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Synthesis and Antifungal Activity of New Bis-γ-lactones Analogous to Avenaciolide

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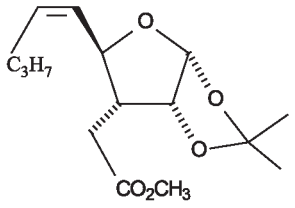
Methyl (2'R,3'R,4'R,5'R)-2-[(Z)-2'-penten-1''-yl- 4',5'-isopropilidenedeoxy-tetrahydrofuran-3'-yl] acetate, **3a**.



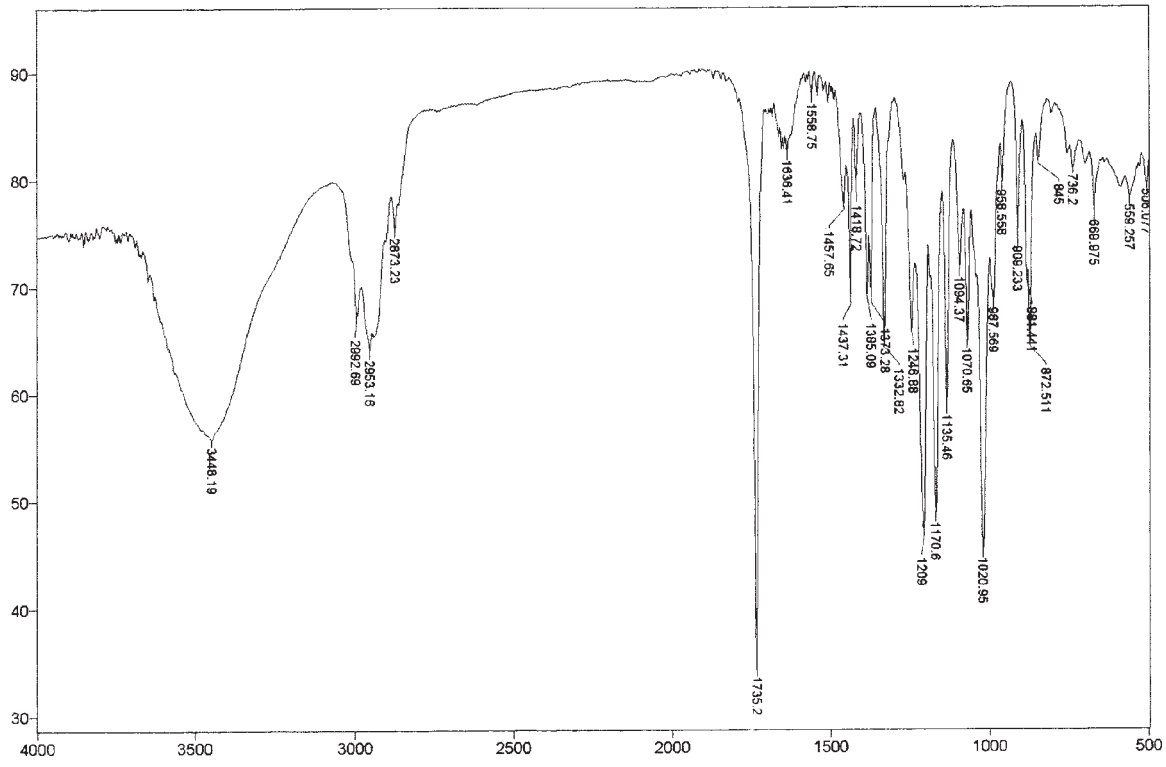


Figure S1. IR (KBr) for compound **3a**.

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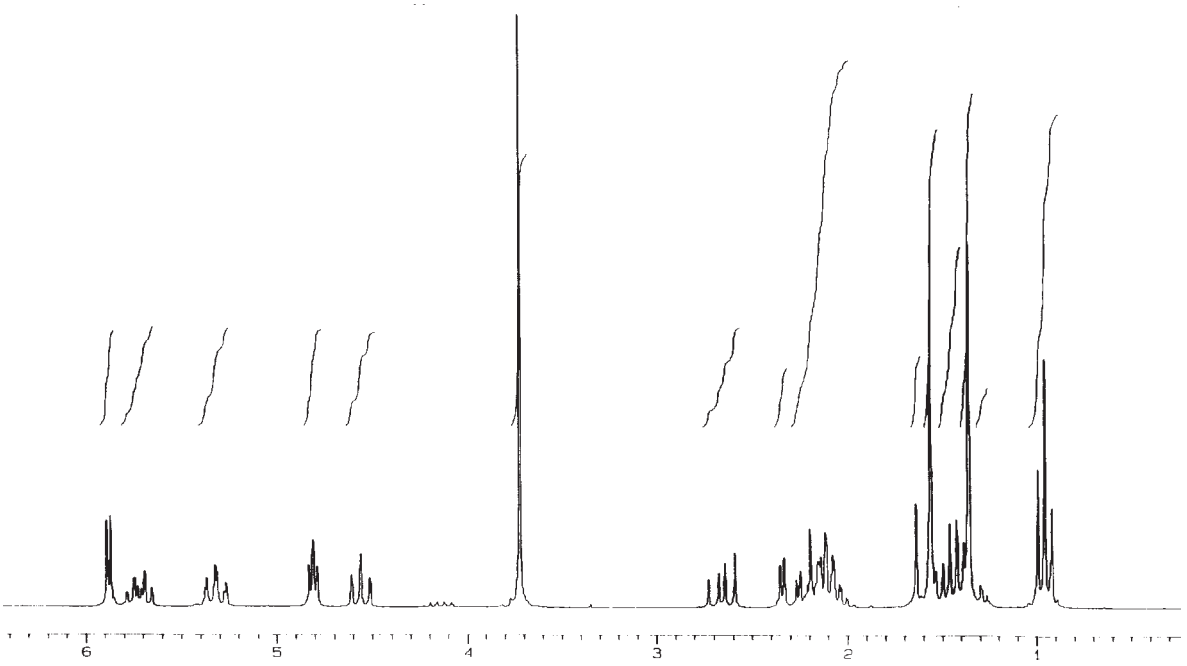


Figure S2. ^{1}H NMR for compound **3a** (200 MHz, $CDCl_3$).

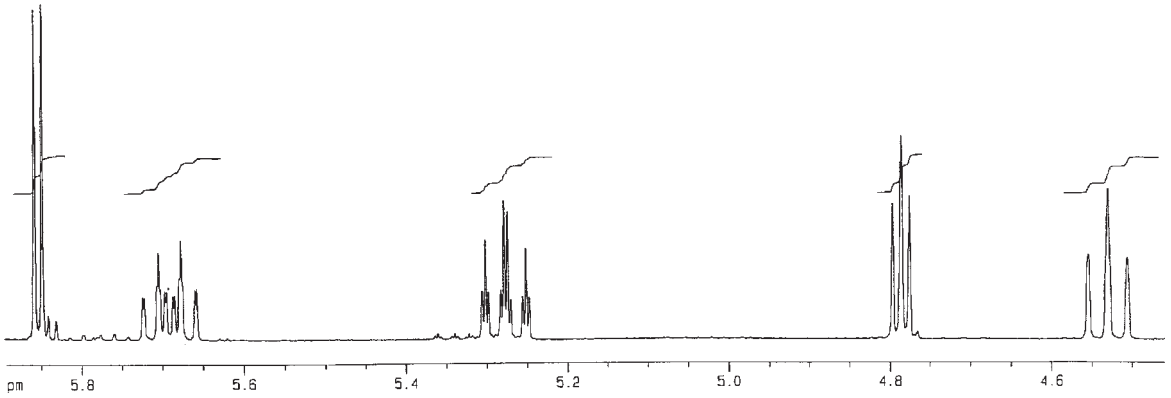


Figure S3. ^{1}H NMR for compound **3a** (200 MHz, $CDCl_3$).

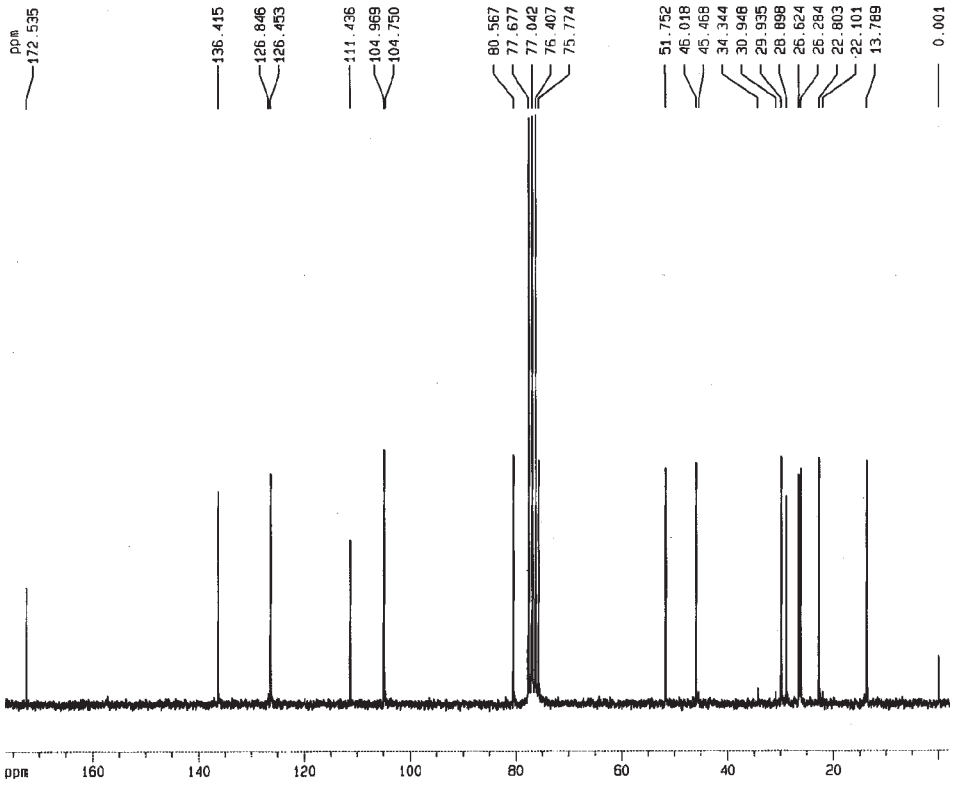


Figure S4. ^{13}C NMR for compound **3a** (50 MHz, $CDCl_3$).

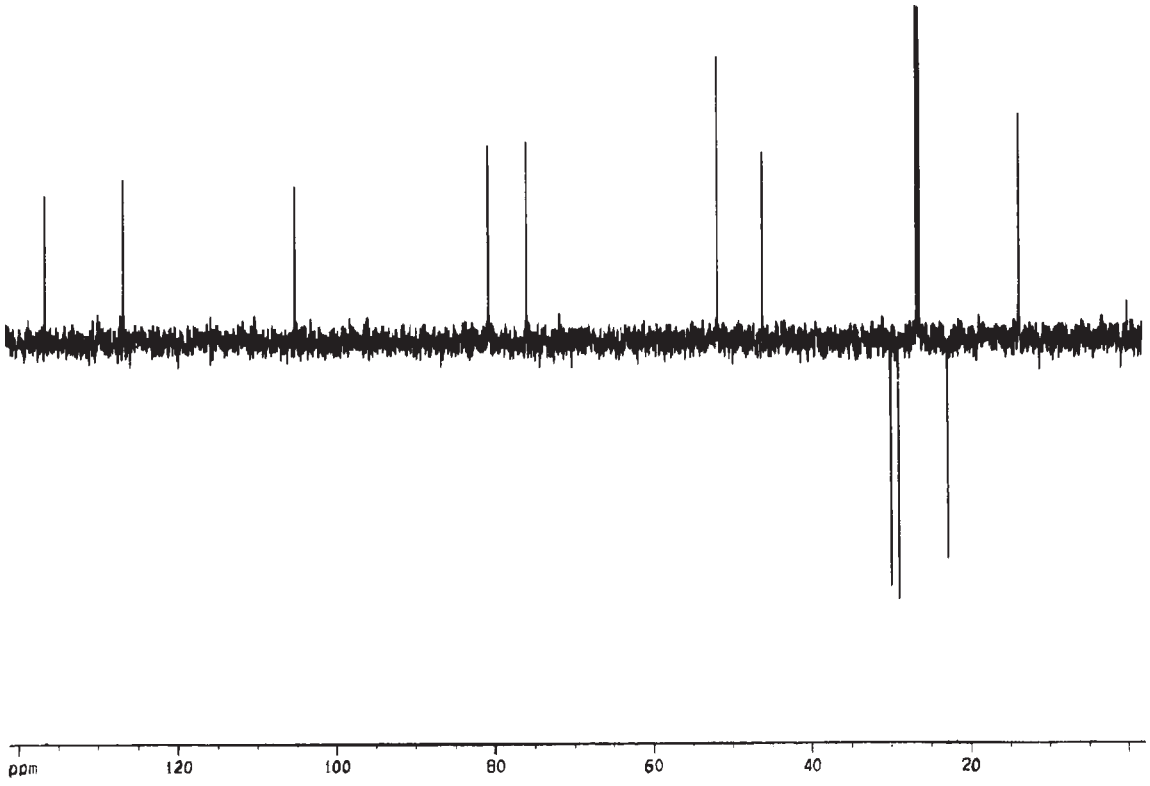


Figure S5. DEPT 135 for compound **3a** (50 MHz, $CDCl_3$).

Methyl (2'R,3'R,4'R,5'R)-2-[(Z)-2''-hexen-1''-yl-4',5'-isopropilidenedeoxy-tetrahydrofuran-3'-yl] acetate, **3b**.

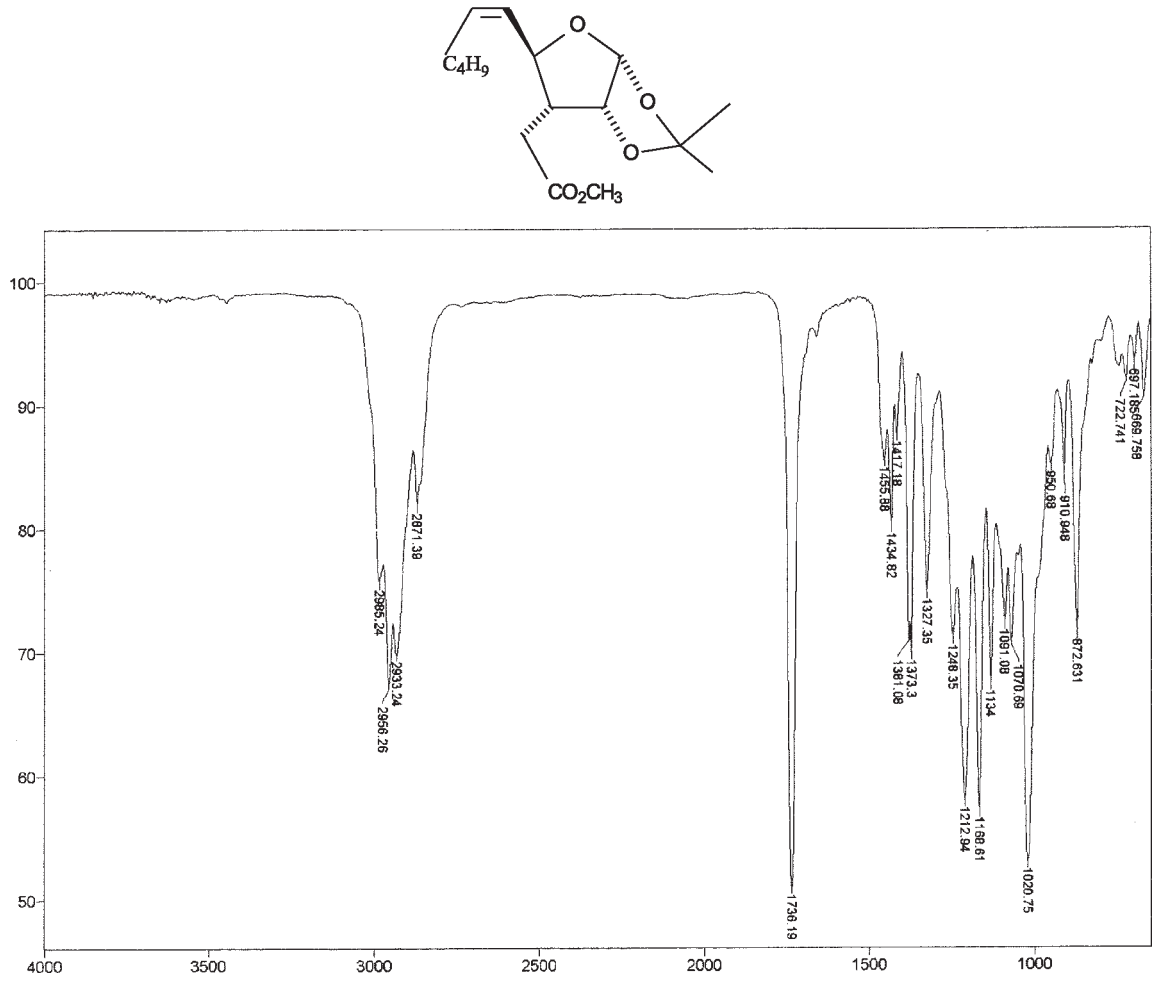


Figure S6. IR (NaCl) for compound **3b**.

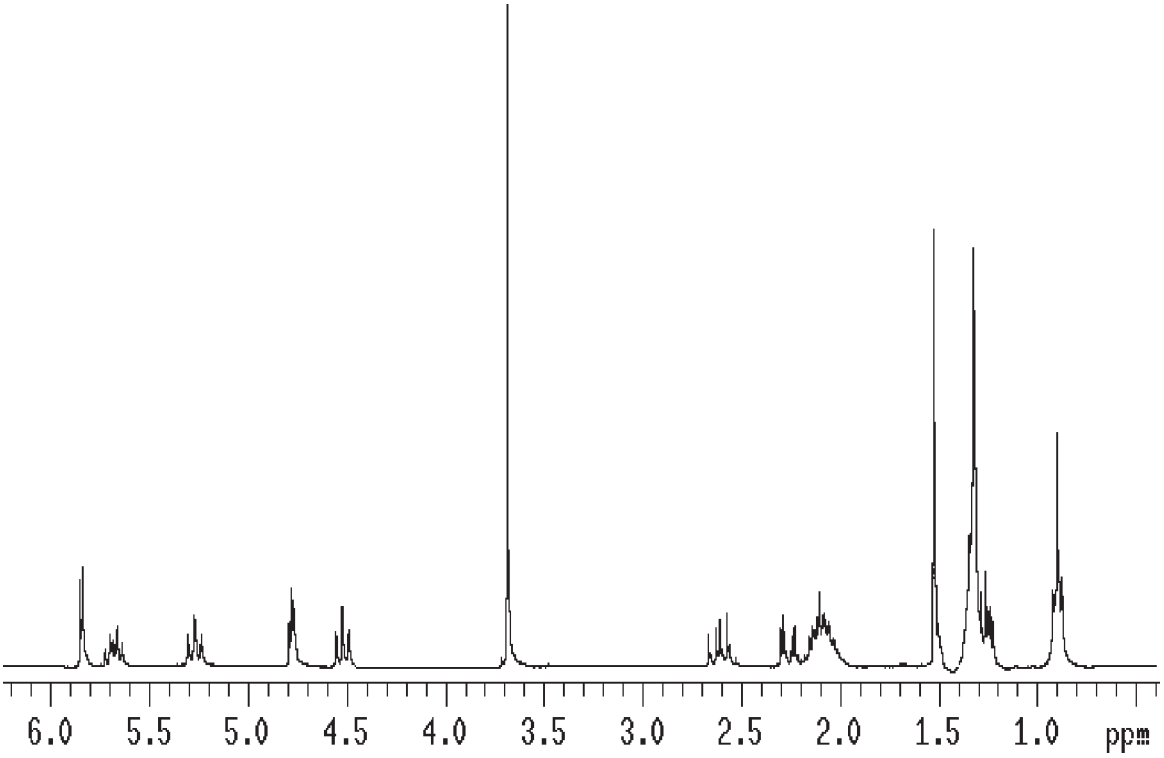


Figure S7. ^{1}H NMR for compound **3b** (300 MHz, $CDCl_3$).

