Supporting information

Content Page

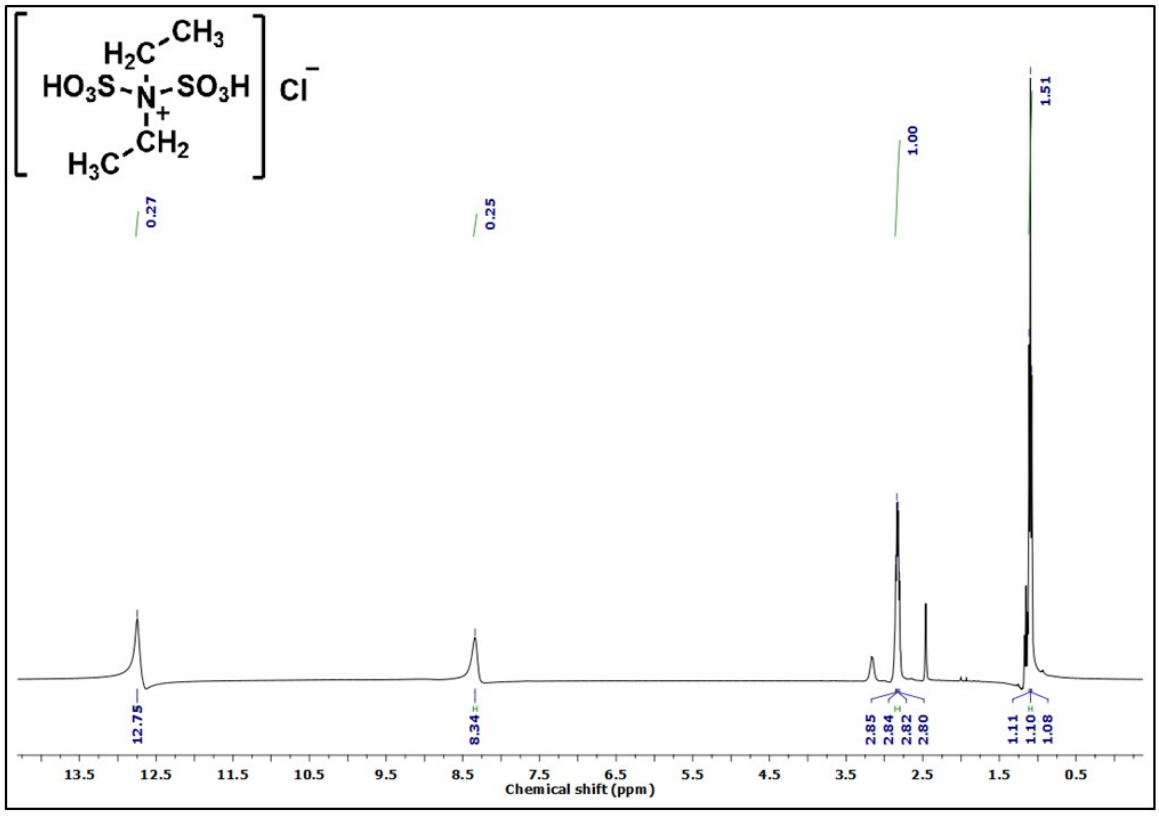


Fig. S1: ^{1}H NMR of [DEDSA]Cl.

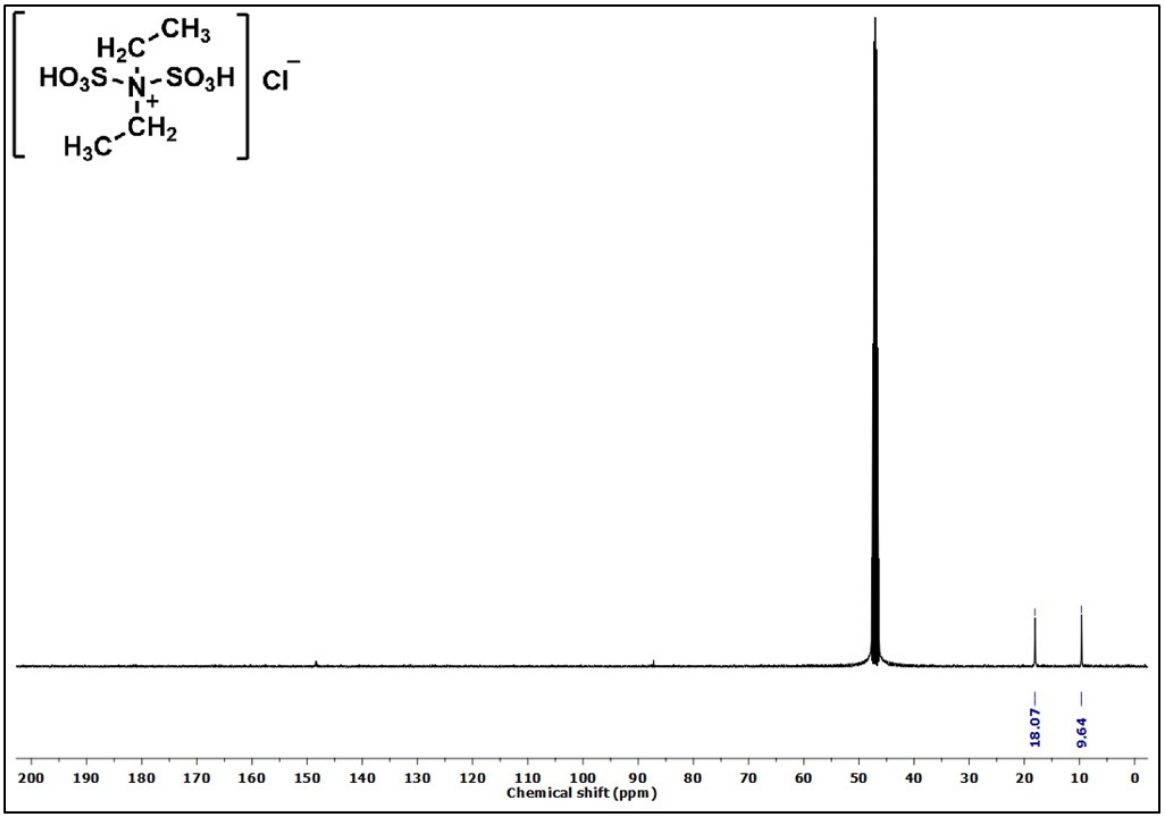


Fig. S2: ^{13}C NMR of [DEDSA]Cl.

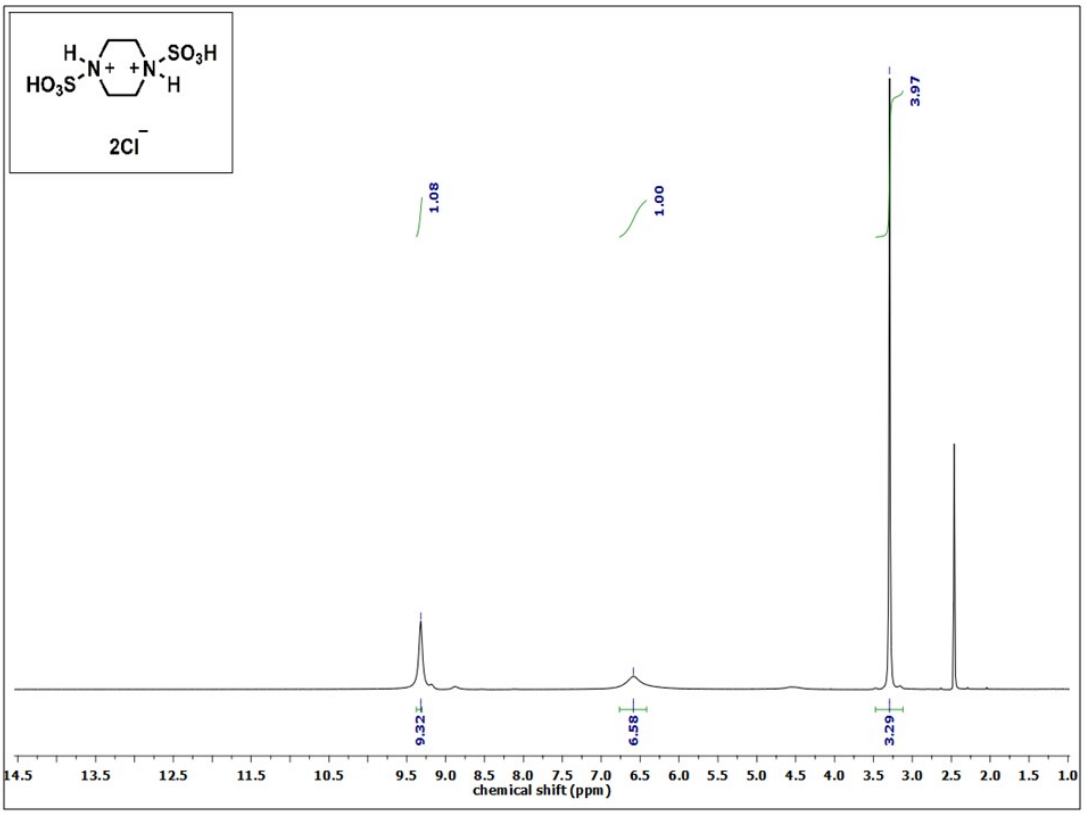


Fig. S3: ^{1}H NMR of [DSPZ].2Cl.

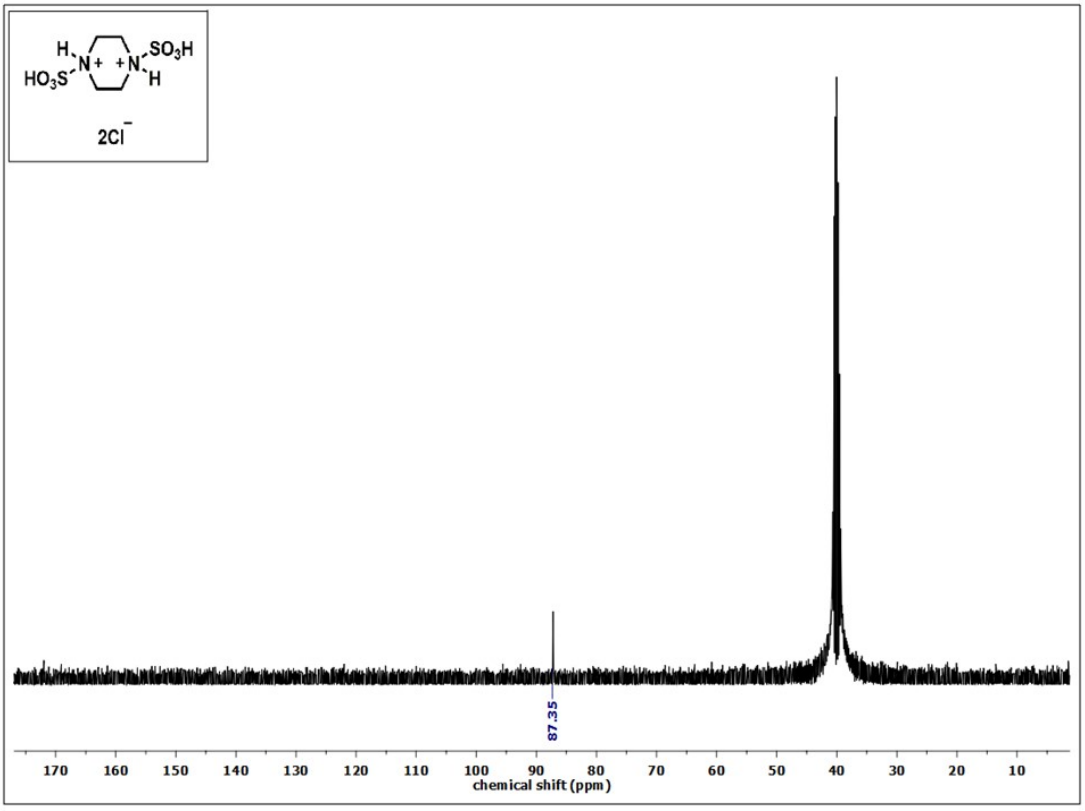


Fig. S4: ^{13}C NMR of [DSPZ].2Cl.

