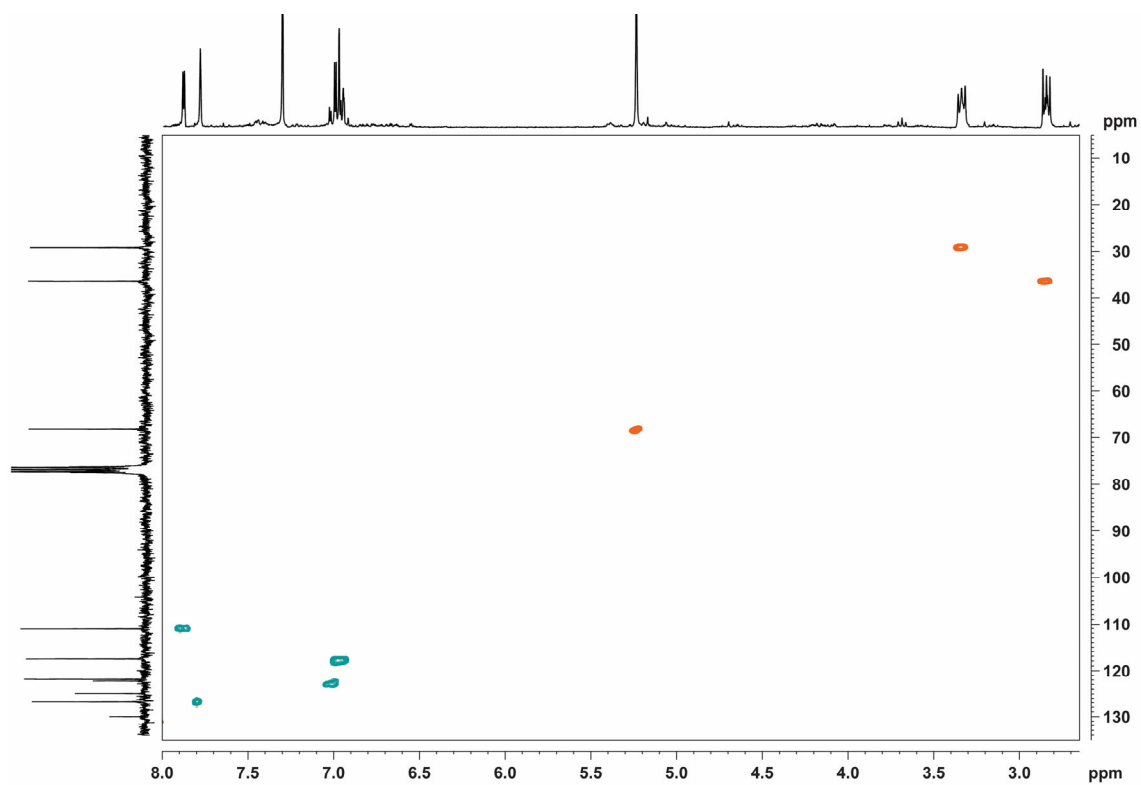


Figure S95. HSQC spectrum of **30** in CDCl₃.

