

Supplementary Materials: Synthesis and Anticancer Activities of Novel Guanyldihydrazone and Aminoguanidine Tetrahydropyran Derivatives

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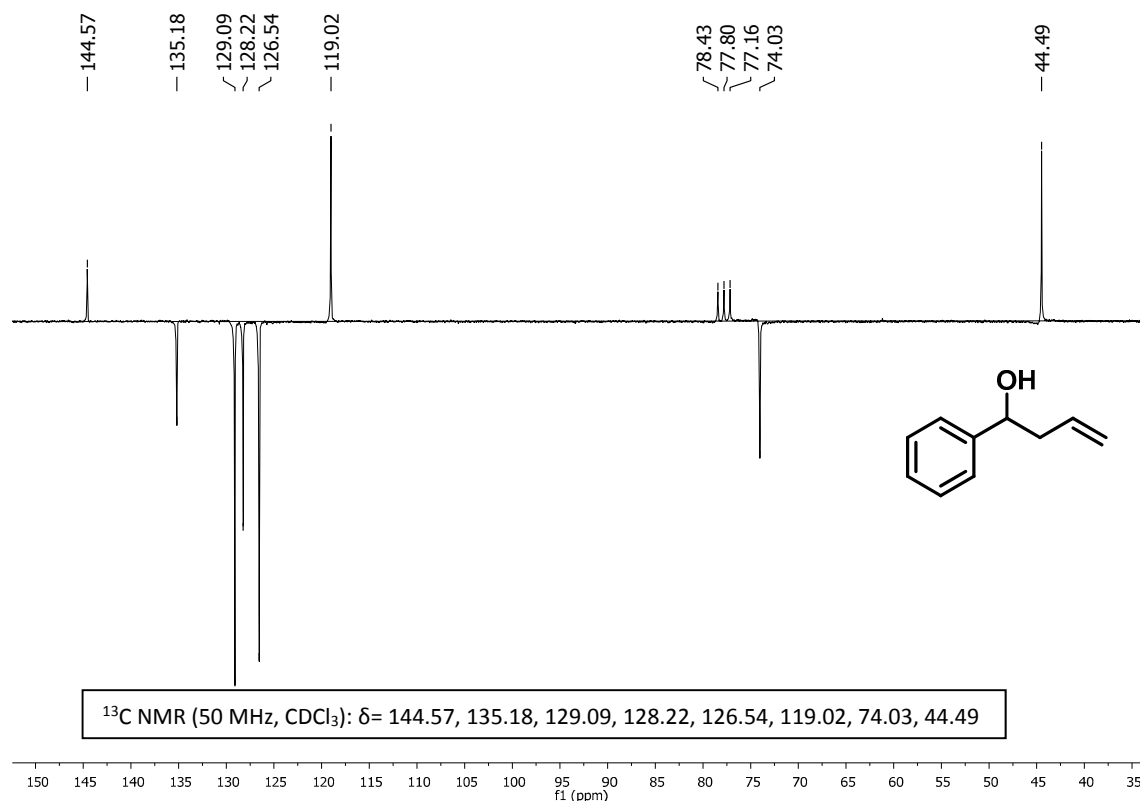
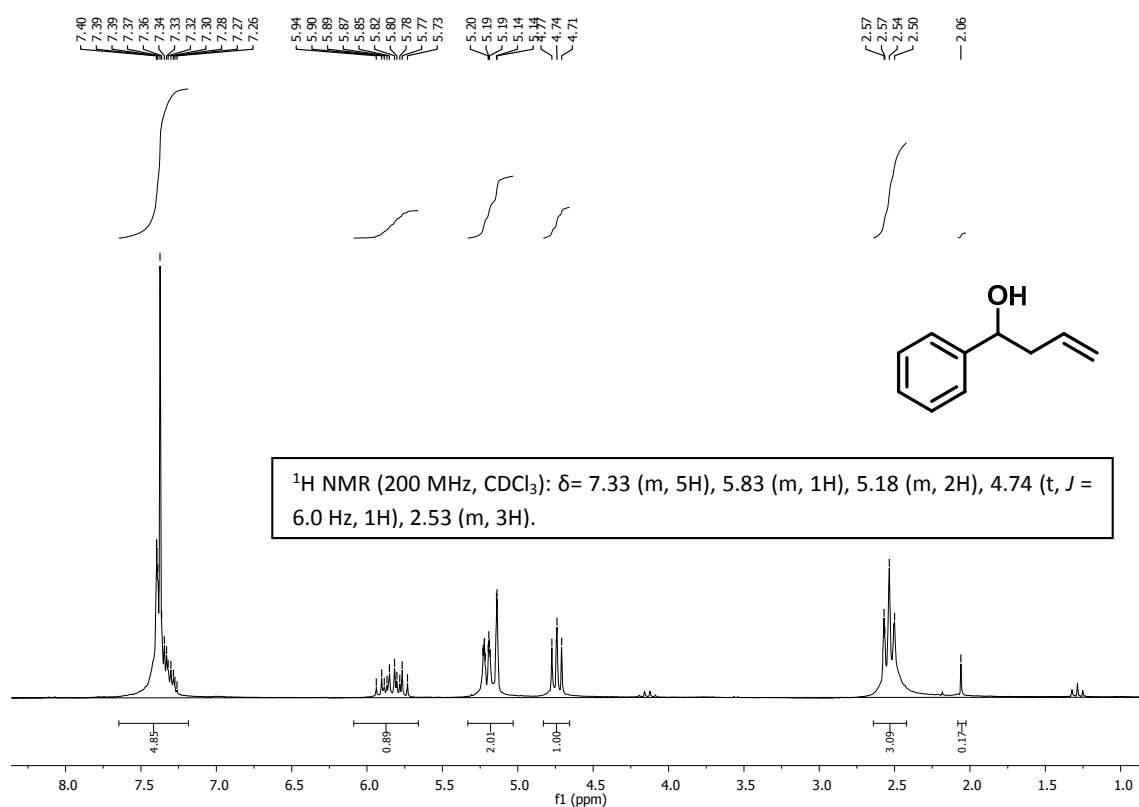
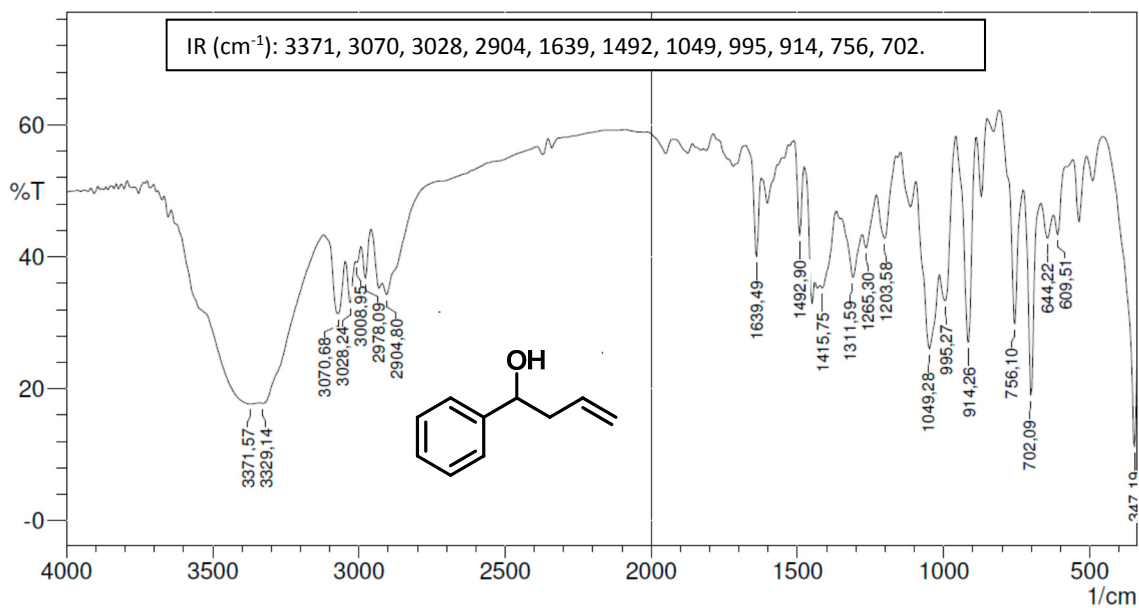
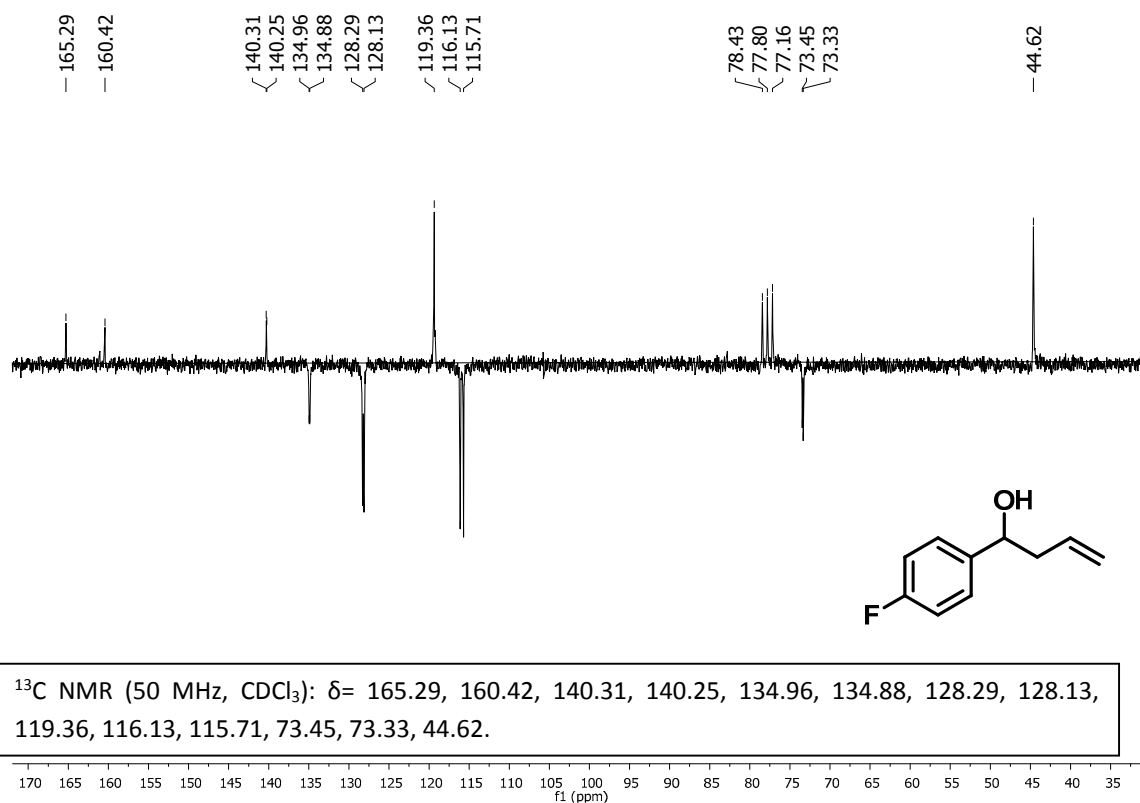
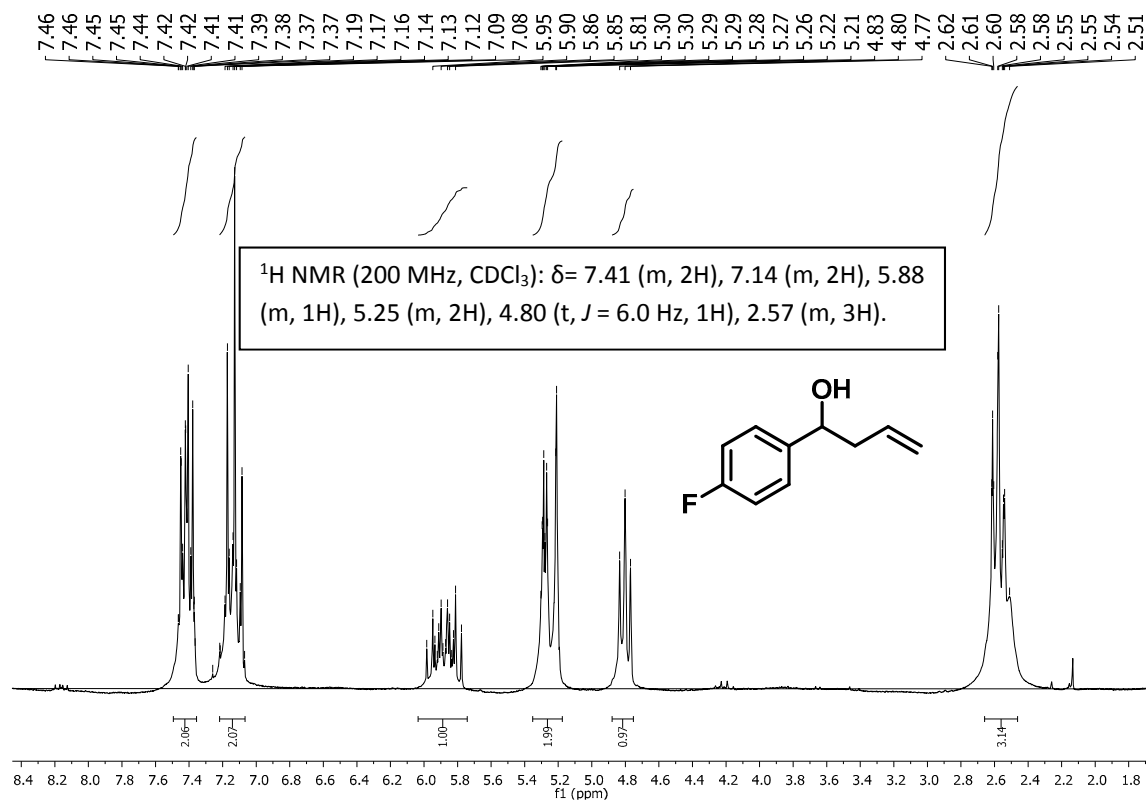
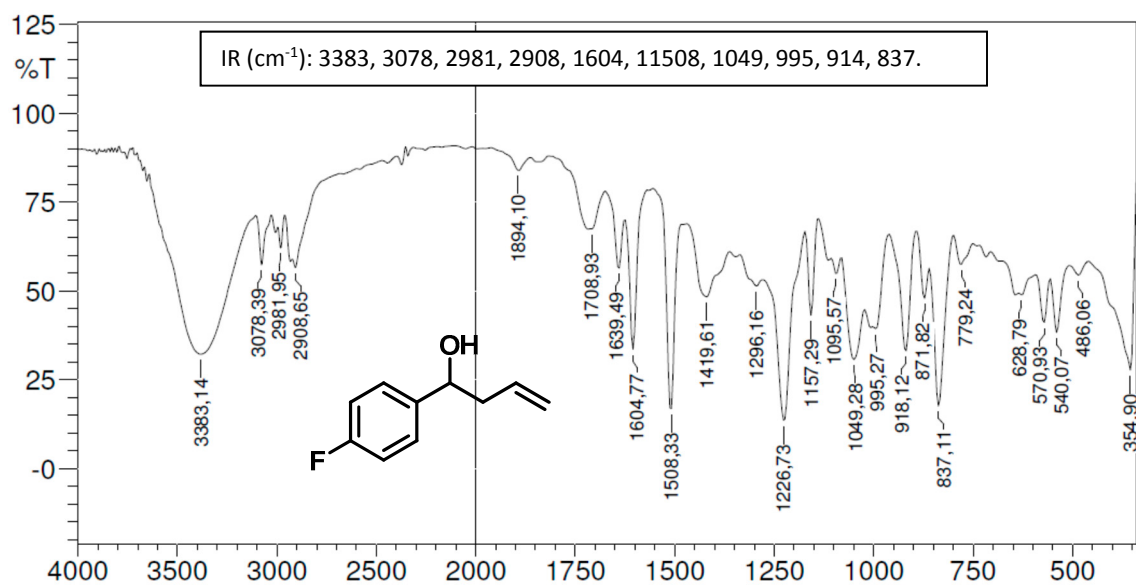
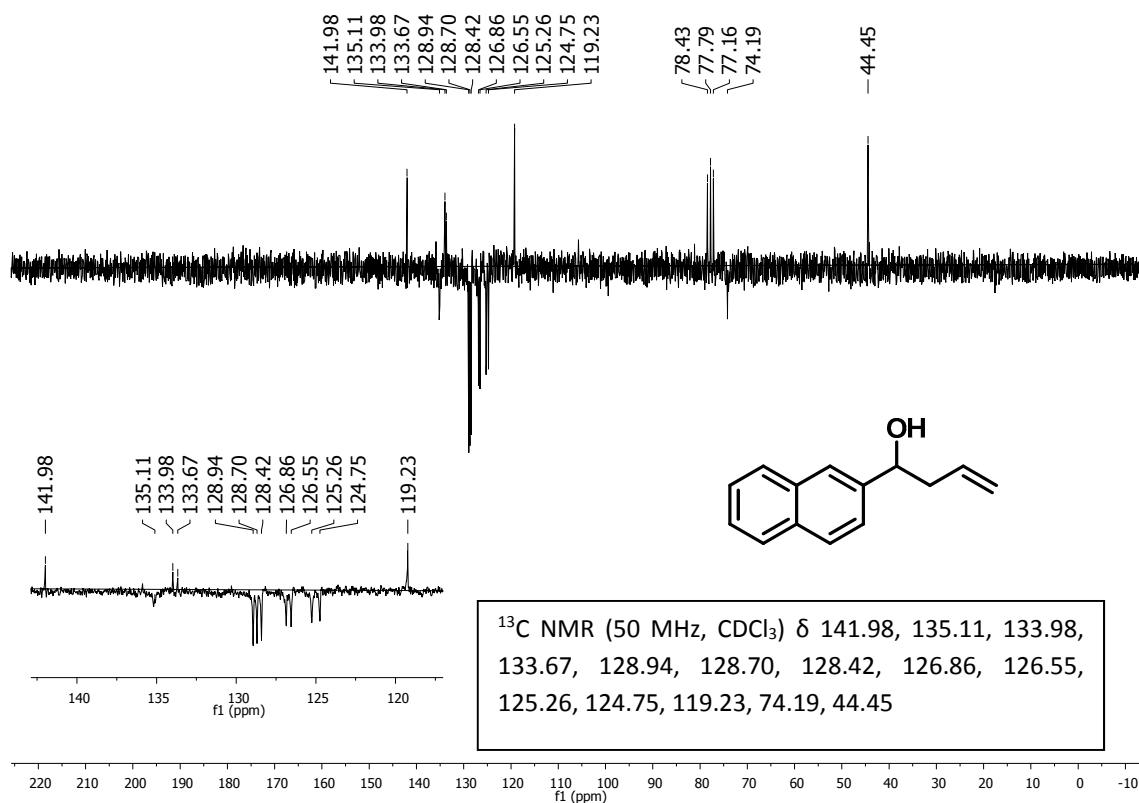
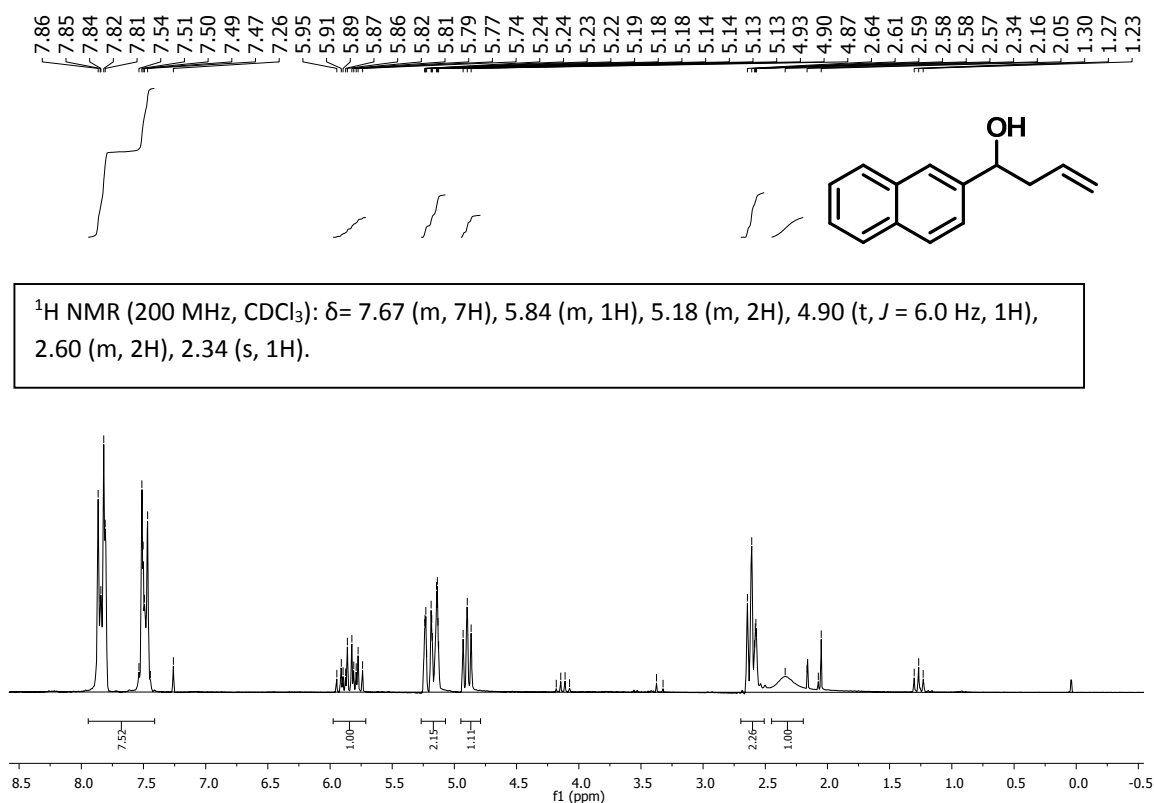
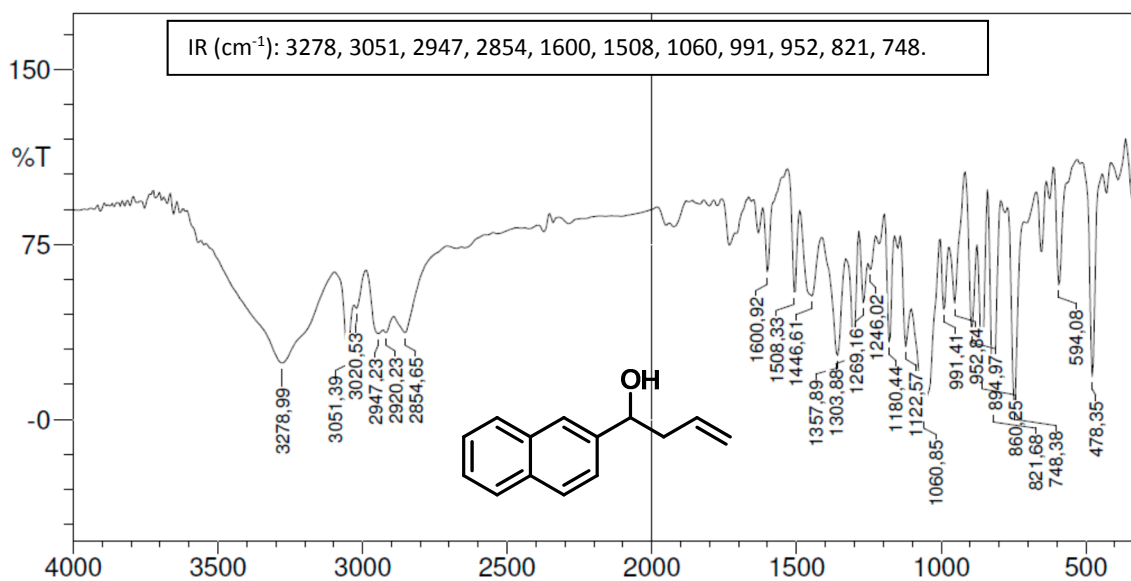


