Electronic Supplementary Information for

A supramolecular dimer strategy for enhancing the selective generation of sulfides and sulfoxides by visible-light induced photoredox thiol-ene cross-coupling reactions of anthraquinone

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Experimental section

Materials: Unless specifically mentioned, all chemicals are commercially available and were used as received.

Characterization

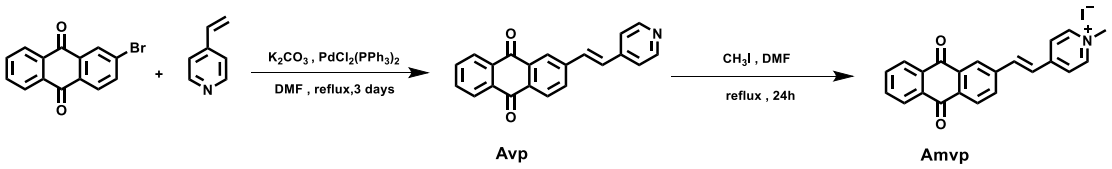
^{1}H NMR spectra was recorded on a Bruker Advance 400 spectrometer (400 MHz) at 298 K, and the chemical shifts (δ) were expressed in ppm and J values were given in Hz. UV-vis spectra were obtained on a Shimadzu UV-1601PC spectrophotometer in a quartz cell (light path 10 mm) at 298 K. Steady-state fluorescence measurements were carried out using a Hitachi 4500 spectrophotometer. Dynamic light scattering (DLS) and zeta potential are measured on Malvern Zetasizer Nano ZS90. Transmission electron microscopy (TEM) images were obtained on a JEM 2100 operating at 120 kV. Samples for TEM measurements were prepared by dropping the mixture aqueous solution on carbon-coated copper grid (300 mesh) and drying by slow evaporation. Electron paramagnetic resonance (EPR) spectroscopy was recorded with a Bruker EMXplus. The cyclic voltammetry (CV) of Amvp-CB[8] was performed on a CHI660C electrochemical workstation (Shanghai Chenhua, China), and the CV curves were obtained using a typical three electrode battery system, with calomel electrode as the reference electrode, glassy carbon (GC) as the working electrode, and Pt line as the counter electrode. Taking CV scans at a scanning rate of 100 mV s^{-1}. The photocatalytic reaction was performed on WATTCAS Parallel Photocatalytic Reactor (WP-TEC-HSL) with 10W COB LED. Hamamatsu absolute quantum yield measuring instrument Quantaurus-QY was used to obtain fluorescence quantum yields. The time-resolved fluorescence decay curve and photoluminescence spectra was obtained by the FLS5 Steady-State/Transient Fluorescence Spectrometer.

General procedure for the coupling reaction of styrene and 4-methylbenzenethiol:

Styrene (0.2 mmol, 20.8 mg) and 4-methylbenzenethiol (0.3 mmol, 37.2 mg) were added in the newly produced solution of Amvp-CB[8] (0.5 mol%, 2.0 mL, [Amvp]=5.0 × 10^{-4} M, CB[8]= 2.5 × 10^{-4} M). The reaction was irradiated with purple light (10 W, 395 nm) at room temperature under the ambient air condition for 0.5 h. Then the mixture was extracted with dichloromethane, and the combined organic layer was dried with anhydrous Na_2SO_4. Then the organic solvent was removed in vacuo and purified by flash column chromatography with petroleum ether/ethyl acetate to afford the products.

General procedure for the oxidation reaction of phenethyl(p-tolyl)sulfane:

Styrene (0.2 mmol, 20.8 mg) and 4-methylbenzenethiol (0.3 mmol, 37.2 mg) were added in the newly produced solution of Amvp-CB[8] (0.5 mol%, 2.0 mL, [Amvp]=5.0 × 10^{-4} M, CB[8]= 2.5 × 10^{-4} M). The reaction was irradiated with purple light (10 W, 395 nm) at room temperature under the ambient air condition for 12 h. Then the mixture was extracted with dichloromethane, and the combined organic layer was dried with anhydrous Na_2SO_4. Then the organic solvent was removed in vacuo and purified by flash column chromatography with petroleum ether/ethyl acetate to afford the products.



Scheme S1. Synthetic route of Amvp.

Synthesis of Amvp: The synthesis of Amvp was as shown in Scheme S1. 4-vinyl pyridine (4 mmol) was added into the solution of 2-dibromoanthracene-9,10-dione (1.148 g, 4.0 mmol) in DMF (30.0 mL), then $Pd(PPh_3)_2Cl_2$ (0.28 g, 0.4 mmol) and potassium carbonate (3.32 g, 24.0 mmol) were added. The mixed solution was refluxed for 3 days. The reaction mixture was then cooled to room temperature. The precipitate was dissolved in CH_2Cl_2 and the solution was washed with water for three times. After the solvent is removed, the product can be obtained by silica gel chromatography (petroleum ether:ethyl acetate = 1:2, v/v) as an orange yellow color solid (1.026 g, 82.5%). Avp (0.2 g, 0.643 mmol) was added in 5 mL of DMF, and CH_3I (0.71 g, 5.0 mmol) was then added. The mixed solution was stirred at 100 ℃ for 1 days. The resulting precipitate was collected by filtration and washed with CH_3CN several times. The resulting precipitation was collected through filtration and dried under vacuum to obtain Amvp as an orange precipitate (0.244 g, 85%). ^{1}H NMR (400 MHz, DMSO-d6) δ 8.98 - 8.94 (m, 2H), 8.54 (d, J = 1.8 Hz, 1H), 8.33 (dd, J = 7.5, 2.2 Hz, 3H), 8.30 - 8.21 (m, 4H), 8.00 - 7.96 (m, 2H), 7.86 (d, J = 16.4 Hz, 1H), 4.30 (s, 3H). ^{13}C NMR (101 MHz, DMSO-d6) δ 182.80, 182.47, 152.11, 145.92, 141.17, 138.70, 135.25, 135.13, 134.15, 133.87, 133.62, 133.52, 133.34, 128.23, 127.55, 127.34, 127.31, 126.64, 124.64, 47.66.

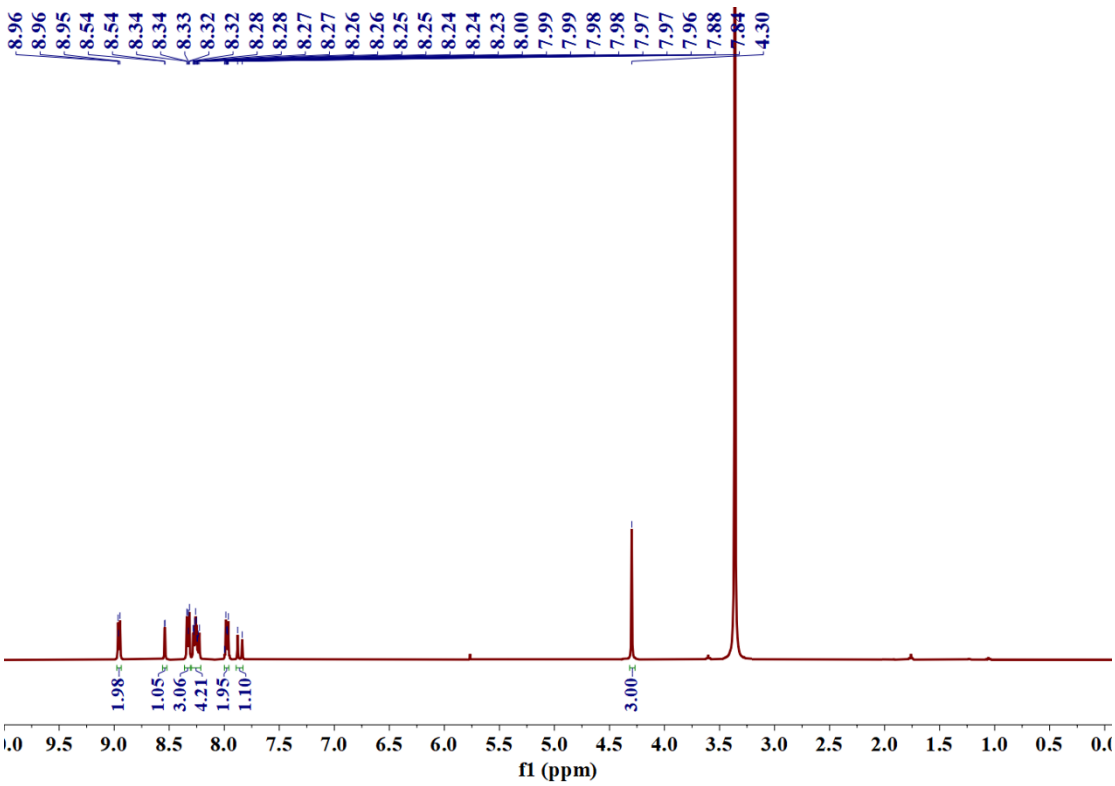


Fig. S1. ^{1}H NMR spectrum of compound Amvp in DMSO-d_6.

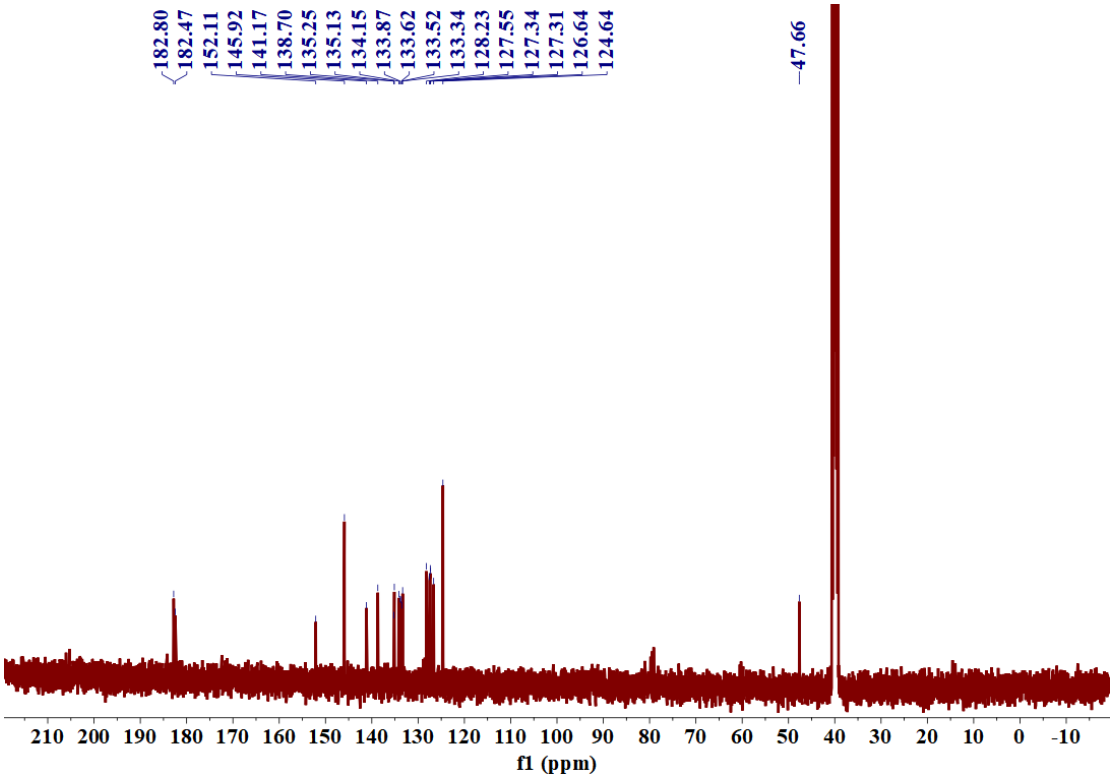


Fig. S2. ^{13}C NMR spectrum of compound Amvp in DMSO-d_6.

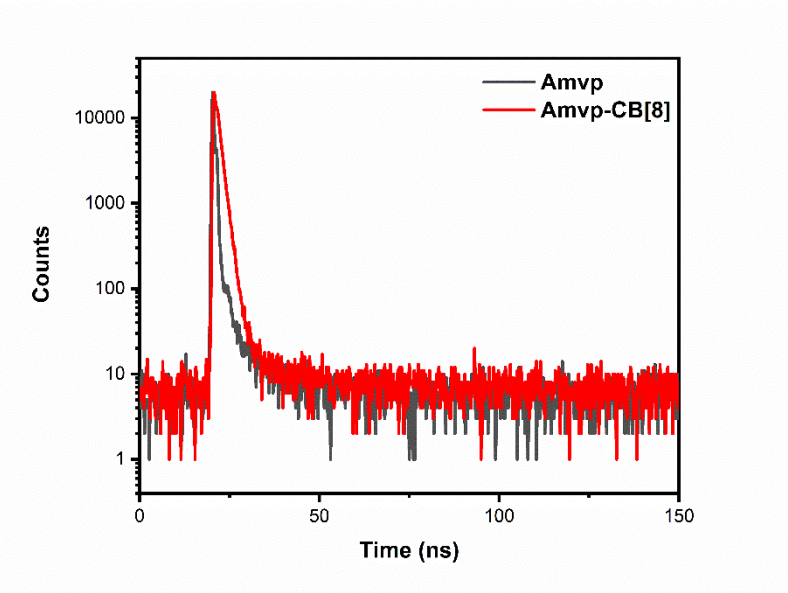
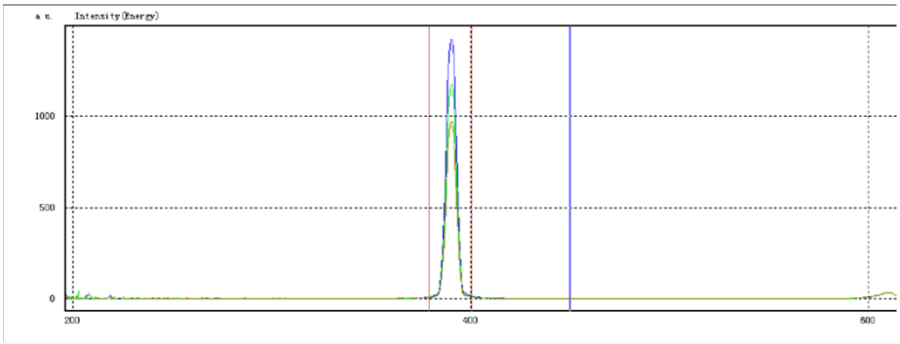


Fig. S3. Fluorescence lifetime maps of Amvp (0.66 ns) and fluorescence lifetime maps of Amvp-CB[8] (1.43 ns). ([Amvp]=2.0×10^{-5} M, [Amvp-CB[8]]=2.0×10^{-5} M).



N ...	Cursor1-2: 379.19 - 400.31(...	Cursor3-4: 449.99 - 618.05(...	QuantumYield	Abs	Peak Wavele...	Peak Co...	Peak FW...	Peak Wavele...	Peak Co...	Peak FW...
1	3482097	---	---	---	389.76	1418.61	5.99	610.63	35.40	11.33
2	2849975	23301	0.037	0.182	390.51	1172.28	5.95	610.63	34.07	10.73
3	2365850	102099	0.091	0.321	389.76	966.73	5.96	609.88	34.85	11.50

Fig. S4. Fluorescence quantum yields of Amvp and Amvp-CB[8] in H_2O. ([Amvp]=2.0×10^{-5} M, [Amvp-CB[8]]=2.0×10^{-5} M).

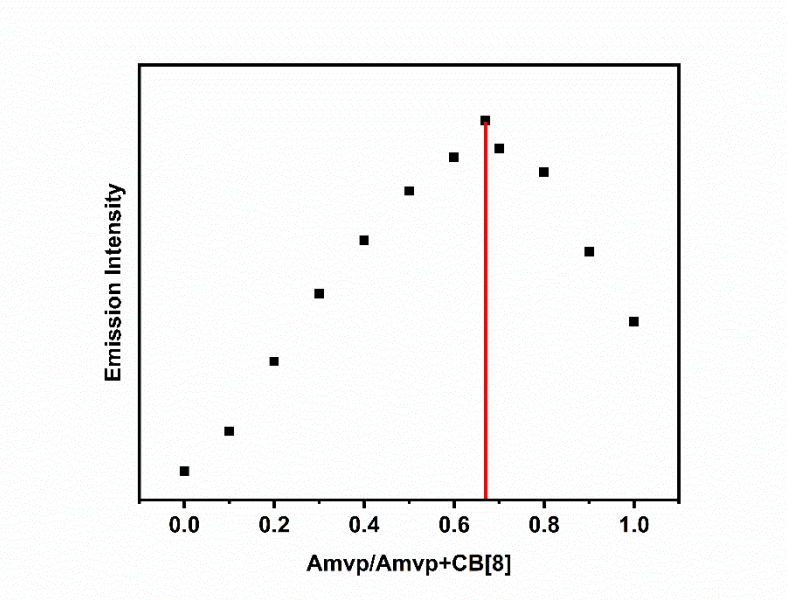


Fig. S5. Job's plot of Amvp and CB[8].

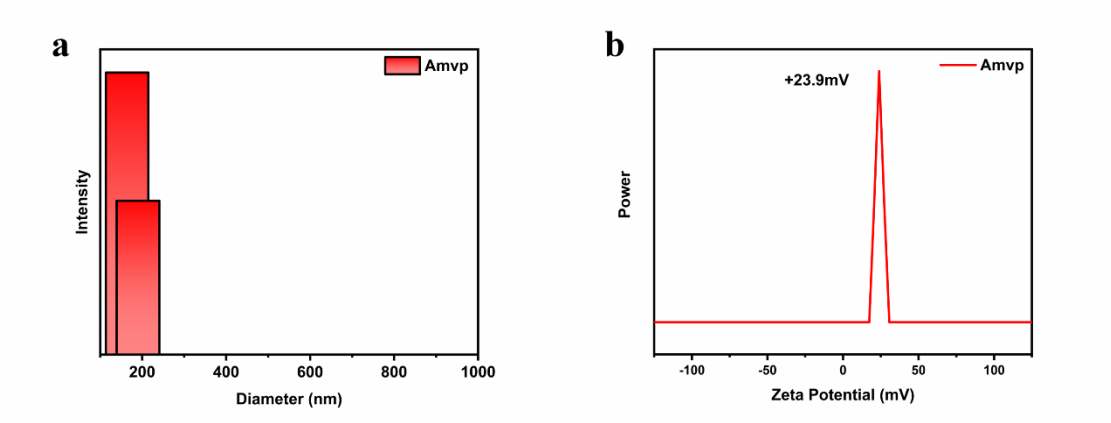


Fig. S6. (a) The particle size distribution of Amvp; (b) Zeta potential of Amvp. ([Amvp]=2.0×10^{-5} M).

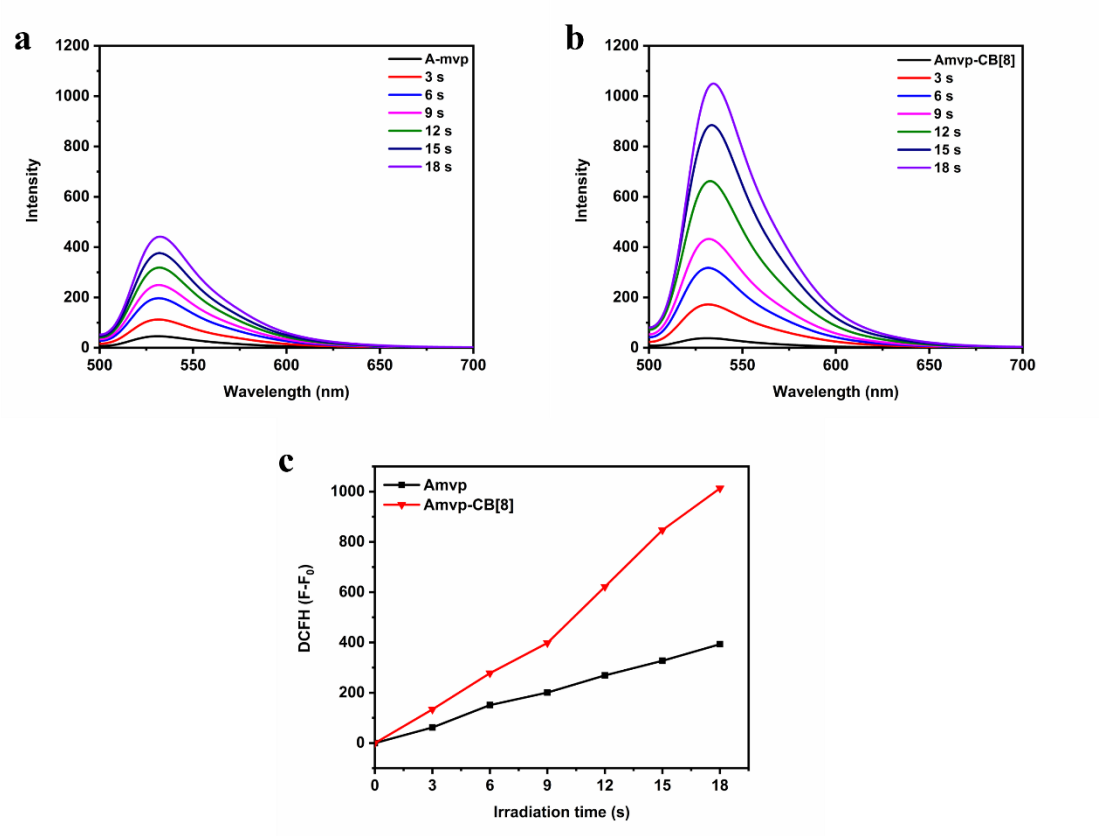


Fig. S7. The fluorescence spectra of DCFH (20 μM) after irradiation (390-400 nm) for different time in the presence of (a) Amvp and (b) Amvp-CB[8]; (c) Plots of $\Delta F(F-F_0)$ of DCFH at fluorescence emission maxima upon light irradiation for different time intervals in the presence of Amvp and Amvp-CB[8]. ([Amvp]=2.0×10^{-5} M, [Amvp-CB[8]]=2.0×10^{-5} M).

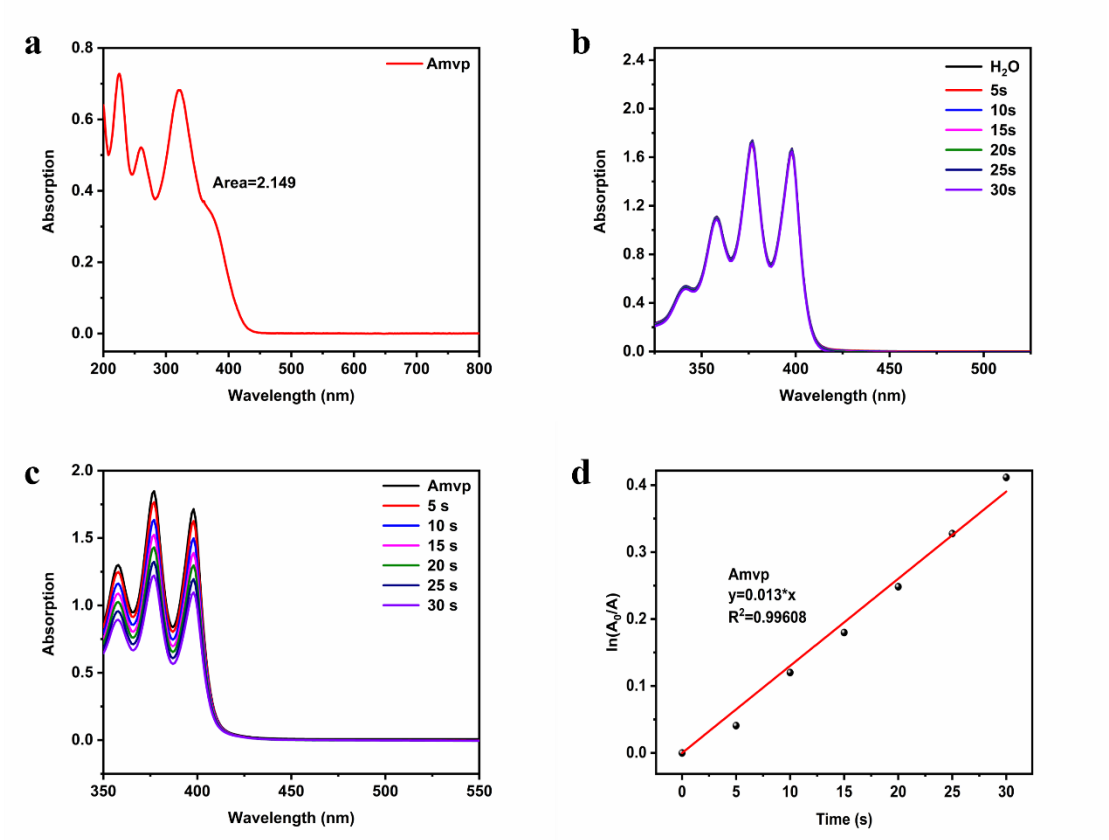


Fig. S8. (a) The UV-vis absorption spectra of Amvp in the aqueous solution; (b) The decomposition rates of ABDA in the presence of H_2O; (c) The absorption spectra of ABDA after irradiation (395 nm, 10 W) for different time in the presence of Amvp; (d) The decomposition rates of ABDA in the presence of Amvp. ([Amvp]=2.0×10^{-5} M).

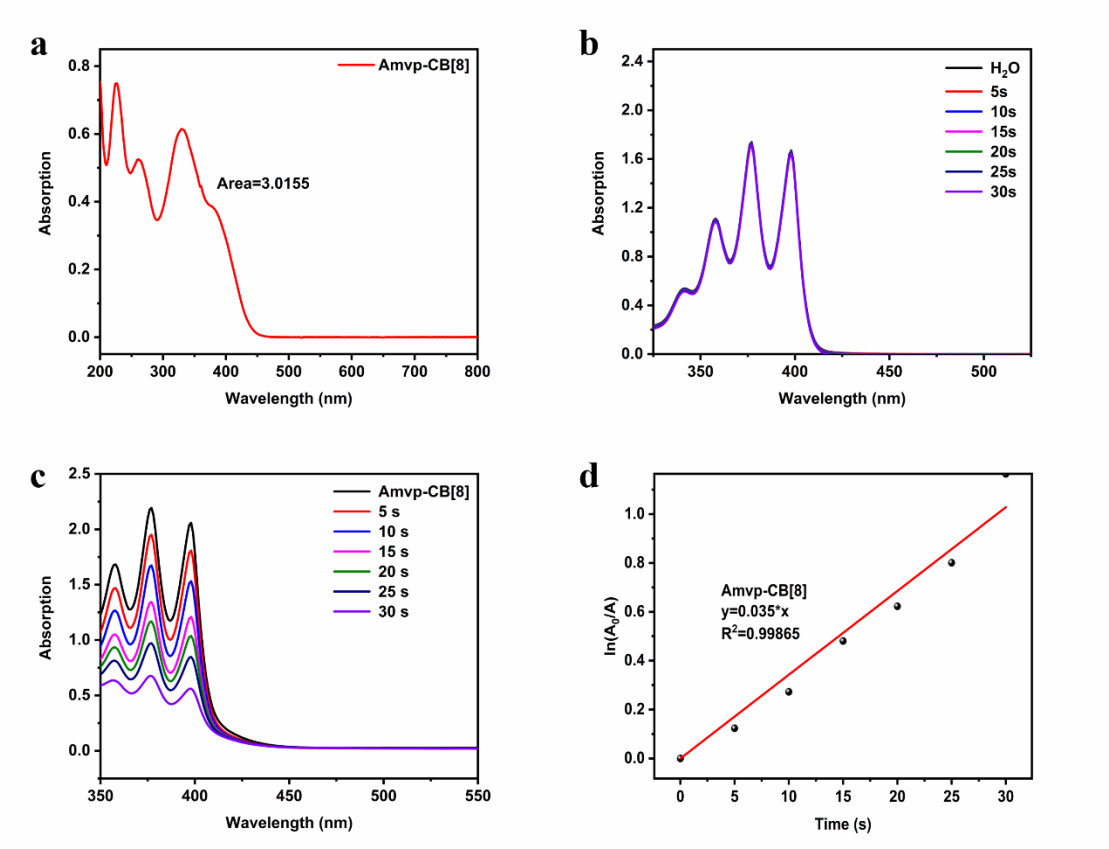


Fig. S9. (a) The UV-vis absorption spectra of Amvp-CB[8] in the aqueous solution; (b) The decomposition rates of ABDA in the presence of H_2O. (c) The absorption spectra of ABDA after irradiation (395 nm, 10 W) for different time in the presence of Amvp-CB[8]; (d) The decomposition rates of ABDA in the presence of Amvp-CB[8]. ([Amvp-CB[8]]=2.0×10^{-5} M).

Procedure for $^1O_2$ Quantum Yield Measurement.

The $^1O_2$ quantum yield was measured using Rose Bengal (RB) as the reference photosensitizer and calculated using the following S1:

$$\Phi_{probe}=\Phi_{RB}\times(K_{probe}A_{RB}/K_{RB}A_{probe}) \quad (S1)$$

where K_{probe} and K_{RB} are the decomposition rate constants of ABDA in the presence of the probe and RB, respectively. Φ_{RB} is the $^1O_2$ quantum yield of RB (Φ_{RB} = 0.75 in water). A_{probe} and A_{RB} represent the integration area of absorption bands ranging from 390 to 400 nm of the probe and RB, respectively. The ABDA (5.0×10^{-5} mol) in 3 mL of the probe solution was exposed to purple light irradiation (395 nm) with a power density of 10W. The natural logarithm of the absorbance ratio (A_0/A) of ABDA at 380 nm was plotted against irradiation time and the slope is regarded as the decomposition rate.

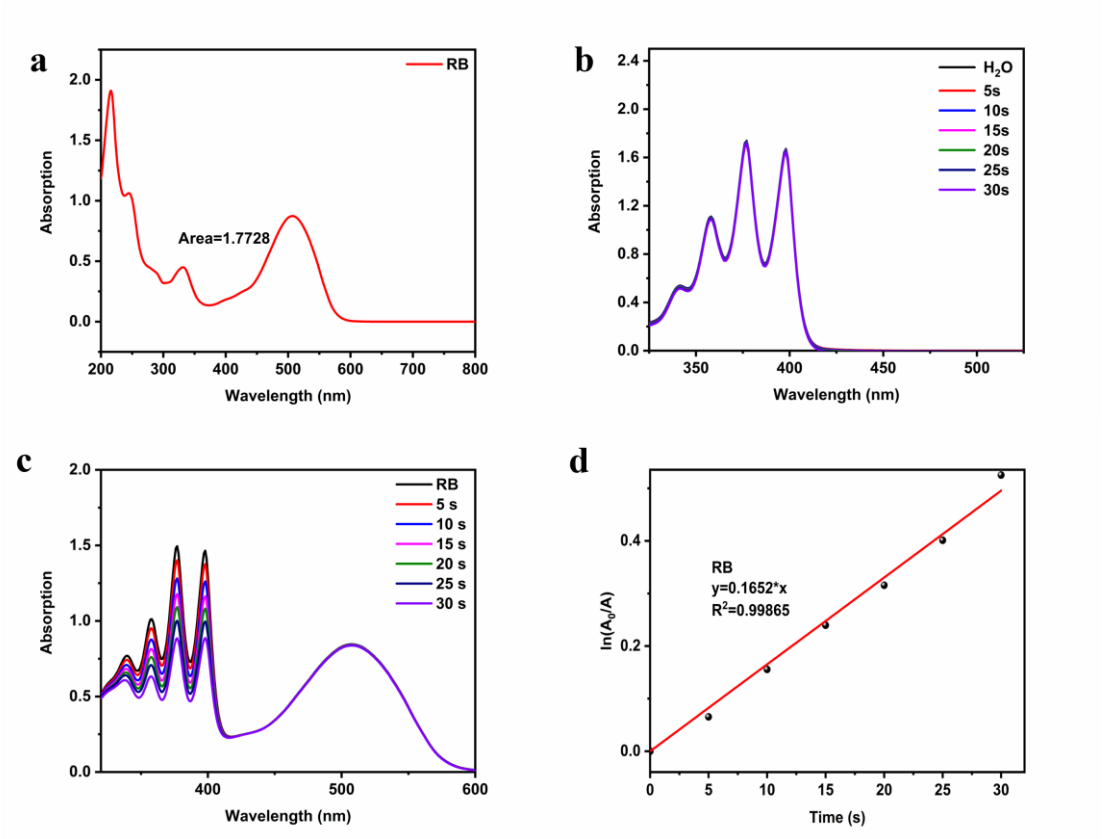


Fig. S10. (a)The UV-vis absorption spectra of RB in the aqueous solution; (b) The decomposition rates of ABDA in the presence of H_2O. (c) The absorption spectra of ABDA after irradiation (395 nm, 10 W) for different time in the presence of RB; (d) The decomposition rates of ABDA in the presence of RB. ([RB]=2.0×10^{-5} M).

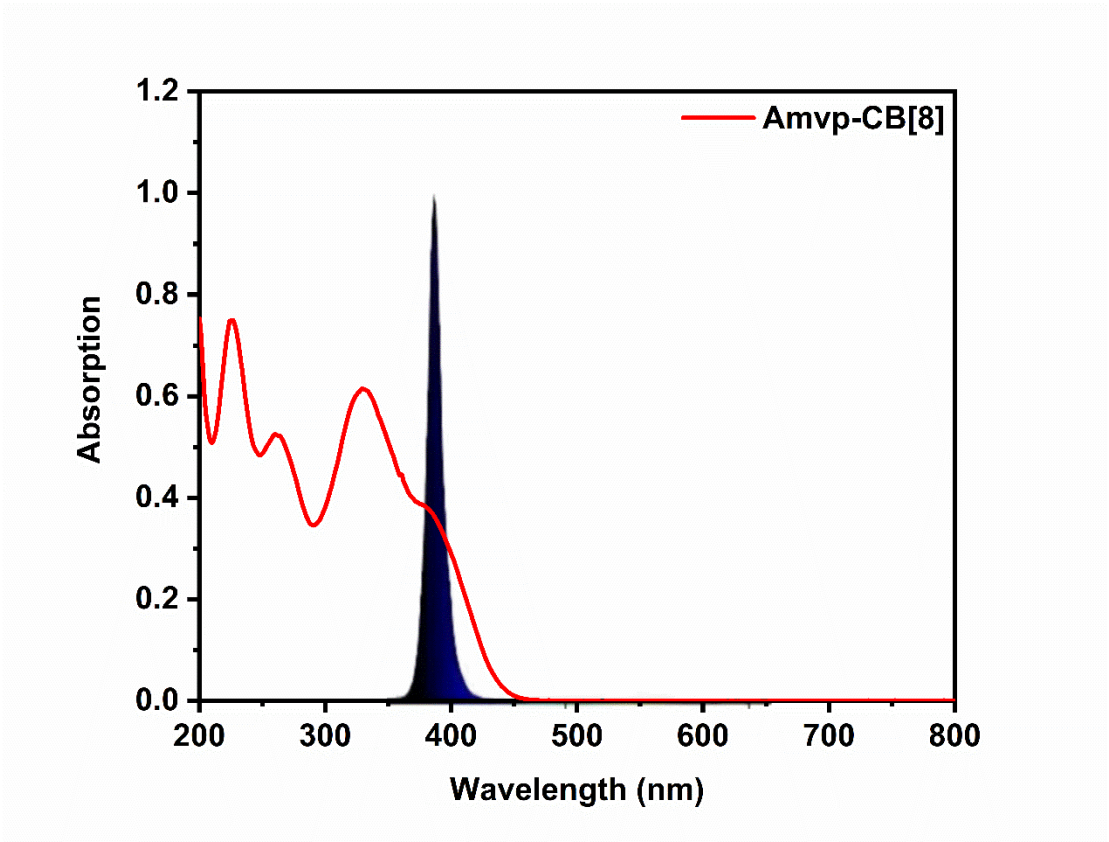


Fig. S11. The UV-vis overlapped absorption spectra of the light source and Amvp-CB[8]. ([Amvp-CB[8]]=2.0×10^{-5} M).

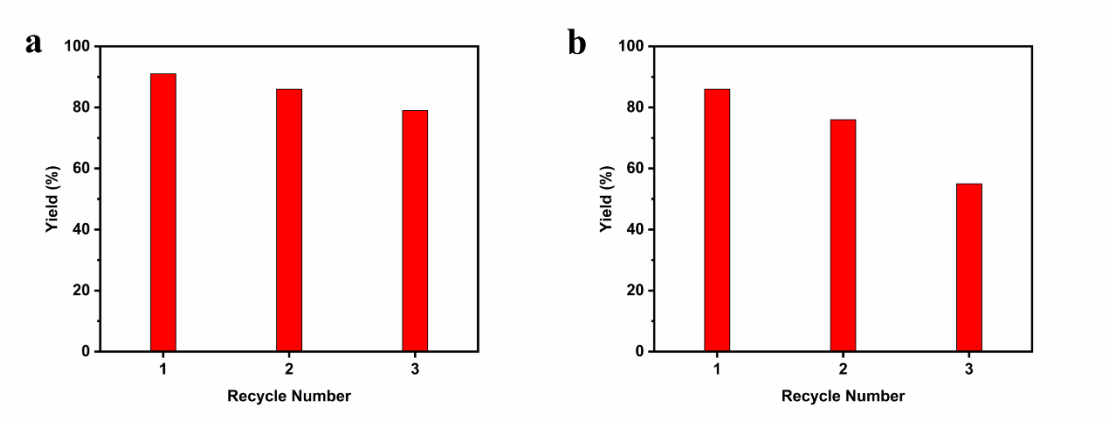


Fig. S12. Photocatalytic activity of Amvp-CB[8] after recycling for photoredox thiol-ene cross-coupling reaction of sulfide (a) and sulfoxide (b).

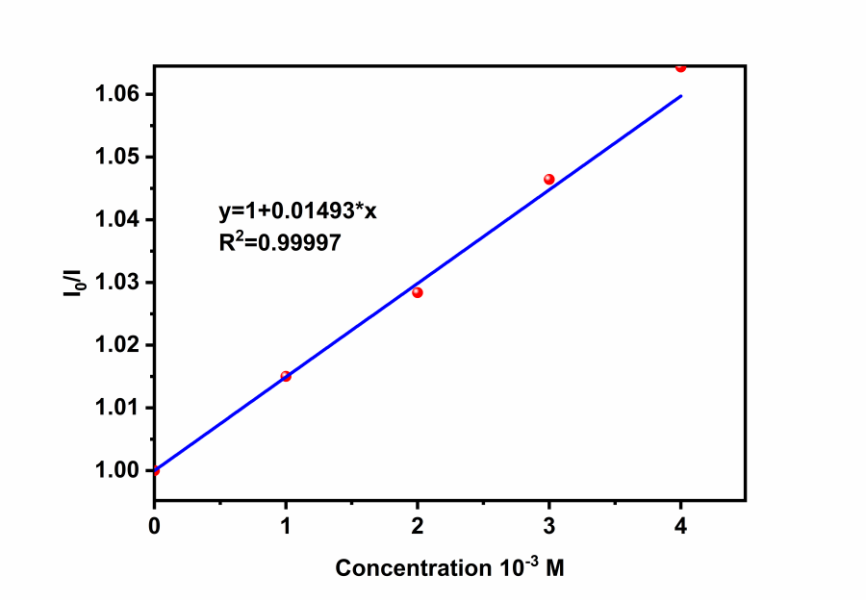


Fig. S13. Stern-Volmer quenching studies of Amvp-CB[8] with styrene Quenching constant, k_q = 5.05 × 10^4 M^{-1} s^{-1} for styrene (monitoring emission at λ_{ex}= 542 nm). ([Amvp-CB[8]]=2.0×10^{-5} M).