UV-Vis DRS analysis

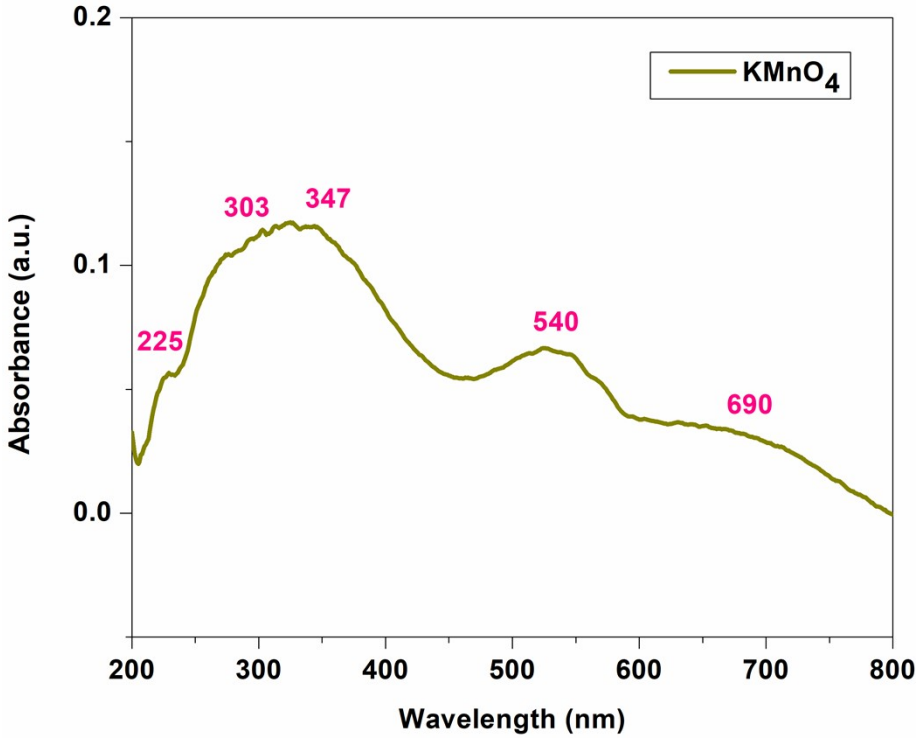


Fig. S5: UV-Vis DRS spectrum of $KMnO_4$.

Raman analysis

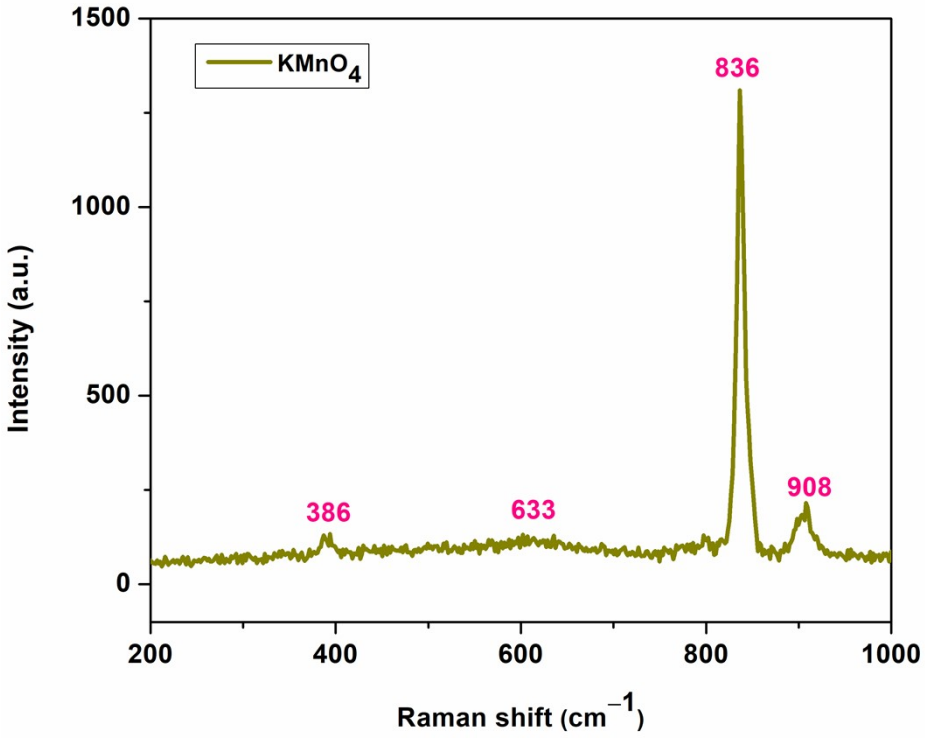
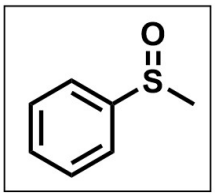
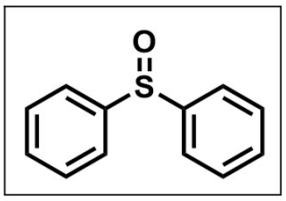
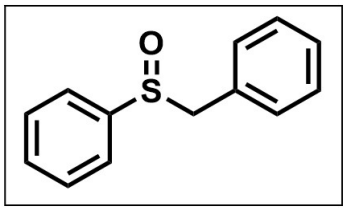
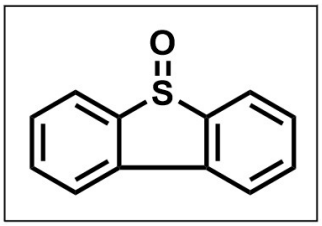
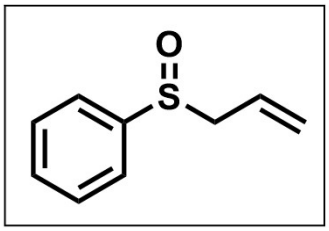
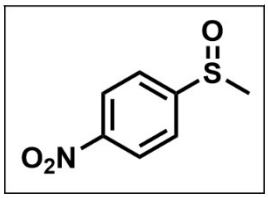
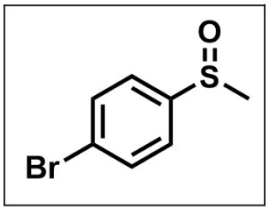


Fig. S6: Raman spectrum of $KMnO_4$.

Table S1: Spectral data of sulfoxide products

Product name	Spectral data
 Methyl phenyl sulfoxide (**2a**)	Colorless liquid [1] , ^{1}H NMR ($CDCl_3$, 400 MHz): δ 7.55-7.53 (m, 2H), 7.44-7.38 (m, 3H), 2.61 (s, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz): δ 145.42, 131.13, 129.42, 123.52, 43.93; GC-MS m/z values 140 (M^+), 125, 109, 98, 77, 63, 51 (100%).
 Diphenyl sulfoxide (**2b**)	White solid, melting point 70 °C [2] (lit. 68-70), ^{1}H NMR ($CDCl_3$, 400 MHz): δ 7.65-7.62 (m, 4H), 7.47-7.41 (m, 6H); ^{13}C NMR ($CDCl_3$, 100 MHz): δ 131.15, 129.44, 124.89; GC-MS m/z values 202 (M^+, 100%), 186, 154, 125, 109, 77, 51.
 Benzyl phenyl sulfoxide (**2c**)	White solid, Mp. 123°C [2] , ^{1}H NMR ($CDCl_3$, 400 MHz): δ 7.45-7.35 (m, 5H), 7.28-7.21 (m, 3H), 6.98 (d, J = 8 Hz, 2H), 4.10-3.97 (dd, J = 12 Hz, 40 Hz, 2H); ^{13}C NMR ($CDCl_3$, 100 MHz): δ 142.81, 131.26, 130.44, 129.19, 128.34, 124.53, 58.38
 Dibenzothiophene-5-oxide (**2d**)	White solid, Mp. 117 °C [2], ^{1}H NMR ($CDCl_3$, 400 MHz): δ 7.99 (d, J = 8.0 Hz. 2H), 7.82-7.80 (d, J = 8.0 Hz , 2H), 7.59 (t, J = 8.0 Hz , 2H), 7.50 (t, J = 8.0 Hz 2H); ^{13}C NMR ($CDCl_3$, 100 MHz): δ 137.77, 134.00, 131.70, 130.49, 122.29, 121.68; GC-MS: m/z 201 ($M+1^+$), 185 (100%), 170, 140, 124, 108, 96, 76, 63, 51.

 Allyl phenyl sulfoxide (**2e**)	Brownish liquid [3], ^{1}H NMR ($CDCl_3$, 400 MHz): δ 7.86-7.84 (m, 2H), 7.65-7.51 (m, 3H), 5.82-5.72 (m, 1H), 5.30 (t, *J* = 8.0 Hz , 1H), 5.15-5.10 (dd, *J* = 4 Hz , 16 Hz, 1H), 3.80 (d, *J* = 8.0 Hz, 2H); ^{13}C NMR ($CDCl_3$, 100 MHz): δ 138.28, 133.88, 129.16, 128.57, 124.88, 124.67, 60.94.
 Methyl 4-nitrophenyl sulfoxide (**2f**)	Off white solid, Mp. 102 °C, ^{1}H NMR ($CDCl_3$, 400 MHz): δ 8.39-8.37 (d, *J* = 8.0 Hz, 2H), 7.83-7.81 (d, *J* = 8.0 Hz, 2H), 2.78 (s, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz): δ 153.27, 149.58, 124.75, 124.59, 43.94; GC-MS m/z values 185 (M^+), 184 (100%), 171, 158, 152, 139, 138, 113, 98, 91, 79, 63, 51.
 Methyl 4-bromophenyl sulfoxide (**2g**)	Off white solid, Mp. 80 °C[4], ^{1}H NMR ($CDCl_3$, 400 MHz): δ 7.66-7.64 (d, *J* = 8.0 Hz, 2H), 7.51-7.49 (d, *J* = 8.0 Hz, 2H), 2.70 (s, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz): δ 144.86, 132.68, 125.57, 125.23, 44.06; GC-MS m/z values 220 (M^+), 218 (M^+), 189, 187, 157, 155, 131, 129, 108, 91, 89, 81, 79, 76, 63, 51.

References

[1] Ozanne-Beaudenon, A.; Quideau, S. *Tetrahedron Lett. 2006,* **47**, 5869.

