

Synthesis of *N*-substituted quaternary carbon centers through *KOt*-Bu-catalyzed aza-Michael addition of pyrazoles to cyclic enones

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Supplementary Information

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■ Copies of ^1H and ^{13}C NMR spectra for all products

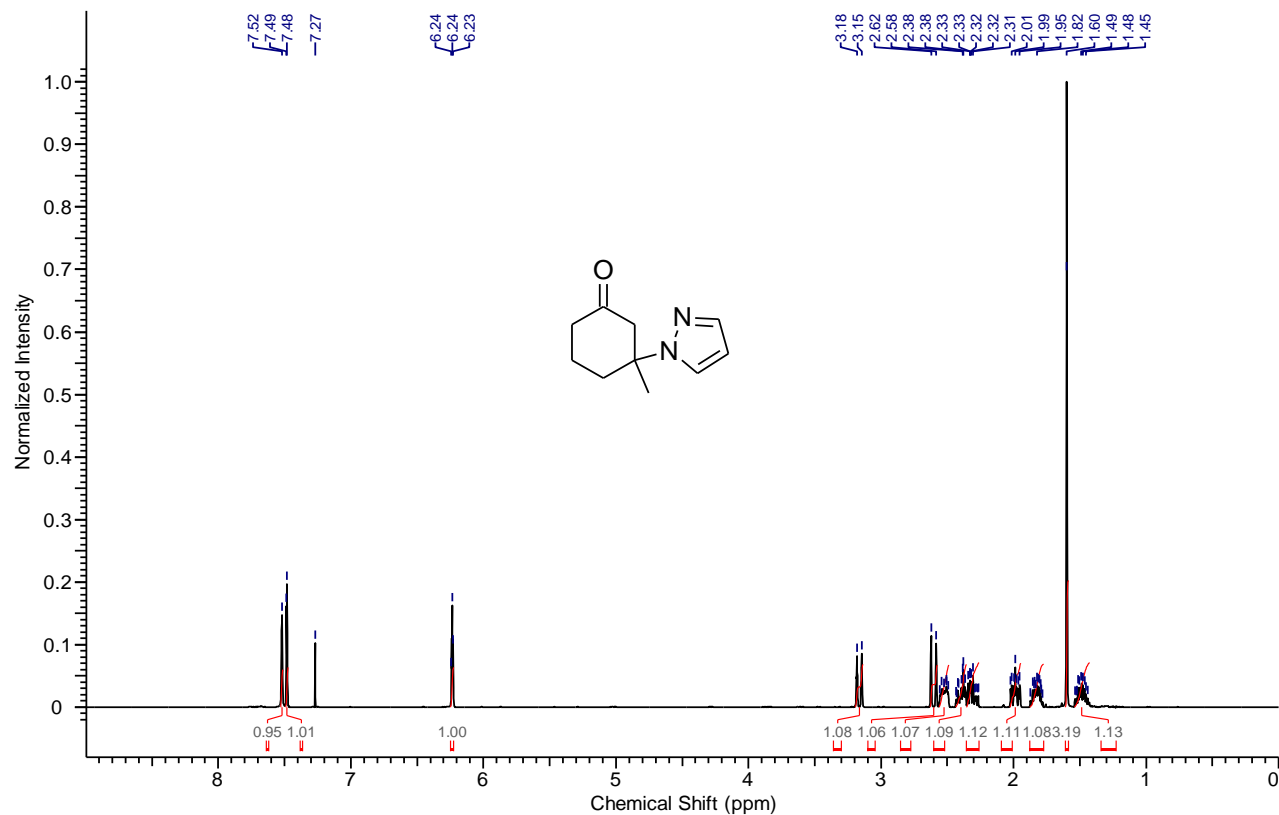


Figure S1. ^1H NMR spectrum of the compound 3aa in CDCl_3 , 400 MHz

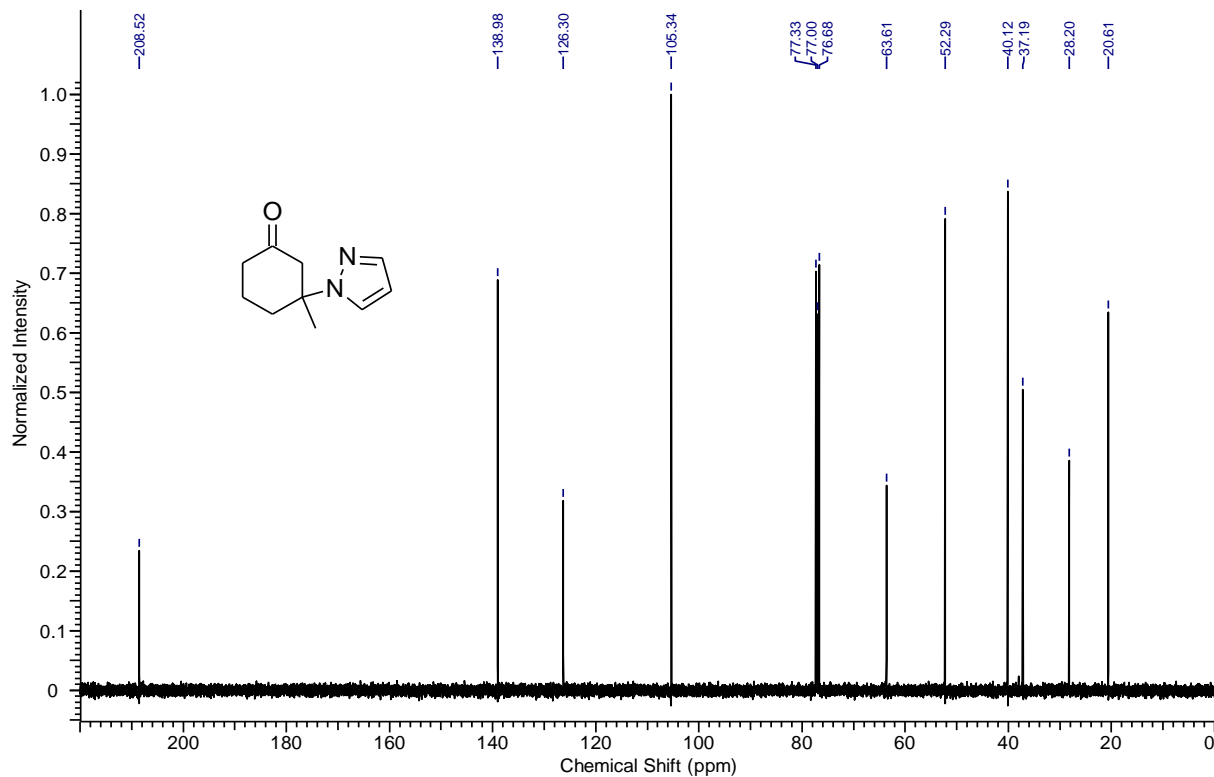


Figure S2. ^{13}C NMR spectrum of the compound 3aa in CDCl_3 , 100 MHz

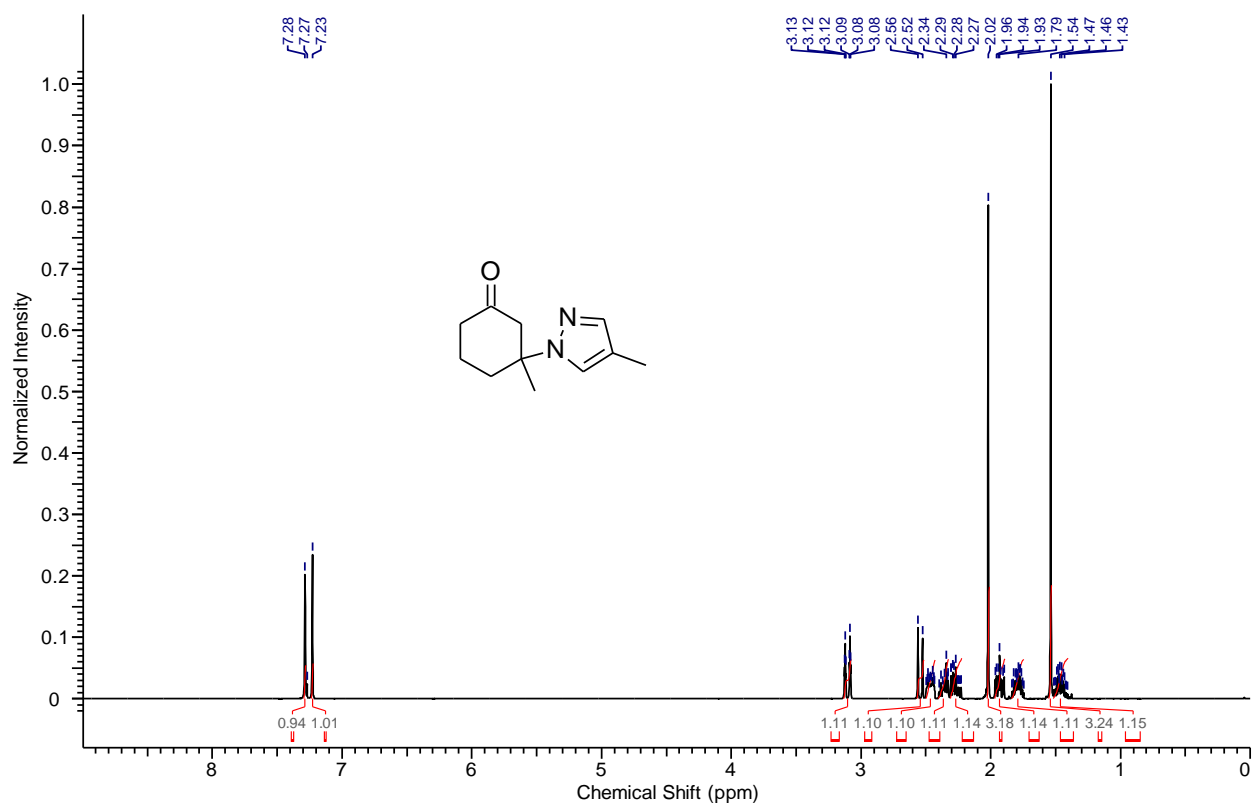


Figure S3. ^1H NMR spectrum of the compound **3ab** in CDCl_3 , 400 MHz

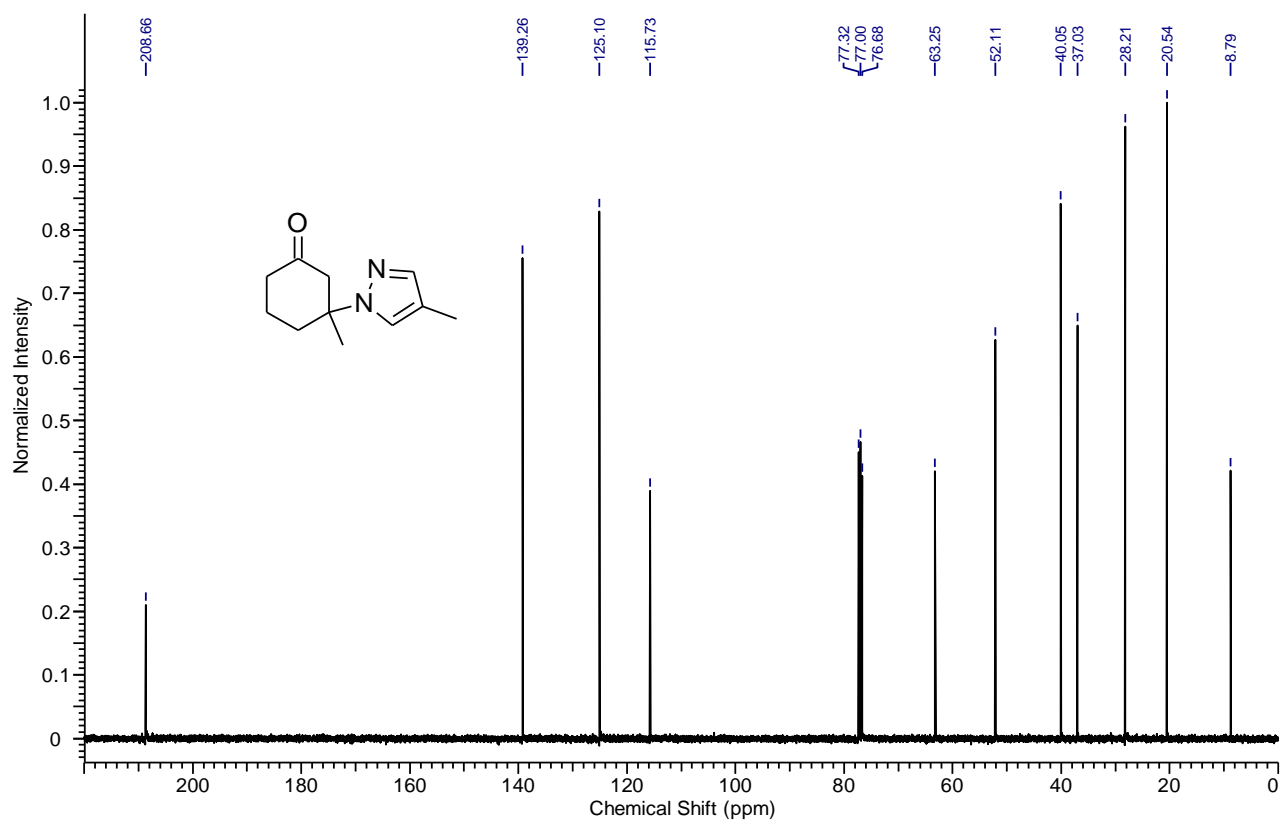


Figure S4. ^{13}C NMR spectrum of the compound **3ab** in CDCl_3 , 100 MHz

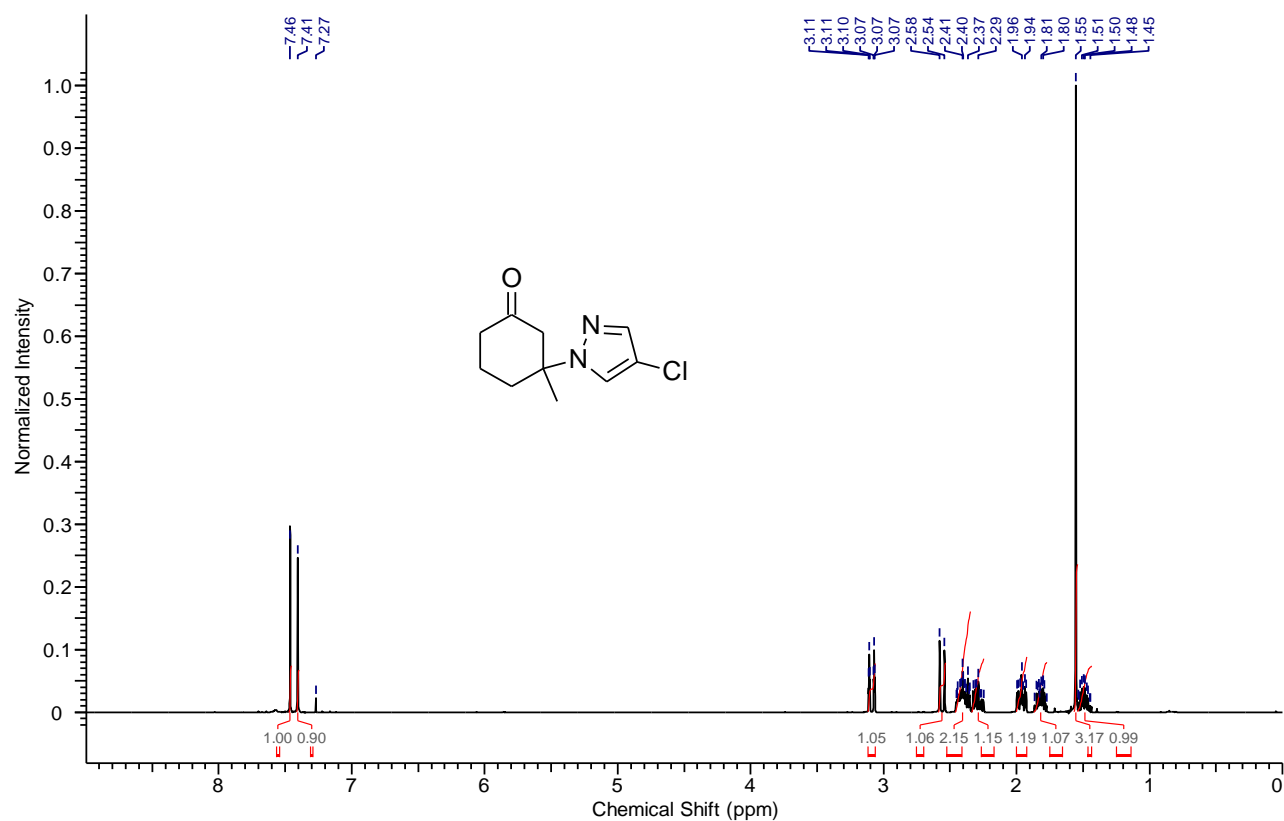


Figure S5. ¹H NMR spectrum of the compound **3ac** in CDCl₃, 400 MHz

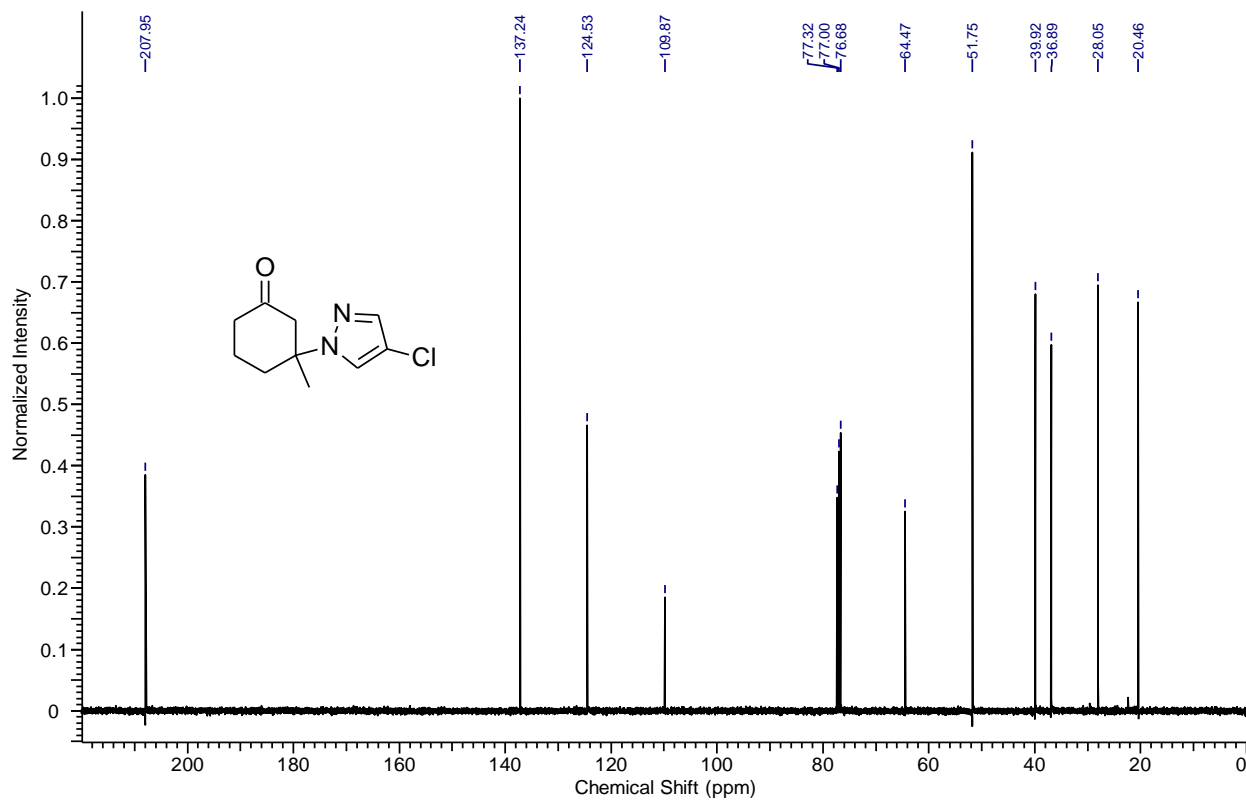


Figure S6. ¹³C NMR spectrum of the compound **3ac** in CDCl₃, 100 MHz

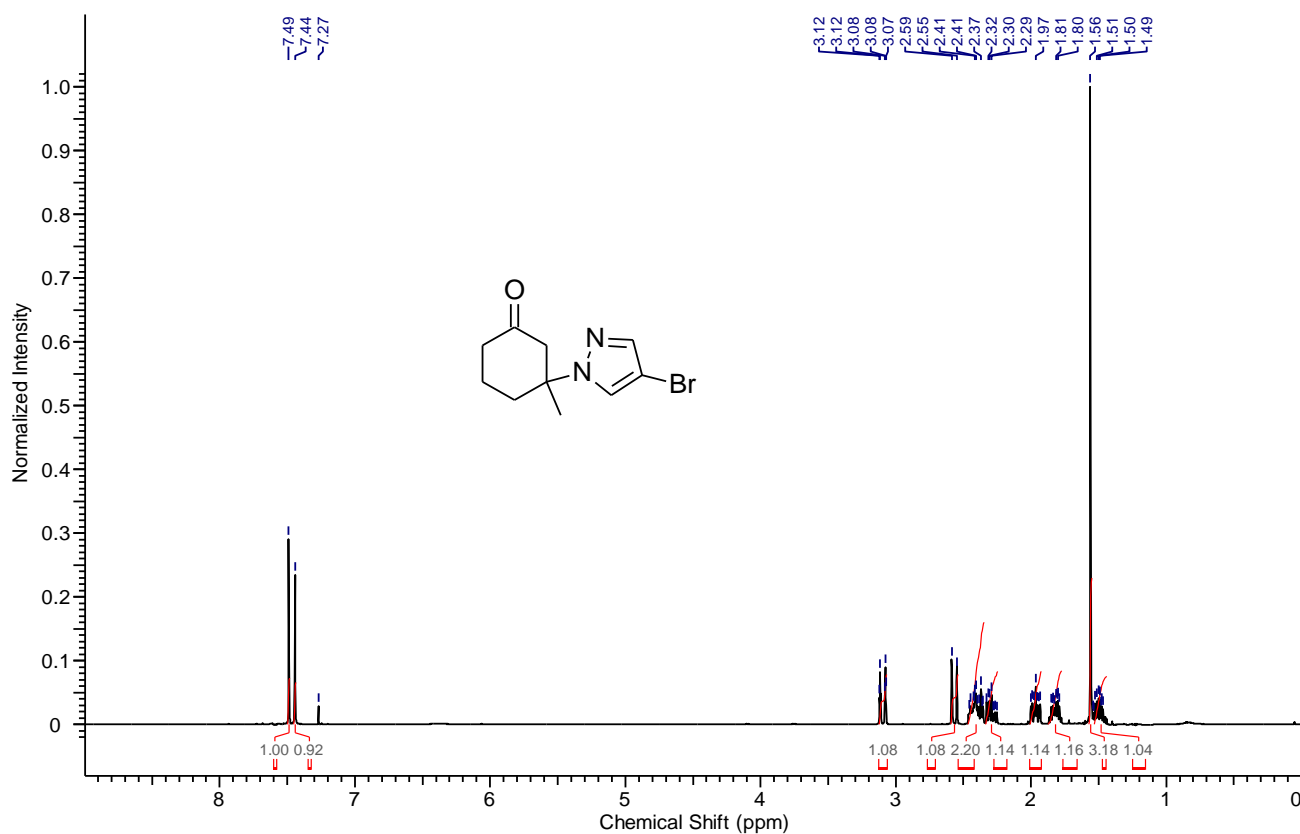


Figure S7. ^1H NMR spectrum of the compound **3ad** in CDCl_3 , 400 MHz

