Supporting Information

Electrochemical Generation of Sulfonamidyl Radicals via Anodic Oxidation of Hydrogen Bonding Complexes: Applications to Electrosynthesis of Benzosultams

Yasuyuki Okumura, Eisuke Sato, Koichi Mitsudo,* and Seiji Suga*

Division of Applied Chemistry, Graduate School of Environmental, Life, Natural Science and Technology, Okayama University, 3-1-1 Tsushima-Naka, Kita-Ku, Okayama 700-8530, Japan
*Corresponding authors: mitsudo@okayama-u.ac.jp (K.M.); suga@cc.okayama-u.ac.jp (S.S.)

Table of Contents

1. General Information

General. Nuclear magnetic resonance (NMR) spectra were recorded on Varian 400-MR (^{1}H 400 MHz), JEOL JNM-ECZ600R (^{1}H 600 MHz, ^{13}C 150 MHz), and JEOL JNM-ECS400 (^{1}H 400 MHz, ^{13}C 100 MHz, ^{19}F NMR 376 MHz) spectrometers. Chemical shifts for ^{1}H NMR are expressed in parts per million (ppm) relative to TMS (δ.0.00 ppm) or residual $CHCl_3$ in $CDCl_3$ (δ 7.26 ppm) or DMSO-d_5 in DMSO-d_6 (δ 2.50 ppm). Data are reported as follows: chemical shift, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, sext = sextet, dd = doublet of doublets, ddd = double doublet of doublets, td = triplet of doublets, tt = triplet of triplets, ttd = triple triplet of doublets, br = broad signal, m = multiplet), coupling constants, and integration. Chemical shifts for ^{13}C NMR are expressed in ppm relative to $CDCl_3$ (δ 77.16 ppm), CD_2Cl_2 (δ 53.84 ppm) or DMSO-d_6 (δ 39.52 ppm). Chemical shifts for ^{19}F NMR are expressed in ppm relative to α,α,α-trifluorotoluene (δ −63.72 ppm). IR spectra were recorded on a SHIMADZU IRAffinity-1 spectrometer. High-resolution mass spectrometry was performed on a Bruker micrOTOF II-SKA (ESI or APCI-TOF). Cyclic voltammetry (CV) was recorded on Electrochemical Analyzer CHI-600B. UV/vis absorption spectra were recorded on a SHIMADZU UV-2450 spectrophotometer. Electron paramagnetic resonance (EPR) spectroscopy was recorded on a JEOL JES-X320 spectrometer. Analytic thin layer chromatography (TLC) was performed on Merck, pre-coated plate silica gel 60 F_{254} (0.25 mm thickness). Column chromatography was performed on KANTO CHEMICAL silica gel 60N (40–50 μm). Gel permeation chromatography (GPC) was carried out on Japan Analytical Industry LC-5060 Plus II equipped with JAIGER-2HR Plus using chloroform as an eluent. All reactions were performed under an argon atmosphere.

Materials. Unless otherwise noted, all materials were obtained from commercial suppliers and used without further purification. Dry tetrahydrofuran (THF) was purchased from FUJIFILM Wako pure chemical corporation. Dichloromethane (CH_2Cl_2) was distilled from CaH_2 and dried over MS4A. Chloroform-*d* ($CDCl_3$) and dichloromethane-d_2 (CD_2Cl_2) were purchased from KANTO CHEMICAL. *tert*-Butyllithium (^{t}BuLi) in heptane was purchased from KANTO CHEMICAL. 2-(1-Phenylvinyl)benzene derivatives,[1–4] 1-bromo-2-(1-cyclopropylvinyl)benzene,[5] (*E*)-1-bromo-2-styrylbenzene,[6] 1-bromo-2-(1-phenylprop-1-en-1-yl)benzene,[7] 2-(prop-1-en-2-yl)benzenesulfonyl chloride[8] and *N*-phenyl-2-vinylbenzenesulfonamide[9] were prepared from according to the literature.

General for Electrochemical Reactions. Electrochemical cyclization was carried out using a carbon rod anode (φ 5.0 mm), which was purchased from AS-ONE corporation (3-693-01), and a Pt plate cathode (1.0 × 1.5 cm^2) connected to Pt wire (Figure S1a). The electrochemical reactions were performed in a 10 mL two-necked flask equipped with a cock and those electrodes (Figure S1b). The two electrodes are connected to DC power supply (KIKUSUI PMX350-0.2A) and an ammeter (YOKOGAWA 2051 03) (Figure S1c).

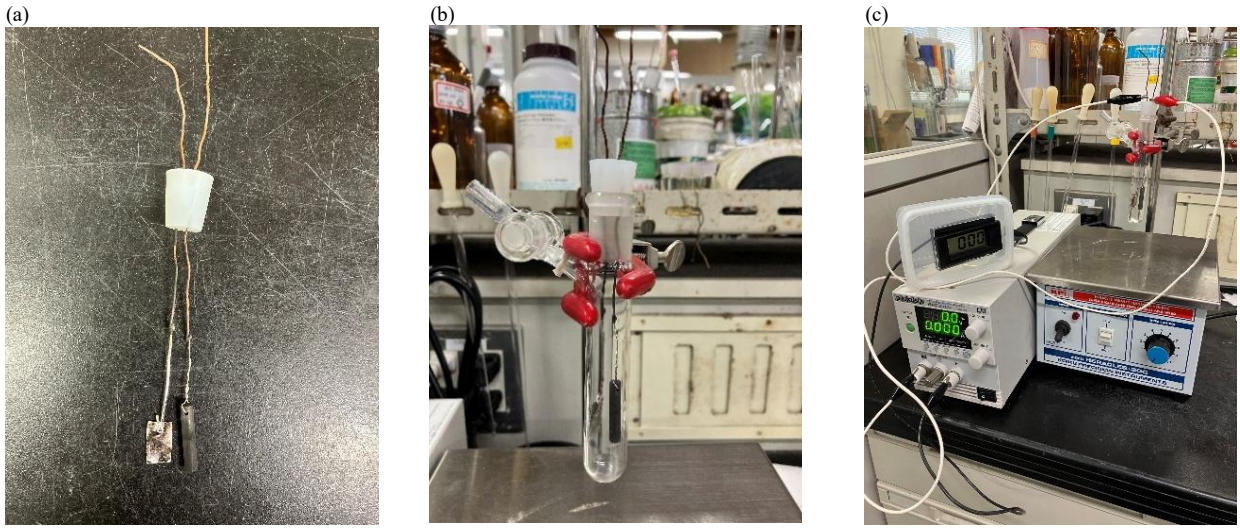
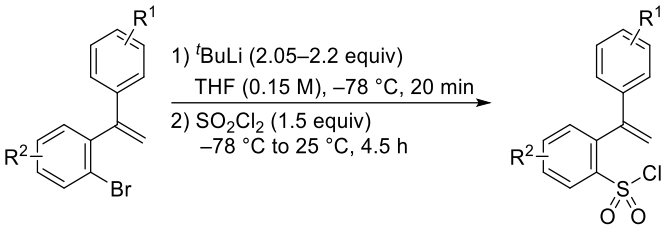


Figure S1. (a) Carbon rod electrode and Pt electrode (1.0 × 1.5 cm^2), (b) 10 mL two-necked flask equipped with a cock and a carbon rod electrode and a Pt electrode, (c) electrochemical system.

2. Procedures for the Synthesis of Substrates and Products

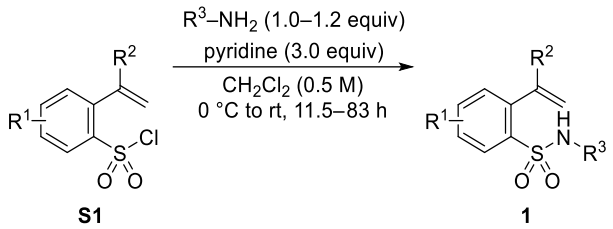
General Procedure A for the Synthesis of 2-(1-Phenylvinyl)benzenesulfonyl Chloride Derivative S1[10]



S1

To a solution of 2-(1-phenylvinyl)benzene derivatives in THF (0.15 M) was added dropwise ^{t}BuLi (1.60 M in heptane, 2.0–2.2 equiv) at −78 °C. After being stirred for 20 min, to the solution was added SO_2Cl_2 (1.5–1.7 equiv) at −78 °C, then the reaction mixture was warmed up to room temperature. After being stirred for 4.5 h, into the resulting mixture was added H_2O (50 mL). The mixture was extracted with $CHCl_3$ (3 × 60 mL). The combined organic phase was dried over $MgSO_4$, filtered, and concentrated under reduced pressure. The residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1) to afford the title compound.

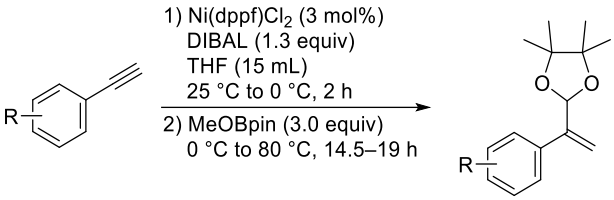
General Procedure B for the Synthesis of Vinylbenzenesulfonamide Derivative 1



S1 **1**

To a solution of benzenesulfonyl chloride **S1** and pyridine (3.0 equiv) in CH_2Cl_2 (0.5 M) was added aniline derivative or an aliphatic amine (1.0–1.2 equiv) at 0 °C. Then, the reaction mixture was warmed up to room temperature, and the mixture was stirred 11.5–83 h. The consumption of the substrate was checked by TLC analysis. After the completion of the reaction, the mixture was extracted with CH_2Cl_2 (3 × 10 mL). The combined organic phase was washed with 1 M HCl aq (20 mL), saturated $NaHCO_3$ aq (20 mL), and dried over $MgSO_4$, filtered, and concentrated under reduced pressure. The residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1 → 3:1) to afford the title compound.

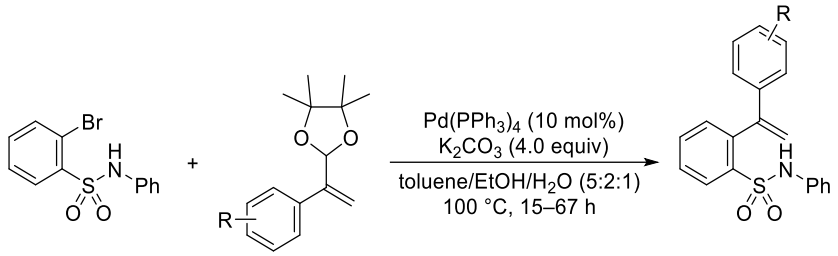
General Procedure C for the Synthesis of 4,4,5,5-Tetramethyl-2-(1-phenylvinyl)-1,3,2-dioxabolane Derivative S2c and S2i[11, 12]



S2c, S2i

To a solution of $Ni(dppf)Cl_2$ (3 mol%) in THF (5 mL) was added DIBAL (1.0 M in hexane, 1.3 equiv) at 25 °C and mixture was cooled to 0 °C. An ethynylbenzene derivative in THF (10 mL) was added dropwise. After being stirred at 0 °C for 2 h, MeOBpin (3.0 equiv) was added dropwise at 0 °C and the reaction mixture was warmed to 80 °C. After being stirred for 14.5–19 h, the reaction mixture was cooled to 0 °C and quenched with H_2O (25 mL). After being stirred for an additional 1 h at room temperature, the mixture was poured into a saturated solution of Rochell salt (50 mL), and the mixture was extracted with EtOAc (3 × 80 mL). The combined organic phase was dried over $MgSO_4$, filtered, and concentrated under reduced pressure. The residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1) to afford the title compound.

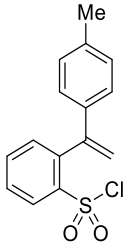
General Procedure D for the Synthesis of *N*-Phenyl-2-(1-phenylvinyl)benzenesulfonamide Derivatives 1[13]



S2c, S2i (1.2–1.5 equiv) **1**

A mixture of 2-bromo-*N*-phenylbenzenesulfonamide, $Pd(PPh_3)_4$ (10 mol%), K_2CO_3 (4.0 equiv) and 4,4,5,5-tetramethyl-2-(1-phenylvinyl)-1,3,2-dioxaborane derivatives (1.2–1.5 equiv) in toluene/EtOH/H_2O (5:2:1) was stirred at 100 °C for 15–67 h. After being allowed to cool to room temperature, and into the mixture was added H_2O (30 mL). The mixture was extracted with $CHCl_3$ (3 × 40 mL). The combined organic layer was dried over $MgSO_4$, filtered, and concentrated under reduced pressure. The residue was purified by column chromatography on silica gel (hexane/EtOAc 3:1) to afford the title compound.

2-(1-(*p*-Tolyl)vinyl)benzenesulfonyl Chloride (S1b)



Prepared by the general procedure A from 1-bromo-2-(1-(*p*-tolyl)vinyl)benzene (2.57 g, 9.41 mmol), ^{t}BuLi (1.67 M in heptane, 12.4 mL, 19.8 mmol) and SO_2Cl_2 (1.90 g, 14.1 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1). The obtained oil was further purified by GPC ($CHCl_3$) to afford the title compound as a yellow oil (691 mg, 2.36 mmol, 25%).

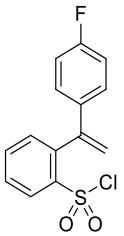
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.23 (dd, *J* = 8.1, 1.2 Hz, 0.2H), 8.15 (dd, *J* = 8.1, 1.2 Hz, 0.8H), 7.83 (td, *J* = 8.1, 1.2 Hz, 0.2H), 7.73 (td, *J* = 8.1, 1.2 Hz, 0.8H), 7.67 (td, *J* = 8.1, 1.2 Hz, 0.2H), 7.59 (td, *J* = 8.1, 1.2 Hz, 0.8H), 7.47 (dd, *J* = 8.1, 1.2 Hz, 0.2H), 7.39 (dd, *J* = 8.1, 1.2 Hz, 0.8H), 7.14 (d, *J* = 8.3 Hz, 1.6H), 7.10 (d, *J* = 8.3 Hz, 2H), 7.06 (d, *J* = 8.3 Hz, 0.4H), 5.98 (s, 1H), 5.39 (s, 0.8H), 5.35 (s, 0.2H), 2.33 (s, 3H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 145.0, 142.9, 141.6, 138.1, 136.5, 135.0, 133.5, 129.3, 129.1, 128.6, 126.7, 116.5, 21.3.

IR (neat) 3028, 1514, 1472, 1360, 1171 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{15}H_{14}ClO_2S$ $[M + H]^+$ 293.0398, found 293.0405.

2-(1-(4-Fluorophenyl)vinyl)benzenesulfonyl Chloride (S1d)



Prepared by the general procedure A from 1-bromo-2-(1-(4-fluorophenyl)vinyl)benzene (3.35 g, 12.1 mmol), ^{t}BuLi (1.70 M in heptane, 15.7 mL, 26.6 mmol) and SO_2Cl_2 (2.81 g, 20.8 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1) to afford the title compound as a yellow oil (1.60 g, 5.40 mmol, 45%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.20 (dd, J = 8.1, 1.2 Hz, 0.7H), 8.15 (dd, J = 8.1, 1.2 Hz, 0.3H), 7.77–7.74 (m, 1H), 7.63–7.60 (m, 1H), 7.44 (dd, J = 8.1, 1.2 Hz, 0.7H), 7.41 (dd, J = 8.1, 1.2 Hz, 0.3H), 7.18 (dd, J = 9.0 Hz, $^4J_{H–F}$ = 5.5 Hz, 2H), 7.00–6.96 (m, 2H), 5.933 (s, 0.7H), 5.930 (s, 0.3H), 5.42 (s, 0.3H), 5.38 (s, 0.7H).

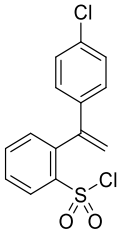
^{13}C NMR (150 MHz, $CDCl_3$) δ 162.71 (d, $^1J_{C–F}$ = 248.5 Hz), 162.69 (d, $^1J_{C–F}$ = 247.1 Hz), 145.0, 144.4, 142.8, 141.0, 140.4, 135.6, 135.5 (d, $^4J_{C–F}$ = 2.9 Hz), 135.24, 135.19, 133.3, 129.4, 129.0 (d, $^3J_{C–F}$ = 10.1 Hz), 128.9, 128.7, 128.6 (d, $^3J_{C–F}$ = 7.2 Hz), 117.24, 117.16, 115.7 (d, $^2J_{C–F}$ = 21.7 Hz), 115.3 (d, $^2J_{C–F}$ = 21.7 Hz).

^{19}F NMR (376 MHz, $CDCl_3$) δ −114.8.

IR (neat) 1504, 1371, 1233, 1163, 912 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{14}H_{11}ClO_2S$ $[M + H]^+$ 297.0147, found 297.0141.

2-(1-(4-Chlorophenyl)vinyl)benzenesulfonyl Chloride (S1e)



Prepared by the general procedure A from 1-bromo-2-(1-(4-chlorophenyl)vinyl)benzene (2.38 g, 8.12 mmol), ^{t}BuLi (1.70 M in heptane, 9.6 mL, 16.2 mmol) and SO_2Cl_2 (1.89 g, 14.0 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1) to afford the title compound as a yellow solid (1.14 g, 3.65 mmol, 45%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.20 (dd, J = 7.8, 1.4 Hz, 0.8H), 8.16 (dd, J = 7.8, 1.4 Hz, 0.2H), 7.77–7.74 (m, 1H), 7.64–7.61 (m, 1H), 7.43 (dd, J = 7.8, 1.4 Hz, 0.8H), 7.40 (dd, J = 7.8, 1.4 Hz, 0.2H), 7.28–7.26 (m, 2H), 7.18 (d, J = 8.7 Hz, 2H), 5.99 (s, 1H), 5.46 (s, 0.2H), 5.42 (s, 0.8H).

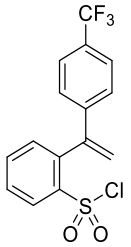
^{13}C NMR (150 MHz, $CDCl_3$) δ 145.1, 144.3, 142.9, 140.8, 140.1, 137.8, 135.23, 135.17, 134.1, 133.4, 129.5, 129.1, 129.0, 128.6, 128.2, 128.1, 117.9, 117.8.

IR (neat) 1589, 1491, 1375, 1366, 1180, 1094, 1015 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{14}H_{10}Cl_2NaO_2S$ $[M + Na]^+$ 334.9671, found 334.9679.

mp 59.3–60.1 °C.

2-(1-(4-(Trifluoromethyl)phenyl)vinyl)benzenesulfonyl Chloride (S1f)



Prepared by the general procedure A from 1-bromo-2-(1-(4-(trifluoromethyl)phenyl)vinyl)benzene (3.16 g, 9.66 mmol), ^{t}BuLi (1.60 M in heptane, 12.7 mL, 20.3 mmol) and SO_2Cl_2 (1.96 g, 14.5 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1) to afford the title compound as a brown oil (395 mg, 1.14 mmol, 12%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.22 (dd, *J* = 7.9, 1.4 Hz, 1H), 7.78 (td, *J* = 7.9, 1.4 Hz, 1H), 7.65 (td, *J* = 7.9, 1.4 Hz, 1H), 7.55 (d, *J* = 8.3 Hz, 2H), 7.44 (dd, *J* = 7.9, 1.4 Hz, 1H), 7.36 (d, *J* = 8.3 Hz, 2H), 6.09 (s, 1H), 5.53 (s, 1H).

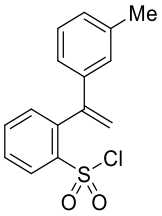
^{13}C NMR (150 MHz, $CDCl_3$) δ 144.3, 142.9, 142.7, 140.3, 135.3, 133.4, 130.1 (q, $^2J_{C–F}$ = 31.8 Hz), 129.6, 129.2, 127.1, 125.4 (q, $^3J_{C–F}$ = 4.3 Hz), 124.2 (q, $^1J_{C–F}$ = 271.7 Hz), 119.5.

^{19}F NMR (376 MHz, $CDCl_3$) δ −63.6.

IR (neat) 1614, 1472, 1373, 1327, 1184 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{15}H_{10}ClF_3NaO_2S$ $[M + Na]^+$ 368.9934, found 368.9956.

2-(1-(*m*-tolyl)vinyl)benzenesulfonyl Chloride (S1g)



Prepared by the general procedure A from 1-bromo-2-(1-(*m*-tolyl)vinyl)benzene (2.41 g, 8.83 mmol), ^{t}BuLi (1.70 M in heptane, 11.4 mL, 19.4 mmol) and SO_2Cl_2 (2.05 g, 15.2 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1) to afford the title compound as a yellow oil (700 mg, 2.39 mmol, 27%).

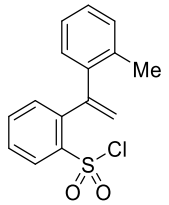
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.20 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.74 (td, *J* = 7.6, 1.4 Hz, 1H), 7.60 (td, *J* = 7.6, 1.4 Hz, 1H), 7.43 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.18 (t, *J* = 7.9 Hz, 1H), 7.09 (d, *J* = 7.9 Hz, 1H), 7.08 (s, 1H), 7.02 (d, *J* = 7.9 Hz, 1H), 6.00 (s, 1H), 5.38 (s, 1H), 2.31 (s, 3H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 145.3, 142.8, 141.4, 139.2, 137.9, 135.1, 133.5, 129.3, 129.0, 128.7, 128.3, 127.4, 124.1, 117.1, 21.6.

IR (neat) 3061, 1603, 1470, 1371, 1182 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{15}H_{14}ClO_2S$ $[M + H]^+$ 293.0398, found 293.0398.

2-(1-(*o*-tolyl)vinyl)benzenesulfonyl Chloride (S1h)



Prepared by the general procedure A from 1-bromo-2-(1-(*o*-tolyl)vinyl)benzene (3.30 g, 12.1 mmol), ^{t}BuLi (1.60 M in heptane, 15.9 mL, 25.4 mmol) and SO_2Cl_2 (2.45 g, 18.2 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1). The obtained solid was further purified by GPC ($CHCl_3$) to afford the title compound as a colorless solid (644 mg, 2.20 mmol, 18%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.16 (dd, *J* = 7.6, 1.4 Hz, 0.7H), 8.11 (dd, *J* = 7.6, 1.4 Hz, 0.3H), 7.70 (td, *J* = 7.6, 1.4 Hz, 1H), 7.50 (td, *J* = 7.6, 1.4 Hz, 1H), 7.48 (dd, *J* = 7.6, 1.4 Hz, 0.7H), 7.46 (dd, *J* = 7.6, 1.4 Hz, 0.3H), 7.22–7.17 (m, 2H), 7.13–7.09 (m, 1H), 7.08 (d, *J* = 4.1 Hz, 0.7H), 7.06 (dd, *J* = 4.1, 1.0 Hz, 0.3H), 5.73 (d, *J* = 0.7 Hz, 0.3H), 5.72 (d, *J* = 0.7 Hz, 0.7H), 5.69 (d, *J* = 0.7 Hz, 1H), 2.34 (s, 0.9H), 2.33 (s, 2.1H).

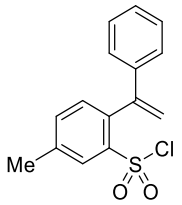
^{13}C NMR (150 MHz, $CDCl_3$) δ 145.8, 145.7, 144.8, 142.8, 142.3, 142.2, 139.4, 139.3, 136.4, 136.3, 135.0, 134.9, 133.8, 131.3, 131.2, 130.42, 130.39, 129.8, 129.3, 128.60, 128.57, 128.0, 125.7, 122.6, 122.5, 21.44, 21.39.

IR (KBr) 1558, 1472, 1369, 1179, 934 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{15}H_{13}NaClO_2S$ $[M + Na]^+$ 315.0217, found 315.0247.

mp 91.1–91.2 °C.

5-Methyl-2-(1-phenylvinyl)benzenesulfonyl Chloride (S1k)



Prepared by the general procedure A from 2-bromo-4-methyl-1-(1-phenylvinyl)benzene (2.84 g, 10.4 mmol), ^{t}BuLi (1.60 M in heptane, 13.7 mL, 21.8 mmol) and SO_2Cl_2 (2.11 g, 15.6 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1). The obtained solid was further purified by GPC ($CHCl_3$) to afford the title compound as a colorless solid (380 mg, 1.30 mmol, 13%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.00 (d, *J* = 1.0 Hz, 1H), 7.54 (dd, *J* = 7.8, 1.0 Hz, 1H), 7.32 (d, *J* = 7.8 Hz, 1H), 7.31–7.24 (m, 5H), 5.98 (s, 1H), 5.38 (s, 1H), 2.51 (s, 3H).

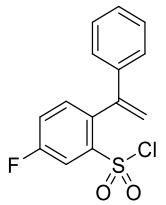
^{13}C NMR (150 MHz, $CDCl_3$) δ 145.3, 142.6, 139.5, 139.3, 138.4, 135.8, 133.3, 129.5, 128.3, 128.1, 126.9, 117.3, 21.2.

IR (KBr) 3094, 1497, 1338, 1169, 901 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{15}H_{13}ClNaO_2S$ $[M + Na]^+$ 315.0217, found 315.0230.

mp 87.7–88.4 °C.

5-Fluoro-2-(1-phenylvinyl)benzenesulfonyl Chloride (S1l)



Prepared by the general procedure A from 2-bromo-4-fluoro-1-(1-phenylvinyl)benzene (4.22 g, 15.2 mmol), ^{t}BuLi (1.70 M in heptane, 19.7 mL, 33.4 mmol) and SO_2Cl_2 (3.53 g, 26.2 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1) to afford the title compound as a brown solid (1.24 g, 4.19 mmol, 28%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.91 (dd, J = 2.4 Hz, $^3J_{H–F}$ = 7.9 Hz, 1H), 7.47–7.42 (m, 2H), 7.32–7.28 (m, 3H), 7.23 (dd, J = 7.9, 1.7 Hz, 2H), 6.02 (s, 1H), 5.40 (s, 1H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 161.3 (d, $^1J_{C–F}$ = 254.3 Hz), 144.4, 143.8 (d, $^3J_{C–F}$ = 7.2 Hz), 139.1, 137.3 (d, $^4J_{C–F}$ = 4.3 Hz), 135.3 (d, $^3J_{C–F}$ = 7.2 Hz), 128.5, 128.4, 126.8, 122.4 (d, $^2J_{C–F}$ = 20.2 Hz), 118.0, 116.6 (d, $^2J_{C–F}$ = 26.0 Hz).

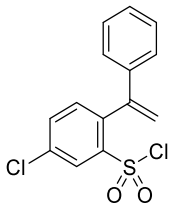
^{19}F NMR (376 MHz, $CDCl_3$) δ −110.6.

IR (KBr) 1601, 1491, 1379, 1263, 1175 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{14}H_{10}NaClFO_2S$ $[M + Na]^+$ 318.9966, found 318.9978.

mp 41.8–42.1 °C.

5-Chloro-2-(1-phenylvinyl)benzenesulfonyl Chloride (S1m)



Prepared by the general procedure A from 2-bromo-4-chloro-1-(1-phenylvinyl)benzene (3.90 g, 13.3 mmol), ^{t}BuLi (1.70 M in heptane, 15.7 mL, 26.6 mmol) and SO_2Cl_2 (3.09 g, 22.9 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1). The obtained oil was further purified by GPC ($CHCl_3$) to afford the title compound as a colorless oil (764 mg, 2.44 mmol, 18%).

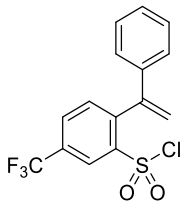
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.18 (d, J = 2.4 Hz, 1H), 7.70 (dd, J = 8.3, 2.4 Hz, 1H), 7.38 (d, J = 8.3 Hz, 1H), 7.32–7.28 (m, 3H), 7.23 (dd, J = 7.9, 2.1 Hz, 2H), 6.02 (s, 1H), 5.40 (s, 1H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 144.4, 143.8, 139.7, 138.9, 135.1, 134.7, 129.2, 128.5, 128.4, 126.9, 118.0.

IR (neat) 3092, 1470, 1178, 1109, 910 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{14}H_{11}Cl_2O_2S$ $[M + H]^+$ 312.9851, found 312.9833.

2-(1-Phenylvinyl)-5-(trifluoromethyl)benzenesulfonyl Chloride (S1n)



Prepared by the general procedure A from 2-bromo-1-(1-phenylvinyl)-4-(trifluoromethyl)benzene (3.58 g, 10.9 mmol), ^{t}BuLi (1.60 M in heptane, 14.3 mL, 23.0 mmol) and SO_2Cl_2 (2.21 g, 16.4 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1). The obtained solid was further purified by GPC ($CHCl_3$) to afford the title compound as a colorless solid (1.18 g, 3.40 mmol, 31%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.46 (brs, 1H), 7.99 (d, J = 8.1, 1.2 Hz, 1H), 7.60 (d, J = 8.1 Hz, 1H), 7.35–7.29 (m, 3H), 7.24–7.22 (m, 2H), 6.07 (s, 1H), 5.44 (s, 1H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 145.1, 144.3, 143.6, 138.6, 134.4, 131.5, 131.4 (q, $^2J_{C–F}$ =34.7 Hz), 128.62, 128.61, 126.9, 126.7 (q, $^3J_{C–F}$ = 4.3 Hz), 122.9 (q, $^1J_{C–F}$ = 273.1 Hz), 118.2.

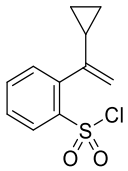
^{19}F NMR (376 MHz, $CDCl_3$) δ −63.8.

IR (KBr) 1611, 1375, 1279, 1175, 1136, 1080 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{15}H_{10}NaClF_3O_2S$ $[M + Na]^+$ 368.9934, found 368.9944.

mp 71.5–71.8 °C.

2-(1-Cyclopropylvinyl)benzenesulfonyl Chloride (S1o)



Prepared by the general procedure A from 1-bromo-2-(1-cyclopropylvinyl)benzene (3.35 g, 15.1 mmol), ^{t}BuLi (1.60 M in heptane, 19.7 mL, 31.6 mmol) and SO_2Cl_2 (3.05 g, 22.6 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1). The obtained oil was further purified by GPC ($CHCl_3$) to afford the title compound as a colorless oil (263 mg, 1.08 mmol, 7%).

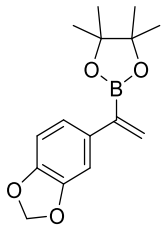
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.14 (dd, J = 8.1, 1.2 Hz, 1H), 7.67 (td, J = 8.1, 1.2 Hz, 1H), 7.52 (td, J = 8.1, 1.2 Hz, 1H), 7.30 (dd, J = 8.1, 1.2 Hz, 1H), 5.29 (t, J = 0.7 Hz, 1H), 5.05 (d, J = 0.7 Hz, 1H), 1.75 (ttd, J = 8.6, 5.3, 1.0 Hz, 1H), 0.78 (ddd, J = 8.6, 6.3, 4.5 Hz, 2H), 0.58 (ddd, J = 6.3, 5.3, 4.5 Hz, 2H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 147.7, 142.6, 142.5, 134.8, 132.4, 129.1, 128.2, 114.0, 18.2, 7.1.

IR (neat) 3088, 1472, 1373, 1184, 772 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{11}H_{11}ClNaO_2S$ $[M + Na]^+$ 265.0060, found 265.0063.