[2] Bayat, Y., Shirini, F., Goli-Jolodar, O., *J. Mol. Liq*. *2018*, **265**, 517-524.

[3] Ochiai, M., Nakanishi, A., Ito, T., *J. Org. Chem*., *1997*, **62,** 4253-4259.

[4] Xie, Y., Li, Y., Zhou, S., Zhou, S., Zhang, Y., Chen, M., Li, Z., *Synlett* , *2018,* **29,** 340-343.

^{1}H and ^{13}C NMR spectra of sulfoxide products

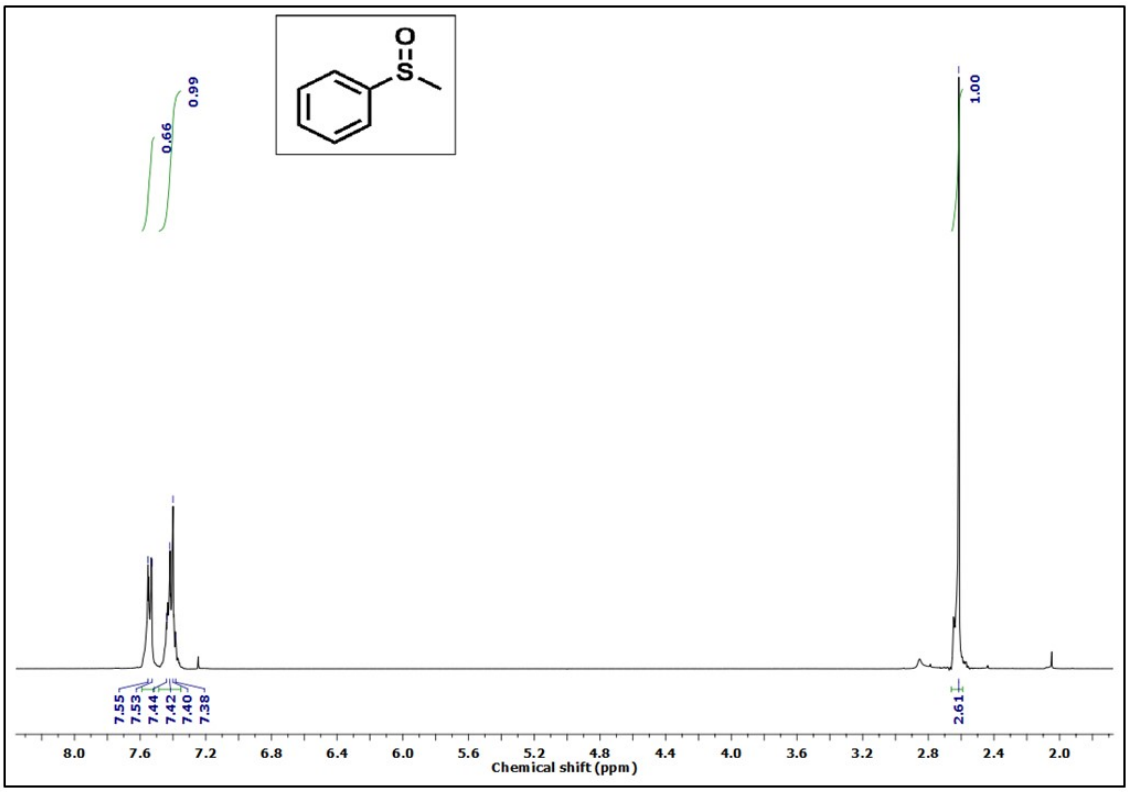


Fig. S7: ^{1}H NMR of methyl phenyl sulfoxide (**2a**).

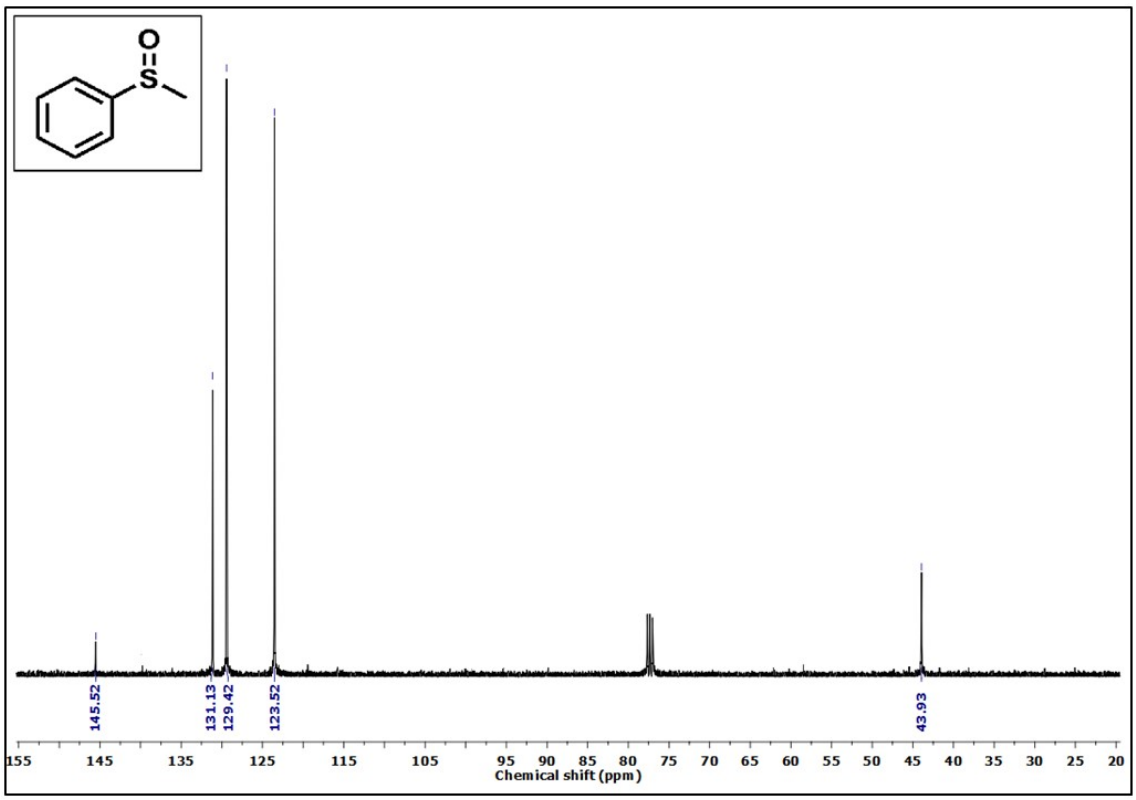


Fig. S8: ^{13}C NMR of methyl phenyl sulfoxide (**2a**).

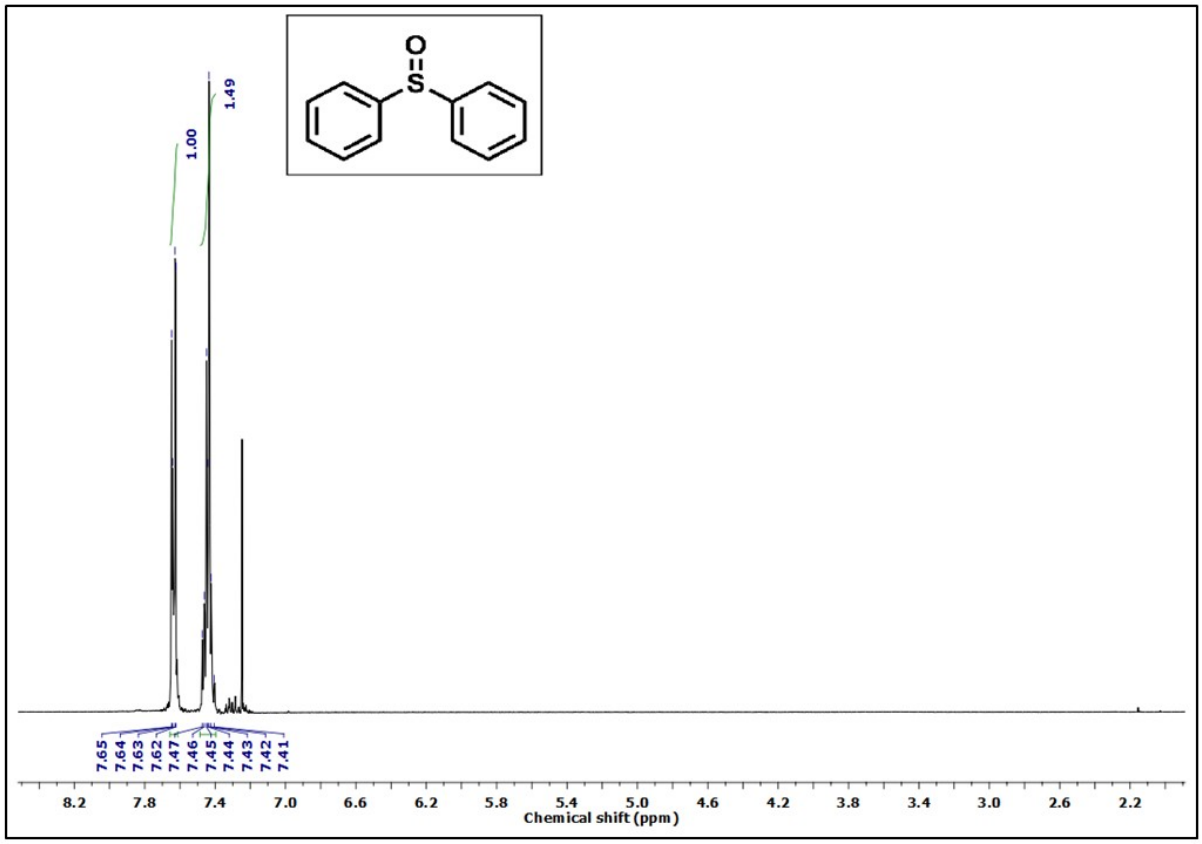


Fig. S9: ^{1}H NMR spectrum of diphenyl sulfoxide (**2b**).