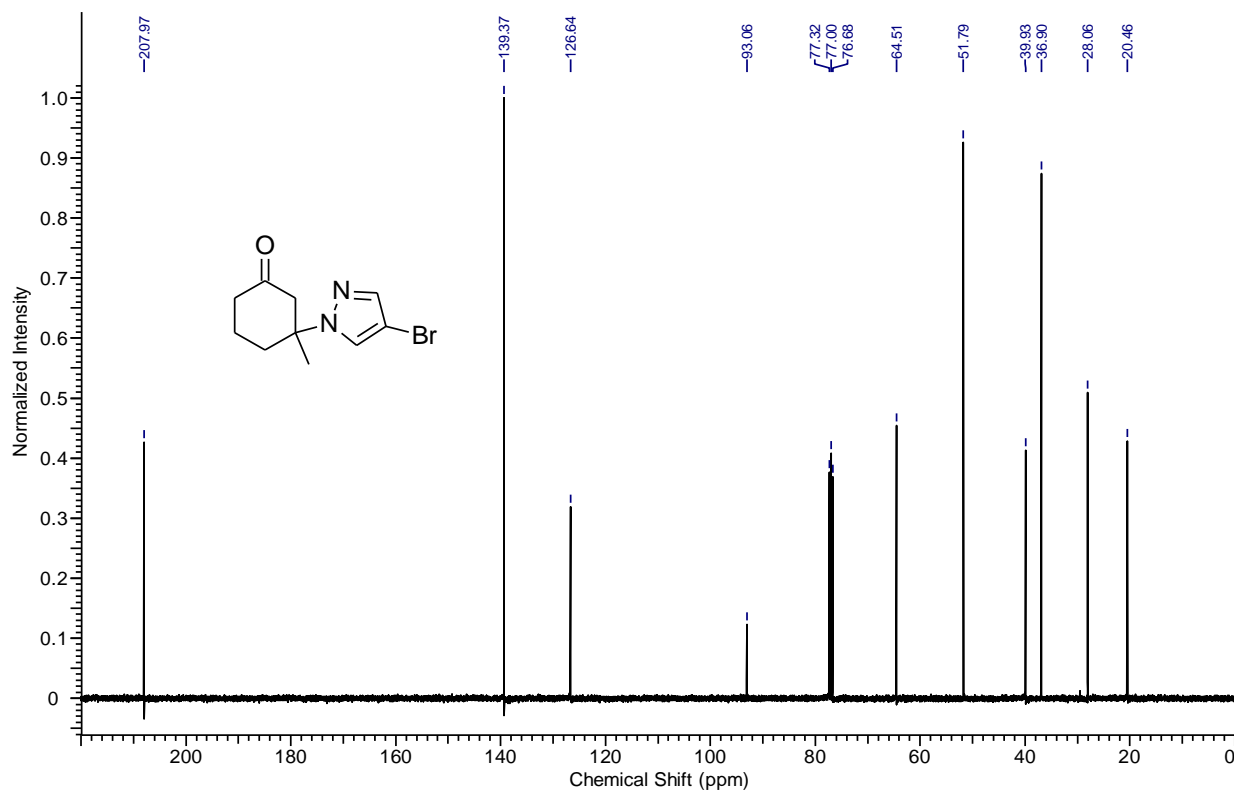


Figure S8. ^{13}C NMR spectrum of the compound **3ad** in CDCl_3 , 100 MHz

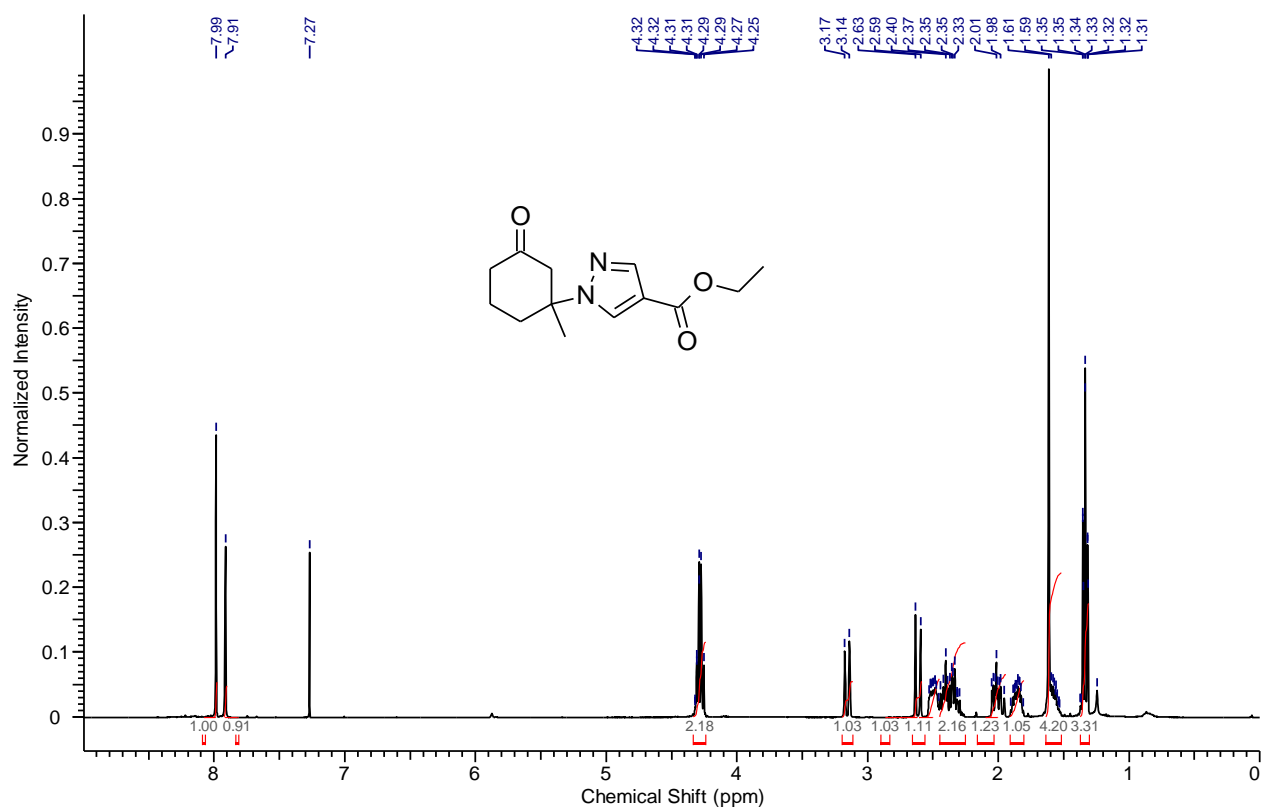


Figure S9. ^1H NMR spectrum of the compound **3ae** in CDCl_3 , 400 MHz

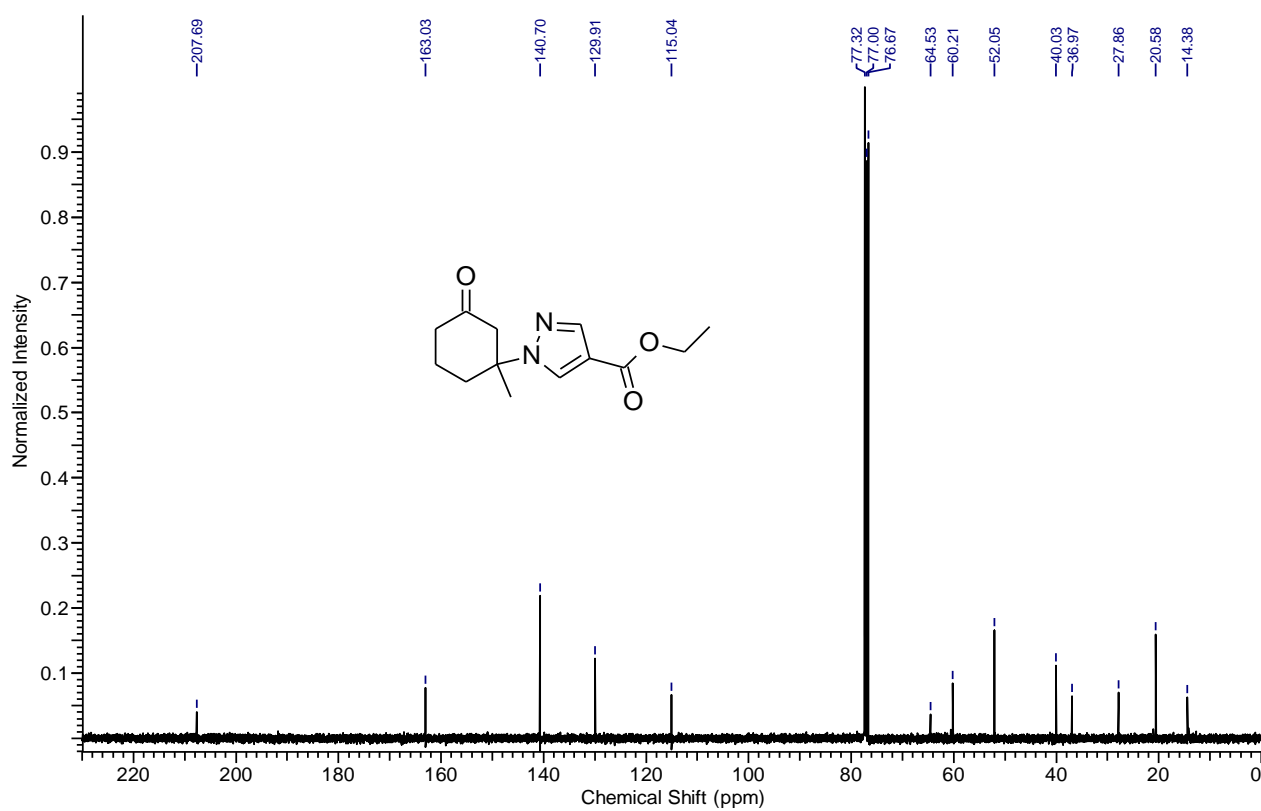


Figure S10. ^{13}C NMR spectrum of the compound **3ae** in CDCl_3 , 100 MHz

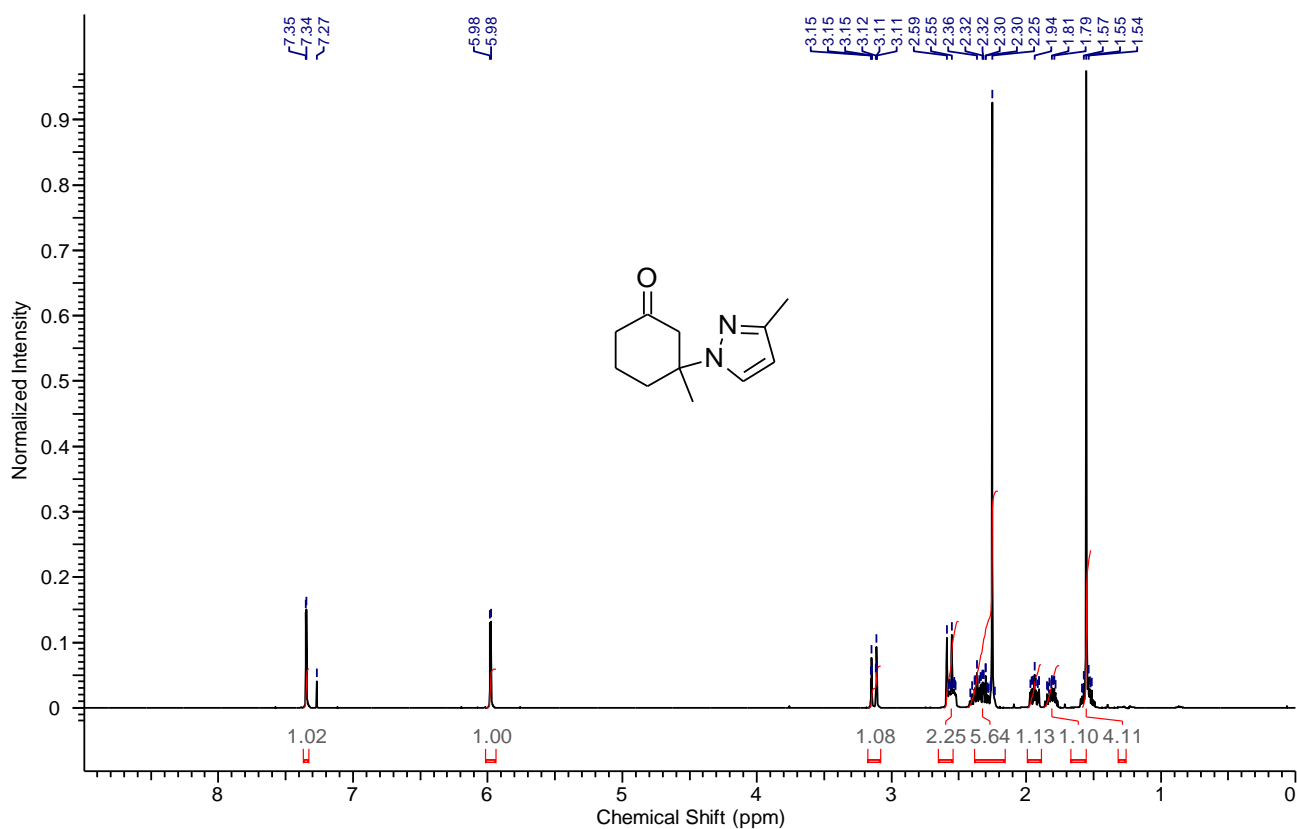


Figure S11. ^1H NMR spectrum of the compound **3af** in CDCl_3 , 400 MHz

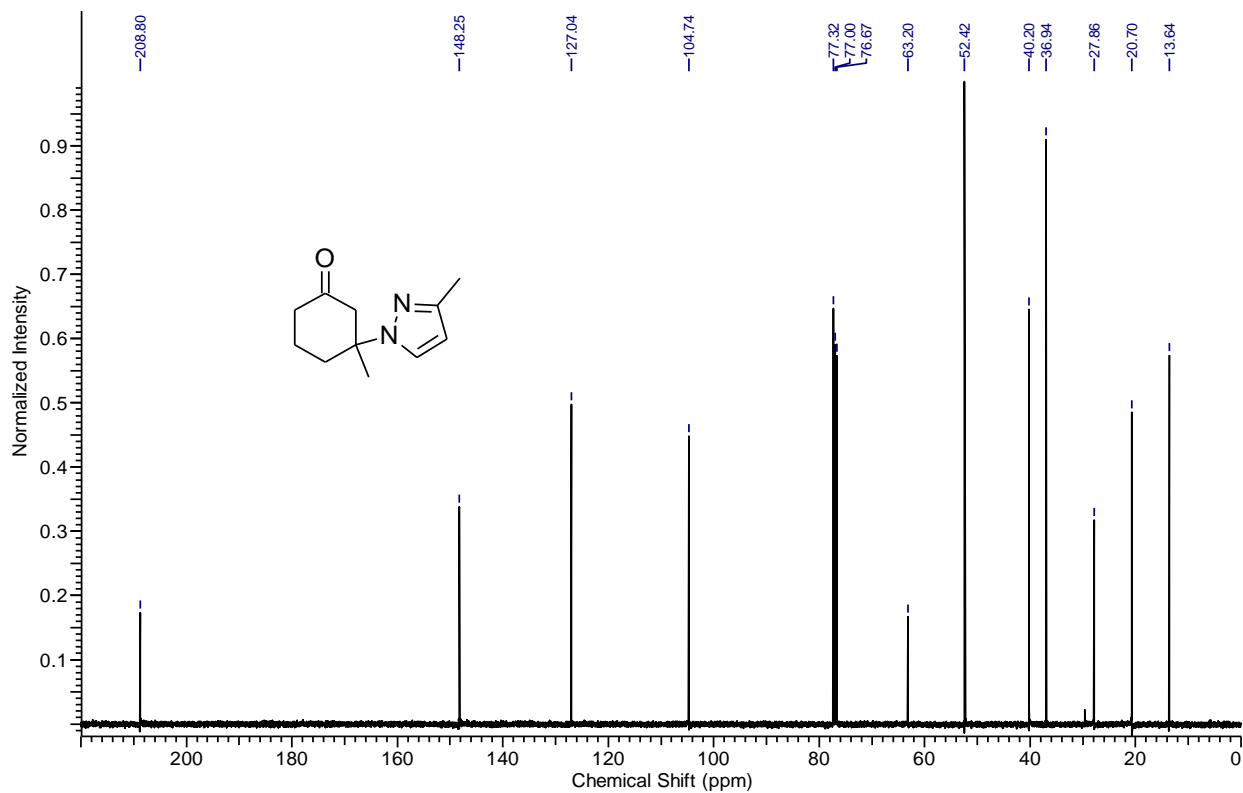


Figure S12. ^{13}C NMR spectrum of the compound **3af** in CDCl_3 , 100 MHz

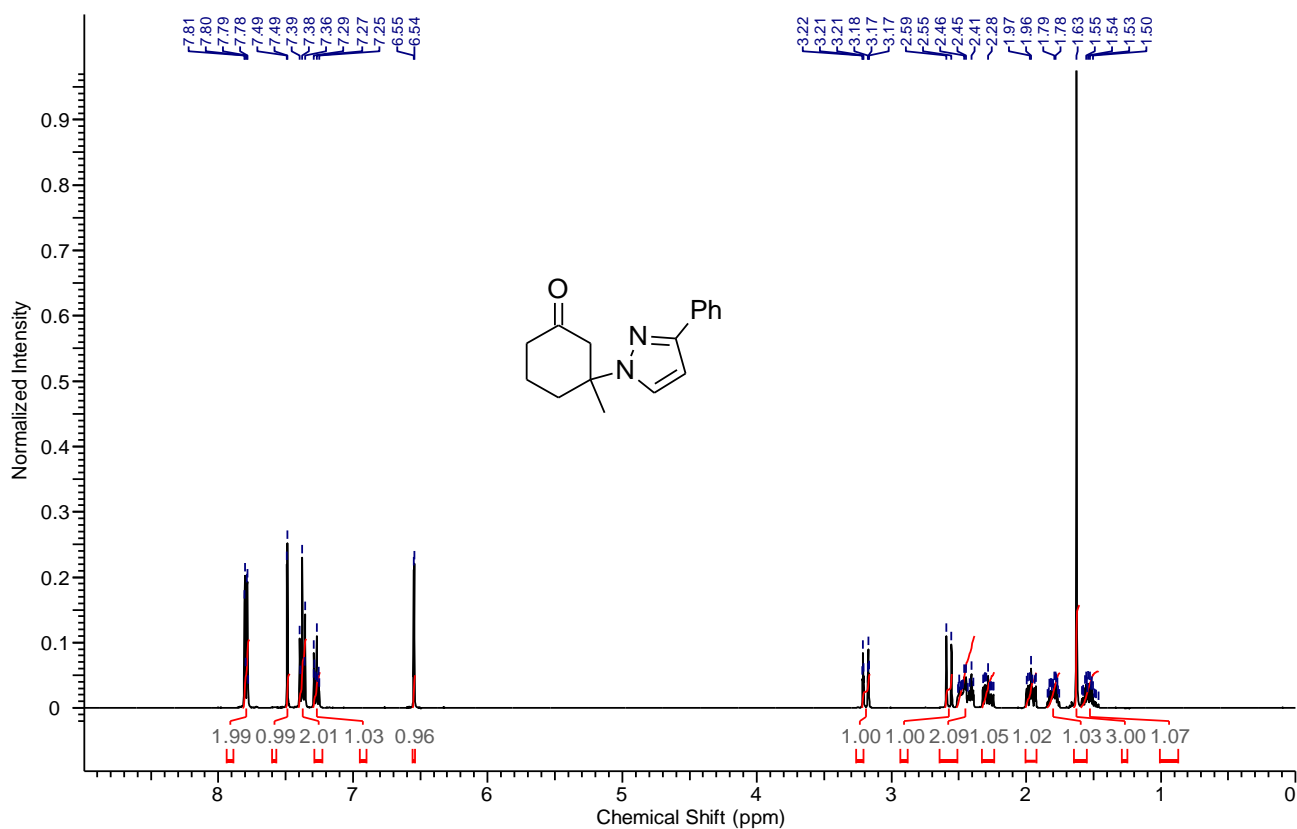


Figure S13. ¹H NMR spectrum of the compound **3ah** in CDCl₃, 400 MHz

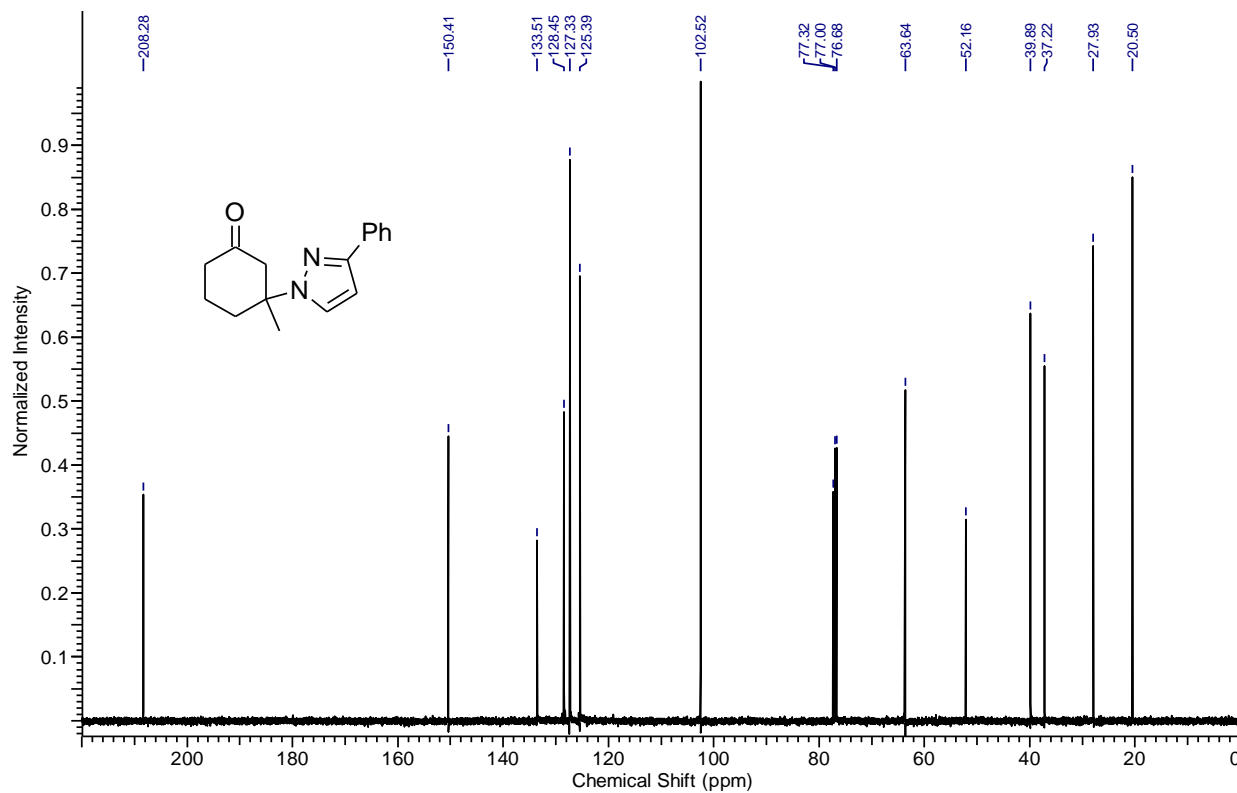


Figure S14. ¹³C NMR spectrum of the compound **3ah** in CDCl₃, 100 MHz

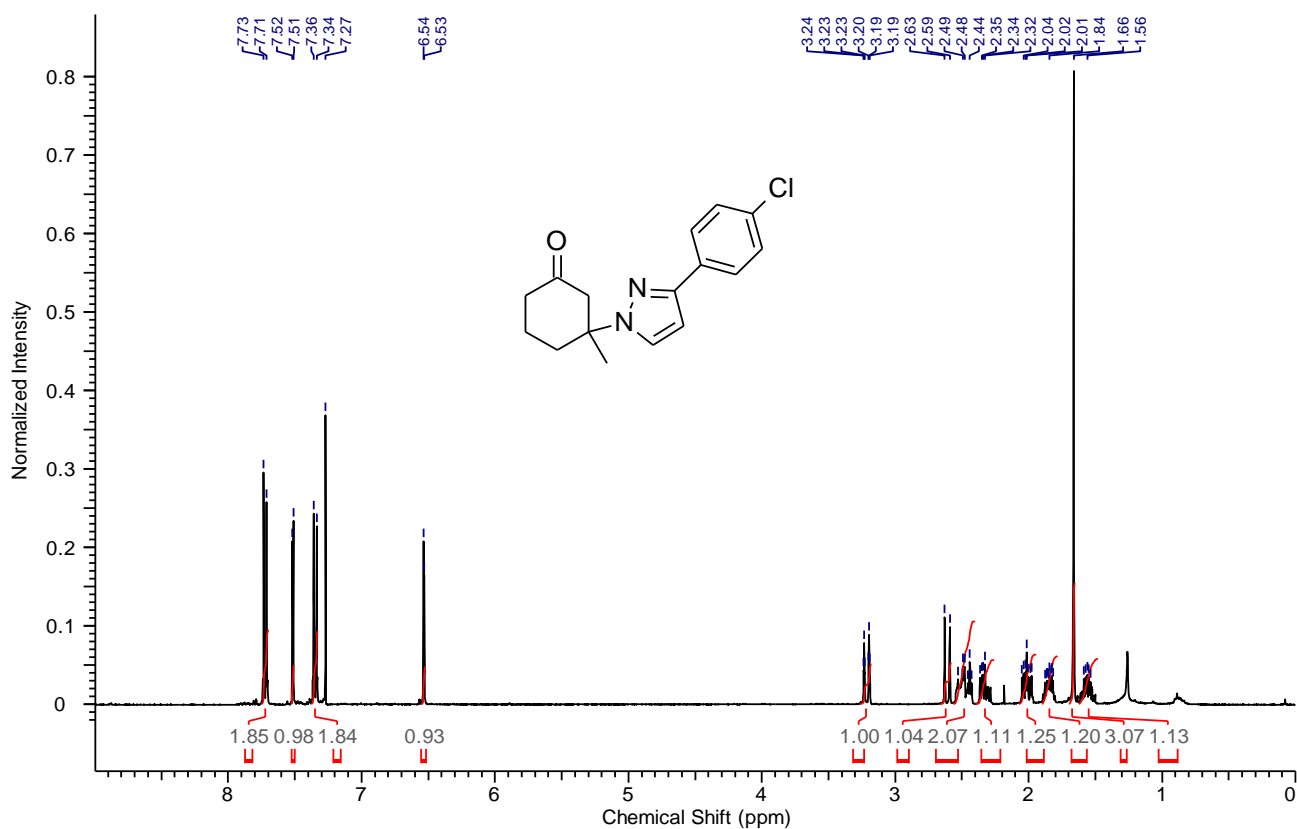


Figure S15. ^1H NMR spectrum of the compound **3ai** in CDCl_3 , 400 MHz

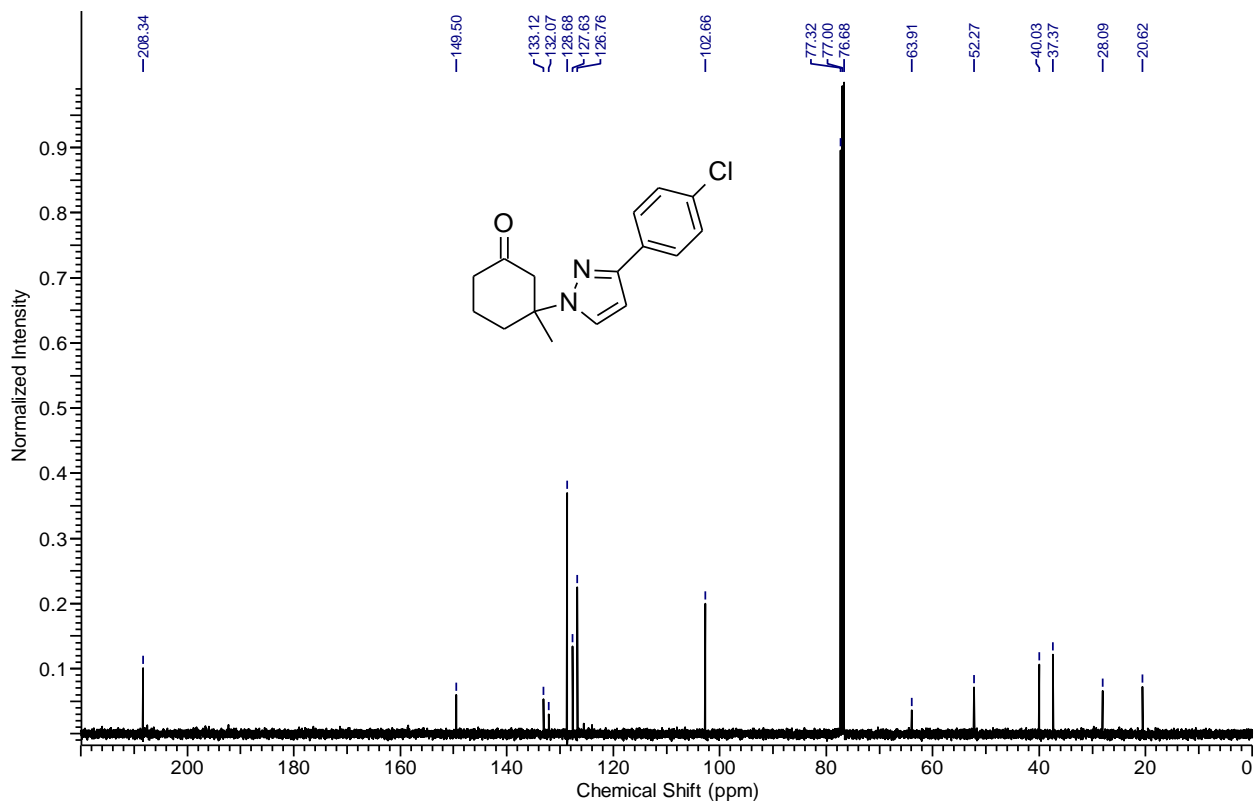


Figure S16. ^{13}C NMR spectrum of the compound **3ai** in CDCl_3 , 100 MHz

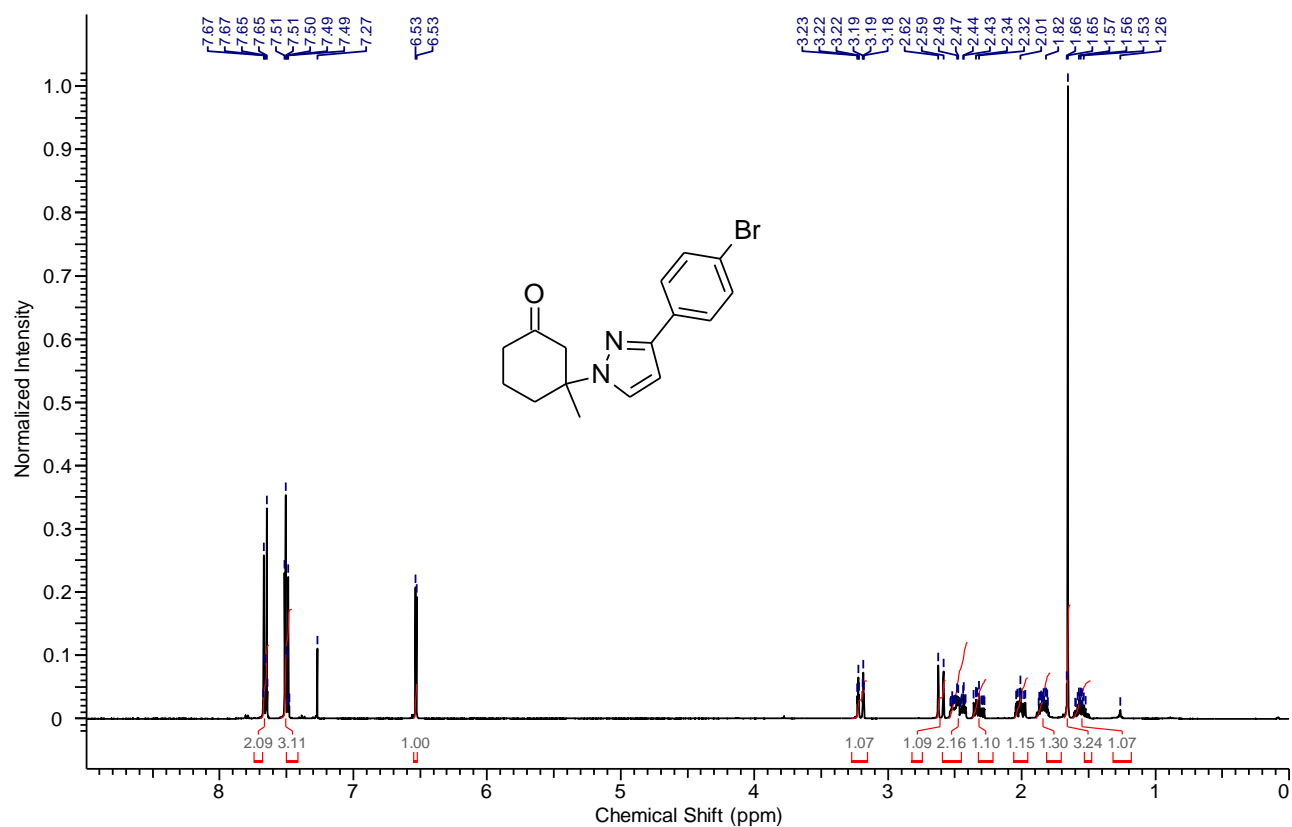


Figure S17. ¹H NMR spectrum of the compound **3aj** in CDCl₃, 400 MHz

