Supplementary Material

Synthesis and structure determination of diastereomeric carbapenems in the Ad_NE-reaction of (±)-4,4-dimethyl-3-mercaptodihydrofuran-2(3*H*)-one with chiral carbapenem enol phosphate

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NMR data

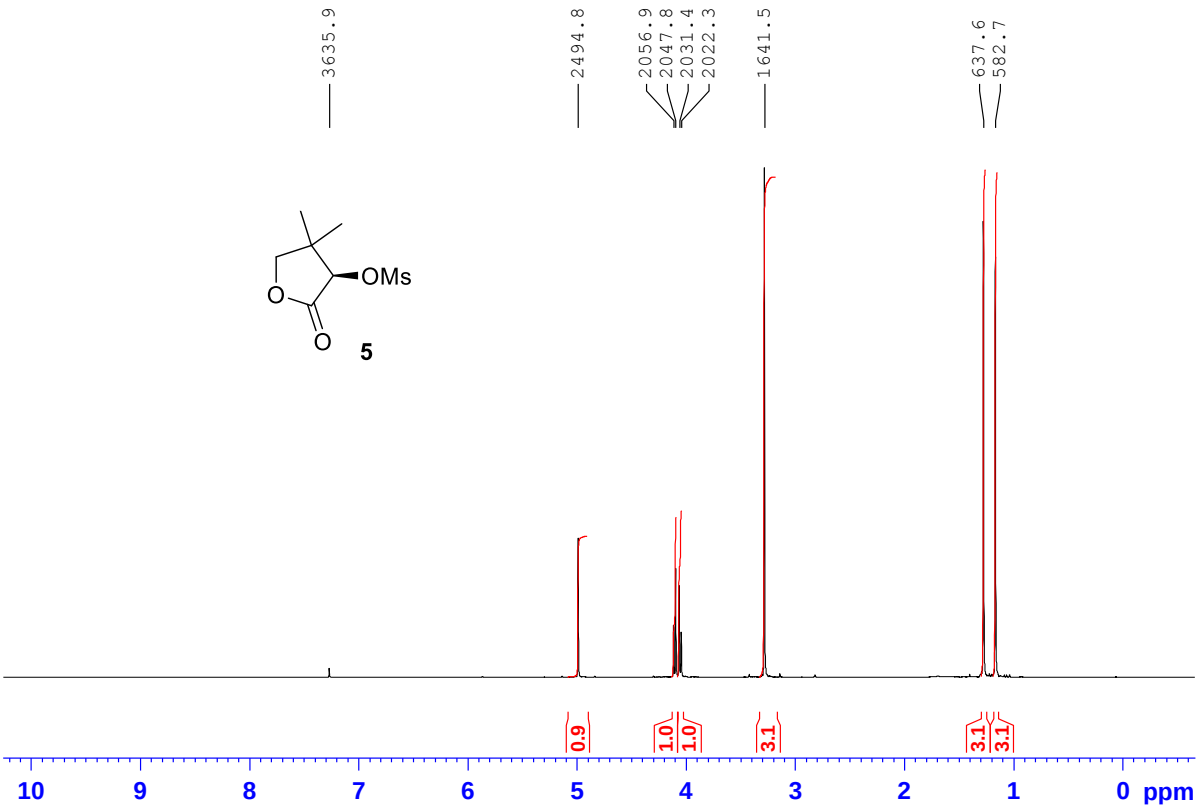

Figure S1. Complete ^{1}H NMR spectrum of compound **5** in $CDCl_3$, 500 MHz.

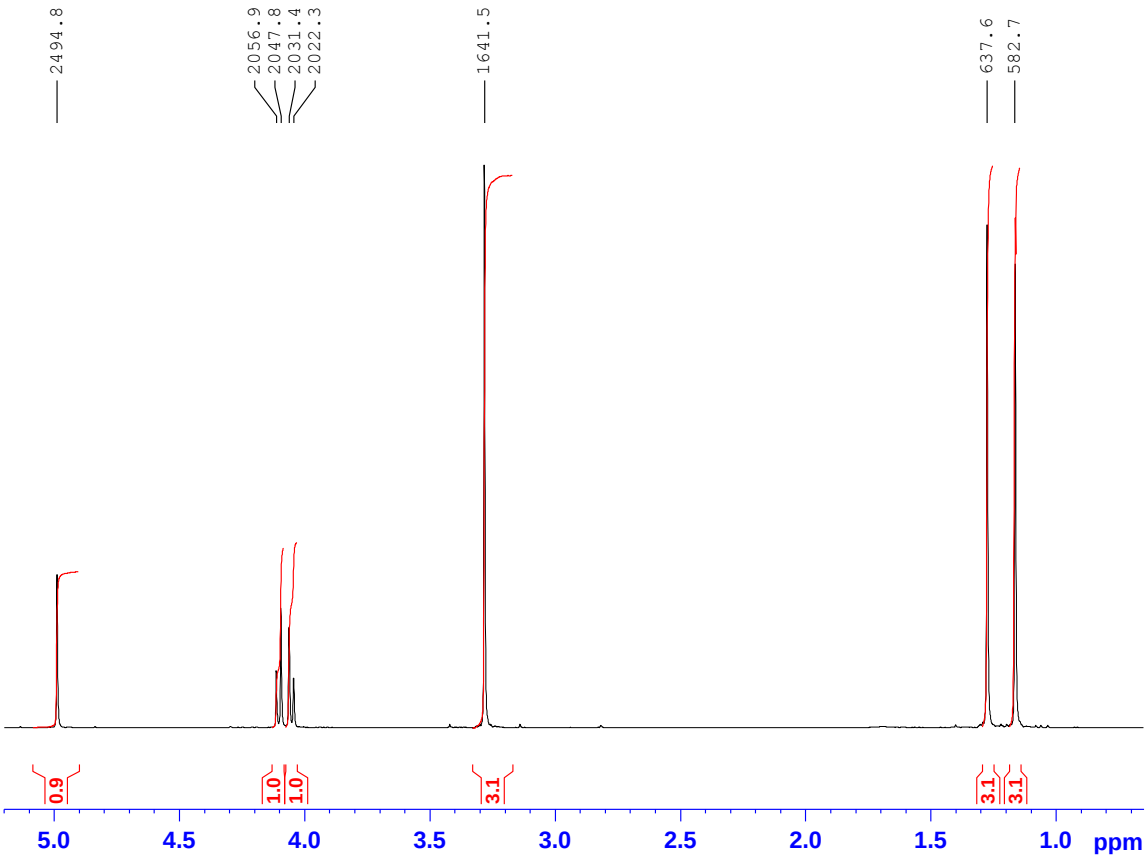

Figure S2. Expanded ^{1}H NMR spectrum of compound **5** in $CDCl_3$, 500 MHz.

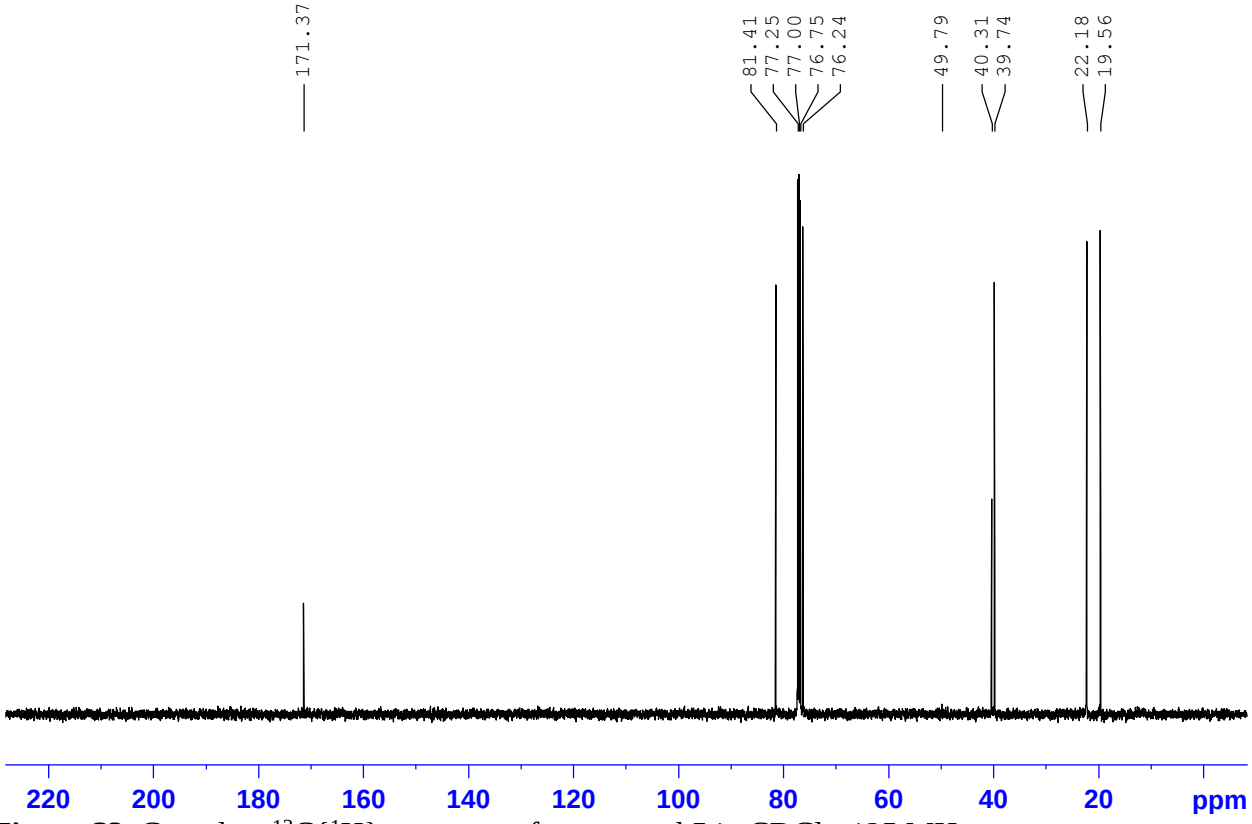

Figure S3. Complete $^{13}C\{^{1}H\}$ spectrum of compound **5** in $CDCl_3$, 125 MHz.

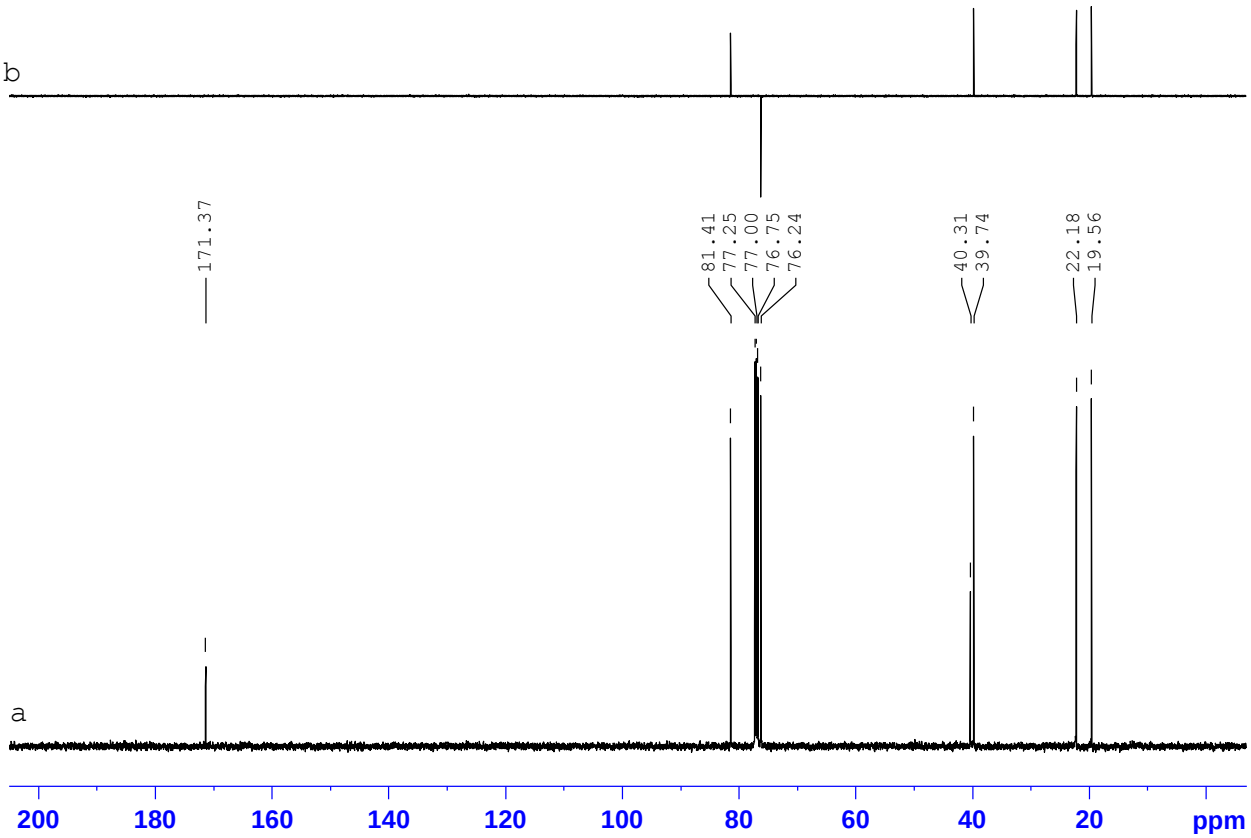

Figure S4. DEPT-135 editing $^{13}C\{^{1}H\}$ NMR spectrum of compound **5** in $CDCl_3$, 125 MHz: a) $^{13}C\{^{1}H\}$ spectrum; b) DEPT-135.

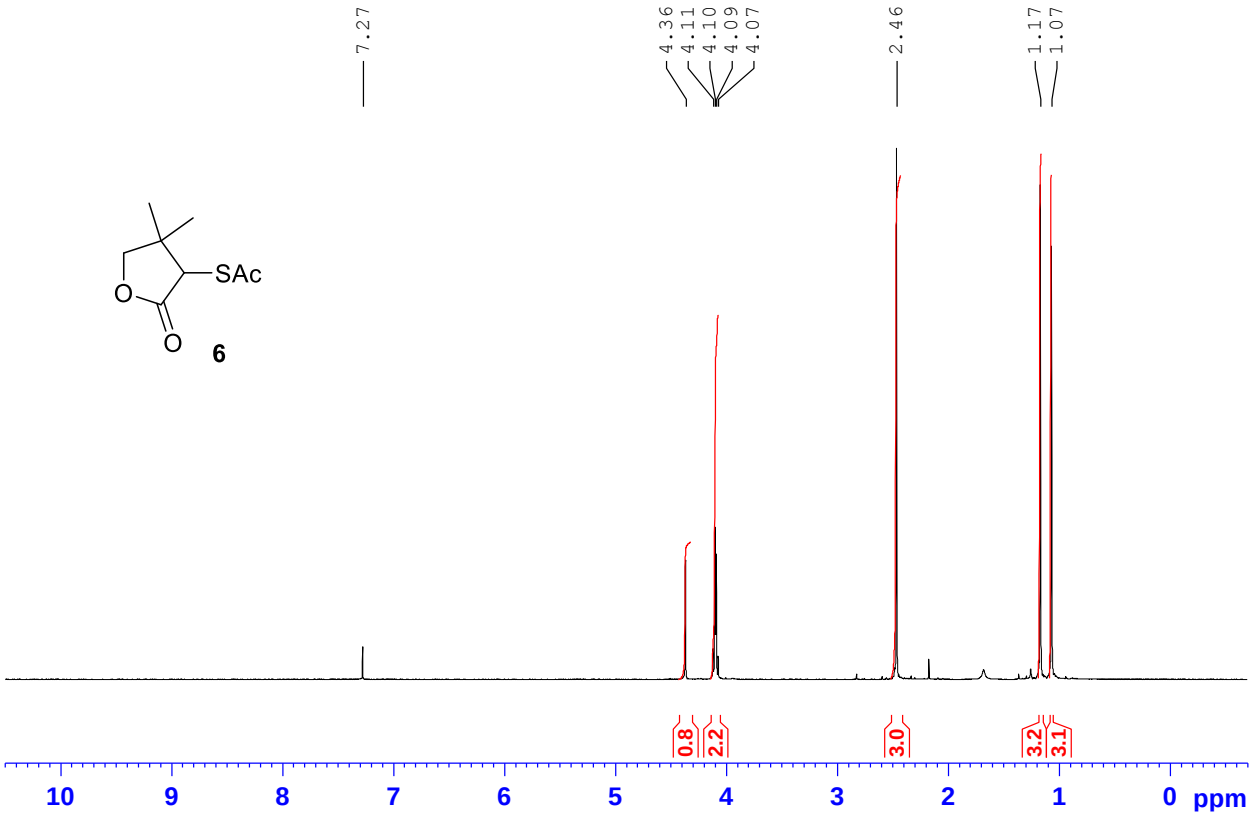

Figure S5. Complete ^{1}H NMR spectrum of compound **6** in $CDCl_3$, 500 MHz.

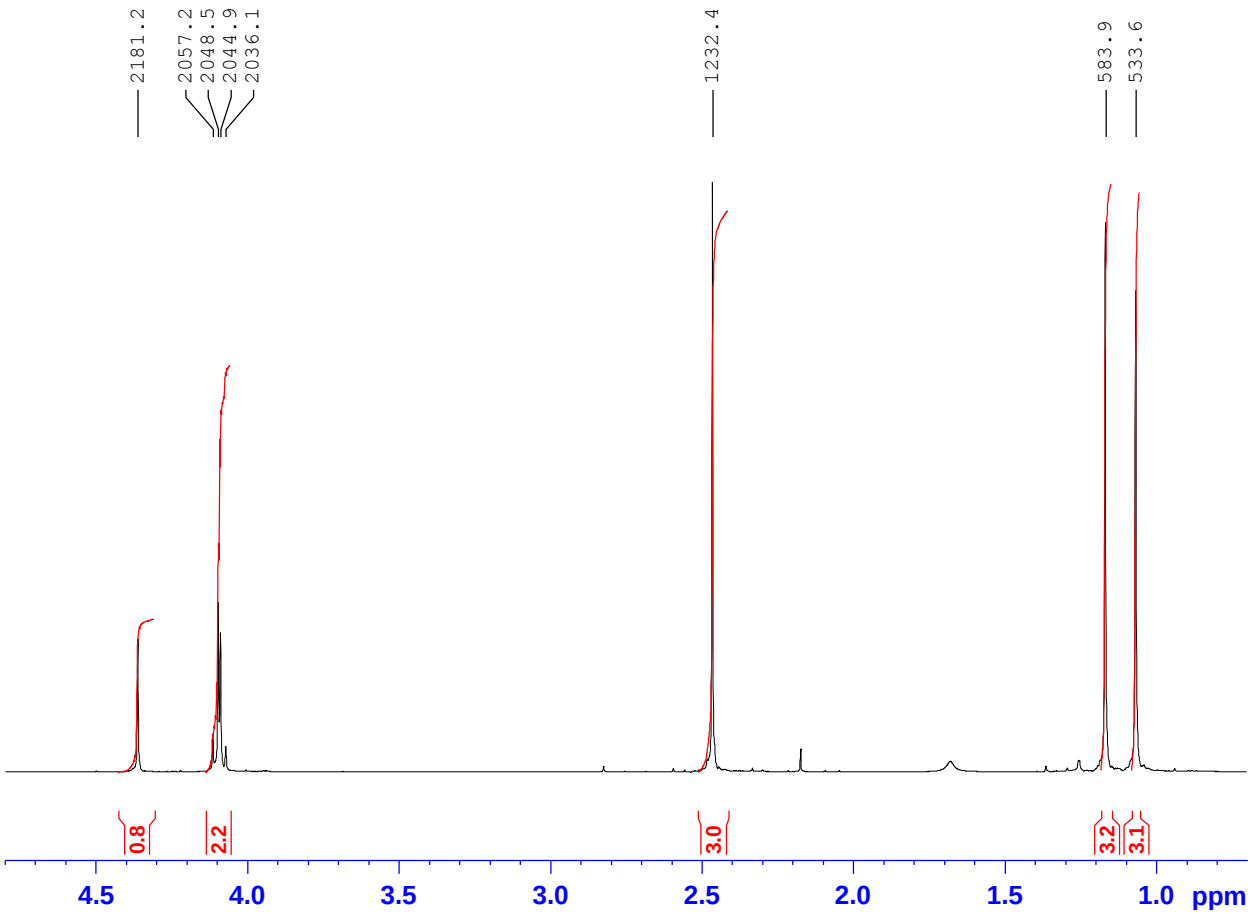

Figure S6. Expanded ^{1}H NMR spectrum of compound **6** in $CDCl_3$, 500 MHz.

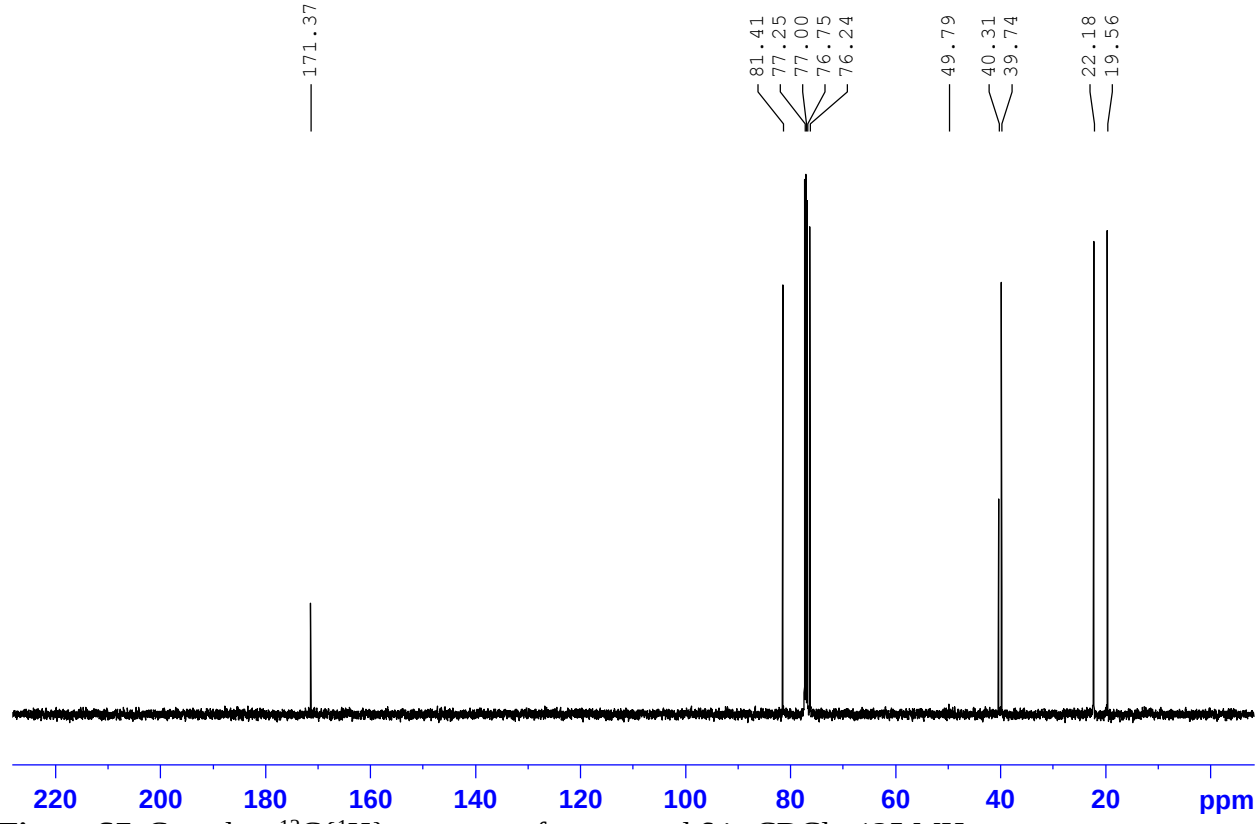

Figure S7. Complete $^{13}C\{^{1}H\}$ spectrum of compound **6** in $CDCl_3$, 125 MHz.

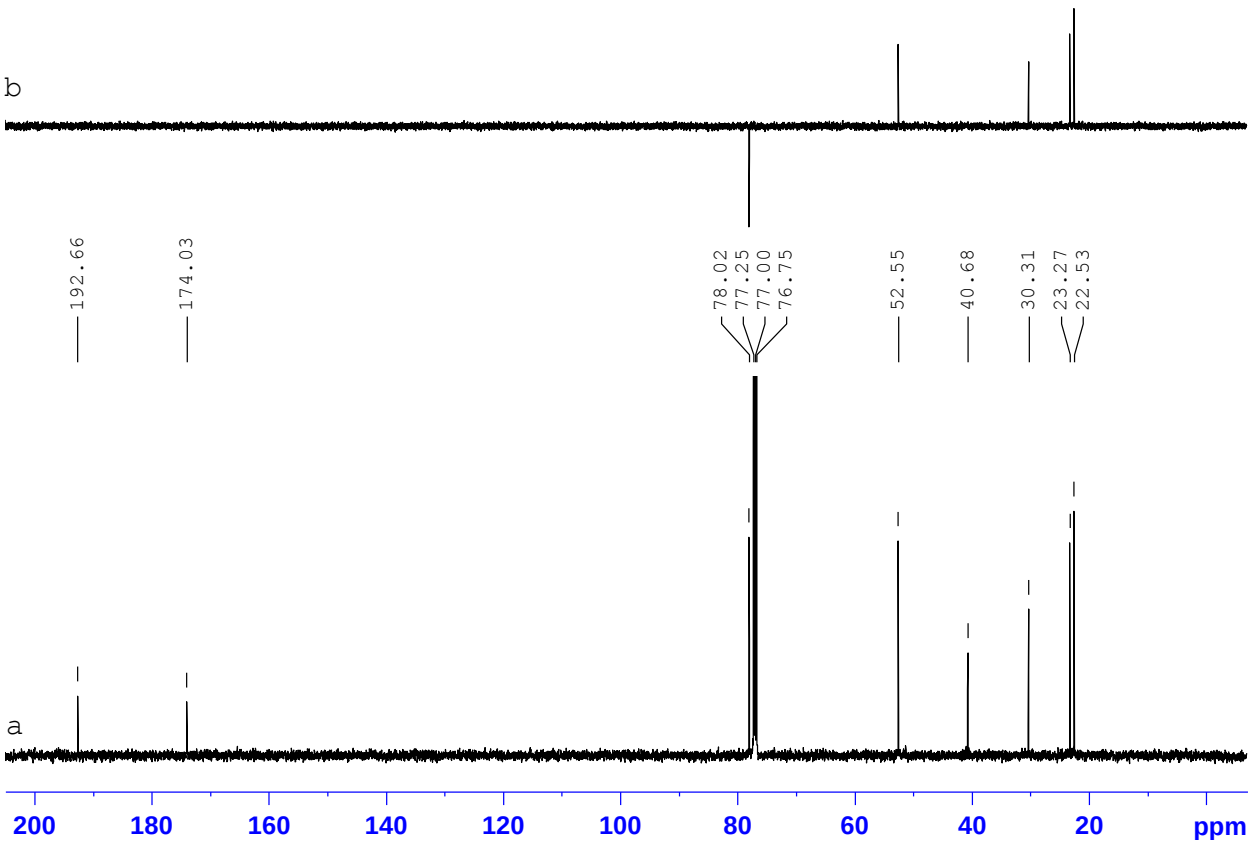

Figure S8. DEPT-135 editing $^{13}C\{^{1}H\}$ NMR spectrum of compound **6** in $CDCl_3$, 125 MHz: a) $^{13}C\{^{1}H\}$ spectrum; b) DEPT-135.

