

Supplementary Materials

Synthesis of Phthalimide Derivatives and Their Insecticidal Activity Against Caribbean Fruit Fly, *Anastrepha suspensa* (Loew)

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Table S1. Screening test to evaluation of derivatives (**4a-4m**) on mortality of adult female *A. suspensa* under the laboratory conditions at $26\pm 1^\circ\text{C}$, $70\pm 5\%$ RH, and 12:12 L:D photoperiod.

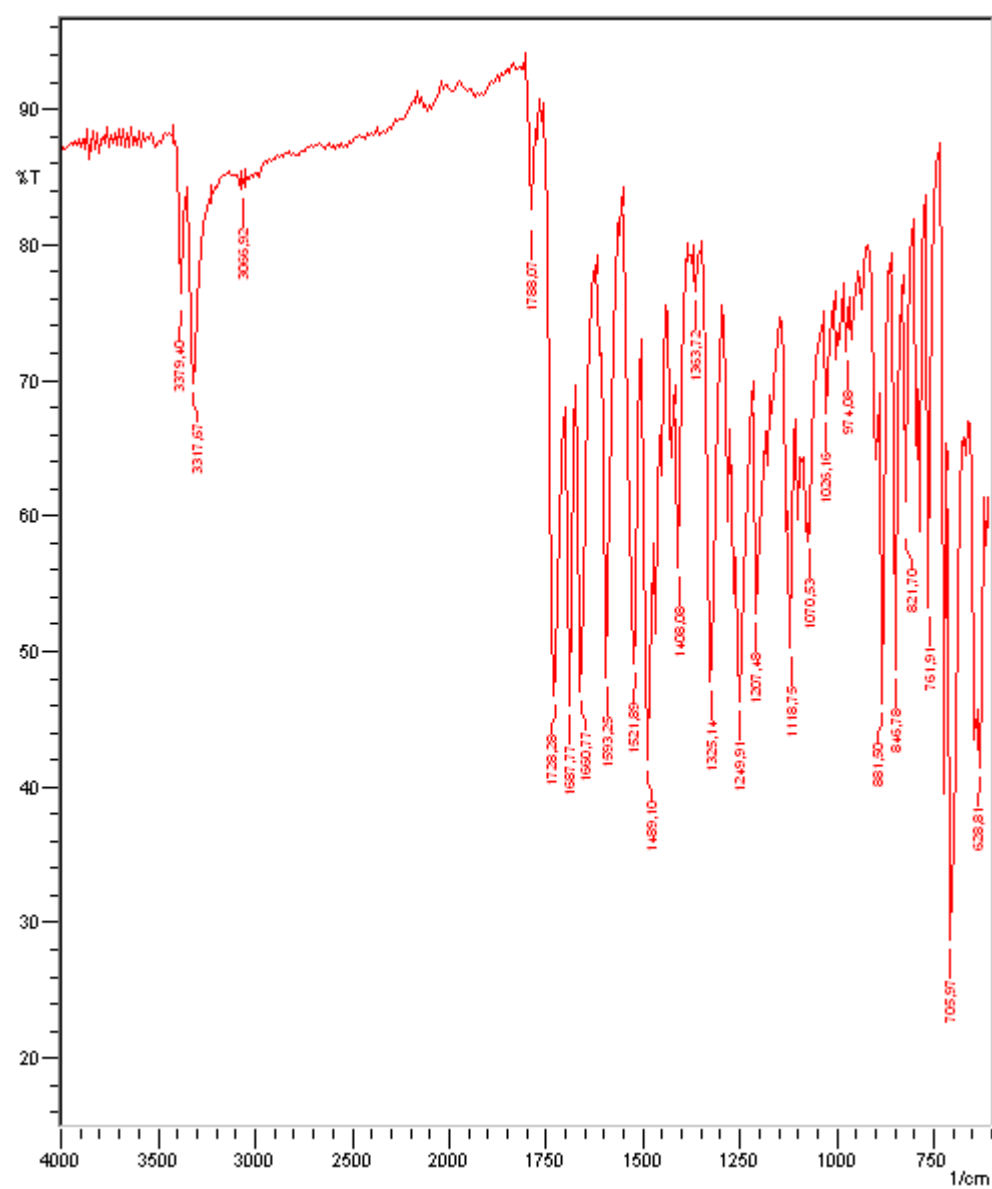


Figure S1. IR spectrum for 4a.

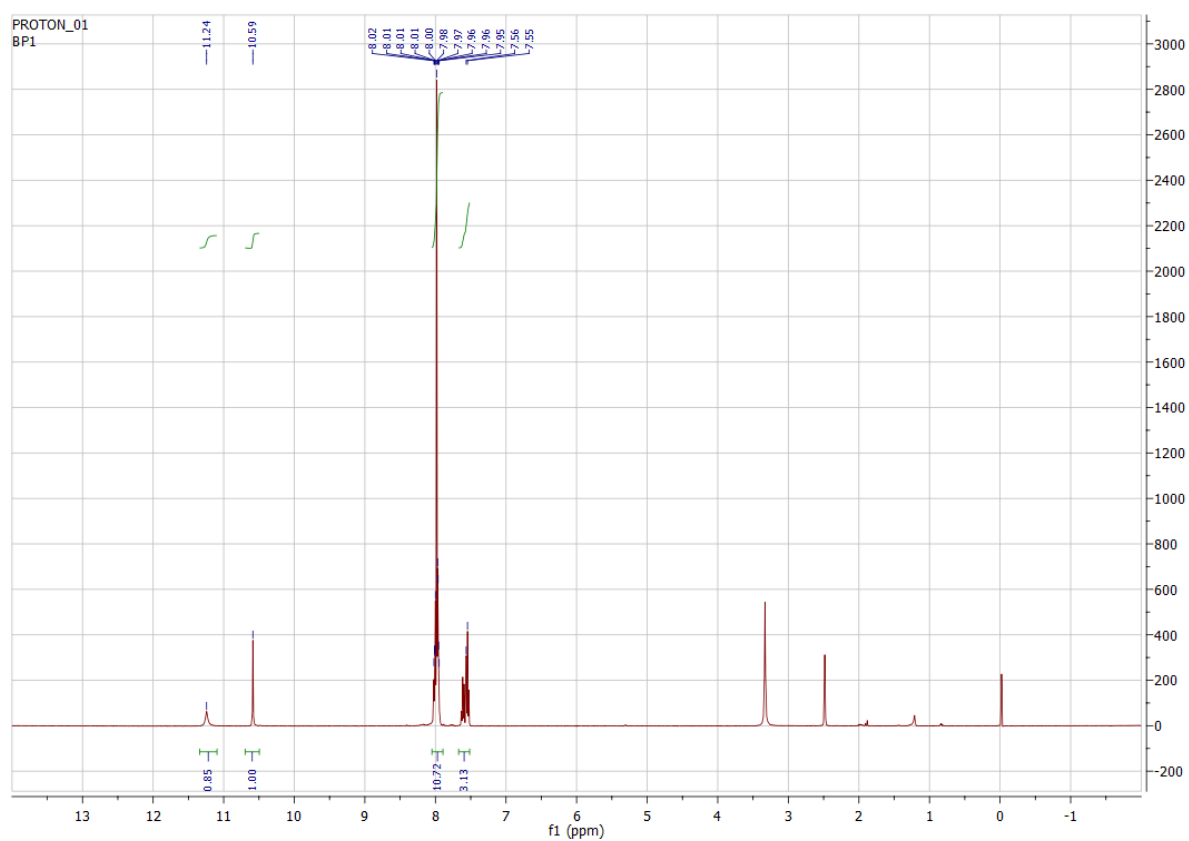


Figure S2. ¹H-NMR spectrum for 4a (400 MHz, DMSO-d₆).

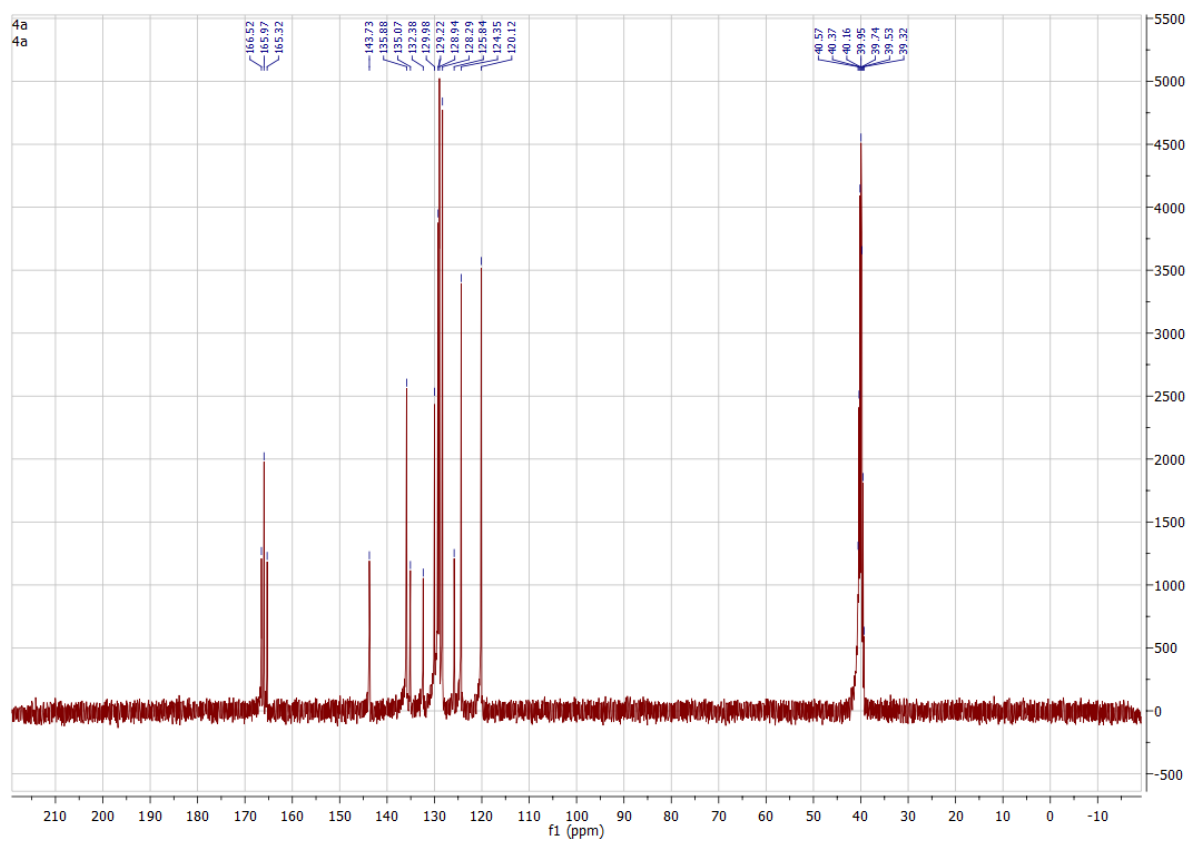


Figure S3. ¹³C-NMR spectrum for 4a (100 MHz, DMSO-d₆).

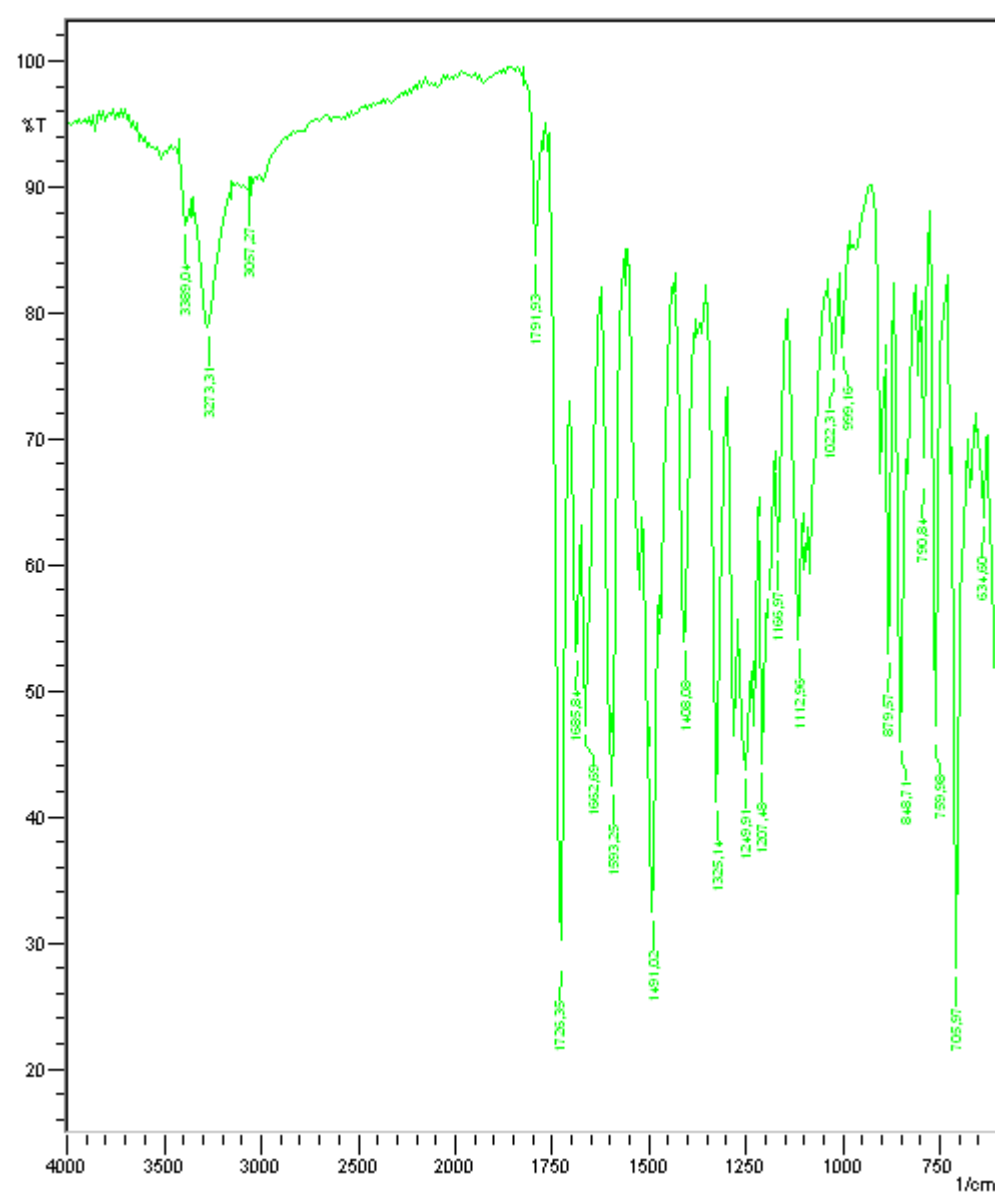


Figure S4. IR spectrum for 4b.

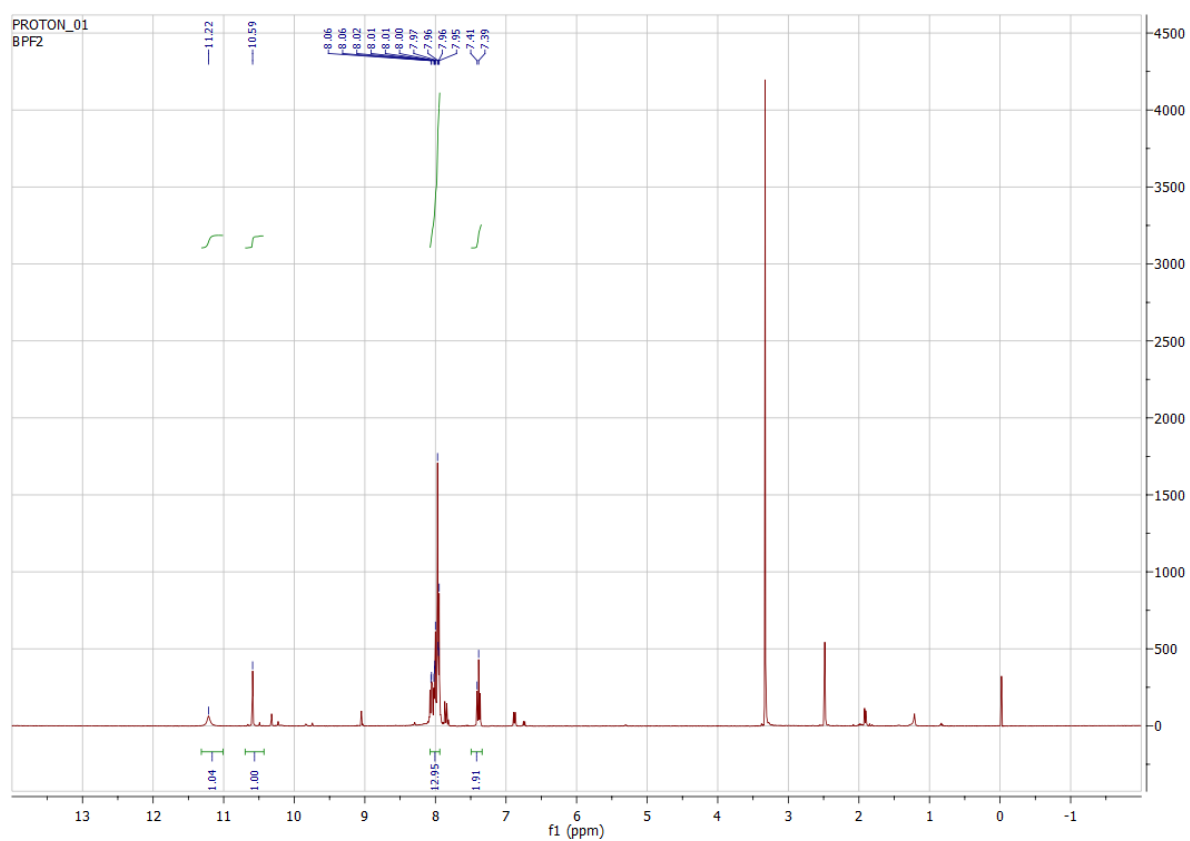


Figure S5. ^1H -NMR spectrum for **4b** (400 MHz, DMSO-d_6).

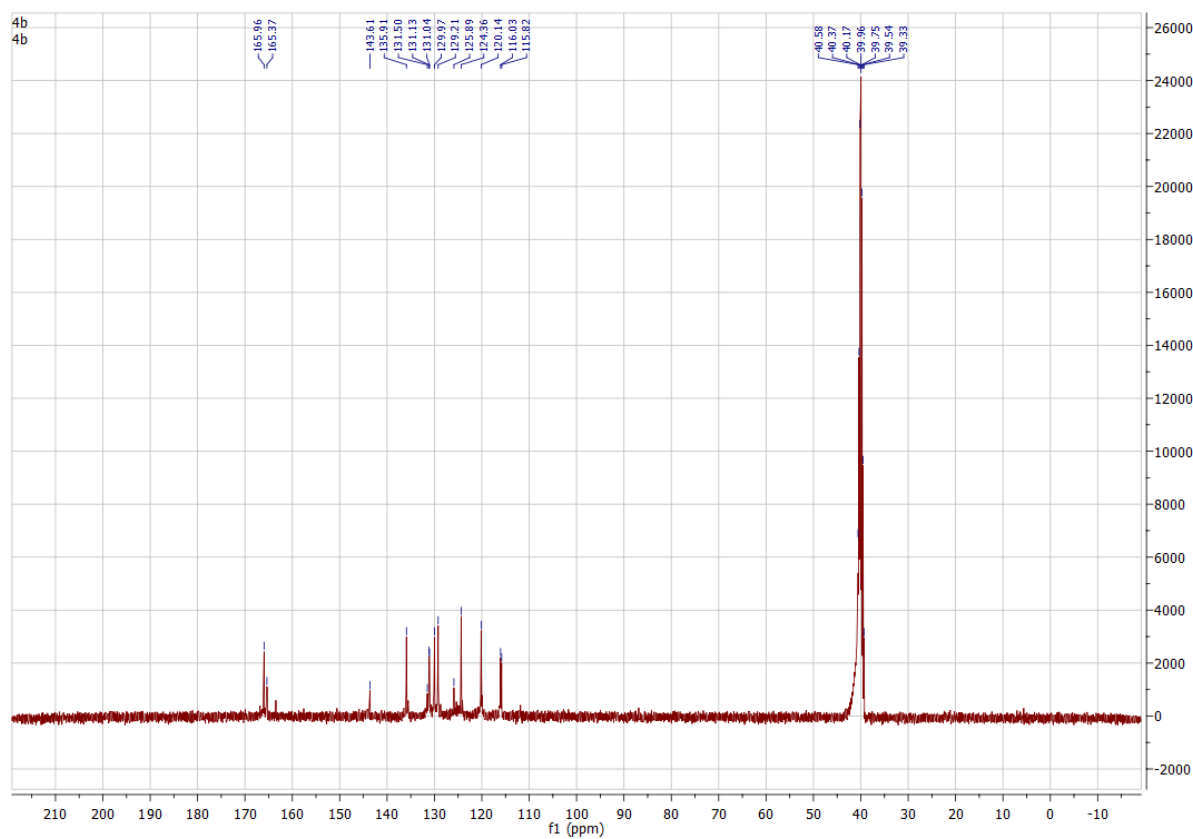


Figure S6. ^{13}C -NMR spectrum for **4b** (100 MHz, DMSO-d_6).