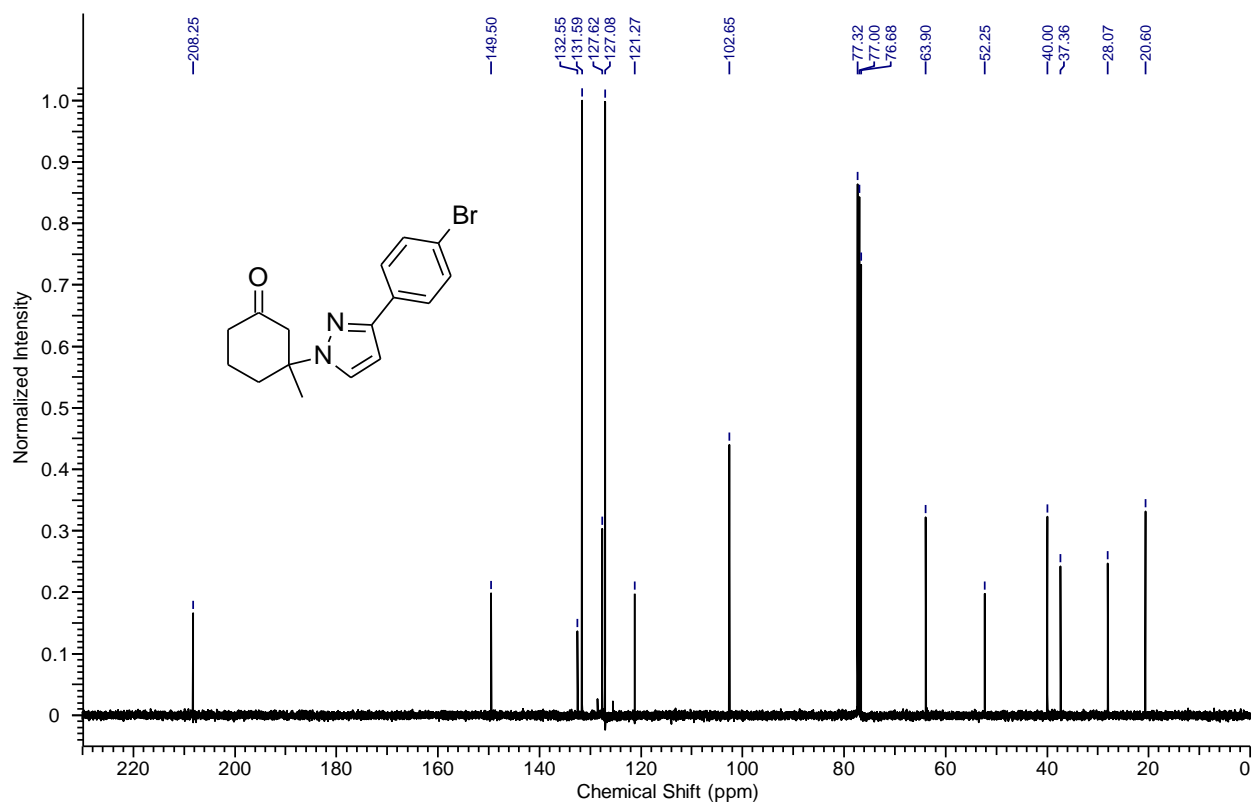


Figure S18. ¹³C NMR spectrum of the compound **3aj** in CDCl₃, 100 MHz

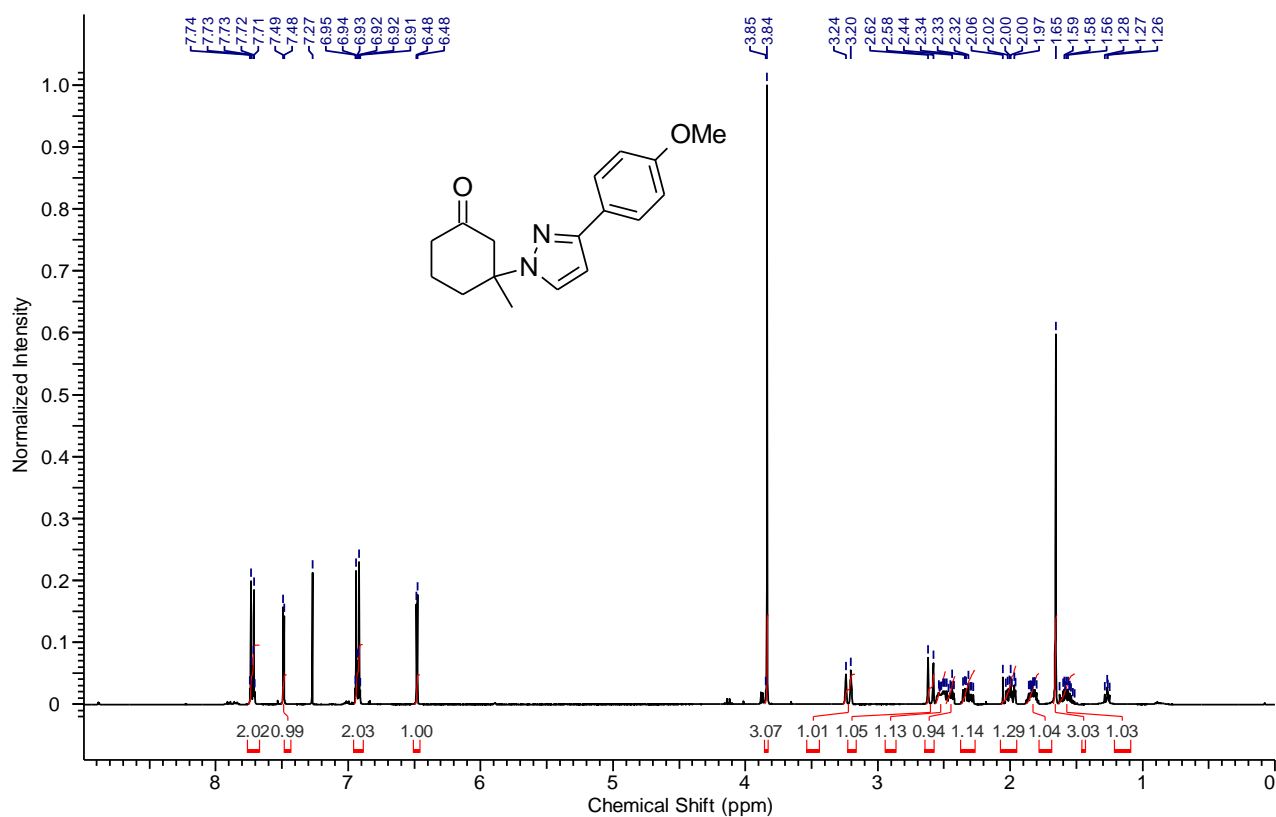


Figure S19. ^1H NMR spectrum of the compound **3ak** in CDCl_3 , 400 MHz

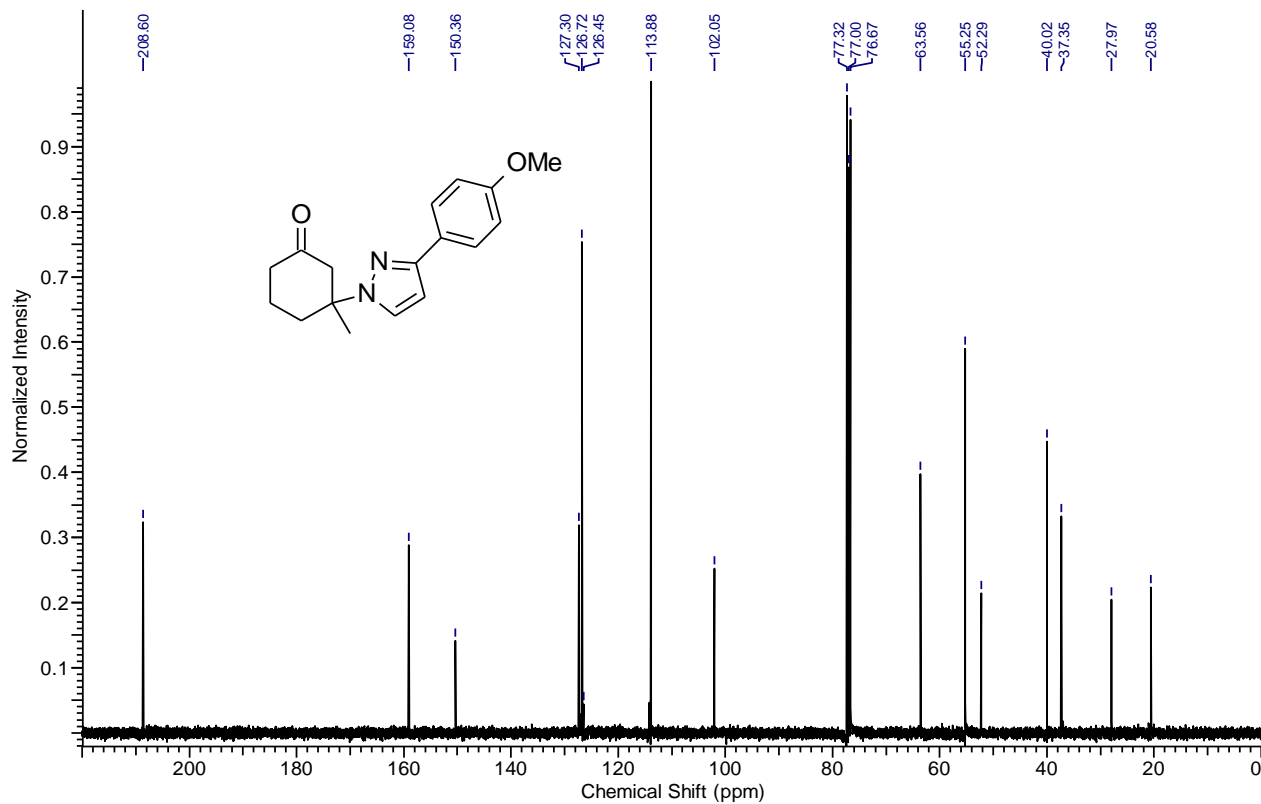


Figure S20. ^{13}C NMR spectrum of the compound **3ak** in CDCl_3 , 100 MHz

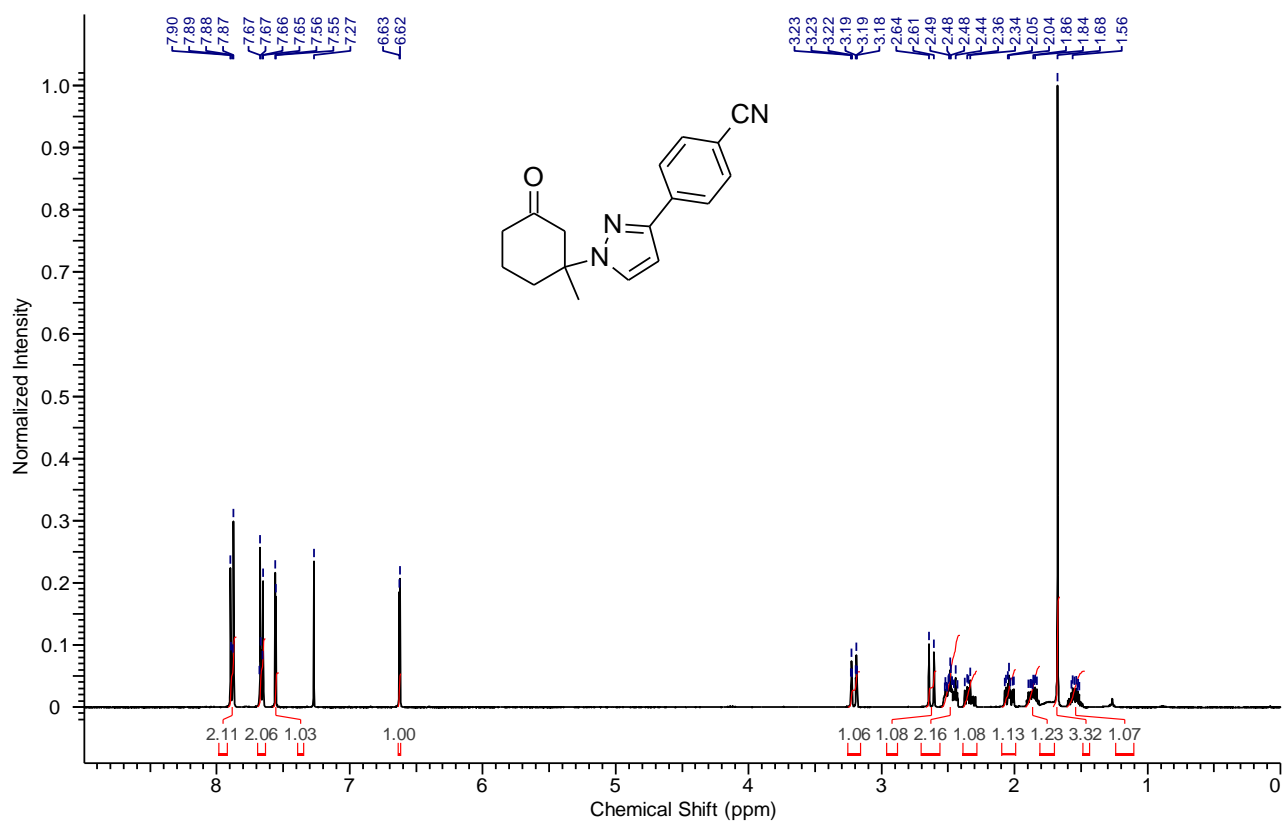


Figure S21. ¹H NMR spectrum of the compound **3al** in CDCl₃, 400 MHz

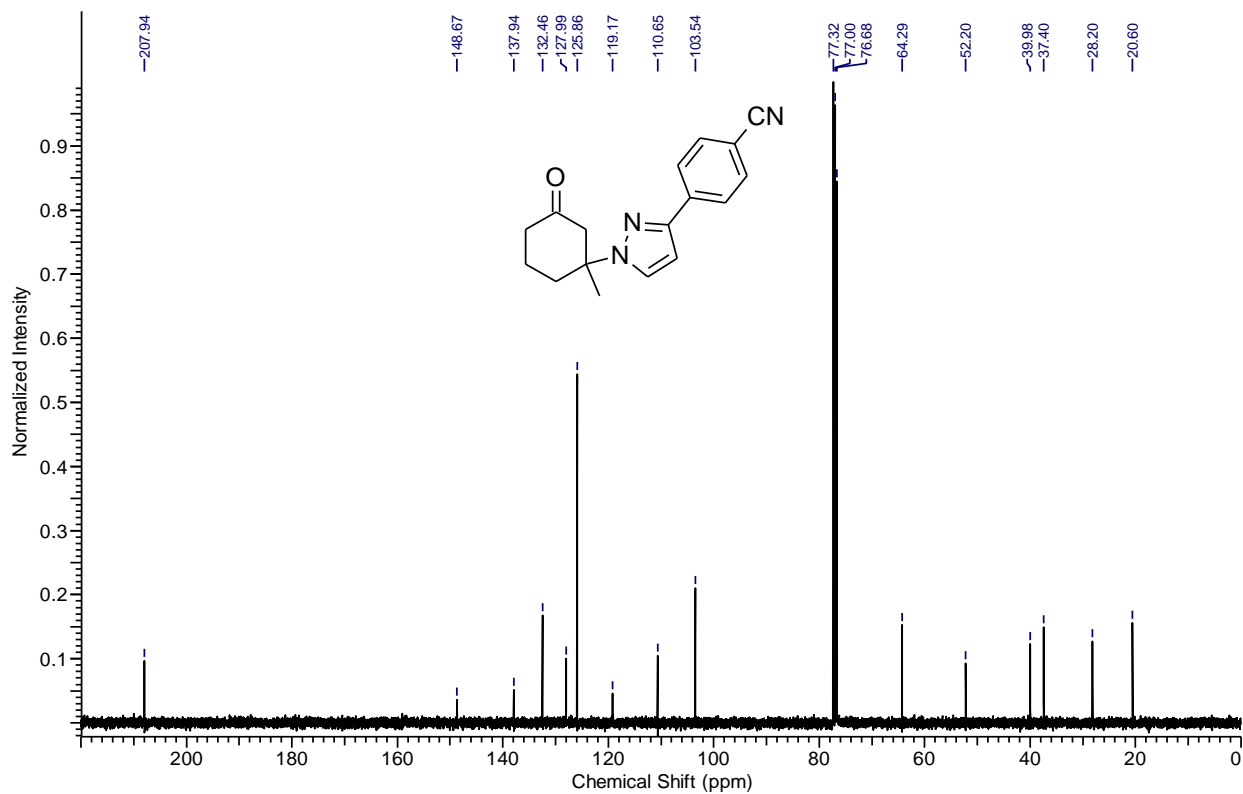


Figure S22. ¹³C NMR spectrum of the compound **3al** in CDCl₃, 100 MHz

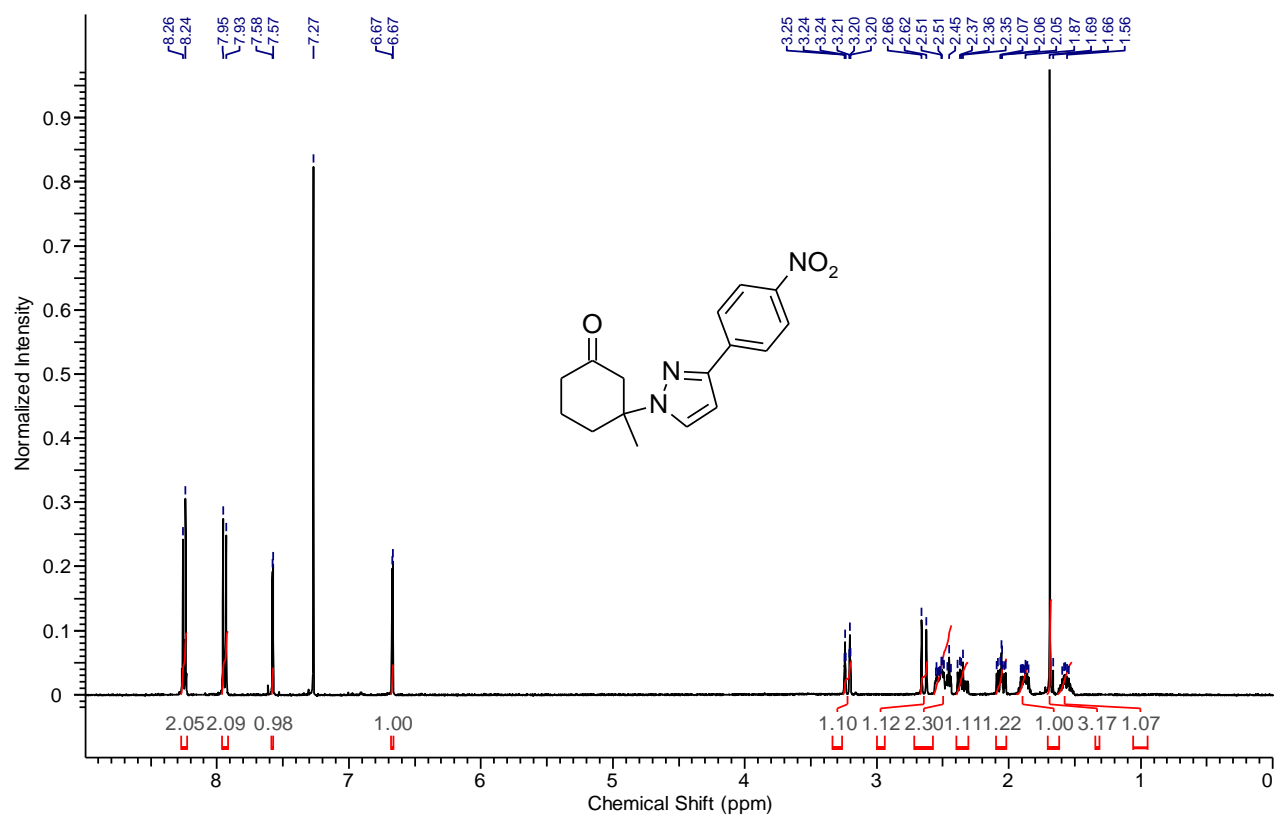


Figure S23. ^1H NMR spectrum of the compound **3am** in CDCl_3 , 400 MHz

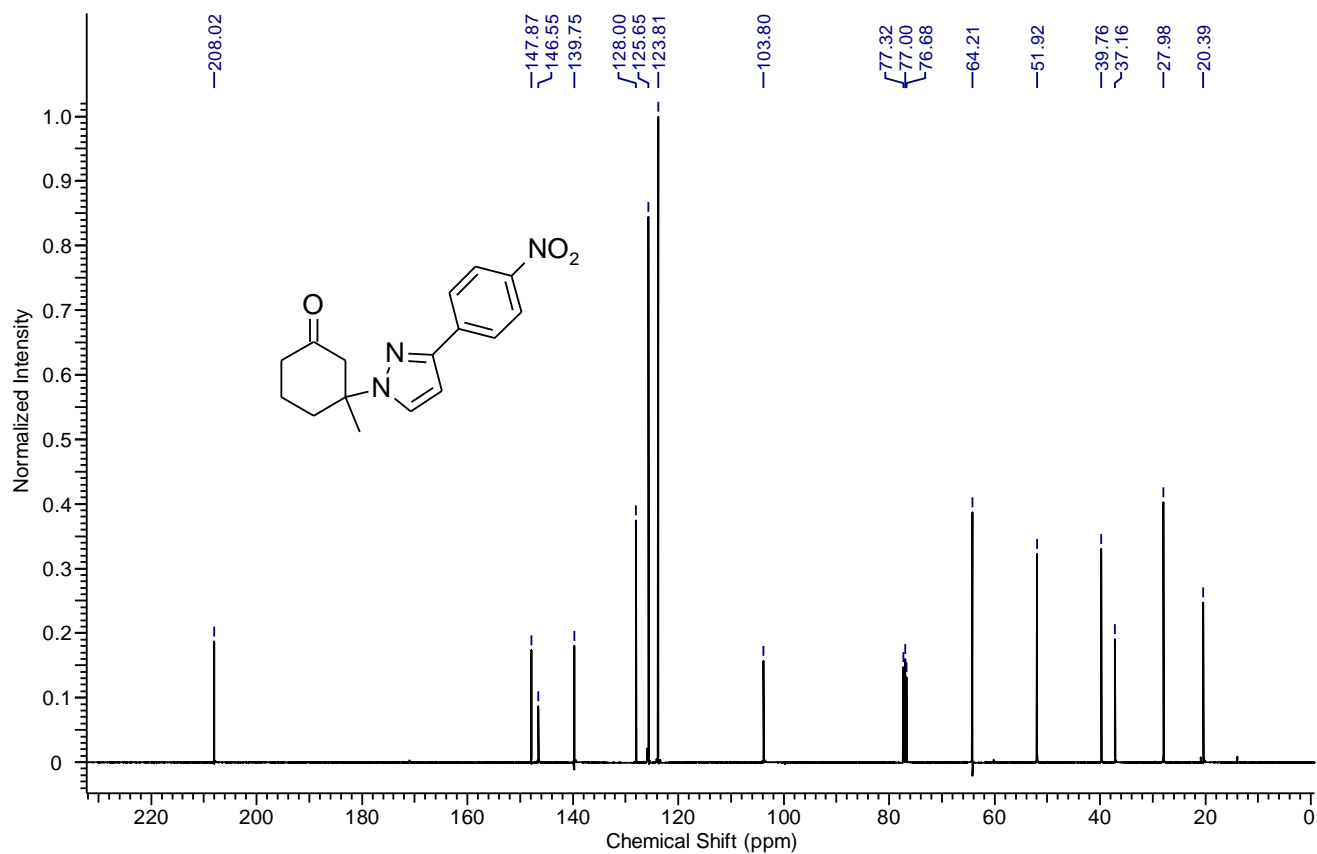


Figure S24. ^{13}C NMR spectrum of the compound **3am** in CDCl_3 , 100 MHz

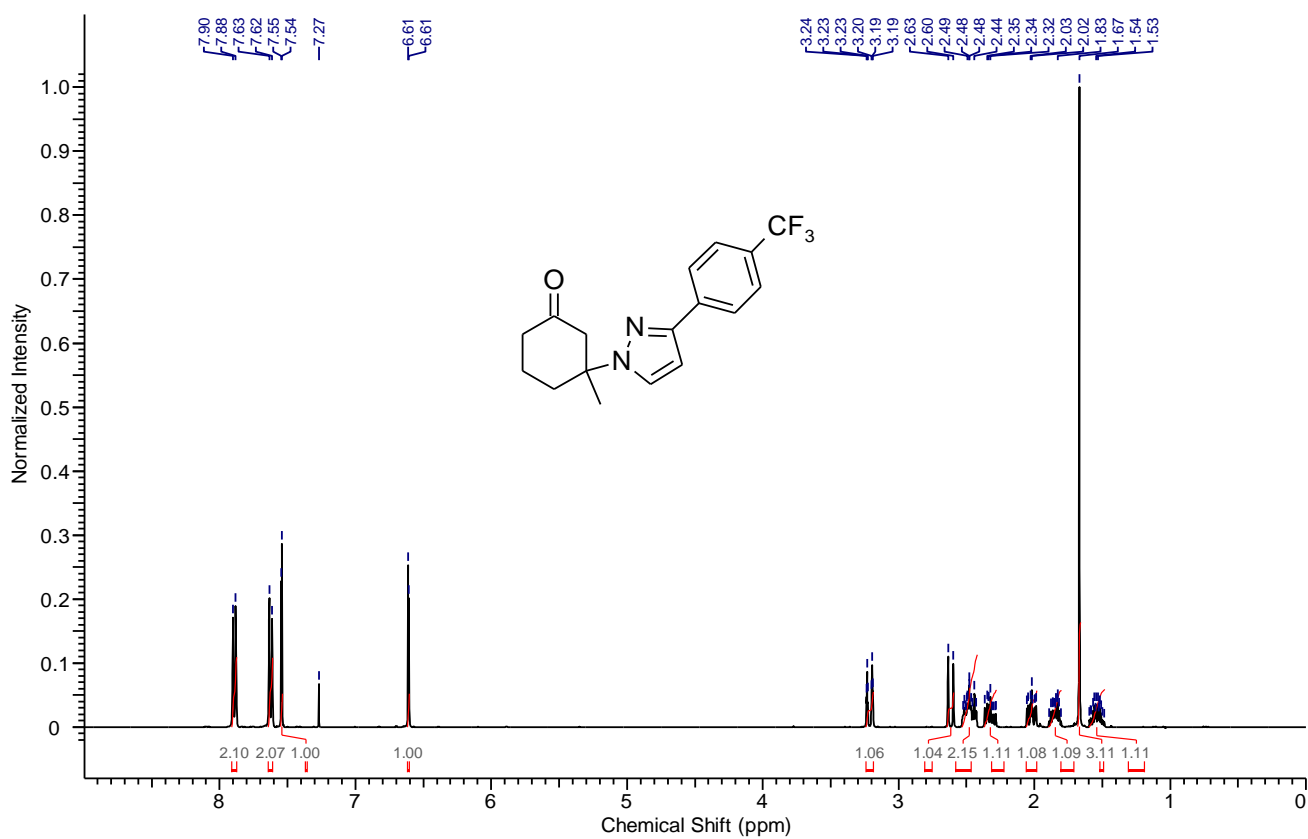


Figure S25. ¹H NMR spectrum of the compound **3an** in CDCl₃, 400 MHz

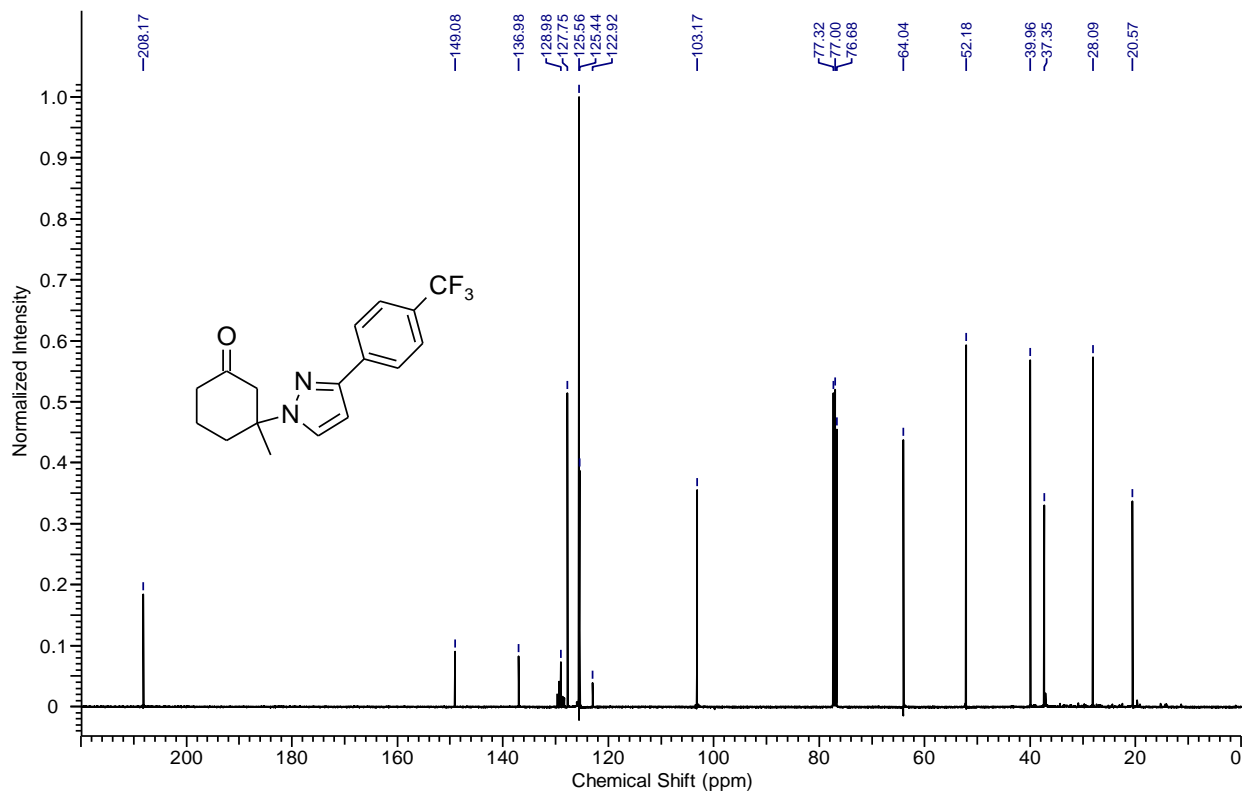


Figure S26. ¹³C NMR spectrum of the compound **3an** in CDCl₃, 100 MHz

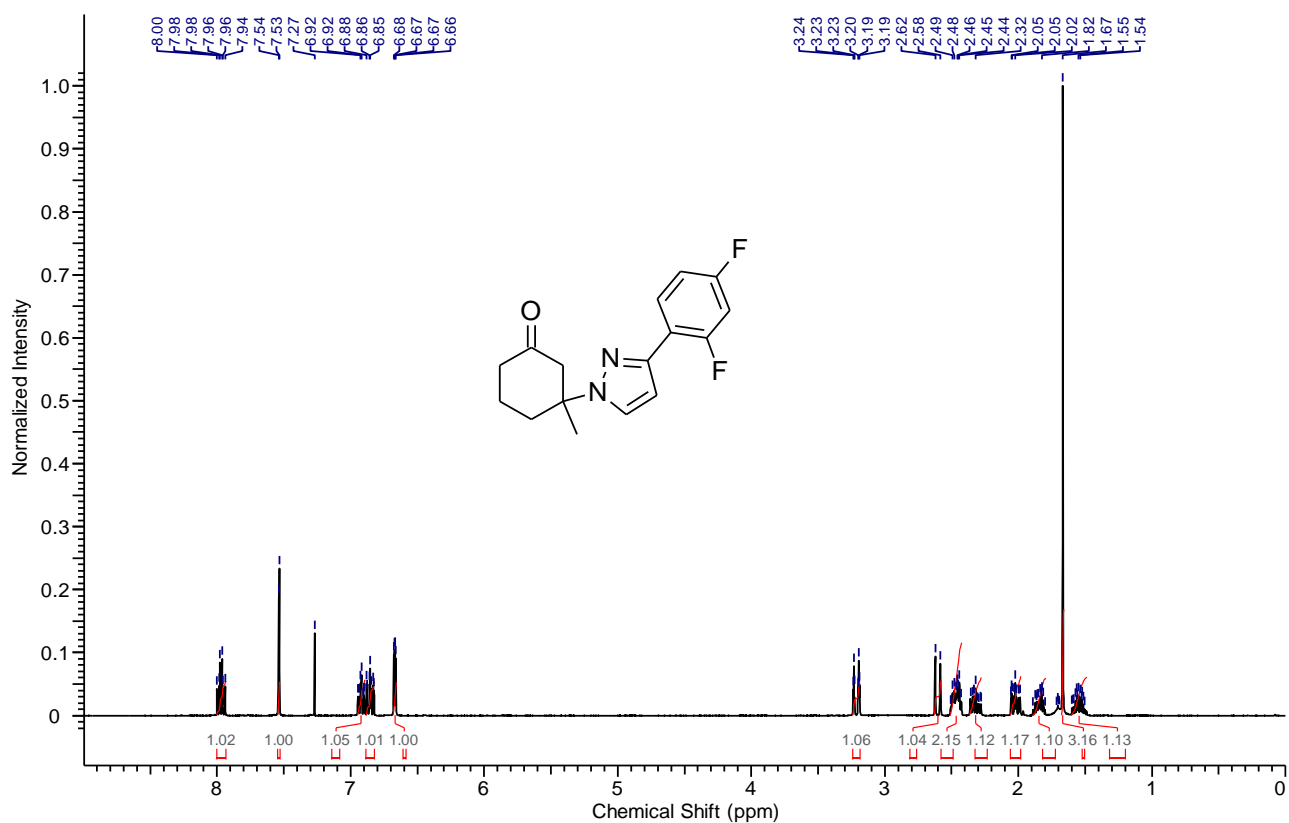