2-(1-(Benzo[*d*][1,3]dioxol-5-yl)vinyl)-4,4,5,5-tetramethyl-1,3,2-dioxabolane (S2i)



Prepared by the general procedure C (14.5 h) from 5-ethynylbenzo[*d*][1,3]dioxole (1.55 g, 10.6 mmol), Ni(dppf)Cl_2 (174 mg, 0.32 mmol), DIBAL (1.03 M in hexane, 13.4 mL, 13.8 mmol) and MeOBpin (5.02 g, 31.8 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1) to afford the title compound as a brown oil (482 mg, 1.76 mmol, 17%).

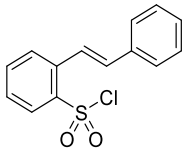
^{1}H NMR (600 MHz, $CDCl_3$) δ 7.01 (d, *J* = 1.7 Hz, 1H), 7.00 (dd, *J* = 8.3, 1.7 Hz, 1H), 6.77 (d, *J* = 8.3 Hz, 1H), 5.99 (d, *J* = 2.8 Hz, 1H), 5.96 (d, *J* = 2.8 Hz, 1H), 5.94 (s, 2H), 1.32 (s, 2H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 147.6, 146.9, 135.7, 129.7, 120.9, 108.2, 107.8, 101.0, 83.9, 24.9.

IR (neat) 2978, 1607, 1504, 1236, 1142 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{15}H_{19}BNaO_4$ $[M + Na]^+$ 297.1271, found 297.1268.

(*E*)-2-Styrylbenzenesulfonyl Chloride (S3)



Prepared by the general procedure A from (*E*)-1-bromo-2-styrylbenzene (3.36 g, 13.0 mmol), ^{t}BuLi (1.60 M in heptane, 17.8 mL, 28.6 mmol) and SO_2Cl_2 (3.01 g, 22.3 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1). The obtained solid was further purified by GPC ($CHCl_3$) to afford the title compound as a colorless solid (1.21 g, 4.33 mmol, 33%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.11 (dd, *J* = 8.1, 1.2 Hz, 1H), 8.02 (d, *J* = 16.2 Hz, 1H), 7.90 (d, *J* = 8.1 Hz, 1H), 7.72 (t, *J* = 8.1 Hz, 1H), 7.60 (dd, *J* = 8.1, 0.9 Hz, 2H), 7.47 (td, *J* = 8.1, 1.2 Hz, 1H), 7.42 (t, *J* = 8.1 Hz, 2H), 7.35 (tt, *J* = 8.1, 0.9 Hz, 1H), 8.11 (d, *J* = 16.2 Hz, 1H).

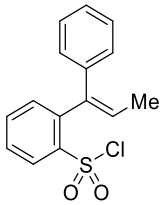
^{13}C NMR (150 MHz, $CDCl_3$) δ 141.2, 137.3, 136.3, 135.4, 134.8, 129.0, 128.9, 128.8, 128.4, 127.6, 127.4, 122.9.

IR (KBr) 1493, 1468, 1358, 1169, 962 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{14}H_{11}NaClO_2S$ $[M + Na]^+$ 301.0060, found 301.0057.

mp 71.3–71.8 °C.

(*E*)-2-(1-Phenylprop-1-en-1-yl)benzenesulfonyl Chloride (S4)



Prepared by the general procedure A from (*E*)-1-bromo-2-(1-phenylprop-1-en-1-yl) (4.27 g, 15.7 mmol), ^{t}BuLi (1.60 M in heptane, 20.0 mL, 32.2 mmol) and SO_2Cl_2 (3.18 g, 23.5 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 20:1). The obtained oil was further purified by GPC ($CHCl_3$) to afford the title compound as a brown oil (301 mg, 1.03 mmol, 7%).

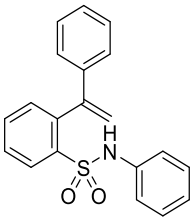
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.23 (dd, *J* = 7.6, 1.0 Hz, 1H), 7.80 (td, *J* = 7.6, 1.0 Hz, 1H), 7.62 (td, *J* = 7.6, 1.0 Hz, 1H), 7.42 (dd, *J* = 7.6, 1.0 Hz, 1H), 7.26 (t, *J* = 7.2 Hz, 2H), 7.20 (tt, *J* = 7.2, 1.4 Hz, 1H), 7.16 (d, *J* = 7.2 Hz, 2H), 6.44 (q, *J* = 7.2 Hz, 1H), 1.64 (d, *J* = 7.2 Hz, 1H), 1.64 (d, *J* = 7.2 Hz, 3H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 143.3, 140.3, 139.5, 138.3, 135.3, 133.9, 129.8, 128.7, 128.3, 127.2, 126.9, 126.3, 16.5.

IR (neat) 3059, 1495, 1443, 1373, 1182 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{15}H_{11}NaClO_2S$ $[M + Na]^+$ 315.0217, found 315.0232.

***N*-Phenyl-2-(1-phenylvinyl)benzenesulfonamide (1aa)[12]**



Prepared by the general procedure B (12 h) from **S1a** (1.43 g, 5.11 mmol), aniline (476 mg, 5.11 mmol) and pyridine (1.21 g, 15.3 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1 → 3:1) to afford the title compound as a colorless solid (1.59 g, 4.73 mmol, 93%).

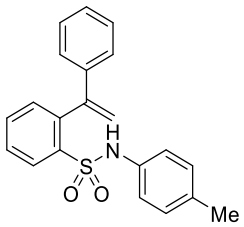
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.95 (dd, *J* = 7.5, 1.4 Hz, 1H), 7.57 (td, *J* = 7.5, 1.4 Hz, 1H), 7.41 (td, *J* = 7.5, 1.4 Hz, 1H), 7.38 (dd, *J* = 7.5, 1.4 Hz, 1H), 7.33–7.26 (m, 5H), 7.13 (t, *J* = 7.3 Hz, 2H), 7.03–6.99 (m, 1H), 6.74 (d, *J* = 7.3 Hz, 2H), 5.89 (d, *J* = 0.9 Hz, 1H), 5.62 (brs, 1H), 5.36 (s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 147.1, 140.6, 139.9, 137.5, 136.5, 133.0, 132.9, 130.4, 129.2, 128.7, 128.4, 128.1, 127.1, 124.5, 119.9, 117.0.

IR (KBr) 3435, 1636, 1499, 1418, 1161, 935, 750 cm^{-1}.

The data were in good agreement with the literature.[12]

2-(1-Phenylvinyl)-*N*-(*p*-tolyl)benzenesulfonamide (1ab)



Prepared by the general procedure B (68 h) from **S1a** (555 mg, 1.99 mmol), *p*-toluidine (216 mg, 2.01 mmol) and pyridine (475 mg, 6.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1 → 3:1) to afford the title compound as a colorless solid (618 mg, 1.77 mmol, 89%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.92 (d, *J* = 7.7 Hz, 1H), 7.56 (td, *J* = 7.7, 1.3 Hz, 1H), 7.41–7.37 (m, 2H), 7.33–7.28 (m, 5H), 6.94 (d, *J* = 8.2 Hz, 2H), 6.67 (d, *J* = 8.2 Hz, 2H), 5.90 (s, 1H), 5.77 (brs, 1H), 5.35 (s, 1H), 2.24 (s, 3H).

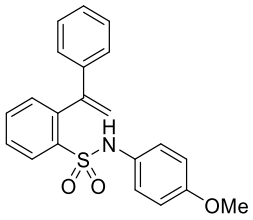
^{13}C NMR (150 MHz, $CDCl_3$) δ 147.2, 140.6, 140.0, 137.5, 134.5, 133.8, 132.9, 132.8, 130.4, 129.7, 128.7, 128.3, 128.0, 127.2, 120.6, 116.8, 20.8.

IR (KBr) 3275, 1616, 1516, 1333, 1163, 943 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{19}NNaO_2S$ $[M + Na]^+$ 372.1029, found 372.1029.

mp 115.6–116.2 °C.

***N*-(4-Methoxyphenyl)-2-(1-phenylvinyl)benzenesulfonamide (1ac)**



Prepared by the general procedure B (67 h) from **S1a** (555 mg, 1.99 mmol), 4-methoxyaniline (256 mg, 2.08 mmol) and pyridine (475 mg, 6.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 3:1) to afford the title compound as a brown solid (519 mg, 1.62 mmol, 81%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.79 (dd, *J* = 7.6, 1.2 Hz, 1H), 7.57 (td, *J* = 7.6, 1.2 Hz, 1H), 7.41 (td, *J* = 7.6, 1.2 Hz, 1H), 7.37 (dd, *J* = 7.6, 1.2 Hz, 1H), 7.34–7.28 (m, 5H), 6.72 (d, *J* = 9.2 Hz, 2H), 6.68 (d, *J* = 9.2 Hz, 2H), 5.87 (s, 1H), 5.57 (brs, 1H), 5.35 (s, 1H), 3.72 (s, 3H).

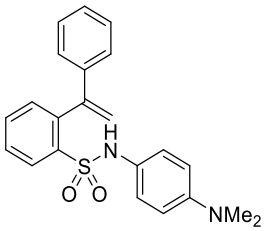
^{13}C NMR (150 MHz, $CDCl_3$) δ 157.2, 147.1, 140.5, 139.9, 137.3, 132.74, 132.67, 130.2, 129.0, 128.5, 128.2, 127.8, 127.1, 123.5, 116.6, 114.2, 55.3.

IR (KBr) 3254, 2949, 1618, 1508, 1333, 1163, 1028 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{19}NNaO_3S$ $[M + Na]^+$ 388.0978, found 388.0980.

mp 91.6–92.3 °C.

***N*-(4-(Dimethylamino)phenyl)-2-(1-phenylvinyl)benzenesulfonamide (1ad)**



Prepared by the general procedure B (71 h) from **S1a** (554 mg, 1.99 mmol), 4-(dimethylamino)aniline (273 mg, 2.01 mmol) and pyridine (475 mg, 6.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 2:1) to afford the title compound as a brown solid (113 mg, 0.30 mmol, 15%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.71 (d, *J* = 7.6 Hz, 1H), 7.57 (td, *J* = 7.6, 1.4 Hz, 1H), 7.42 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.36–7.34 (m, 5H), 7.32–7.29 (m, 1H), 6.67 (d, *J* = 9.0 Hz, 2H), 6.50 (d, *J* = 9.0 Hz, 2H), 5.84 (d, *J* = 0.7 Hz, 1H), 5.36 (d, *J* = 0.7 Hz, 1H), 5.21 (brs, 1H), 2.88 (s, 6H).

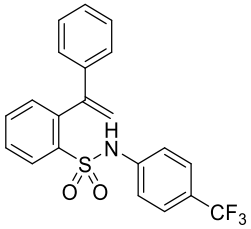
^{13}C NMR (150 MHz, $CDCl_3$) δ 149.0, 148.0, 140.6, 140.4, 137.6, 132.8, 132.6, 130.5, 128.7, 128.4, 127.9, 127.5, 125.2, 125.0, 116.7, 112.7, 40.7.

IR (KBr) 3258, 1611, 1520, 1314, 1157 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{22}H_{23}N_2O_2S$ $[M + H]^+$ 379.1475, found 379.1468.

mp 84.7–85.5 °C.

2-(1-Phenylvinyl)-*N*-(4-(trifluoromethyl)phenyl)benzenesulfonamide (1ae)



Prepared by the general procedure B (22 h) from **S1a** (419 mg, 1.50 mmol), 4-(trifluoromethyl)aniline (241 mg, 1.50 mmol) and pyridine (356 mg, 4.50 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1) to afford the title compound as a colorless solid (572 mg, 1.42 mmol, 95%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.11 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.61 (td, *J* = 7.8, 1.4 Hz, 1H), 7.49 (td, *J* = 7.8, 1.4 Hz, 1H), 7.37 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.33 (d, *J* = 8.7 Hz, 2H), 7.27–7.22 (m, 3H), 7.19 (dd, *J* = 8.0, 1.6 Hz, 2H), 6.74 (d, *J* = 8.7 Hz, 2H), 6.18 (brs, 1H), 5.96 (s, 1H), 5.35 (s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 145.5, 140.9, 139.9, 138.8, 137.2, 133.4, 133.1, 130.5, 128.5, 128.1, 126.6, 126.3 (q, $^3J_{C–F}$ = 3.8 Hz), 125.3 (q, $^2J_{C–F}$ = 36.4 Hz), 124.1 (q, $^1J_{C–F}$ = 271.3 Hz), 117.3, 116.9.

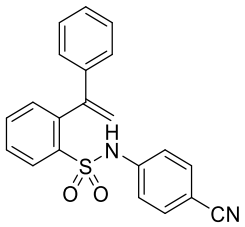
^{19}F NMR (376 MHz, $CDCl_3$) δ −63.0.

IR (KBr) 3269, 1618, 1522, 1323, 1298, 1159, 1115 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{16}F_3NNaO_2S$ $[M + Na]^+$ 426.0746, found 426.0746.

mp 133.3–134.1 °C.

***N*-(4-Cyanophenyl)-2-(1-phenylvinyl)benzenesulfonamide (1af)**



Prepared by the general procedure B (17 h) from **S1a** (425 mg, 1.52 mmol), 4-aminobenzonitrile (185 mg, 1.57 mmol) and pyridine (356 mg, 4.50 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 4:1 → 2:1) to afford the title compound as a pale pink solid (382 mg, 1.06 mmol, 70%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.13 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.64 (td, *J* = 7.8, 1.4 Hz, 1H), 7.52 (td, *J* = 7.8, 1.4 Hz, 1H), 7.39 (d, *J* = 7.8 Hz, 1H), 7.37 (d, *J* = 8.7 Hz, 2H), 7.31–7.24 (m, 3H), 7.18 (d, *J* = 7.3 Hz, 2H), 6.69 (d, *J* = 8.7 Hz, 2H), 6.12 (brs, 1H), 5.97 (s, 1H), 5.36 (s, 1H).

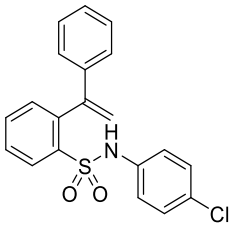
^{13}C NMR (150 MHz, $CDCl_3$) δ 145.7, 140.74, 140.68, 139.2, 137.0, 133.7, 133.4, 133.2, 130.5, 128.8, 128.4, 128.3, 126.7, 118.7, 117.7, 117.6, 106.7.

IR (KBr) 3244, 2230, 1607, 1466, 1344, 1167 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{16}N_2NaO_2S$ $[M + Na]^+$ 383.0825, found 383.0824.

mp 187.9–188.3 °C.

***N*-(4-Chlorophenyl)-2-(1-phenylvinyl)benzenesulfonamide (1ag)**



Prepared by the general procedure B (69 h) from **S1a** (558 mg, 2.00 mmol), 4-chloroaniline (255 mg, 2.00 mmol) and pyridine (475 mg, 6.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 4:1) to afford the title compound as a colorless solid (683 mg, 1.85 mmol, 92%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.94 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.60 (td, *J* = 7.6, 1.4 Hz, 1H), 7.44 (td, *J* = 7.6, 1.4 Hz, 1H), 7.40 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.34–7.31 (m, 3H), 7.28–7.25 (m, 2H), 7.08 (d, *J* = 9.5 Hz, 2H), 6.64 (d, *J* = 9.5 Hz, 2H), 5.90 (s, 1H), 5.61 (brs, 1H), 5.36 (s, 1H).

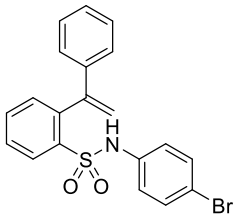
^{13}C NMR (150 MHz, $CDCl_3$) δ 146.2, 140.7, 139.4, 137.2, 135.2, 133.2, 132.9, 130.4, 129.4, 129.1, 128.6, 128.2, 128.0, 126.9, 120.4, 116.9.

IR (KBr) 3258, 1493, 1327, 1157, 945, 822, 773 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{20}H_{16}ClNNaO_2S$ $[M + Na]^+$ 392.0482, found 392.0489.

mp 130.5–131.2 °C.

***N*-(4-Bromophenyl)-2-(1-phenylvinyl)benzenesulfonamide (1ah)**



Prepared by the general procedure B (70 h) from **S1a** (555 mg, 1.99 mmol), 4-bromoaniline (349 mg, 2.03 mmol) and pyridine (475 mg, 6.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1 → 4:1) to afford the title compound as a colorless solid (768 mg, 1.85 mmol, 92%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.95 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.60 (td, *J* = 7.6, 1.4 Hz, 1H), 7.44 (td, *J* = 7.6, 1.4 Hz, 1H), 7.44 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.33–7.30 (m, 3H), 7.26–7.24 (m, 2H), 7.23 (d, *J* = 9.6 Hz, 2H), 6.58 (d, *J* = 9.6 Hz, 2H), 5.90 (s, 1H), 5.63 (brs, 1H), 5.36 (s, 1H).

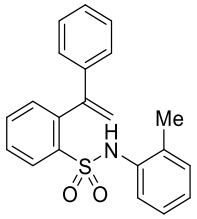
^{13}C NMR (150 MHz, $CDCl_3$) δ 145.6, 140.6, 139.0, 137.0, 135.7, 133.1, 132.8, 131.8, 130.3, 128.3, 128.0, 127.9, 126.6, 120.2, 116.64, 116.60.

IR (KBr) 3250, 1489, 1389, 1325, 1161 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{20}H_{16}BrNNaO_2S$ $[M + Na]^+$ 437.9977, found 437.9961.

mp 118.0–118.6 °C.

2-(1-Phenylvinyl)-*N*-(*o*-tolyl)benzenesulfonamide (1ai)



Prepared by the general procedure B (22 h) from **S1a** (420 mg, 1.51 mmol), *o*-toluidine (161 mg, 1.50 mmol) and pyridine (356 mg, 4.50 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1) to afford the title compound as a colorless solid (409 mg, 1.17 mmol, 78%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.07 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.60 (td, *J* = 7.6, 1.4 Hz, 1H), 7.49 (td, *J* = 7.6, 1.4 Hz, 1H), 7.35 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.23–7.18 (m, 5H), 7.02–6.96 (m, 3H), 6.91 (d, *J* = 7.8 Hz, 1H), 5.97 (s, 1H), 5.78 (brs, 1H), 5.37 (s, 1H), 1.91 (s, 3H).

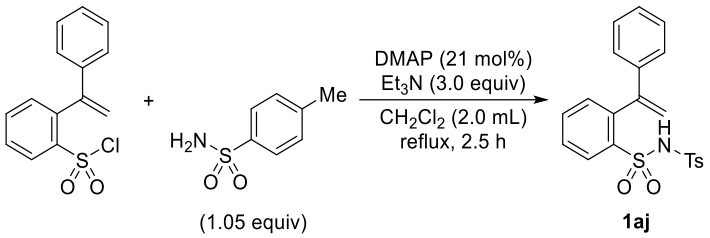
^{13}C NMR (150 MHz, $CDCl_3$) δ 146.7, 140.5, 139.4, 138.7, 135.0, 132.9, 132.8, 131.0, 130.3, 130.1, 128.5, 128.2, 128.1, 126.9, 126.7, 125.1, 120.5, 116.8, 17.6.

IR (KBr) 3267, 1497, 1339, 1163, 908 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{19}NNaO_2S$ $[M + Na]^+$ 372.1029, found 372.1025.

mp 146.6–146.9 °C.

2-(1-Phenylvinyl)-*N*-tosylbenzenesulfonamide (1aj)[14]



A mixture of **S1a** (557 mg, 2.00 mmol), 4-methylbenzenesulfonamide (361 mg, 2.10 mmol), DMAP (50.1 mg, 0.41 mmol) and Et_3N (607 mg, 6.00 mmol) in CH_2Cl_2 (2.0 mL) was refluxed for 2.5 h. After being allowed to cool to room temperature, and into the mixture was added 1 M HCl aq (5 mL). The mixture was extracted with CH_2Cl_2 (3 × 5 mL). The combined organic phase was dried over $MgSO_4$, filtered, and concentrated under reduced pressure. The residue was purified by column chromatography on silica gel (hexane/EtOAc 4:1) to afford the title compound as a colorless oil (207 mg, 0.50 mmol, 25%).

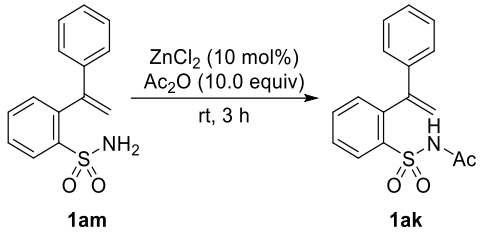
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.16 (d, *J* = 7.8 Hz, 1H), 7.76 (d, *J* = 8.3 Hz, 2H), 7.69 (td, *J* = 7.8, 1.1 Hz, 1H), 7.55 (td, *J* = 7.8, 1.1 Hz, 1H), 7.44 (dd, *J* = 7.8, 1.1 Hz, 1H), 7.41–7.37 (m, 3H), 7.32 (dd, *J* = 7.6, 1.6 Hz, 2H), 7.29 (d, *J* = 8.3 Hz, 2H), 6.43 (brs, 1H), 5.89 (s, 1H), 5.40 (s, 1H), 2.42 (s, 3H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 146.9, 145.1, 140.9, 139.4, 138.1, 136.7, 133.8, 132.6, 130.6, 129.6, 128.8, 128.5, 128.2, 127.9, 127.3, 117.2, 21.7.

IR (neat) 1597, 1368, 1165, 1090, 856 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{19}NNaO_4S_2$ $[M + Na]^+$ 436.0648, found 436.0650.

***N*-((2-(1-Phenylvinyl)phenyl)sulfonyl)acetamide (1ak)**[15]



To a solution of $ZnCl_2$ (26.4 mg, 0.19 mmol) in Ac_2O (2.04 g, 20 mmol) was added 2-(1-phenylvinyl)benzenesulfonamide (**1am**; 520 mg, 2.00 mmol) at room temperature. After being stirred at room temperature for 3 h, and into the mixture was added H_2O (5 mL). The mixture was extracted with EtOAc (3 × 10 mL). The combined organic phase was dried over Na_2SO_4, filtered, and concentrated under reduced pressure. The residue was purified by column chromatography on silica gel (hexane/EtOAc 2:1 → 1:1) to afford the title compound as a colorless solid (509 mg, 1.69 mmol, 85%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.32 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.68 (td, *J* = 7.8, 1.4 Hz, 1H), 7.58 (td, *J* = 7.8, 1.4 Hz, 1H), 7.38 (d, *J* = 7.8 Hz, 1H), 7.33–7.27 (m, 5H), 6.02 (d, *J* = 1.8 Hz, 1H), 5.33 (s, 1H), 1.42 (s, 3H).

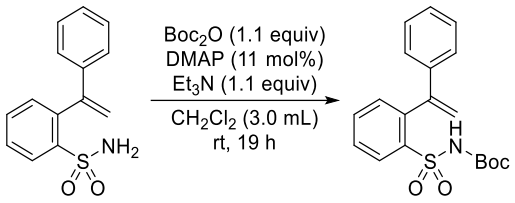
^{13}C NMR (150 MHz, $CDCl_3$) δ 168.3, 144.8, 140.6, 138.7, 136.7, 133.8, 132.6, 131.7, 128.7, 128.2, 128.1, 126.5, 116.9, 22.6.

IR (KBr) 3233, 1719, 1437, 1344, 1161 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{16}H_{15}NNaO_3S$ $[M + Na]^+$ 324.0665, found 324.0659.

mp 149.0–149.8 °C.

***tert*-Butyl ((2-(1-Phenylvinyl)phenyl)sulfonyl)carbamate (1al)[16]**



1al

A mixture of **1am** (517 mg, 1.99 mmol), Boc_2O (482 mg, 2.20 mmol), DMAP (26.4 mg, 0.22 mmol) and Et_3N (223 mg, 0.22 mmol) in CH_2Cl_2 (3.0 mL) was stirred at room temperature for 19 h. After the completion of the reaction, into the mixture was added TFE (1 mL), and stirred additional 5 min. Into the mixture was added H_2O (5 mL), and extracted with CH_2Cl_2 (3 × 10 mL). The combined organic phase was washed by saturated $NaHCO_3$ (10 mL), dried over $MgSO_4$, filtered, and concentrated under reduced pressure. The residue was purified by column chromatography on Al_2O_3 (hexane/EtOAc 1:1 → MeOH) to afford the title compound as a colorless solid (590 mg, 1.64 mmol, 82%).

^{1}H NMR (600 MHz, DMSO-d_6) δ 7.98 (d, J = 7.6 Hz, 1H), 7.45–7.39 (m, 2H), 7.29–7.17 (m, 6H), 7.03 (d, J = 6.9 Hz, 1H), 5.84 (s, 1H), 5.21 (s, 1H), 1.21 (s, 9H).

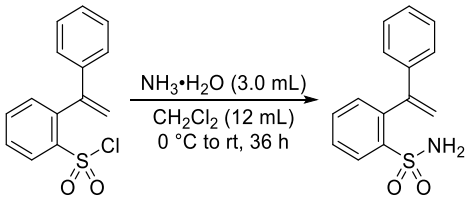
^{13}C NMR (150 MHz, DMSO-d_6) δ 172.1, 145.3, 140.8, 139.8, 131.1, 130.1, 129.3, 127.8, 127.0, 126.9, 126.5, 116.3, 28.2, 21.1.

IR (KBr) 3482, 1717, 1647, 1288, 1155 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{19}H_{21}NNaO_4S$ $[M + Na]^+$ 382.1083, found 382.1084.

mp decomp at ca 130 °C.

2-(1-Phenylvinyl)benzenesulfonamide (1am)



1am

To a solution of **S1a** (1.65 mg, 5.93 mmol) in CH_2Cl_2 (3.0 mL) was added NH_3•H_2O (3 mL) at 0 °C. After being stirred at room temperature for 36 h, and into the mixture was added H_2O (10 mL). The mixture was extracted with CH_2Cl_2 (3 × 20 mL). The combined organic phase was dried over $MgSO_4$, filtered, and concentrated under reduced pressure. The residue was purified by short column chromatography on silica gel ($CHCl_3$) to afford the title compound as a colorless solid (1.47 g, 5.66 mmol, 95%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.04 (dd, J = 7.8, 1.4 Hz, 1H), 7.54 (td, J = 7.8, 1.4 Hz, 1H), 7.45 (td, J = 7.8, 1.4 Hz, 1H), 7.34 (dd, J = 7.8, 1.4 Hz, 1H), 7.32–7.27 (m, 5H), 5.94 (s, 1H), 5.40 (s, 1H), 4.59 (s, 2H).

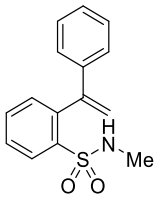
^{13}C NMR (150 MHz, $CDCl_3$) δ 146.9, 140.7, 140.0, 139.6, 132.53, 132.48, 128.7, 128.5, 128.3, 128.2, 127.1, 117.5.

IR (KBr) 3281, 1233, 1163, 920, 772 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{14}H_{13}NNaO_2S$ $[M + Na]^+$ 282.0559, found 282.0557.

mp 84.9–85.2 °C.

***N*-Methyl-2-(1-phenylvinyl)benzenesulfonamide (1an)**



Prepared by the general procedure B (22 h) from **S1a** (552 mg, 1.98 mmol), methanamine (62.1 mg, 2.00 mmol) and pyridine (475 mg, 6.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 4:1) to afford the title compound as a colorless oil (259 mg, 0.94 mmol, 47%).

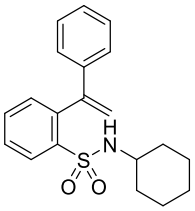
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.06 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.62 (td, *J* = 7.8, 1.4 Hz, 1H), 7.50 (td, *J* = 7.8, 1.4 Hz, 1H), 7.41 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.34–7.28 (m, 5H), 5.88 (s, 1H), 5.37 (s, 1H), 3.51 (q, *J* =5.5 Hz, 1H), 2.25 (d, *J* = 5.5 Hz, 3H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 146.8, 140.3, 139.8, 136.7, 132.8, 132.6, 130.5, 128.6, 128.4, 128.0, 126.7, 117.0, 29.3.

IR (neat) 3343, 3059, 1495, 1337, 1165, 912 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{15}H_{15}NNaO_2S$ $[M + Na]^+$ 296.0716, found 296.0723.

***N*-Cyclohexyl-2-(1-phenylvinyl)benzenesulfonamide (1ao)**



Prepared by the general procedure B (71 h) from **S1a** (553 mg, 1.98 mmol), cyclohexylamine (198 mg, 2.00 mmol) and pyridine (475 mg, 6.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 4:1) to afford the title compound as a colorless solid (357 mg, 1.05 mmol, 53%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.06 (dd, *J* = 7.5, 1.4 Hz, 1H), 7.59 (td, *J* = 7.5, 1.4 Hz, 1H), 7.49 (td, *J* = 7.5, 1.4 Hz, 1H), 7.40 (dd, *J* = 7.5, 1.4 Hz, 1H), 7.33–7.29 (m, 5H), 5.84 (d, *J* = 0.9 Hz, 1H), 5.32 (s, 1H), 3.54 (brs, 1H), 3.05–2.97 (m, 1H), 1.55–1.44 (m, 5H), 1.18–1.06 (m, 2H), 1.02–0.92 (m, 1H), 0.84–0.74 (m, 2H).

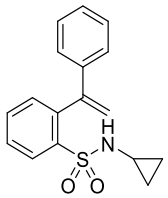
^{13}C NMR (150 MHz, $CDCl_3$) δ 147.5, 140.03, 139.96, 139.8, 132.7, 132.1, 129.1, 128.5, 128.1, 128.0, 127.1, 116.8, 52.9, 33.5, 25.1, 24.6.

IR (KBr) 3287, 2936, 1319, 1155, 908, 775 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{20}H_{23}NNaO_2S$ $[M + Na]^+$ 364.1342, found 364.1341.

mp 101.5–102.0 °C.

***N*-Cyclopropyl-2-(1-phenylvinyl)benzenesulfonamide (1ap)**



Prepared by the general procedure B (16 h) from **S1a** (282 mg, 1.01 mmol), cyclopropylamine (209 μL, 3.00 mmol) and pyridine (242 μL, 3.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1) to afford the title compound as a colorless solid (275 mg, 0.92 mmol, 91%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.12 (dd, *J* = 7.7, 1.4 Hz, 1H), 7.64 (td, *J* = 7.7, 1.4 Hz, 1H), 7.52 (td, *J* = 7.7, 1.4 Hz, 1H), 7.44 (dd, *J* = 7.7, 1.4 Hz, 1H), 7.35–7.31 (m, 3H), 7.31–7.28 (m, 2H), 5.84 (d, *J* = 0.7 Hz, 1H), 5.36 (d, *J* = 0.7 Hz, 1H), 3.76 (brs, 1H), 1.86 (ttd, *J* = 6.7, 3.4, 1.4 Hz, 1H), 0.41–0.31 (m, 4H).

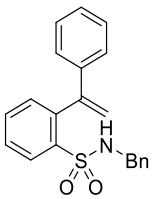
^{13}C NMR (150 MHz, $CDCl_3$) δ 147.1, 140.4, 139.9, 137.4, 132.72, 132.67, 130.5, 128.5, 128.2, 128.0, 126.9, 116.9, 24.2, 5.8.

IR (KBr) 3291, 3021, 1393, 1319, 1159 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{17}H_{17}NNaO_2S$ $[M + Na]^+$ 322.0872, found 322.0880.

mp 96.3–97.0 °C.

