Supporting Information For

Hydride-catalyzed selectively reductive cleavage of unactivated tertiary amides using hydrosilane

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1. General considerations

1.1 Materials

All manipulations were carried out using standard Schlenk, high vacuum, and glovebox techniques. Glassware was dried in a 140 ºC oven over 4 h prior to use. $LiBEt_3H$ (1.7 M solution in THF), $NaBEt_3H$ (1M solution in THF), KO*t*Bu (98%), NaOH (98%) and PMe_3 (97%) were purchased from Acros and used as received. $KBEt_3H$ (1M solution in THF), BEt_3 (1M solution in THF) and Hg (99.999%) were purchased from Aladdin and used as received. BPh_3 (96%), Boron trifluoride etherate (98+%), $(EtO)_3SiH$ (96%), and $B(C_6F_5)_3$ (97%) were purchased from Alfa and used as received. Poly(methylhydrosiloxane) (98%) was purchased from Chembee and used as received. Flash colum chromatography was performed on silica gel (particle size 300-400 mesh ASTM), purchased from Yantai, China. The other bases and silanes were obtained from commerical sources and used as received. All solvents were obtained from commercial sources and dried and degassed according to standard procedures. Tertiary aromatic amides were synthesized according to literature procedures.[1]

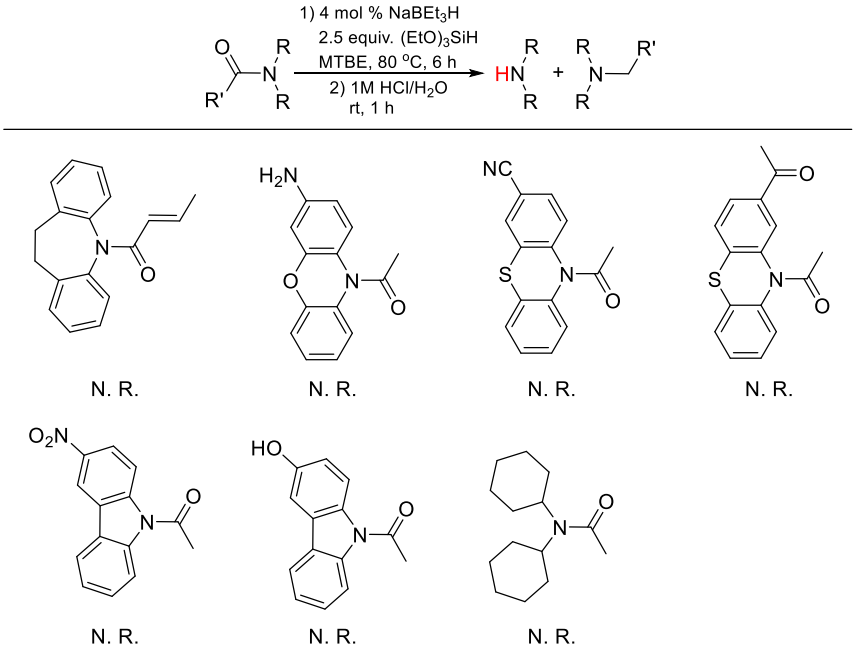
1.2 Analytical Methods

NMR spectra data were obtained on AVANCE (III) HD 400 MHz instruments. ^{1}H NMR and ^{13}C NMR spectra were referenced to residual protio solvent peaks or TMS signal (0 ppm). Data for ^{1}H NMR are recorded as follows: chemical shift (δ, ppm), multiplicity (s = singlet, d = doublet, t = triplet, m = multiplet or unresolved, br = broad singlet, coupling constant (s) in Hz, integration). Data for ^{13}C NMR are reported in terms of chemical shift (δ, ppm). GC was performed on a Shimadzu GC-2010 plus spectrometer. GC/MS was performed on a Shimadzu GCMS-QP2010 Plus spectrometer.

2. Typical procedures for the cleavage of C-N bonds

In an argon filled glovebox, a 10 mL dried Schlenk tube equipped with a magnetic stir bar was charged with $NaBEt_3H$ (20 μL, 20 μmol), amide (0.5 mmol), silane (1.25 mmol, 2.5 equiv.), MTBE (2.0 mL). The tube was then sealed with a Teflon plug under an argon atmosphere, and removed from the glovebox. Then, the solution was stirred at 80 °C for 6-24 h. After the allotted time, the reaction was quenched by adding 1 M aqueous HCl (1 mL) at room temperature. The mixture stirred for 1 h at room temperature, and was extracted with dichloromethane (DCM). Then, the organic layer was filtrated though Celite, and dried over MgSO4. The combined organic layers were analyzed by GC analysis, with *p*-xylene an internal standard to obtain the GC yield. After that, the crude product was purified by silica gel column chromatography using an ethyl actetate/petroleum ether mixture.

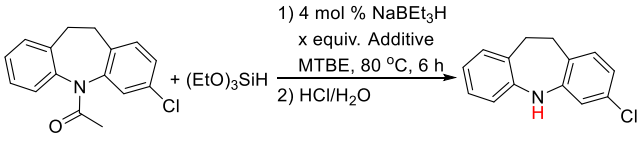
3. The unreactive substrates



Reaction conditions: amides (0.5 mmol), $(EtO)_3SiH$ (1.25 mmol), $NaBEt_3H$ (20 μmol), MTBE (2 mL), at 80 °C, 6 h, then 1M HCl/H_2O, rt, 1 h. Yields were determined by GC-MS.

4. Mechanistic studies

4.1 Homogeneity test with Hg and PMe_3

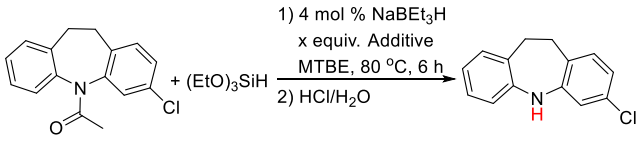


1a **2a**

Entry	Additive	Equivalent	Yield (%)
1	--	--	94
2	Hg	100	97
3	PMe_3	1.0	94

Reaction conditions: **1a** (0.5 mmol), $(EtO)_3SiH$ (1.25 mmol), $NaBEt_3H$ (20 μmol), MTBE (2 mL), at 80 °C, 6 h. Yields were determined by GC analysis with *p*-xylene as an internal standard.

4.2 Effects of radical scavengers on the reduction reactions



1a **2a**

Entry	Additive	Equivalent	Yield (%)
1	--	--	84
2	9,10-dihydroanthracene	0.5	84
		1.0	86
3	TEMPO	0.5	85
		1.0	83

Reaction conditions: **1a** (0.5 mmol), $(EtO)_3SiH$ (1.25 mmol), $NaBEt_3H$ (20 μmol), MTBE (2 mL), at 80 °C, 6 h. Yields were determined by GC analysis with *p*-xylene as an internal standard.

4.3 The kinetic profiles for the reduction reactions

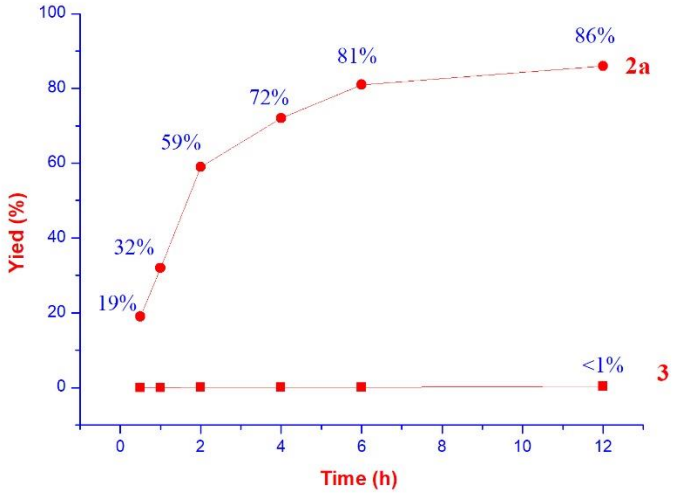


Figure S1. Reaction conditions: **1a** (0.5 mmol), $LiBEt_3H$ (20 μmol), $(EtO)_3SiH$ (1.25 mmol, 2.5 equiv.), MTBE (2 mL), at 80 °C, 0.5-12 h, then 1M HCl/H_2O, rt, 1 h. Yields were determined by GC analysis with *p*-xylene as an internal standard. All points were taken as an average after repeating the experiments in triplicate.

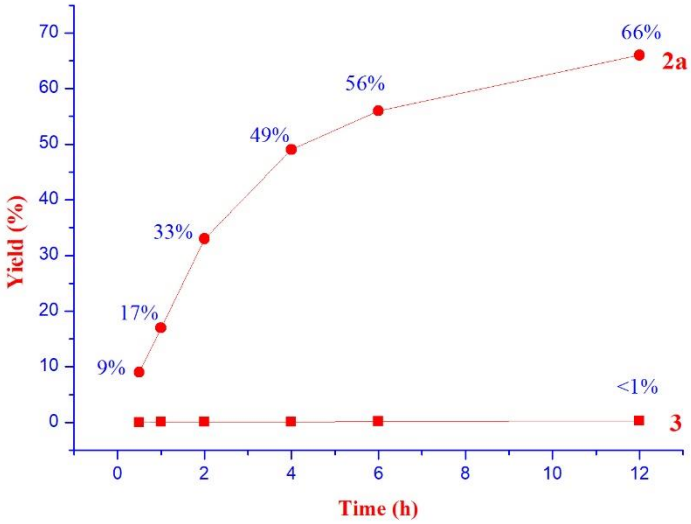


Figure S2. Reaction conditions: **1a** (0.5 mmol), $KBEt_3H$ (20 μmol), $(EtO)_3SiH$ (1.25 mmol, 2.5 equiv.), MTBE (2 mL), at 80 °C, 0.5-12 h, then 1M HCl/H_2O, rt, 1 h. Yields were determined by GC analysis with *p*-xylene as an internal standard. All points were taken as an average after repeating the experiments in triplicate.

4.4 The less likely pathway

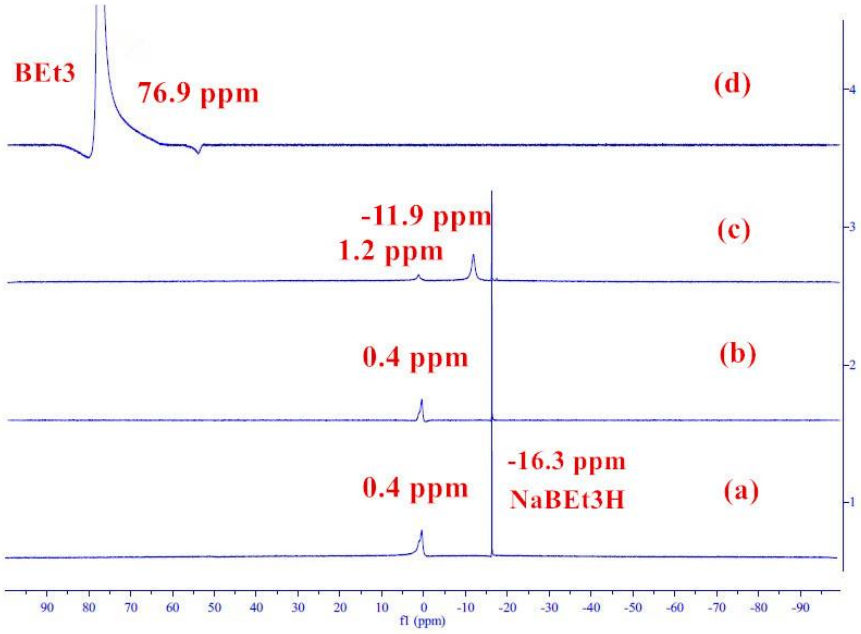
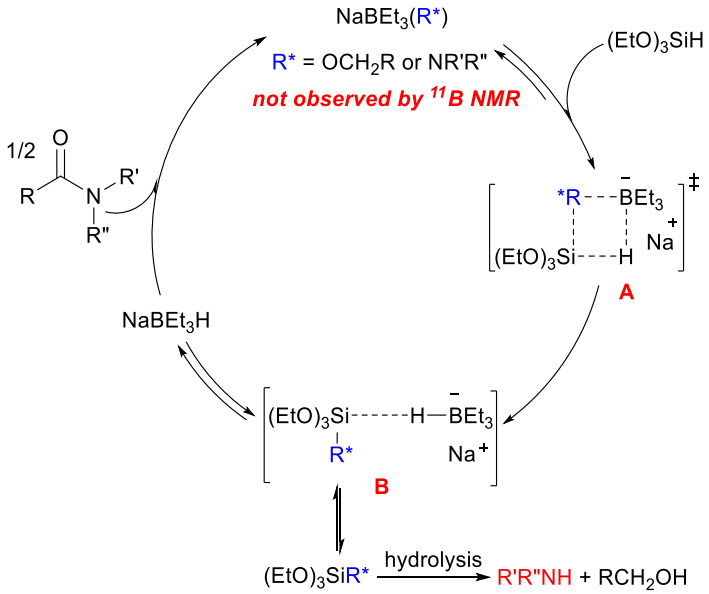


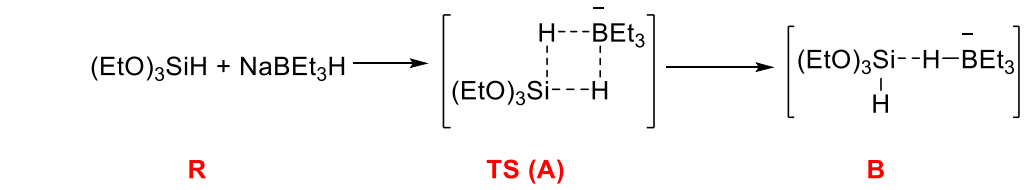
Figure S3. ^{11}B NMR spectra. (a) $NaBEt_3H$ + 1.0 equiv. $Ph_2NC(O)Me$ in MTBE, rt, 1 h. (b) $NaBEt_3H$ + 1.0 equiv. $Ph_2NC(O)Me$ in MTBE, rt, 6 h. (c) $NaBEt_3H$ + 1.0 equiv. Ph_2NH in MTBE, rt, 1 h. (d) BEt3 in MTBE. *Not observed the formation of NaBEt$_3$NPh$_2$ (-11.9 ppm) and NaBEt$_3$OEt (0.15 ppm).*

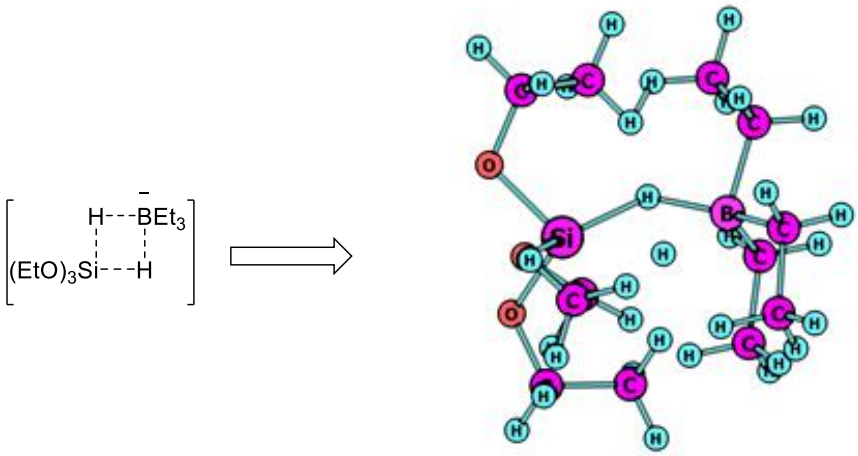


4.5 The energy barrier profile

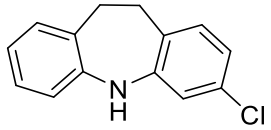
Table S1. Zero-point energies (E_{ZEP}), total electronic energies (E_T), Gibbs free energies (G), and relative energies calculed by DFT/B3LYP/6-31+G*. Gibbs free energies $\triangle G$ and imaginary frequencies v of the transition state offered in the reaction pathway via intramolecular proton transfer in gas phase.