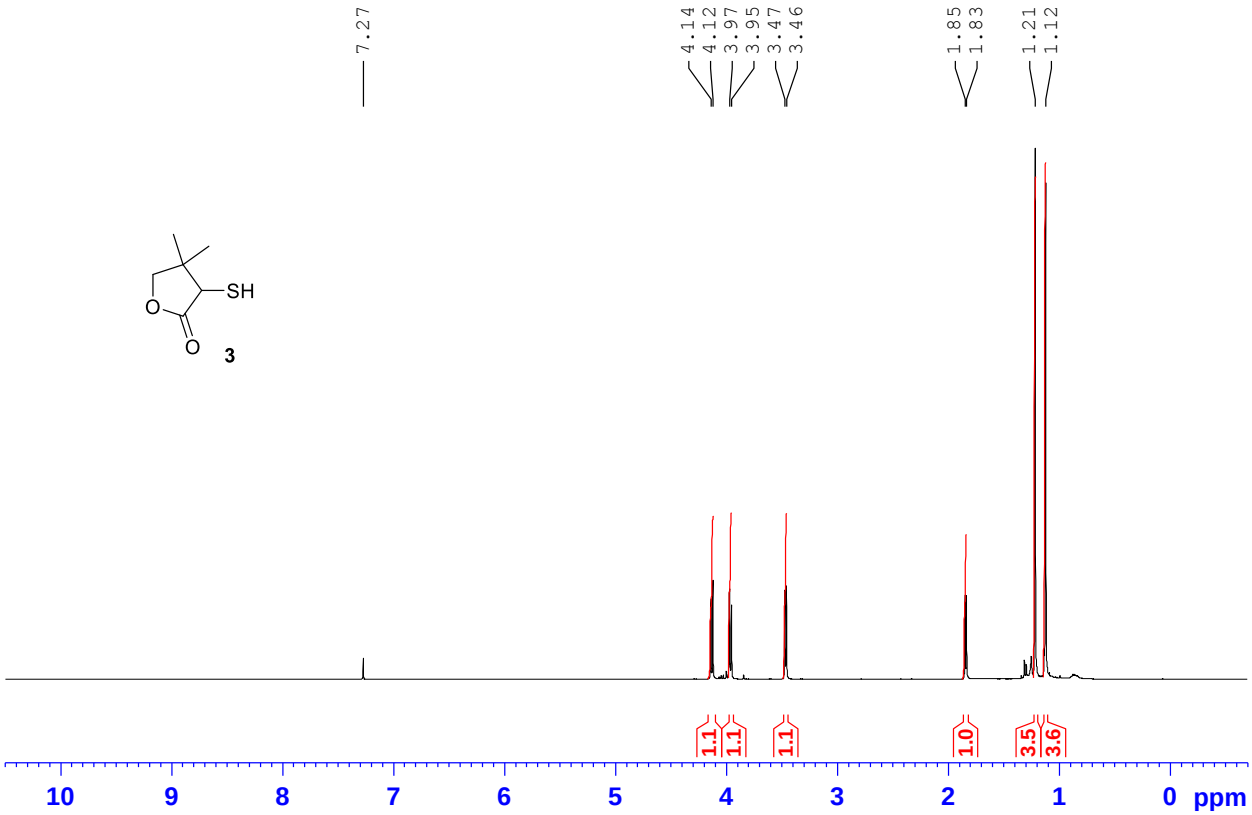

Figure S9. Complete ^{1}H NMR spectrum of compound **3** in $CDCl_3$, 500 MHz.

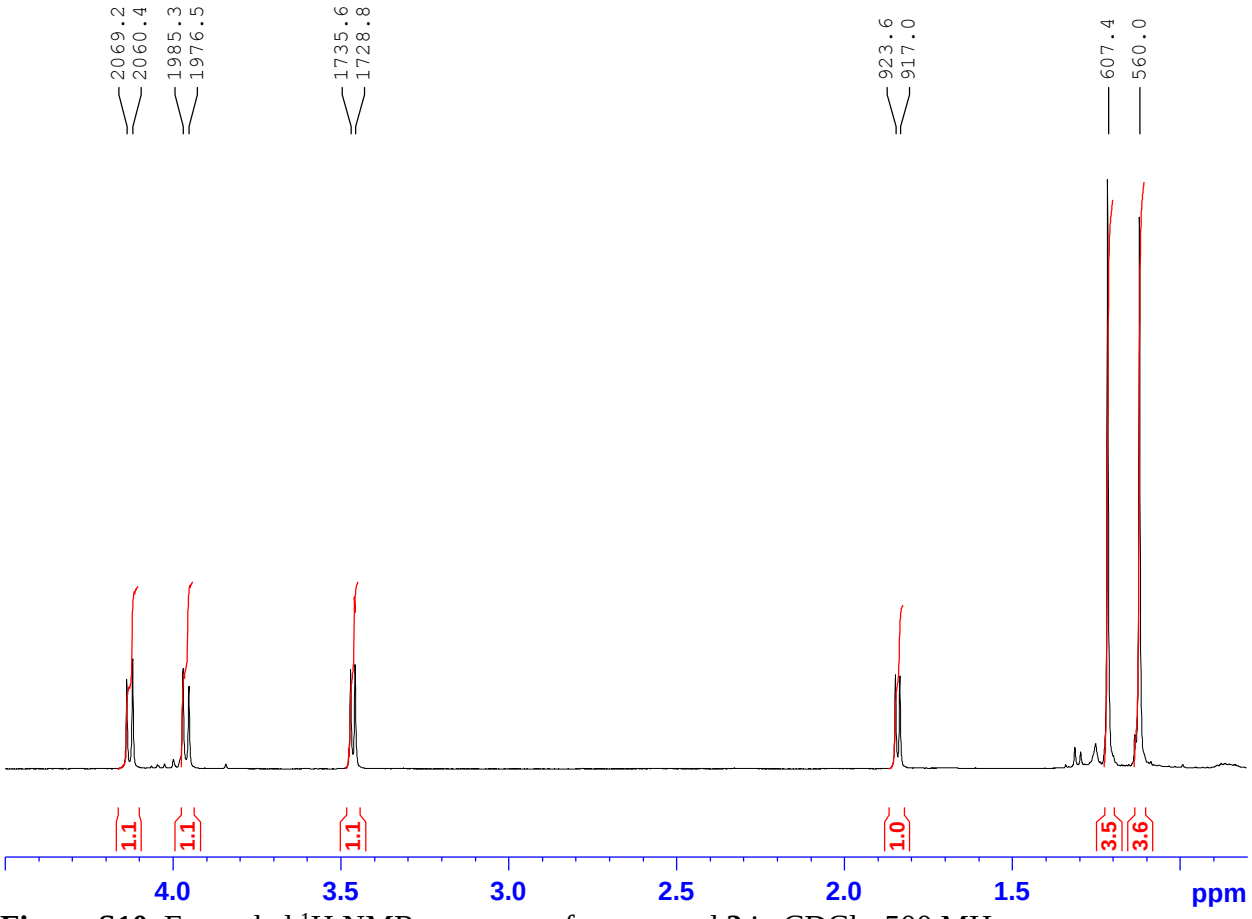

Figure S10. Expanded ^{1}H NMR spectrum of compound **3** in $CDCl_3$, 500 MHz.

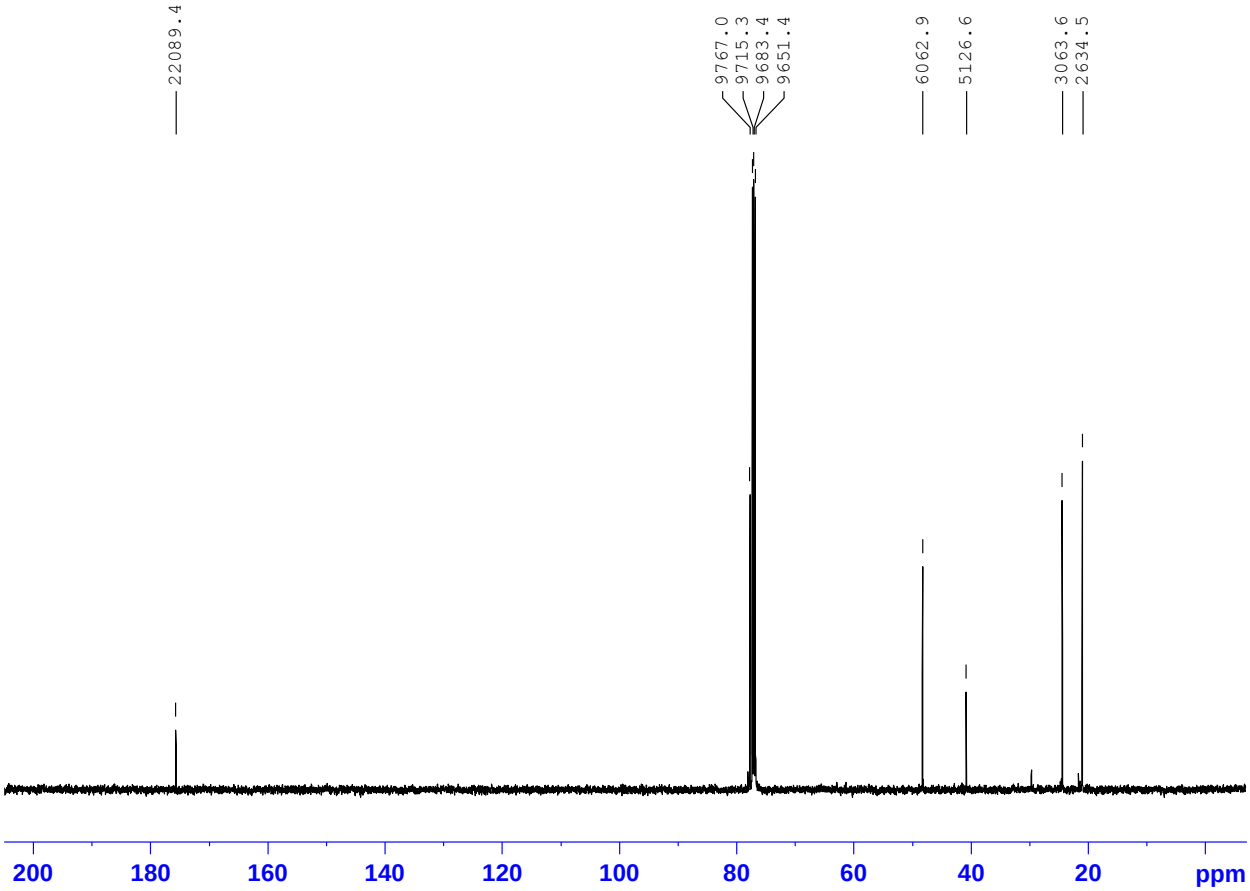

Figure S11. Complete $^{13}C\{^{1}H\}$ spectrum of compound **3** in $CDCl_3$, 125 MHz.

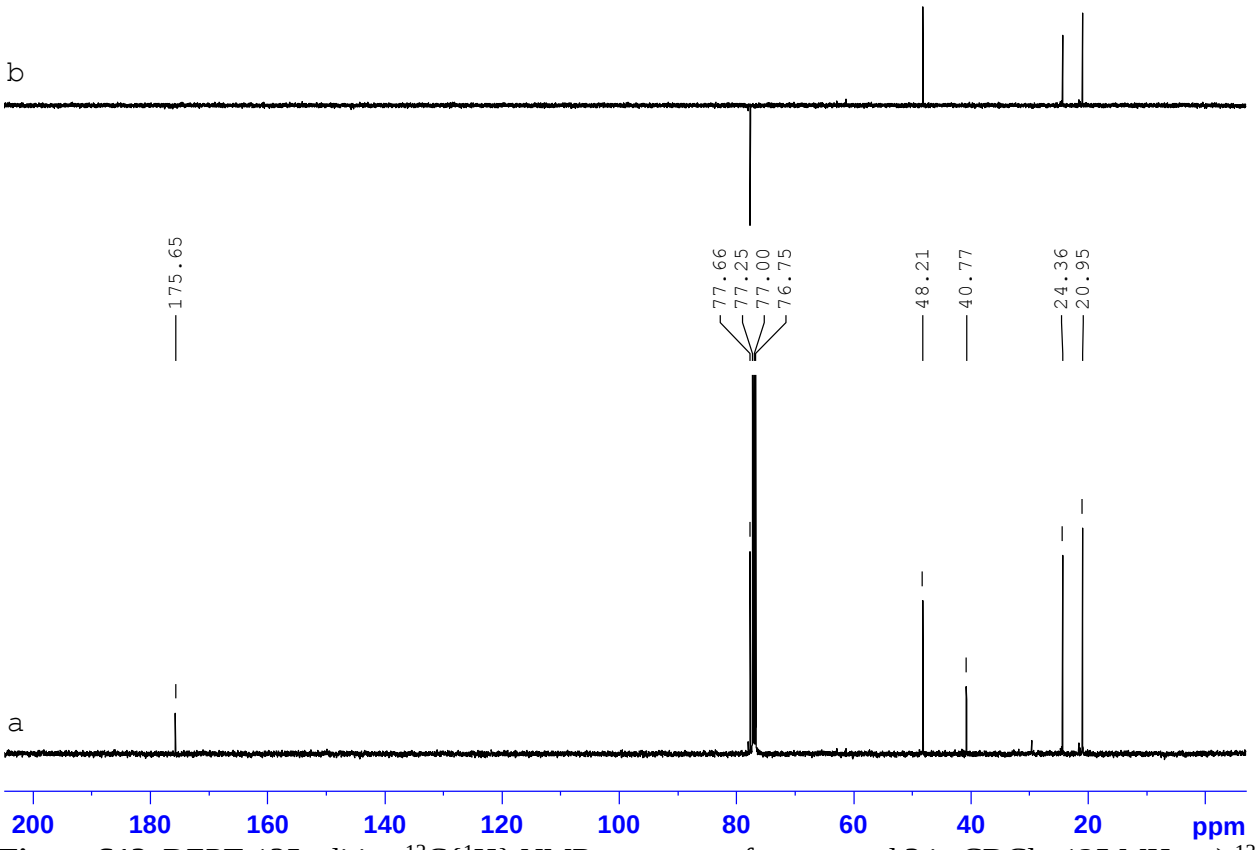

Figure S12. DEPT-135 editing $^{13}C\{^{1}H\}$ NMR spectrum of compound **3** in $CDCl_3$, 125 MHz: a) $^{13}C\{^{1}H\}$ spectrum; b) DEPT-135.

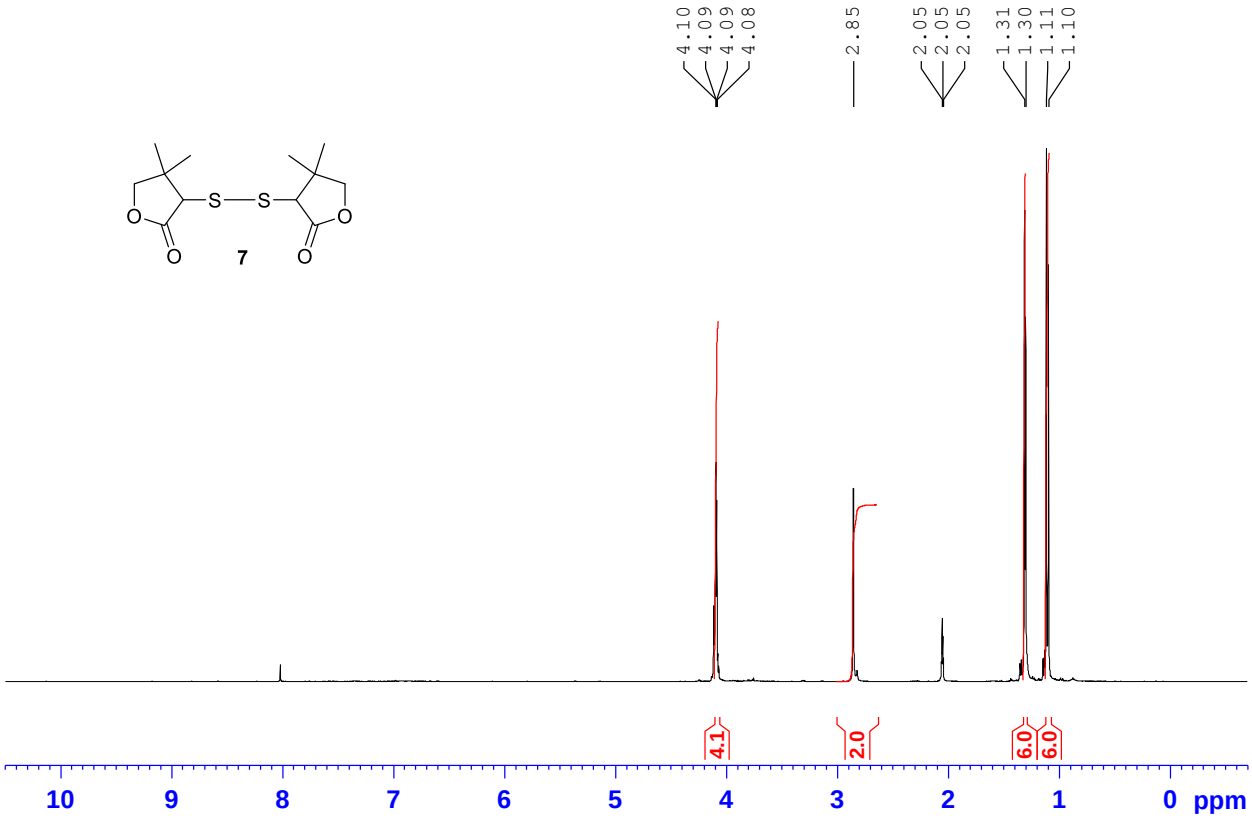

Figure S13. Complete ^{1}H NMR spectrum of compound **7** in Acetone-d_6, 500 MHz.

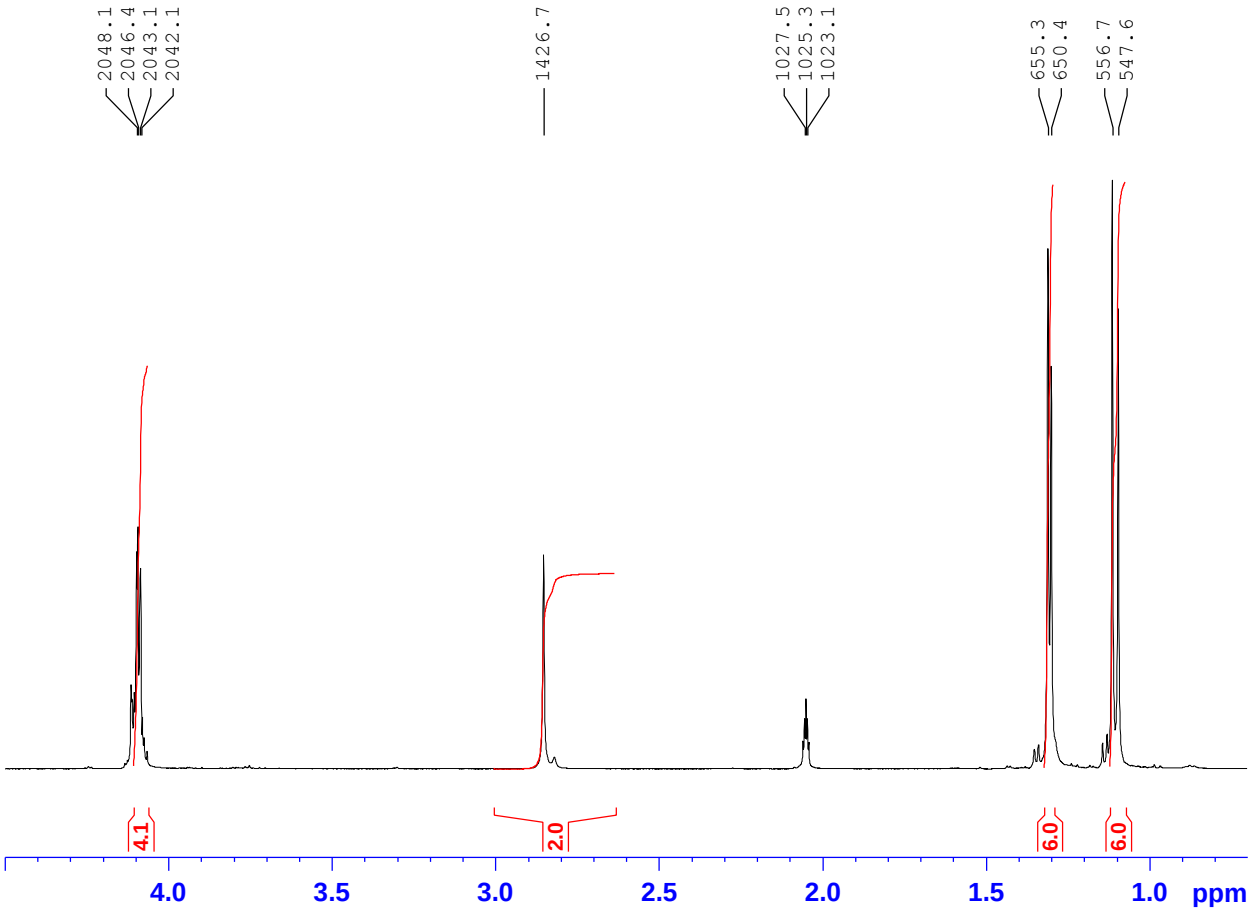

Figure S14. Expanded ^{1}H NMR spectrum of compound **7** in Acetone-d_6, 500 MHz.

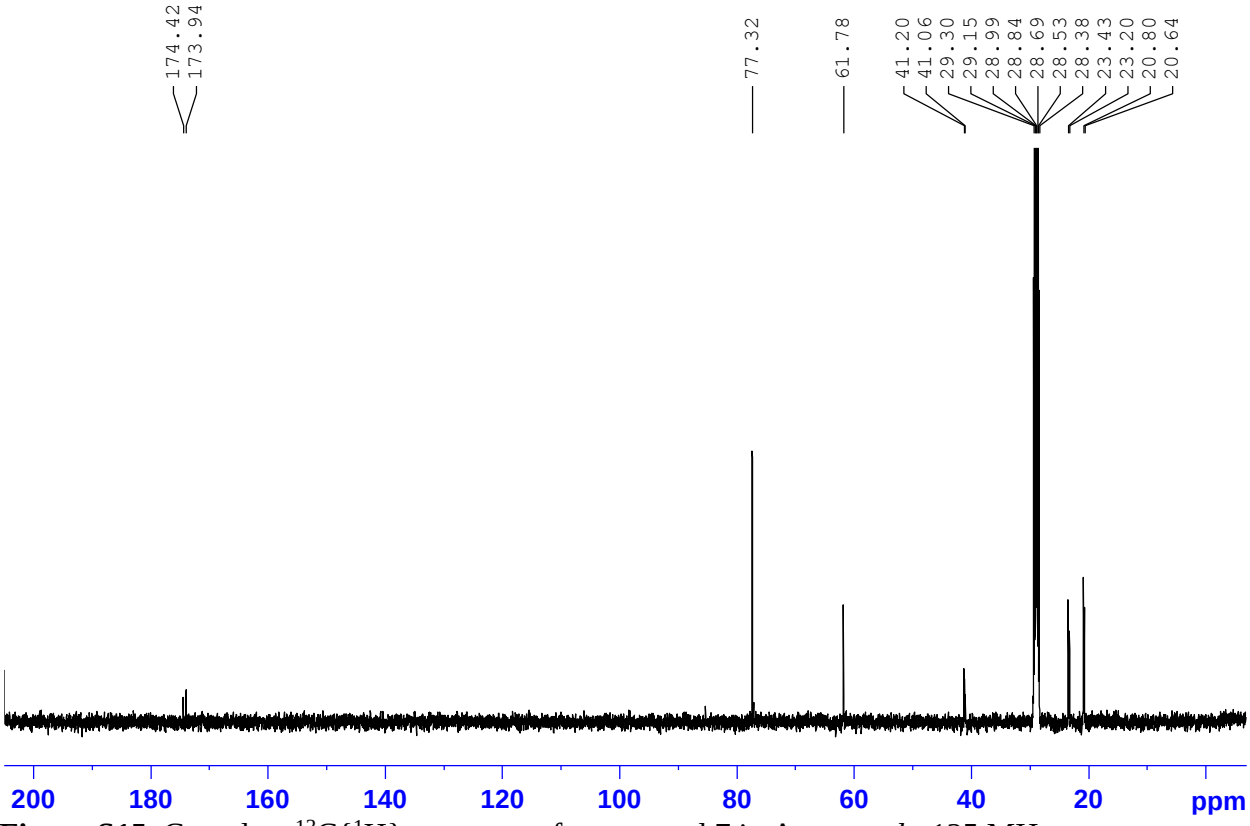

Figure S15. Complete $^{13}C\{^{1}H\}$ spectrum of compound **7** in Acetone-d_6, 125 MHz.