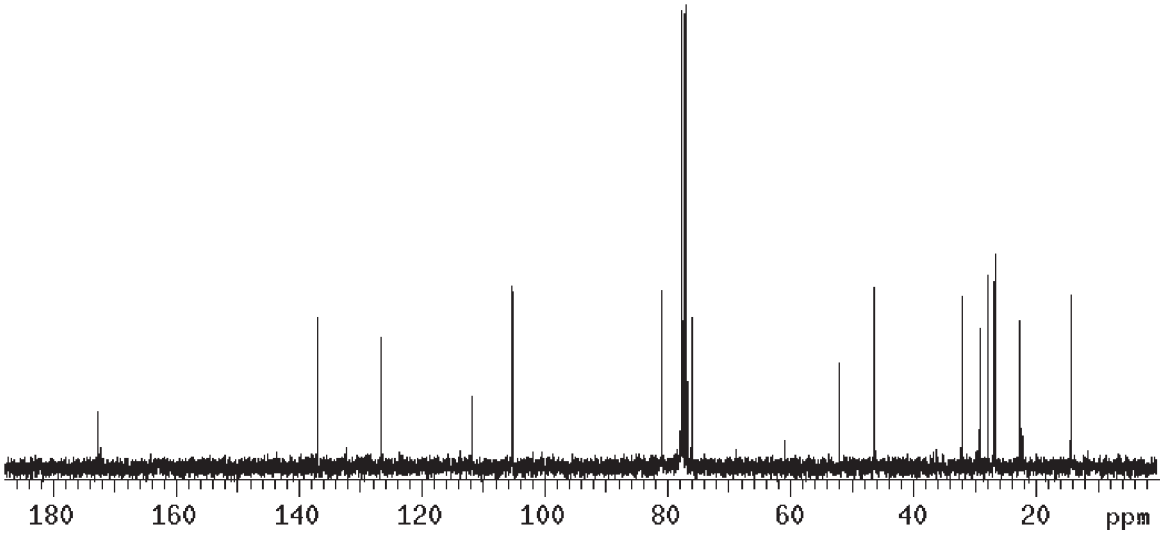


Figure S8. ^{13}C NMR for compound **3b** (75 MHz, $CDCl_3$).

Methyl (2'R,3'R,4'R,5'R)-2-[(Z)-2'-hepten-1''-yl-4',5'-isopropilidenedeoxy-tetrahydrofuran-3'-yl] acetate, **3c**.

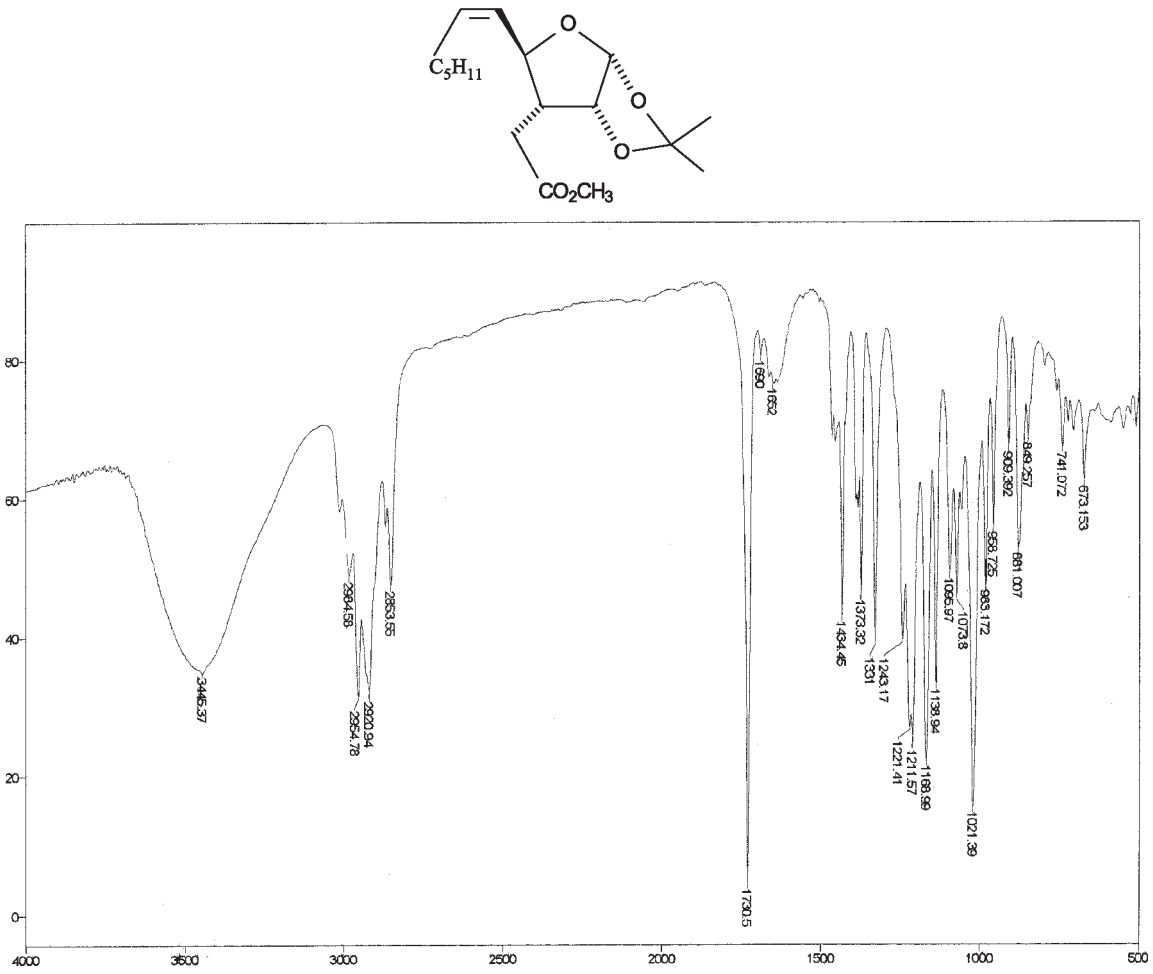


Figure S9. IR (KBr) for compound **3c**.

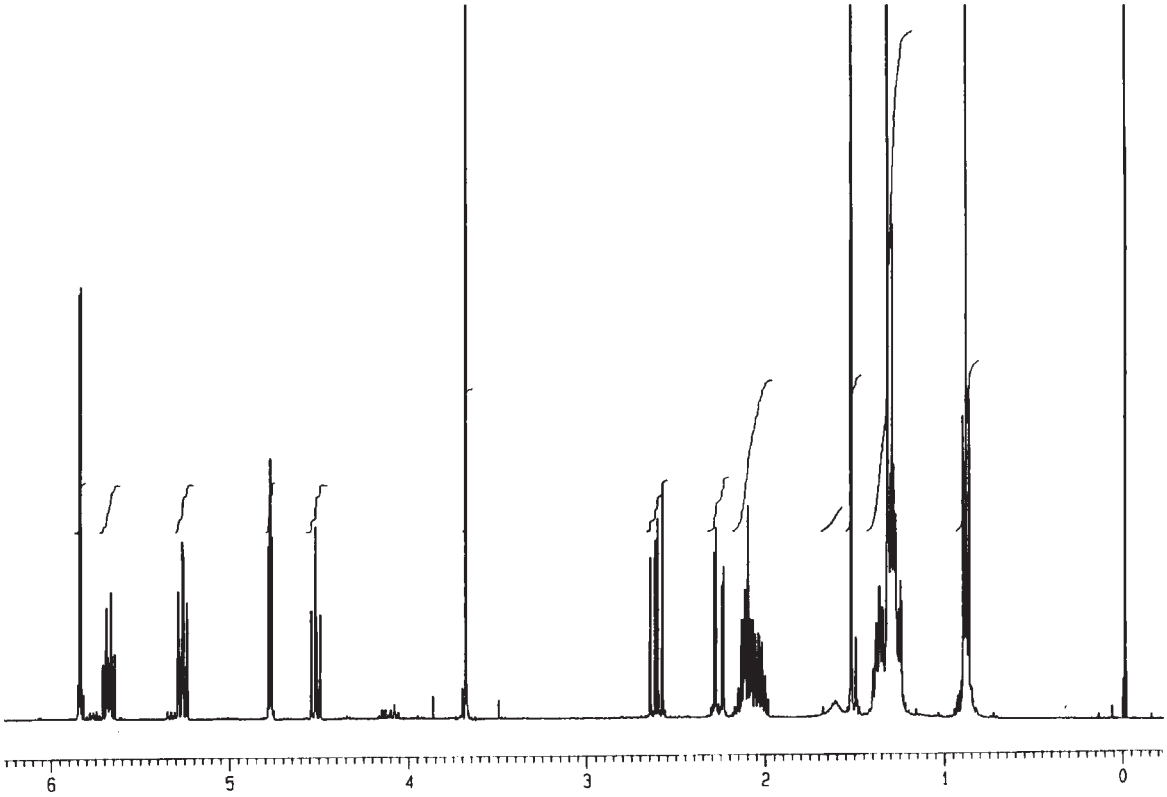


Figure S10. ^{1}H NMR for compound **3c** (400 MHz, $CDCl_3$).

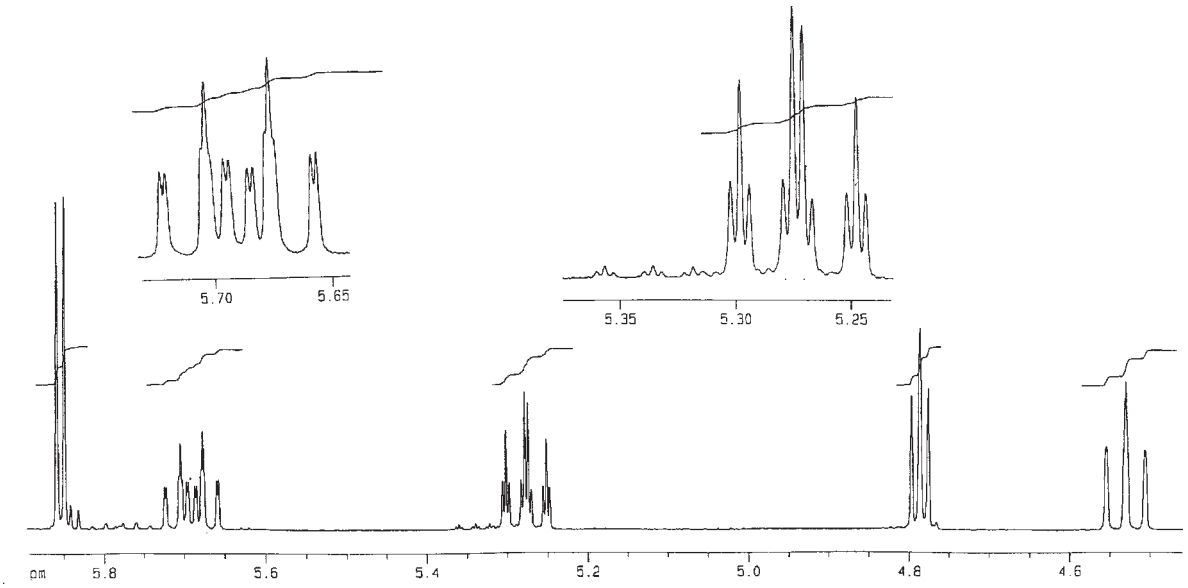


Figure S11. ^{1}H NMR for compound **3c** (400 MHz, $CDCl_3$).

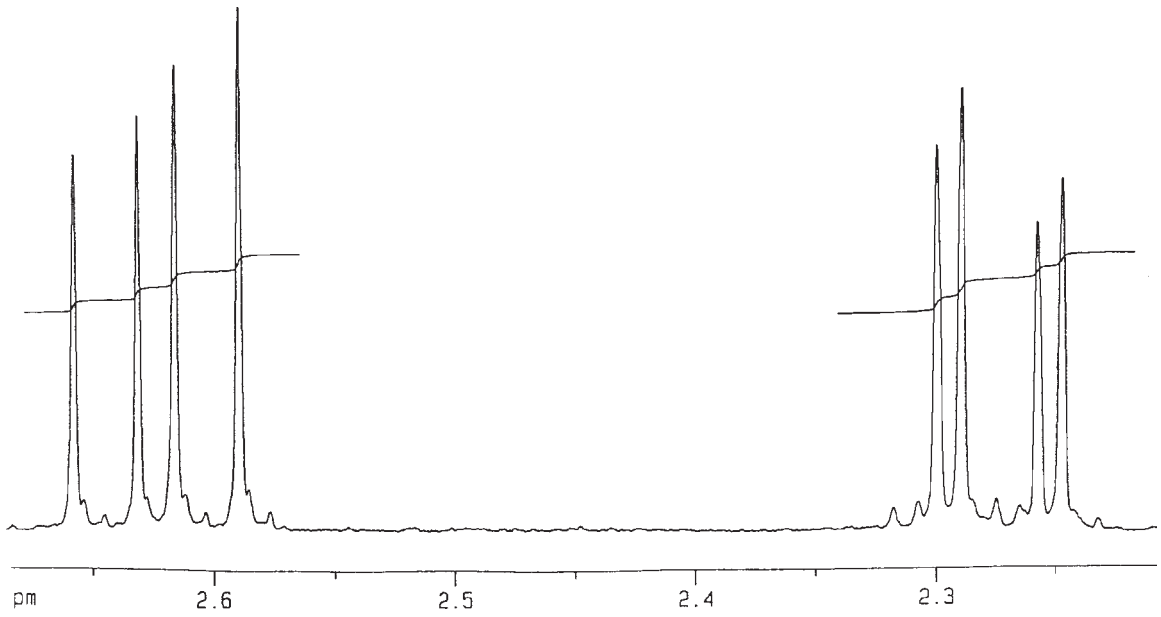


Figure S12. ^{1}H NMR for compound **3c** (400 MHz, $CDCl_3$).

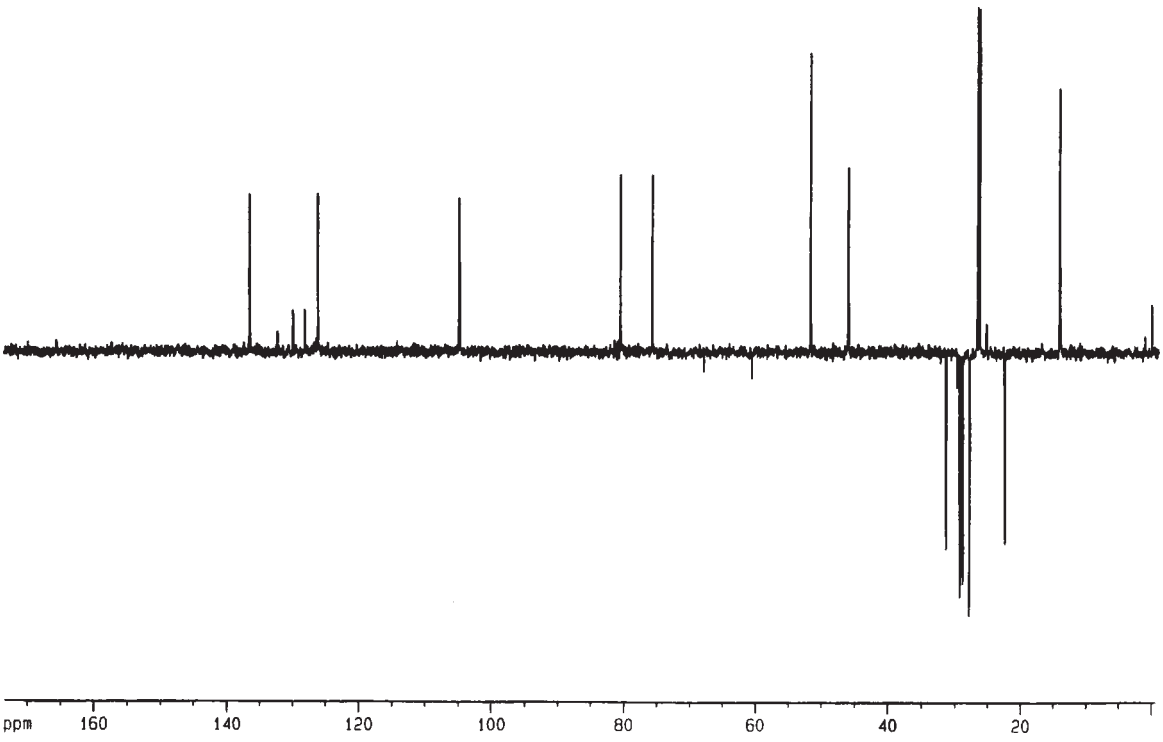


Figure S13. DEPT 135 for compound **3c** (100 MHz, $CDCl_3$).

Methyl (2'R,3'R,4'R,5'R)-2-[2'-pentyl-4',5'-isopropilidenedeoxytetrahydrofuran-3'-yl] acetate, **4a**.

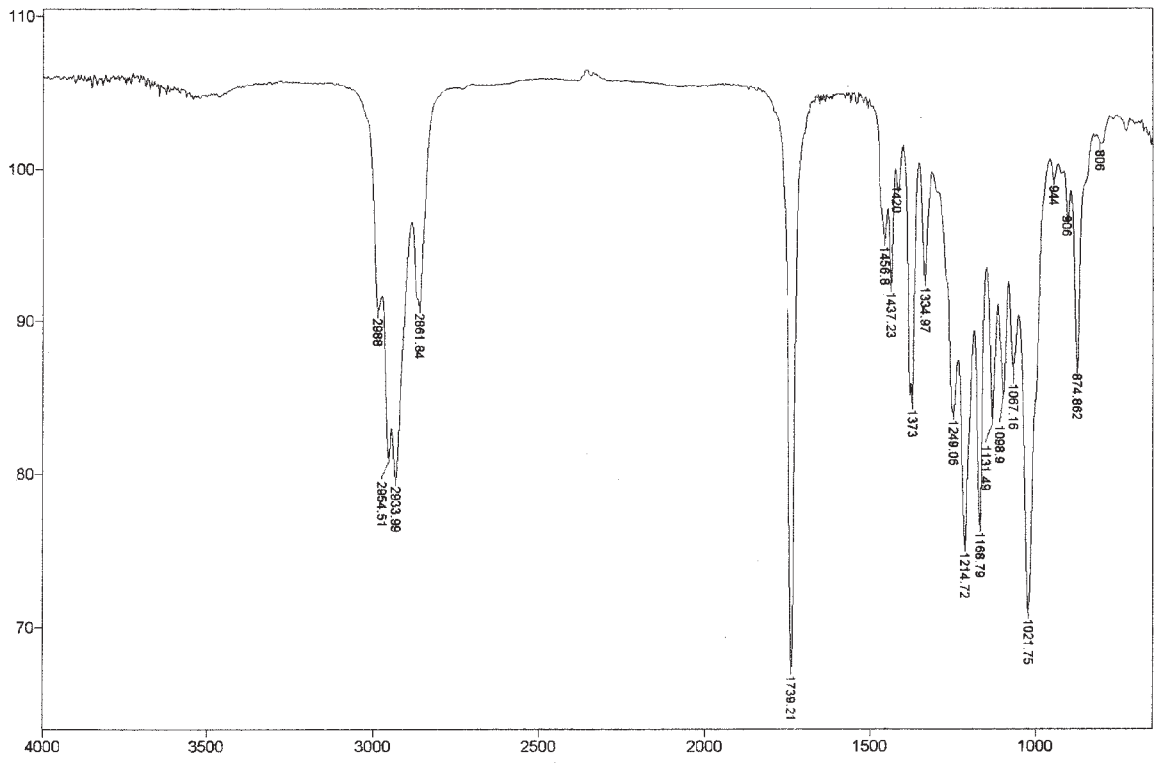


Figure S14. IR (NaCl) for compound **4a**.