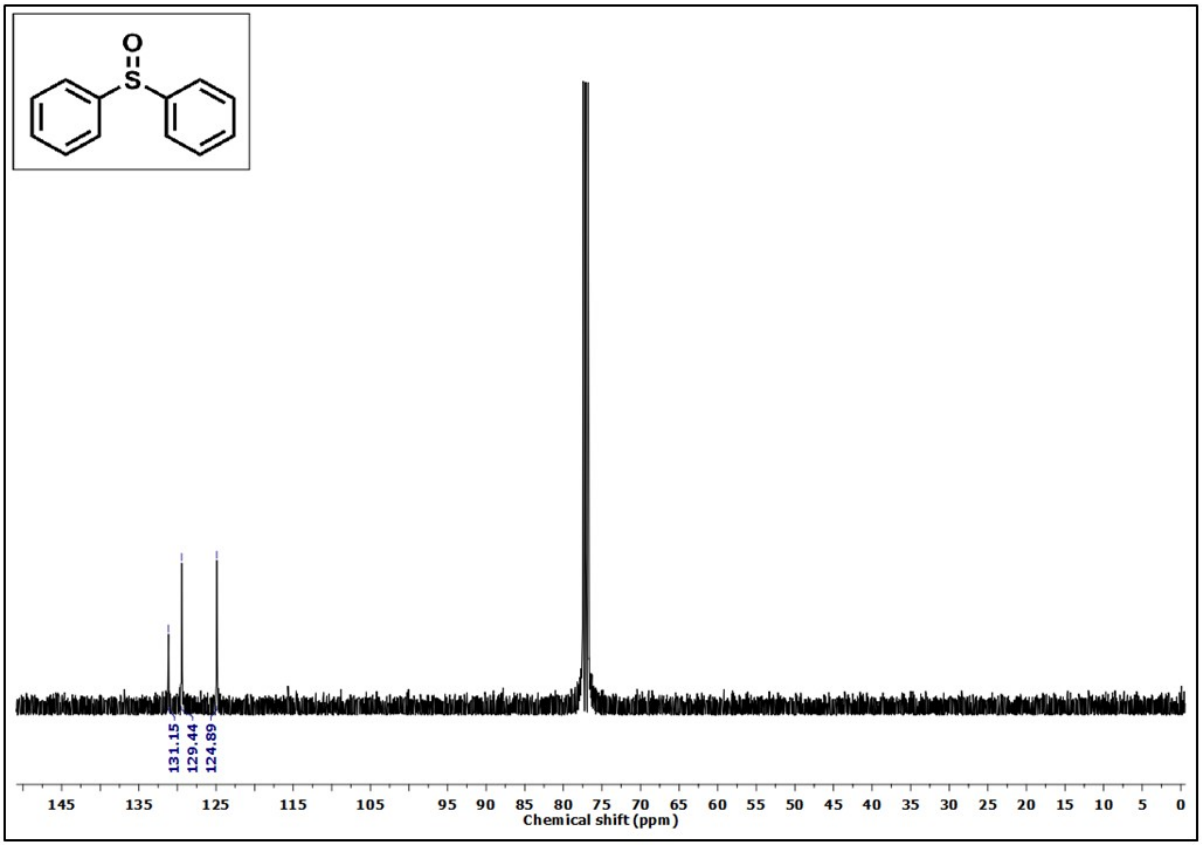


Fig. S10: ^{13}C NMR spectrum of diphenyl sulfoxide (**2b**).

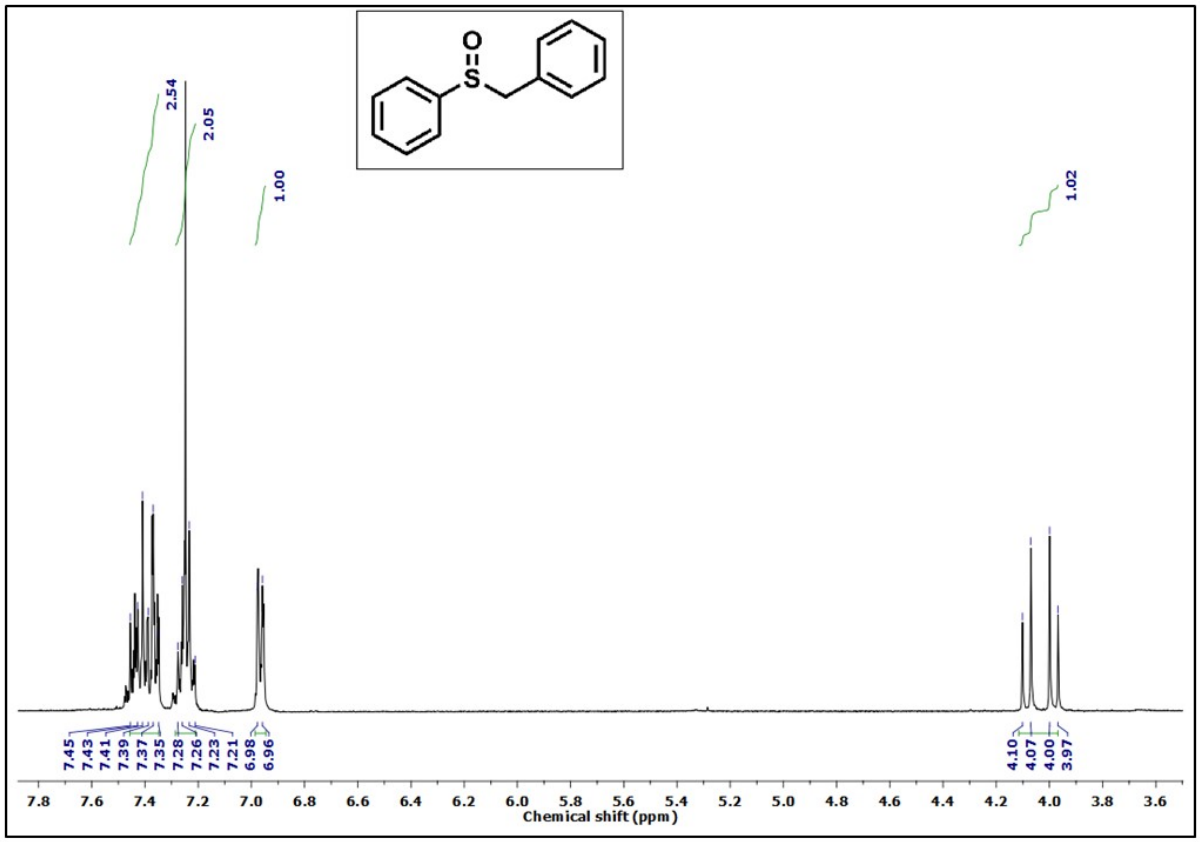


Fig. S11: ^{1}H NMR spectrum of benzyl phenyl sulfoxide (**2c**).

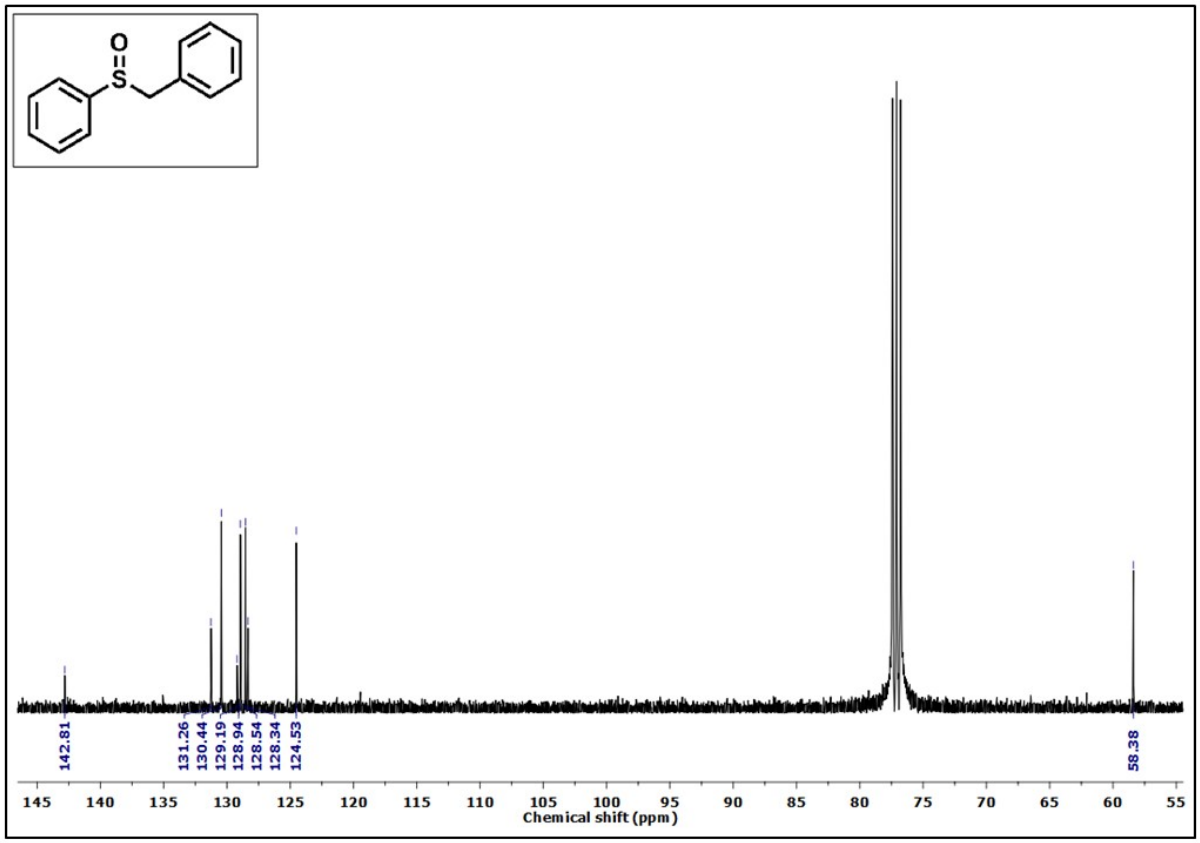


Fig. S12: ^{13}C NMR spectrum of benzyl phenyl sulfoxide (**2c**).

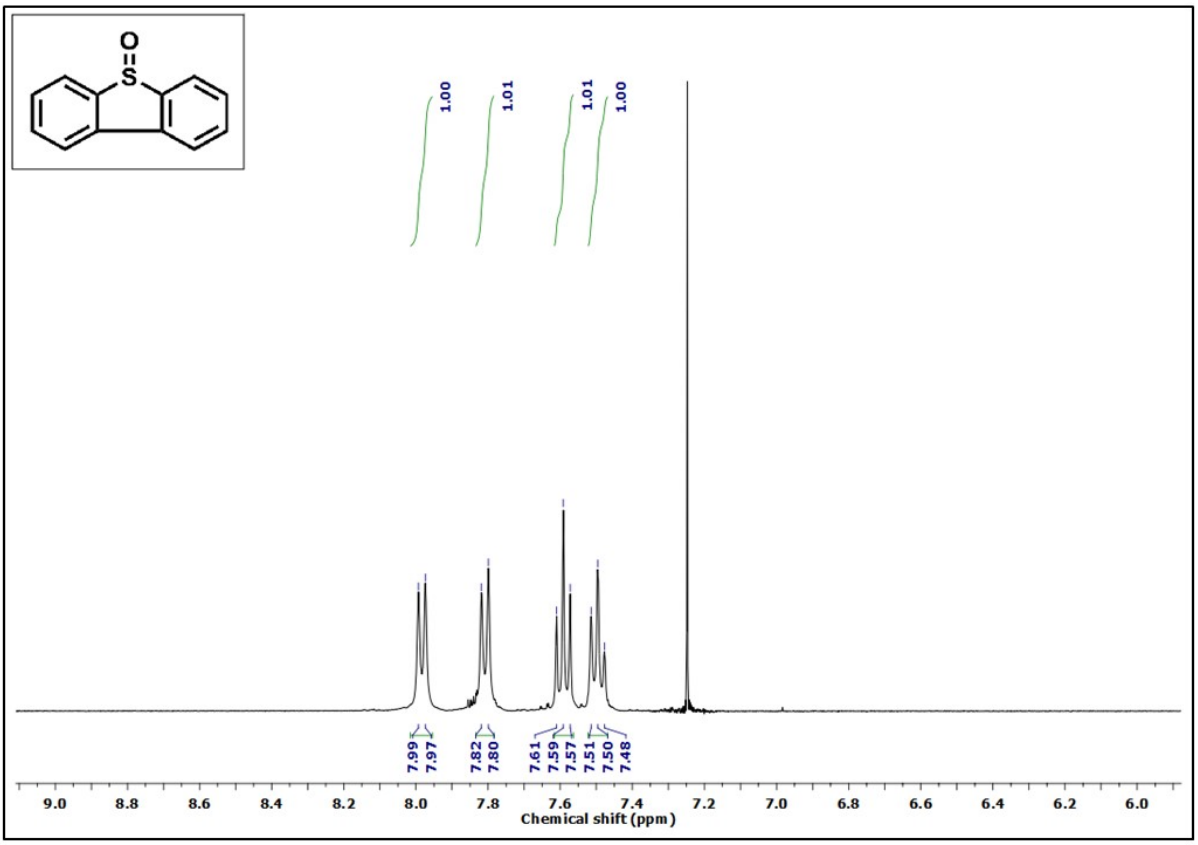


Fig. S13: ^{1}H NMR spectrum of dibenzothiophene-5-oxide (**2d**).