Figure S27. ¹H NMR spectrum of the compound **3ao** in CDCl₃, 400 MHz

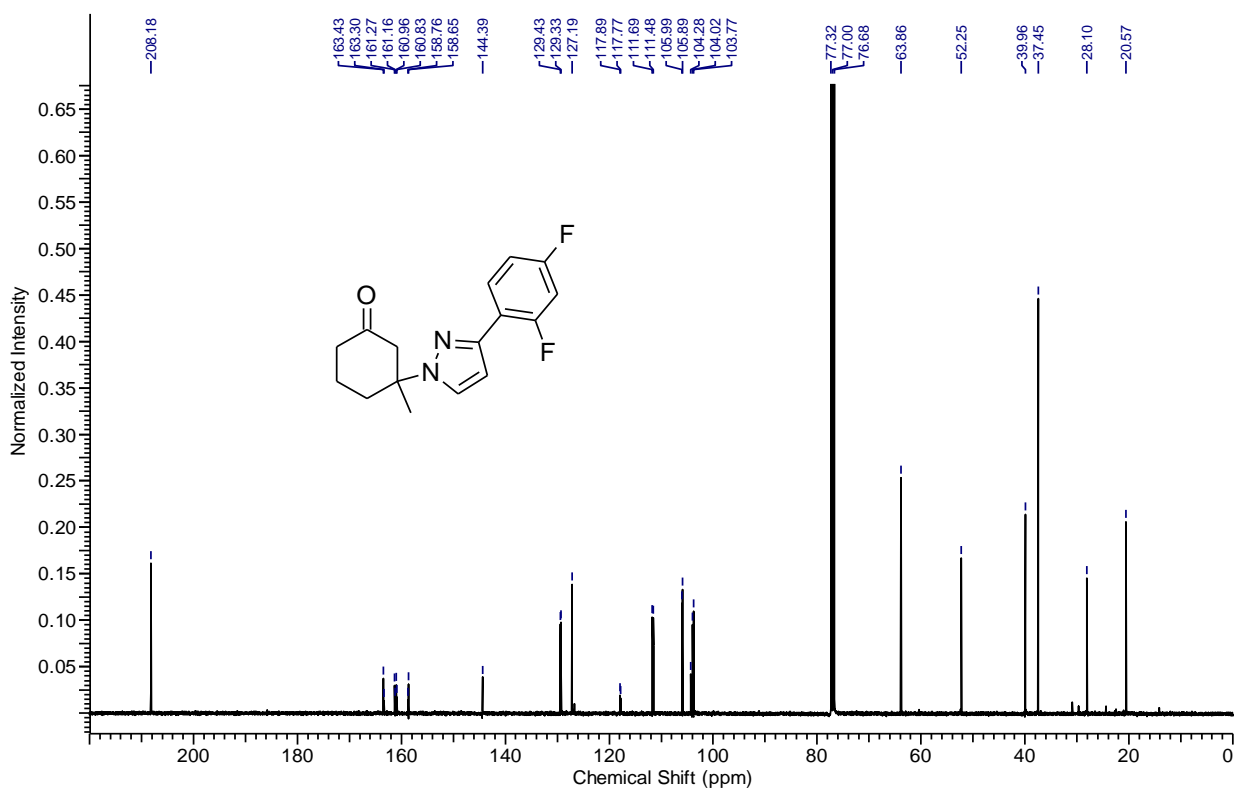


Figure S28. ¹³C NMR spectrum of the compound **3ao** in CDCl₃, 100 MHz

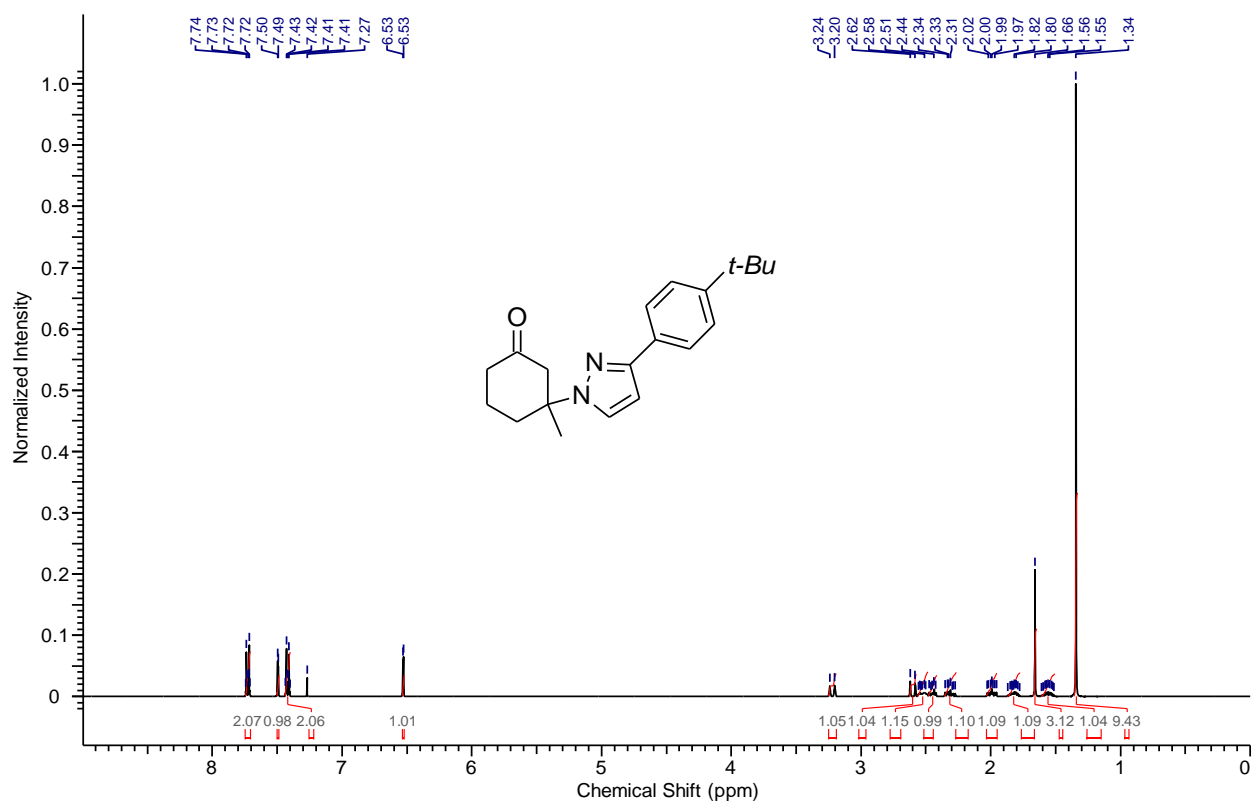


Figure S29. ¹H NMR spectrum of the compound **3ap** in CDCl₃, 400 MHz

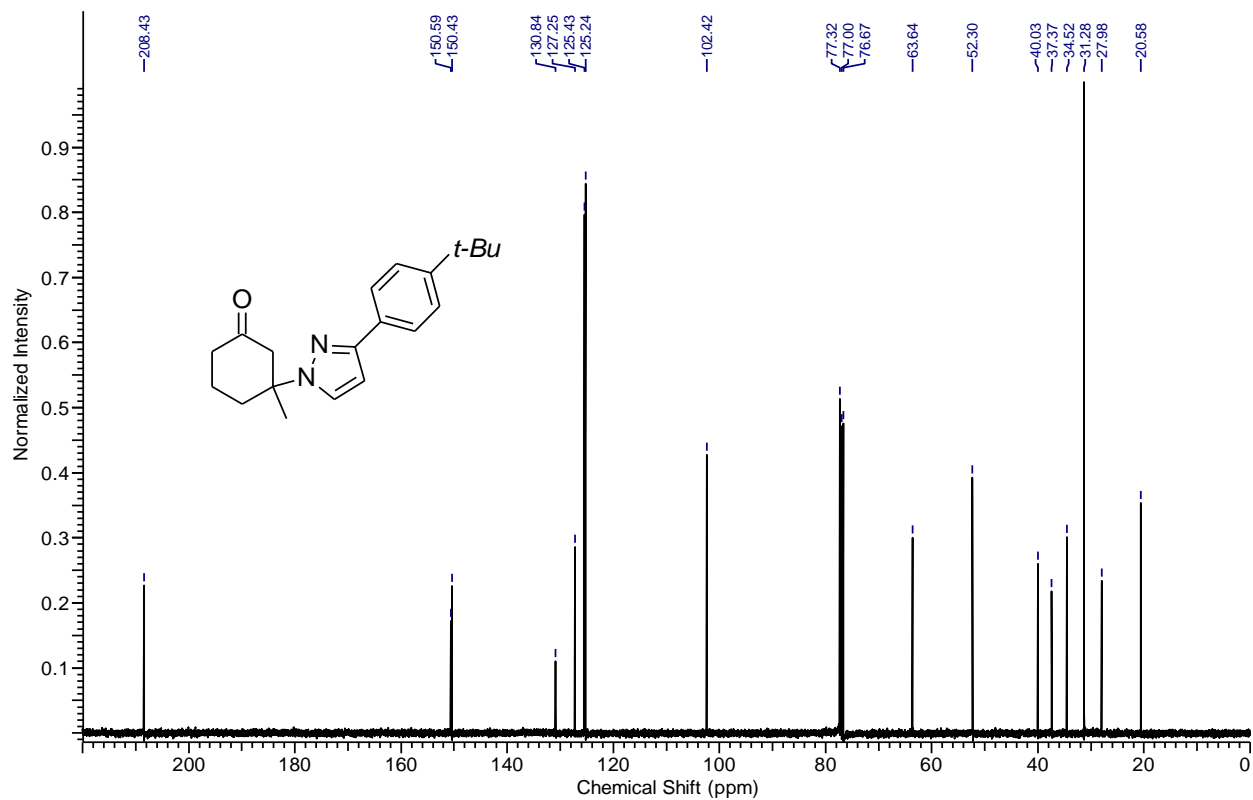


Figure S30. ¹³C NMR spectrum of the compound **3ap** in CDCl₃, 100 MHz

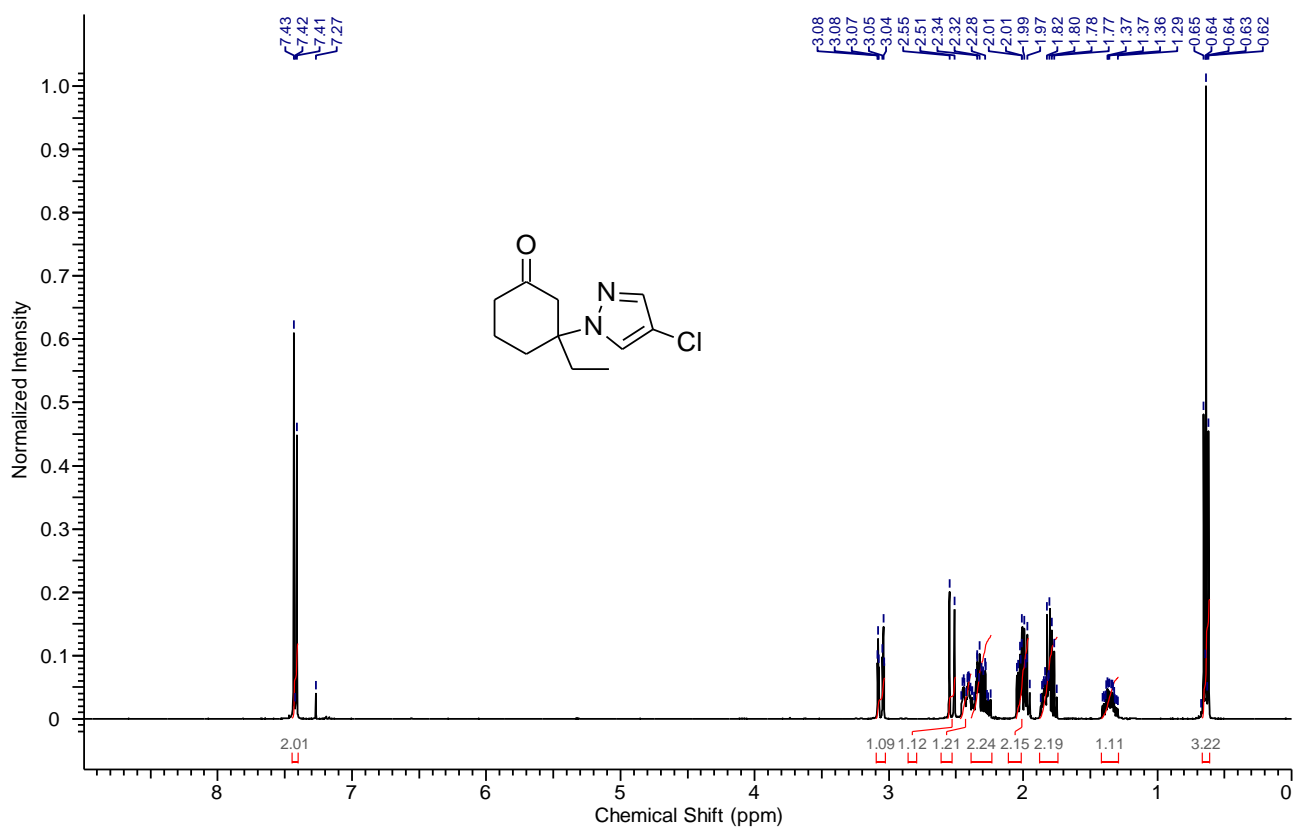


Figure S31. ¹H NMR spectrum of the compound **3bc** in CDCl₃, 400 MHz

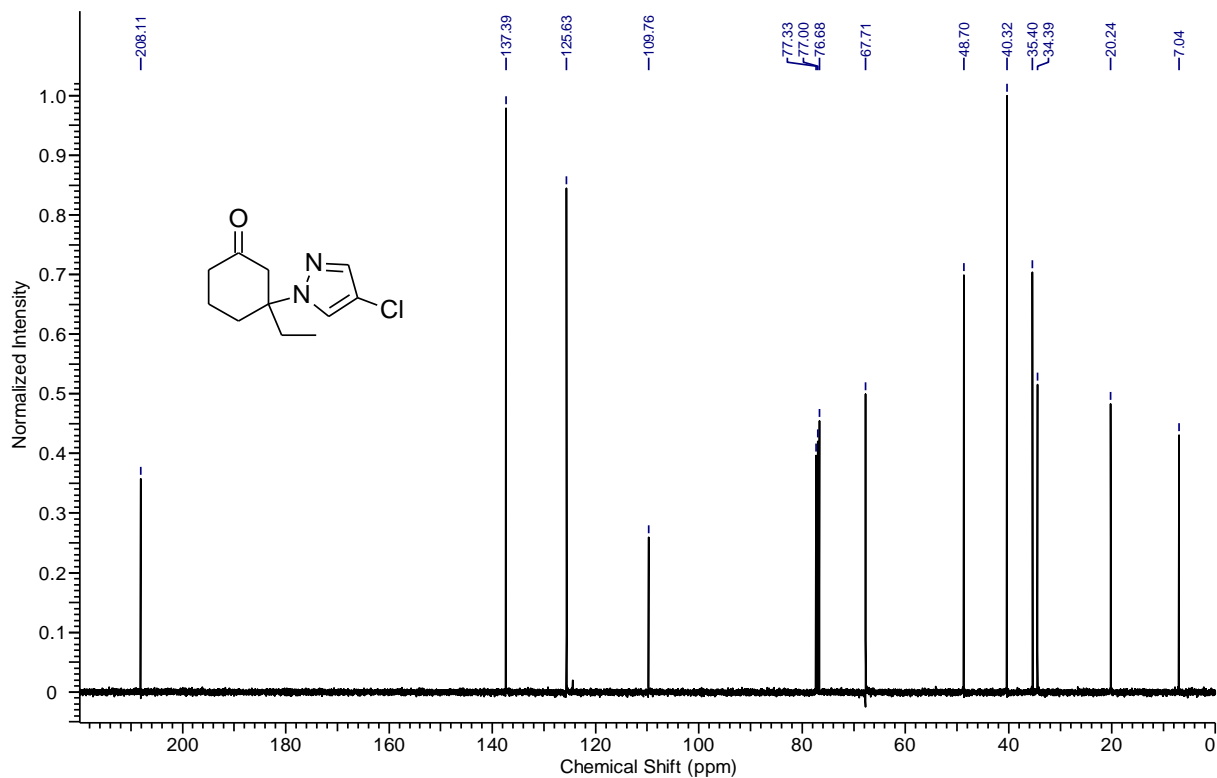


Figure S32. ¹³C NMR spectrum of the compound **3bc** in CDCl₃, 100 MHz

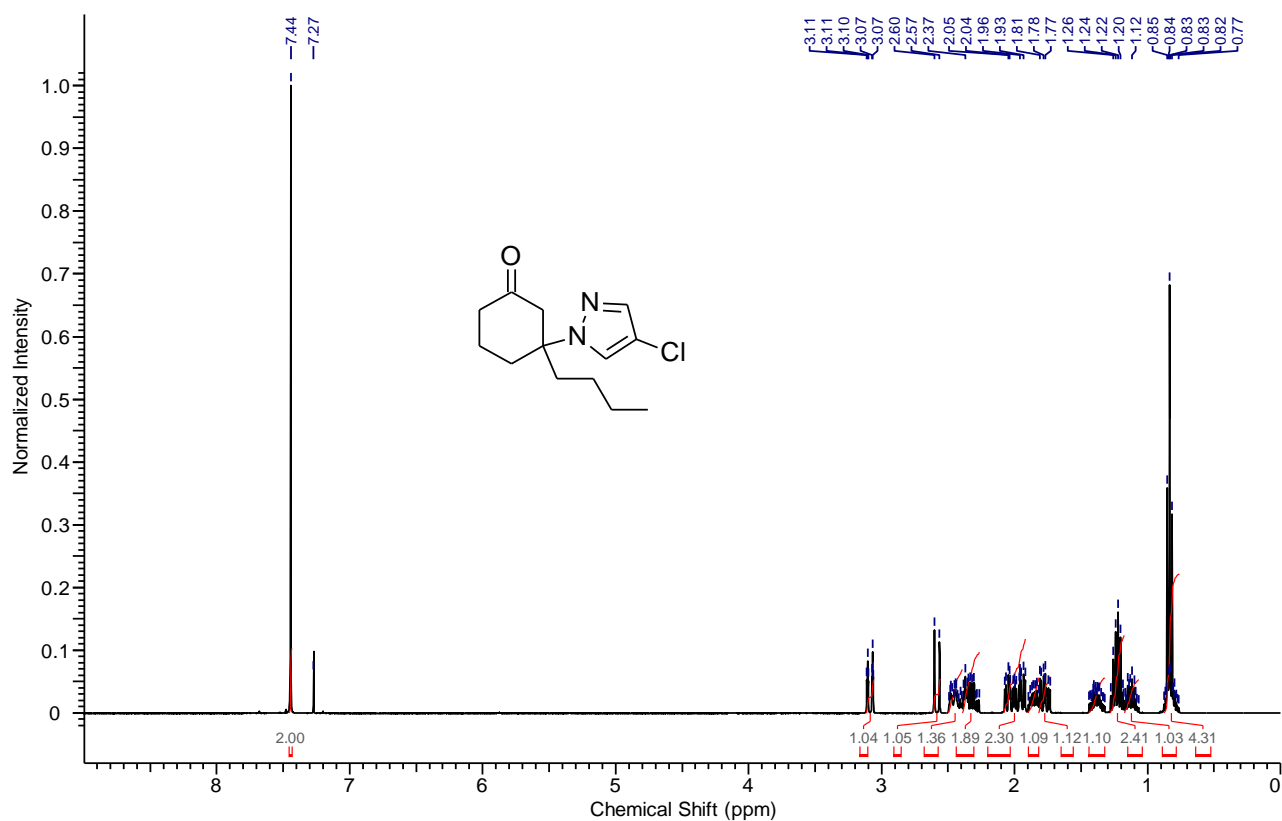


Figure S33. ^1H NMR spectrum of the compound **3cc** in CDCl_3 , 400 MHz

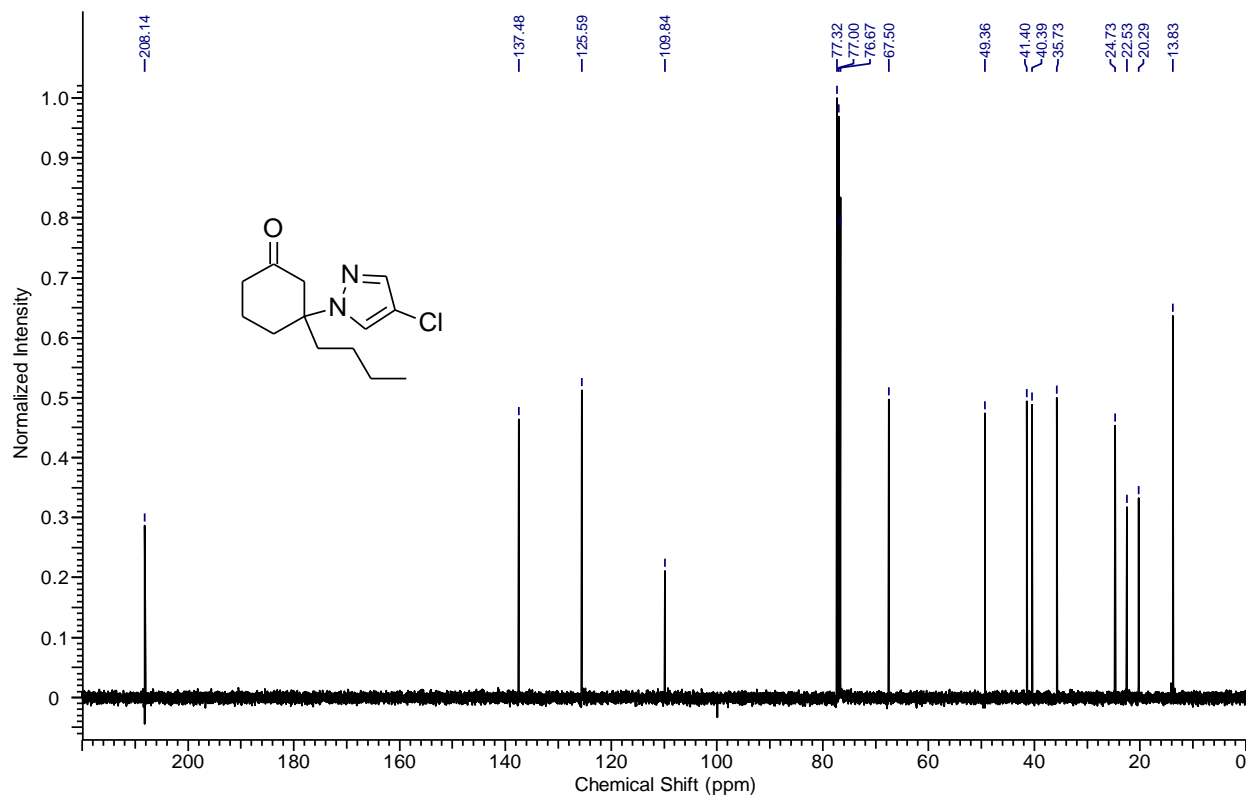


Figure S34. ^{13}C NMR spectrum of the compound **3cc** in CDCl_3 , 100 MHz

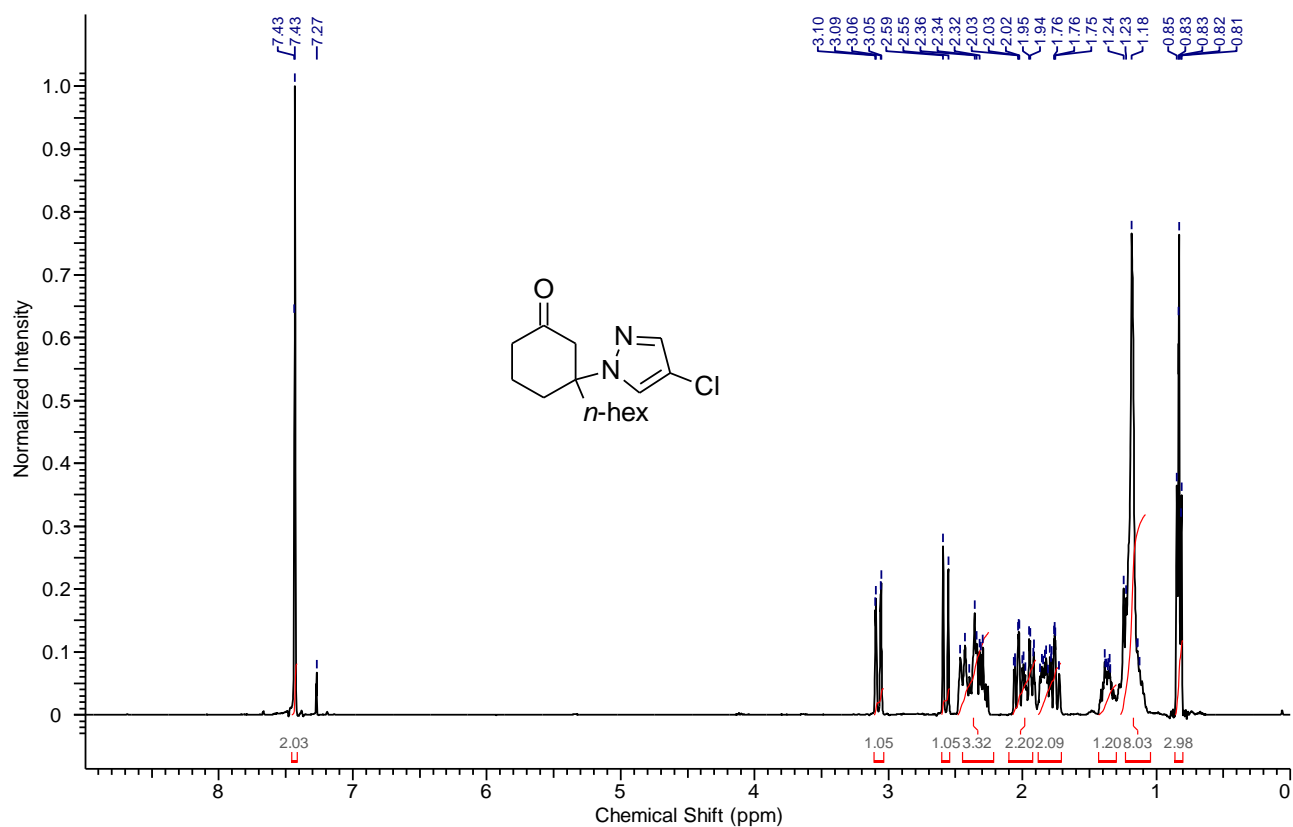


Figure S35. ¹H NMR spectrum of the compound **3dc** in CDCl₃, 400 MHz

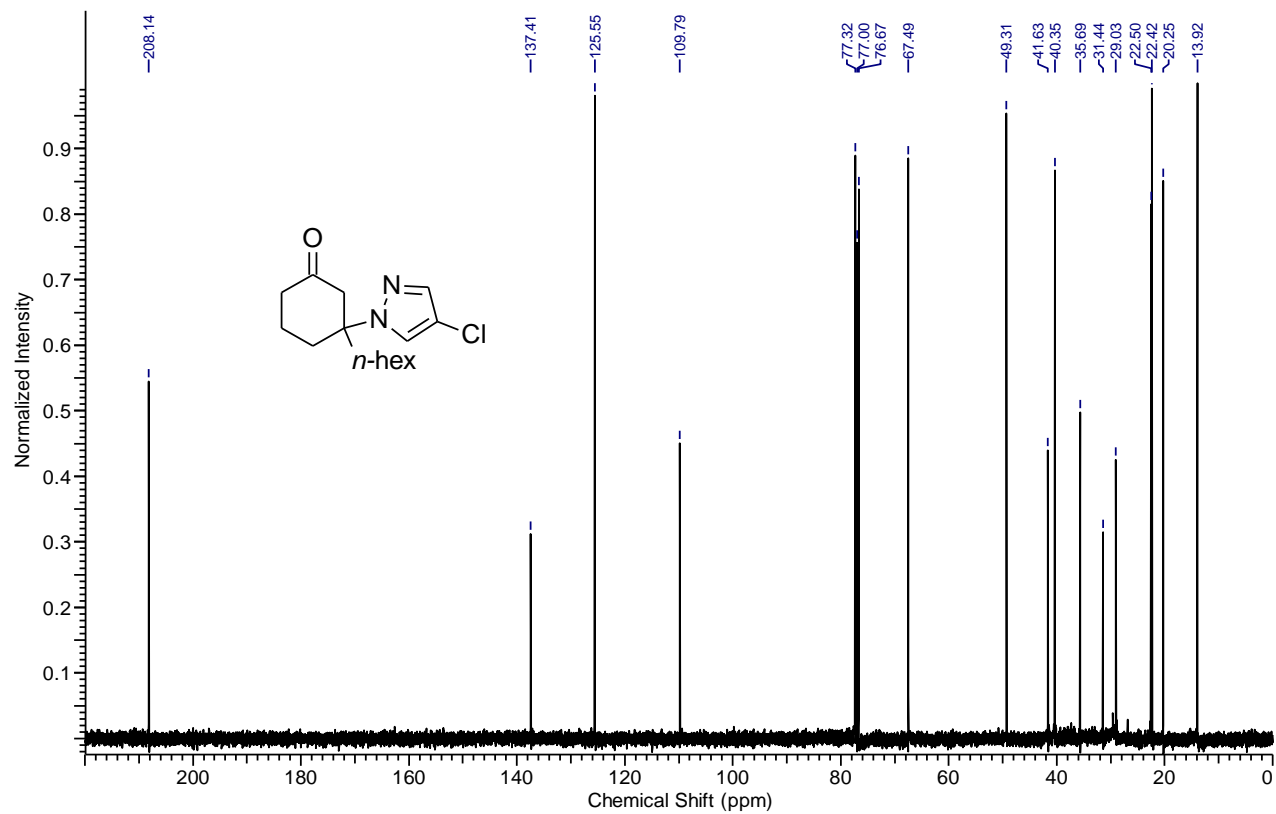


Figure S36. ¹³C NMR spectrum of the compound **3dc** in CDCl₃, 100 MHz

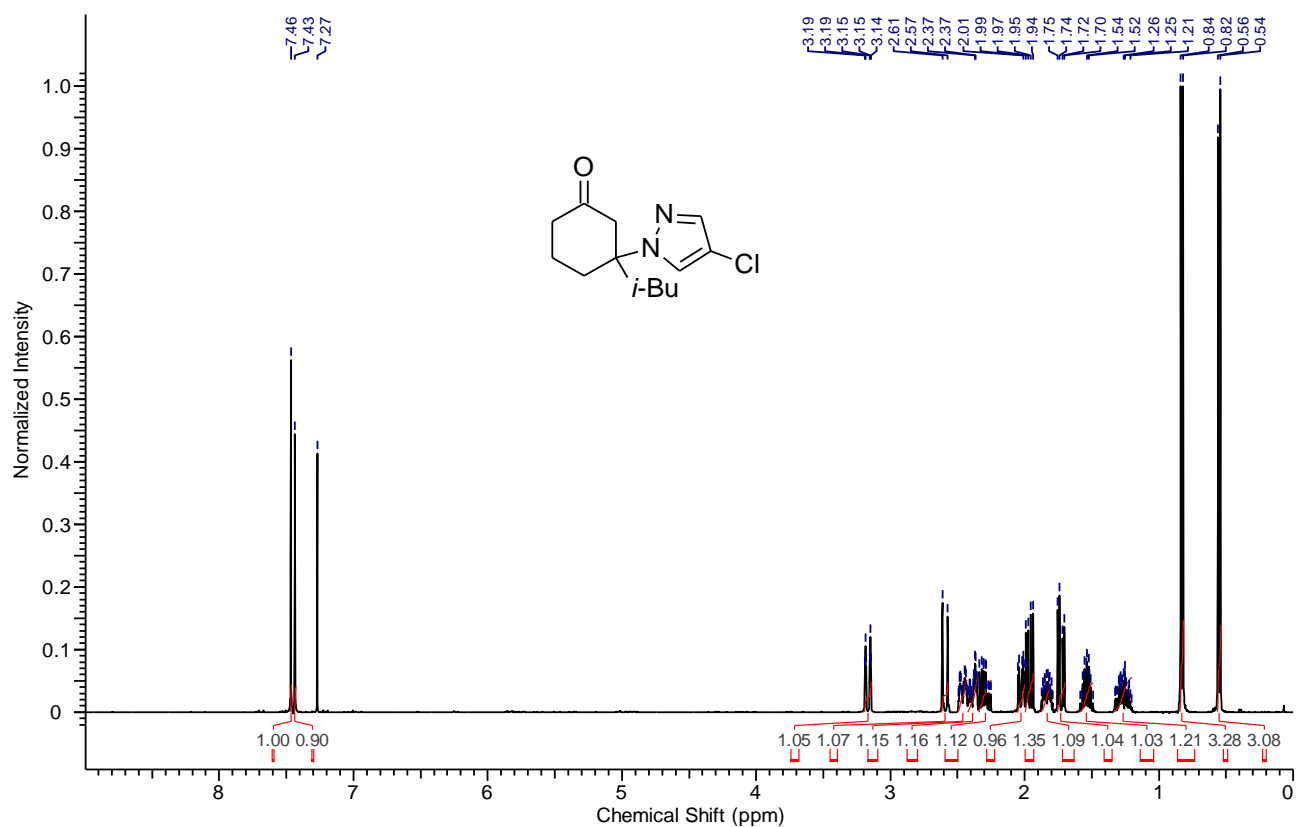