In gas phase	E_{zpe}/Hartree	E_T/Hartree	G/Hartree	$\triangle G$/kJ.mol^{-1}	v/cm^{-1}
R	0.392839	-1010.96106	-1010.568221	0	-
TS(A)	0.391605	-1010.69224	-1010.300635	34.12	1895.6 i
B	0.392142	-1010.79689	-1010.404748	21.96	-

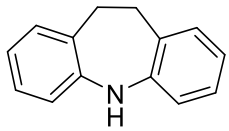




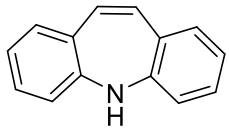
5. NMR spectra data



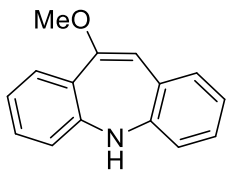
2a. Purification by silica gel column chromatography using petroleum ether/EtOAc gave white solid, 0.1 g, 91%. ^{1}H NMR (400 MHz, $CDCl_3$, 20 ºC) δ 7.11-7.02 (m, 2H), 6.95 (d, *J* = 8.0 Hz, 1H), 6.81 (s, 1H), 6.74 (m, 3H), 3.04 (s, 4H). ^{13}C NMR (101 MHz, $CDCl_3$, 20 ºC) δ 143.5, 141.9, 132.1, 132.0, 130.8, 129.1, 127.1, 127.0, 120.3, 119.3, 118.3, 117.6, 34.8, 34.7. These spectroscopic data correspond to reported data.[2]



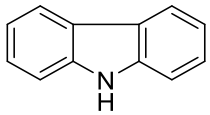
2b. Purification by silica gel column chromatography using petroleum ether/EtOAc gave pale yellow solid, 96 mg, 99%. ^{1}H NMR (400 MHz, $CDCl_3$, 20 ºC) δ 7.12-7.06 (m, 4H), 6.83-6.82 (m, 4H), 3.12 (s, 4H). ^{13}C NMR (101 MHz, $CDCl_3$, 20 ºC) δ 142.5, 130.8, 128.8, 126.9, 119.6, 118.1, 35.0. These spectroscopic data correspond to reported data.[2]



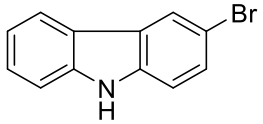
2f. Purification by silica gel column chromatography using petroleum ether/EtOAc gave pale yellow solid, 95 mg, 99%. ^{1}H NMR (400 MHz, $CDCl_3$, 20 ºC) δ 7.07 (t, *J* = 8.0, 2H), 6.94-6.90 (m, 4H), 6.73 (d, *J* = 8.0 Hz, 2H), 6.42 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$, 20 ºC) δ 148.5, 132.3, 130.6, 129.9, 129.6, 123.2, 119.5. These spectroscopic data correspond to reported data.[3]



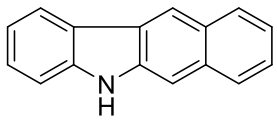
2g. Purification by silica gel column chromatography using petroleum ether/EtOAc gave pale yellow solid, 66 mg, 59%. ^{1}H NMR (400 MHz, $CDCl_3$, 20 ºC) δ 7.50-7.47 (m, 1H), 7.21-7.17 (m, 1H), 7.06-6.99 (m, 3H), 6.97-6.92 (m, 1H), 6.68 (t, *J* = 10 Hz, 2H), 5.88 (s, 1H), 5.17 (s, 1H), 3.87 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$, 20 ºC) δ 156.2, 149.2, 146.6, 130.4, 129.6, 128.7, 128.3, 127.6, 127.3, 123.6, 123.1, 119.8, 119.4, 103.4, 55.5. These spectroscopic data correspond to reported data.[4]



2h. Purification by silica gel column chromatography using petroleum ether/EtOAc gave white solid, 54 mg, 65%. ^{1}H NMR (400 MHz, DMSO-d_6, 20 ºC) δ 11.26 (s, 1H), 8.11 (d, *J* = 8.0 Hz, 2H), 7.49 (d, *J* = 8.0 Hz, 2H), 7.39 (t, *J* = 6.0 Hz, 2H), 7.16 (t, *J* = 8.0 Hz, 2H). ^{13}C NMR (101 MHz, DMSO-d_6, 20 ºC) δ 139.7, 125.5, 122.4, 120.2, 118.5, 110.9.These spectroscopic data correspond to reported data.[2]

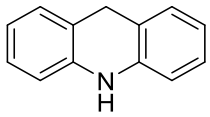


2i. Purification by silica gel column chromatography using petroleum ether/EtOAc gave white solid, 69 mg, 56%. ^{1}H NMR (400 MHz, DMSO-d_6, 20 ºC) δ 11.45 (s, 1H), 8.36 (s, 1H), 8.16 (d, *J* = 8.0 Hz, 1H), 7.52-7.49 (m, 2H), 7.47 (t, *J* = 8.0 Hz, 1H), 7.42(t, *J* = 8.0 Hz, 1H), 7.17 (t, *J* = 8.0 Hz, 1H). ^{13}C NMR (101 MHz, DMSO-d_6, 20 ºC) δ 140.1, 138.4, 127.9, 126.3, 124.4, 122.8, 121.5, 120.7, 118.9, 112.9, 111.2, 110.6. These spectroscopic data correspond to reported data.[5]

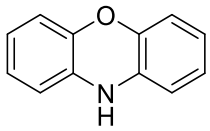


2j. Purification by silica gel column chromatography using petroleum ether/EtOAc gave pale yellow solid, 66 mg, 61%. ^{1}H NMR (400 MHz, DMSO-d_6, 20 ºC) δ 11.22 (s, 1H), 8.68 (s, 1H), 8.25 (d, *J* = 8.0 Hz, 1H), 8.05 (d, *J* = 8.0 Hz, 1H), 8.00 (d, *J* = 8.0 Hz, 1H), 7.86 (s, 1H), 7.50-7.43 (m, 3H), 7.36 (t, *J* = 8.0 Hz, 1H), 7.21-7.17 (m, 1H). ^{13}C

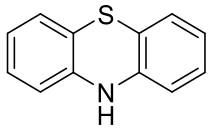
NMR (101 MHz, DMSO-d_6, 20 ºC) δ 142.5, 139.6, 132.2, 128.3, 127.5, 127.3, 126.9, 125.1, 124.8, 122.2, 121.0, 118.6, 118.3, 110.5, 105.1. These spectroscopic data correspond to reported data.[6]



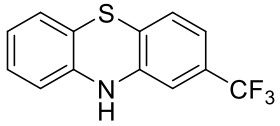
2k. Purification by silica gel column chromatography using petroleum ether/EtOAc gave white solid, 61 mg, 67%. ^{1}H NMR (400 MHz, $CDCl_3$, 20 ºC) δ 7.09-7.04 (m, 4H), 6.84 (t, J = 8.0 Hz, 2H), 6.66 (d, J = 8.0 Hz, 2H), 4.04 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$, 20 ºC) δ 140.2, 128.7, 127.1, 120.7, 120.1, 113.6, 31.5. These spectroscopic data correspond to reported data.[7]



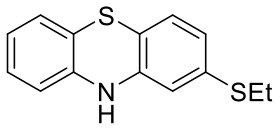
2l. Purification by silica gel column chromatography using petroleum ether/EtOAc gave white solid, 63 mg, 69%. ^{1}H NMR (400 MHz, DMSO-d_6, 20 ºC) δ 8.17 (s, 1H), 6.73-6.69 (m, 2H), 6.60-6.53 (m, 4H), 6.45-6.43 (m, 2H). ^{13}C NMR (101 MHz, DMSO-d_6, 20 ºC) δ 142.8, 132.4, 123.9, 120.3, 115.1, 113.3. These spectroscopic data correspond to reported data.[8]



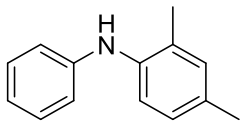
2m. Purification by silica gel column chromatography using petroleum ether/EtOAc gave pale yellow solid, 77 mg, 77%. ^{1}H NMR (400 MHz, DMSO-d_6, 20 ºC) δ 8.59 (s, 1H), 6.98 (t, J = 8.0 Hz, 2H), 6.90 (d, J = 4.0 Hz, 2H), 6.74 (t, J = 6.0 Hz, 2H), 6.69 (d, J = 8.0 Hz, 2H). ^{13}C NMR (101 MHz, DMSO-d_6, 20 ºC) δ 142.1, 127.5, 126.2, 121.8, 116.3, 114.4. These spectroscopic data correspond to reported data.[9]



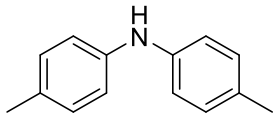
2n. Purification by silica gel column chromatography using petroleum ether/EtOAc gave pale yellow solid, 80 mg, 60%. ^{1}H NMR (400 MHz, DMSO-d_6, 20 ºC) δ 8.88 (s, 1H), 7.09 (d, J = 8.0 Hz, 1H), 7.03-6.99 (m, 2H), 6.93-6.91 (m, 2H), 6.79 (t, J = 8.0 Hz, 1H), 6.65 (d, J = 8.0 Hz, 1H). ^{13}C NMR (101 MHz, DMSO-d_6, 20 ºC) δ 142.7, 140.9, 128.1, 126.9, 126.4, 125.4, 122.7, 122.6, 122.0, 118.0, 115.3, 114.7, 110.1. These spectroscopic data correspond to reported data.[9]



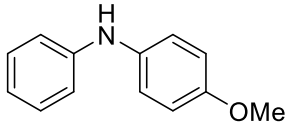
2o. Purification by silica gel column chromatography using petroleum ether/EtOAc gave pale yellow solid, 63 mg, 49%. ^{1}H NMR (400 MHz, DMSO-d_6, 20 ºC) δ 8.61 (s, 1H), 6.99 (t, J = 8.0 Hz, 1H), 6.91 (d, J = 8.0 Hz, 1H), 6.84 (d, J = 8.0 Hz, 1H), 6.75 (t, J = 8.0 Hz, 1H), 6.70-6.64 (m, 3H), 2.89 (q, J = 16.0 Hz, J = 8.0 Hz, 2H), 1.22 (t, J = 8.0 Hz, 3H). ^{13}C NMR (101 MHz, DMSO-d_6, 20 ºC) δ 142.6, 141.7, 135.3, 127.6, 126.6, 126.3, 121.9, 121.3, 116.4, 114.5, 113.7, 113.6, 26.3, 14.3. These spectroscopic data correspond to reported data.[9]



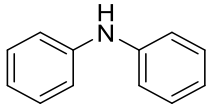
2p. Purification by silica gel column chromatography using petroleum ether/EtOAc gave white solid, 87 mg, 88%. ^{1}H NMR (400 MHz, $CDCl_3$, 20 ºC) δ 7.21 (t, J = 8.0 Hz, 2H), 7.13 (d, J = 8.0 Hz, 1H), 7.03 (s, 1H), 6.96 (d, J = 8.0 Hz, 1H), 6.86-6.82 (m, 3H), 5.28 (s, 1H), 2.30 (s, 3H), 2.21 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$, 20 ºC) δ 145.1, 138.4, 132.4, 131.8, 129.9, 129.4, 127.4, 120.9, 119.8, 116.4, 20.9, 18.0. These spectroscopic data correspond to reported data.[2]



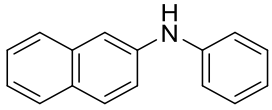
2q. Purification by silica gel column chromatography using petroleum ether/EtOAc gave white solid, 69 mg, 70%. ^{1}H NMR (400 MHz, $CDCl_3$, 20 ºC) δ) δ 7.09 (d, *J* = 8.0 Hz, 4H), 6.97 (d, *J* = 8.0 Hz, 4H), 5.53 (s, 1H), 2.32 (s, 6H). ^{13}C NMR (101 MHz, $CDCl_3$, 20 ºC) δ 141.2, 130.3, 129.9, 118.0, 20.8. These spectroscopic data correspond to reported data.[2]



2r. Purification by silica gel column chromatography using petroleum ether/EtOAc gave white solid, 74 mg, 74%. ^{1}H NMR (400 MHz, $CDCl_3$, 20 ºC) δ 7.20 (t, *J* = 8.0 Hz,, 2H), 7.06 (d, *J* = 8.0 Hz, 2H), 6.91-6.80 (m, 5H), 5.48 (s, 1H), 3.78 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$, 20 ºC) δ 155.4, 145.3, 135.8, 129.4, 122.3, 119.7, 115.7, 114.8, 55.7. These spectroscopic data correspond to reported data.[2]

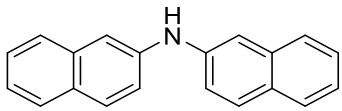


2s. Purification by silica gel column chromatography using petroleum ether/EtOAc gave white solid, 70 mg, 83%. ^{1}H NMR (400 MHz, $CDCl_3$, 20 ºC) δ 7.30-7.23 (m, 4H), 7.15-7.08 (m, 4H), 6.95 (t, *J* = 7.3 Hz, 2H). ^{13}C NMR (101 MHz, $CDCl_3$, 20 ºC) δ 143.2, 129.5, 121.1, 117.9. These spectroscopic data correspond to reported data.[2]

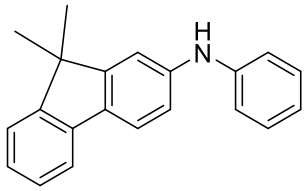


2w. Purification by silica gel column chromatography using petroleum ether/EtOAc gave white solid, 98 mg, 89%. ^{1}H NMR (400 MHz, $CDCl_3$, 20 ºC) δ 7.75 (d, 4.0 Hz, 2H), 7.67 (d, *J* = 8.0 Hz, 1H), 7.62 (s, 1H), 7.46-7.38 (m, 2H), 7.33 (m, 6H), 7.07 (t, *J* = 6.0 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$, 20 ºC) δ 142.5, 140.4, 134.6, 129.6, 129.5,

129.4, 127.8, 126.7, 126.6, 123.9, 122.1, 120.2, 118.8, 112.5. These spectroscopic data correspond to reported data.[2]



2x. Purification by silica gel column chromatography using petroleum ether/EtOAc gave white solid, 101 mg, 75%. ^{1}H NMR (400 MHz, $CDCl_3$, 20 ºC) δ 7.78 (t, *J* = 8.0 Hz, 2H), 7.68 (d, *J* = 8.0 Hz, 1H), 7.54 (s, 1H), 7.43 (t, *J* = 8.0 Hz, 1H), 7.33 (t, *J* = 8.0 Hz, 2H). ^{13}C NMR (101 MHz, $CDCl_3$, 20 ºC) δ 139.9, 134.5, 130.0, 129.6, 127.8, 126.9,126.7, 124.3, 120.5, 113.7. These spectroscopic data correspond to reported data.[10]



2y. Purification by silica gel column chromatography using petroleum ether/EtOAc gave white solid, 125 mg, 88%. ^{1}H NMR (400 MHz, $CDCl_3$, 20 ºC) δ 7.62 (d, *J* = 8.0 Hz, 2H), 7.41 (d, *J* = 8.0 Hz, 1H), 7.32 (dd, *J* = 12.0, *J* = 3.0 Hz, 3H), 7.13 (s, 3H), 6.96 (s, 1H), 1.48 (s, 6H). ^{13}C NMR (101 MHz, $CDCl_3$, 20 ºC) δ 155.4, 153.2, 139.4, 129.5, 127.1, 126.2, 122.5, 121.0, 119.2, 117.8, 112.5, 46.9, 27.4. These spectroscopic data correspond to reported data.[11]