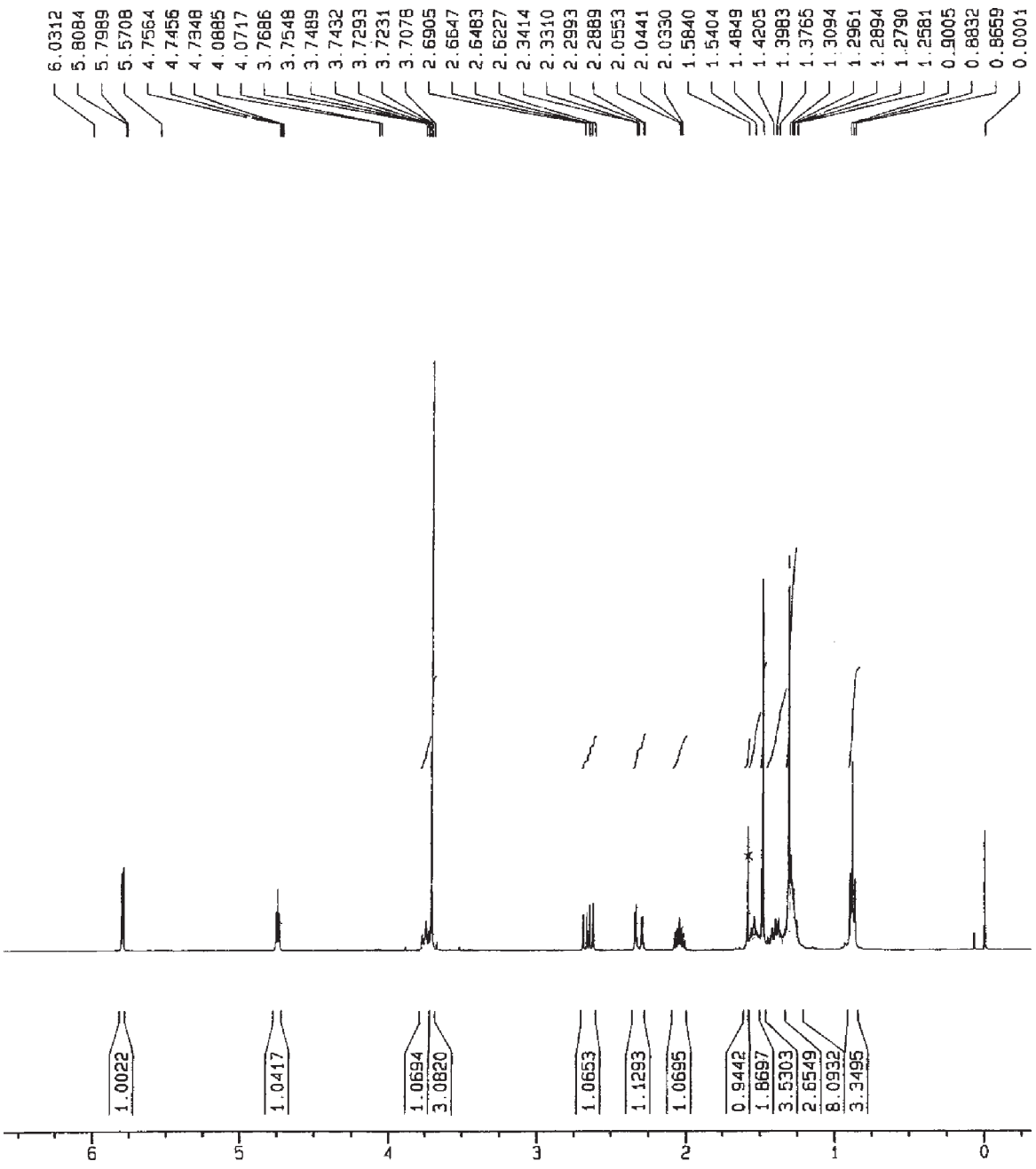


Figure S15. ^{1}H NMR for compound **4a** (400 MHz, $CDCl_3$).

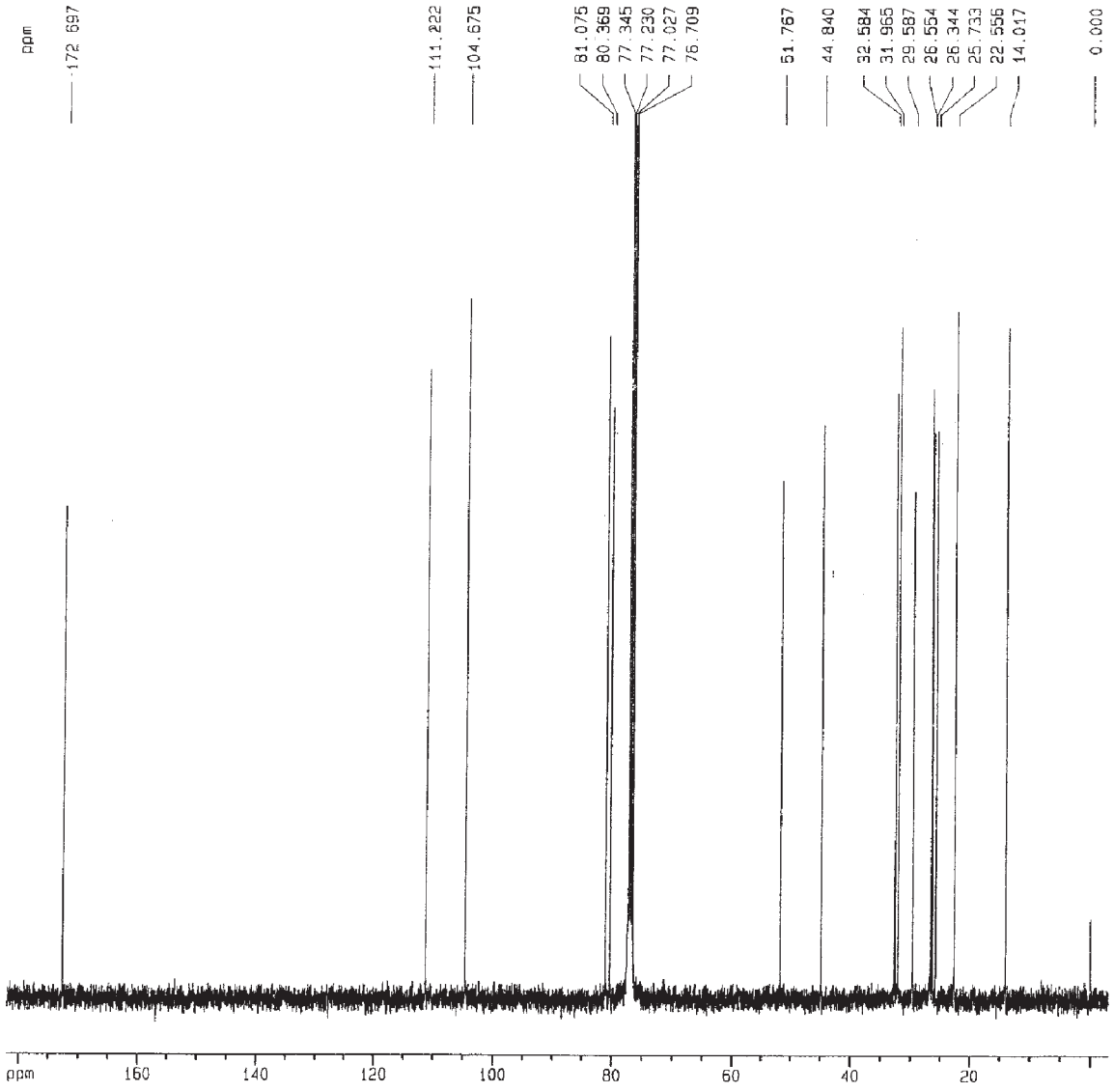


Figure S16. ^{13}C NMR for compound **4a** (100 MHz, $CDCl_3$).

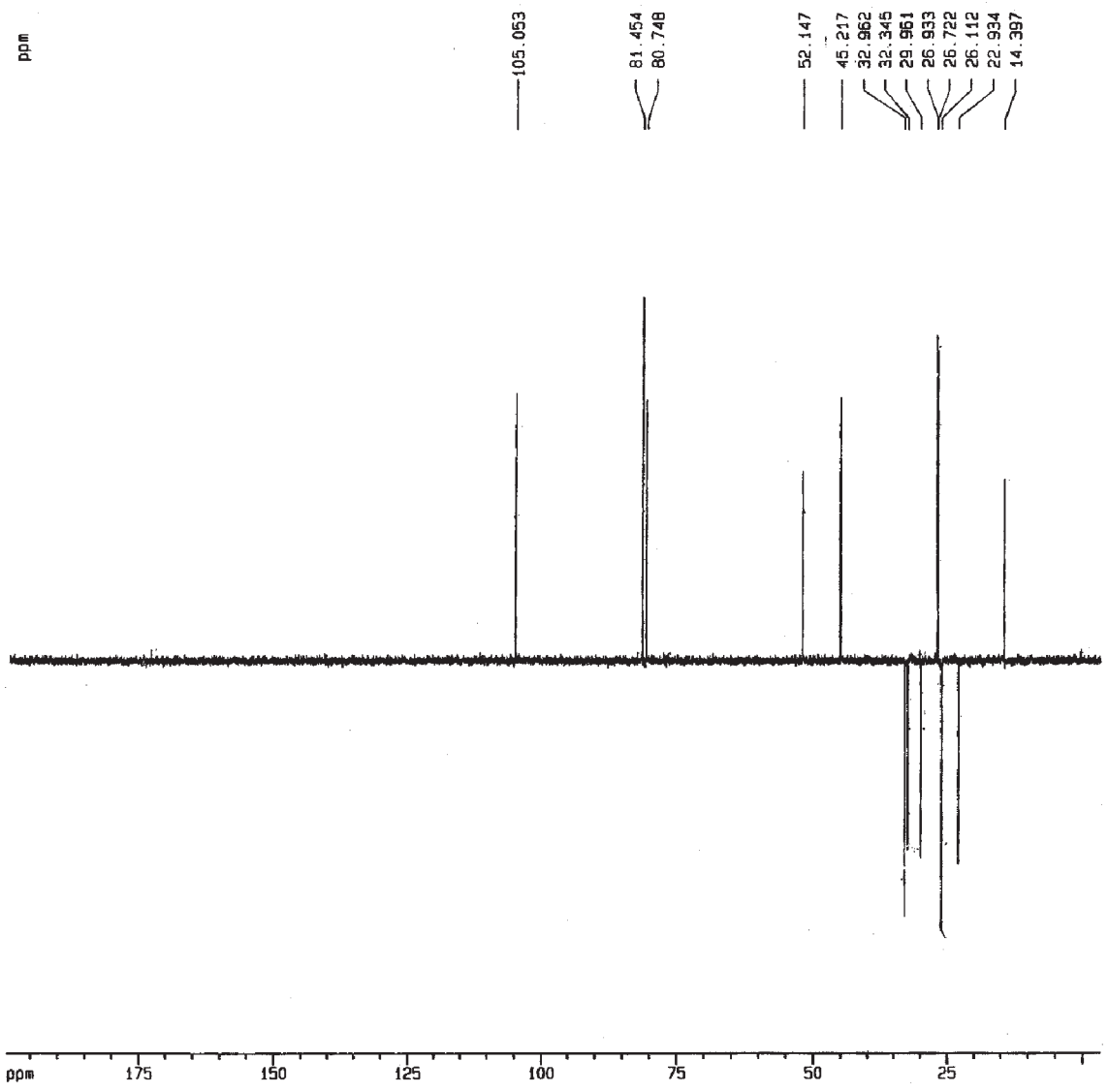
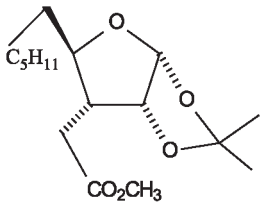


Figure S17. DEPT for compound **4a** (100 MHz, $CDCl_3$).

Methyl (2'R,3'R,4'R,5'R)-2-[2'-hexyl-4',5'-isopropilidenedeoxytetrahydrofuran-3'-yl] acetate, **4b**.



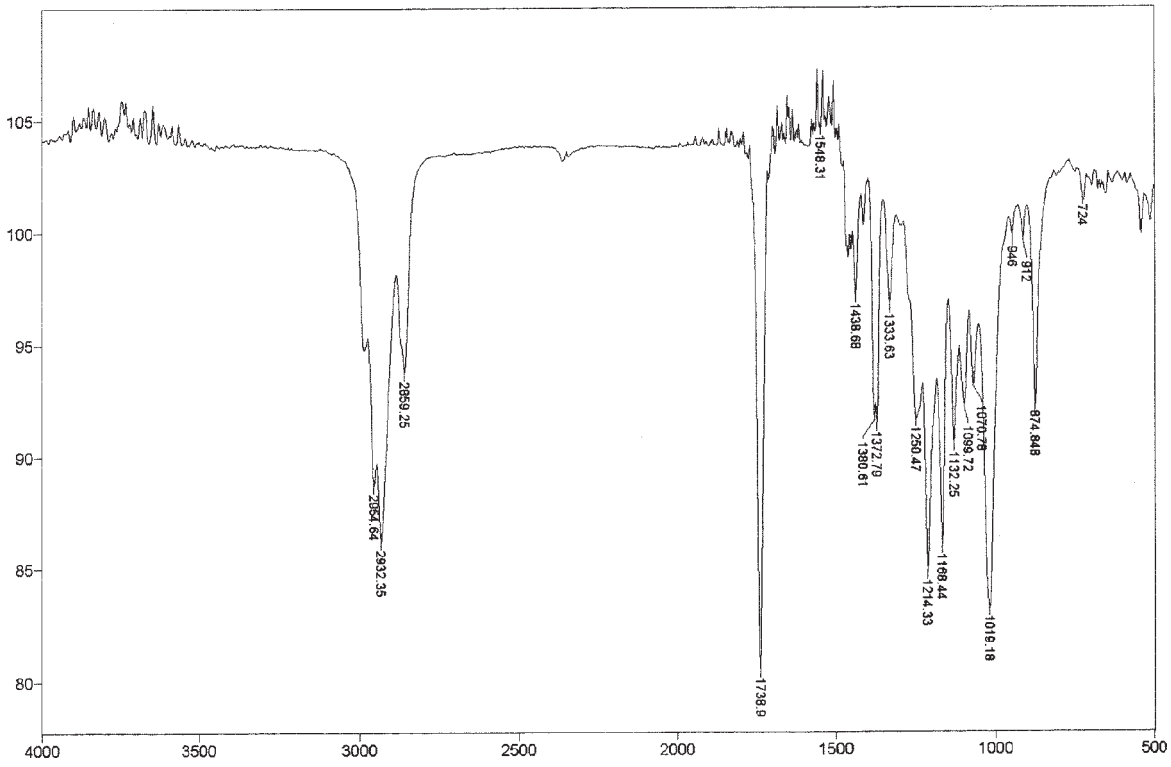


Figure S18. IR (NaCl) for compound **4b.**

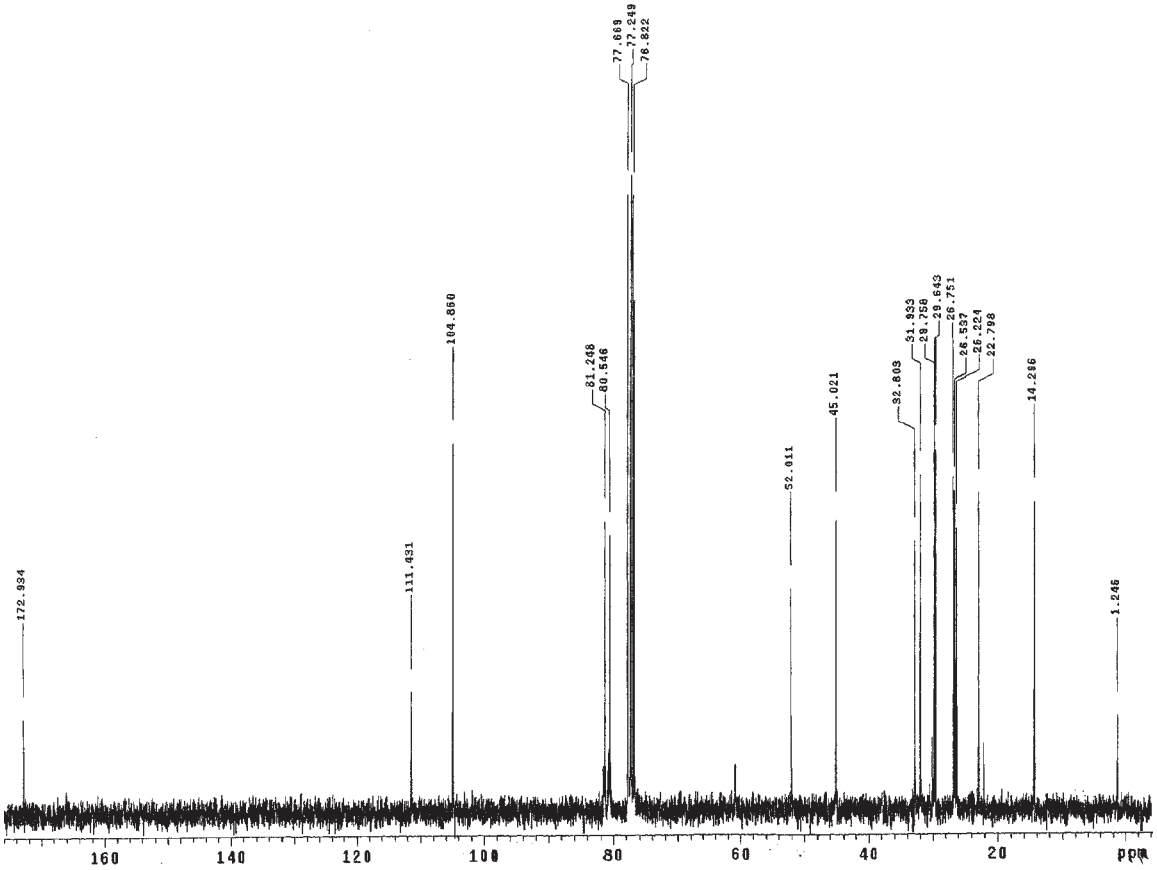


Figure S19. ^{1}H NMR for compound **4b** (300 MHz, $CDCl_3$).

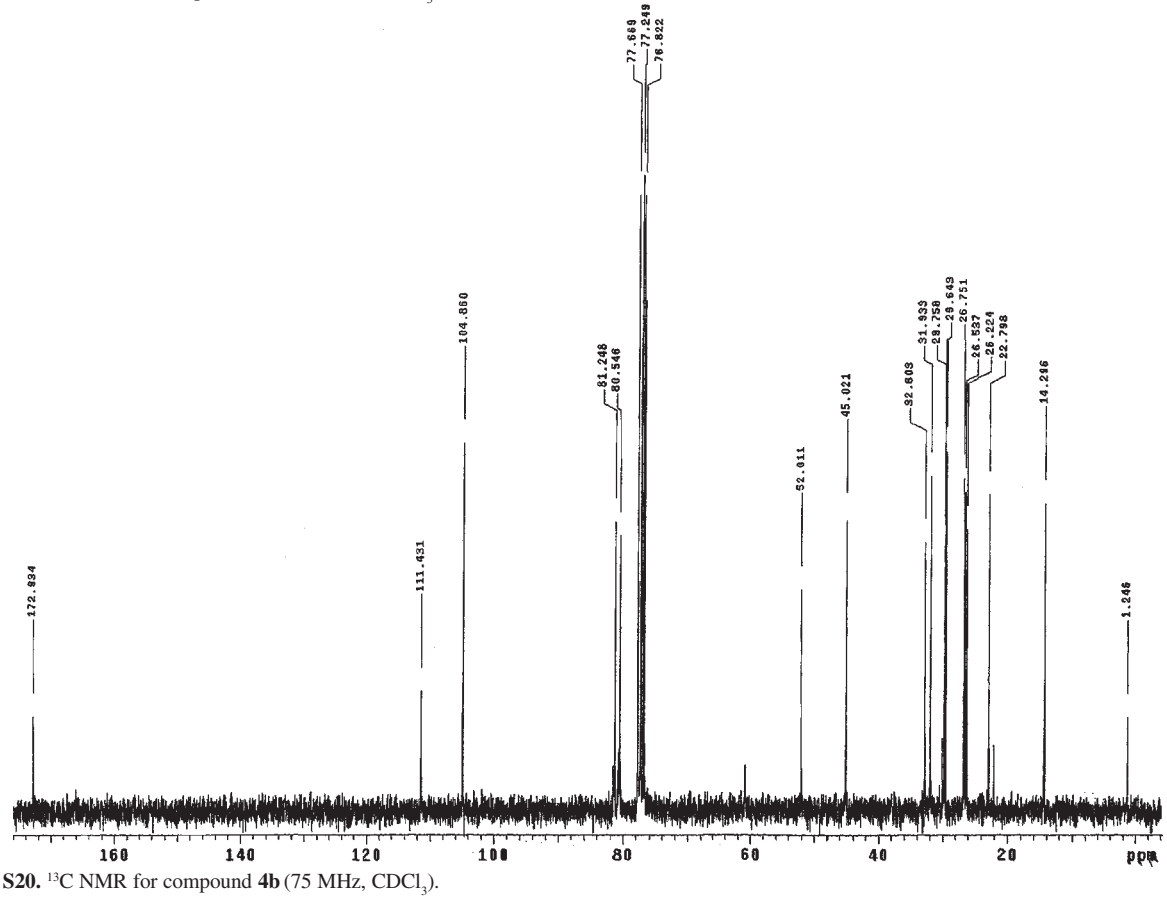


Figure S20. ^{13}C NMR for compound **4b** (75 MHz, $CDCl_3$).