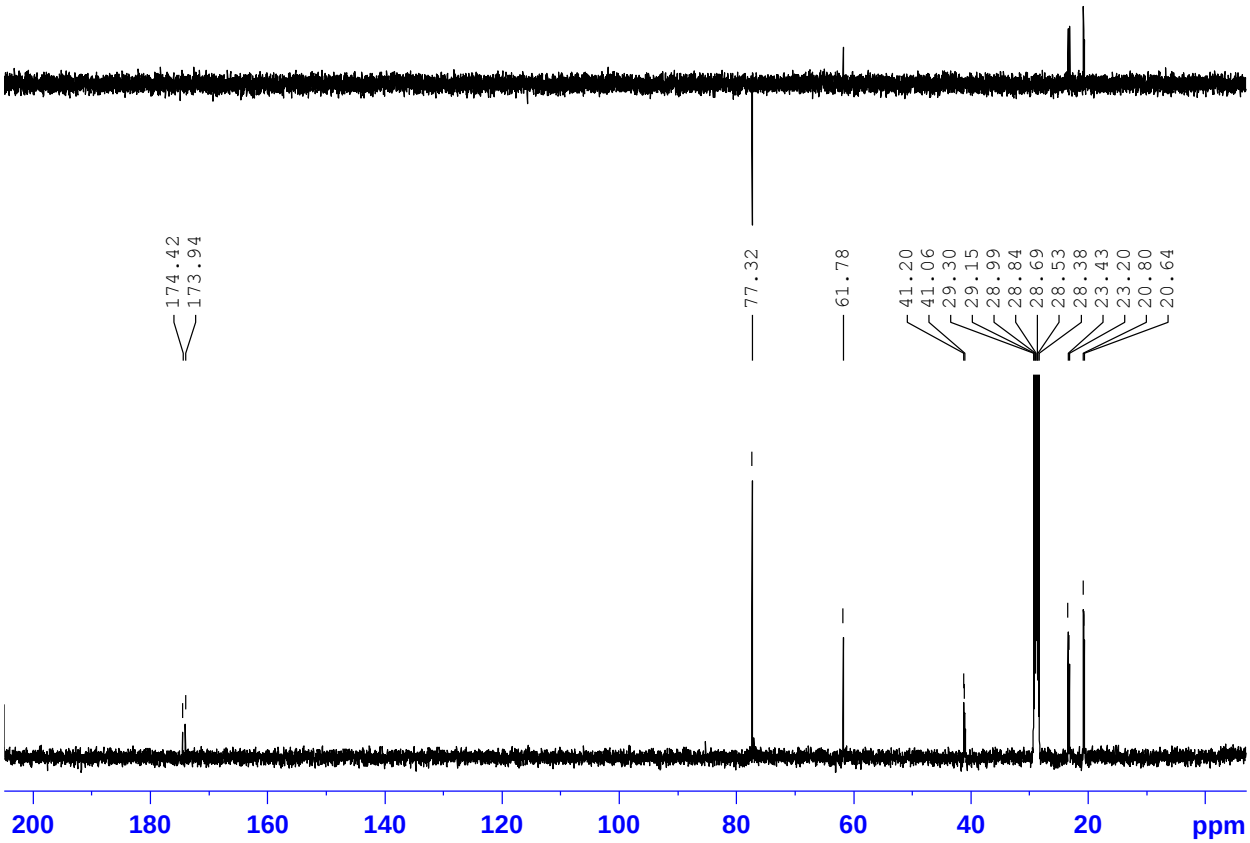

Figure S16. DEPT-135 editing $^{13}C\{^{1}H\}$ NMR spectrum of compound **7** in Acetone-d_6, 125 MHz: a) $^{13}C\{^{1}H\}$ spectrum; b) DEPT-135.

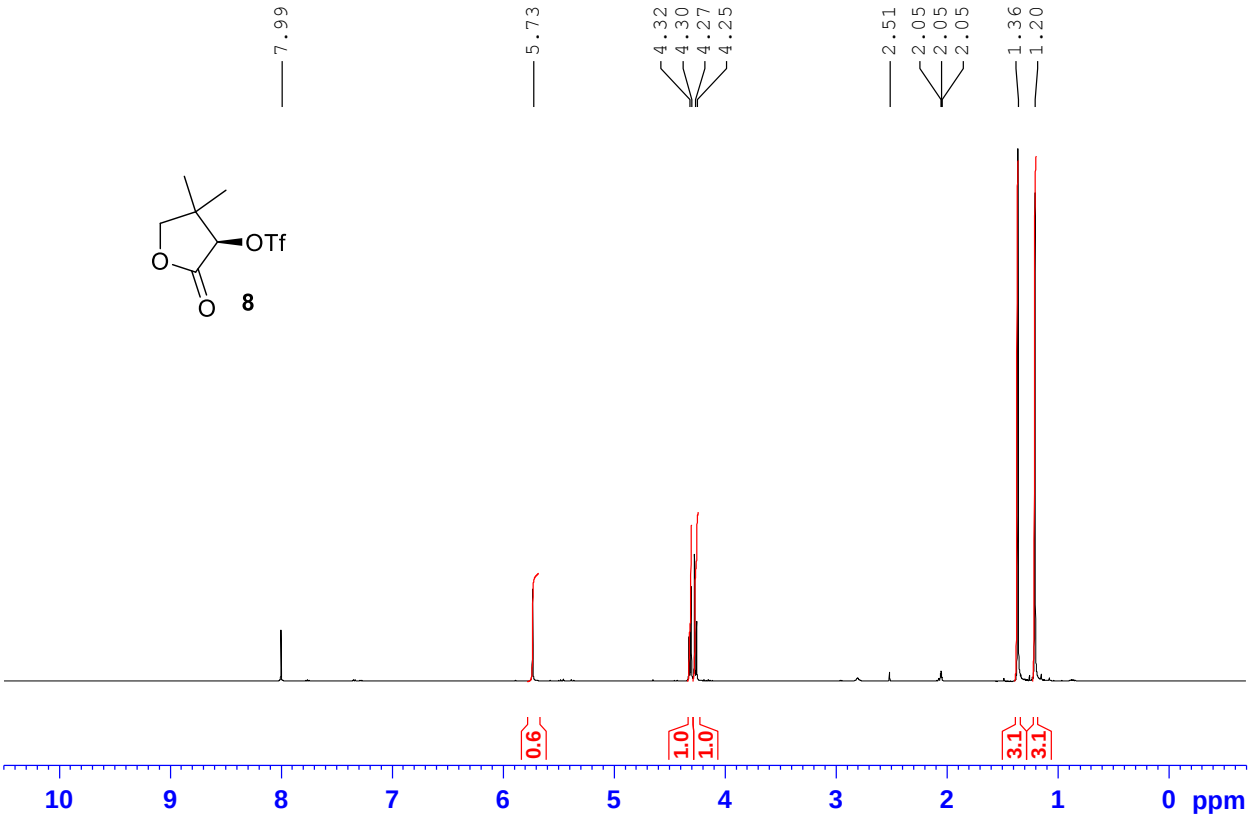

Figure S17. Complete ^{1}H NMR spectrum of compound **8** in Acetone-d_6, 500 MHz.

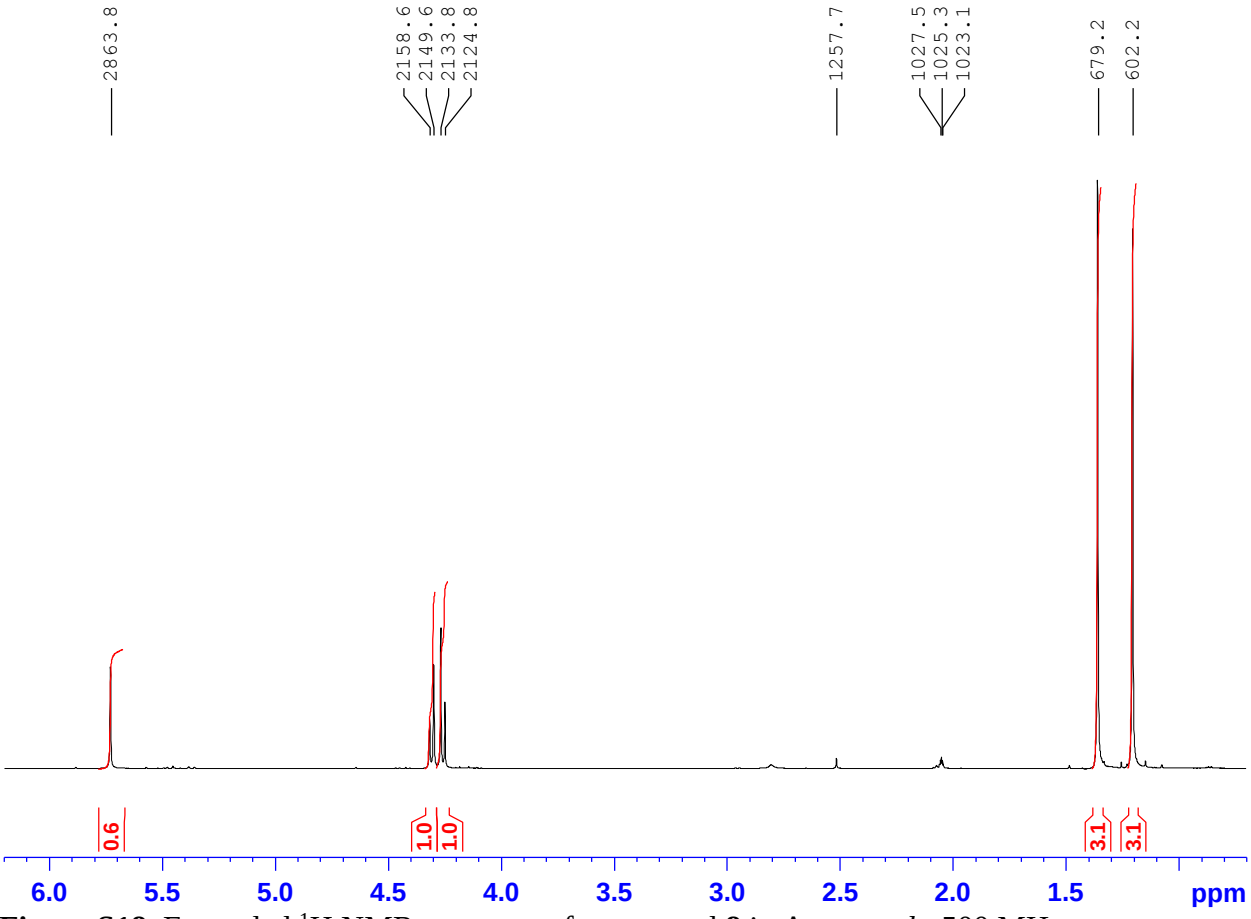

Figure S18. Expanded ^{1}H NMR spectrum of compound **8** in Acetone-d_6, 500 MHz.

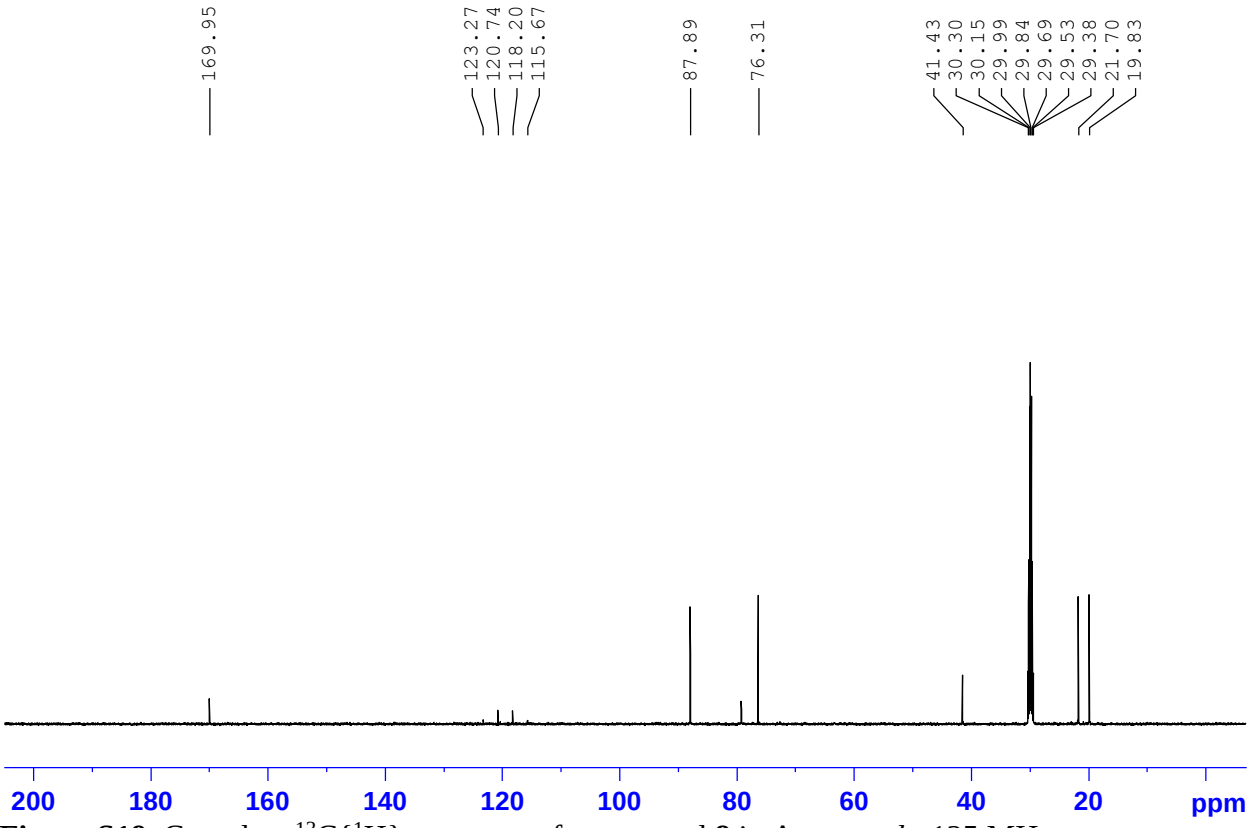

Figure S19. Complete $^{13}C\{^{1}H\}$ spectrum of compound **8** in Acetone-d_6, 125 MHz.

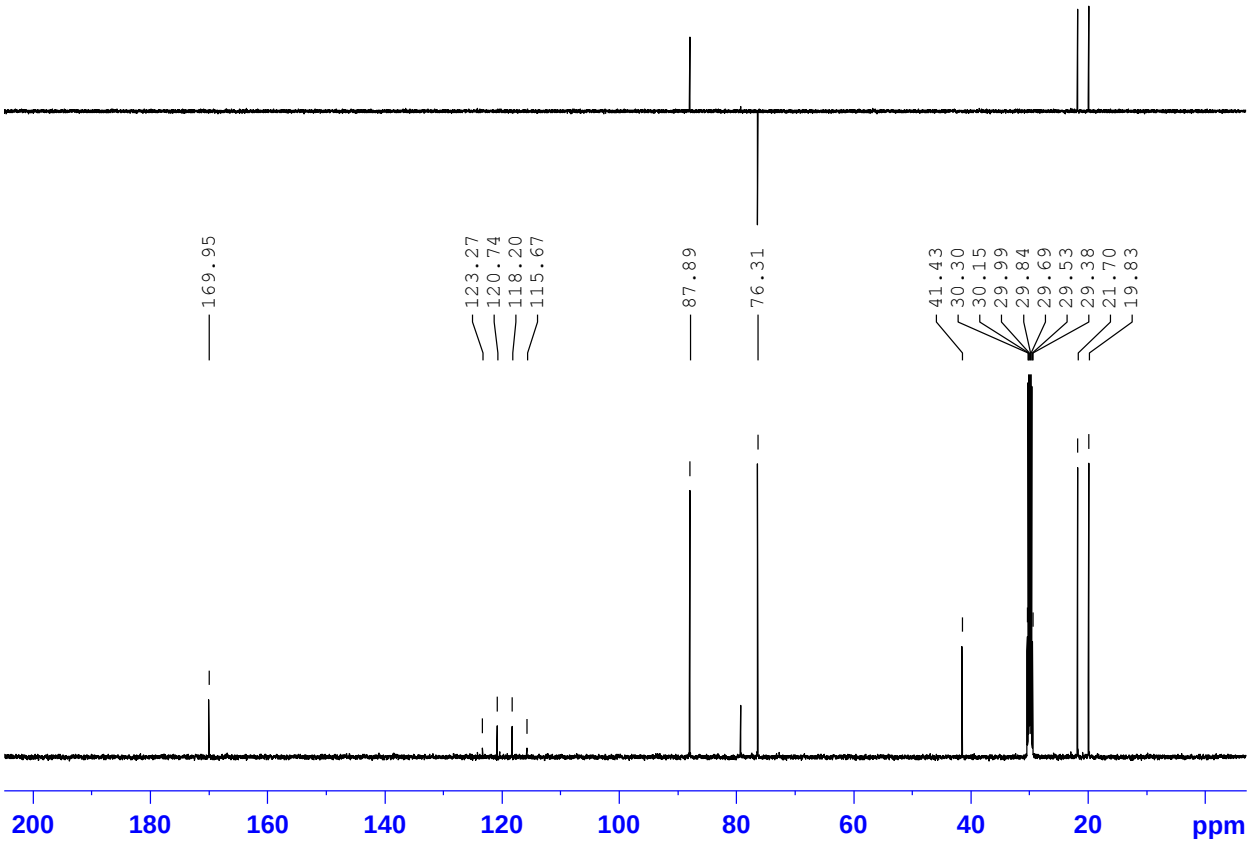

Figure S20. DEPT-135 editing $^{13}C\{^{1}H\}$ NMR spectrum of compound **8** in Acetone-d_6, 125 MHz: a) $^{13}C\{^{1}H\}$ spectrum; b) DEPT-135.

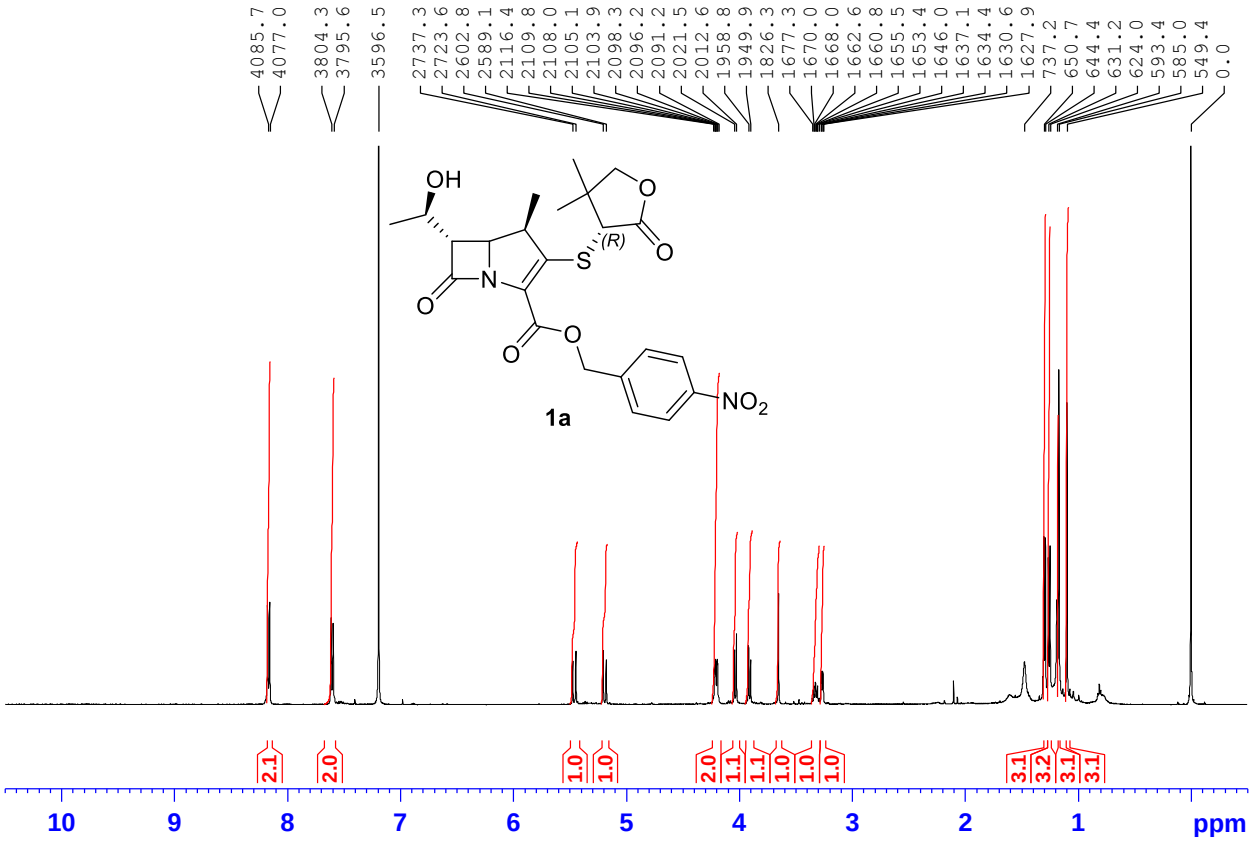

Figure S21. Complete ^{1}H NMR spectrum of compound **1a** in $CDCl_3$, 500 MHz.

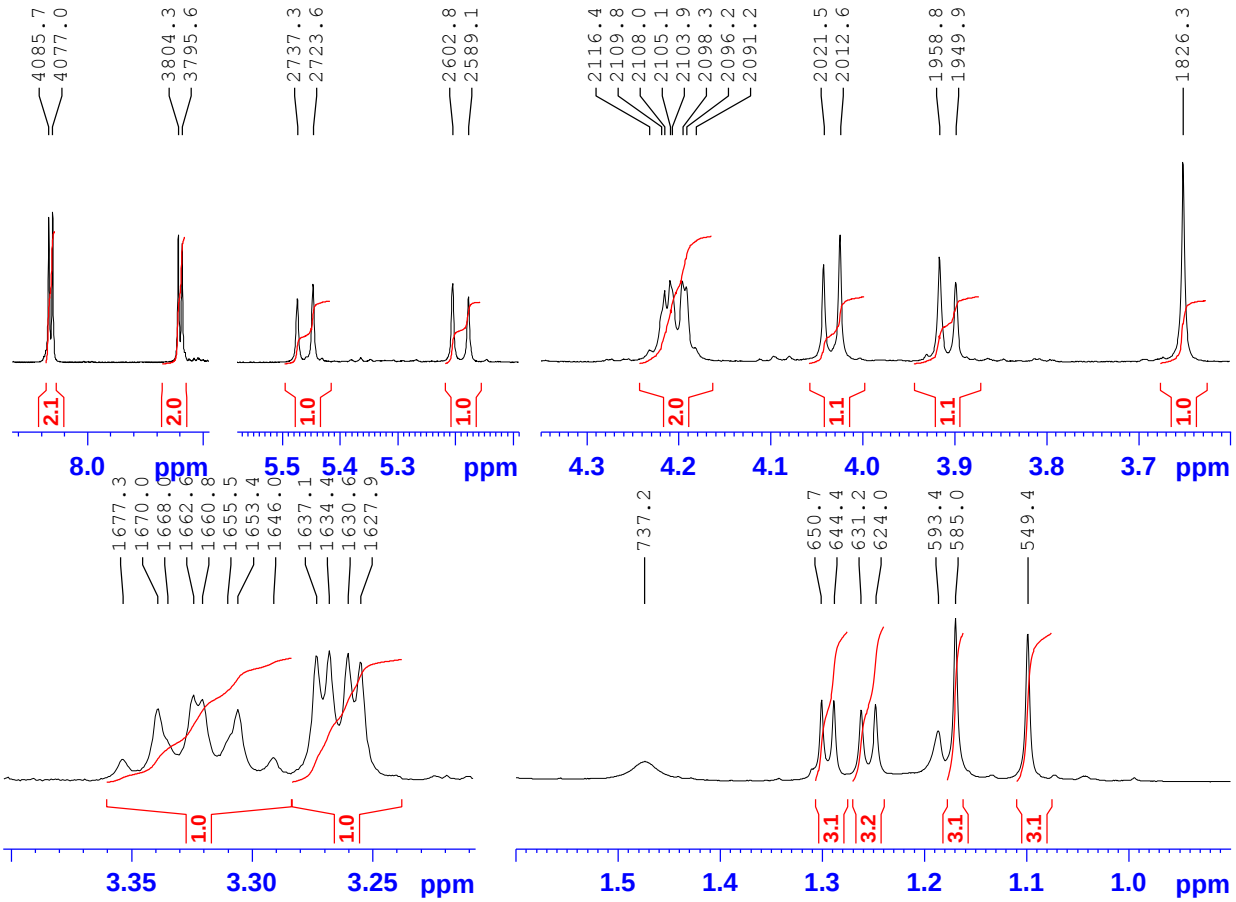

Figure S22. Expanded ^{1}H NMR spectrum of compound **1a** in $CDCl_3$, 500 MHz.

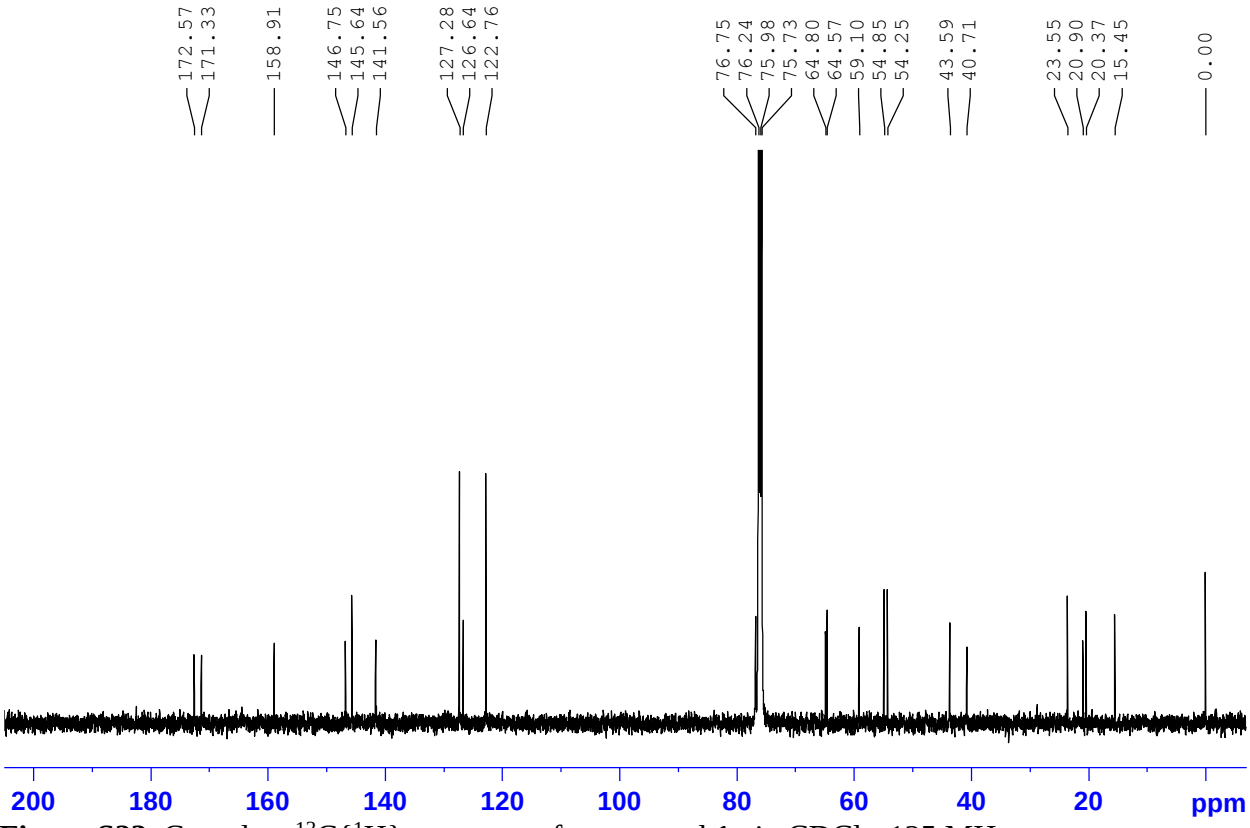

Figure S23. Complete $^{13}C\{^{1}H\}$ spectrum of compound **1a** in $CDCl_3$, 125 MHz.