6. References

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7. NMR spectra

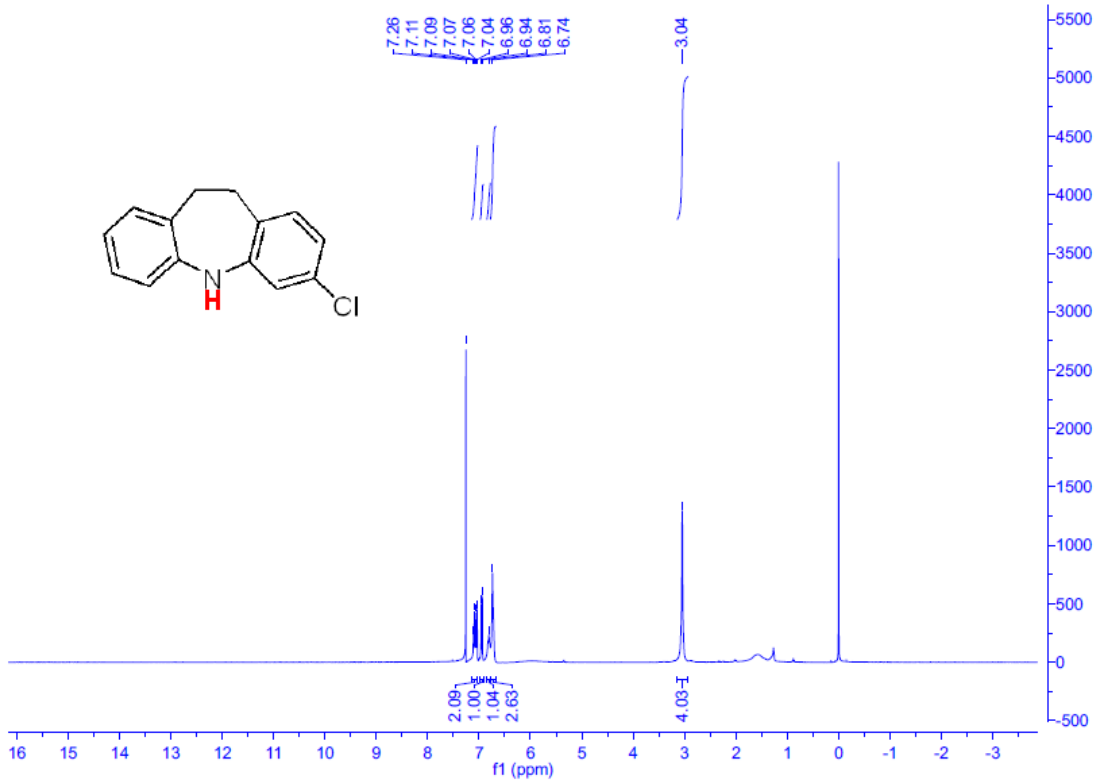

Figure S4. ^{1}H NMR (400 MHz, $CDCl_3$, 20 ºC) of **2a**

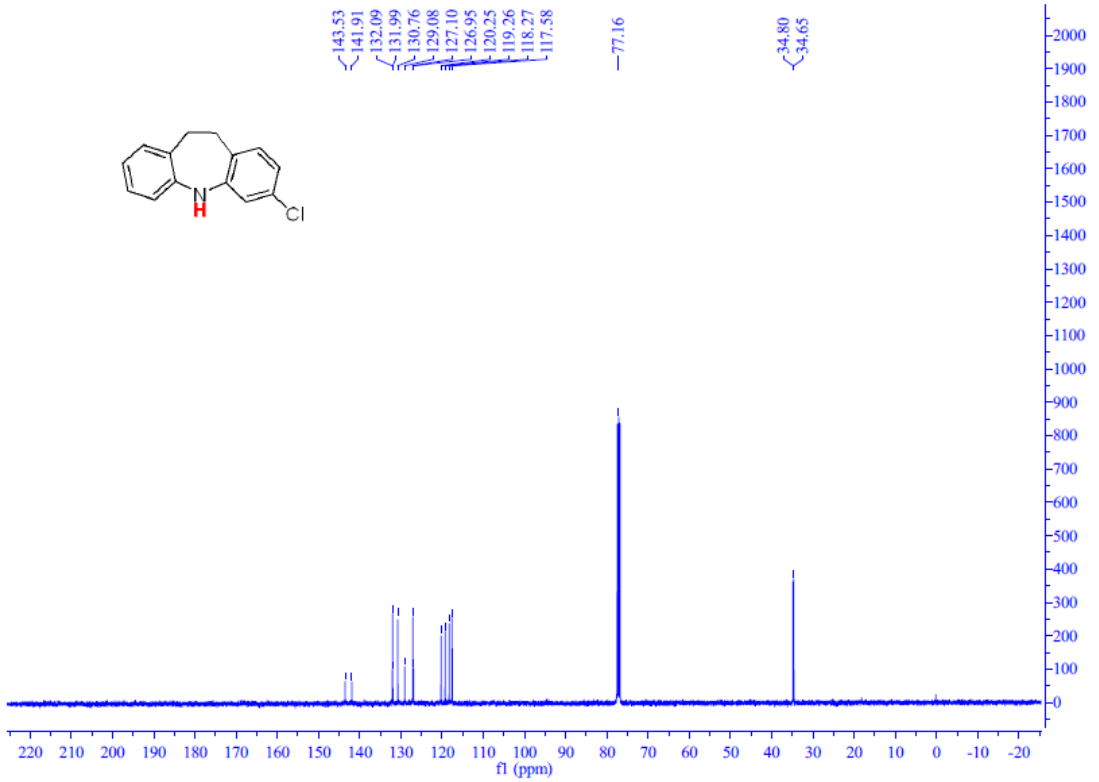

Figure S5. ^{13}C NMR (MHz, $CDCl_3$, 20 ºC) of **2a**

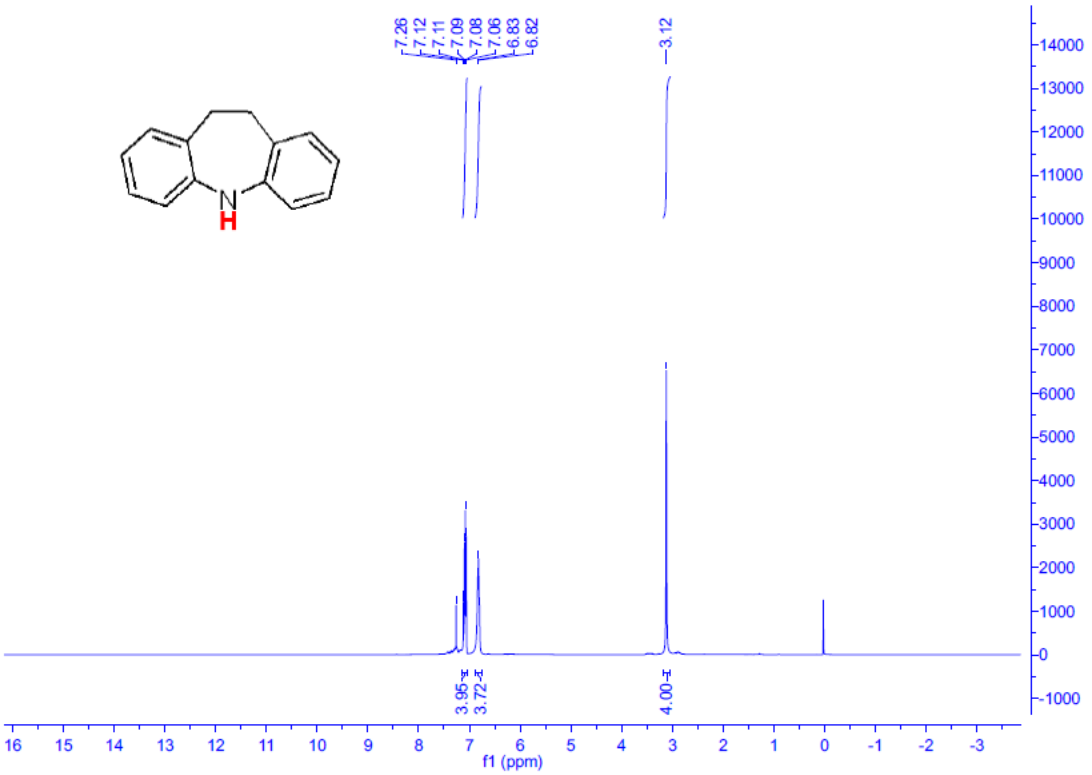

Figure S6. ^{1}H NMR (400 MHz, $CDCl_3$, 20 °C) of **2b**

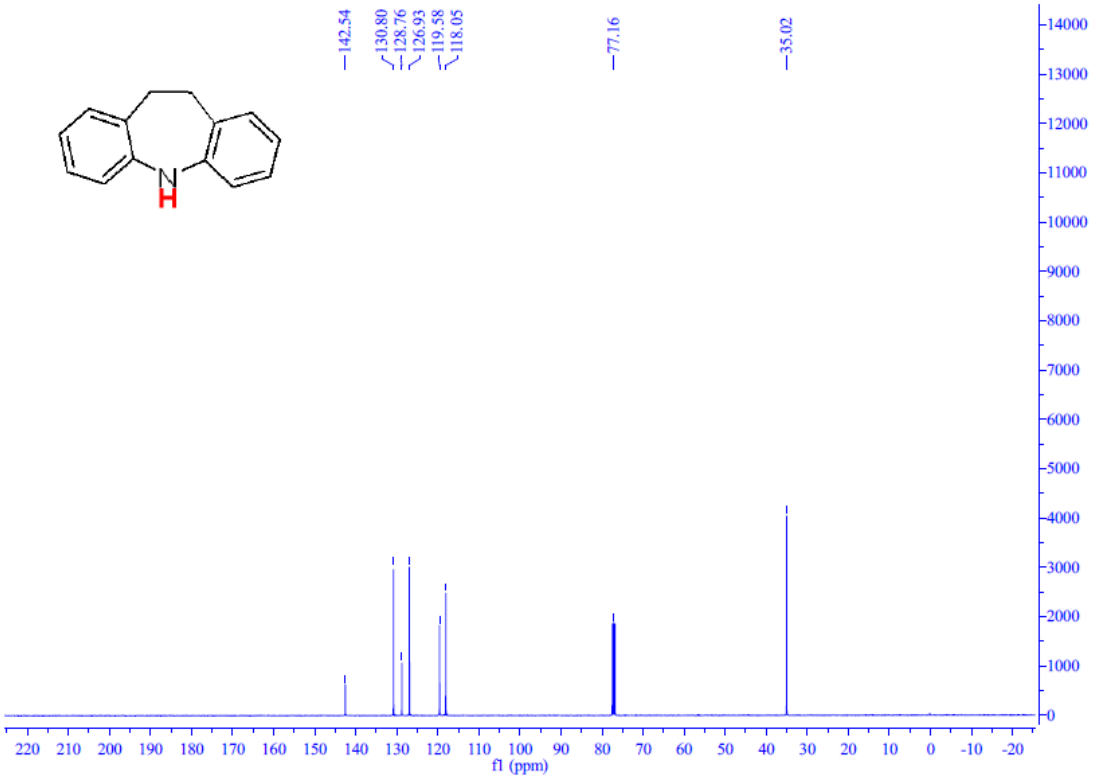

Figure S7. ^{13}C NMR (101 MHz, $CDCl_3$, 20 °C) of **2b**

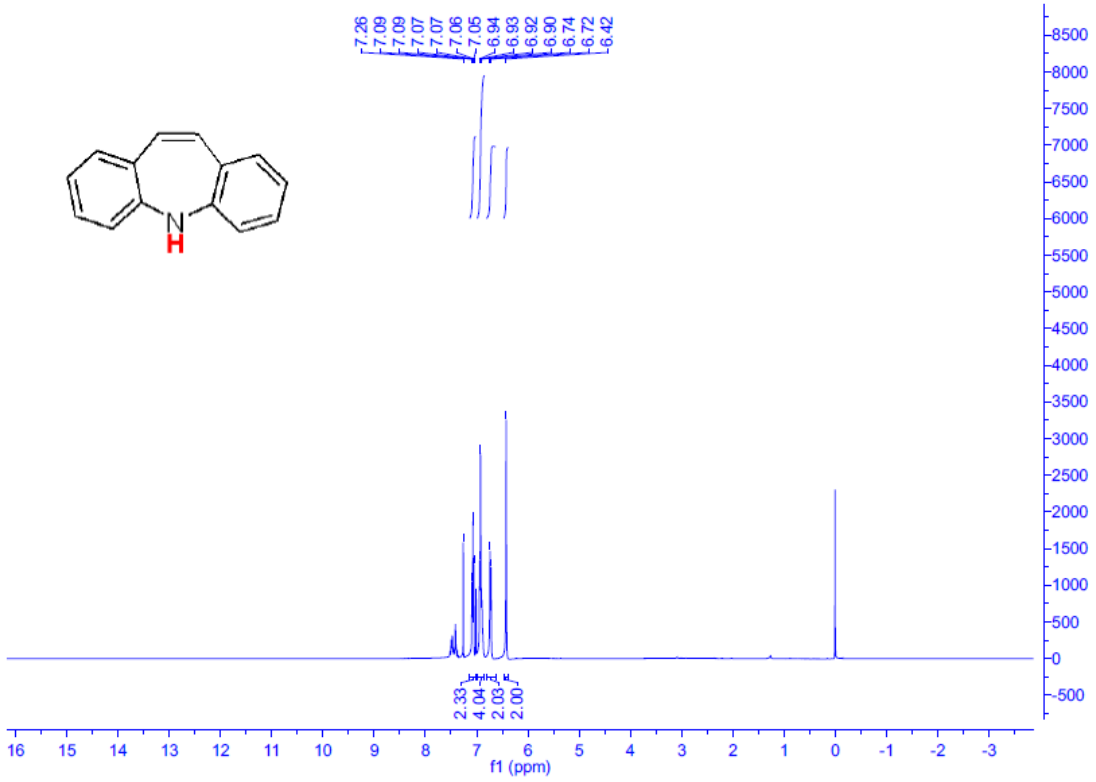

Figure S8. ^{1}H NMR (400 MHz, $CDCl_3$, 20 °C) of **2f**

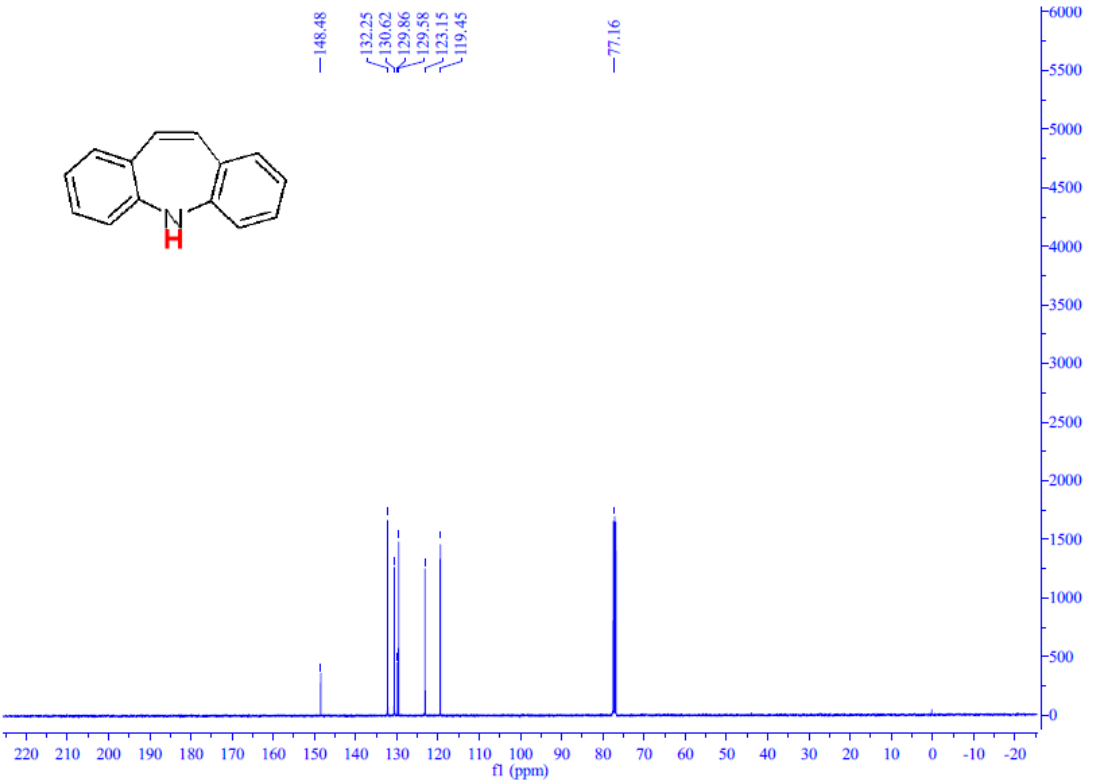

Figure S9. ^{13}C NMR (101 MHz, $CDCl_3$, 20 °C) of **2f**