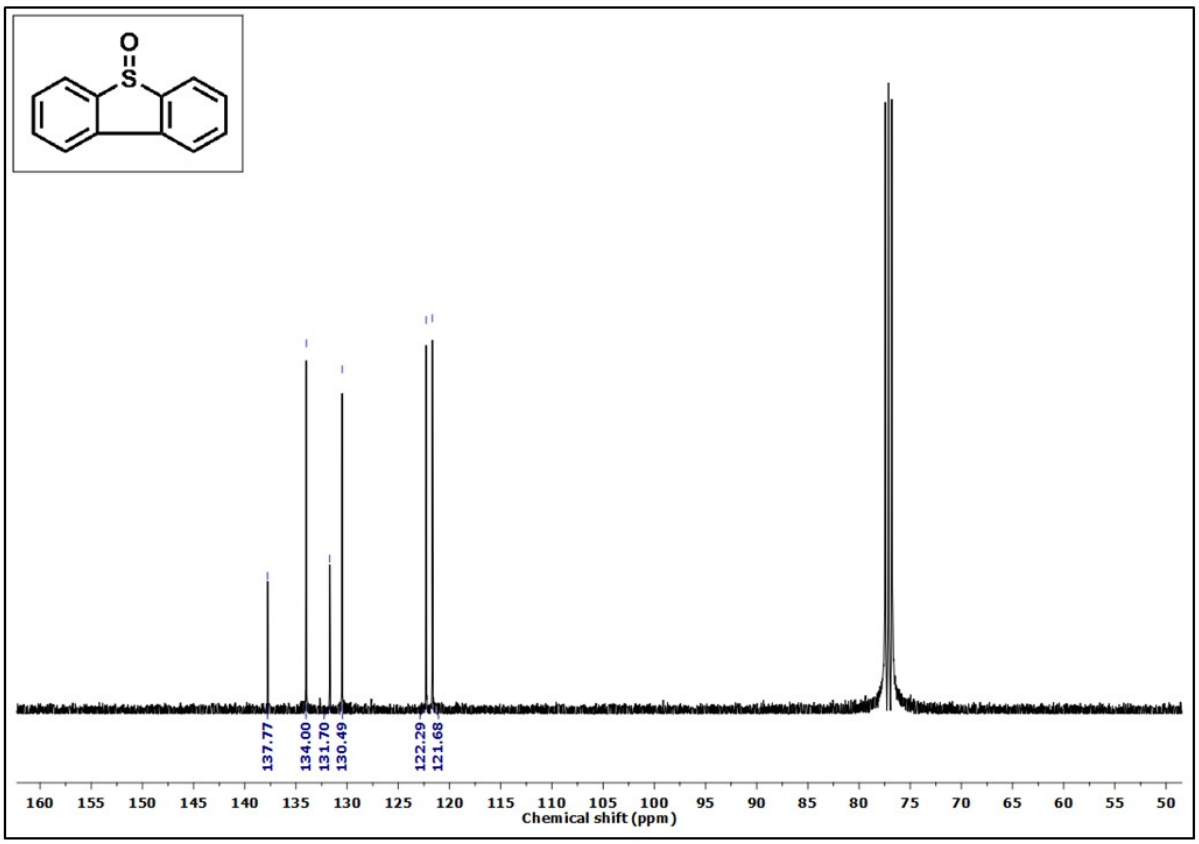


Fig. S14: ^{13}C NMR spectrum of dibenzothiophene-5-oxide (**2d**).

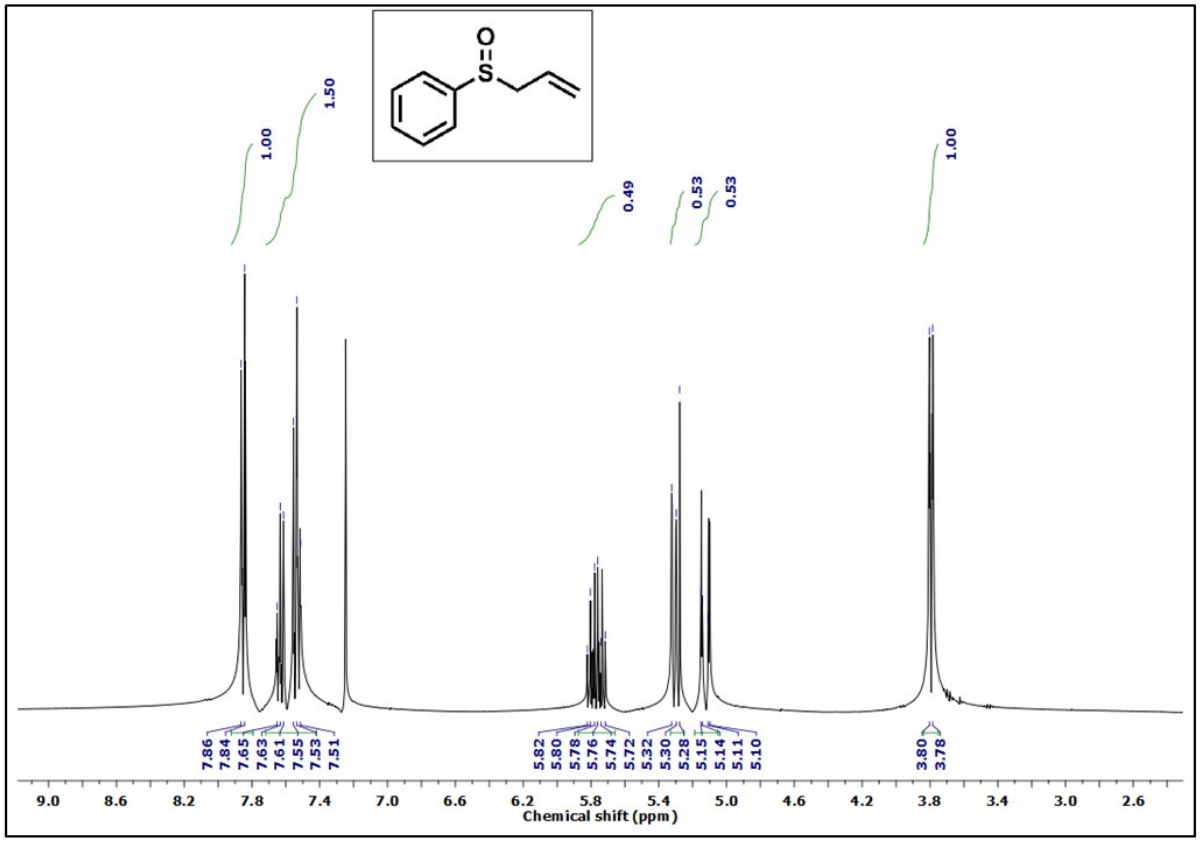


Fig. S15: ^{1}H NMR spectrum of allyl phenyl sulfoxide (**2e**).

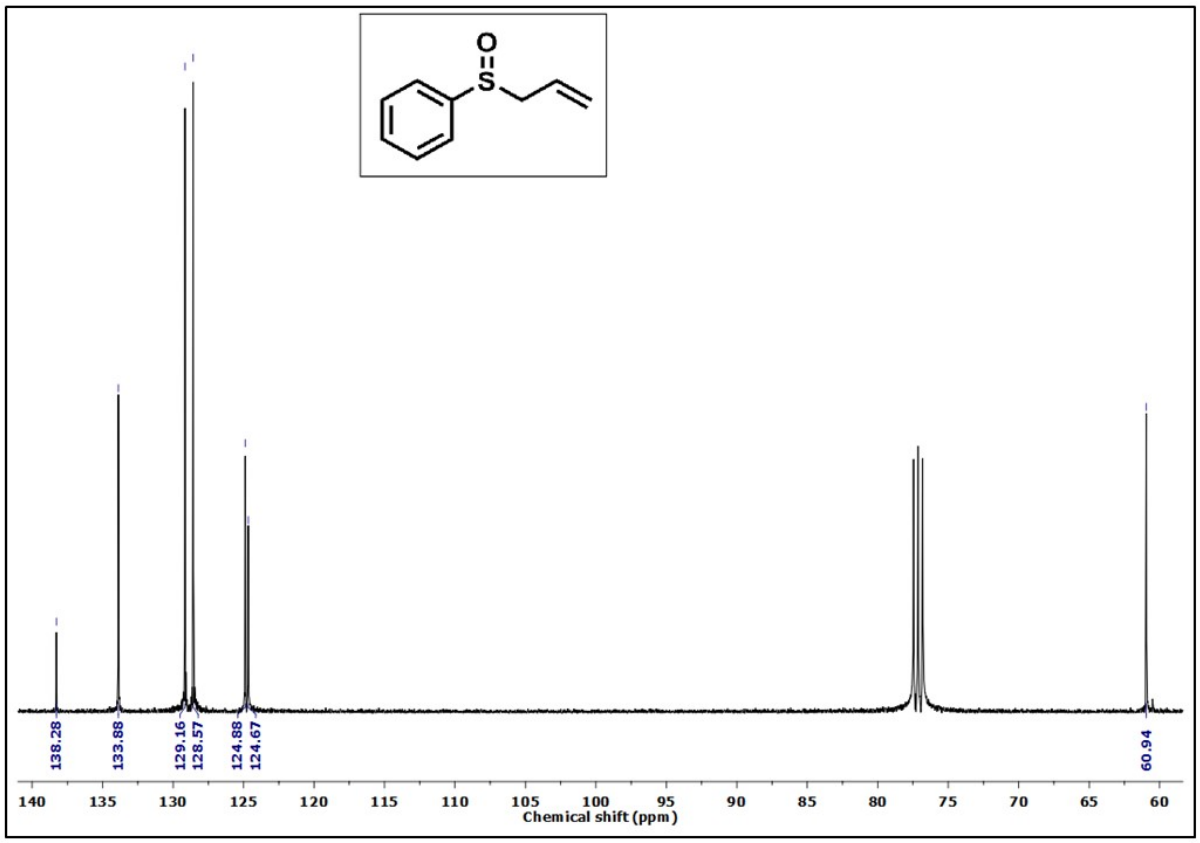


Fig. S16: ^{13}C NMR spectrum of allyl phenyl sulfoxide (**2e**).