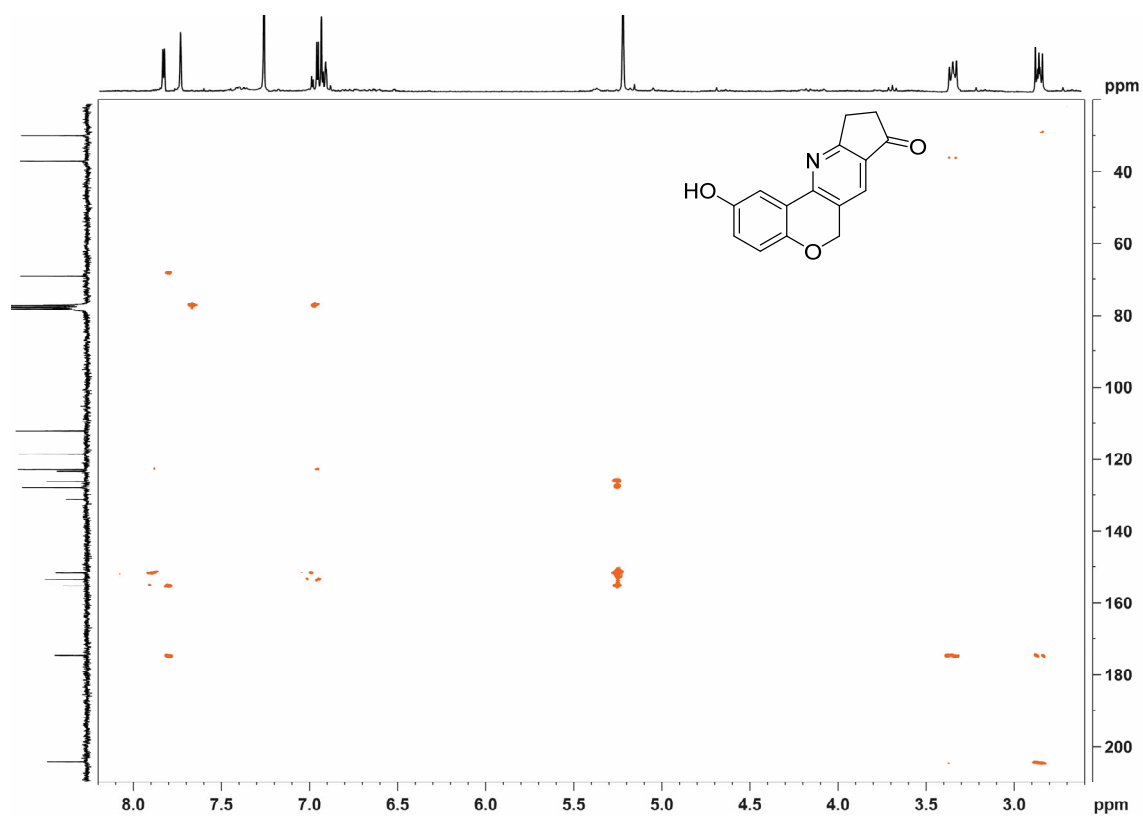


Figure S96. HMBC spectrum of **30** in CDCl₃.

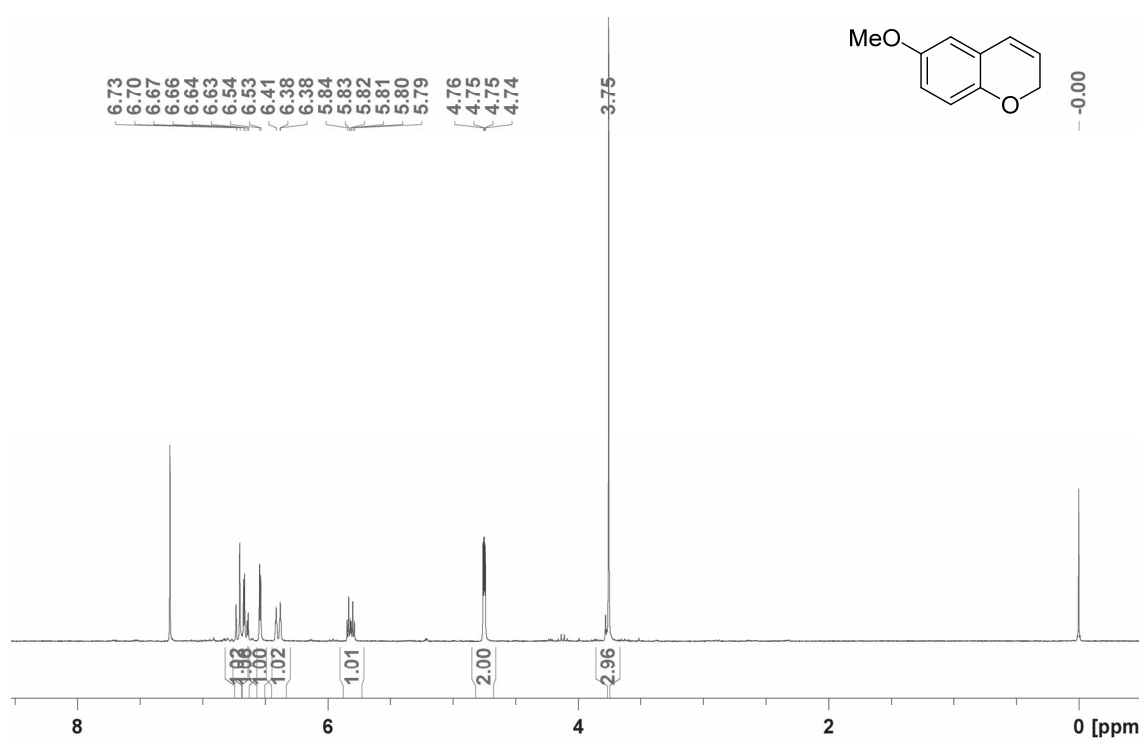


Figure S97. ¹H NMR (300 MHz) spectrum of **31** in CDCl₃.