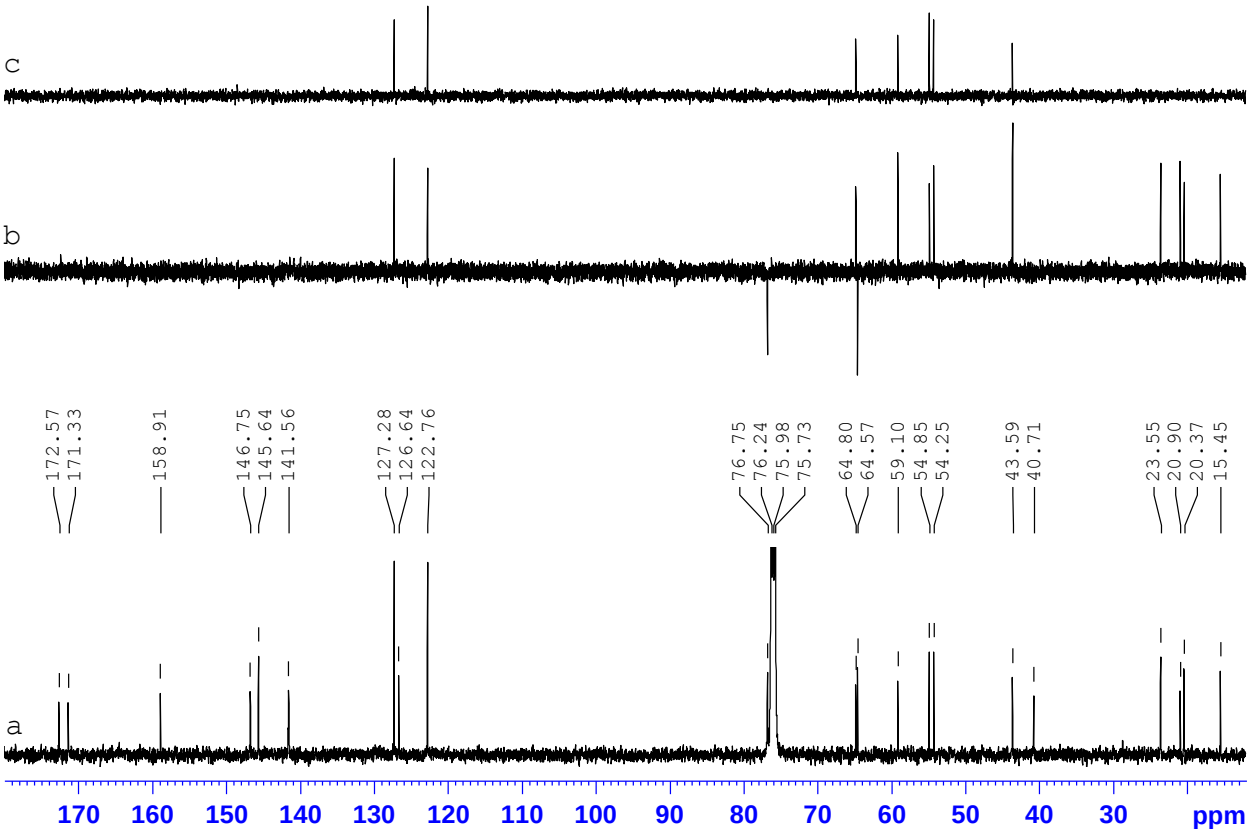

Figure S24. DEPT editing $^{13}C\{^{1}H\}$ NMR spectrum of compound **1a** in $CDCl_3$, 125 MHz: a) $^{13}C\{^{1}H\}$ spectrum; b) DEPT-135; c) DEPT-90.

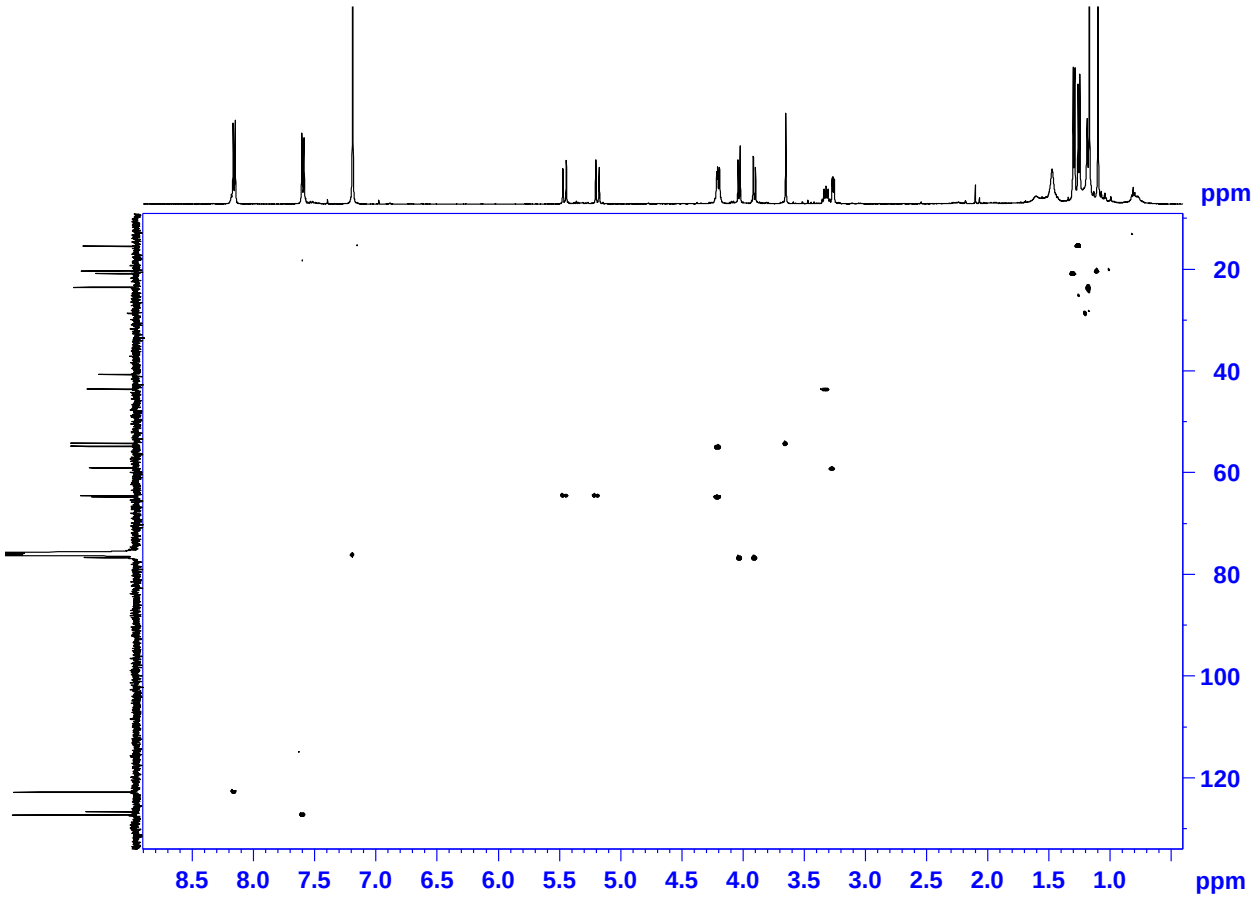

Figure S25. {^{1}H, ^{13}C} HSQC NMR spectrum of compound **1a** in $CDCl_3$, 500 MHz.

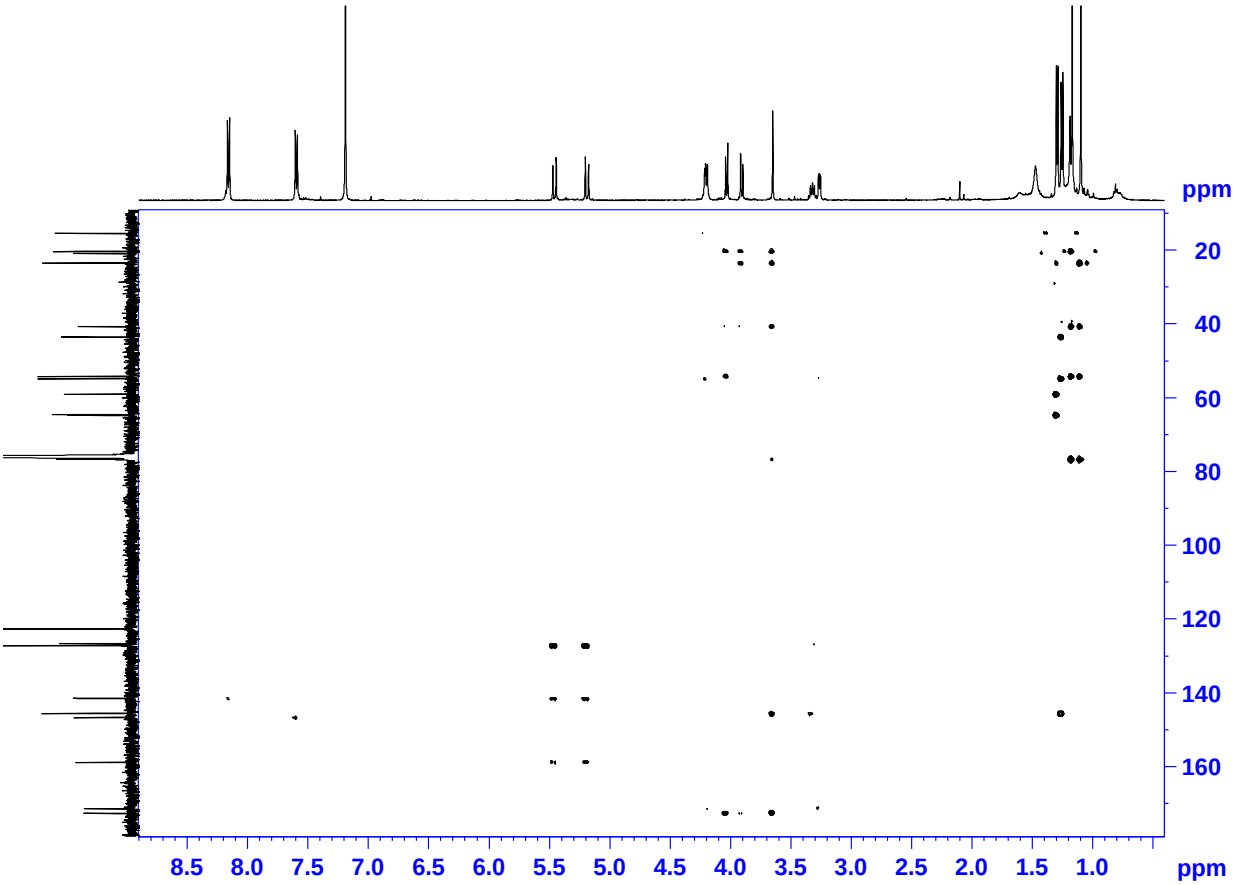

Figure S26. {^{1}H, ^{13}C} HMBC NMR spectrum of compound **1a** in $CDCl_3$, 500 MHz.

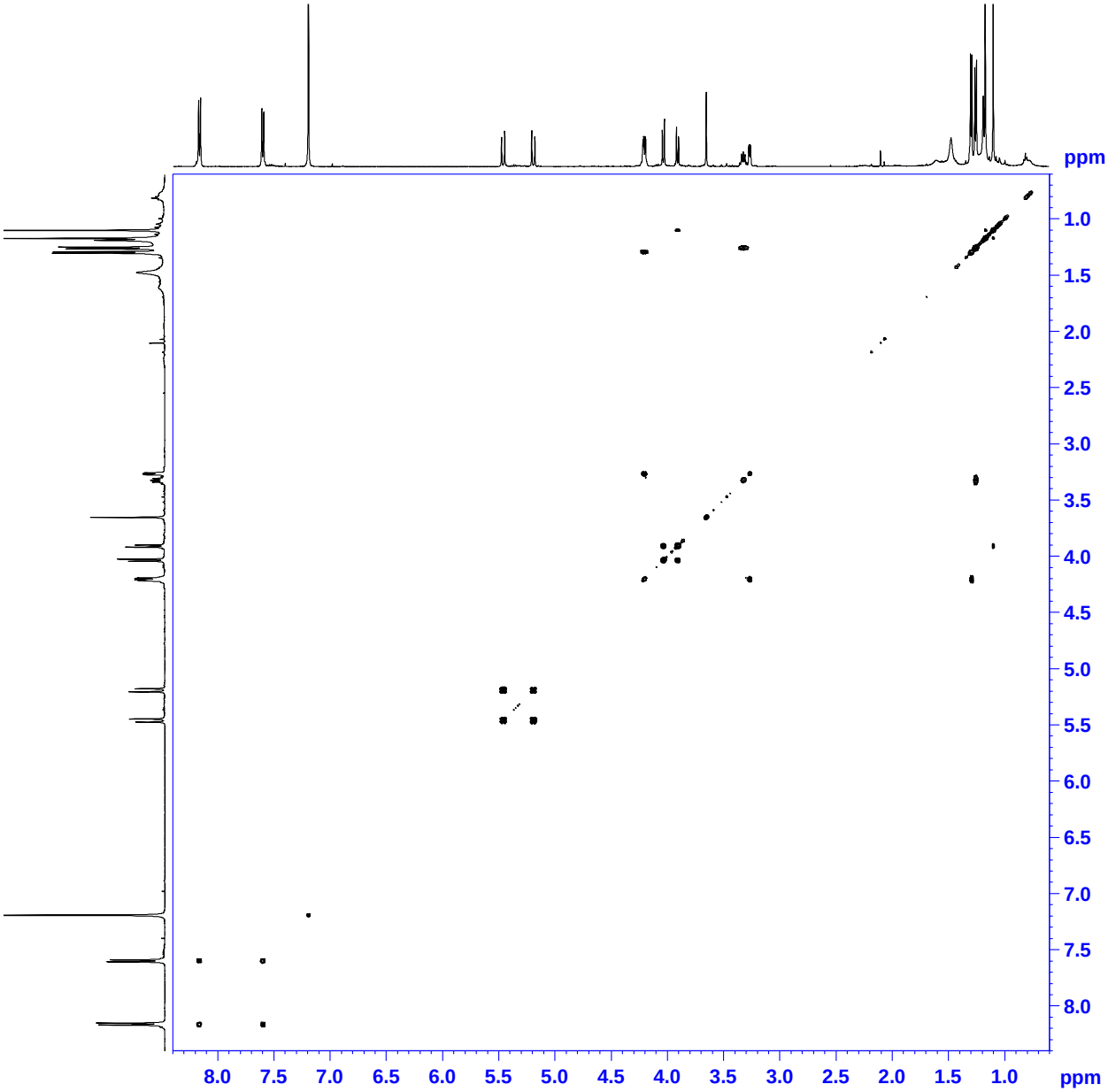

Figure S27. {^{1}H, ^{1}H} COSY NMR spectrum of compound **1a** in $CDCl_3$, 500 MHz.

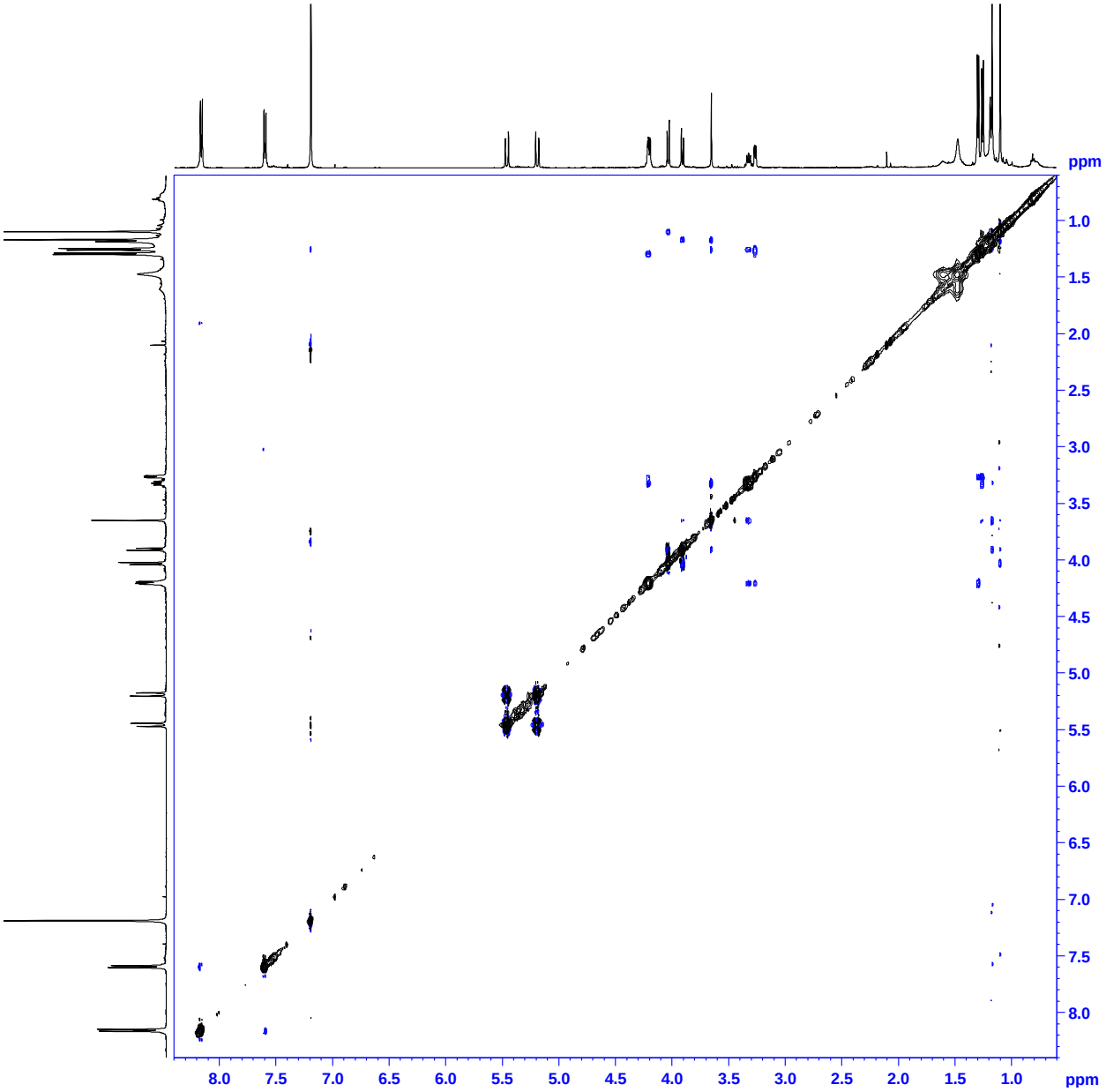

Figure S28. {^{1}H, ^{1}H} NOESY NMR spectrum of compound **1a** in $CDCl_3$, 500 MHz.

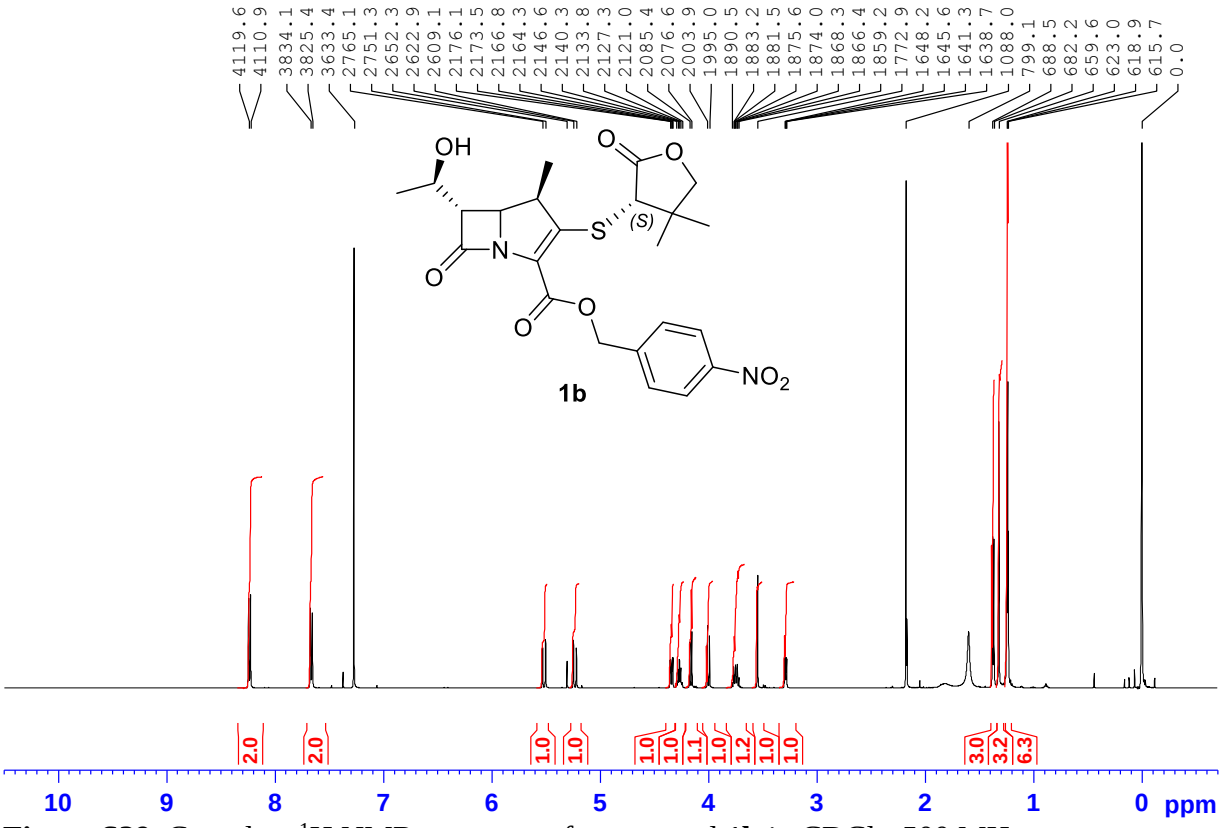

Figure S29. Complete ^{1}H NMR spectrum of compound **1b** in $CDCl_3$, 500 MHz.

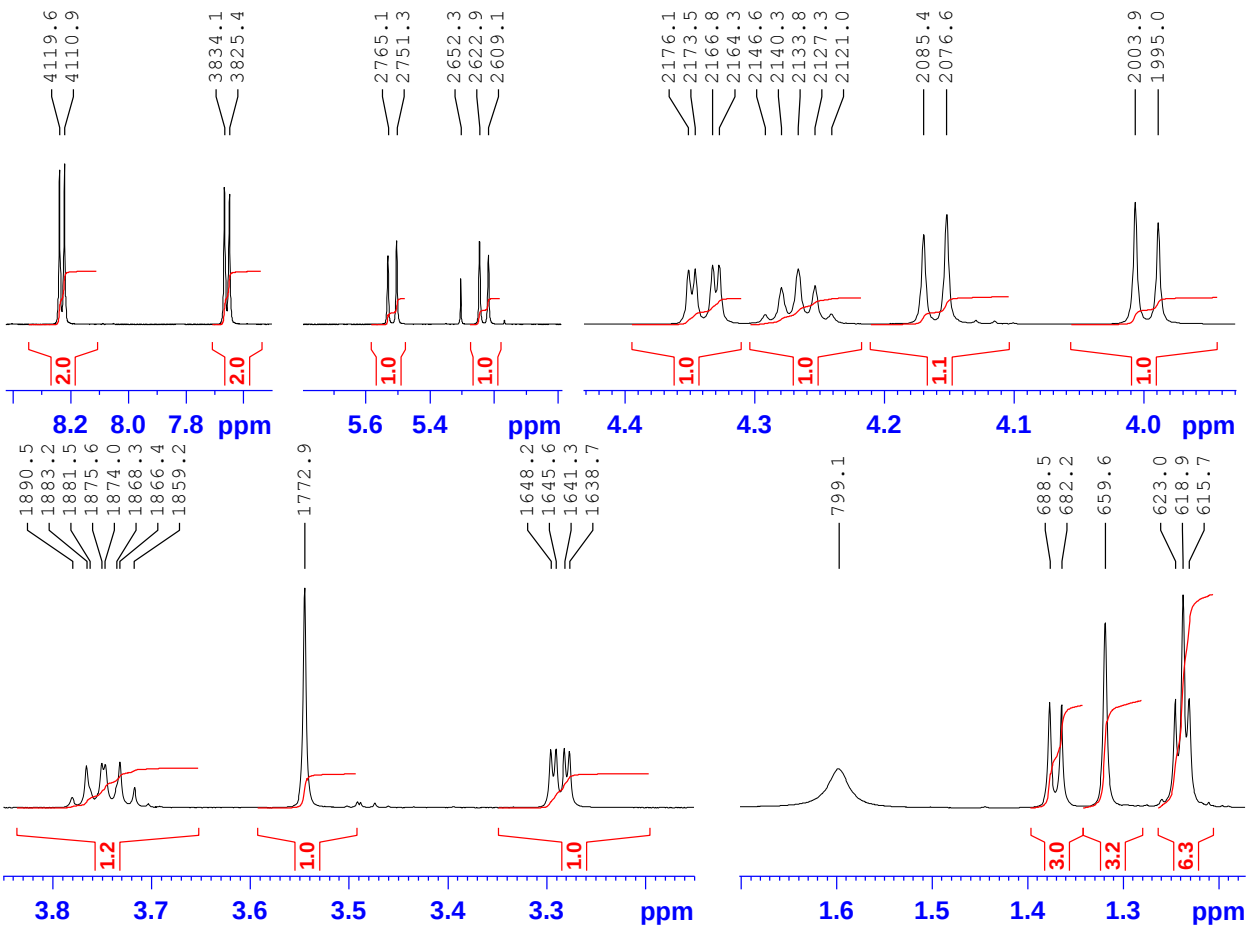

Figure S30. Expanded ^{1}H NMR spectrum of compound **1b** in $CDCl_3$, 500 MHz.