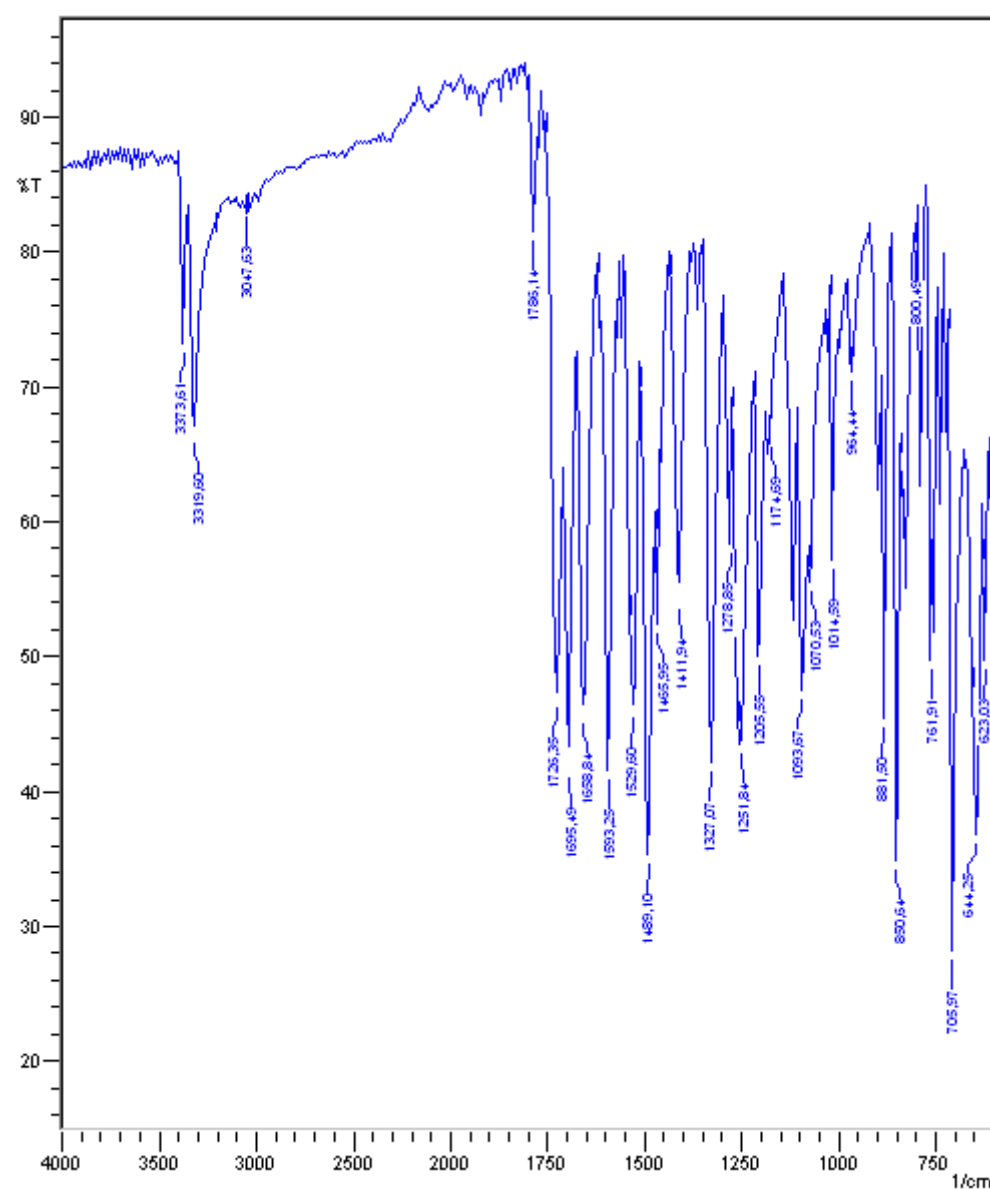


Figure S7. IR spectrum for 4c.

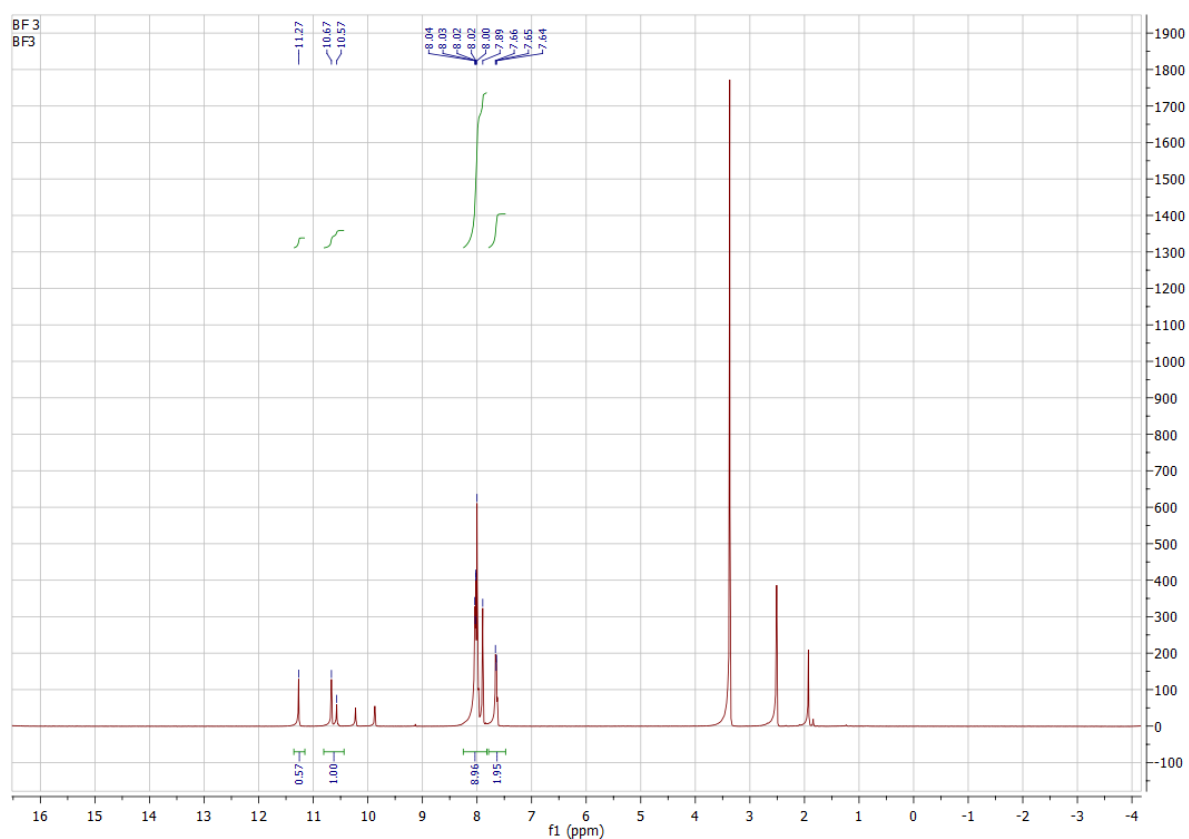


Figure S8. ¹H-NMR spectrum for 4c (400 MHz, DMSO-d₆).

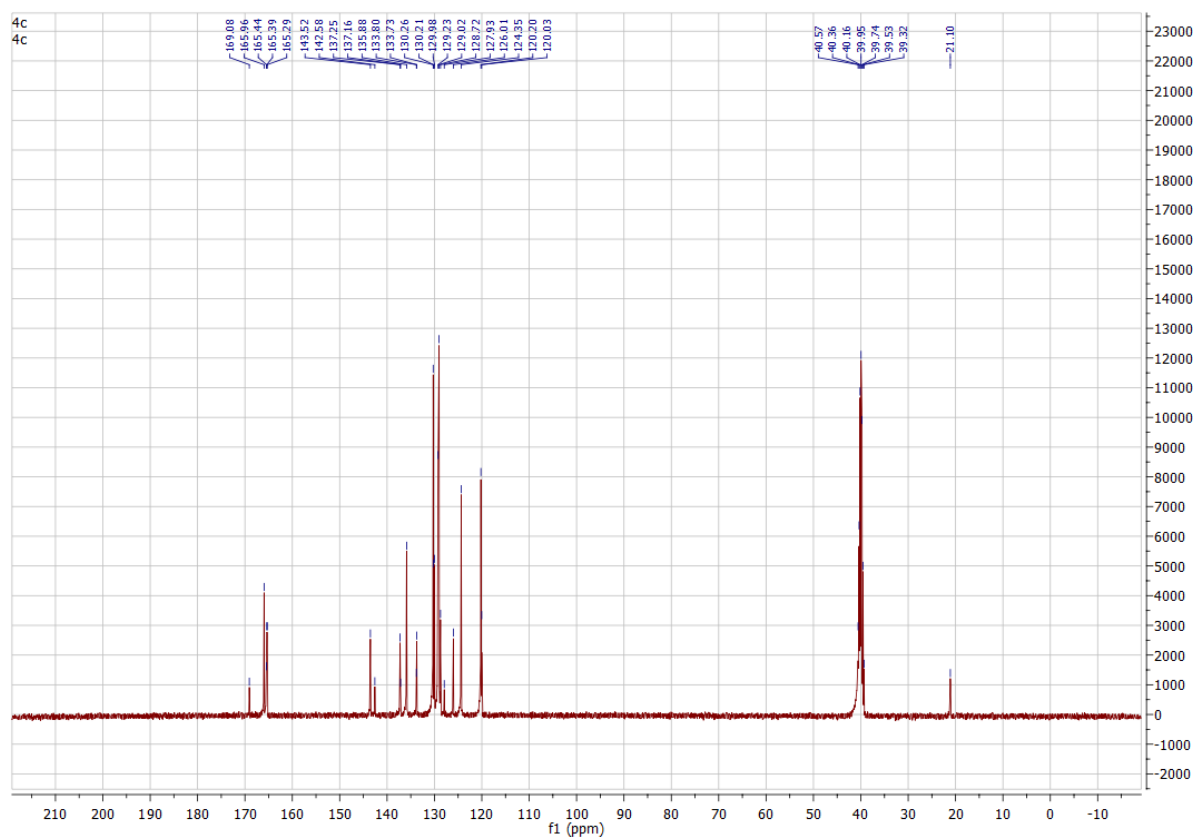


Figure S9. ¹³C-NMR spectrum for 4c (100 MHz, DMSO-d₆).

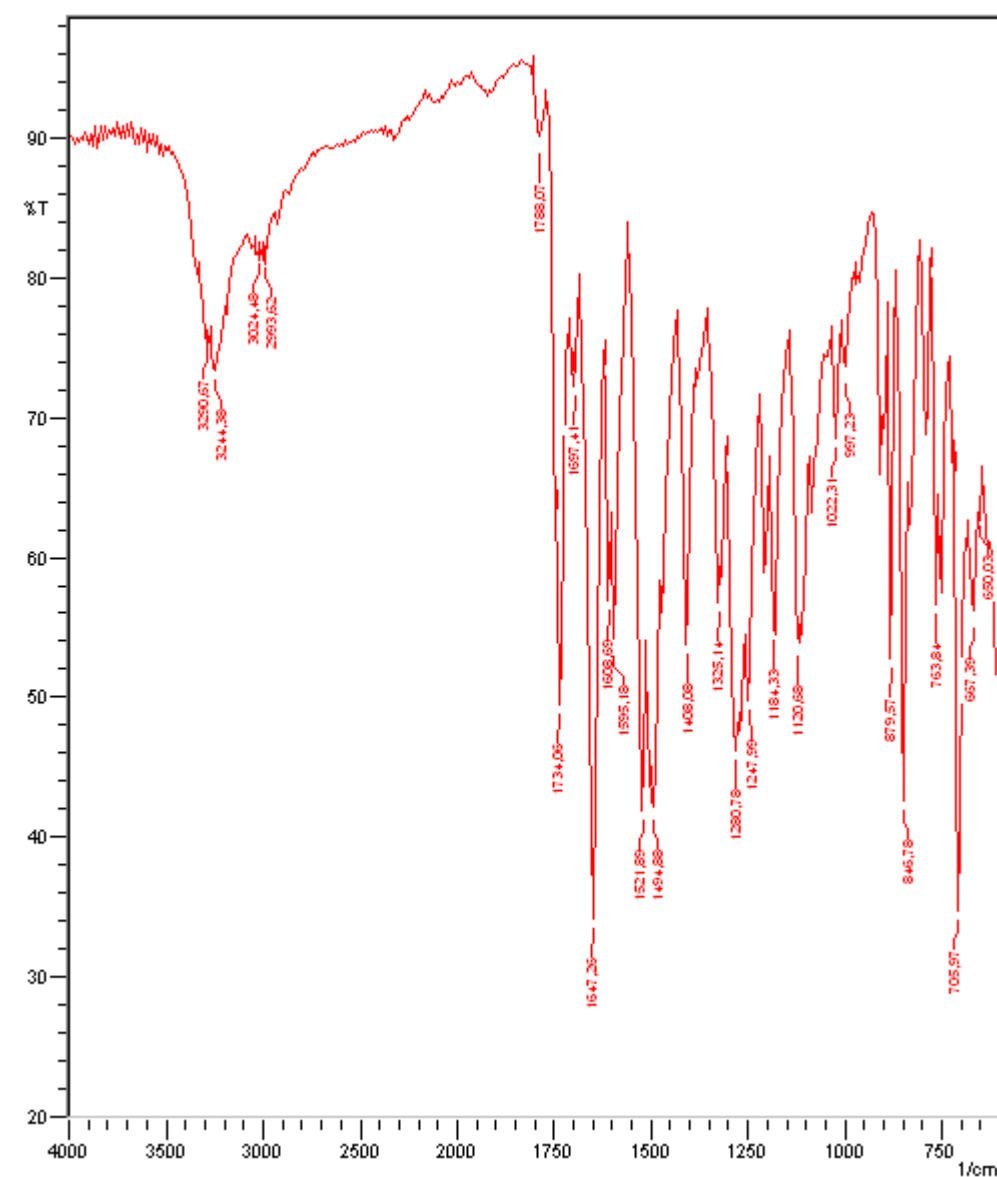


Figure S10. IR spectrum for 4d.

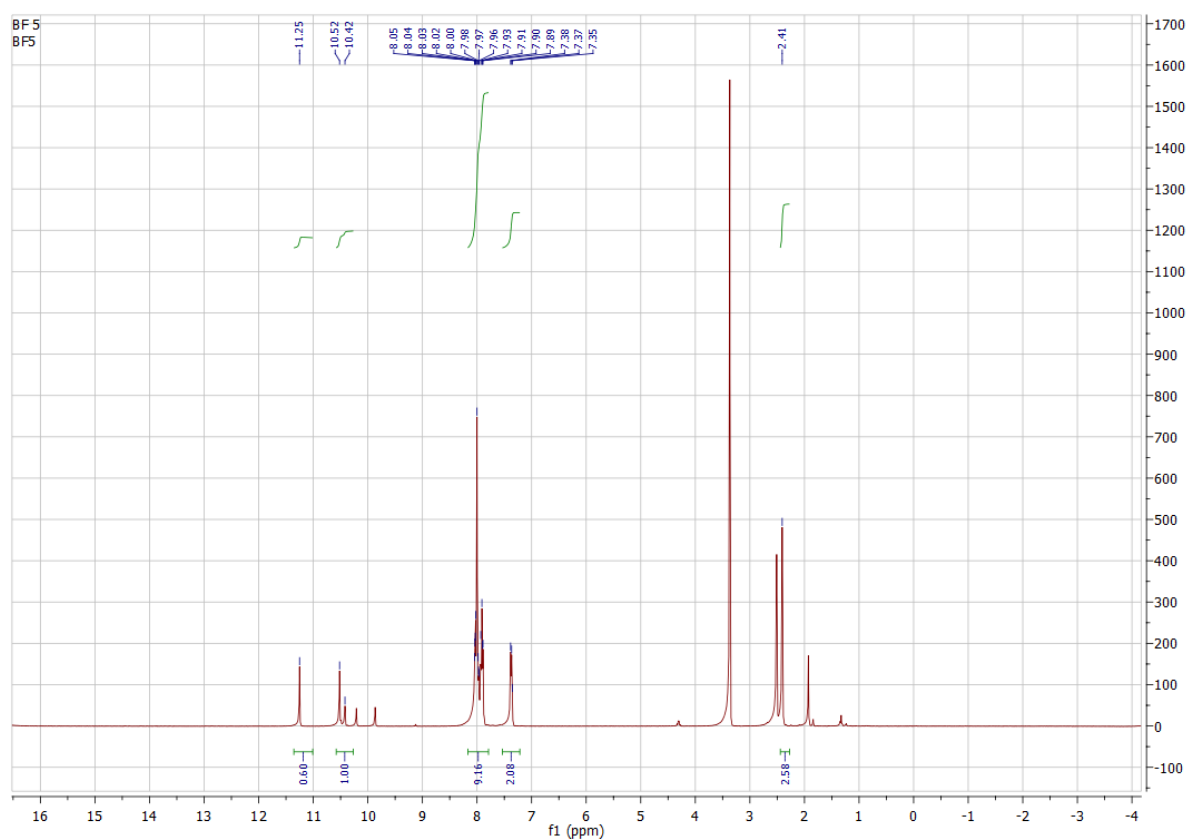


Figure S11. ¹H-NMR spectrum for **4d** (400 MHz, DMSO-d₆).