Figure S1. ¹³C NMR-APT CDCl₃, 50 MHz) of 1-phenylbut-3-en-1-ol.

Figure S2. ¹H NMR (CDCl₃, 200 MHz) of 1-phenylbut-3-en-1-ol.Figure S3. IR (KBr, cm⁻¹) of 1-phenylbut-3-en-1-ol.

Figure S4. NMR ¹³C-APT (CDCl₃, 50 MHz) of 1-(4-fluorophenyl)but-3-en-1-ol.Figure S5. ¹H NMR (CDCl₃, 200 MHz) of 1-(4-fluorophenyl)but-3-en-1-ol.

Figure S6. IR (KBr, cm⁻¹) of 1-(4-fluorophenyl)but-3-en-1-ol.Figure S7. ¹³C NMR-APT (CDCl₃, 50 MHz) of 1-(naphthalen-2-yl)but-3-en-1-ol.

Figure S8. ¹H NMR (CDCl₃, 200 MHz) of 1-(naphthalen-2-yl)but-3-en-1-ol.Figure S9. IR (KBr, cm⁻¹) of 1-(naphthalen-2-yl)but-3-en-1-ol.

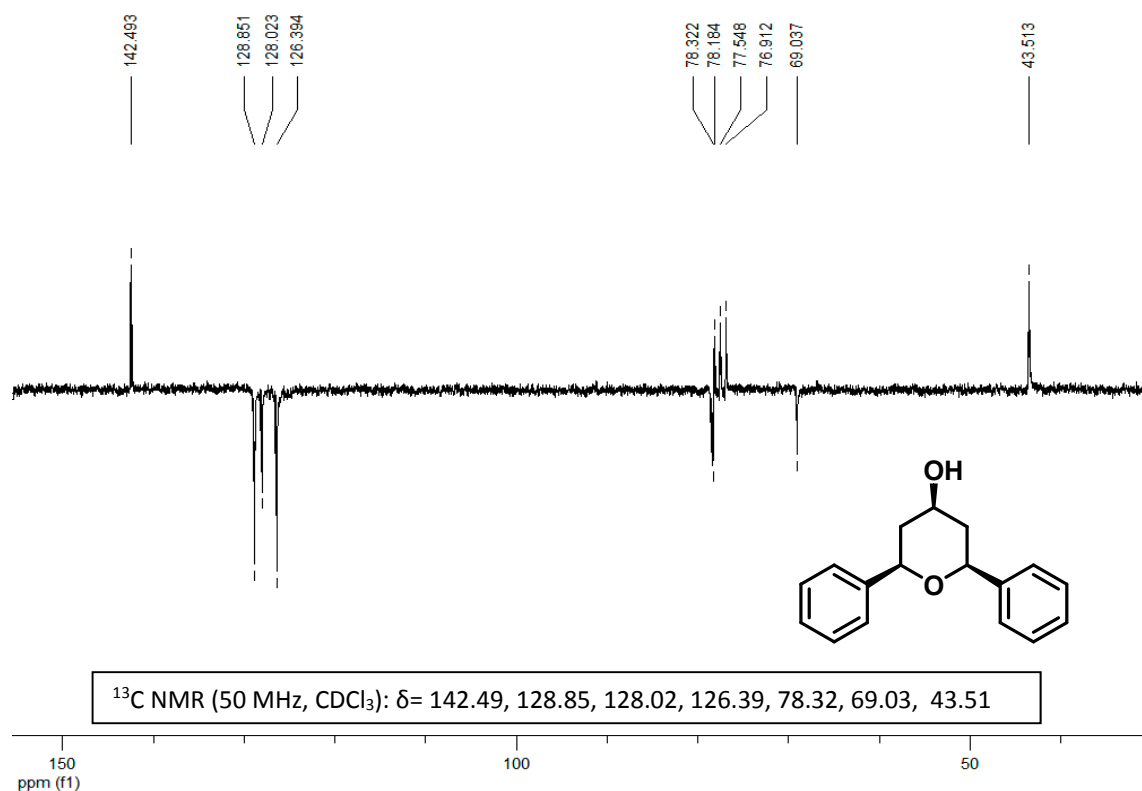


Figure S10. ¹³C NMR-APT (CDCl₃, 50 MHz) of 2,6-diphenyl-tetrahydro-2H-pyran-4-ol (**1a**).

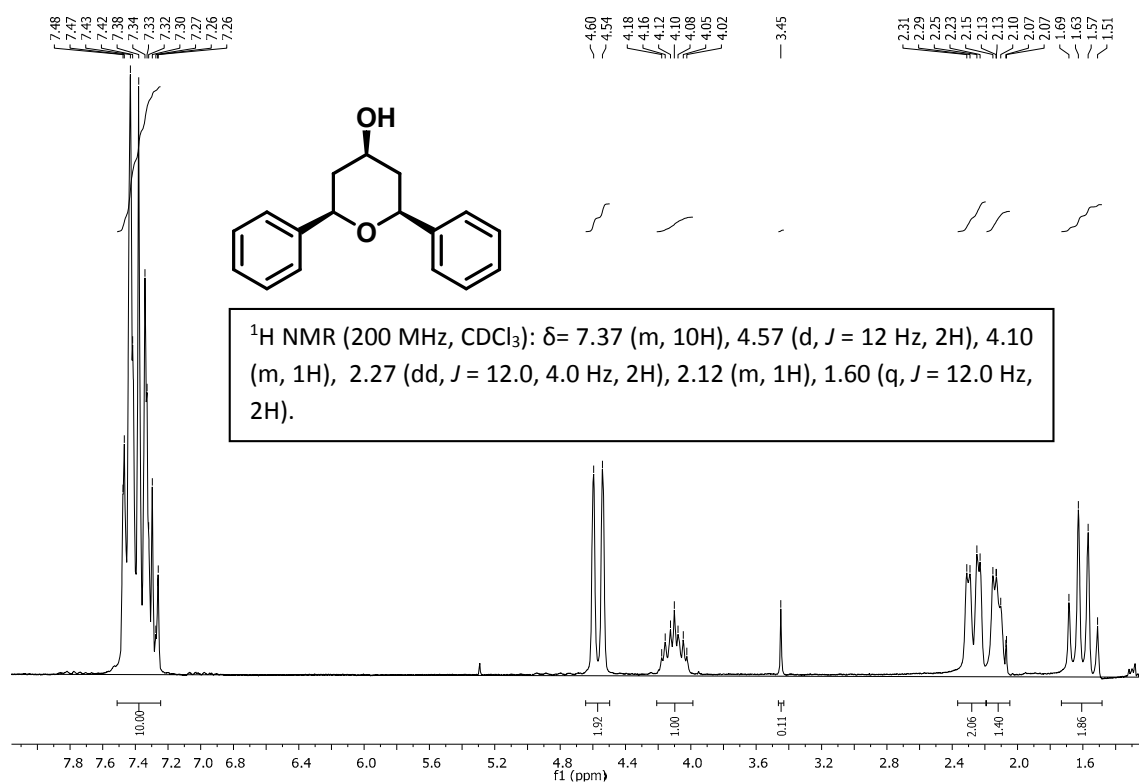


Figure S11. ¹H NMR (CDCl₃, 200 MHz) of 2,6-diphenyl-tetrahydro-2H-pyran-4-ol (**1a**).

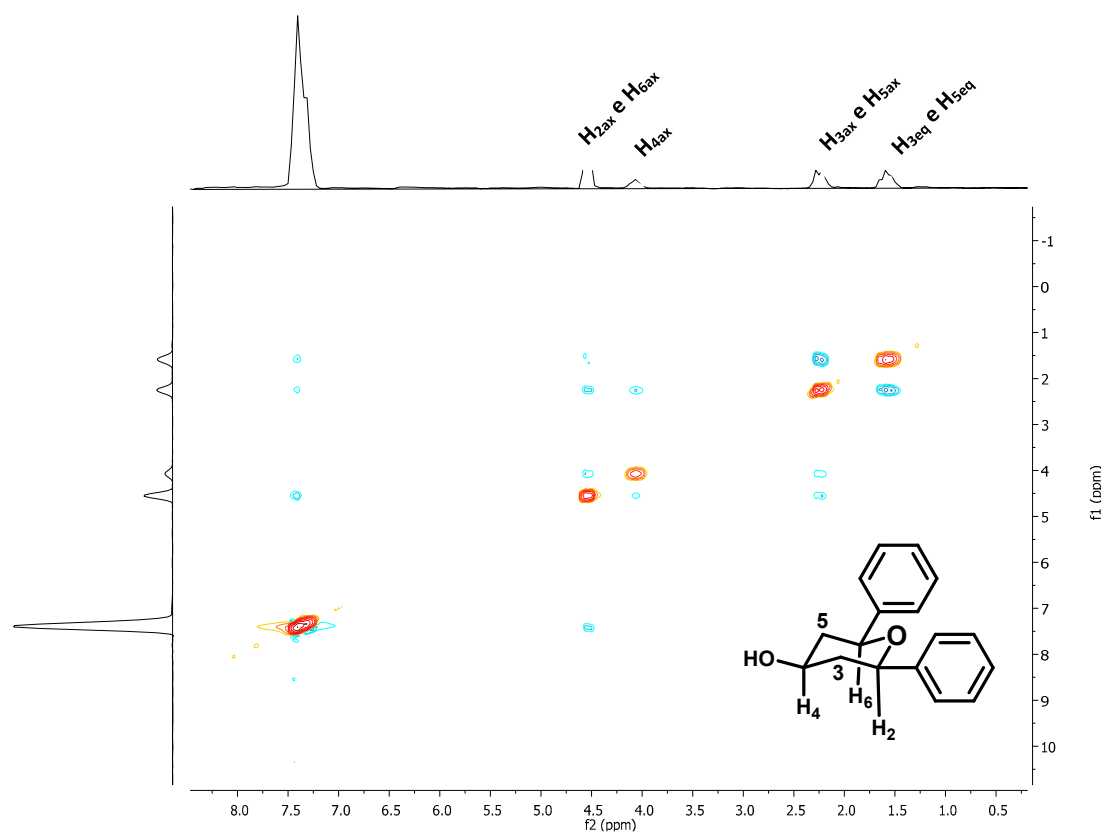


Figure S12. NOSY of 2,6-diphenyl-tetrahydro-2H-pyran-4-ol (**1a**).