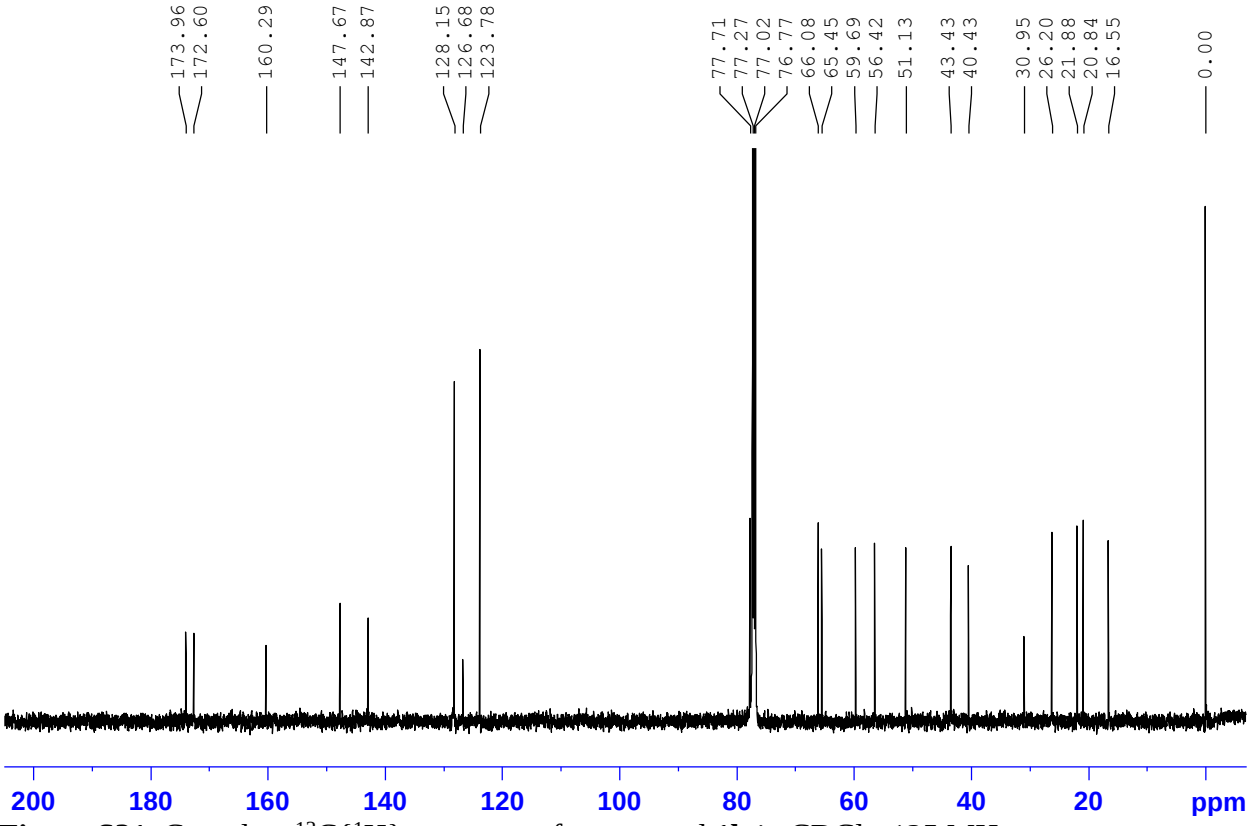

Figure S31. Complete $^{13}C\{^{1}H\}$ spectrum of compound **1b** in $CDCl_3$, 125 MHz.

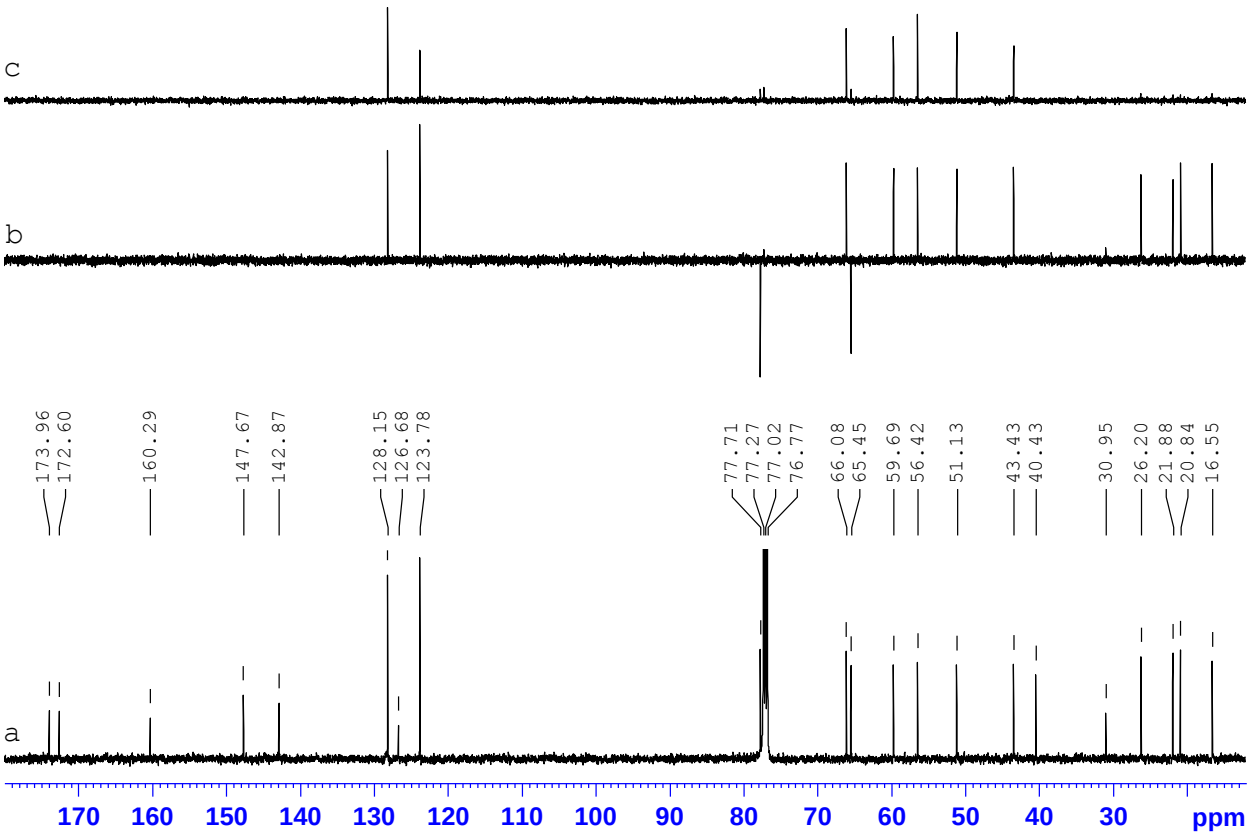

Figure S32. DEPT editing $^{13}C\{^{1}H\}$ NMR spectrum of compound **1b** in $CDCl_3$, 125 MHz: a) $^{13}C\{^{1}H\}$ spectrum; b) DEPT-135; c) DEPT-90.

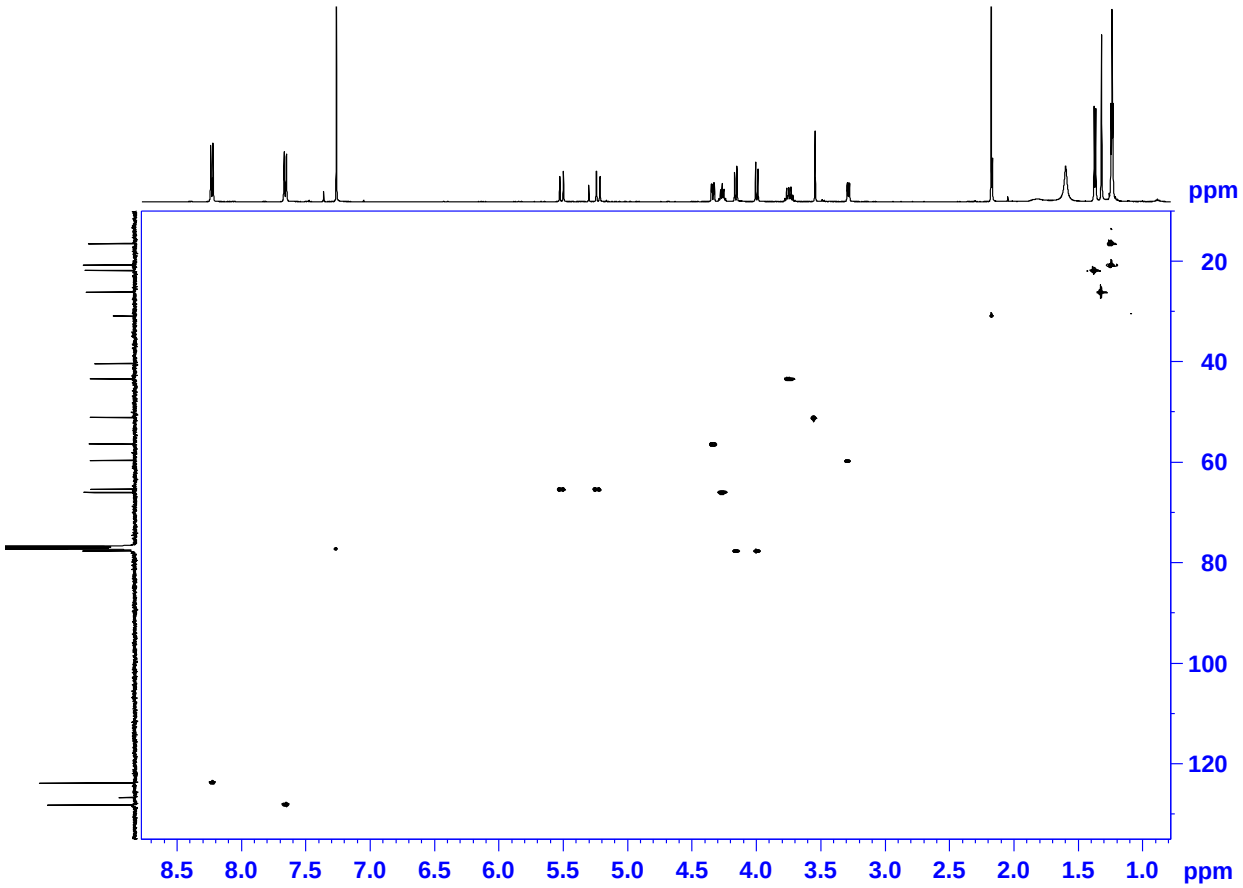

Figure S33. {^{1}H, ^{13}C} HSQC NMR spectrum of compound **1b** in $CDCl_3$, 500 MHz.

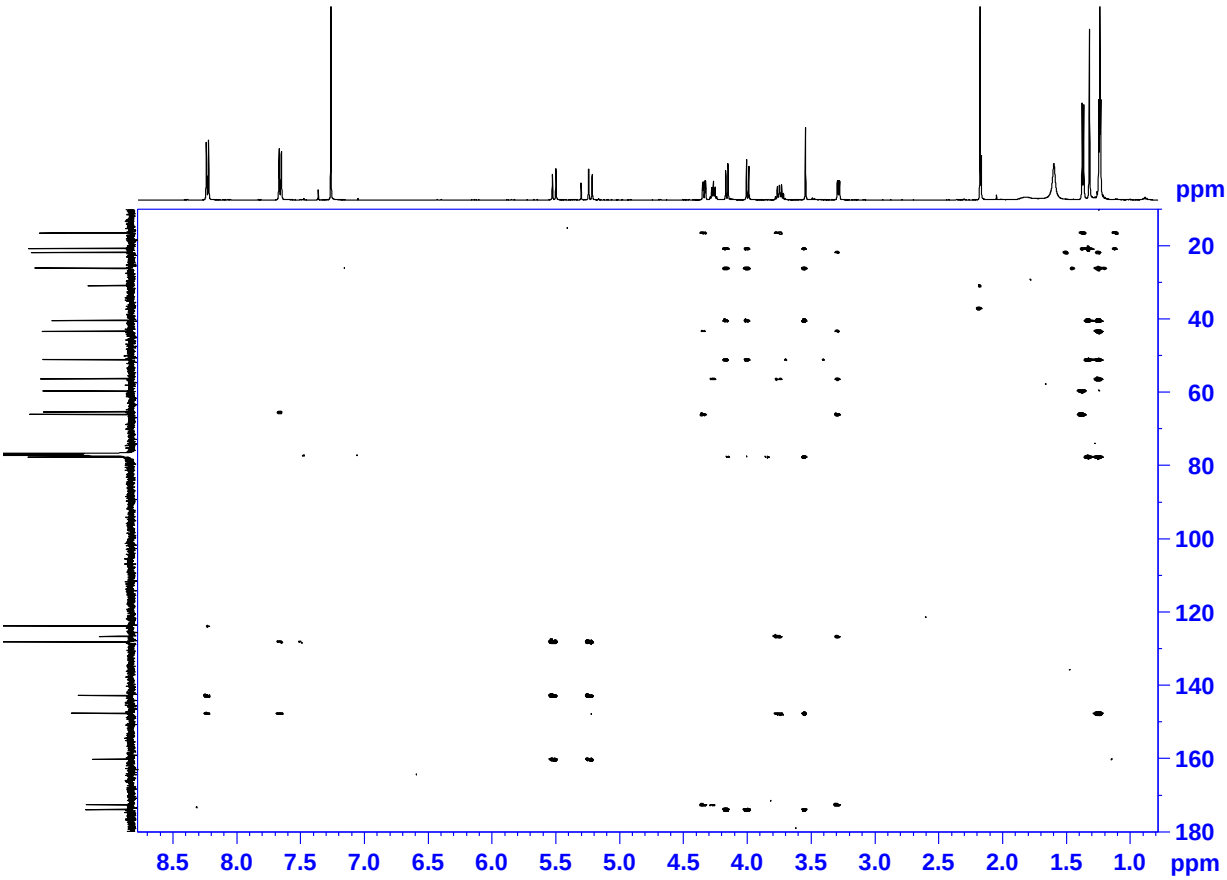

Figure S34. {^{1}H, ^{13}C} HMBC NMR spectrum of compound **1b** in $CDCl_3$, 500 MHz.

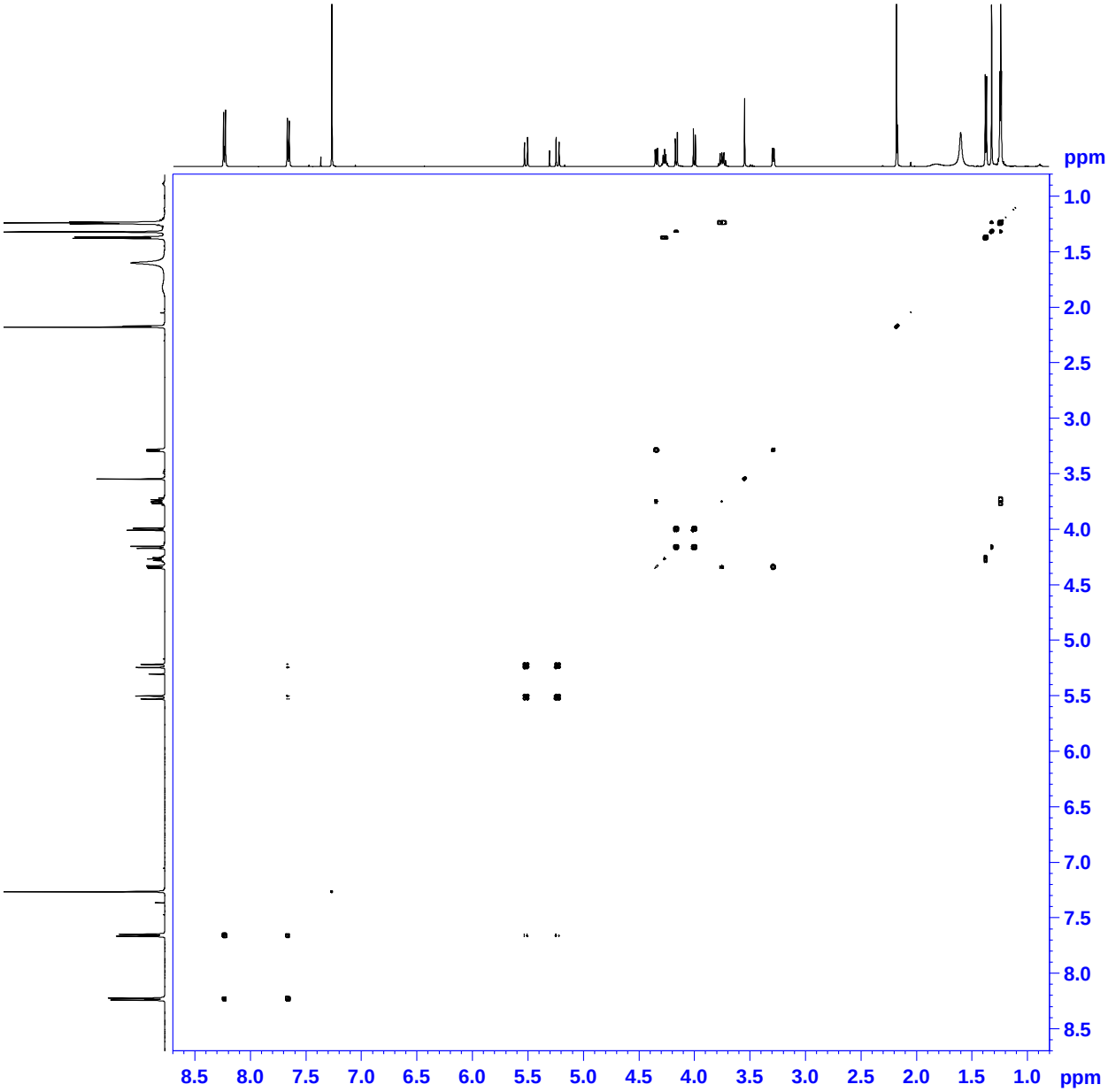

Figure S35. {^{1}H, ^{1}H} COSY NMR spectrum of compound **1b** in $CDCl_3$, 500 MHz.

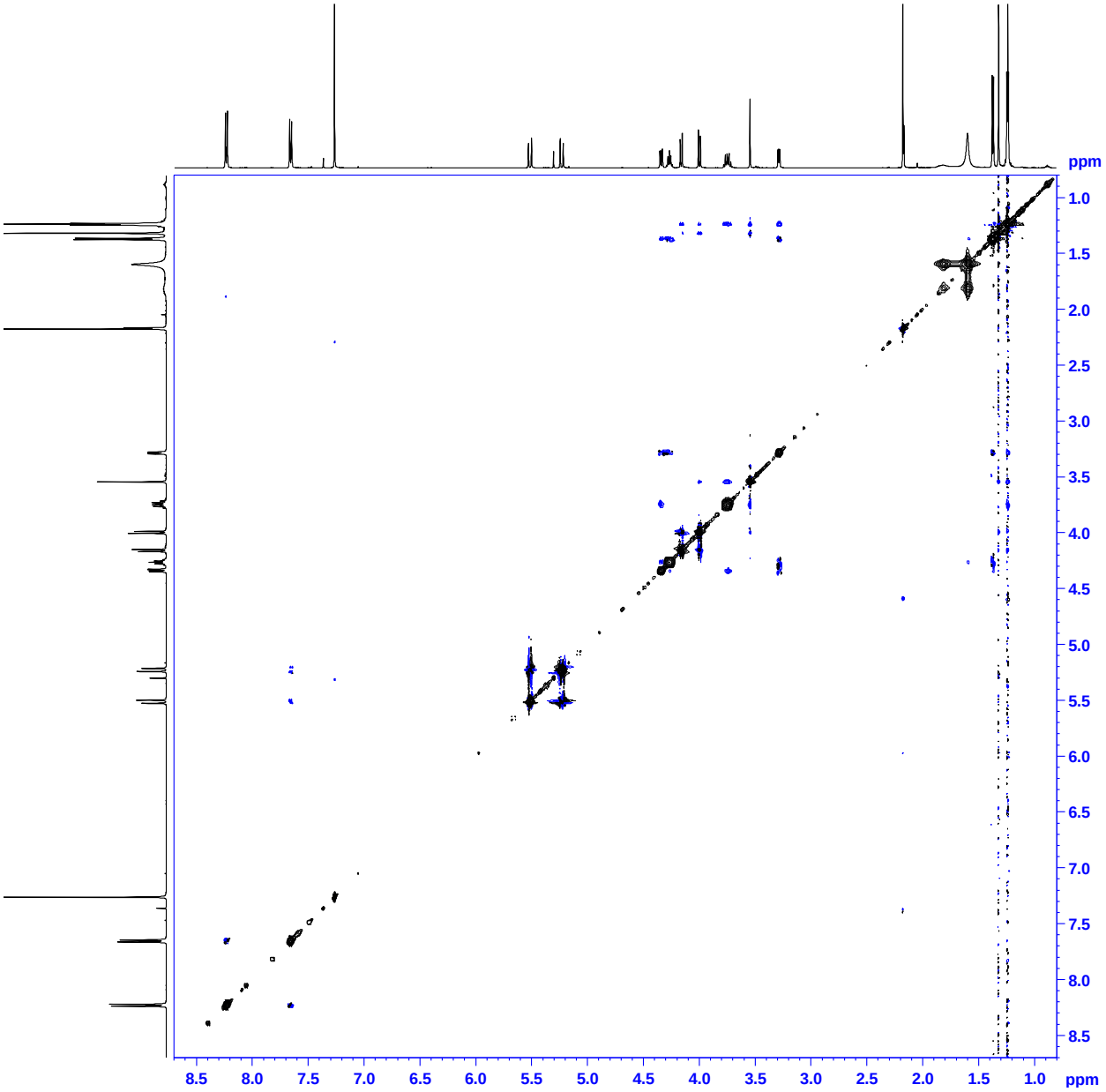

Figure S36. {^{1}H, ^{1}H} NOESY NMR spectrum of compound **1b** in $CDCl_3$, 500 MHz.

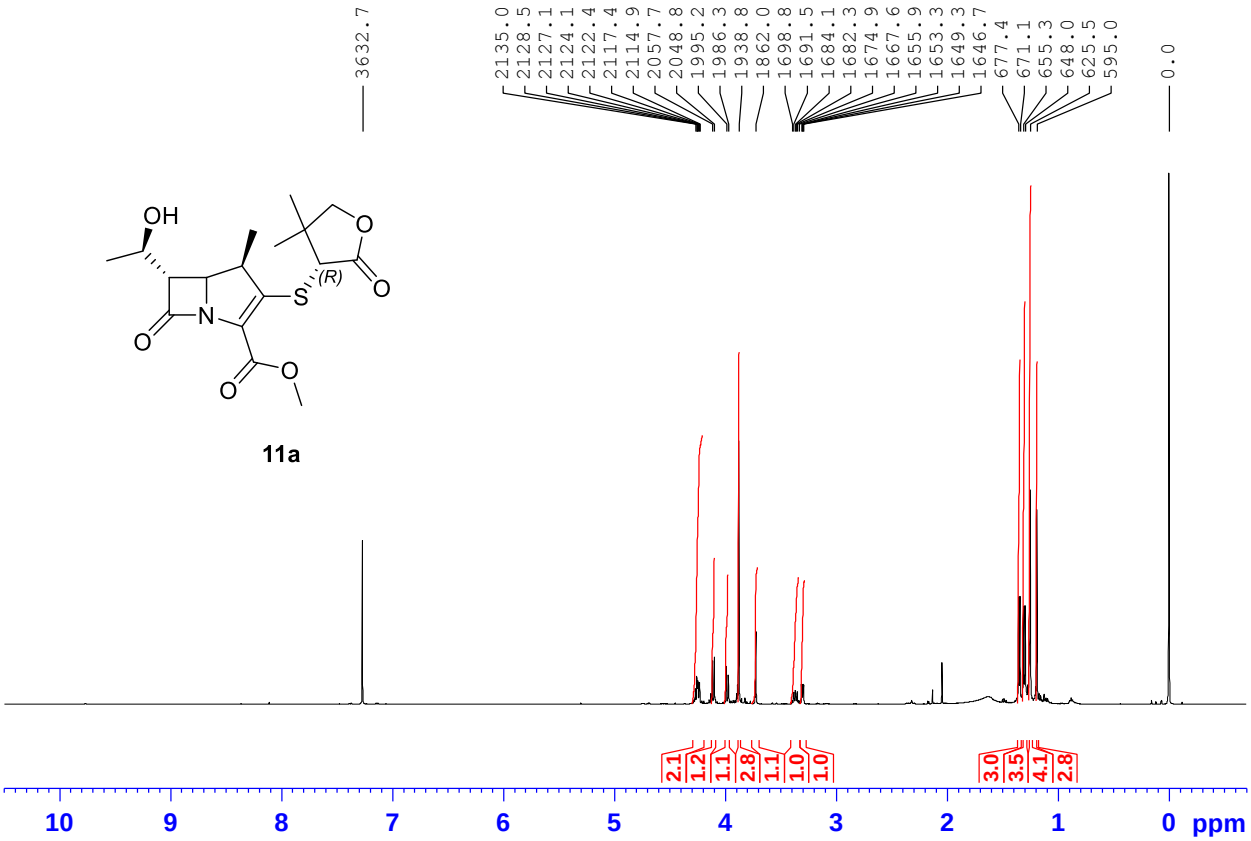

Figure S37. Complete ^{1}H NMR spectrum of compound **11a** in $CDCl_3$, 500 MHz.