Methyl (2'R,3'R,4'R,5'R)-2-[2'-heptyl-4',5'-isopropilidenedeoxytetrahydrofuran-3'-yl] acetate, **4c**.

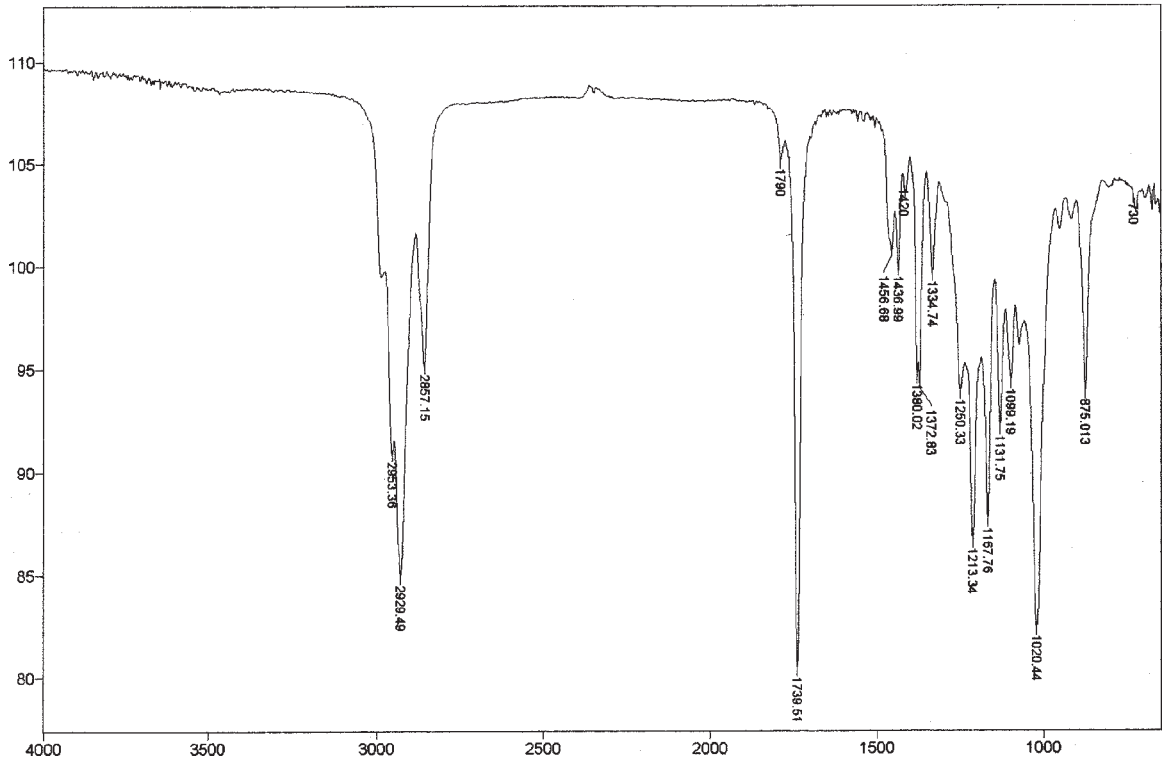


Figure S21. IR (NaCl) for compound **4c**.

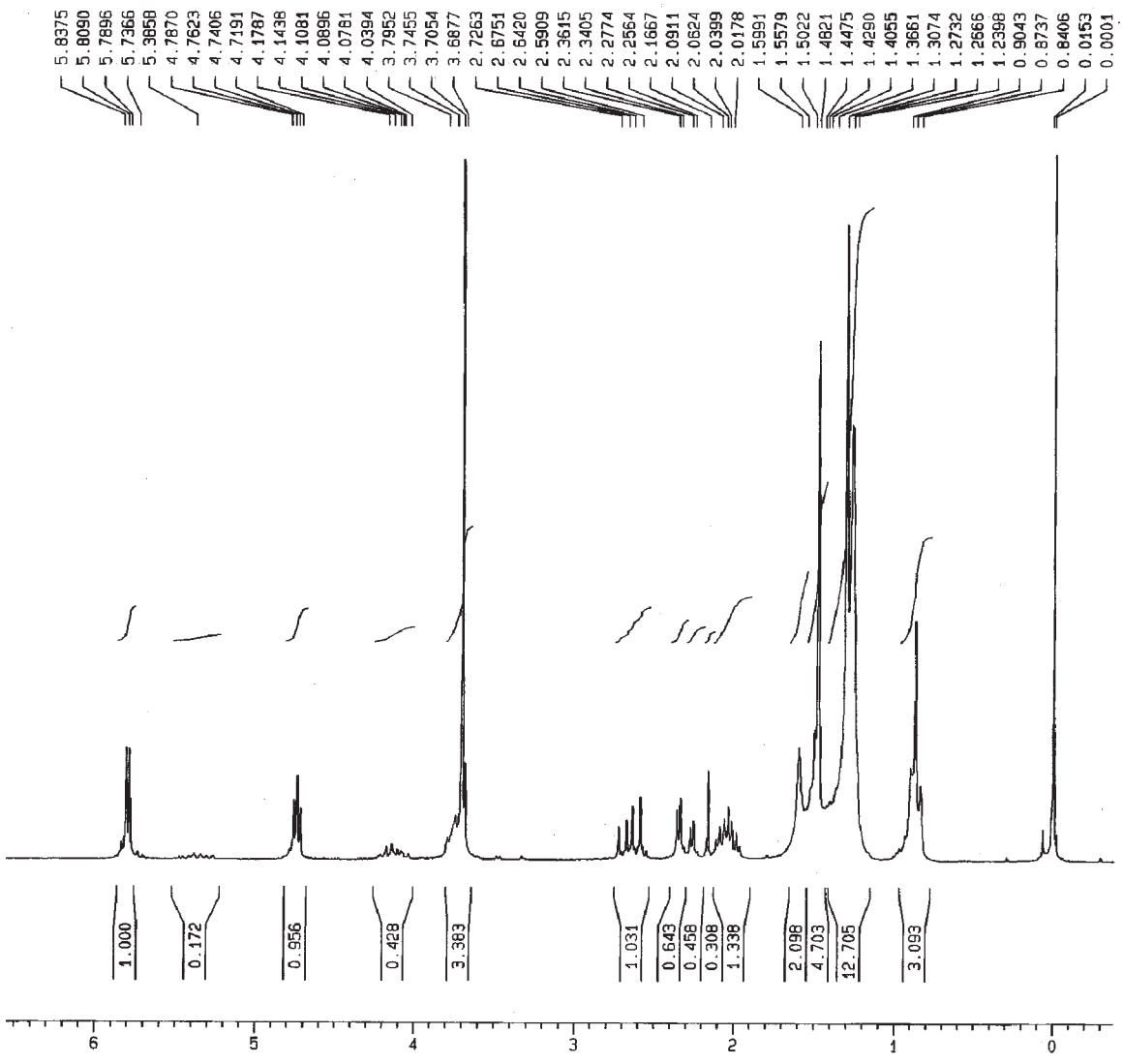


Figure S22. ^{1}H NMR for compound **4c** (200 MHz, $CDCl_3$).

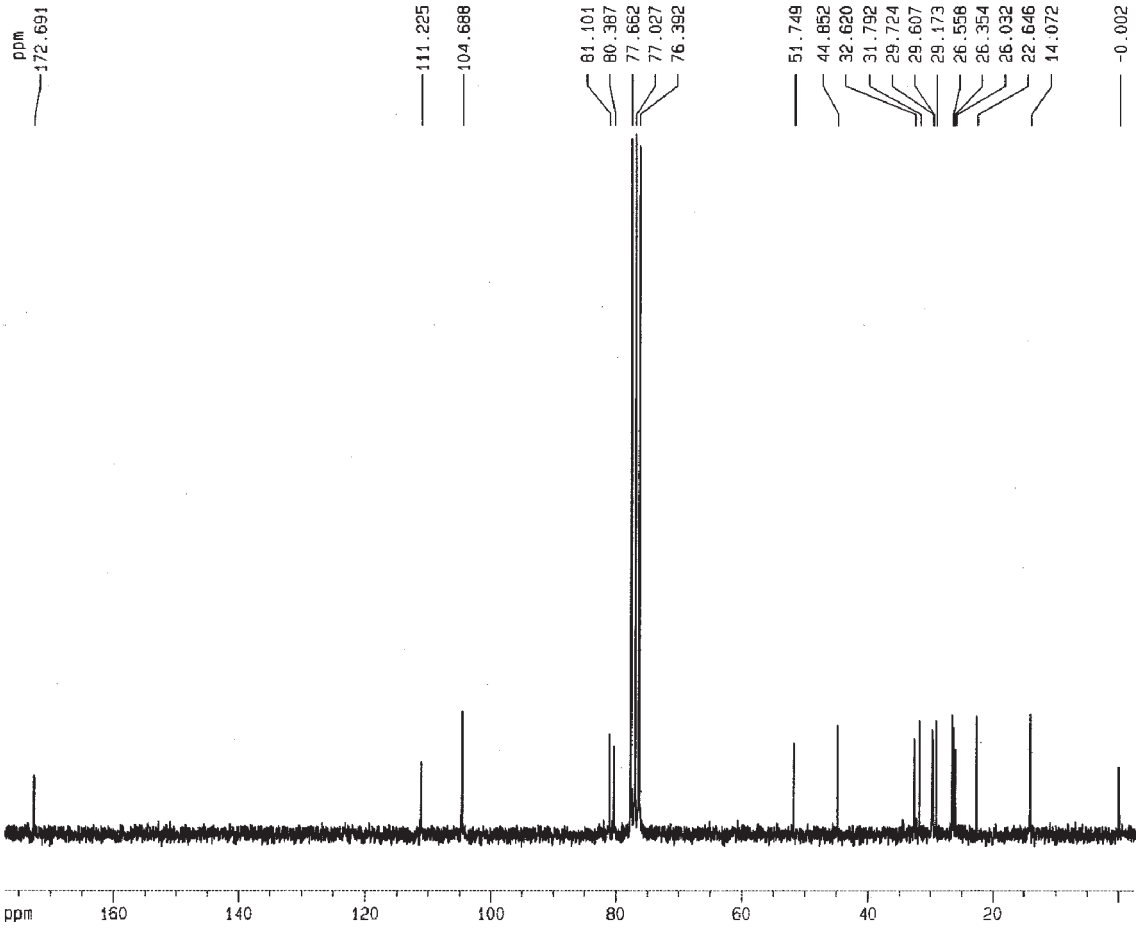


Figure S23. ^{13}C NMR for compound **4c** (50 MHz, $CDCl_3$).

(1R,5R,6R,8S)-8-hydroxy-6-pentyl-2,7-dioxabicyclo[3.3.0]octan-3-one, **5aα** *and (1R,5R,6R,8R)-8-hydroxy-6-pentyl-2,7-dioxabicyclo[3.3.0]octan-3-one,* **5aβ**.

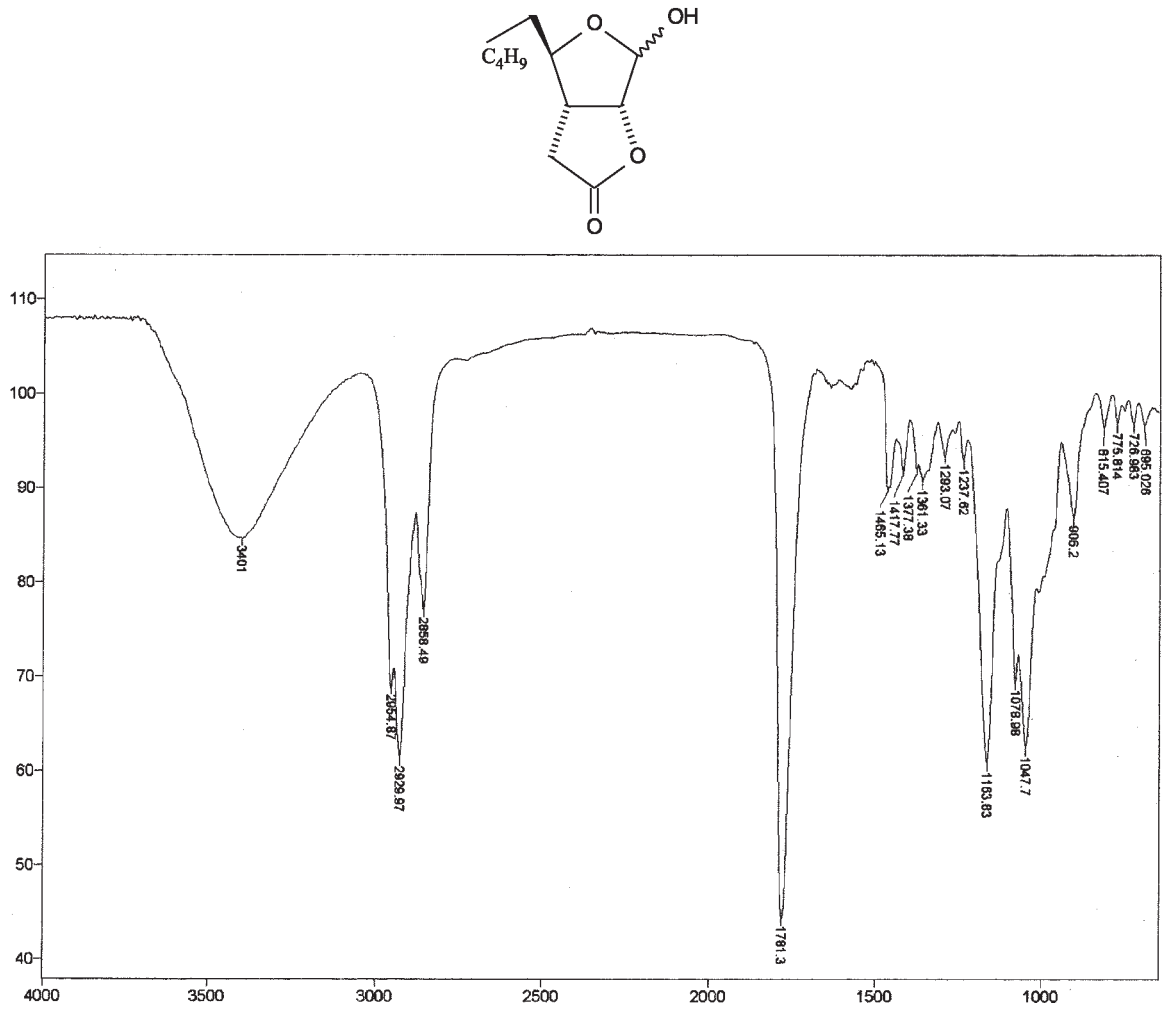


Figure S24. IR (NaCl) for compound **5a**.

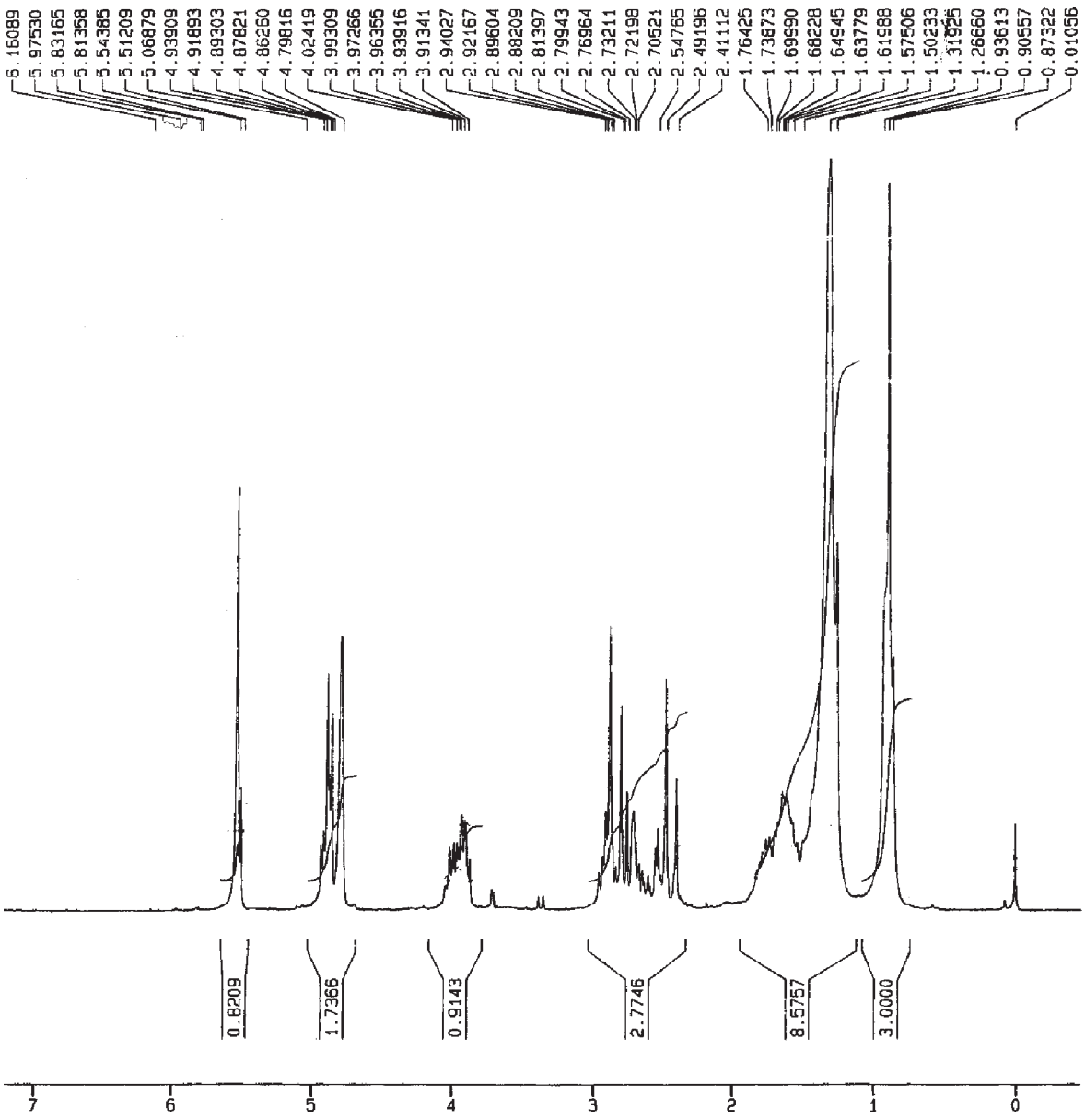


Figure S25. ^{1}H NMR for compound **5a** (400 MHz, $CDCl_3$).