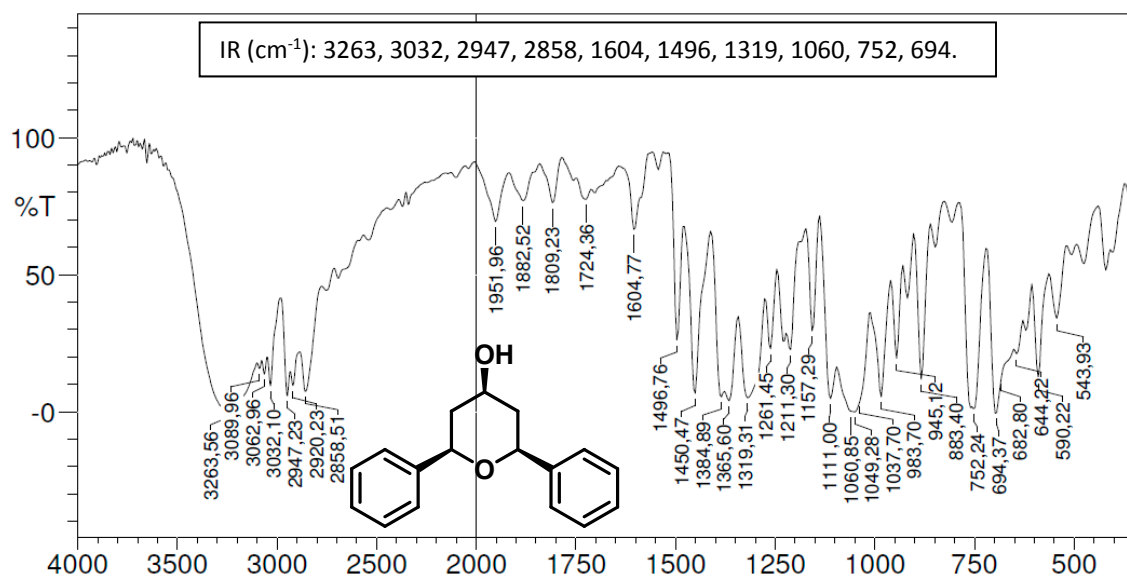


Figure S13. IR (KBr, cm^{-1}) of 2,6-diphenyl-tetrahydro-2H-pyran-4-ol (**1a**).

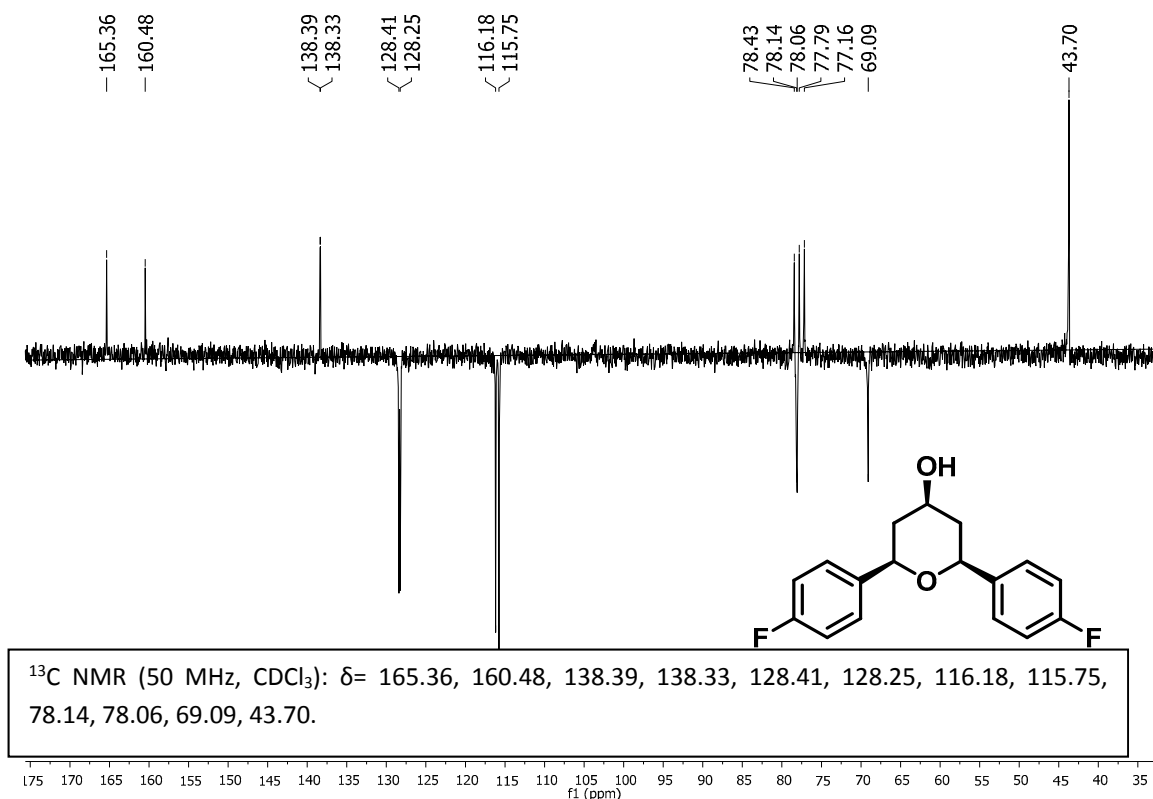


Figure S14. ¹³C NMR-APT (CDCl₃, 50 MHz) of 2,6-di(naphthalen-2-yl)-tetrahydro-2H-pyran-4-ol (**1b**).

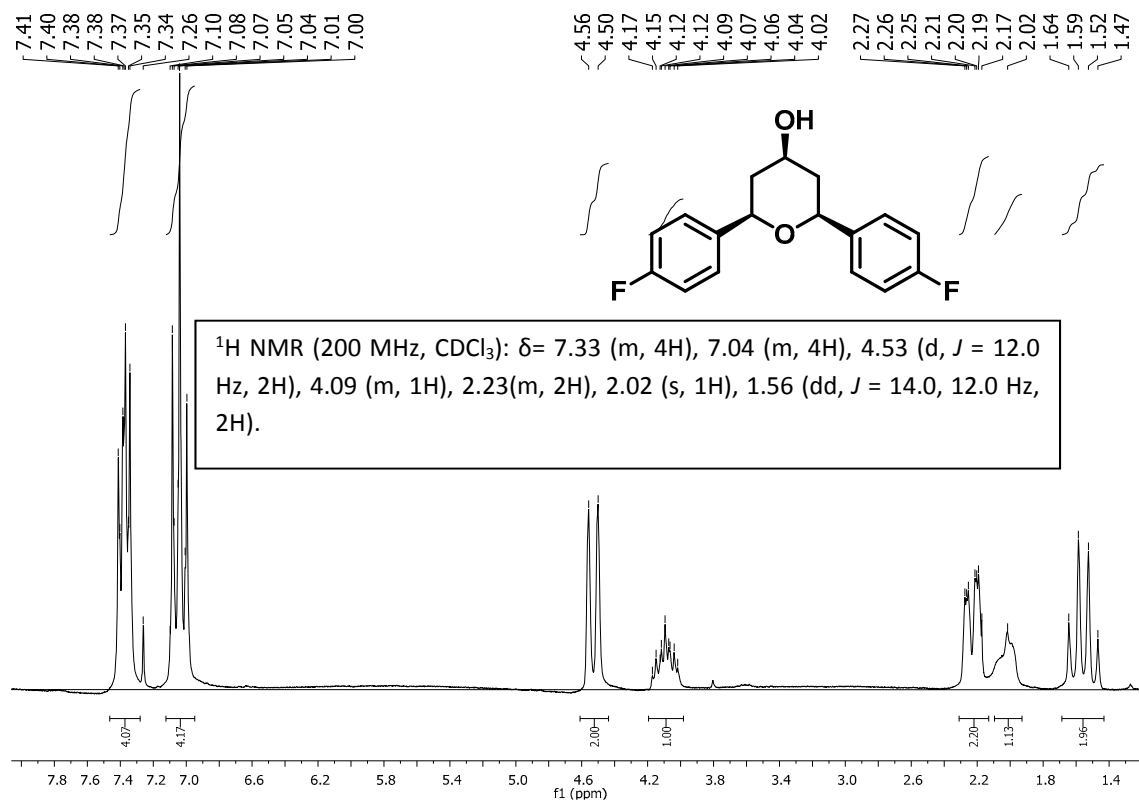
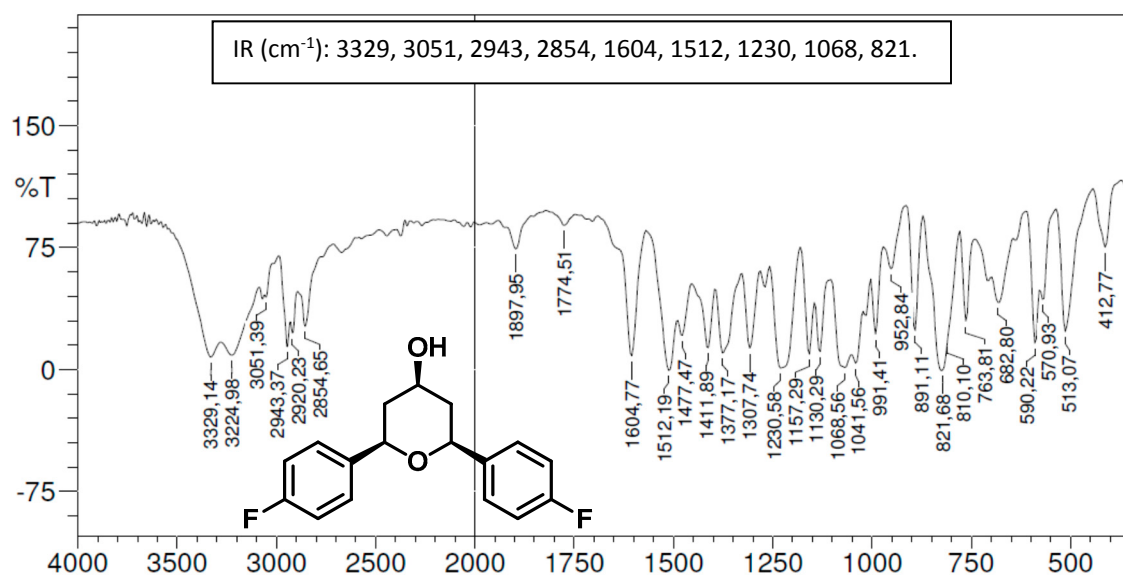
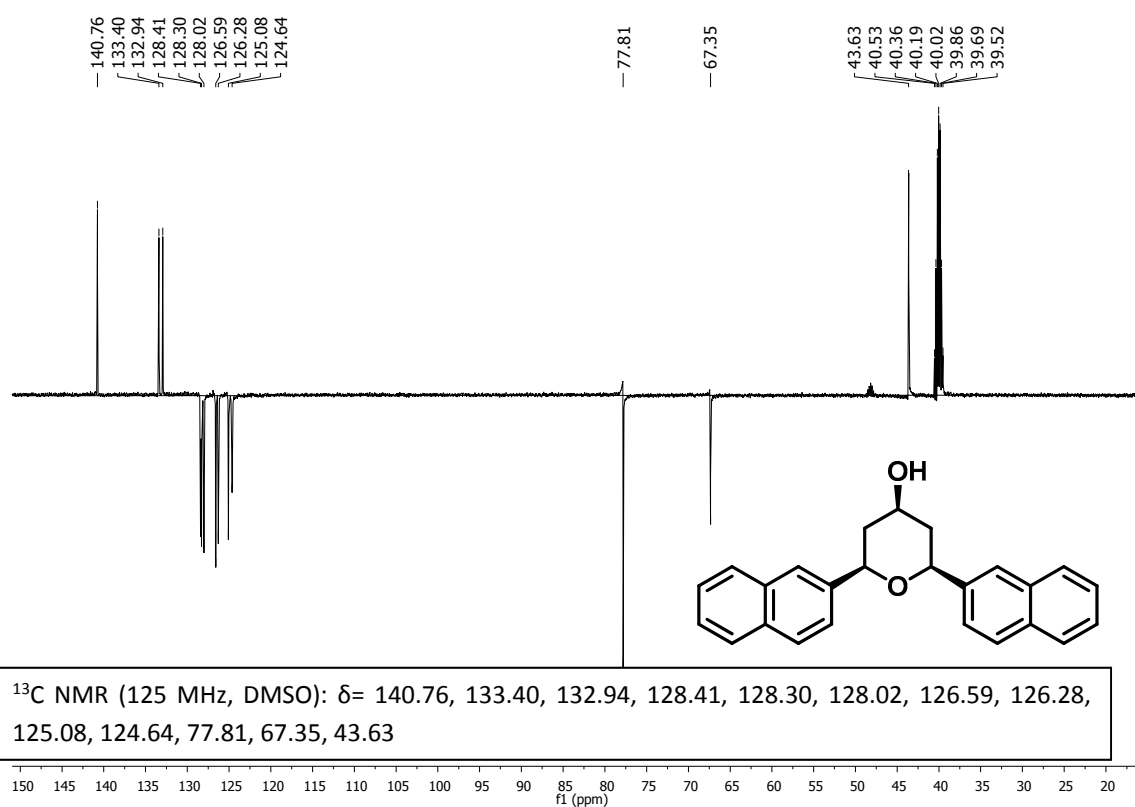


Figure S15. ¹H NMR (CDCl₃, 200 MHz) of 2,6-di(naphthalen-2-yl)-tetrahydro-2H-pyran-4-ol (**1b**).

Figure S16. IR (KBr, cm⁻¹) of 2,6-di(naphthalen-2-yl)-tetrahydro-2H-pyran-4-ol (**1b**).Figure S17. ¹³C NMR-APT (DMSO, 125 MHz) of 2,6-di(naphthalen-2-yl)-tetrahydro-2H-pyran-4-ol (**1c**).

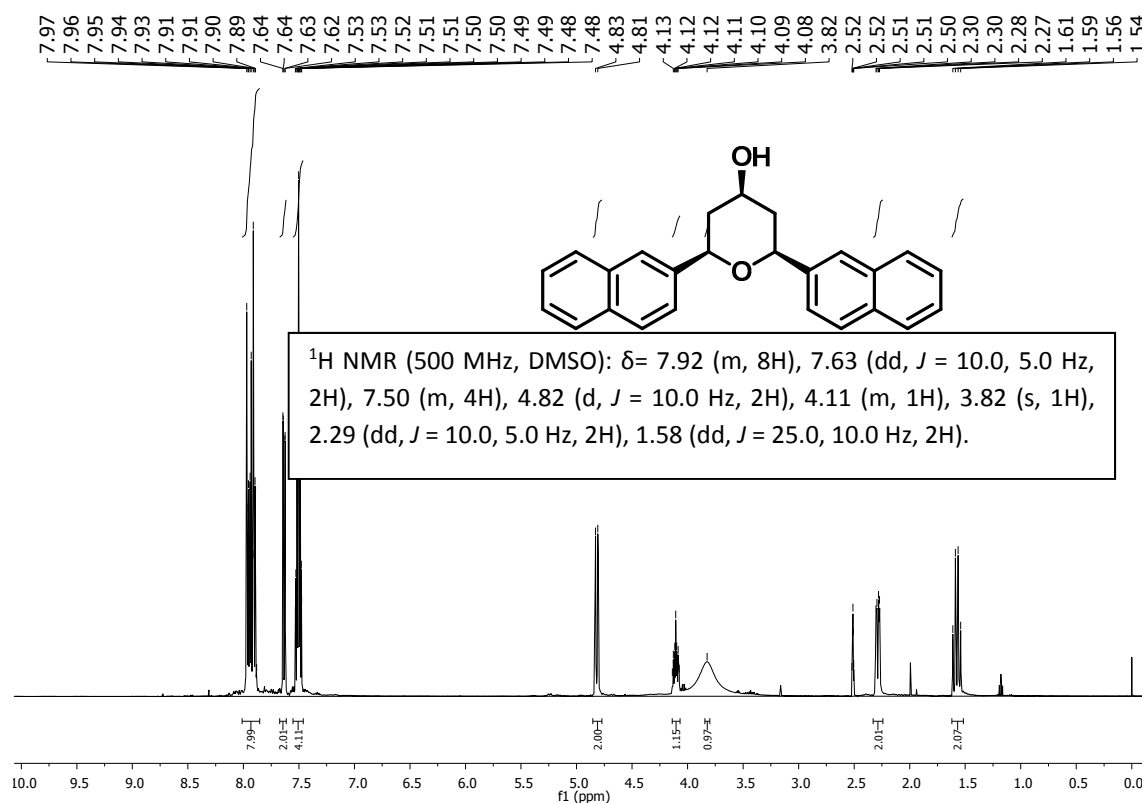


Figure S18. ¹H NMR (DMSO, 500 MHz) of 2,6-di(naphthalen-2-yl)-tetrahydro-2H-pyran-4-ol (1c).