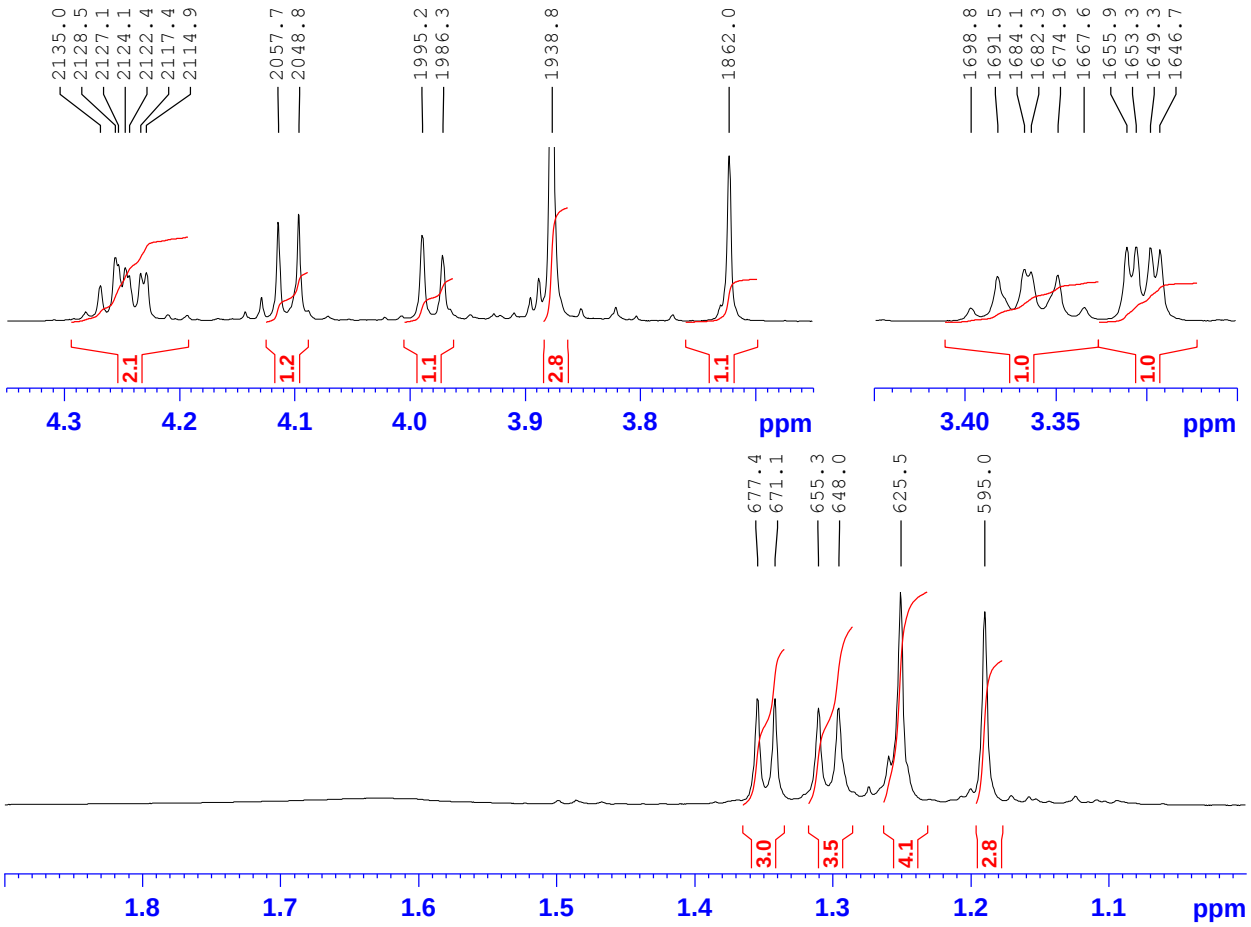

Figure S38. Expanded ^{1}H NMR spectrum of compound **11a** in $CDCl_3$, 500 MHz.

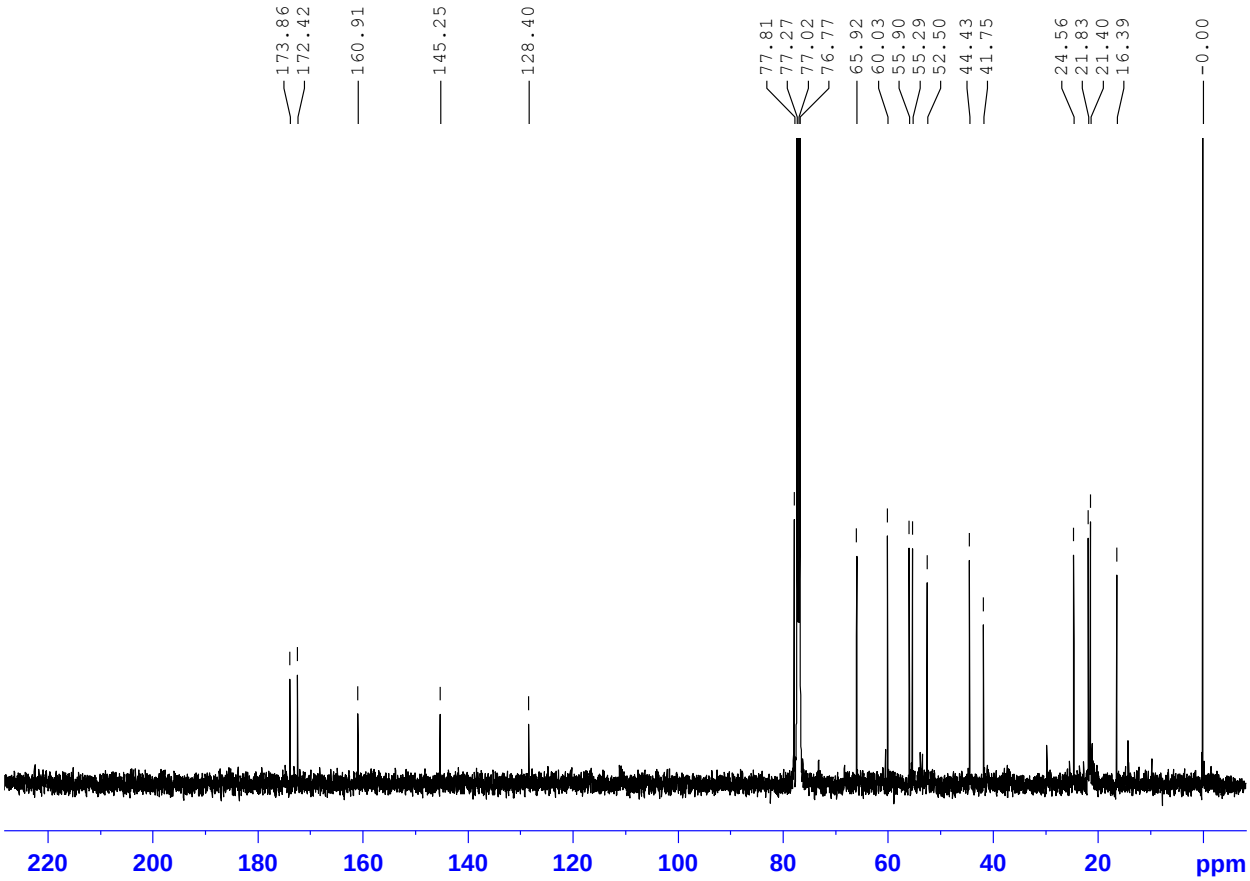

Figure S39. Complete $^{13}C\{^{1}H\}$ spectrum of compound **11a** in $CDCl_3$, 125 MHz.

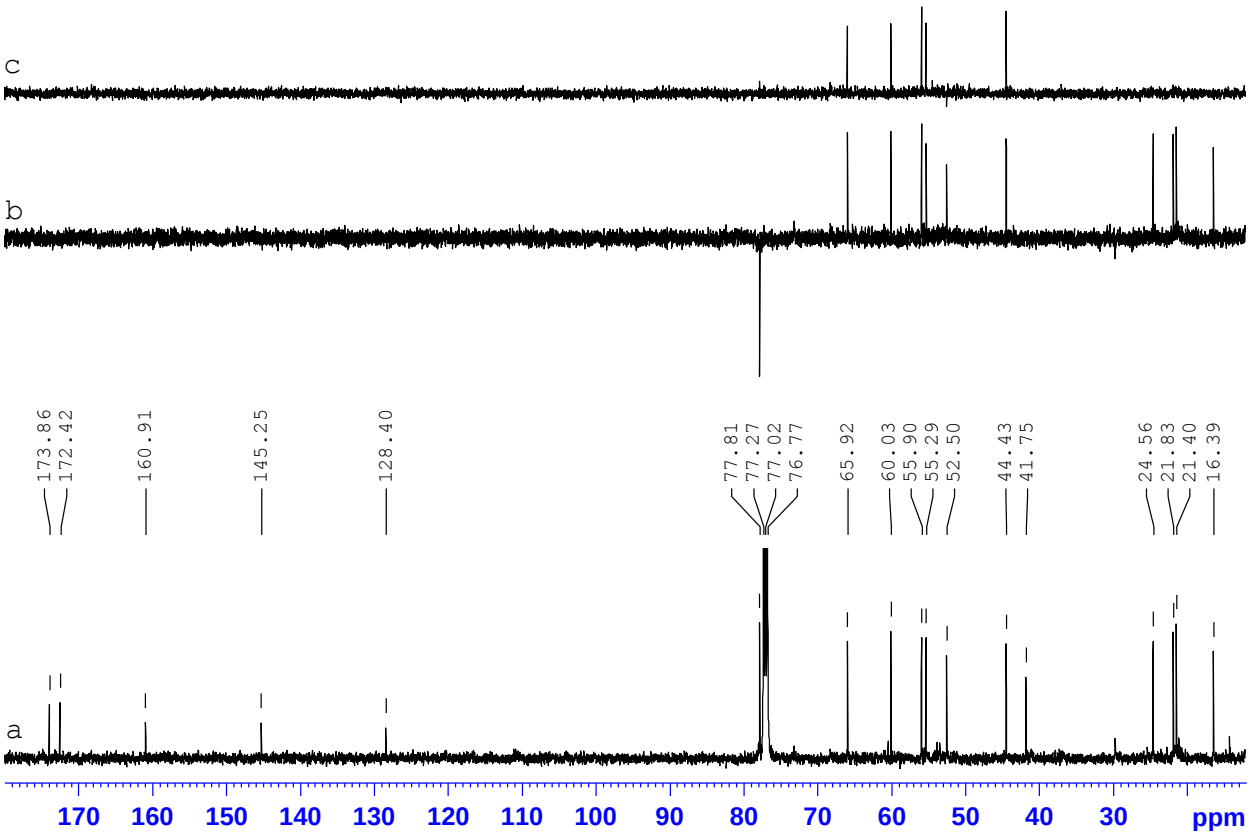

Figure S40. DEPT editing $^{13}C\{^{1}H\}$ NMR spectrum of compound **11a** in $CDCl_3$, 125 MHz: a) $^{13}C\{^{1}H\}$ spectrum; b) DEPT-135; c) DEPT-90.

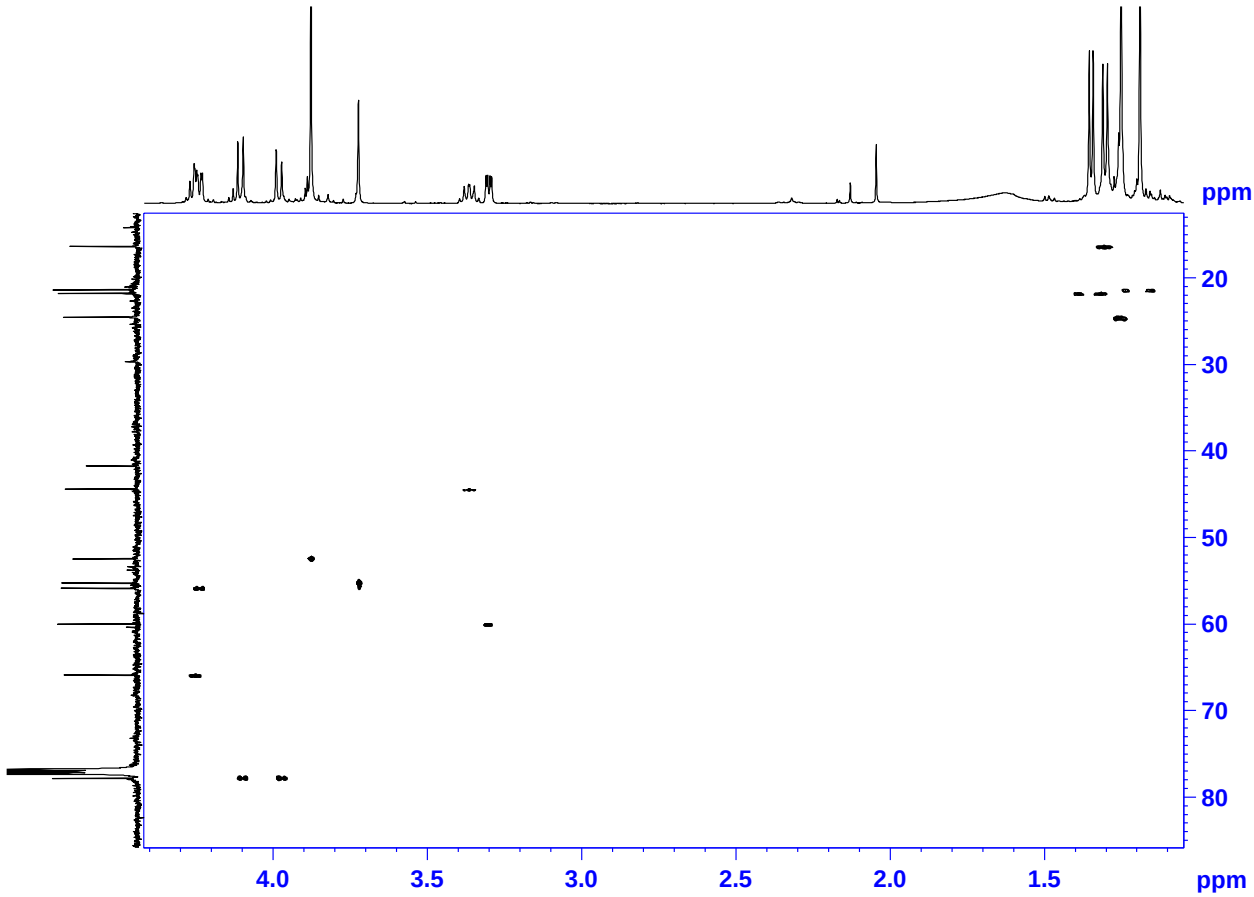

Figure S41. {^{1}H, ^{13}C} HSQC NMR spectrum of compound **11a** in $CDCl_3$, 500 MHz.

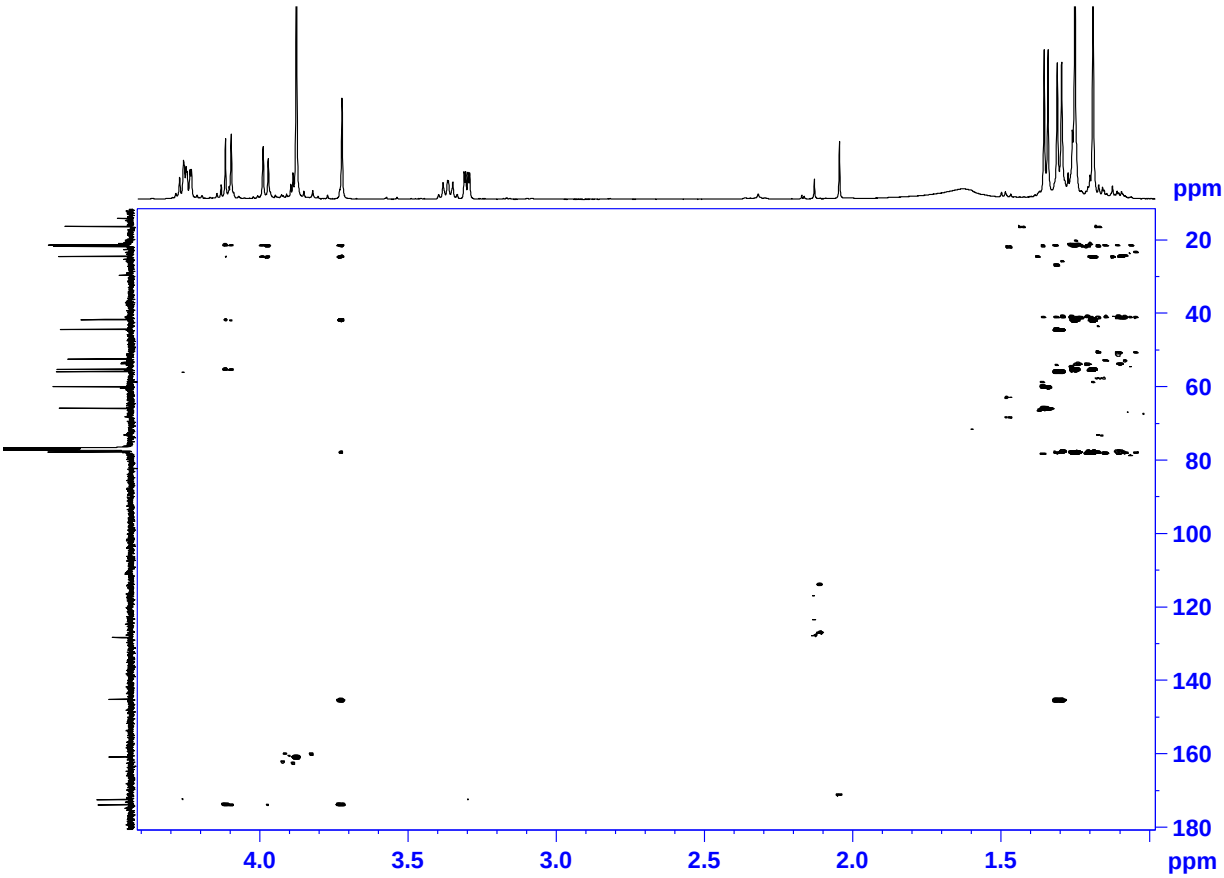

Figure S42. {^{1}H, ^{13}C} HMBC NMR spectrum of compound **11a** in $CDCl_3$, 500 MHz.

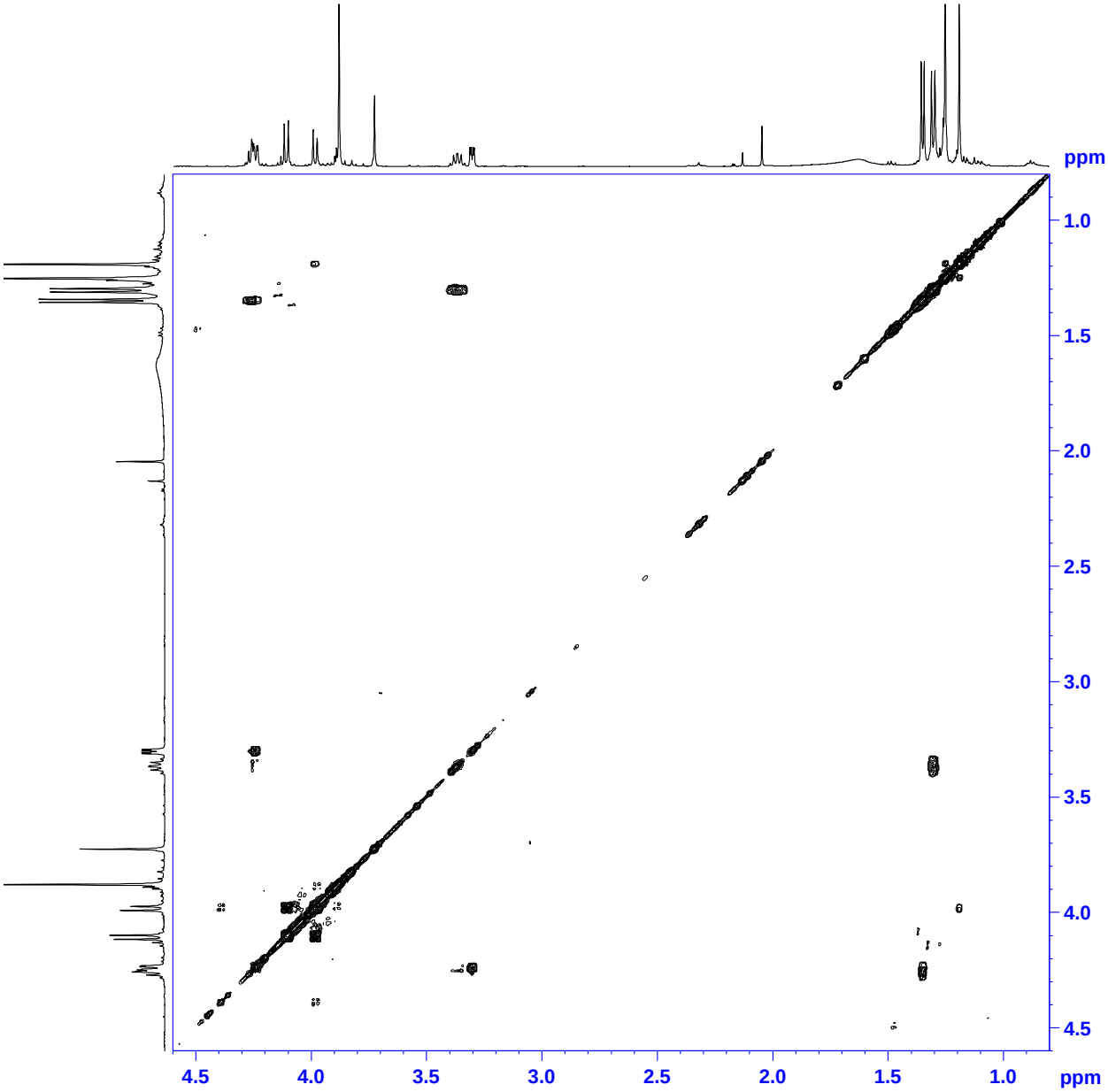

Figure S43. {^{1}H, ^{1}H} COSY NMR spectrum of compound **11a** in $CDCl_3$, 500 MHz.

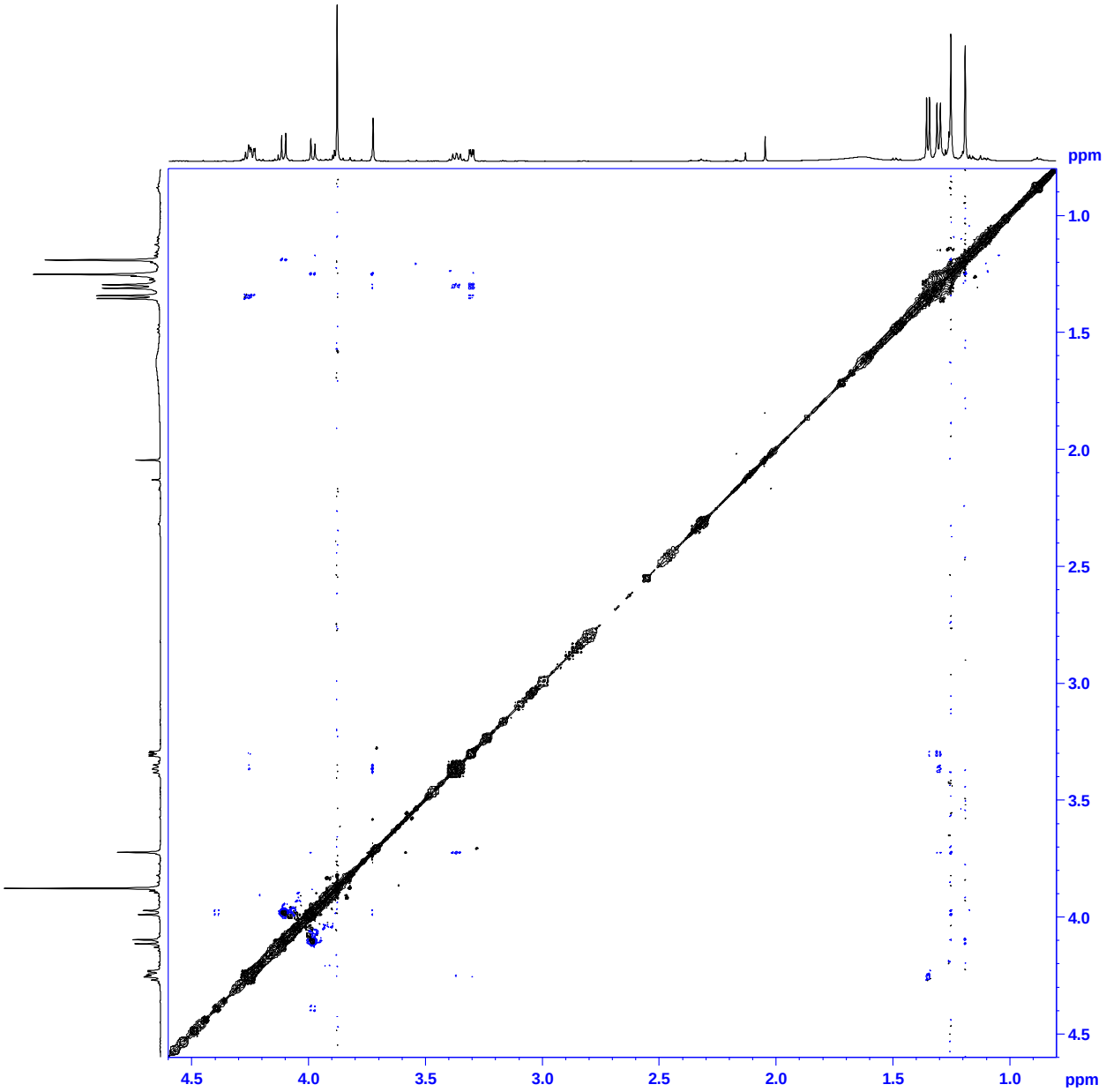

Figure S44. {^{1}H, ^{1}H} NOESY NMR spectrum of compound **11a** in $CDCl_3$, 500 MHz.