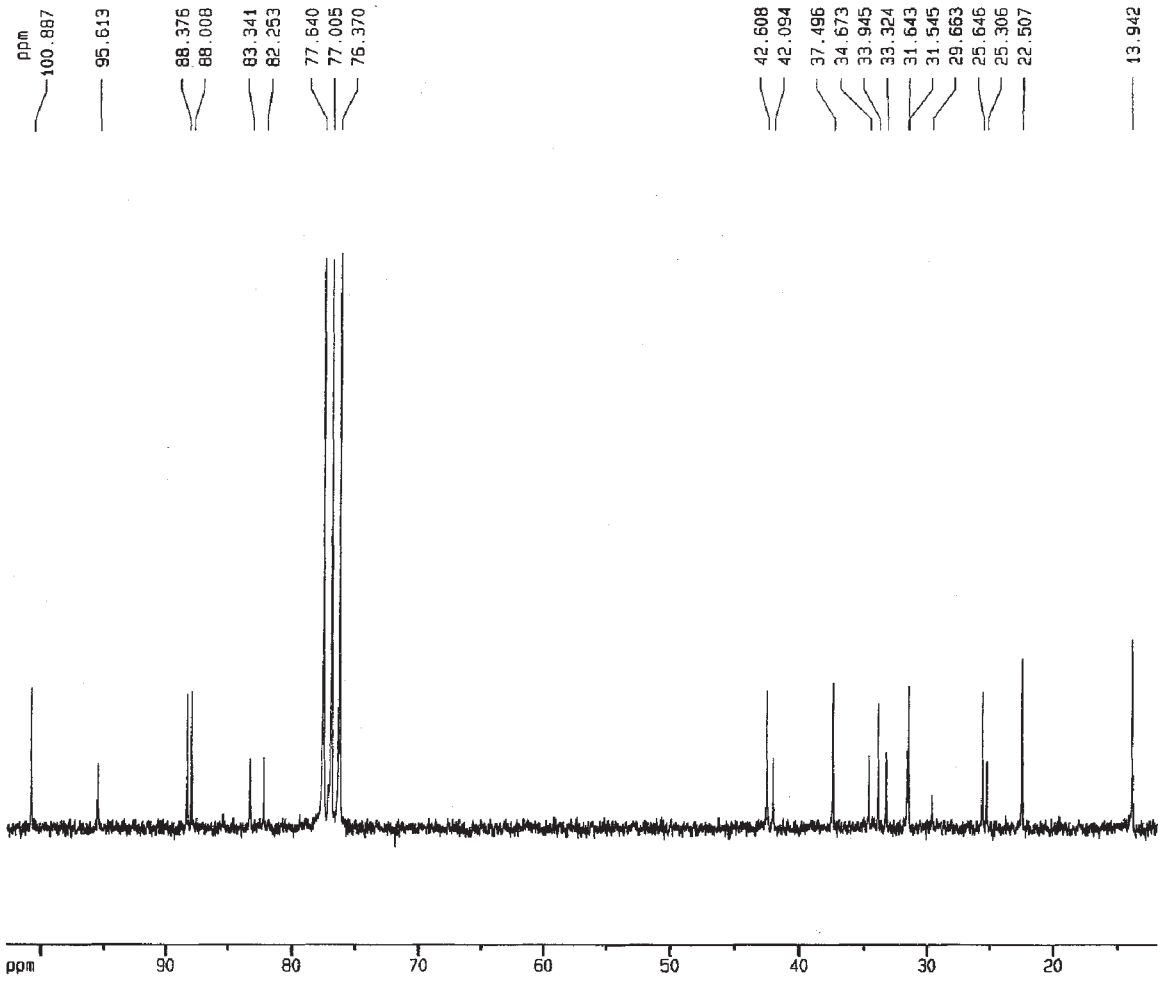


Figure S26. ^{13}C NMR for compound **5a** (100 MHz, $CDCl_3$).

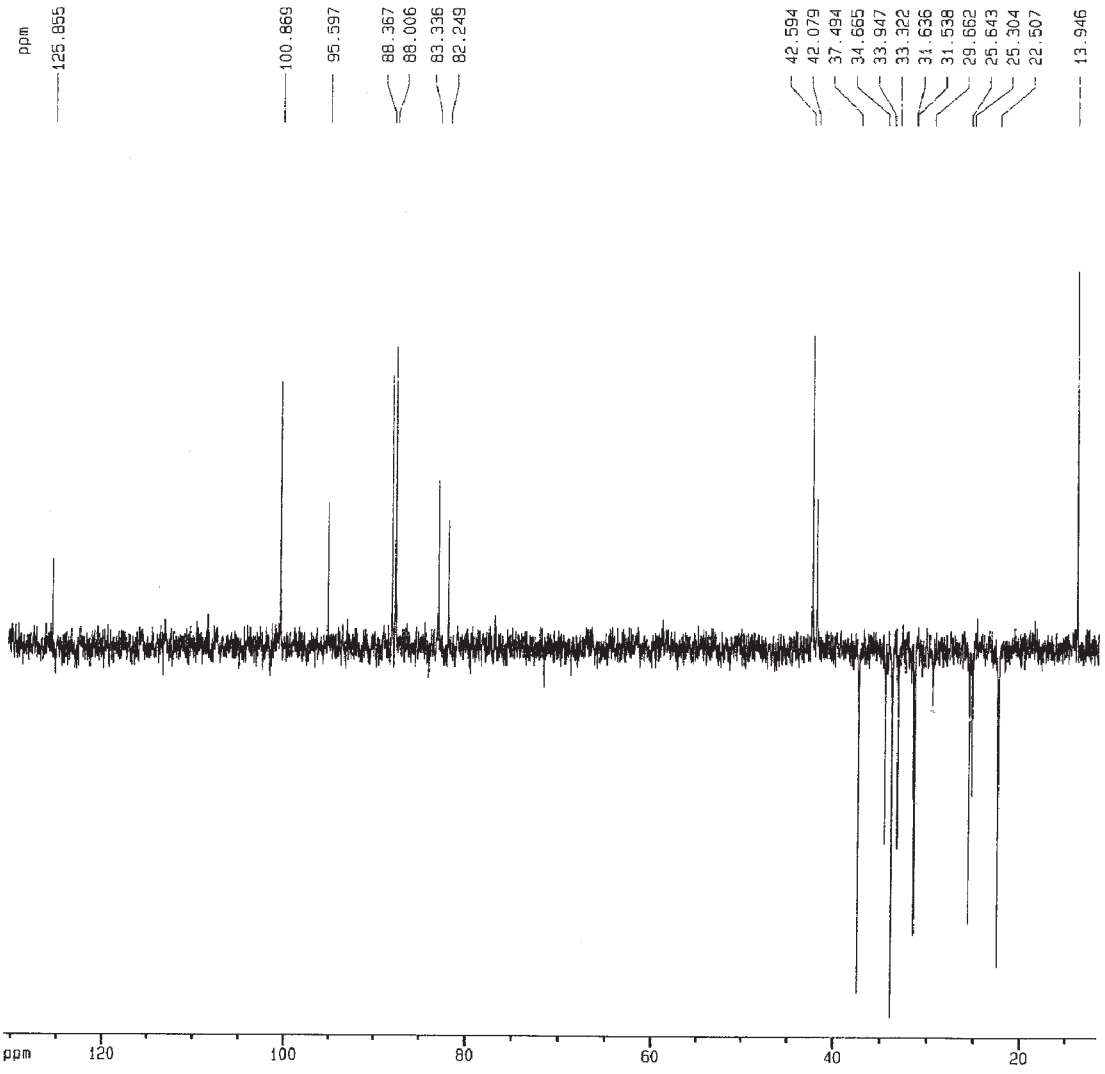


Figure S27. DEPT for compound **5a** (100 MHz, $CDCl_3$).

(1R,5R,6R,8S)-8-hydroxy-6-hexyl- 2,7-dioxabicyclo[3.3.0]octan-3-one **5bα**, *and (1R,5R,6R,8R)-8-hydroxy-6-hexyl-2,7-dioxabicyclo[3.3.0]octan-3-one* **5bβ**.

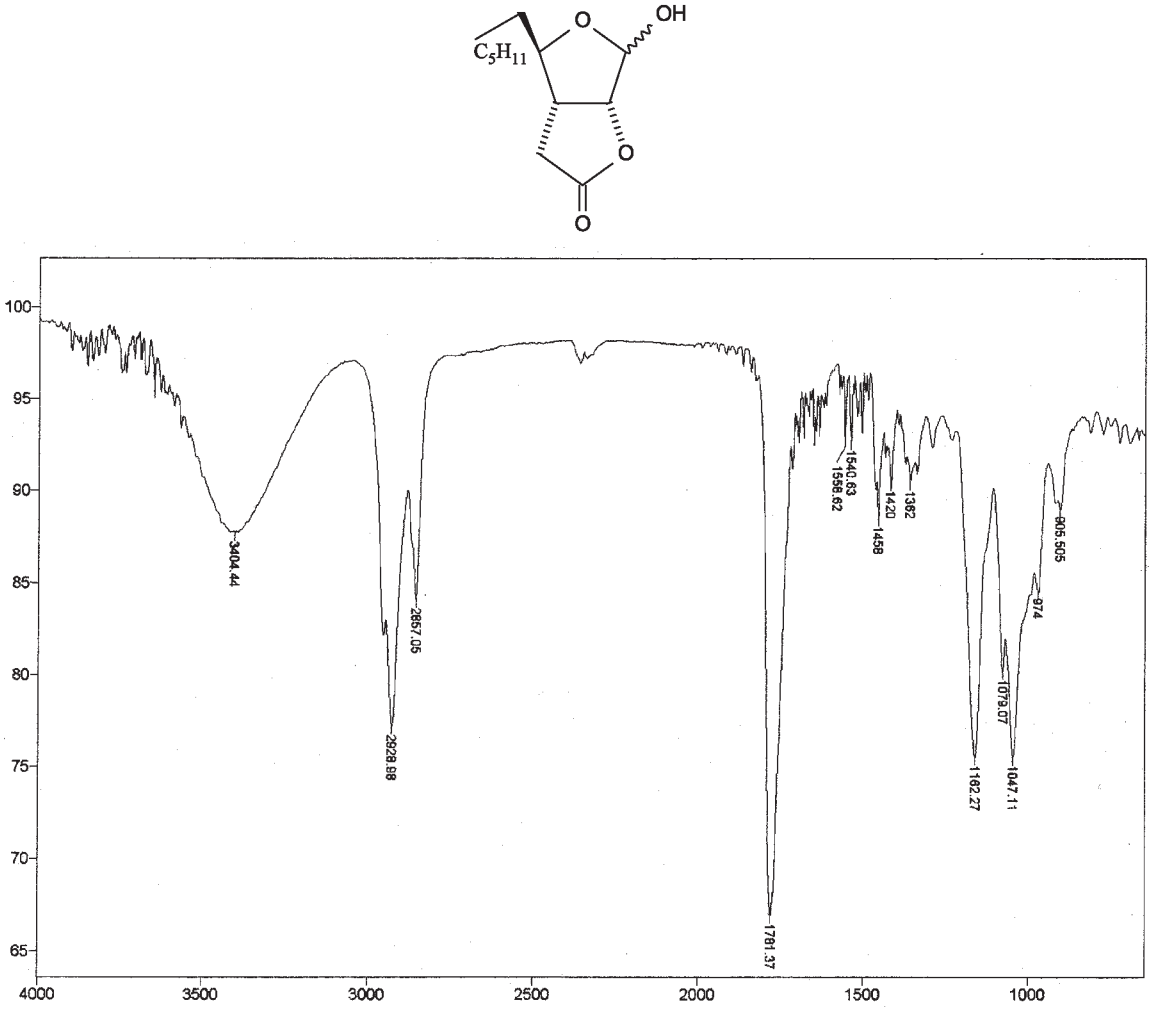


Figure S28. IR (NaCl) for compound **5b**.

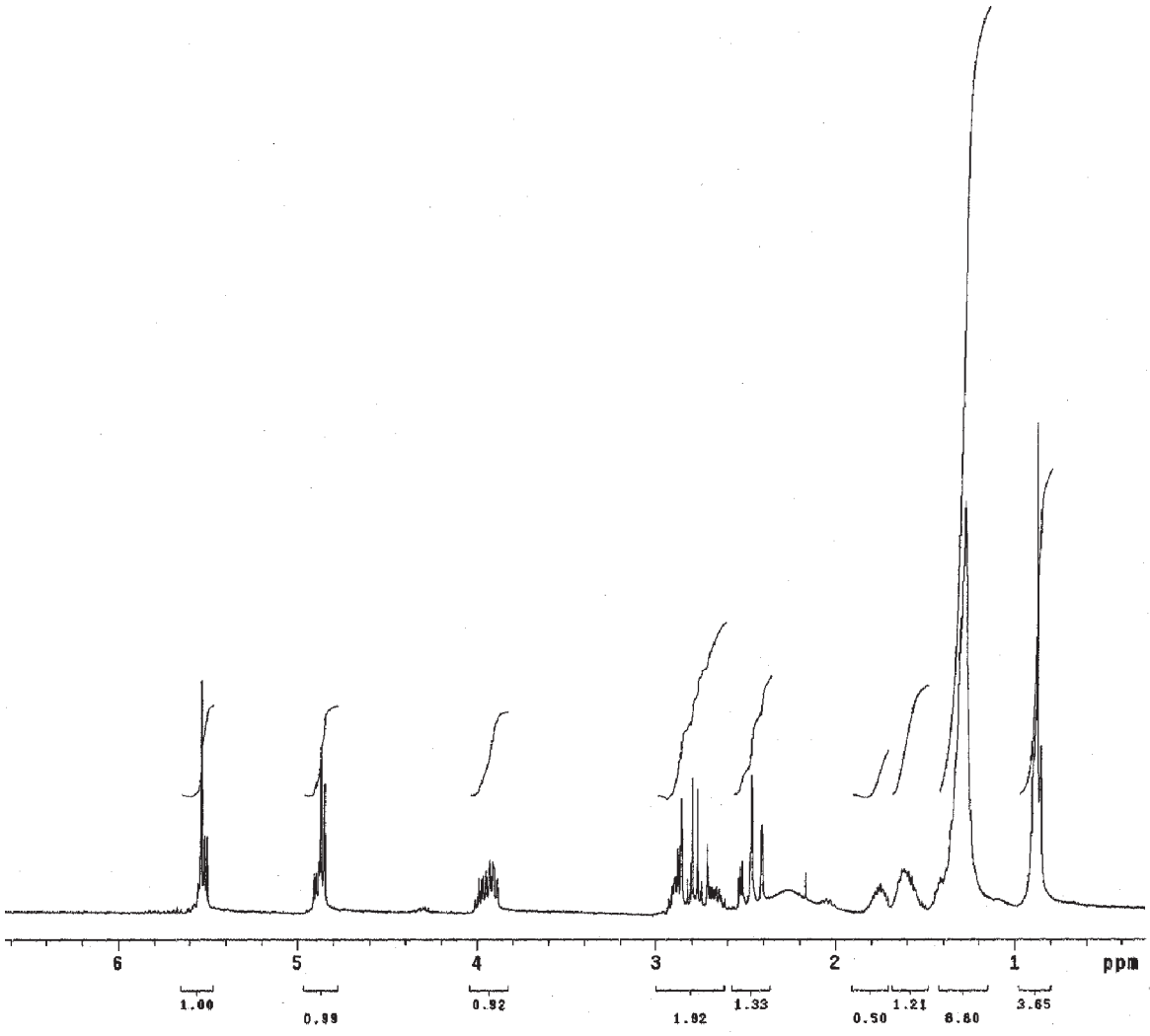


Figure S29. ^{1}H NMR for compound **5b** (300 MHz, $CDCl_3$).

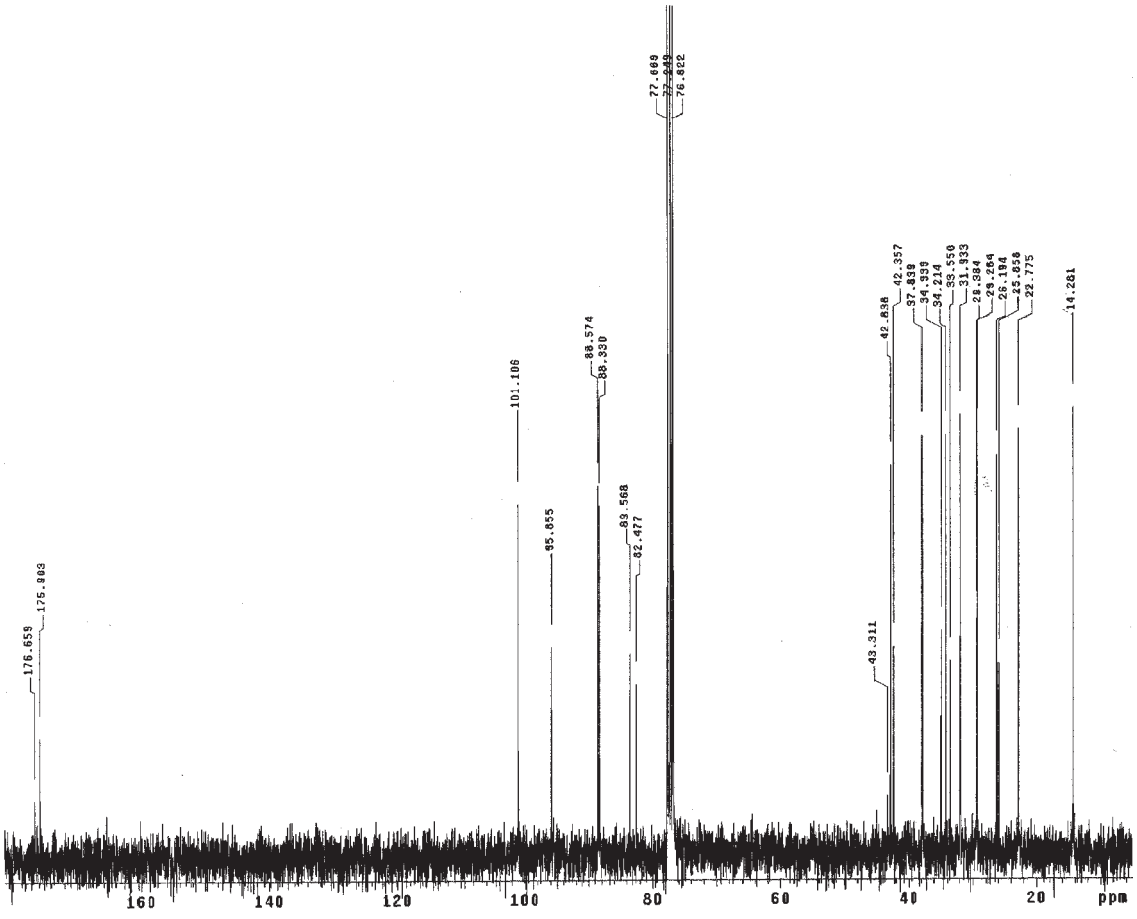


Figure S30. ^{13}C NMR for compound **5b** (75 MHz, $CDCl_3$).

(1R,5R,6R,8S)-8-hydroxy-6-hepyl-2,7-dioxabicyclo[3.3.0]octan-3-one, **5cα** and *(1R,5R,6R,8R)-8-hydroxy-6-heptyl-2,7-dioxabicyclo[3.3.0]octan-3-one,* **5cβ**.

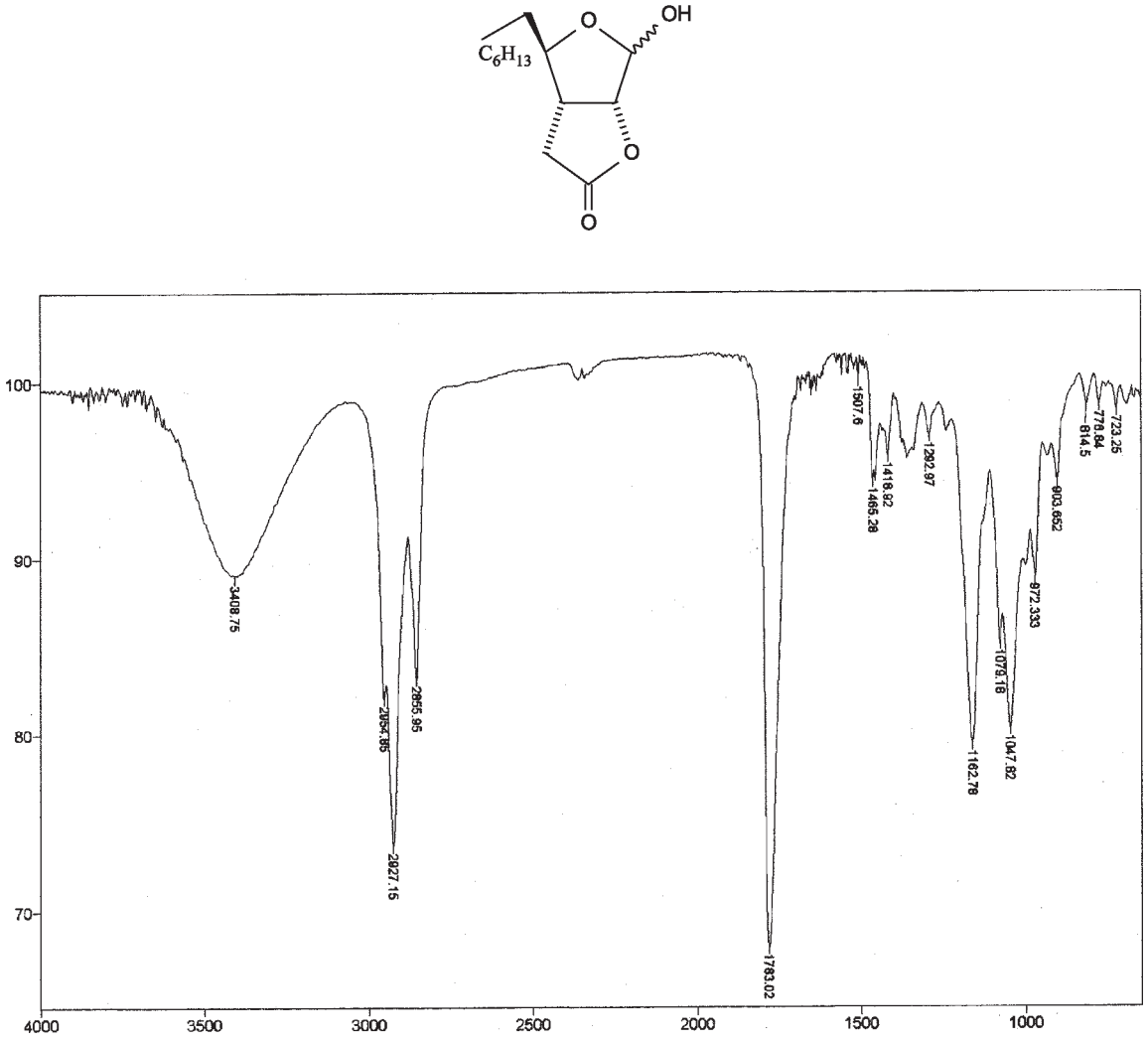


Figure S31. IR (KBr) for compound **5c**.