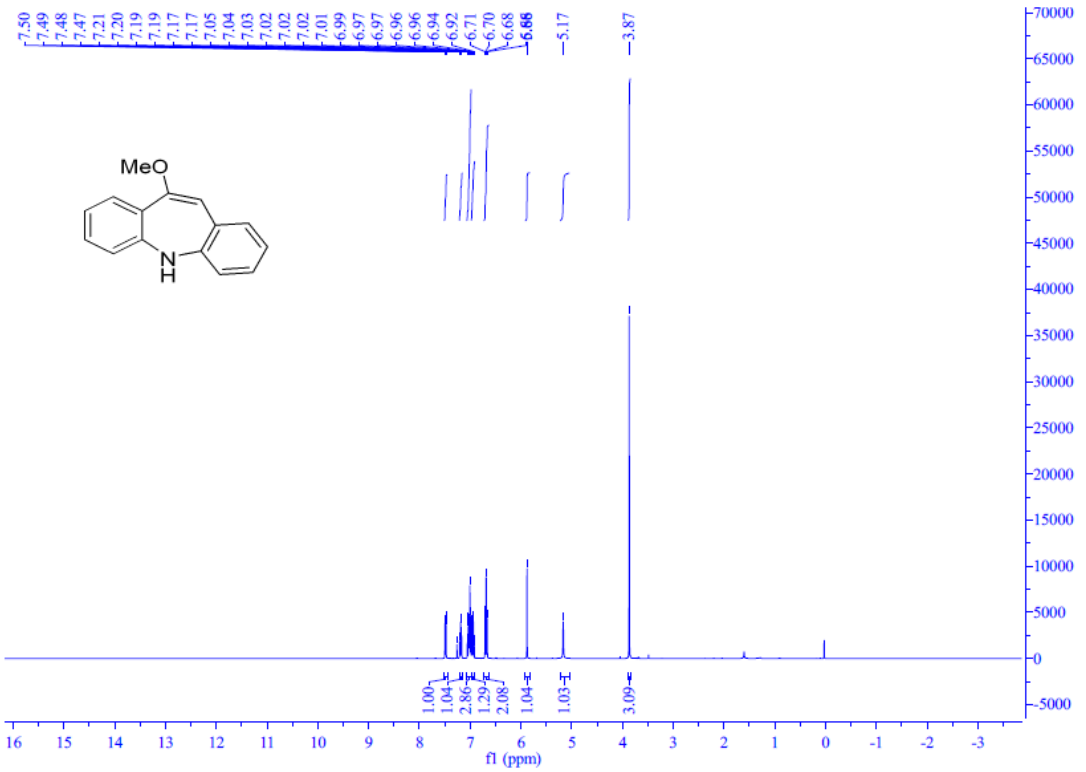

Figure S10. ^{1}H NMR (400 MHz, $CDCl_3$, 20 °C) of **2g**

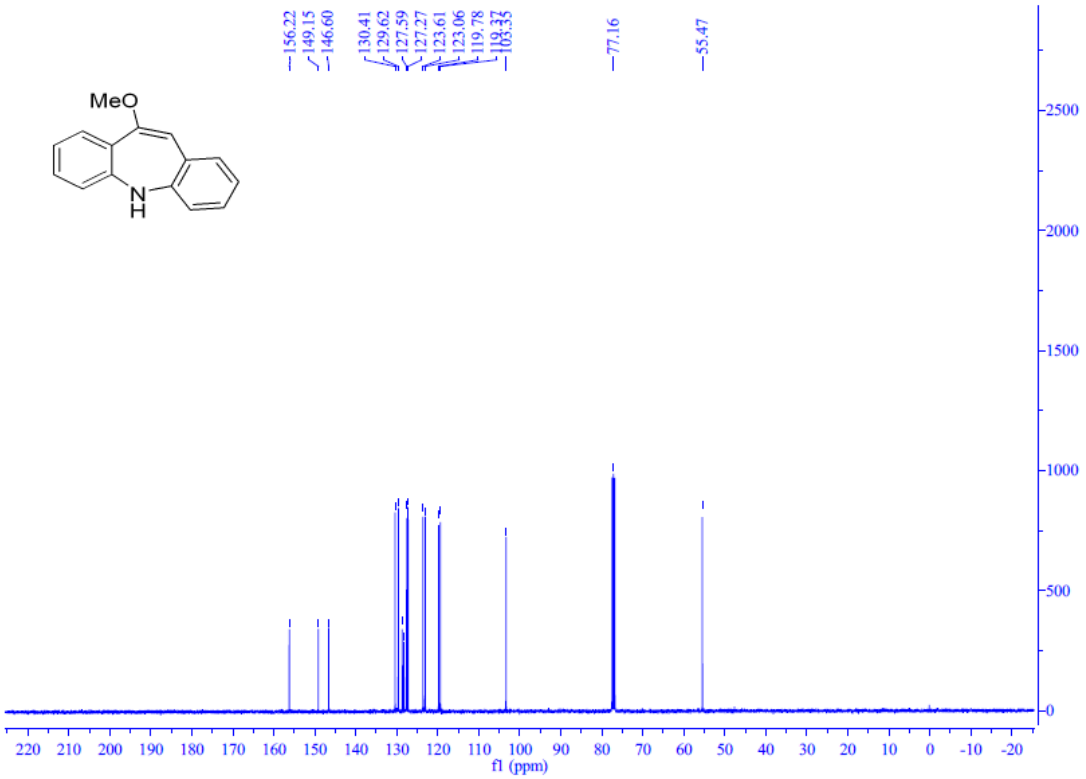

Figure S11. ^{13}C NMR (101 MHz, $CDCl_3$, 20 °C) of **2g**

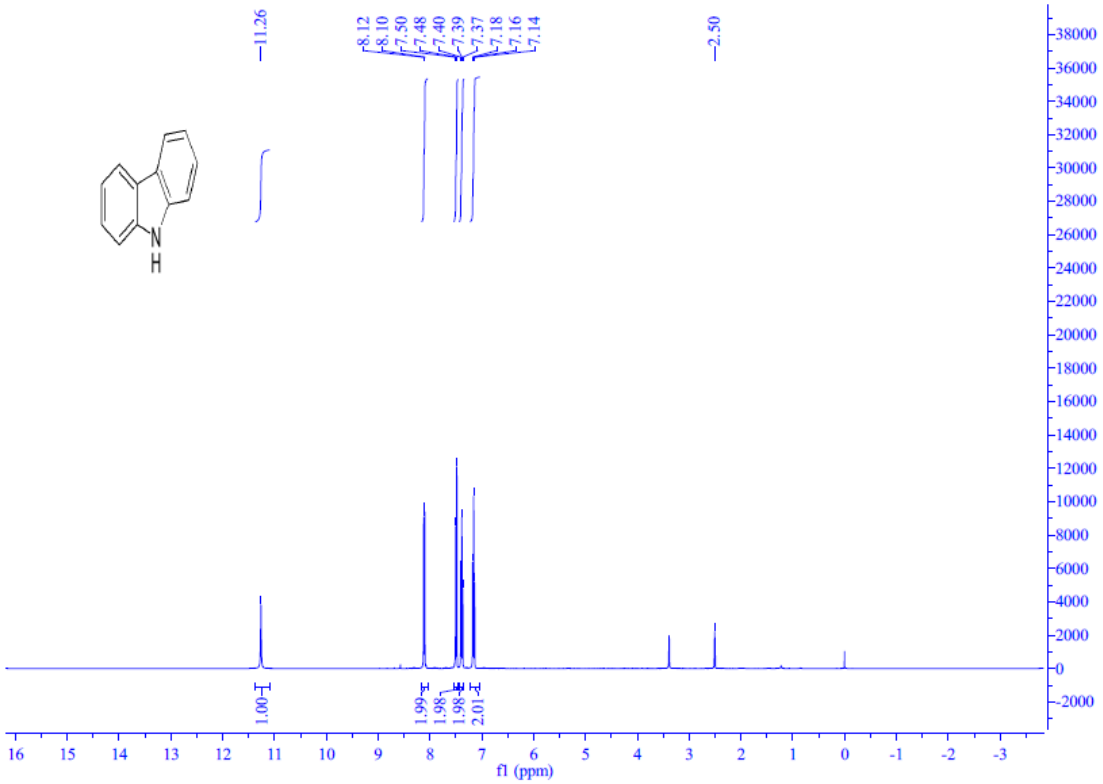

Figure S12. ^{1}H NMR (400 MHz, DMSO-d_6, 20 °C) of **2h**

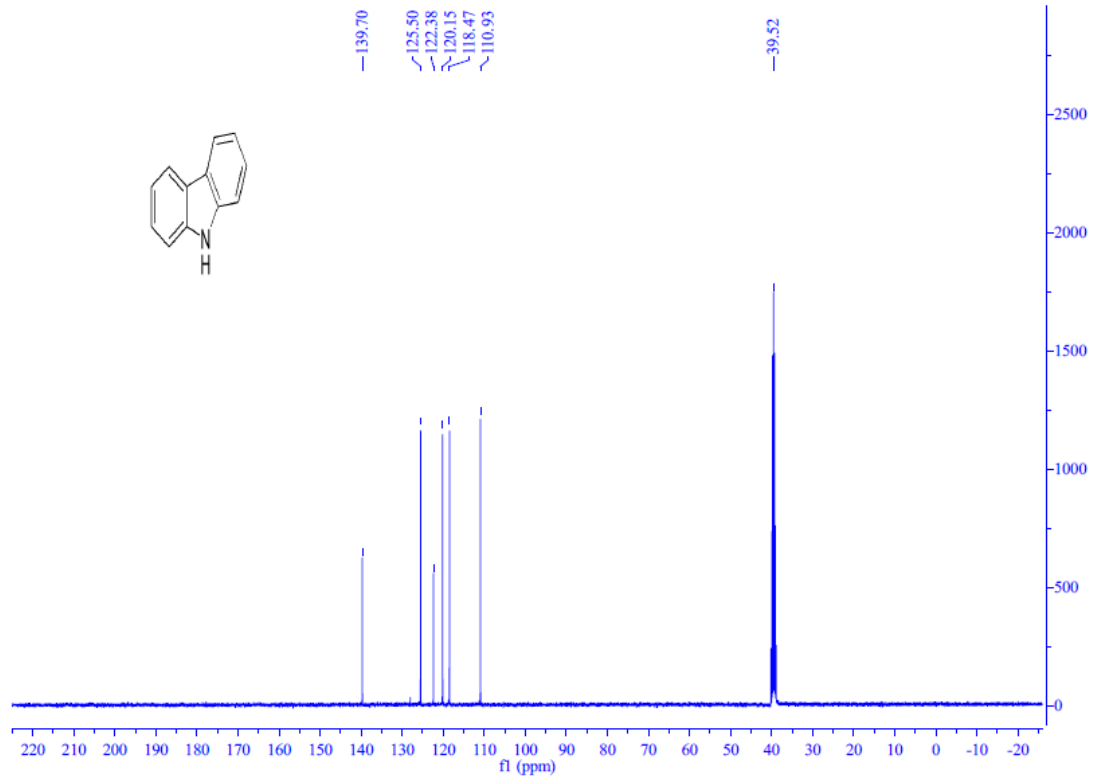

Figure S13. ^{13}C NMR (101 MHz, DMSO-d_6, 20 °C) of **2h**

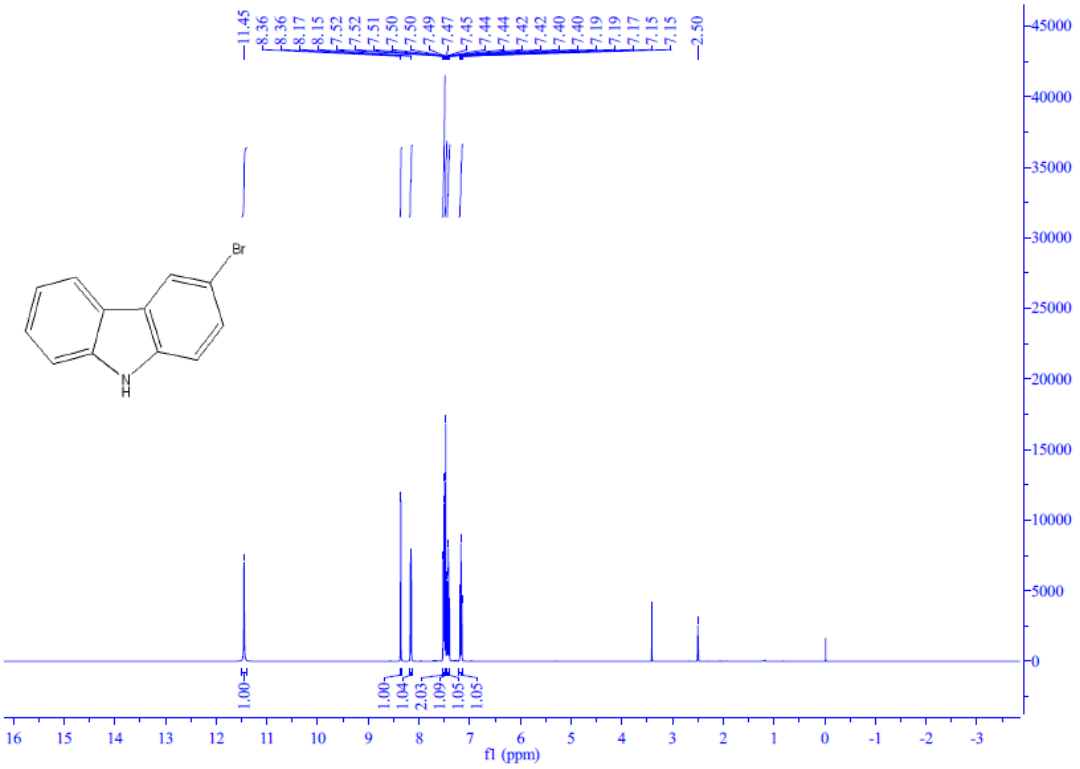

Figure S14. ^{1}H NMR (400 MHz, DMSO-d_6, 20 °C) of **2i**

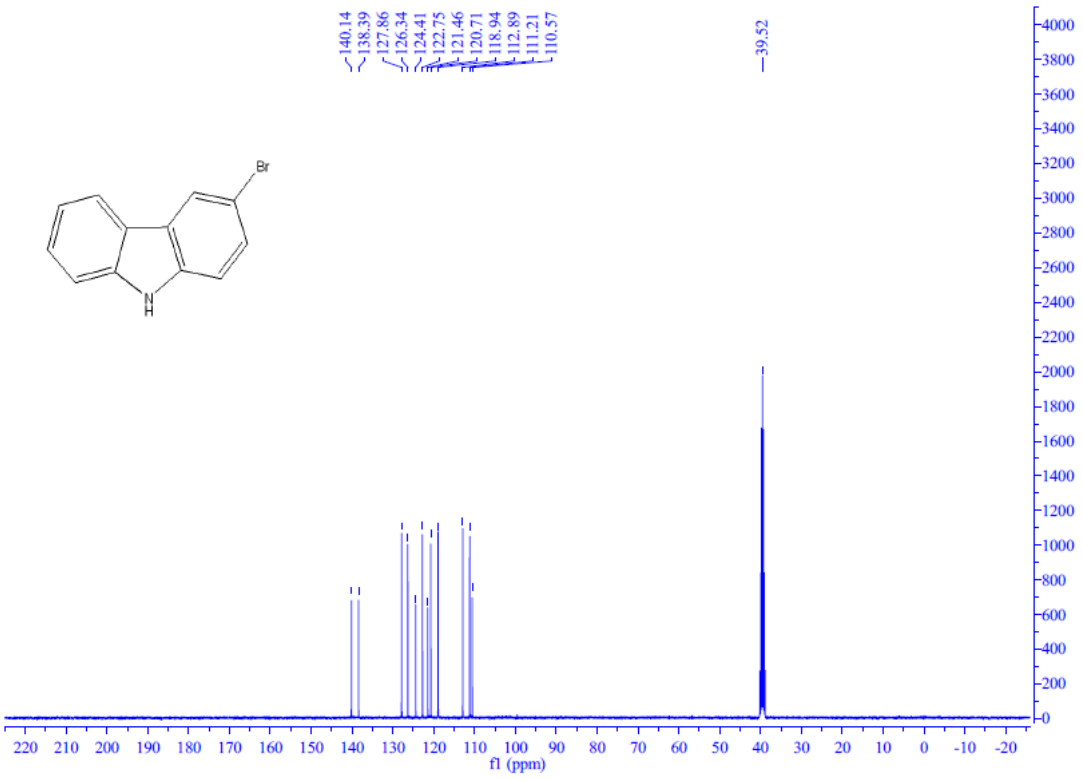

Figure S15. ^{13}C NMR (101 MHz, DMSO-d_6, 20 °C) of **2i**