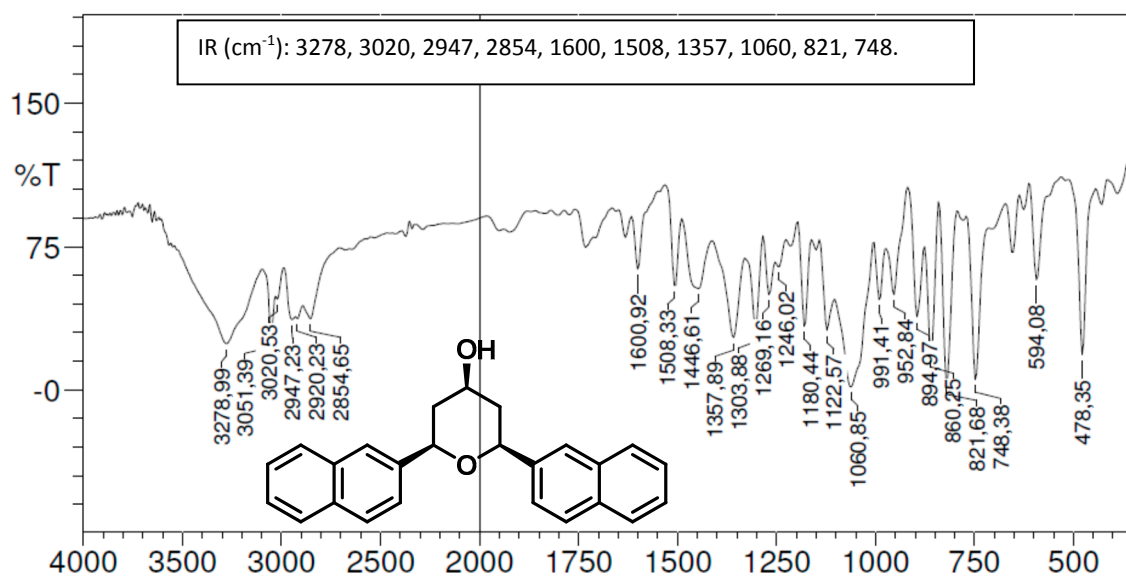
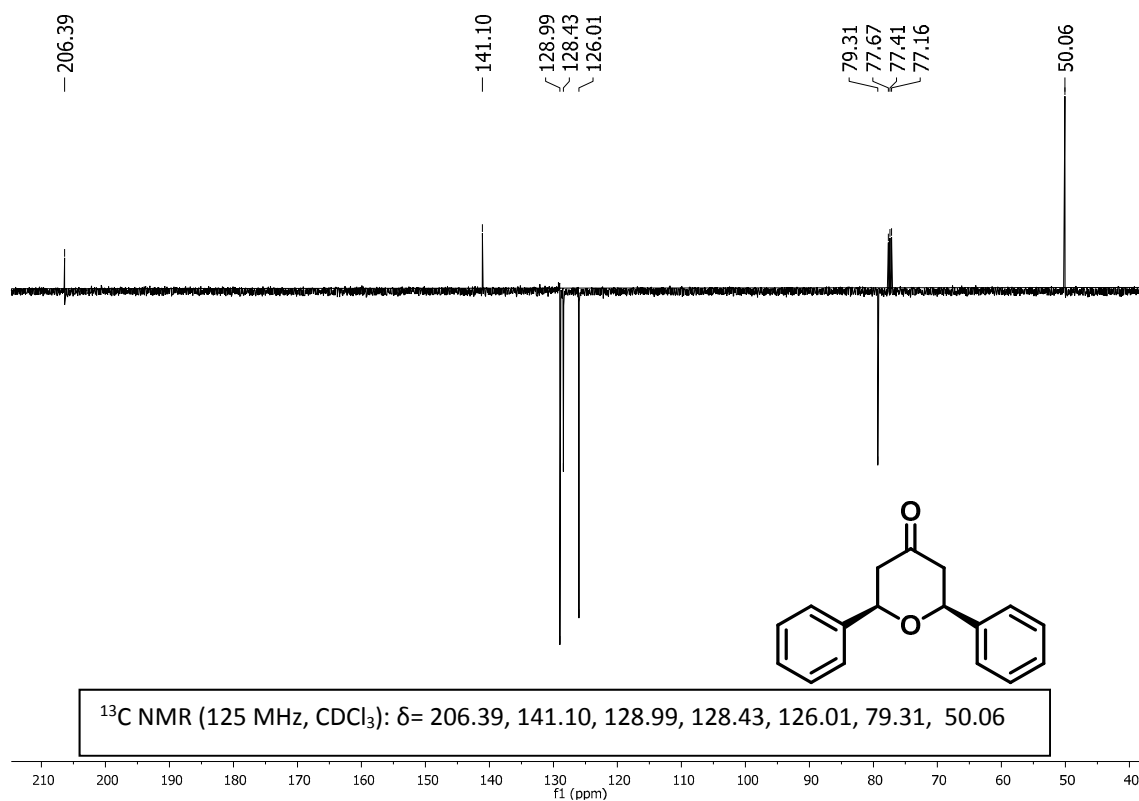
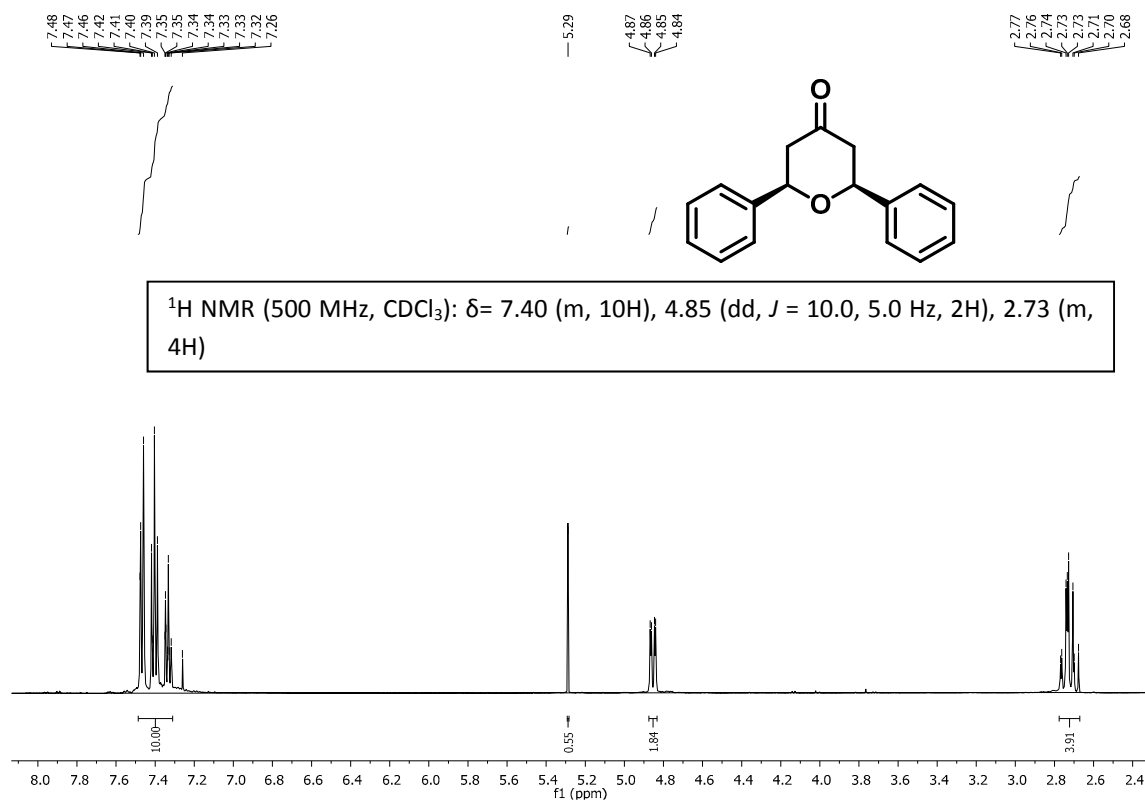


Figure S19. IR (KBr, cm⁻¹) of 2,6-di(naphthalen-2-yl)-tetrahydro-2H-pyran-4-ol (1c).

Figure S20. ¹³C NMR-APT (CDCl₃, 125 MHz) of 2,6-diphenyl-tetrahydropyran-4-one (8a).Figure S21. ¹H NMR (CDCl₃, 500 MHz) of 2,6-diphenyl-tetrahydropyran-4-one (8a).

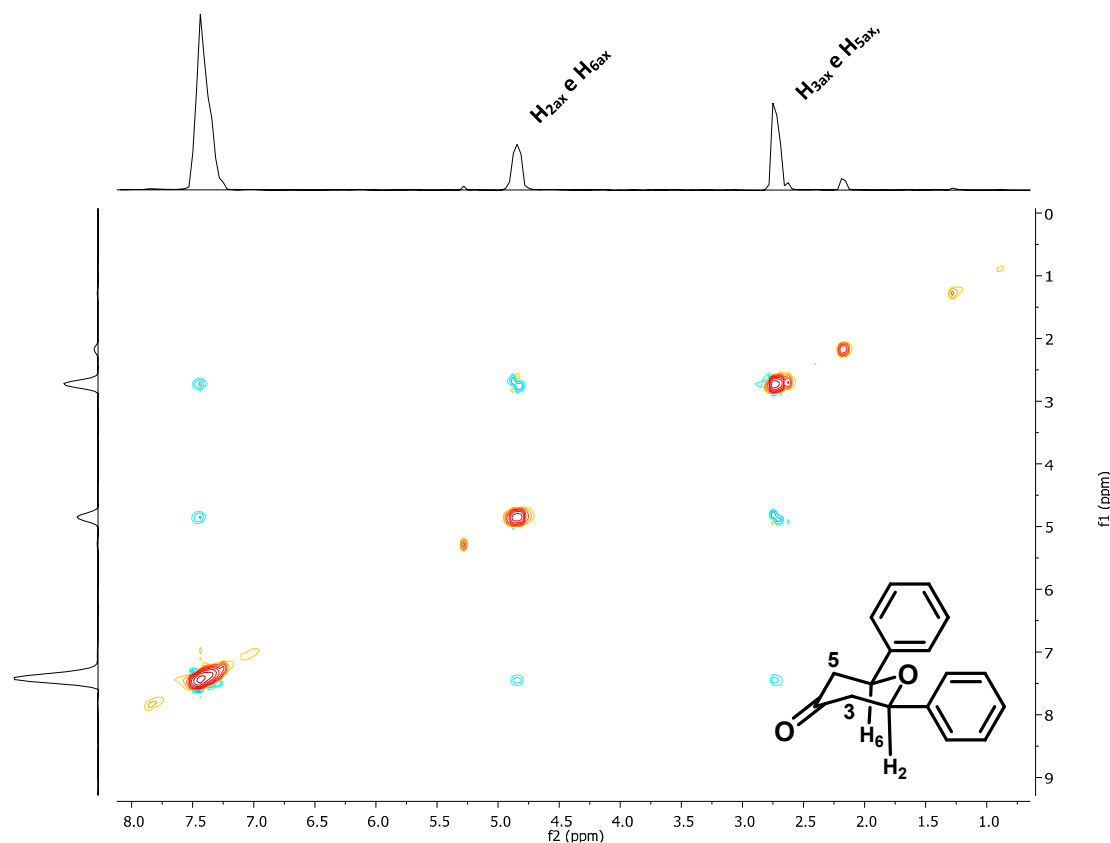
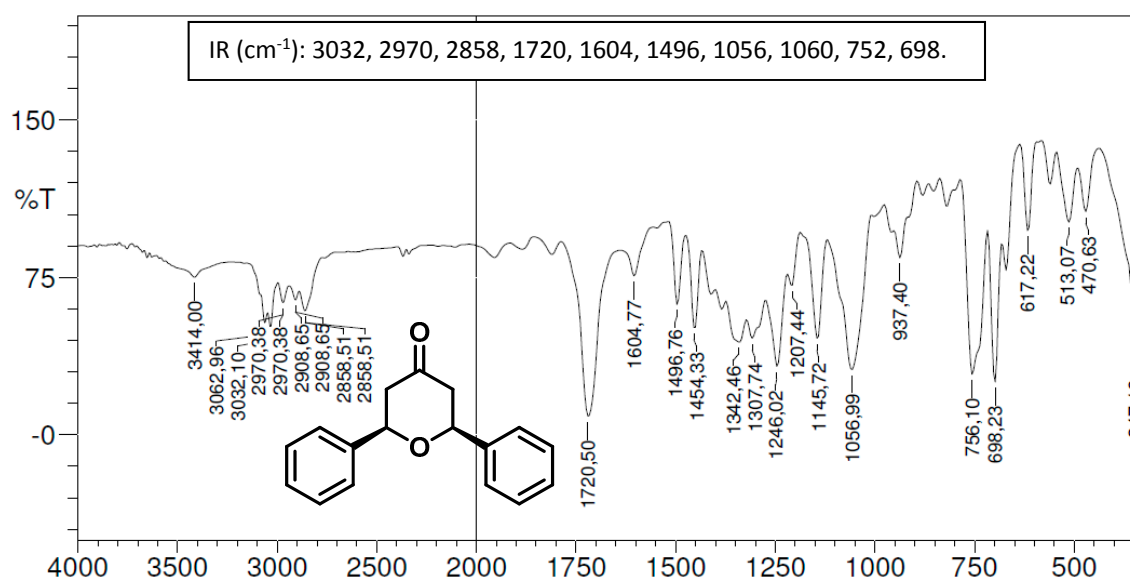


Figure S22. NOSY of 2,6-diphenyl-tetrahydropyran-4-one (8a).

Figure S23. IR (KBr, cm^{-1}) of 2,6-diphenyl-tetrahydropyran-4-one (8a).

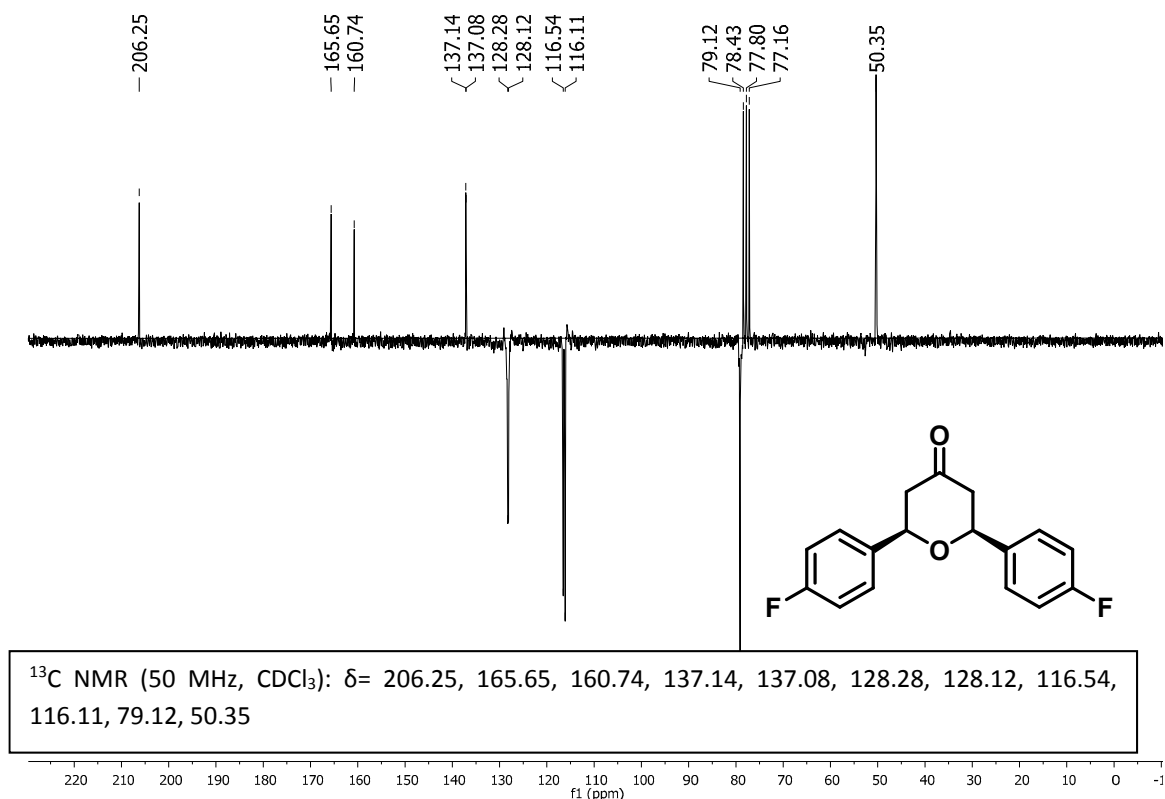


Figure S24. ¹³C NMR-APT (CDCl₃, 50 MHz) of 2,6-bis(4-fluorophenyl)-tetrahydropyran-4-one (8b).