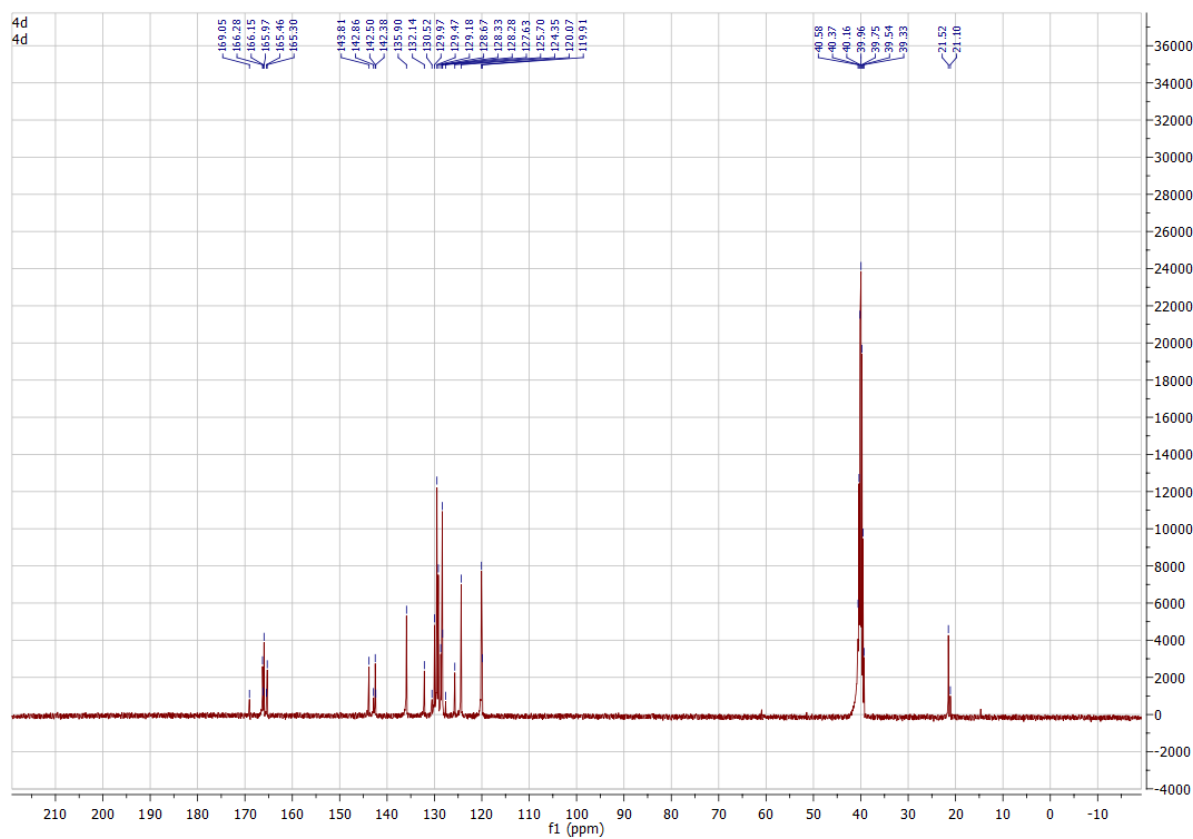


Figure S12. ¹³C-NMR spectrum for **4d** (100 MHz, DMSO-d₆).

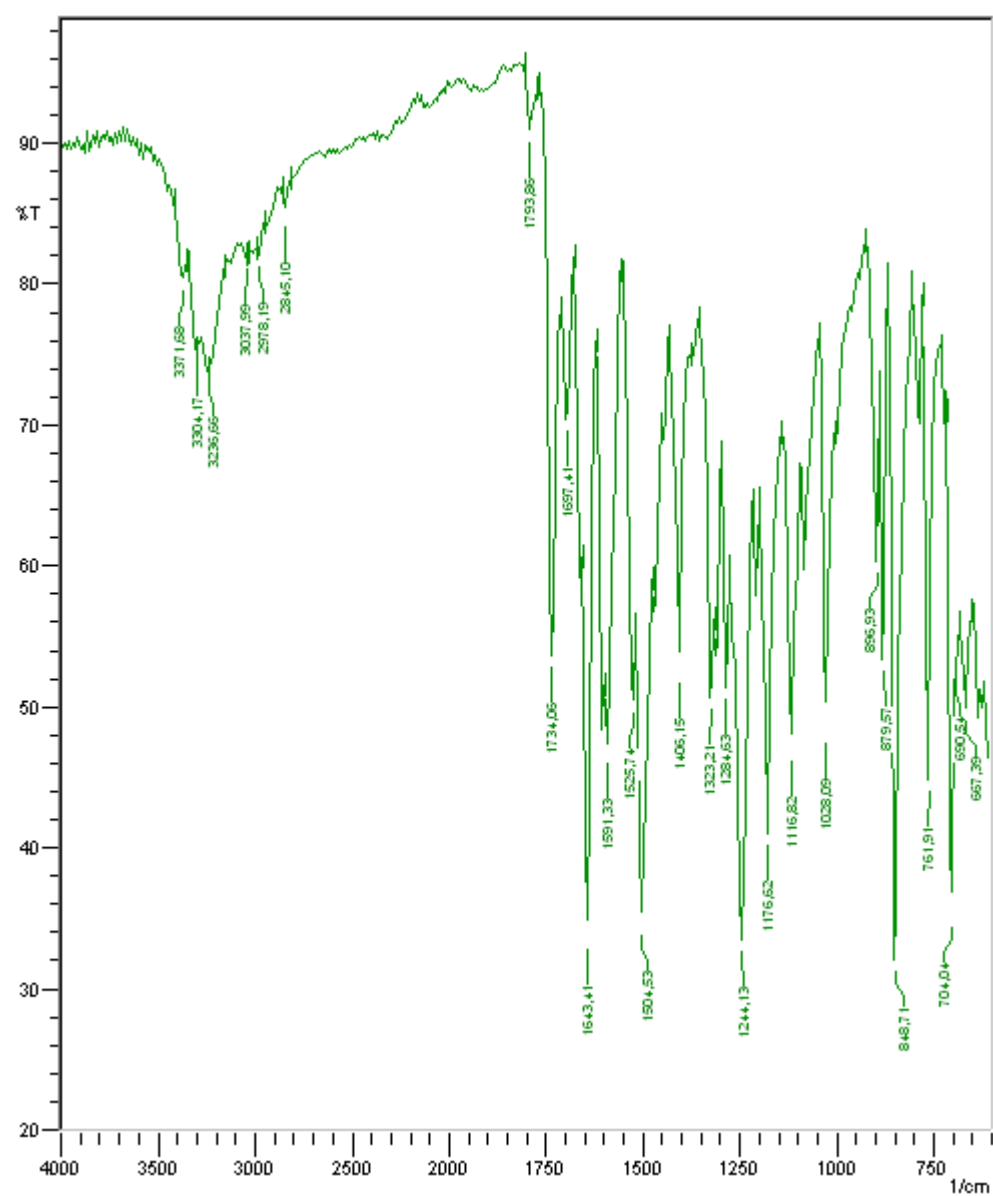


Figure S13. IR spectrum for 4e.

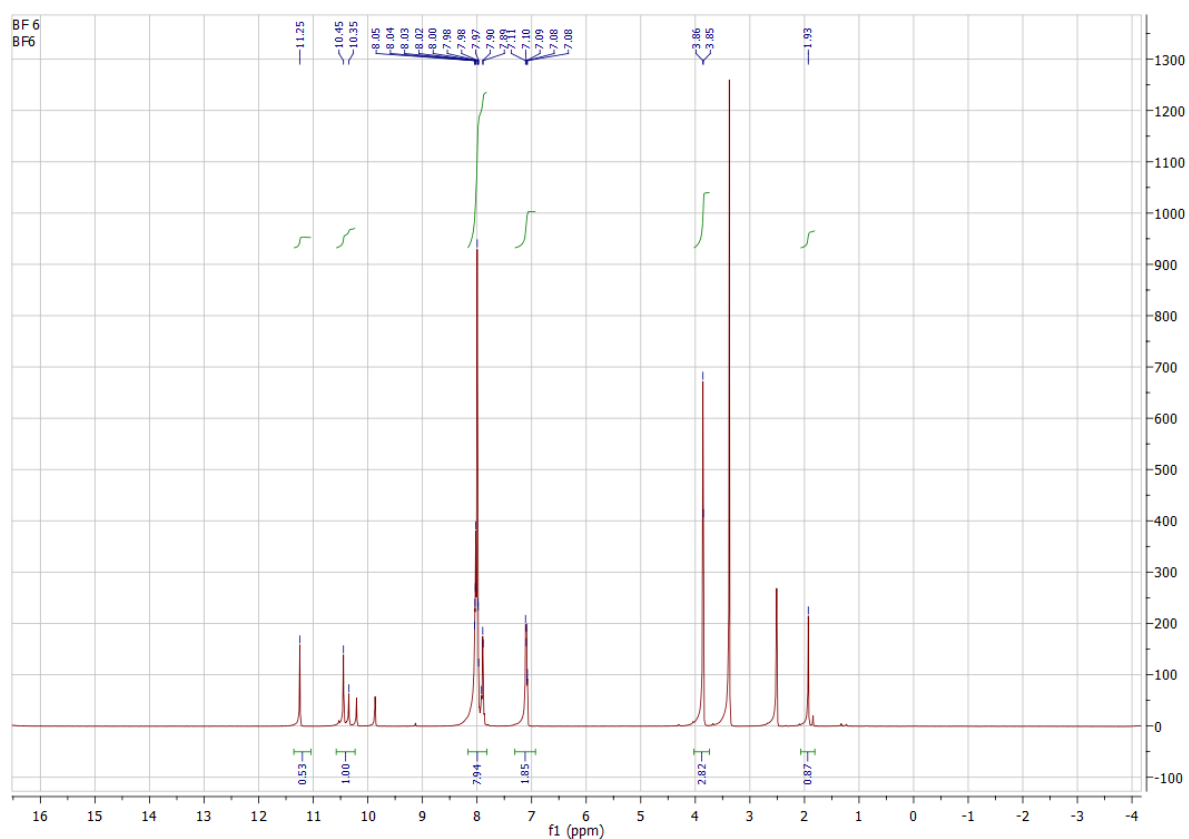


Figure S14. ¹H-NMR spectrum for **4e** (400 MHz, DMSO-d₆).

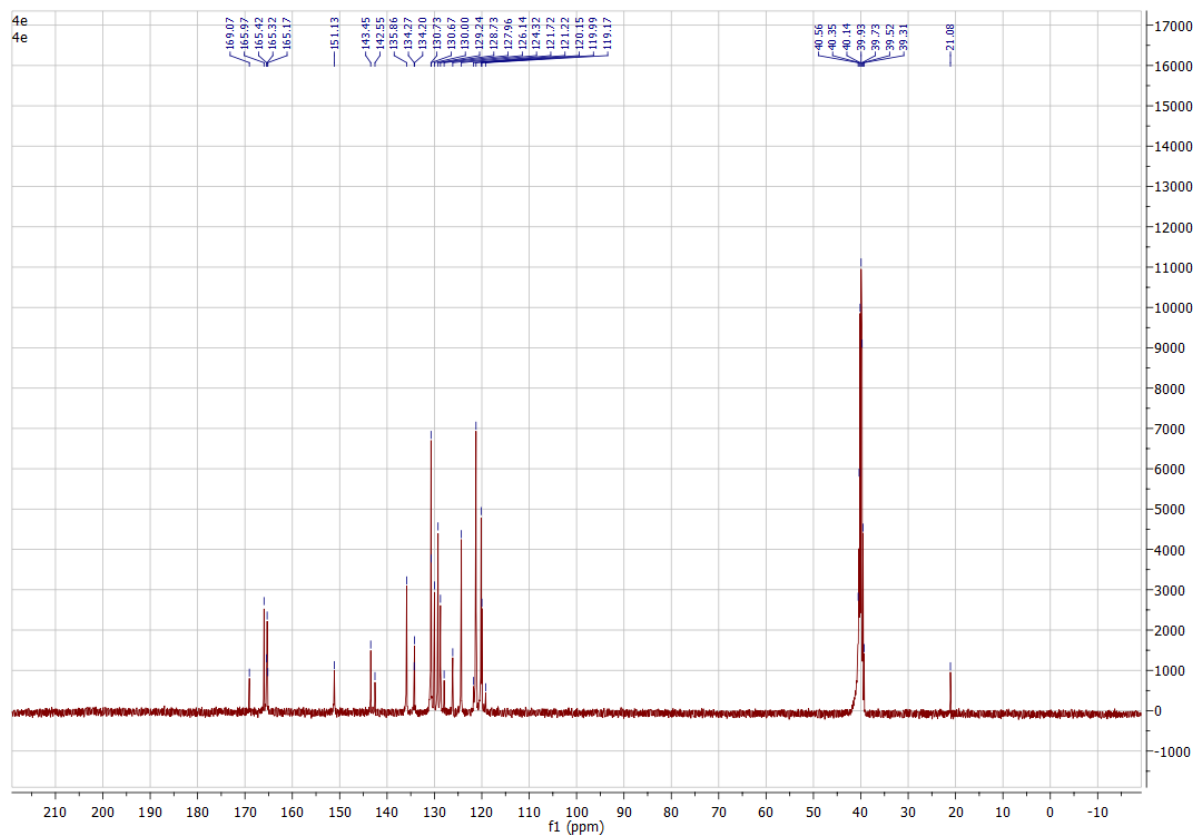


Figure S15. ¹³C-NMR spectrum for **4e** (100 MHz, DMSO-d₆).

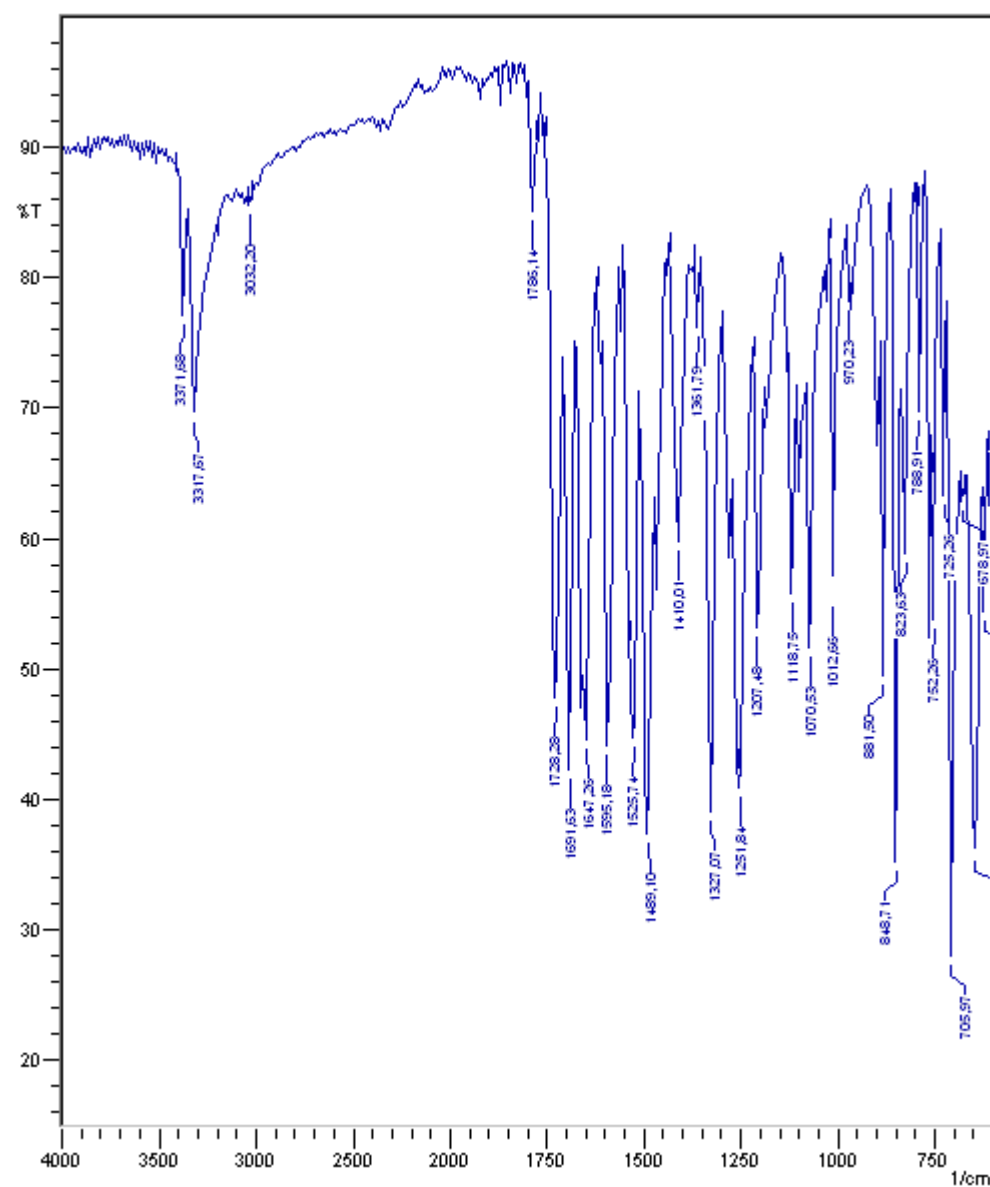
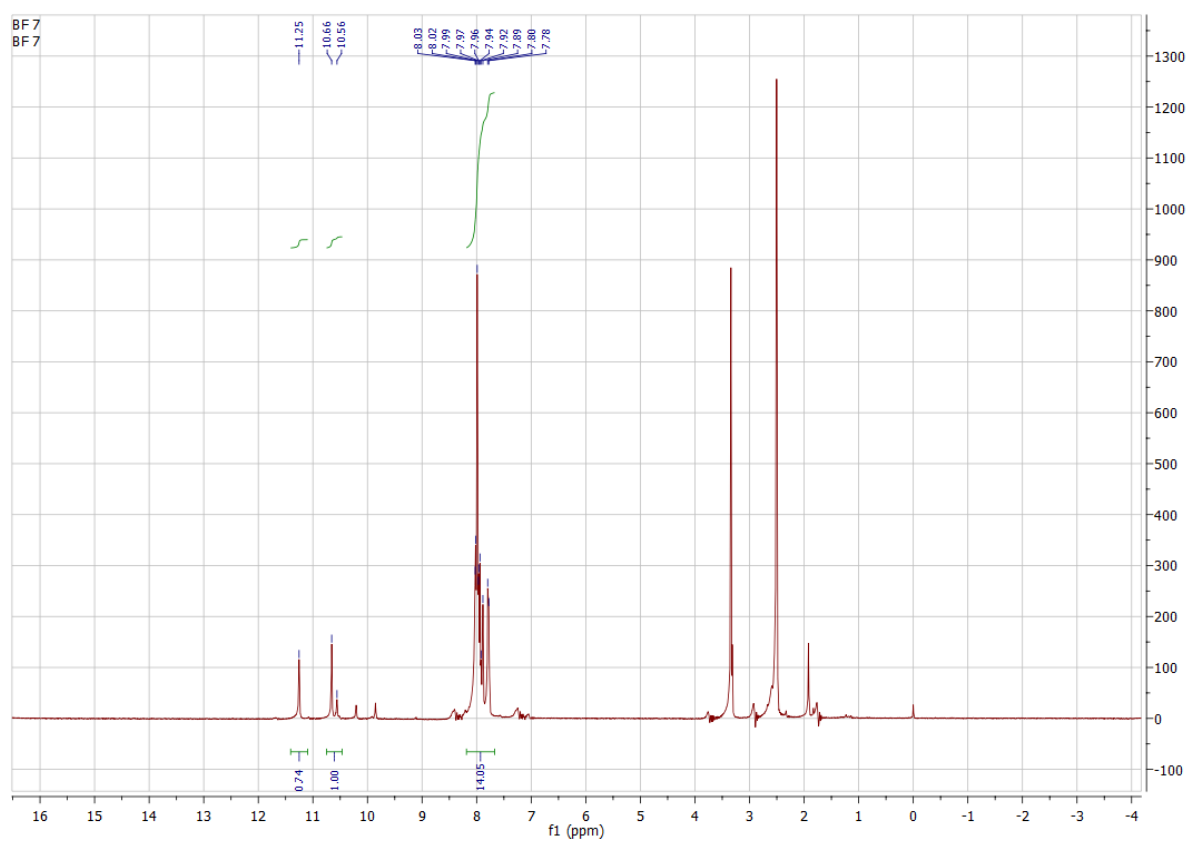
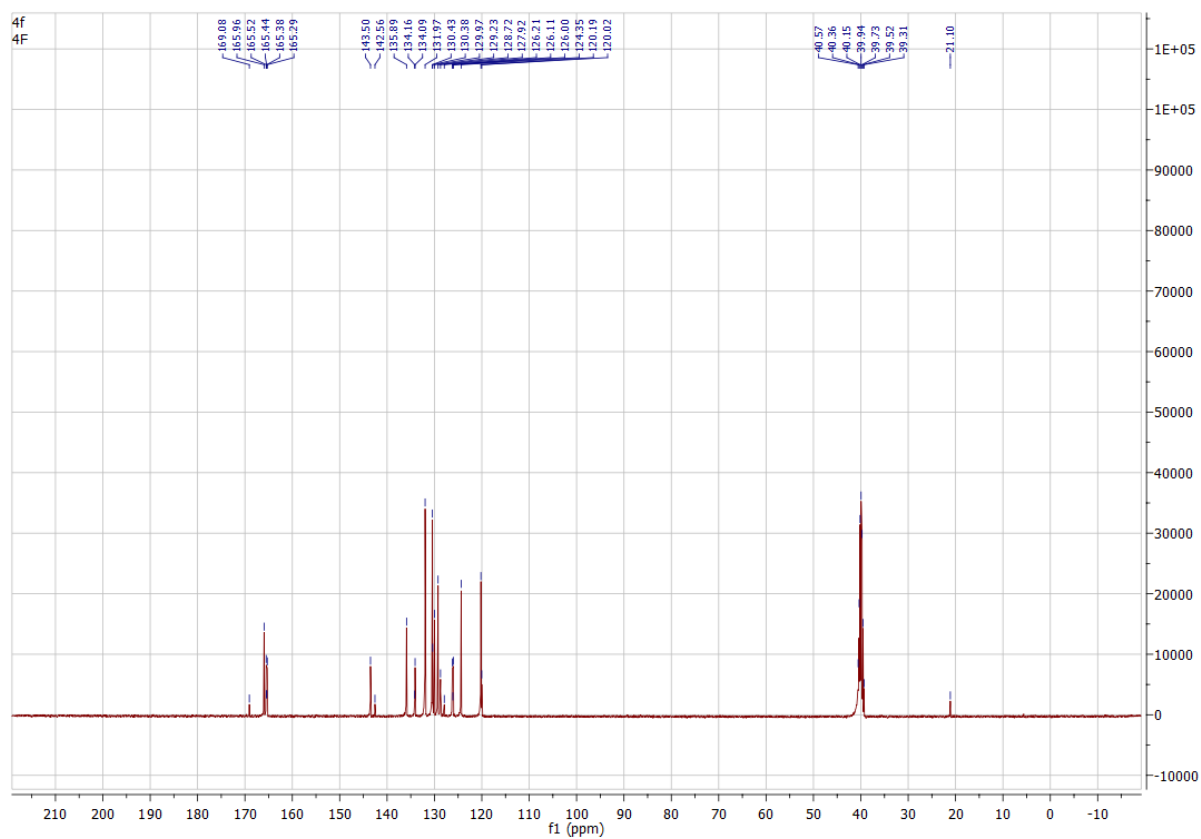


Figure S16. IR spectrum for 4f.