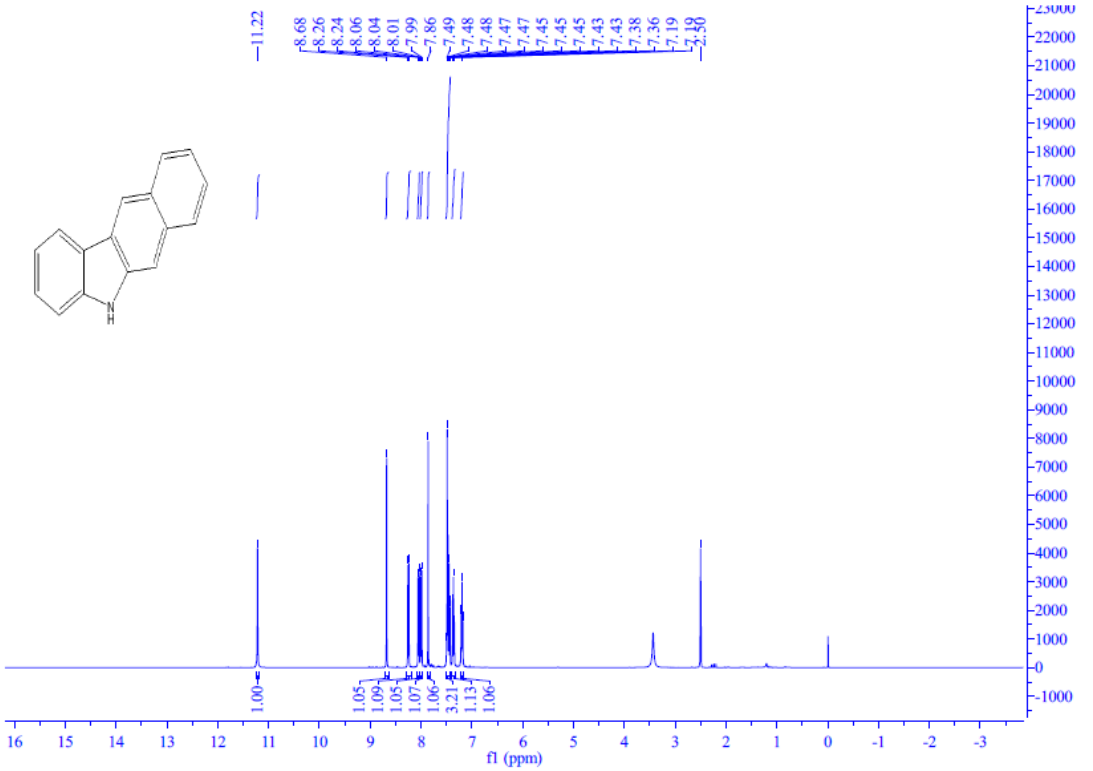

Figure S16. ^{1}H NMR (400 MHz, DMSO-d_6, 20 °C) of **2j**

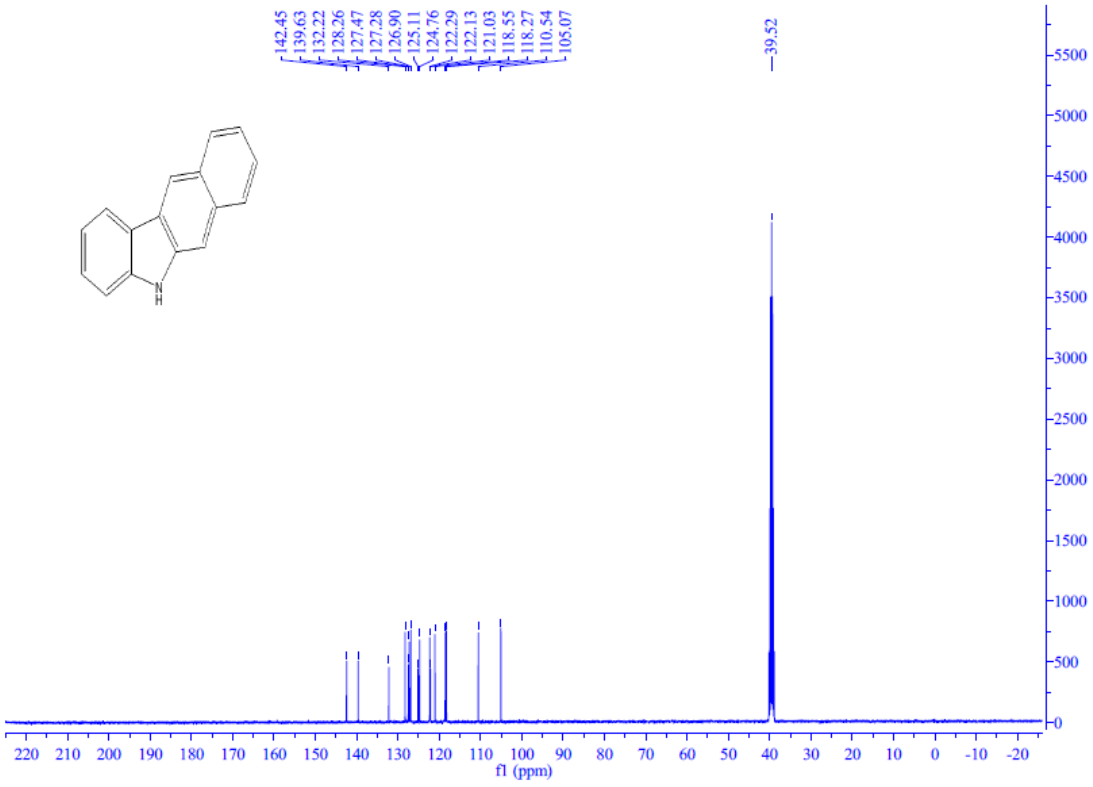

Figure S17. ^{13}C NMR (101 MHz, DMSO-d_6, 20 °C) of **2j**

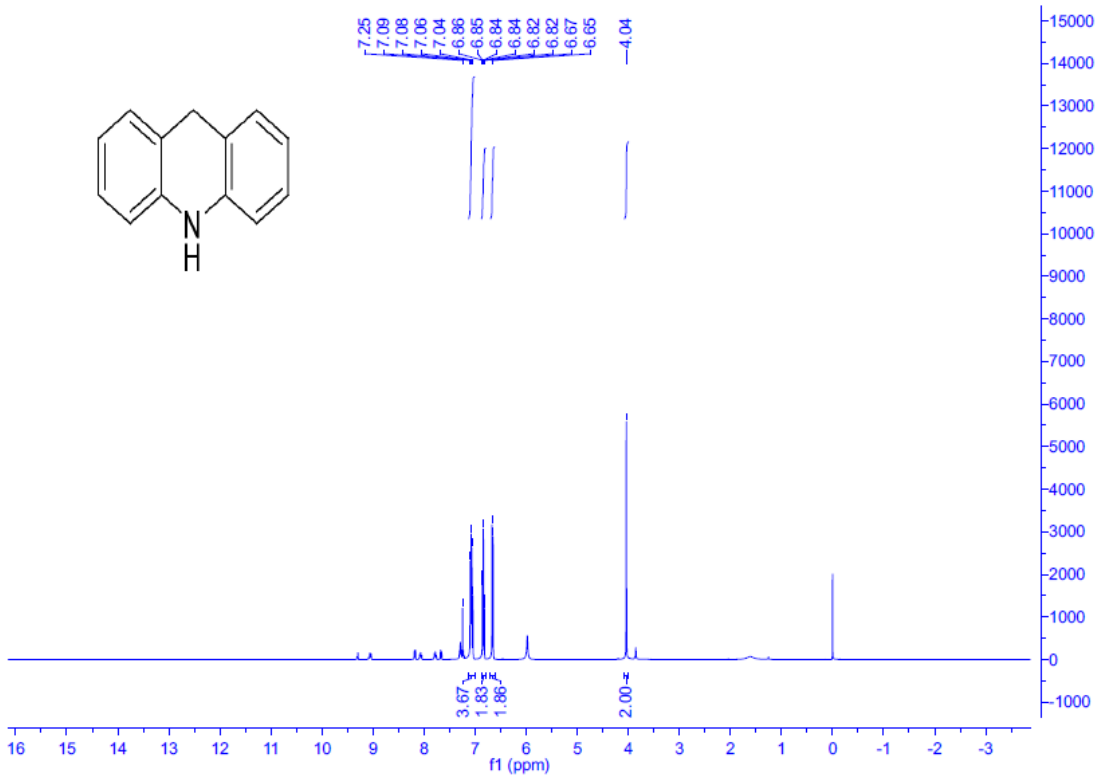

Figure S18. ^{1}H NMR (400 MHz, $CDCl_3$, 20 °C) of **2k**

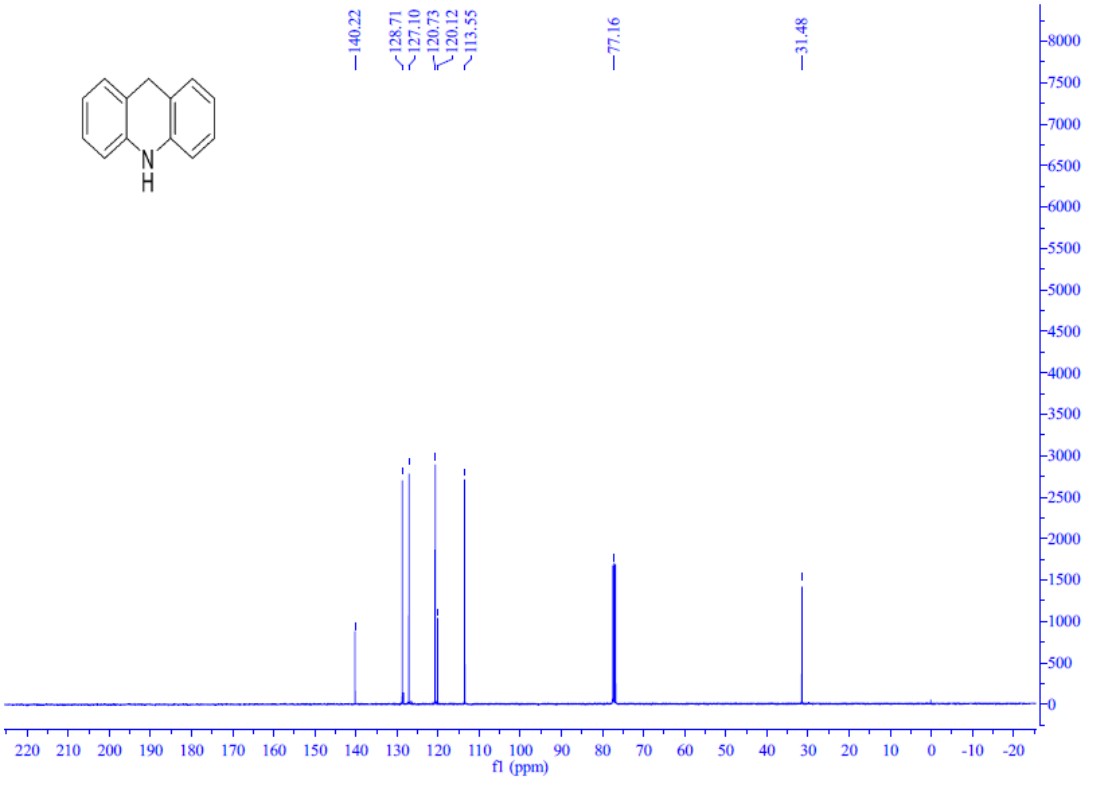

Figure S19. ^{13}C NMR (101 MHz, $CDCl_3$, 20 °C) of **2k**

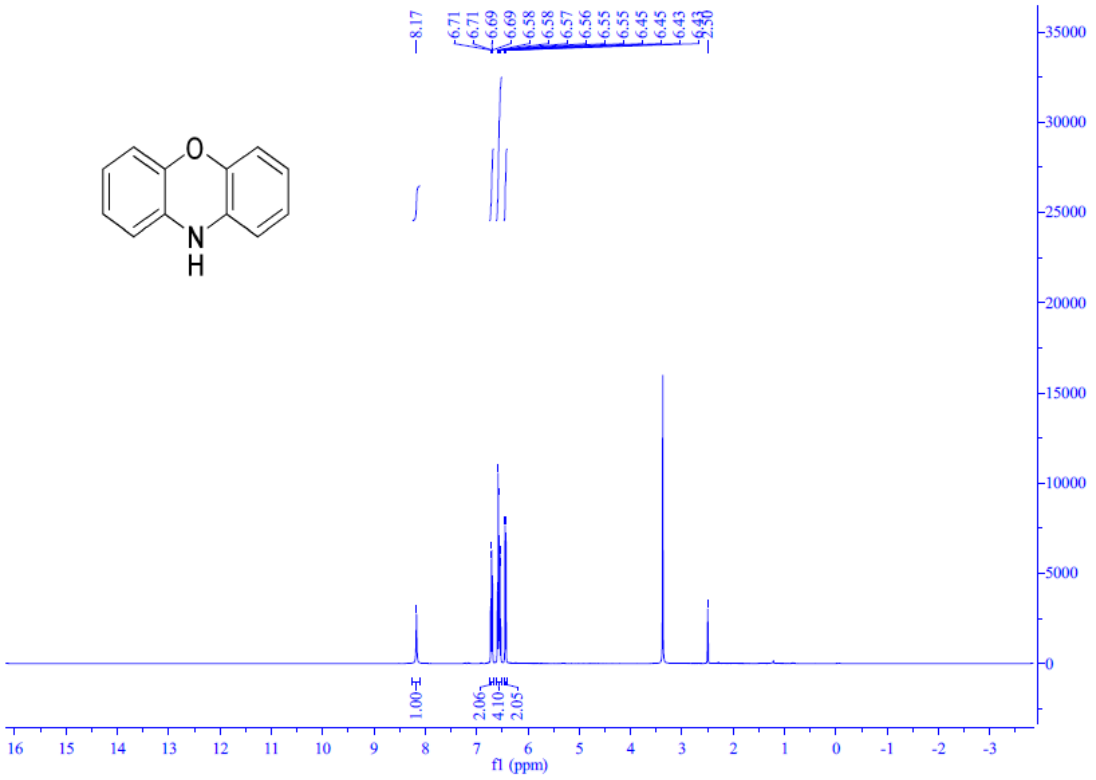

Figure S20. ^{1}H NMR (400 MHz, DMSO-d_6, 20 °C) of **2l**

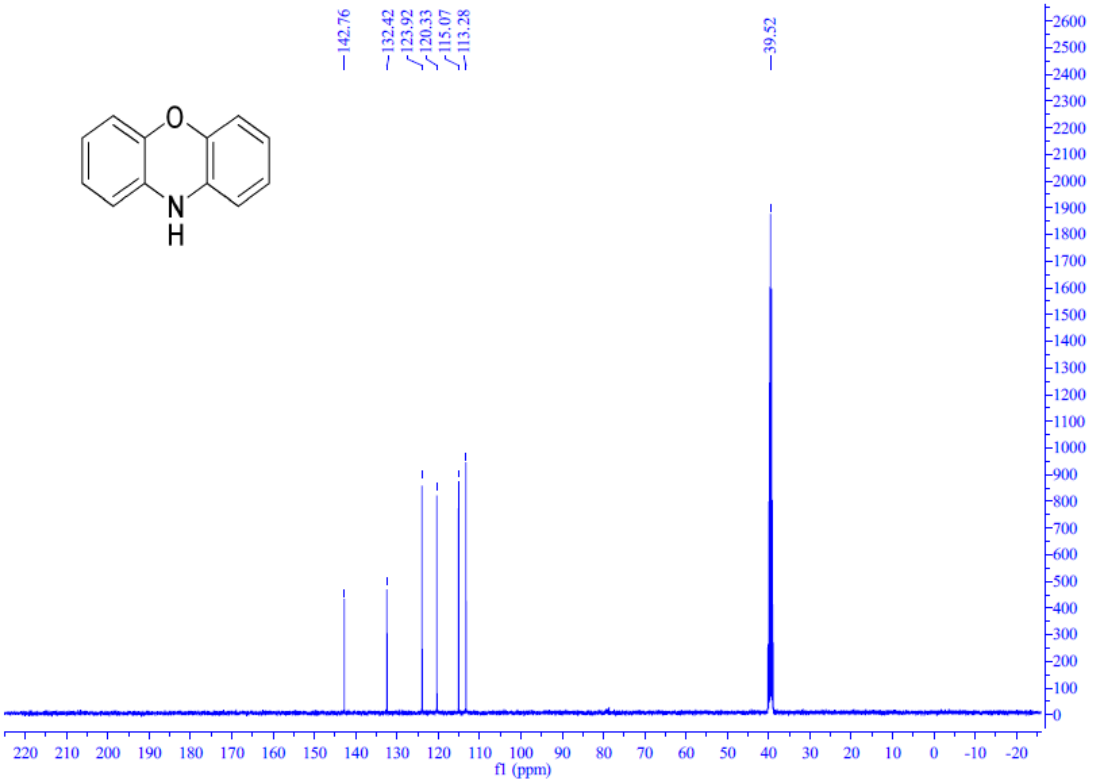

Figure S21. ^{13}C NMR (101 MHz, DMSO-d_6, 20 °C) of **2l**

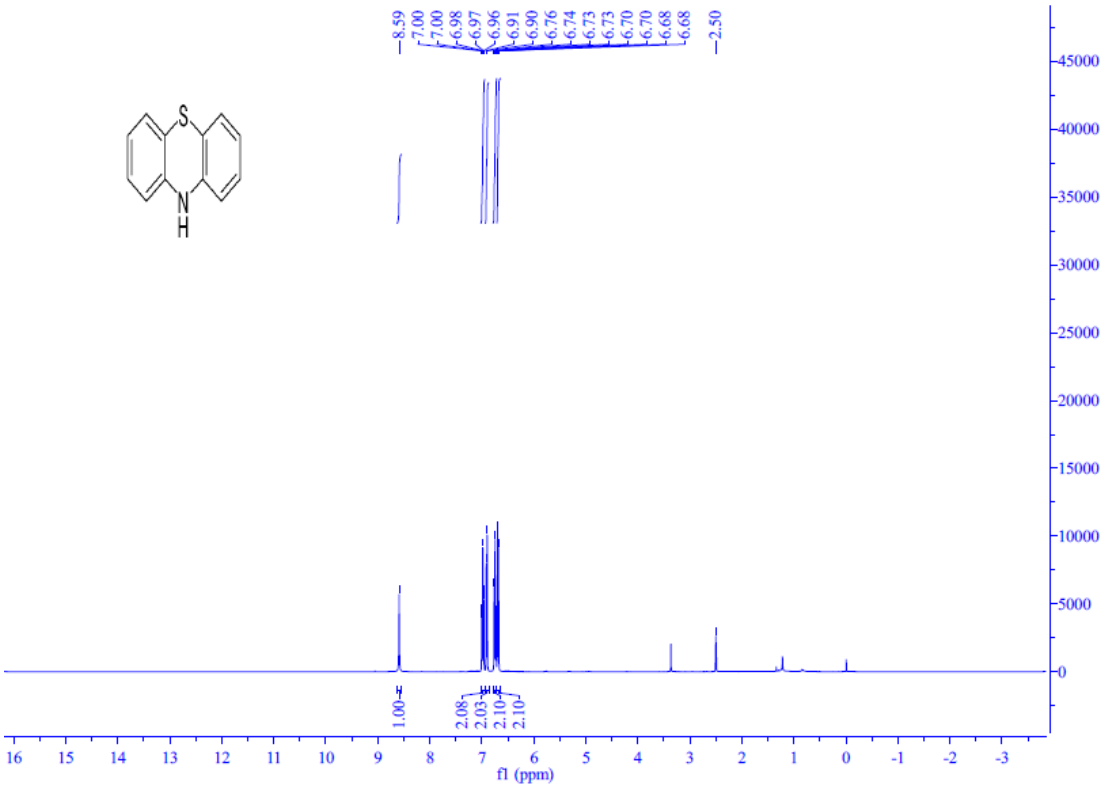