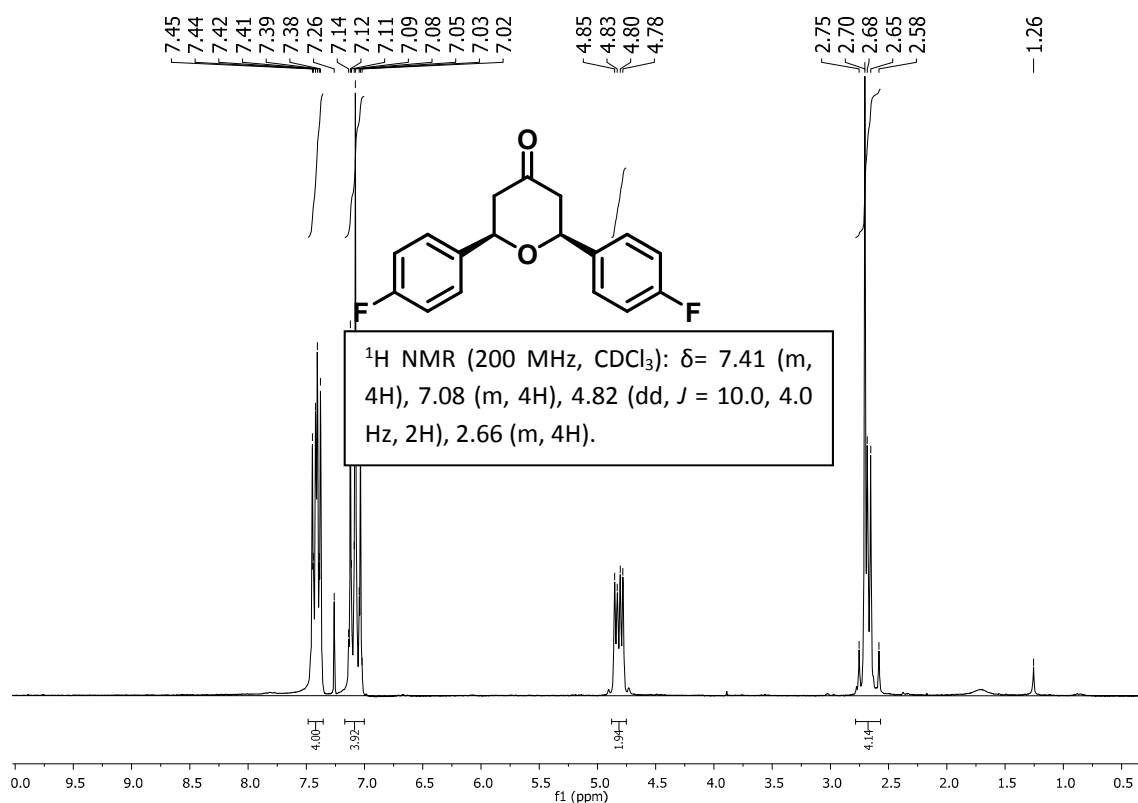
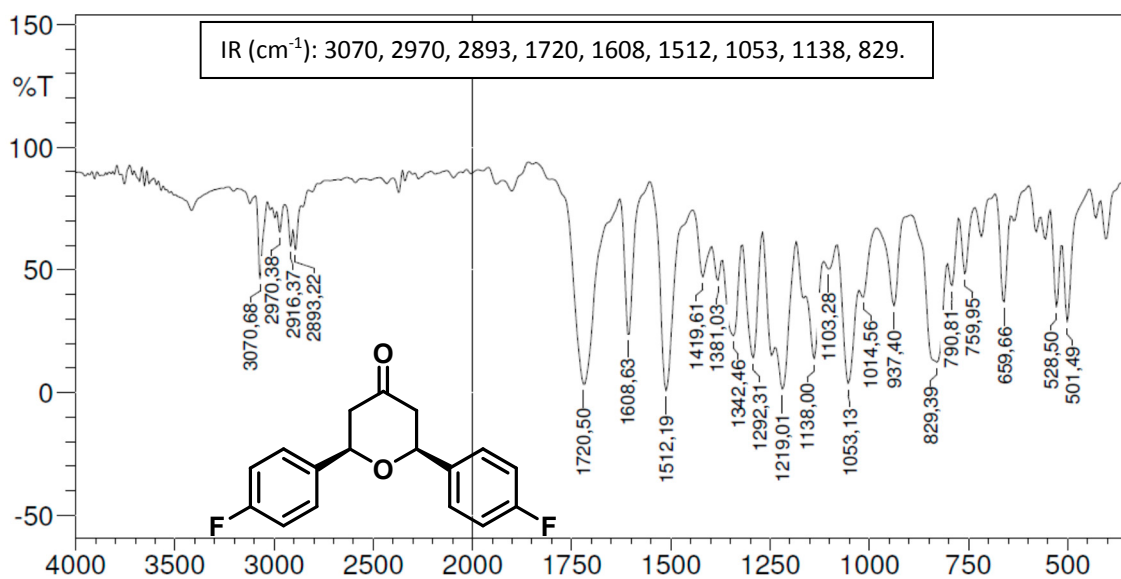
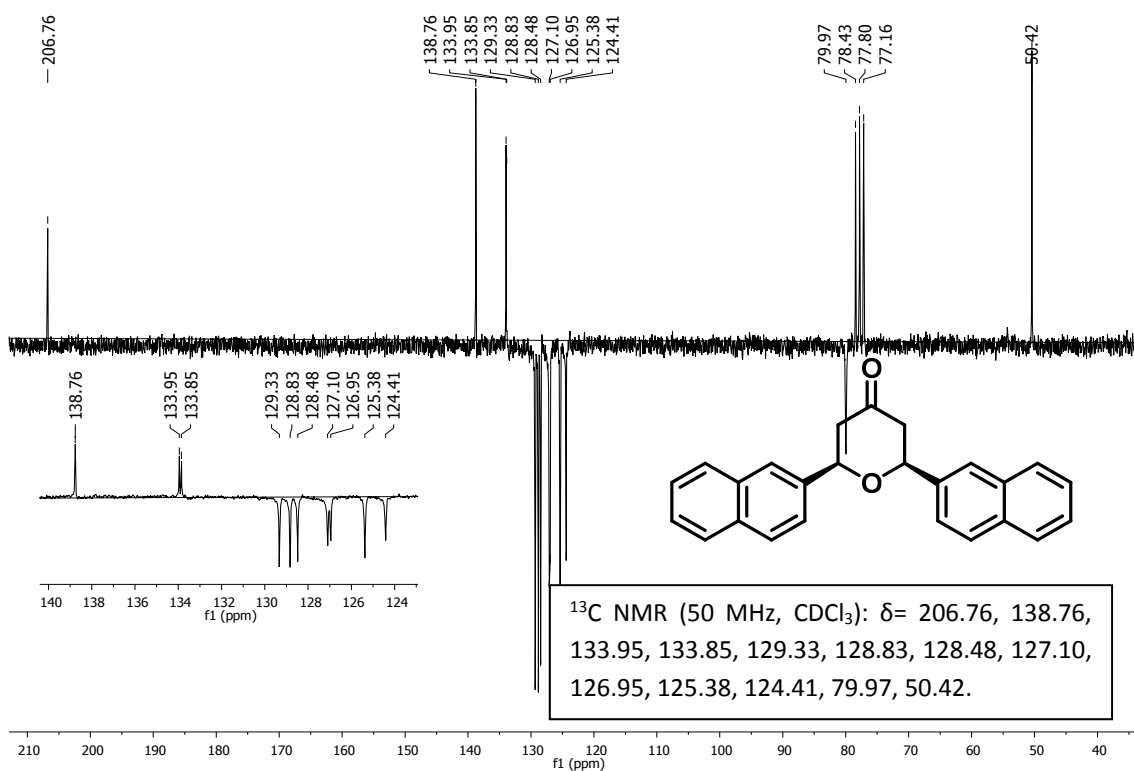
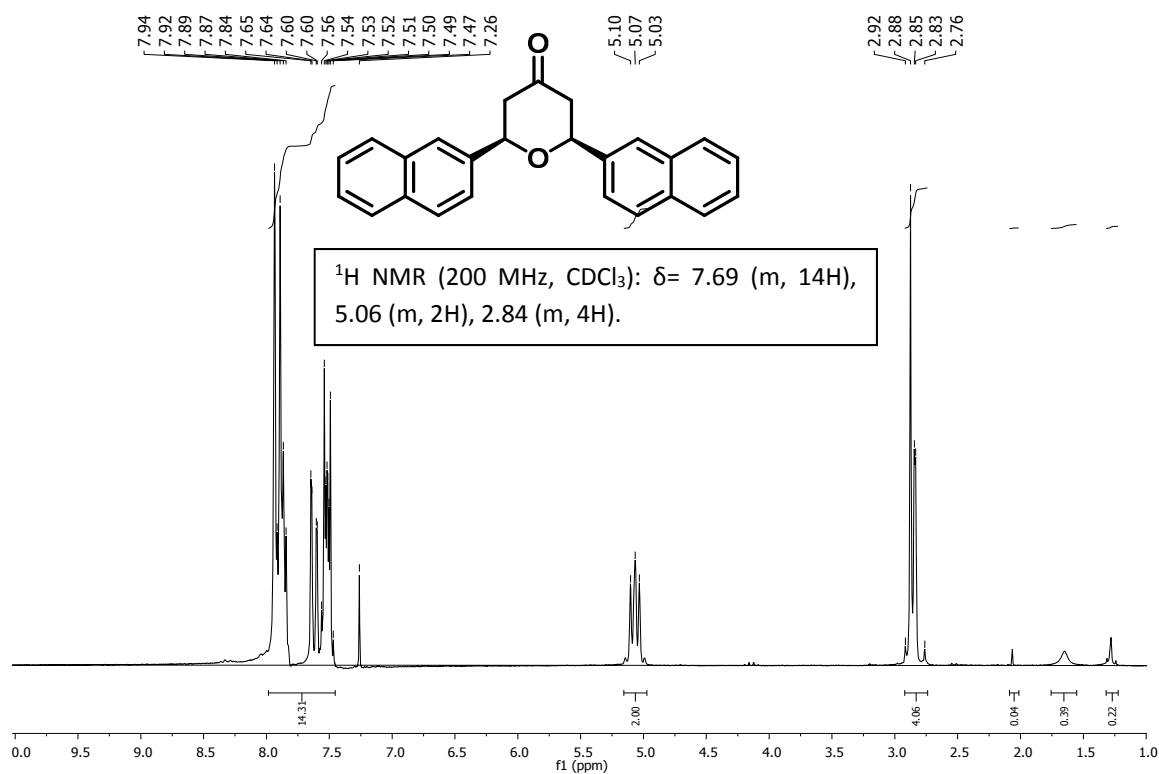
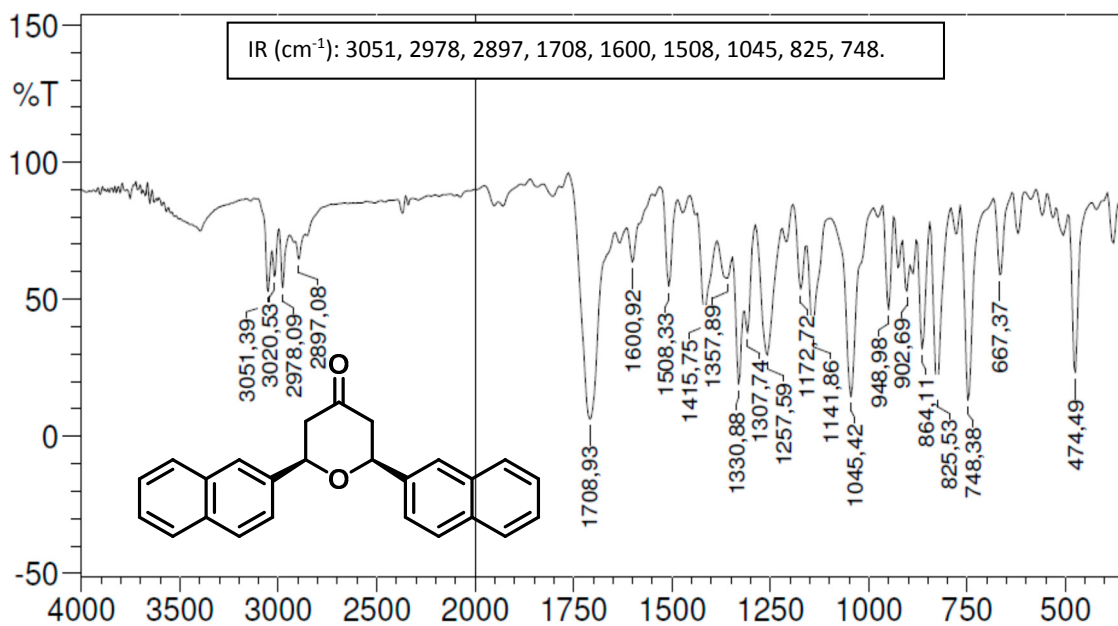


Figure S25. ¹H NMR CDCl₃, 200 MHz) of 2,6-bis(4-fluorophenyl)-tetrahydropyran-4-one (8b).

Figure S26. IR (KBr, cm⁻¹) of 2,6-bis(4-fluorophenyl)-tetrahydropyran-4-one (8b).Figure S27. ¹³C NMR-APT (CDCl₃, 50 MHz) of 2,6-di(naphthalen-2-yl)-tetrahydropyran-4-one (8c).

Figure S28. ¹H NMR (CDCl₃, 200 MHz) of 2,6-di(naphthalen-2-yl)-tetrahydropyran-4-one (8c).Figure S29. IR (KBr, cm⁻¹) of 2,6-di(naphthalen-2-yl)-tetrahydropyran-4-one (8c).

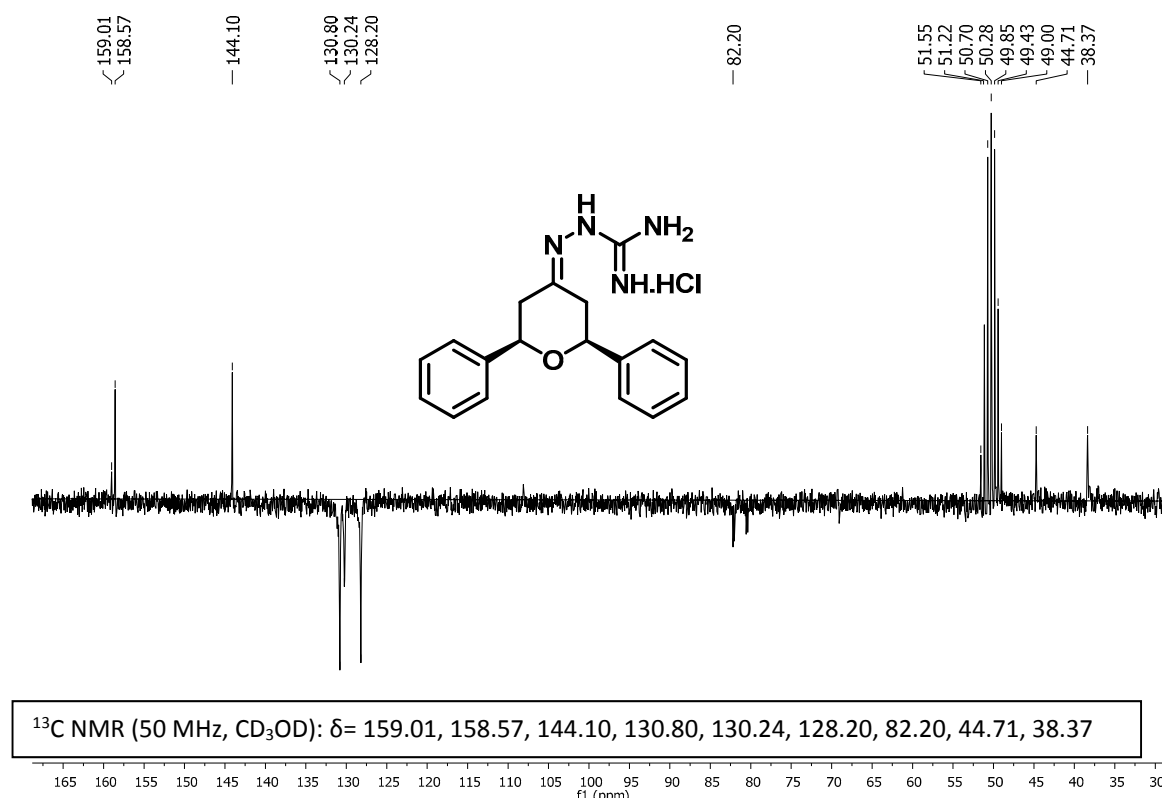


Figure S30. ¹³C NMR-APT (CD₃OD, 50 MHz) of 2-((cis-2,6-diphenyldihydro-2H-pyran-4(3H)-ylidene)hydrazinecarboximidamide hydrochloride (2).