According to the Stern-Volmer equations: $I_0/I = 1 + k_{sv}[Q] = 1 + k_q \tau_0 [Q]$ where τ_0 is the lifetimes of radical anion (1.43 ns), and I_0 and I are the emission intensities in the absence and in the presence of the quencher Q, respectively, k_{sv} is the Stern Volmer constant and k_q is the quenching constant.

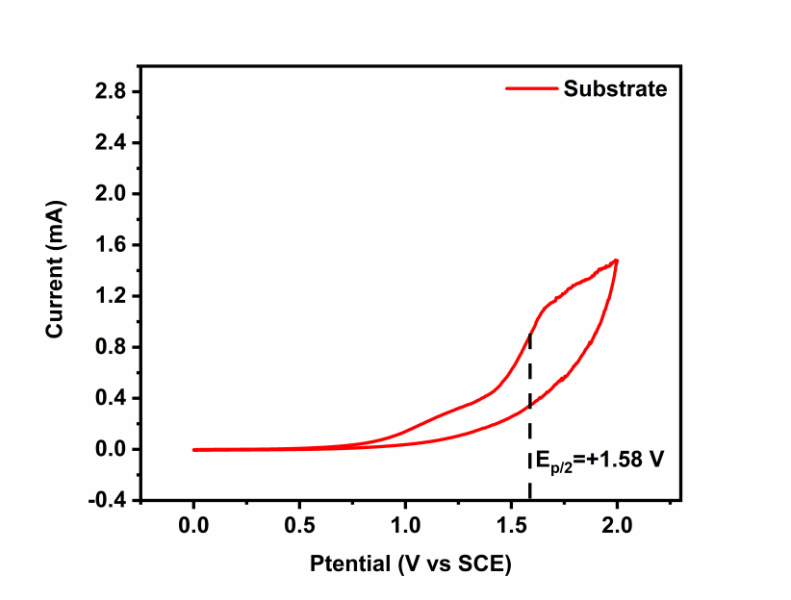
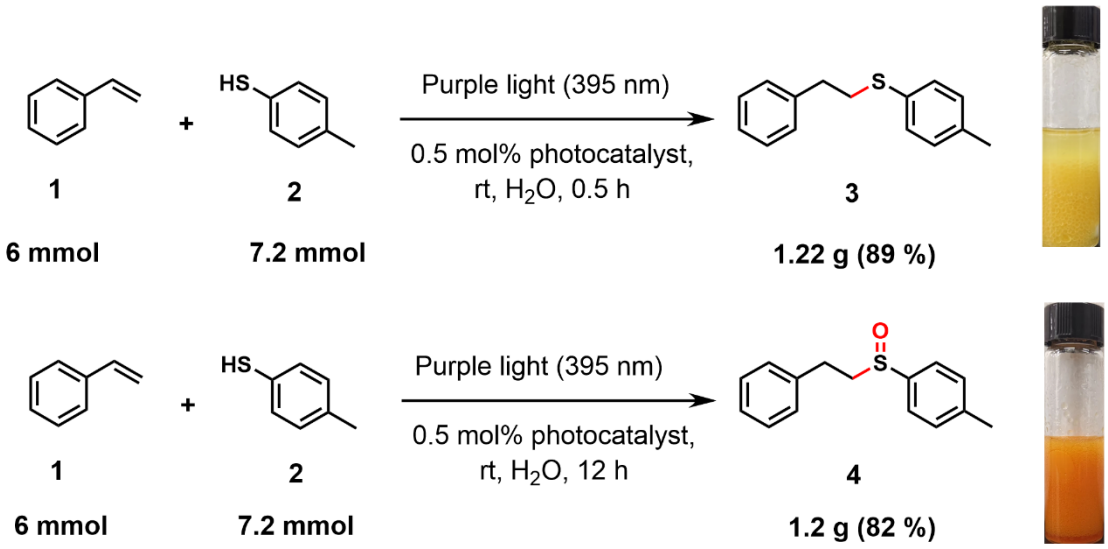


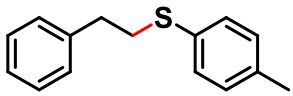
Fig. S14. CV experimental spectrum of 4-methylthiophenol (1.0×10^{-3} M).



Scheme S2. Amplification experiment of the photocatalytic reaction.

^{1}H NMR and ^{13}C NMR data of 3a-3ab and 4a-4o

3a. phenethyl(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3a as a colorless oil (41.5 mg, 91% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31 - 7.25 (m, 4H), 7.23 - 7.19 (m, 1H), 7.19 - 7.15 (m, 2H), 7.10 (d, *J* = 7.9 Hz, 2H), 3.16 - 3.08 (m, 2H), 2.89 (dd, *J* = 9.4, 6.4 Hz, 2H), 2.32 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 140.38, 136.25, 132.50, 130.14, 129.78, 128.57, 128.53, 126.44, 35.86, 35.79, 21.08.

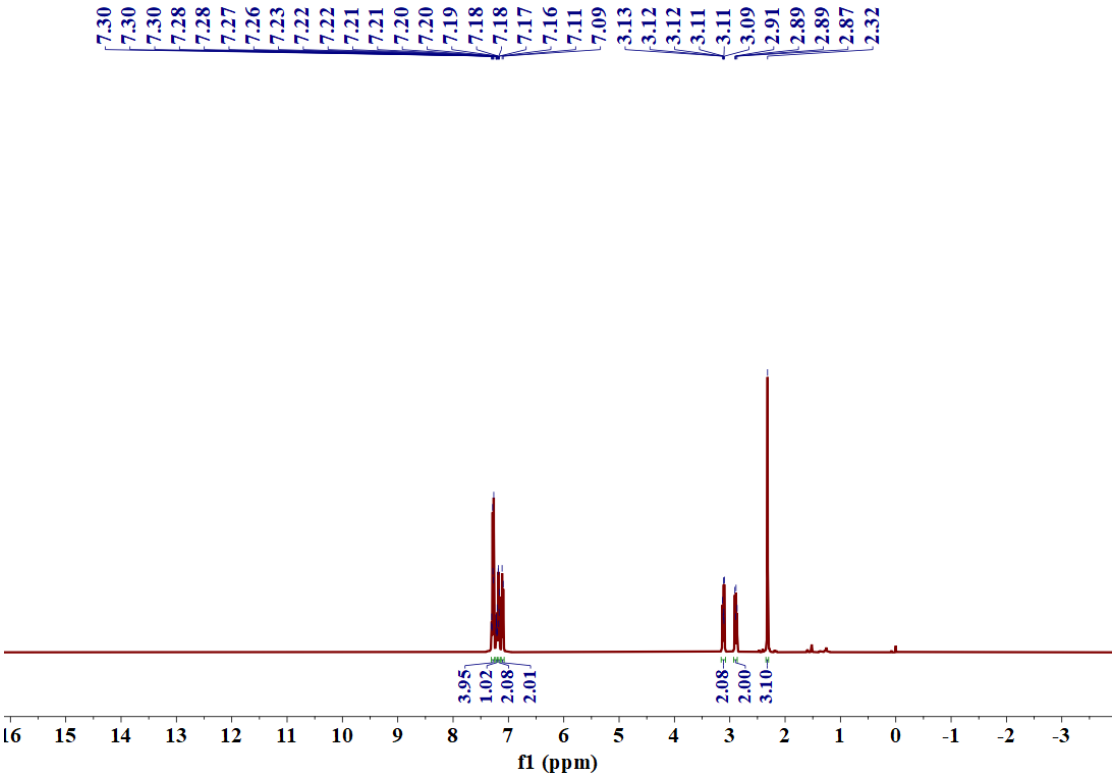


Fig. S15. ^{1}H NMR spectra of phenethyl(p-tolyl)sulfane in $CDCl_3$.

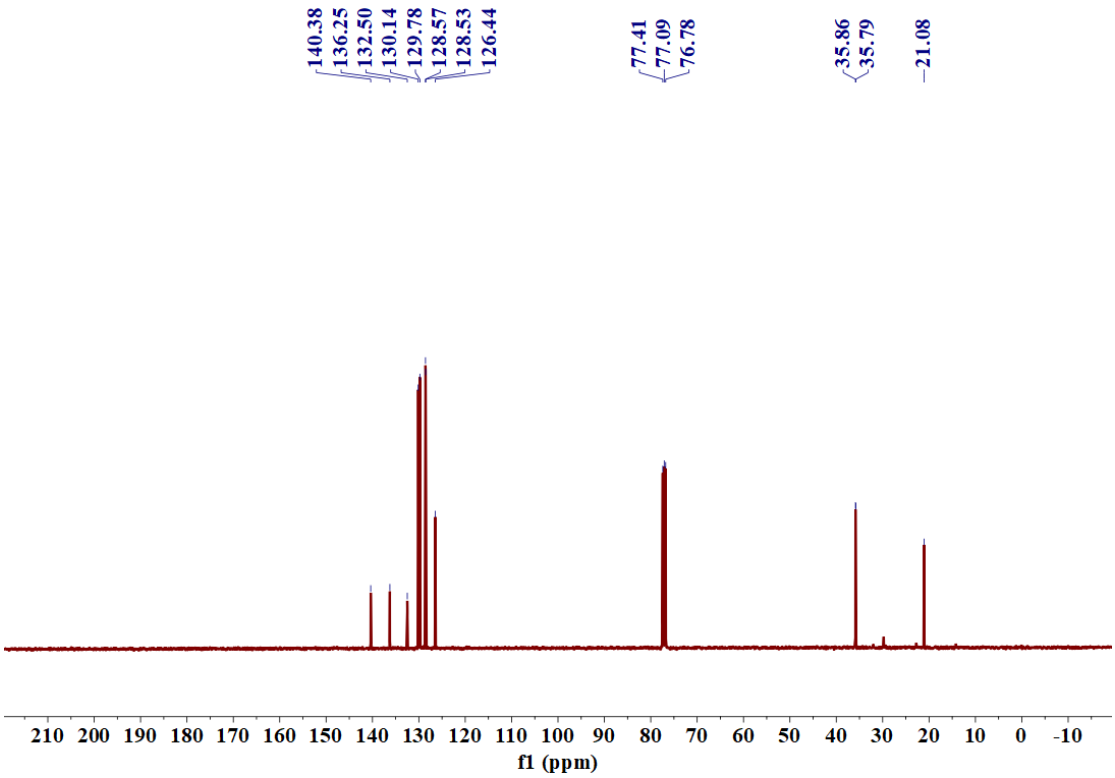
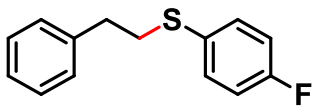


Fig. 16. ^{13}C NMR spectra of phenethyl(p-tolyl)sulfane in $CDCl_3$.

3b. (4-fluorophenyl)(phenethyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3b as a colorless oil (38.1 mg, 82% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.26 - 7.20 (m, 2H), 7.17 (dd, *J* = 8.1, 6.7 Hz, 2H), 7.13 - 7.07 (m, 1H), 7.07 - 7.02 (m, 2H), 6.87 (t, *J* = 8.7 Hz, 2H), 2.98 (dd, *J* = 9.2, 6.4 Hz, 2H), 2.76 (dd, *J* = 9.3, 6.5 Hz, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 163.06, 160.61, 140.14, 132.43, 132.35, 131.26, 131.23, 128.62, 128.60, 126.58, 116.24, 116.02, 36.52, 35.79.

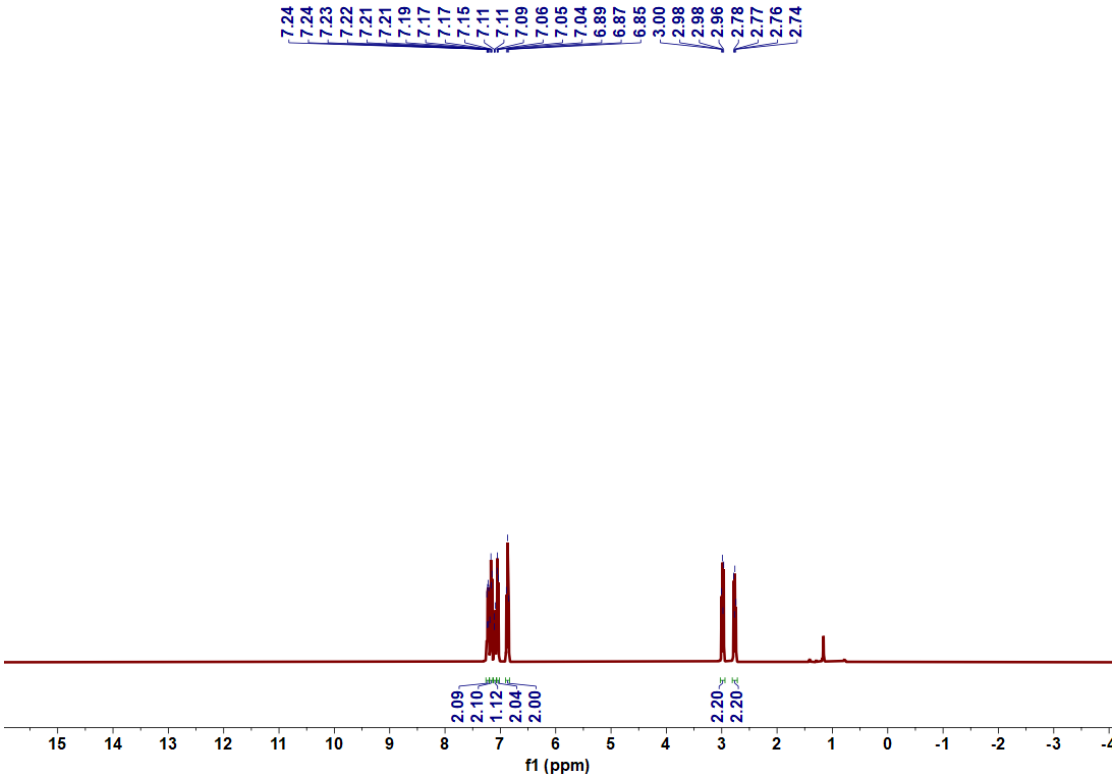


Fig. S17. ^{1}H NMR spectra of (4-fluorophenyl)(phenethyl)sulfane in $CDCl_3$.

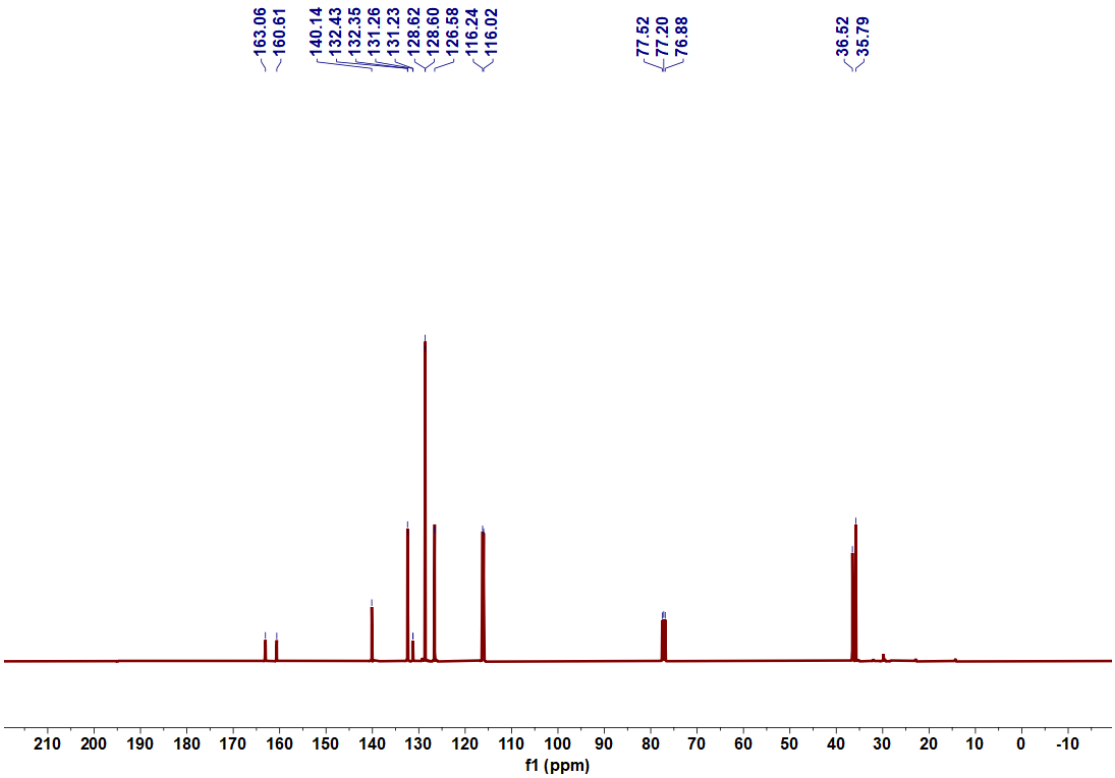
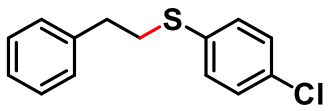


Fig. S18. ^{13}C NMR spectra of (4-fluorophenyl)(phenethyl)sulfane in $CDCl_3$.

3c. (4-chlorophenyl)(phenethyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3c as yellow oil (41.2 mg, 83% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 - 7.21 (m, 7H), 7.21 - 7.15 (m, 2H), 3.13 (dd, *J* = 9.1, 6.6 Hz, 2H), 2.90 (dd, *J* = 9.2, 6.5 Hz, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 139.96, 134.93, 131.99, 130.58, 129.09, 128.60, 128.54, 126.60, 35.54, 35.40.

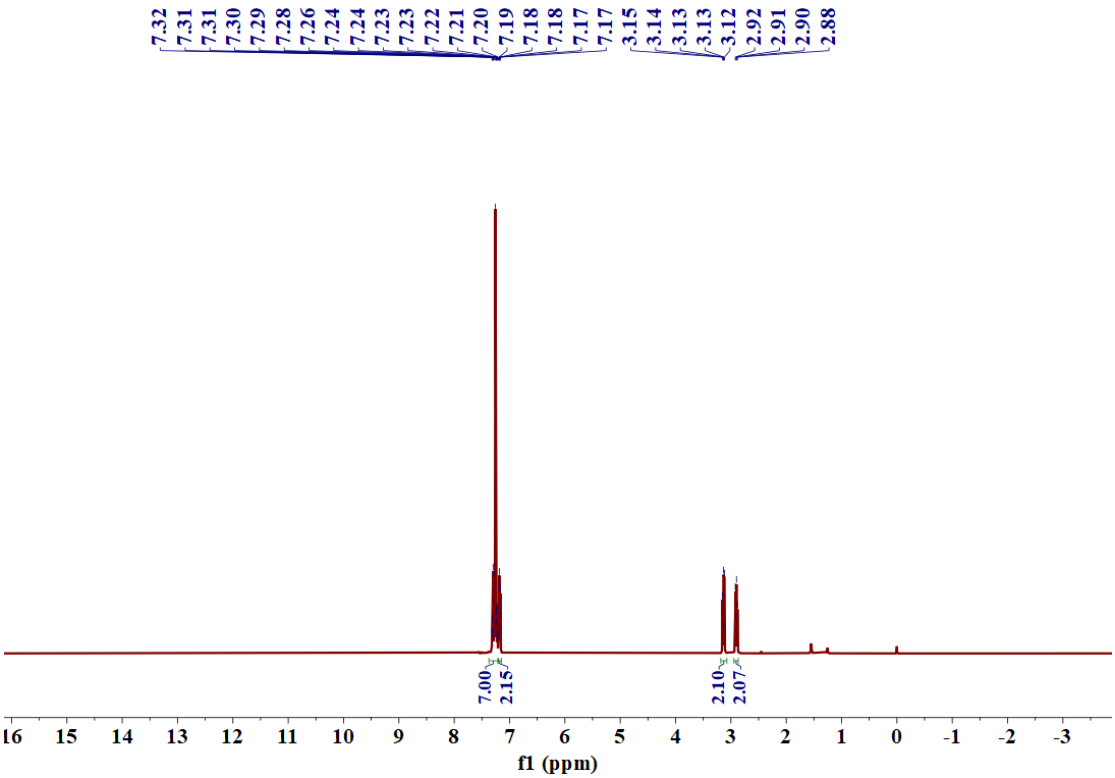


Fig. S19. 1H NMR spectra of (4-chlorophenyl)(phenethyl)sulfane in $CDCl_3$.

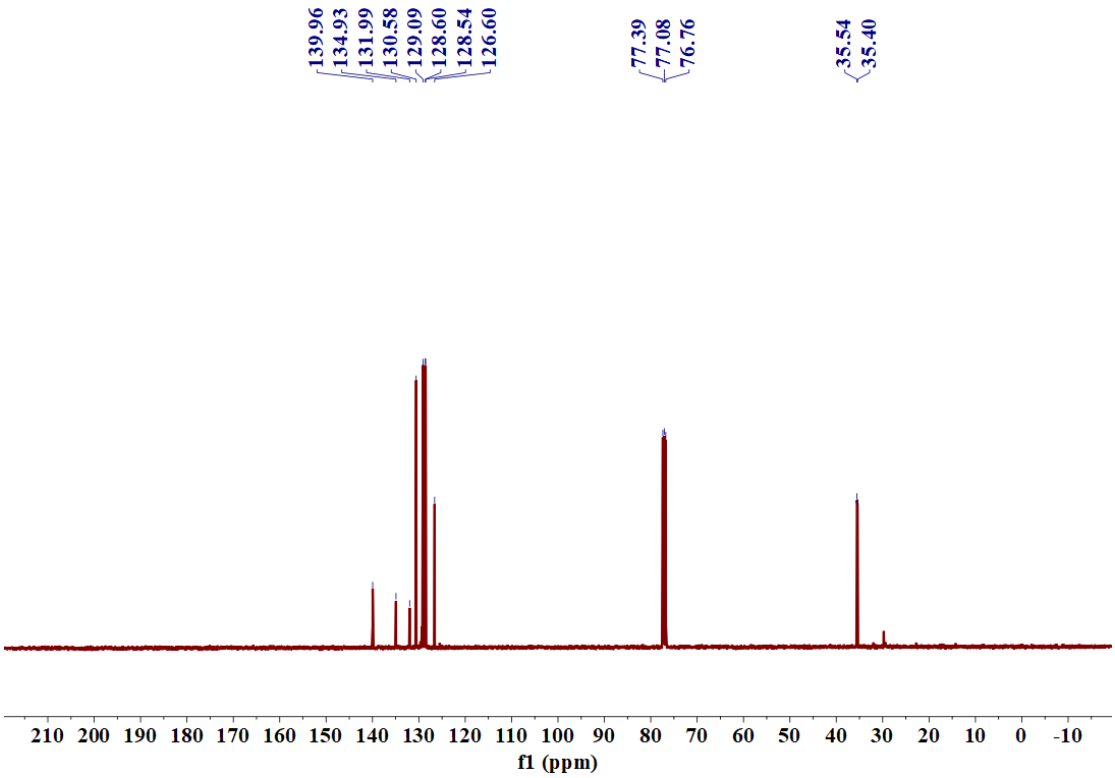
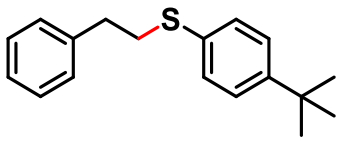


Fig. S20. ^{13}C NMR spectra of (4-chlorophenyl)(phenethyl)sulfane in $CDCl_3$.

3d. (4-(tert-butyl)phenyl)(phenethyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3d as a colorless oil (50.2 mg, 93% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35 - 7.27 (m, 6H), 7.25 - 7.16 (m, 3H), 3.18 - 3.12 (m, 2H), 2.92 (dd, *J* = 9.4, 6.4 Hz, 2H), 1.31 (s, 9H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 149.36, 140.37, 132.66, 129.47, 128.54, 128.51, 126.43, 126.02, 35.82, 35.51, 34.49, 31.31.

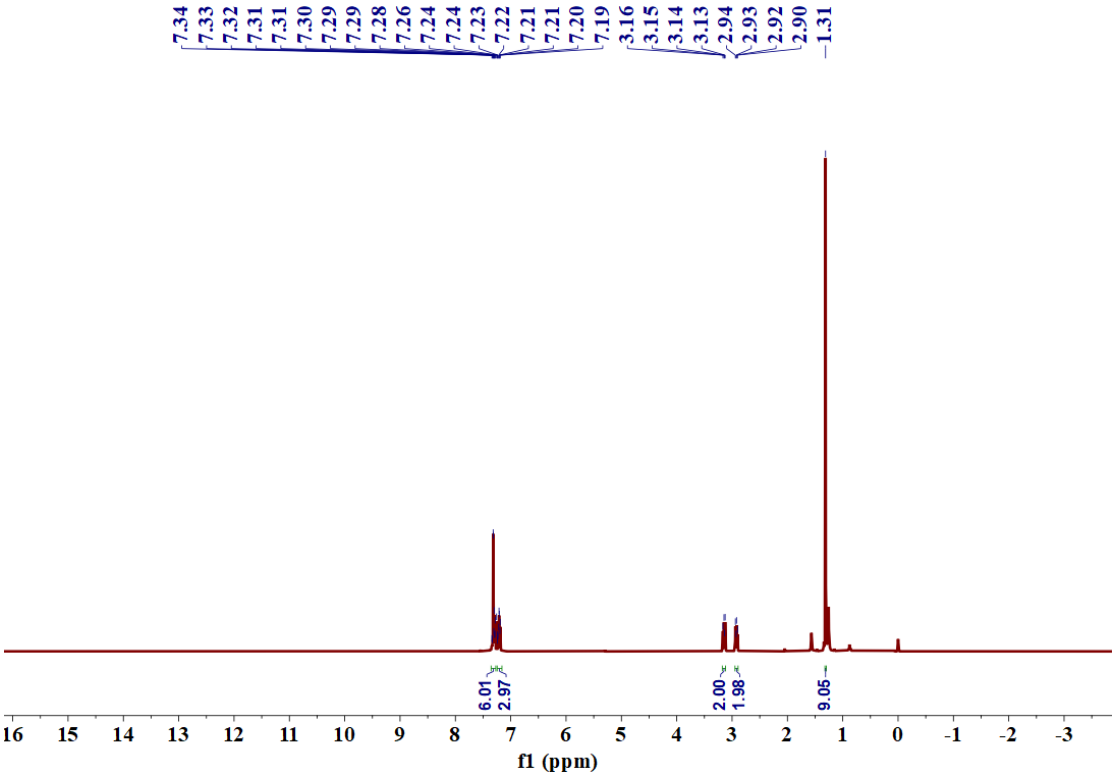


Fig. S21. ^{1}H NMR spectra of (4-(tert-butyl)phenyl)(phenethyl)sulfane in $CDCl_3$.

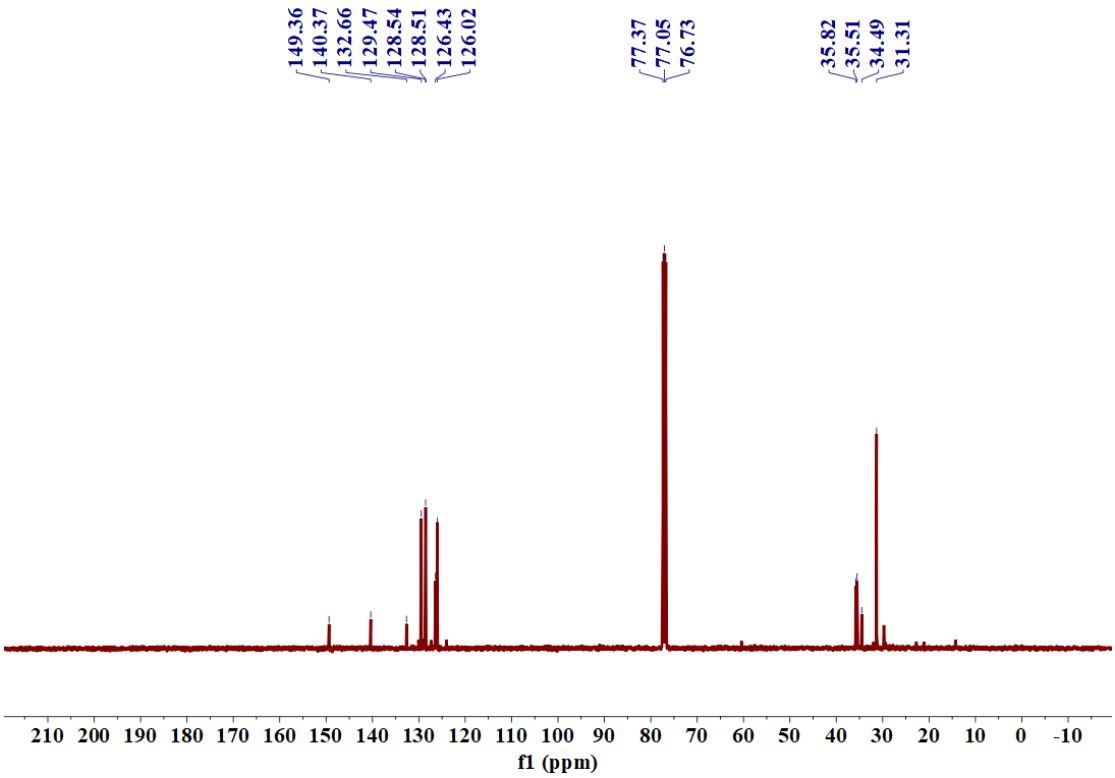
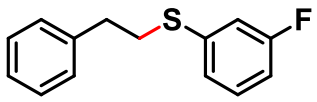


Fig. S22. ^{13}C NMR spectra of (4-(tert-butyl)phenyl)(phenethyl)sulfane in CDCl3.

3e. (3-fluorophenyl)(phenethyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3e as a colorless oil (36.2 mg, 78% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30 (dd, *J* = 8.0, 6.6 Hz, 2H), 7.26 - 7.17 (m, 4H), 7.08 (m, 1H), 7.02 (m, 1H), 6.89 - 6.82 (m, 1H), 3.17 (dd, *J* = 8.9, 6.7 Hz, 2H), 2.93 (dd, *J* = 9.2, 6.5 Hz, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 164.19, 161.73, 139.93, 139.14, 139.06, 130.25, 130.17, 128.63, 128.56, 126.65, 124.10, 124.07, 115.34, 115.11, 112.83, 112.62, 35.43, 34.67.

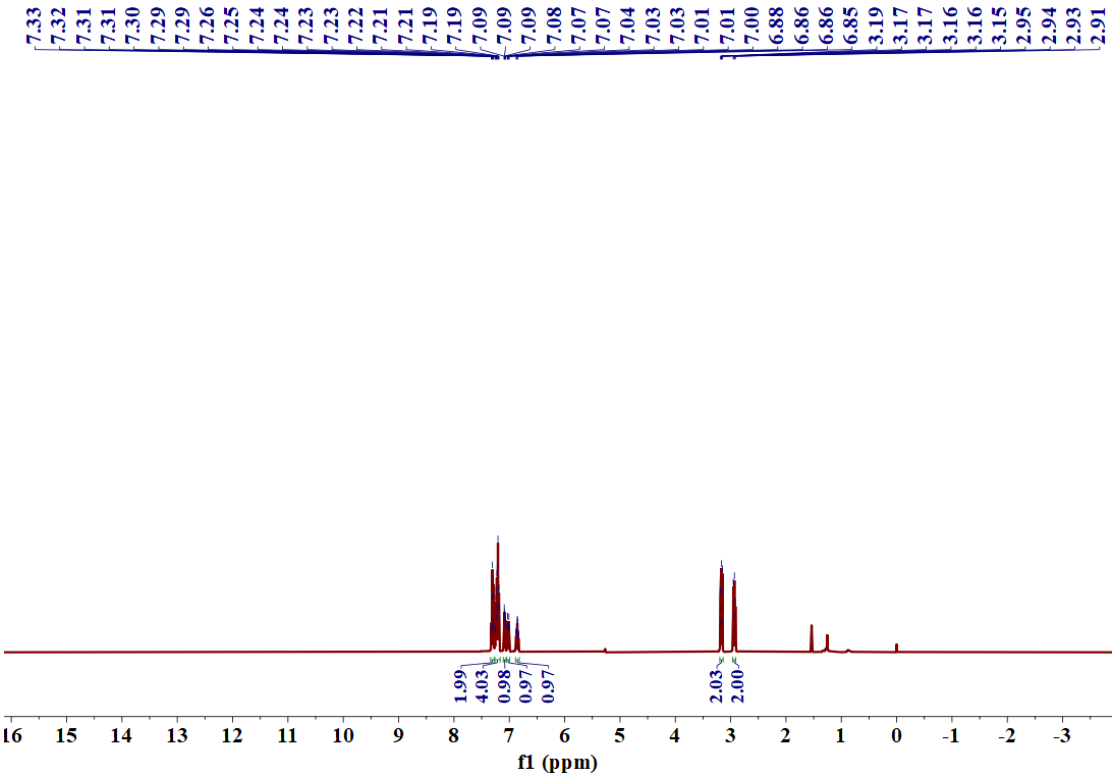


Fig. S23. ^{1}H NMR spectra of (3-fluorophenyl)(phenethyl)sulfane in $CDCl_3$.

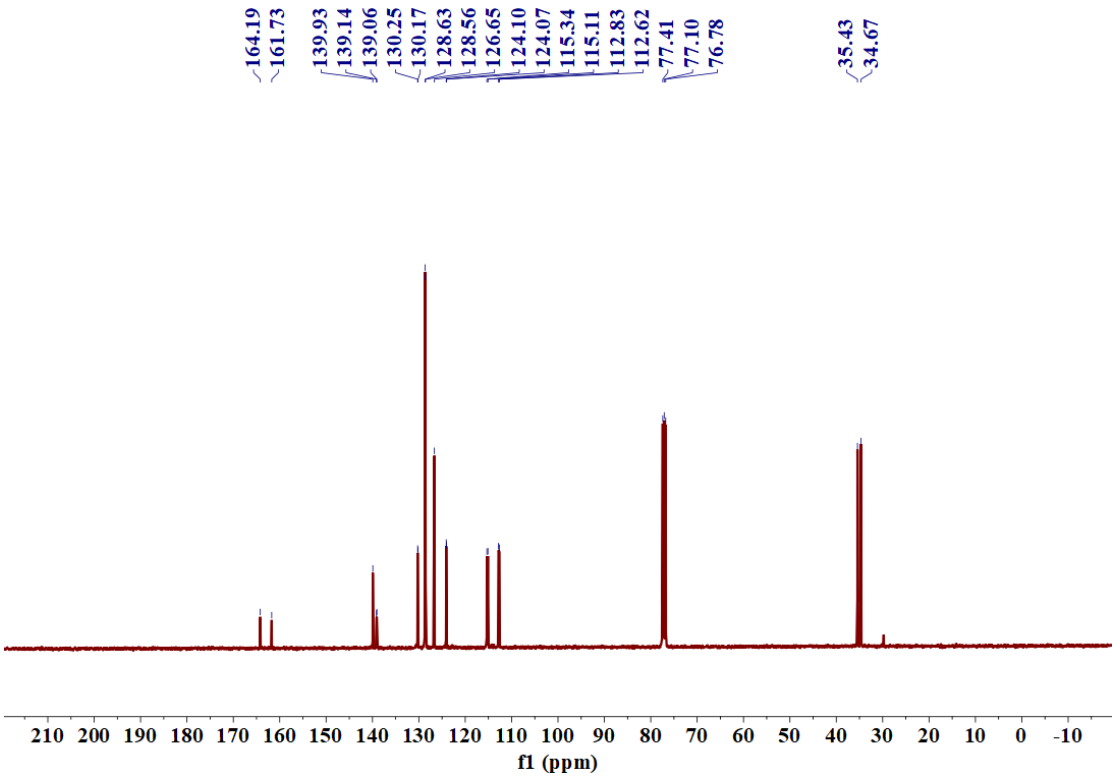
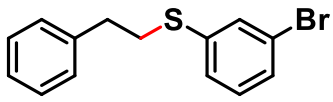


Fig. S24. ^{13}C NMR spectra of (3-fluorophenyl)(phenethyl)sulfane in $CDCl_3$.

3f. (3-bromophenyl)(phenethyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3f as a colorless oil (44.5 mg, 76% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.46 - 7.43 (m, 1H), 7.33 - 7.26 (m, 3H), 7.25 - 7.17 (m, 4H), 7.13 (t, *J* = 7.9 Hz, 1H), 3.16 (dd, *J* = 9.1, 6.5 Hz, 2H), 2.92 (dd, *J* = 9.2, 6.5 Hz, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 139.87, 139.09, 131.09, 130.24, 128.86, 128.64, 128.57, 127.23, 126.67, 122.91, 35.43, 34.85.

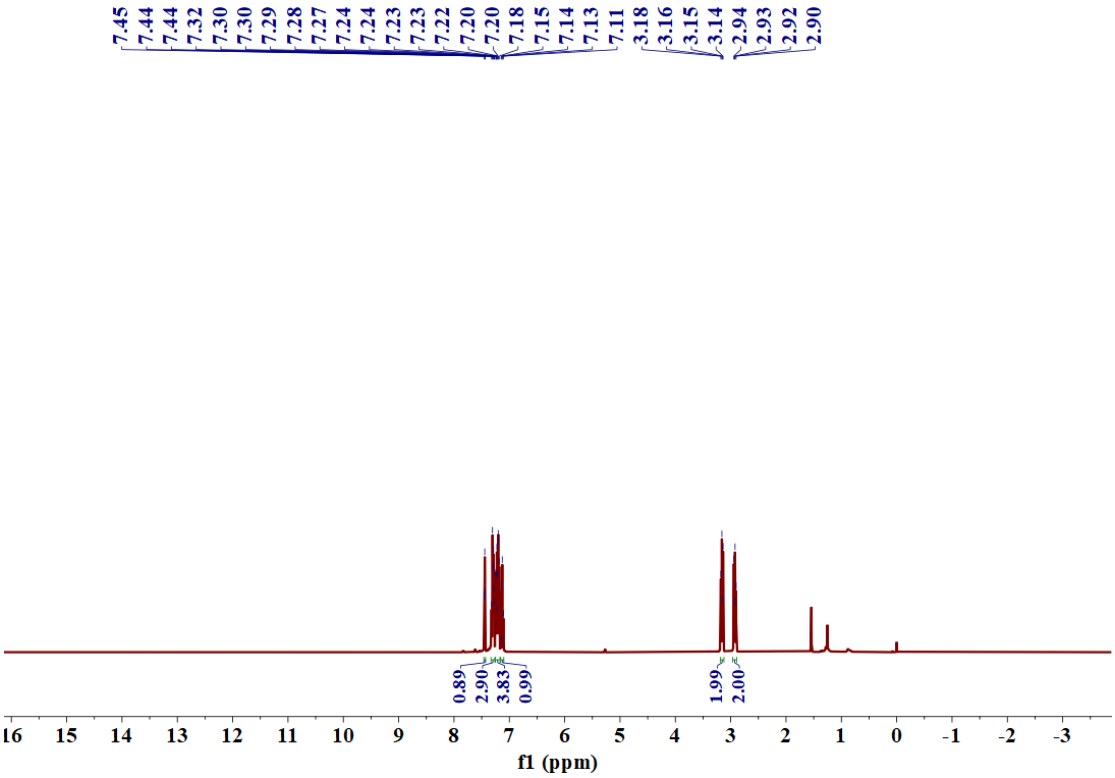


Fig. S25. ^{1}H NMR spectra of (3-bromophenyl)(phenethyl)sulfane in $CDCl_3$.