(1R,5R,6R)-6-pentyl-2,7-dioxabicyclo[3.3.0]octan-3,8-dione, **6a**.

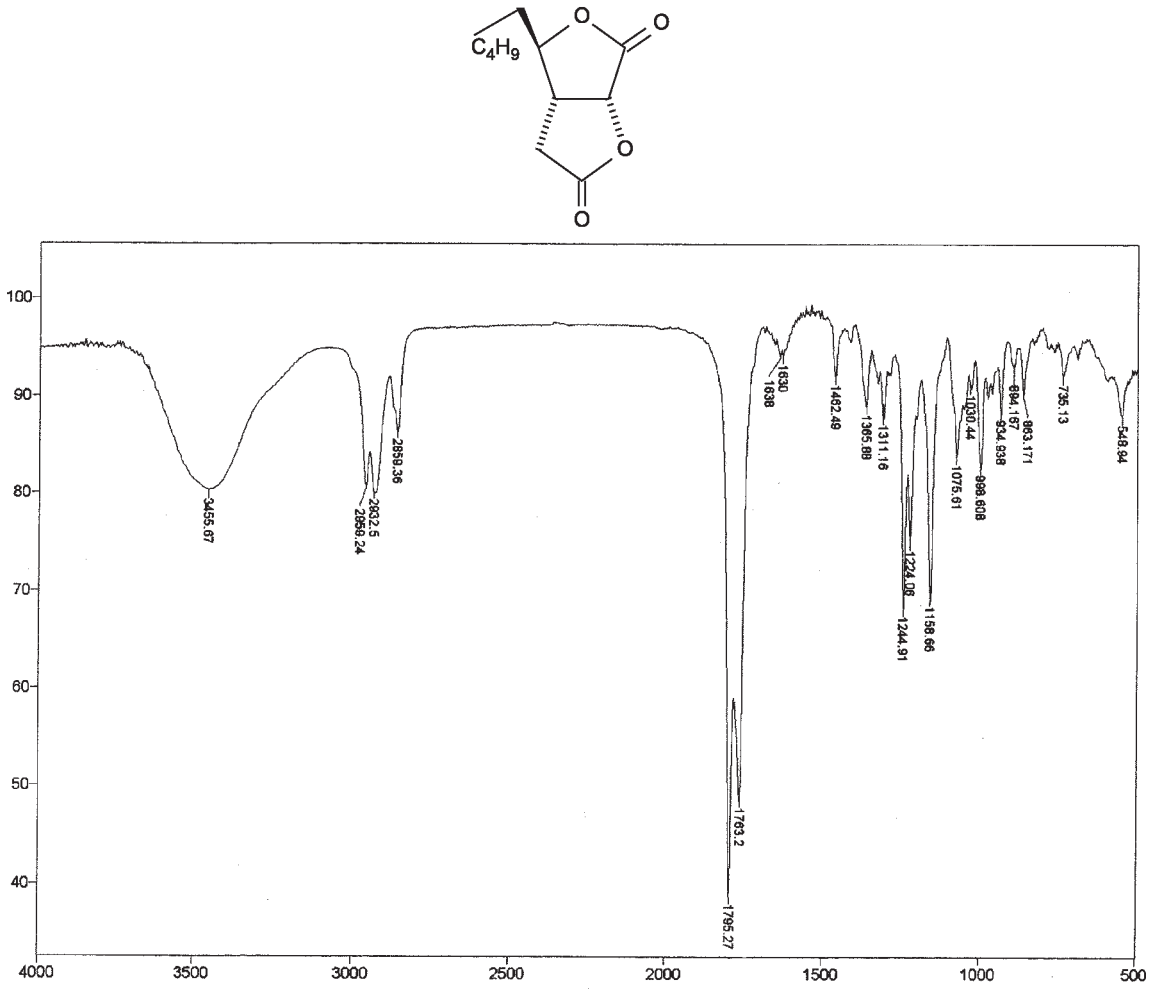


Figure S32. IR (KBr) for compound **6a**.

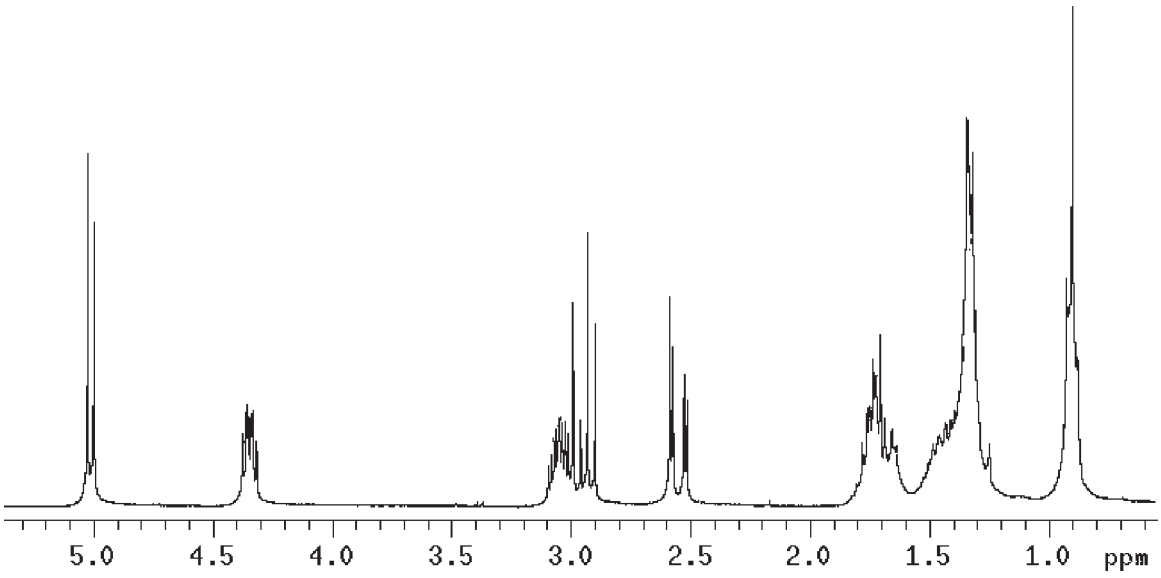


Figure S33. ^{1}H NMR for compound **6a** (300 MHz, $CDCl_3$).

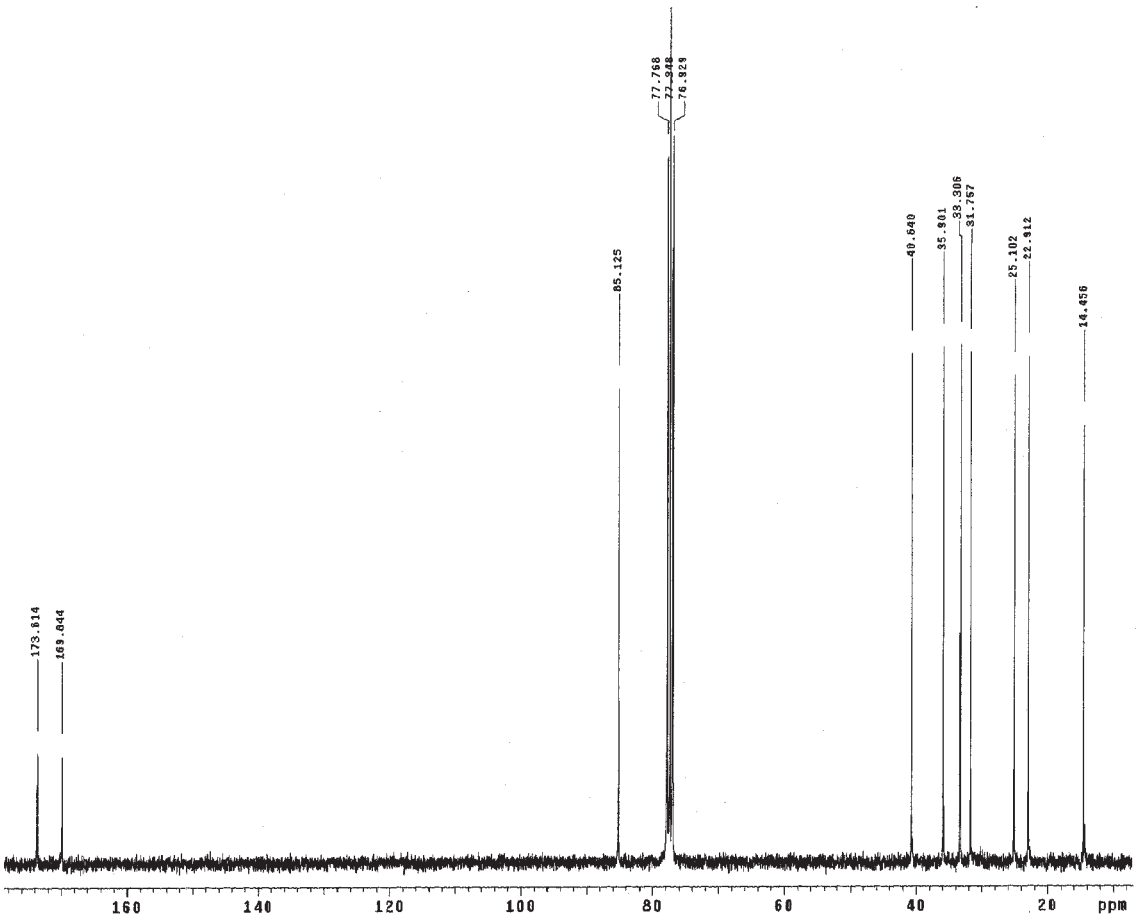


Figure S34. ^{13}C NMR for compound **6a** (75 MHz, $CDCl_3$).

(1R,5R,6R)-6-hexyl-2,7-dioxabicyclo[3.3.0]octan-3,8-dione, **6b.**

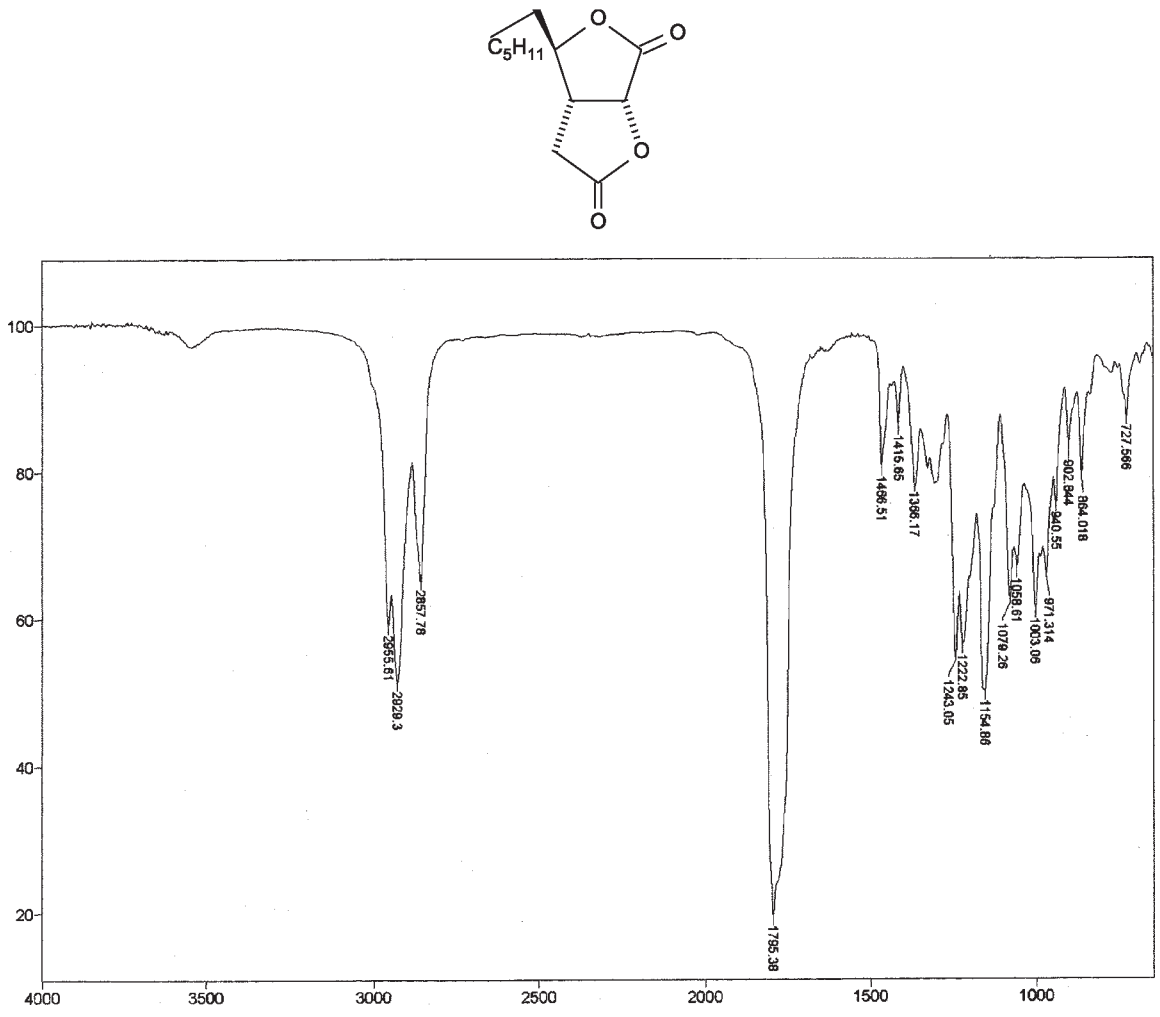


Figure S35. IR (NaCl) for compound **6b**.

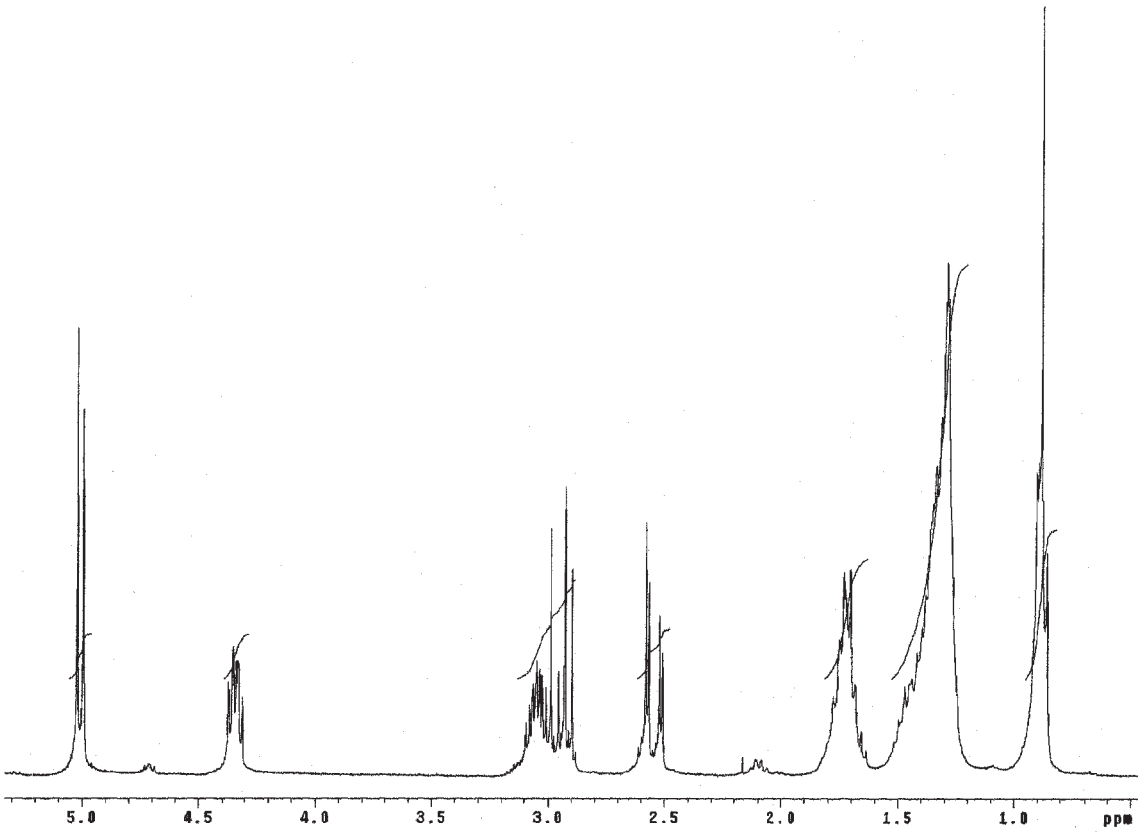


Figure S36. ^{1}H NMR for compound **6b** (300 MHz, $CDCl_3$).

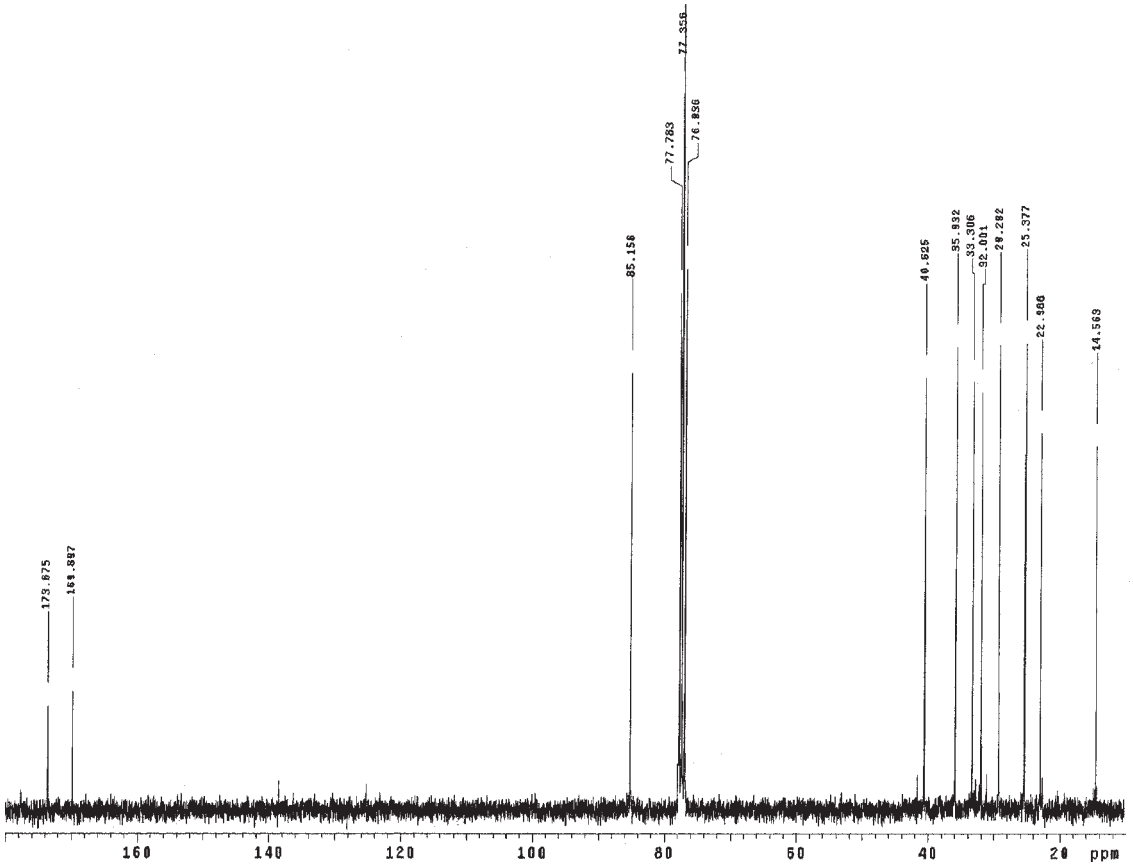


Figure S37. ^{13}C NMR for compound **6b** (75 MHz, $CDCl_3$).