***N*-Benzyl-2-(1-phenylvinyl)benzenesulfonamide (1aq)**



Prepared by the general procedure B (22 h) from **S1a** (558 mg, 2.00 mmol), phenylmethanamine (214 mg, 2.00 mmol) and pyridine (475 mg, 6.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1) to afford the title compound as a colorless solid (618 mg, 1.77 mmol, 89%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.12 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.65 (td, *J* = 7.8, 1.4 Hz, 1H), 7.54 (td, *J* = 7.8, 1.4 Hz, 1H), 7.44 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.28–7.26 (m, 2H), 7.24–7.21 (m, 5H), 7.16 (tt, *J* = 7.1, 1.6 Hz, 1H), 7.00–6.98 (m, 2H), 5.85 (d, *J* = 0.9 Hz, 1H), 5.33 (s, 1H), 3.75 (brs, 3H).

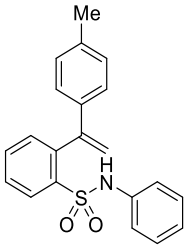
^{13}C NMR (100 MHz, $CDCl_3$) δ 147.0, 140.3, 139.8, 137.9, 136.2, 132.9, 132.7, 130.2, 128.7, 128.6, 128.4, 128.2, 127.91, 127.86, 126.8, 117.2, 47.4.

IR (KBr) 3287, 3065, 1431, 1315, 1153, 918 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{19}NNaO_2S$ $[M + Na]^+$ 372.1029, found 372.1030.

mp 99.4–99.9 °C.

***N*-Phenyl-2-(1-(*p*-tolyl)vinyl)benzenesulfonamide (1ba)**



Prepared by the general procedure B (47 h) from **S1b** (309 mg, 1.06 mmol), aniline (118 mg, 1.27 mmol) and pyridine (252 mg, .3.18 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1) to afford the title compound as a colorless solid (298 mg, 0.85 mmol, 80%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.99–7.97 (m, 1H), 7.56 (td, *J* = 7.4, 1.2 Hz, 1H), 7.41 (td, *J* = 7.4, 1.2 Hz, 1H), 7.36 (d, *J* = 7.4 Hz, 1H), 7.16–7.11 (m, 4H), 7.08 (d, *J* = 7.4 Hz, 2H), 7.00 (t, *J* = 7.4 Hz, 1H), 6.75 (d, *J* = 7.4 Hz, 2H), 5.96–5.84 (m, 2H), 5.28 (s, 1H), 2.32 (s, 3H).

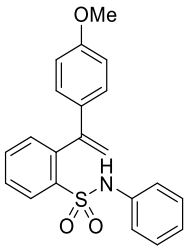
^{13}C NMR (150 MHz, $CDCl_3$) δ 146.9, 140.9, 138.3, 137.5, 137.1, 136.6, 133.0, 132.8, 130.4, 129.4, 129.1, 128.0, 127.0, 124.5, 119.8, 116.0, 21.3.

IR (KBr) 3262, 1420, 1339, 1159, 935, 756 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{19}NNaO_2S$ $[M + Na]^+$ 372.1029, found 372.1034.

mp 149.9–150.7 °C.

2-(1-(4-Methoxyphenyl)vinyl)-*N*-phenylbenzenesulfonamide (1ca)



Prepared by the general procedure D (67 h) from 2-bromo-*N*-phenylbenzenesulfonamide (1.11 g, 3.58 mmol), **S2c** (1.44 g, 5.52 mmol), $Pd(PPh_3)_4$ (434 mg, 0.38 mmol) and K_2CO_3 (2.01 g, 14.6 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 3:1). The obtained solid was recrystallized from $CHCl_3$/hexane to afford the title compound as a yellow solid (712 mg, 1.95 mmol, 54%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.97 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.56 (td, *J* = 7.8, 1.4 Hz, 1H), 7.41 (td, *J* = 7.8, 1.4 Hz, 1H), 7.35 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.18 (d, *J* = 8.7 Hz, 2H), 7.14 (t, *J* = 7.3 Hz, 2H), 7.01 (t, *J* = 7.3 Hz, 1H), 6.81 (d, *J* = 8.7 Hz, 2H), 6.78 (d, *J* = 7.3 Hz, 2H), 5.83 (brs, 1H), 5.82 (d, *J* = 0.9 Hz, 1H), 5.24 (s, 1H), 3.79 (s, 3H).

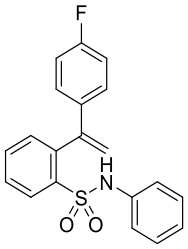
^{13}C NMR (150 MHz, $CDCl_3$) δ 159.7, 146.6, 140.9, 137.6, 136.6, 133.0, 132.8, 132.4, 130.4, 129.2, 128.4, 128.0, 124.5, 119.8, 115.0, 114.0, 55.4.

IR (KBr) 3252, 1609, 1510, 1252, 1157 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{19}NNaO_3S$ $[M + Na]^+$ 388.0978, found 388.0965.

mp 181.3–181.8 °C.

2-(1-(4-Fluorophenyl)vinyl)-*N*-phenylbenzenesulfonamide (1da)



Prepared by the general procedure D (24 h) from 2-bromo-*N*-phenylbenzenesulfonamide (745 mg, 2.38 mmol), (1-(4-fluorophenyl)vinyl)boronic acid (754 mg, 4.54 mmol), $Pd(PPh_3)_4$ (279 mg, 0.24 mmol) and K_2CO_3 (1.33 g, 9.60 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 3:1). The obtained solid was further purified by GPC ($CHCl_3$) and recrystallized from $CHCl_3$/hexane to afford the title compound as a colorless solid (121 mg, 0.34 mmol, 14%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.01 (dd, *J* = 7.7, 1.1 Hz, 1H), 7.57 (td, *J* = 7.7, 1.1 Hz, 1H), 7.44 (td, *J* = 7.7, 1.1 Hz, 1H), 7.32 (dd, *J* = 7.7, 1.1 Hz, 1H), 7.24–7.20 (m, 2H), 7.16 (t, *J* = 8.0 Hz, 2H), 7.03 (t, *J* = 8.0 Hz, 1H), 6.96 (t, *J* = 8.0 Hz, 2H), 6.80 (d, *J* = 8.0 Hz, 2H), 5.90 (brs, 1H), 5.88 (s, 1H), 5.31 (s, 1H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 162.6 (d, $^1J_{C–F}$ = 248.5 Hz), 145.6, 140.5, 137.6, 136.6, 135.6 (d, $^4J_{C–F}$ = 2.9 Hz), 133.1, 132.7, 130.5, 129.3, 128.6 (d, $^3J_{C–F}$ = 8.7 Hz), 128.1, 124.4, 119.1, 116.2, 115.4 (d, $^2J_{C–F}$ = 21.7 Hz).

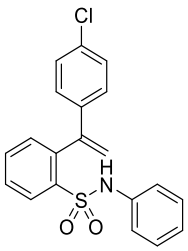
^{19}F NMR (376 MHz, $CDCl_3$) δ −114.7.

IR (KBr) 3275, 1603, 1508, 1418, 1157 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{20}H_{16}NNaO_2S$ $[M + Na]^+$ 376.0778, found 376.0780.

mp 138.8–139.7 °C.

2-(1-(4-Chlorophenyl)vinyl)-*N*-phenylbenzenesulfonamide (1ea)



Prepared by the general procedure B (56 h) from **S1e** (633 mg, 2.06 mmol), aniline (211 mg, 2.27 mmol) and pyridine (489 mg, 6.18 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1) to afford the title compound as a colorless solid (547 mg, 1.48 mmol, 72%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.11–8.09 (m, 1H), 7.55 (td, *J* = 7.4, 1.1 Hz, 1H), 7.45 (td, *J* = 7.4, 1.1 Hz, 1H), 7.25 (d, *J* = 7.4 Hz, 1H), 7.13–7.07 (m, 6H), 6.98 (t, *J* = 7.4 Hz, 2H), 6.74 (d, *J* = 7.4 Hz, 2H), 6.64 (brs, 1H), 6.00–5.99 (m, 1H), 5.28 (s, 1H).

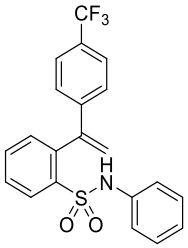
^{13}C NMR (150 MHz, $CDCl_3$) δ 145.1, 140.3, 137.6, 136.5, 134.0, 133.1, 132.7, 130.6, 129.2, 128.5, 128.2, 128.0, 124.1, 118.6, 116.8.

IR (KBr) 3254, 1491, 1159, 932, 750 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{20}H_{16}ClNNaO_2S$ $[M + Na]^+$ 392.0482, found 392.0483.

mp 138.1–139.0 °C.

***N*-Phenyl-2-(1-(4-(trifluoromethyl)phenyl)vinyl)benzenesulfonamide (1fa)**



Prepared by the general procedure B (56 h) from **S1f** (232 mg, 0.67 mmol), aniline (74.3 mg, 0.80 mmol) and pyridine (198 mg, 2.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1 → 4:1) to afford the title compound as a yellow solid (197 mg, 0.49 mmol, 74%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.08 (dd, *J* = 8.1, 1.2 Hz, 1H), 7.60 (td, *J* = 8.1, 1.2 Hz, 1H), 7.50–7.47 (m, 3H), 7.32 (d, *J* = 8.3 Hz, 2H), 7.31 (dd, *J* = 8.1, 1.2 Hz, 1H), 7.14 (t, *J* = 7.6 Hz, 2H), 7.02 (t, *J* = 7.6 Hz, 1H), 6.74 (d, *J* = 7.6 Hz, 2H), 6.06 (s, 1H), 5.96 (brs, 1H), 5.44 (s, 1H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 144.9, 142.3, 139.9, 137.7, 136.4, 133.2, 132.7, 130.7, 129.7 (q, $^2J_{C–F}$ = 31.8 Hz), 129.3, 128.3, 126.8, 125.3 (q, $^3J_{C–F}$ = 2.9 Hz), 124.10, 124.08 (q, $^1J_{C–F}$ = 271.7 Hz), 118.4, 118.2.

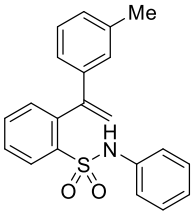
^{19}F NMR (376 MHz, $CDCl_3$) δ −63.6.

IR (KBr) 3264, 1603, 1329, 1163, 1123 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{16}F_3NNaO_2S$ $[M + Na]^+$ 426.0746, found 426.0750.

mp 126.0–126.3 °C.

***N*-Phenyl-2-(1-(*m*-tolyl)vinyl)benzenesulfonamide (1ga)**



Prepared by the general procedure B (54 h) from **S1g** (292 mg, 1.00 mmol), aniline (102 mg, 1.10 mmol) and pyridine (237 mg, 3.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1) to afford the title compound as a colorless solid (237 mg, 0.68 mmol, 68%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.97 (dd, *J* = 7.8, 0.9 Hz, 1H), 7.57 (td, *J* = 7.8, 0.9 Hz, 1H), 7.42 (td, *J* = 7.8, 0.9 Hz, 1H), 7.37 (d, *J* = 7.8 Hz, 1H), 7.22 (t, *J* = 7.8 Hz, 1H), 7.14–7.11 (m, 4H), 7.00 (d, *J* = 7.8 Hz, 1H), 6.99 (s, 1H), 6.70 (d, *J* = 7.8 Hz, 2H), 5.87 (d, *J* = 0.9 Hz, 1H), 5.66 (s, 1H), 5.35 (s, 1H), 2.23 (s, 3H).

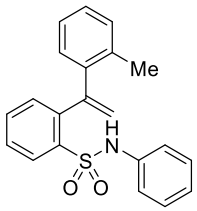
^{13}C NMR (150 MHz, $CDCl_3$) δ 146.7, 140.8, 139.7, 138.2, 137.4, 136.6, 132.9, 132.8, 130.4, 129.05, 129.02, 128.6, 127.9, 127.7, 124.2, 124.1, 119.4, 117.0, 21.4.

IR (KBr) 3275, 1601, 1497, 1159, 928, 748 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{19}NNaO_2S$ $[M + Na]^+$ 372.1029, found 372.1023.

mp 122.1–122.9 °C.

***N*-Phenyl-2-(1-(*o*-tolyl)vinyl)benzenesulfonamide (1ha)**



Prepared by the general procedure B (54 h) from **S1h** (375 mg, 1.28 mmol), aniline (143 mg, 1.53 mmol) and pyridine (304 mg, 3.84 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1) to afford the title compound as a colorless solid (396 mg, 1.13 mmol, 88%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.78 (dd, *J* = 8.0, 0.7 Hz, 1H), 7.57–7.55 (m, 2H), 7.36–7.32 (m, 1H), 7.31–7.23 (m, 4H), 7.14 (t, *J* = 8.0 Hz, 2H), 7.01 (t, *J* = 8.0 Hz, 1H), 6.72 (dd, *J* = 8.0, 0.7 Hz, 2H), 5.61 (d, *J* = 0.9 Hz, 1H), 5.57 (d, *J* = 0.9 Hz, 1H), 4.84 (brs, 1H), 2.25 (s, 3H).

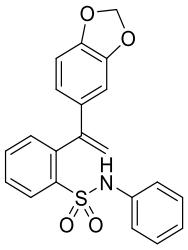
^{13}C NMR (150 MHz, $CDCl_3$) δ 147.8, 142.0, 140.0, 136.8, 136.6, 136.3, 133.9, 133.0, 131.6, 130.9, 130.4, 129.0, 128.3, 127.9, 126.1, 124.8, 121.4, 120.9, 21.4.

IR (KBr) 3285, 1489, 1152, 930, 746 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{19}NNaO_2S$ $[M + Na]^+$ 372.1029, found 372.1033.

mp 125.0–125.8 °C.

2-(1-Benzo[*d*][1,3]dioxol-5-yl)-*N*-phenylbenzenesulfonamide (1ia)



Prepared by the general procedure D (15 h) from 2-bromo-*N*-phenylbenzenesulfonamide (385 mg, 1.23 mmol), **S2i** (384 mg, 1.40 mmol), $Pd(PPh_3)_4$ (144 mg, 0.12 mmol) and K_2CO_3 (663 mg, 4.80 mmol). After the general work-up, the residue was purified by short column chromatography on silica gel ($CHCl_3$/EtOAc 1:1). The obtained solid was further purified by GPC ($CHCl_3$) and recrystallized from $CHCl_3$/hexane to afford the title compound as a colorless solid (198 mg, 0.52 mmol, 43%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.97 (dd, *J* = 7.7, 1.4 Hz, 1H), 7.56 (td, *J* = 7.7, 1.4 Hz, 1H), 7.41 (td, *J* = 7.7, 1.4 Hz, 1H), 7.33 (dd, *J* = 7.7, 1.4 Hz, 1H), 7.16 (t, *J* = 7.6 Hz, 2H), 7.02 (t, *J* = 7.6 Hz, 1H), 6.83–6.80 (m, 3H), 6.69 (d, *J* = 8.3 Hz, 1H), 6.64 (dd, *J* = 8.3, 1.9 Hz, 1H), 5.95 (s, 2H), 5.91 (brs, 1H), 5.81 (s, 1H), 5.24 (s, 1H).

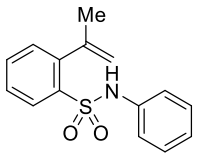
^{13}C NMR (150 MHz, $CDCl_3$) δ 148.1, 147.8, 146.4, 140.7, 137.5, 136.7, 134.1, 133.0, 132.8, 130.5, 129.2, 128.1, 124.5, 121.1, 119.7, 115.4, 108.2, 107.3, 101.4.

IR (KBr) 3250, 1422, 1319, 1242, 1157 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{17}NNaO_4S$ $[M + Na]^+$ 402.0770, found 402.0770.

mp 172.3–172.8 °C.

***N*-Phenyl-2-(prop-1-en-2-yl)benzenesulfonamide (1ja)**



Prepared by the general procedure B (47 h) from **S1j** (517 mg, 2.39 mmol), aniline (267 mg, 2.87 mmol) and pyridine (567 mg, 7.17 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1) to afford the title compound as a brown solid (465 mg, 1.70 mmol, 71%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.78 (dd, *J* = 8.0, 0.7 Hz, 1H), 7.57–7.55 (m, 2H), 7.36–7.32 (m, 1H), 7.31–7.23 (m, 4H), 7.14 (t, *J* = 8.0 Hz, 2H), 7.14 (t, *J* = 8.0 Hz, 2H), 7.01 (t, *J* = 8.0 Hz, 1H), 6.72 (dd, *J* = 8.0, 0.7 Hz, 2H), 5.61 (d, *J* = 0.9 Hz, 1H), 5.57 (d, *J* = 0.9 Hz, 1H), 4.84 (brs, 1H), 2.25 (s, 3H).

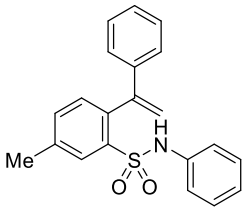
^{13}C NMR (150 MHz, $CDCl_3$) δ 145.0, 143.4, 136.8, 136.2, 132.9, 130.4, 129.9, 129.2, 127.1, 124.2, 119.0, 115.9, 25.6.

IR (KBr) 3283, 1601, 1497, 1416, 1157 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{15}H_{15}NNaO_2S$ $[M + Na]^+$ 296.0716, found 296.0706.

mp 93.5–94.2 °C.

5-Methyl-*N*-phenyl-2-(1-phenylvinyl)benzenesulfonamide (1ka)



Prepared by the general procedure B (47 h) from **S1k** (241 mg, 0.83 mmol), aniline (93.1 mg, 1.00 mmol) and pyridine (196 mg, 2.48 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1 → 4:1) to afford the title compound as a colorless solid (233 mg, 0.67 mmol, 81%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.79 (d, *J* = 1.6 Hz, 1H), 7.36 (dd, *J* = 8.0, 1.6 Hz, 1H), 7.30–7.28 (m, 3H), 7.27–7.25 (m, 3H), 7.13 (t, *J* = 7.5 Hz, 2H), 7.00 (tt, *J* = 7.5, 1.2 Hz, 1H), 6.74 (d, *J* = 7.5 Hz, 2H), 5.88 (s, 1H), 5.73 (brs, 1H), 5.33 (d, *J* = 0.9 Hz, 1H), 2.38 (s, 3H).

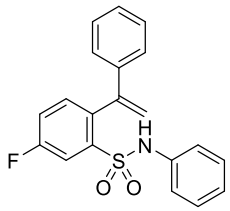
^{13}C NMR (150 MHz, $CDCl_3$) δ 146.6, 139.9, 138.2, 137.7, 137.3, 136.6, 133.6, 132.7, 130.7, 129.1, 128.5, 128.1, 127.0, 124.2, 119.4, 116.8, 21.1.

IR (KBr) 3586, 1335, 1155, 926, 750 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{19}NNaO_2S$ $[M + Na]^+$ 372.1029, found 372.1026.

mp 151.3–151.8 °C.

5-Fluoro-*N*-phenyl-2-(1-phenylvinyl)benzenesulfonamide (1la)



Prepared by the general procedure B (23 h) from **S1l** (445 mg, 1.50 mmol), aniline (140 mg, 1.50 mmol) and pyridine (356 mg, 4.50 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 4:1). The obtained solid was recrystallized from $CHCl_3$/hexane to afford the title compound as a colorless solid (312 mg, 0.88 mmol, 59%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.69 (dd, J = 2.7 Hz, $^3J_{H–F}$ = 8.2 Hz, 1H), 7.36 (dd, J = 8.5 Hz, $^4J_{H–F}$ = 5.5 Hz, 1H), 7.32–7.30 (m, 3H), 7.28–7.24 (m, 3H), 7.15 (t, J = 7.8 Hz, 2H), 7.04 (t, J = 7.8 Hz, 1H), 6.74 (dd, J = 7.8, 1.1 Hz, 2H), 5.91 (d, J = 0.9 Hz, 1H), 5.74 (brs, 1H), 5.35 (s, 1H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 161.3 (d, $^1J_{C–F}$ = 252.1 Hz), 145.8, 139.6, 139.4 (d, $^3J_{C–F}$ = 6.7 Hz), 136.6 (d, $^4J_{C–F}$ = 3.8 Hz), 136.1, 134.6 (d, $^3J_{C–F}$ = 6.7 Hz), 129.3, 128.7, 128.4, 127.0, 124.7, 119.9 (d, $^2J_{C–F}$ = 21.1 Hz), 119.7, 117.7 (d, $^2J_{C–F}$ = 24.9 Hz), 117.5.

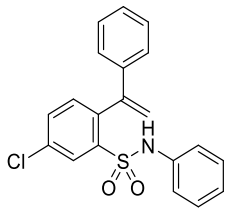
^{19}F NMR (376 MHz, $CDCl_3$) δ −112.5

IR (KBr) 3271, 1603, 1497, 1260, 1155 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{20}H_{16}FNNaO_2S$ $[M + Na]^+$ 376.0778, found 376.0772.

mp 137.0–137.8 °C.

5-Chloro-*N*-phenyl-2-(1-phenylvinyl)benzenesulfonamide (1ma)



Prepared by the general procedure B (23.5 h) from **S1m** (313 mg, 1.00 mmol), aniline (93.1 mg, 1.00 mmol) and pyridine (237 mg, 3.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 4:1) to afford the title compound as a colorless solid (363 mg, 0.98 mmol, 98%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.98 (d, J = 1.8 Hz, 1H), 7.53 (dd, J = 8.0, 1.8 Hz, 1H), 7.30–7.28 (m, 4H), 7.24–7.22 (m, 2H), 7.15 (t, J = 7.3 Hz, 2H), 7.03 (t, J = 7.3 Hz, 1H), 6.73 (d, J = 7.3 Hz, 2H), 5.92 (s, 1H), 5.87 (brs, 1H), 5.34 (s, 1H).

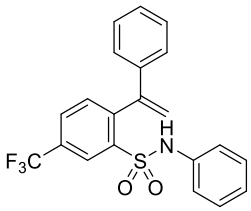
^{13}C NMR (150 MHz, $CDCl_3$) δ 145.9, 139.4, 139.2, 139.0, 136.1, 134.1, 133.0, 130.3, 129.3, 128.8, 128.6, 127.1, 124.9, 119.8, 117.6.

IR (KBr) 3262, 1497, 1418, 1341, 1159 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{20}H_{16}ClNNaO_2S$ $[M + Na]^+$ 392.0482, found 392.0478.

mp 136.8–137.2 °C.

***N*-Phenyl-2-(1-phenylvinyl)-5-(trifluoromethyl)benzenesulfonamide (1na)**



Prepared by the general procedure B (12 h) from **S1n** (602 mg, 1.74 mmol), aniline (195 mg, 2.09 mmol) and pyridine (517 mg, 5.22 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 4:1) to afford the title compound as a colorless solid (589 mg, 1.47 mmol, 84%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.20 (d, *J* = 1.2 Hz, 1H), 7.82 (dd, *J* = 7.7, 1.2 Hz, 1H), 7.53 (d, *J* = 7.7 Hz, 1H), 7.35–7.33 (m, 3H), 7.25–7.24 (m, 2H), 7.16 (t, *J* = 7.6 Hz, 2H), 7.05 (t, *J* = 7.6 Hz, 1H), 6.73 (d, *J* = 7.6 Hz, 2H), 5.95 (s, 1H), 5.66 (brs, 1H), 5.39 (s, 1H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 145.8, 144.4, 139.0, 138.8, 135.9, 133.6, 130.5 (q, $^2J_{C–F}$ = 33.2 Hz), 129.5 (q, $^3J_{C–F}$ = 2.9 Hz), 129.3, 128.9, 128.7, 127.6 (q, $^3J_{C–F}$ = 2.9 Hz), 127.0, 125.0, 123.2 (q, $^1J_{C–F}$ = 273.1 Hz), 119.8, 117.7.

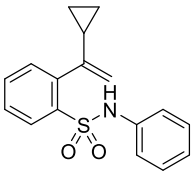
^{19}F NMR (376 MHz, $CDCl_3$) δ −63.8.

IR (KBr) 3237, 1495, 1329, 1163, 1082 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{16}F_3NNaO_2S$ $[M + Na]^+$ 426.0746, found 426.0740.

mp 151.8–152.7 °C.

2-(1-(4-Cyclopropylphenyl)vinyl)-*N*-phenylbenzenesulfonamide (1oa)



Prepared by the general procedure B (11.5 h) from **S1o** (202 mg, 0.83 mmol), aniline (93.1 mg, 1.00 mmol) and pyridine (197 mg, 2.49 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 4:1) to afford the title compound as a colorless solid (219 mg, 0.73 mmol, 88%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.00 (dd, *J* = 7.7, 1.4 Hz, 1H), 7.47 (td, *J* = 7.7, 1.4 Hz, 1H), 7.34 (td, *J* = 7.7, 1.4 Hz, 1H), 7.21–7.17 (m, 3H), 7.05–7.01 (m, 3H), 6.72 (brs, 1H), 5.22 (d, *J* = 1.0 Hz, 1H), 4.90 (d, *J* = 1.0 Hz, 1H), 1.77–1.73 (m, 1H), 0.79–0.77 (m, 2H), 0.63–0.60 (m, 2H).

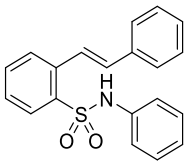
^{13}C NMR (150 MHz, $CDCl_3$) δ 151.5, 142.0, 136.9, 136.8, 132.7, 131.3, 130.1, 129.4, 127.4, 124.7, 119.7, 111.4, 18.4, 7.7.

IR (KBr) 3294, 2359, 1341, 1165, 766 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{17}H_{17}NNaO_2S$ $[M + Na]^+$ 322.0872, found 322.0885.

mp 116.1–116.7 °C.

(*E*)-*N*-Phenyl-2-styrylbenzenesulfonamide (S5)



Prepared by the general procedure B (83 h) from **S3** (548 mg, 1.97 mmol), aniline (224 mg, 2.40 mmol) and pyridine (476 mg, 6.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 4:1) to afford the title compound as a colorless solid (570 mg, 1.70 mmol, 85%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.99 (d, *J* = 16.2 Hz, 1H), 7.93 (dd, *J* = 7.9, 1.2 Hz, 1H), 7.64 (d, *J* = 7.9 Hz, 1H), 7.56 (d, *J* = 7.2 Hz, 2H), 7.51 (td, *J* = 7.9, 1.2 Hz, 1H), 7.41 (t, *J* = 7.2 Hz, 2H), 7.35 (t, *J* = 7.2 Hz, 1H), 7.31 (dd, *J* = 7.9, 1.2 Hz, 1H), 7.14 (t, *J* =7.2 Hz, 2H), 7.02 (t, *J* = 7.2 Hz, 1H), 6.97 (d, *J* = 16.2 Hz, 1H), 6.93 (d, *J* = 7.2 Hz, 2H), 6.43 (brs, 1H).

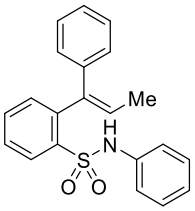
^{13}C NMR (150 MHz, $CDCl_3$) δ 137.2, 136.5, 136.11, 136.07, 134.7, 133.5, 130.3, 129.3, 129.1, 128.9, 128.5, 127.6, 127.3, 125.7, 124.9, 121.9.

IR (KBr) 3283, 1601, 1499, 1412, 1150, 924 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{20}H_{17}NNaO_2S$ $[M + Na]^+$ 358.0872, found 358.0867.

mp 134.3–134.7 °C.

(*E*)-*N*-Phenyl-2-(1-phenylprop-1-en-1-yl)benzenesulfonamide (S6)



Prepared by the general procedure B (19 h) from **S4** (216 mg, 0.74 mmol), aniline (82.3 mg, 0.88 mmol) and pyridine (175 mg, 2.21 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1) to afford the title compound as a colorless solid (197 mg, 0.56 mmol, 77%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.99 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.62 (td, *J* = 7.6, 1.4 Hz, 1H), 7.42 (td, *J* = 7.6, 1.4 Hz, 1H), 7.36 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.31–7.27 (m, 3H), 7.24–7.22 (m, 2H), 7.05 (t, *J* = 7.4 Hz, 2H), 6.95 (tt, *J* = 7.4, 1.2 Hz, 1H), 6.49 (dd, *J* = 7.4, 1.2 Hz, 2H), 6.35 (q, *J* = 7.0 Hz, 1H), 5.46 (brs, 1H), 1.63 (d, *J* = 7.0 Hz, 3H).

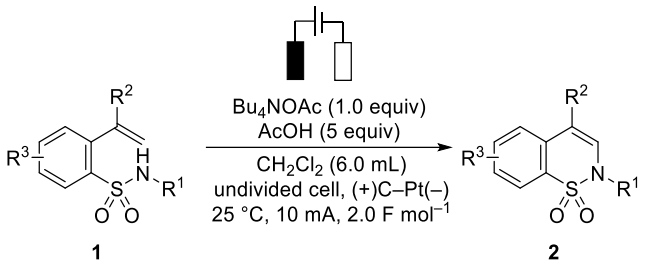
^{13}C NMR (150 MHz, $CDCl_3$) δ 140.8, 138.63, 138.59, 137.9, 136.4, 133.2, 133.0, 130.6, 128.85, 128.83, 127.9, 127.8, 127.3, 126.4, 124.0, 119.3, 16.4.

IR (KBr) 3256, 1603, 1501, 1418, 1161 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{19}NNaO_2S$ $[M + Na]^+$ 372.1029, found 372.1022.

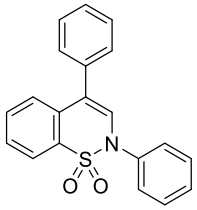
mp 123.6–124.4 °C.

General Procedure E for the Synthesis of Benzosultam Derivatives (2)



Electrochemical cyclization was carried out in a 10 mL two-necked flask equipped with a carbon rod anode, and a Pt cathode (1.0 × 1.5 cm^2). Substrate **1** (0.2 mmol), Bu_4NOAc (1.0 equiv), and AcOH (5.0 equiv) were placed in the flask equipped with a stirring bar. Then, CH_2Cl_2 (6.0 mL) was added with a syringe at room temperature. A constant current (10 mA, 2.0 F mol^{-1}, 1.07 h) was supplied at 25 °C with an oil bath. After the electrolysis, the solvent was removed by evaporation. The residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1 → 3:1) to afford compound **2**.

2,4-Diphenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2aa)[13]



Prepared by the general procedure E from **1aa** (67.1 mg, 0.20 mmol), Bu_4NOAc (61.2 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as a colorless solid (52.2 mg, 0.16 mmol, 78%).

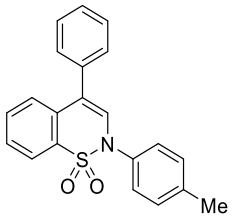
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.04 (dd, *J* = 7.6, 1.8 Hz, 1H), 7.57 (td, *J* = 7.6, 1.8 Hz, 1H), 7.54 (td, *J* = 7.6, 1.8 Hz, 1H), 7.47–7.38 (m, 11H), 6.78 (s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 137.6, 136.2, 133.6, 132.2, 131.9, 130.1, 129.7, 129.6, 129.0, 128.4, 128.3, 128.2, 127.1, 126.7, 123.0, 122.6.

IR (KBr) 3063, 1591, 1491, 1346, 1254, 1179, 1121 cm^{-1}.