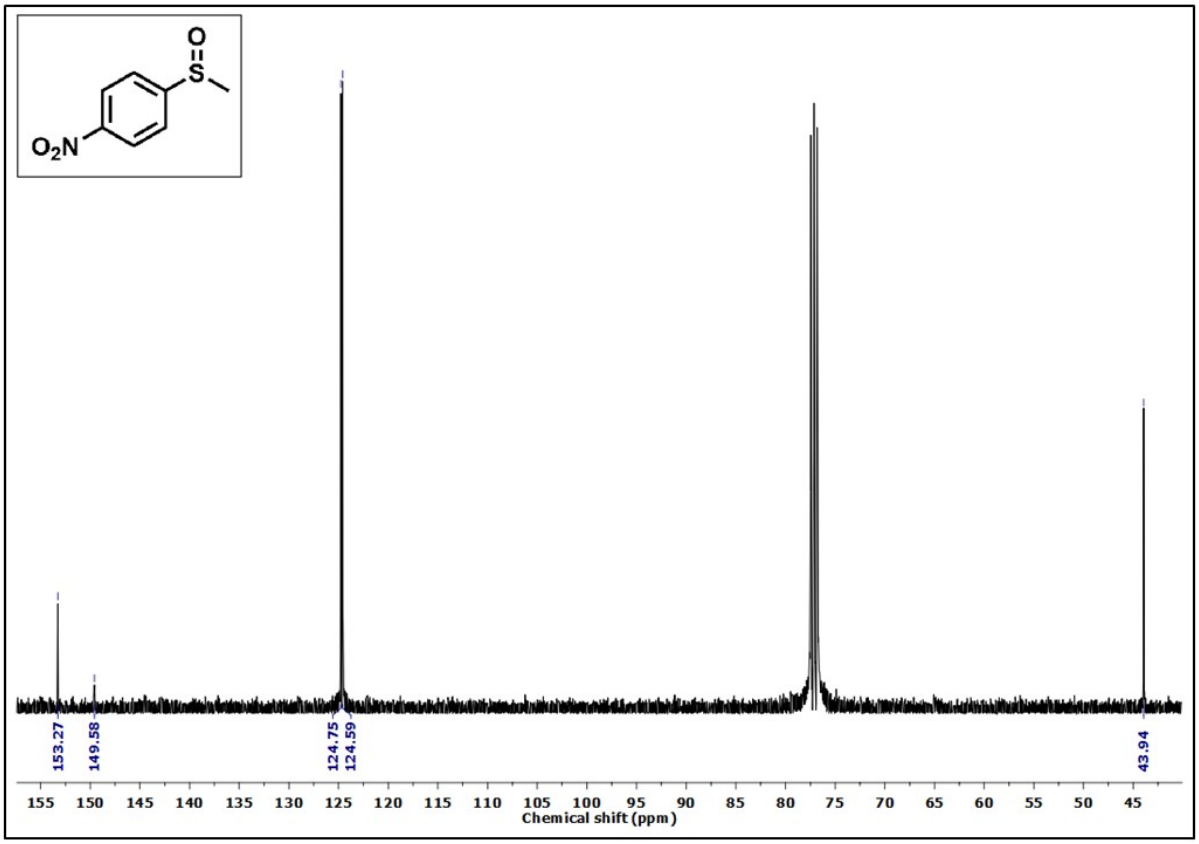


Fig. S17: ^{1}H NMR of methyl 4-nitrophenyl sulfoxide (**2f**).

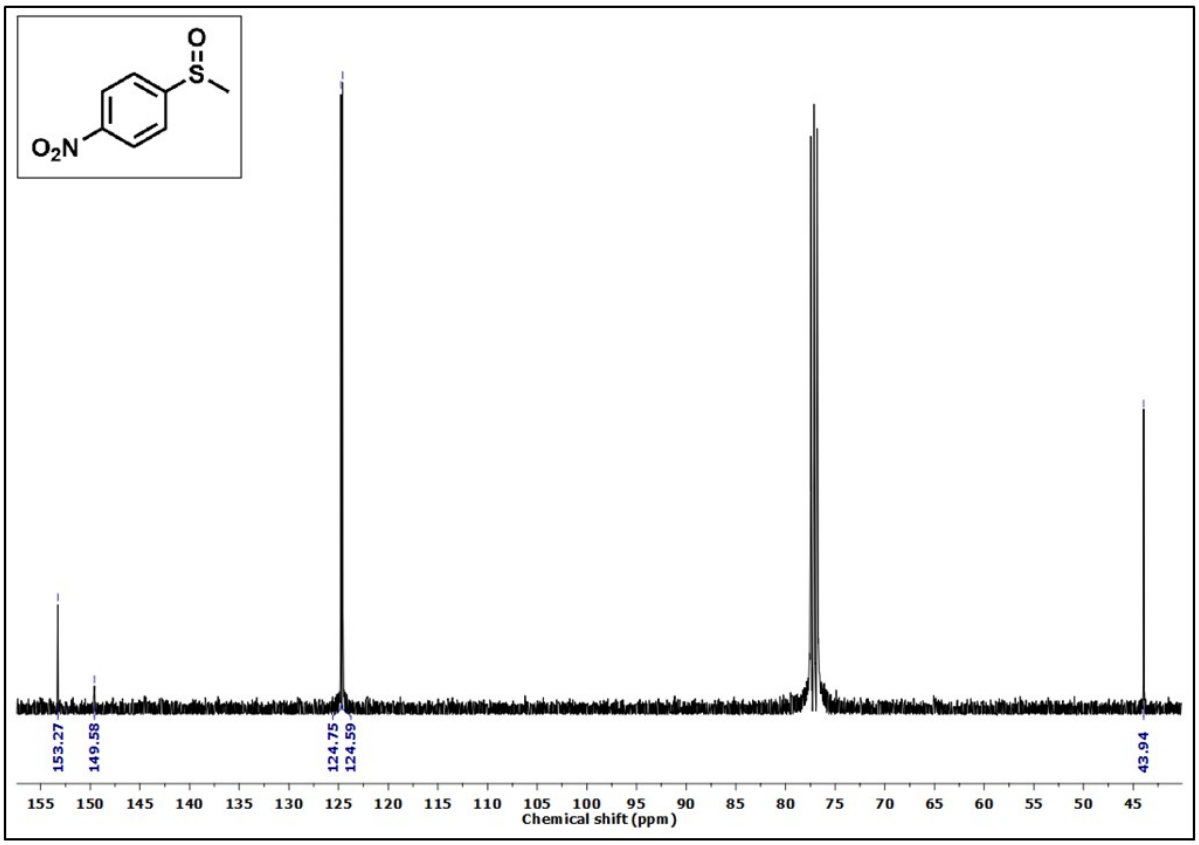


Fig. S18: ^{13}C NMR of methyl 4-nitrophenyl sulfoxide (**2f**).

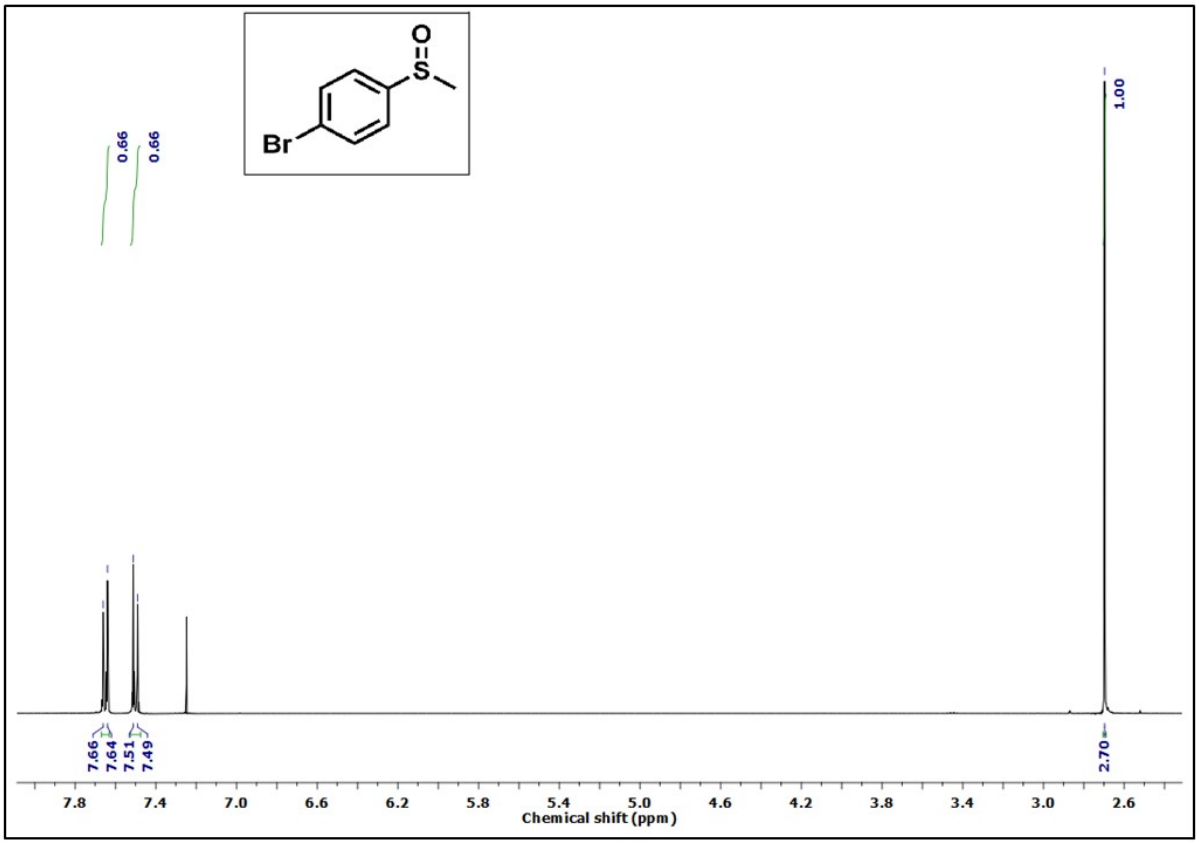


Fig. S19: ^{1}H NMR of methyl 4-bromophenyl sulfoxide (**2g**).