Figure S22. ^{1}H NMR (400 MHz, DMSO-d_6, 20 °C) of **2m**

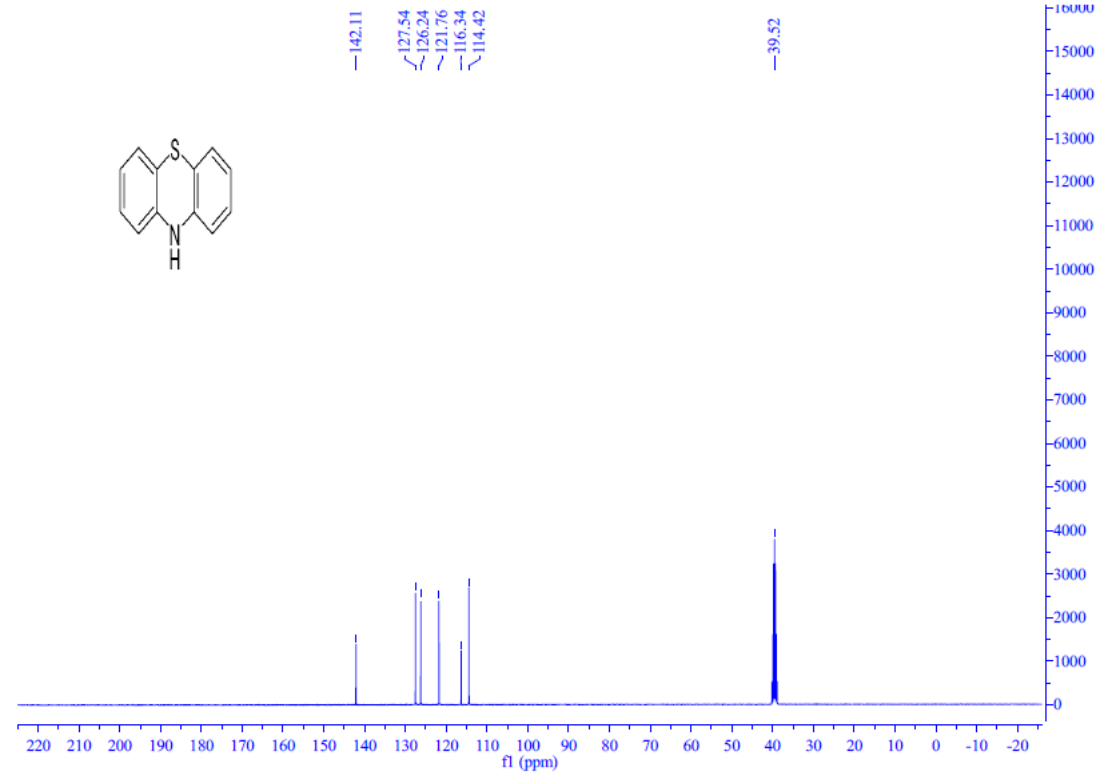

Figure S23. ^{13}C NMR (101 MHz, DMSO-d_6, 20 °C) of **2m**

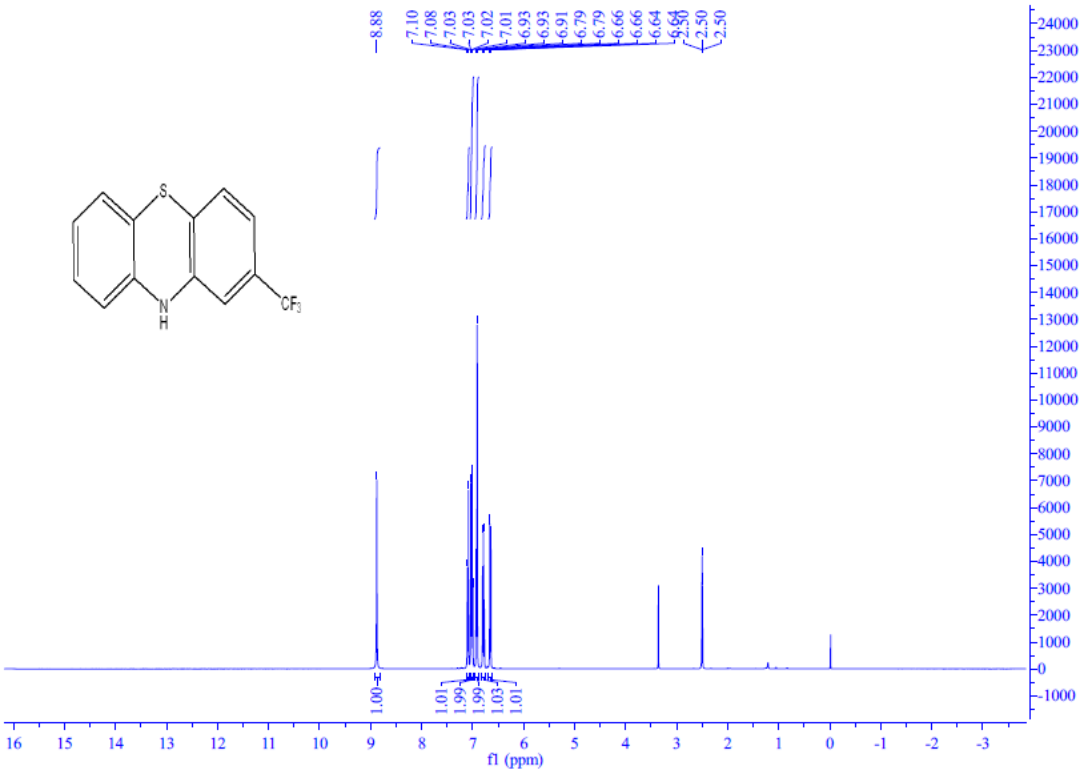

Figure S24. ^{1}H NMR (400 MHz, DMSO-d_6, 20 ºC) of **2n**

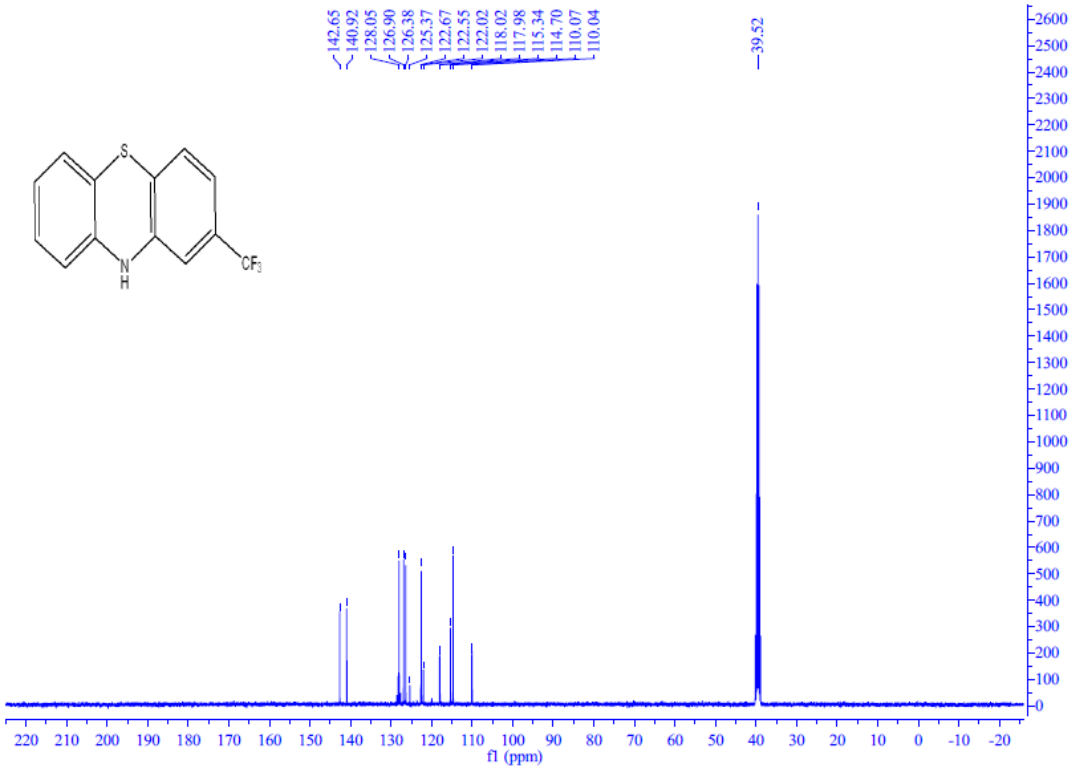

Figure S25. ^{13}C NMR (101 MHz, DMSO-d_6, 20 ºC) of **2n**

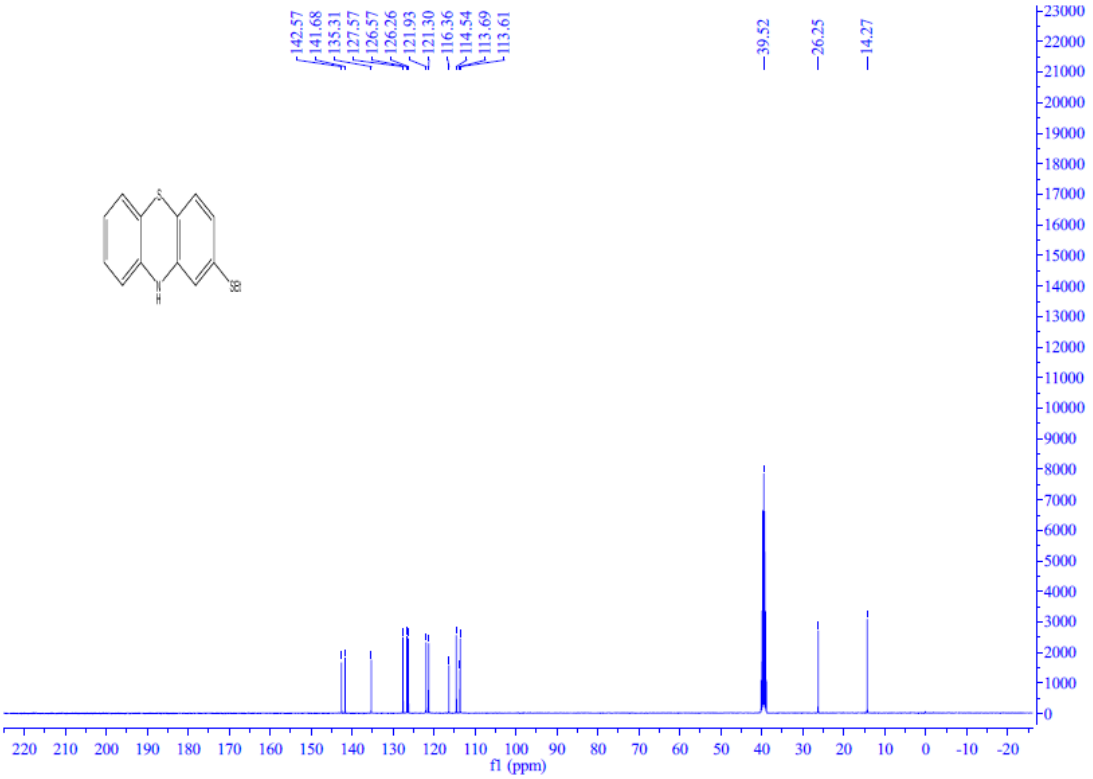

Figure S26. ^{1}H NMR (400 MHz, DMSO-d_6, 20 °C) of **2o**

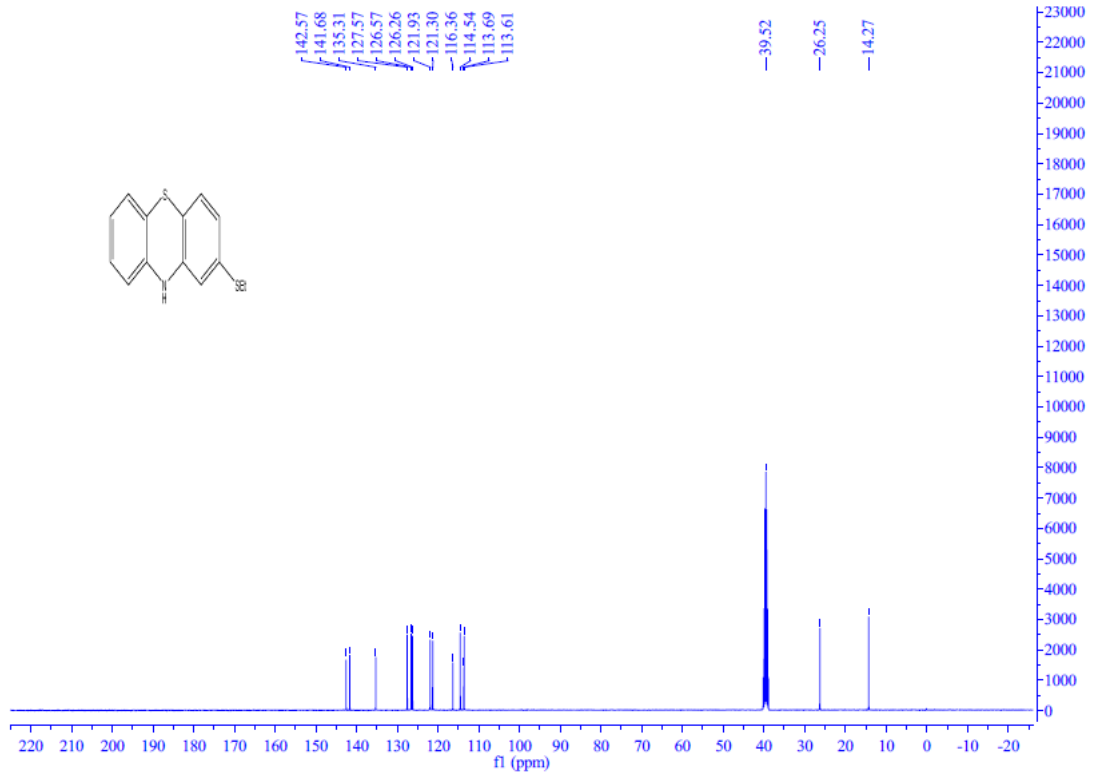

Figure S27. ^{13}C NMR (101 MHz, DMSO-d_6, 20 °C) of **2o**

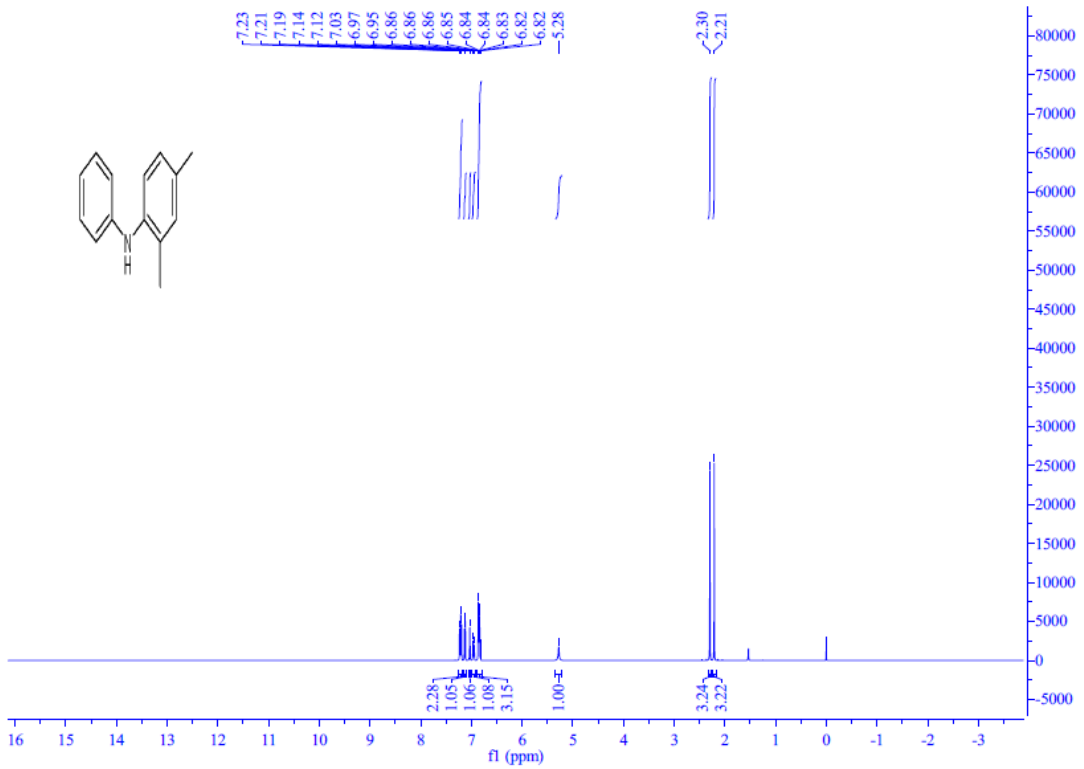

Figure S28. ^{1}H NMR (400 MHz, $CDCl_3$, 20 °C) of **2p**