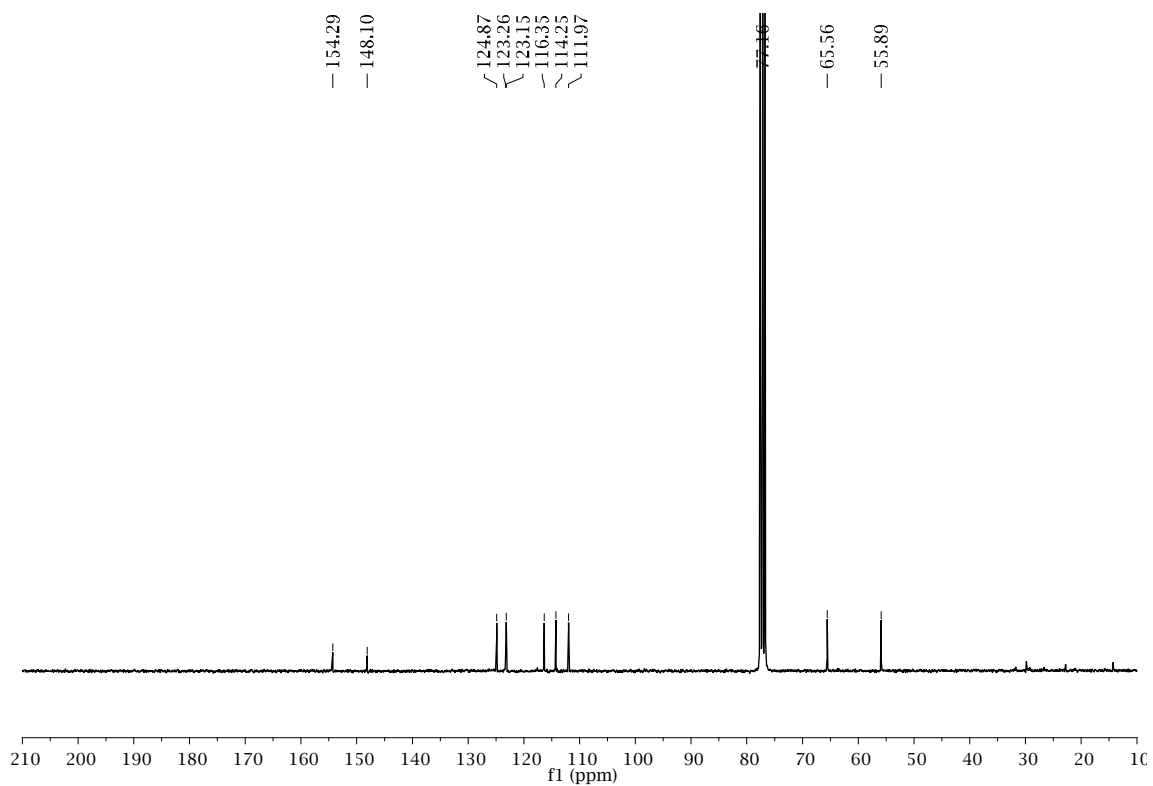


Figure S98. ¹³C NMR (75 MHz) spectrum of **31** in CDCl₃.