The data were in good agreement with the literature.[13]

4-Phenyl-2-(*p*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ab)



Prepared by the general procedure E from **1ab** (70.3 mg, 0.20 mmol), Bu_4NOAc (61.2 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as a colorless solid (42.0 mg, 0.12 mmol, 60%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.01 (dd, *J* = 7.6, 1.8 Hz, 1H), 7.55 (td, *J* = 7.6, 1.8 Hz, 1H), 7.52 (td, *J* = 7.6, 1.8 Hz, 1H), 7.45–7.43 (m, 4H), 7.42–7.34 (m, 2H), 7.33 (d, *J* = 7.8 Hz, 2H), 7.24 (d, *J* = 7.8 Hz, 2H), 6.78 (s, 1H), 2.38 (s, 3H).

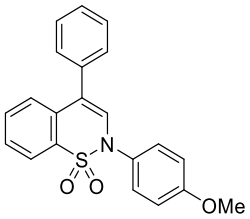
^{13}C NMR (100 MHz, $CDCl_3$) δ 138.7, 136.3, 135.0, 133.7, 132.1, 131.8, 130.4, 130.2, 129.7, 129.0, 128.2, 127.2, 126.6, 122.6, 21.6.

IR (KBr) 1508, 1354, 1265, 1180, 770 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{17}NNaO_2S$ $[M + Na]^+$ 370.0872, found 370.0867.

mp 158.7–159.7 °C.

2-(4-Methoxyphenyl)-4-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ac)



Prepared by the general procedure E from **1ac** (73.6 mg, 0.20 mmol), Bu_4NOAc (61.2 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1) to afford the title compound as a colorless solid (15.3 mg, 0.042 mmol, 21%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.03–8.01 (m, 1H), 7.58–7.50 (m, 2H), 7.45–7.35 (m, 8H), 6.96 (d, *J* = 6.3 Hz, 2H), 6.73 (s, 1H), 3.83 (s, 3H).

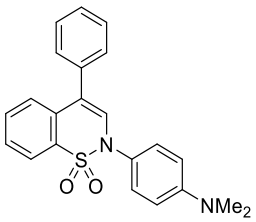
^{13}C NMR (150 MHz, $CDCl_3$) δ 159.9, 136.3, 133.8, 132.1, 131.7, 130.9, 130.1, 129.7, 129.1, 129.0, 128.2, 126.6, 122.7, 122.3, 114.8, 55.7.

IR (KBr) 1508, 1339, 1250, 1167, 775 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{17}NNaO_3S$ $[M + Na]^+$ 386.0821, found 386.0822.

mp 148.0–148.6 °C.

2-(4-(Dimethylamino)phenyl)-4-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ad)



Prepared by the general procedure E from **1ad** (74.7 mg, 0.20 mmol), Bu_4NOAc (61.8 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 3:1) to afford the title compound as a colorless solid (8.70 mg, 0.023 mmol, 12%).

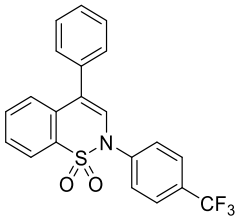
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.02 (dd, *J* = 7.3, 1.8 Hz, 1H), 7.54 (td, *J* = 7.3, 1.8 Hz, 1H), 7.51 (td, *J* = 7.3, 1.8 Hz, 1H), 7.44–7.43 (m, 4H), 7.42–7.35 (m ,2H), 7.30 (d, *J* = 8.7 Hz, 2H), 6.75 (s, 1H), 6.72 (d, *J* =8.7 Hz, 2H), 2.99 (s, 6H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 150.7, 136.6, 133.9, 132.0, 131.7, 131.5, 129.8, 128.94, 128.92, 128.01, 127.95, 126.4, 125.8, 122.7, 121.6, 112.6, 40.6.

HRMS (ESI) *m/z* calcd for $C_{22}H_{21}N_2O_2S$ $[M + H]^+$ 377.1318, found 377.1323.

mp 167.5–168.4 °C.

4-Phenyl-2-(4-(trifluoromethyl)phenyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ae)



Prepared by the general procedure E from **1ae** (80.5 mg, 0.20 mmol), Bu_4NOAc (59.2 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as a colorless solid (50.6 mg, 0.13 mmol, 63%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.03–8.00 (m, 1H), 7.71 (d, *J* = 8.5 Hz, 2H), 7.61–7.55 (m, 4H), 7.47–7.41 (m, 5H), 7.40–7.38 (m, 1H), 6.74 (s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 140.8, 135.9, 133.5, 132.5, 132.2, 129.9 (q, $^2J_{C–F}$ = 32.6 Hz), 129.6, 129.1, 128.8, 128.7, 128.5, 127.1, 126.7 (q, $^3J_{C–F}$ = 3.8 Hz), 126.6, 124.8, 123.8 (q, $^1J_{C–F}$ = 272.2 Hz), 122.7.

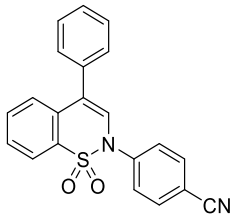
^{19}F NMR (376 MHz, $CDCl_3$) δ −63.5.

IR (KBr) 1611, 1337, 1250, 1173, 1126 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{14}F_3NNaO_2S$ $[M + Na]^+$ 424.0590, found 424.0591.

mp 133.1–133.9 °C.

4-(1,1-Dioxido-4-phenyl-2*H*-benzo[*e*][1,2]thiazin-2-yl)benzonitrile (2af)



Prepared by the general procedure E from **1af** (72.7 mg, 0.20 mmol), Bu_4NOAc (61.1 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1) to afford the title compound as a colorless solid (44.5 mg, 0.12 mmol, 62%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.01 (dd, *J* = 7.3, 2.3 Hz, 1H), 7.73 (d, *J* = 8.7 Hz, 2H), 7.62–7.57 (m, 2H), 7.54 (d, *J* = 8.7 Hz, 2H), 7.50–7.42 (m, 5H), 7.40–7.37 (m, 1H), 6.72 (s, 1H).

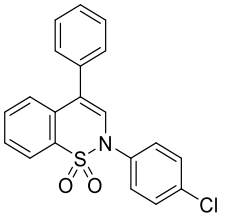
^{13}C NMR (100 MHz, $CDCl_3$) δ 141.6, 135.6, 133.37, 133.30, 132.6, 132.3, 129.6, 129.1, 128.8, 128.6, 128.0, 127.2, 126.3, 125.7, 122.7, 118.1, 111.2.

IR (KBr) 2228, 1508, 1352, 1252, 1175 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{14}N_2NaO_2S$ $[M + Na]^+$ 381.0688, found 381.0677.

mp 155.5–156.4 °C.

2-(4-Chlorophenyl)-4-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ag)



Prepared by the general procedure E from **1ag** (73.9 mg, 0.20 mmol), Bu_4NOAc (59.0 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as a colorless solid (50.0 mg, 0.14 mmol, 68%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.00 (dd, *J* = 7.8, 1.8 Hz, 1H), 7.56 (td, *J* = 7.8, 1.8 Hz, 1H), 7.54 (td, *J* = 7.8, 1.8 Hz, 1H), 7.48–7.34 (m, 10H), 6.70 (s, 1H).

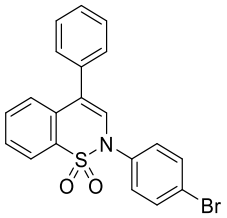
^{13}C NMR (100 MHz, $CDCl_3$) δ 136.1, 136.0, 134.3, 133.6, 132.3, 131.9, 129.7, 129.64, 129.56, 129.0, 128.45, 128.36, 128.29, 126.8, 123.7, 122.6.

IR (KBr) 1489, 1348, 1254, 1171, 831 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{20}H_{14}ClNNaO_2S$ $[M + Na]^+$ 390.0326, found 390.0327.

mp 157.0–157.9 °C.

2-(4-Bromophenyl)-4-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ah)



Prepared by the general procedure E from **1ah** (82.9 mg, 0.20 mmol), Bu_4NOAc (59.8 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as a colorless solid (51.6 mg, 0.13 mmol, 63%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.01 (dd, *J* = 7.3, 2.3 Hz, 1H), 7.59–7.52 (m, 4H), 7.48–7.39 (m, 5H), 7.38–7.36 (m, 1H), 7.31 (d, *J* = 8.7 Hz, 2H), 6.71 (s, 1H).

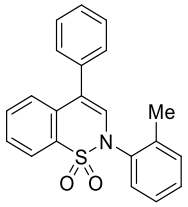
^{13}C NMR (100 MHz, $CDCl_3$) δ 136.7, 136.0, 133.6, 132.7, 132.4, 131.9, 129.7, 129.5, 129.1, 128.54, 128.48, 128.39, 126.9, 123.8, 122.6, 122.3.

IR (KBr) 1489, 1346, 1254, 1184, 1121, 1015 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{20}H_{14}BrNNaO_2S$ $[M + Na]^+$ 433.9821, found 433.9829.

mp 161.5–162.2 °C.

4-Phenyl-2-(*o*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ai)



Prepared by the general procedure E from **1ai** (70.1 mg, 0.20 mmol), Bu_4NOAc (61.4 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as a colorless solid (40.9 mg, 0.12 mmol, 59%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.03 (dd, *J* = 7.3, 1.8 Hz, 1H), 7.56 (td, *J* = 7.3, 1.8 Hz, 1H), 7.53 (td, *J* = 7.3, 1.8 Hz, 1H), 7.45–7.37 (m, 7H), 7.36–7.35 (m, 2H), 7.29–7.24 (m, 1H), 6.65 (s, 1H), 2.29 (s, 3H).

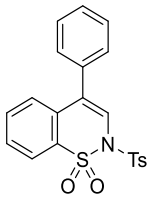
^{13}C NMR (100 MHz, $CDCl_3$) δ 138.0, 136.33, 136.25, 133.7, 132.1, 132.0, 131.6, 130.9, 130.1, 129.8, 129.7, 129.0, 128.1, 127.2, 126.6, 122.4, 122.3, 18.2.

IR (KBr) 3065, 1325, 1248, 1165, 775 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{17}NNaO_2S$ $[M + Na]^+$ 370.0872, found 370.0870.

mp 161.2–161.9 °C.

4-Phenyl-2-tosyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2aj)



Prepared by the general procedure E from **1aj** (82.8 mg, 0.20 mmol), Bu_4NOAc (60.3 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1 → 2:1) to afford the title compound as colorless oil (57.3 mg, 0.14 mmol, 70%).

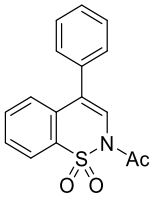
^{1}H NMR (600 MHz, $CDCl_3$) δ 7.83 (d, *J* = 8.7 Hz, 2H), 7.81 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.51–7.42 (m, 7H), 7.22–7.19 (m, 3H), 7.18 (s, 1H), 2.35 (s, 3H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 145.9, 135.38, 133.35, 134.3, 132.9, 132.7, 129.8, 129.5, 129.1, 129.04, 129.00, 128.9, 128.3, 127.8, 124.2, 123.1, 21.8.

IR (neat) 3028, 1593, 1472, 1393, 1173, 1088 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{17}NNaO_4S_2$ $[M + Na]^+$ 434.0491, found 434.0492.

1-(1,1-Dioxido-4-phenyl-2*H*-benzo[*e*][1,2]thiazin-2-yl)ethan-1-one (2ak)



Prepared by the general procedure E from **1ak** (70.1 mg, 0.20 mmol), Bu_4NOAc (61.4 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as a colorless solid (40.9 mg, 0.12 mmol, 59%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.08 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.60 (td, *J* = 7.8, 1.4 Hz, 1H), 7.57 (td, *J* = 7.8, 1.4 Hz, 1H), 7.48–7.42 (m, 5H), 7.331 (dd, *J* = 7.8, 1.4 Hz, 1H), 7.328 (s, 1H), 2.74 (s, 3H).

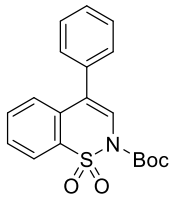
^{13}C NMR (150 MHz, $CDCl_3$) δ 167.6, 135.7, 134.0, 133.5, 133.3, 129.6, 129.0, 128.73, 128.67, 127.5, 125.6, 124.2, 123.4, 26.0.

IR (KBr) 1716, 1354, 1244, 1170, 772 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{16}H_{13}NNaO_3S$ $[M + Na]^+$ 322.0508, found 322.0512.

mp 117.8–118.2 °C.

***tert*-Butyl 4-Phenyl -2*H*-benzo[*e*][1,2]thiazine-2-carboxylate 1,1-Dioxide (2al)**



Prepared by the general procedure E from **1al** (72.5 mg, 0.20 mmol), Bu_4NOAc (58.6 mg, 0.19 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as a colorless solid (16.1 mg, 0.045 mmol, 22%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.10–8.07 (m, 1H), 7.55 (td, *J* = 7.3, 1.8 Hz, 1H), 7.52 (td, *J* = 7.3, 1.8 Hz, 1H), 7.48–7.40 (m, 5H), 7.29–7.27 (m, 1H), 7.11 (s, 1H), 1.63 (s, 9H).

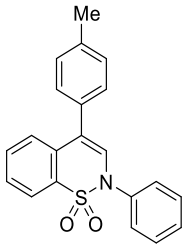
^{13}C NMR (100 MHz, $CDCl_3$) δ 149.0, 135.9, 133.9, 133.2, 132.9, 129.7, 129.0, 128.5, 128.4, 127.0, 125.6, 123.8, 123.0, 86.7, 28.1.

IR (KBr) 1744, 1356, 1287, 1140, 750 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{19}H_{19}NNaO_4S$ $[M + Na]^+$ 380.0927, found 380.0931.

mp 126.2–126.9 °C.

2-Phenyl-4-(*p*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ba)



Prepared by the general procedure E from **1ba** (70.8 mg, 0.20 mmol), Bu_4NOAc (60.5 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as a colorless solid (42.9 mg, 0.12 mmol, 61%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.01 (dd, *J* = 7.3, 1.8 Hz, 1H), 7.54 (td, *J* = 7.3, 1.8 Hz, 1H), 7.52 (td, *J* = 7.3, 1.8 Hz, 1H), 7.44–7.43 (m, 4H), 7.40–7.35 (m, 2H), 7.33 (d, *J* = 8.2 Hz, 2H), 7.25 (d, *J* = 8.2 Hz, 2H), 6.73 (s, 1H), 2.41 (s, 3H).

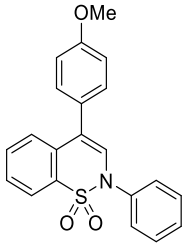
^{13}C NMR (100 MHz, $CDCl_3$) δ 138.0, 137.7, 133.8, 133.2, 132.1, 131.9, 129.8, 129.6, 129.5, 128.3, 128.2, 127.1, 126.7, 123.1, 122.6, 21.3.

IR (KBr) 1587, 1508, 1350, 1182, 1121 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{17}NNaO_2S$ $[M + Na]^+$ 370.0872, found 370.0880.

mp 143.8–144.4 °C.

4-(4-Methoxyphenyl)-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ca)



Prepared by the general procedure E from **1ca** (73.1 mg, 0.20 mmol), Bu_4NOAc (59.8 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1) to afford the title compound as a colorless solid (42.4 mg, 0.12 mmol, 59%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.02 (dd, *J* = 7.6, 1.7 Hz, 1H), 7.56 (td, *J* = 7.6, 1.7 Hz, 1H), 7.54 (td, *J* = 7.6, 1.7 Hz, 1H), 7.47–7.43 (m, 4H), 7.40–7.36 (m, 4H), 6.98 (d, *J* = 9.0 Hz, 2H), 6.73 (s, 1H), 3.86 (s, 3H).

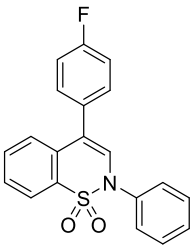
^{13}C NMR (150 MHz, $CDCl_3$) δ 159.6, 137.7, 134.0, 132.2, 132.0, 130.9, 129.7, 129.6, 128.5, 128.4, 128.2, 127.1, 126.8, 122.9, 122.6, 114.4, 55.5.

IR (KBr) 1609, 1510, 1346, 1250, 1171 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{17}NNaO_3S$ $[M + Na]^+$ 386.0821, found 386.0825.

mp 135.4–136.3 °C.

4-(4-Fluorophenyl)-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2da)



Prepared by the general procedure E from **1da** (70.3 mg, 0.20 mmol), Bu_4NOAc (61.3 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as a colorless solid (53.9 mg, 0.15 mmol, 77%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.02 (dd, *J* = 7.3, 1.8 Hz, 1H), 7.57 (td, *J* = 7.3, 1.8 Hz, 1H), 7.54 (td, *J* = 7.3, 1.8 Hz, 1H), 7.48–7.36 (m, 7H), 7.32 (dd, *J* = 7.3, 1.8 Hz, 1H), 7.14 (dd, *J* = 8.5 Hz, $^3J_{C–F}$ = 8.5 Hz, 2H), 6.74 (s, 1H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 162.7 (d, $^1J_{C–F}$ = 247.3 Hz), 137.6, 133.6, 132.3, 132.2 (d, $^4J_{C–F}$ = 2.9 Hz), 131.9, 131.4 (d, $^3J_{C–F}$ = 8.6 Hz), 130.3, 129.6, 128.5, 128.4, 127.1, 126.5, 122.7, 122.0, 116.0 (d, $^2J_{C–F}$ = 21.1 Hz).

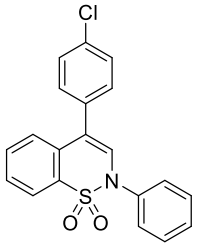
^{19}F NMR (376 MHz, $CDCl_3$) δ −114.6.

IR (KBr) 1601, 1508, 1352, 1182, 854 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{20}H_{14}FNNaO_2S$ $[M + Na]^+$ 374.0621, found 374.0624.

mp 105.5–106.5 °C.

4-(4-Chlorophenyl)-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ea)



Prepared by the general procedure E from **1ea** (75.2 mg, 0.20 mmol), Bu_4NOAc (58.8 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as a colorless solid (59.1 mg, 0.16 mmol, 79%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.02 (dd, *J* = 7.3, 1.8 Hz, 1H), 7.57 (td, *J* = 7.3, 1.8 Hz, 1H), 7.54 (td, *J* = 7.3, 1.8 Hz, 1H), 7.47–7.36 (m, 9H), 7.32 (dd, *J* = 7.3, 1.8 Hz, 1H), 6.75 (s, 1H).

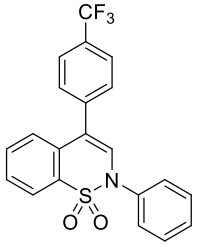
^{13}C NMR (100 MHz, $CDCl_3$) δ 137.5, 134.7, 134. 2, 133.3, 132.3, 131.9, 131.0, 130.3, 129.6, 129.2, 128.5, 128.4, 127.1, 126.4, 122.7, 121.8.

IR (KBr) 1541, 1336, 1182, 1121, 764 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{20}H_{14}ClNNaO_2S$ $[M + Na]^+$ 390.0326, found 390.0326.

mp 121.6–122.3 °C.

2-Phenyl-4-(4-(trifluoromethyl)phenyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2fa)



Prepared by the general procedure E from **1fa** (81.3 mg, 0.20 mmol), Bu_4NOAc (60.9 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as colorless oil (39.2 mg, 0.098 mmol, 48%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.04 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.72 (d, *J* = 7.9 Hz, 2H), 7.61–7.56 (m, 4H), 7.48–7.44 (m, 4H), 7.43–7.40 (m, 1H), 7.32 (dd, *J* = 7.6, 1.4 Hz, 1H), 6.80 (s, 1H).

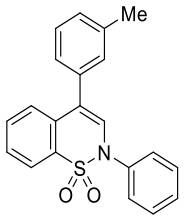
^{13}C NMR (150 MHz, $CDCl_3$) δ 140.0, 137.4, 133.0, 132.4, 131.9, 130.9, 130.3 (q, $^2J_{C–F}$ = 33.2 Hz), 130.1, 129.7, 128.7, 128.6, 127.3, 126.3, 126.0 (q, $^3J_{C–F}$ = 4.3 Hz), 124.2 (q, $^1J_{C–F}$ = 271.7 Hz), 122.8, 121.5.

^{19}F NMR (376 MHz, $CDCl_3$) δ −63.5.

IR (neat) 2725, 1541, 1323, 1167, 1123 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{14}F_3NNaO_2S$ $[M + Na]^+$ 424.0590, found 424.0598.

2-Phenyl-4-(*m*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ga)



Prepared by the general procedure E from **1ga** (70.1 mg, 0.20 mmol), Bu_4NOAc (61.5 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as a colorless solid (45.9 mg, 0.13 mmol, 66%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.02 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.56 (td, *J* = 7.6, 1.4 Hz, 1H), 7.53 (td, *J* = 7.6, 1.4 Hz, 1H), 7.46–7.44 (m, 4H), 7.40–7.36 (m, 2H), 7.33 (t, *J* = 7.6 Hz, 1H), 7.26 (s, 1H), 7.25 (d, *J* = 7.6 Hz, 1H), 7.22 (d, *J* = 7.6 Hz, 1H), 6.75 (s, 1H), 2.40 (s, 3H).

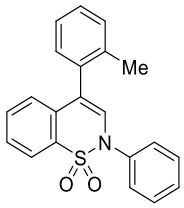
^{13}C NMR (100 MHz, $CDCl_3$) δ 138.7, 137.7, 136.1, 133.8, 132.2, 131.9, 130.3, 130.0, 129.6, 129.0, 128.8, 128.4, 128.2, 127.1, 126.8, 126.7, 123.2, 122.6, 21.5.

IR (KBr) 2355, 1333, 1254, 1175, 935 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{17}NNaO_2S$ $[M + Na]^+$ 370.0872, found 370.0880.

mp 143.8–144.4 °C.

2-Phenyl-4-(*o*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ha)



Prepared by the general procedure E from **1ha** (69.8 mg, 0.20 mmol), Bu_4NOAc (61.8 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as a colorless solid (67.0 mg, 0.19 mmol, 97%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.02–7.99 (m, 1H), 7.52 (td, *J* = 7.3, 0.9 Hz, 1H), 7.50 (td, *J* = 7.3, 0.9 Hz, 1H), 7.45–7.42 (m, 4H), 7.40–7.26 (m, 5H), 7.03–6.98 (m, 1H), 6.66 (s, 1H), 2.19 (s, 3H).

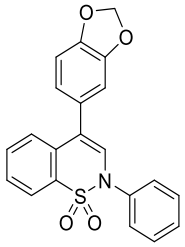
^{13}C NMR (100 MHz, $CDCl_3$) δ 138.3, 137.7, 135.4, 133.9, 132.3, 131.5, 130.7, 130.5, 130.3, 129.5, 128.7, 128.3, 128.2, 127.0, 126.33, 126.29, 122.6, 122.5, 20.2.

IR (neat) 3063, 1589, 1337, 1177, 772 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{17}NNaO_2S$ $[M + Na]^+$ 370.0872, found 370.0872.

mp 131.5–131.6 °C.

4-(Benzo[*d*][1,3]dioxol-5-yl)-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ia)



Prepared by the general procedure E from **1ia** (75.0 mg, 0.20 mmol), Bu_4NOAc (61.8 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1) to afford the title compound as a colorless solid (32.2 mg, 0.085 mmol, 43%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.00 (dd, *J* = 7.6, 1.4 Hz, 1H), 7.57 (td, *J* = 7.6, 1.4 Hz, 1H), 7.53 (td, *J* = 7.6, 1.4 Hz, 1H), 7.46–7.37 (m, 6H), 6.92 (dd, *J* = 6.2, 2.1 Hz, 1H), 6.91 (s, 1H), 6.88 (dd, *J* = 6.2, 2.1 Hz, 1H), 6.73 (s, 1H), 6.01 (s, 2H).

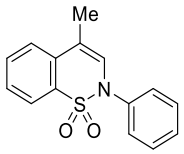
^{13}C NMR (150 MHz, $CDCl_3$) δ 148.1, 147.7, 137.6, 133.8, 132.2, 131.9, 130.0, 129.9, 129.6, 128.4, 128.3, 127.1, 126.7, 123.2, 122.8, 122.6, 110.2, 108.8, 101.5.

IR (KBr) 1587, 1491, 1348, 1234, 1182, 1040 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{15}NNaO_4S$ $[M + Na]^+$ 400.0614, found 400.0608.

mp 168.0–168.4 °C.

4-Methyl-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ja)



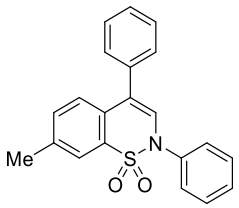
Prepared by the general procedure E from **1ja** (55.1 mg, 0.20 mmol), Bu_4NOAc (60.5 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1). The obtained oil was further purified by GPC ($CHCl_3$) to afford the title compound as brown oil (8.00 mg, 0.030 mmol, 15%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.96 (dd, *J* = 7.7, 1.2 Hz, 1H), 7.68 (td, *J* = 7.7, 1.2 Hz, 1H), 7.59 (d, *J* = 7.7 Hz, 1H), 7.54 (td, *J* = 7.7, 1.2 Hz, 1H), 7.44–7.40 (m, 2H), 7.36–7.34 (m, 3H), 6.57 (q, *J* = 1.4 Hz, 1H), 2.28 (d, *J* = 1.4 Hz, 3H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 137.8, 134.1, 132.4, 131.9, 129.4, 128.7, 128.13, 128.08, 126.8, 124.5, 122.6, 116.0, 16.5.

HRMS (ESI) *m/z* calcd for $C_{15}H_{13}NNaO_2S$ $[M + Na]^+$ 294.0559, found 294.0564.

7-Methyl-2,4-diphenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ka)



Prepared by the general procedure E from **1ka** (69.8 mg, 0.20 mmol), Bu_4NOAc (60.6 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as yellow oil (41.0 mg, 0.12 mmol, 59%).

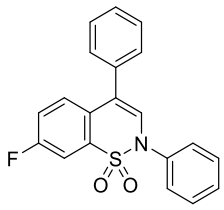
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83 (brs, 1H), 7.45–7.44 (m, 8H), 7.42–7.35 (m, 3H), 7.26 (d, J = 9.1 Hz, 1H), 6.70 (s, 1H), 2.46 (s, 3H).

^{13}C NMR (100 MHz, $CDCl_3$) δ 138.9, 137.8, 136.4, 133.2, 131.9, 131.0, 129.6, 129.5, 129.3, 128.9, 128.1, 127.1, 126.7, 126.7, 123.2, 122.5, 21.4.

IR (neat) 3063, 1487, 1337, 1167, 760 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{17}NNaO_2S$ $[M + Na]^+$ 370.0872, found 370.0870.

7-Fluoro-2,4-diphenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2la)



Prepared by the general procedure E from **1la** (71.0 mg, 0.20 mmol), Bu_4NOAc (61.0 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as colorless oil (42.2 mg, 0.12 mmol, 60%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.71 (dd, J = 2.7 Hz, $^3J_{H–F}$ =7.6 Hz, 1H), 7.48–7.36 (m, 11H), 7.27 (td, J = 8.8 Hz, $^4J_{H–F}$ = 3.1 Hz, 1H), 6.72 (s, 1H).

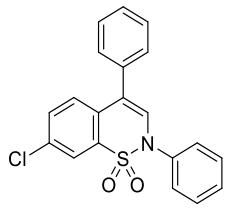
^{13}C NMR (100 MHz, $CDCl_3$) δ 161.8 (d, $^1J_{C–F}$ = 253.0 Hz), 137.4, 136.0, 133.1 (d, $^3J_{C–F}$ = 6.7 Hz), 130.1 (d, $^4J_{C–F}$ = 3.8 Hz), 129.7, 129.6, 129.30, 129.25 (d, $^3J_{C–F}$ = 4.8 Hz), 129.1, 128.6, 128.4, 127.2, 123.0, 120.0 (d, $^2J_{C–F}$ = 22.0 Hz), 109.7 (d, $^2J_{C–F}$ = 24.9 Hz).

^{19}F NMR (376 MHz, $CDCl_3$) δ −110.7.

IR (neat) 3061, 1337, 1167, 916, 772 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{20}H_{14}FNNaO_2S$ $[M + Na]^+$ 374.0621, found 374.0622.

7-Chloro-2,4-diphenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ma)



Prepared by the general procedure E from **1ma** (74.5 mg, 0.20 mmol), Bu_4NOAc (60.0 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as a colorless solid (41.6 mg, 0.11 mmol, 56%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.99 (d, J = 1.8 Hz, 1H), 7.51–7.38 (m, 11H), 7.32 (d, J = 8.7 Hz, 1H), 6.76 (s, 1H).

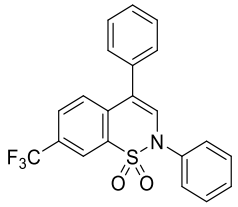
^{13}C NMR (150 MHz, $CDCl_3$) δ 137.3, 135.7, 134.0, 132.7, 132.4, 132.1, 130.2, 129.7, 129.6, 129.1, 128.7, 128.5, 128.3, 127.2, 122.7, 122.6.

IR (KBr) 1489, 1348, 1242, 1171, 758 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{20}H_{14}ClNNaO_2S$ $[M + Na]^+$ 390.0326, found 390.0329.

mp 119.2–120.1 °C.

2,4-Diphenyl-7-(trifluoromethylphenyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2na)



Prepared by the general procedure E from **1na** (80.4 mg, 0.20 mmol), Bu_4NOAc (59.8 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1) to afford the title compound as pale yellow oil (37.8 mg, 0.094 mmol, 47%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.29 (s, 1H), 7.78 (dd, J = 8.7, 1.4 Hz, 1H), 7.51 (d, J = 8.7 Hz, 1H), 7.49–7.41 (m, 10H), 6.89 (s, 1H).

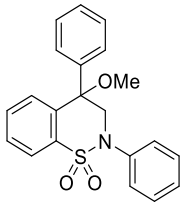
^{13}C NMR (150 MHz, $CDCl_3$) δ 137.1, 136.9, 135.5, 132.2, 131.7, 130.2 (q, $^2J_{C–F}$ = 33.2 Hz), 129.8, 129.6, 129.2, 129.0, 128.7 (q, $^4J_{C–F}$ = 2.9 Hz), 128.6, 127.4, 127.3, 123.4 (q, $^1J_{C–F}$ = 273.1 Hz), 122.3, 120.5 (q, $^2J_{C–F}$ = 4.3 Hz).

^{19}F NMR (376 MHz, $CDCl_3$) δ −63.5.

IR (neat) 2773, 2041, 1506, 1219, 772 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{14}F_3NNaO_2S$ $[M + Na]^+$ 424.0590, found 424.0582.

4-Methoxy-2,4-diphenyl-3,4-dihydro-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2aa-OMe)



Colorless oil.

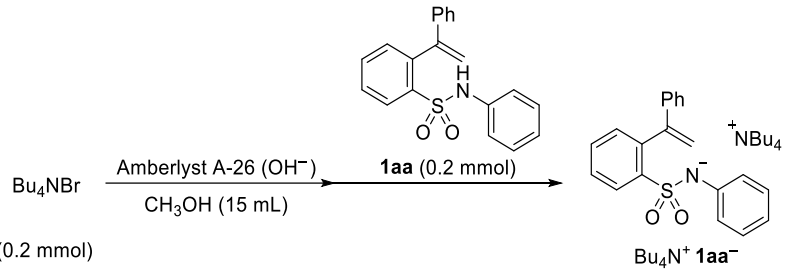
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.05–8.02 (m, 1H), 7.57–7.53 (m, 2H), 7.40–7.38 (m, 2H), 7.37–7.32 (m, 4H), 7.31–7.28 (m, 4H), 7.25–7.22 (m, 1H), 4.40 (d, *J* = 12.1 Hz, 1H), 4.31 (d, *J* = 12.1 Hz, 1H), 3.33 (s, 3H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 143.7, 139.8, 139.0, 137.1, 132.5, 130.9, 129.5, 129.3, 128.4, 128.00, 127.96, 127.5, 126.9, 123.3, 78.7, 61.2, 52.9.