Figure S17. ¹H-NMR spectrum for 4f (400 MHz, DMSO-d₆).Figure S18. ¹³C-NMR spectrum for 4f (100 MHz, DMSO-d₆).

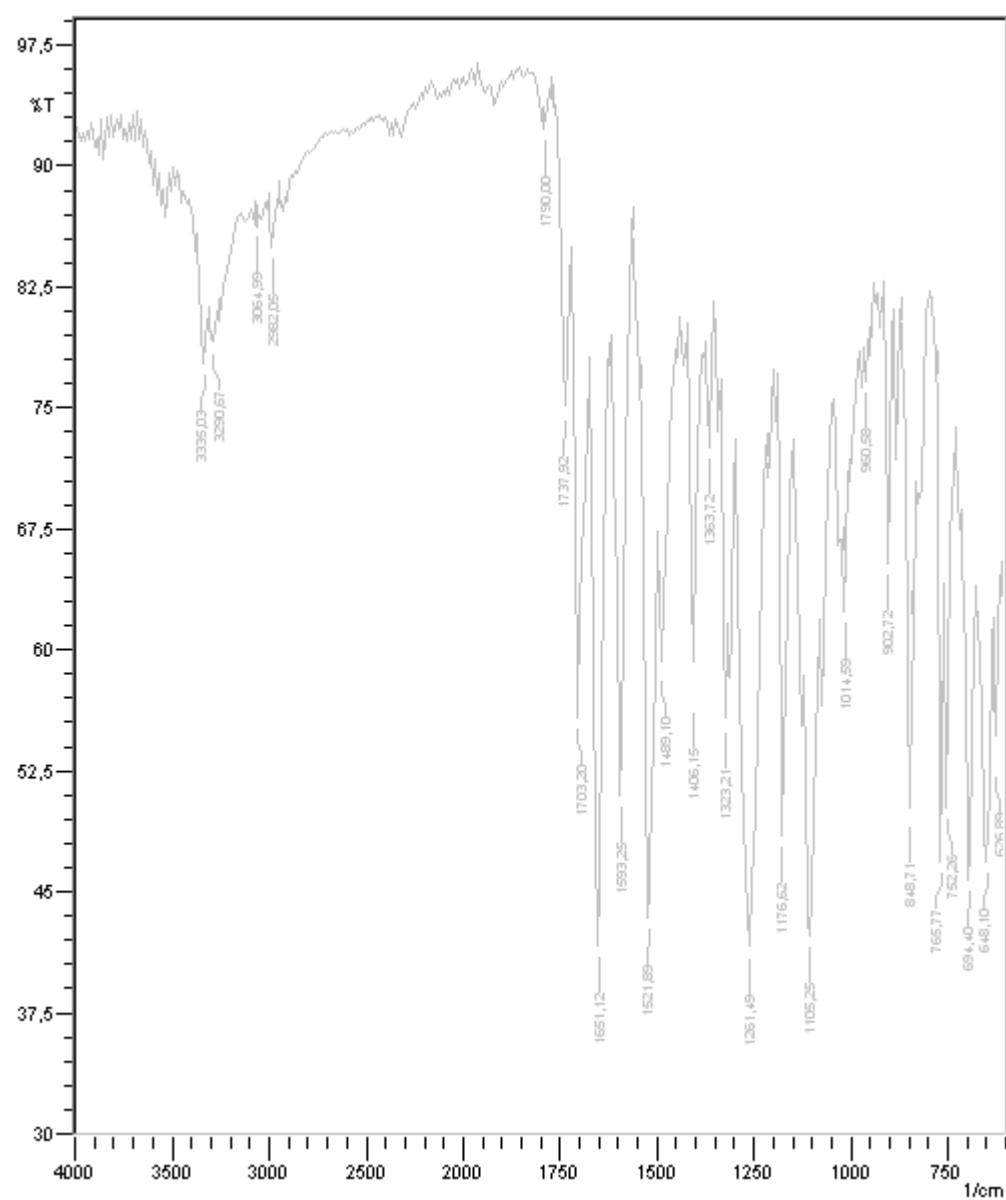


Figure S19. IR spectrum for 4g.

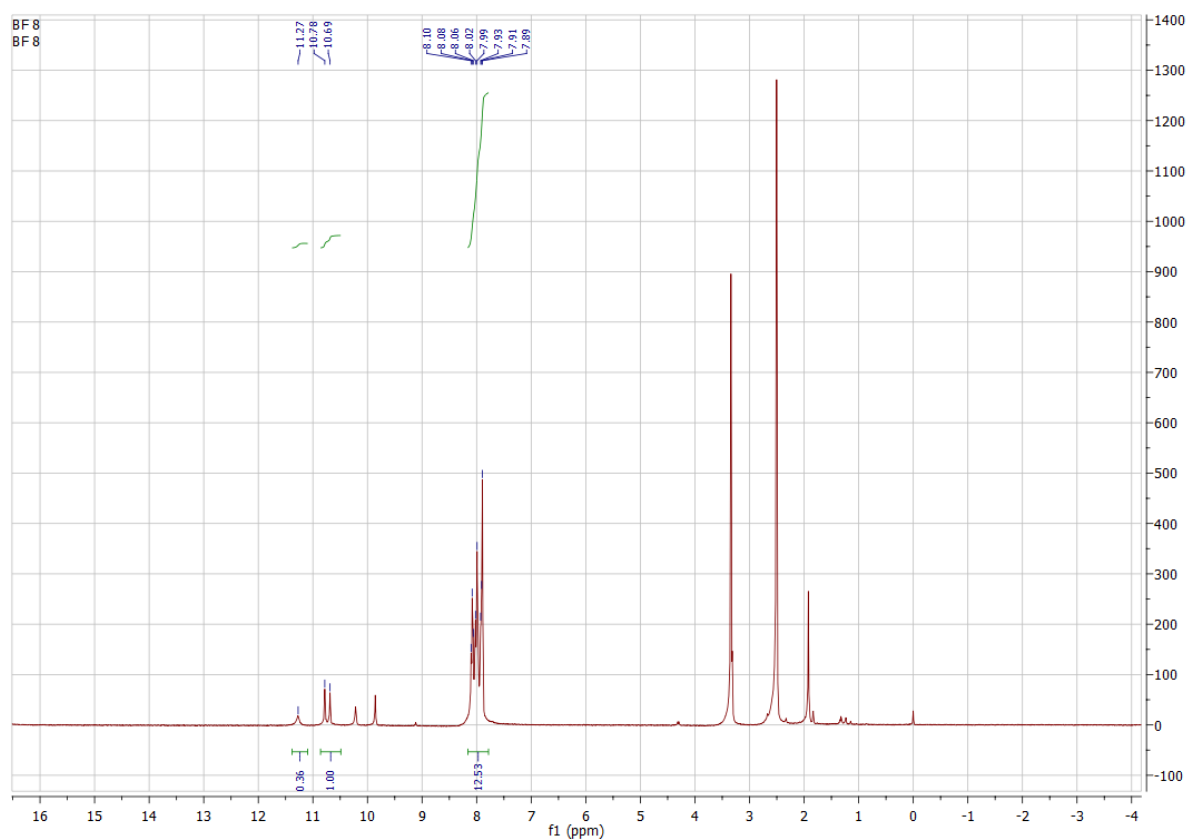


Figure S20. ¹H-NMR spectrum for **4g** (400 MHz, DMSO-d₆).

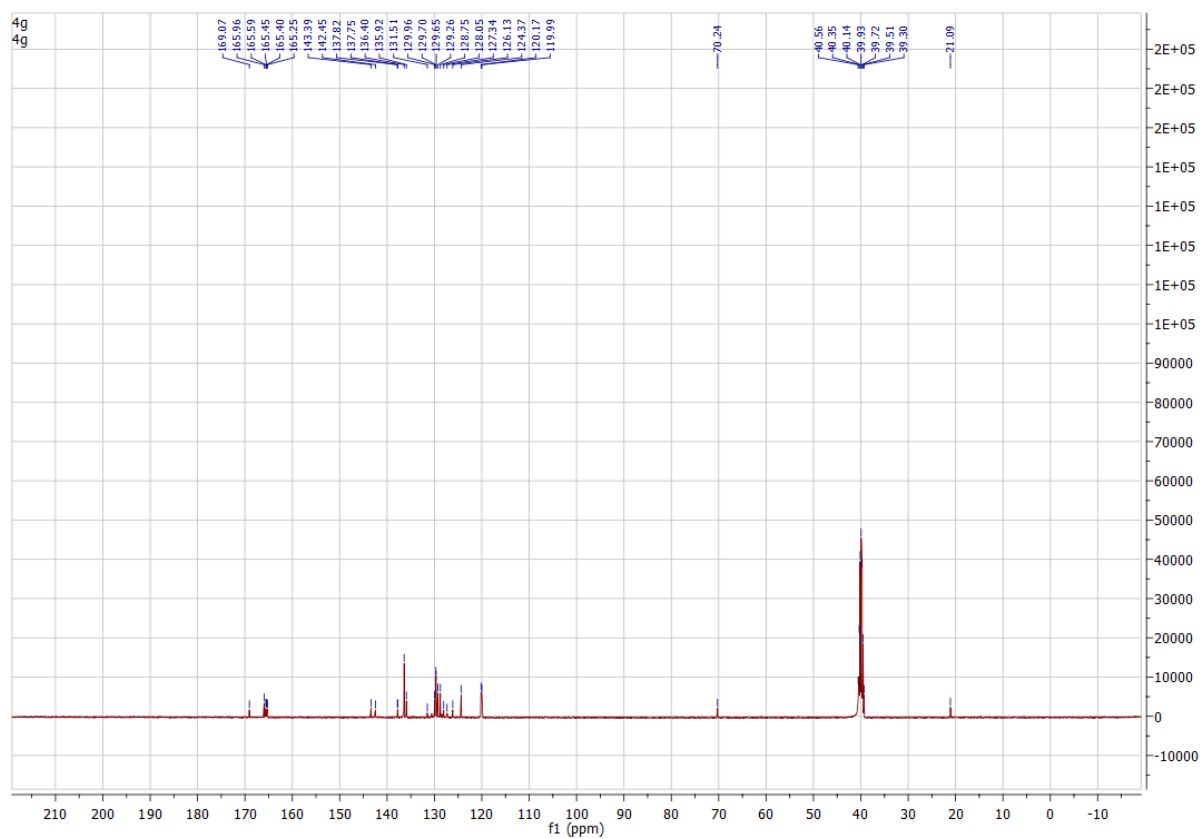


Figure S21. ¹³C-NMR spectrum for **4g** (100 MHz, DMSO-d₆).

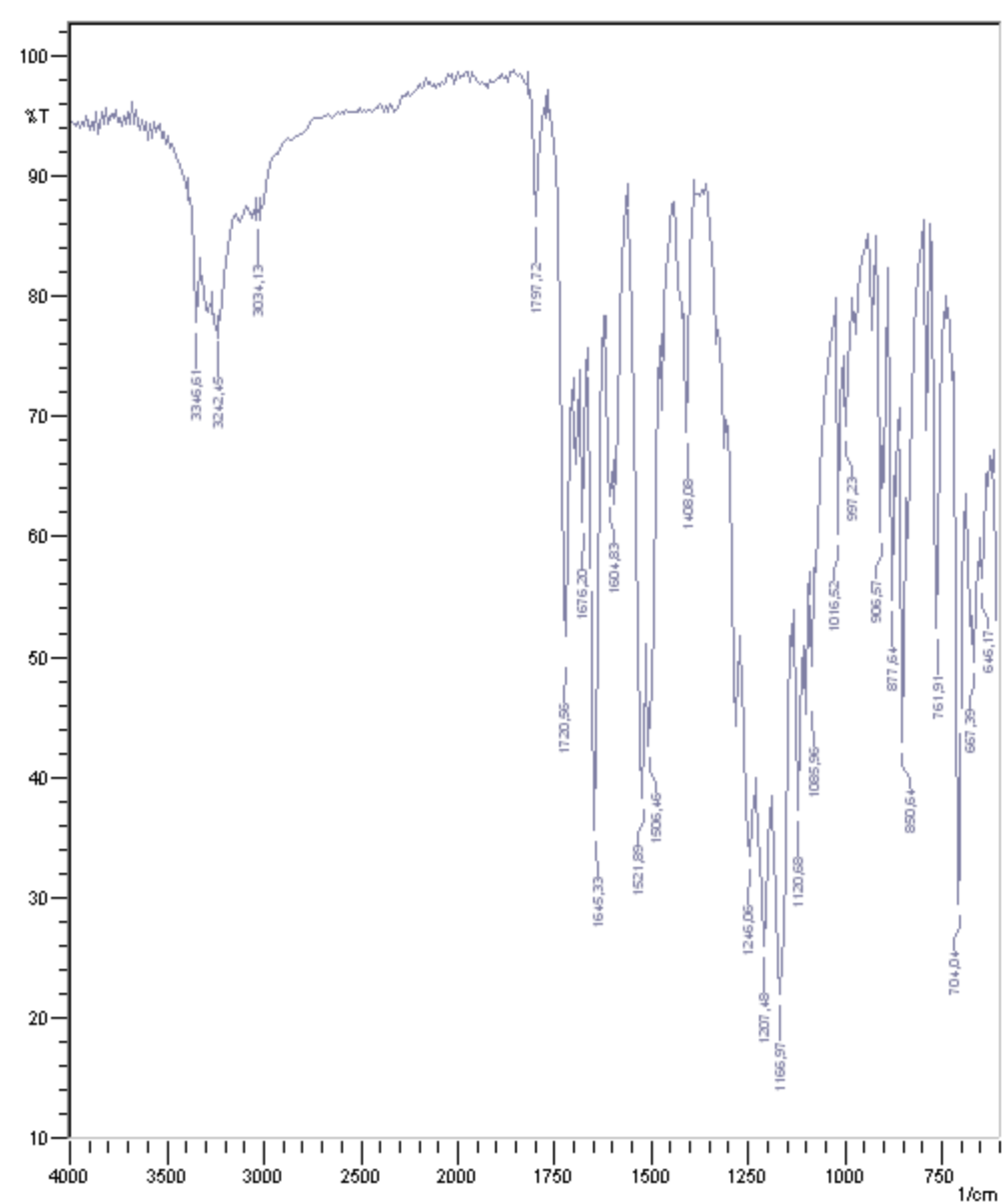


Figure S22. IR spectrum for 4h.

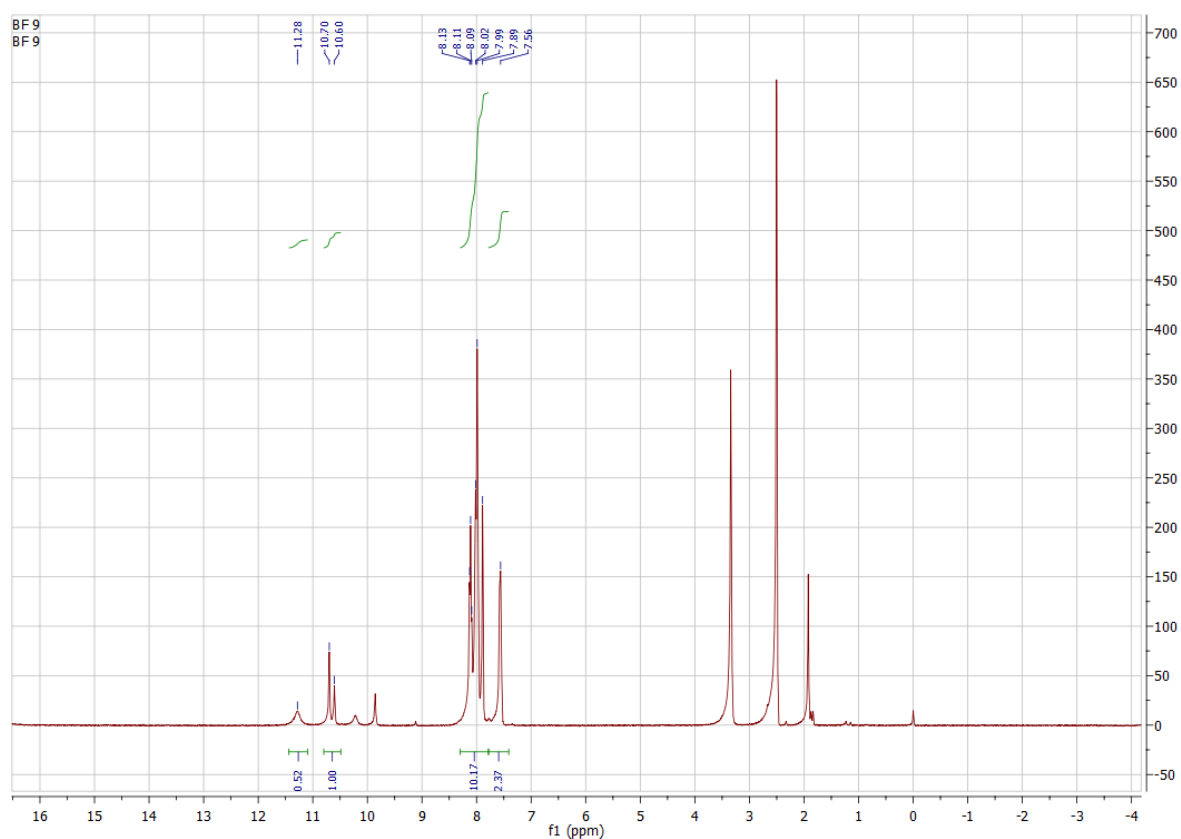


Figure S23. ¹H-NMR spectrum for **4h** (400 MHz, DMSO-d₆).