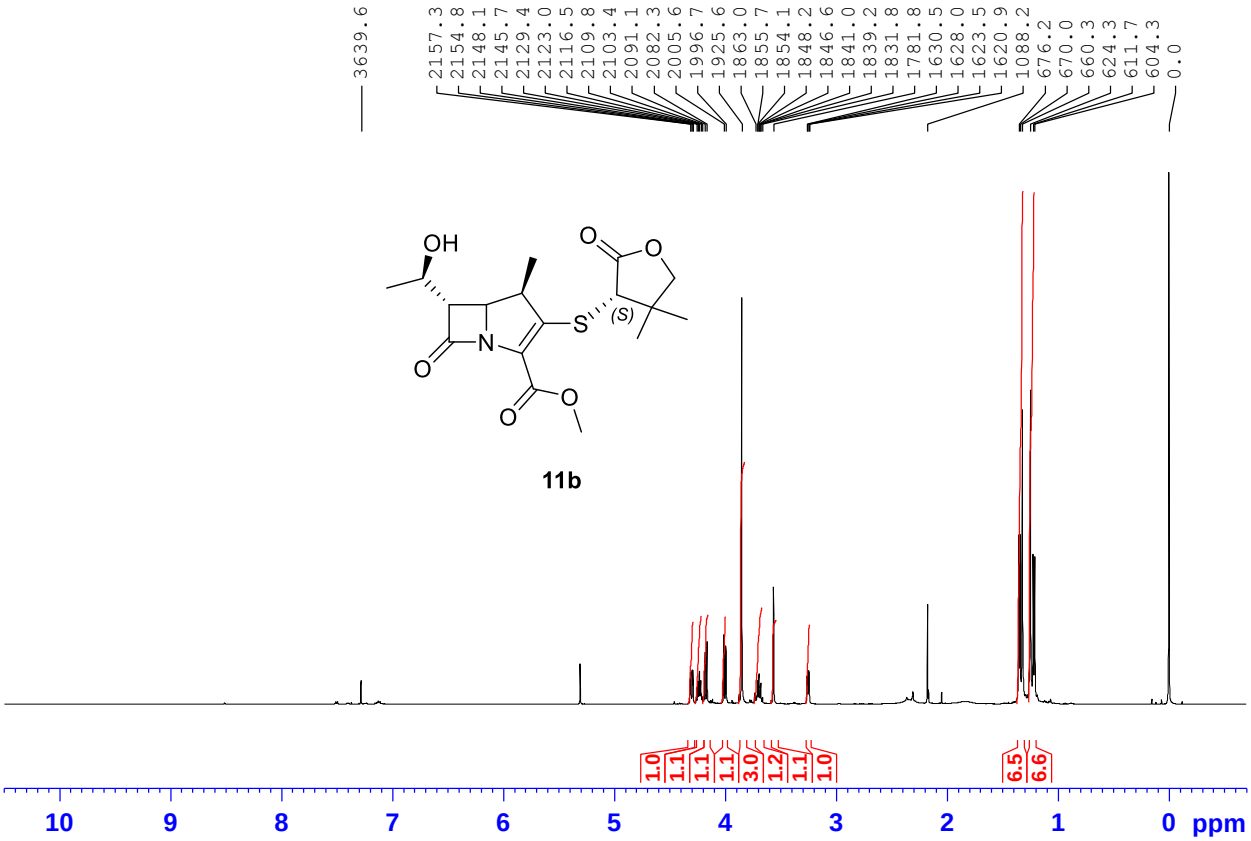

Figure S45. Complete ^{1}H NMR spectrum of compound **11b** in $CDCl_3$, 500 MHz.

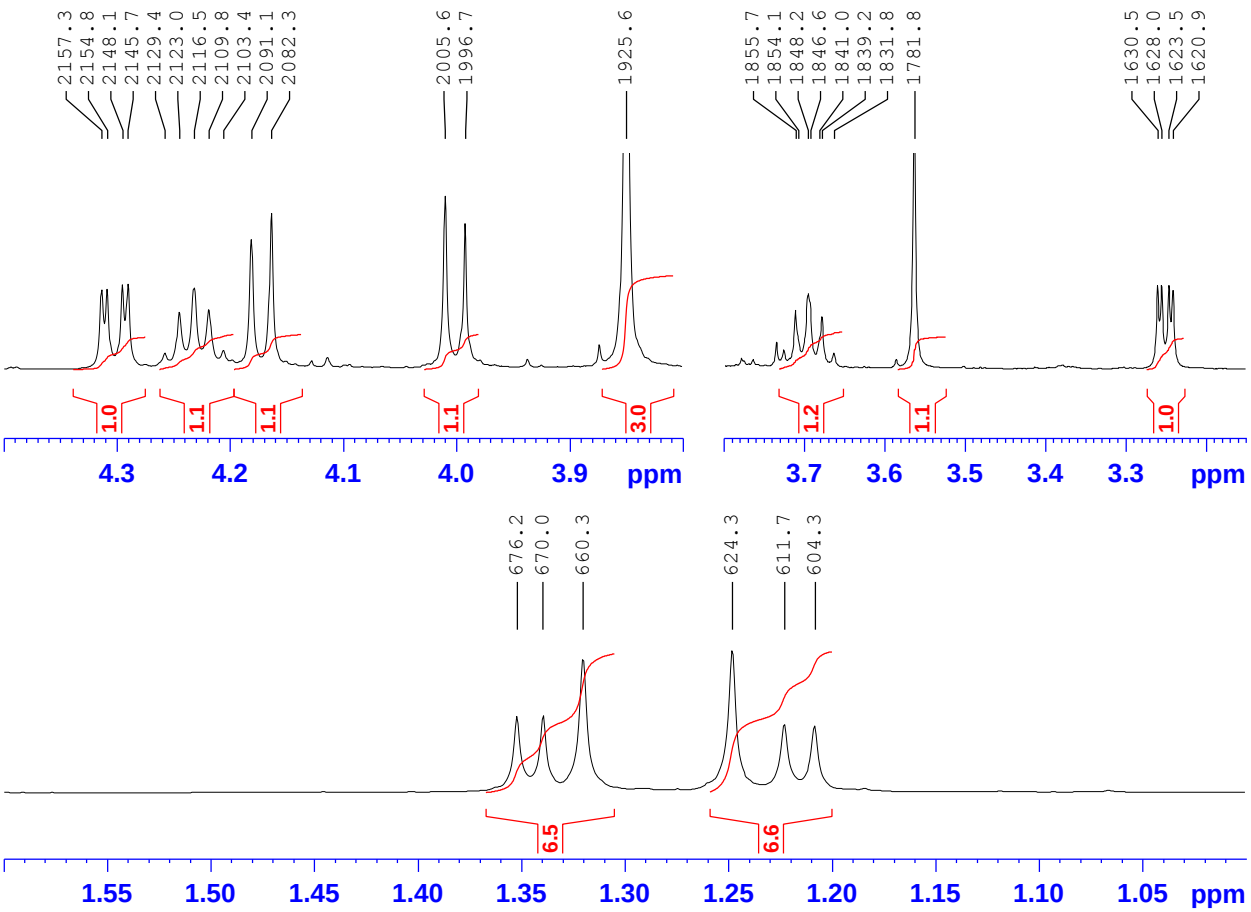

Figure S46. Expanded ^{1}H NMR spectrum of compound **11b** in $CDCl_3$, 500 MHz.

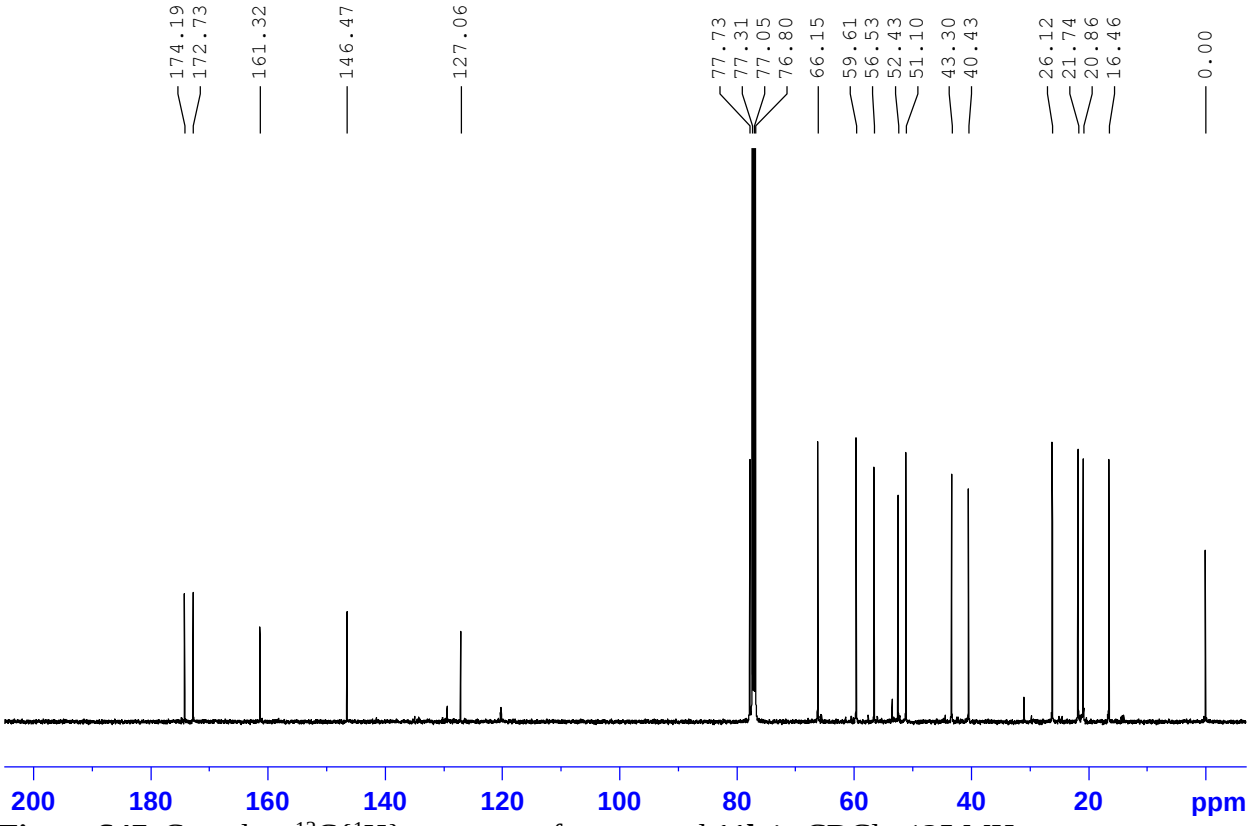

Figure S47. Complete $^{13}C\{^{1}H\}$ spectrum of compound **11b** in $CDCl_3$, 125 MHz.

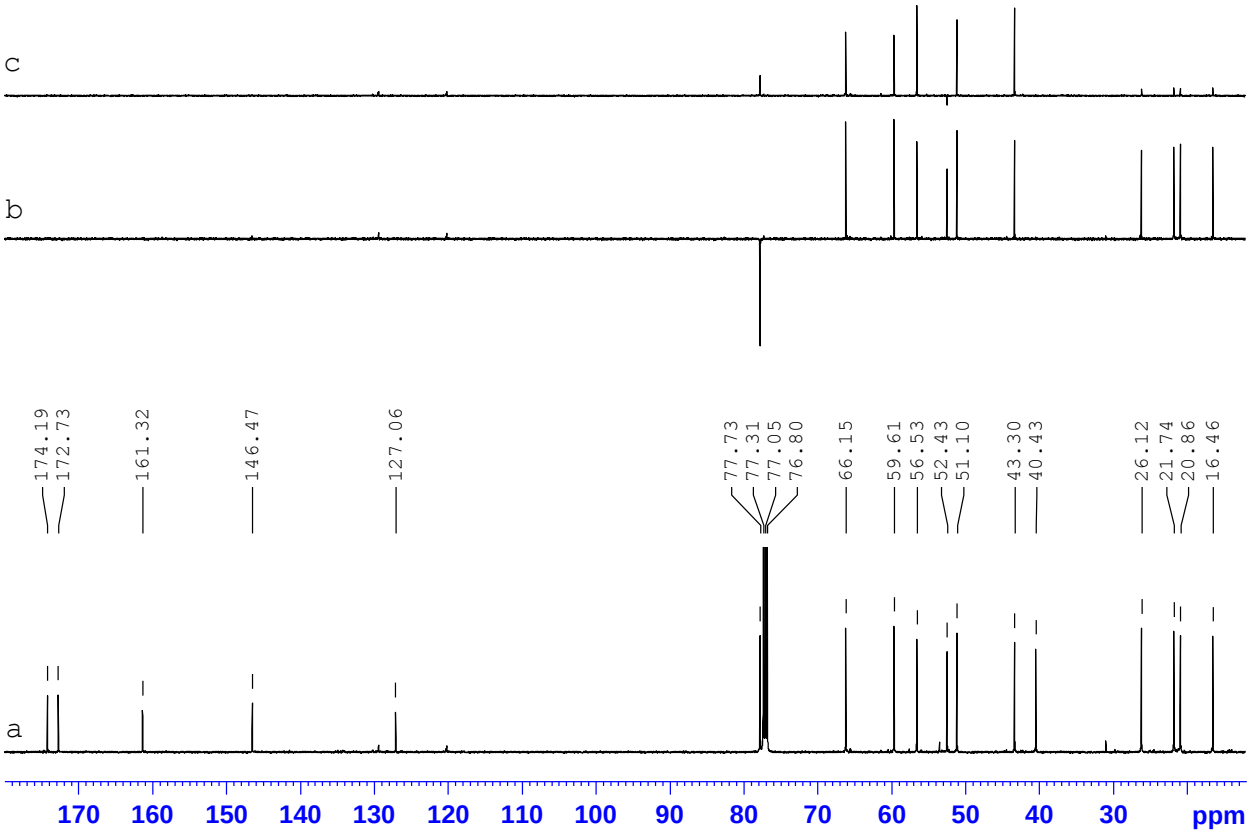

Figure S48. DEPT editing $^{13}C\{^{1}H\}$ NMR spectrum of compound **11b** in $CDCl_3$, 125 MHz: a) $^{13}C\{^{1}H\}$ spectrum; b) DEPT-135; c) DEPT-90.

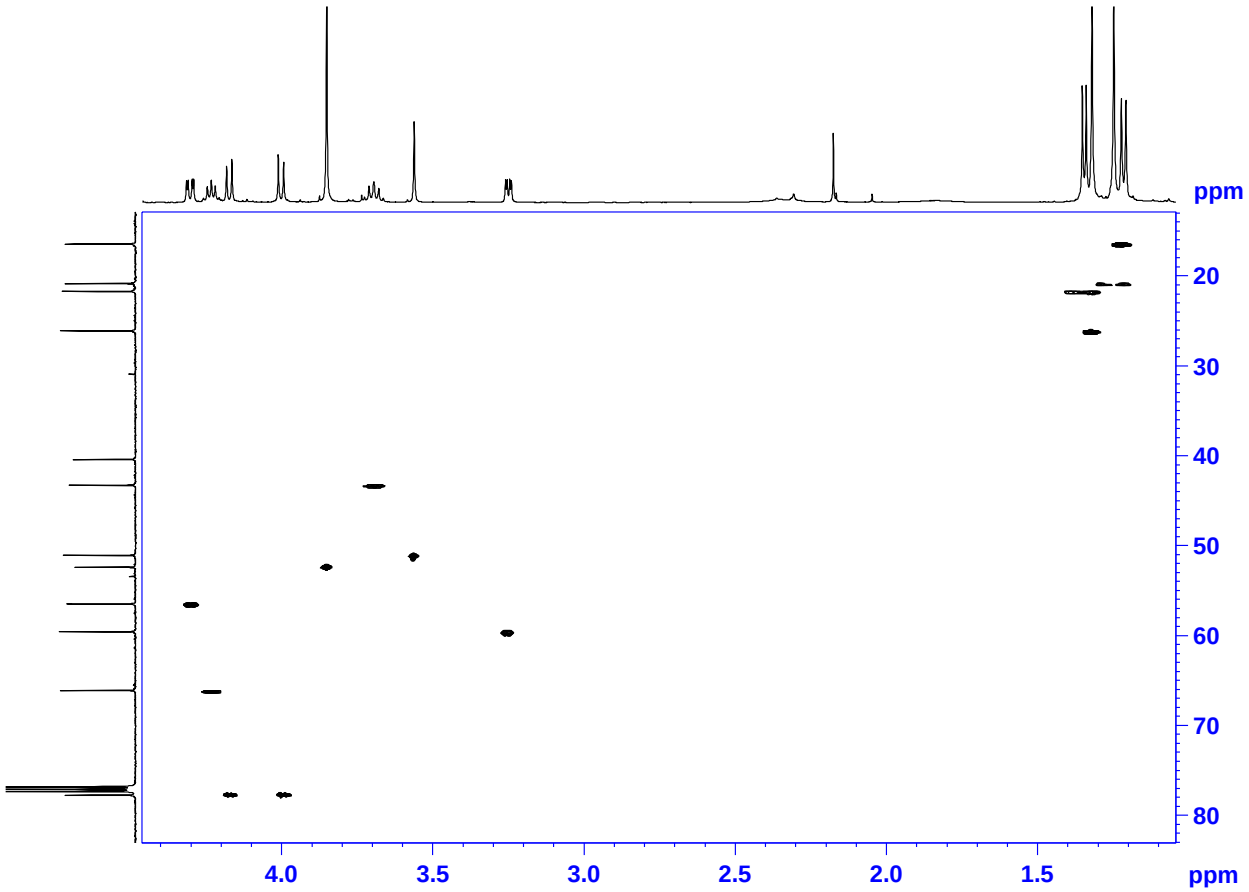

Figure S49. {^{1}H, ^{13}C} HSQC NMR spectrum of compound **11b** in $CDCl_3$, 500 MHz.

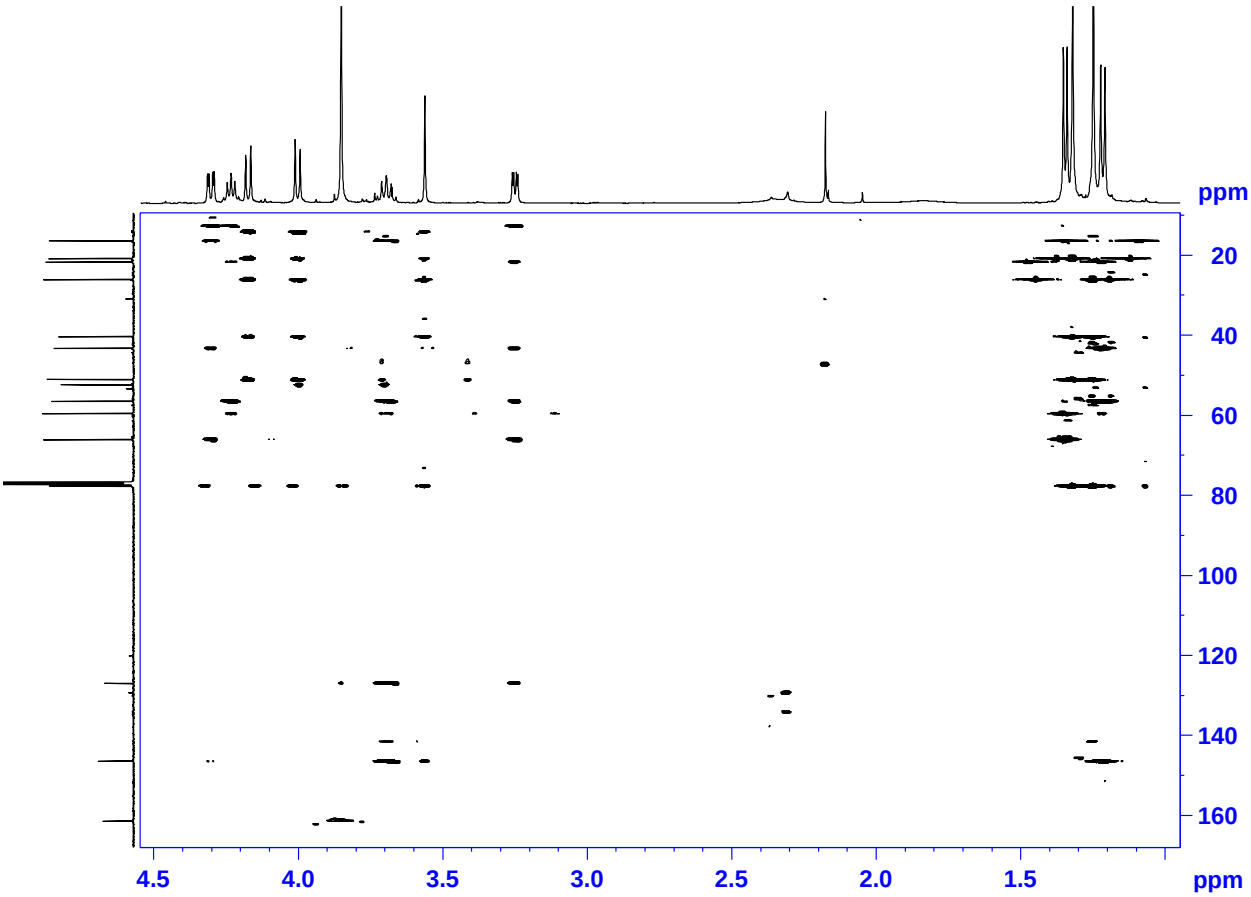

Figure S50. {^{1}H, ^{13}C} HMBC NMR spectrum of compound **11b** in $CDCl_3$, 500 MHz.

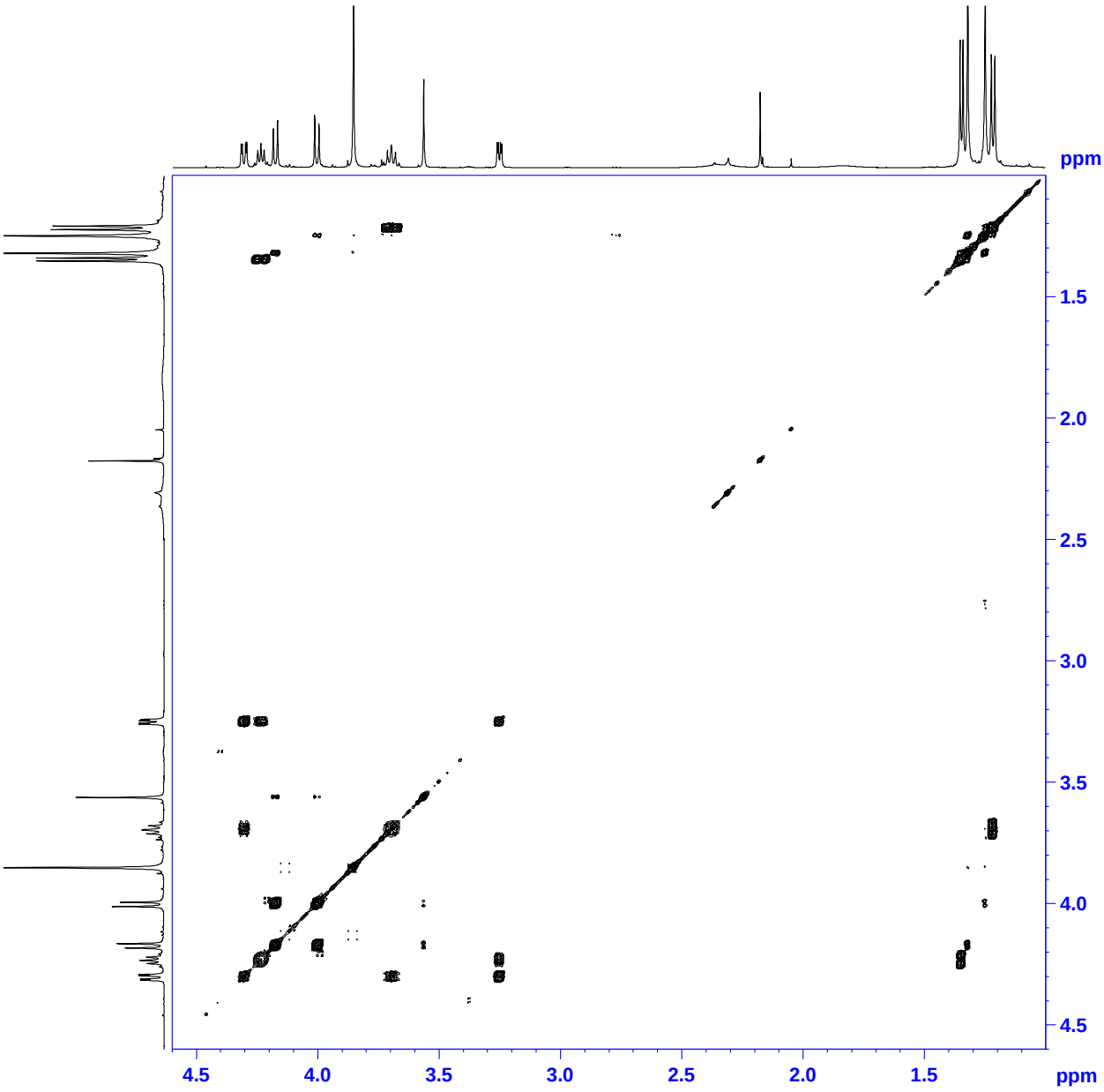

Figure S51. {^{1}H, ^{1}H} COSY NMR spectrum of compound **11b** in $CDCl_3$, 500 MHz.