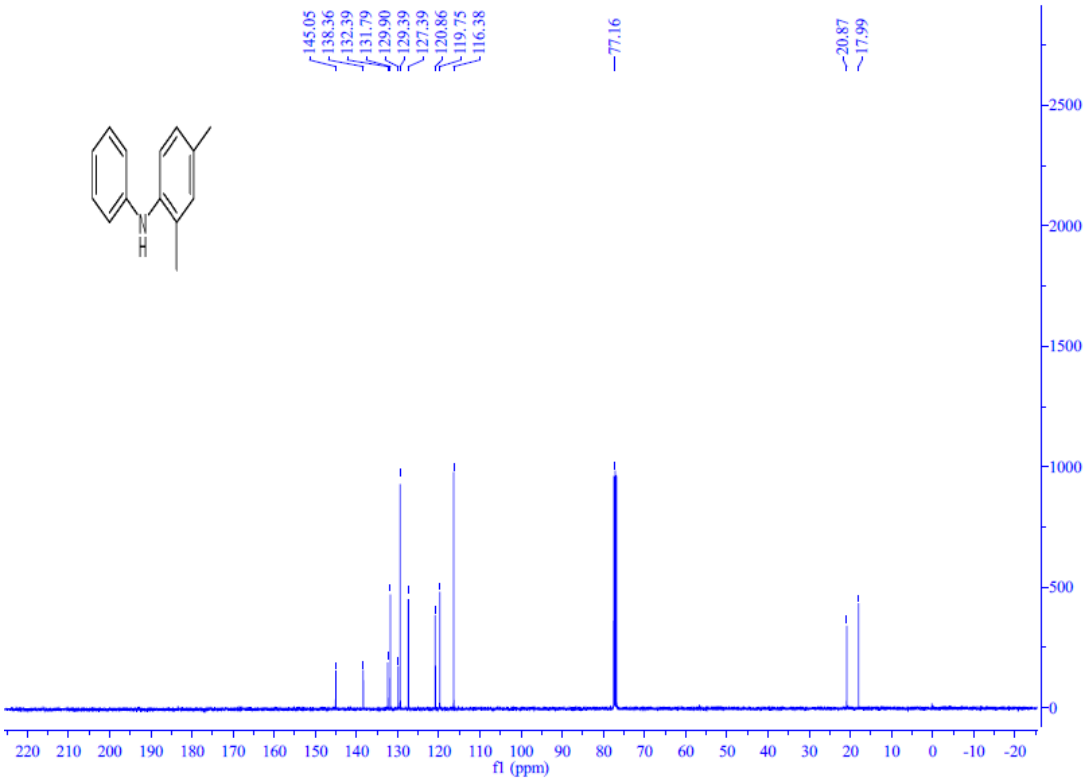

Figure S29. ^{1}H NMR (400 MHz, $CDCl_3$, 20 °C) of **2p**

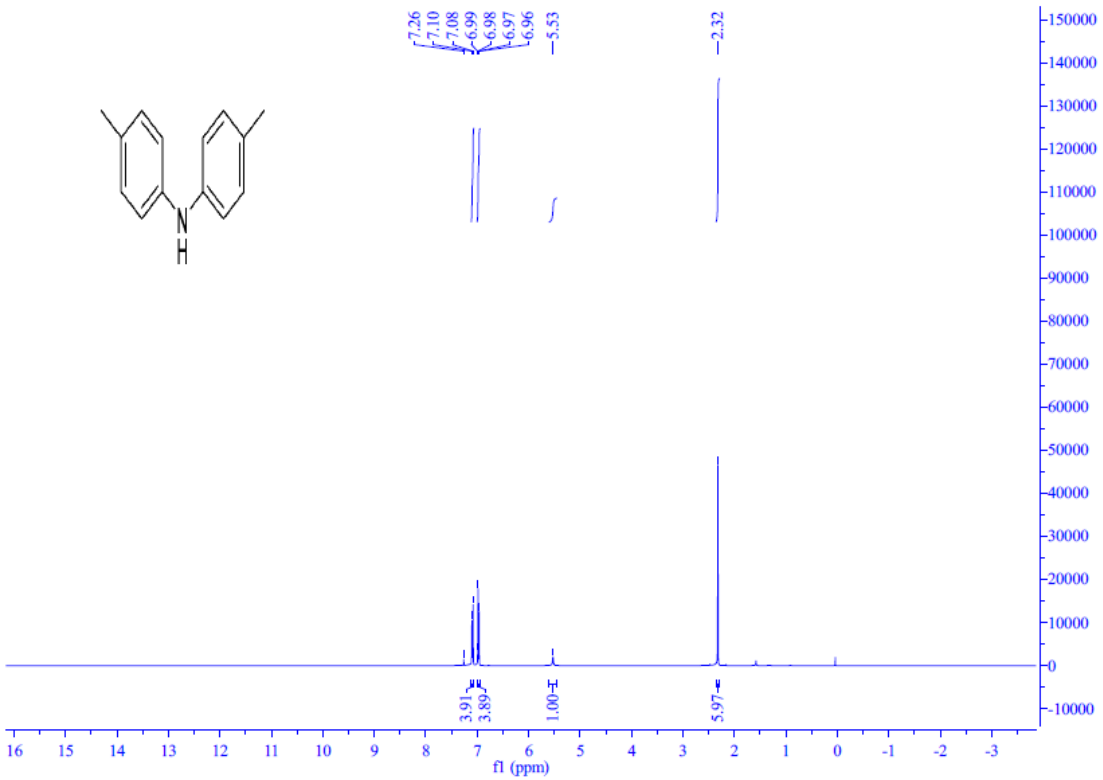

Figure S30. ^{1}H NMR (400 MHz, $CDCl_3$, 20 °C) of **2q**

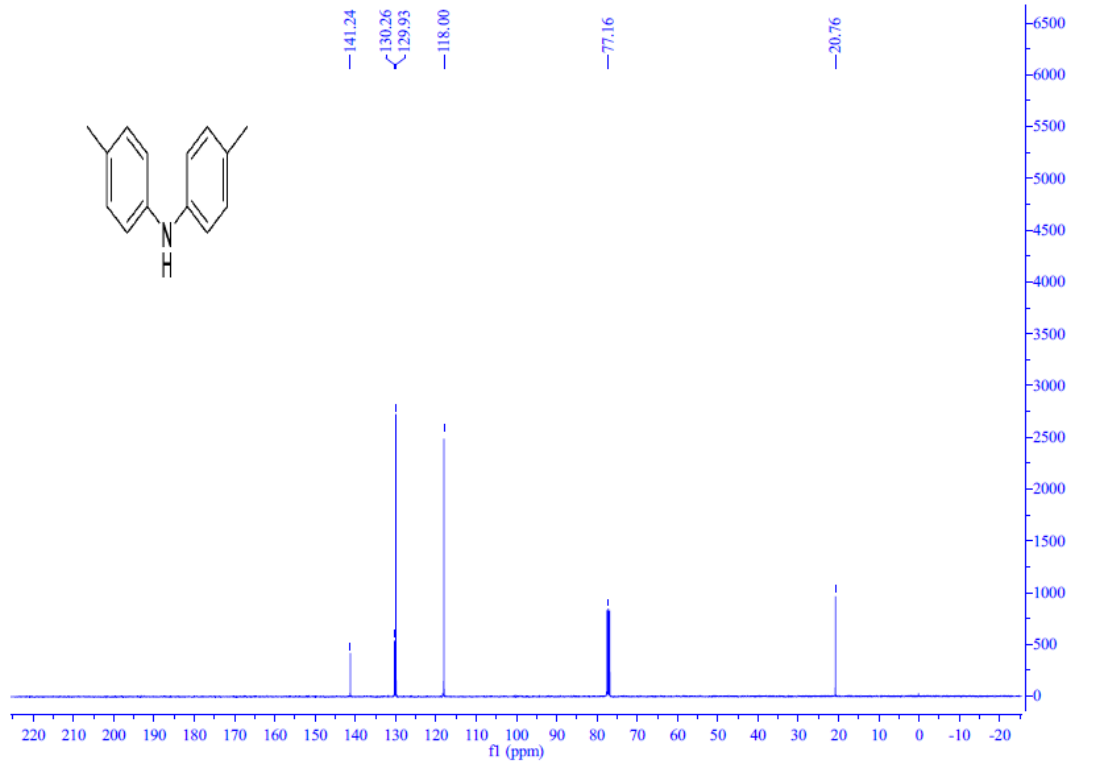

Figure S31. ^{13}C NMR (101 MHz, $CDCl_3$, 20 °C) of **2q**

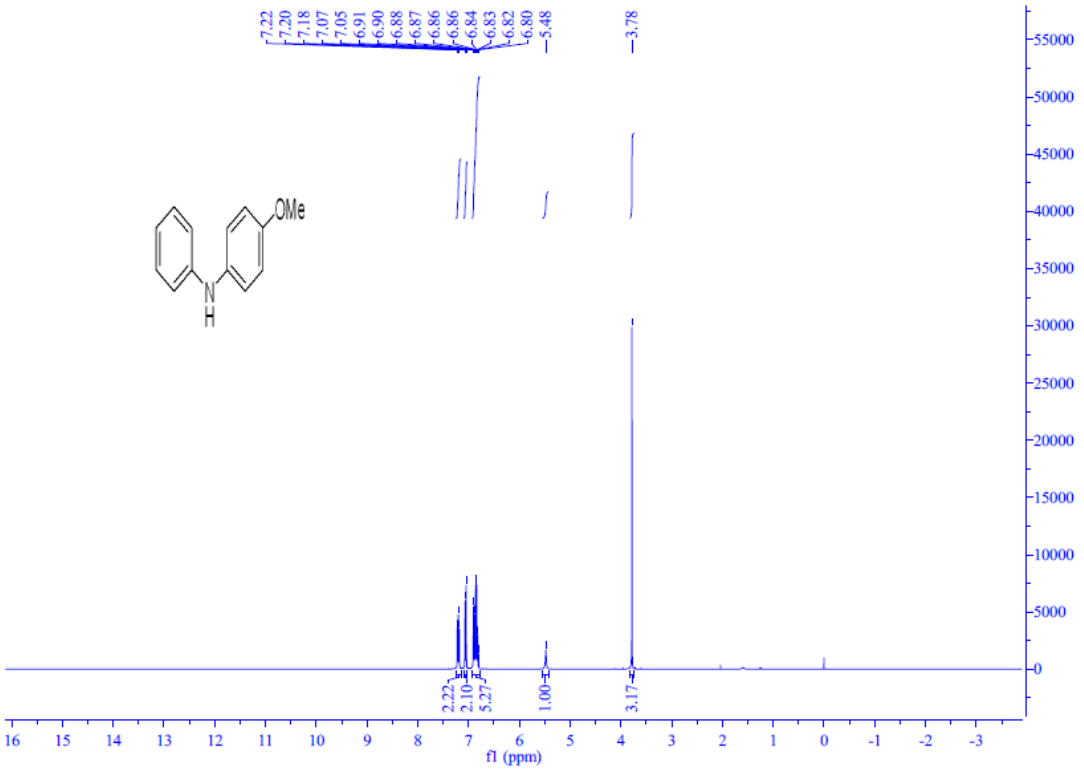

Figure S32. ^{1}H NMR (400 MHz, $CDCl_3$, 20 °C) of **2r**

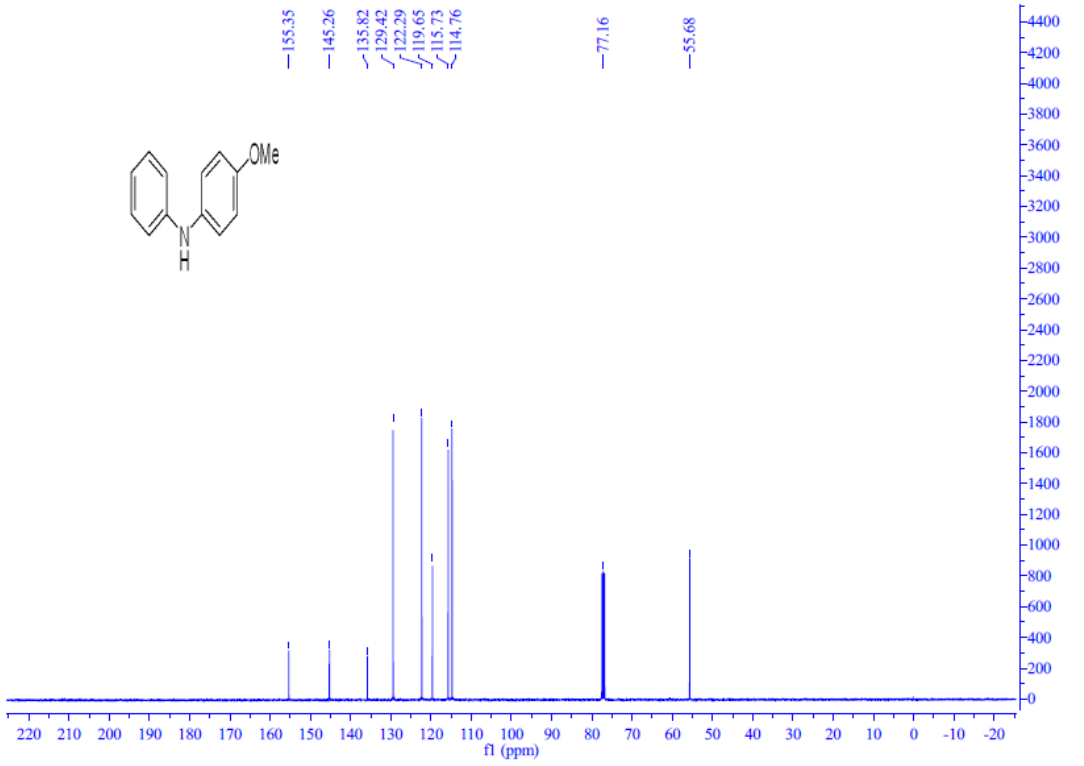

Figure S33. ^{13}C NMR (101 MHz, $CDCl_3$, 20 °C) of **2r**

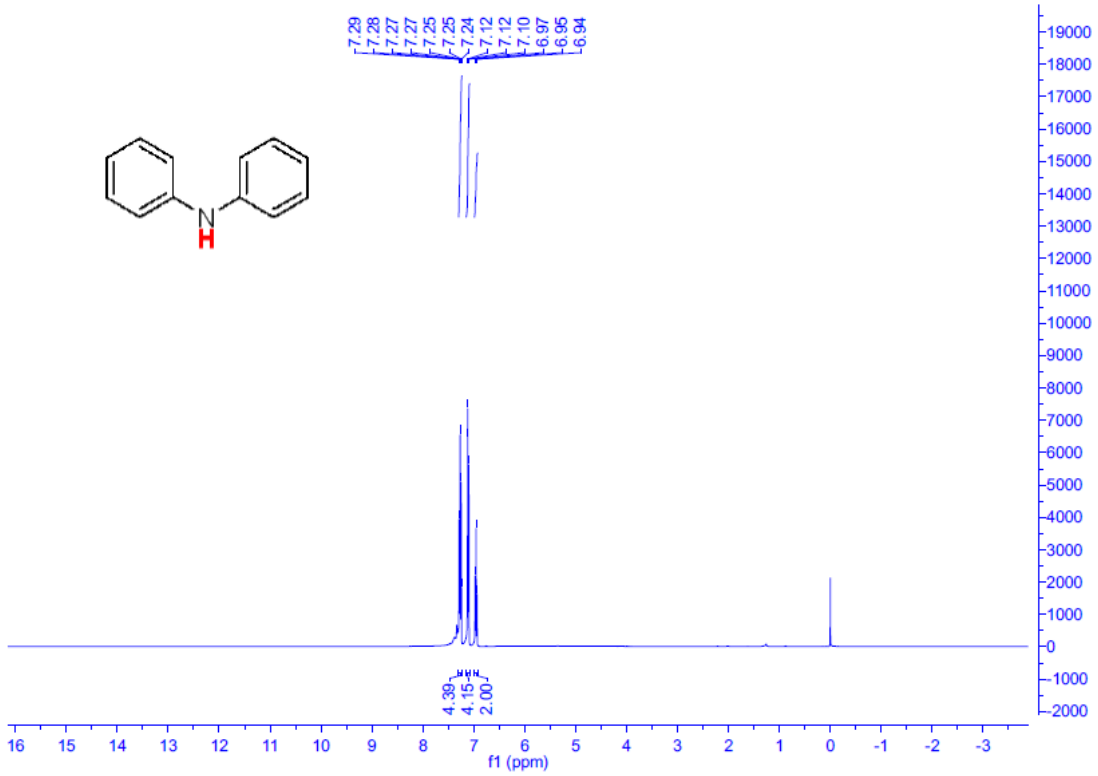

Figure S34. ^{1}H NMR (400 MHz, $CDCl_3$, 20 °C) of **2s**

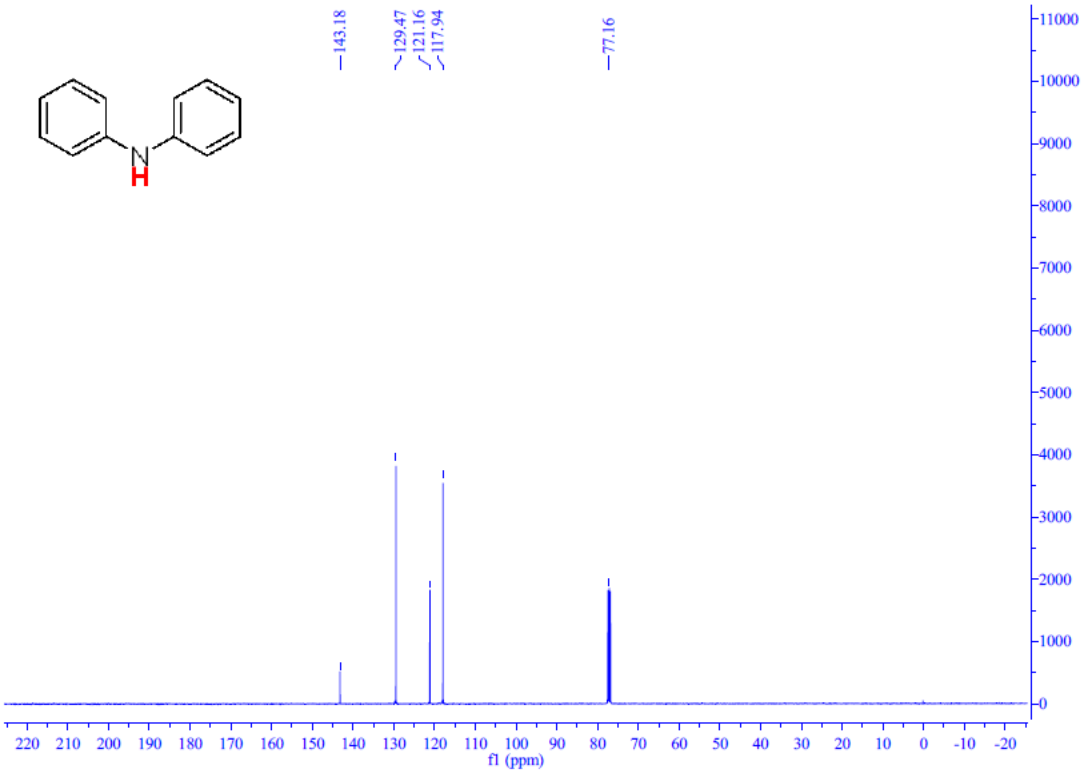