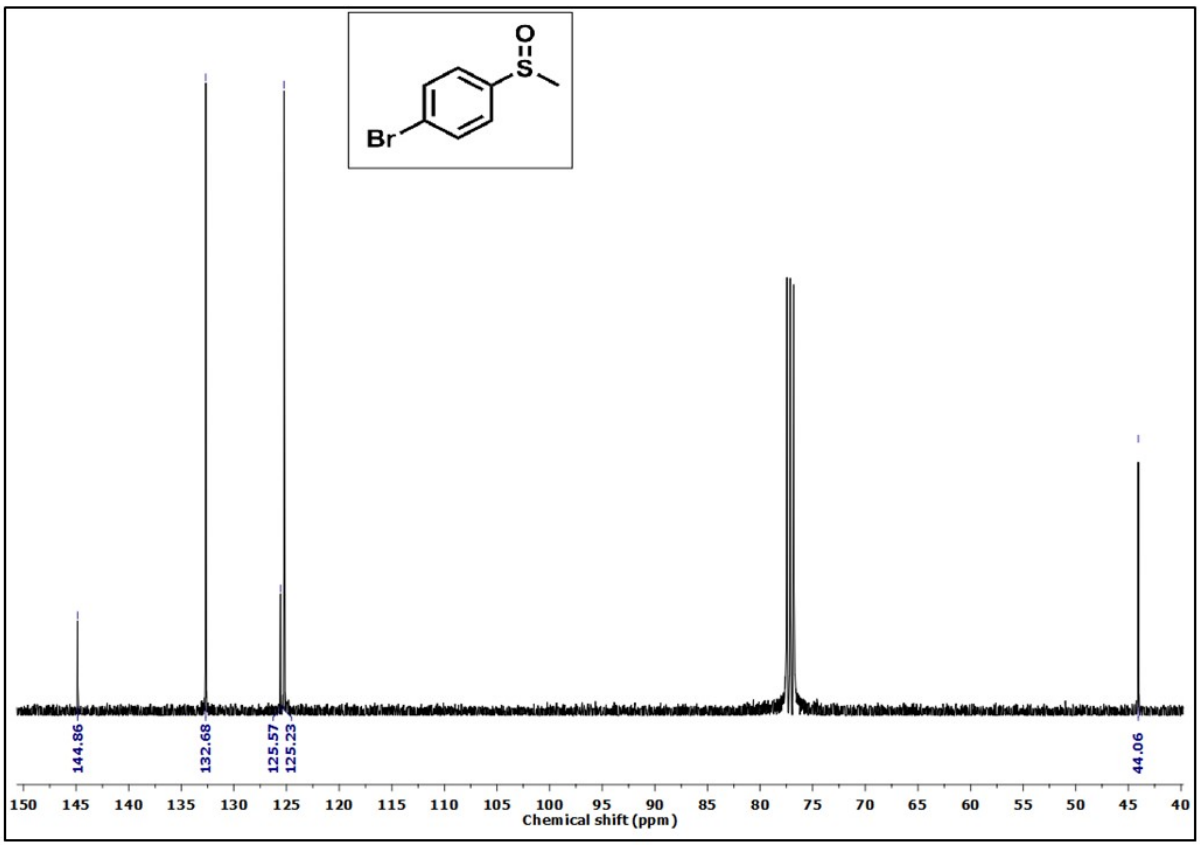


Fig. S20: ^{13}C NMR of methyl 4-bromophenyl sulfoxide (**2g**).

Mass spectra (MS) of the sulfoxide products

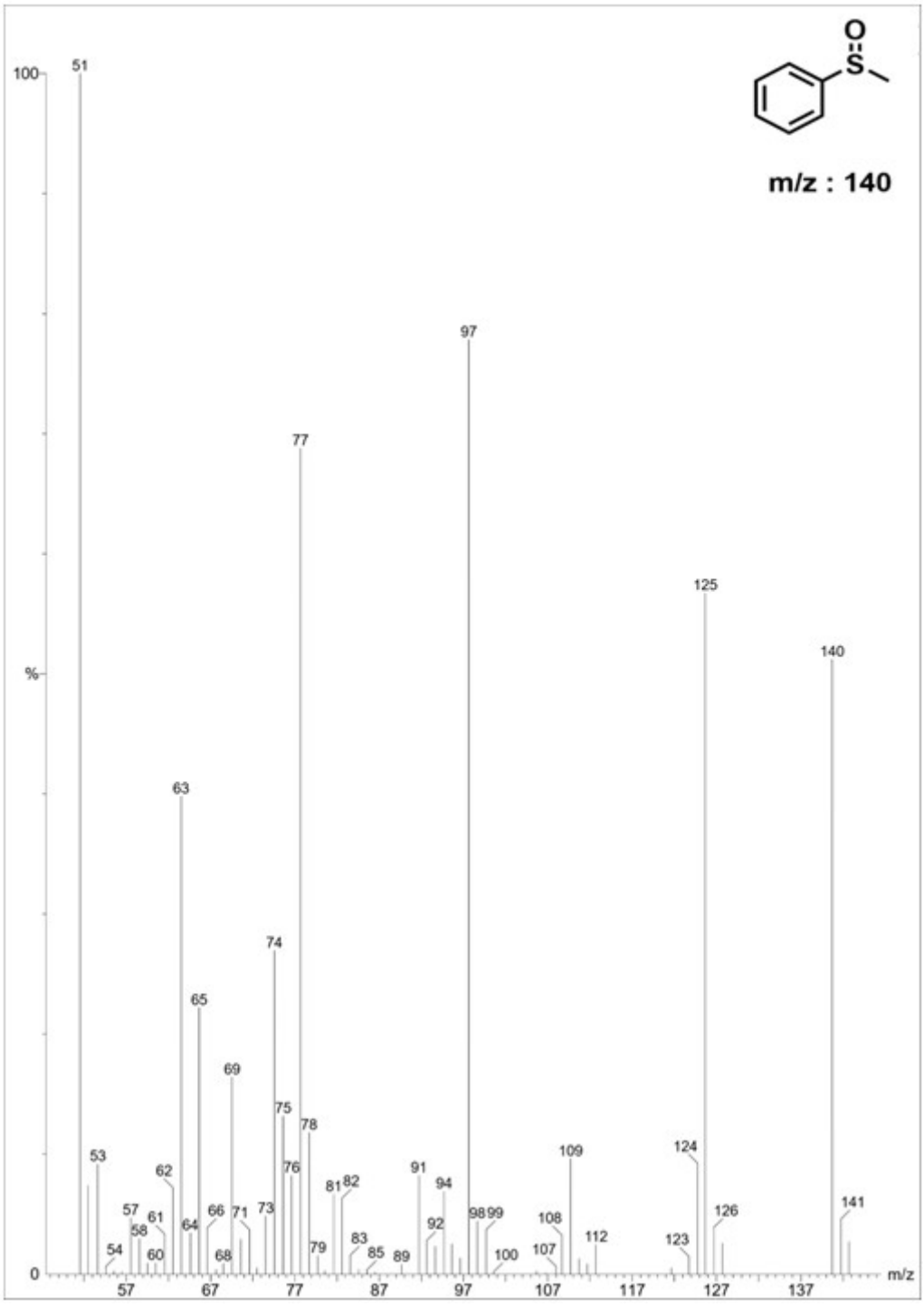


Fig. S21: Mass spectrum of **2a** [m/z = 140 (M^+), 125, 109, 98, 77, 63, 51 (100%)].

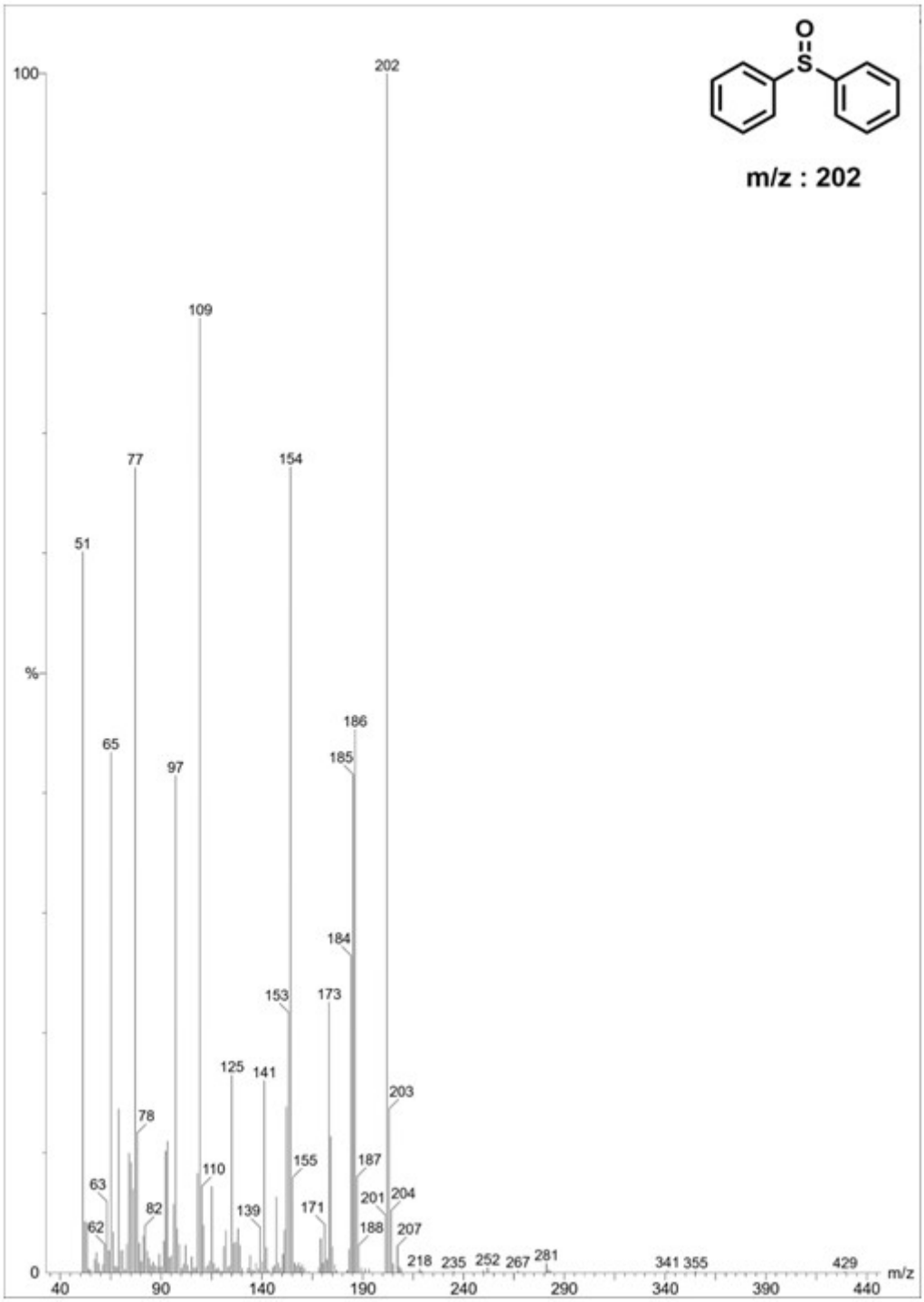


Fig. S22: Mass spectrum of **2b** [m/z = 202 (M^+, 100%), 186, 154, 125, 109, 77, 51].