IR (neat) 2936, 1493, 1323, 1167, 899, 752 cm^{-1}.

HRMS (ESI) *m/z* calcd for $C_{21}H_{19}NNaO_3S$ $[M + Na]^+$ 388.0978, found 388.0983.

Tetrabutylammonium Phenyl((2-(1-phenylvinyl)phenyl)sulfonyl)amide (Bu_4N^+ 1aa$^-$)



Prepared by the following procedure which was reported by Ooi and his co-workers.[17] A CH_3OH solution (15 mL) of tetrabutylammonium bromide (64.0 mg, 0.20 mmol) was passed through a column of ion-exchange resin Amberlyst A-26 ($^-$OH form) to yield a solution of tetrabutylammonium hydroxide. To the solution was added sulfonamide **1aa** (67.0 mg, 0.20 mmol) at room temperature. After being stirred at that temperature for 30 min, the solvent was removed under reduced pressure, and the residue was co-evaporated with acetonitrile. Drying under vacuum afforded the title compound as a colorless solid.

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.17 (dd, *J* = 6.2, 3.1 Hz, 1H), 7.32 (dd, *J* = 8.1, 1.2 Hz, 2H), 7.23 (t, *J* = 3.1 Hz, 1H), 7.22 (t, *J* = 3.1 Hz, 1H), 7.16 (t, *J* = 6.9 Hz, 2H), 7.12 (tt, *J* = 6.9, 2.4 Hz, 1H), 7.05 (dd, *J* = 6.2, 3.1 Hz, 1H), 6.92 (td, *J* = 8.1, 1.2 Hz, 2H), 6.85 (dd, *J* = 6.9, 1.0 Hz, 2H), 6.50 (tt, *J* = 8.1, 1.2 Hz, 1H), 5.84 (d, *J* = 1.0 Hz, 1H), 5.45 (d, *J* = 1.0 Hz, 1H), 3.11–3.07 (m, 8H), 1.49–1.42 (m, 8H), 1.30 (sext, *J* = 7.4 Hz, 8H), 0.91 (t, *J* = 7.4 Hz, 12H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 150.9, 147.4, 145.7, 141.9, 140.5, 131.5, 129.4, 128.7, 128.2, 127.6, 127.4, 126.8, 126.5, 121.2, 116.2, 115.5, 58.7, 24.1, 19.8, 13.8.

IR (KBr) 2959, 2365, 1491, 1298, 1225, 1113 cm^{-1}.

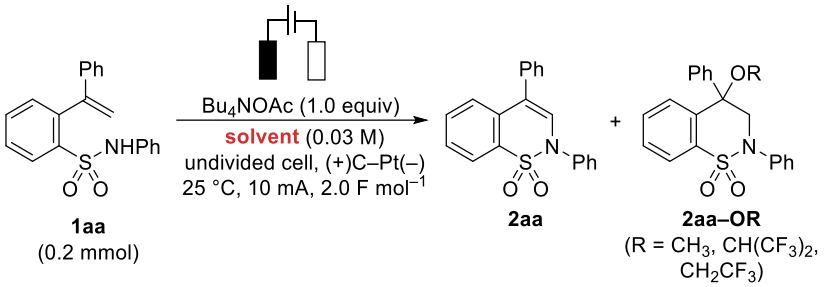
HRMS (ESI) *m/z* calcd for $C_{16}H_{36}N$ [M] 242.2848, found 242.2844.

m/z calcd for $C_{20}H_{16}NO_2S$ $[M - H]^-$ 334.0907, found 334.0893.

mp 93.7–94.4 °C.

3. Optimization of Reaction Conditions

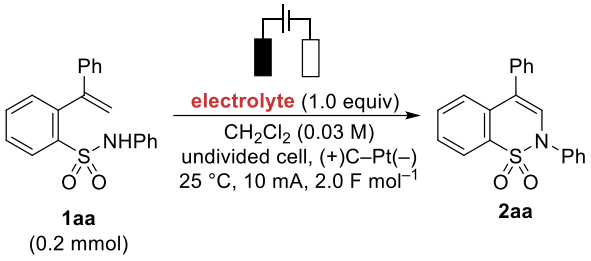
Table S1. Effects of solvent



entry	**solvent**	**2aa** (%)[a]	**2aa-OR** (%)[a]	recov of **1aa** (%)[a]
1	CH_3OH	36	58	12
2	HFIP	27	N.D.[b]	37
3	TFE	2	N.D.	75
4	CH_3CN	49	N.D.	N.D.
5	CH_2Cl_2	50	N.D.	18

Reaction conditions: **1aa** (0.2 mmol), Bu_4NOAc (0.2 mmol), solvent (0.03 M), 25 °C, constant current electrolysis, 10 mA, 2.0 F mol^{-1}. [a] Determined by ^1H NMR with 1,1,2,2-tetrachloroethane as an internal standard. [b] Not Detected.; HFIP = 1,1,1,3,3,3-hexafluoropropan-2-ol, TFE = 2,2,2-trifluoroethanol.

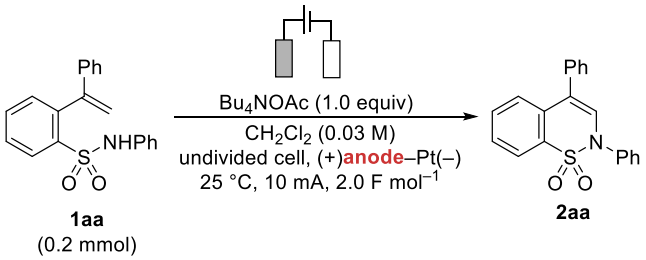
Table S2. Screening of supporting electrolytes



entry	**electrolyte**	**2aa** (%)[a]	recov of **1aa** (%)[a]
1	Bu_4NOAc	50	18
2	Bu_4NOTf	27	26
3	Bu_4NClO_4	N.D.[b]	11
4	Bu_4NBF_4	N.D.	22
5	Bu_4NPF_6	8	10
6	Bu_4NBr	4	14

Reaction conditions: **1aa** (0.2 mmol), electrolyte (0.2 mmol), CH_2Cl_2 (0.03 M), 25 °C, constant current electrolysis, 10 mA, 2.0 F mol^{-1}. [a] Determined by ^1H NMR with 1,1,2,2-tetrachloroethane as an internal standard. [b] Not Detected.

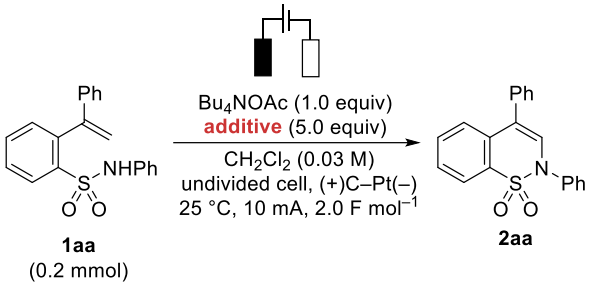
Table S3. Screening of anode materials



entry	**anode**	**2aa** (%)[a]	recov of **1aa** (%)[a]
1	carbon rod	50	18
2	RVC	8	28
3	GC	N.D.[b]	92
4	Pt plate	N.D.	47

Reaction conditions: **1aa** (0.2 mmol), Bu_4NOAc (0.2 mmol), CH_2Cl_2 (0.03 M), 25 °C, constant current electrolysis, 10 mA, 2.0 F mol^{-1}. [a] Determined by ^1H NMR with 1,1,2,2-tetrachloroethane as an internal standard. [b] Not Detected; RVC = reticulated vitreous carbon, GC = glassy carbon.

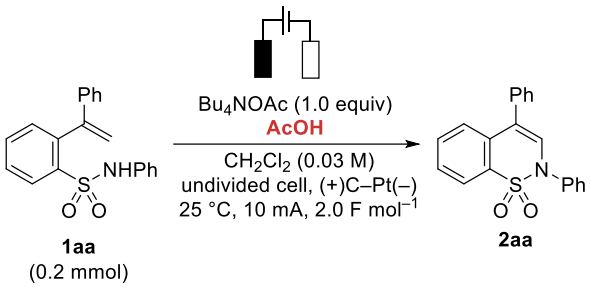
Table S4. Screening of additives as sacrificial reagents



entry	**additive**	**2aa** (%)[a]	recov of **1aa** (%)[a]
1	—	50	18
2	CH_3OH	65	7
3	^tBuOH	46	trace
4	HFIP	77	7
5	TFE	68	6
6	AcOH	83 (78)[b]	7

Reaction conditions: **1aa** (0.2 mmol), Bu_4NOAc (0.2 mmol), additive (1.0 mmol), CH_2Cl_2 (0.03 M), 25 °C, constant current electrolysis, 10 mA, 2.0 F mol^{-1}. [a] Determined by ^1H NMR with 1,1,2,2-tetrachloroethane as an internal standard. [b] Isolated yield.

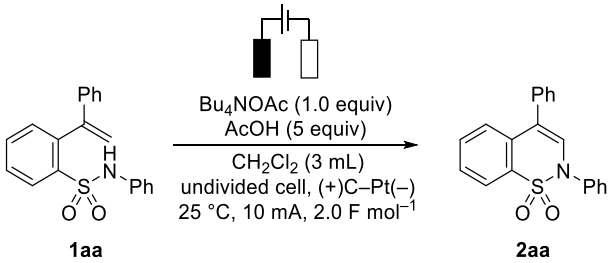
Table S5. Screening of amounts of AcOH



entry	**AcOH** (equiv)	**2aa** (%)[a]	recov of **1aa** (%)[a]
1	5	83 (78)[b]	7
2	7	70	7
3	10	64	18
4	20	57	37

Reaction conditions: **1aa** (0.2 mmol), Bu_4NOAc (0.2 mmol), additive, CH_2Cl_2 (0.03 M), 25 °C, constant current electrolysis, 10 mA, 2.0 F mol^{-1}. [a] Determined by ^1H NMR with 1,1,2,2-tetrachloroethane as an internal standard. [b] Isolated yield.

1 mmol Synthesis of Benzosultam 2aa

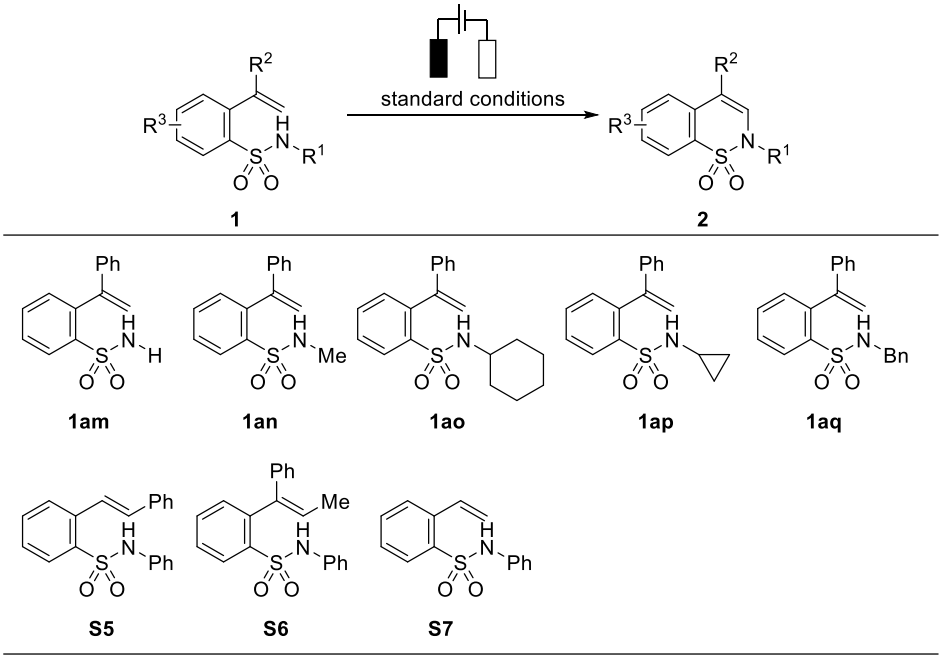


Electrochemical cyclization was carried out in a 50 mL two-necked flask equipped with a carbon rod anode, and a Pt cathode (1.0 × 1.5 cm^2). Substrate **1aa** (336 mg, 1.00 mmol), Bu_4NOAc (302 mg, 1.00 mmol), and AcOH (286μL, 5.00 mmol) were placed in the flask equipped with a stirring bar. Then, CH_2Cl_2 (30 mL) was added with a syringe at room temperature. A constant current (10 mA, 2.0 F mol^{-1}, 5.37 h) was supplied at 25 °C with an oil bath. After the electrolysis, the solvent was removed by evaporation. The residue was purified by column chromatography on silica gel (hexane/EtOAc 7:1 → 3:1) to afford compound **2aa** as a colorless solid (262 mg, 0.78 mmol, 78%).

Unsuccessful Substrates

The following Table S6 lists the sulfonamides that were unsuccessfully tested. The reactions were carried out according to General Procedure E and gave several complex mixtures or recovery of starting materials.

Table S6. Unsuccessful substrates



4. Spectroscopic Experiments

^{1}H NMR Analysis of 1:1 mixture between 1aa and Bu_4NOAc in CD_2Cl_2

The ^{1}H NMR analyses of CD_2Cl_2 solution of AcOH, Bu_4NOAc, **1aa**, and 1:1 mixture of **1aa** and Bu_4NOAc (0.026 M) were carried out. ^{1}H NMR spectra of each sample were recorded at 298 K. TMS (δ.0.00 ppm), which was added, was used as an internal standard.

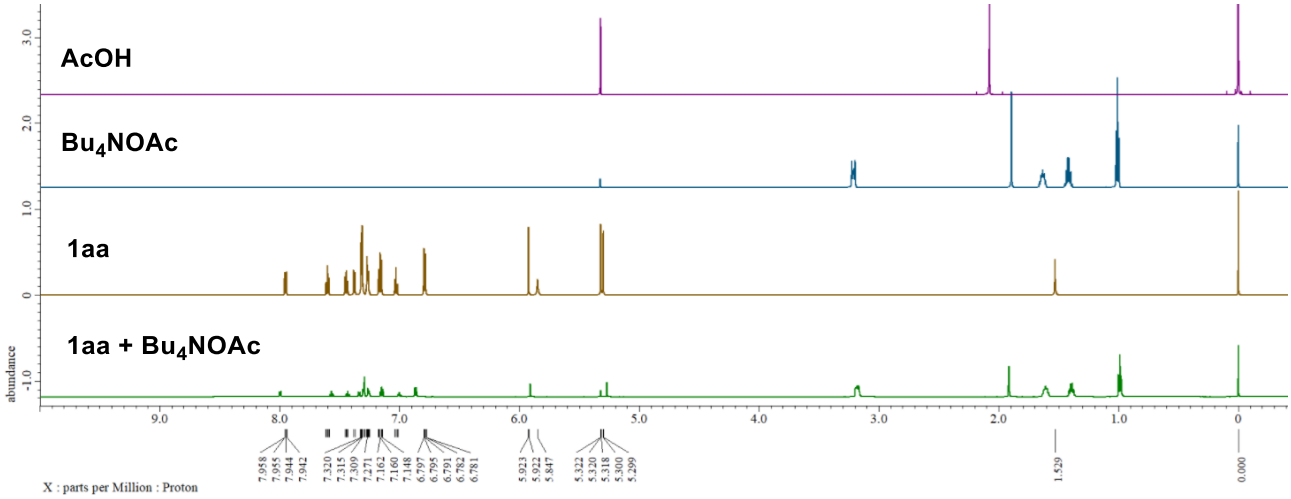


Figure S1. ^{1}H NMR spectra of AcOH, Bu_4NOAc, **1aa**, and 1:1 mixture of **1aa** and Bu_4NOAc (600 MHz, CD_2Cl_2)

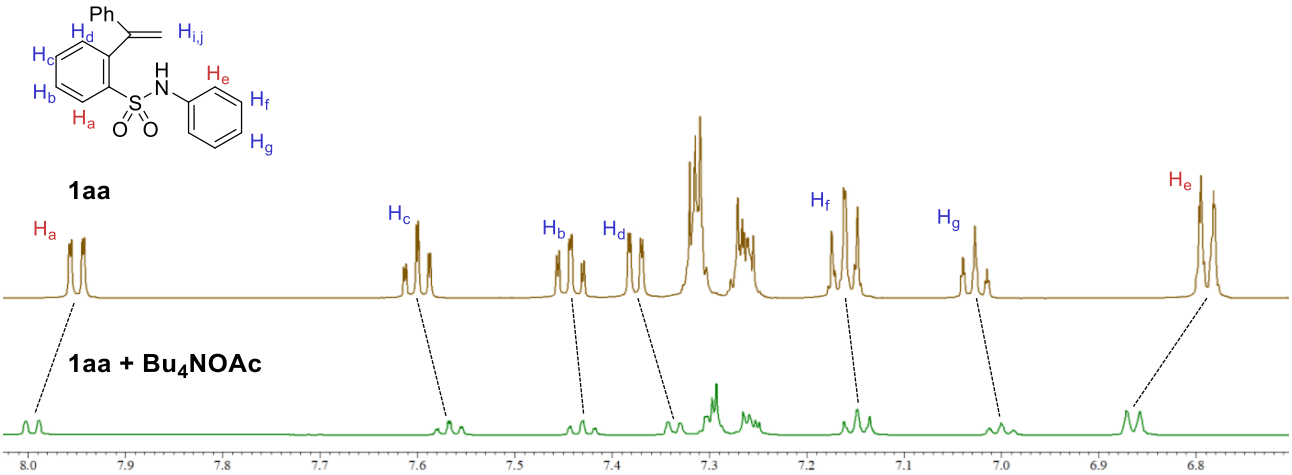


Figure S2. ^{1}H NMR spectra from 8.0 ppm to 6.7 ppm (600 MHz, CD_2Cl_2); (Top) **1aa**, (Bottom) 1:1 mixture of **1aa** and Bu_4NOAc.

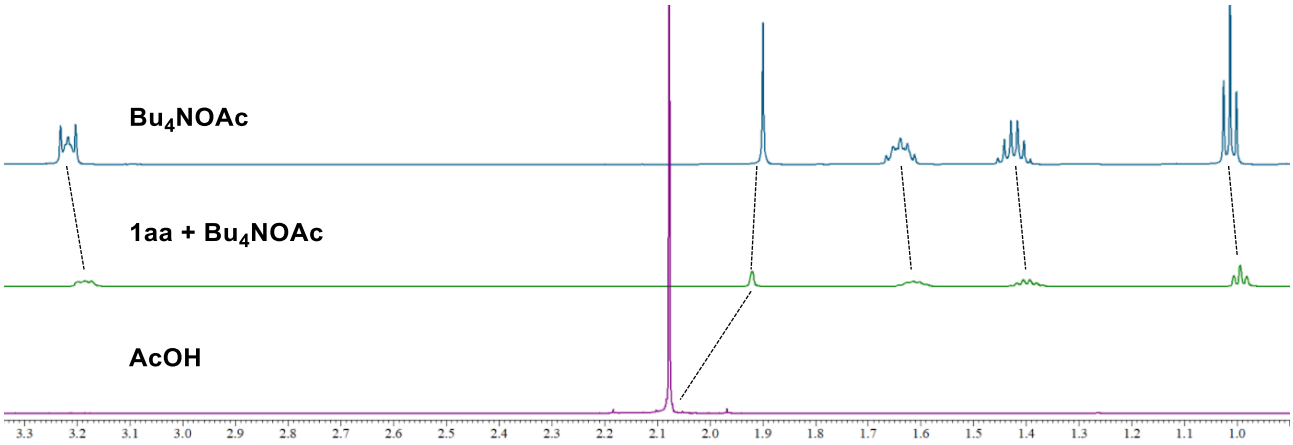


Figure S3. ^{1}H NMR spectra from 3.3 ppm to 0.9 ppm (600 MHz, CD_2Cl_2); (Top) Bu_4NOAc, (Center) 1:1 mixture of **1aa** and Bu_4NOAc, (Bottom) AcOH.

The peaks corresponding to H_a, H_e and an amide proton of **1aa** showed downfield shifts in the presence of Bu_4NOAc (Figures S1 and S2). The peaks of other protons of **1aa** (H_b, H_c, H_d, H_g) showed only slightly upfield shift. The upfield shifts of the signals that derived from tetrabutylammonium were observed with **1aa** (Figure S3). The chemical shift of methyl proton of acetate in the mixture was 0.02 ppm downfield in comparison with that of Bu_4NOAc, and 0.16 ppm lower than that of AcOH. These ^{1}H NMR measurements indicate that the 1:1 complex would form between **1aa** and Bu_4NOAc.

^{13}C NMR Analysis of 1:1 mixture between 1aa and Bu_4NOAc in CD_2Cl_2

The ^{13}C NMR analysis of CD_2Cl_2 solution of same samples (0.026 M) were also carried out. ^{13}C NMR spectra of each sample were recorded at 298 K. Chemical shifts for ^{13}C NMR are expressed in ppm relative to CD_2Cl_2 (δ 53.84 ppm).

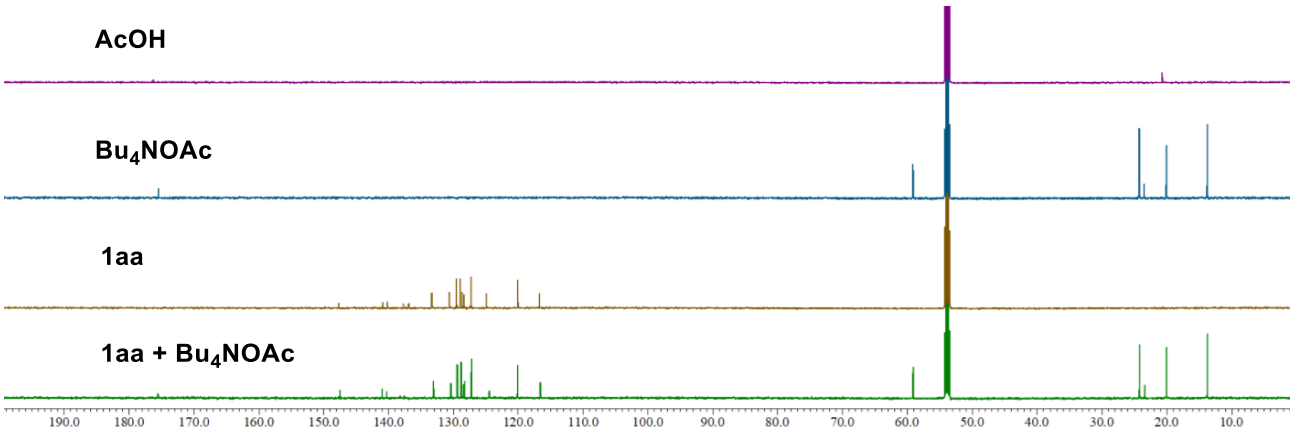


Figure S4. ^{13}C NMR spectra of AcOH, Bu_4NOAc, **1aa**, and 1:1 mixture of **1aa** and Bu_4NOAc (150 MHz, CD_2Cl_2)

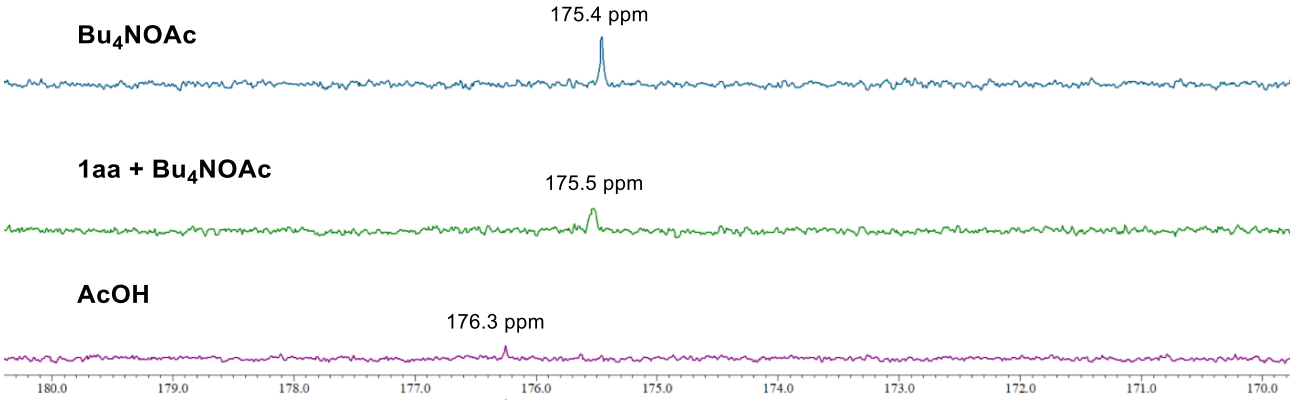


Figure S5. The chemical shifts of carbonyl carbon of acetyl group (150 MHz, CD_2Cl_2)

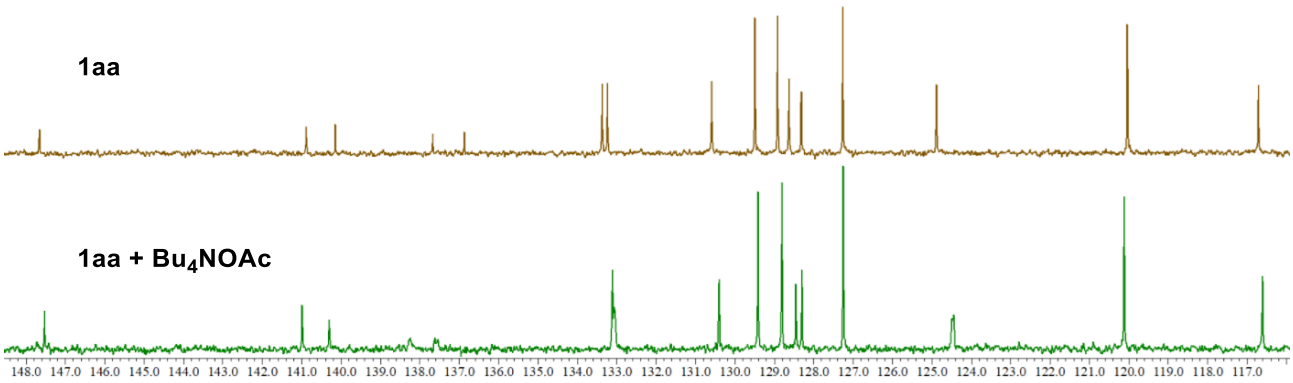


Figure S6. ^{13}C NMR spectra from 150 ppm to 115 ppm (150 MHz, CD_2Cl_2); (Top) **1aa**, (Bottom) 1:1 mixture of **1aa** and Bu_4NOAc.

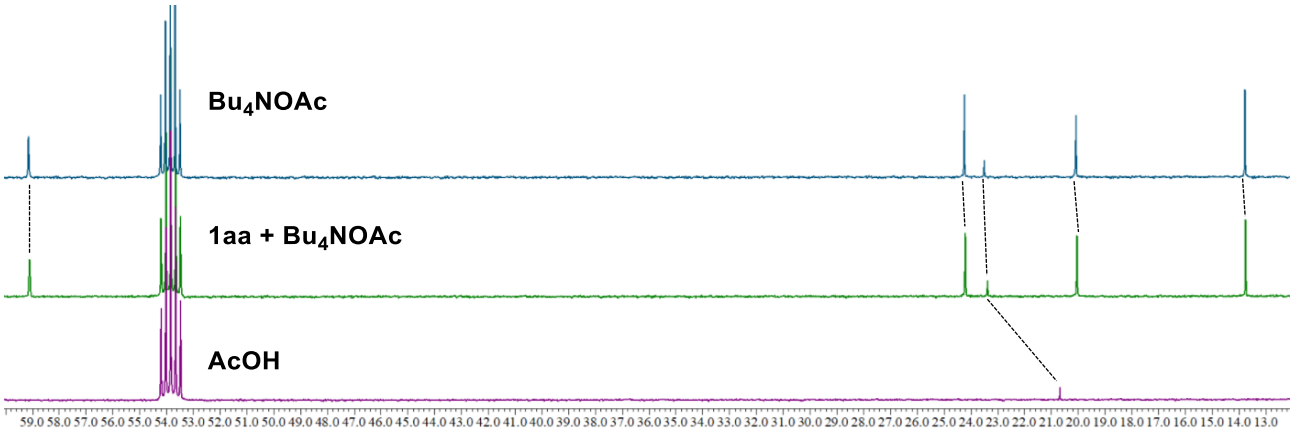


Figure S7. ^{13}C NMR spectra from 60 ppm to 10 ppm (150 MHz, CD_2Cl_2); (Top) Bu_4NOAc, (Center) 1:1 mixture of **1aa** and Bu_4NOAc, (Bottom) AcOH.

The chemical shift of the carbonyl carbon of acetate in the mixture was 0.1 ppm upfield in comparison with that of Bu_4NOAc, and 0.8 ppm lower than that of AcOH (Figure S5). The downfield shift of methyl carbon in the mixture was observed compared with Bu_4NOAc (Figure S7). The chemical shift of that carbon in the mixture was lower than that of AcOH. These ^{13}C NMR measurements also indicate that the 1:1 complex would form between **1aa** and Bu_4NOAc.

Job Plot Analysis with ^{1}H NMR Spectroscopy

The binding ratio between sulfonamide **1aa** and Bu_4NOAc was evaluated by a Job plot analysis with ^{1}H NMR spectroscopy. $CDCl_3$ was passed through a column of basic alumina to remove a residue acid. The total volume of the $CDCl_3$ solution was 0.60 mL, and the total amount of **1aa** and Bu_4NOAc was maintained at 0.017 M. Eleven samples with different molar ratios of **1aa** (χ_{1aa}) were prepared. ^{1}H NMR spectra of each of the samples in $CDCl_3$ were recorded at 298 K. The chemical shift differences ($\Delta\delta$) for *ortho*-H (H_e, see Figure S2) of **1aa** were plotted against the molar fractions.