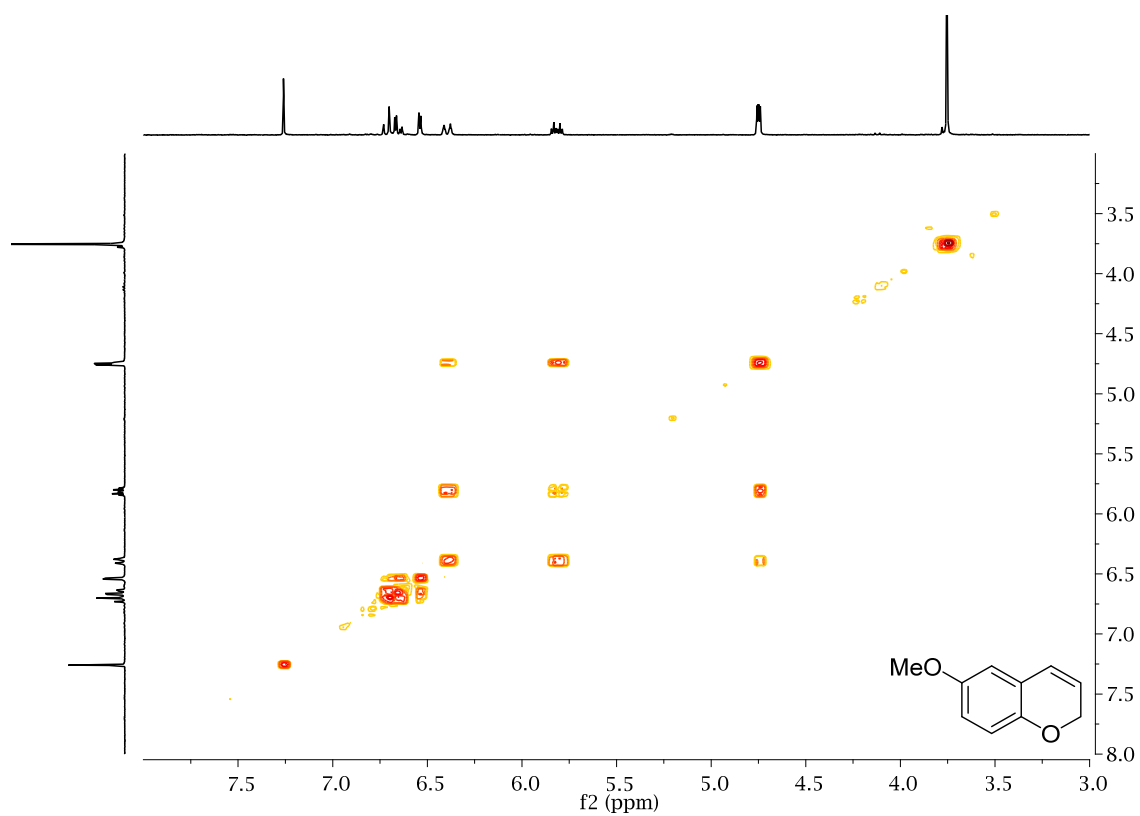


Figure S99. COSY spectrum of **31** in CDCl₃.

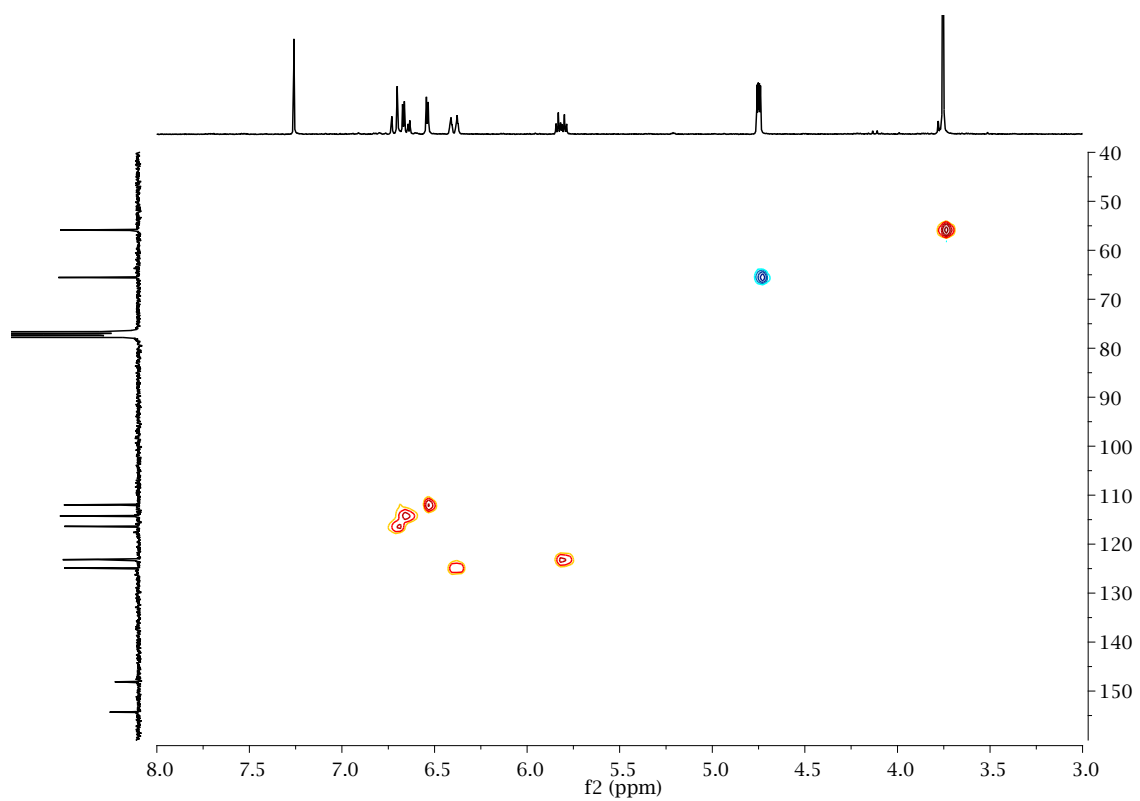


Figure S100. HSQC spectrum of **31** in CDCl₃.