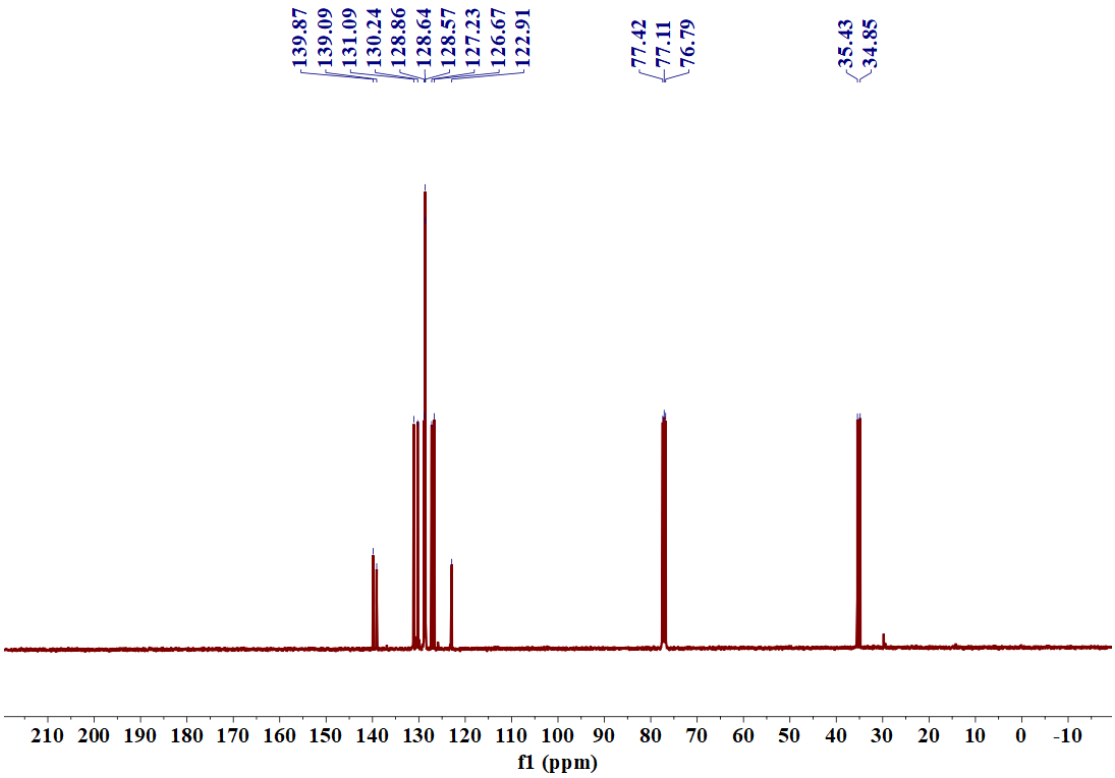
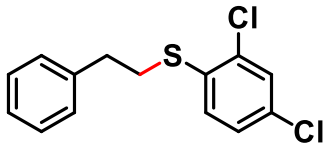


Fig. S26. ^{13}C NMR spectra of (3-bromophenyl)(phenethyl)sulfane in $CDCl_3$.

3g. (2,4-dichlorophenyl)(phenethyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3g as a yellow oil (41.9 mg, 74% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 (d, *J* = 2.2 Hz, 1H), 7.34 - 7.27 (m, 3H), 7.26 - 7.22 (m, 1H), 7.19 (tt, *J* = 5.7, 1.4 Hz, 2H), 7.12 (dd, *J* = 8.4, 2.2 Hz, 1H), 3.15 (dd, *J* = 8.8, 6.7 Hz, 2H), 2.92 (dd, *J* = 9.0, 6.6 Hz, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 139.66, 137.01, 132.93, 130.58, 130.11, 129.87, 128.66, 128.56, 128.06, 126.73, 35.39, 35.11.

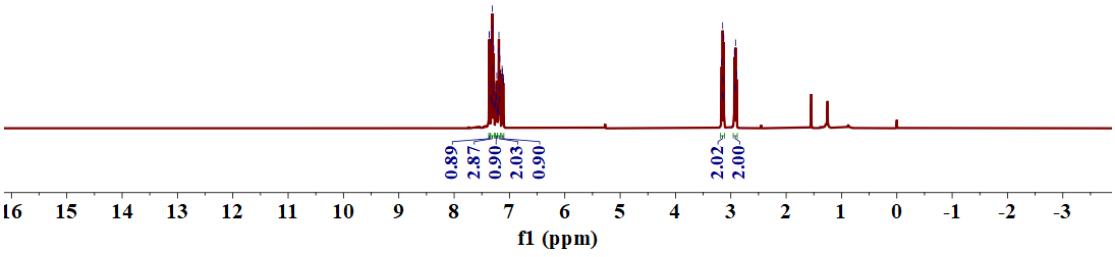


Fig. S27. ^{1}H NMR spectra of (2,4-dichlorophenyl)(phenethyl)sulfane in $CDCl_3$.

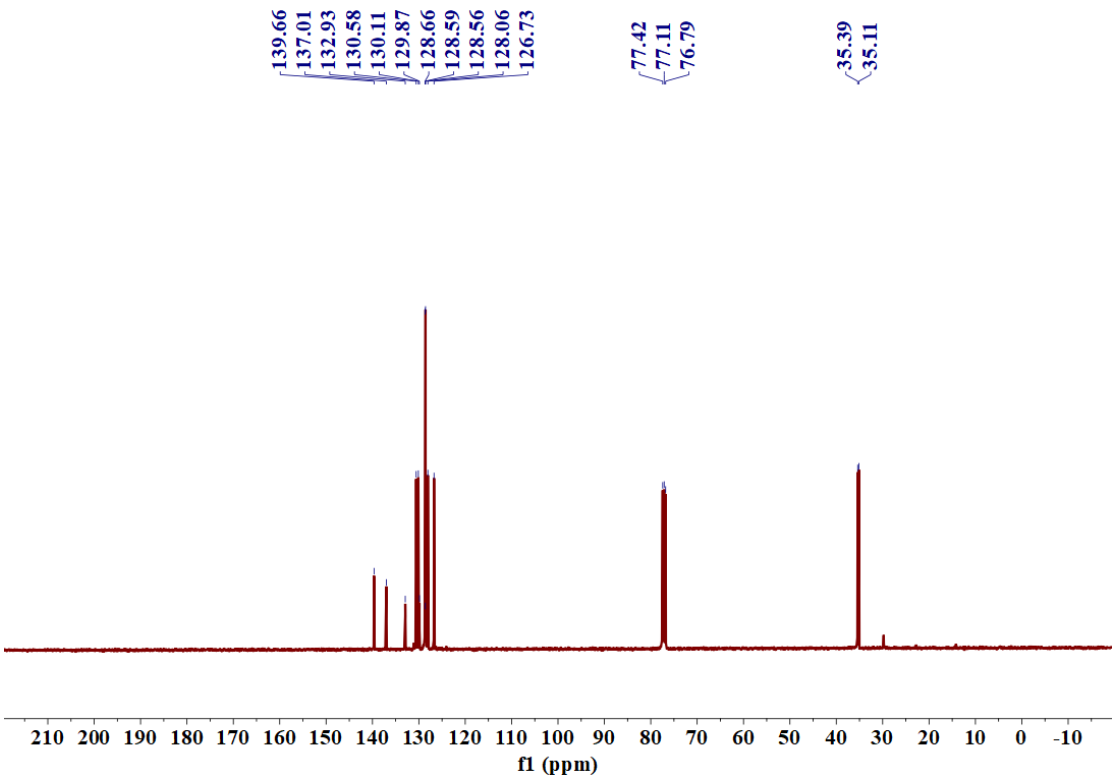
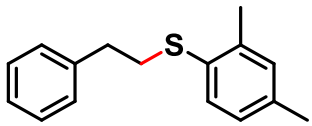


Fig. S28. ^{13}C NMR spectra of (2,4-dichlorophenyl)(phenethyl)sulfane in $CDCl_3$

3h. (2,4-dimethylphenyl)(phenethyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3h as a colorless oil (42.1 mg, 87% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.29 (dd, *J* = 8.0, 6.6 Hz, 2H), 7.25 - 7.16 (m, 4H), 7.01 (d, *J* = 2.0 Hz, 1H), 6.98 (dd, *J* = 7.8, 2.0 Hz, 1H), 3.12 - 3.06 (m, 2H), 2.90 (dd, *J* = 9.4, 6.5 Hz, 2H), 2.35 (s, 3H), 2.29 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 140.48, 138.21, 135.97, 131.82, 131.19, 129.28, 128.54, 127.22, 126.44, 35.68, 35.02, 20.95, 20.48.

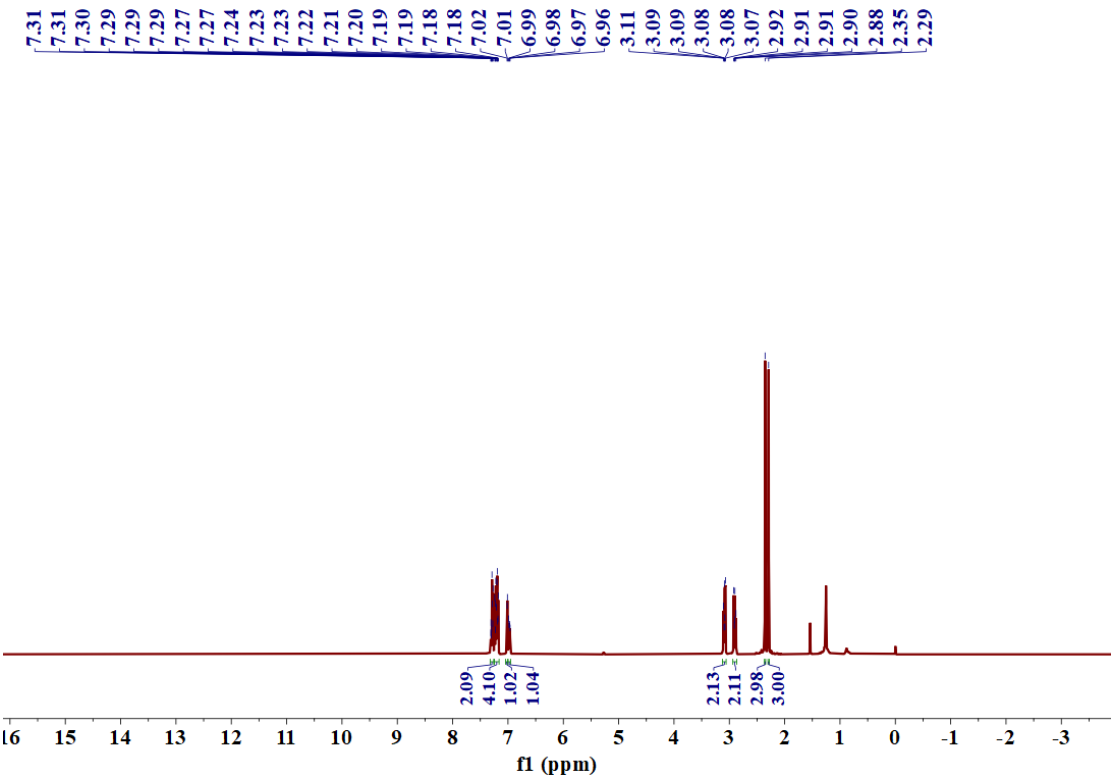


Fig. S29. ^{1}H NMR spectra of (2,4-dimethylphenyl)(phenethyl)sulfane in $CDCl_3$

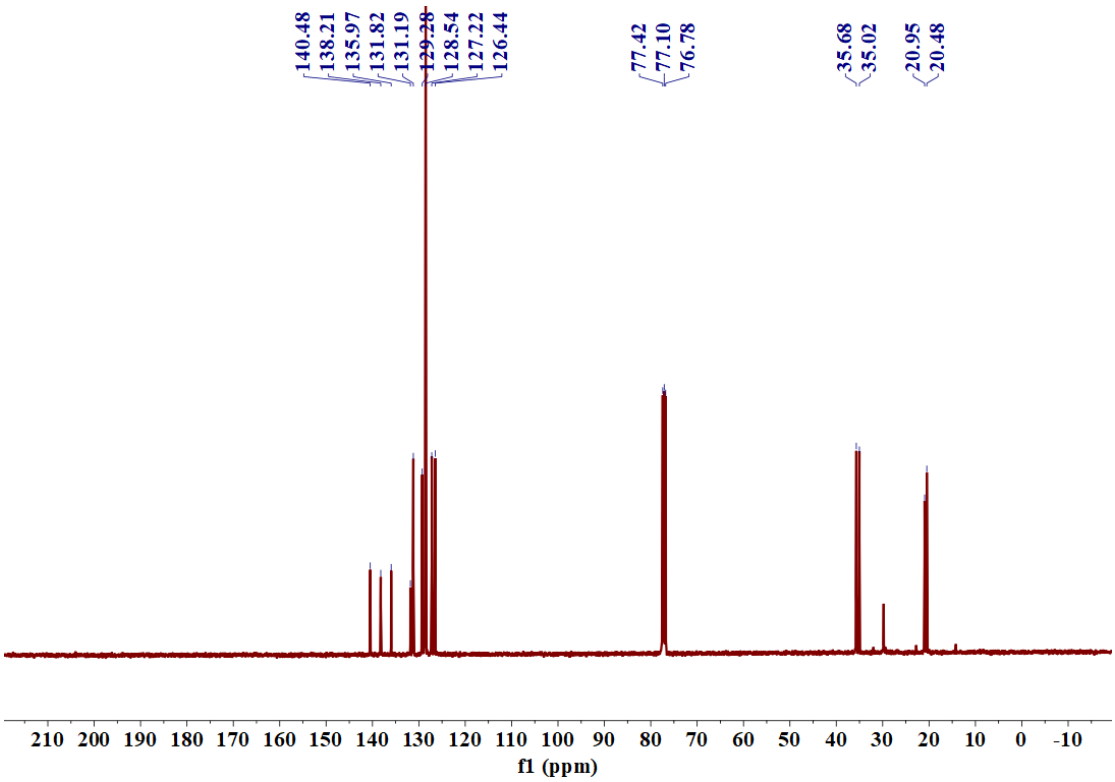
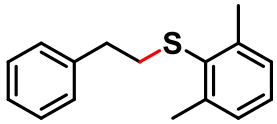


Fig. S30. ^{13}C NMR spectra of (2,4-dimethylphenyl)(phenethyl)sulfane in $CDCl_3$

3i. (2,6-dimethylphenyl)(phenethyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3i as a colorless oil (38.7 mg, 80% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.26 (t, J = 7.4 Hz, 2H), 7.19 (q, J = 7.4, 6.8 Hz, 1H), 7.15 - 7.06 (m, 5H), 2.92 - 2.86 (m, 2H), 2.84 - 2.78 (m, 2H), 2.52 (s, 6H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 143.11, 140.56, 133.50, 128.48, 128.44, 128.21, 128.14, 126.34, 36.51, 36.41, 22.19.

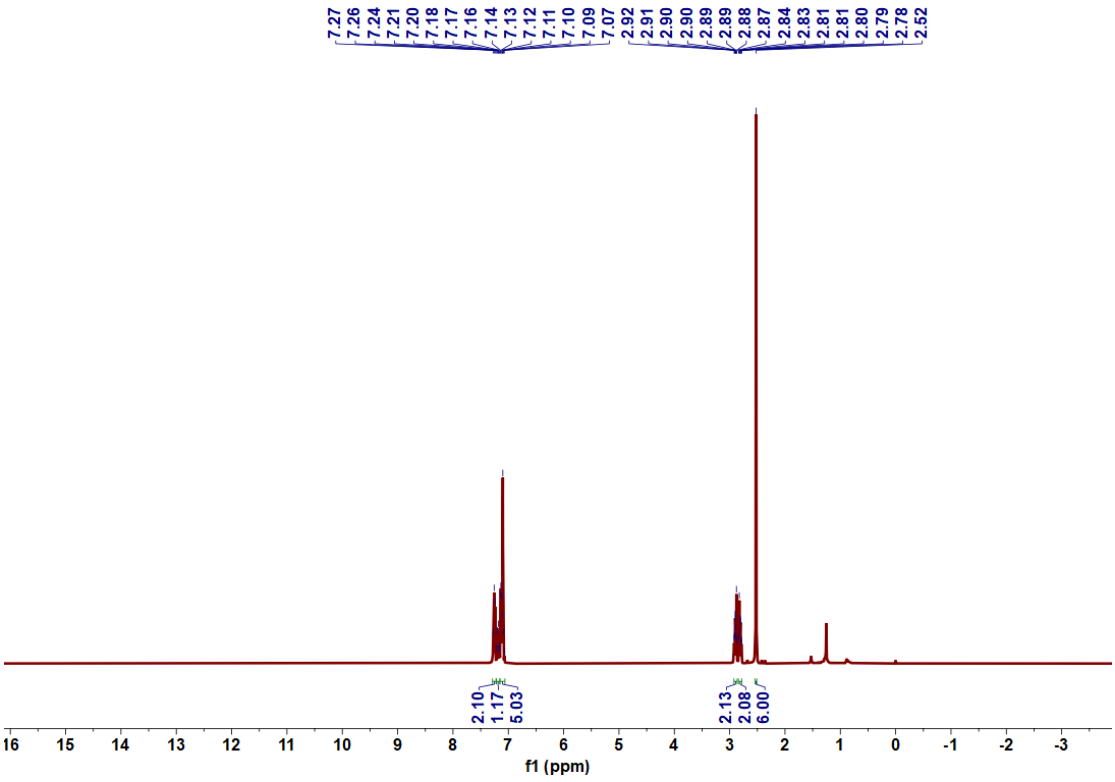


Fig. S31. ^{1}H NMR spectra of (2,6-dimethylphenyl)(phenethyl)sulfane in $CDCl_3$.

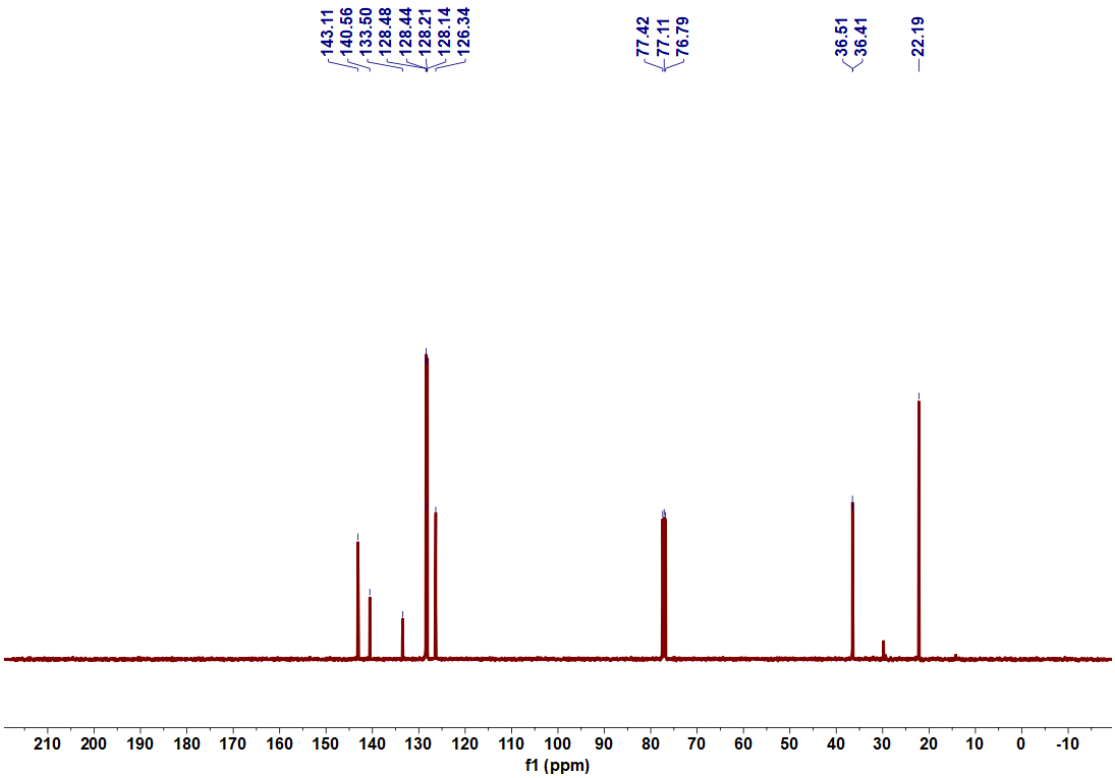
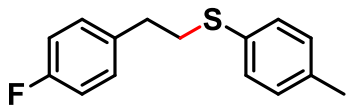


Fig. S32. ^{13}C NMR spectra of (2,6-dimethylphenyl)(phenethyl)sulfane in $CDCl_3$

3j. (4-fluorophenethyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3j as a colorless oil (42.3 mg, 86% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.26 (m, 2H), 7.11 (dd, *J* = 8.4, 3.6 Hz, 5H), 6.97 (m, 2H), 3.13 - 3.05 (m, 2H), 2.86 (m, 2H), 2.32 (d, *J* = 3.4 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 162.79, 160.36, 136.38, 135.95, 135.92, 132.25, 131.27, 130.60, 130.26, 130.03, 130.00, 129.93, 129.77, 128.22, 115.36, 115.14, 36.02, 34.89, 21.04.

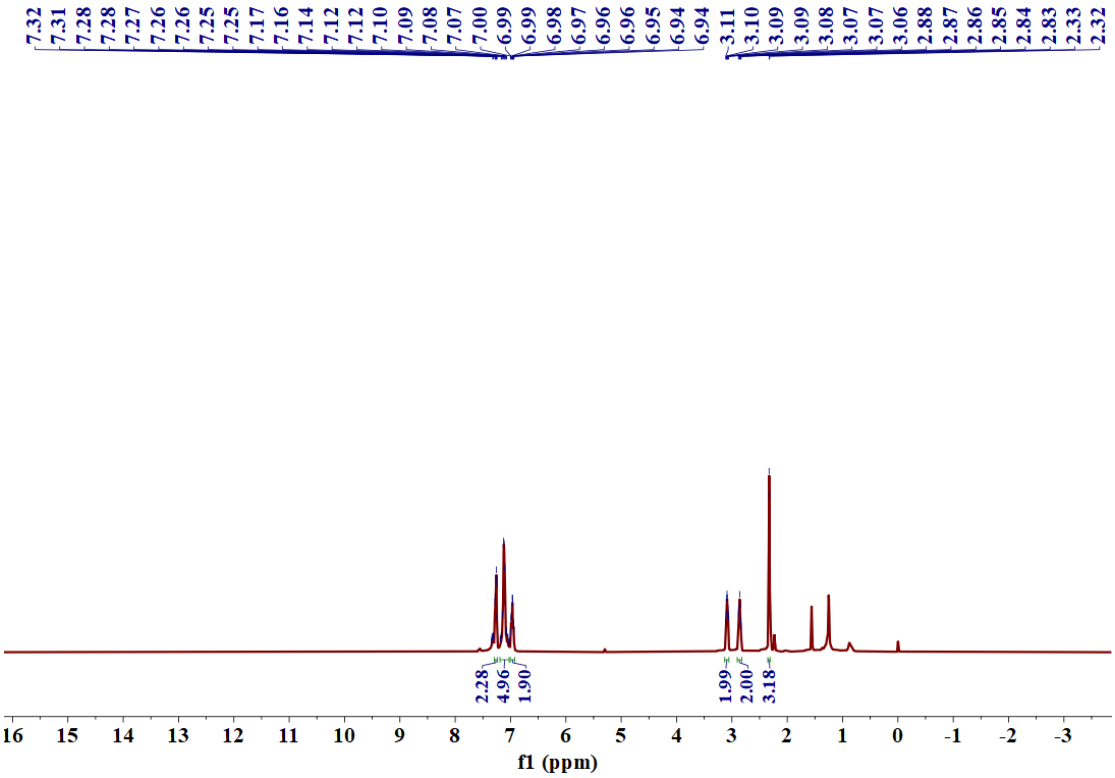


Fig. S33. ^{1}H NMR spectra of (4-fluorophenethyl)(p-tolyl)sulfane in $CDCl_3$.

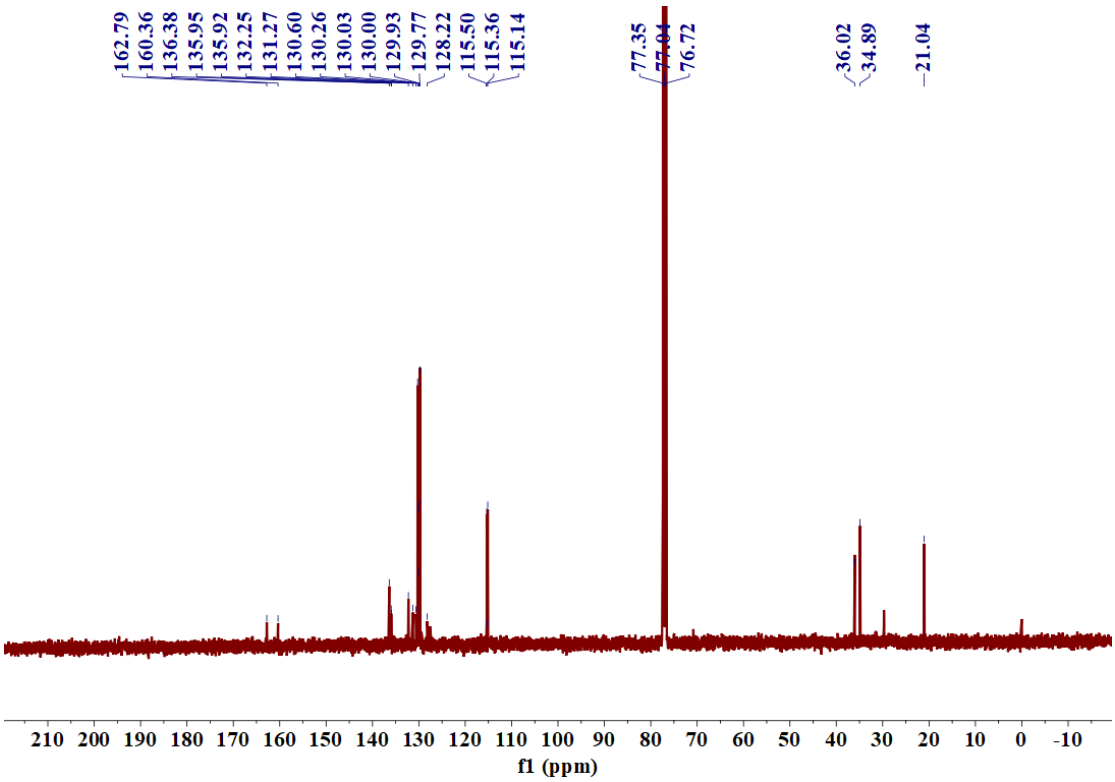
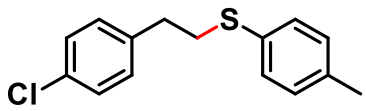


Fig. S34. ^{13}C NMR spectra of (4-fluorophenethyl)(p-tolyl)sulfane in $CDCl_3$

3k. (4-chlorophenethyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3k as a colorless oil (46.1 mg, 88% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30 - 7.23 (m, 4H), 7.14 - 7.07 (m, 4H), 3.09 (dd, J = 8.8, 6.7 Hz, 2H), 2.86 (dd, J = 9.0, 6.5 Hz, 2H), 2.33 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 138.70, 136.46, 132.18, 132.12, 130.34, 129.93, 129.80, 128.59, 35.81, 35.03, 21.06.

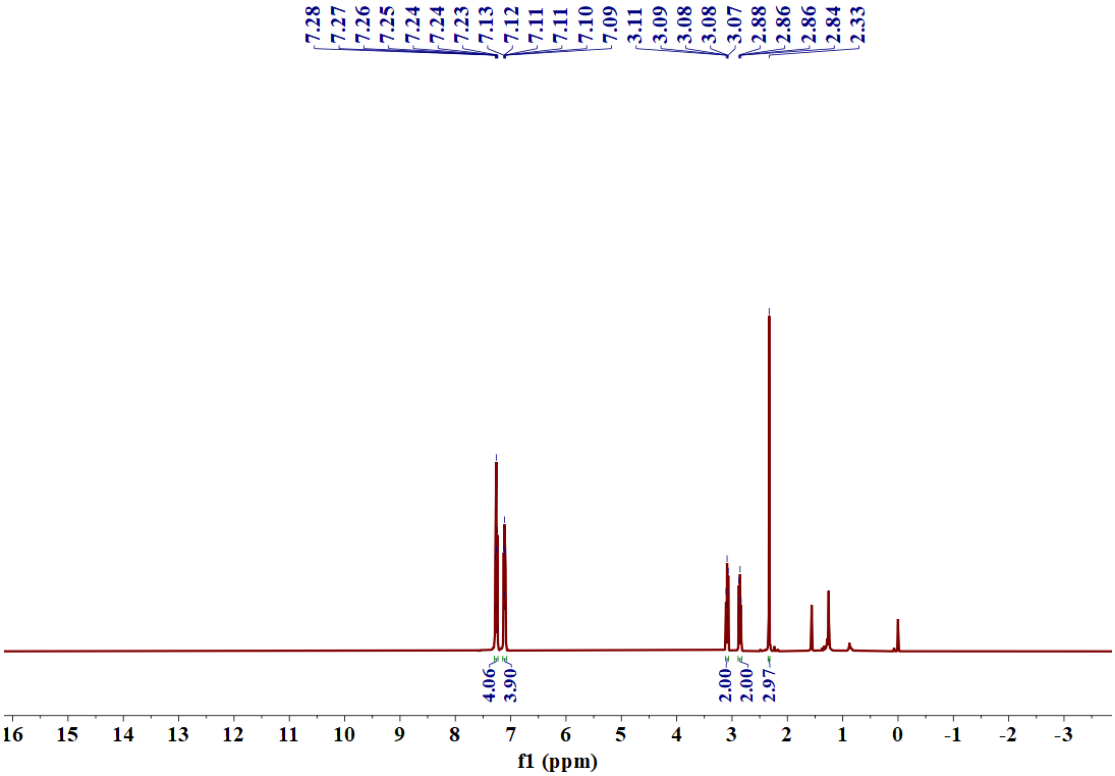


Fig. S35. ^{1}H NMR spectra of (4-chlorophenethyl)(p-tolyl)sulfane in $CDCl_3$.

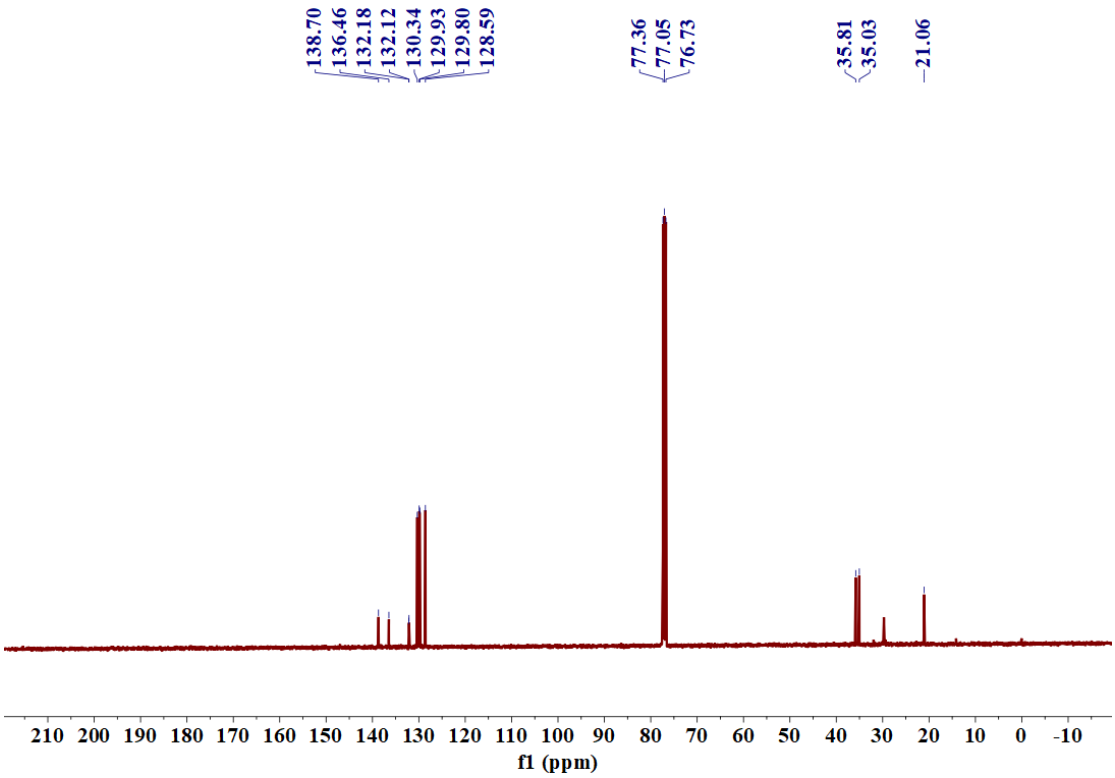
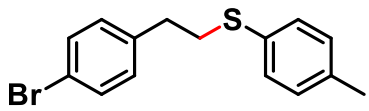


Fig. S36. ^{13}C NMR spectra of (4-chlorophenethyl)(p-tolyl)sulfane in $CDCl_3$

3l. (4-bromophenethyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3l as a colorless oil (51.5 mg, 84% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40 (d, *J* = 8.1 Hz, 2H), 7.27 (d, *J* = 8.1 Hz, 2H), 7.13 - 7.10 (m, 2H), 7.06 (t, *J* = 8.0 Hz, 3H), 3.09 (dd, *J* = 8.9, 6.6 Hz, 2H), 2.84 (dd, *J* = 9.0, 6.5 Hz, 2H), 2.33 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 139.21, 136.48, 133.91, 132.08, 131.54, 130.35, 129.81, 128.20, 127.75, 124.05, 120.23, 35.73, 35.09, 21.08.

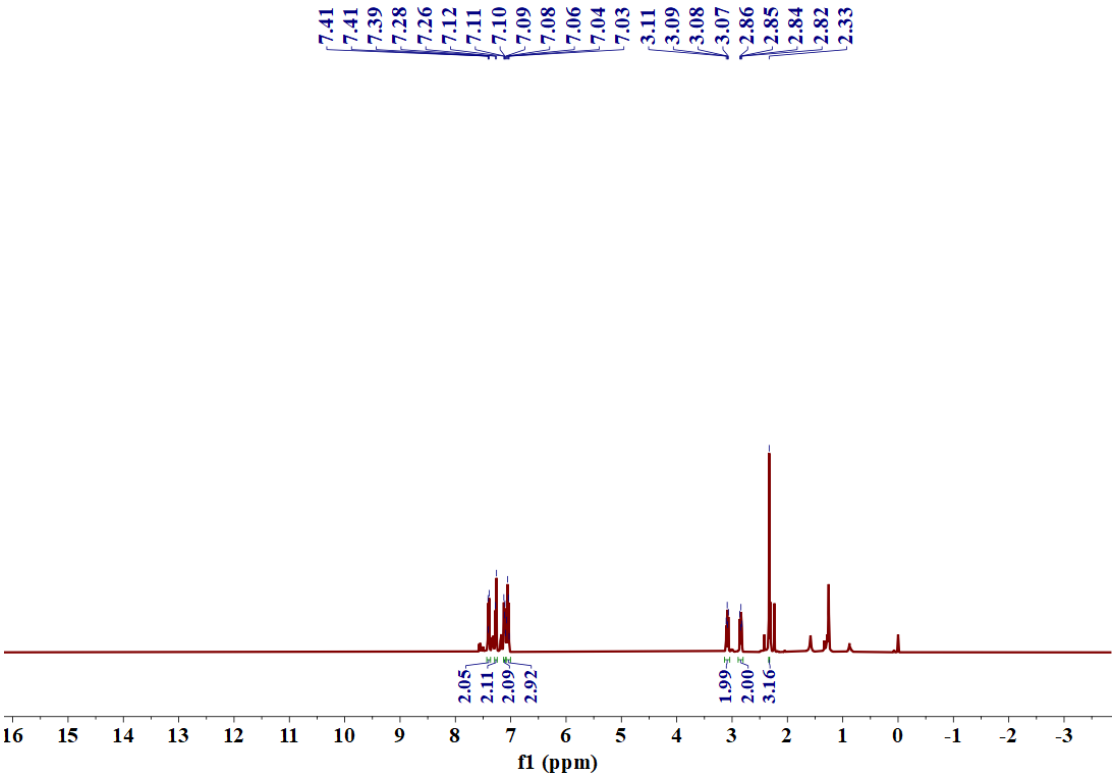


Fig. S37. ^{1}H NMR spectra of (4-bromophenethyl)(p-tolyl)sulfane in $CDCl_3$.

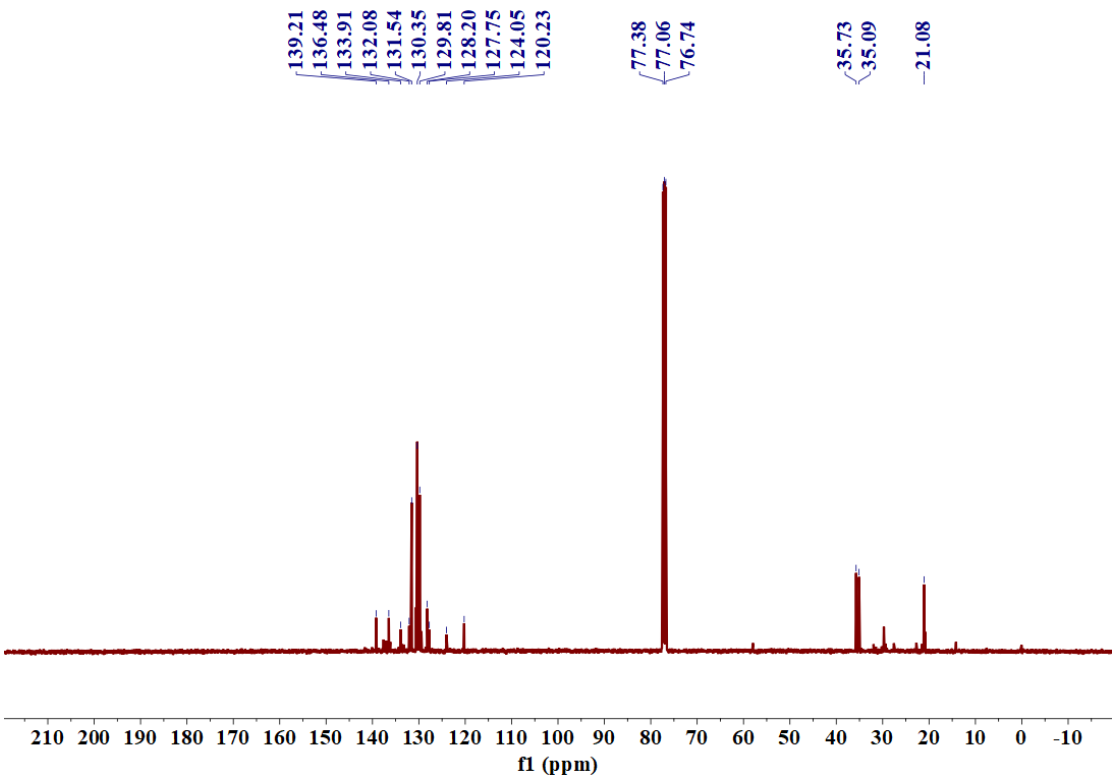
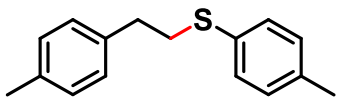


Fig. S38. ^{13}C NMR spectra of (4-bromophenethyl)(p-tolyl)sulfane in $CDCl_3$

3m. (4-methylphenethyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3m as a colorless oil (45.5 mg, 94% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30 - 7.24 (m, 2H), 7.15 - 7.05 (m, 6H), 3.13 - 3.07 (m, 2H), 2.86 (dd, J = 9.4, 6.4 Hz, 2H), 2.32 (d, J = 2.7 Hz, 6H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 137.29, 136.15, 135.94, 132.55, 130.05, 129.73, 129.19, 128.41, 35.92, 35.31, 21.07, 21.04.