(1R,5R,6R)-6-heptyl-2,7-dioxabicyclo[3.3.0]octan-3,8-dione, **6c**.

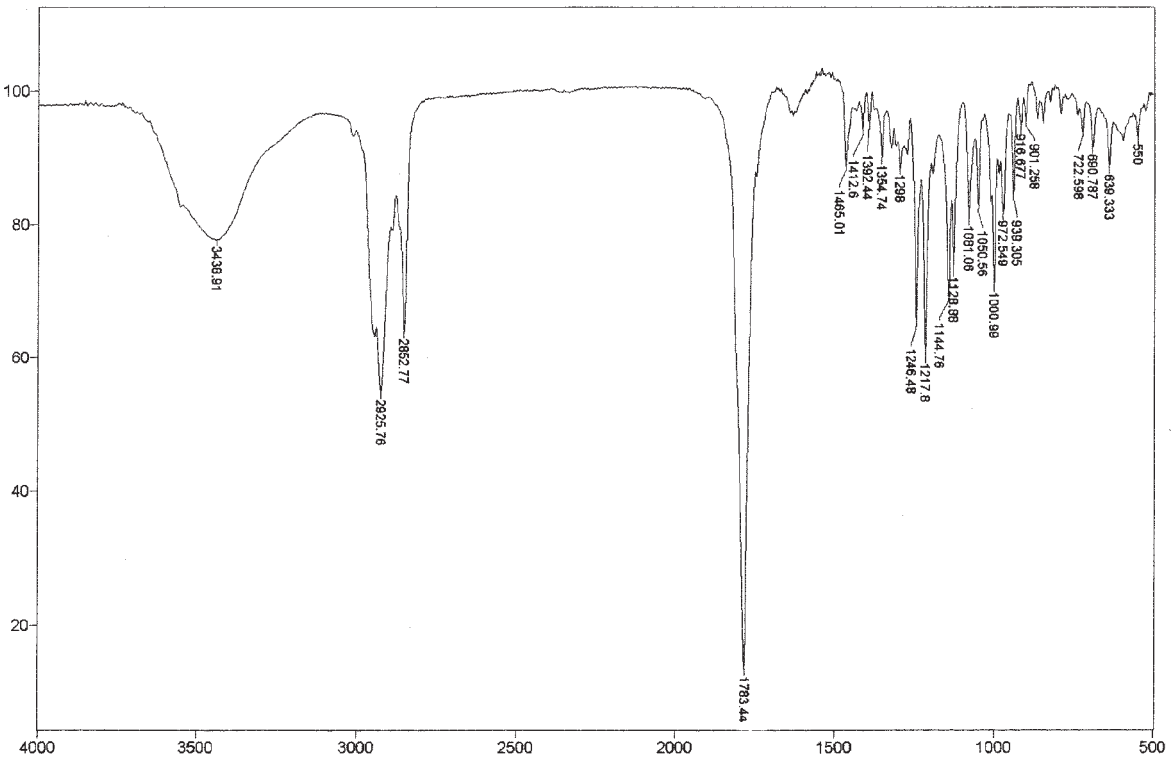


Figure S38. IR (KBr) for compound **6c**.

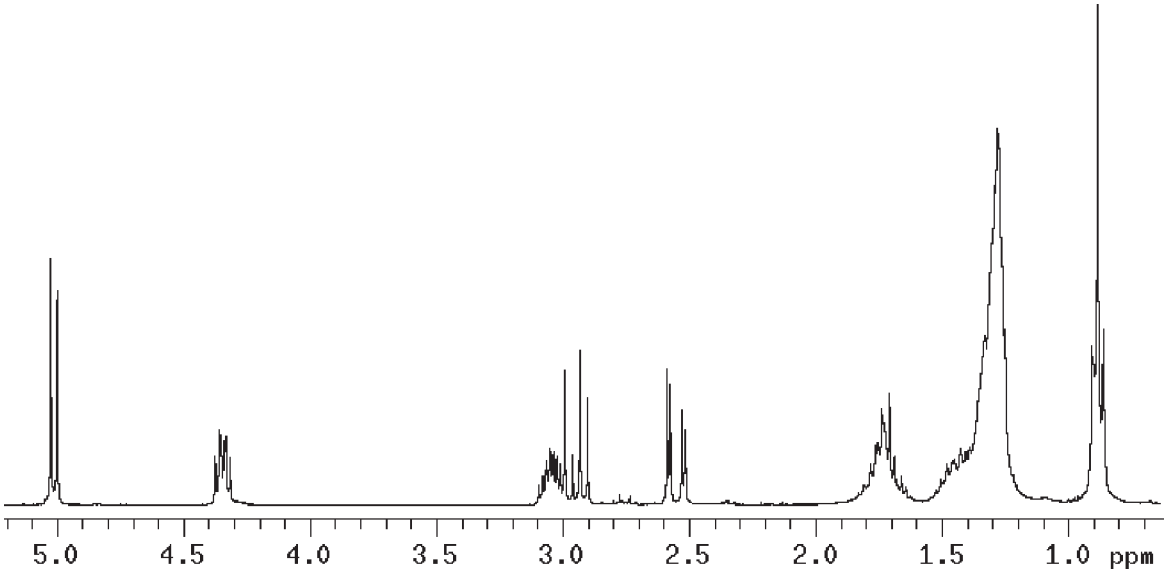


Figure S39. ^{1}H NMR for compound **6c** (300 MHz, $CDCl_3$).

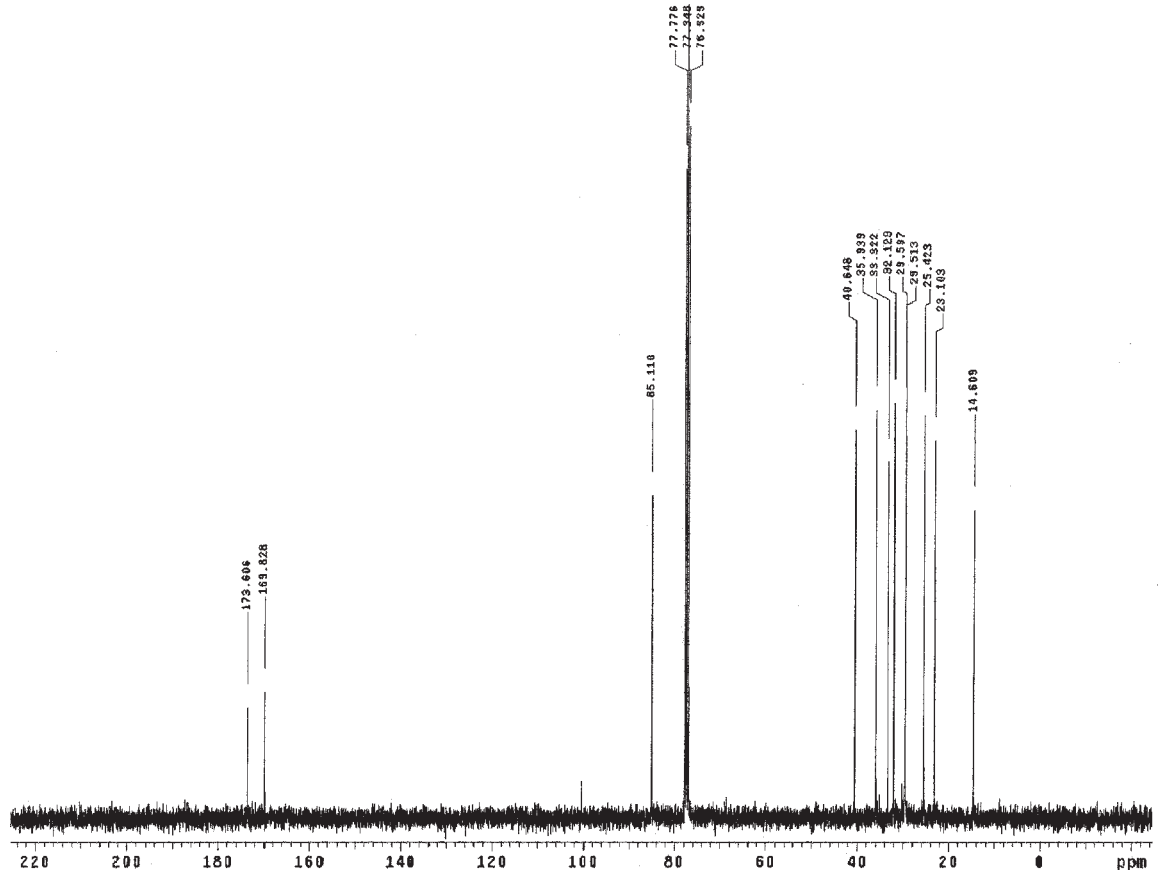


Figure S40. ^{13}C NMR for compound **6c** (75 MHz, $CDCl_3$)

(1R,5R,6R)-6-pentyl-4-methylene-2,7-dioxabicyclo[3.3.0]octan-3,8-dione, **7a.**

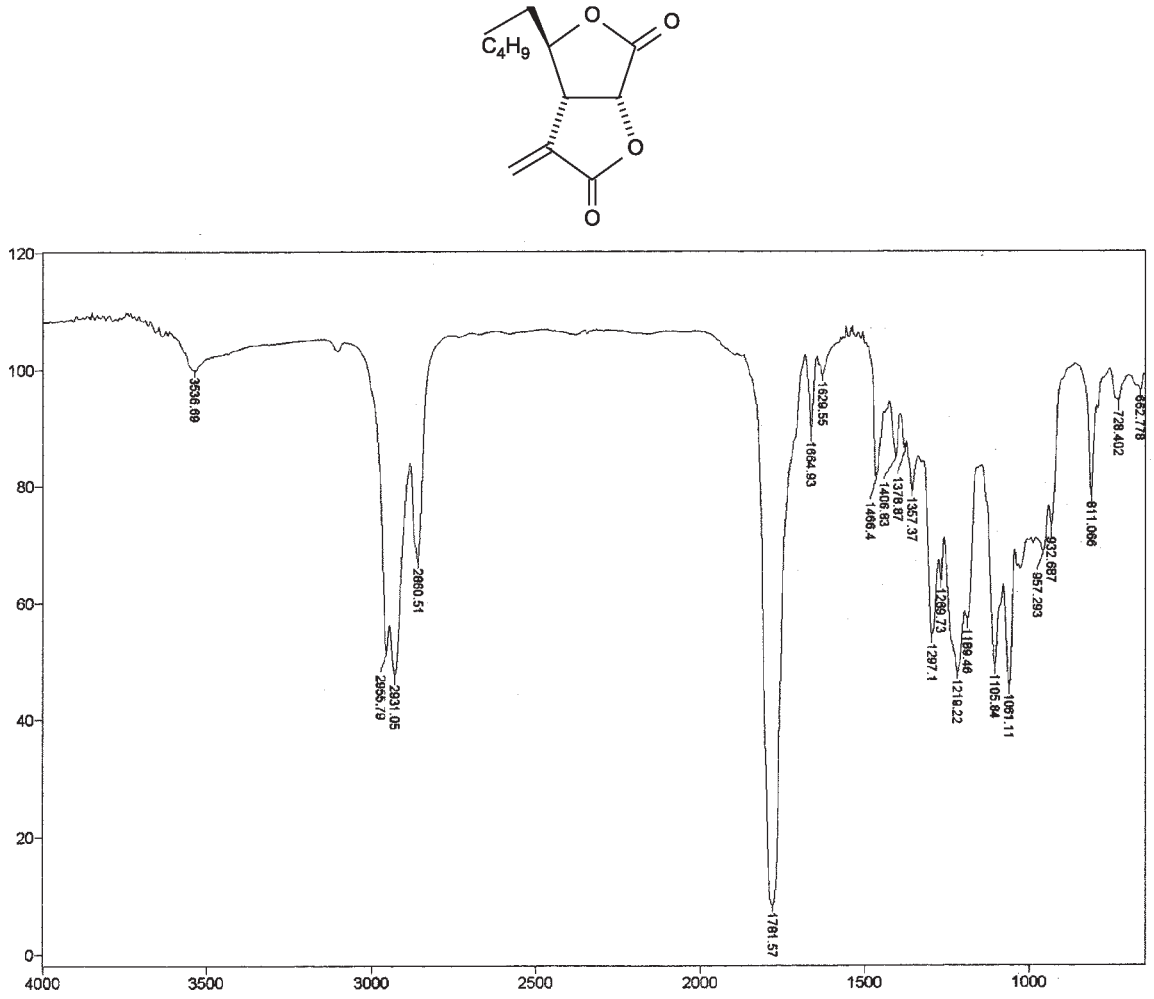


Figure S41. IR (NaCl) for compound **7a**.

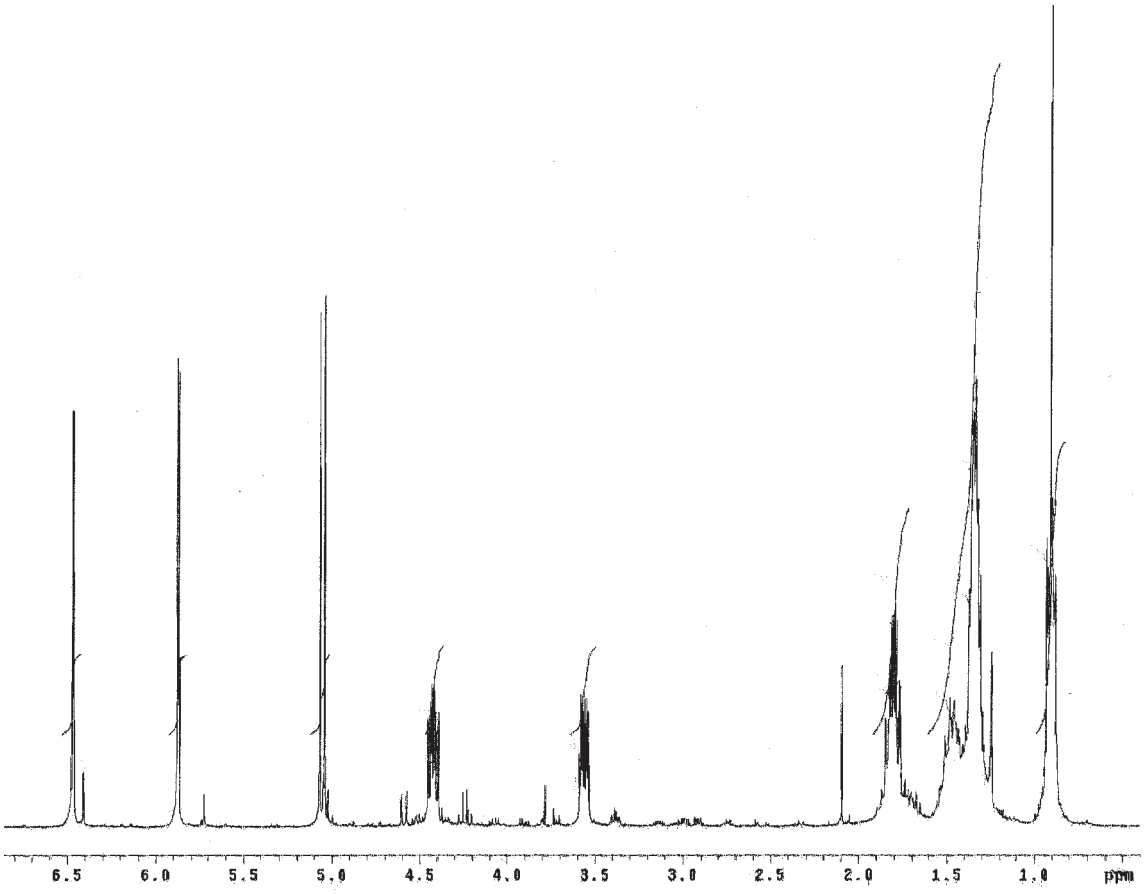


Figure S42. ^{1}H NMR for compound **7a** (300 MHz, $CDCl_3$).

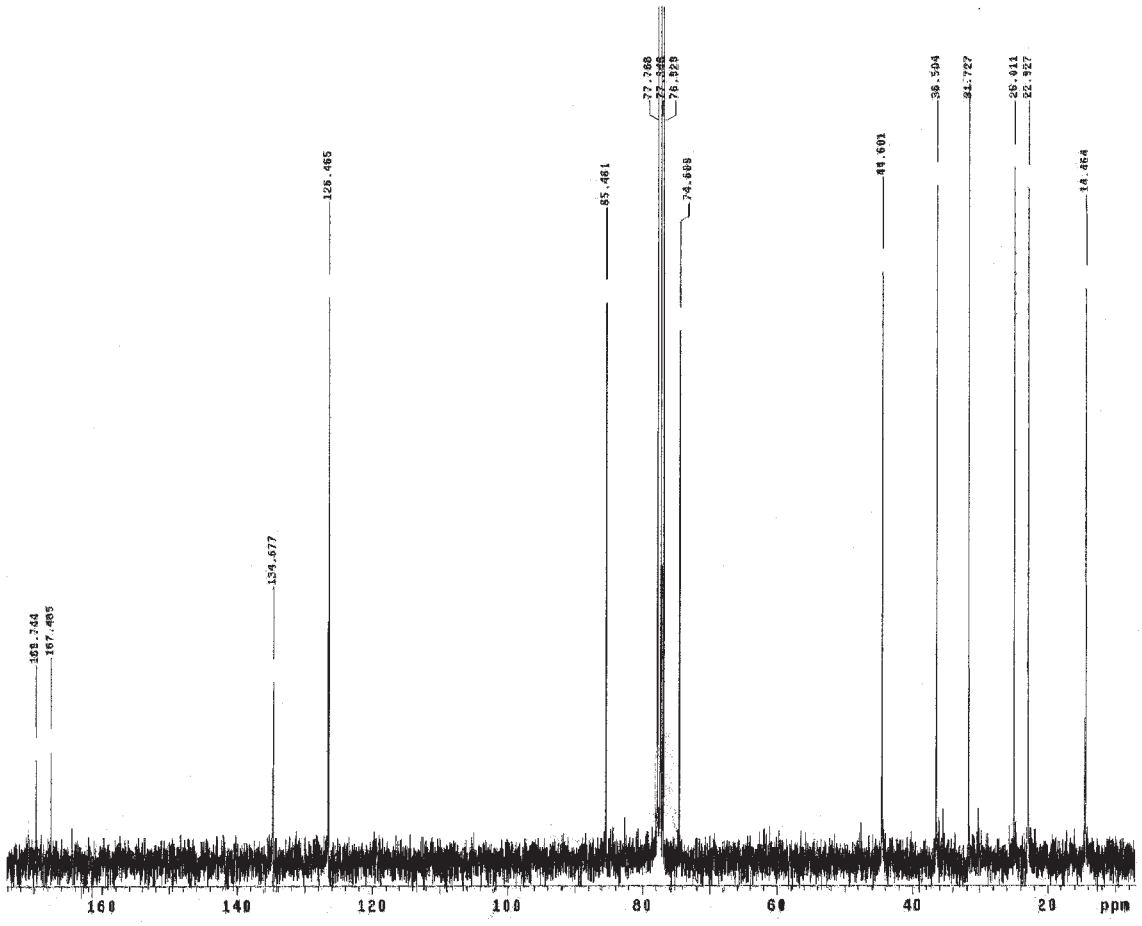


Figure S43. ^{13}CNMR for compound **7a** (75 MHz, $CDCl_3$).