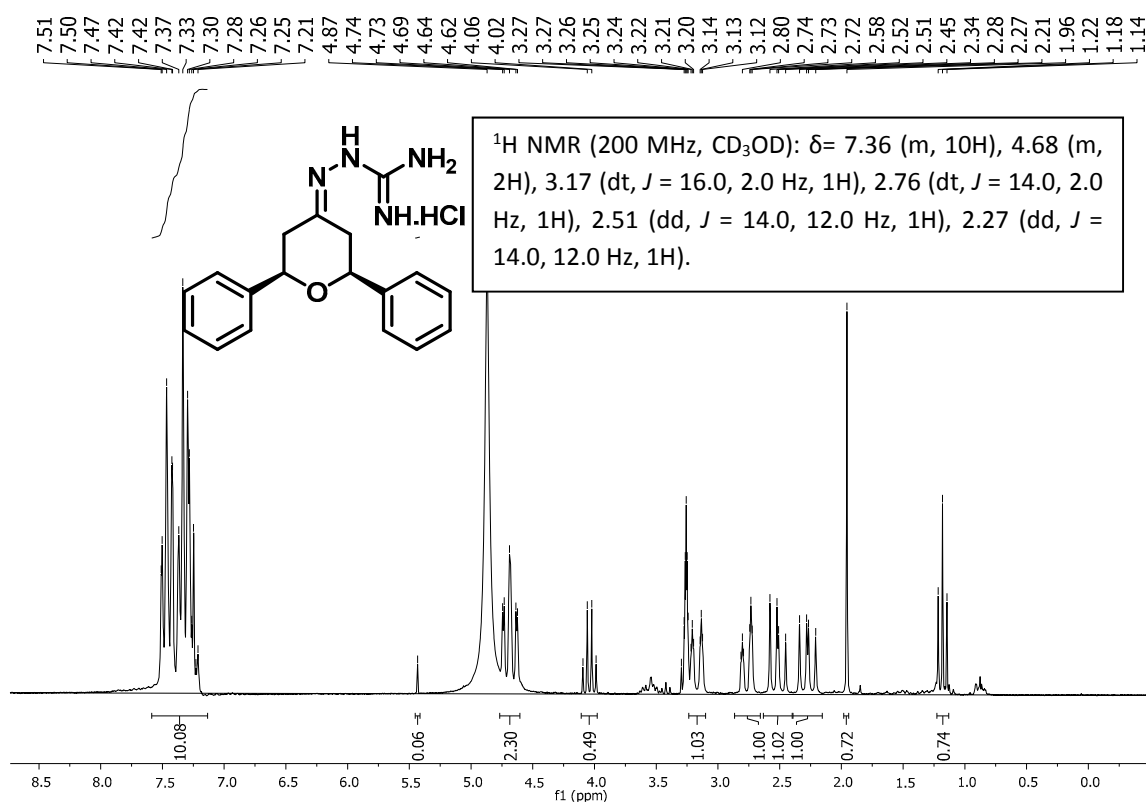


Figure S31. ¹H NMR (CD₃OD, 200 MHz) of 2-((cis-2,6-diphenyldihydro-2H-pyran-4(3H)-ylidene)hydrazinecarboximidamide hydrochloride (2).

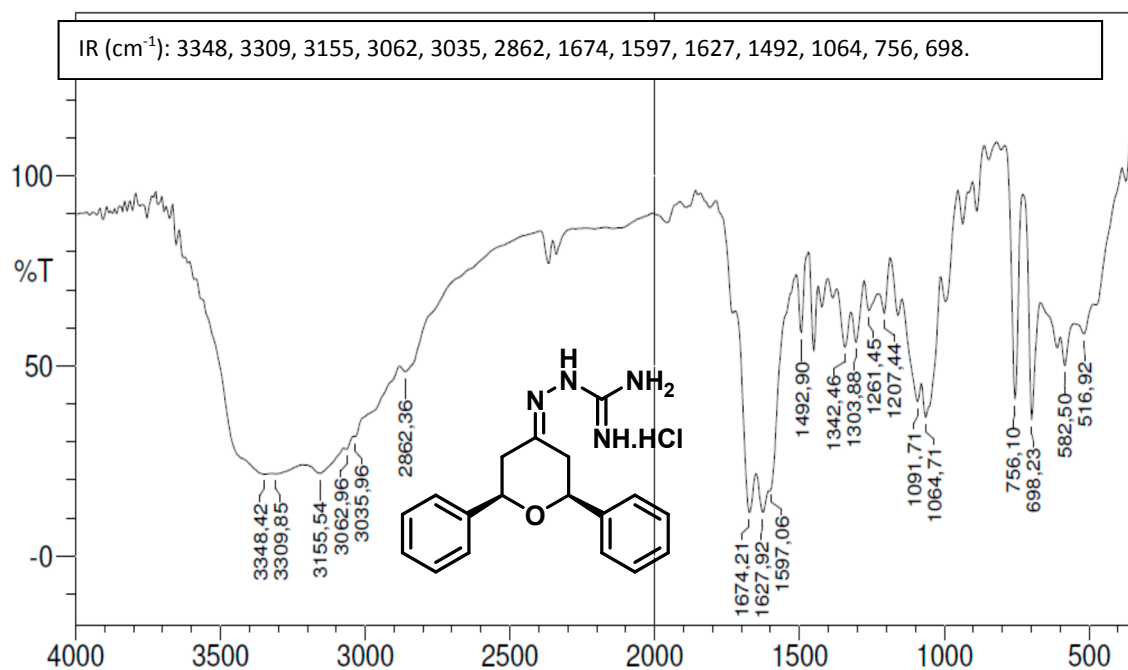


Figure S32. IR (KBr, cm^{-1}) 2-((cis-2,6-diphenyldihydro-2H-pyran-4(3H)-ylidene)hydrazinecarboximidamide hydrochloride (2).

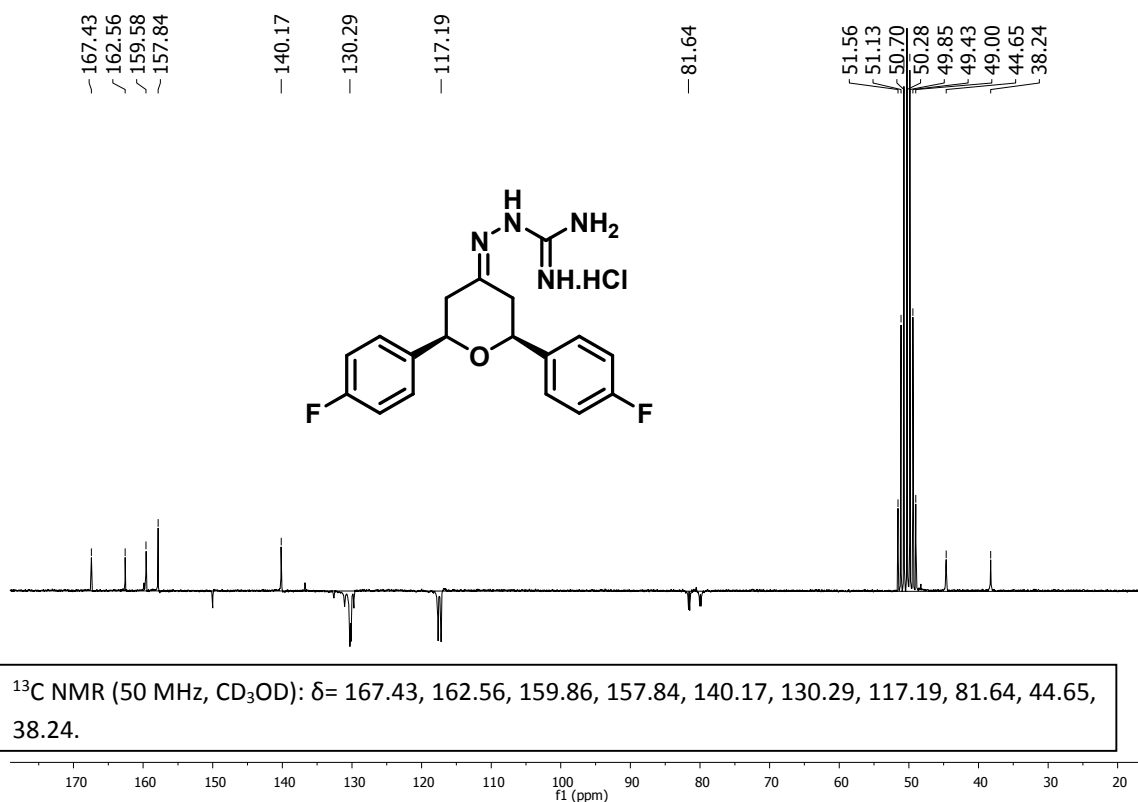


Figure S33. ^{13}C NMR-APT (CD_3OD , 50 MHz) of 2-((cis-2,6-bis(4-fluorophenyl)dihydro-2H-pyran-4(3H)-ylidene)hydrazinecarboximidamide hydrochloride (3).

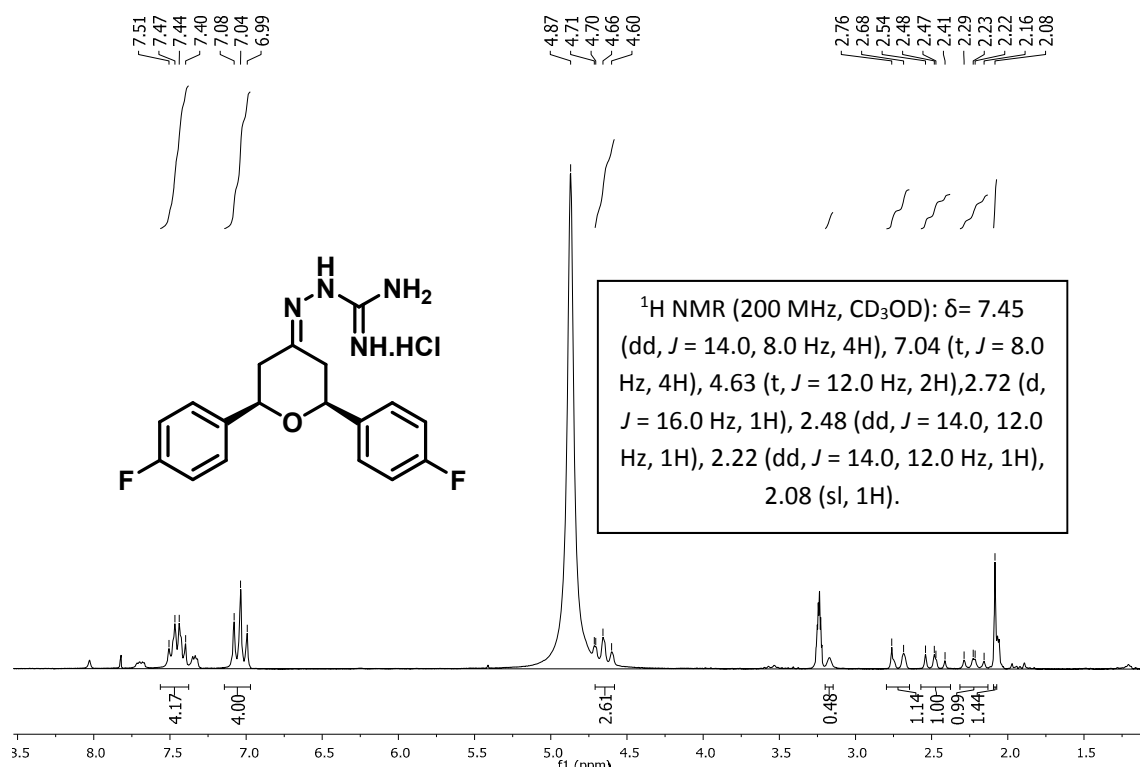


Figure S34. ¹H NMR (CD₃OD, 200 MHz) of 2-((cis-2,6-bis(4-fluorophenyl) dihydro-2H-pyran-4(3H)-ylidene)hydrazinecarboximidamide hydrochloride (3).

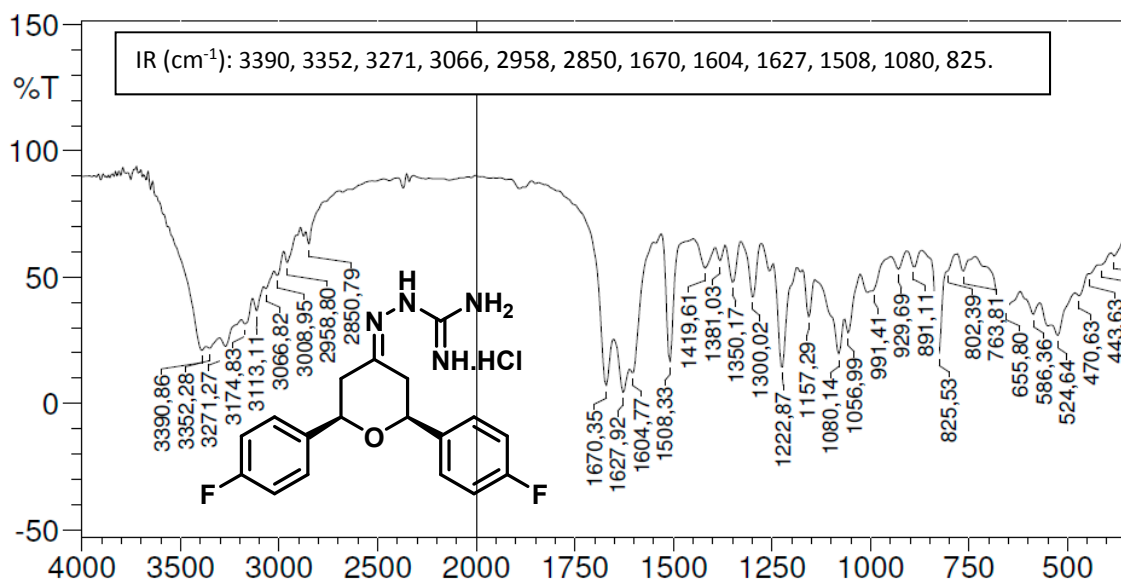


Figure S35. IR (KBr, cm⁻¹) of 2-((cis-2,6-bis(4-fluorophenyl) dihydro-2H-pyran-4(3H)-ylidene)hydrazinecarboximidamide hydrochloride (3).

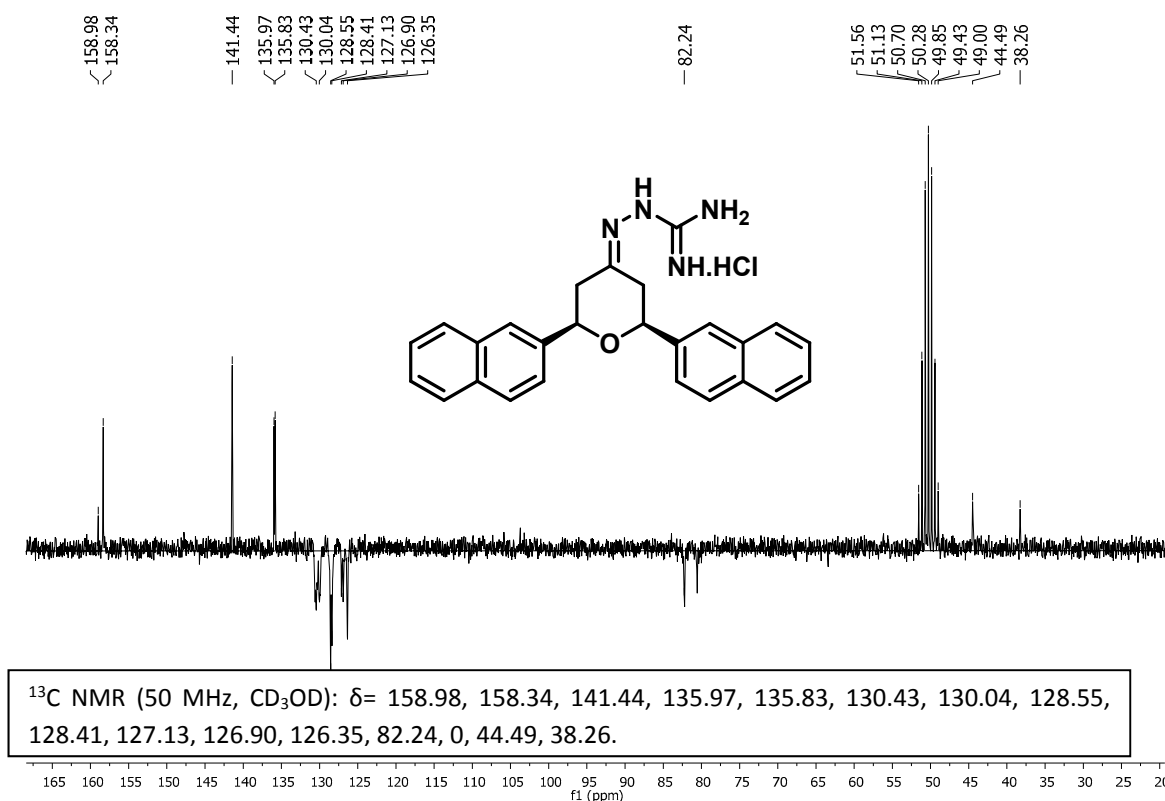


Figure S36. ¹³C NMR-APT (CD₃OD, 50 MHz) of 2-((cis,trans)-2,6-di(naphthalen-2-yl) dihydro-2H-pyran-4(3H)-ylidene)hydrazinecarboximidamide hydrochloride (4).