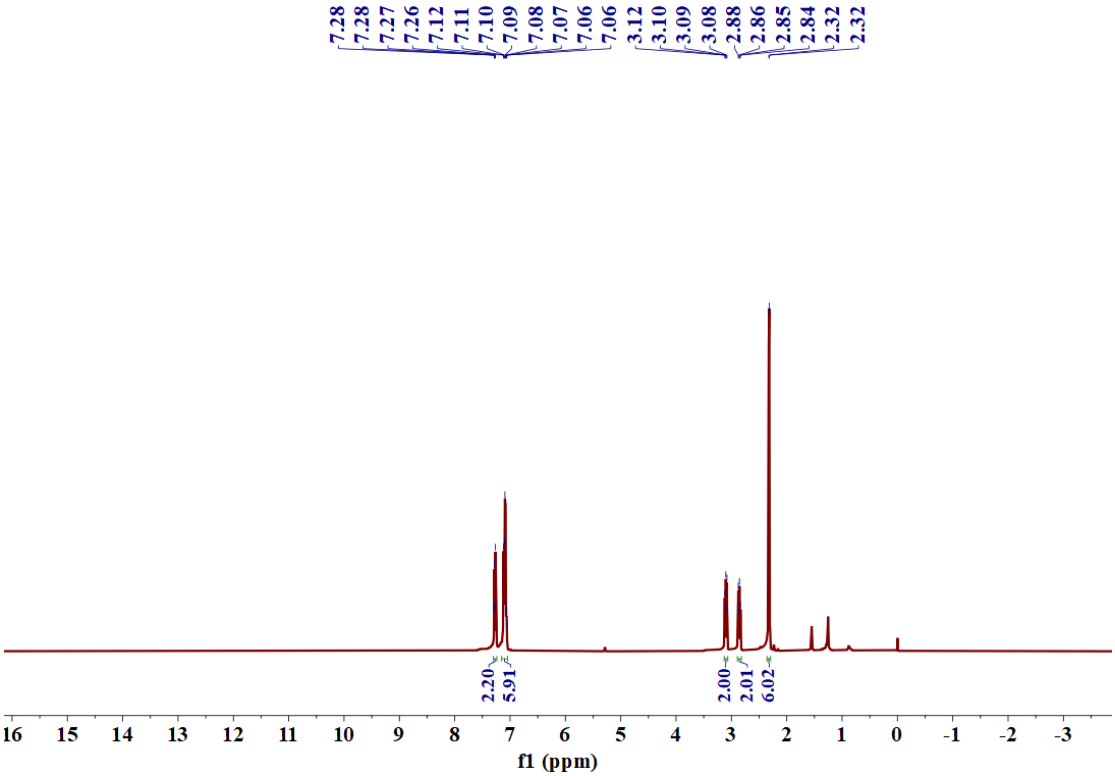


Fig. S39. ^{1}H NMR spectra of (4-methylphenethyl)(p-tolyl)sulfane in $CDCl_3$.

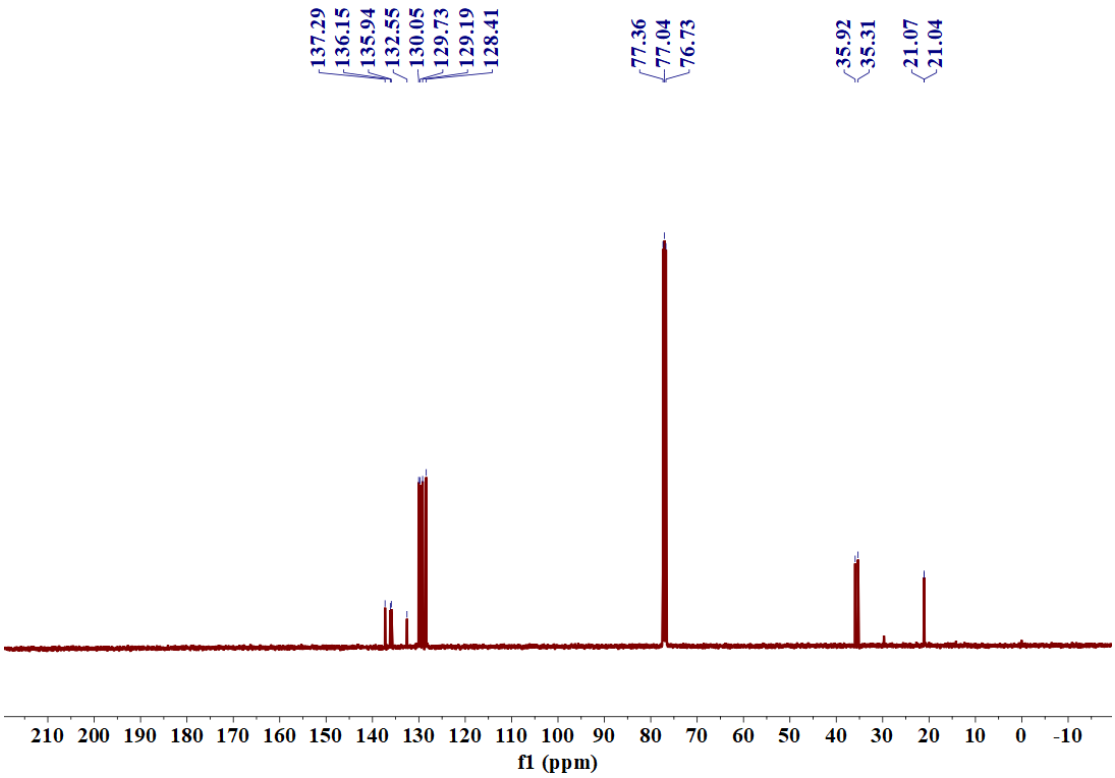
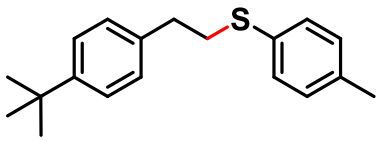


Fig. S40. ^{13}C NMR spectra of (4-methylphenethyl)(p-tolyl)sulfane in $CDCl_3$

3n. (4-(tert-butyl)phenethyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3n as a colorless oil (52.8 mg, 93% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30 (m, 4H), 7.12 (td, J = 7.9, 2.5 Hz, 4H), 3.12 m, 2H), 2.87 (m, 2H), 2.33 (d, J = 2.7 Hz, 3H), 1.34 - 1.29 (m, 9H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 149.24, 137.32, 136.12, 132.60, 129.97, 129.73, 128.18, 125.40, 35.73, 35.27, 34.43, 31.40, 21.05.

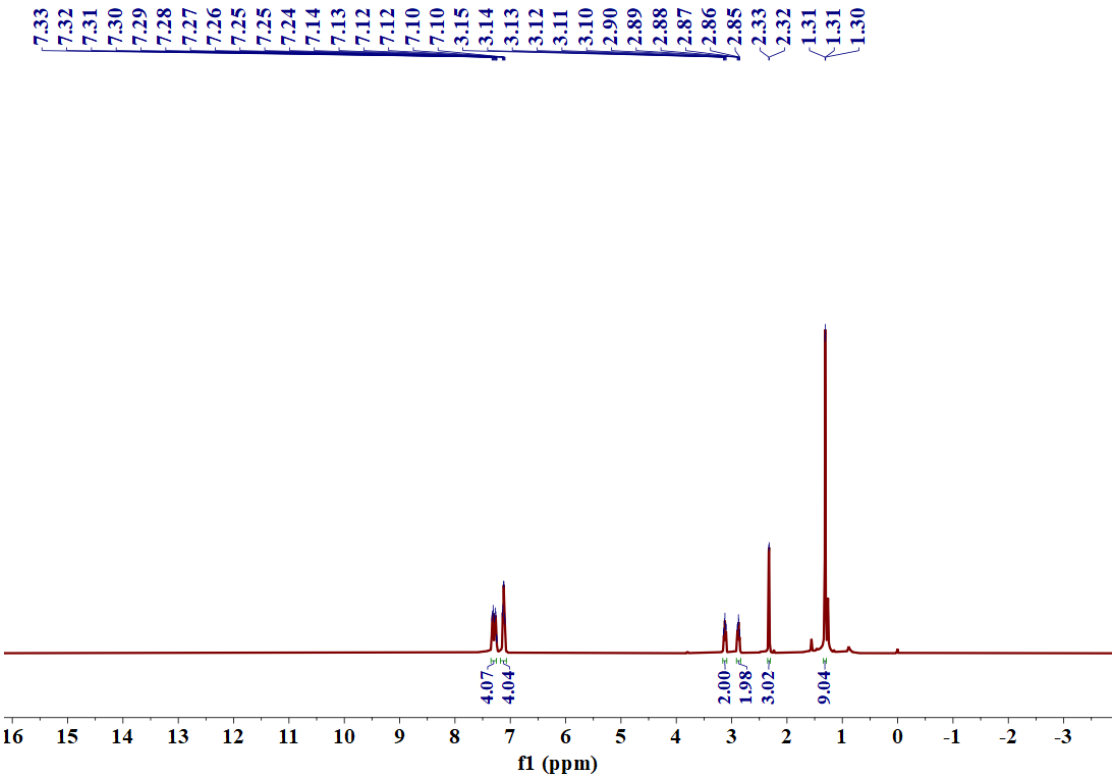


Fig. S41. ^{1}H NMR spectra of (4-(tert-butyl)phenethyl)(p-tolyl)sulfane in $CDCl_3$.

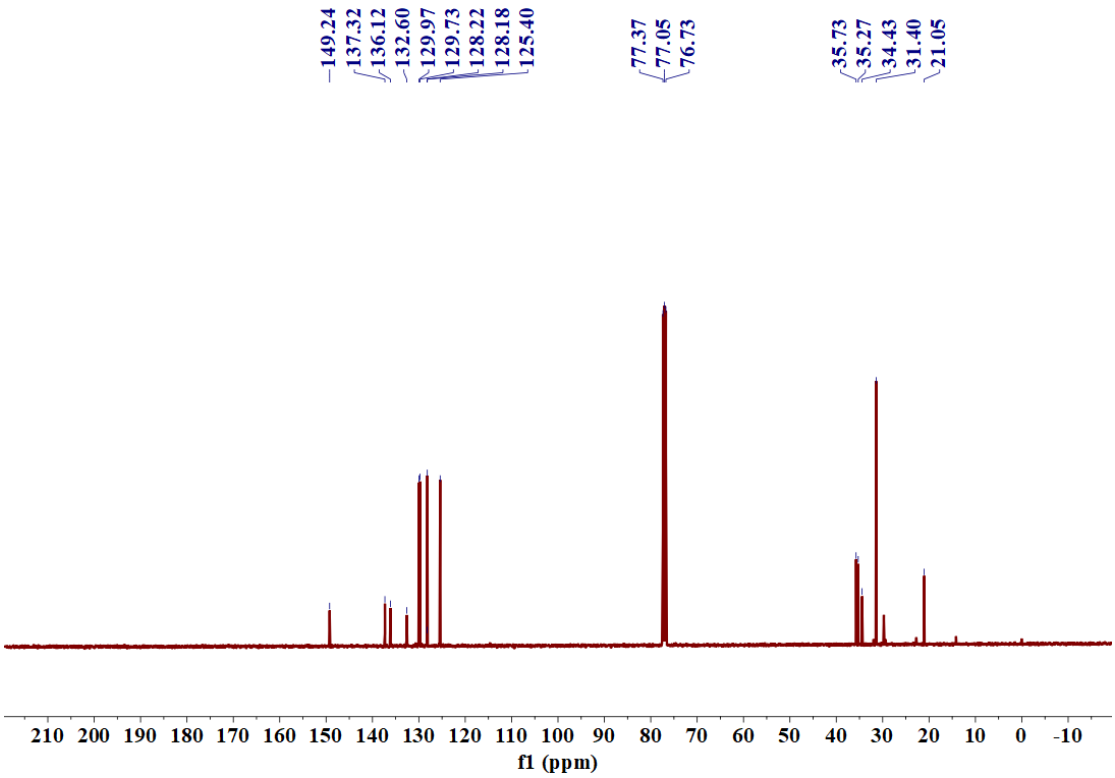
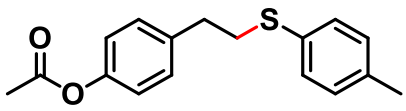


Fig. S42. ^{13}C NMR spectra of (4-(tert-butyl)phenethyl)(p-tolyl)sulfane in $CDCl_3$

3o. 4-(2-(p-tolylthio)ethyl)phenyl acetate



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=20:1) to give 3o as a colorless oil (37.7 mg, 66 % yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.27 - 7.20 (m, 2H), 7.14 - 7.08 (m, 2H), 7.05 (d, J = 8.0 Hz, 2H), 7.00 - 6.92 (m, 2H), 3.08 - 2.98 (m, 2H), 2.82 (dd, J = 9.3, 6.5 Hz, 2H), 2.26 (s, 3H), 2.18 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 169.48, 149.31, 137.93, 136.20, 132.59, 130.14, 129.88, 129.57, 121.64, 35.71, 35.20, 21.13, 21.12.

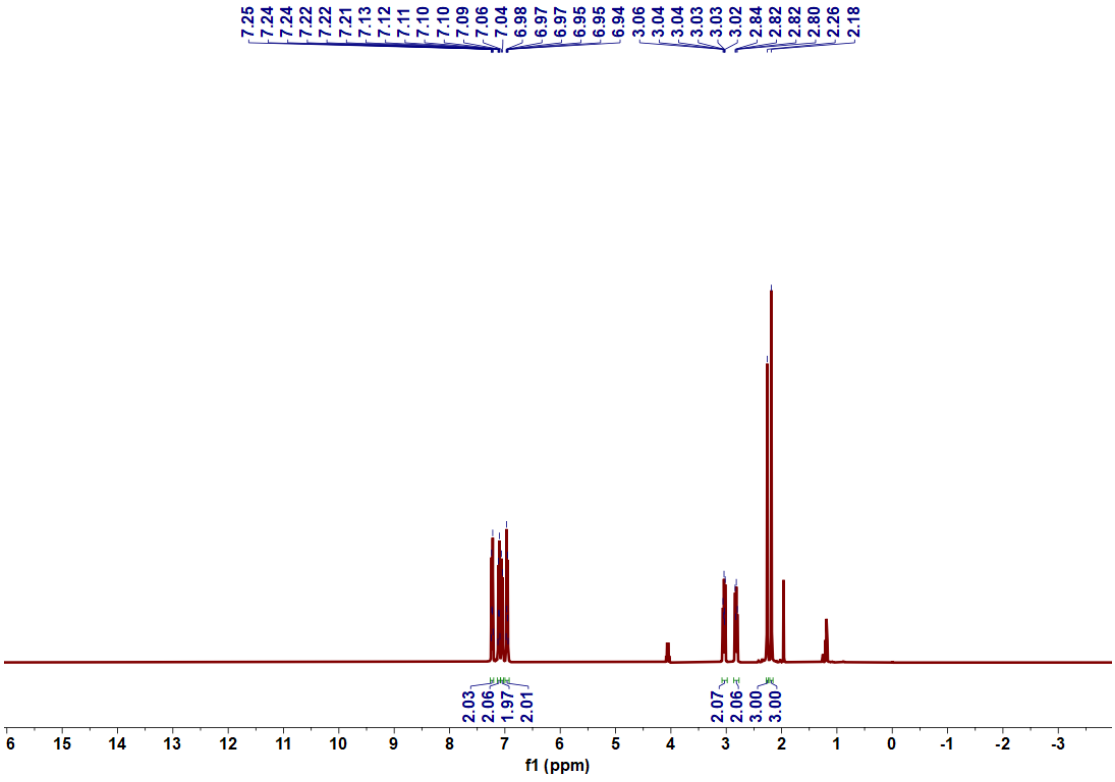


Fig. S43. ^{1}H NMR spectra of 4-(2-(p-tolylthio)ethyl)phenyl acetate in $CDCl_3$.

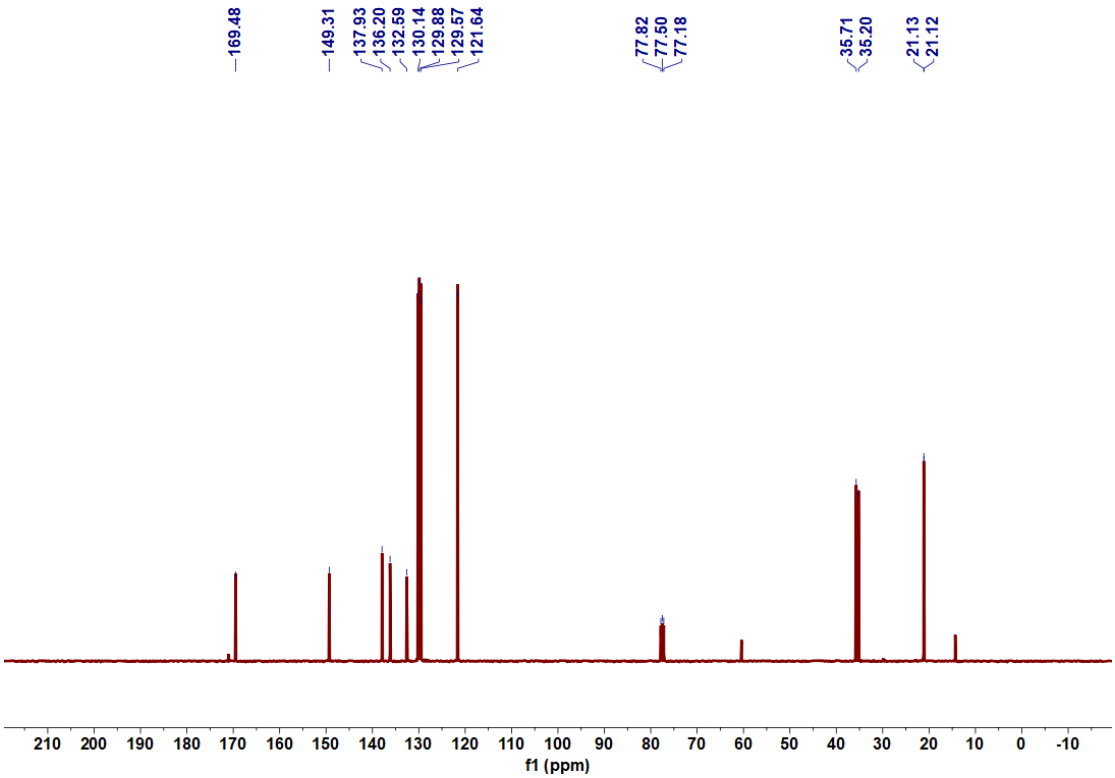
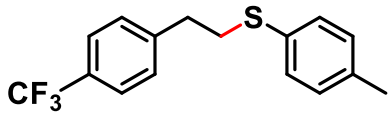


Fig. S44. ^{13}C NMR spectra of 4-(2-(p-tolylthio)ethyl)phenyl acetate in $CDCl_3$

3p. p-tolyl(4-(trifluoromethyl)phenethyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3p as a colorless oil (43.2 mg, 73% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.44 (d, *J* = 8.0 Hz, 2H), 7.24 - 7.15 (m, 4H), 7.02 (d, *J* = 7.9 Hz, 2H), 3.03 (dd, *J* = 8.8, 6.4 Hz, 2H), 2.85 (dd, *J* = 8.9, 6.5 Hz, 2H), 2.24 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 144.31, 144.30, 136.60, 131.96, 130.48, 129.85, 128.95, 128.89, 128.57, 125.66, 125.46, 125.42, 125.38, 125.34, 122.95, 35.61, 35.53, 21.06.

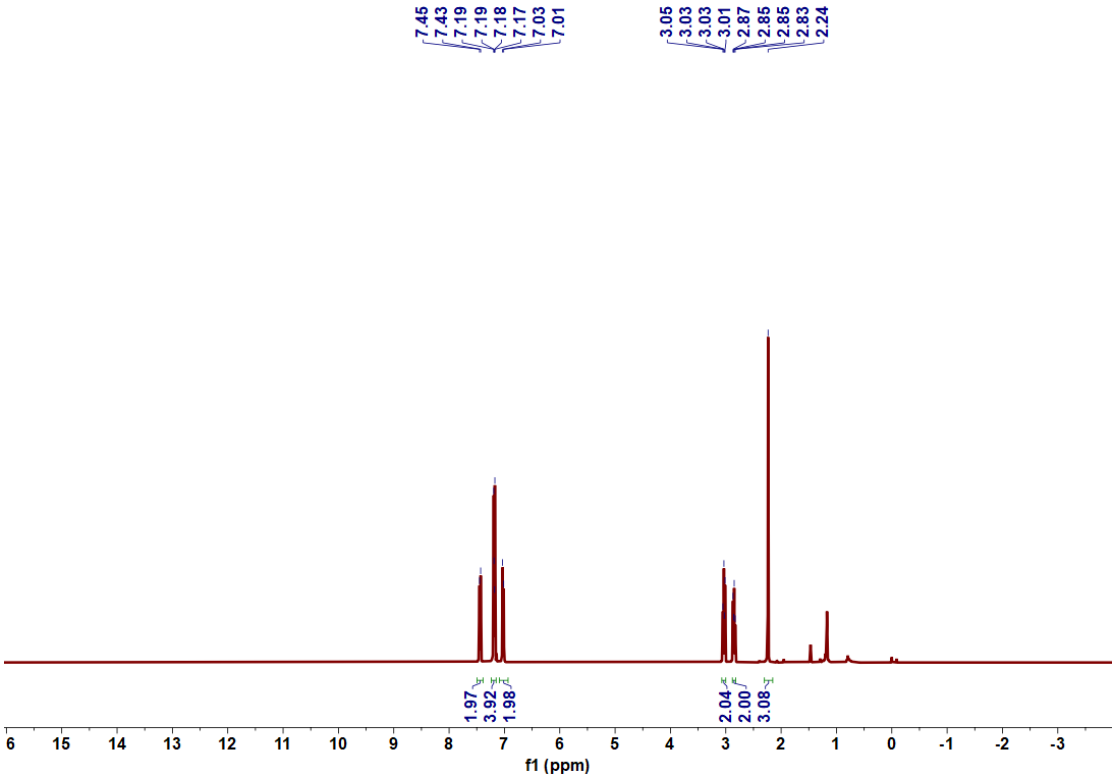


Fig. S45 ^{1}H NMR spectra of p-tolyl(4-(trifluoromethyl)phenethyl)sulfane in $CDCl_3$.

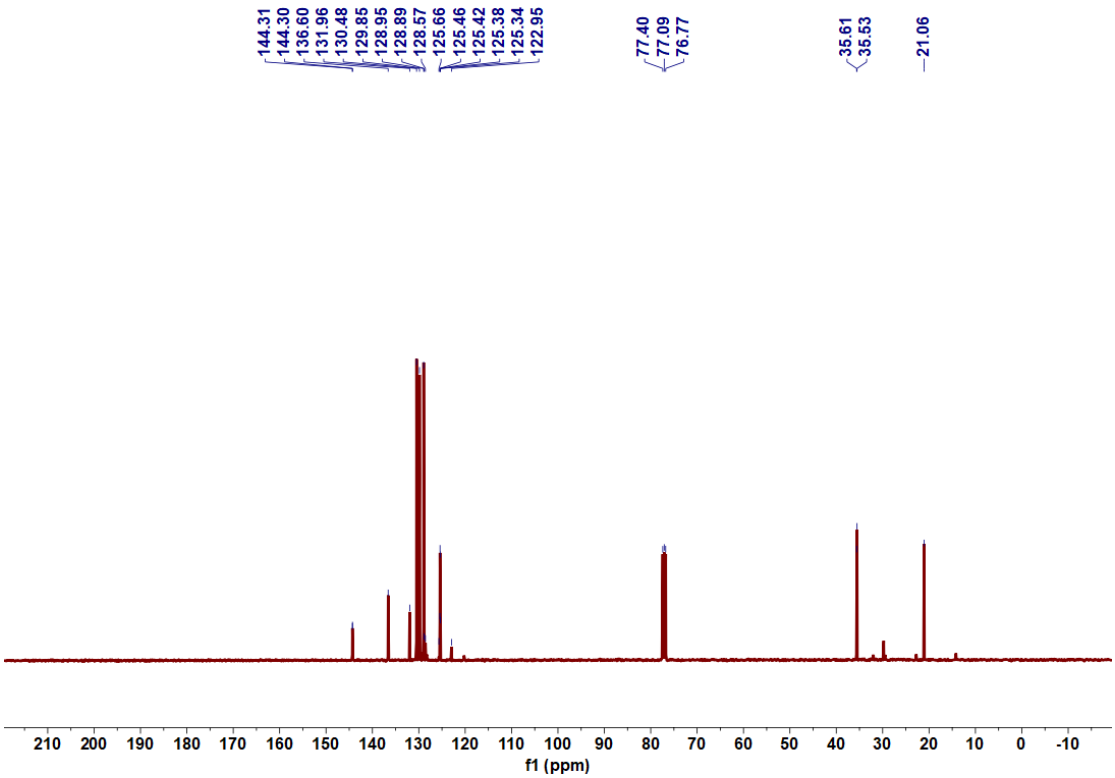
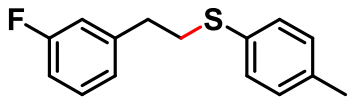


Fig. S46. ^{13}C NMR spectra of p-tolyl(4-(trifluoromethyl)phenethyl)sulfane in $CDCl_3$

3q. (3-fluorophenethyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3q as a colorless oil (35.4 mg, 72% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32 - 7.23 (m, 3H), 7.12 (d, J = 7.9 Hz, 2H), 7.00 - 6.82 (m, 3H), 3.11 (dd, J = 8.9, 6.6 Hz, 2H), 2.88 (dd, J = 9.1, 6.5 Hz, 2H), 2.33 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 164.11, 161.67, 142.83, 142.76, 136.49, 132.09, 130.37, 129.96, 129.88, 129.82, 124.24, 124.21, 115.55, 115.34, 113.42, 113.21, 35.63, 35.46, 35.44, 21.07.

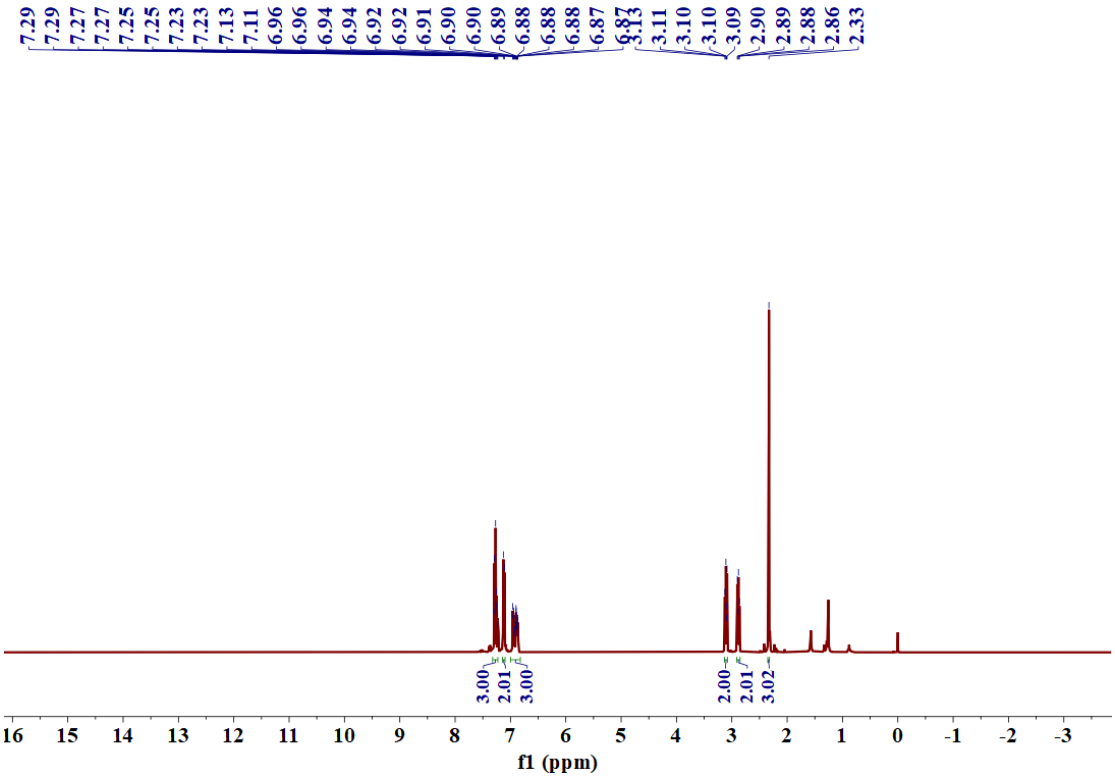


Fig. S47. ^{1}H NMR spectra of (3-fluorophenethyl)(p-tolyl)sulfane in $CDCl_3$.

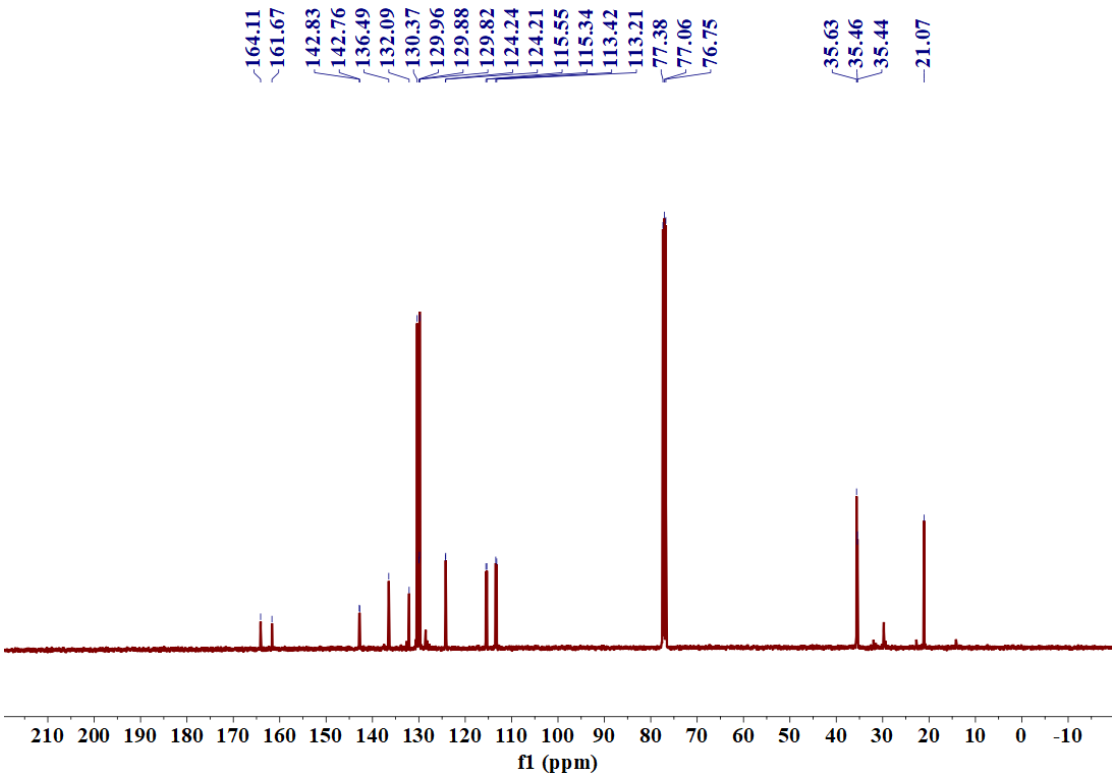
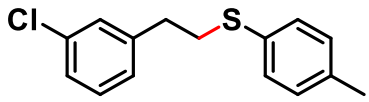


Fig. S48. ^{13}C NMR (3-fluorophenethyl)(p-tolyl)sulfane in $CDCl_3$

3r. (3-chlorophenethyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3r as a colorless oil (37.2 mg, 71% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.27 (t, *J* = 6.8 Hz, 2H), 7.22 - 7.15 (m, 3H), 7.12 (d, *J* = 7.9 Hz, 2H), 7.06 (td, *J* = 5.5, 4.9, 3.1 Hz, 1H), 3.10 (dd, *J* = 9.2, 6.4 Hz, 2H), 2.86 (dd, *J* = 9.2, 6.5 Hz, 2H), 2.33 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 142.27, 136.52, 134.21, 132.03, 130.59, 130.42, 130.04, 129.82, 129.77, 129.74, 128.70, 128.53, 128.20, 126.79, 126.61, 35.66, 35.40, 21.08.

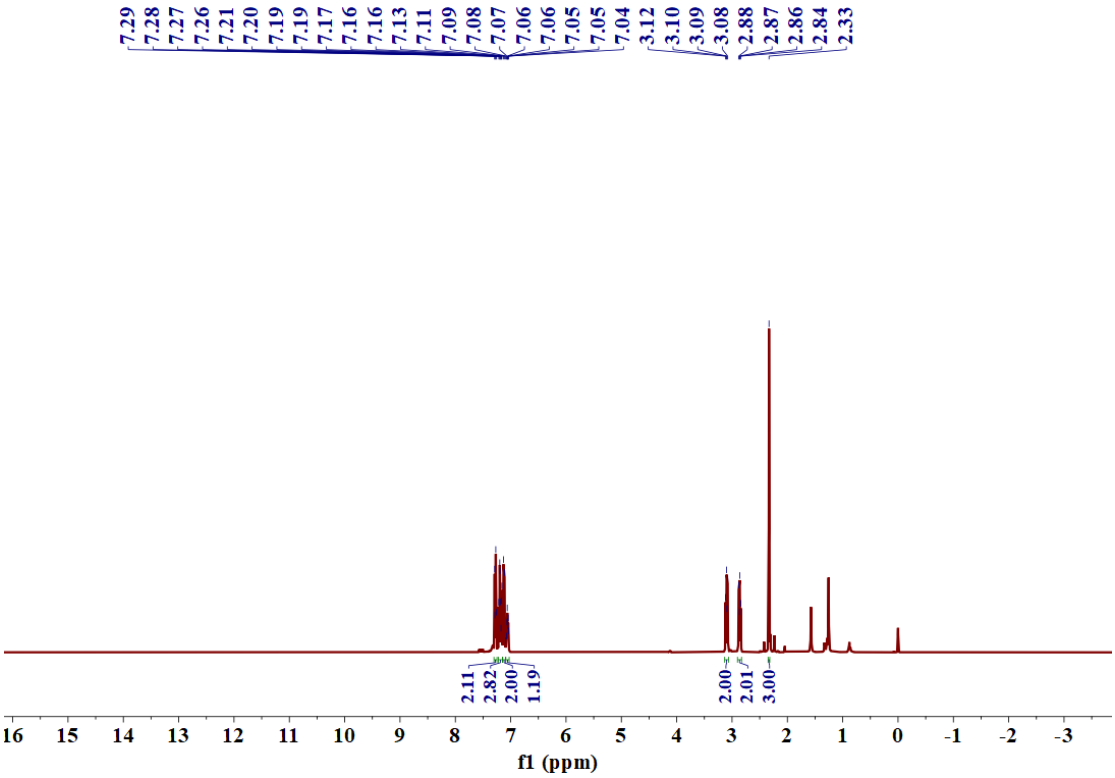


Fig. S49. ^{1}H NMR spectra of (3-chlorophenethyl)(p-tolyl)sulfane in $CDCl_3$.

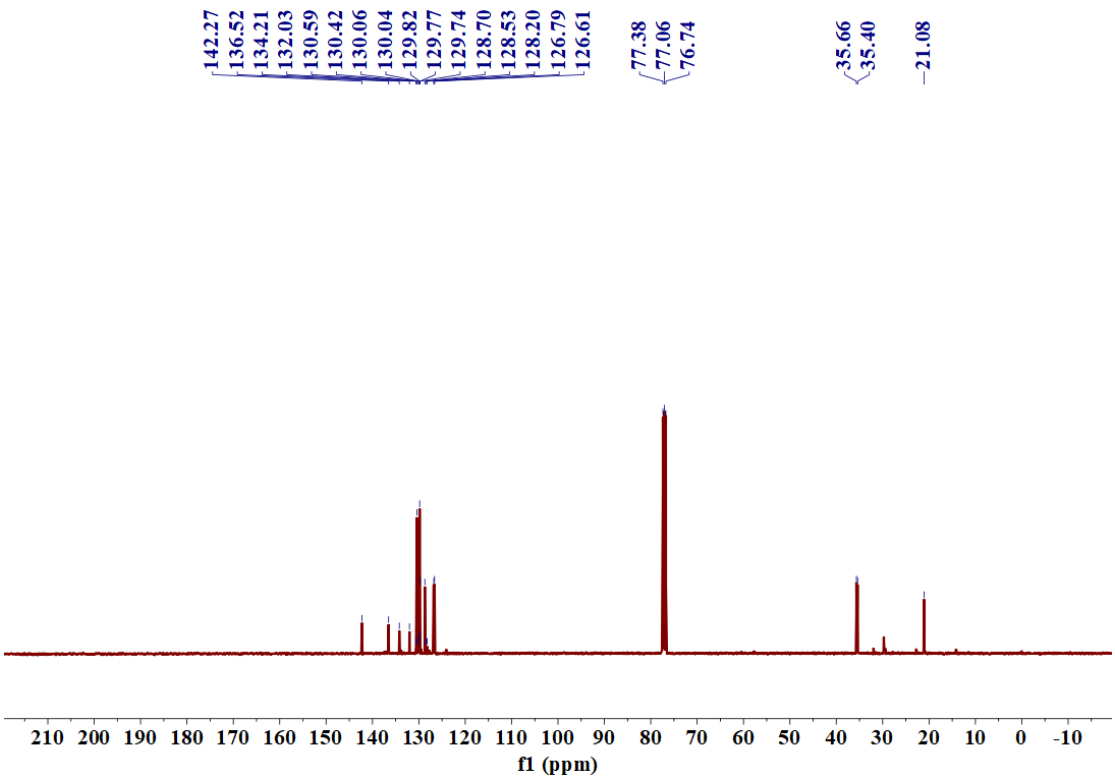
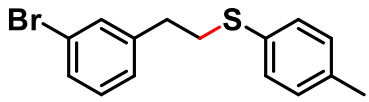


Fig. S50. ^{13}C NMR spectra of (3-chlorophenethyl)(p-tolyl)sulfane in $CDCl_3$

3s. (3-bromophenethyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3s as a colorless oil (42.9 mg, 70% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 - 7.24 (m, 4H), 7.18 - 7.06 (m, 4H), 3.08 (dd, J = 9.1, 6.5 Hz, 2H), 2.84 (dd, J = 9.1, 6.5 Hz, 2H), 2.32 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 142.59, 136.51, 132.05, 131.62, 130.44, 130.05, 129.83, 129.53, 127.27, 122.52, 35.69, 35.40, 21.10.

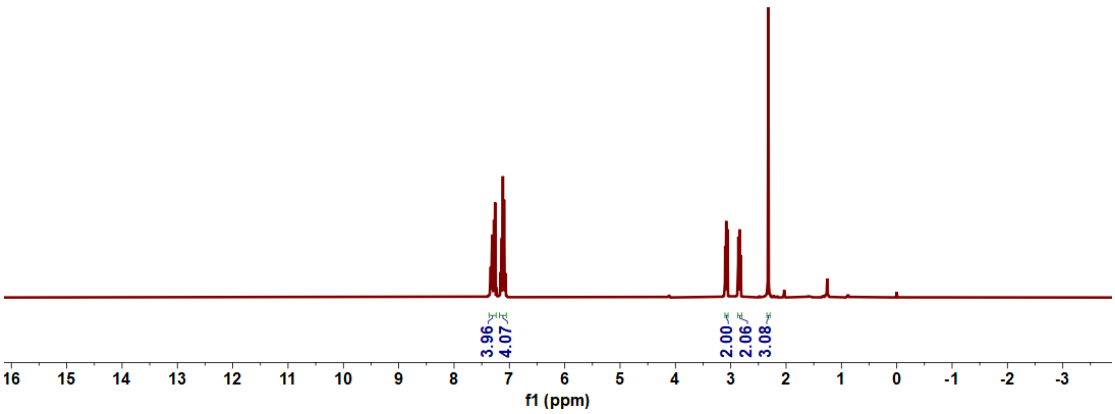


Fig. S51. ^{1}H NMR spectra of (3-bromophenethyl)(p-tolyl)sulfane in $CDCl_3$.