(1R,5R,6R)-6-hexyl-4-methylene-2,7-dioxabicyclo[3.3.0]octan-3,8-dione, **7b**.

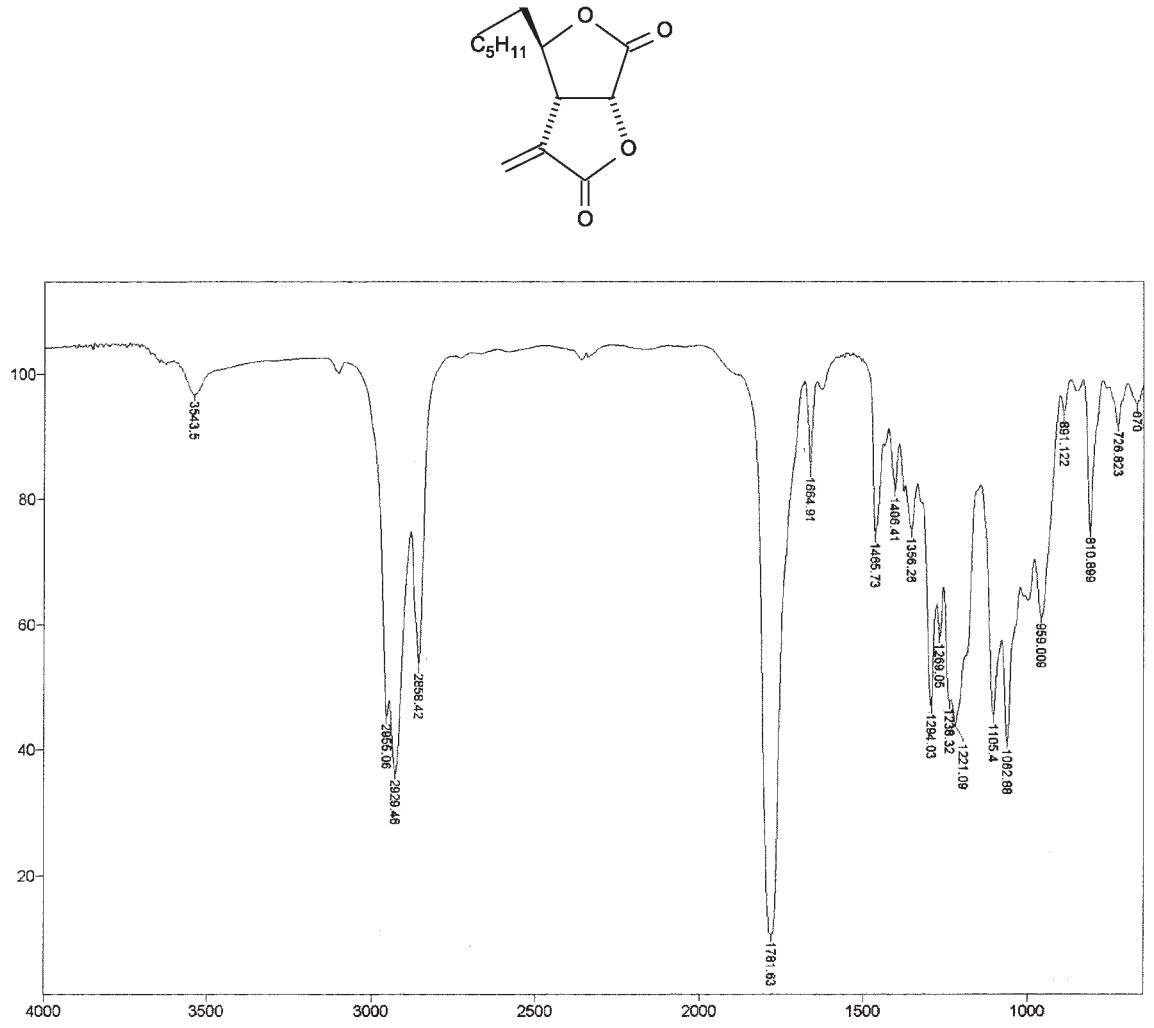


Figure S44. IR (NaCl) for compound **7b**.

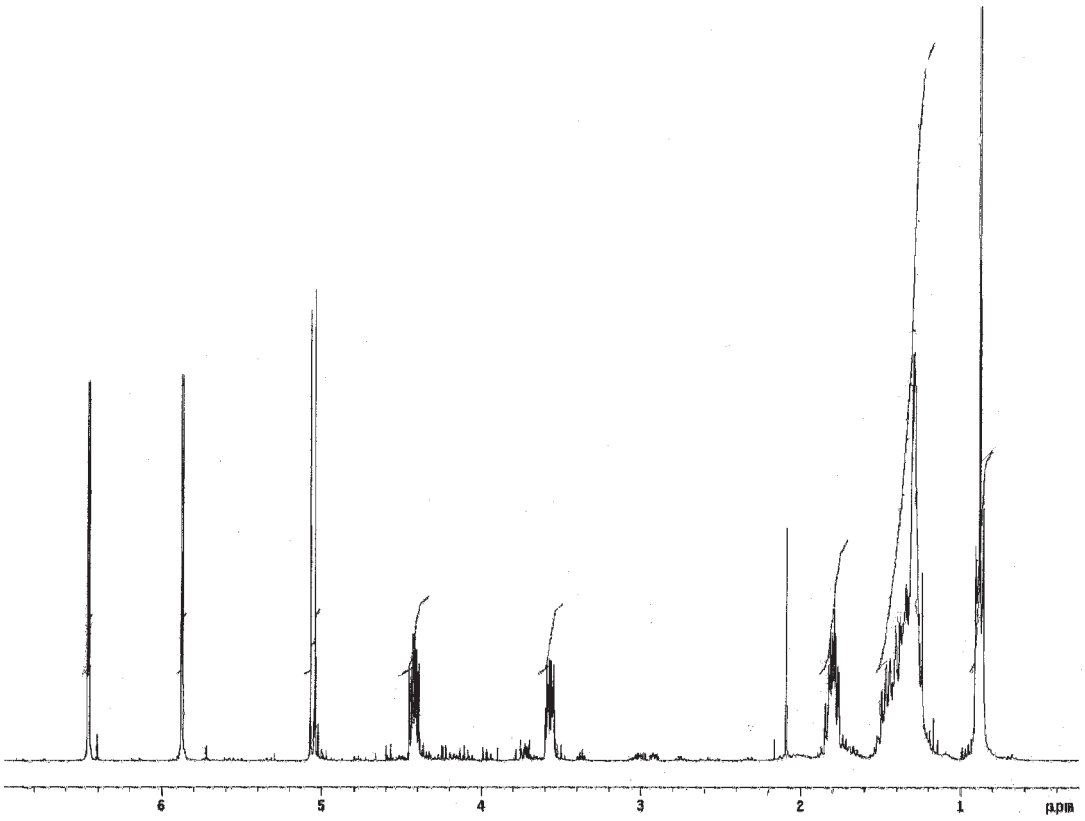


Figure S45. ^{1}H NMR for compound **7b** (300 MHz, $CDCl_3$).

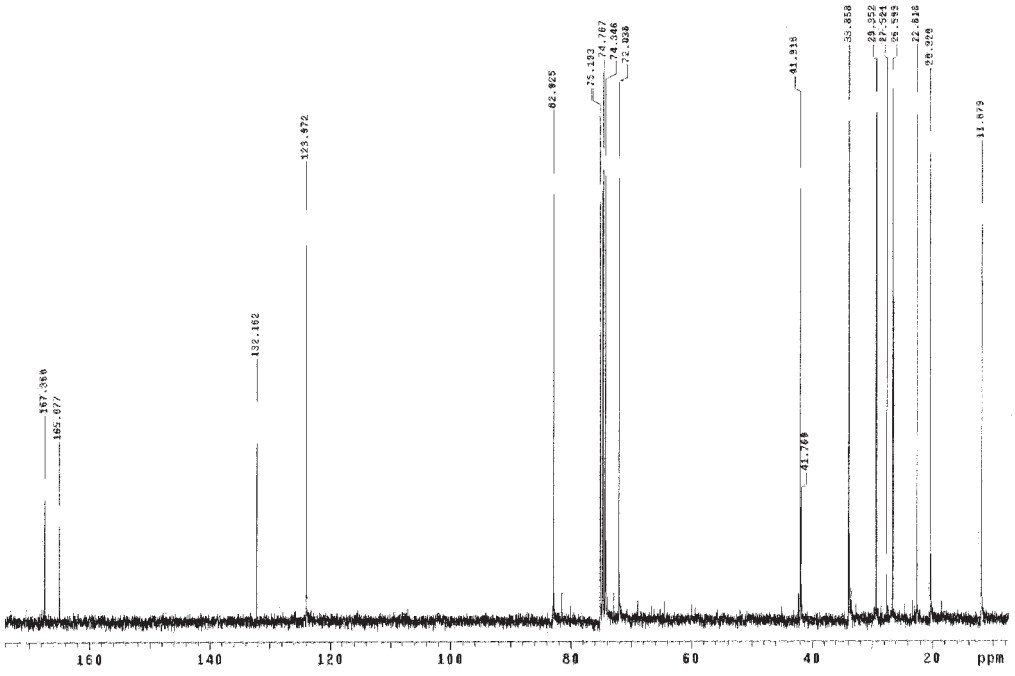


Figure S46. ^{13}C NMR for compound **7b** (75 MHz, $CDCl_3$).

(1R,5R,6R)-6-heptyl-4- methylene-2,7-dioxabicyclo[3.3.0]octan-3,8-dione, **7c**.

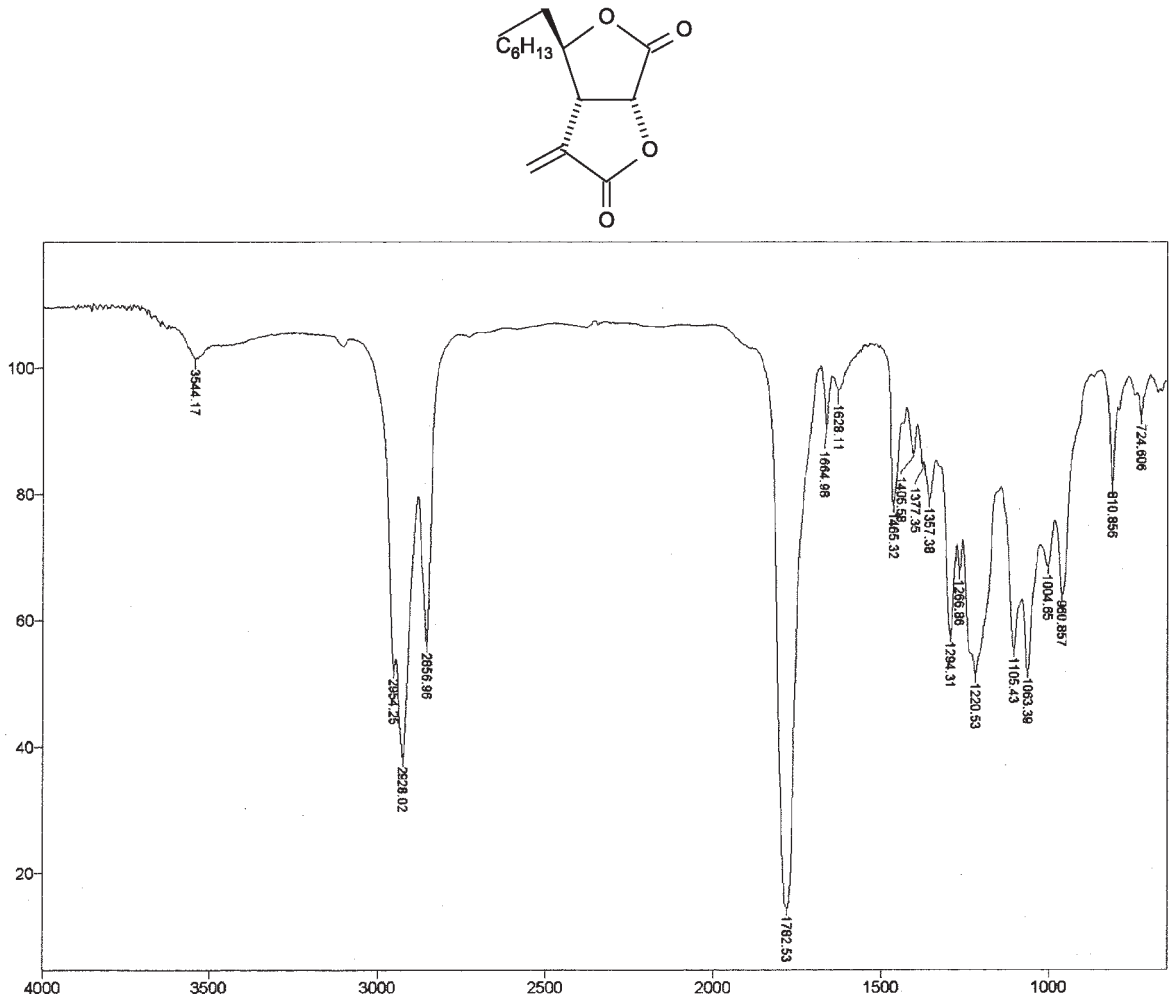


Figure S47. IR (NaCl) for compound **7c**.

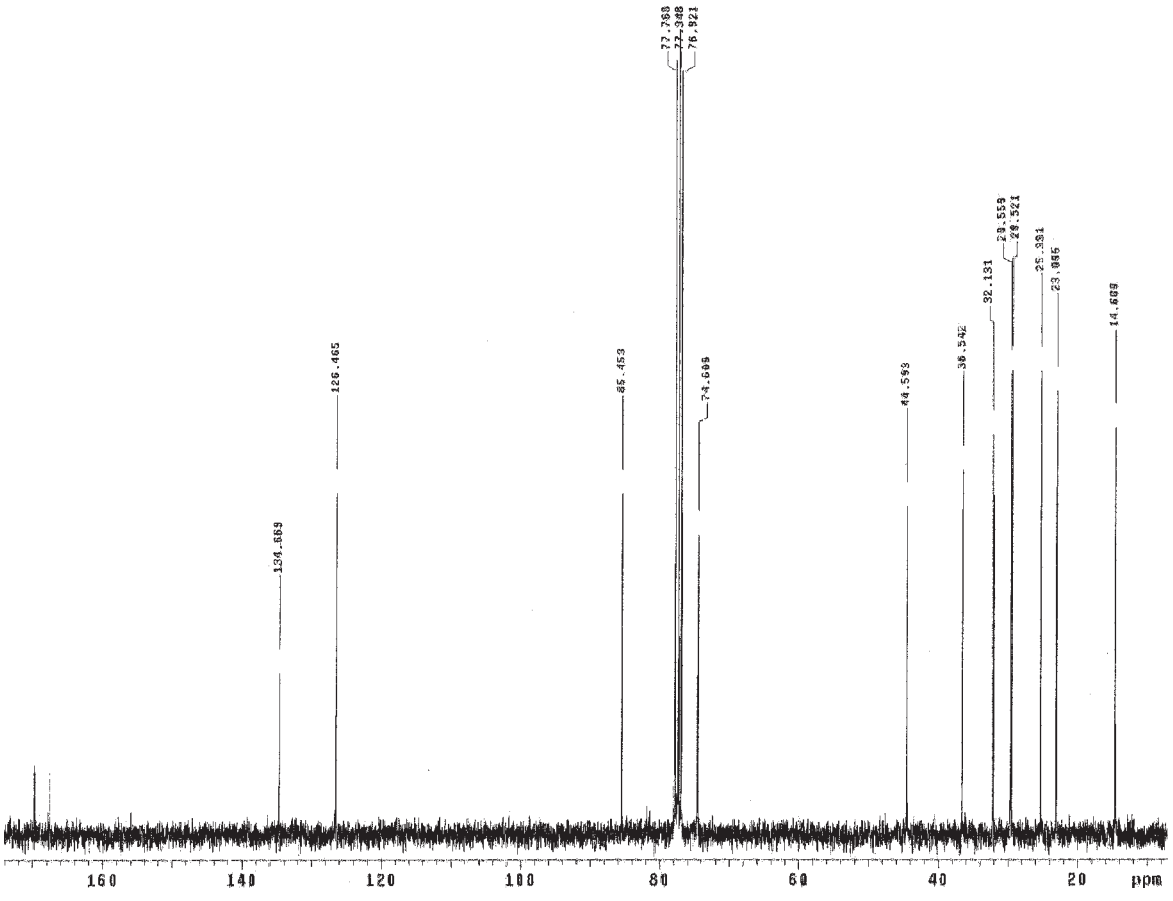


Figure S48. ^{1}H NMR for compound **7c** (300 MHz, $CDCl_3$).

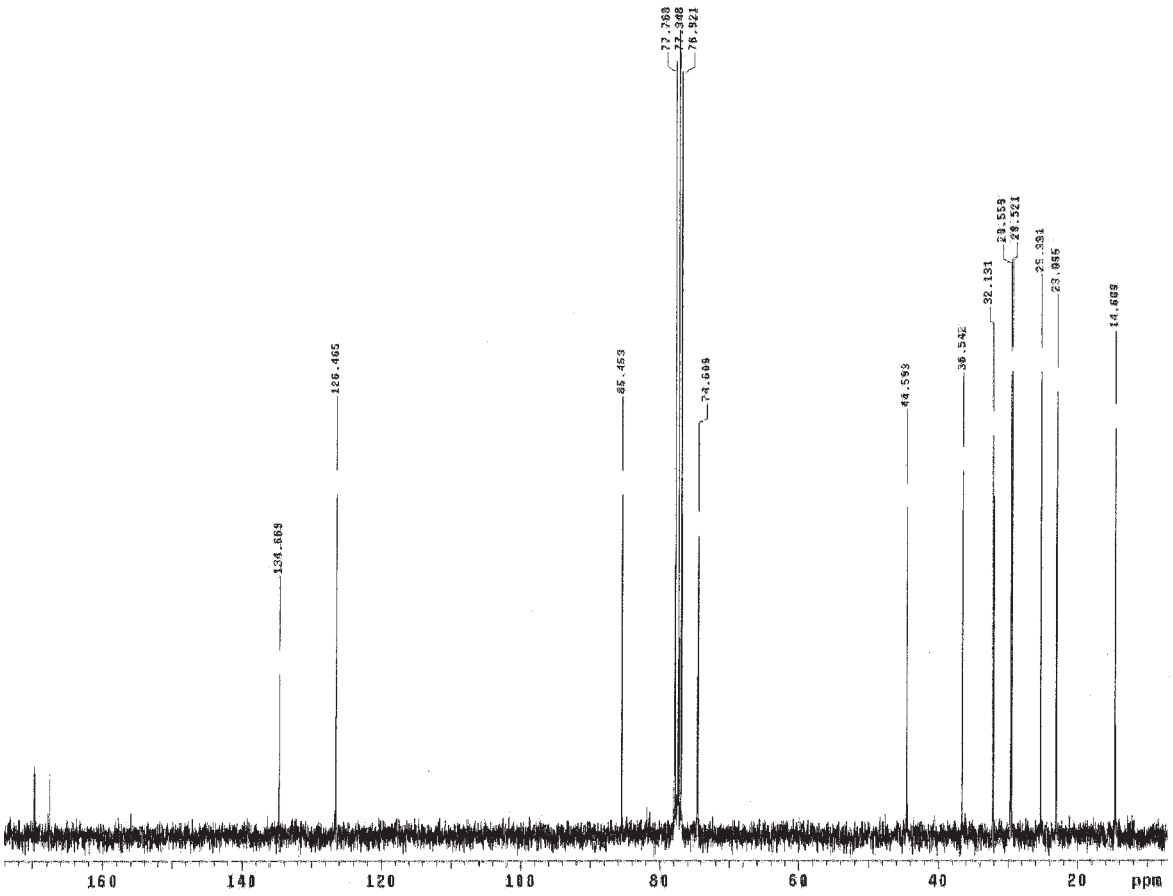


Figure S49. ^{13}C NMR for compound **7c** (75 MHz, $CDCl_3$).