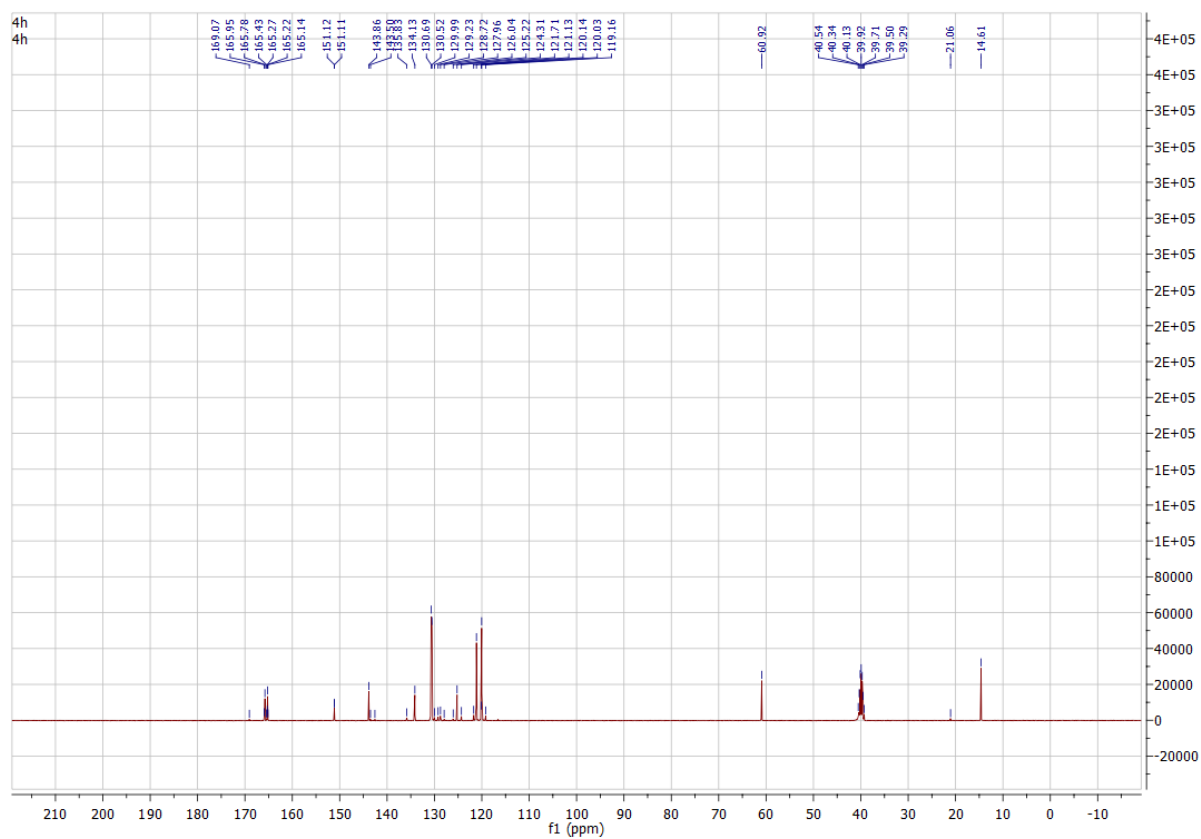


Figure S24. ¹³C-NMR spectrum for **4h** (100 MHz, DMSO-d₆).

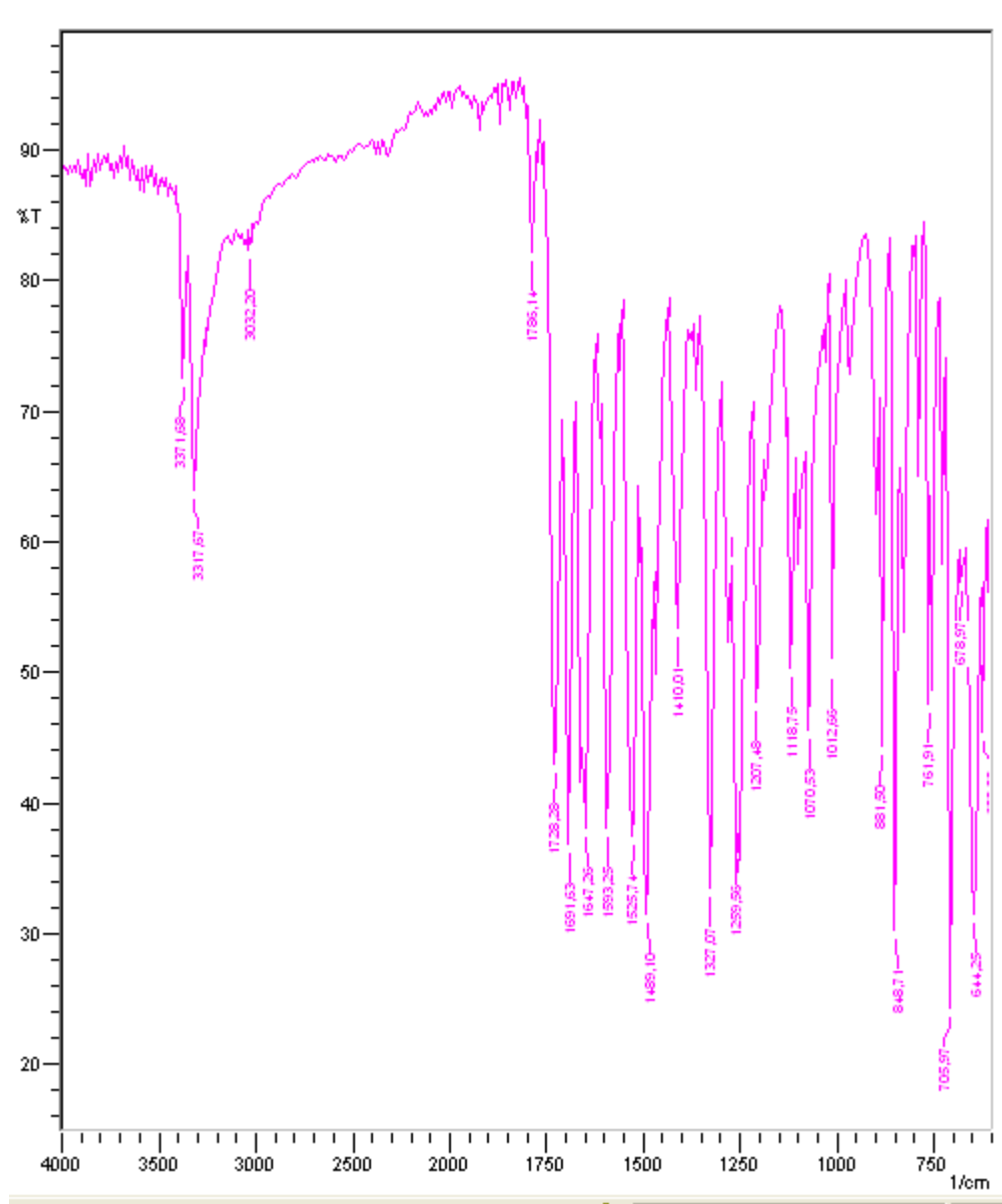


Figure S25. IR spectrum for 4i.

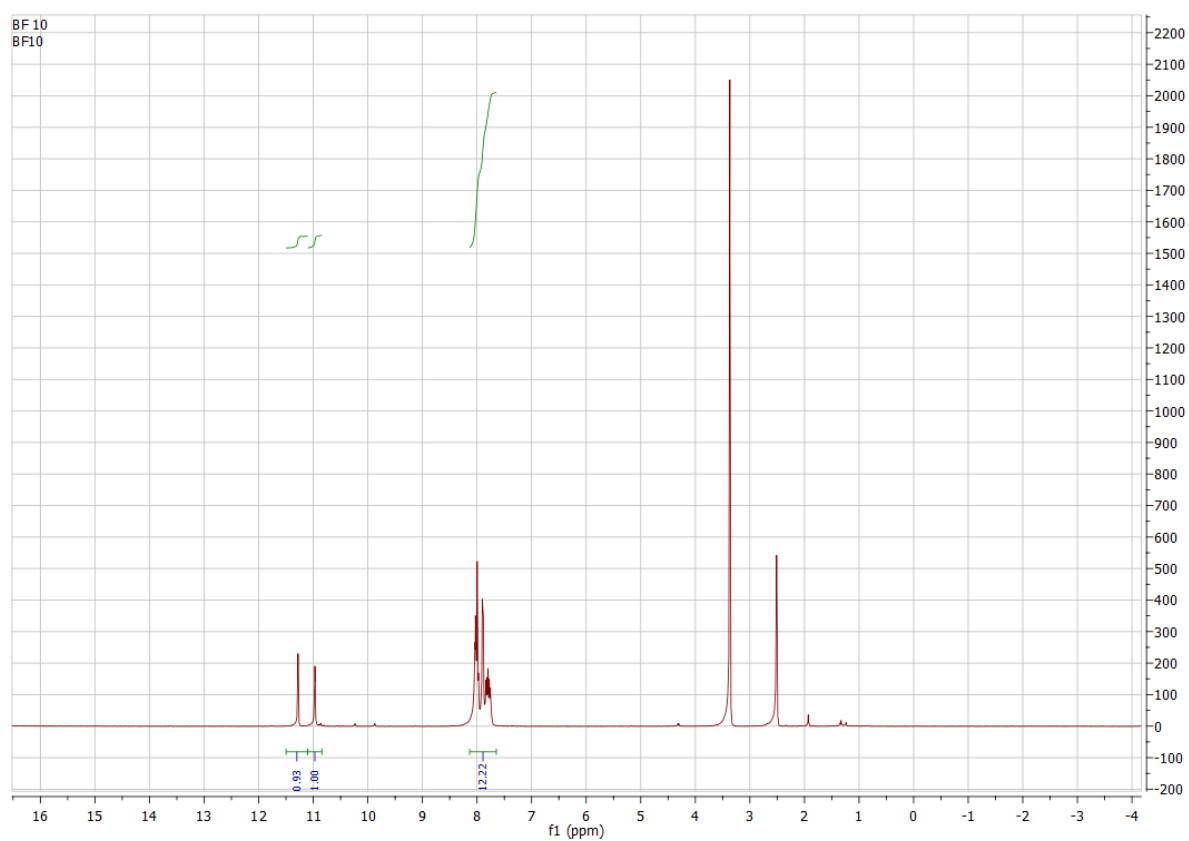


Figure S26. ¹H-NMR spectrum for **4i** (400 MHz, DMSO-d₆).

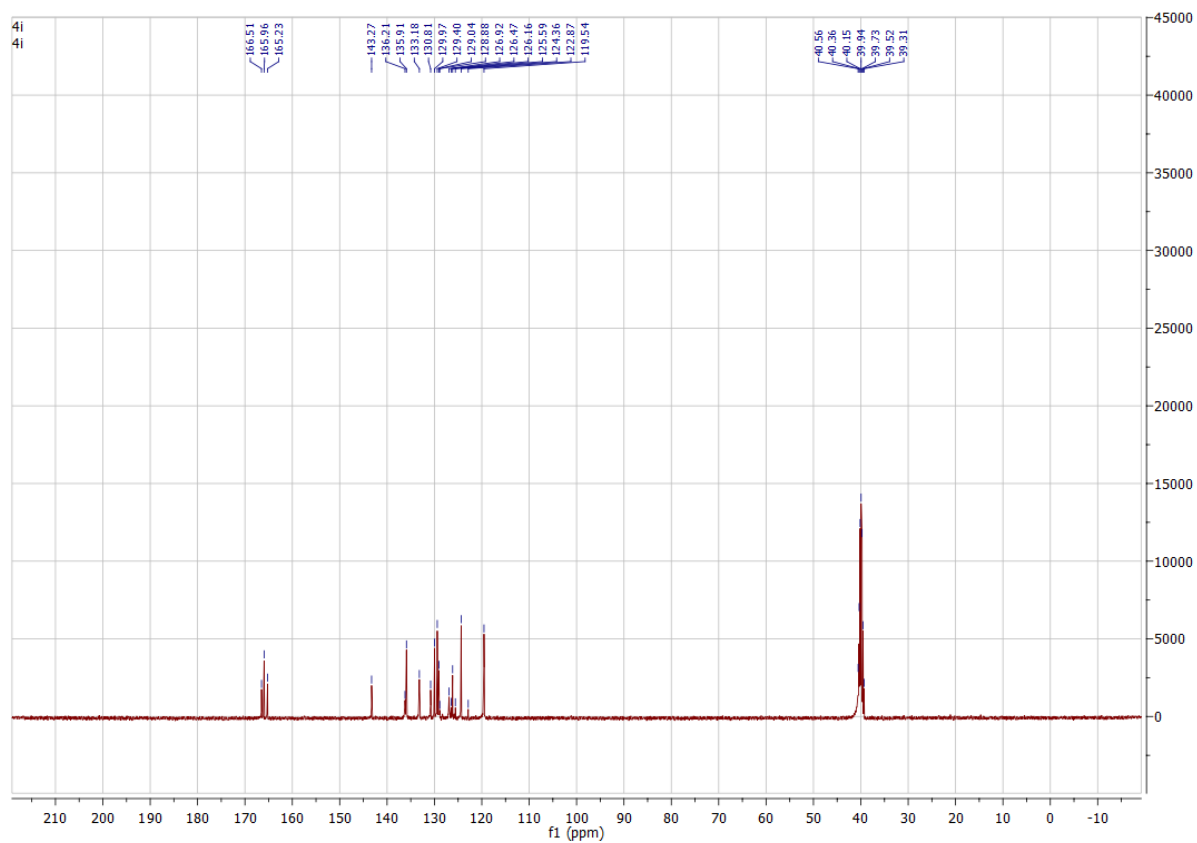


Figure S27. ¹³C-NMR spectrum for **4i** (100 MHz, DMSO-d₆).

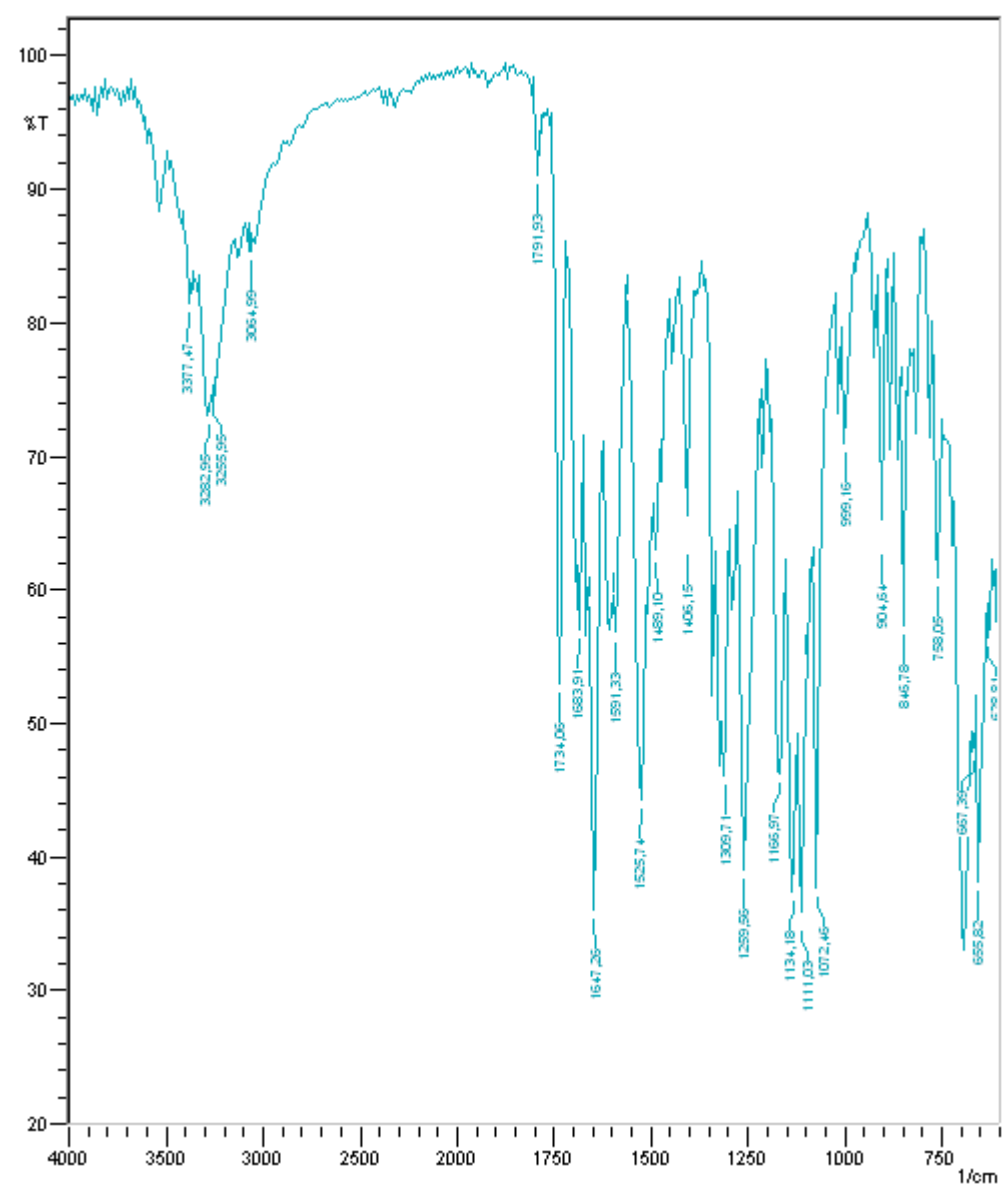
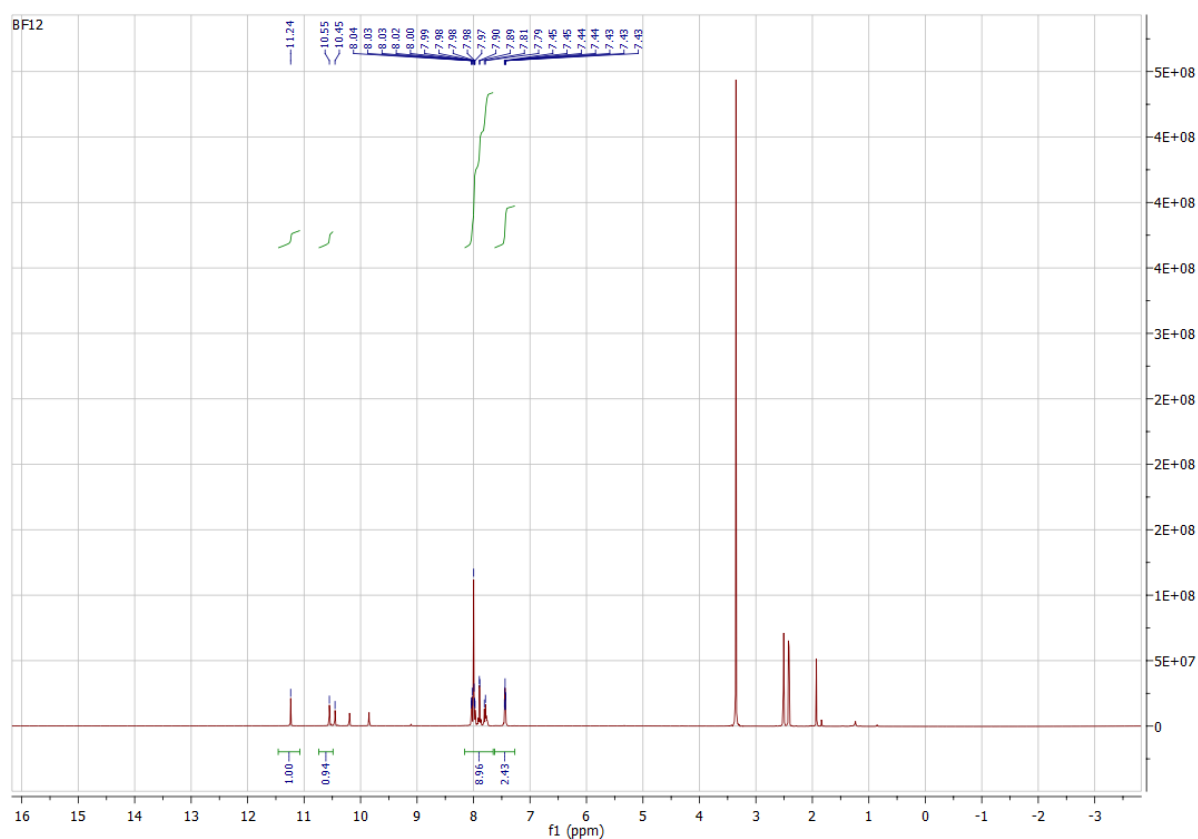
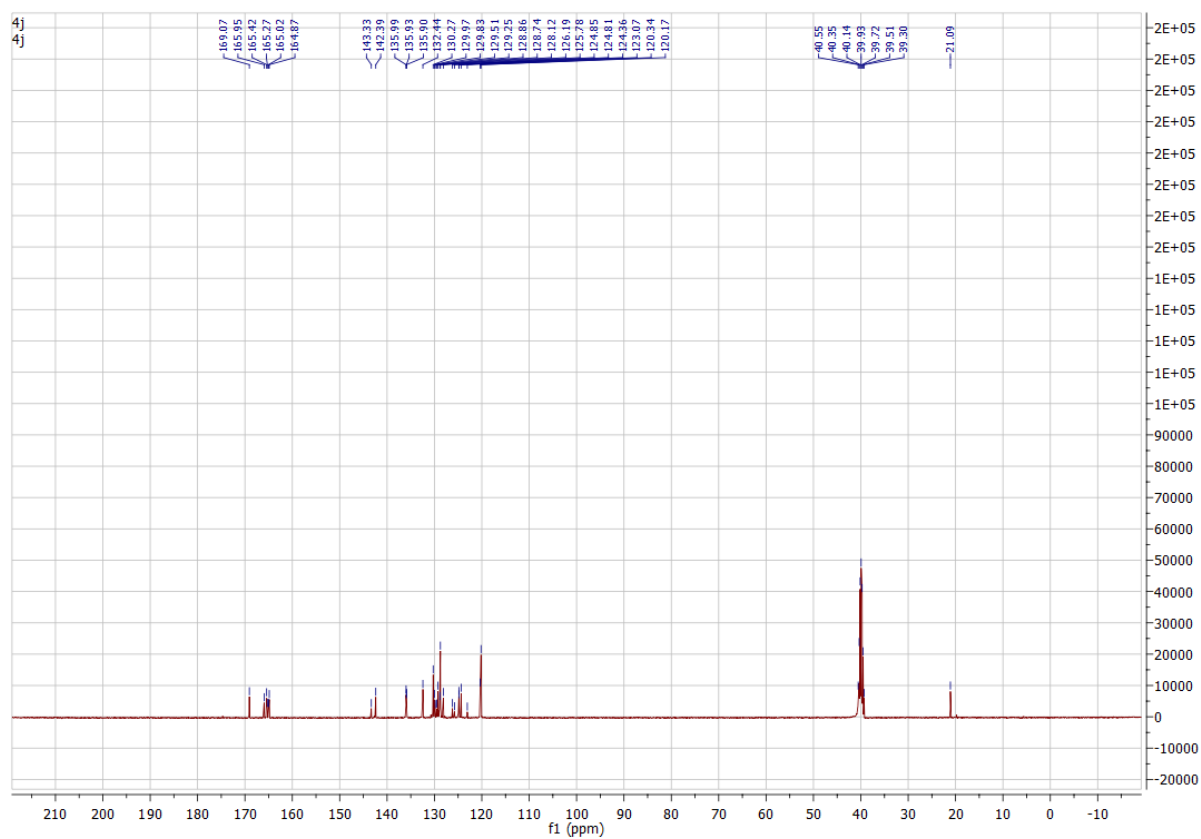