Figure S35. ^{13}C NMR (101 MHz, $CDCl_3$, 20 °C) of **2s**

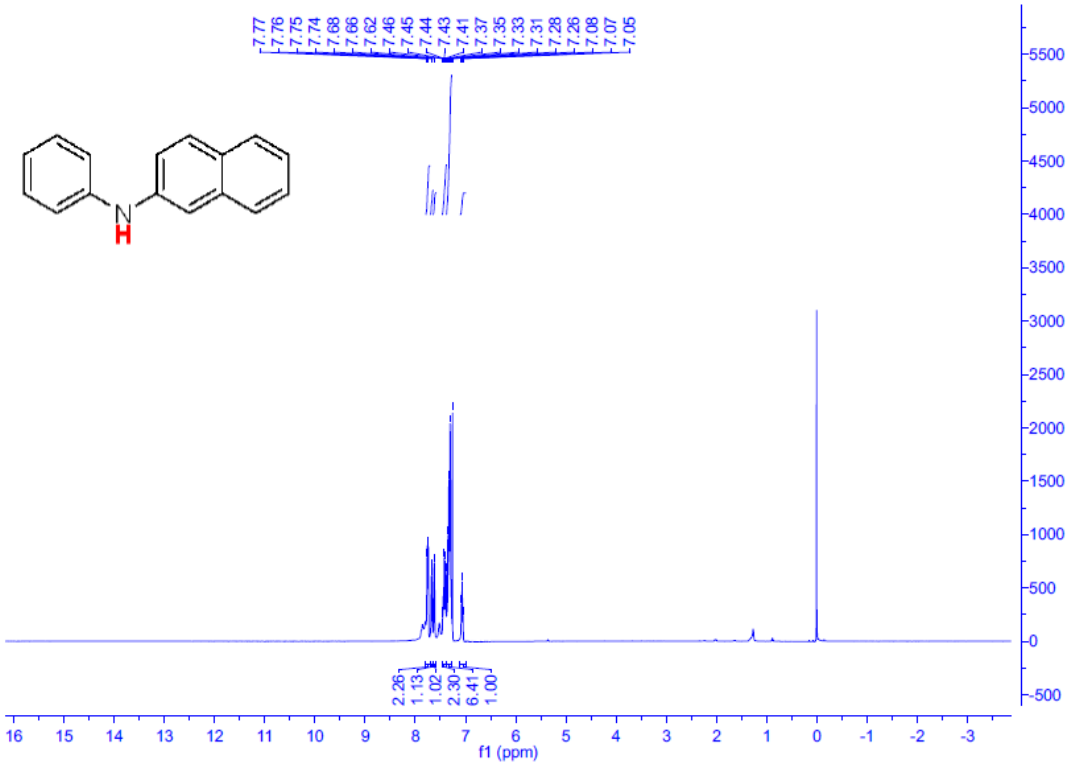

Figure S36. ^{1}H NMR (400 MHz, $CDCl_3$, 20 °C) of **2w**

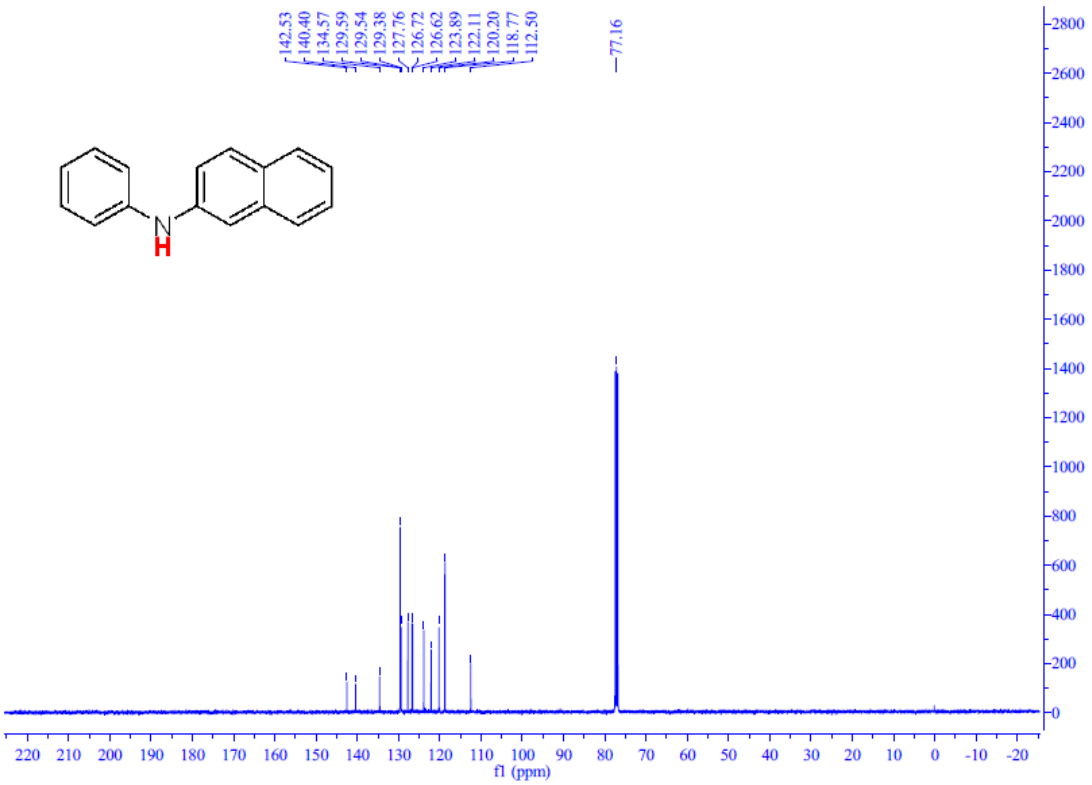

Figure S37. ^{13}C NMR (101 MHz, $CDCl_3$, 20 °C) of **2w**

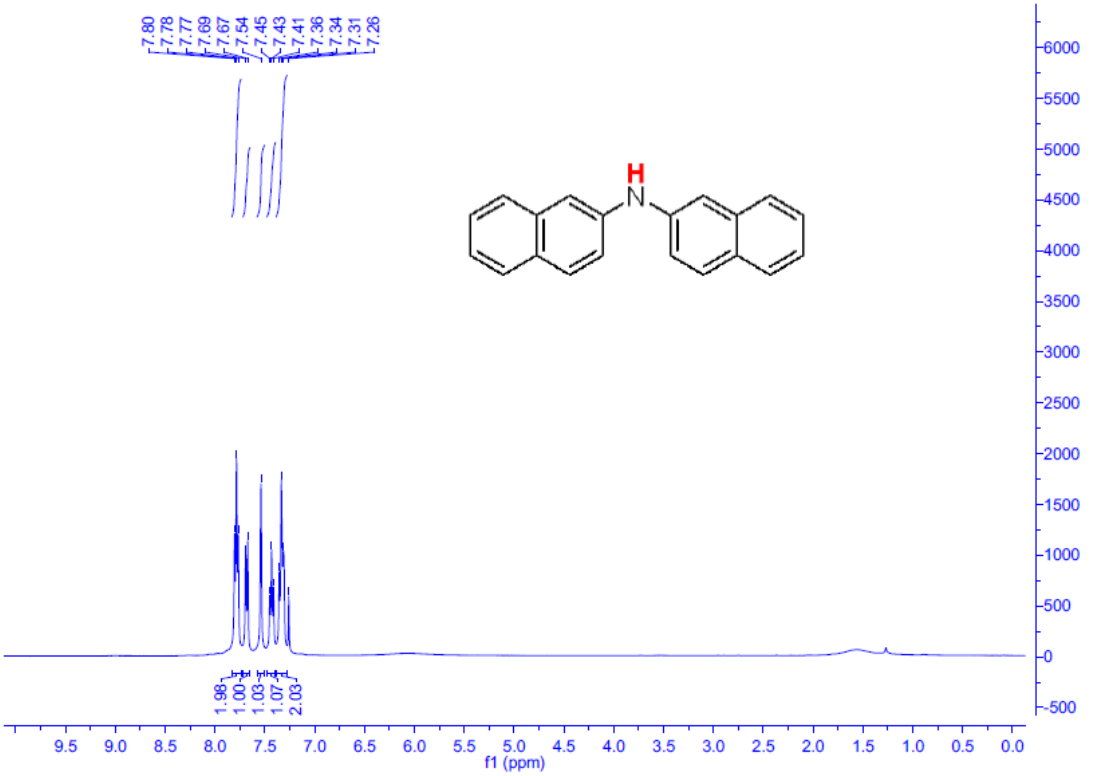

Figure S38. ^{1}H NMR (400 MHz, $CDCl_3$, 20 °C) of **2x**

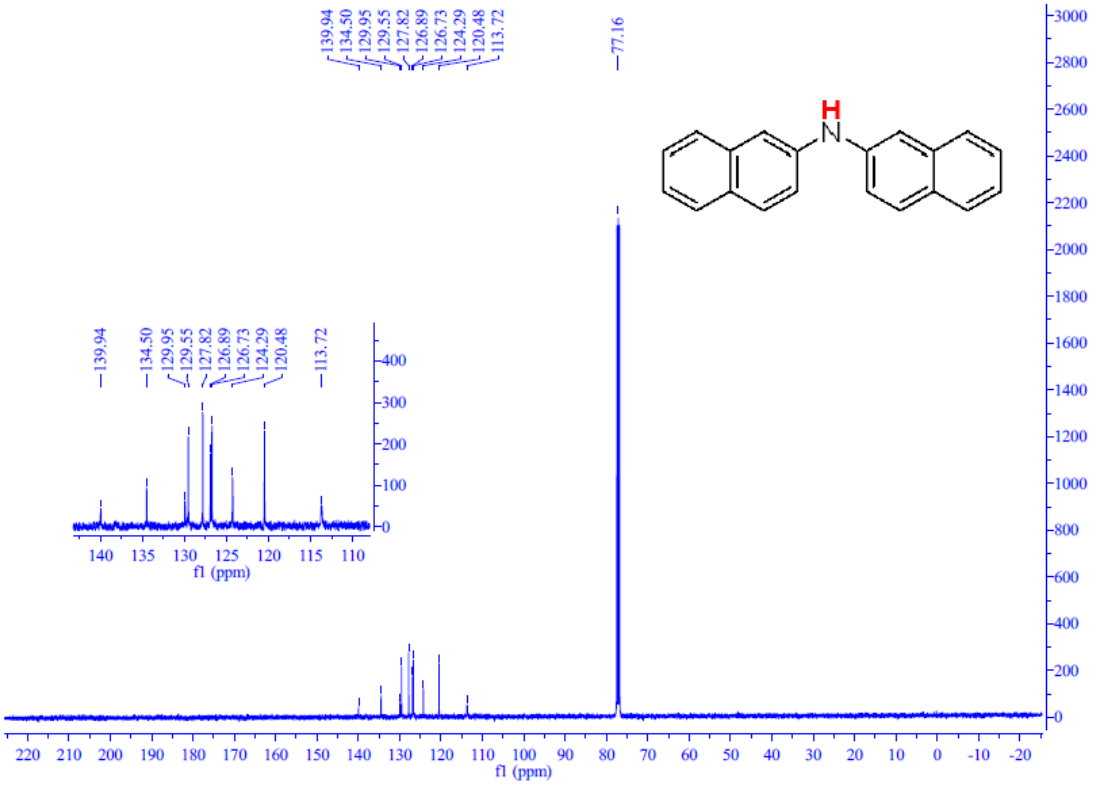

Figure S39. ^{13}C NMR (101 MHz, $CDCl_3$, 20 °C) of **2x**

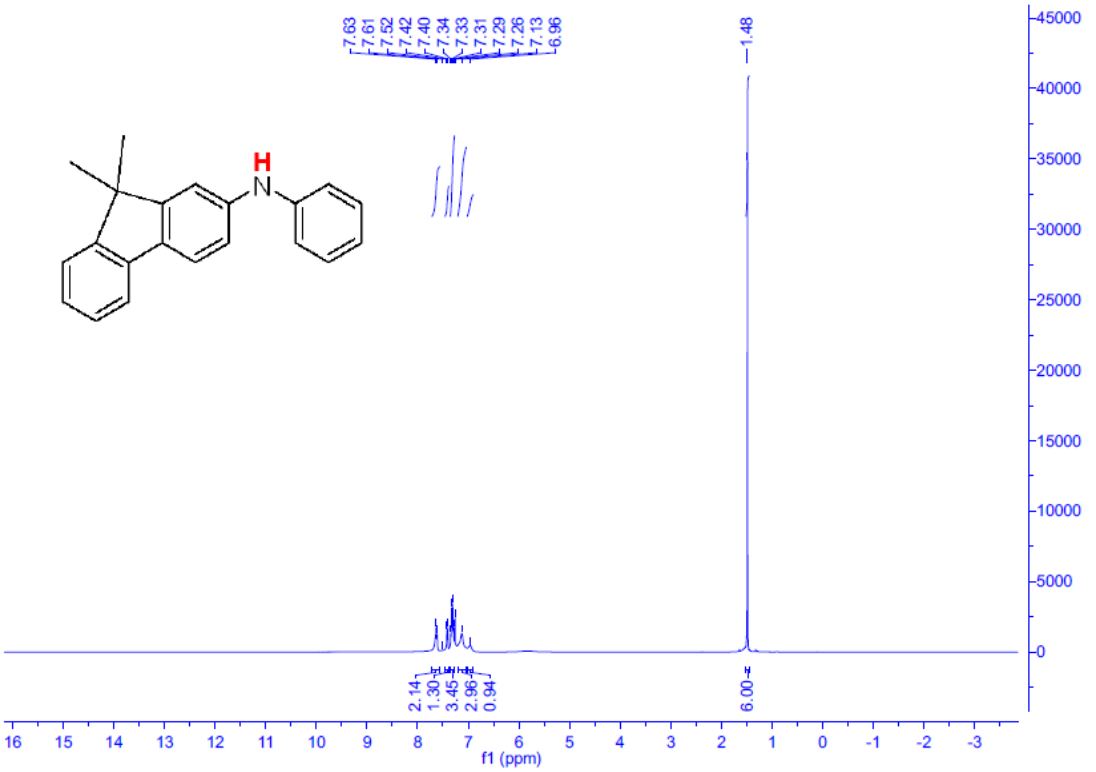

Figure S30. ^{1}H NMR (400 MHz, $CDCl_3$, 20 °C) of **2y**

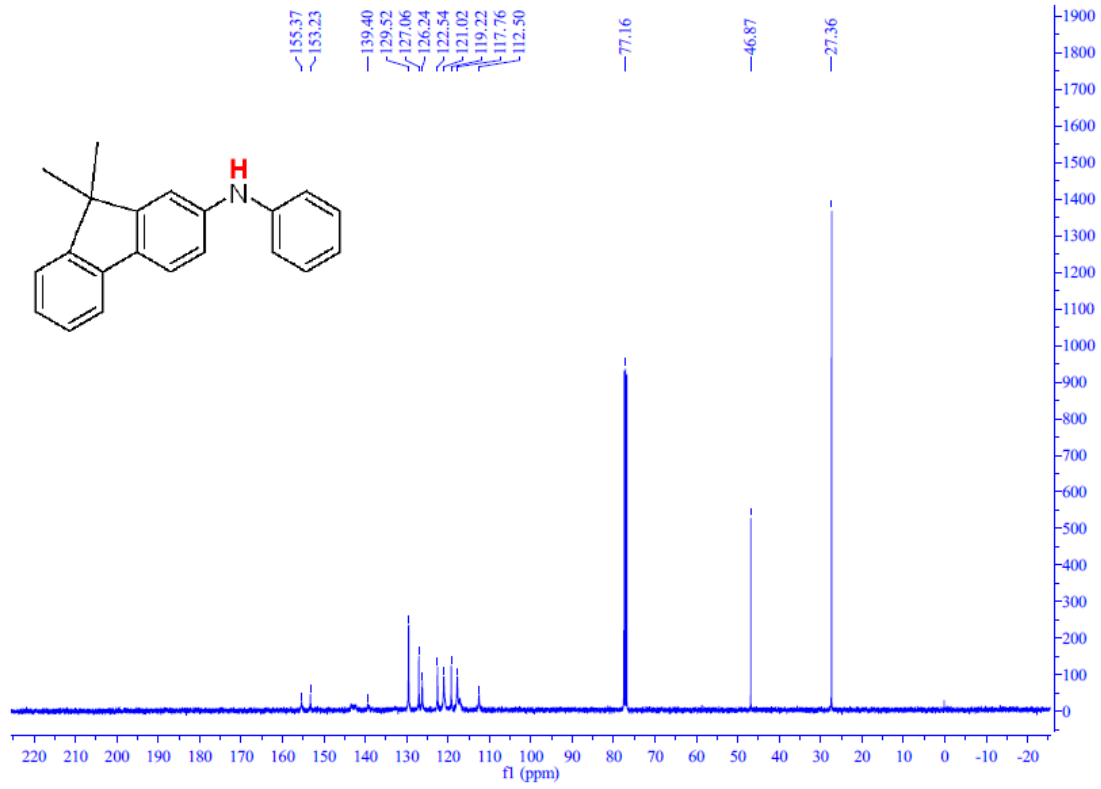

Figure S31. ^{13}C NMR (101 MHz, $CDCl_3$, 20 °C) of **2y**