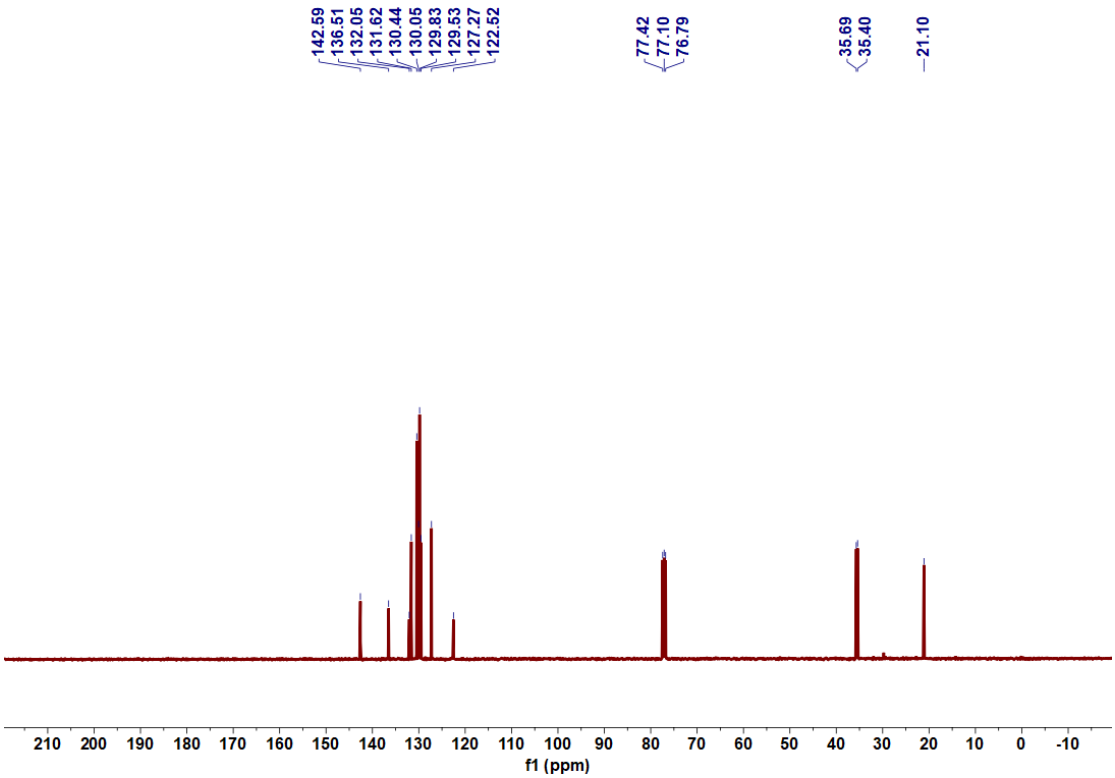
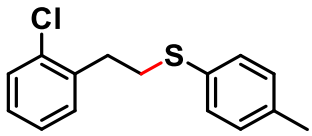


Fig. S52. ^{13}C NMR spectra of (3-bromophenethyl)(p-tolyl)sulfane in $CDCl_3$

3t. (2-chlorophenethyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3t as yellow oil (40.3 mg, 77% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 - 7.28 (m, 3H), 7.18 (m, 3H), 7.12 (d, J = 7.9 Hz, 2H), 3.16 - 3.09 (m, 2H), 3.05 - 2.98 (m, 2H), 2.33 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 137.84, 136.27, 133.95, 132.21, 130.87, 130.12, 129.74, 129.60, 127.98, 126.87, 33.88, 33.78, 21.06.

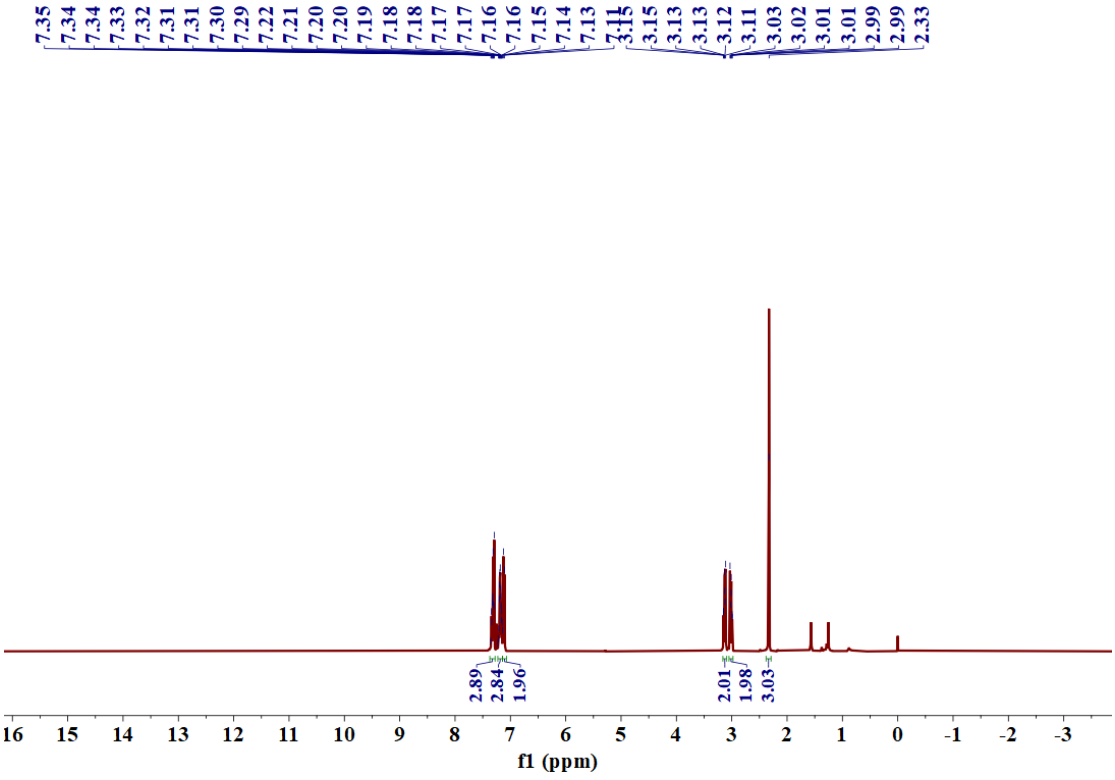


Fig. S53. ^{1}H NMR spectra of (2-chlorophenethyl)(p-tolyl)sulfane in $CDCl_3$.

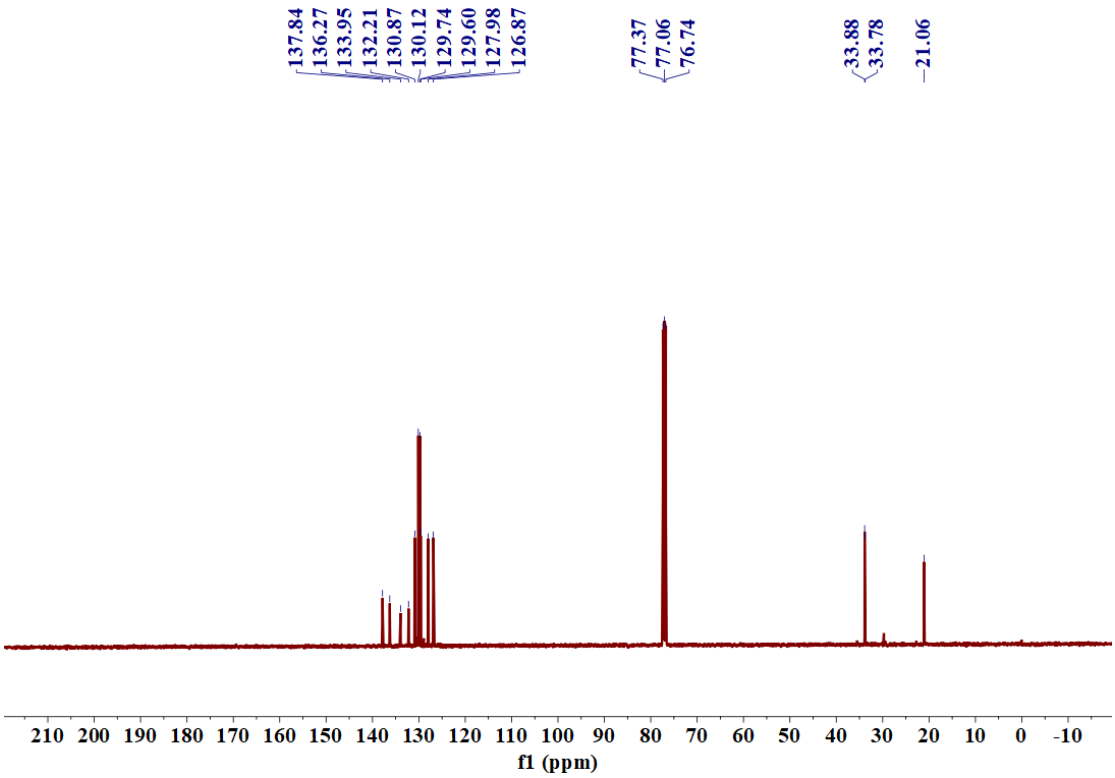
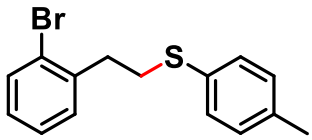


Fig. S54. ^{13}C NMR spectra of (2-chlorophenethyl)(p-tolyl)sulfane e in $CDCl_3$

3u. (2-bromophenethyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3u as yellow oil (45.5 mg, 74% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52 (d, *J* = 7.9 Hz, 1H), 7.31 (d, *J* = 8.0 Hz, 2H), 7.25 - 7.18 (m, 2H), 7.14 - 7.06 (m, 3H), 3.13 (dd, *J* = 9.3, 5.5 Hz, 2H), 3.02 (dd, *J* = 10.0, 6.2 Hz, 2H), 2.33 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 139.55, 136.31, 132.91, 132.15, 130.88, 130.22, 129.74, 128.21, 127.52, 124.33, 36.35, 33.92, 21.07.

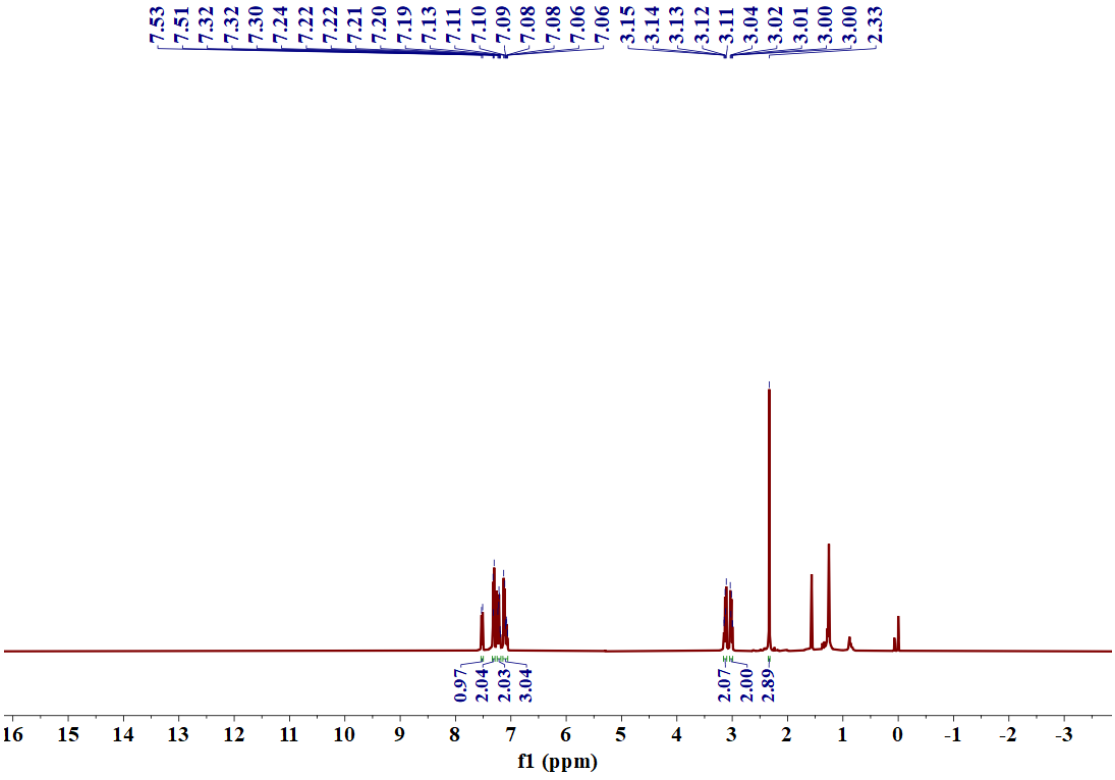


Fig. S55. ^{1}H NMR spectra of (2-bromophenethyl)(p-tolyl)sulfane in $CDCl_3$.

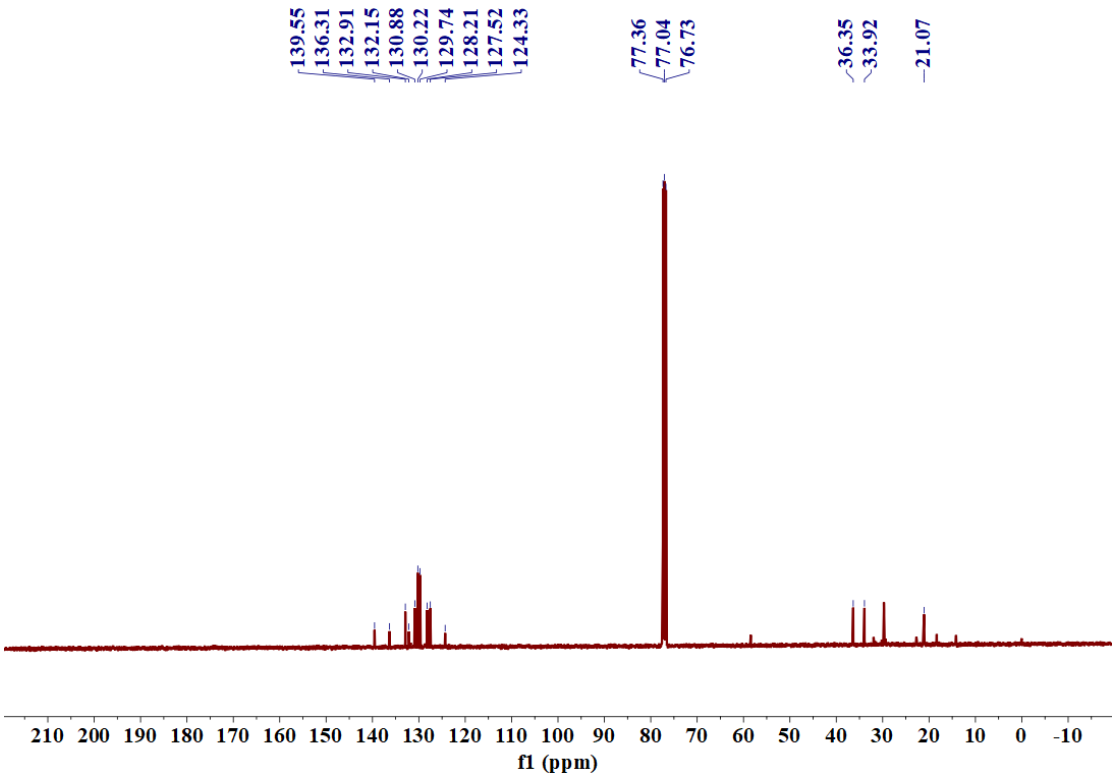
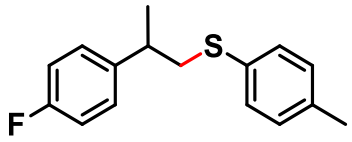


Fig. S56. ^{13}C NMR spectra of (2-bromophenethyl)(p-tolyl)sulfane in $CDCl_3$

3v. (2-(4-fluorophenyl)propyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3v as a colorless oil (35.3 mg, 68% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.25 - 7.18 (m, 2H), 7.12 - 7.03 (m, 4H), 6.99 - 6.89 (m, 2H), 3.09 (dd, *J* = 12.5, 6.5 Hz, 1H), 2.94 (m, 2H), 2.28 (s, 3H), 1.32 (d, *J* = 6.8 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 162.81, 160.39, 141.31, 141.28, 136.18, 132.94, 130.40, 130.24, 130.21, 130.14, 129.82, 128.55, 128.47, 115.42, 115.21, 42.98, 38.90, 21.27, 21.12.

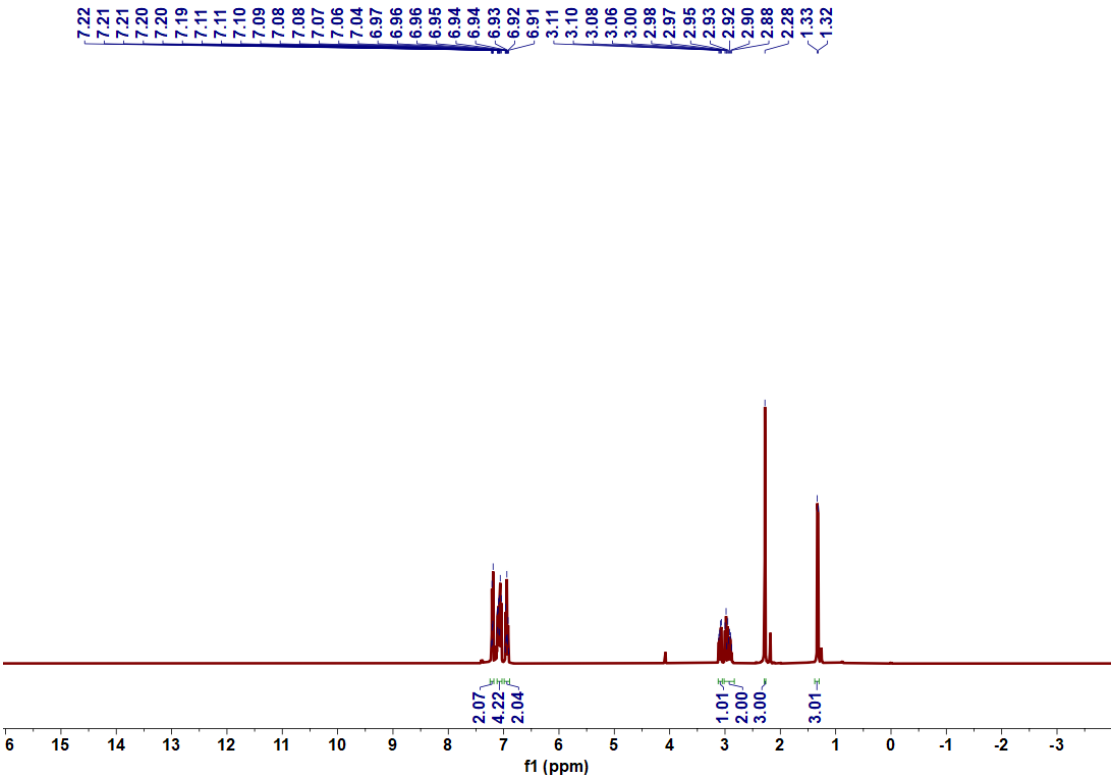


Fig. S57. ^{1}H NMR spectra of (2-(4-fluorophenyl)propyl)(p-tolyl)sulfane in $CDCl_3$.

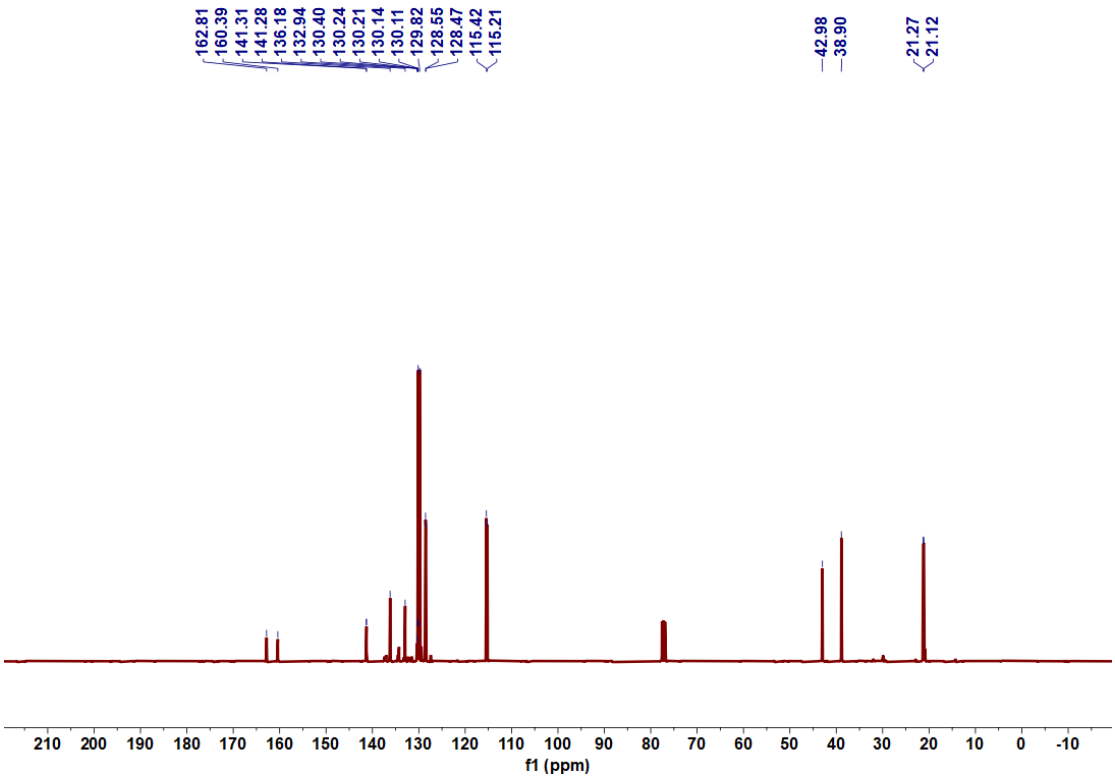
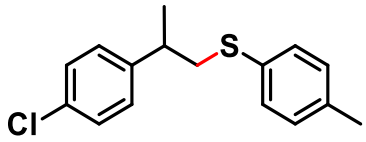


Fig. S58. ^{13}C NMR spectra of (2-(4-fluorophenyl)propyl)(p-tolyl)sulfane in $CDCl_3$

3w. (2-(4-chlorophenyl)propyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3w as a colorless oil (38.1 mg, 69% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.27 - 7.20 (m, 2H), 7.16 - 7.06 (m, 4H), 6.98 (t, J = 8.7 Hz, 2H), 3.11 (dd, J = 12.6, 6.7 Hz, 1H), 2.97 (m, 2H), 2.32 (s, 3H), 1.35 (d, J = 6.8 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 162.74, 160.31, 141.20, 141.17, 136.18, 132.76, 130.09, 129.76, 129.72, 128.44, 128.37, 115.34, 115.13, 42.95, 38.81, 21.20, 21.04.

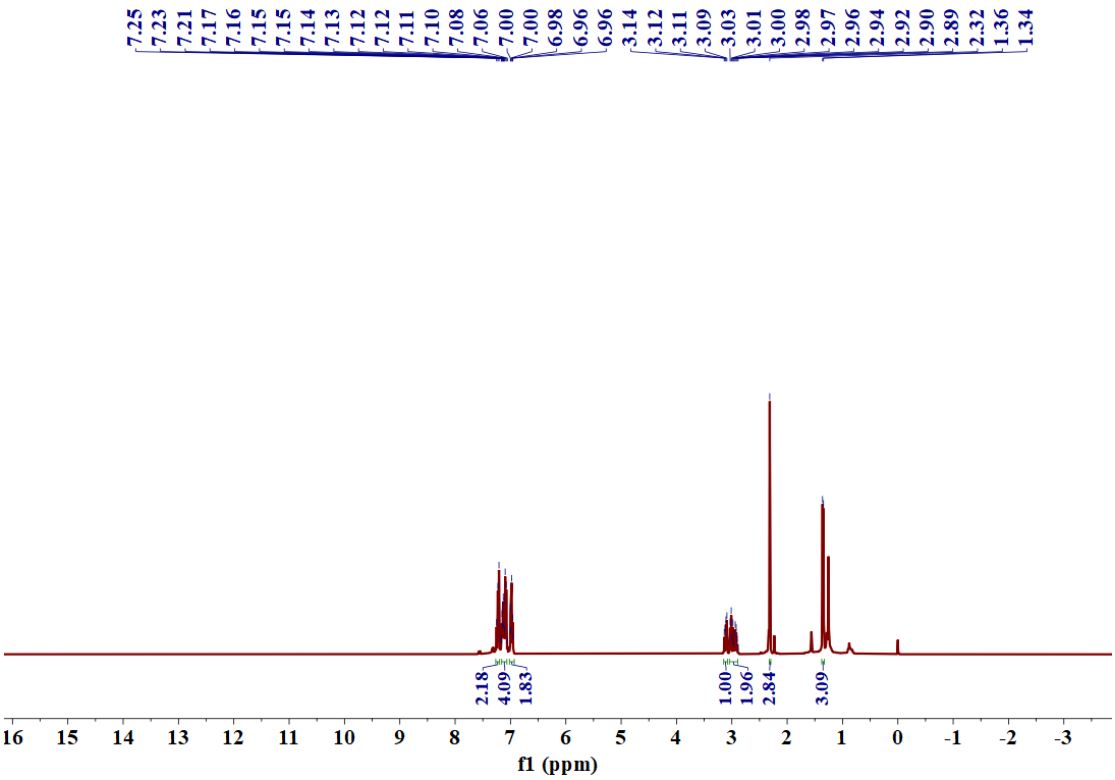


Fig. S59. ^{1}H NMR spectra of (2-(4-chlorophenyl)propyl)(p-tolyl)sulfane in $CDCl_3$.

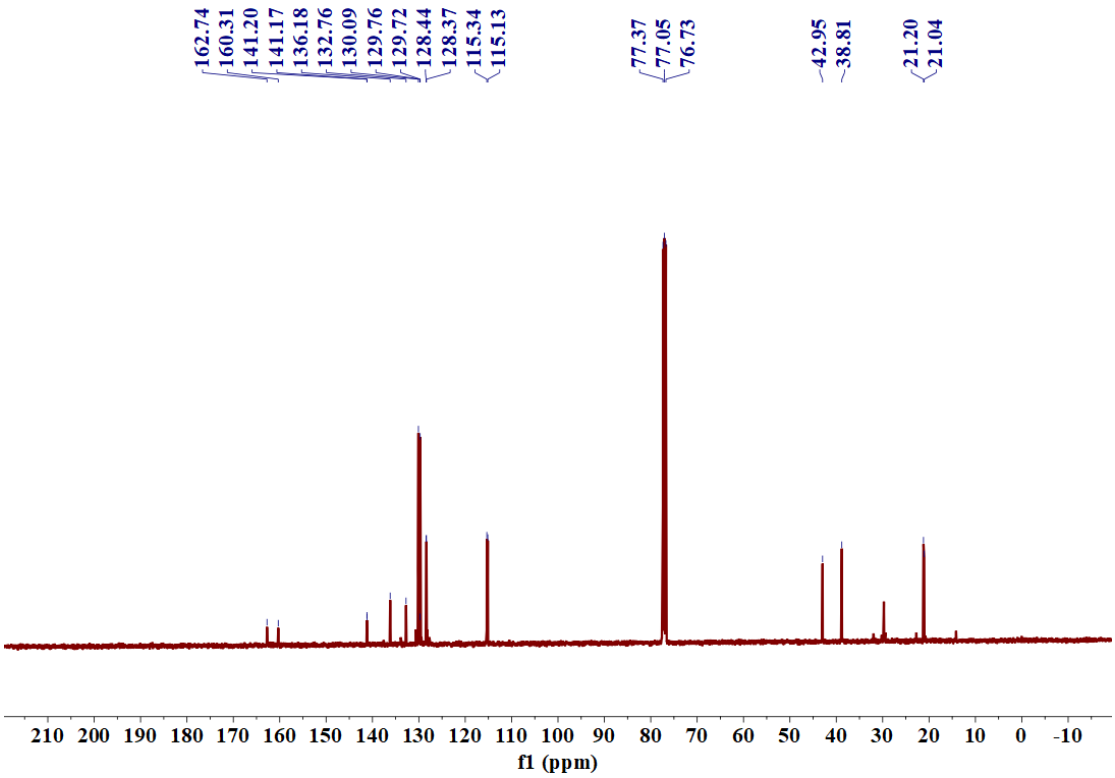
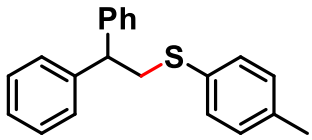


Fig. S60. ^{13}C NMR spectra of (2-(4-chlorophenyl)propyl)(p-tolyl)sulfane in $CDCl_3$

3x. (2,2-diphenylethyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3x as a colorless oil (40.7 mg, 67% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.71 - 7.59 (m, 10H), 7.56 (m, 2H), 7.44 (d, J = 8.0 Hz, 2H), 4.63 (t, J = 7.9 Hz, 1H), 3.96 (d, J = 7.9 Hz, 2H), 2.66 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 143.64, 136.47, 133.39, 130.61, 130.23, 129.01, 128.46, 127.10, 51.03, 40.68, 21.51.

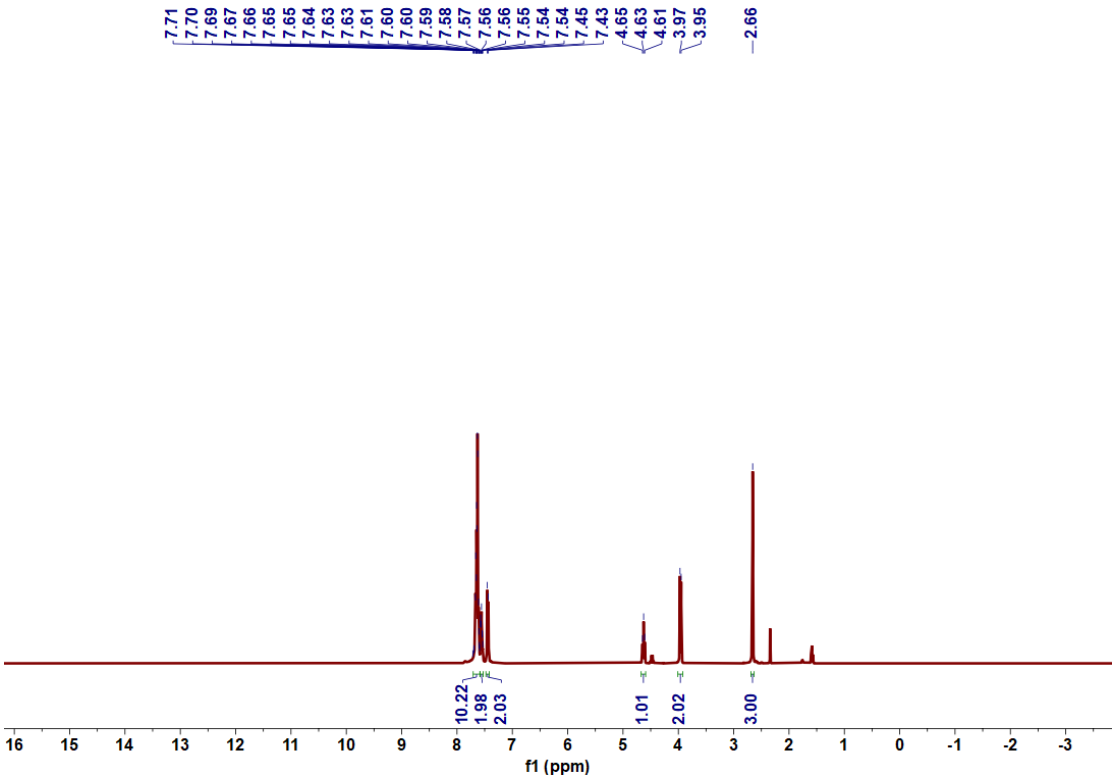


Fig. S61. ^{1}H NMR spectra of (2,2-diphenylethyl)(p-tolyl)sulfane in $CDCl_3$.

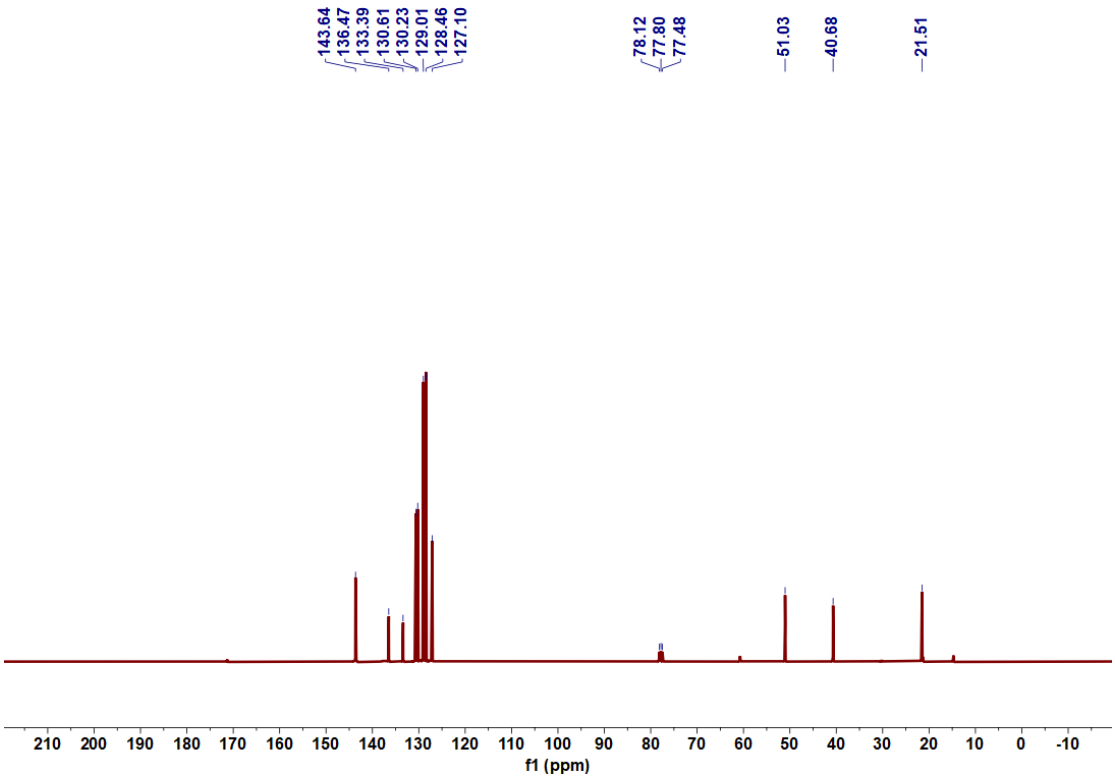
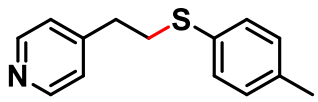


Fig. S62. ^{13}C NMR spectra of (2,2-diphenylethyl)(p-tolyl)sulfane in $CDCl_3$

3y. 4-(2-(p-tolylthio)ethyl)pyridine



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=5:1) to give 3y as a brown oil (34.8 mg, 76% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.56 - 8.42 (m, 2H), 7.33 - 7.25 (m, 2H), 7.18 - 7.05 (m, 4H), 3.11 (dd, *J* = 8.6, 6.8 Hz, 2H), 2.87 (dd, *J* = 8.8, 6.6 Hz, 2H), 2.33 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 149.83, 149.04, 136.76, 131.68, 130.65, 129.88, 123.96, 34.91, 34.81, 21.09.

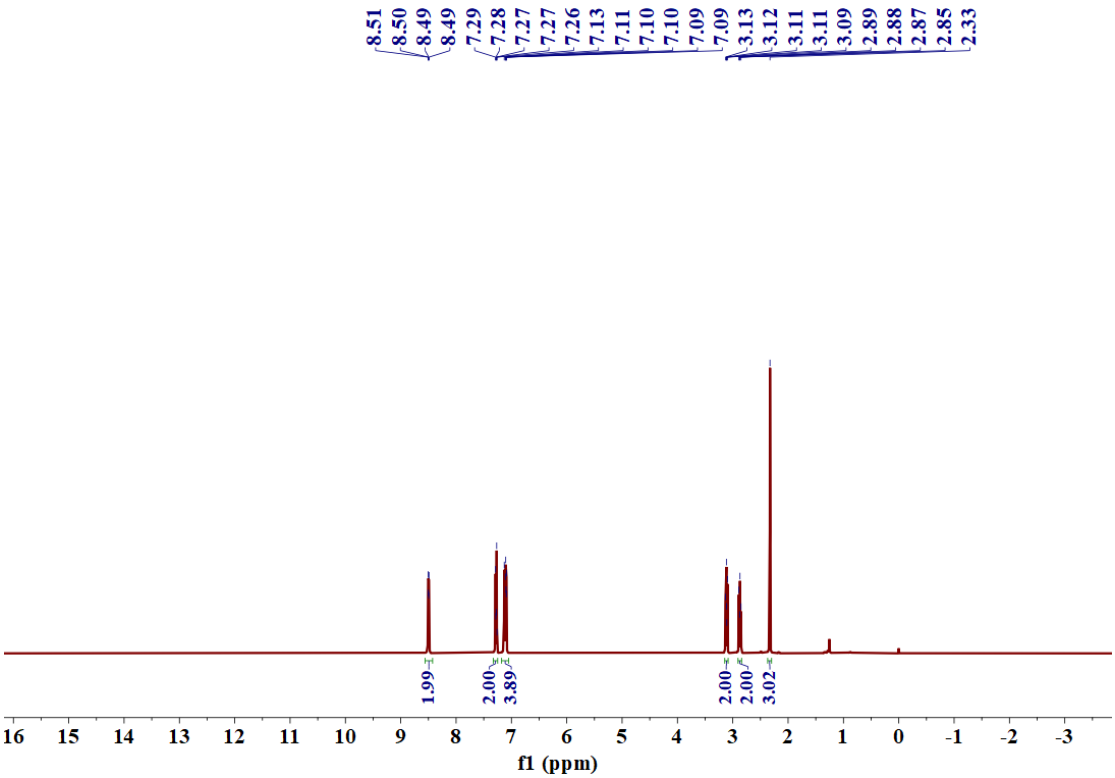


Fig. S63. ^{1}H NMR spectra of 4-(2-(p-tolylthio)ethyl)pyridine in $CDCl_3$.