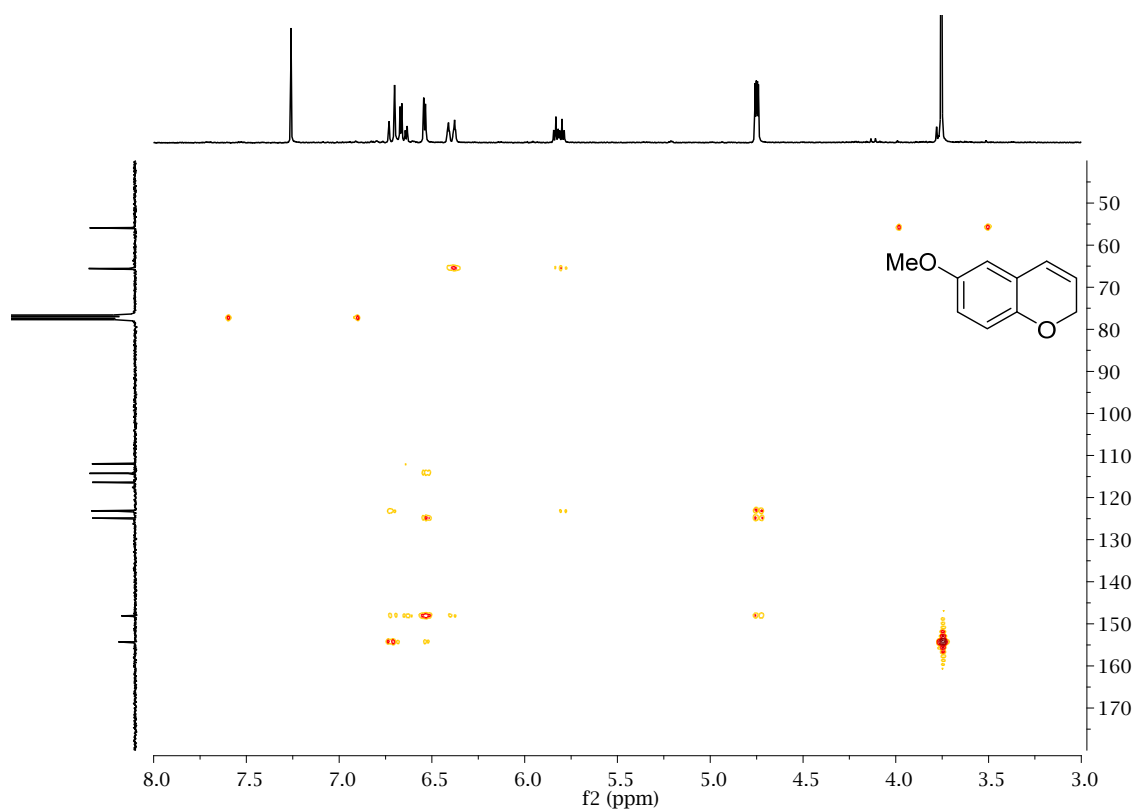


Figure S101. HMBC spectrum of **31** in CDCl_3 .