Figure S28. IR spectrum for 4j.

Figure S29. ¹H-NMR spectrum for **4j** (400 MHz, DMSO-d₆).Figure S30. ¹³C-NMR spectrum for **4j** (100 MHz, DMSO-d₆).

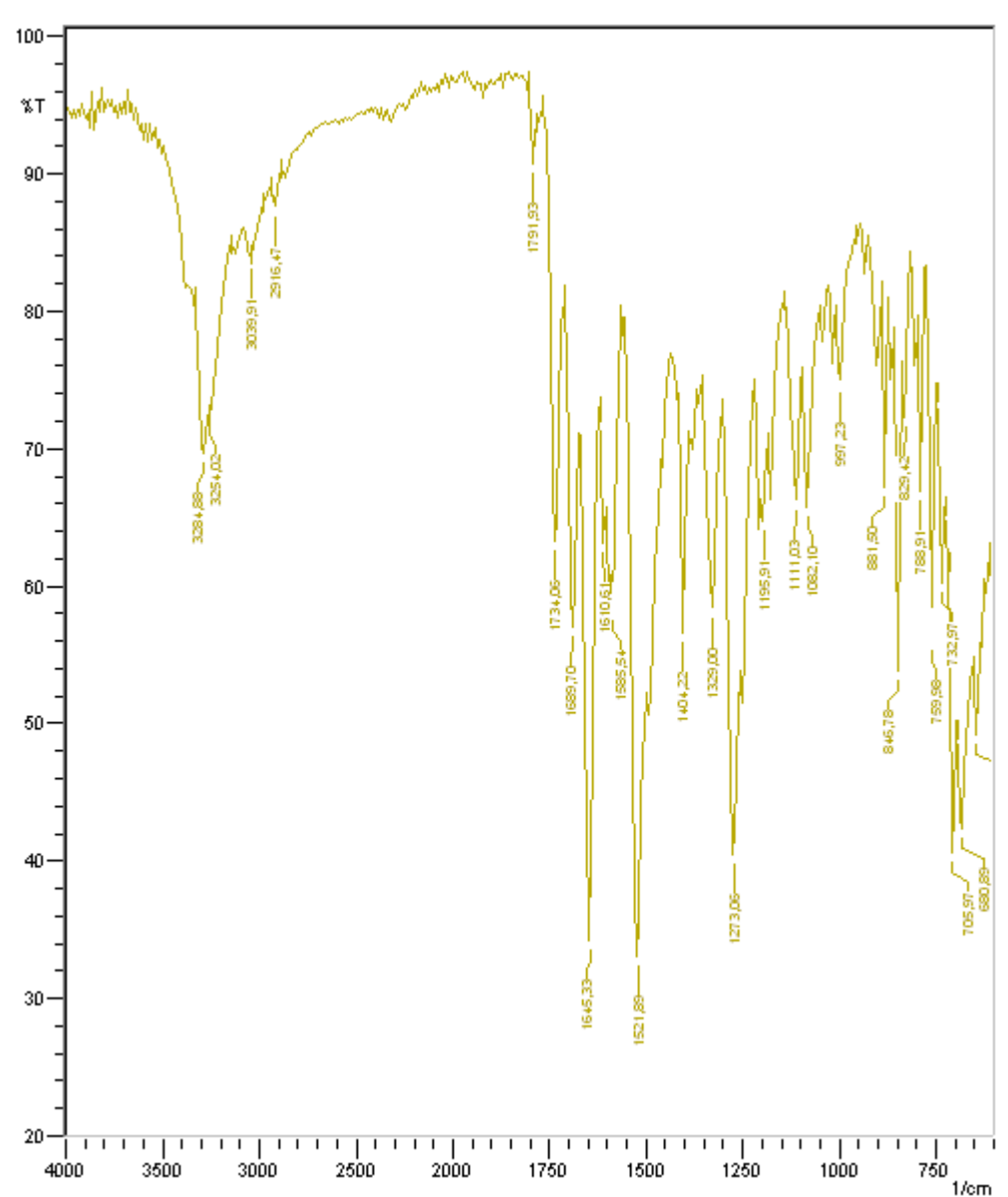


Figure S31. IR spectrum for 4k.

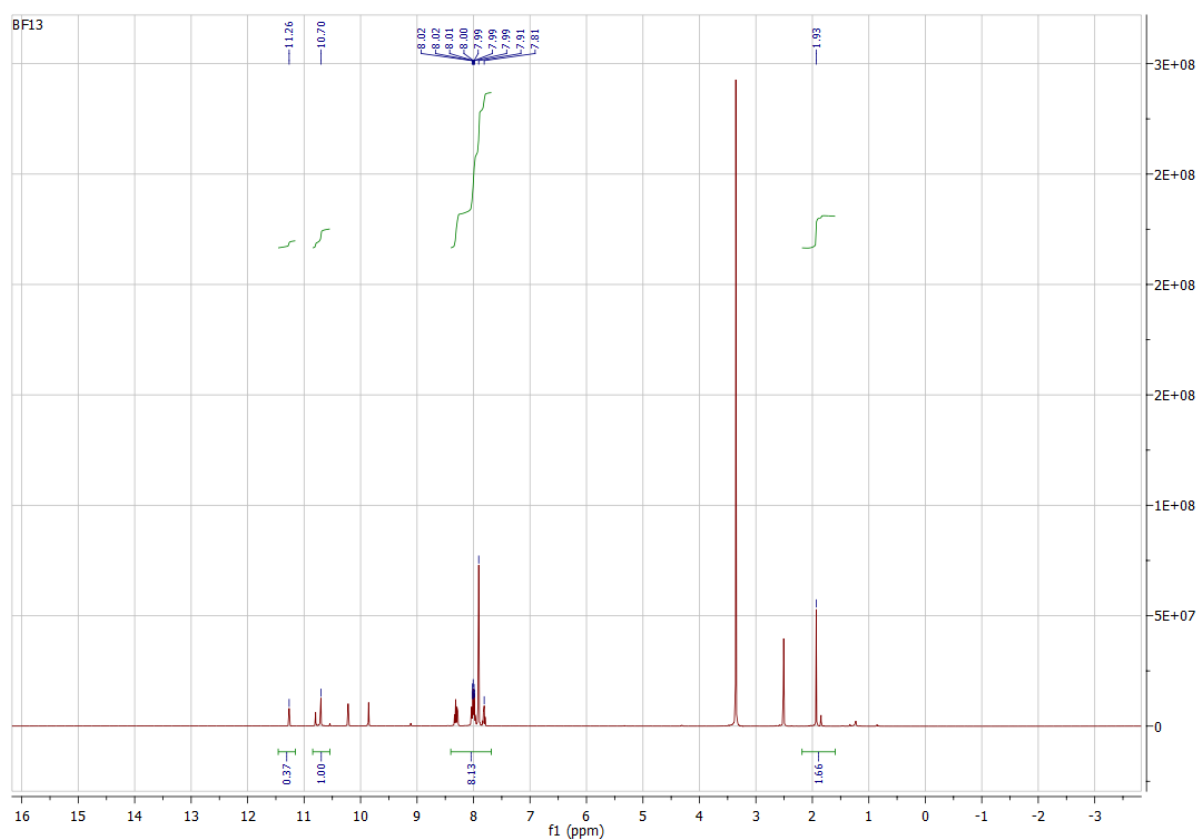


Figure S32. ¹H-NMR spectrum for 4k (400 MHz, DMSO-d₆).

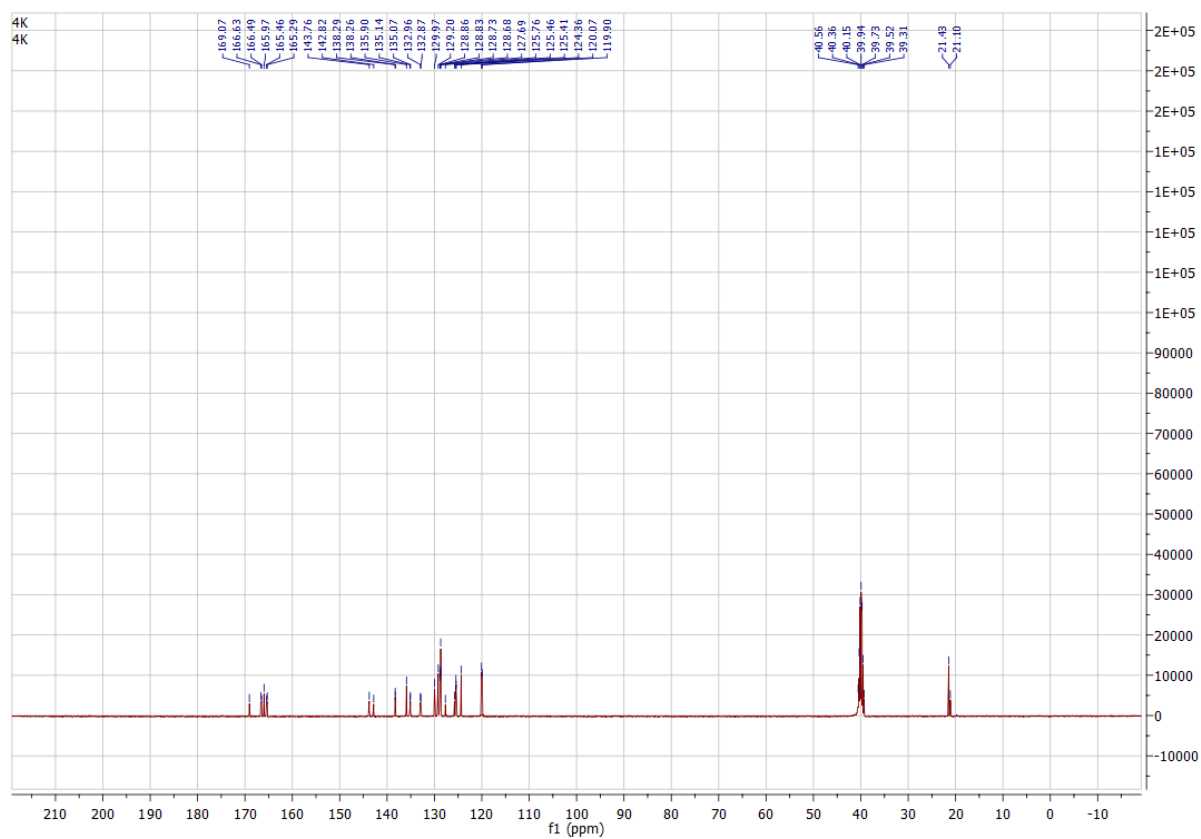


Figure S33. ¹³C-NMR spectrum for 4k (100 MHz, DMSO-d₆).

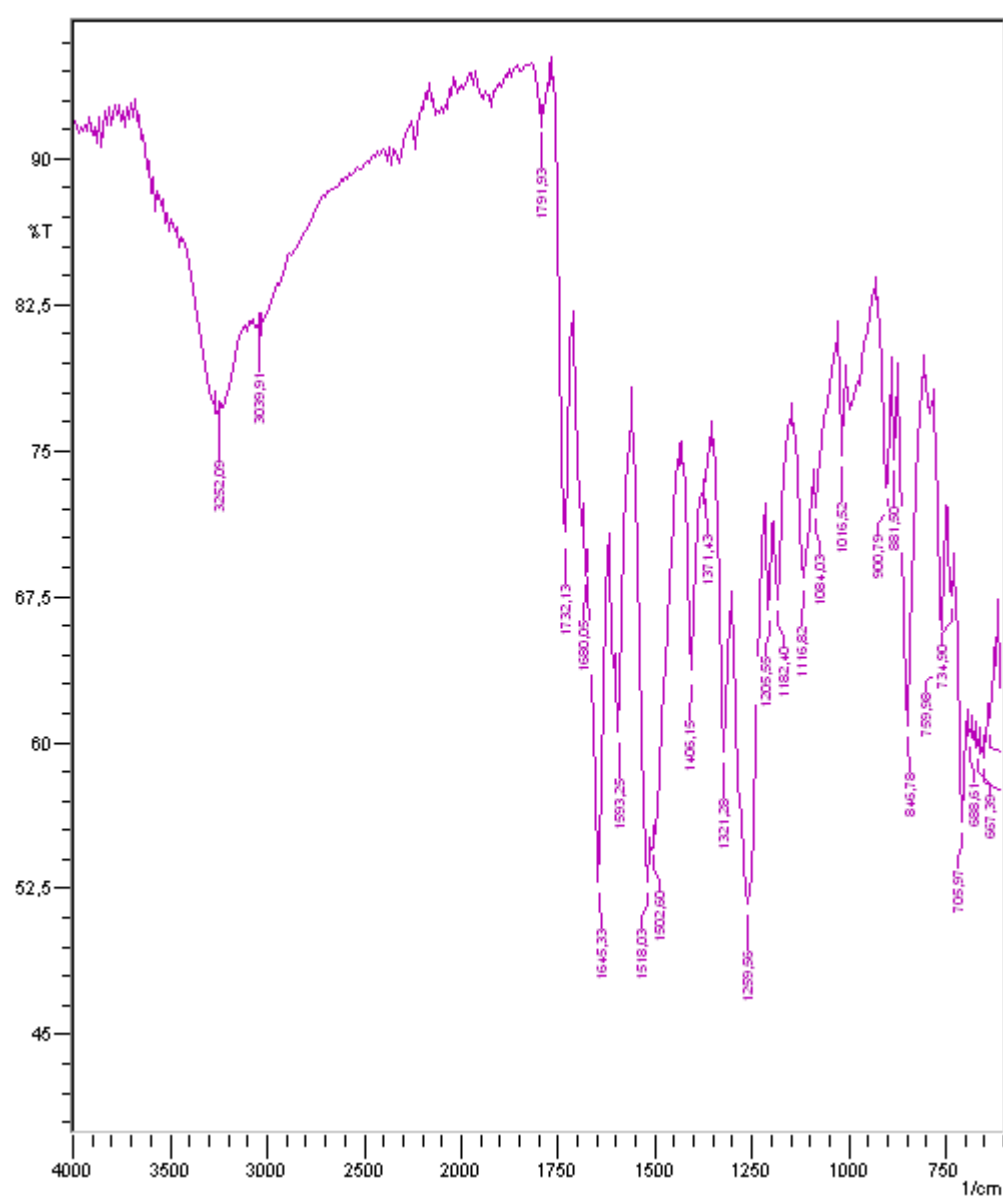


Figure S34. IR spectrum for 4l.