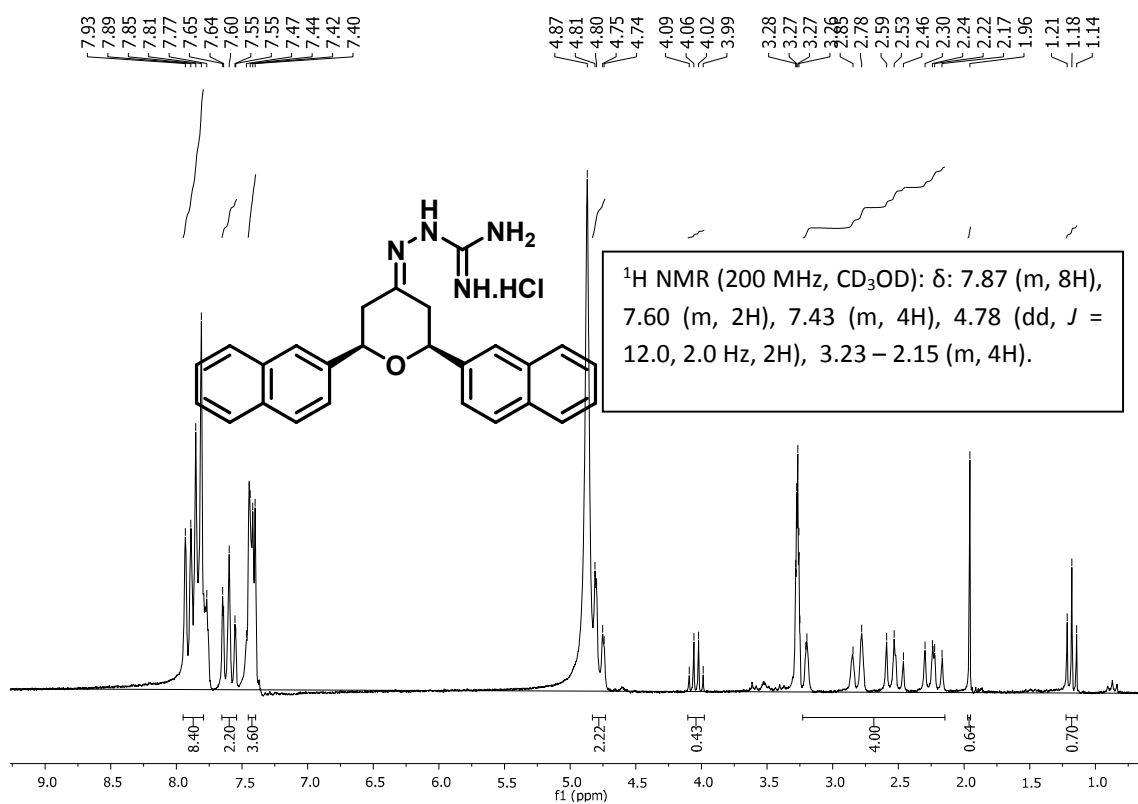


Figure S37. ¹H NMR (CD₃OD, 200 MHz) of 2-((cis,trans)-2,6-di(naphthalen-2-yl) dihydro-2H-pyran-4(3H)-ylidene)hydrazinecarboximidamide hydrochloride (4).

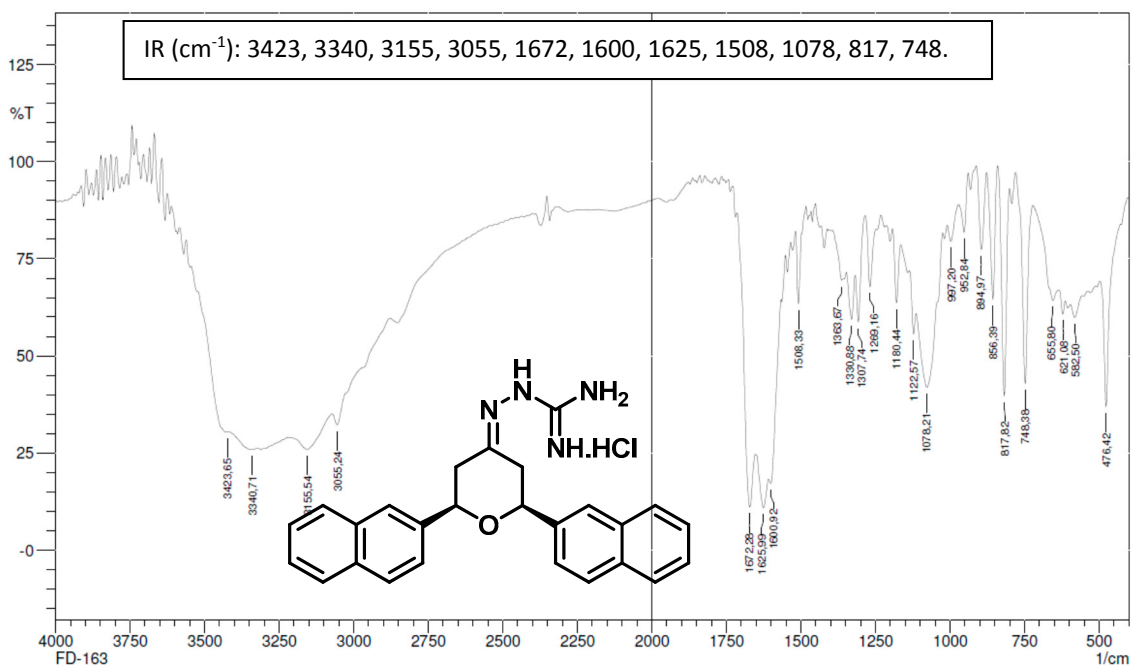


Figure S38. IR (KBr, cm⁻¹) of 2-((cis,trans)-2,6-di(naphthalen-2-yl)dihydro-2H-pyran-4(3H)-ylidene)hydrazinecarboximidamide hydrochloride (4).

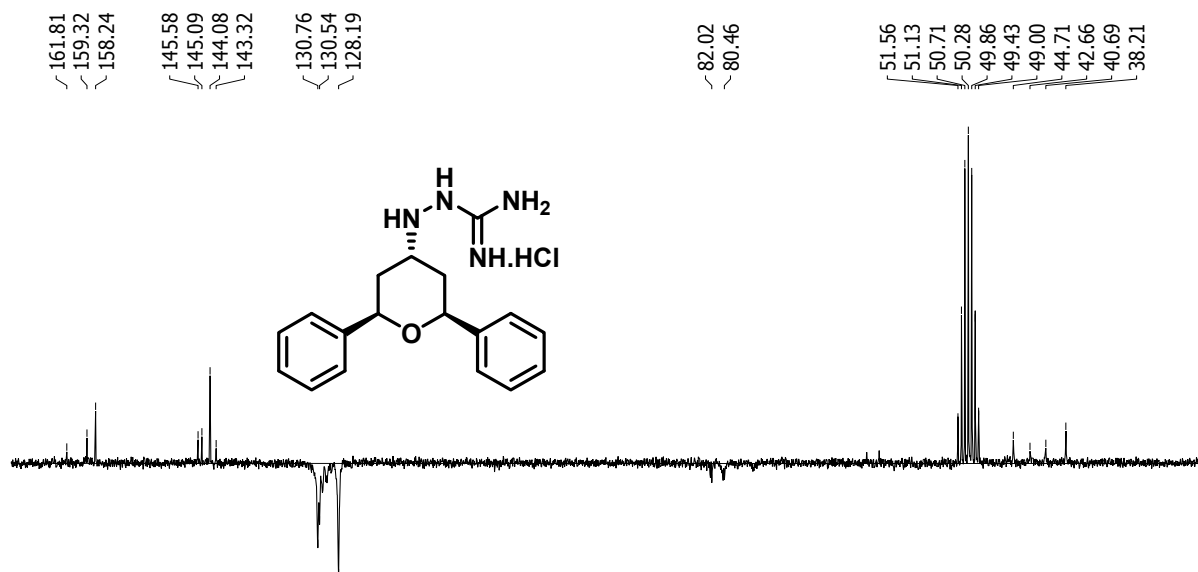


Figure S39. ¹³C NMR (50 MHz, CD₃OD): δ = 161.81, 159.32, 158.24, 145.58, 145.09, 144.08, 143.32, 130.76, 130.54, 128.19, 82.02, 80.46, 44.71, 42.66, 40.69, 38.21

Figure S39. ¹³C NMR-APT (CD₃OD, 50 MHz) of 2-((cis,trans)-2,6-diphenyltetrahydro-2H-pyran-4-yl)hydrazinecarboximidamide hydrochloride (5).

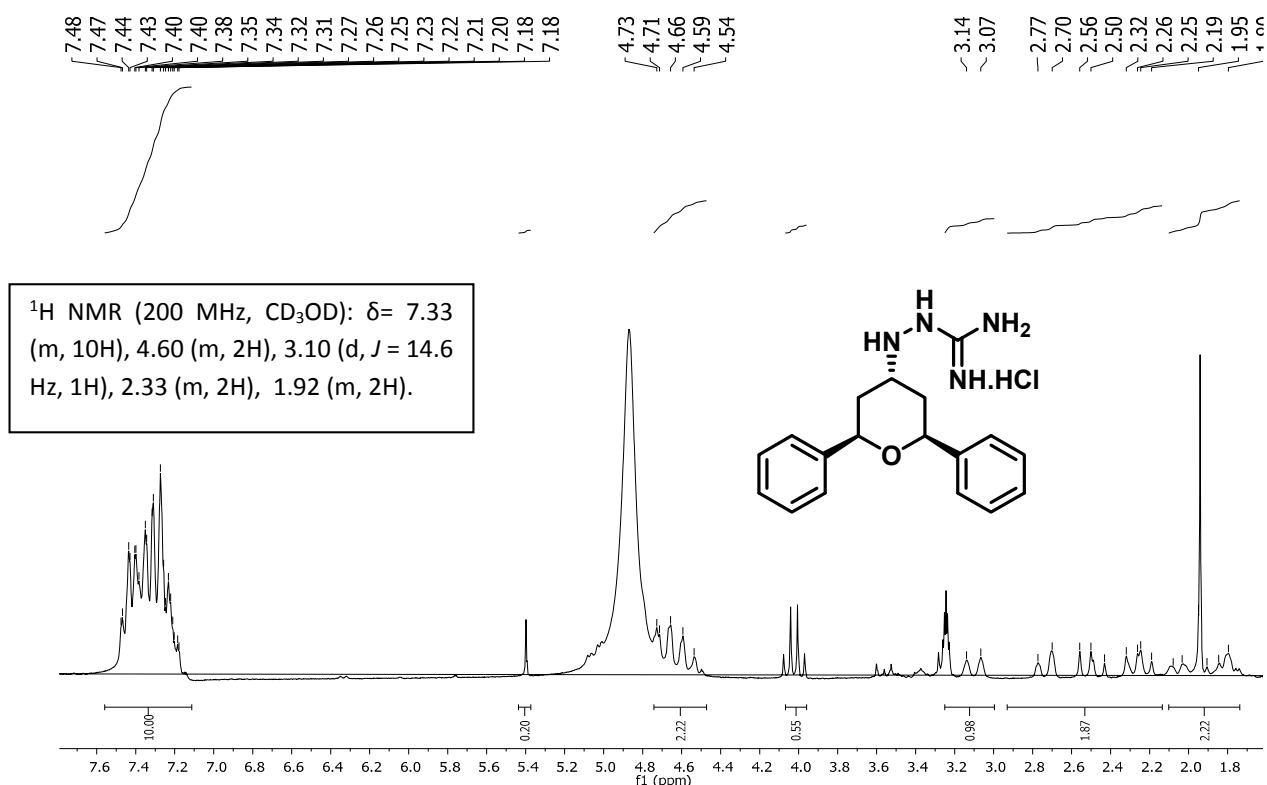


Figure S40. ¹H NMR (CD₃OD, 200 MHz) of 2-((cis,trans)-2,6-diphenyltetrahydro-2H-pyran-4-yl)hydrazinecarboximidamide hydrochloride (5).

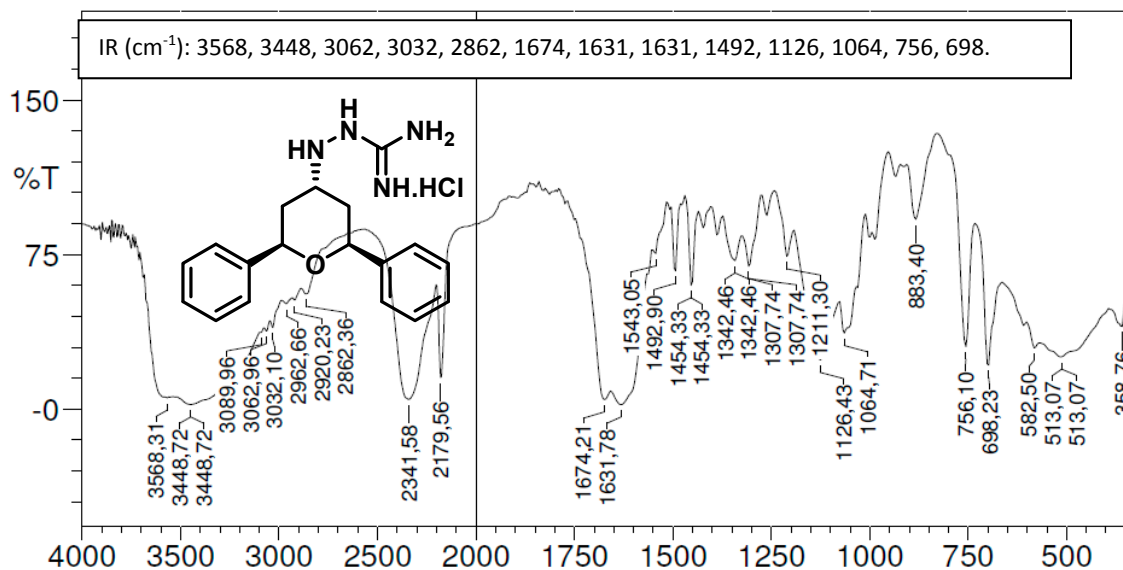


Figure S41. IR (KBr, cm⁻¹) of 2-((cis,trans)-2,6-diphenyltetrahydro-2H-pyran-4-yl)hydrazinecarboximidamide hydrochloride (5).

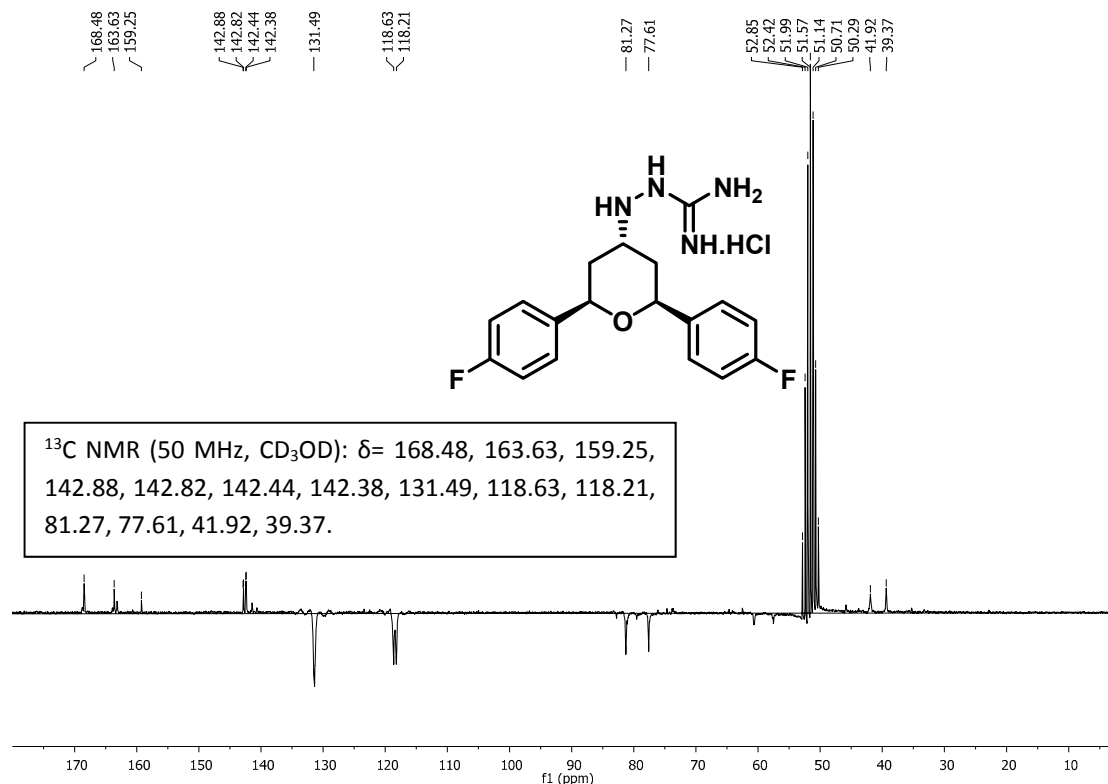


Figure S42. ¹³C NMR-APT (CD₃OD, 50 MHz) of 2-((cis,trans)-2,6-bis(4-fluorophenyl)tetrahydro-2H-pyran-4-yl)hydrazinecarboximidamide hydrochloride (6).