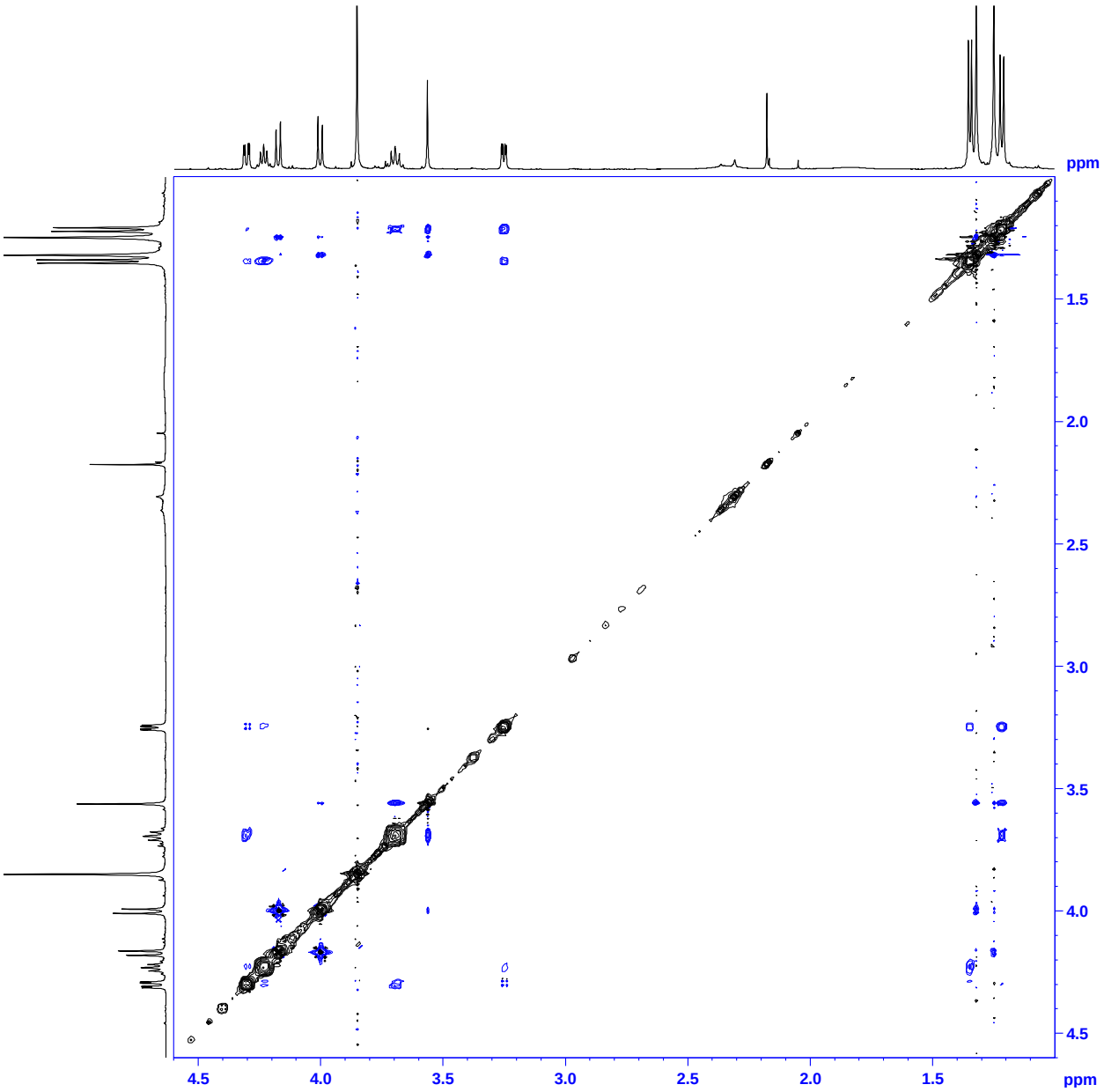

Figure S52. {^{1}H, ^{1}H} NOESY NMR spectrum of compound **11b** in $CDCl_3$, 500 MHz.

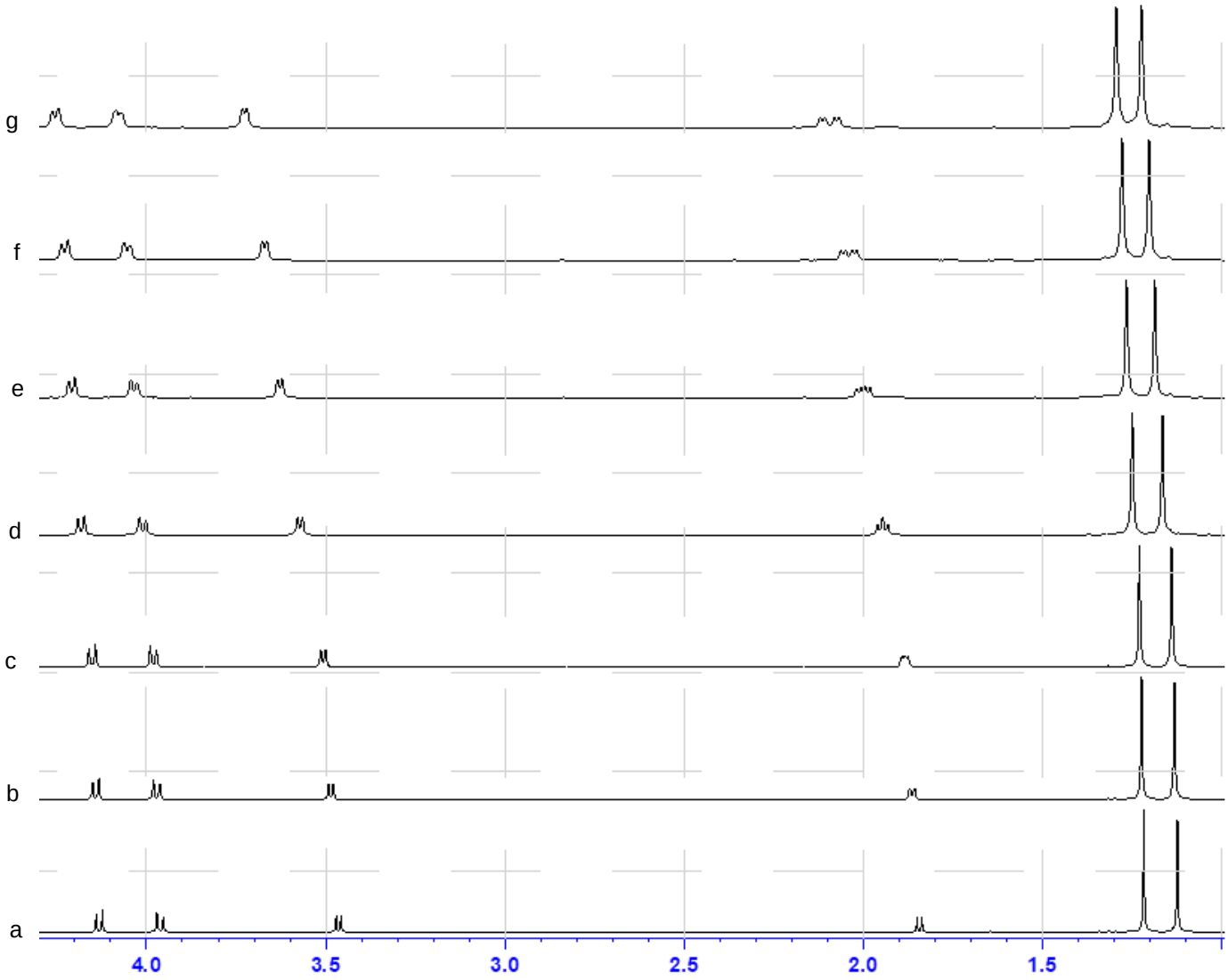

Figure S53. Spectrum (±)-**3** (a) and spectra (±)-**3** after each addition of (-)-Eu $(hfc)_3$ (b-g).

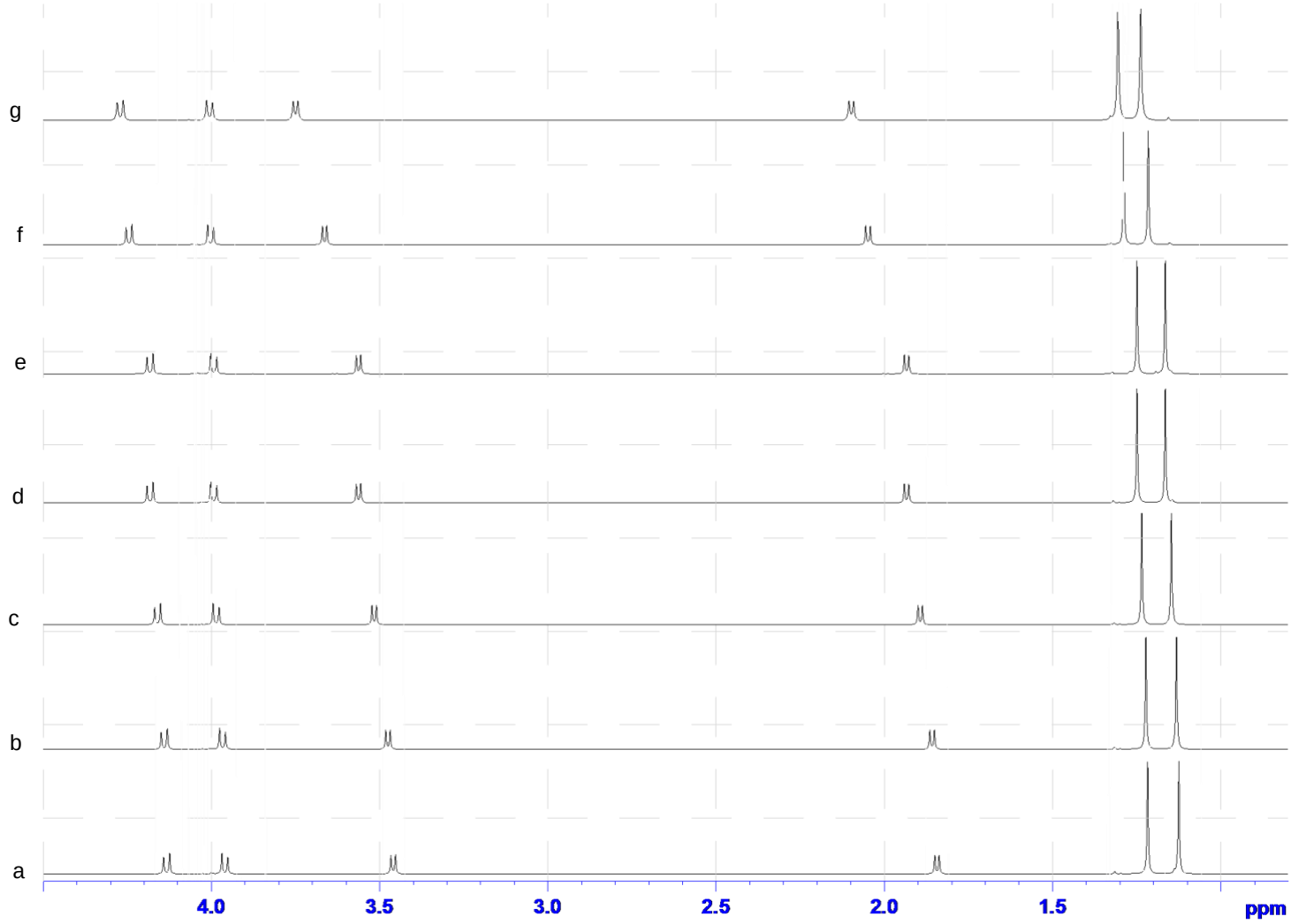

Figure S54. Spectrum *S*-**3** (a) and spectra *S*-**3** after each addition of (-)-Eu (hfc)$_3$ (b-g).

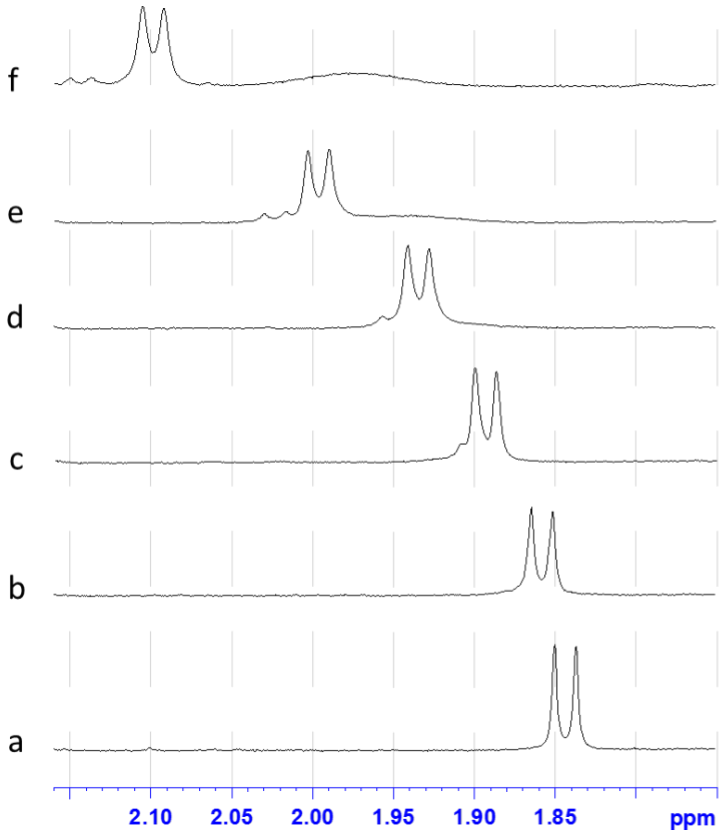

Figure S55. SH signal in the spectrum of *S*-**3** (a) and spectra of *S*-**3** after each addition of (-)-Eu (hfc)$_3$ (b-f).

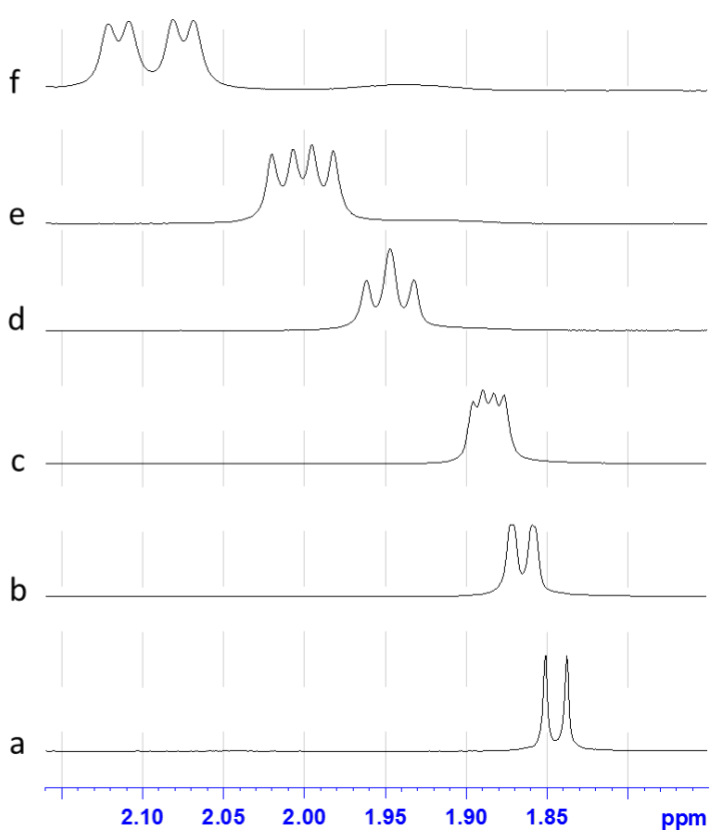

Figure S56. SH signal in the spectrum of (±)-**3** (a) and spectra of (±)-**3** after each addition of (-)-Eu (hfc)$_3$ (b-f).

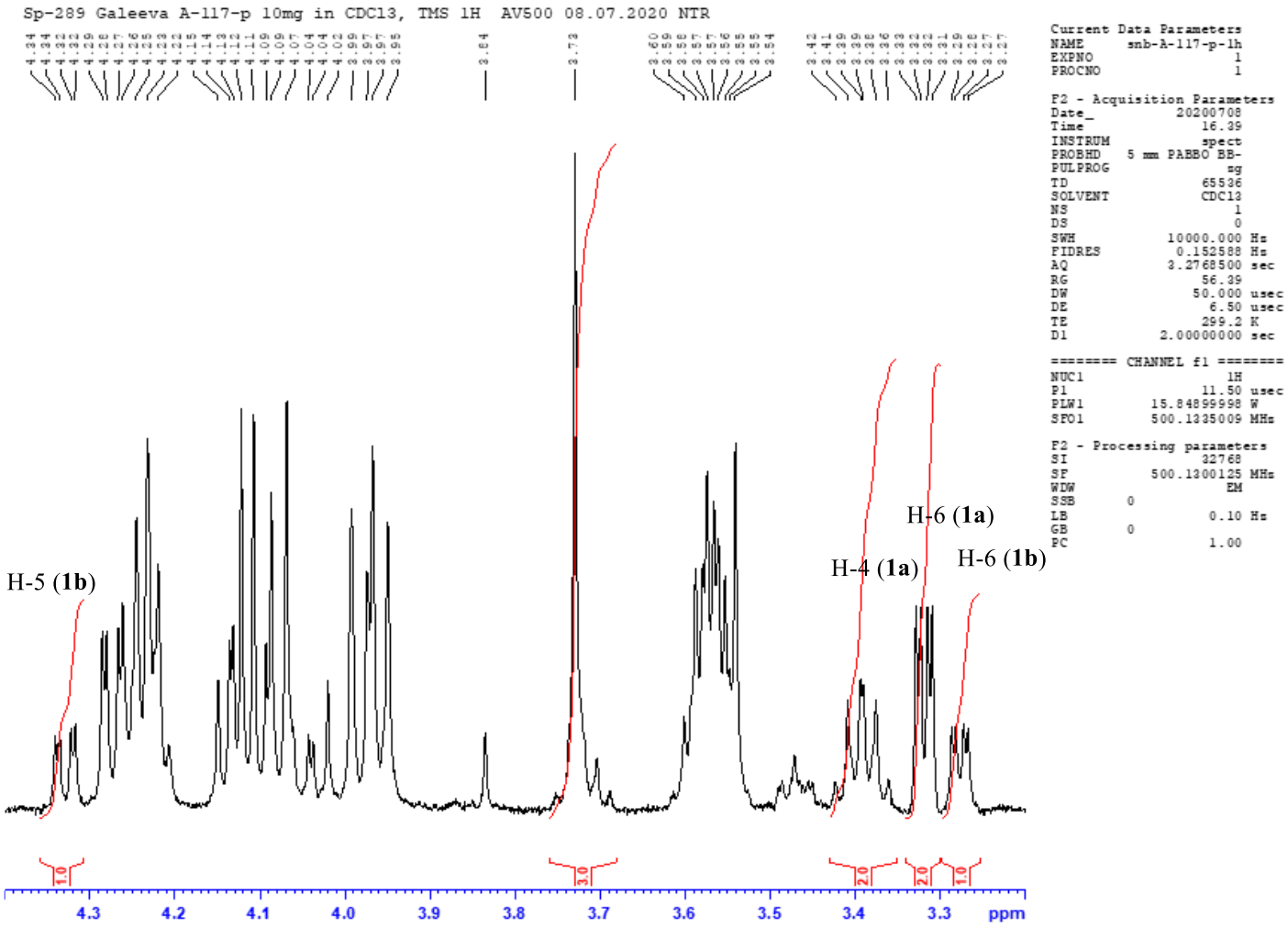

Figure S57. Part of ^{1}H NMR spectrum of reaction mixture after reaction **2** and **3**, before column chromatography (**1a**:**1b** = 2:1, by integrated intensity of signals H-6)

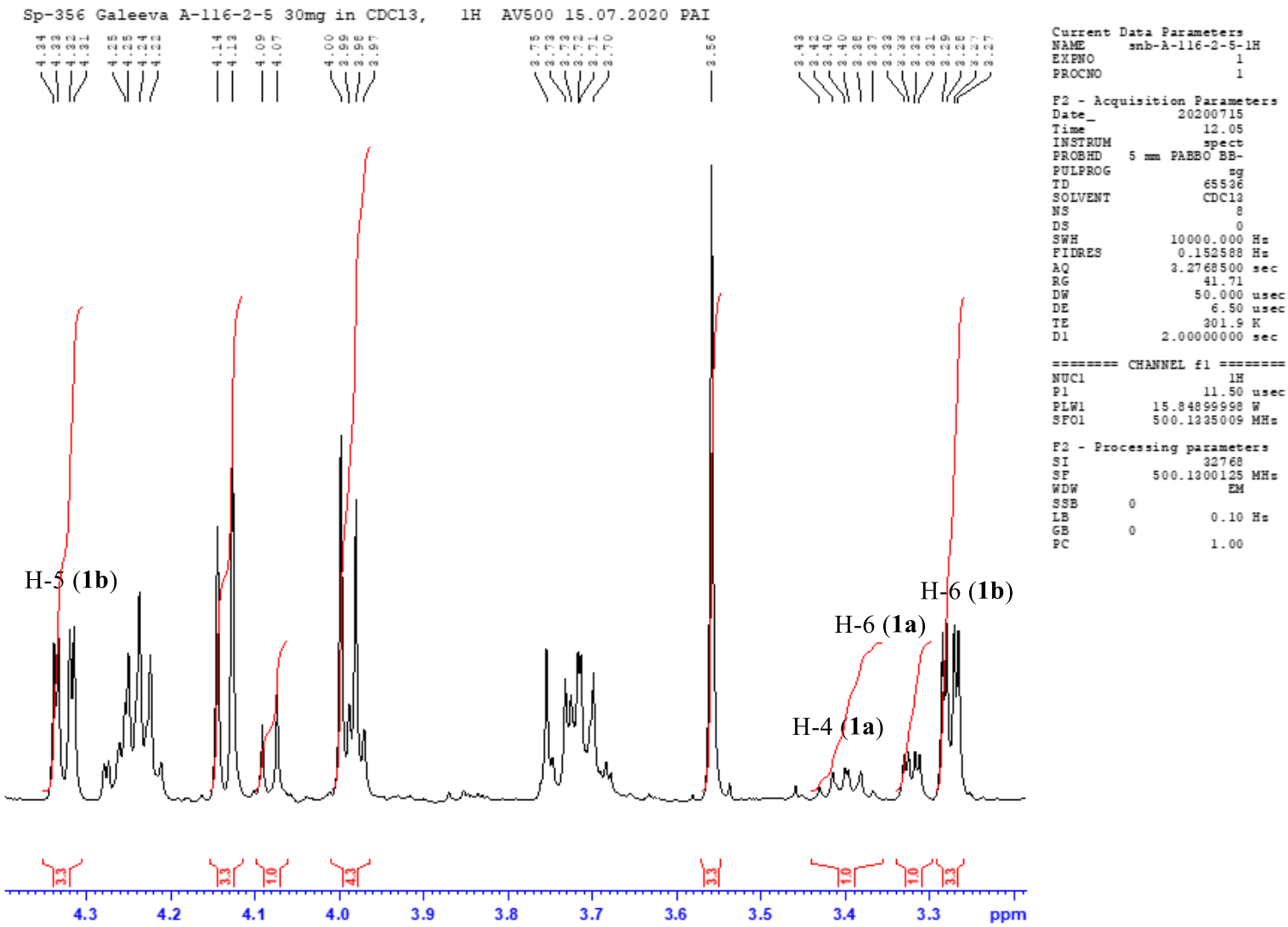

Figure S58. Part of ^{1}H NMR spectrum of mixture **1a**, **1b** after column chromatography on SiO_2 with $CHCl_3$-MeOH-Et_3N (**1a**:**1b** = 1:3.3).

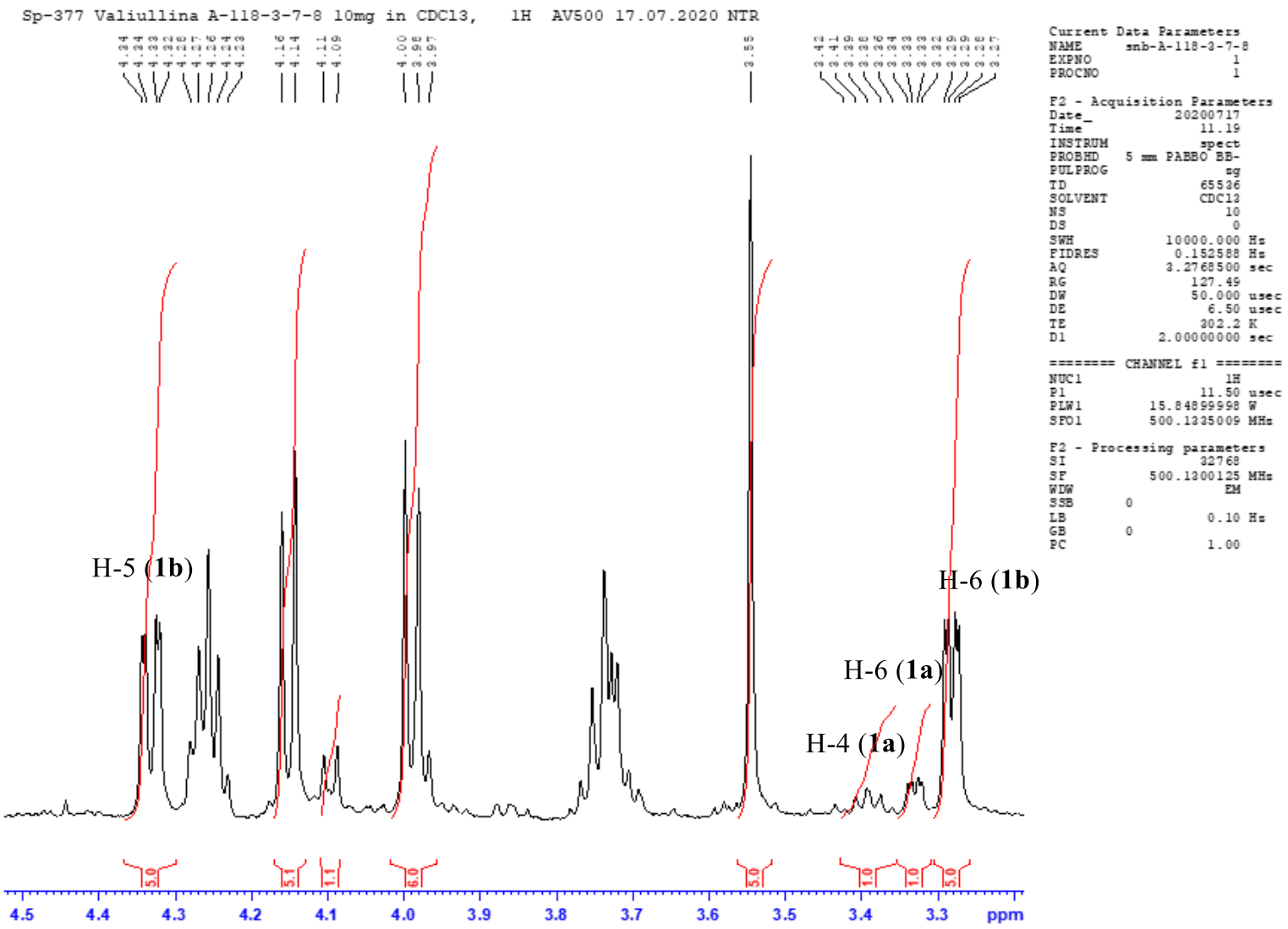

Figure S59. Part of ^{1}H NMR spectrum of mixture **1a**, **1b** after column chromatography **1a** on SiO_2 with $CHCl_3$-MeOH-Et_3N (**1a**:**1b** = 1:5).