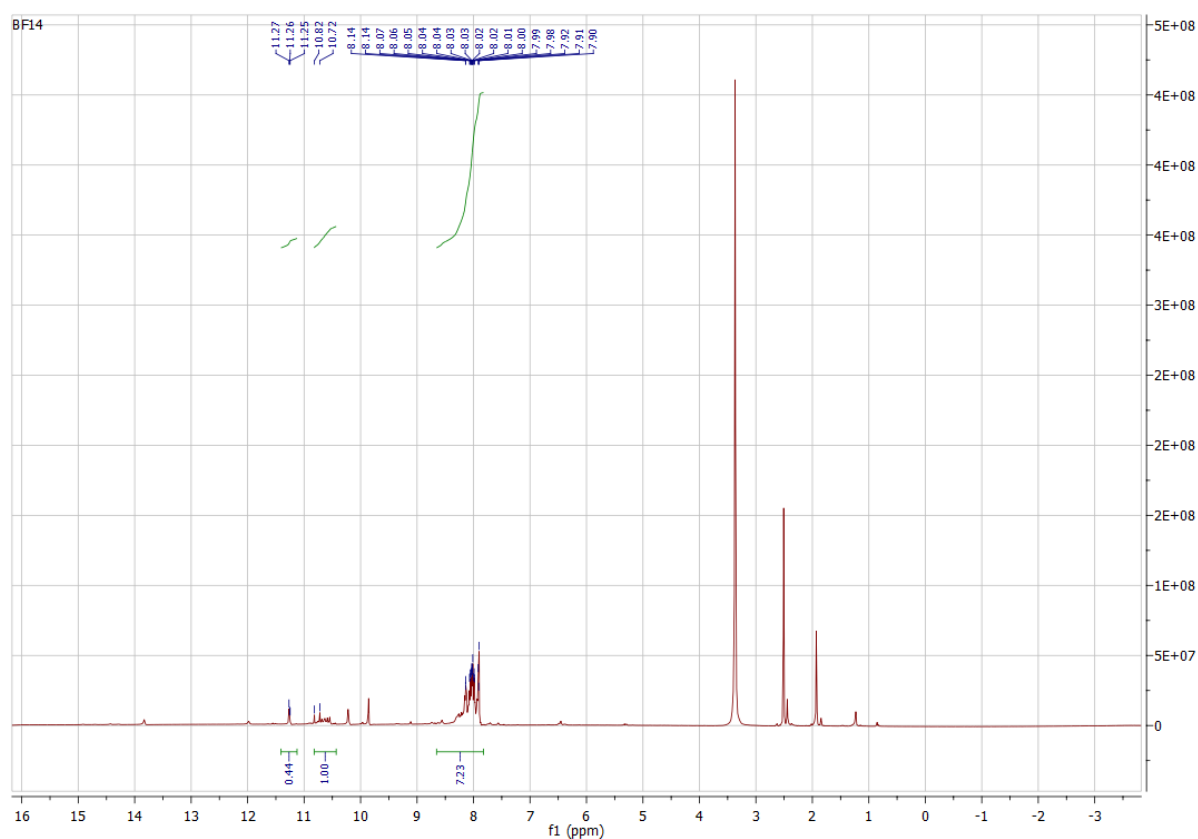


Figure S35. ¹H-NMR spectrum for **4l** (400 MHz, DMSO-d₆).

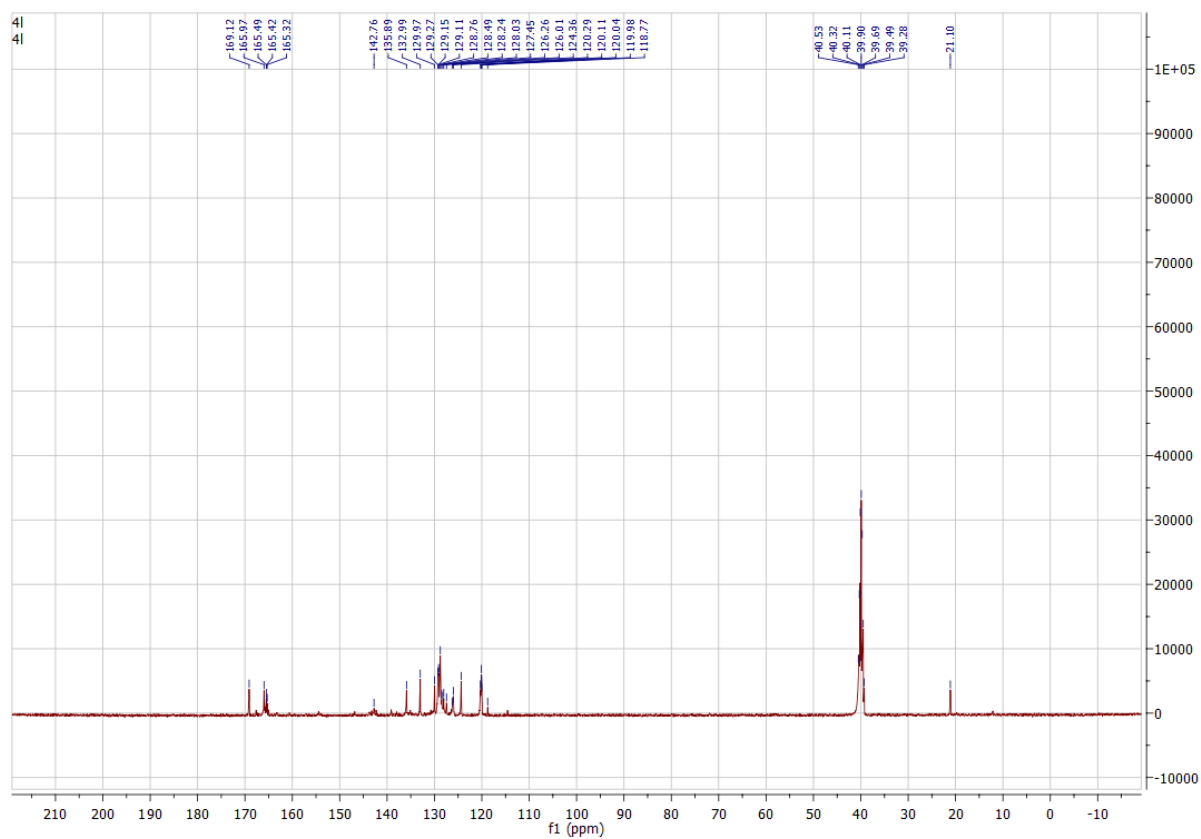


Figure S36. ¹³C-NMR spectrum for **4l** (100 MHz, DMSO-d₆).

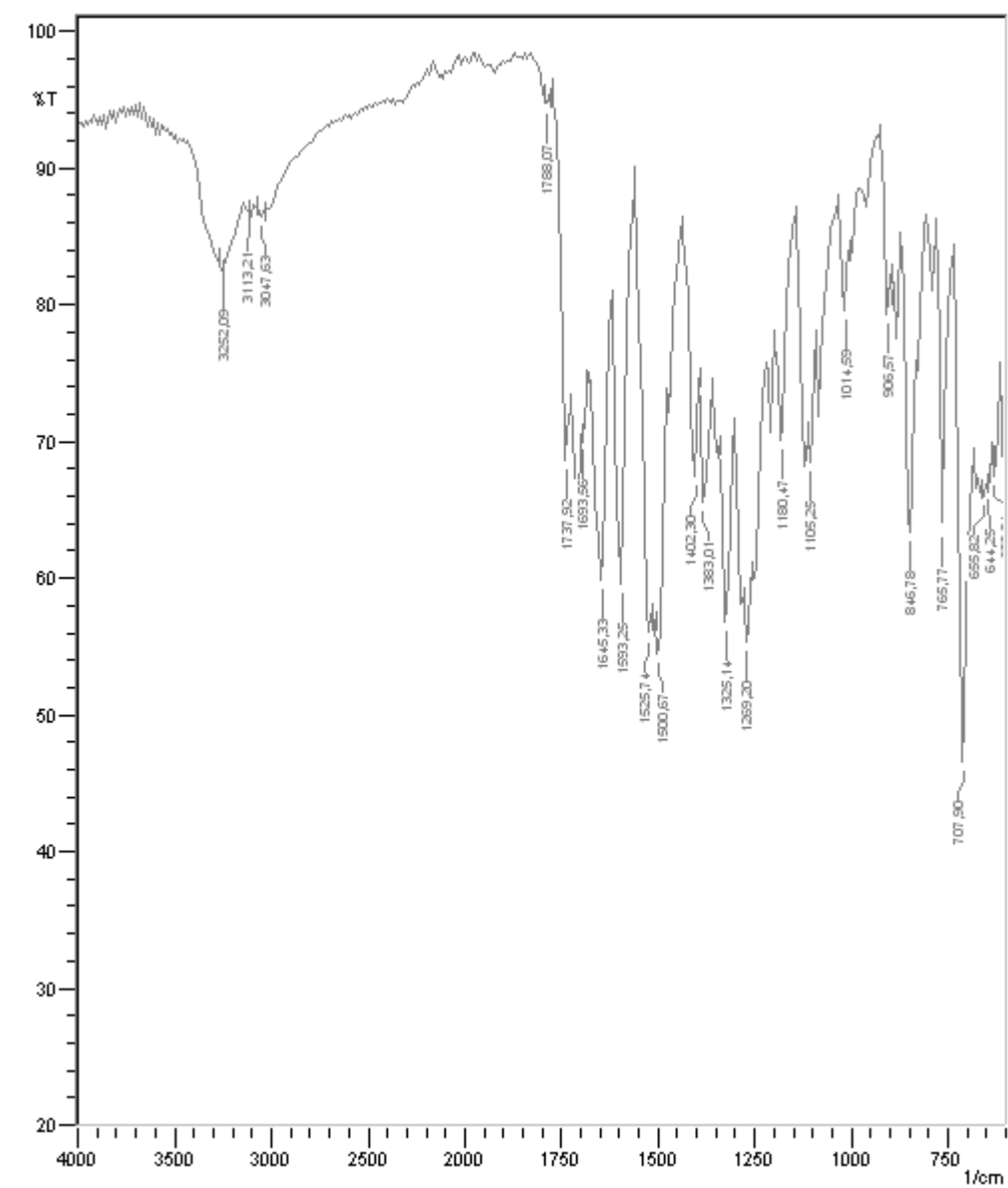


Figure S37. IR spectrum for 4m.

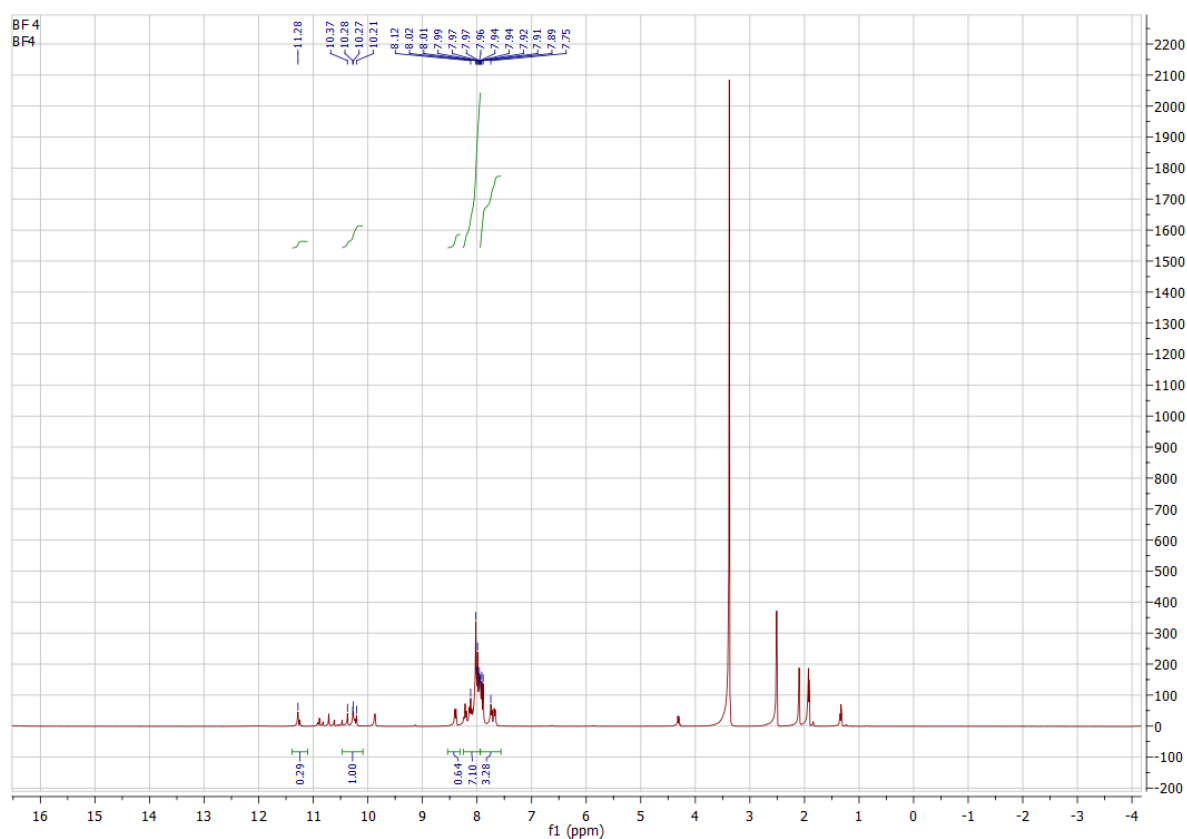


Figure S38. ¹H-NMR spectrum for **4m** (400 MHz, DMSO-d₆).

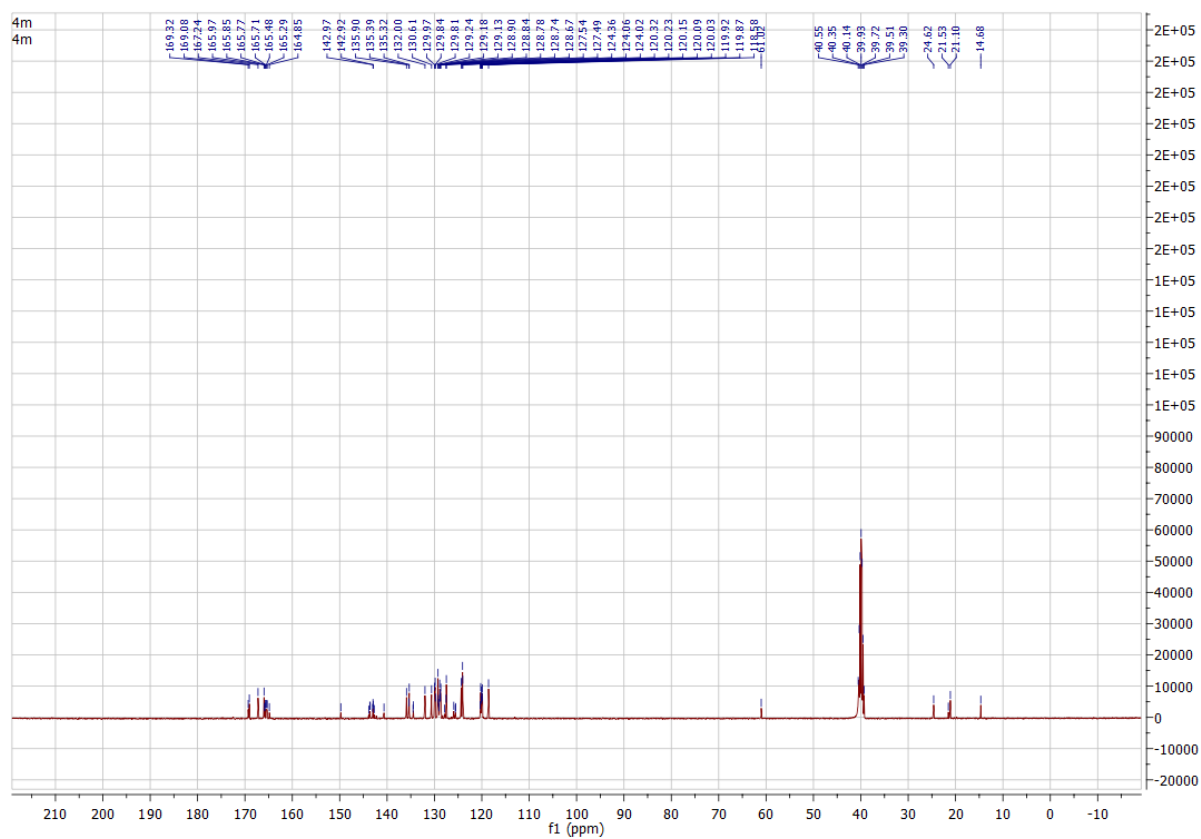


Figure S39. ¹³C-NMR spectrum for **4m** (100 MHz, DMSO-d₆).

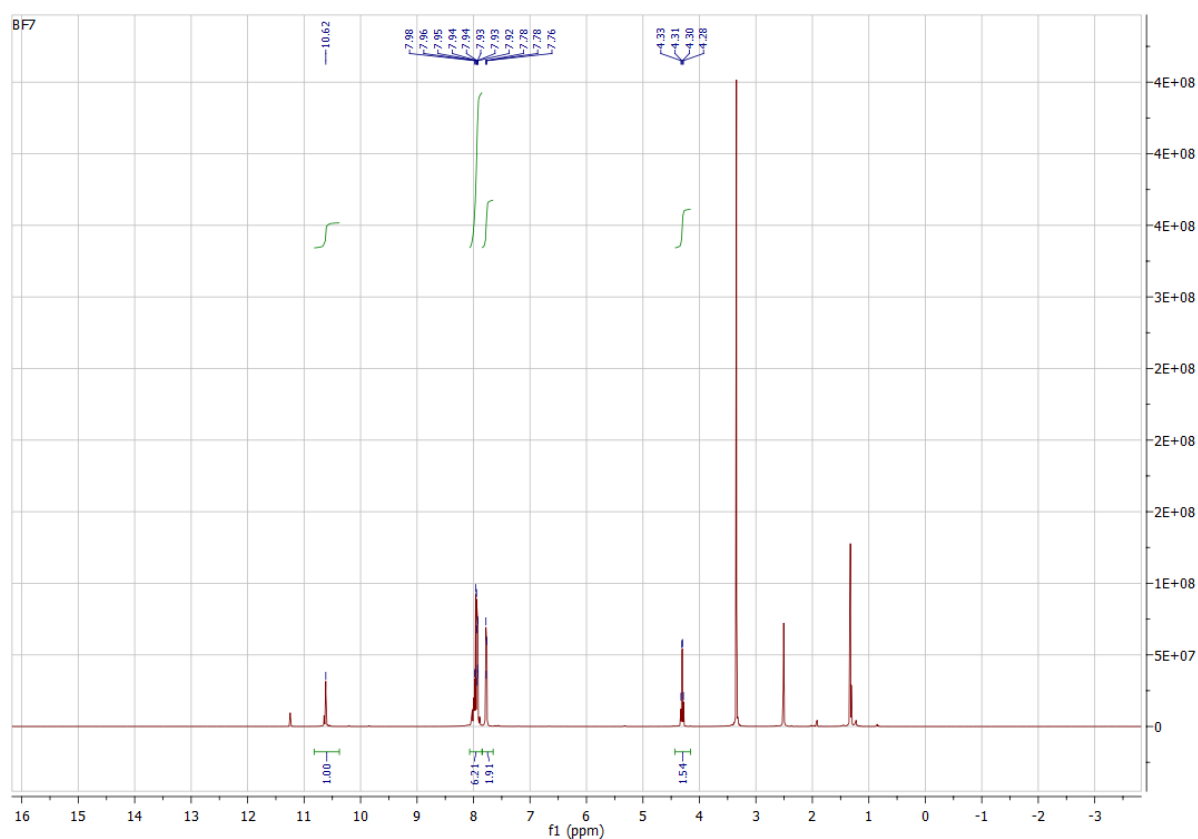


Figure S40. ¹H-NMR spectrum for 3f (500 MHz, DMSO-d₆).