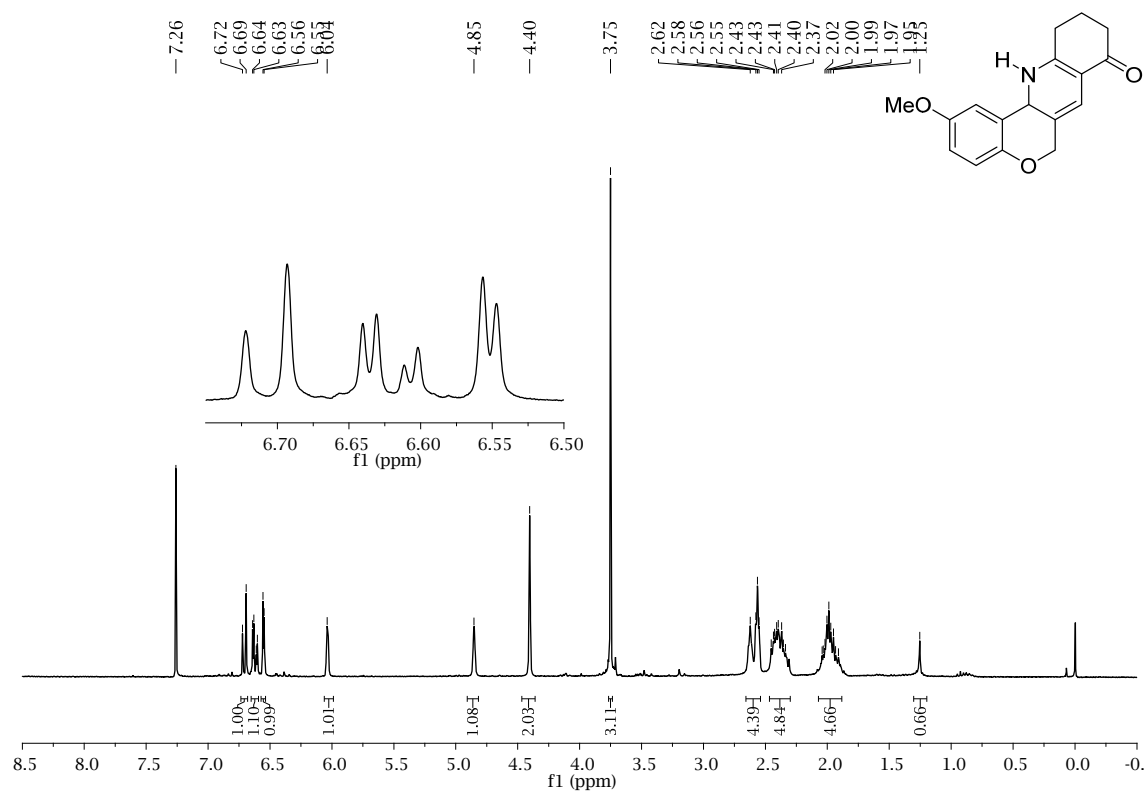


Figure S102. ¹H NMR (300 MHz) spectrum of **13a** in CDCl₃.

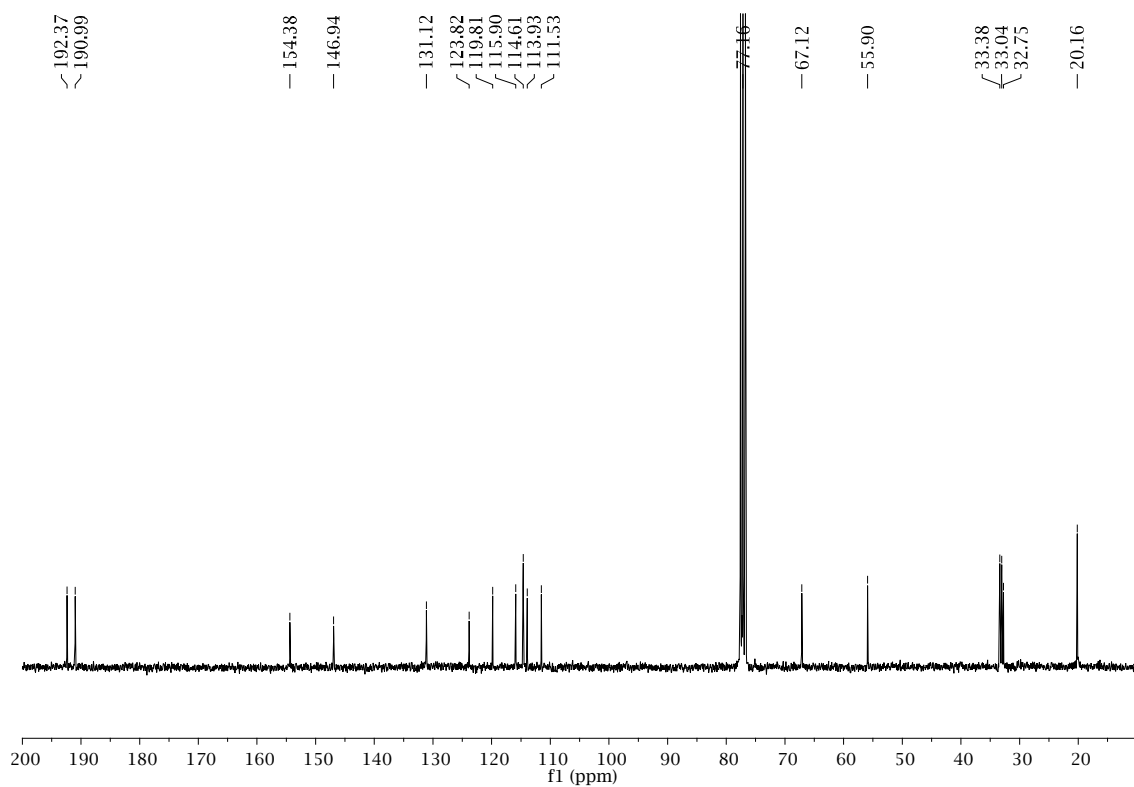


Figure S103. ¹³C NMR (75 MHz) spectrum of **13a** in CDCl₃.