Figure S37. ^1H NMR spectrum of the compound **3ec** in CDCl_3 , 400 MHz

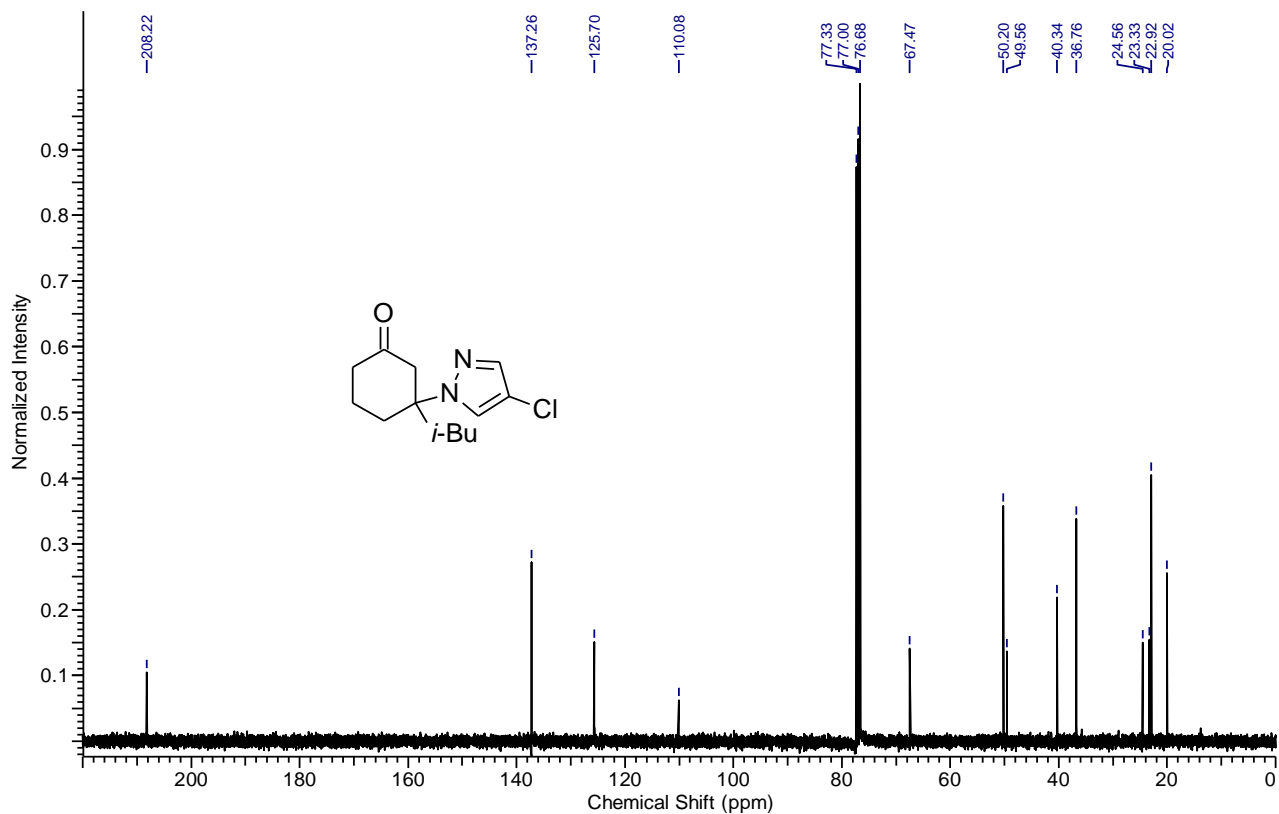


Figure S38. ^{13}C NMR spectrum of the compound **3ec** in CDCl_3 , 100 MHz

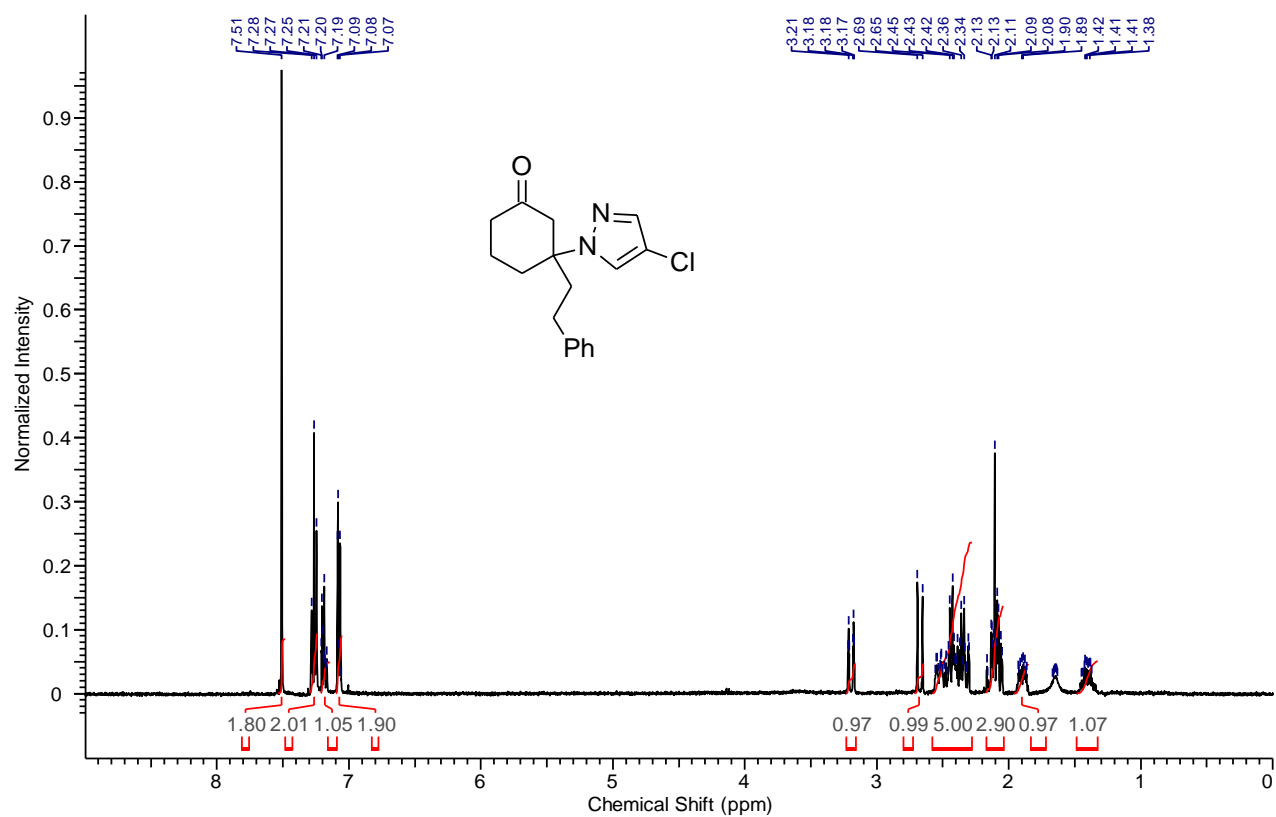


Figure S39. ¹H NMR spectrum of the compound **3fc** in CDCl₃, 400 MHz

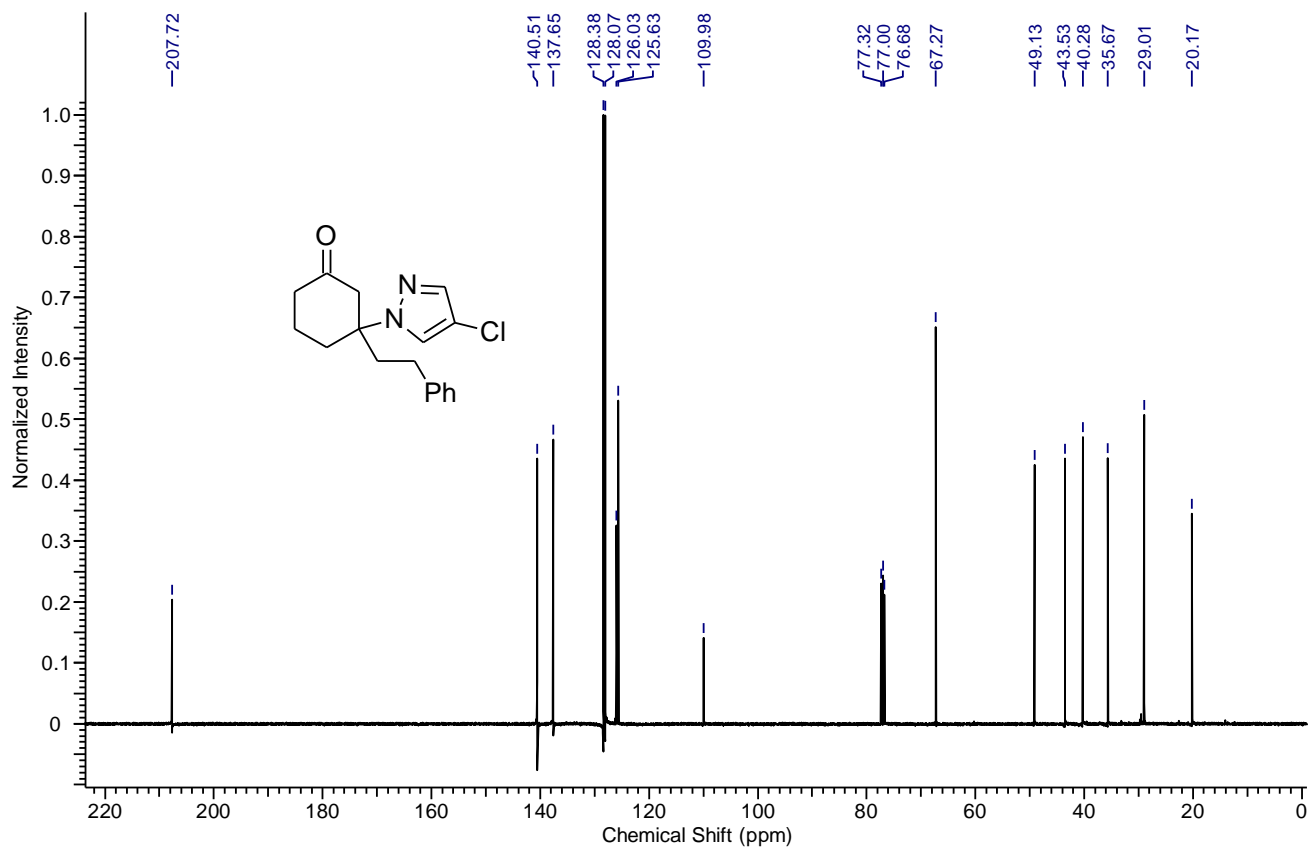


Figure S40. ¹³C NMR spectrum of the compound **3fc** in CDCl₃, 100 MHz

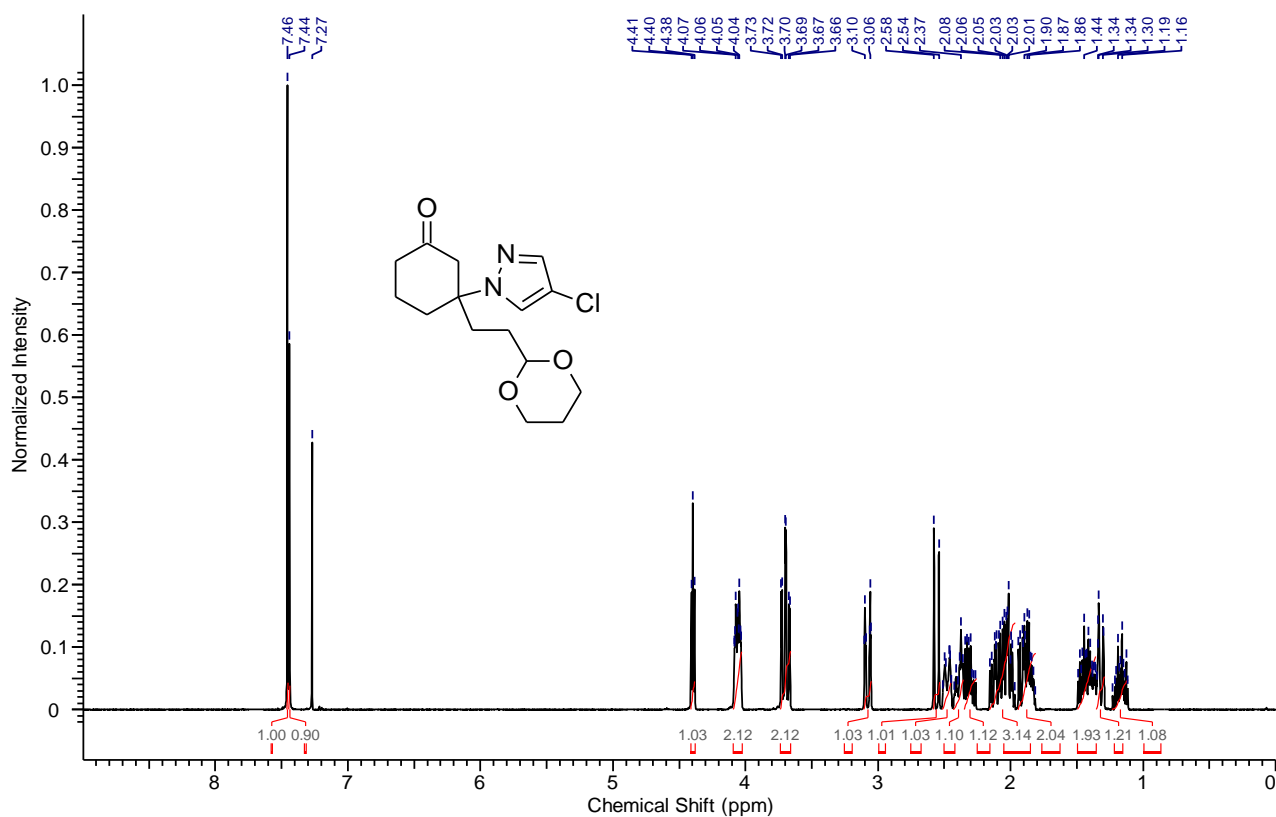


Figure S41. ^1H NMR spectrum of the compound **3gc** in CDCl_3 , 400 MHz

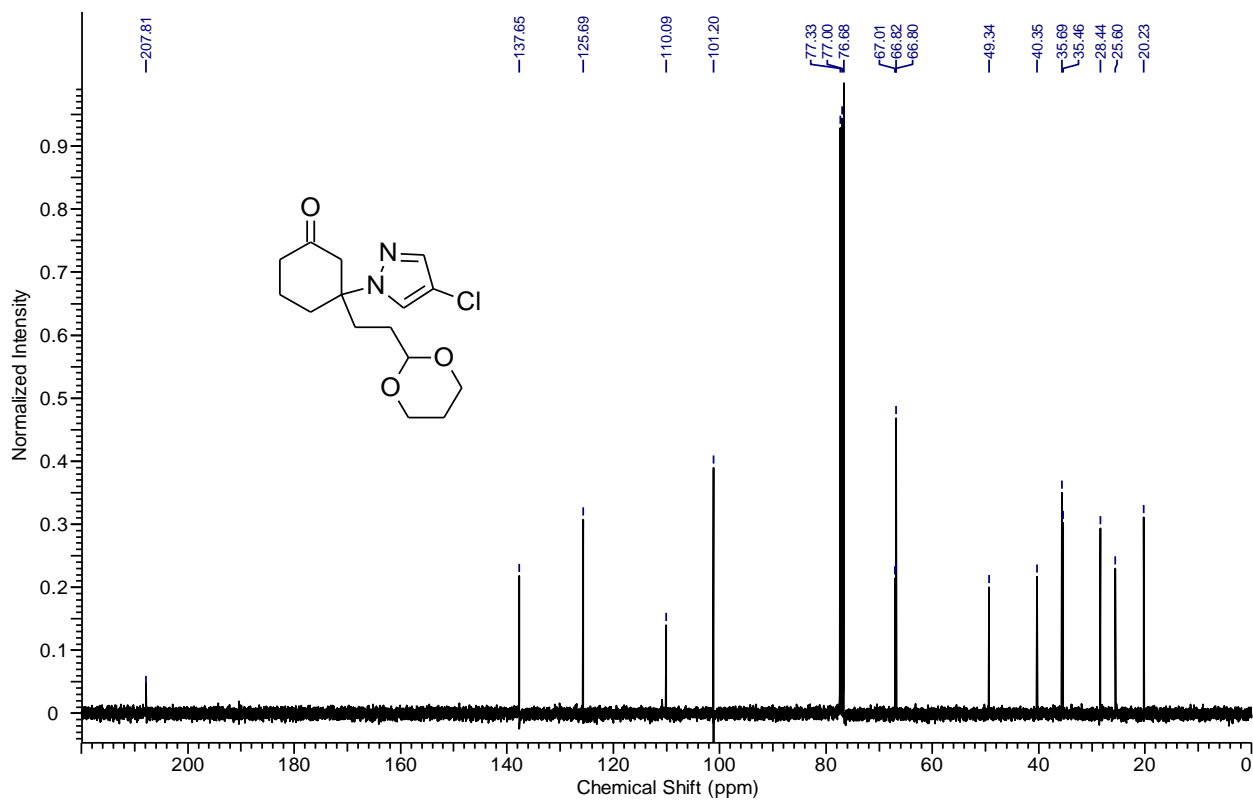


Figure S42. ^{13}C NMR spectrum of the compound **3gc** in CDCl_3 , 100 MHz

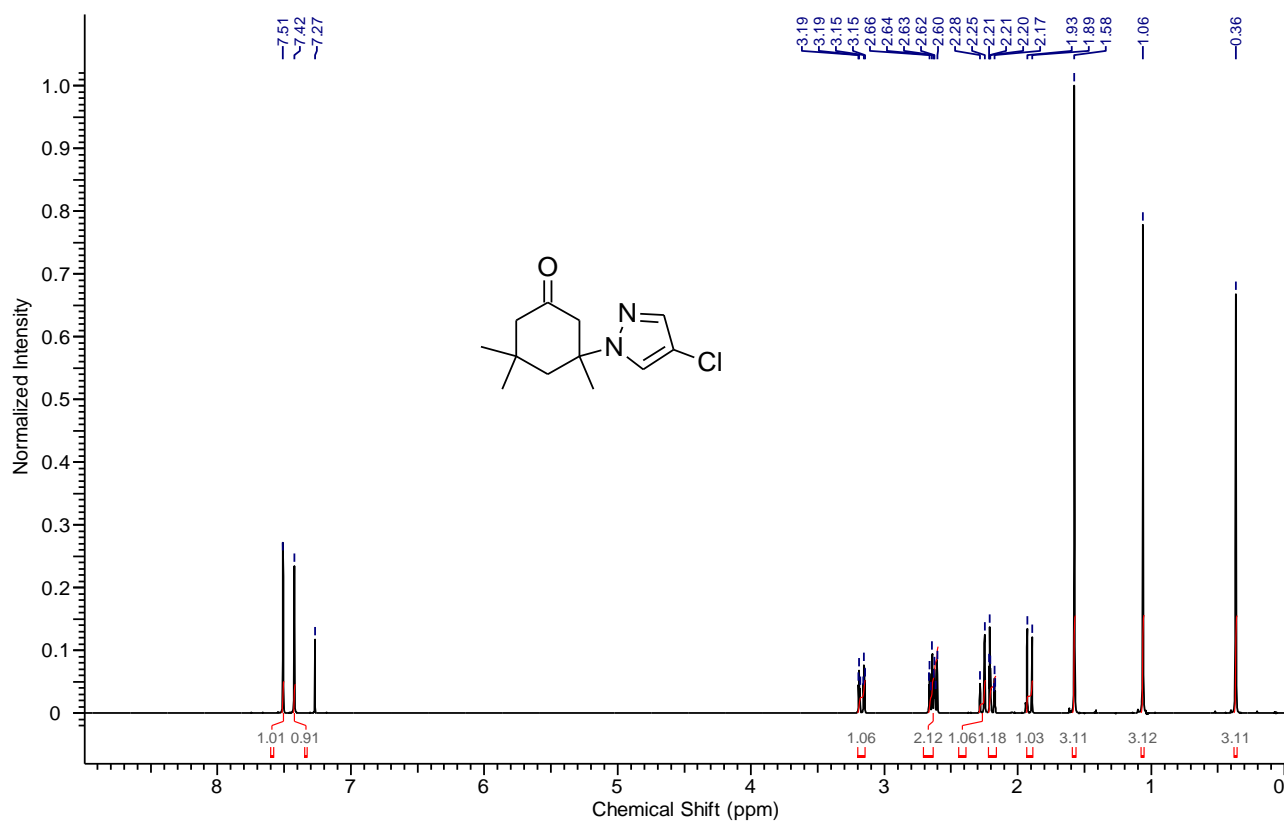


Figure S43. ^1H NMR spectrum of the compound **3hc** in CDCl_3 , 400 MHz

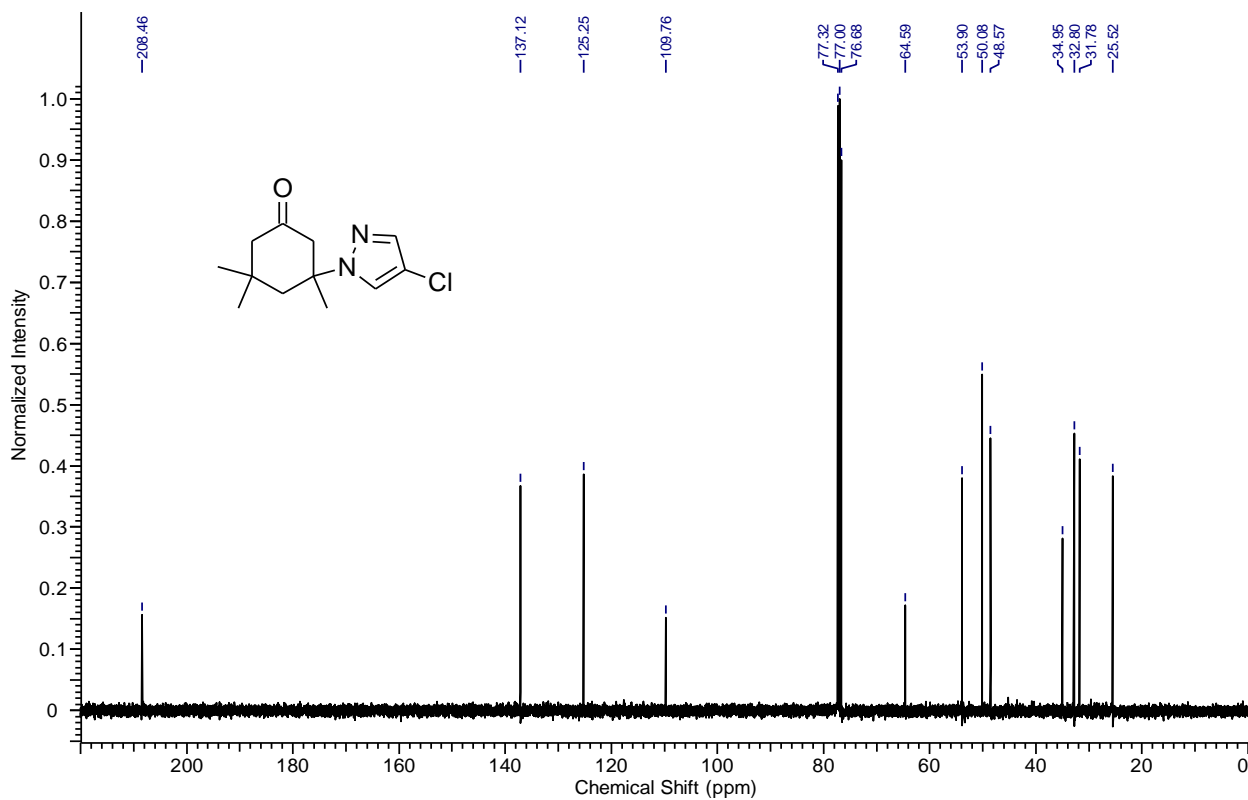


Figure S44. ^{13}C NMR spectrum of the compound **3hc** in CDCl_3 , 100 MHz

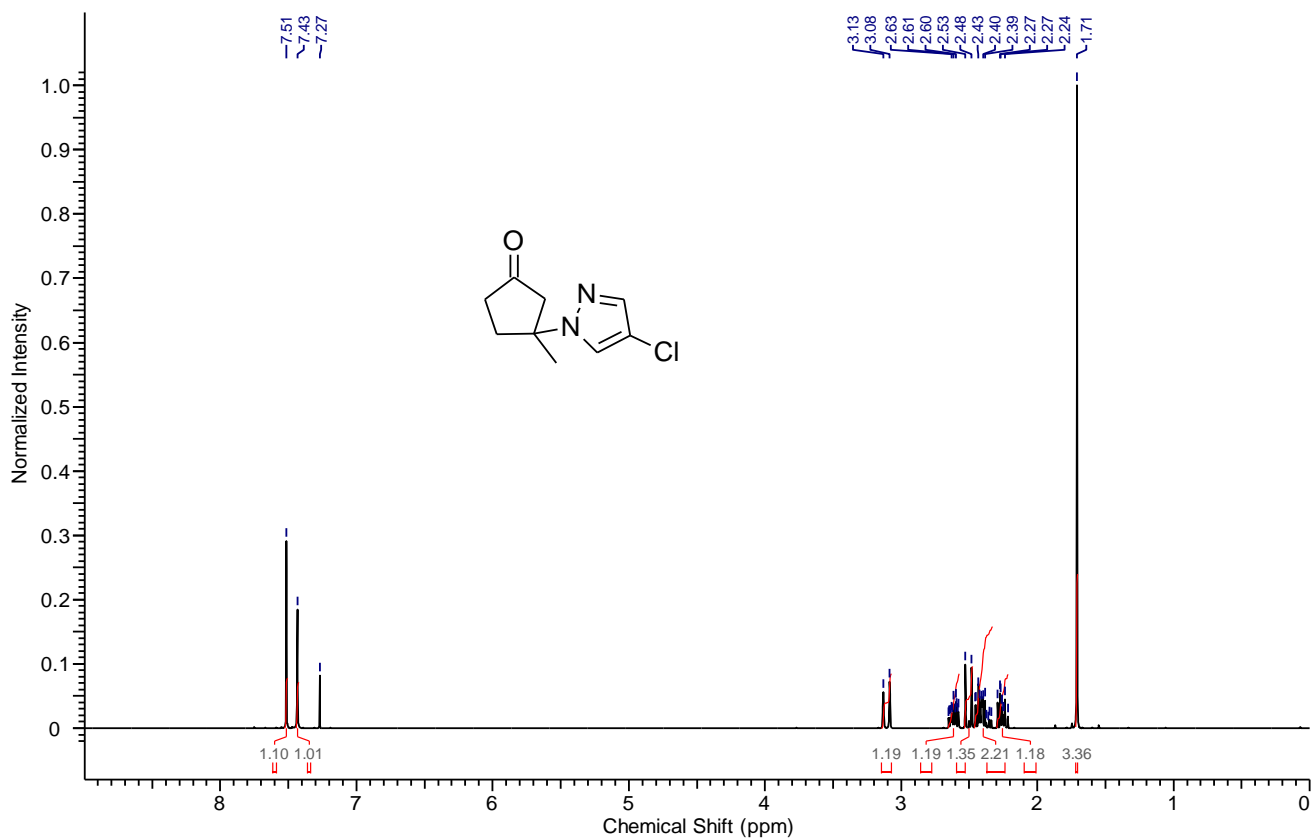


Figure S45. ^1H NMR spectrum of the compound **3ic** in CDCl_3 , 400 MHz

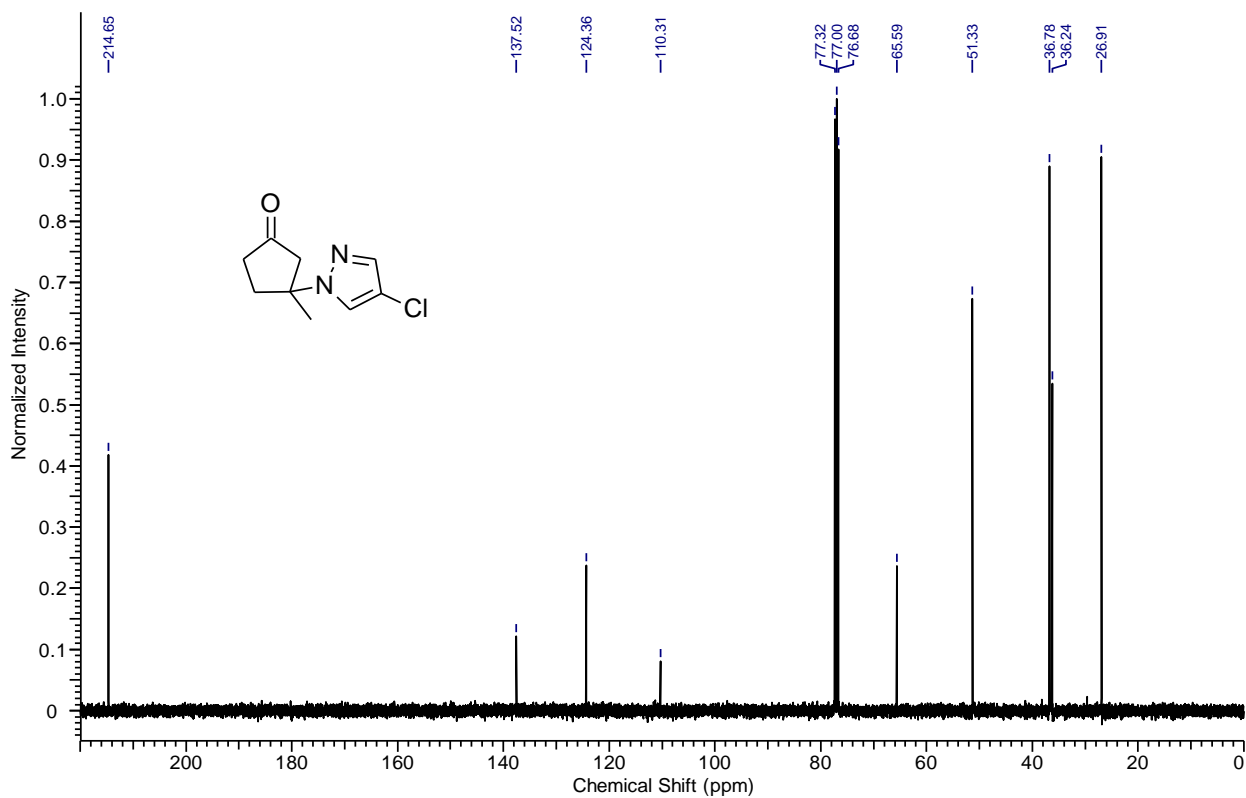
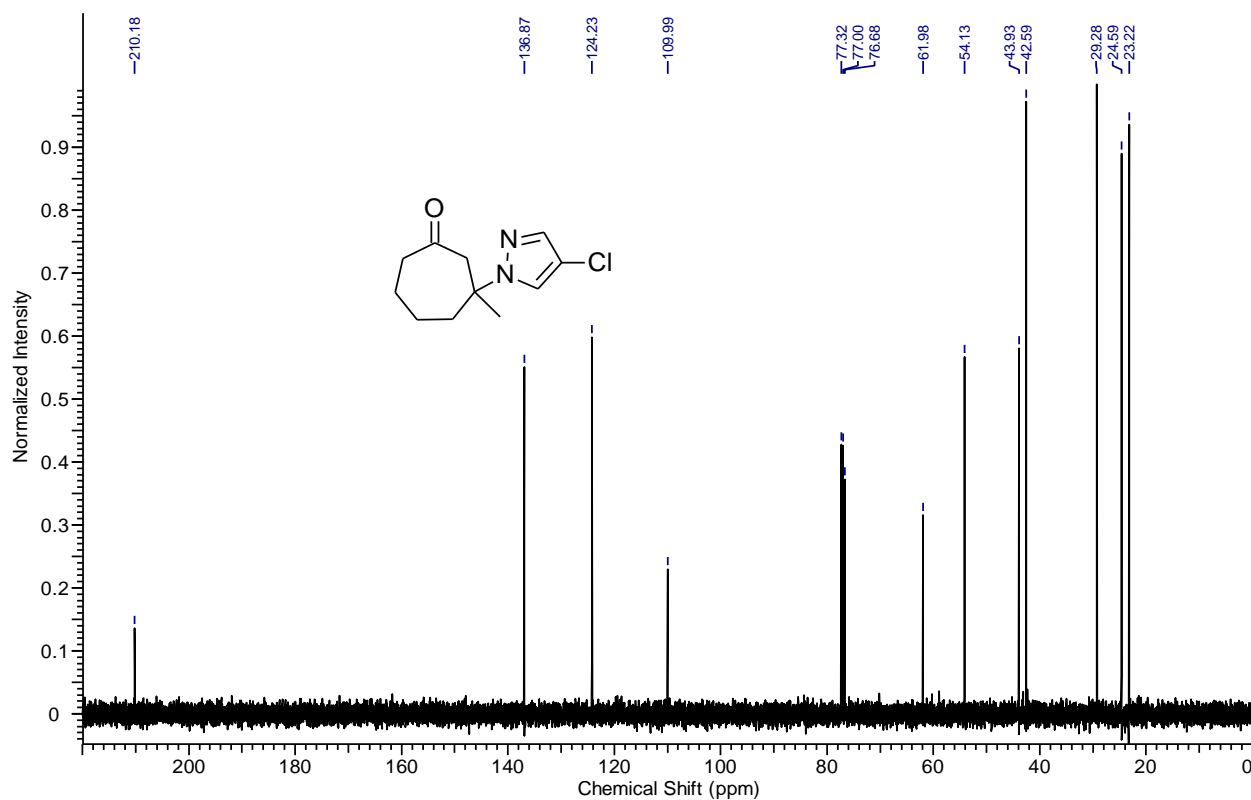
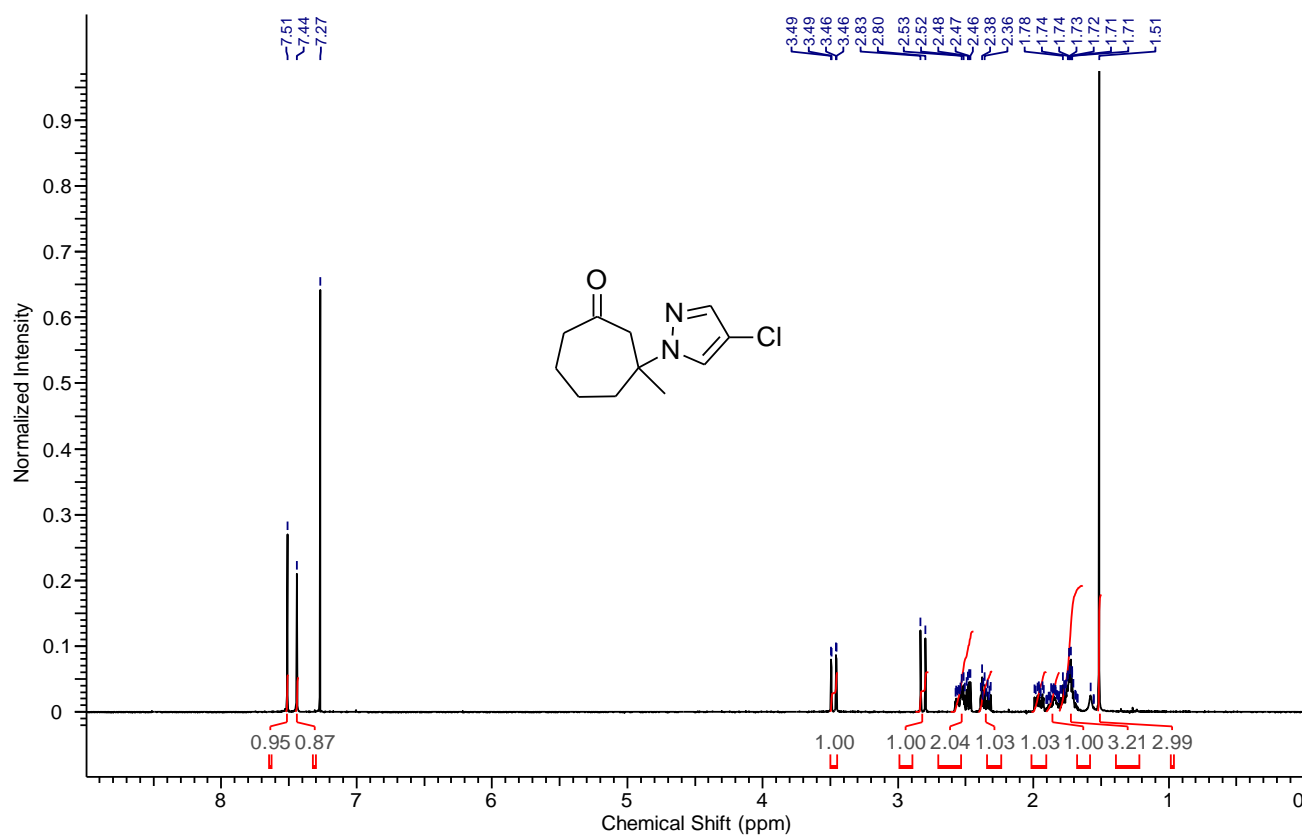