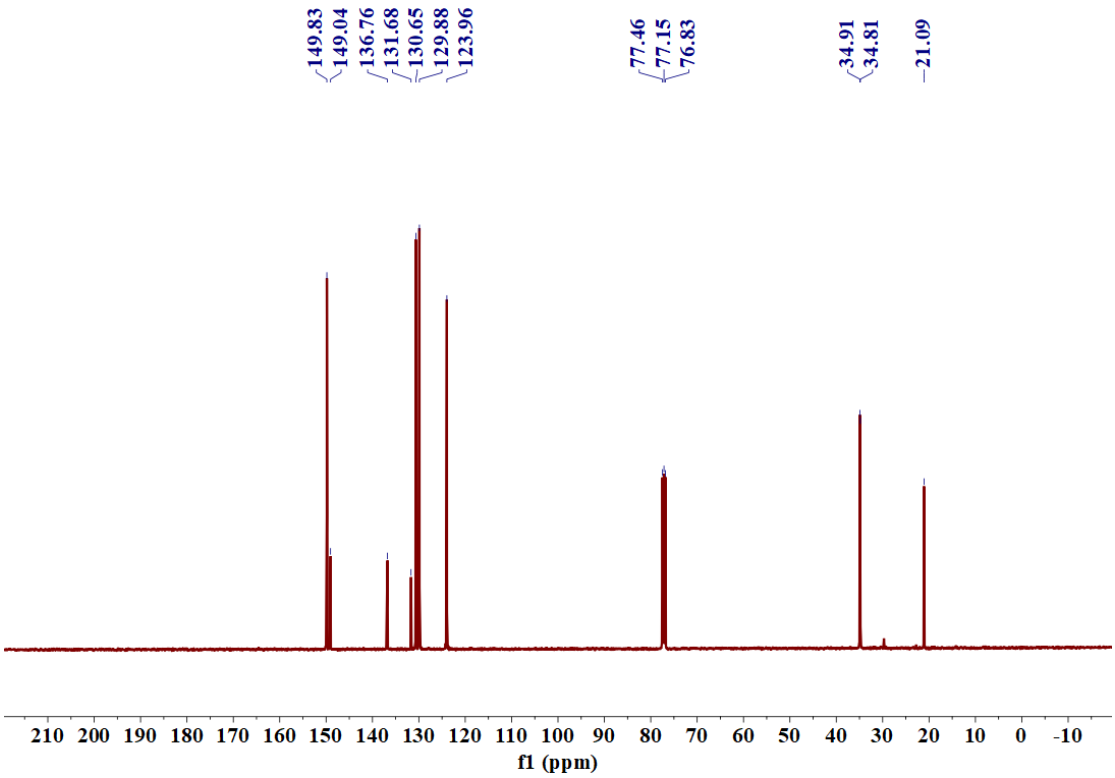
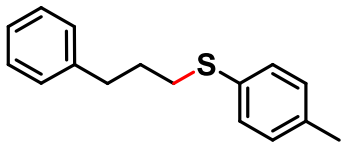


Fig. S64. ^{13}C NMR spectra of 4-(2-(p-tolylthio)ethyl)pyridine in $CDCl_3$

3z. (3-phenylpropyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3z as a colorless oil (28.6 mg, 59% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.28 - 7.19 (m, 4H), 7.18 - 7.11 (m, 3H), 7.05 (d, J = 7.9 Hz, 2H), 2.84 (t, J = 7.2 Hz, 2H), 2.71 (t, J = 7.5 Hz, 2H), 2.28 (s, 3H), 1.91 (p, J = 7.4 Hz, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 141.49, 136.08, 132.82, 130.10, 129.78, 128.62, 128.50, 128.42, 126.06, 34.77, 33.73, 30.84, 21.14.

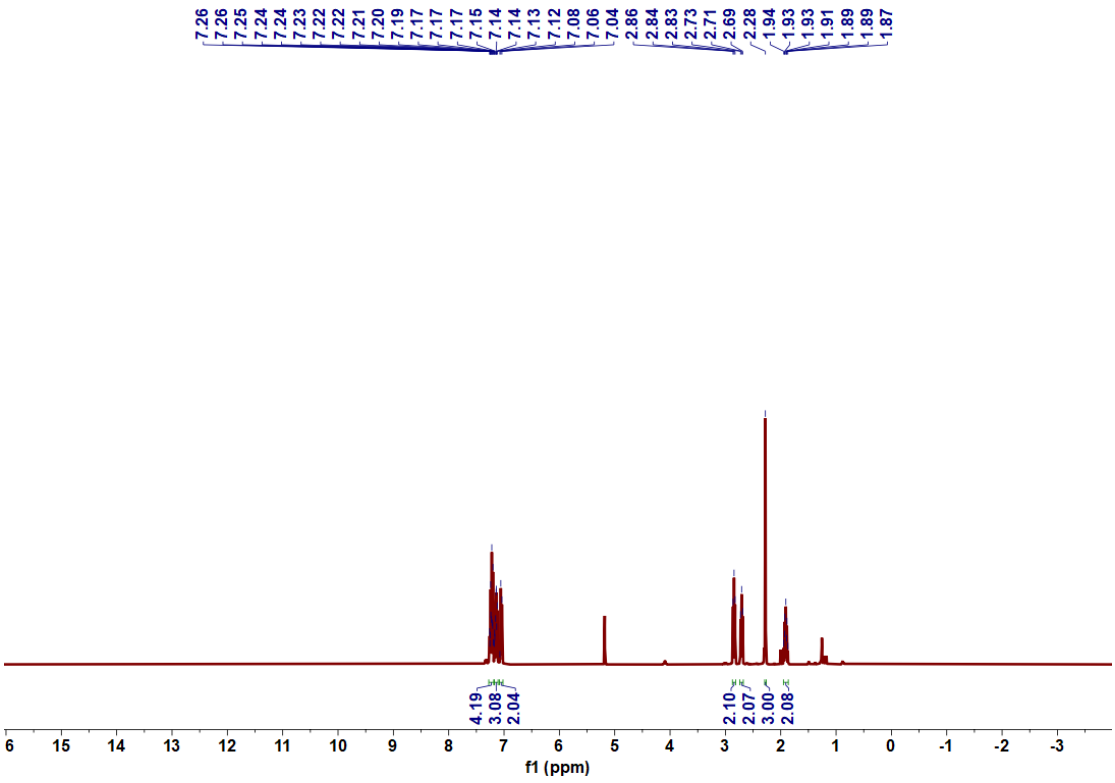


Fig. S65. ^{1}H NMR spectra of (3-phenylpropyl)(p-tolyl)sulfane in $CDCl_3$.

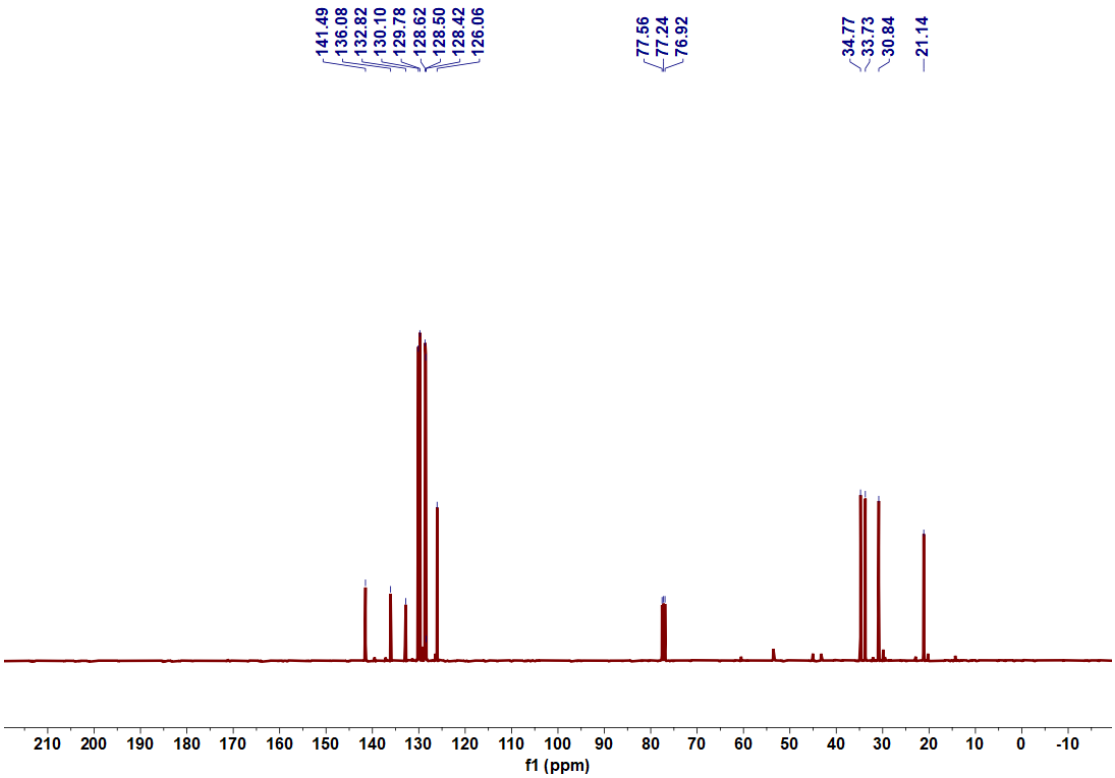
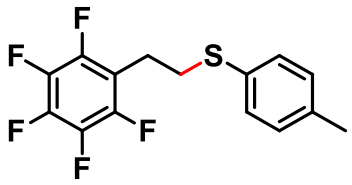


Fig. S66. ^{13}C NMR spectra of (3-phenylpropyl)(p-tolyl)sulfane in $CDCl_3$

3aa. (2-(perfluorophenyl)ethyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3aa as a colorless oil (38.1 mg, 60% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.27 (dd, J = 9.0, 2.7 Hz, 2H), 7.11 (d, J = 7.8 Hz, 2H), 3.09 (dd, J = 8.1, 5.9 Hz, 2H), 2.98 (dd, J = 8.0, 6.0 Hz, 2H), 2.33 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 139.86, 139.05, 136.90, 131.16, 131.06, 130.56, 130.21, 129.82, 128.84, 128.61, 128.54, 127.20, 126.64, 35.40, 22.84, 21.05.

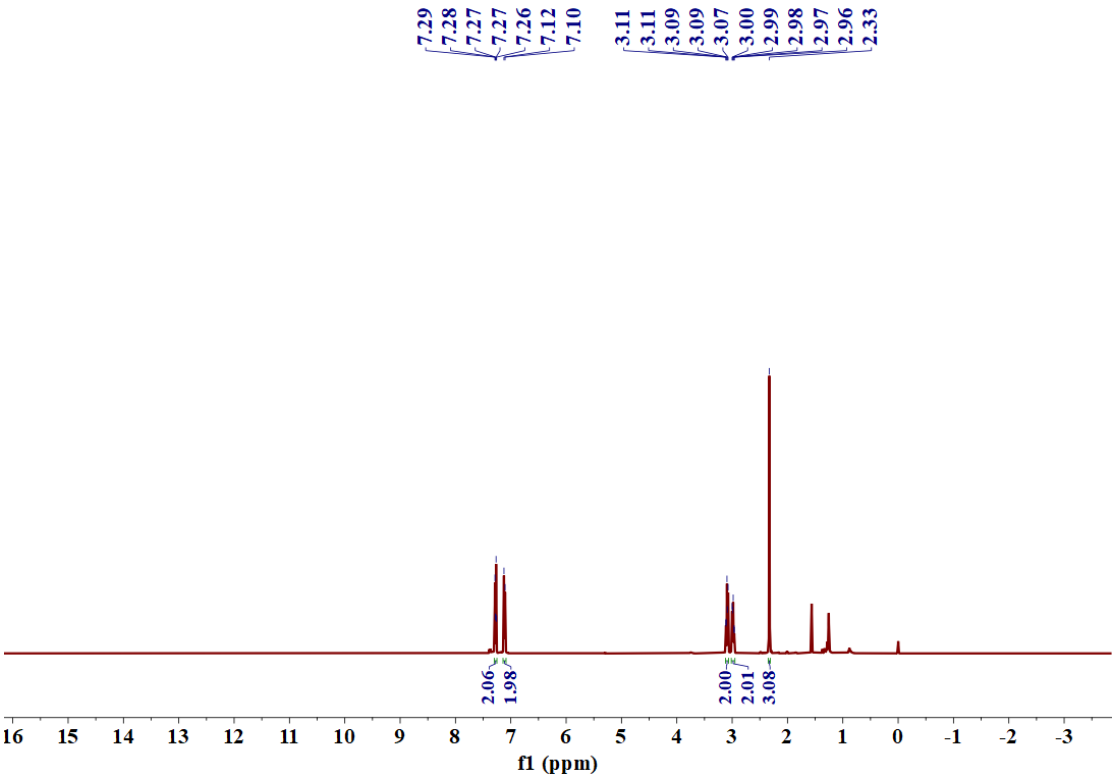


Fig. S67. ^{1}H NMR spectra of (2-(perfluorophenyl)ethyl)(p-tolyl)sulfane in $CDCl_3$.

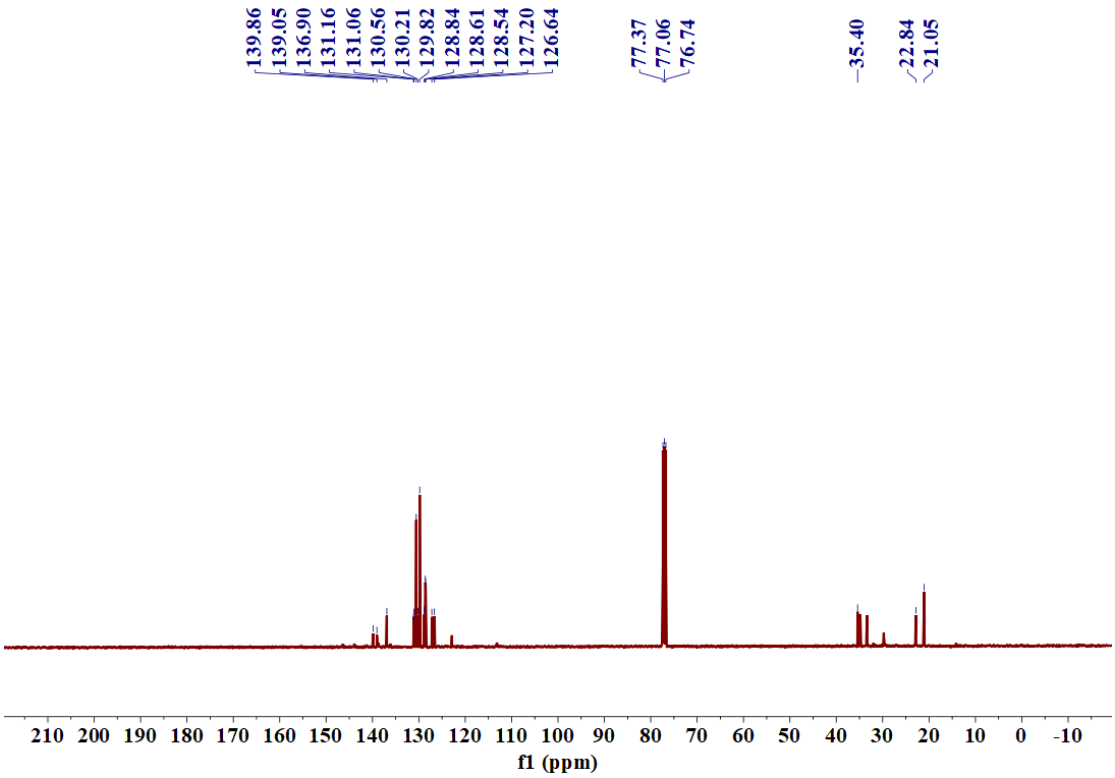
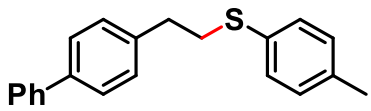


Fig. S68. ^{13}C NMR spectra of (2-(perfluorophenyl)ethyl)(p-tolyl)sulfane in $CDCl_3$

3ab. (2-([1,1'-biphenyl]-4-yl)ethyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=30:1) to give 3ab as a yellow oil (37.7 mg, 62% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.59 - 7.54 (m, 2H), 7.54 - 7.49 (m, 2H), 7.42 (dd, *J* = 8.4, 6.9 Hz, 2H), 7.35 - 7.27 (m, 3H), 7.25 (dd, *J* = 8.7, 2.4 Hz, 2H), 7.12 (d, *J* = 8.0 Hz, 2H), 3.18 - 3.12 (m, 2H), 2.94 (dd, *J* = 9.3, 6.5 Hz, 2H), 2.33 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 140.97, 139.44, 139.40, 136.30, 132.44, 130.19, 130.14, 129.80, 129.07, 129.01, 128.79, 127.27, 127.19, 127.07, 35.84, 35.42, 21.09.

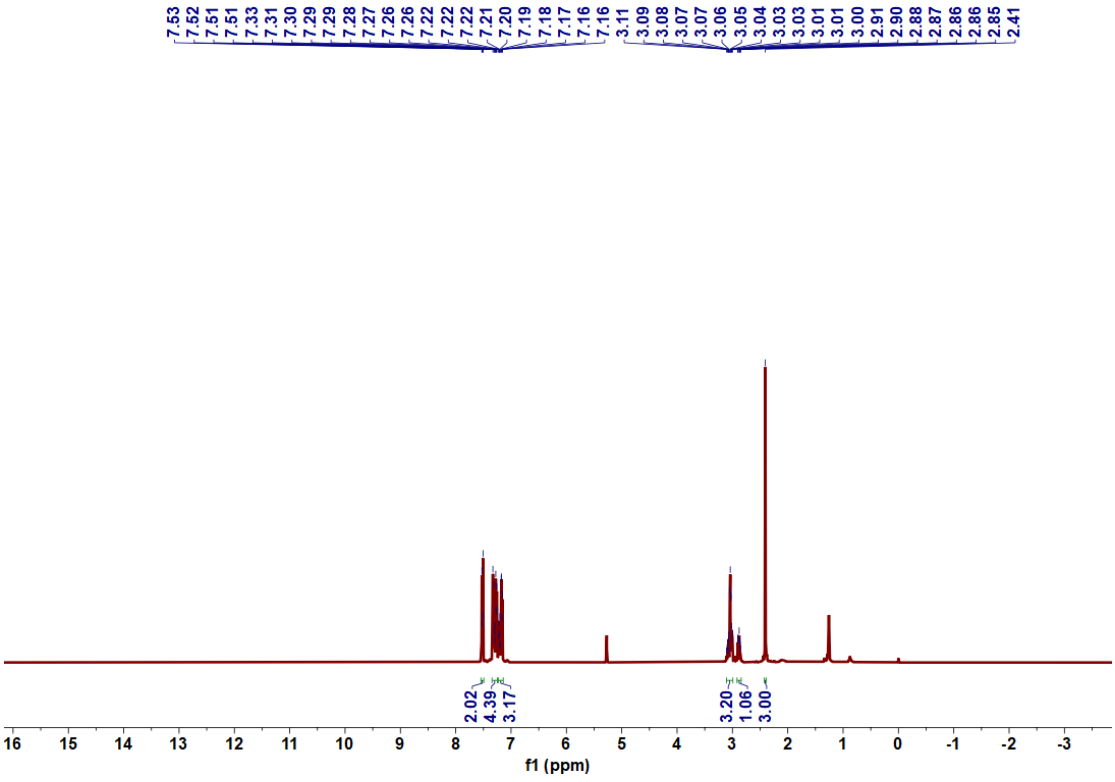


Fig. S69. ^{1}H NMR spectra of (2-([1,1'-biphenyl]-4-yl)ethyl)(p-tolyl)sulfane in $CDCl_3$.

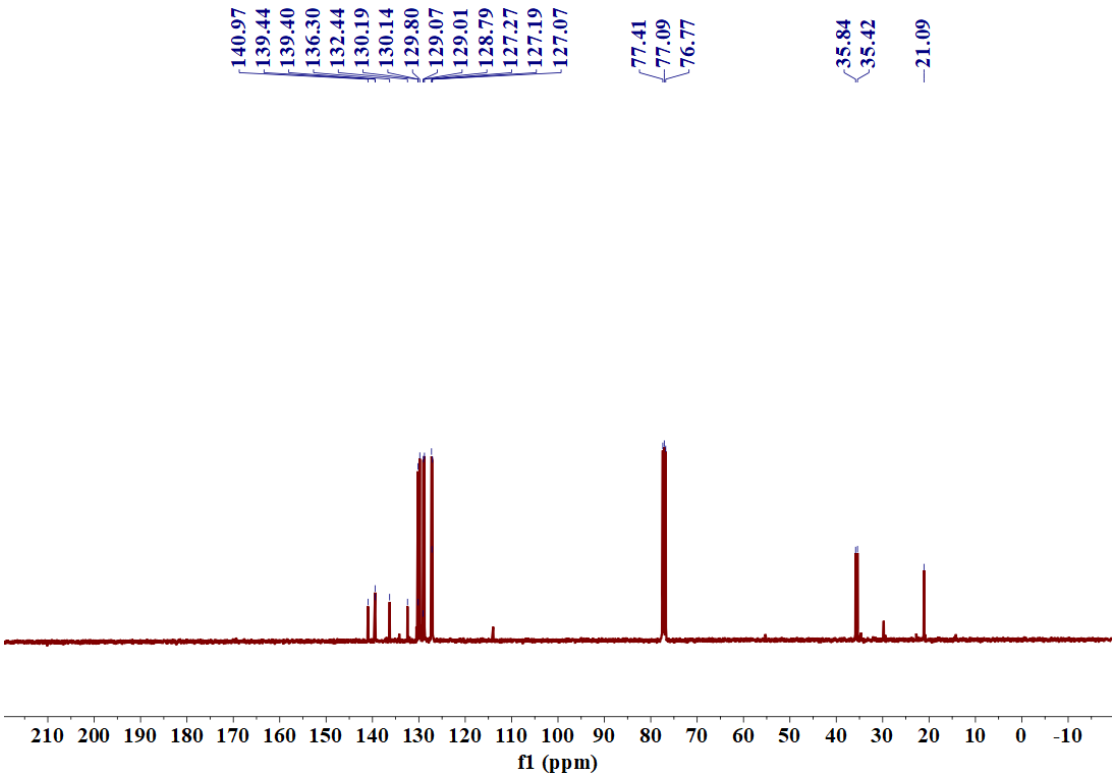
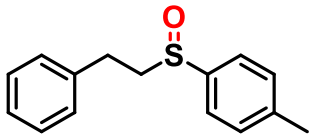


Fig. S70. ^{13}C NMR spectra of (2-([1,1'-biphenyl]-4-yl)ethyl)(p-tolyl)sulfane in $CDCl_3$

4a. 1-methyl-4-(phenethylsulfinyl)benzene



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=10:1) to give 4a as a colorless oil (41.9 mg, 86% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55 - 7.49 (m, 2H), 7.35 - 7.25 (m, 4H), 7.23 - 7.14 (m, 3H), 3.11 - 2.99 (m, 3H), 2.92 - 2.84 (m, 1H), 2.41 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 141.51, 140.32, 138.84, 129.99, 128.73, 128.55, 126.67, 124.08, 58.33, 28.21, 21.45.

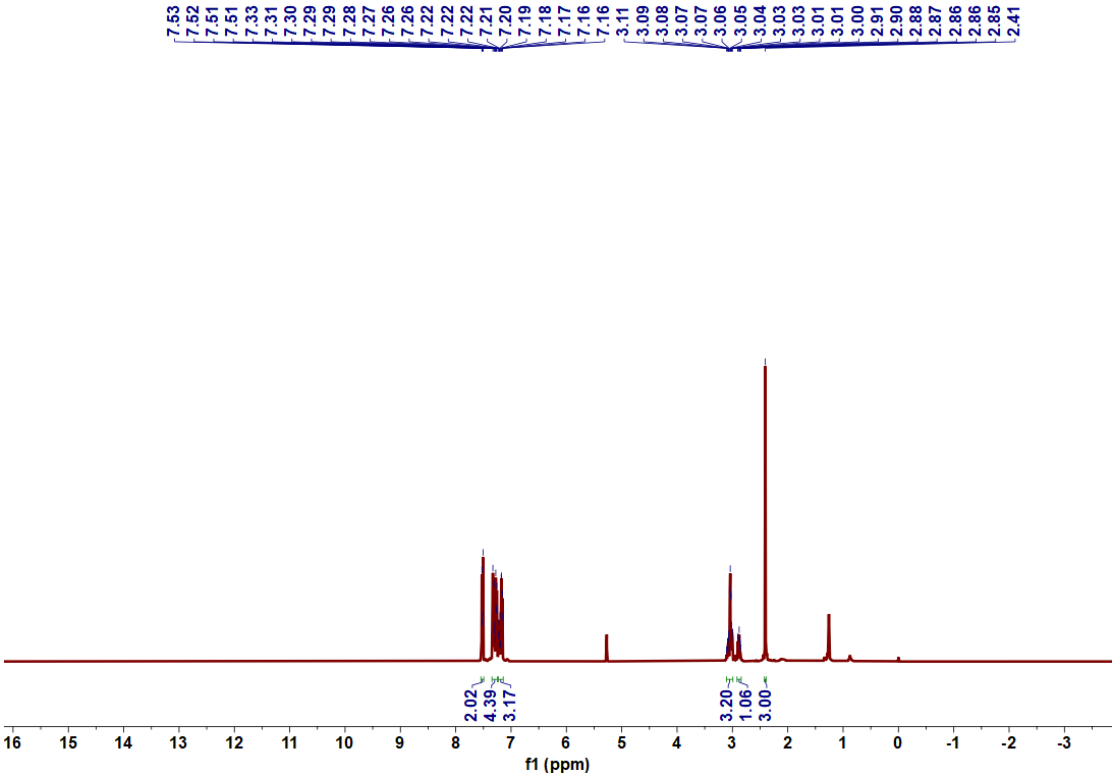


Fig. S71. ^{1}H NMR spectra of 1-methyl-4-(phenethylsulfinyl)benzene in $CDCl_3$.

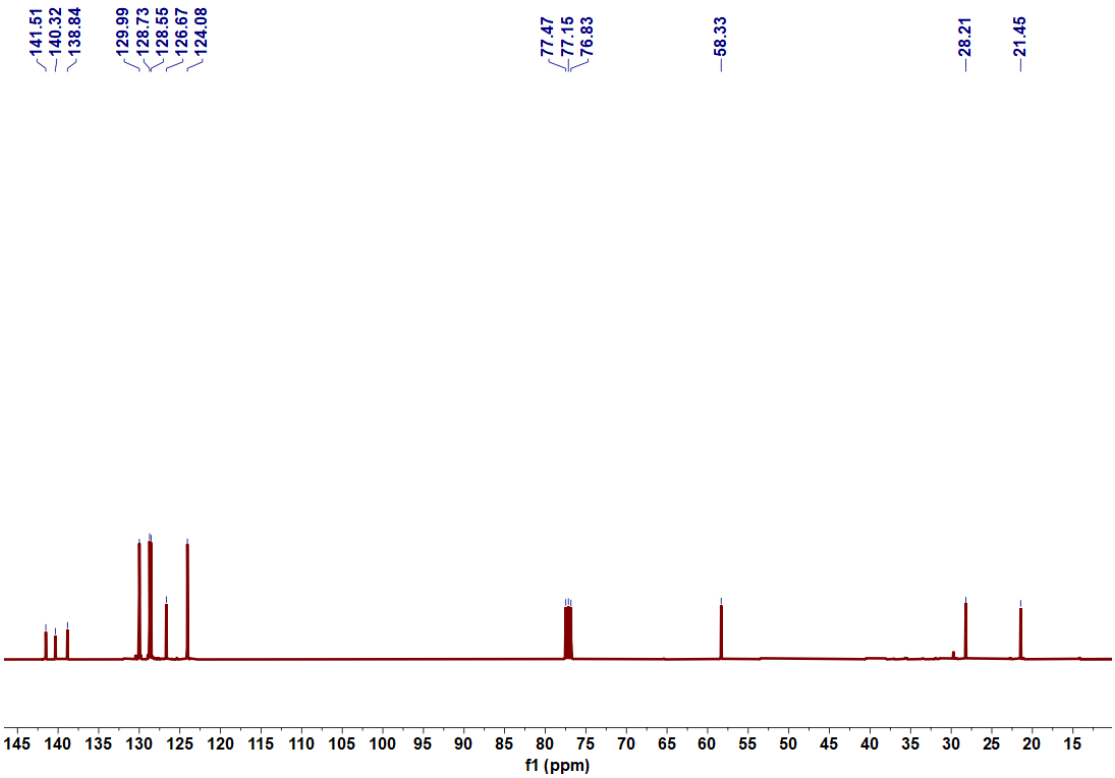
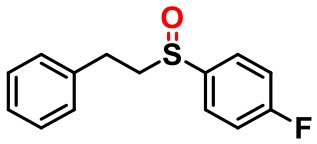


Fig. S72. ^{13}C NMR spectra of 1-methyl-4-(phenethylsulfinyl)benzene in $CDCl_3$

4b. (2-chlorophenethyl)(p-tolyl)sulfane



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=10:1) to give 4b as a white solid (40.7 mg, 82% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.66 - 7.57 (m, 2H), 7.31 - 7.23 (m, 2H), 7.23 - 7.09 (m, 5H), 3.11 - 2.96 (m, 3H), 2.87 (m, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 165.49, 163.00, 139.08, 139.05, 138.55, 128.77, 128.54, 126.75, 126.38, 126.29, 116.71, 116.49, 58.39, 58.38, 28.11.

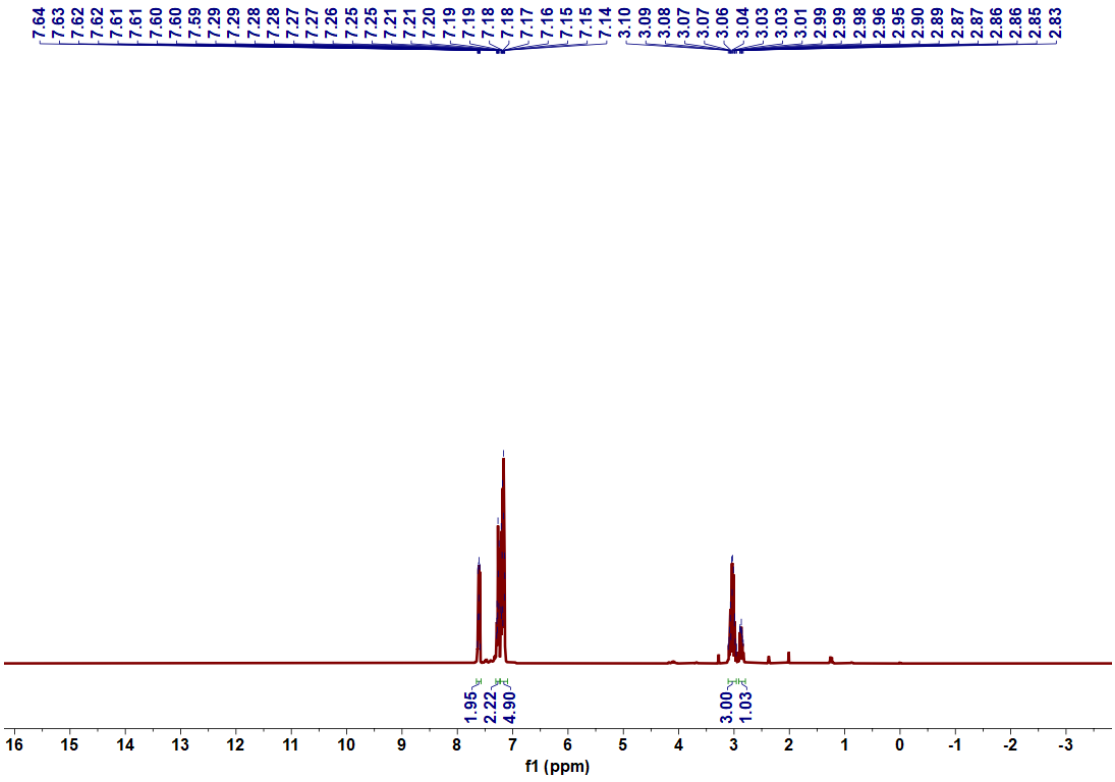


Fig. S73. ^{1}H NMR spectra of (2-chlorophenethyl)(p-tolyl)sulfane in $CDCl_3$.

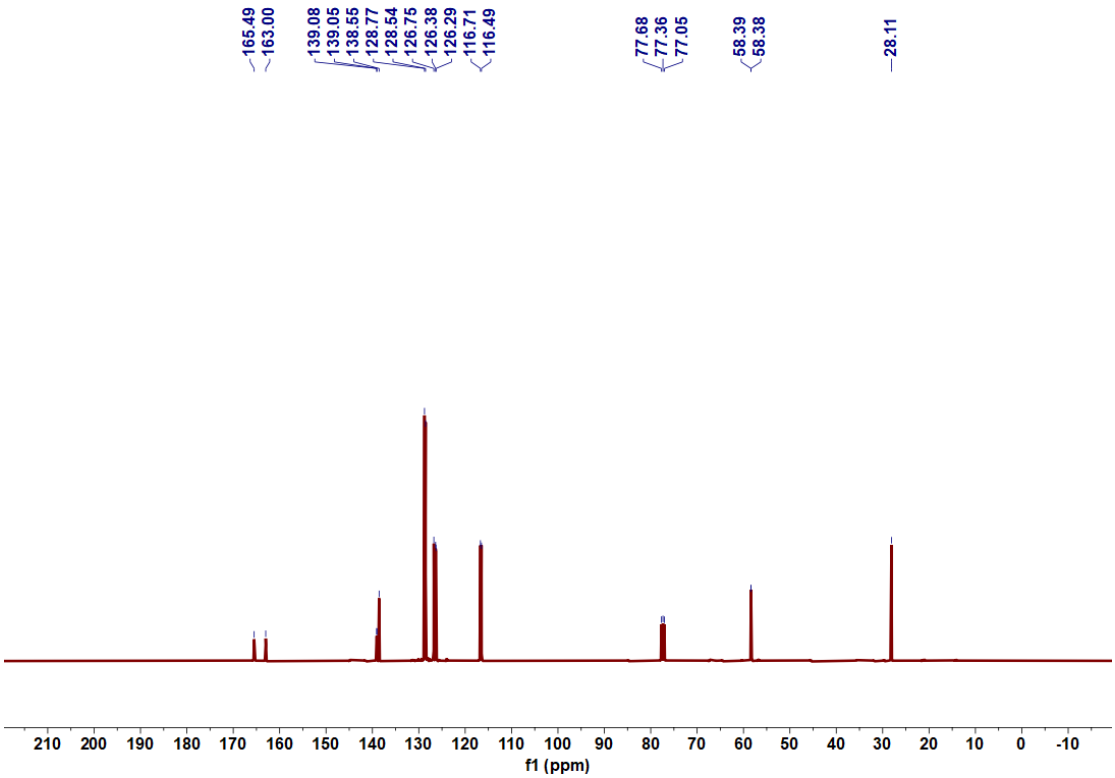
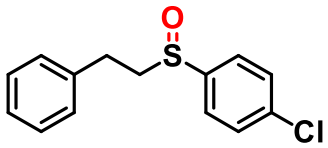


Fig. S74. ^{13}C NMR spectra of (2-chlorophenethyl)(p-tolyl)sulfane e in $CDCl_3$

4c. 1-chloro-4-(phenethylsulfinyl)benzene



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=10:1) to give 4c as a yellow solid (43.8 mg, 83% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.61 - 7.55 (m, 2H), 7.54 - 7.47 (m, 2H), 7.33 - 7.15 (m, 5H), 3.16 - 2.98 (m, 3H), 2.88 (m, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 142.09, 138.46, 137.26, 129.60, 128.81, 128.55, 126.82, 125.47, 58.37, 28.08.

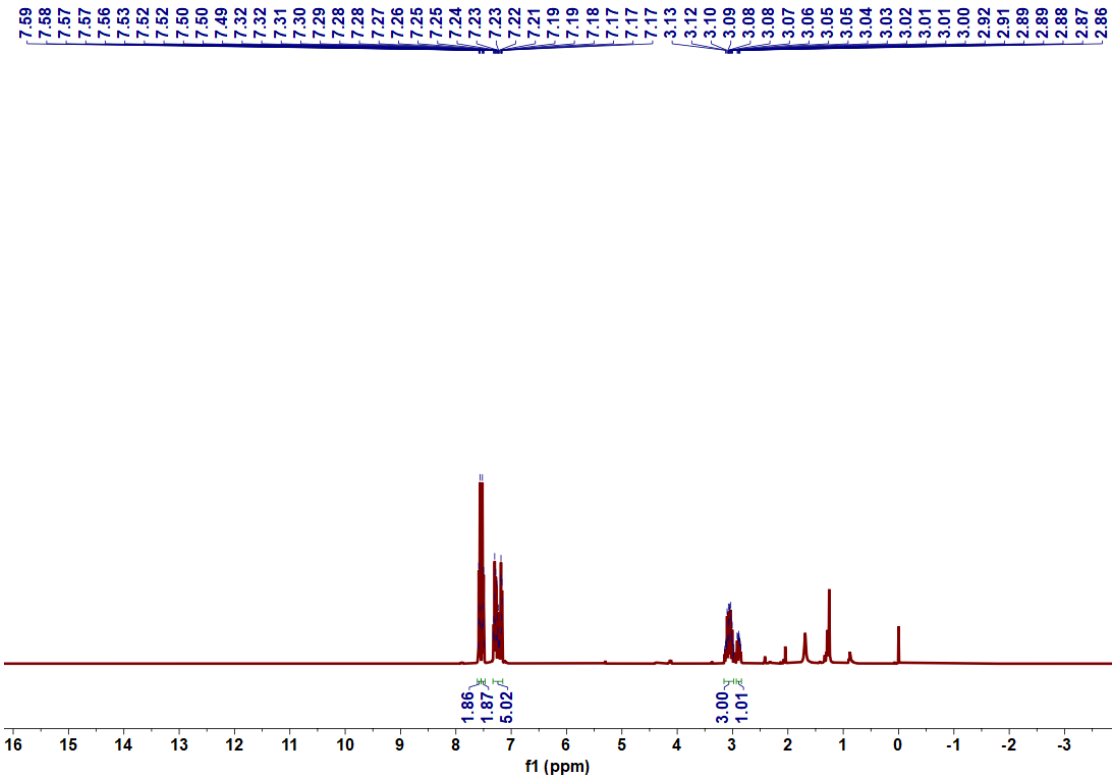


Fig. S75. ^{1}H NMR spectra of 1-chloro-4-(phenethylsulfinyl)benzene in $CDCl_3$.