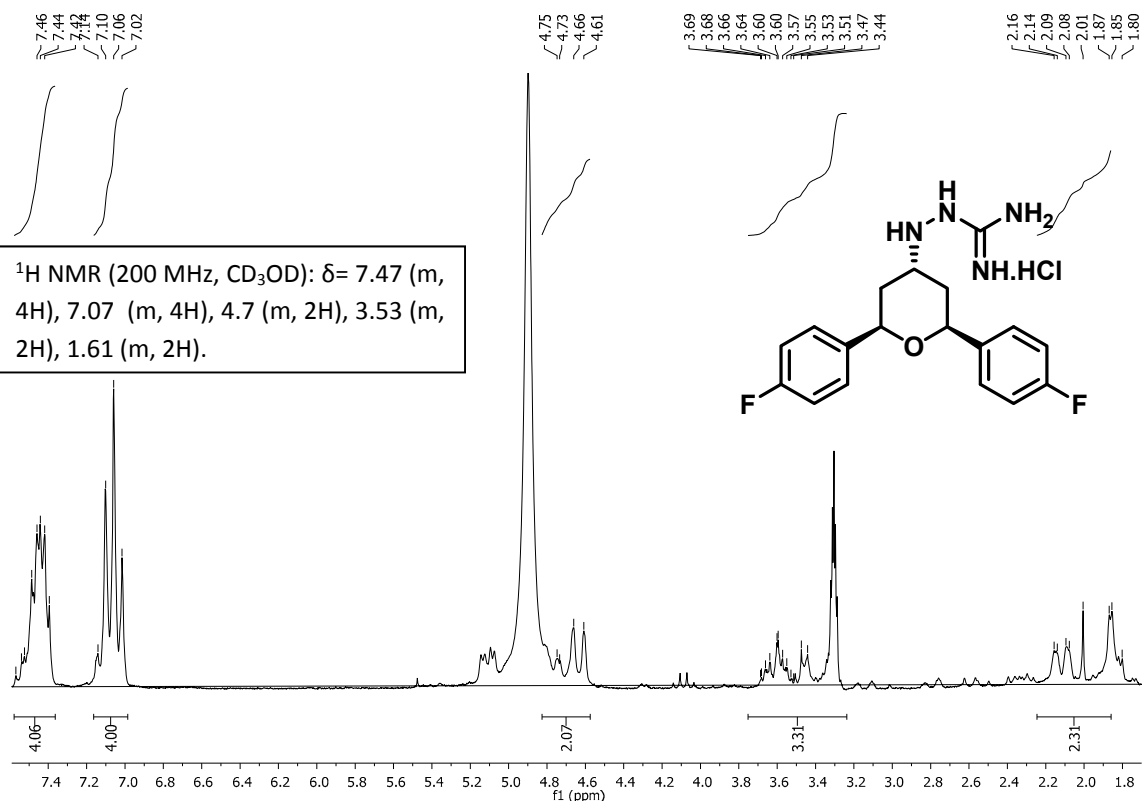


Figure S43. ¹H NMR (CD₃OD, 200 MHz) of 2-((cis,trans)-2,6-bis(4-fluorophenyl)tetrahydro-2H-pyran-4-yl)hydrazinecarboximidamide hydrochloride (6).

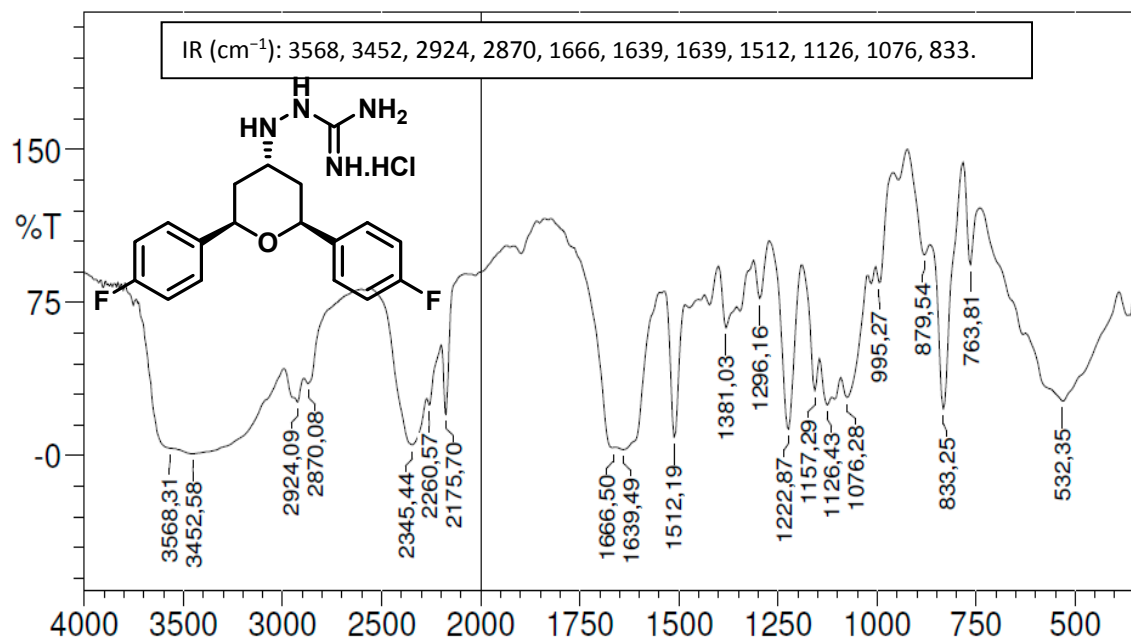


Figure S44. IR (KBr, cm⁻¹) of 2-((cis,trans)-2,6-bis(4-fluorophenyl)tetrahydro-2H-pyran-4-yl)hydrazinecarboximidamide hydrochloride (6).

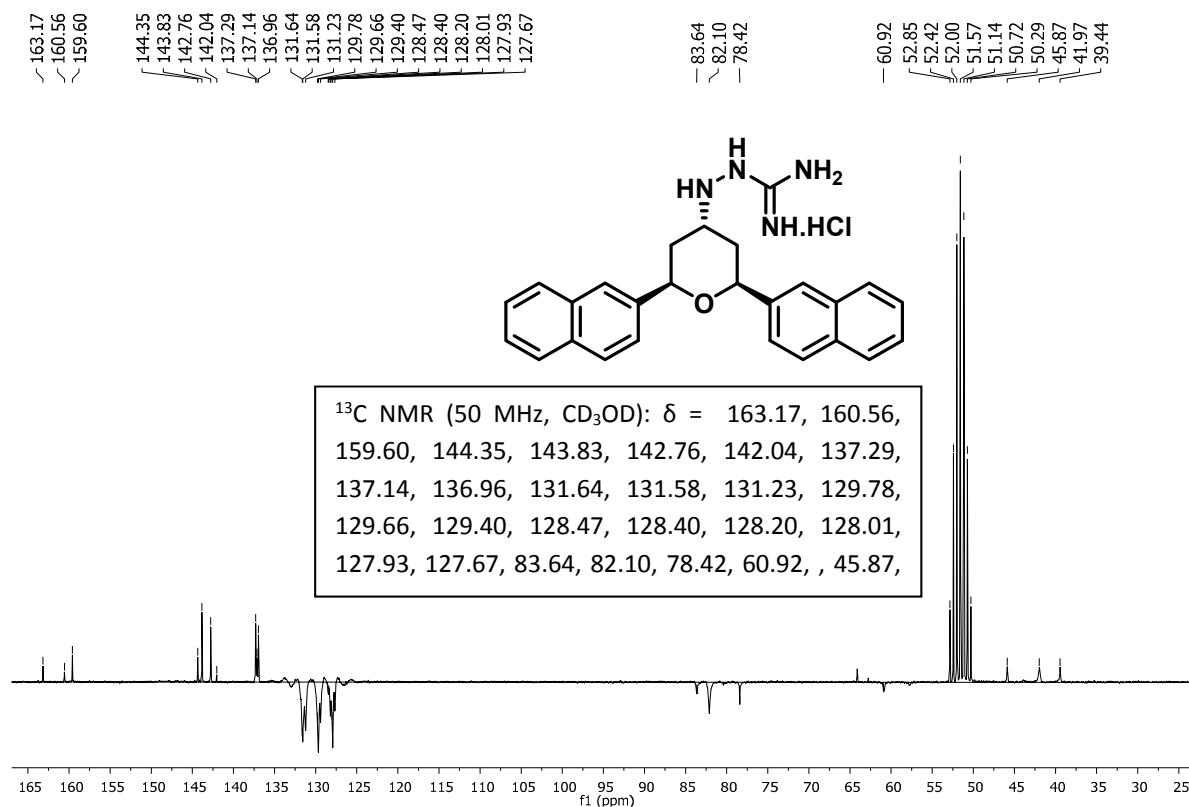


Figure S45. ¹³C NMR-APT (CD₃OD, 50 MHz) of 2-((cis,trans)-2,6-di(naphthalen-2-yl)tetrahydro-2H-pyran-4-yl)hydrazinecarboximidamide hydrochloride (7).

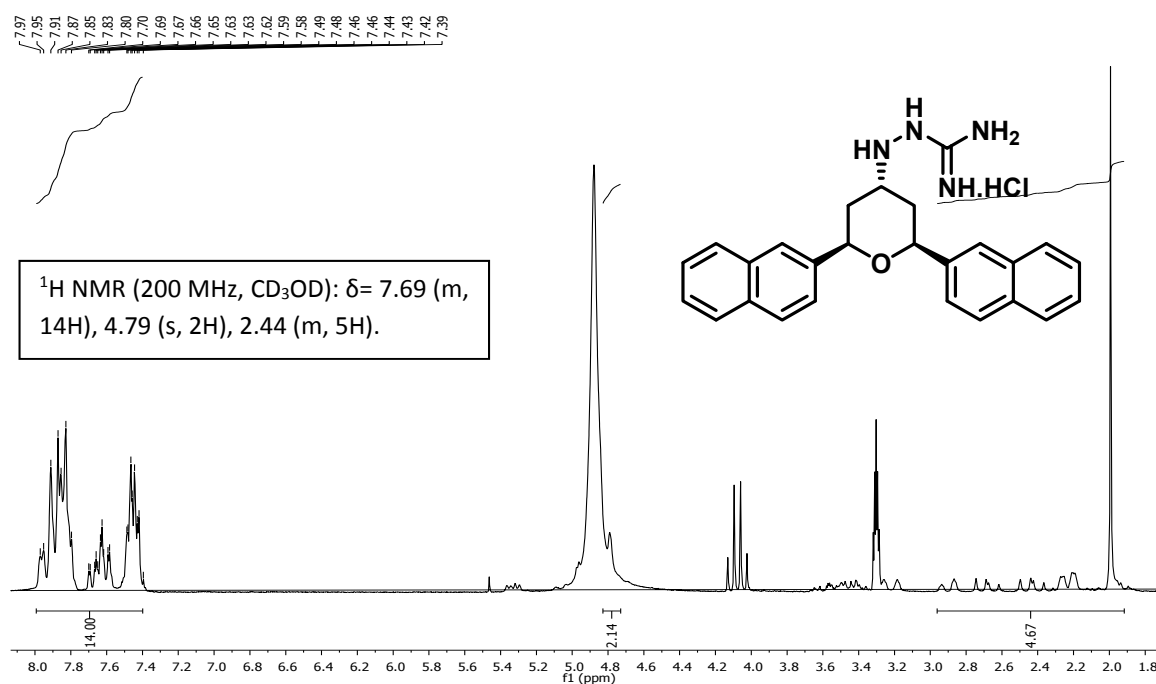


Figure S46. ¹H NMR (CD₃OD, 200 MHz) of 2-((cis,trans)-2,6-di(naphthalen-2-yl)tetrahydro-2H-pyran-4-yl)hydrazinecarboximidamide hydrochloride (7).

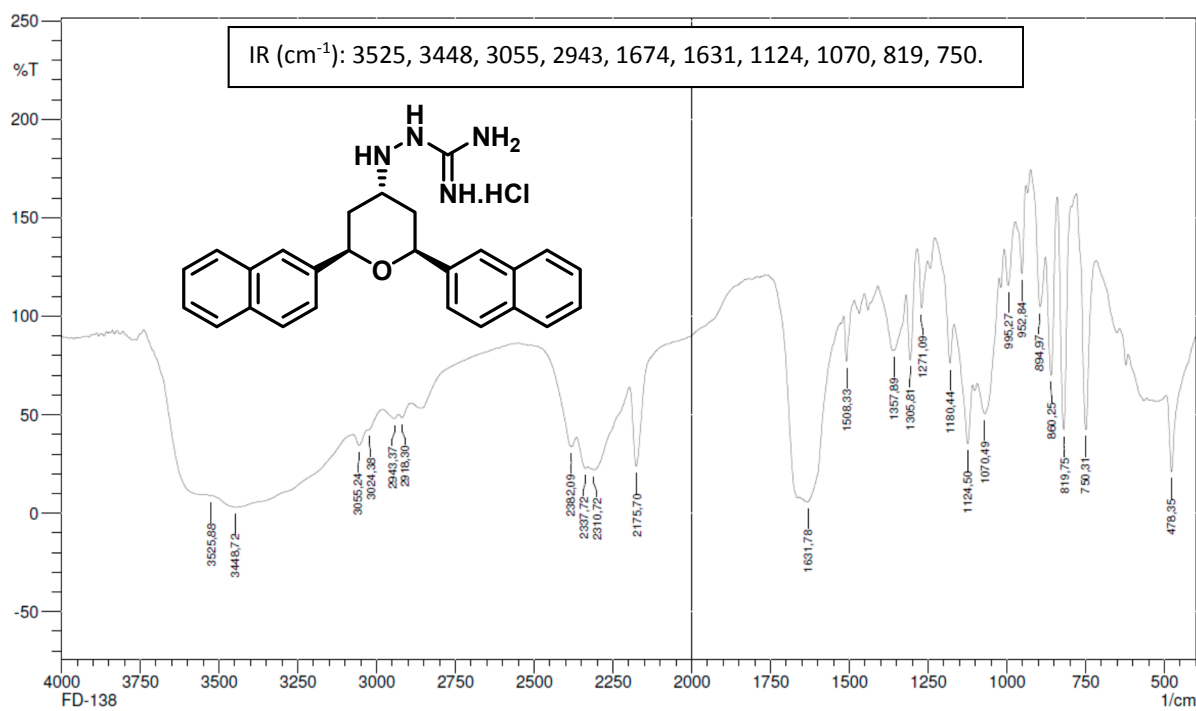


Figure S47. IR (KBr, cm⁻¹) of 2-((cis,trans)-2,6-di(naphthalen-2-yl)tetrahydro-2H-pyran-4-yl)hydrazinecarboximidamide hydrochloride (7).

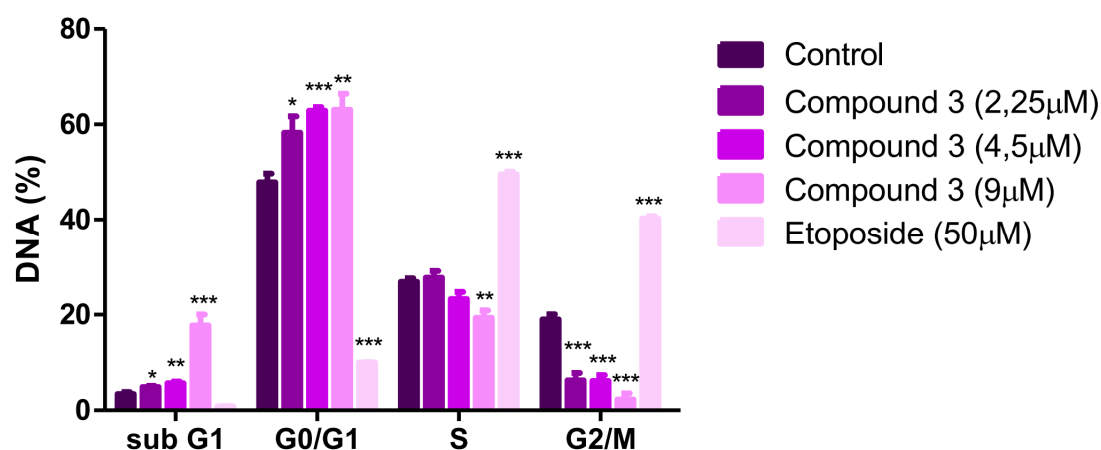


Figure S48. Effects of compound 3 in K562 cell cycle distribution, after 24 h. Cell cycle analysis was quantified by Flow cytometer on FL2-A, 10,000 events were recorded in each experiment. Data are expressed as percentage values. Each result was performed in duplicate, and data are reported as mean $\pm$ SD of at least three independent experiments. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$ vs control group.

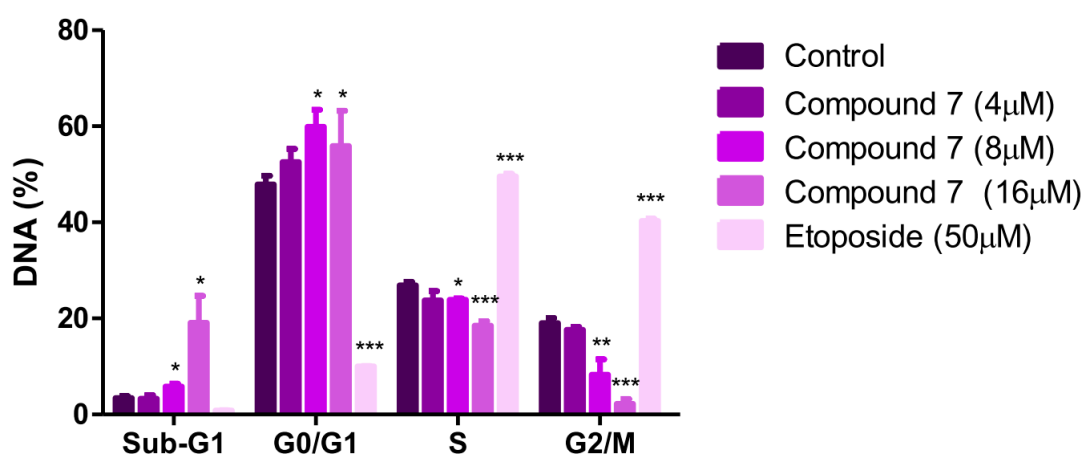


Figure S49. Effects of compound 7 in K562 cell cycle distribution, after 24 hours. Cell cycle analysis was quantified by Flow cytometer on FL2-A, 10000 events were recorded in each experiment. Data are expressed as percentage values. Each result was performed in duplicate, and data are reported as mean $\pm$ SD of at least three independent experiments. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$ vs control group.