Figure S46. ^{13}C NMR spectrum of the compound **3ic** in CDCl_3 , 100 MHz



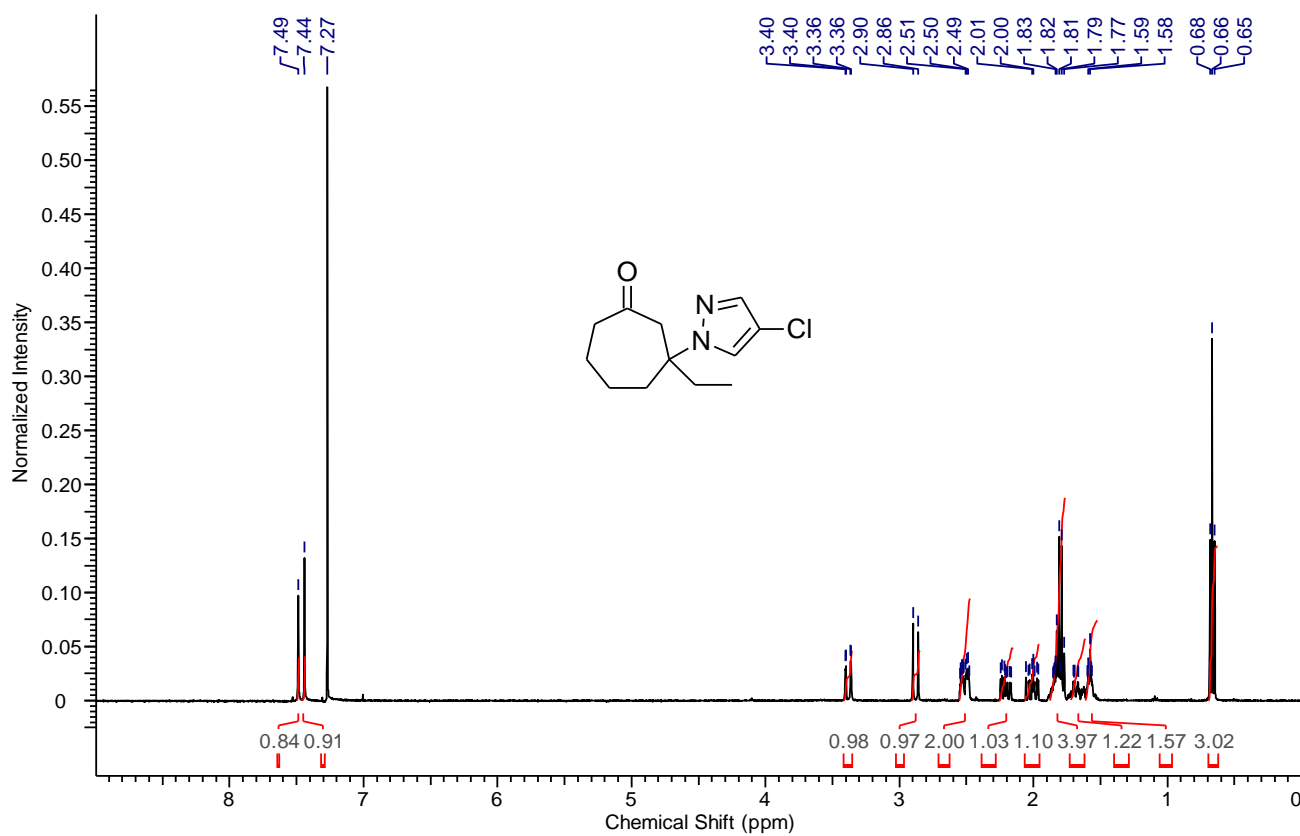


Figure S49. ¹H NMR spectrum of the compound **3kc** in CDCl₃, 400 MHz

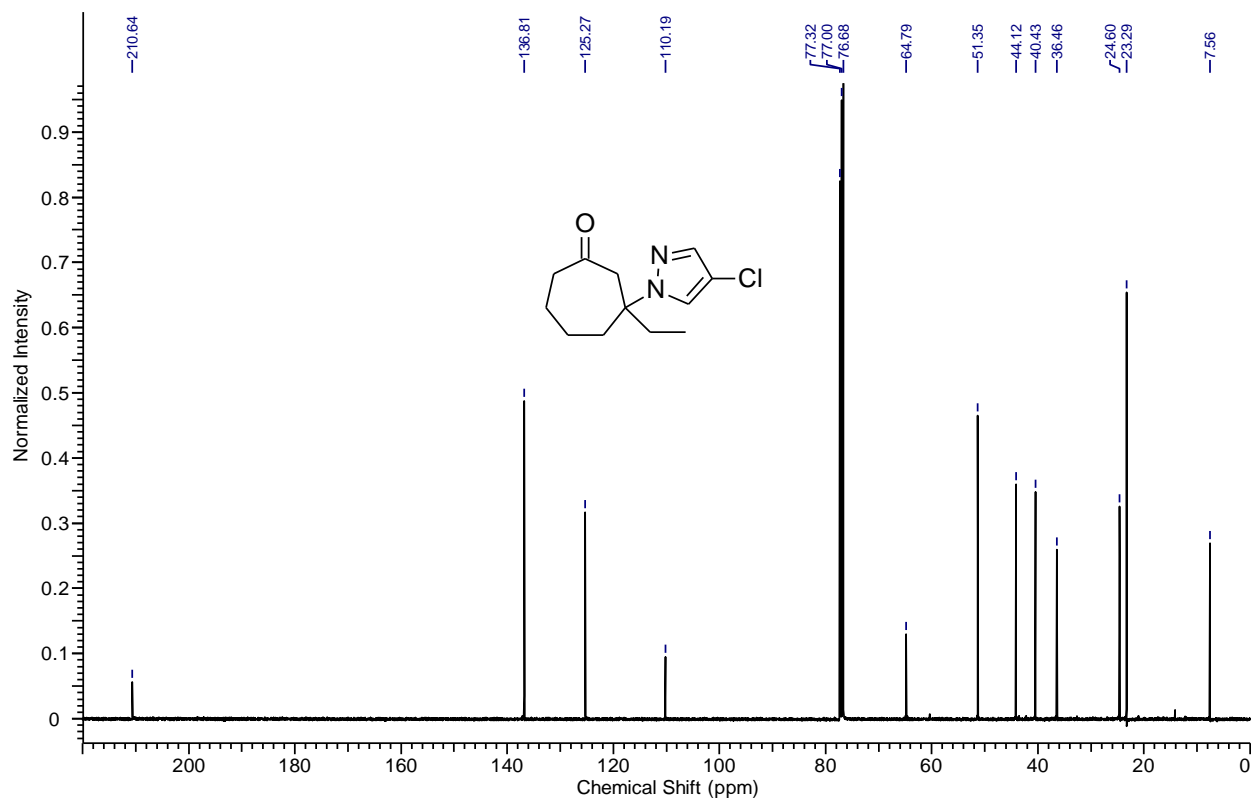


Figure S50. ¹³C NMR spectrum of the compound **3kc** in CDCl₃, 100 MHz

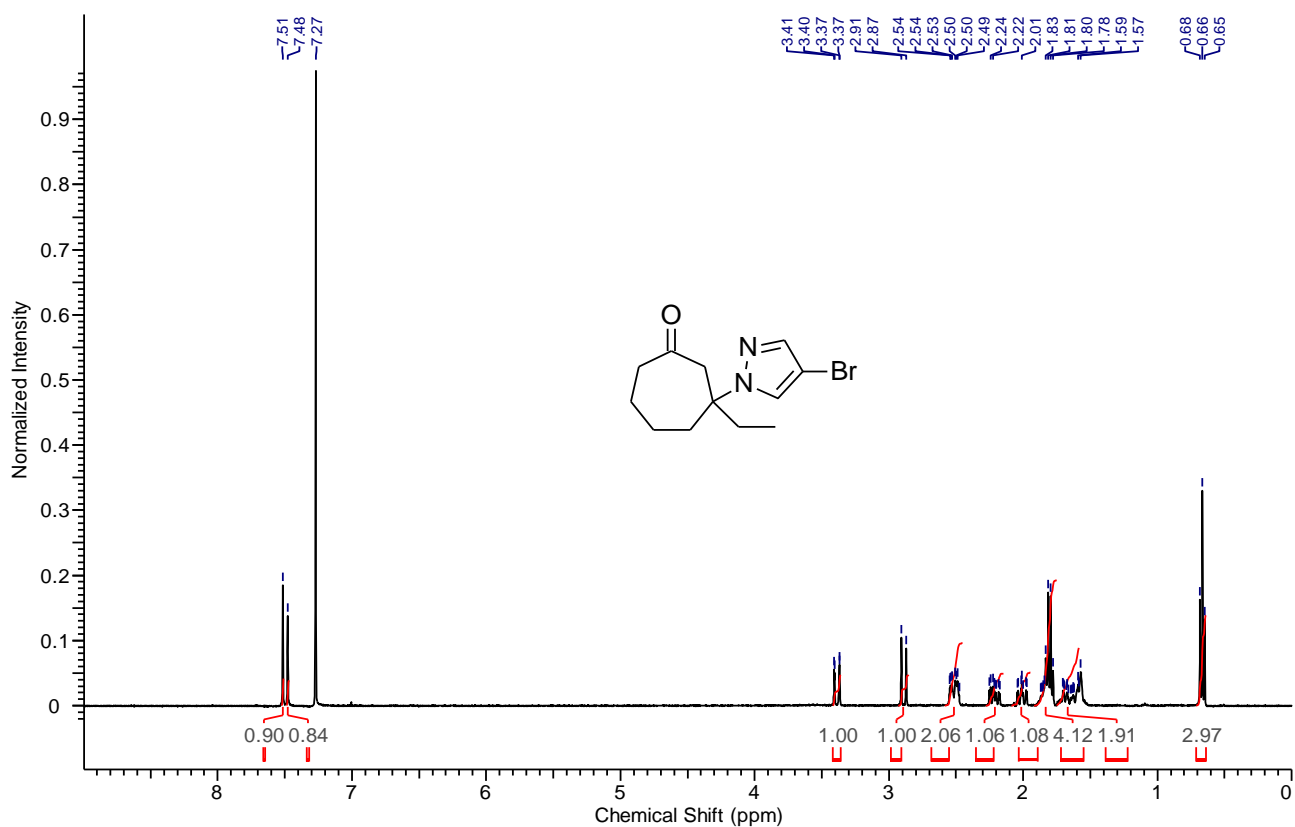


Figure S51. ^1H NMR spectrum of the compound **3kd** in CDCl_3 , 400 MHz

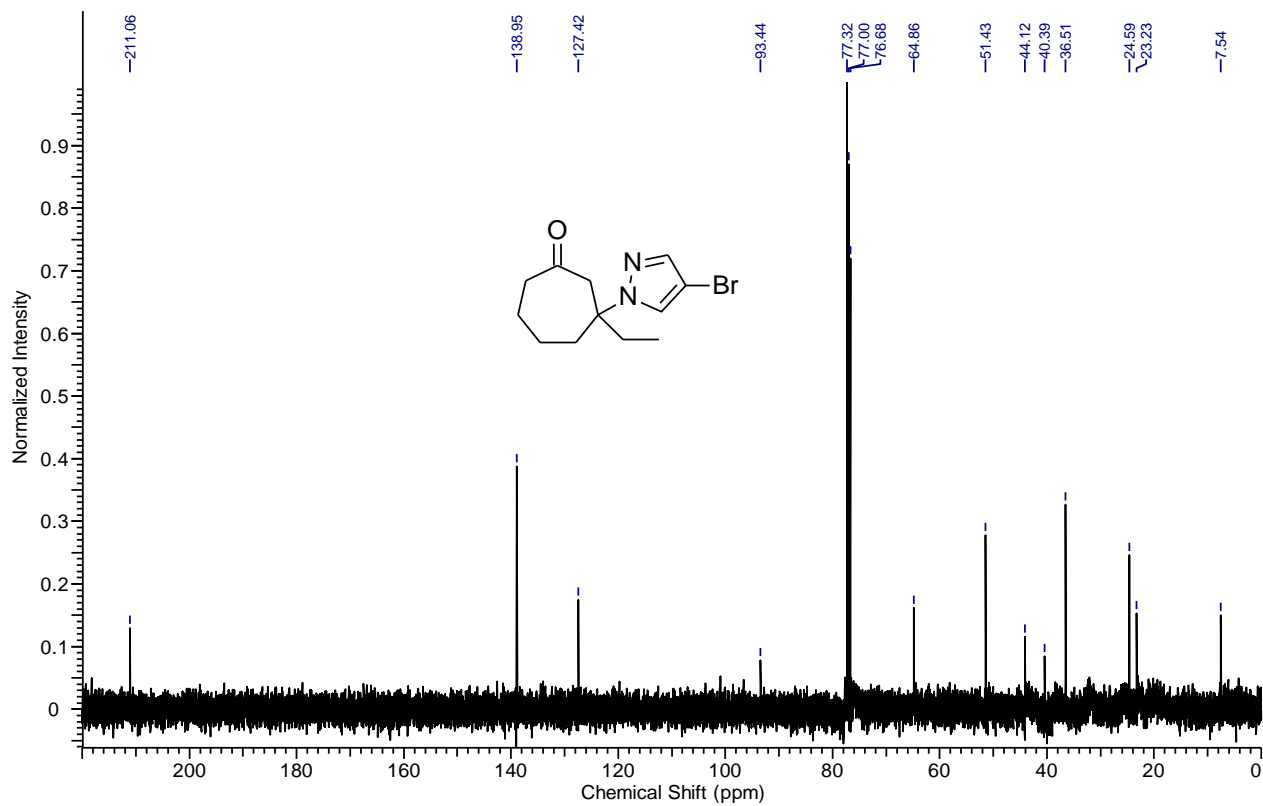


Figure S52. ^{13}C NMR spectrum of the compound **3kd** in CDCl_3 , 100 MHz

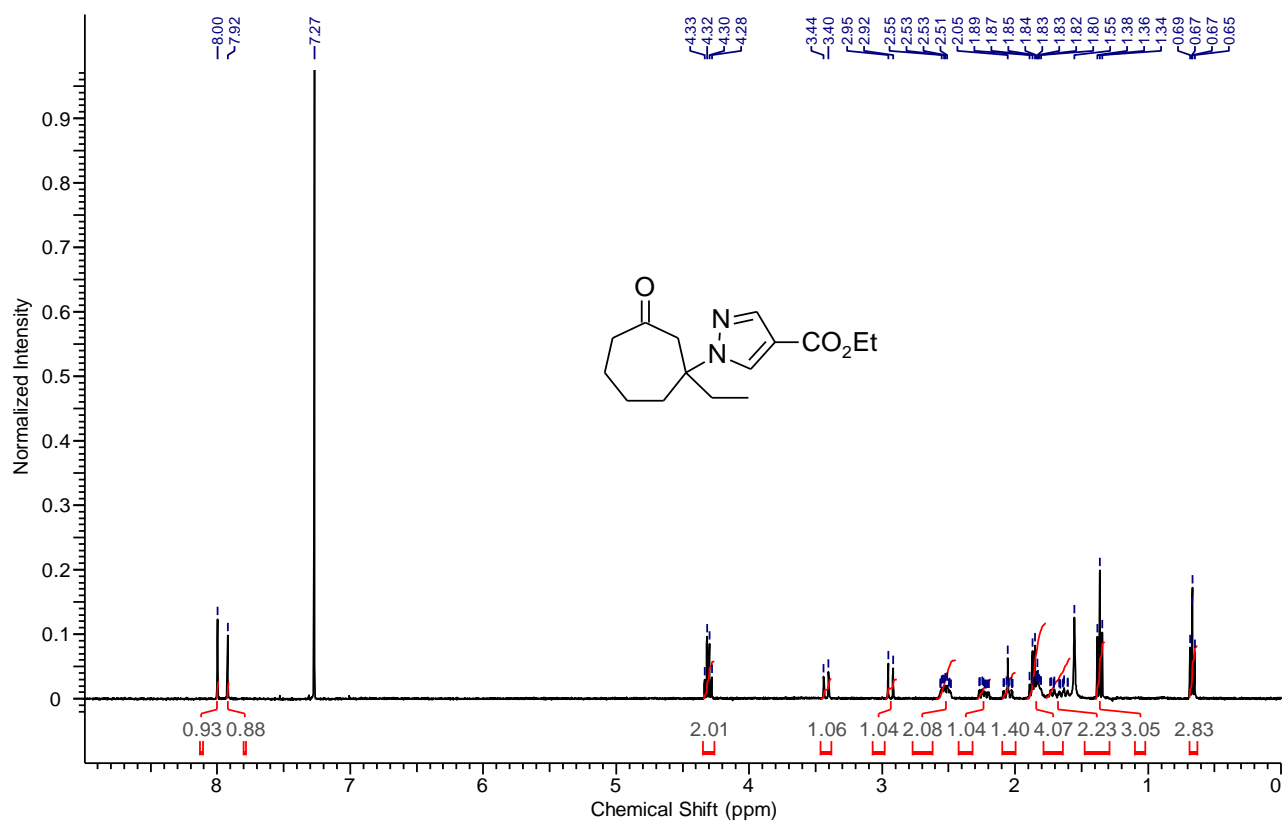


Figure S53. ^1H NMR spectrum of the compound **3ke** in CDCl_3 , 400 MHz

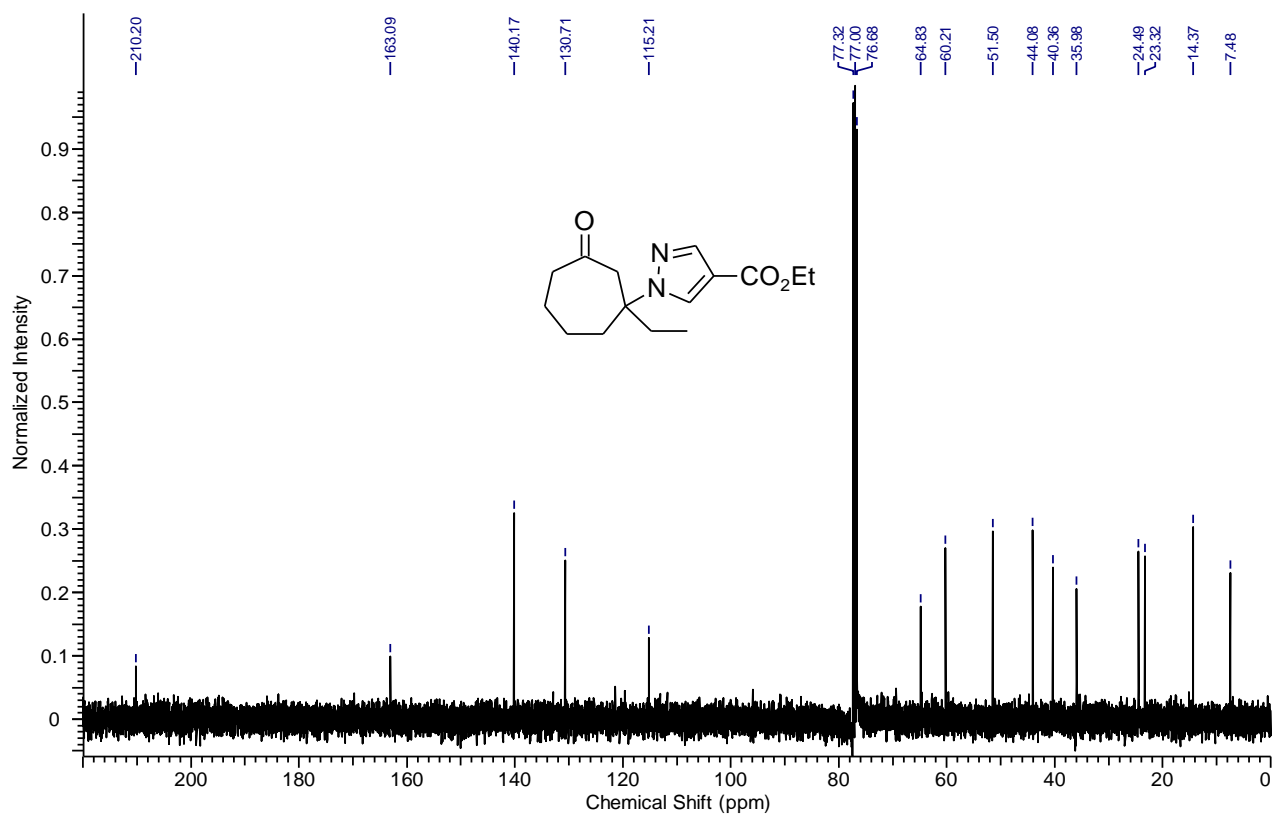


Figure S54. ^{13}C NMR spectrum of the compound **3ke** in CDCl_3 , 100 MHz

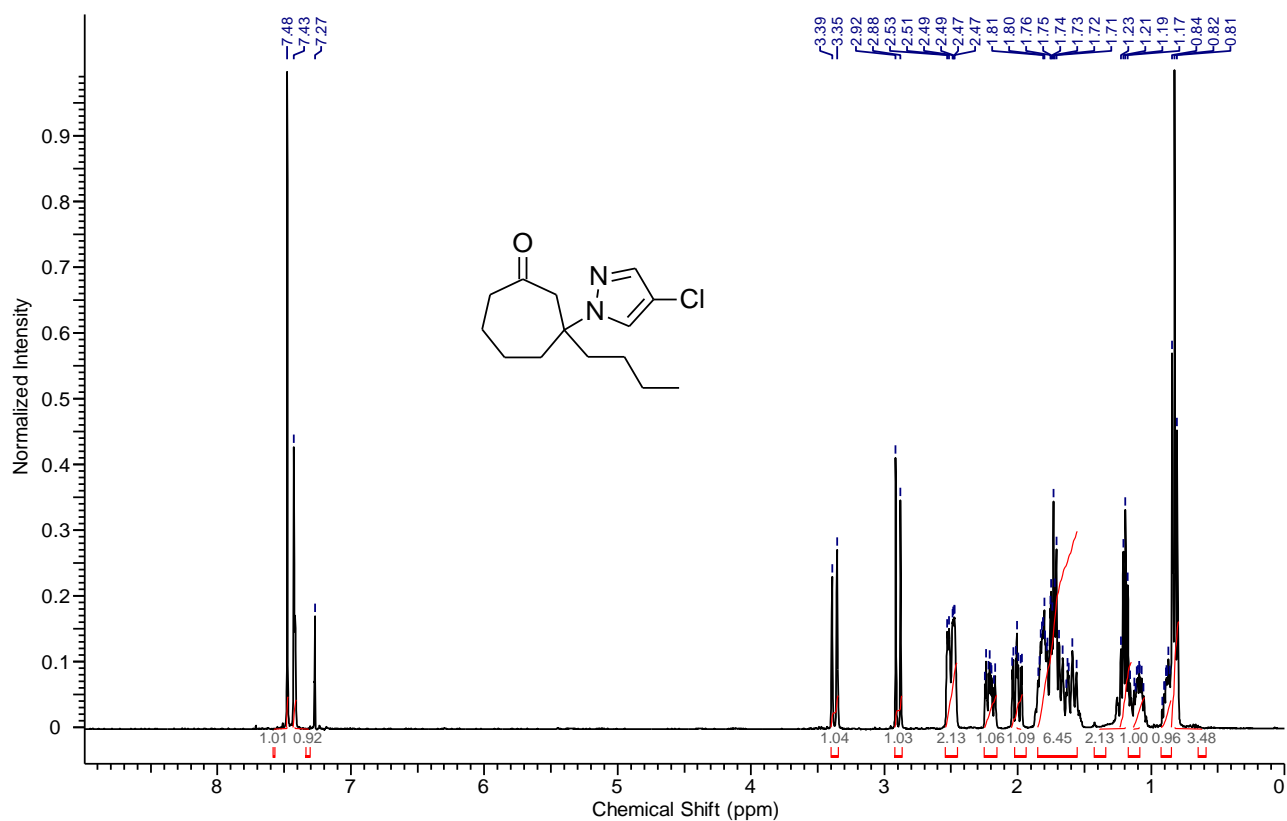


Figure S55. ^1H NMR spectrum of the compound **3lc** in CDCl_3 , 400 MHz