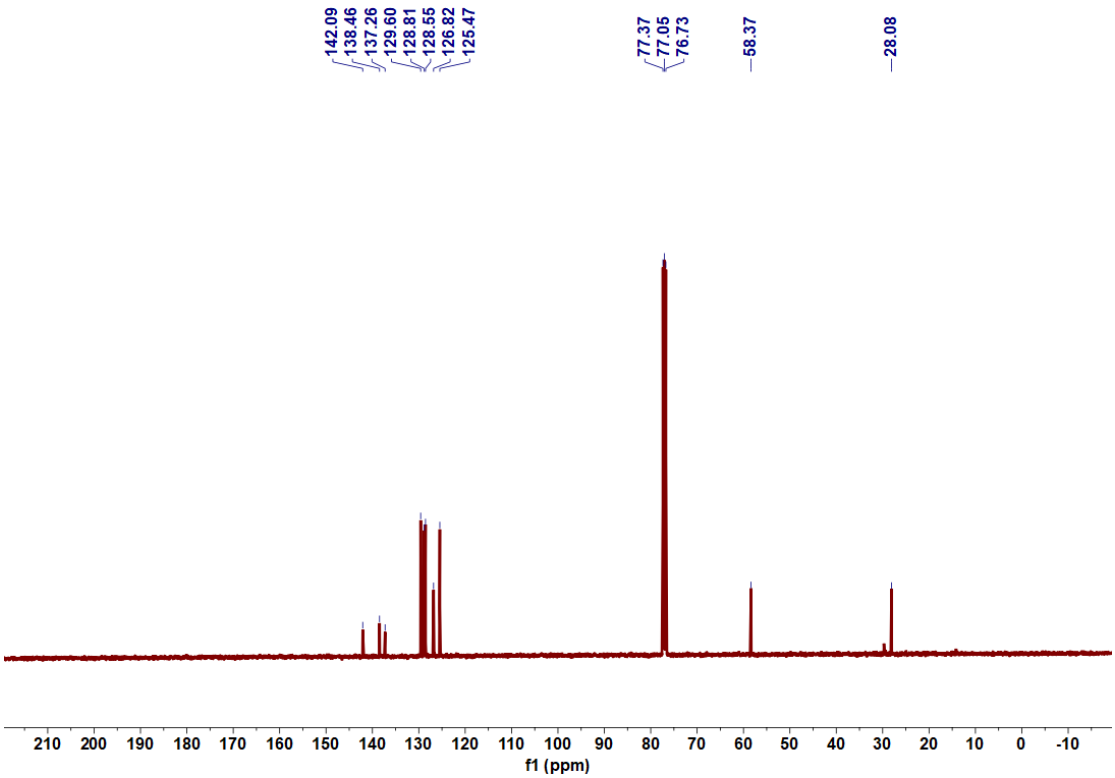
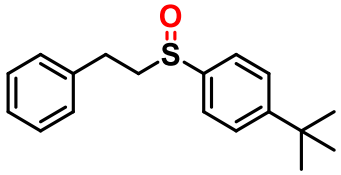


Fig. S76. ^{13}C NMR spectra of 1-chloro-4-(phenethylsulfinyl)benzene in $CDCl_3$

4d. 1-(tert-butyl)-4-(phenethylsulfinyl)benzene



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=10:1) to give 4d as a white solid (50.3 mg, 88% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.59 - 7.51 (m, 4H), 7.28 (dd, *J* = 7.9, 6.4 Hz, 2H), 7.23 - 7.15 (m, 3H), 3.15 - 3.00 (m, 3H), 2.99 - 2.88 (m, 1H), 1.34 (s, 9H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 154.67, 140.25, 138.87, 128.73, 128.56, 126.67, 126.34, 123.92, 58.33, 35.01, 31.24, 28.36.

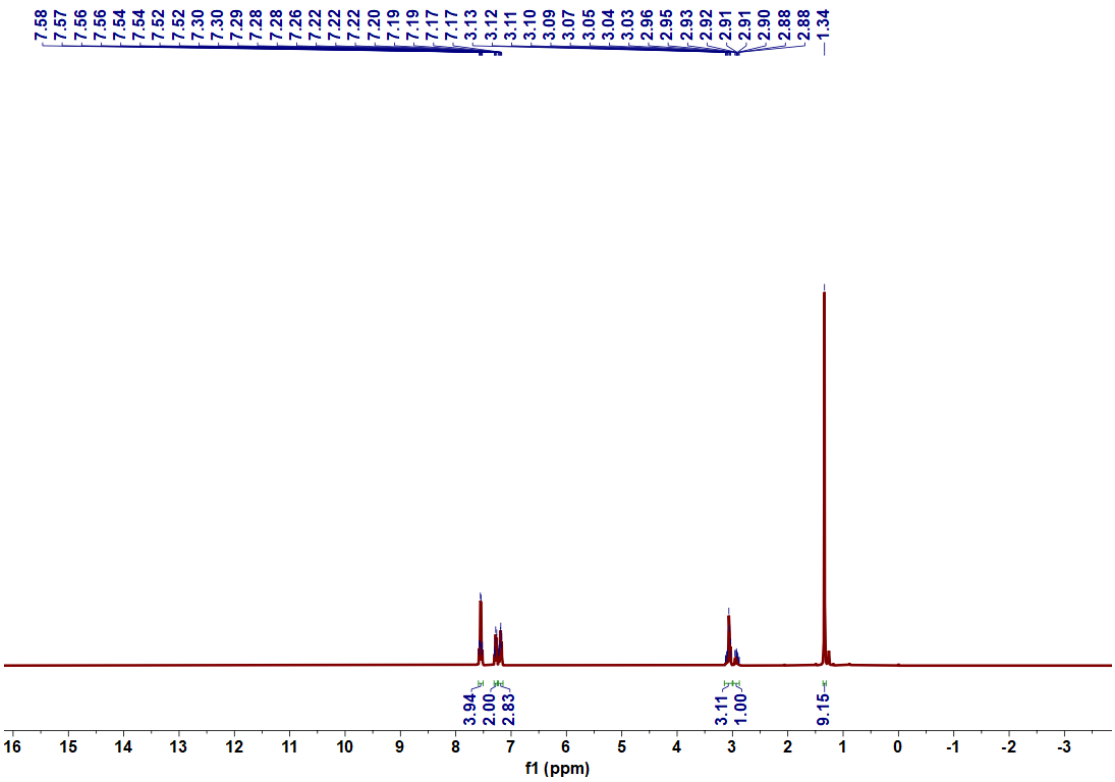


Fig. S77. ^{1}H NMR spectra of 1-(tert-butyl)-4-(phenethylsulfinyl)benzene in $CDCl_3$.

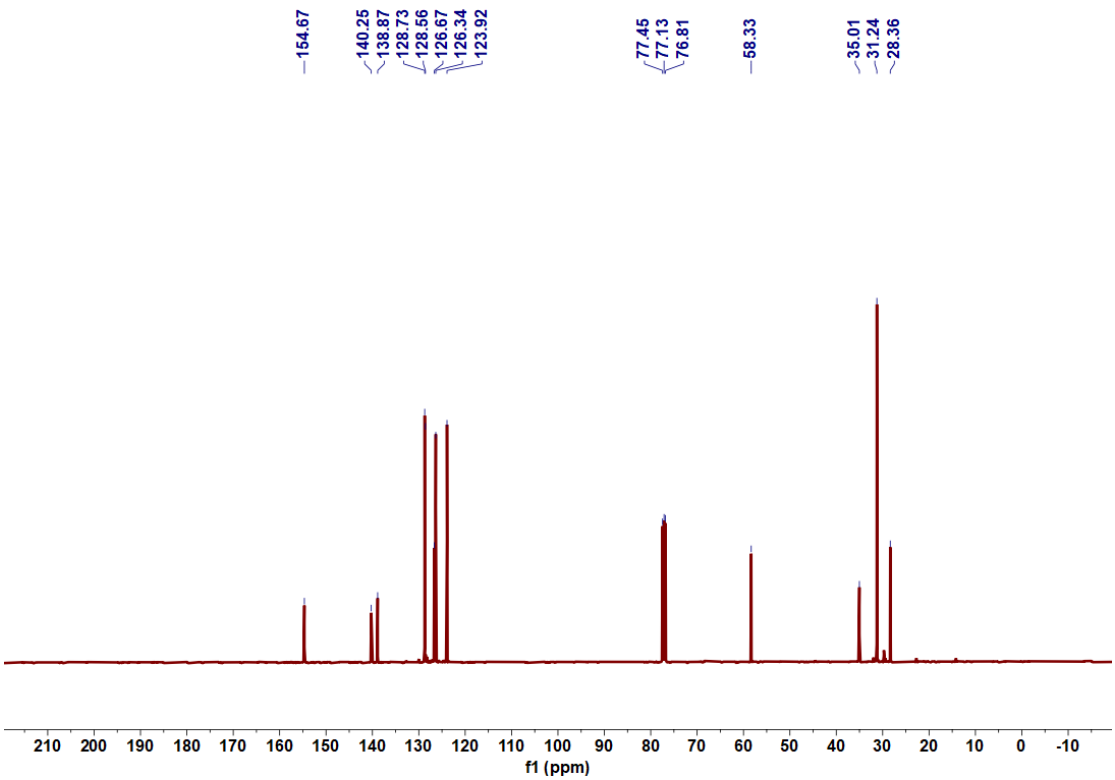
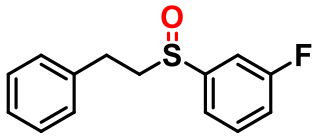


Fig. S78. ^{13}C NMR spectra of 1-(tert-butyl)-4-(phenethylsulfinyl)benzene in $CDCl_3$

4e. 1-fluoro-3-(phenethylsulfinyl)benzene



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=10:1) to give 4e as a white solid (38.7 mg, 78% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.49 (m, 1H), 7.38 (dd, *J* = 17.2, 8.0 Hz, 2H), 7.33 - 7.03 (m, 6H), 3.08 (m, 3H), 2.95 - 2.81 (m, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 164.35, 161.84, 146.34, 146.28, 138.46, 131.05, 130.97, 128.81, 128.57, 126.82, 119.66, 119.63, 118.26, 118.04, 111.47, 111.24, 58.29, 28.07.

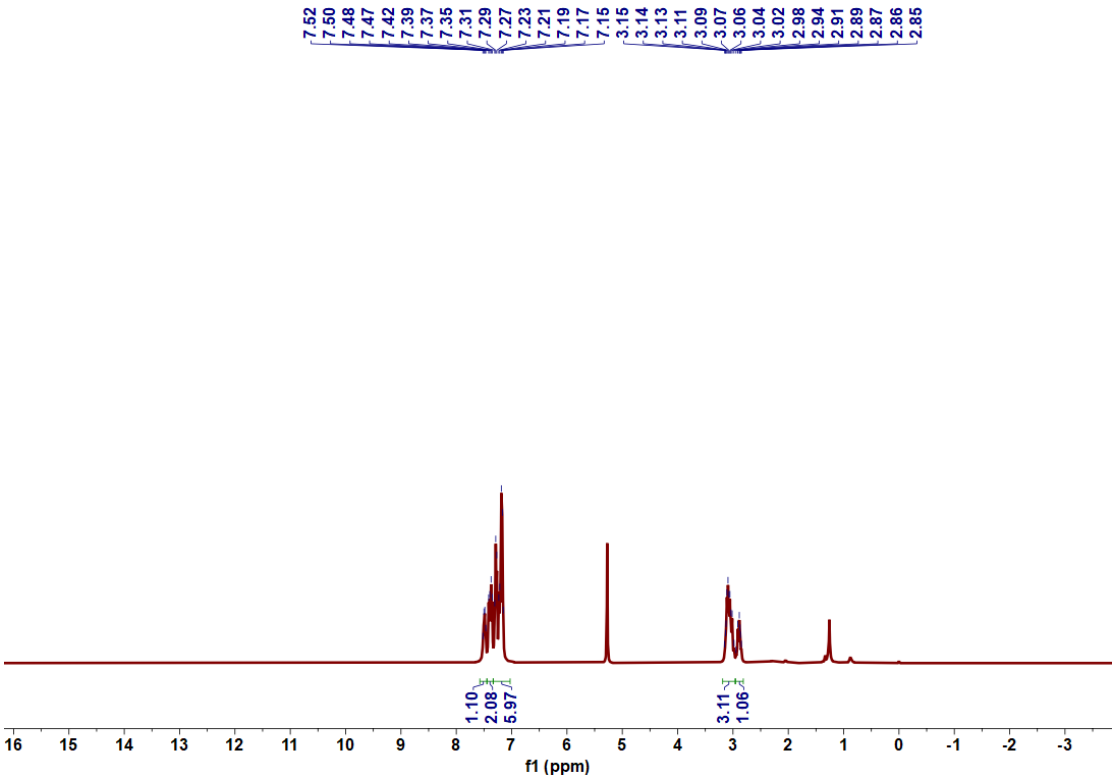


Fig. S79. ^{1}H NMR spectra of 1-fluoro-3-(phenethylsulfinyl)benzene in $CDCl_3$.

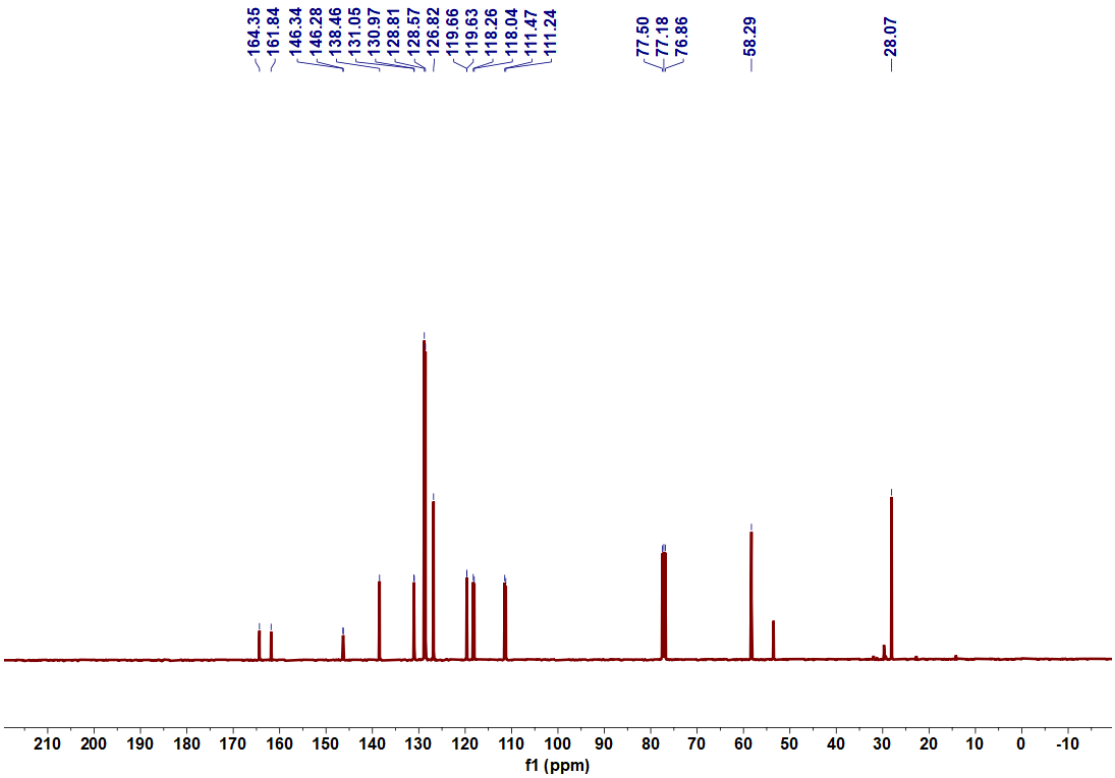
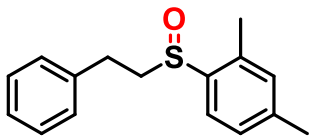


Fig. S80. ^{13}C NMR spectra of 1-fluoro-3-(phenethylsulfinyl)benzene in $CDCl_3$

4f. 2,4-dimethyl-1-(phenethylsulfinyl)benzene



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=10:1) to give 4f as a colorless oil (43.9 mg, 85% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.80 (d, J = 8.0 Hz, 1H), 7.31 - 7.15 (m, 6H), 7.00 (s, 1H), 3.16 - 2.89 (m, 4H), 2.35 (s, 3H), 2.26 (s, 3H)

^{13}C NMR (101 MHz, $CDCl_3$) δ 141.09, 138.95, 138.53, 134.20, 131.54, 128.71, 128.53, 127.93, 126.64, 124.01, 56.45, 28.44, 21.25, 18.08.

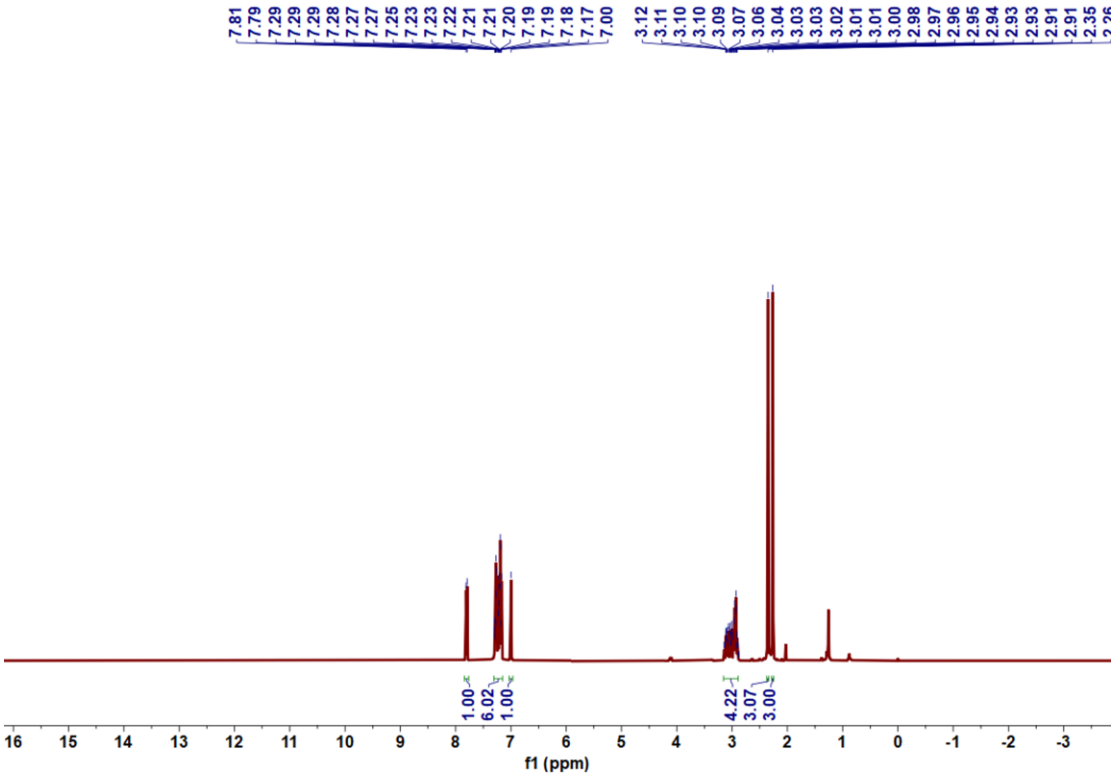


Fig. S81. ^{1}H NMR spectra of 2,4-dimethyl-1-(phenethylsulfinyl)benzene in $CDCl_3$.

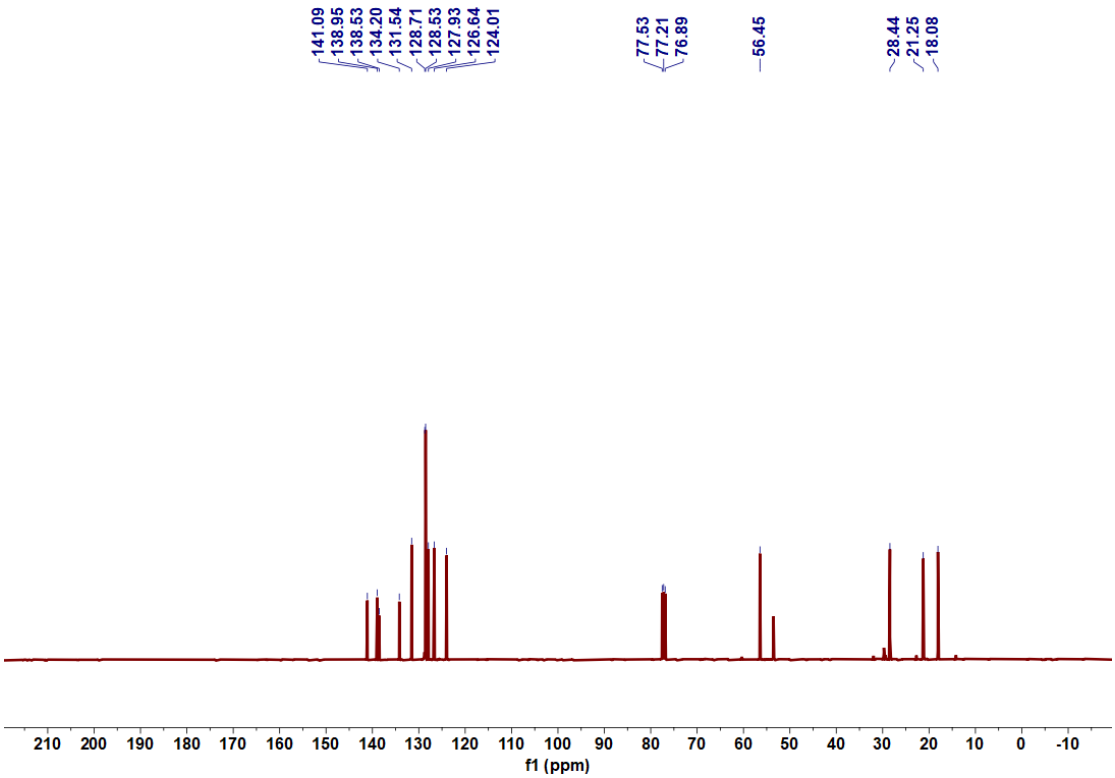
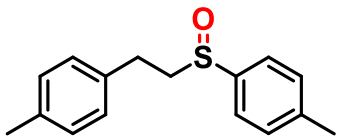


Fig. S82. ^{13}C NMR spectra of 2,4-dimethyl-1-(phenethylsulfinyl)benzene in $CDCl_3$

4g. 1-methyl-4-((4-methylphenethyl)sulfinyl)benzene



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=10:1) to give 4g as a white solid (44.9 mg, 87% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.51 (d, *J* = 8.0 Hz, 2H), 7.31 (d, *J* = 7.9 Hz, 2H), 7.11 - 7.03 (m, 4H), 3.06 - 2.97 (m, 3H), 2.90 - 2.80 (m, 1H), 2.40 (s, 3H), 2.29 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 141.46, 140.32, 136.20, 135.69, 129.97, 129.39, 128.43, 124.07, 58.47, 27.78, 21.43, 21.04.

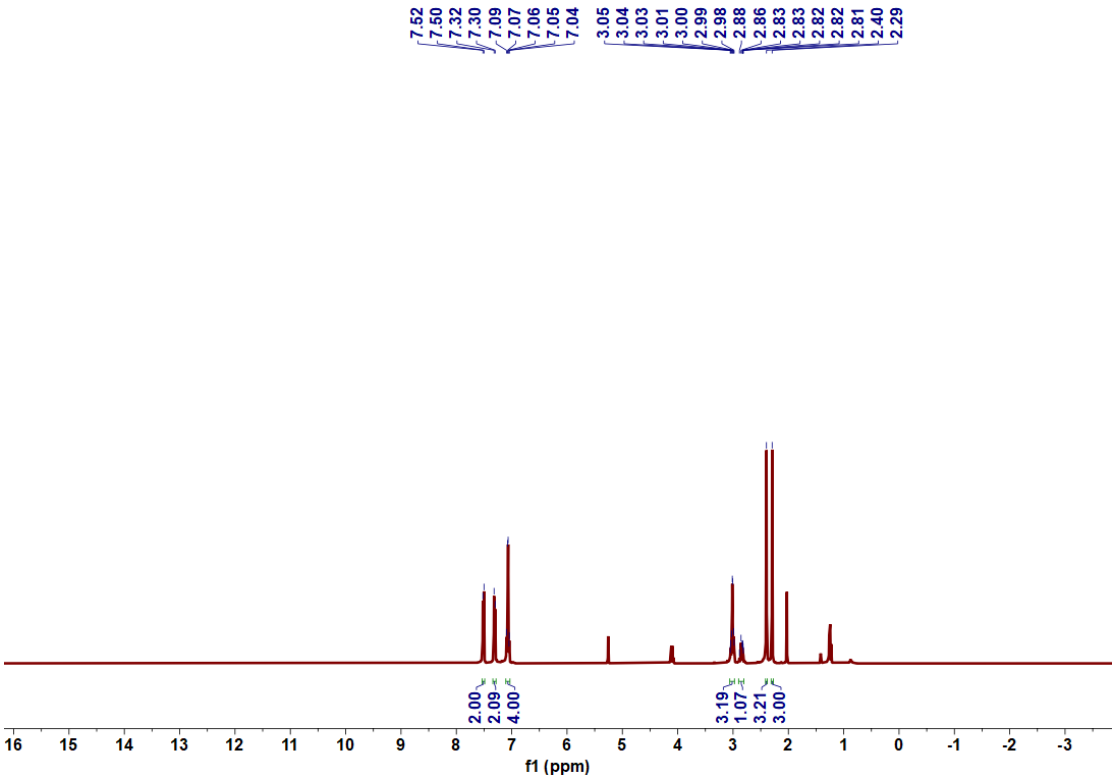


Fig. S83. ^{1}H NMR spectra of 1-methyl-4-((4-methylphenethyl)sulfinyl)benzene in $CDCl_3$.

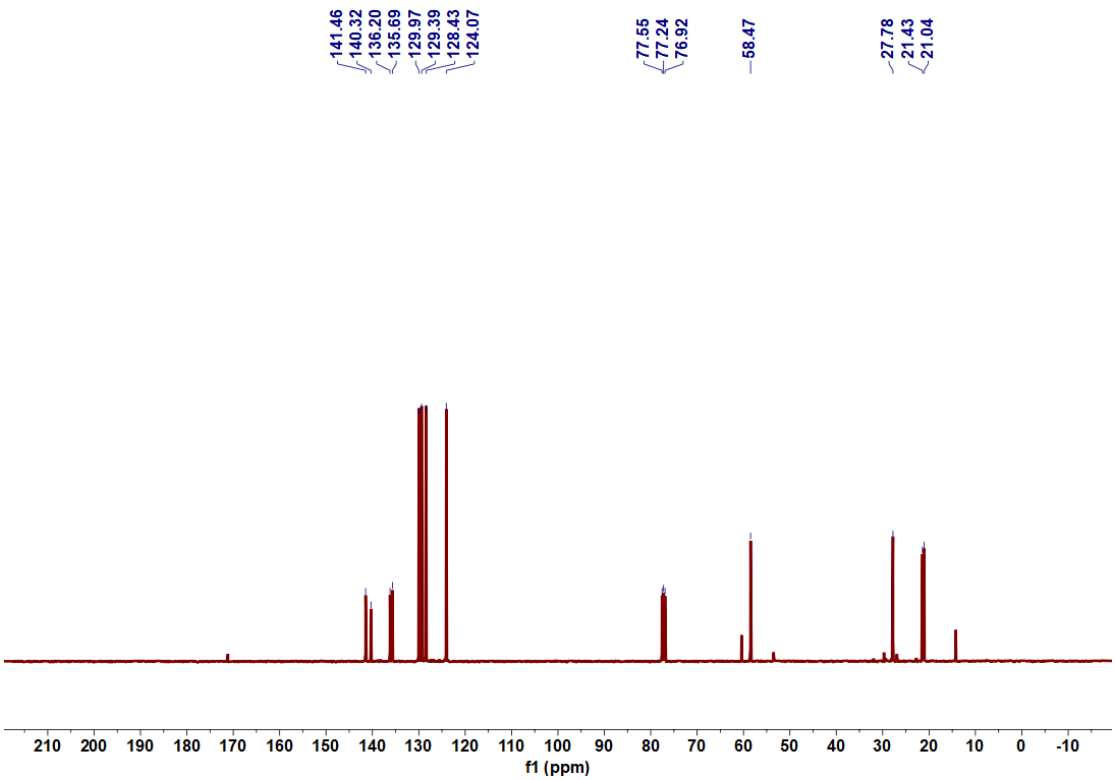
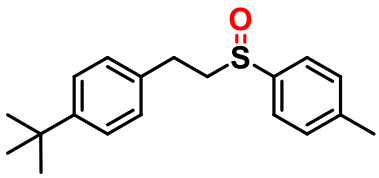


Fig. S84. ^{13}C NMR spectra of 1-methyl-4-((4-methylphenethyl)sulfinyl)benzene in $CDCl_3$

4h. 1-(tert-butyl)-4-(2-(p-tolylsulfinyl)ethyl)benzene



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=10:1) to give 4h as a white solid (54 mg, 90% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55 - 7.49 (m, 2H), 7.31 (dd, *J* = 8.4, 6.9 Hz, 4H), 7.14 - 7.08 (m, 2H), 3.08 - 2.99 (m, 3H), 2.92 - 2.84 (m, 1H), 2.41 (s, 3H), 1.29 (s, 9H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 149.56, 141.47, 140.36, 135.75, 129.96, 128.20, 125.62, 124.09, 58.37, 34.44, 31.36, 27.70, 21.45.

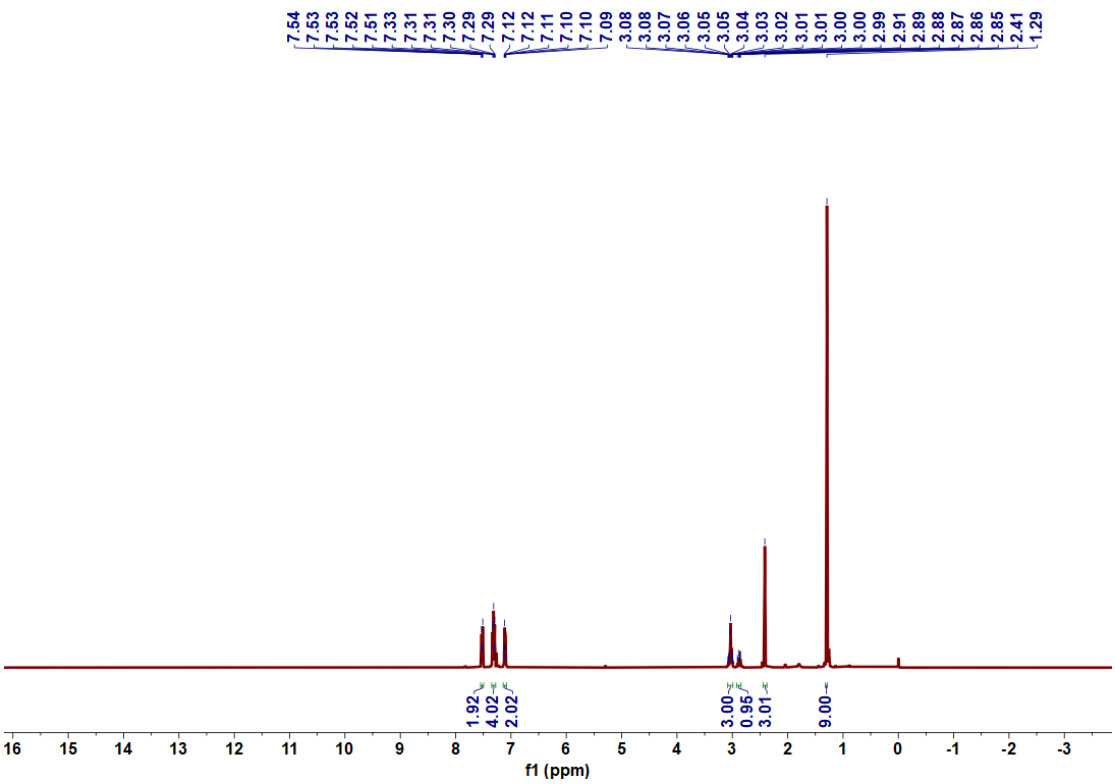


Fig. S85. ^{1}H NMR spectra of 1-(tert-butyl)-4-(2-(p-tolylsulfinyl)ethyl)benzene in $CDCl_3$.

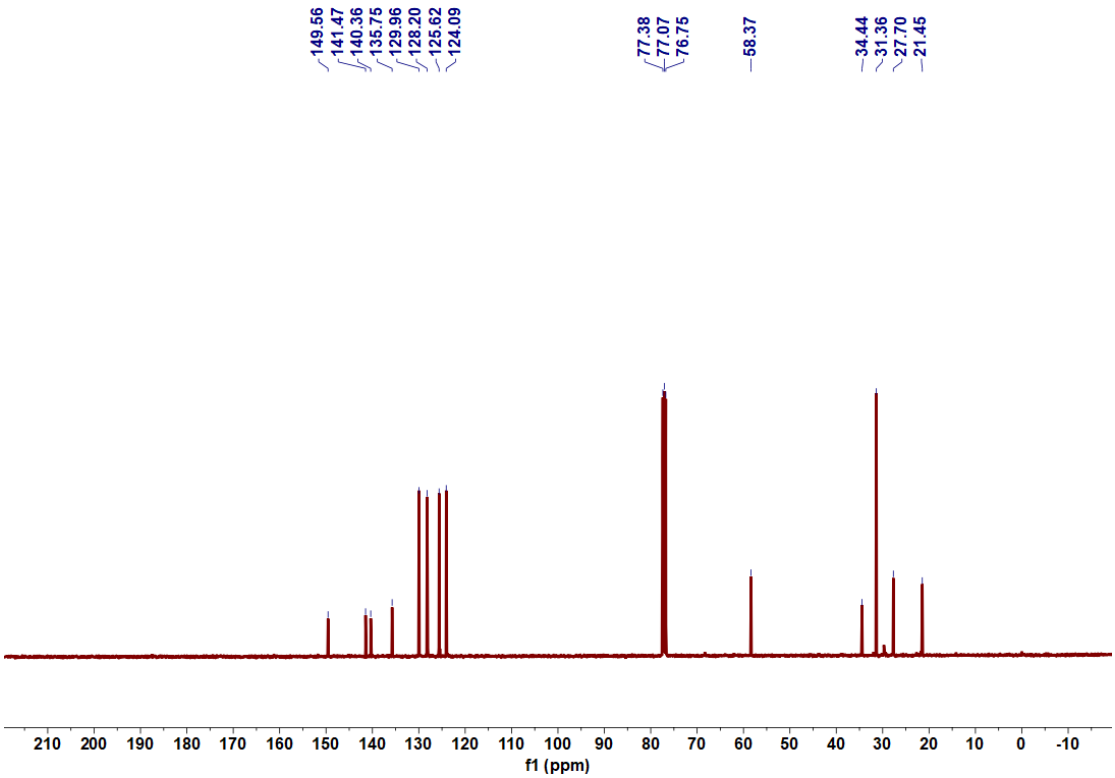
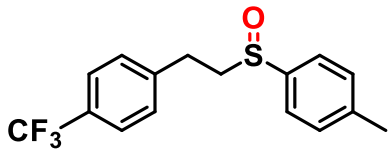


Fig. S86. ^{13}C NMR spectra of 1-(tert-butyl)-4-(2-(p-tolylsulfinyl)ethyl)benzene in $CDCl_3$

4i 1-methyl-4-((4-(trifluoromethyl)phenethyl)sulfinyl)benzene



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=10:1) to give 4i as a yellow solid (46.1 mg, 74% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.53 (dd, *J* = 8.1, 5.5 Hz, 4H), 7.31 (dd, *J* = 15.8, 8.0 Hz, 4H), 3.20 - 3.00 (m, 3H), 3.00 - 2.89 (m, 1H), 2.42 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 143.00, 142.98, 141.68, 139.89, 130.02, 128.93, 125.65, 125.61, 125.57, 125.54, 123.99, 57.53, 27.81, 21.37, 21.01.

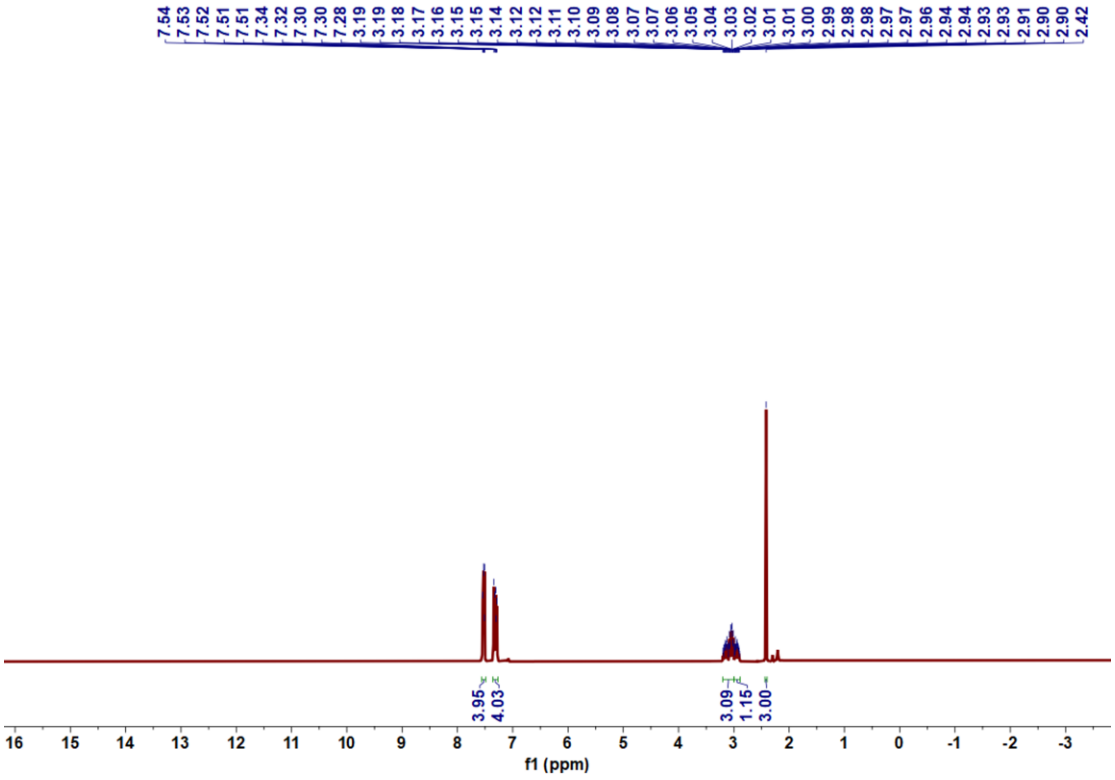


Fig. S87. ^{1}H NMR spectra of 1-methyl-4-((4-(trifluoromethyl)phenethyl)sulfinyl)benzene in $CDCl_3$.

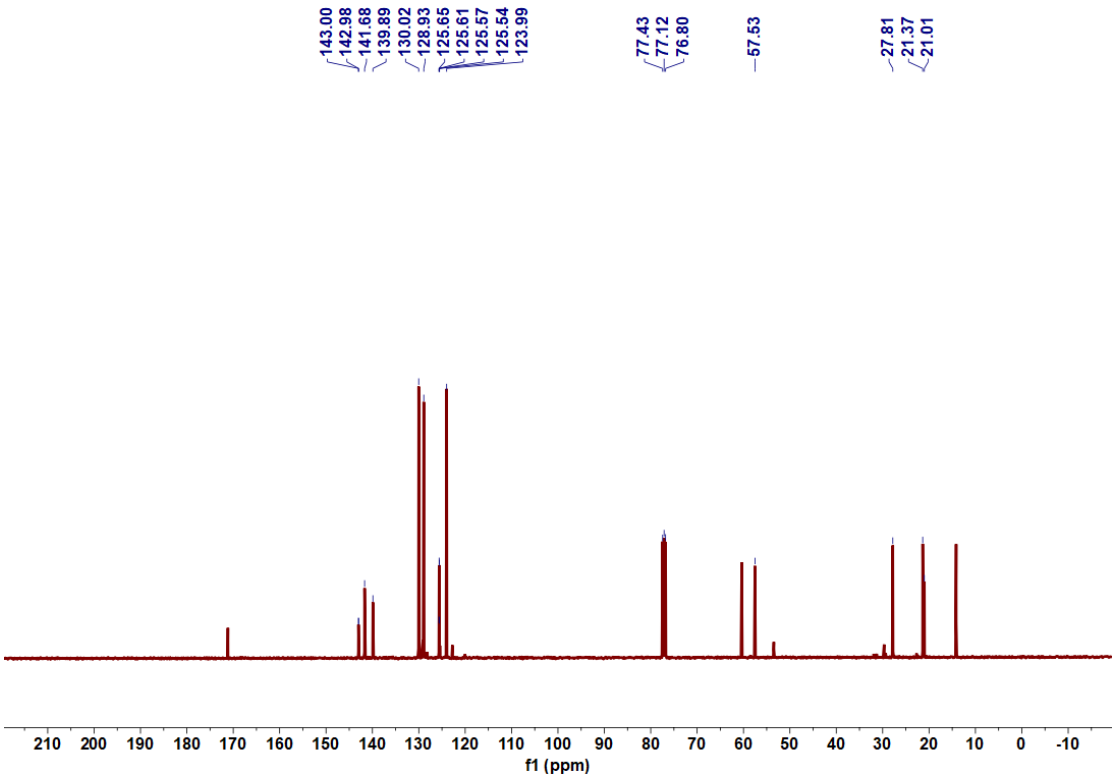
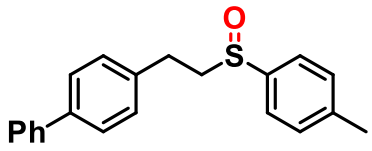


Fig. S88. ^{13}C NMR spectra of 1-methyl-4-((4-(trifluoromethyl)phenethyl)sulfinyl)benzene in $CDCl_3$.