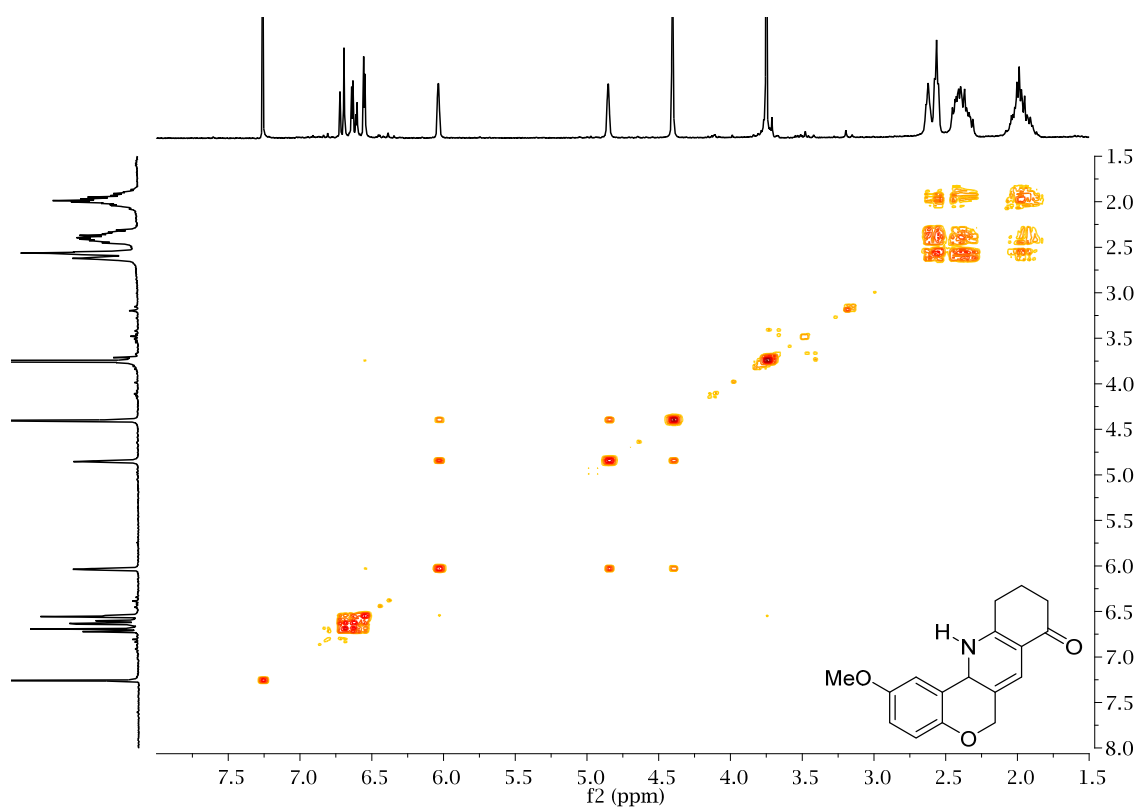


Figure S104. COSY spectrum of **13a** in CDCl₃.