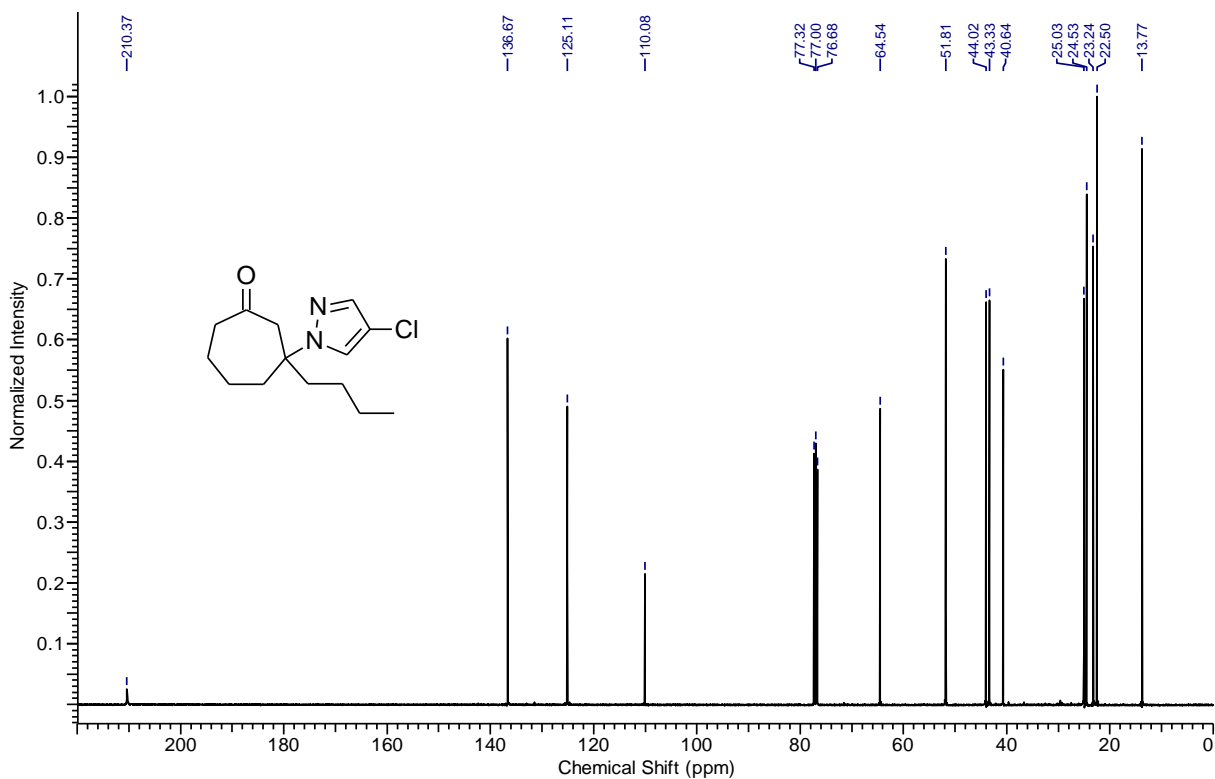


Figure S56. ^{13}C NMR spectrum of the compound **3lc** in CDCl_3 , 100 MHz

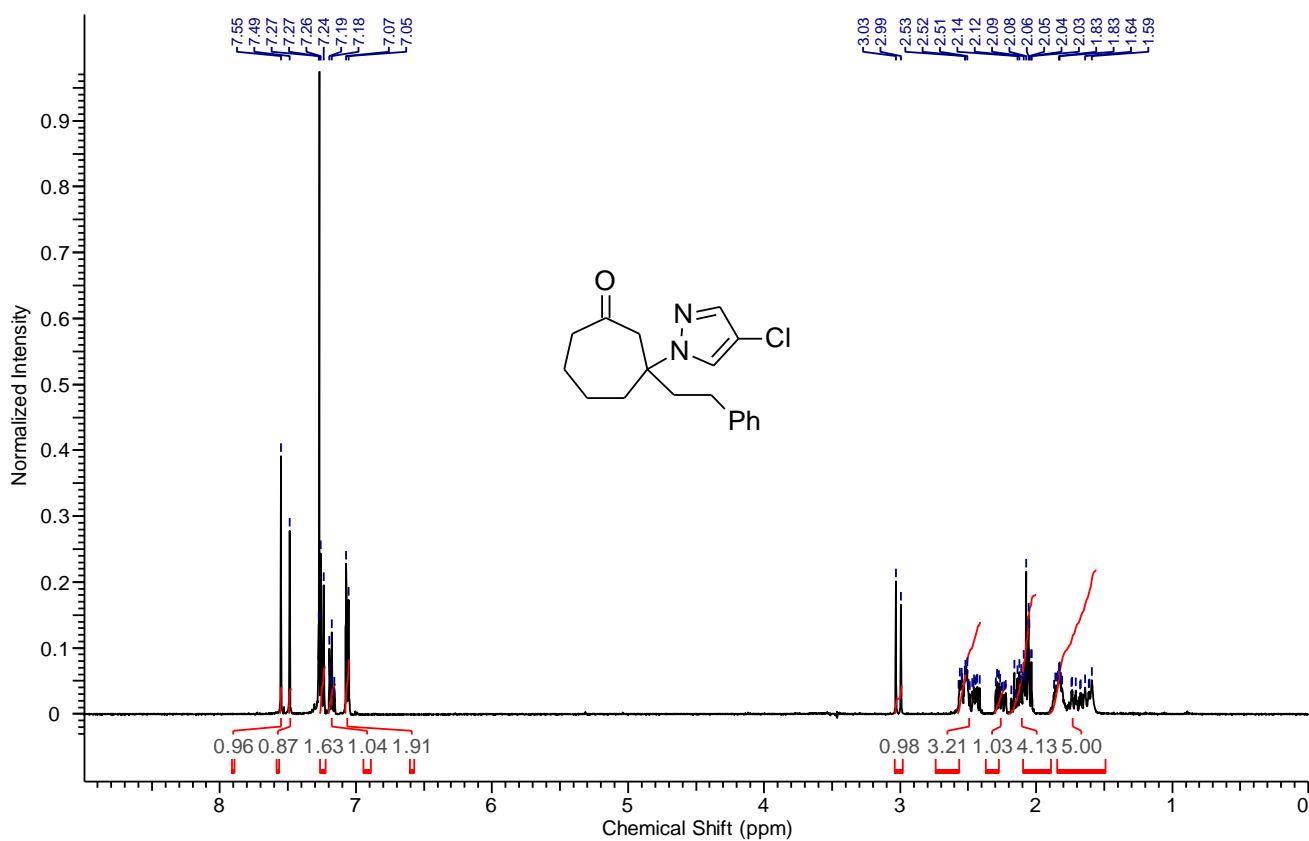


Figure S57. ^1H NMR spectrum of the compound **3mc** in CDCl_3 , 400 MHz

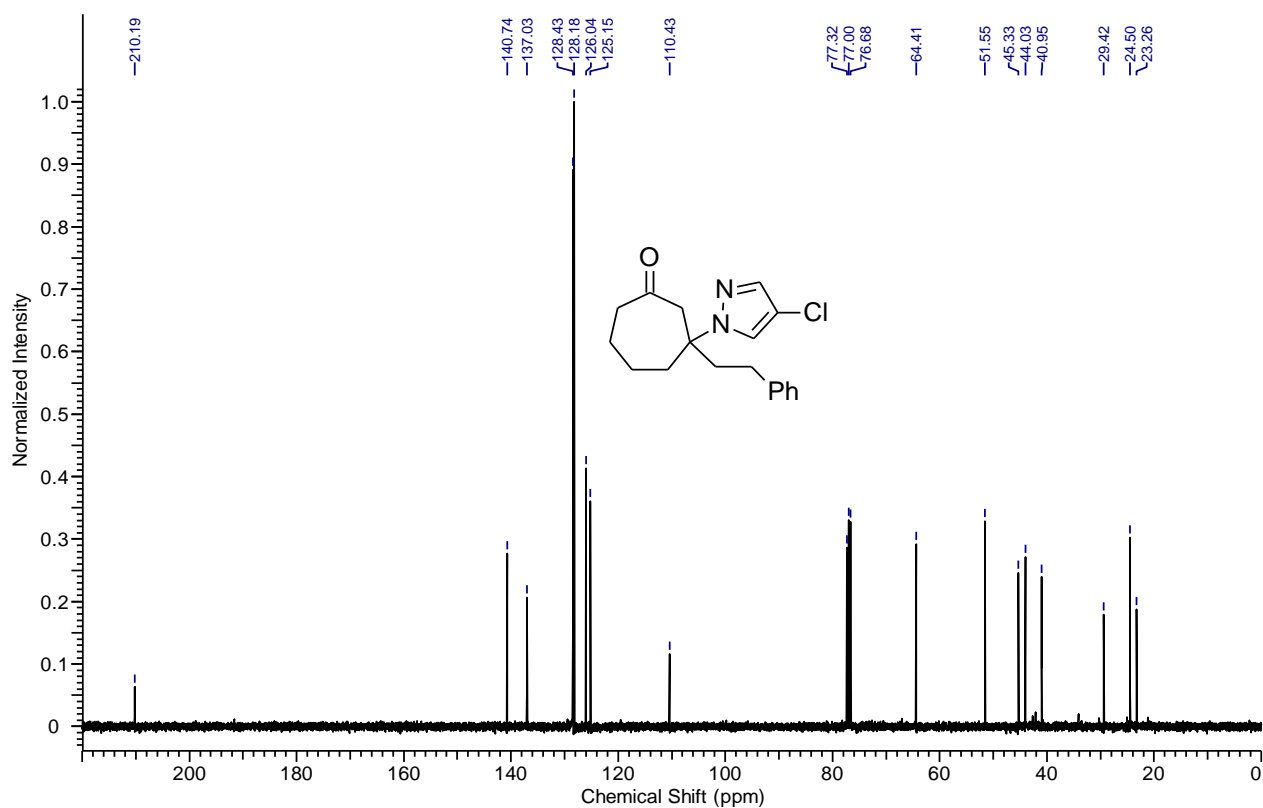


Figure S58. ^{13}C NMR spectrum of the compound **3mc** in CDCl_3 , 100 MHz

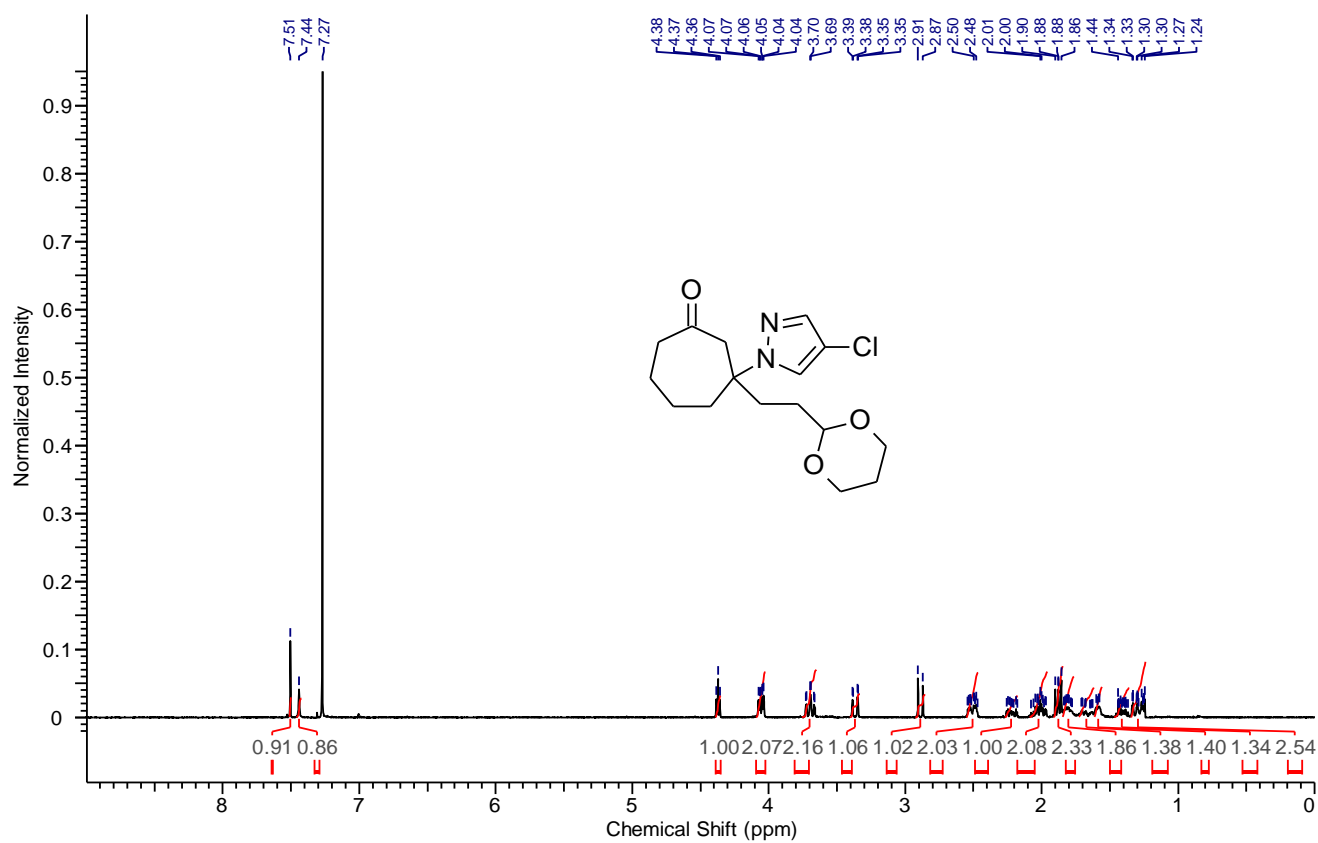


Figure S59. ^1H NMR spectrum of the compound **3nc** in CDCl_3 , 400 MHz

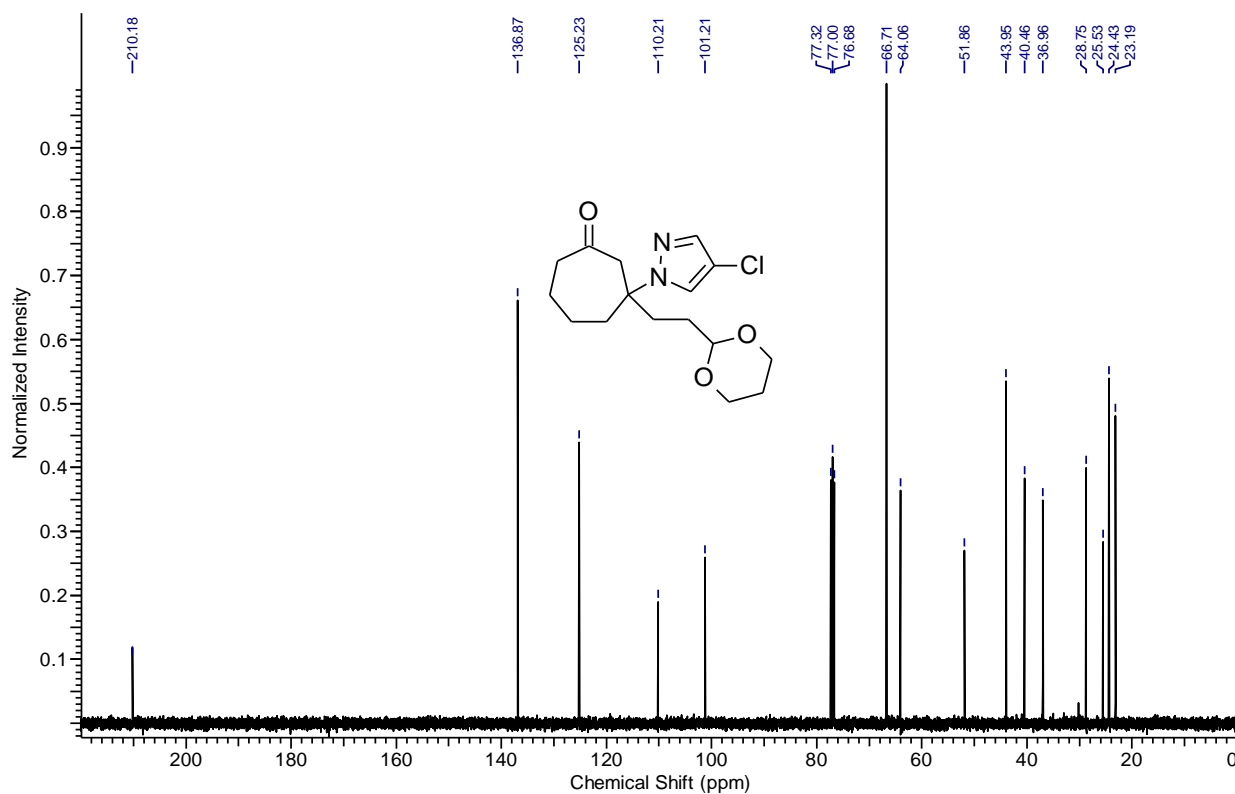


Figure S60. ^{13}C NMR spectrum of the compound **3nc** in CDCl_3 , 100 MHz

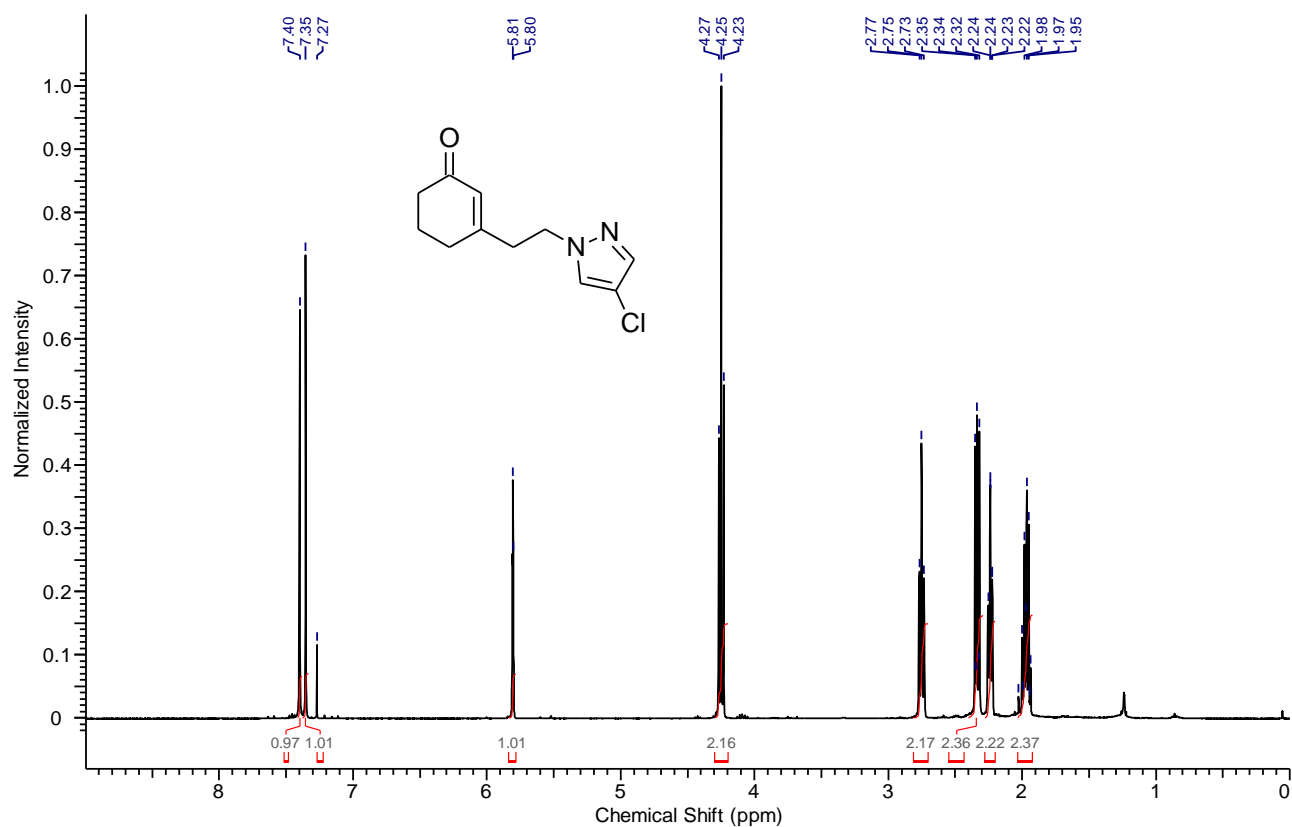


Figure S61. ^1H NMR spectrum of the compound **30c** in CDCl_3 , 400 MHz

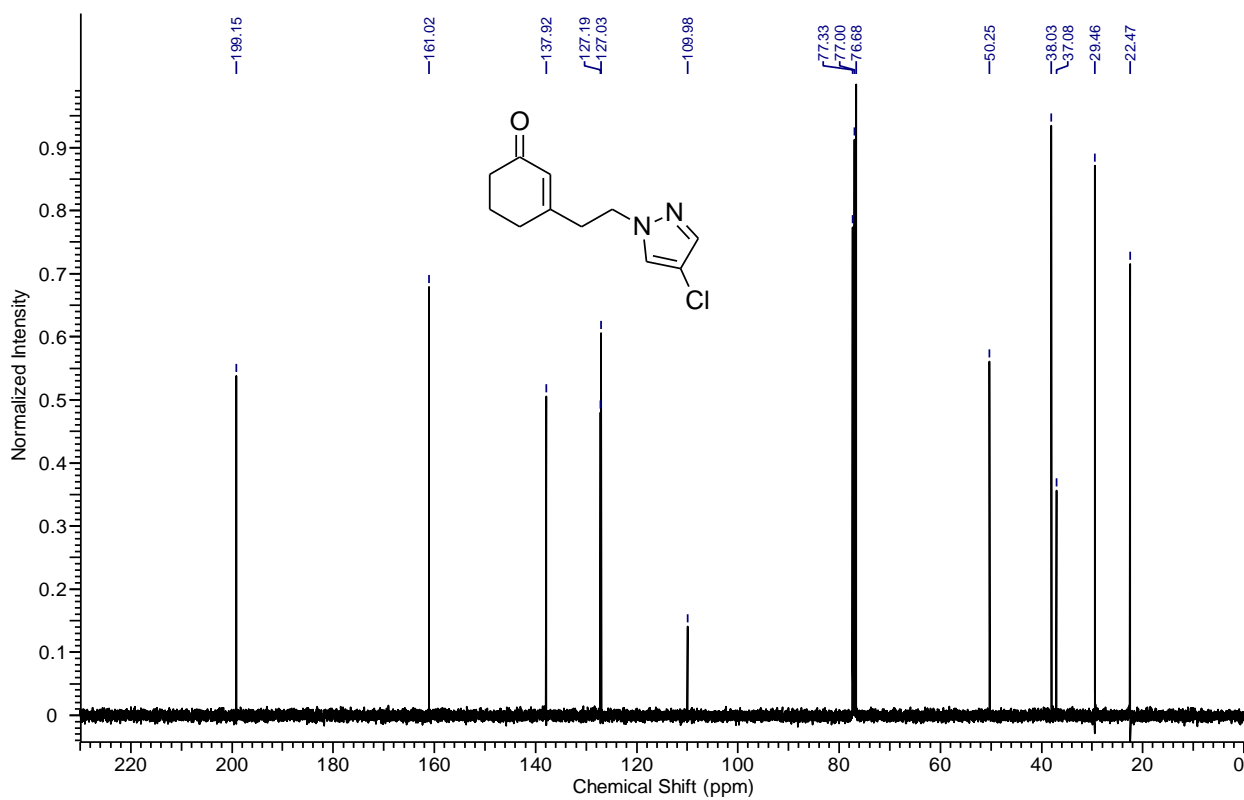


Figure S62. ^{13}C NMR spectrum of the compound **30c** in CDCl_3 , 100 MHz

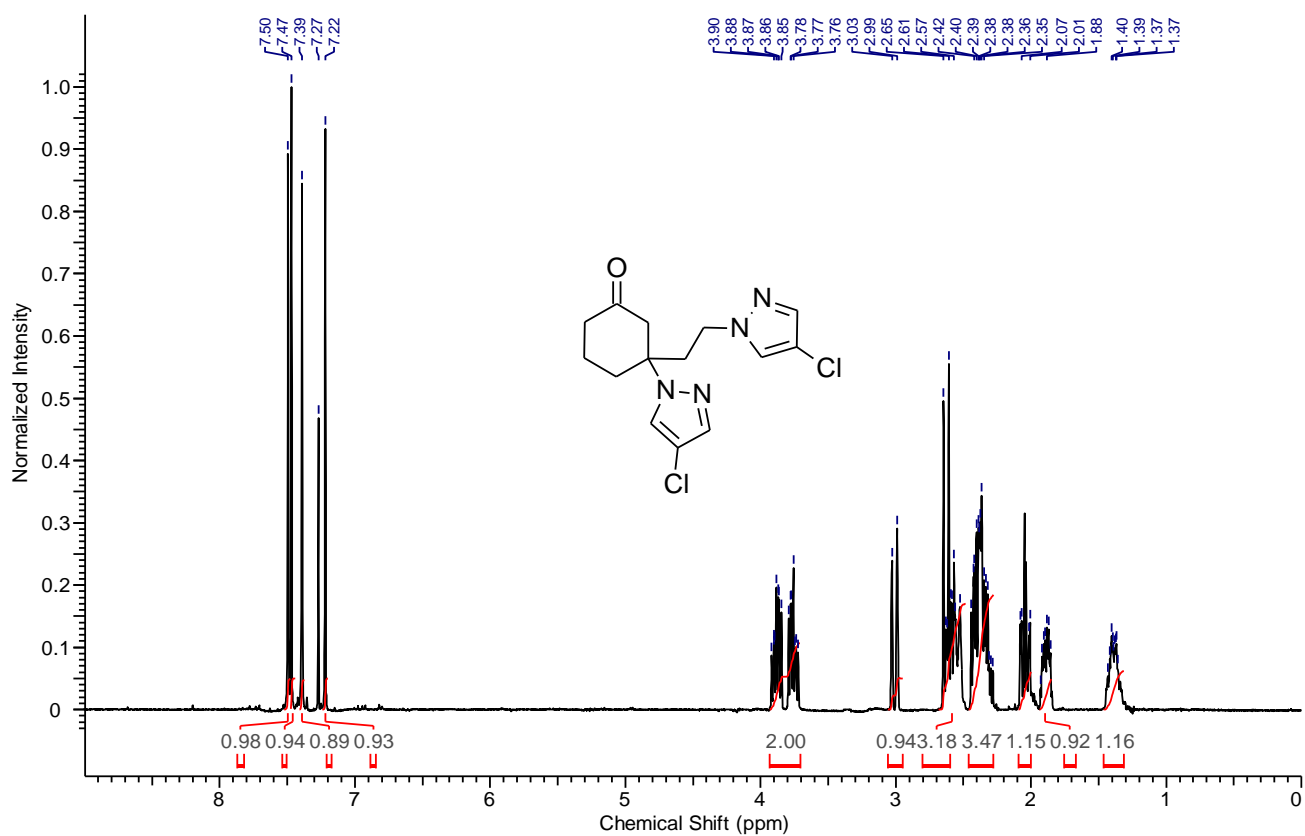