4j. 4-(2-(p-tolylsulfinyl)ethyl)-1,1'-biphenyl



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=10:1) to give 4j as a white solid (48.6 mg, 76% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.58 - 7.49 (m, 6H), 7.43 (m, 2H), 7.37 - 7.29 (m, 3H), 7.25 (d, J = 7.2 Hz, 2H), 3.08 (m, 3H), 2.93 (t, J = 8.6 Hz, 1H), 2.42 (d, J = 2.6 Hz, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 141.57, 140.71, 139.66, 137.89, 130.02, 128.99, 128.78, 127.45, 127.27, 127.01, 124.10, 58.27, 27.85, 21.46.

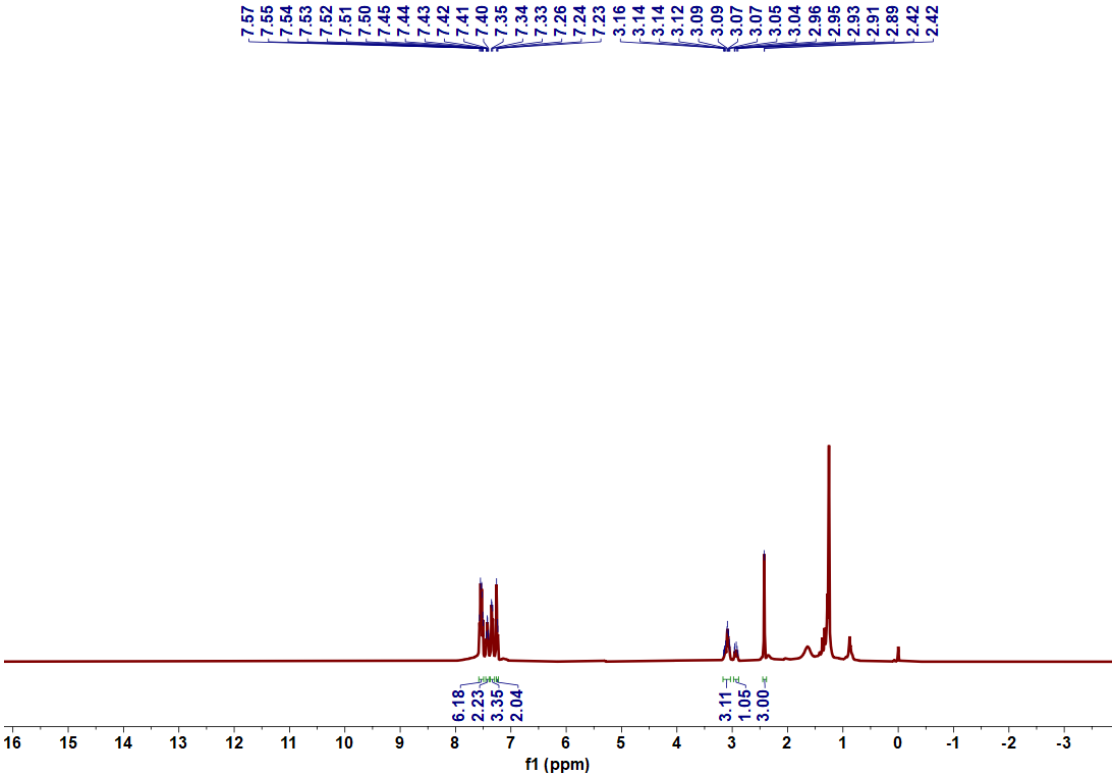


Fig. S89. ^{1}H NMR spectra of 4-(2-(p-tolylsulfinyl)ethyl)-1,1'-biphenyl in $CDCl_3$.

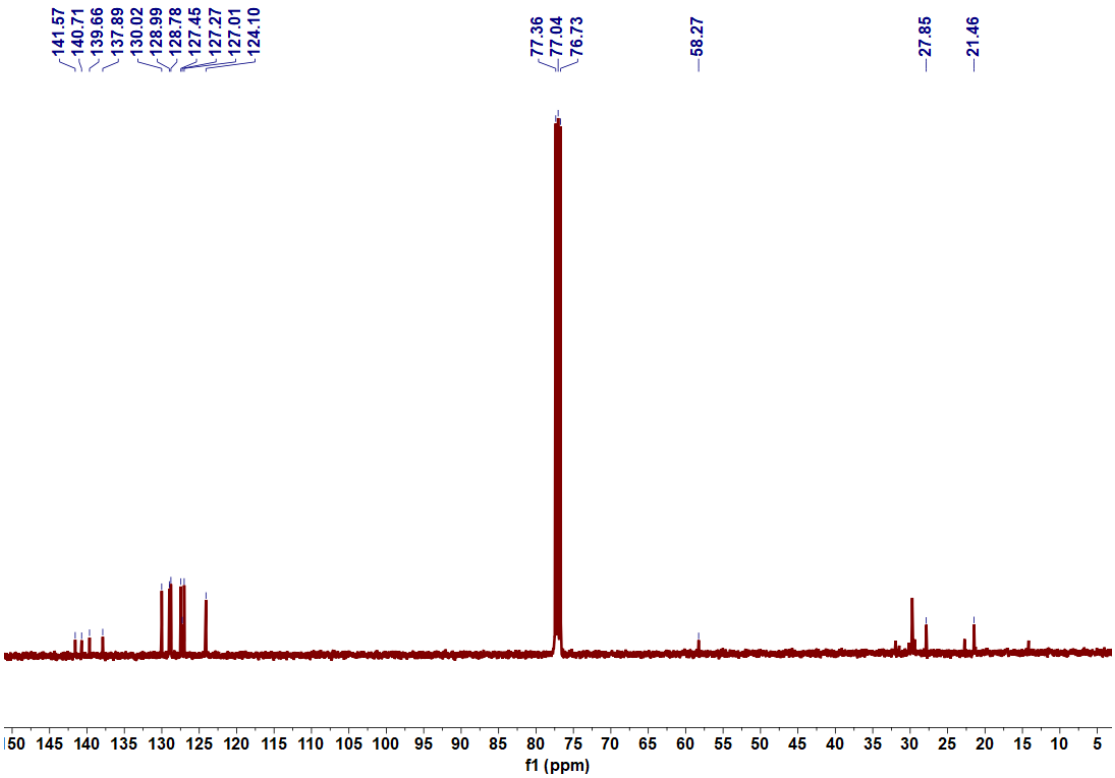
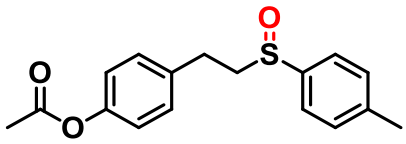


Fig. S90. ^{13}C NMR spectra of 4-(2-(p-tolylsulfinyl)ethyl)-1,1'-biphenyl in $CDCl_3$.

4k. 4-(2-(p-tolylsulfinyl)ethyl)phenyl acetate



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=8:1) to give 4k as a colorless oil (43.5 mg, 72% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.99 - 7.93 (m, 2H), 7.55 - 7.50 (m, 2H), 7.34 (d, J = 8.0 Hz, 2H), 7.25 (d, J = 8.2 Hz, 2H), 3.90 (s, 3H), 3.18 - 3.00 (m, 3H), 2.92 (m, 1H), 2.42 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 166.86, 144.24, 141.69, 139.95, 130.05, 130.03, 128.62, 124.04, 57.61, 52.13, 28.07, 21.45.

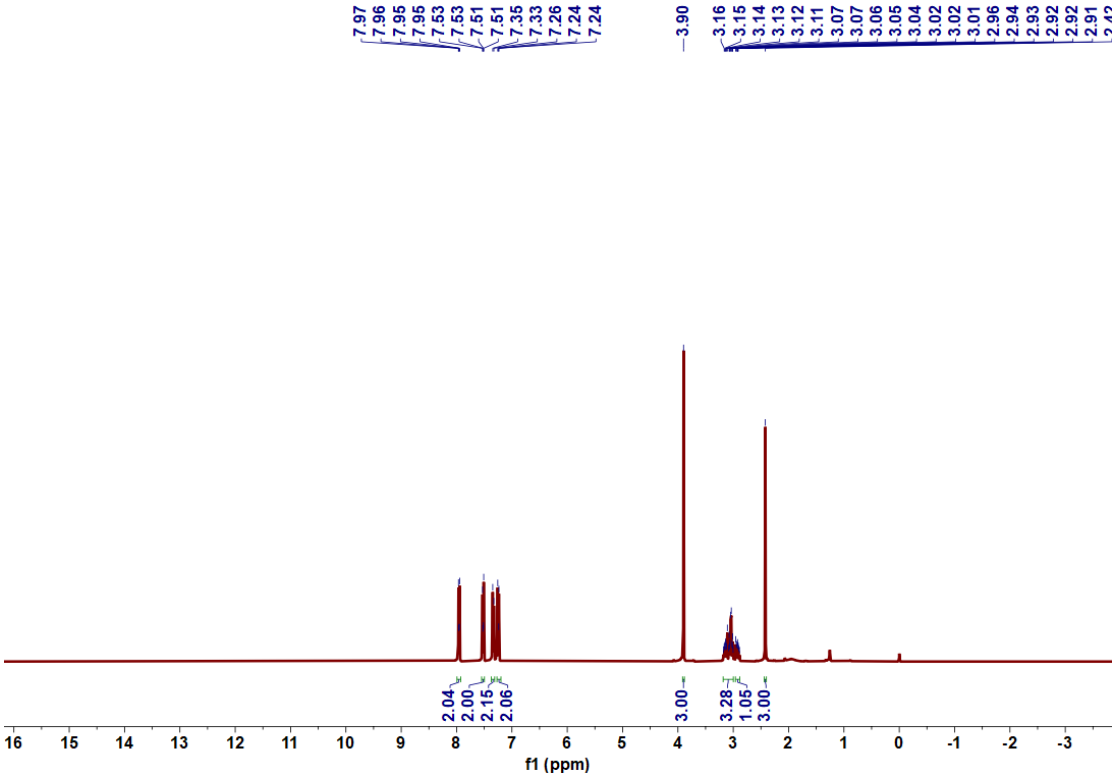


Fig. S91. ^{1}H NMR spectra of 4-(2-(p-tolylsulfinyl)ethyl)phenyl acetate in $CDCl_3$.

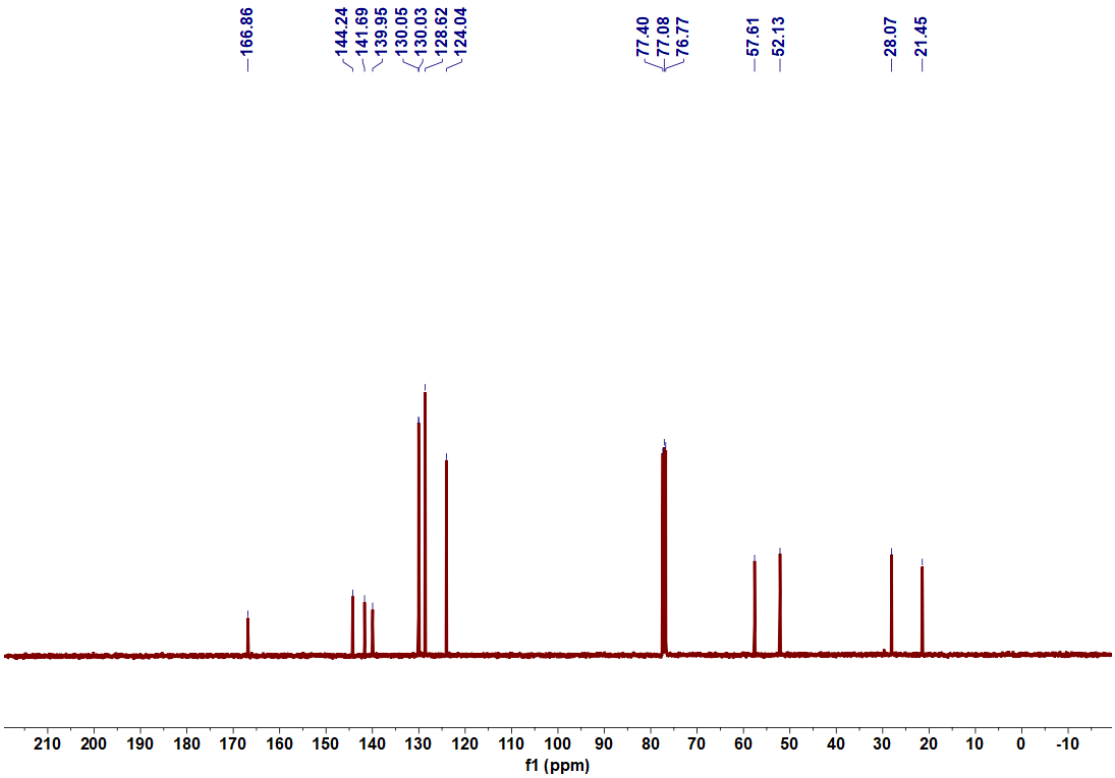
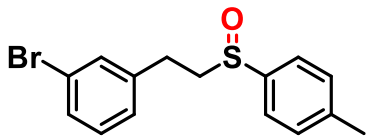


Fig. S92. ^{13}C NMR spectra of 4-(2-(p-tolylsulfinyl)ethyl)phenyl acetate in $CDCl_3$.

4l. 1-bromo-3-(2-(p-tolylsulfinyl)ethyl)benzene



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=10:1) to give 4l as a white solid (51 mg, 79% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.51 (d, *J* = 7.9 Hz, 2H), 7.37 - 7.28 (m, 4H), 7.14 (m, 2H), 3.03 (m, 3H), 2.88 - 2.80 (m, 1H), 2.42 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 141.70, 141.15, 139.93, 131.57, 130.29, 130.05, 129.82, 127.27, 124.05, 122.69, 57.74, 27.68, 21.46.

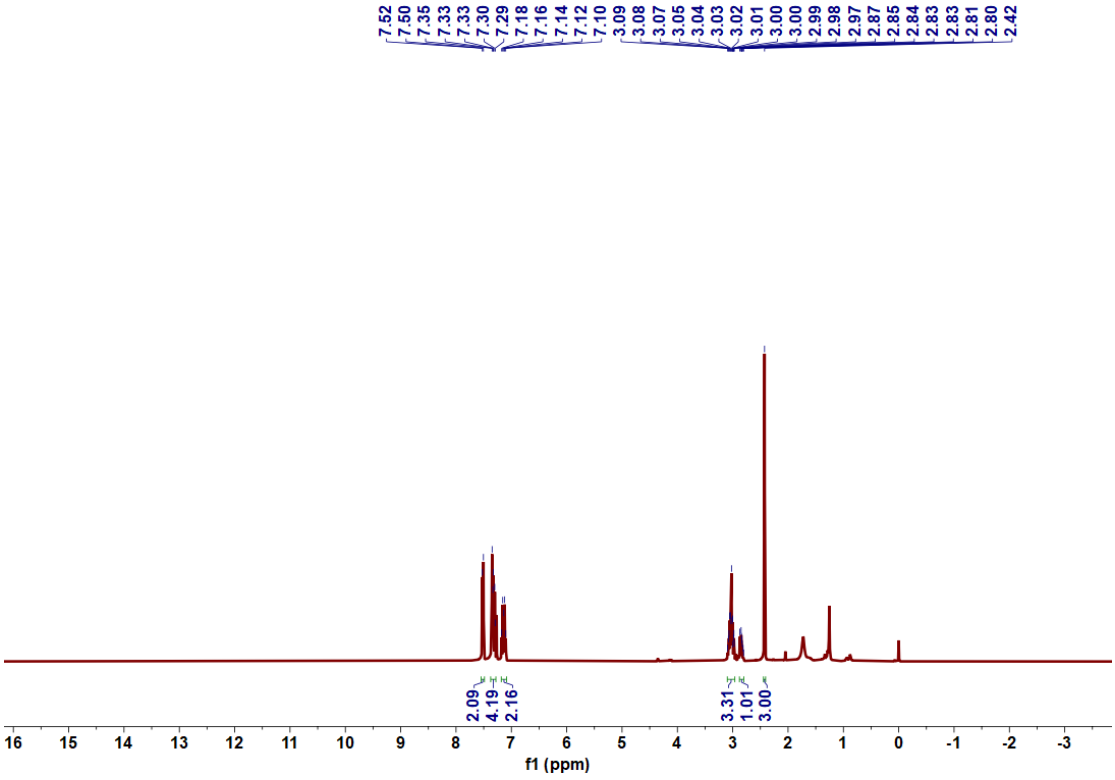


Fig. S93. ^{1}H NMR spectra of 1-bromo-3-(2-(p-tolylsulfinyl)ethyl)benzene in $CDCl_3$.

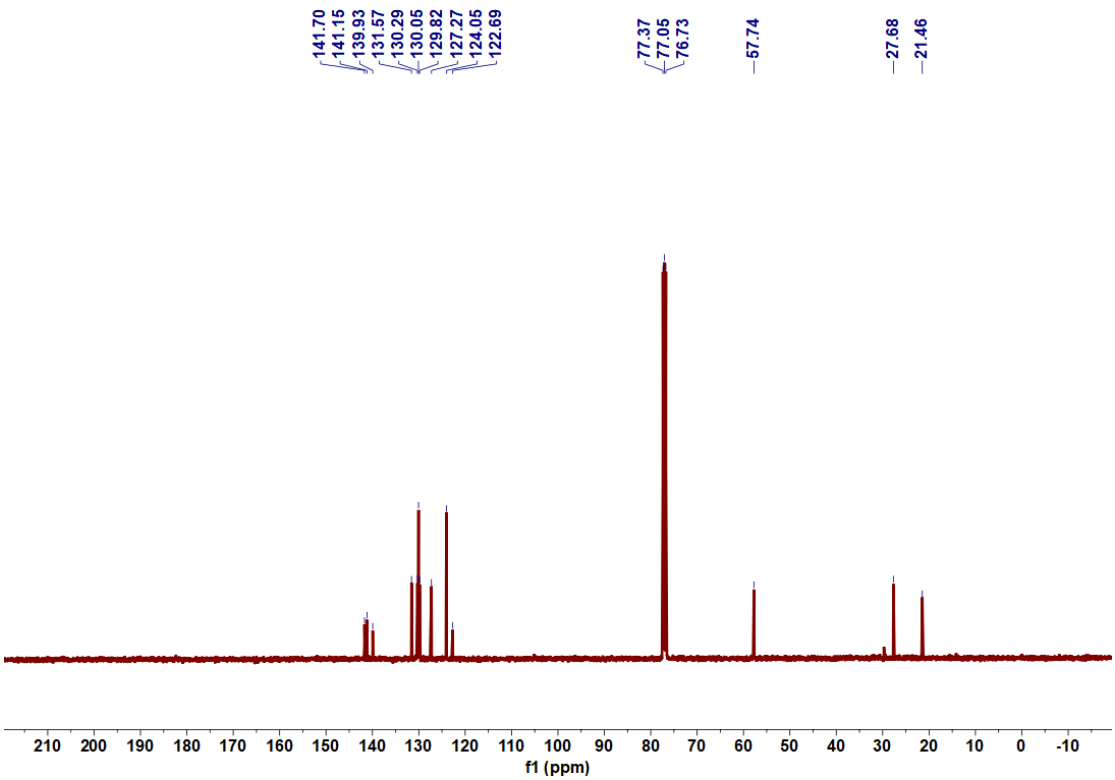
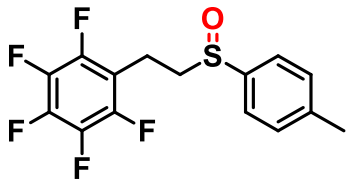


Fig. S94. ^{13}C NMR spectra of 1-bromo-3-(2-(p-tolylsulfinyl)ethyl)benzene in $CDCl_3$.

4m. 1,2,3,4,5-pentafluoro-6-(2-(p-tolylsulfinyl)ethyl)benzene



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=10:1) to give 4m as a yellow solid (46.1 mg, 69% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52 (d, J = 7.9 Hz, 2H), 7.34 (d, J = 7.9 Hz, 2H), 3.23 - 2.89 (m, 4H), 2.43 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 141.91, 139.38, 130.07, 124.03, 54.38, 21.44, 15.20.

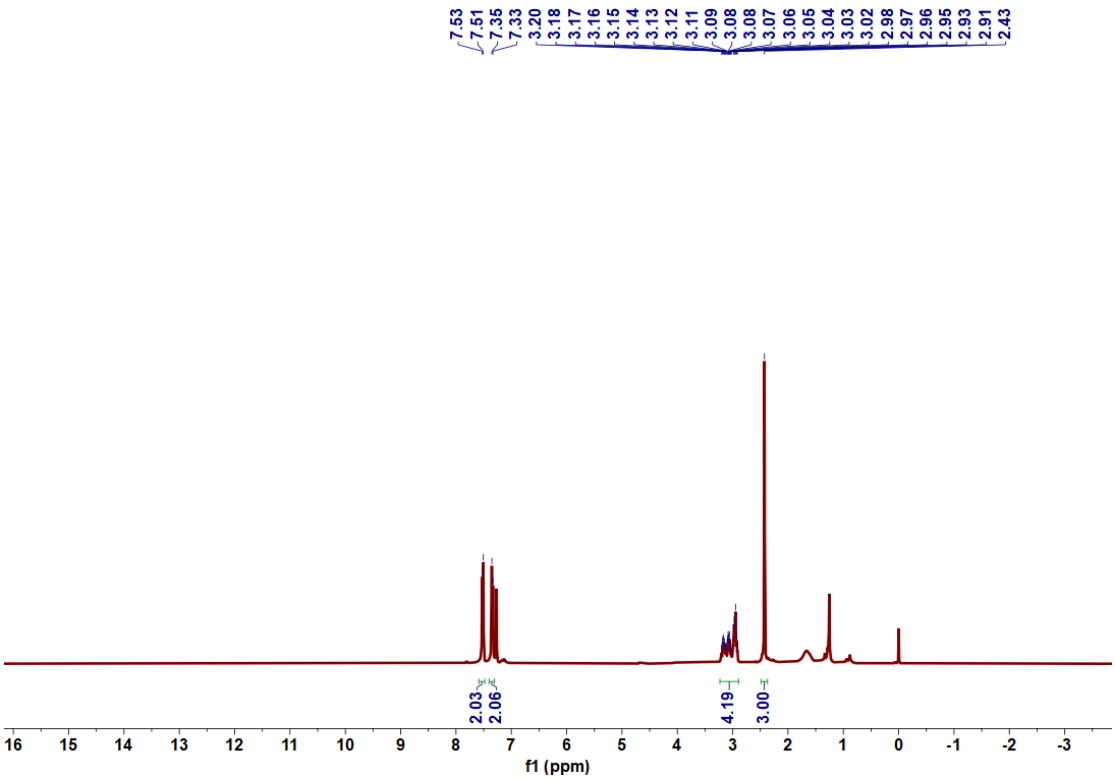


Fig. S95. ^{1}H NMR spectra of 1,2,3,4,5-pentafluoro-6-(2-(p-tolylsulfinyl)ethyl)benzene in $CDCl_3$.

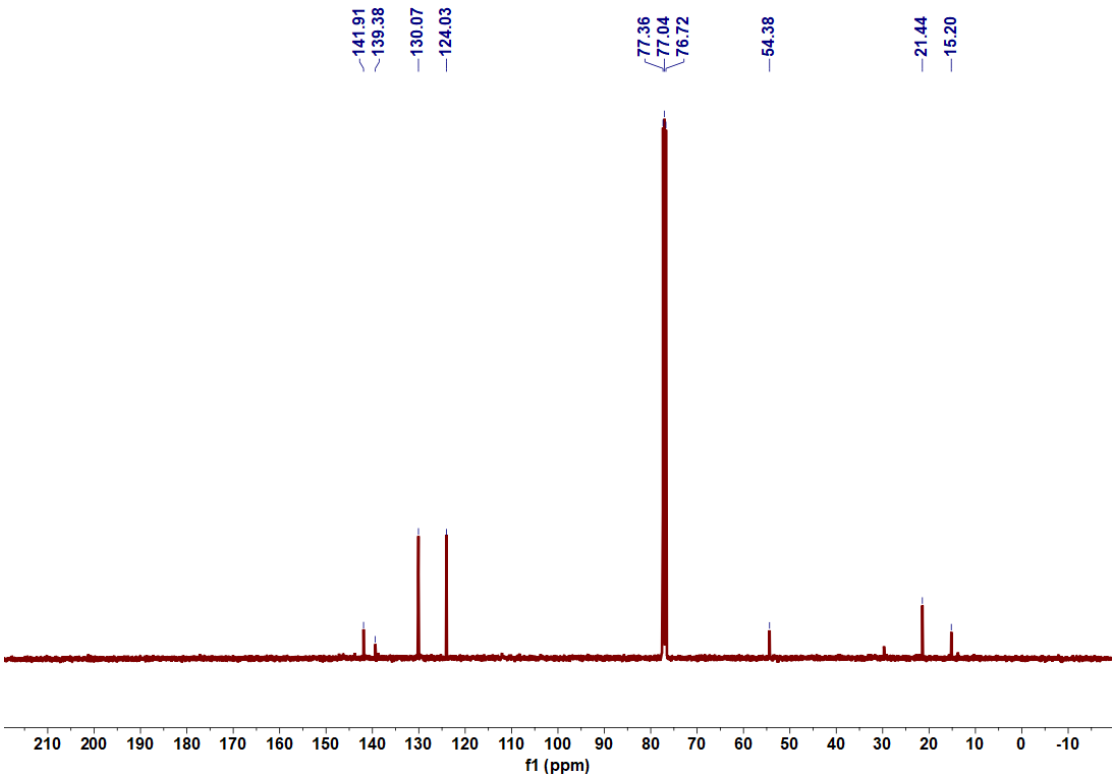
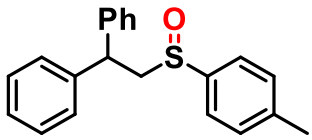


Fig. S96. ^{13}C NMR spectra of 1,2,3,4,5-pentafluoro-6-(2-(p-tolylsulfinyl)ethyl)benzene in $CDCl_3$.

4n. (2-(p-tolylsulfinyl)ethane-1,1-diyl)dibenzene



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=10:1) to give 4n as a white solid (46.7 mg, 73% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.49 (dd, *J* = 16.0, 8.0 Hz, 2H), 7.44 - 7.15 (m, 12H), 4.54 (dd, *J* = 10.7, 5.3 Hz, 1H), 3.67 - 3.32 (m, 3H), 2.37 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 142.42, 142.19, 141.75, 141.48, 141.05, 140.51, 130.26, 130.08, 128.96, 128.79, 128.58, 128.36, 128.27, 127.74, 127.65, 127.48, 127.24, 126.94, 126.68, 125.68, 124.15, 124.11, 64.72, 45.51, 21.52, 21.51.

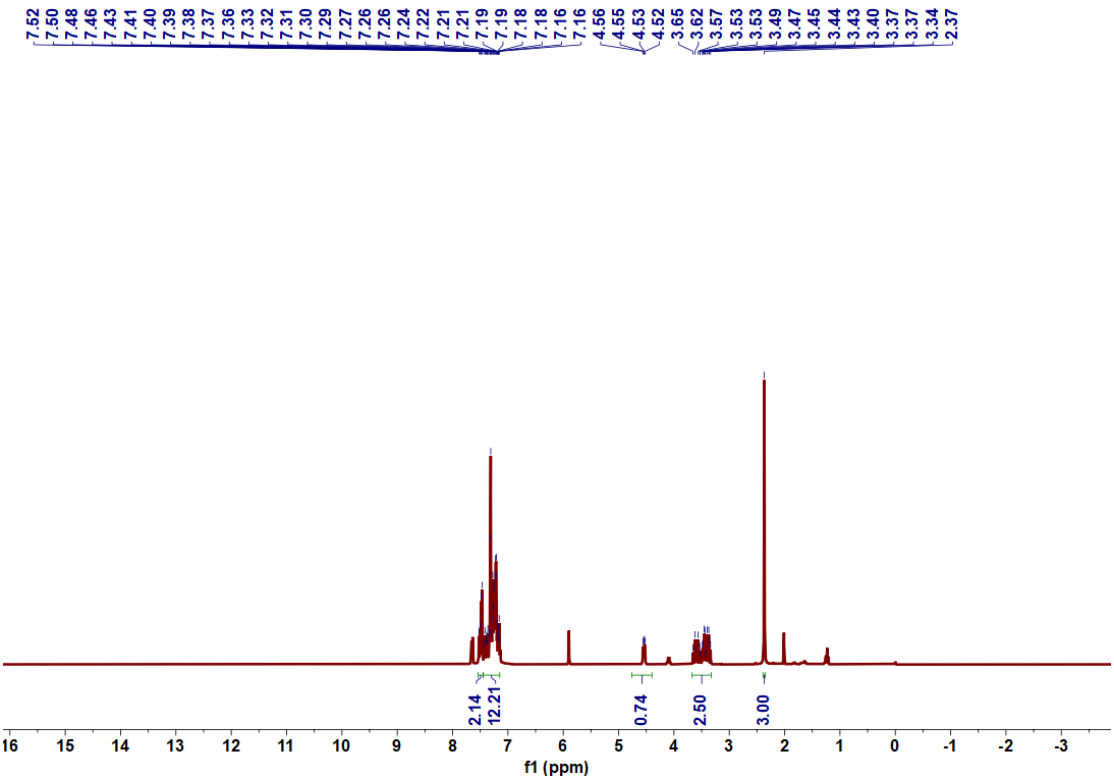


Fig. S97. ^{1}H NMR spectra of (2-(p-tolylsulfinyl)ethane-1,1-diyl)dibenzene in $CDCl_3$.

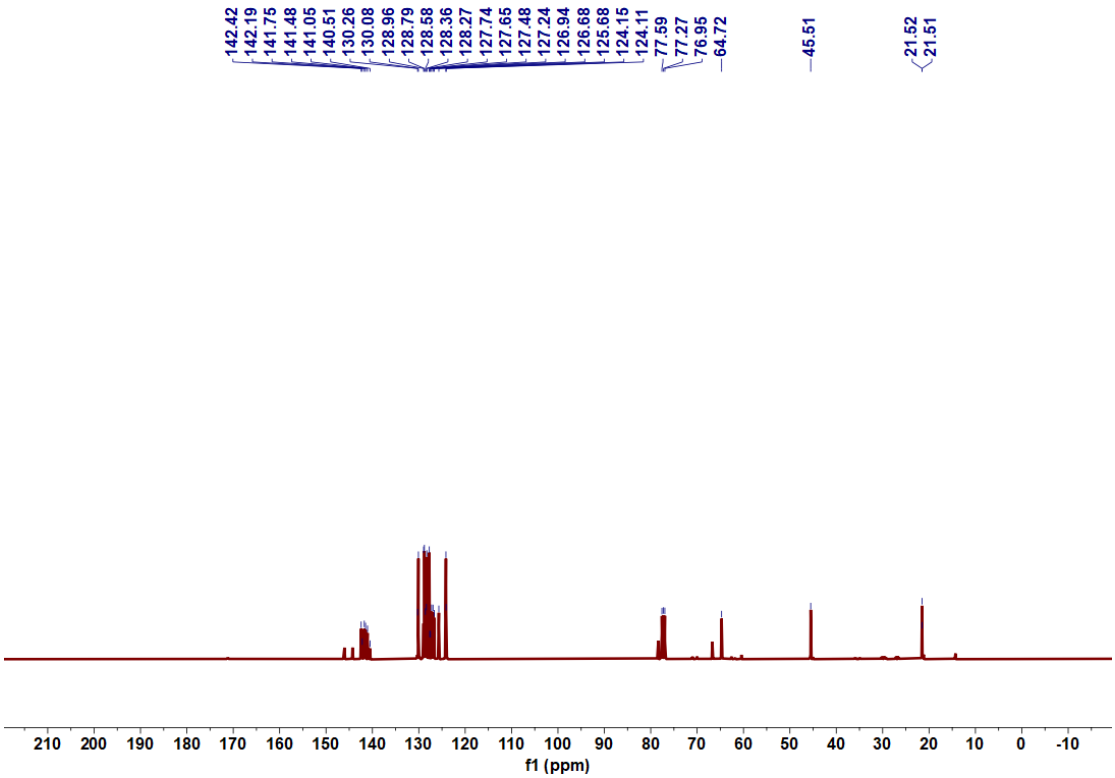
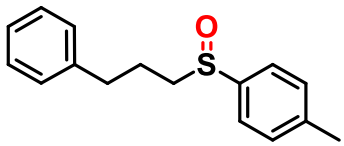


Fig. S98. ^{13}C NMR spectra of (2-(p-tolylsulfinyl)ethane-1,1-diyl)dibenzene in $CDCl_3$.

4o. 1-methyl-4-((3-phenylpropyl)sulfinyl)benzene



Following the general procedure, the crude material was purified by rapid column chromatography rapid column chromatography (petroleum ether/ethyl acetate=10:1) to give 4o as a white solid (36.6 mg, 71% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.48 - 7.42 (m, 2H), 7.30 - 7.19 (m, 4H), 7.19 - 7.05 (m, 3H), 2.74 (t, *J* = 7.7 Hz, 2H), 2.68 (m, 2H), 2.34 (s, 3H), 2.11 - 1.98 (m, 1H), 1.97 - 1.81 (m, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 141.31, 140.52, 140.47, 129.91, 128.50, 128.42, 126.22, 124.02, 56.23, 34.52, 23.62, 21.40.

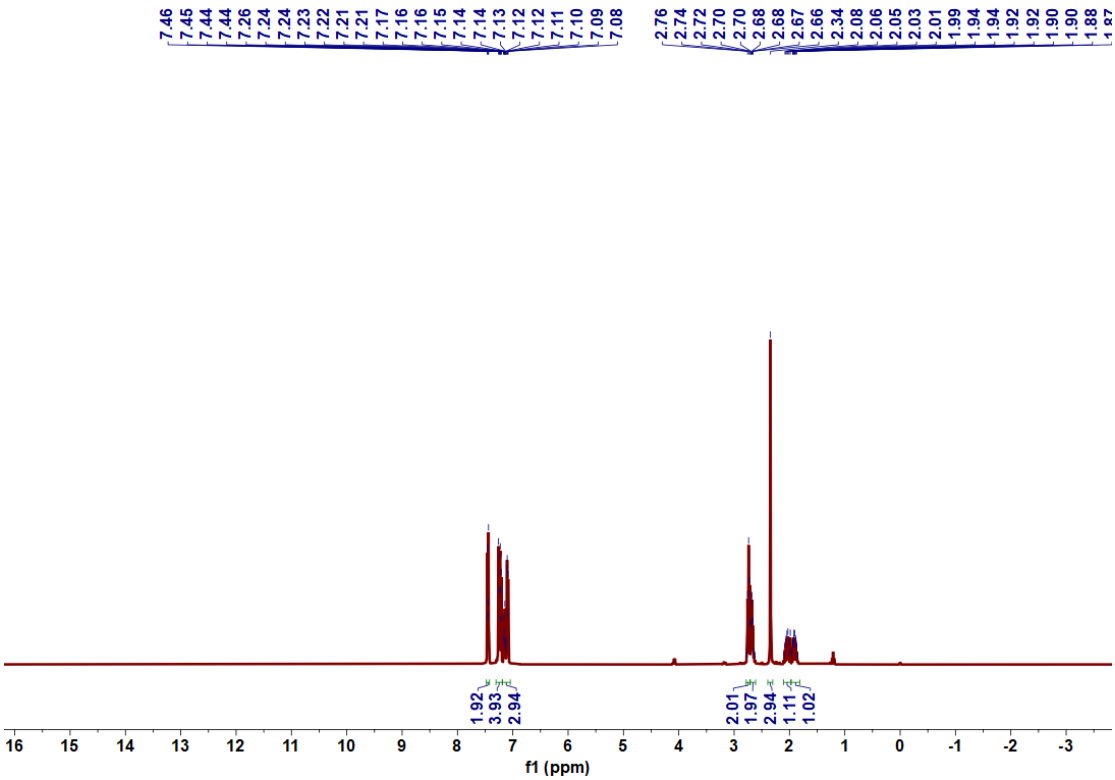


Fig. S99 ^{1}H NMR spectra of 1-methyl-4-((3-phenylpropyl)sulfinyl)benzene in $CDCl_3$.

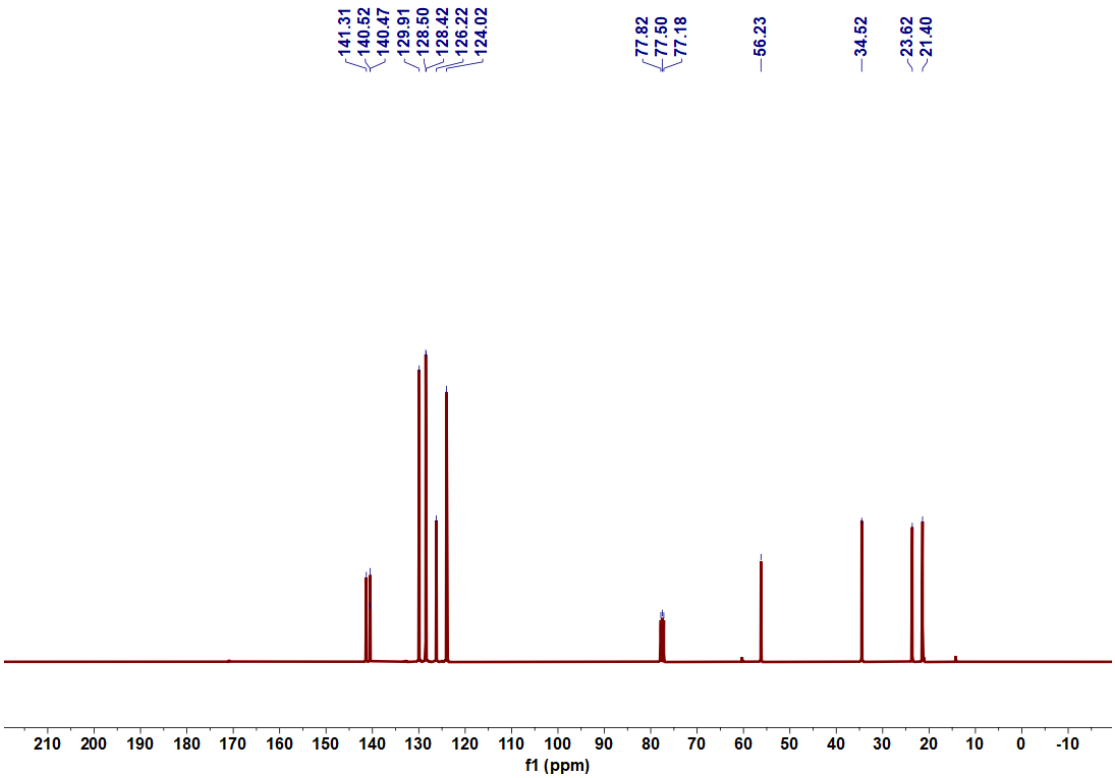


Fig. S100. ^{13}C NMR spectra of 1-methyl-4-((3-phenylpropyl)sulfinyl)benzene in $CDCl_3$.