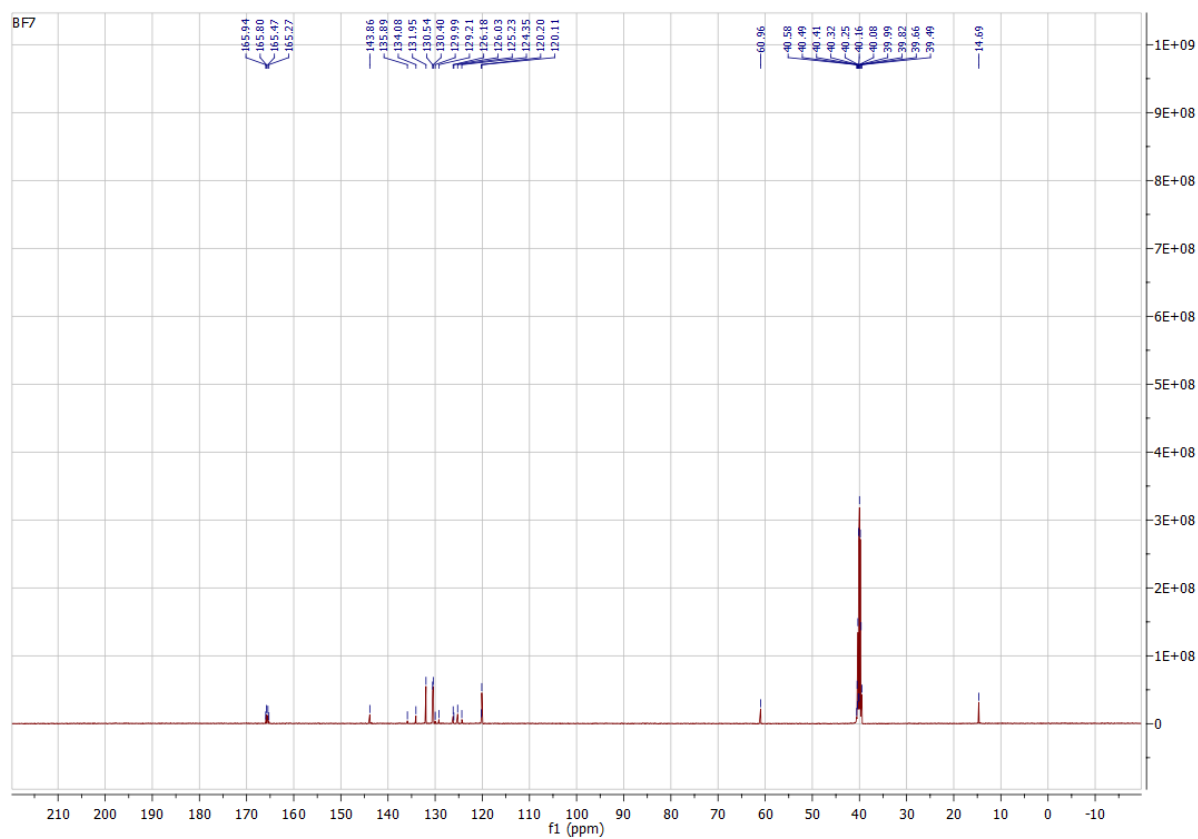


Figure S41. ¹³C-NMR spectrum for 3f (125 MHz, DMSO-d₆).

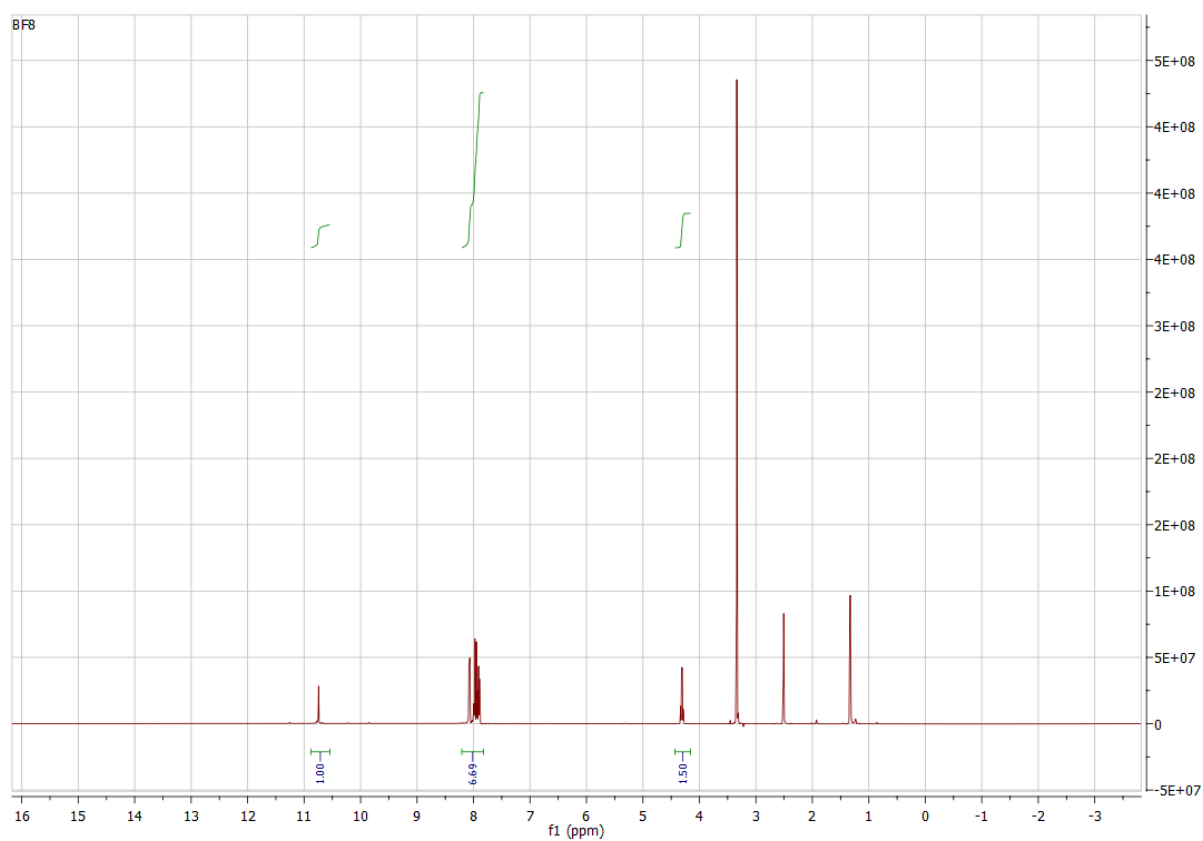


Figure S42. ¹H-NMR spectrum for **3g** (500 MHz, DMSO-d₆).

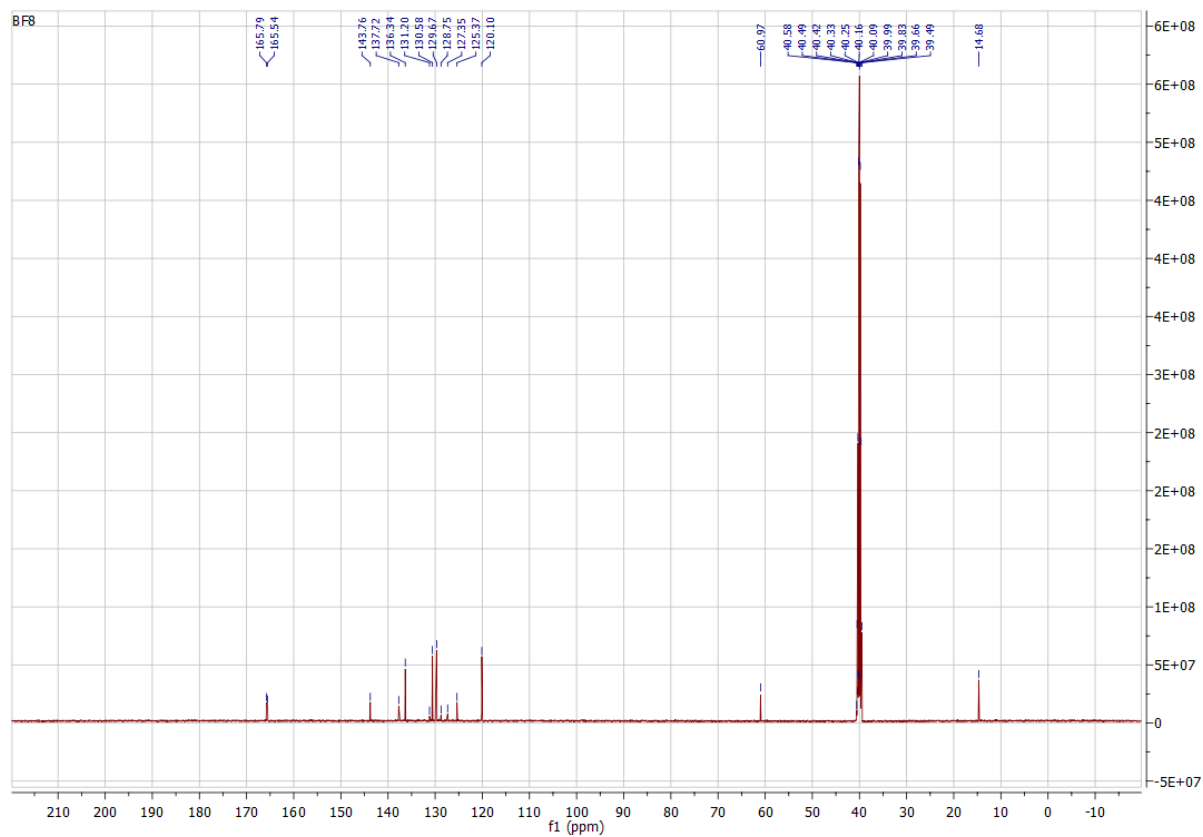
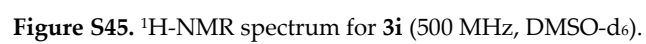
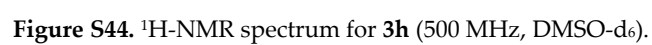


Figure S43. ¹³C-NMR spectrum for **3g** (125 MHz, DMSO-d₆).



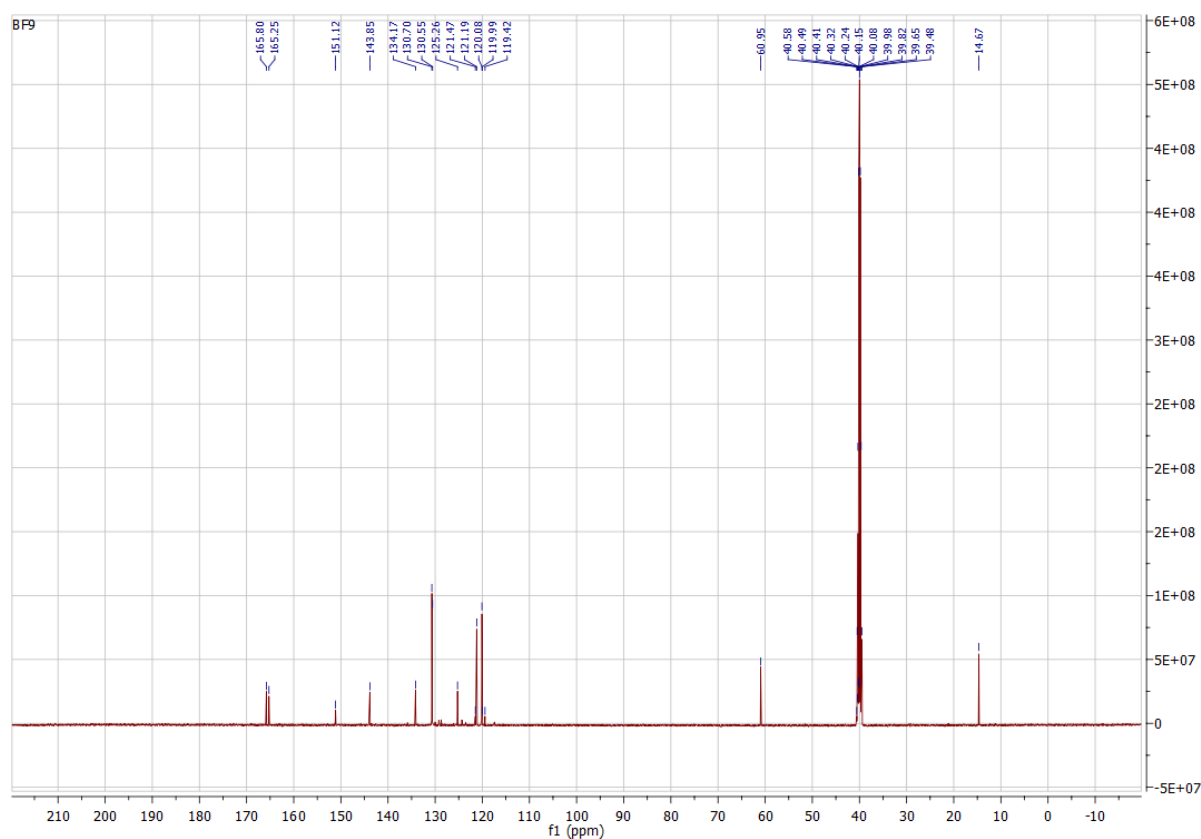


Figure S46. ¹³C-NMR spectrum for **3i** (125 MHz, DMSO-d₆).

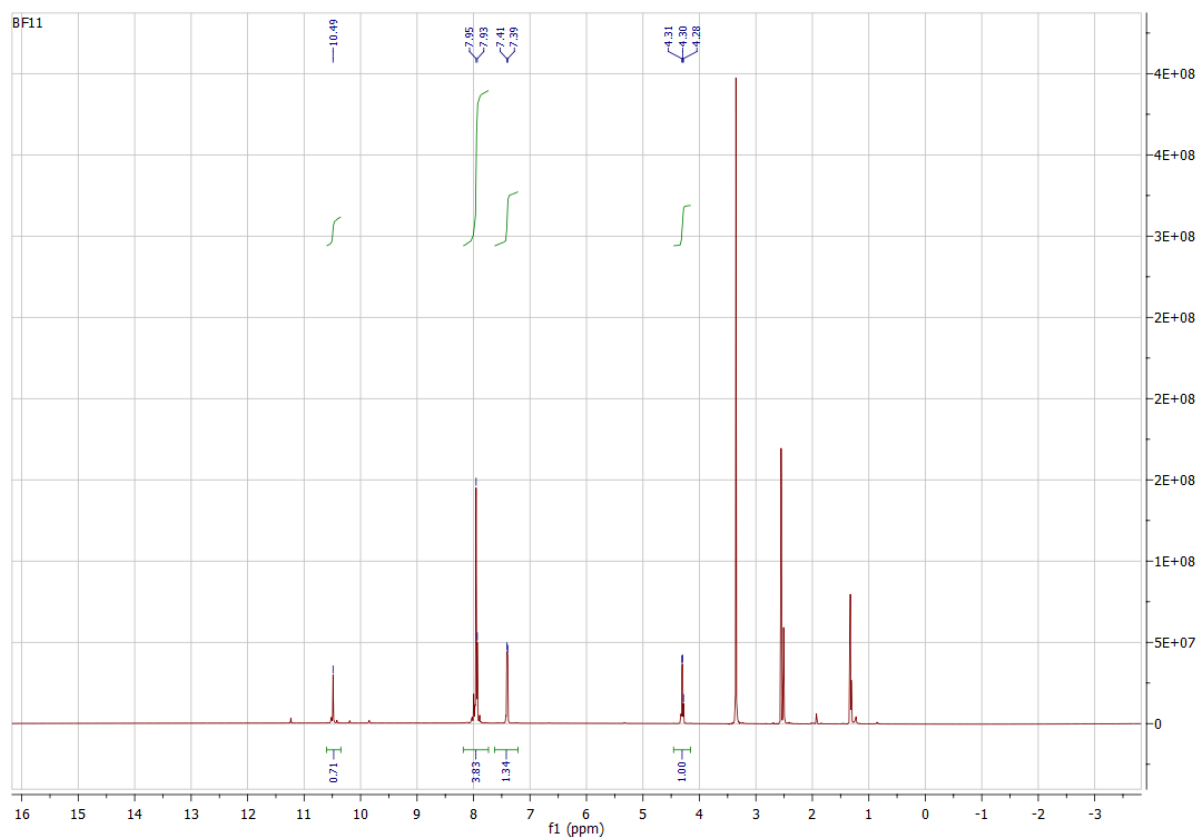


Figure S47. ¹H-NMR spectrum for **3j** (500 MHz, DMSO-d₆).

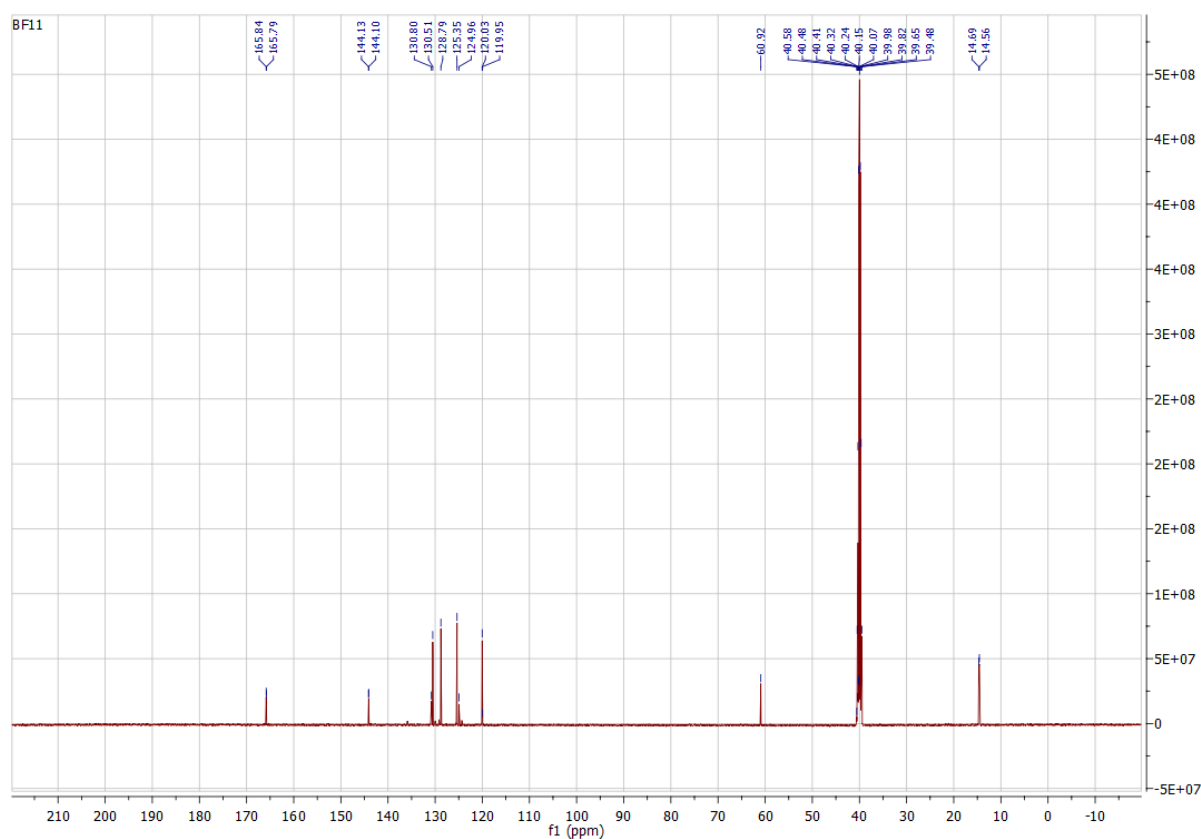


Figure S48. ^{13}C -NMR spectrum for **3j** (125 MHz, DMSO-d_6).

Table S1*. Screening test to evaluation of derivatives (**4a–4m**) on mortality of adult female *A. suspensa* under the laboratory conditions at $26\pm 1^\circ\text{C}$, $70\pm 5\%$ RH, and 12:12 L:D photoperiod.

Derivatives	Dosage, $\mu\text{g}/\text{fly}$	n	Mortality, % (Mean \pm SE)
4a	100	60	100.0 \pm 0.0
4b	100	59	13.6 \pm 1.8
4c	100	60	100.0 \pm 0.0
4d	100	60	100.0 \pm 0.0
4e	100	60	16.7 \pm 6.0
4f	100	59	15.3 \pm 0.3
4g	100	59	6.8 \pm 1.6
4h	100	60	16.7 \pm 6.0
4i	100	60	20.0 \pm 2.9
4j	100	59	16.9 \pm 7.2
4k	100	60	13.5 \pm 1.5
4l	100	60	15.0 \pm 2.9
4m	100	60	17.0 \pm 3.5
Control		60	3.3 \pm 1.7

*The screening tests were conducted following the same procedure described in the toxicity test. A higher dosage at 100 μg per fly of each derivative was used to evaluate the effect on mortality of female *A. suspensa*. In each test, 19–20 female adults were tested and replicated 3 times. Neat acetone was used as control.