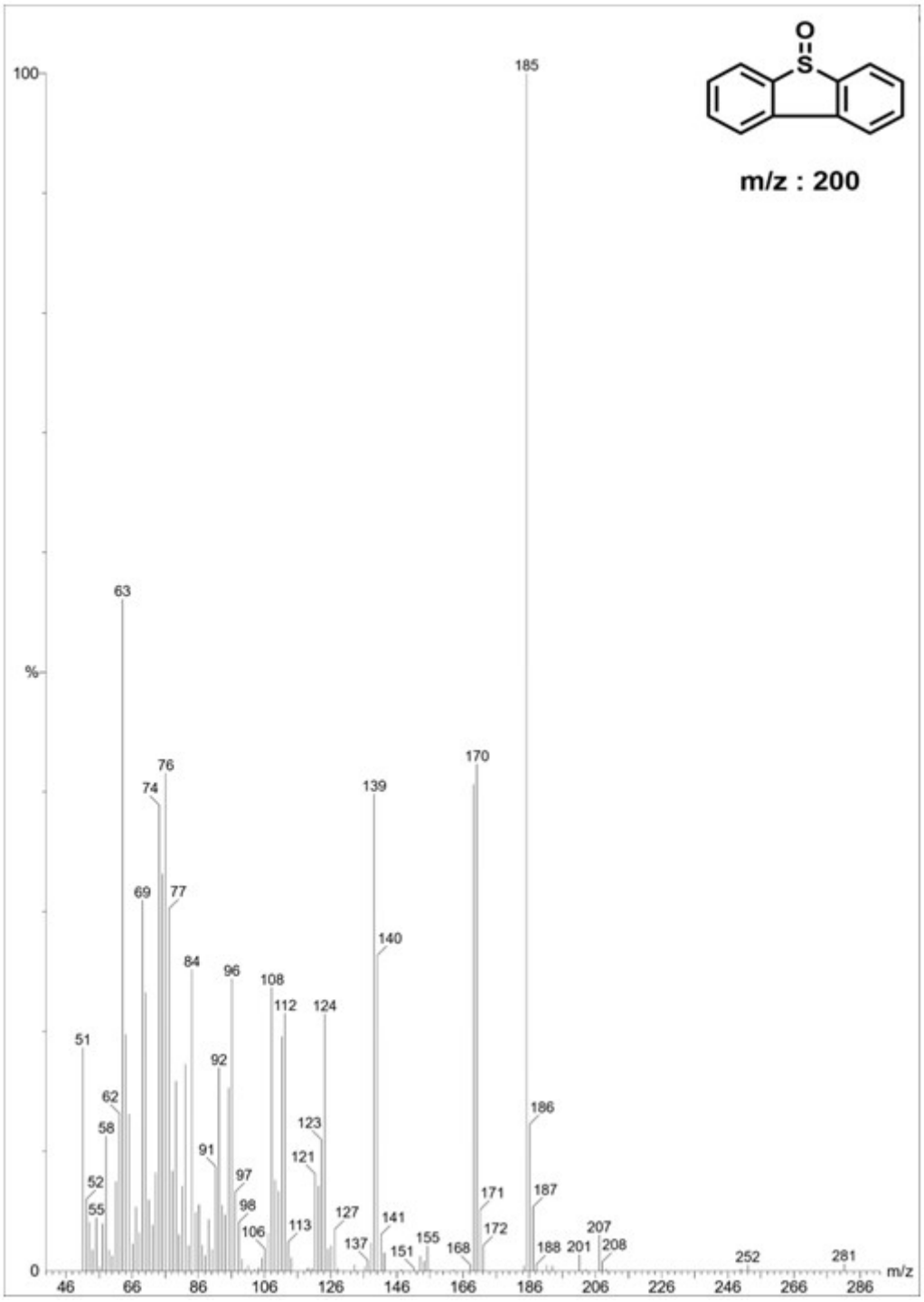


Fig. S23: Mass spectrum of **2d** [m/z = 201 ($M+1^+$), 185 (100%), 170, 140, 124, 108, 96, 76, 63, 51].

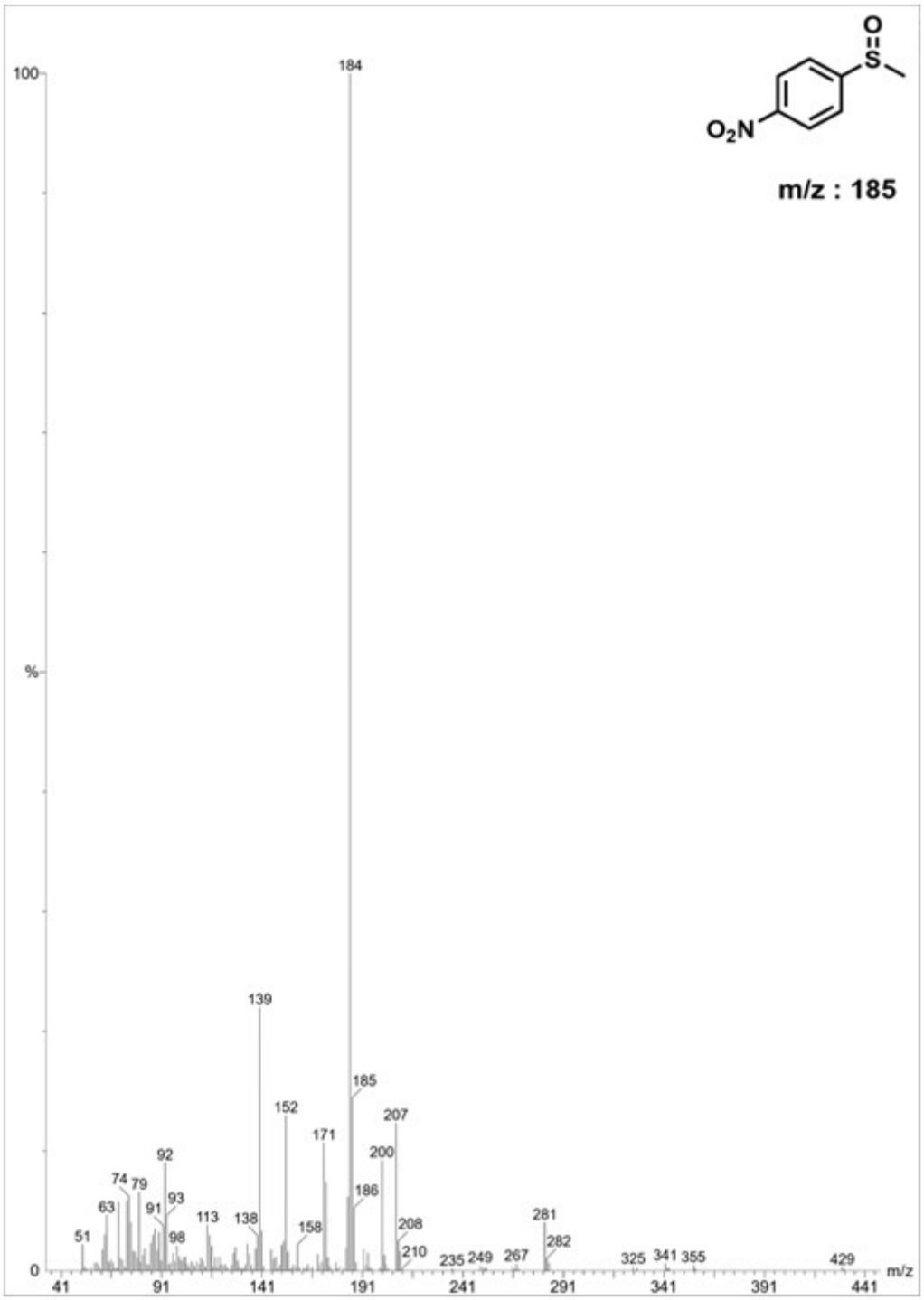


Fig. S24: Mass spectrum of **2f** [m/z = 185 (M^+), 184 (100%), 171, 158, 152, 139, 138, 113, 98, 91, 79, 63, 51].

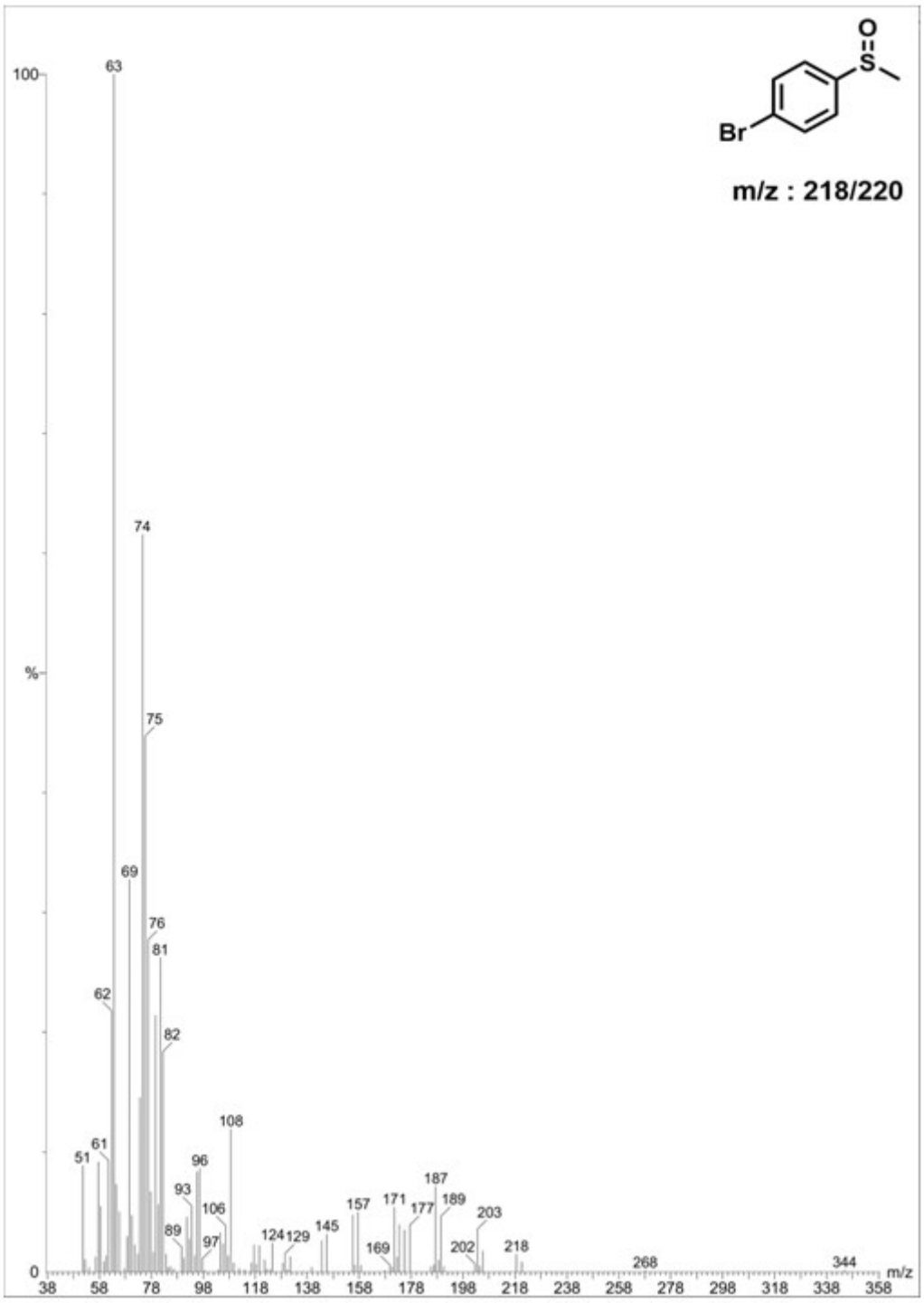


Fig. S25: Mass spectrum of **2g** [m/z = 220 (M^+), 218 (M^+), 189, 187, 157, 155, 131, 129, 108, 91, 89, 81, 79, 76, 63, 51].