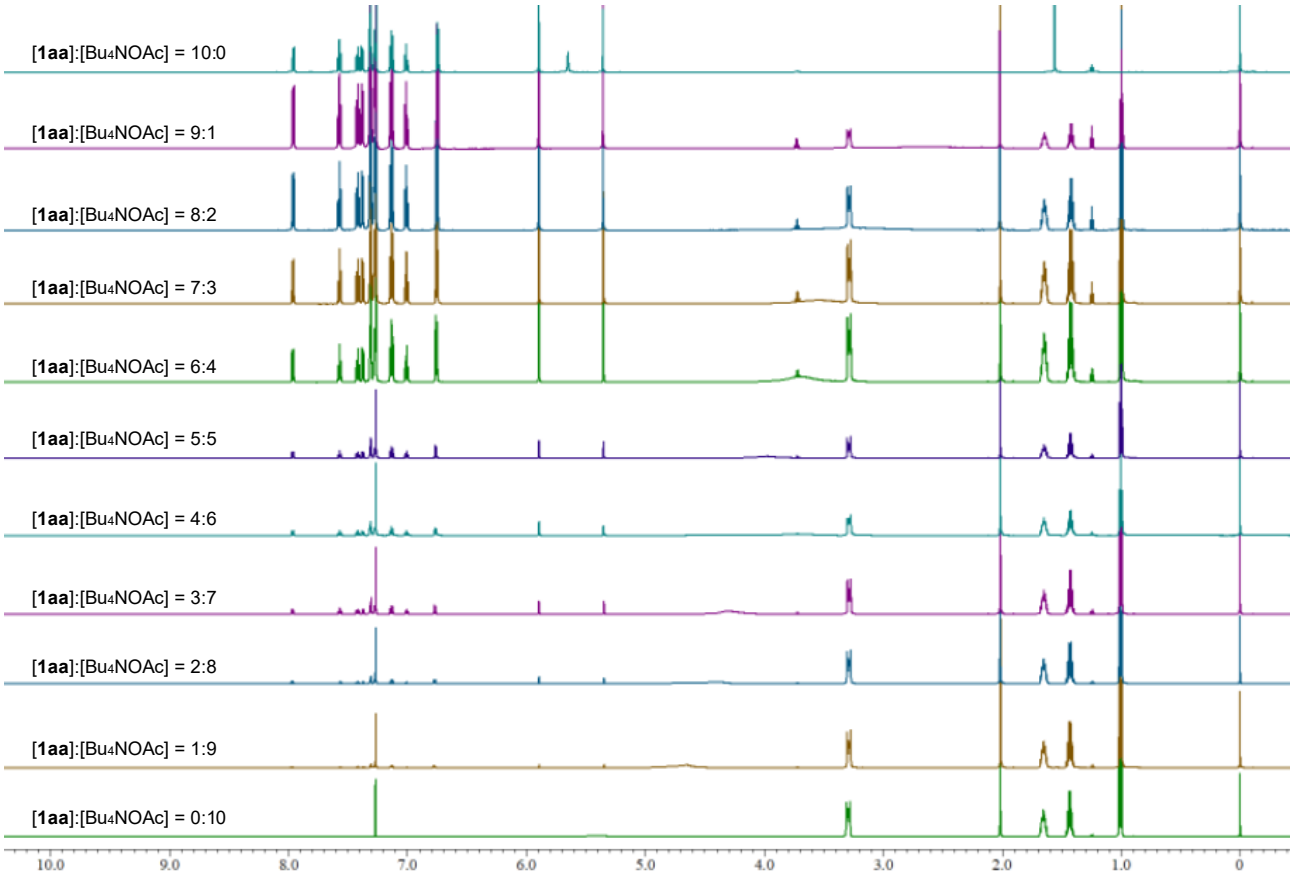


Figure S8. 1aa + Bu_4NOAc in various ratios at [**1aa**] + [Bu_4NOAc] = 0.017 M (600 MHz, $CDCl_3$)

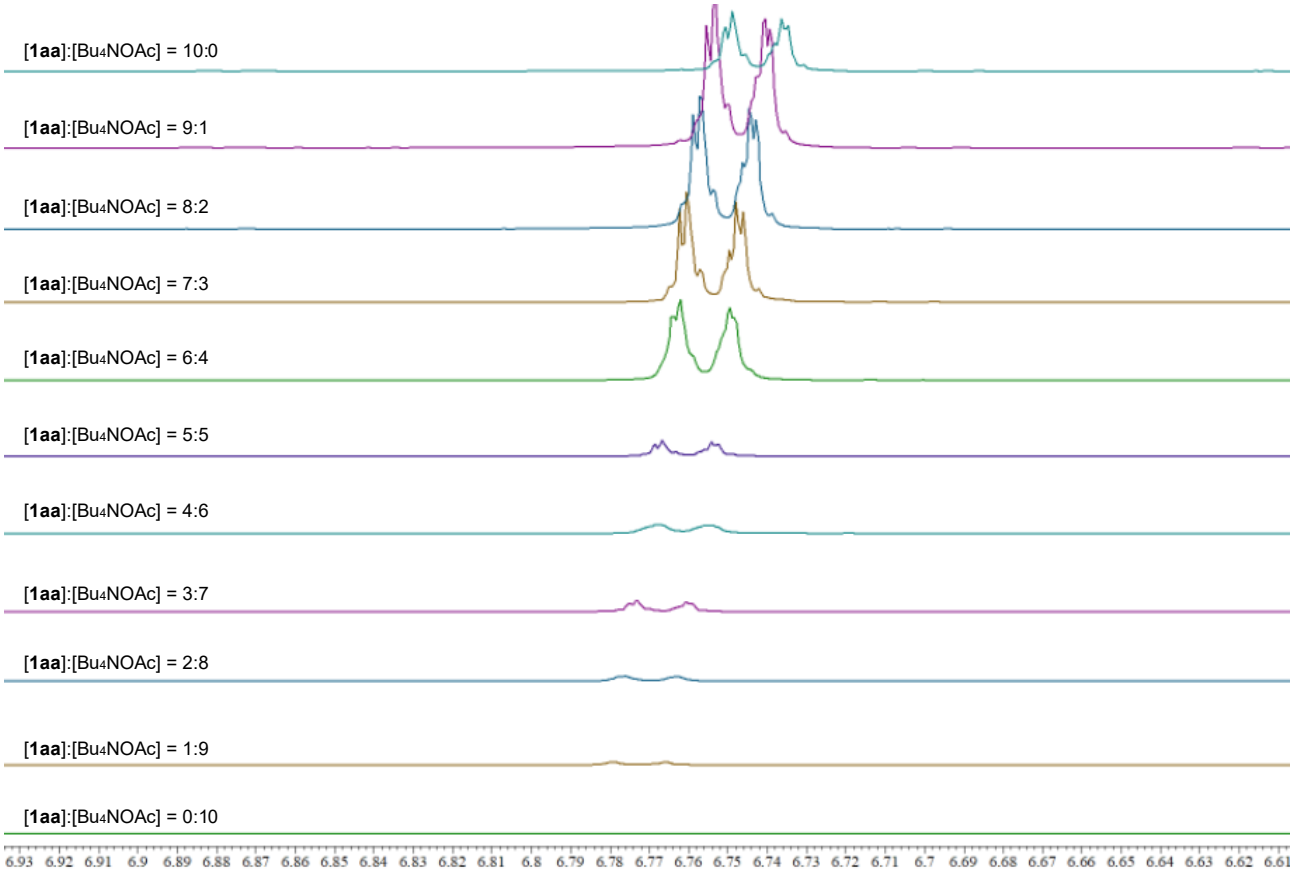


Figure S9. The chemical shift difference (Δδ) for *ortho*-H of **1aa** (600 MHz, $CDCl_3$)

Table S7. Job plot analysis with ^{1}H NMR

[**1aa**] (M)	χ_{1aa} (=[**1aa**]/([**1aa**] + [Bu_4NOAc]))	δ (ppm)	Δδ (ppm)	Δδ× χ_{1aa} (ppm)
0.017	1.0	6.742	0	0
0.015	0.9	6.747	−0.005	−0.0045
0.013	0.8	6.751	−0.009	−0.0072
0.012	0.7	6.754	−0.012	−0.0084
0.010	0.6	6.756	−0.014	−0.0084
0.008	0.5	6.760	−0.018	−0.0090
0.007	0.4	6.761	−0.019	−0.0076
0.005	0.3	6.767	−0.025	−0.0075
0.003	0.2	6.770	−0.028	−0.0056
0.002	0.1	6.772	−0.030	−0.0030
0	—	—	—	—

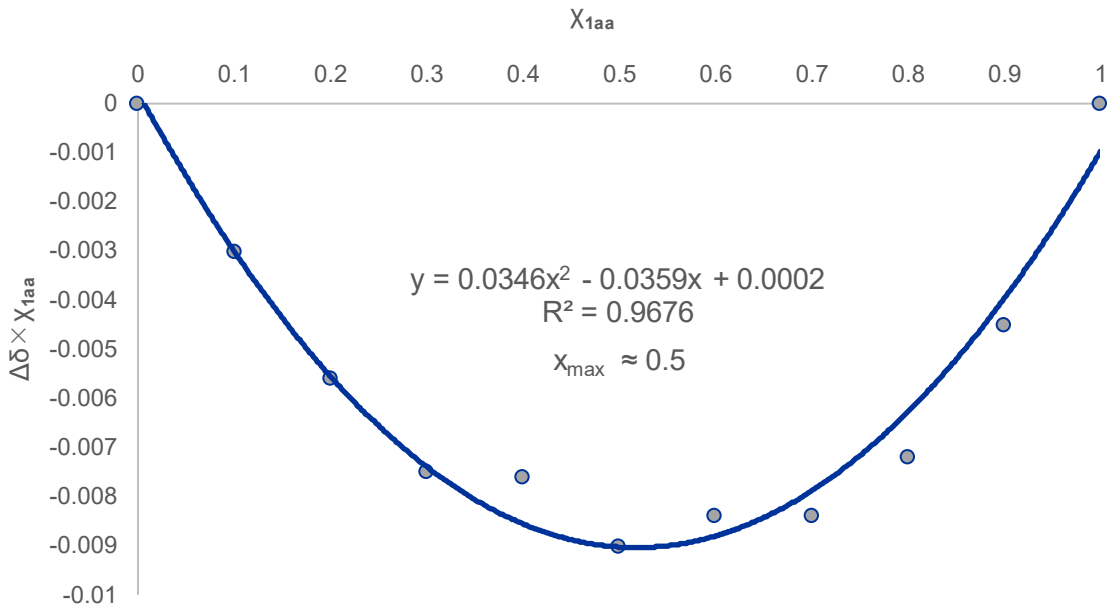


Figure S10. Job plot with ^{1}H NMR

These results suggest that a 1:1 complex would form between **1aa** and Bu_4NOAc in $CDCl_3$.

Job Plot Analysis with UV-vis Spectroscopy

The binding ratio between **1aa** and Bu_4NOAc was also evaluated by a Job plot analysis using CH_2Cl_2 with UV-vis spectroscopy. The total amount of **1aa** and Bu_4NOAc was kept at 2.5×10^{-5} M. Eleven samples with different molar ratios of **1aa** (χ_{1aa}) were prepared. The molar extinction coefficients of the maximum wavelength of **1aa** (234 nm) were plotted against the molar ratios.

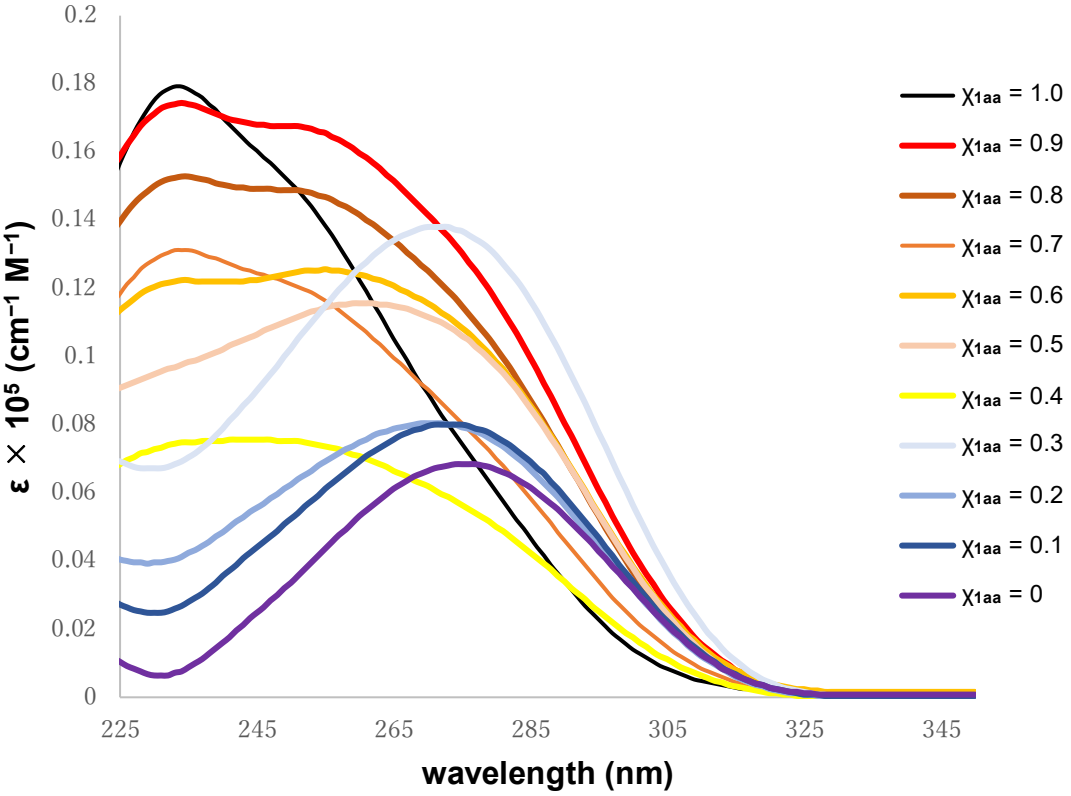


Figure S10. UV-vis spectroscopy of the mixture of **1aa** and Bu_4NOAc (CH_2Cl_2, 2.5×10^{-5} M)

Table S7. Job plot analysis with UV-vis spectroscopy

[**1aa**] (10^{-5} M)	χ_{1aa} (=[**1aa**]/([**1aa**] + [Bu_4NOAc]))	ε (10^{-5} cm^{-1} M^{-1})	Δε (10^{-5} cm^{-1} M^{-1})	Δε× χ_{1aa} (10^{-5} cm^{-1} M^{-1})
2.50	1.0	0.1792	0	0
2.25	0.9	0.1744	0.0048	0.0108
2.00	0.8	0.1528	0.0264	0.0528
1.75	0.7	0.1312	0.0480	0.0840
1.50	0.6	0.1224	0.0568	0.0852
1.25	0.5	0.0976	0.0816	0.1020
1.00	0.4	0.0748	0.1044	0.1044
0.75	0.3	0.0692	0.1100	0.0825
0.50	0.2	0.0412	0.1380	0.0690
0.25	0.1	0.0268	0.1524	0.0381
0	—	0.0076	0.1716	0

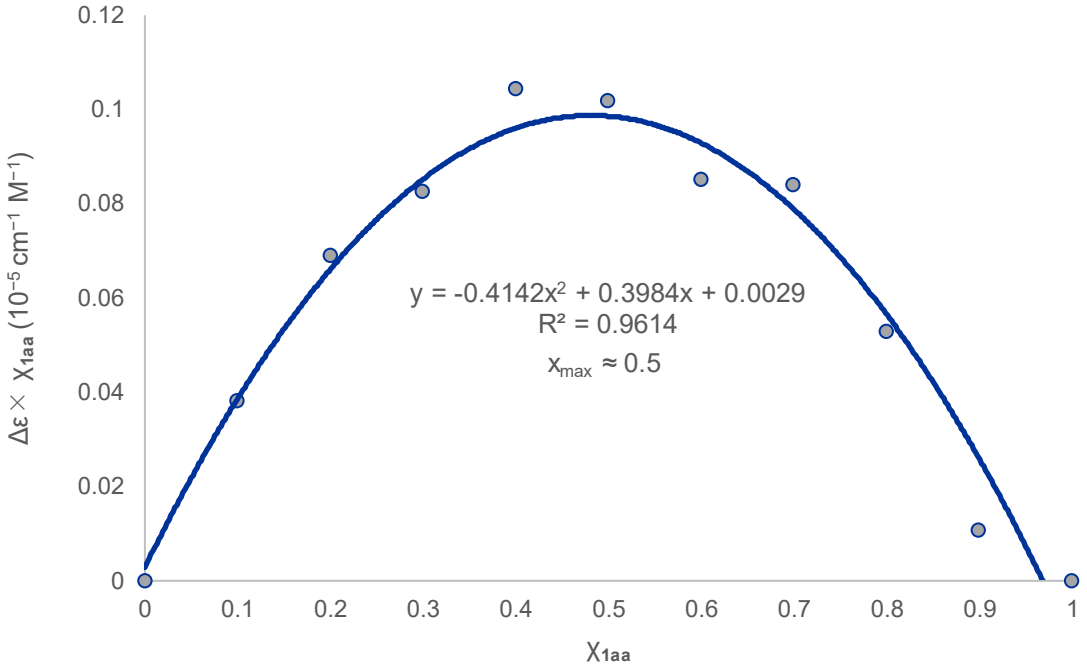


Figure S11. Job plot with UV-vis spectroscopy

The Job plot also gave a maximum at 50% molar fraction. It suggests that a 1:1 complex would form between **1aa** and Bu_4NOAc in CH_2Cl_2. This experiment is very significant because it shows that the complex form even at low concentrations.

Determination of Association Constant (K_a)

To determine the association constant (K_a) of the complex, ^1H NMR titration experiment was carried out. In an NMR tube, a CD_2Cl_2 solution of Bu_4NOAc (0.027 M, 0.75 mL, 0.02 mmol) was added at 298 K. To the tube, **1aa** was added from 0.01 to 0.066 mmol. The inverse of the value of the chemical shift differences ($\Delta\delta$) for methyl proton of acetate were plotted against 1/[**1aa**].

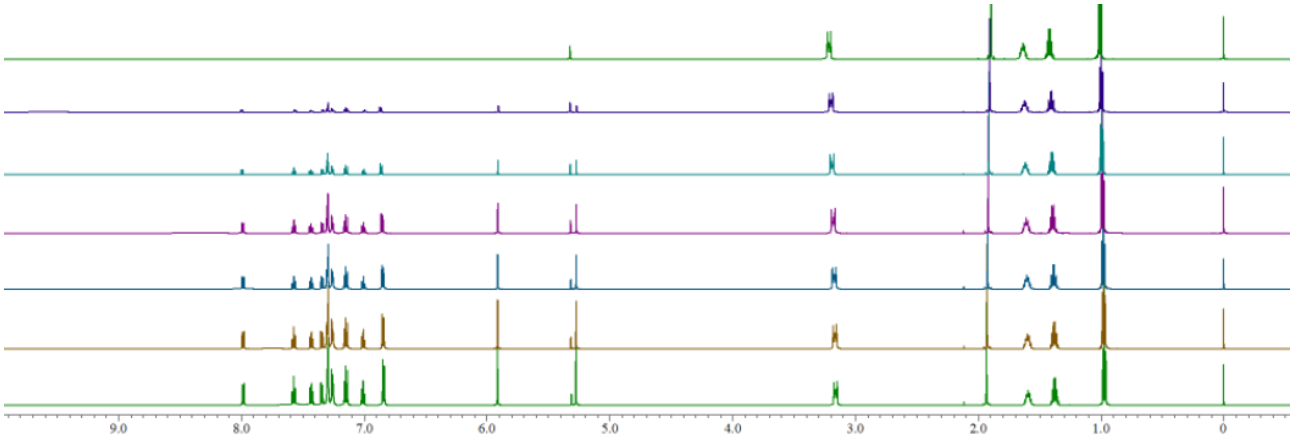


Figure S12. ^1H NMR titration experiment (600 MHz, CD_2Cl_2)

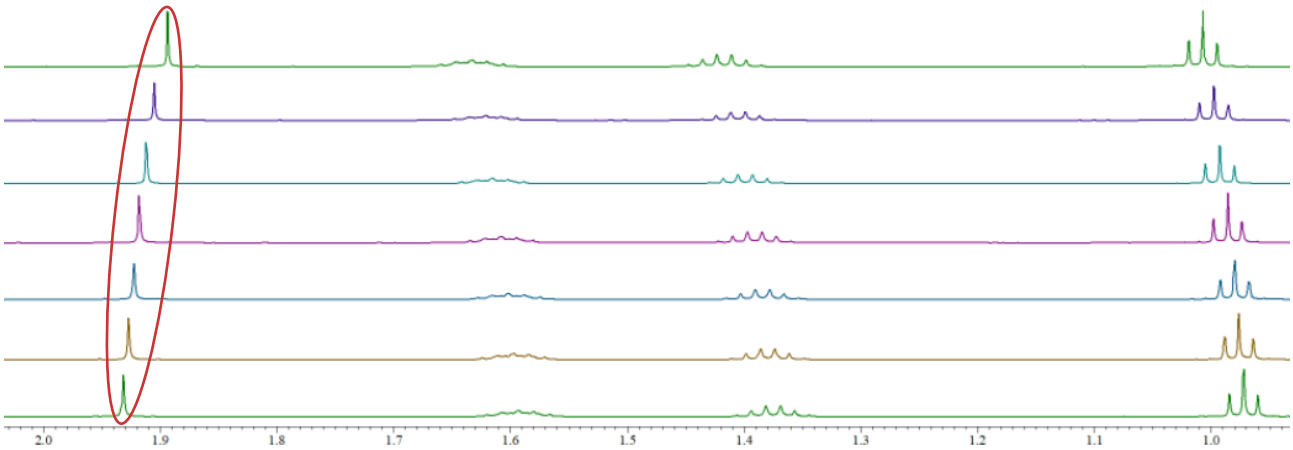


Figure S13. The chemical shift difference (Δδ) for the methyl proton of acetate (600 MHz, $CDCl_3$)

Table S8. Determination of association constant (K_α)

[**1aa**] (M)	1/[**1aa**] (M^{-1})	δ (ppm)	Δδ (ppm)	1/Δδ
0	—	1.894	0	—
0.013	75.00	1.905	0.011	90.91
0.028	35.71	1.911	0.017	58.82
0.044	22.73	1.918	0.024	41.67
0.060	16.67	1.923	0.029	34.48
0.073	13.64	1.927	0.033	30.30
0.088	11.37	1.931	0.037	27.03

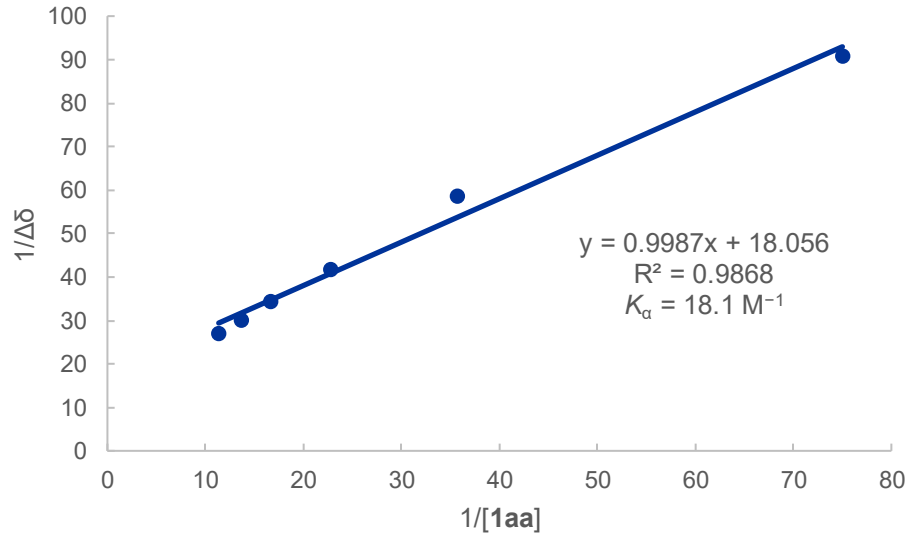


Figure S14. Determination of association constant (K_α) of the complex

The association constant K_α was calculated to 18.1 M^{-1}.

5. Cyclic Voltammetry

A glassy carbon electrode (surface area: 0.071 cm^2, BAS), a Pt coil electrode, and an Ag/Ag^+ electrode (Ag wire in 0.01 M $AgNO_3$/0.10 M Bu_4NPF_6/CH_2Cl_2) were used as a working, counter, and reference electrodes, respectively. The working electrode was polished with 5 μm alumina slurry. After polishing, it was washed with deionized water and acetone, and dried in an oven. A CH_2Cl_2 solution of sample including 1 mM of each sample and 0.10 M of Bu_4NPF_6 was prepared as an electrochemical solution. Using the electrodes and the solutions, beaker-typed three electrode electrochemical cell were constructed, and were connected with the potentiostat to perform cyclic voltammetry. The redox potentials were calibrated with ferrocene as a standard. Otherwise noted, CV was performed at a scan rate of 100 mV/s.

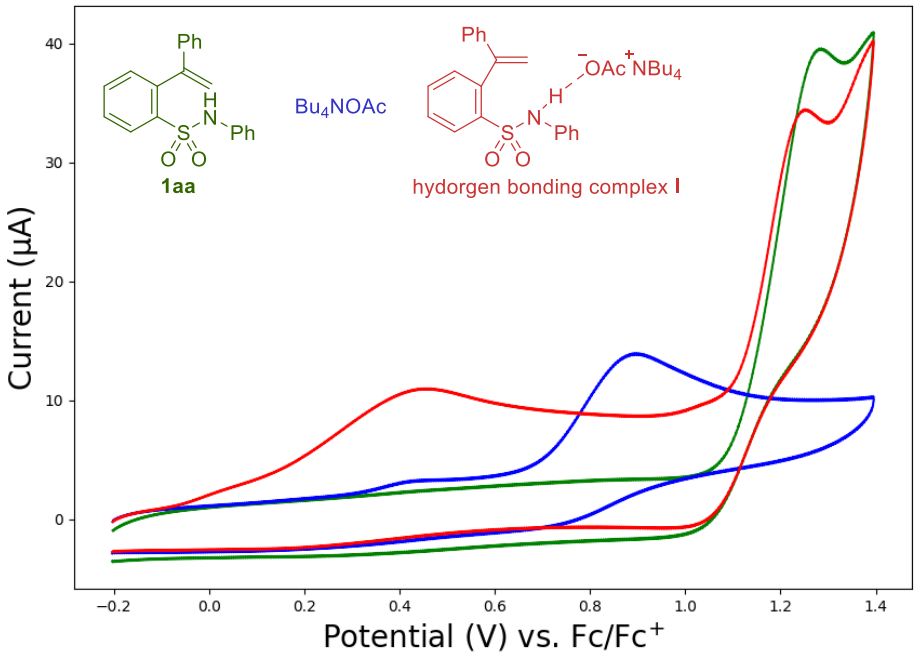


Figure S15. Cyclic voltammograms; **1aa** (green), Bu_4NOAc (blue), hydrogen bonding complex **I** between **1aa** and Bu_4NOAc (red).

The cyclic voltammogram of **1aa**, Bu_4NOAc, and complex **I** exhibit irreversible oxidation waves with half-wave potentials ($E_{p/2}$) of 1.18, 0.76, and 0.16 V vs Fc/Fc^+ (Fc = ferrocene), respectively. The onset potential of **1aa**, Bu_4NOAc, and **I** were observed at 1.10, 0.61, −0.06 V, respectively. These results indicate that the oxidation of complex **I** proceeds predominantly under the reaction conditions.

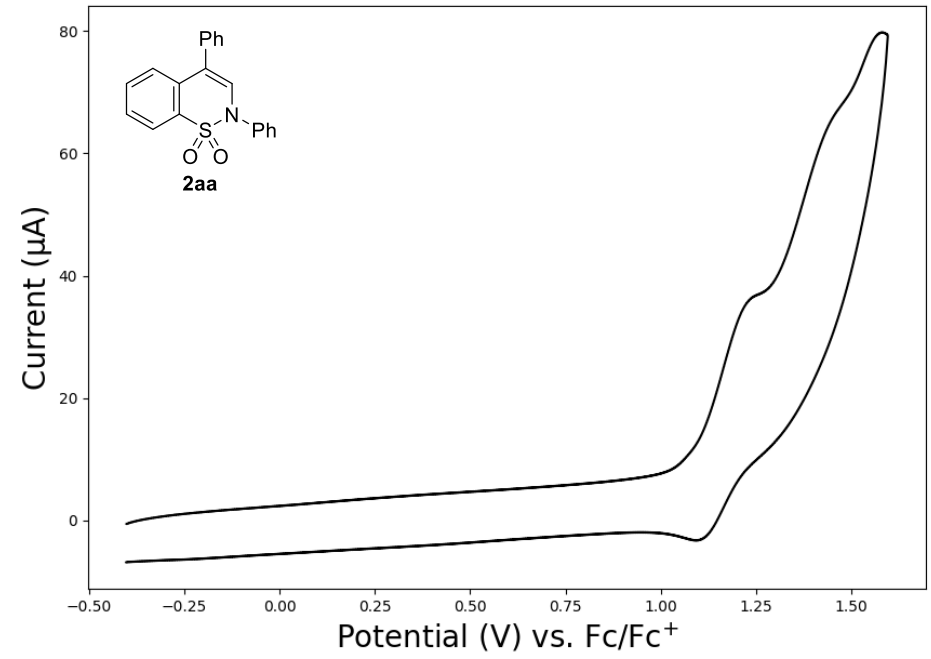


Figure S16. Cyclic voltammogram of **2aa**

A quasi-reversible oxidation wave and an irreversible oxidation wave were observed at 1.13 and 1.36 V ($E_{p/2}$: vs Fc/Fc^+).

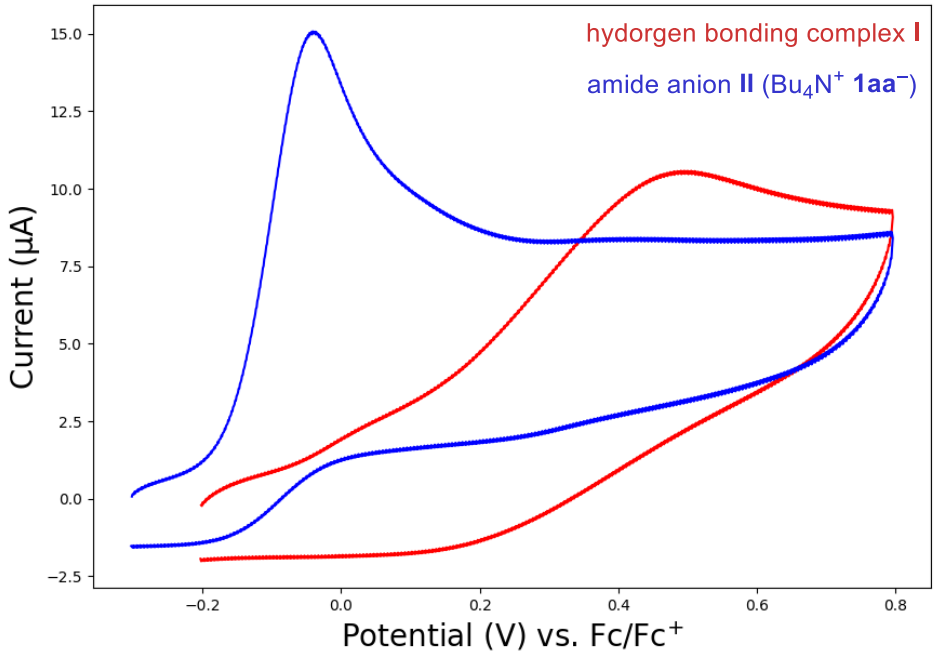


Figure S17. Cyclic voltammograms of Bu_4N^+ **1aa**$^-$ and complex **I**

The cyclic voltammogram of amide anion **II** (Bu_4N^+ **1aa**$^-$) shows an irreversible oxidation peak at −0.03 V ($E_{p/2}$: vs Fc/Fc^+). These voltammograms strongly suggest that the amide anion is hardly existing in a solution

under the reaction conditions, and sulfonamidyl radical should be generated via proton-coupled electron transfer (PCET) process.