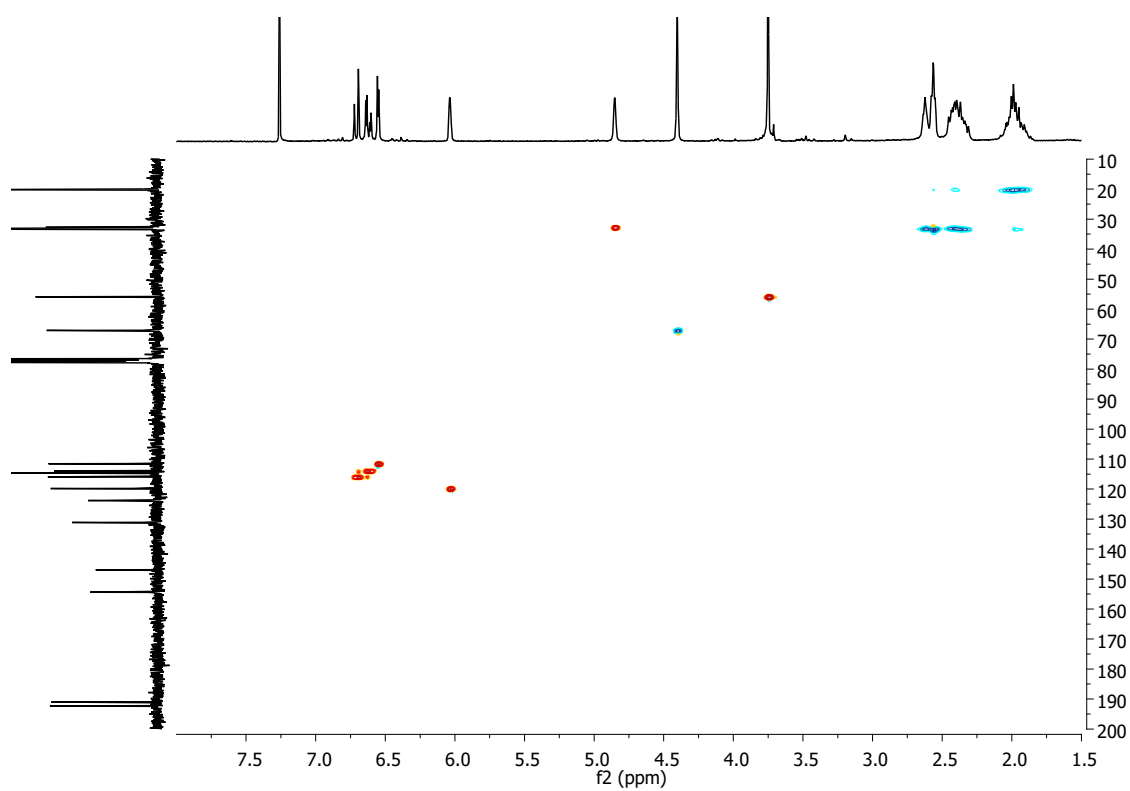


Figure S105. HSQC spectrum of **13a** in CDCl₃.

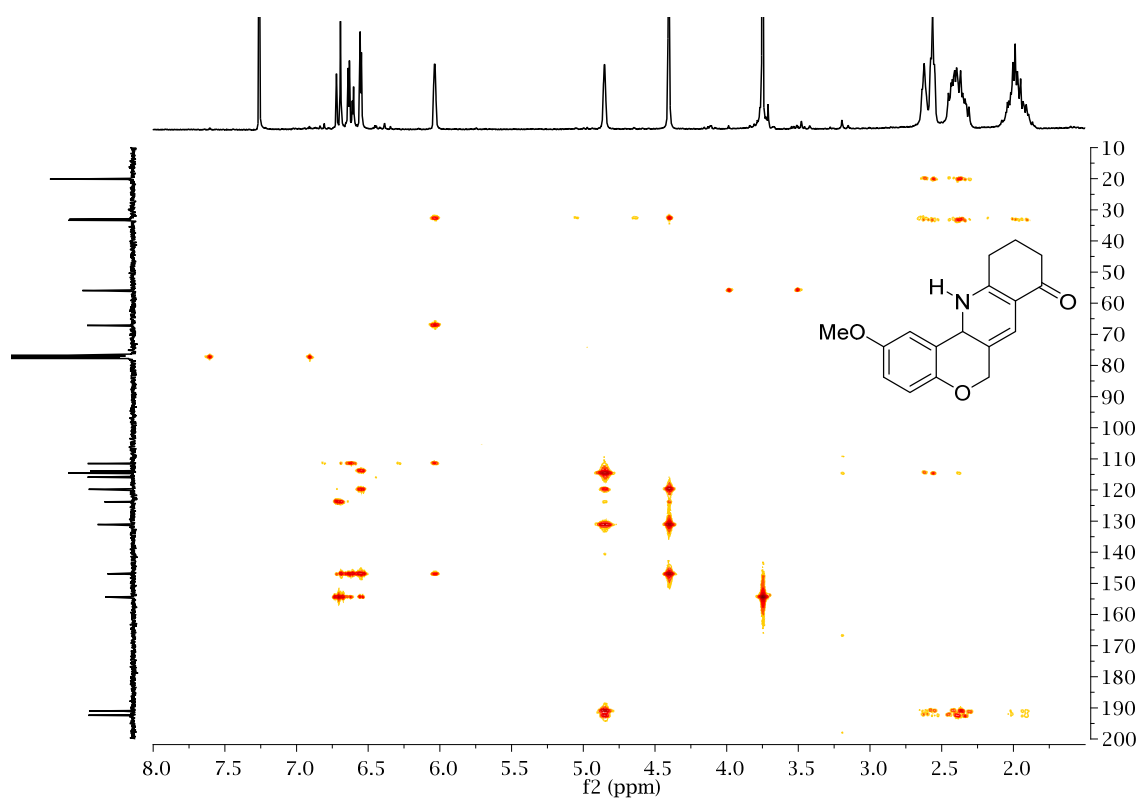


Figure S106. HMBC spectrum of **13a** in CDCl_3 .