Figure S63. ¹H NMR spectrum of the compound **4a** in CDCl₃, 400 MHz

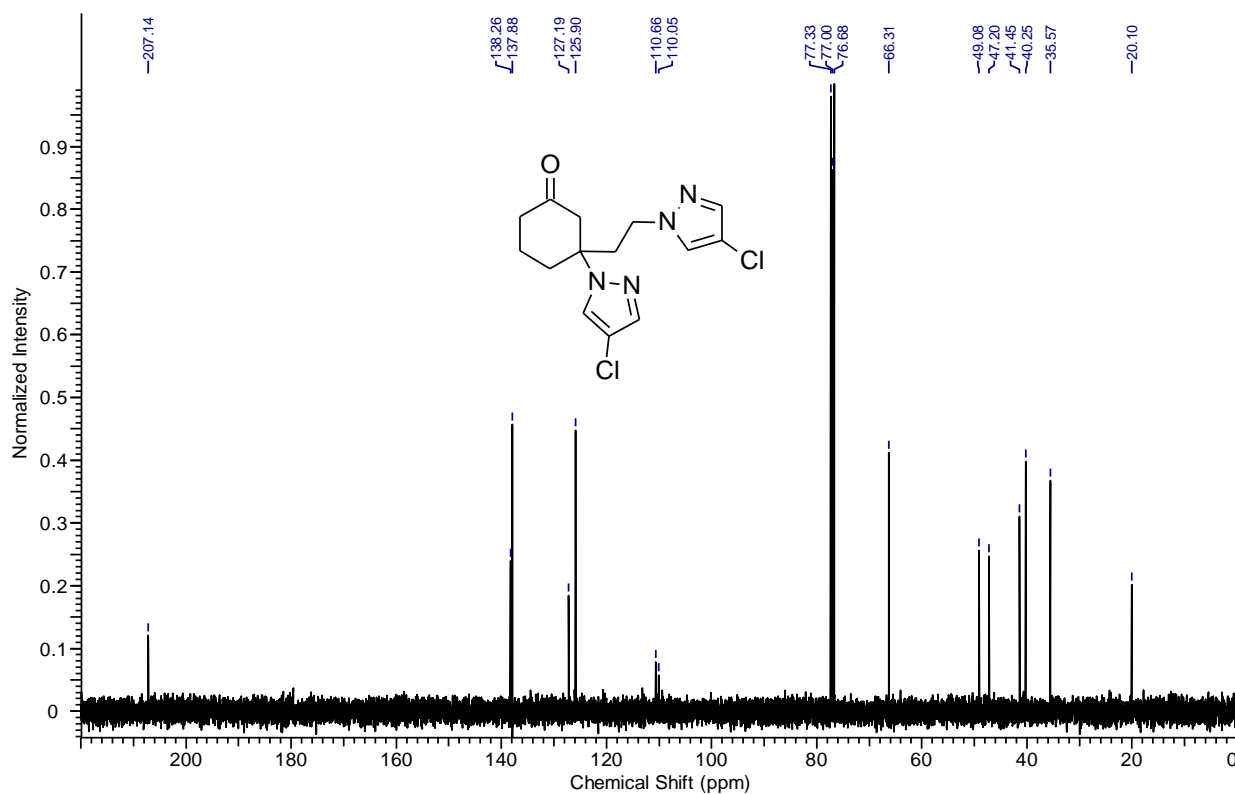


Figure S64. ¹³C NMR spectrum of the compound **4a** in CDCl₃, 100 MHz

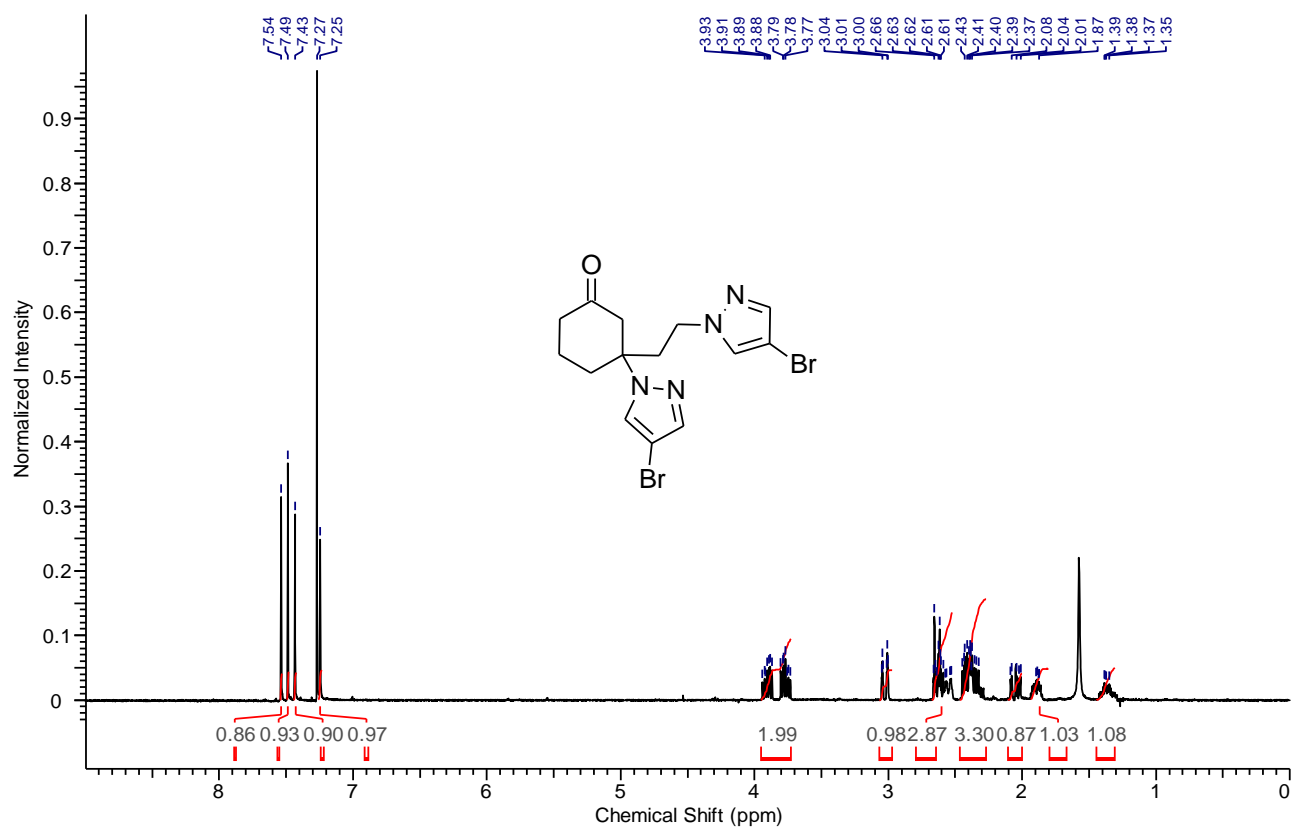


Figure S65. ¹H NMR spectrum of the compound **4b** in CDCl₃, 400 MHz

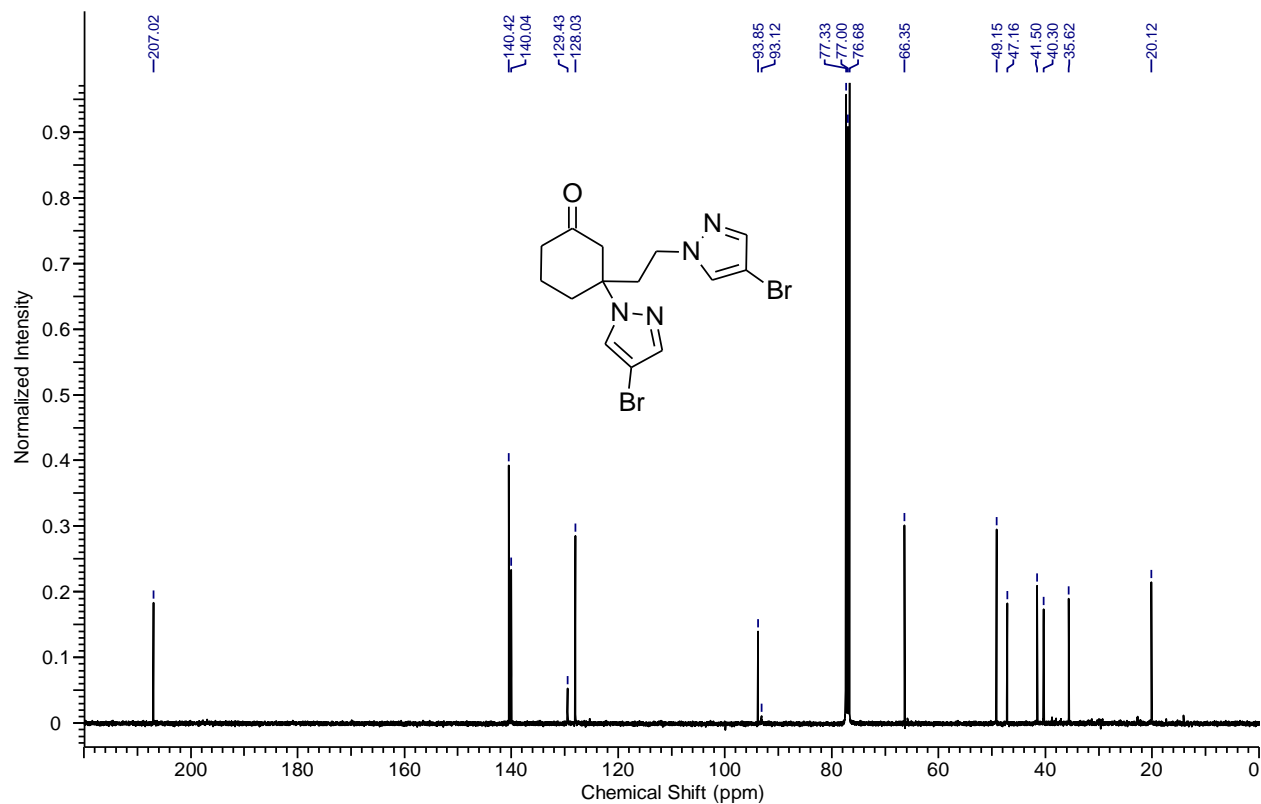


Figure S66. ¹³C NMR spectrum of the compound **4b** in CDCl₃, 100 MHz

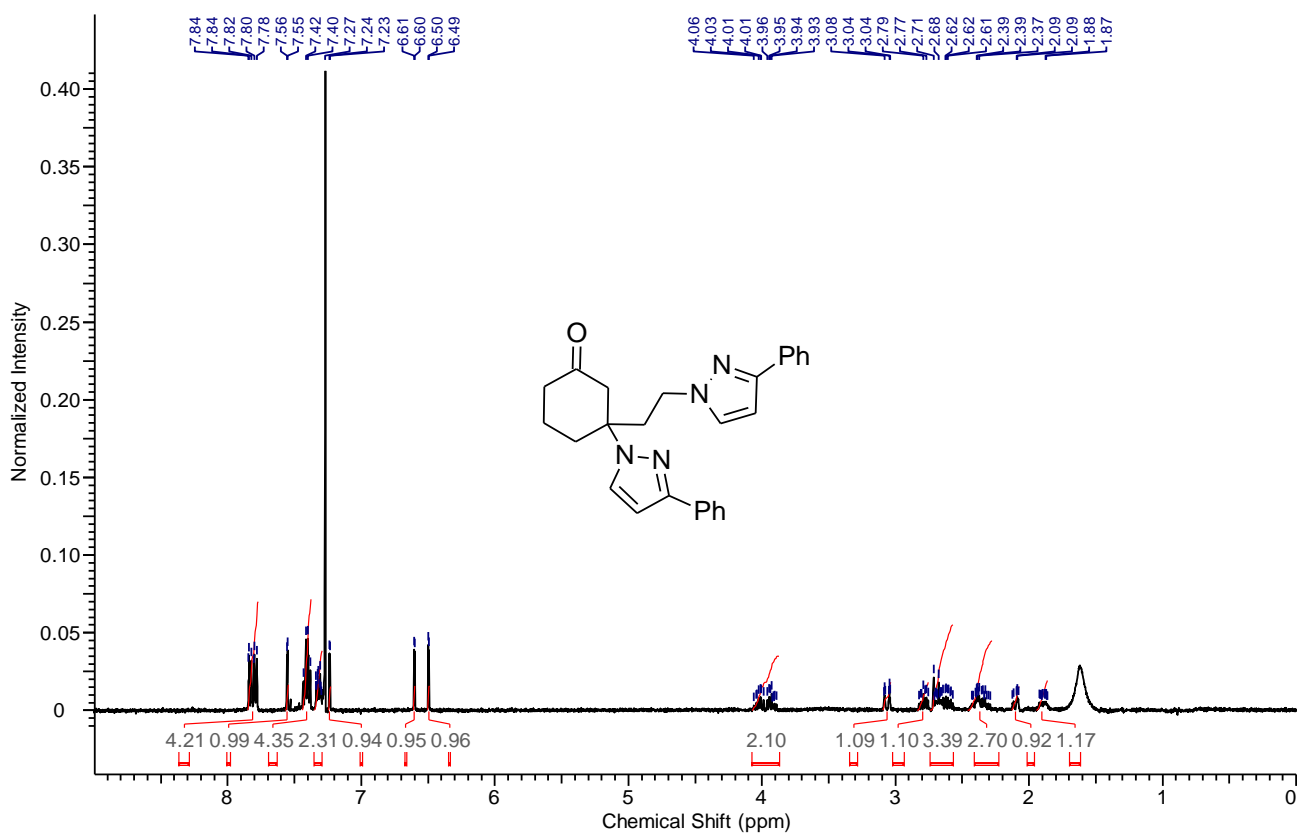


Figure S67. ^1H NMR spectrum of the compound **4c** in CDCl_3 , 400 MHz

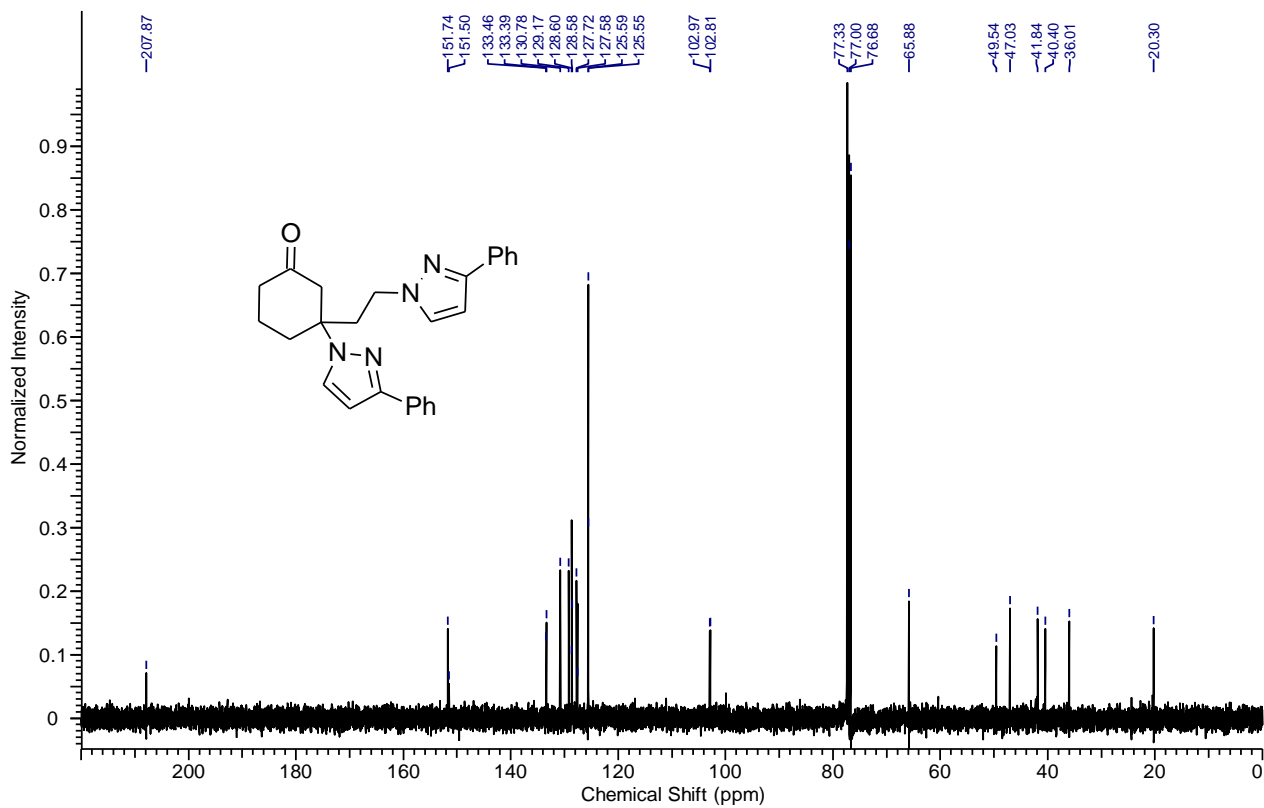


Figure S68. ^{13}C NMR spectrum of the compound **4c** in CDCl_3 , 100 MHz

■ 2D-NOESY proton NMR spectra of compound 3af, 3ah and ¹H NOESY correlations

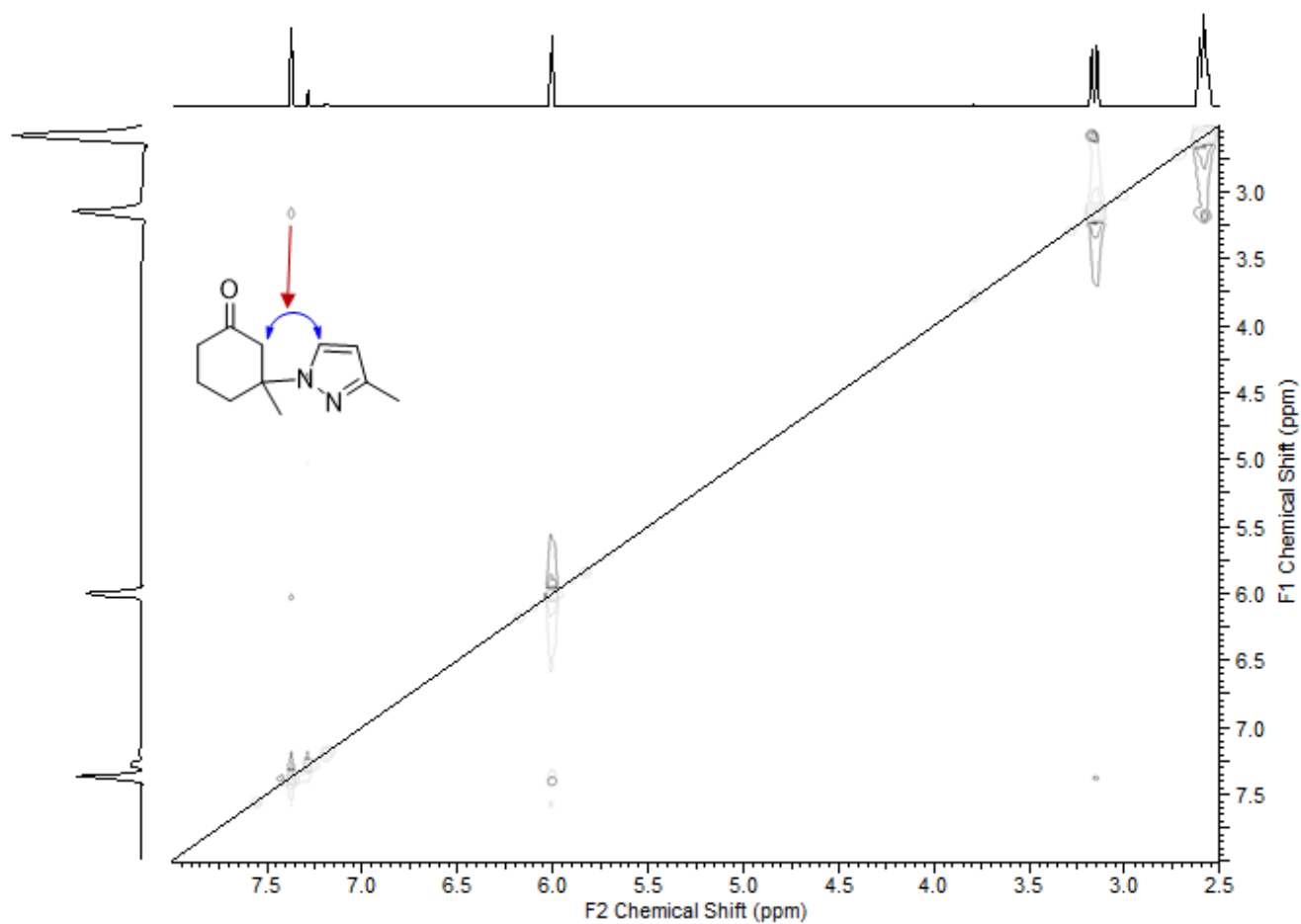


Figure S. 2D-NOESY spectrum of the compound 3af in CDCl₃

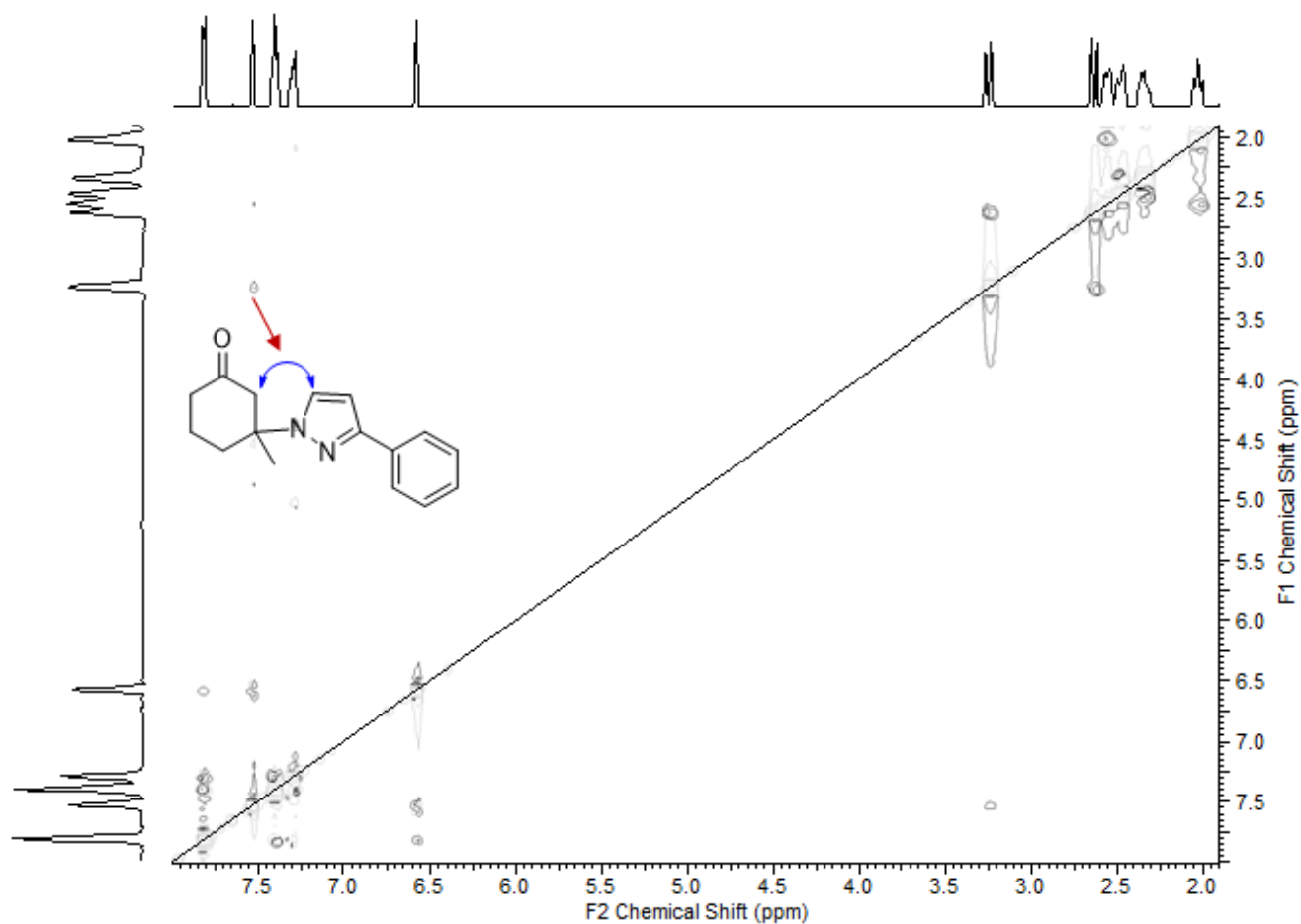


Figure S. 2D-NOESY spectrum of the compound **3ah** in CDCl₃