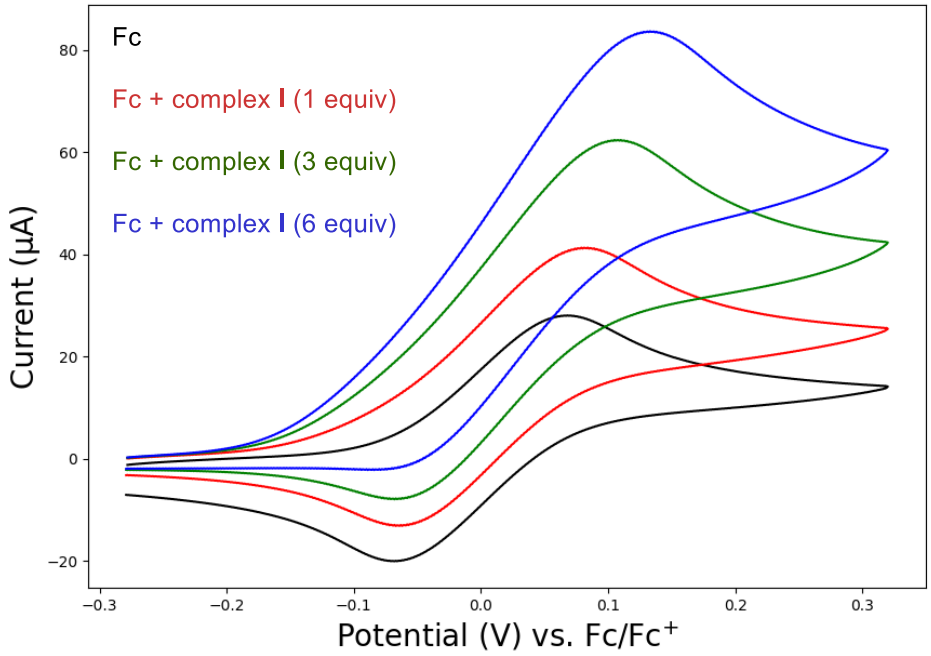
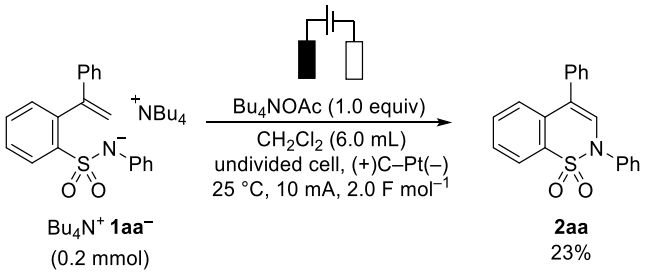


Figure S18. Titration experiment with cyclic voltammetry

To a solution of ferrocene ($E°$ = 0.00 V) in 0.1 M Bu_4NPF_6/CH_2Cl_2 was titrated complex **I** ($E_{p/2}$ = 0.16 V) from 1 to 6 equiv. Without complex **I**, a reversible oxidation wave was observed. When we added 1 equiv of complex **I**, the value of the peak current increased; in short, a catalytic current was observed. As complex **I** added, the catalytic current increased, and the reduction wave was reduced. This suggests that outer-sphere single electron transfer occurs from Fc^+ to complex **I**. It also indicates that the hydrogen bonding complex itself would be a chemical species that undergoes electron transfer.

6. Control Experiments

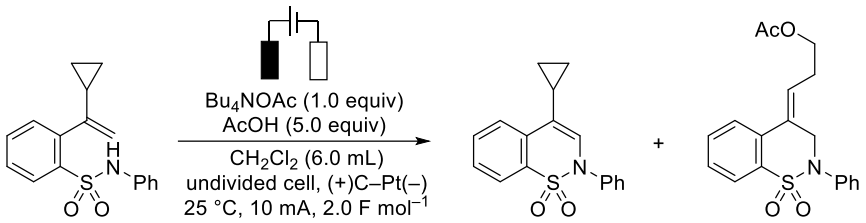
The Electrolysis of An Amide Anion



Bu_4N^+ **1aa**$^-$ (0.2 mmol) — **2aa** 23%

The electrolysis of Bu_4N^+ **1aa**$^-$ (0.2 mmol) was carried out without AcOH from standard conditions to avoid the protonation of the amide anion, and **2aa** was obtained in 23% yield. This reaction also gave several unidentified byproducts. While the reason has not been cleared yet, we assumed that a sulfonamidyl radical was generated at a high concentration and might have caused undesired intermolecular reactions.

Radical Clock Experiment



Prepared by the general procedure E from **1oa** (59.4 mg, 0.20 mmol), Bu_4NOAc (59.0 mg, 0.20 mmol) and AcOH (57 μL, 1.00 mmol). After the general work-up, the residue was purified by column chromatography on silica gel (hexane/EtOAc 5:1 → 3:1). The obtained oil was further purified by GPC ($CHCl_3$) to afford 4-cyclopropyl-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-dioxide (**2oa**) as colorless oil (16.4 mg, 0.055 mmol, 28%) and (*Z*)-3-(1,1-dioxido-2-phenyl-2,3-dihydro-4*H*-benzo[*e*][1,2]thiazin-4-ylidene)propyl acetate (**2oa′**) as colorless oil (12.9 mg, 0.036 mmol, 18%).

4-Cyclopropyl-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2oa)

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.01 (dd, *J* = 7.7, 1.4 Hz, 1H), 7.95 (dd, *J* = 7.7, 1.4 Hz, 1H), 7.70 (td, *J* = 7.7, 1.4 Hz, 1H), 7.54 (td, *J* = 7.7, 1.4 Hz, 1H), 7.43 (t, *J* = 7.2 Hz, 2H), 7.43 (t, *J* = 7.2 Hz, 2H), 7.36 (t, *J* = 7.2 Hz, 1H), 7.35 (d, *J* = 7.2 Hz, 2H), 6.58 (d, *J* = 1.4 Hz, 1H), 1.89–1.85 (m, 1H), 0.97–0.94 (m, 2H), 0.64–0.61 (m, 2H).

^{13}C NMR (150 MHz, $CDCl_3$) δ 137.9, 134.5, 132.3, 131.5, 129.49, 129.46, 128.2, 128.0, 126.9, 124.9, 122.4, 120.9, 11.3, 5.7.

IR (neat) 3067, 1589, 1489, 1333, 1248, 1177 cm^{-1}.

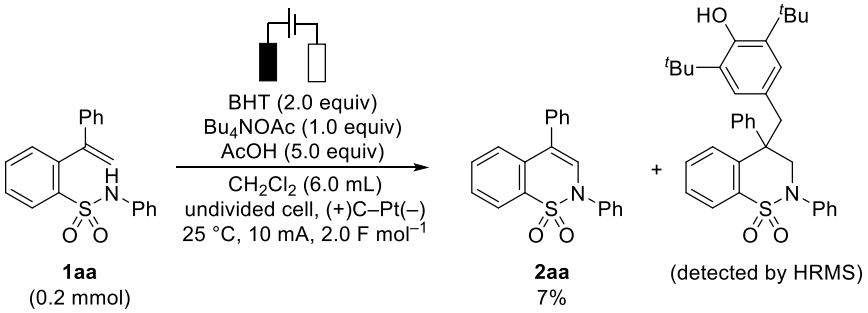
HRMS (ESI) *m/z* calcd for $C_{17}H_{15}NNaO_2S$ $[M + Na]^+$ 320.0716, found 320.0712.

(*Z*)-3-(1,1-dioxido-2-phenyl-2,3-dihydro-4*H*-benzo[*e*][1,2]thiazin-4-ylidene)propyl acetate (2oa′)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.75–7.72 (m, 2H), 7.56 (td, *J* = 7.8, 1.4 Hz, 1H), 7.38 (t, *J* = 7.8 Hz, 1H), 7.31–7.17 (m, 3H), 7.13 (dd, *J* = 7.1, 1.6 Hz, 2H), 6.38 (t, *J* = 7.3 Hz, 1H), 4.89 (dd, *J* = 2.5, 1.4 Hz, 2H), 4.23 (t, *J* = 6.4 Hz, 2H), 2.55 (dt, *J* = 7.3, 6.4 Hz, 2H), 2.05 (s, 3H).

HRMS (ESI) *m/z* calcd for $C_{19}H_{19}NNaO_4S$ $[M + Na]^+$ 380.0927, found 380.0930.

Radical Trapping Experiment with 2,6-Di-*tert*-butyl-4-methylphenol (BHT)



Radical trapping experiment was carried out in a 10 mL two-necked flask equipped with a carbon rod anode, and a Pt cathode (1.0 × 1.5 cm^2). Substrate **1aa** (0.2 mmol), BHT (0.4 mmol), Bu_4NOAc (0.2 mmol) and AcOH (1.0 mmol) were placed in the flask equipped with a stirring bar. Then, CH_2Cl_2 (6.0 mL) was added with a syringe at room temperature. A constant current (10 mA, 2.0 F mol^{-1}, 1.07 h) was supplied at 25 °C with an oil bath. After the electrolysis, the solvent was removed by evaporation. **2aa** was obtained in 7% yield and the BHT adduct was detected by HRMS (Figure S19). It suggests that this reaction system would proceed via a radical pathway.

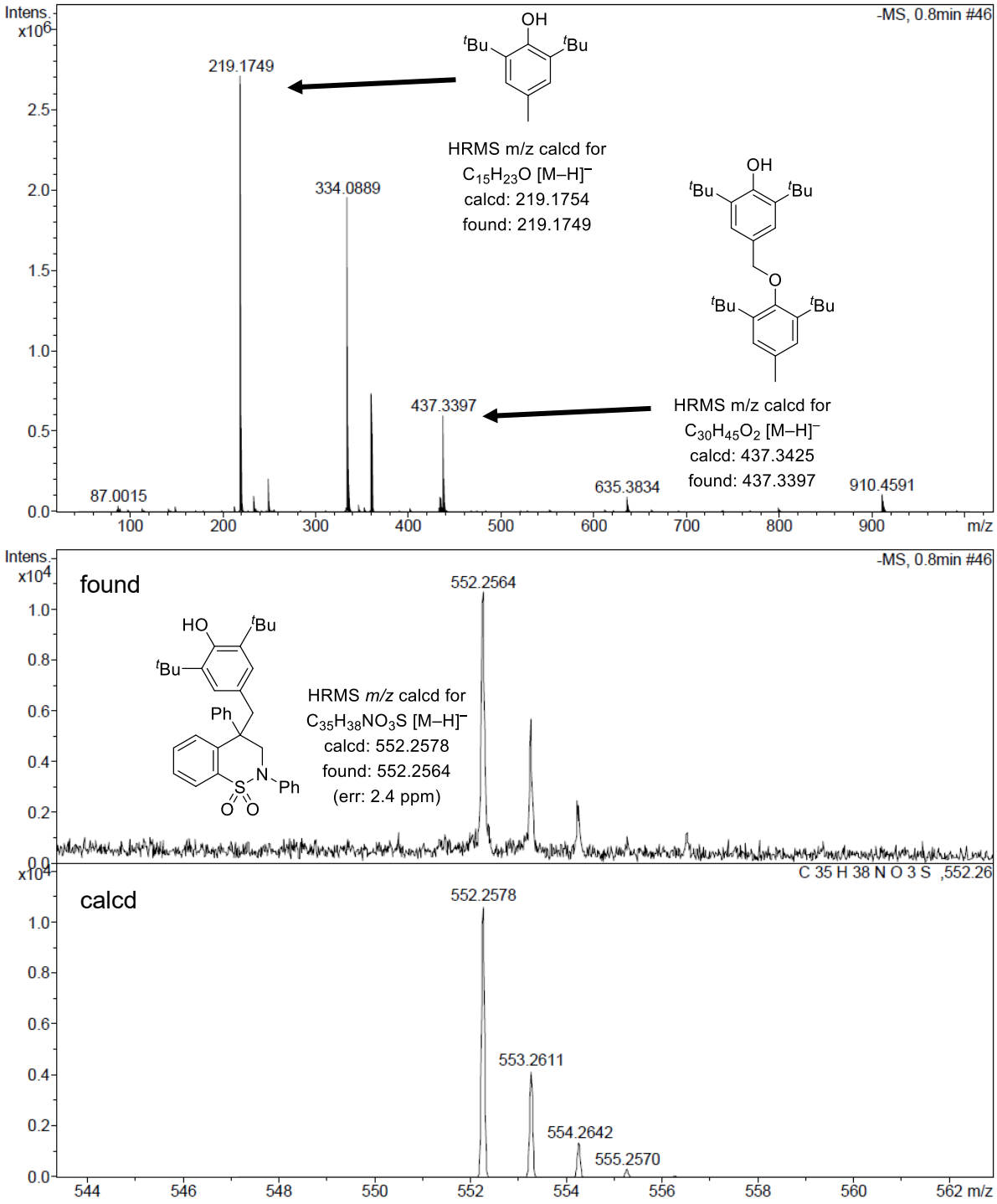
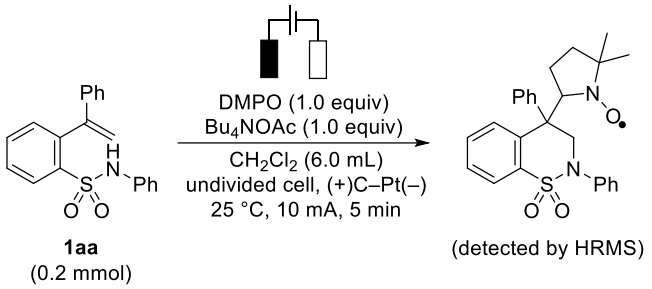


Figure S19. Radical trapping experiment and the ESI-HRMS (negative mode) spectrum

Electron Paramagnetic Resonance (EPR) Experiment

Electrolysis was carried out in a 10 mL two-necked flask equipped with a carbon rod anode, and a Pt cathode (1.0 × 1.5 cm^2). Substrate **1aa** (0.2 mmol), DMPO (0.2 mmol) and Bu_4NOAc (0.2 mmol) were placed in the flask equipped with a stirring bar. Then, CH_2Cl_2 (6.0 mL) was added with a syringe at room temperature. A constant current (10 mA) was supplied at 25 °C with an oil bath for 5 minutes. The resulting mixture was analyzed by EPR spectroscopy and HRMS. EPR spectrum was recorded at room temperature.



1aa
(0.2 mmol)

(detected by HRMS)

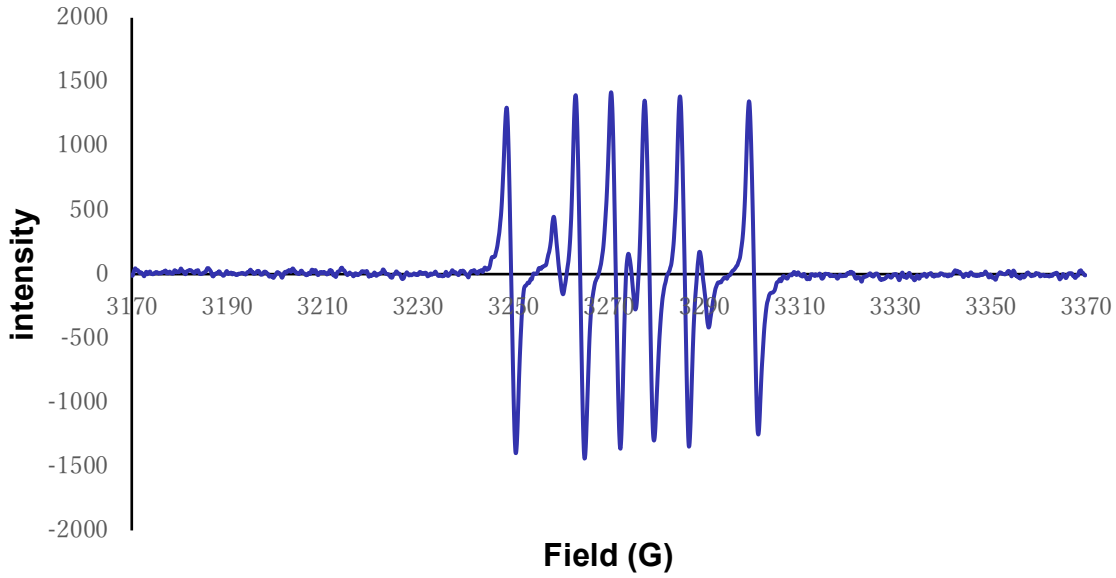


Figure S20. EPR experiment
(microwave frequency: 9.17883 GHz, *g*-value: 2.0030, A(N) = 14.4 G, A(H) = 21.7 G)

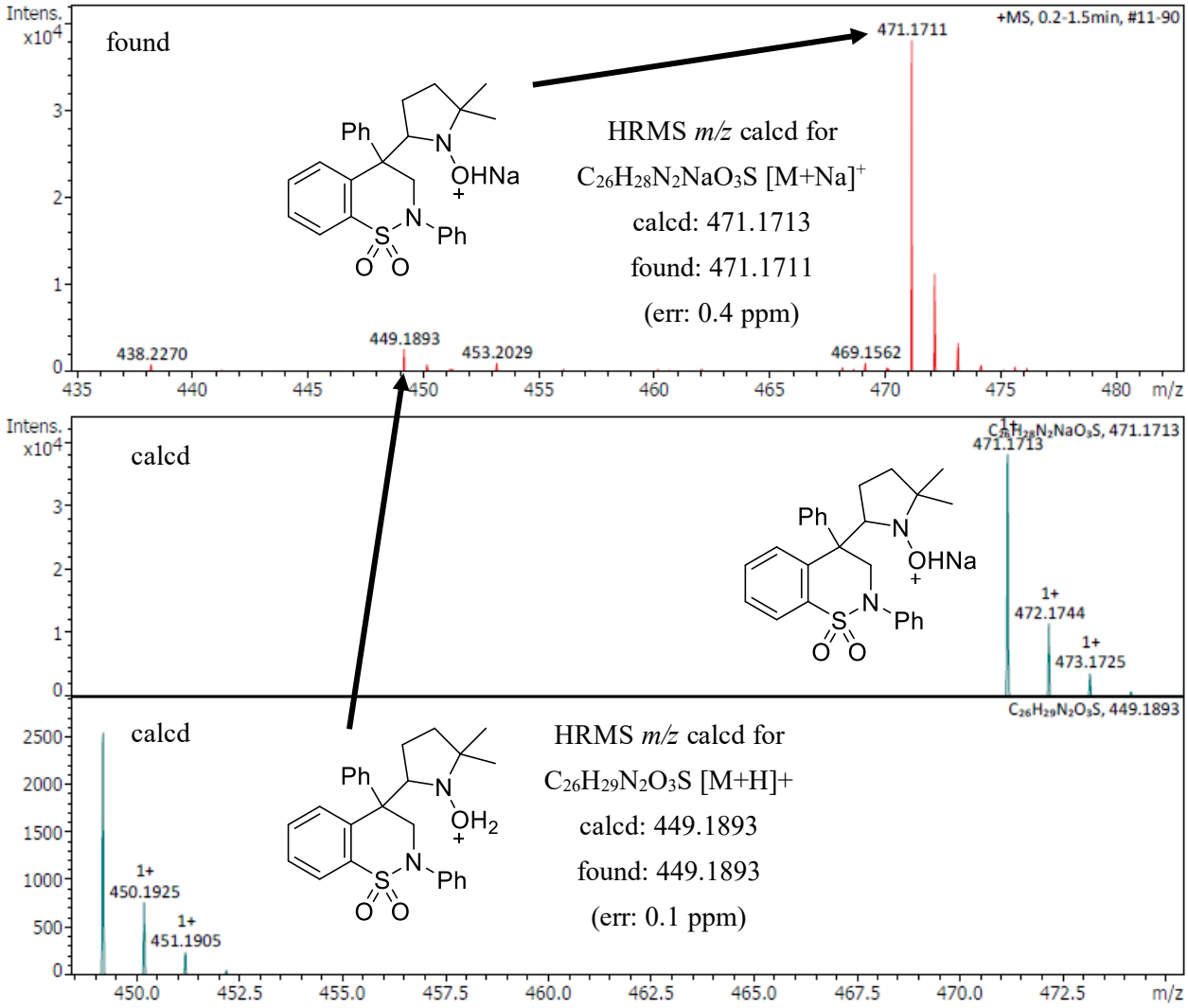


Figure S21. Electrochemical reaction with DMPO and the ESI-HRMS spectrum

7. DFT Calculations

Density functional theory (DFT) calculations were performed using the Gaussian 16 program.[18] Geometries were optimized at the (U)M06-2X/6-31+G(d,p).[19] CPCM solvation model[20] in CH_2Cl_2 was applied. Tight convergence criteria integration grid was applied. Thermochemical corrections were obtained from frequency calculations at the same level of theory. Natural population analysis (NPA) charges were analyzed with NBO 7.0.10 program.[21] The data was summarized in Figure S22–S27. Calculated structures are illustrated using ChemDraw and CYLView.[22] In Table S9 are listed the number of imaginary frequencies (NImag) and the following energies: electronic energy (E), enthalpy at 298.15 K (H) and Gibbs free energy at 298.15 K and 1 mol L^{-1} (G). Otherwise noted, all energies are given in Hartree.

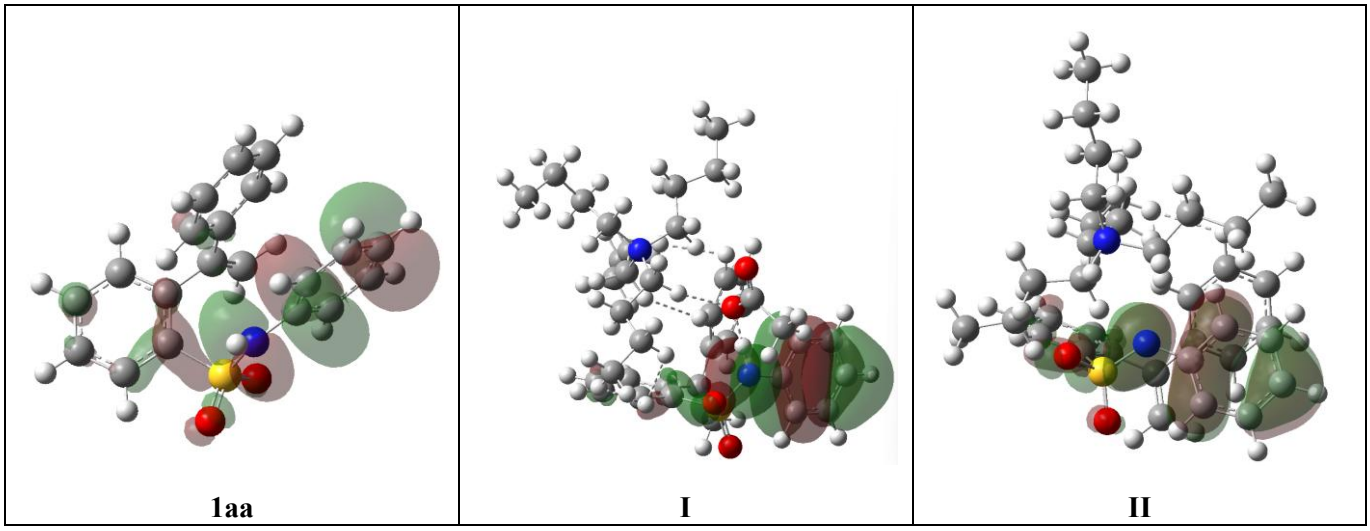


Figure S22. Highest occupied molecular orbitals (HOMOs) of sulfonamide **1aa** (left), hydrogen bonding complex **I** (middle), and sulfonamide anion **II** (right).

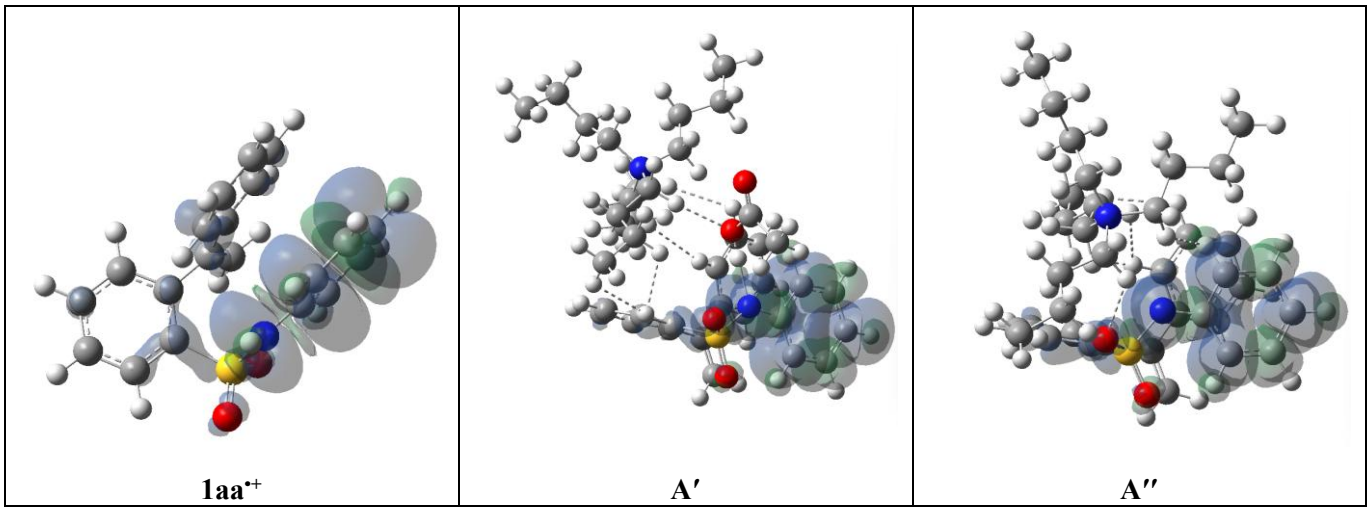


Figure S23. Natural population analysis (NPA) charges of each radical species.

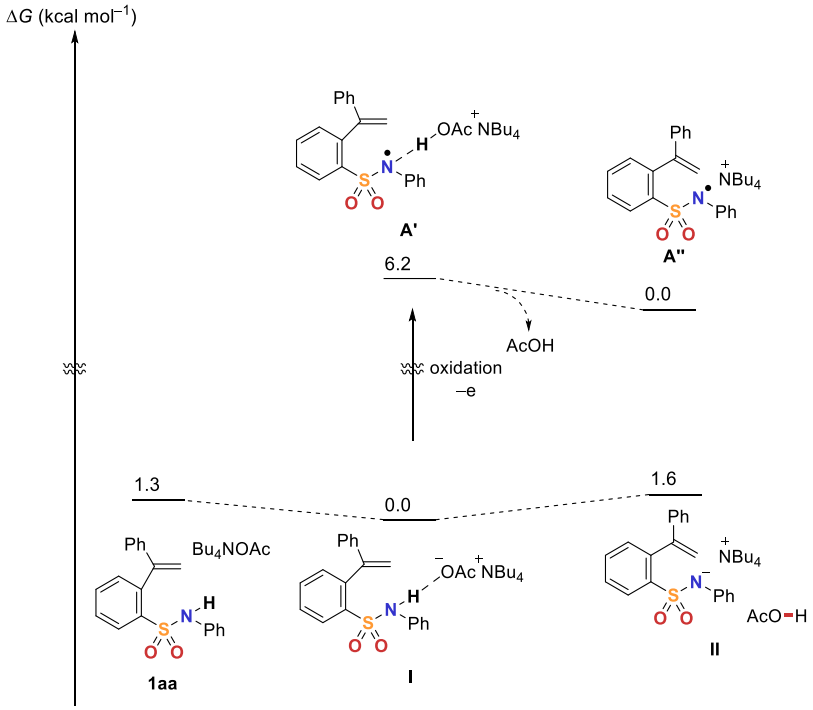


Figure S24. Energy profiles for comparison of Gibbs free energies of each state calculated at the CPCM(CH_2Cl_2)/(U)M06-2X/6-31+G(d,p) level of theory. Energies are shown in kcal mol^{-1}.

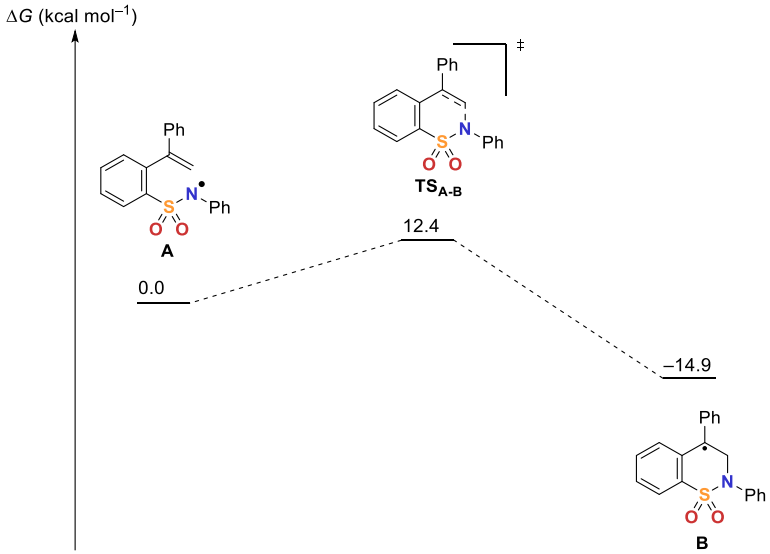


Figure S25. Energy profile of radical cyclization from sulfonamidyl radical **A** to dibenzyl radical **B** calculated at the CPCM(CH_2Cl_2)/UM06-2X/6-31+G(d,p) level of theory. Energies are shown in kcal mol^{-1}.

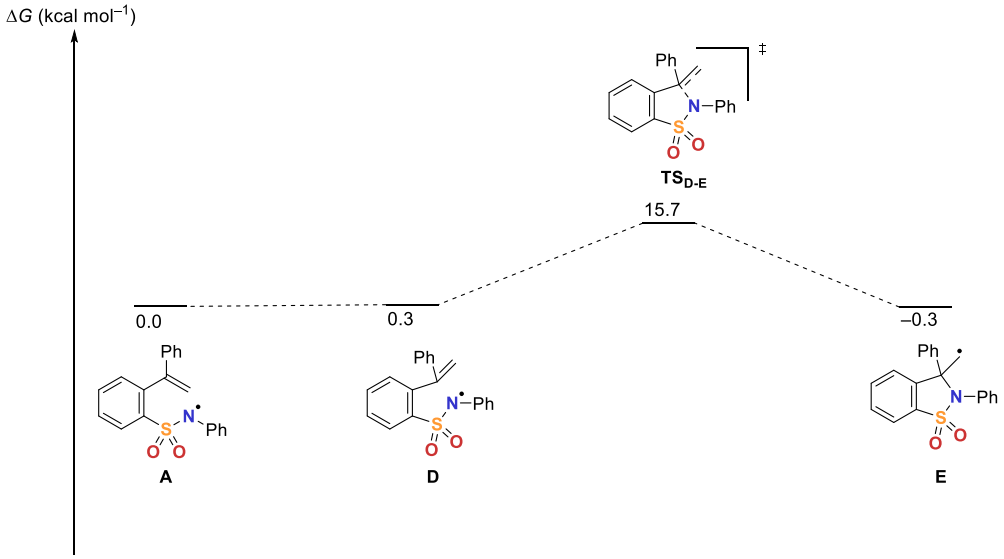


Figure S26. Energy profile of undesired radical cyclization (5-*exo*-*trig*) from sulfonamidyl radical **A** to radical **E** calculated at the CPCM(CH_2Cl_2)/UM06-2X/6-31+G(d,p) level of theory. Energies are shown in kcal mol^{-1}.

The activation energy of radical cyclization from **A** to **B** was 12.4 kcal mol^{-1}, and the free energy of radical **B** was 14.9 kcal mol^{-1} lower than that of **A** (Figure S21). In contrast, the activation energy of undesired radical cyclization from D to E was 3.0 kcal mol^{-1} higher than that of 6-membered radical cyclization, and the energy of **E** was 14.6 kcal mol^{-1} higher than that of **B** due to the lack of radical stability (Figure S22). Therefore, 6-membered radical cyclization (**A→B**) would proceed predominantly in this reaction system.

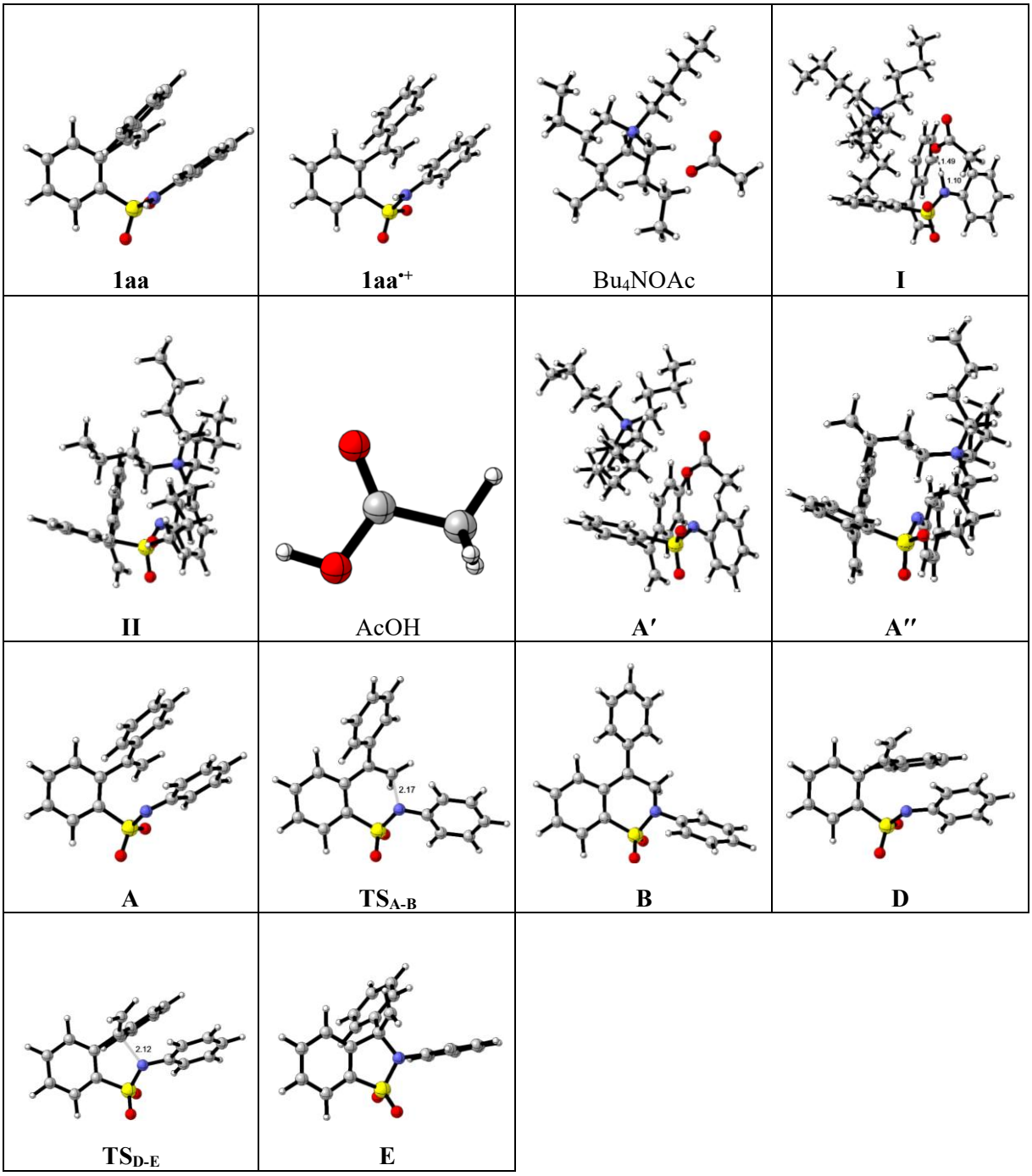


Figure S27. A list of stationary points of each compound

Table S9. Calculated energies of stationary points

stationary points	NImag	E	H	G
1aa	0	-1375.294667	-1374.948676	-1375.018273
1aa$^{\bullet+}$	0	-1375.0609982	-1374.714660	-1374.784021
Bu_4NOAc	0	-914.231047	-913.641341	-913.732625
I	0	-2289.552464	-2288.616309	-2288.752947
II	0	-2060.524236	-2059.657399	-2059.776520
AcOH	0	-229.008937	-228.941171	-228.973838
A′	0	-2289.352829	-2288.415305	-2288.553602
A″	0	-2060.334572	-2059.466479	-2059.589691
A	0	-1374.644508	-1374.311916	-1374.381236
TS$_{A-B}$	1	-1374.623923	-1374.292091	-1374.361506
B	0	-1374.670295	-1374.335462	-1374.405026
D	0	-1374.642160	-1374.309709	-1374.380767
TS$_{D-E}$	1	-1374.618013	-1374.287450	-1374.356296
E	0	-1374.644006	-1374.311841	-1374.381722

1aa

C	3.6326720	-0.1634220	-0.5766680
C	4.3799920	0.9977990	-0.4050200
C	3.8295470	2.0796840	0.2796730
C	2.5366120	1.9982360	0.7903220
C	1.7684210	0.8386020	0.6444310
C	2.3402350	-0.2338150	-0.0528100
C	0.3853300	0.8128250	1.2151610
C	-0.6706060	1.5409840	0.4611800
C	-1.9240350	1.8073690	1.0328760
C	-2.9210930	2.4423190	0.3009920
C	-2.6877610	2.8337640	-1.0188490
C	-1.4430920	2.5892890	-1.5945630
C	-0.4440680	1.9513830	-0.8605010
C	0.1737400	0.1601080	2.3645510
S	1.4750200	-1.7884980	-0.3017990
N	0.0115250	-1.4326480	-0.9780540
O	2.2240480	-2.4935640	-1.3373960
O	1.2495710	-2.4419730	0.9803290
C	-2.2898850	-0.8715420	-1.2877040
C	-1.3078060	-1.4275710	-0.4585130
C	-1.6681390	-1.9588500	0.7826140
C	-3.0023260	-1.9011440	1.1866460
C	-3.9833970	-1.3440690	0.3693610
C	-3.6168100	-0.8346840	-0.8763490
H	4.0370110	-1.0105950	-1.1180680
H	5.3846440	1.0552170	-0.8094660
H	4.4050470	2.9896240	0.4146680
H	2.1017160	2.8440050	1.3151910
H	-2.1268000	1.5216390	2.0599490
H	-3.8849980	2.6331690	0.7628610
H	-3.4676700	3.3293200	-1.5884640
H	-1.2461450	2.8908320	-2.6187690
H	0.5172980	1.7599010	-1.3288750
H	-0.8070400	0.0980570	2.8239180
H	0.9865960	-0.3584040	2.8618550
H	-2.0064370	-0.4494680	-2.2479590
H	-0.9204280	-2.4004690	1.4266200
H	-3.2707210	-2.3094340	2.1563710
H	-5.0174180	-1.3089620	0.6959500
H	-4.3614830	-0.3915990	-1.5303300
H	0.1070560	-1.1553200	-1.9501320

1aa$^{\bullet+}$

C	3.6128590	-0.2032430	-0.5817170
C	4.3109080	0.9958240	-0.5006570
C	3.7311110	2.0906310	0.1382800
C	2.4587750	1.9894480	0.6958420
C	1.7357870	0.7942240	0.6515740
C	2.3445500	-0.2904930	-0.0008180
C	0.3731620	0.7561180	1.2720820
C	-0.7203770	1.4736660	0.5558440
C	-1.9610370	1.7120090	1.1690550
C	-2.9907190	2.3402670	0.4754980
C	-2.8034870	2.7570360	-0.8447200
C	-1.5744810	2.5407600	-1.4616180
C	-0.5441750	1.9048870	-0.7686710
C	0.2135460	0.1165990	2.4381000
S	1.5630990	-1.8829670	-0.1447980
N	0.0810390	-1.4743110	-0.9691030
O	2.2816050	-2.6647630	-1.1283340
O	1.1996090	-2.4547660	1.1324730
C	-2.1447670	-0.8608440	-1.4828300
C	-1.1963600	-1.4197680	-0.5546280
C	-1.6381350	-1.8733720	0.7353160
C	-2.9529010	-1.7011080	1.0794820
C	-3.8644840	-1.0991310	0.1820770
C	-3.4487080	-0.6962510	-1.1076890
H	4.0371000	-1.0623200	-1.0882550
H	5.2984400	1.0727250	-0.9410150
H	4.2692120	3.0305030	0.2003380
H	2.0059480	2.8486880	1.1815140
H	-2.1282260	1.4172740	2.1999210
H	-3.9406830	2.5134720	0.9715580
H	-3.6074700	3.2504530	-1.3810980
H	-1.4116170	2.8622450	-2.4853350
H	0.4056880	1.7436890	-1.2711680
H	-0.7445840	0.0633250	2.9445920
H	1.0498910	-0.3837200	2.9140580
H	-1.8009100	-0.5501950	-2.4642480

H	-0.9361230	-2.3376550	1.4124450
H	-3.2991810	-2.0300110	2.0524300
H	-4.8968930	-0.9577380	0.4812500
H	-4.1603380	-0.2500960	-1.7922900
H	0.2712480	-1.1829930	-1.9295050

Bu_4NOAc

C	3.0880370	-1.5596870	-0.3708180
O	3.3265430	-0.3432660	-0.1404180
O	2.0000030	-2.0164320	-0.8209370
C	4.1845740	-2.5746880	-0.0322670
H	4.1539740	-3.4254070	-0.7160920
H	5.1725140	-2.1109290	-0.0506180
H	4.0042240	-2.9533100	0.9800980
C	-0.7917630	-0.5645490	-1.3697010
H	0.0284800	-1.2869350	-1.3127310
H	-0.7552770	-0.0871950	-2.3536650
C	-2.1568790	-1.2250320	-1.2218000
H	-2.9604340	-0.4937260	-1.3701170
H	-2.2955750	-1.6706350	-0.2339760
C	-2.2894840	-2.3256230	-2.2792740
H	-1.4991470	-3.0699270	-2.1235460
H	-2.1255940	-1.8968820	-3.2755480
C	-3.6568220	-3.0032460	-2.2278360
H	-4.4579830	-2.2794530	-2.4088680
H	-3.7364940	-3.7901490	-2.9823300
H	-3.8297980	-3.4575150	-1.2469460
C	-1.5461830	1.4974290	-0.1438280
H	-1.0808840	2.4496150	0.1120240
H	-2.0462130	1.6233490	-1.1102430
C	-2.5490080	1.1337000	0.9455880
H	-2.0539490	1.1420010	1.9235450
H	-2.9573430	0.1335360	0.7949410
C	-3.7069740	2.1406640	0.9627170
H	-4.2397810	2.0939340	0.0046950
H	-4.4182750	1.8165070	1.7288940
C	-3.2782030	3.5807100	1.2487360
H	-4.1517180	4.2217610	1.3924350
H	-2.6700860	3.6319620	2.1585720
N	-0.4070010	0.5339110	-0.3888640
C	0.7100730	1.2975620	-1.1006760
H	1.4000770	0.5247150	-1.4521310
H	0.2320120	1.7924490	-1.9518780
C	1.4932060	2.2977560	-0.2636430
H	0.8437380	3.0322340	0.2272020
H	2.0613980	1.7682430	0.5054220
C	2.4837620	3.0333700	-1.1708390
H	1.9363710	3.5863670	-1.9442460
H	3.1054920	2.2914770	-1.6858800
C	3.3736310	3.9905640	-0.3814970
H	4.0749420	4.5122700	-1.0381620
H	2.7734250	4.7445110	0.1384940
H	3.9549850	3.4467210	0.3699460
C	0.2018300	-0.0204610	0.8908550
H	1.2433030	-0.2253730	0.6340910
H	0.1728240	0.7989130	1.6152440
C	-0.3913480	-1.2914230	1.4794860
H	-0.3428370	-2.0977550	0.7400050
H	-1.4337700	-1.1686320	1.7890680
C	0.4515220	-1.7012030	2.6907750
H	1.4946430	-1.8210080	2.3712540
H	0.4394010	-0.8961340	3.4361770
C	-0.0485010	-2.9980920	3.3226930
H	-0.0146910	-3.8197450	2.6000200
H	0.5630650	-3.2807830	4.1835910
H	-1.0835760	-2.8928850	3.6637560
H	-2.6936390	4.0075210	0.4283510

I

C	-0.5799300	-3.1811470	1.1180160
C	0.2270410	-3.2573640	2.2505780
C	0.0599830	-2.3343130	3.2808220
C	-0.9150260	-1.3452520	3.1758020
C	-1.7437500	-1.2518220	2.0525750
C	-1.5521430	-2.1842790	1.0236940
C	-2.7842480	-0.1766530	2.0286740
C	-2.3277650	1.2138020	1.7627310
C	-3.0143430	2.3122110	2.3015320
C	-2.6362280	3.6148090	1.9851600
C	-1.5618730	3.8450170	1.1240070

C	-0.8611060	2.7603030	0.5990160	C	3.5434790	2.4551740	-1.1212090
C	-1.2285860	1.4573340	0.9273480	H	4.5976110	2.2932280	-1.3751830
C	-4.0626810	-0.4868310	2.2732220	H	3.5060240	2.8433810	-0.1002410
S	-2.5847370	-2.2175110	-0.4512180	C	2.9686070	3.5092230	-2.0739870
N	-2.6519290	-0.6901860	-0.9958380	H	1.9140350	3.6843880	-1.8281070
O	-1.8232350	-3.0041330	-1.4261780	H	2.9890420	3.1216620	-3.0996080
O	-3.9137630	-2.7032110	-0.0769710	C	3.7402530	4.8246190	-1.9998740
C	-3.4109460	1.4925800	-1.5519320	H	4.7902920	4.6762320	-2.2715110
C	-3.7344110	0.2082210	-1.0808170	H	3.3178600	5.5685330	-2.6801680
C	-5.0661540	-0.0808510	-0.7550310	H	3.7103010	5.2378510	-0.9865520
C	-6.0388010	0.9117400	-0.8829560	C	4.6333760	-0.2312600	-0.3501950
C	-5.7183410	2.1882930	-1.3402400	H	4.7847710	-1.2983000	-0.1878050
C	-4.3933440	2.4682390	-1.6792990	H	5.0259210	0.0119770	-1.3431250
H	-0.4658630	-3.8862780	0.3016230	C	5.3814930	0.5346760	0.7345220
H	0.9812870	-4.0344370	2.3269250	H	5.0552460	0.1938390	1.7242020
H	0.6848210	-2.3835380	4.1668910	H	5.1888410	1.6067060	0.6744610
H	-1.0495090	-0.6252730	3.9789100	C	6.8926440	0.2998430	0.6002530
H	-3.8450980	2.1454750	2.9807870	H	7.2326750	0.6857860	-0.3687760
H	-3.1797480	4.4512120	2.4135930	H	7.3901930	0.9032180	1.3658960
H	-1.2724470	4.8596510	0.8688320	C	7.3160620	-1.1616780	0.7557980
H	-0.0360770	2.9275620	-0.0882660	H	8.4049740	-1.2437060	0.8005420
H	-0.6900150	0.6264900	0.4775050	H	6.9086160	-1.5887700	1.6787180
H	-4.8429760	0.2675950	2.2575680	N	3.1338120	-0.0455760	-0.4479260
H	-4.3607610	-1.5133550	2.4602590	C	2.5775490	-1.2293850	-1.2419120
H	-2.3763640	1.7148460	-1.7981880	H	1.5478790	-0.9456030	-1.4763280
H	-5.3377060	-1.0640530	-0.3968410	H	3.1460140	-1.2465370	-2.1758040
H	-7.0650930	0.6717650	-0.6204680	C	2.6163810	-2.5974610	-0.5781080
H	-6.4856480	2.9495530	-1.4354250	H	3.6417200	-2.9585400	-0.4411210
H	-4.1162150	3.4543410	-2.0404030	H	2.1391600	-2.5789540	0.4067900
H	-1.6873430	-0.3512960	-1.3947170	C	1.8528210	-3.5841390	-1.4699990
C	-0.1563180	-0.0514870	-3.1440390	H	2.2609150	-3.5486720	-2.4876660
O	0.9242350	0.1901550	-3.7095990	H	0.8051830	-3.2630240	-1.5415310
O	-0.3577240	0.1025390	-1.8821520	C	1.9319020	-5.0137930	-0.9398380
C	-1.3334510	-0.5807530	-3.9558360	H	1.3408980	-5.6968240	-1.5555180
H	-2.2085270	0.0615970	-3.8111880	H	2.9665240	-5.3711710	-0.9339070
H	-1.0830180	-0.6277740	-5.0155450	H	1.5564710	-5.0773610	0.0875250
H	-1.6011950	-1.5770730	-3.5896900	C	2.4418370	-0.0360520	0.9024310
C	2.7515510	1.1663770	-1.2901560	H	1.4210370	-0.3871420	0.7056710
H	1.6784950	1.3074210	-1.1224630	H	2.9412300	-0.7936120	1.5140240
H	2.8370280	0.8338420	-2.3269170	C	2.3617630	1.2928480	1.6442610

H	1.7976410	2.0202060	1.0511030
H	3.3500430	1.7177150	1.8339750
C	1.6357690	1.0925680	2.9750600
H	0.6724680	0.6097970	2.7825310
H	2.2121280	0.4074660	3.6100930
C	1.3984440	2.4155620	3.6982150
H	0.7679740	3.0737940	3.0900750
H	0.8945840	2.2553830	4.6552970
H	2.3425310	2.9342150	3.8948920
H	6.9786110	-1.7812390	-0.0803340

II

C	0.5527190	3.2948980	1.3415210
C	0.7492210	3.5497380	2.6970490
C	1.7938120	2.9212830	3.3723600
C	2.6473580	2.0638150	2.6818950
C	2.4867420	1.8174720	1.3121820
C	1.4070670	2.4290080	0.6555800
C	3.4859890	0.9356390	0.6301320
C	3.5714770	-0.4810130	1.0725140
C	4.7619940	-1.2135180	0.9537290
C	4.8106940	-2.5581510	1.3125340
C	3.6726970	-3.1954550	1.8108590
C	2.4896890	-2.4715670	1.9536730
C	2.4432840	-1.1266640	1.5928730
C	4.2856930	1.4387580	-0.3185770
S	1.0058010	2.0706950	-1.0795310
N	0.8729280	0.5010070	-1.1595650
O	-0.3409320	2.6717630	-1.2422950
O	2.0460280	2.7140510	-1.9139010
C	1.6349880	-1.7256110	-1.4798070
C	1.7270850	-0.3630540	-1.8376830
C	2.6232830	-0.0329270	-2.8790970
C	3.3855000	-1.0207930	-3.5008420
C	3.2813030	-2.3636940	-3.1341170
C	2.3887410	-2.7058140	-2.1158940
H	-0.2777110	3.7420880	0.8059810
H	0.0781880	4.2207200	3.2236660
H	1.9477620	3.0985680	4.4320880
H	3.4660610	1.5757570	3.2044800
H	5.6611170	-0.7249400	0.5905620
H	5.7422570	-3.1070050	1.2137710
H	3.7112750	-4.2432600	2.0917440
H	1.5971490	-2.9615890	2.3334920
H	1.5138380	-0.5698570	1.6767150
H	5.0076890	0.8178780	-0.8399130
H	4.2027580	2.4746740	-0.6256600
H	0.9703690	-1.9939690	-0.6624680
H	2.7225820	1.0000200	-3.1865940
H	4.0689560	-0.7303590	-4.2947450
H	3.8764500	-3.1232820	-3.6306470
H	2.2850300	-3.7422480	-1.8030110
C	-2.0686950	-1.3045540	-1.2654870
H	-1.0230350	-0.9784700	-1.2535850
H	-2.4150490	-1.2828180	-2.3033020
C	-2.2364500	-2.7272010	-0.7453450
H	-3.2953270	-3.0028320	-0.6973860
H	-1.8186450	-2.8464750	0.2586580
C	-4.2703590	-0.5841070	-0.2825070
H	-4.8547430	0.3364900	-0.3174860
H	-4.5838290	-1.2030210	-1.1289750
C	-4.5644260	-1.2792300	1.0409250
H	-4.3269470	-0.6121690	1.8776510
H	-3.9708550	-2.1878550	1.1676570
N	-2.8391590	-0.1851780	-0.5773250
C	-2.8828880	0.9375270	-1.6157110
H	-1.8569180	1.0325990	-1.9818520
H	-3.5296030	0.5676710	-2.4173660
C	-3.3541380	2.2995810	-1.1283900
H	-4.3409470	2.2539840	-0.6532130
H	-2.6427430	2.7038310	-0.4037180
C	-2.1029560	0.3673750	0.6303700
H	-1.3236110	1.0123940	0.2153890
H	-2.8281250	0.9958010	1.1551350
C	-1.4510730	-0.6131640	1.5963350
H	-0.6360770	-1.1465940	1.0908650
H	-2.1545960	-1.3582680	1.9752890
C	-0.8774280	0.1813230	2.7760530
H	-0.0646710	0.8257810	2.4178740
H	-1.6505000	0.8544180	3.1690670

C	-0.3767250	-0.7180760	3.9034220	C	-0.9774970	-1.3134430	3.1141870
H	0.3926030	-1.4110240	3.5500400	C	-1.8487190	-1.2413920	2.0237500
H	0.0580560	-0.1237830	4.7120620	C	-1.6430910	-2.1465500	0.9720460
H	-1.1958640	-1.3126960	4.3205530	C	-2.9326100	-0.2088120	2.0382550
C	-6.0504190	-1.6445540	1.1010940	C	-2.5424790	1.1915050	1.7159520
H	-6.6552710	-0.7420280	0.9508680	C	-3.3688530	2.2733630	2.0566240
H	-6.2885660	-2.3247630	0.2741760	C	-3.0382810	3.5708490	1.6768020
C	-6.4202380	-2.2989770	2.4301940	C	-1.8704920	3.8186800	0.9533060
H	-6.2152550	-1.6240400	3.2671840	C	-1.0303270	2.7561590	0.6257230
H	-7.4810580	-2.5603590	2.4593930	C	-1.3585550	1.4578680	1.0115530
H	-5.8421510	-3.2151140	2.5874940	C	-4.1822230	-0.5821510	2.3406610
C	-3.4155350	3.2564280	-2.3226210	S	-2.7315930	-2.2318070	-0.4500320
H	-2.4411270	3.2504500	-2.8240070	N	-2.7152800	-0.6487070	-0.9918330
H	-4.1566630	2.8956760	-3.0464830	O	-2.0274880	-2.9850480	-1.4884410
C	-3.7612350	4.6787350	-1.8887810	O	-4.0451870	-2.7169370	-0.0329160
H	-3.0037700	5.0653160	-1.1990130	C	-3.4288880	1.5032870	-1.5543300
H	-3.8114780	5.3537510	-2.7472180	C	-3.7566900	0.1839840	-1.0702340
H	-4.7292560	4.7094830	-1.3777150	C	-5.1233070	-0.0872210	-0.7063880
C	-1.5399760	-3.6994230	-1.7049760	C	-6.0626420	0.9131520	-0.8051210
H	-2.0271170	-3.6427940	-2.6860440	C	-5.7114490	2.1979200	-1.2614420
H	-0.4995430	-3.3906290	-1.8546860	C	-4.3866990	2.4826370	-1.6403400
C	-1.5841140	-5.1350280	-1.1870710	H	-0.4970210	-3.7764300	0.1689950
H	-2.6170450	-5.4672630	-1.0400440	H	1.0112740	-3.8975930	2.1545080
H	-1.1056110	-5.8221240	-1.8897680	H	0.6969500	-2.2995300	4.0316600
H	-1.0644790	-5.2181910	-0.2270080	H	-1.1147740	-0.6130910	3.9336660
				H	-4.2743720	2.1052670	2.6309520
AcOH				H	-3.6933770	4.3920760	1.9500440
O	-0.7877270	-1.0278940	0.0002030	H	-1.6167800	4.8301880	0.6528520
C	-0.0886900	0.1202780	-0.0001130	H	-0.1243580	2.9361150	0.0537230
C	1.3916790	-0.1213380	0.0000060	H	-0.7026910	0.6380700	0.7275170
O	-0.6300190	1.2040600	-0.0003130	H	-5.0068330	0.1233230	2.3566410
H	-1.7341000	-0.8106380	0.0003080	H	-4.4122050	-1.6195940	2.5593650
H	1.6654660	-0.7022130	0.8837110	H	-2.3967870	1.7062550	-1.8223850
H	1.6652690	-0.7057610	-0.8813930	H	-5.3953680	-1.0704070	-0.3495040
H	1.9181840	0.8306040	-0.0018650	H	-7.0899680	0.7086890	-0.5241670
				H	-6.4689550	2.9715820	-1.3233390
A′				H	-4.1214080	3.4736170	-1.9913660
C	-0.6187310	-3.0933410	1.0036260	H	-1.1559800	-0.1929220	-1.5535040
C	0.2221530	-3.1537250	2.1124280	C	-0.0836360	-0.1151440	-3.1816110
C	0.0430550	-2.2605470	3.1664480	O	0.9845100	0.1475340	-3.6943810

O	-0.2520440	0.0971870	-1.8679360	C	2.0386790	-5.0035050	-0.9109950
C	-1.2647900	-0.6846550	-3.9227920	H	1.4848700	-5.6869350	-1.5594210
H	-2.1125650	0.0047640	-3.8604640	H	3.0626560	-5.3781560	-0.8183160
H	-0.9963390	-0.8398720	-4.9659290	H	1.5823550	-5.0419250	0.0841070
H	-1.5697700	-1.6285340	-3.4607650	C	2.5285370	-0.0171590	0.8840880
C	2.9571280	1.1611030	-1.3026060	H	1.5200090	-0.3729970	0.6402820
H	1.8798420	1.3141410	-1.1866010	H	2.9977150	-0.7664650	1.5284990
H	3.1083790	0.8210220	-2.3296290	C	2.4106710	1.3195490	1.6068950
C	3.7370000	2.4529910	-1.1025070	H	1.8533000	2.0336470	0.9899970
H	4.8002410	2.2934660	-1.3153300	H	3.3881510	1.7595100	1.8153390
H	3.6570940	2.8378450	-0.0834340	C	1.6620670	1.1250160	2.9269530
C	3.1916480	3.5072380	-2.0723300	H	0.7053690	0.6303000	2.7285760
H	2.1306110	3.6821500	-1.8552960	H	2.2356480	0.4518470	3.5766140
H	3.2430090	3.1215860	-3.0976790	C	1.4070460	2.4527070	3.6354240
C	3.9622570	4.8216170	-1.9736490	H	0.7880120	3.1076180	3.0125190
H	5.0191710	4.6729170	-2.2161320	H	0.8853470	2.2975780	4.5834630
H	3.5594140	5.5667240	-2.6642090	H	2.3465620	2.9733000	3.8467950
H	3.9038590	5.2328970	-0.9609100	H	7.0931000	-1.8024890	0.1854700
C	4.7836340	-0.2321240	-0.2486700				
H	4.9195870	-1.2976010	-0.0636370	**A″**			
H	5.2297060	-0.0035190	-1.2220580	C	-0.4307930	-3.2265440	1.2536930
C	5.4748120	0.5454660	0.8649030	C	-0.5178710	-3.5044180	2.6146740
H	5.0891670	0.2249110	1.8398500	C	-1.5338880	-2.9251650	3.3730530
H	5.2988010	1.6182530	0.7754290	C	-2.4746660	-2.0939320	2.7680050
C	6.9886830	0.2921530	0.8220690	C	-2.4354380	-1.8279480	1.3949330
H	7.3887190	0.6567360	-0.1320560	C	-1.3811950	-2.3941140	0.6607870
H	7.4468230	0.9049650	1.6044110	C	-3.5215510	-0.9992050	0.7784400
C	7.3855610	-1.1703580	1.0291220	C	-3.5620640	0.4567880	1.0889400
H	8.4687780	-1.2616960	1.1409410	C	-4.6788270	1.2420860	0.7612090
H	6.9191240	-1.5761150	1.9335310	C	-4.6830290	2.6127680	0.9981520
N	3.2899800	-0.0432360	-0.4294470	C	-3.5755150	3.2326080	1.5800020
C	2.7761970	-1.2354410	-1.2371630	C	-2.4666040	2.4638920	1.9247080
H	1.7626140	-0.9558190	-1.5293950	C	-2.4611590	1.0909500	1.6816400
H	3.3943970	-1.2688480	-2.1384980	C	-4.4097650	-1.6115700	-0.0157880
C	2.7628050	-2.5959330	-0.5565850	S	-1.1512630	-2.0652270	-1.0887110
H	3.7753050	-2.9677880	-0.3672670	N	-1.0741270	-0.3997750	-1.0619260
H	2.2407500	-2.5561800	0.4042140	O	0.2058300	-2.5062900	-1.4296360
C	2.0280890	-3.5836900	-1.4715940	O	-2.2405090	-2.6509080	-1.8715240
H	2.4928250	-3.5782630	-2.4648660	C	-1.7168240	1.8183270	-1.3667480
H	0.9939160	-3.2402790	-1.6097010	C	-1.9420040	0.4245130	-1.6544460

C	-3.0553440	0.0837000	-2.5025510	H	1.3285550	-0.9591860	0.1238010
C	-3.8679220	1.0809470	-2.9932260	H	2.8374730	-1.0457580	1.0457320
C	-3.6297160	2.4327480	-2.6831110	C	1.5620560	0.6322690	1.5327290
C	-2.5431930	2.7943250	-1.8672530	H	0.7626990	1.2162180	1.0581300
H	0.3720240	-3.6372810	0.6503200	H	2.3095650	1.3346610	1.9074510
H	0.2148340	-4.1546310	3.0800300	C	0.9725420	-0.1484860	2.7128580
H	-1.5985290	-3.1223380	4.4380750	H	0.1365240	-0.7631170	2.3567100
H	-3.2693240	-1.6487460	3.3601090	H	1.7235830	-0.8503350	3.0970180
H	-5.5598590	0.7841590	0.3237990	C	0.5107870	0.7637540	3.8462790
H	-5.5576840	3.1985890	0.7329620	H	-0.2166250	1.5021840	3.4954170
H	-3.5806810	4.3020160	1.7649600	H	0.0395810	0.1849350	4.6454080
H	-1.5974750	2.9367120	2.3730650	H	1.3568420	1.3100660	4.2744680
H	-1.5812400	0.5061430	1.9340560	C	6.2043360	1.4266000	0.9997280
H	-5.2156570	-1.0759220	-0.5064310	H	6.7504650	0.4880250	0.8464420
H	-4.3340970	-2.6749750	-0.2132310	H	6.4802950	2.0913010	0.1721470
H	-0.8942560	2.0617970	-0.7020170	C	6.6200670	2.0553500	2.3275910
H	-3.2472050	-0.9531090	-2.7400250	H	6.3772170	1.3939000	3.1651360
H	-4.7077400	0.8193040	-3.6279440	H	7.6953050	2.2490140	2.3513910
H	-4.2898280	3.1989530	-3.0750080	H	6.1019840	3.0061210	2.4878050
H	-2.3680680	3.8362810	-1.6215090	C	3.2723710	-3.2802080	-2.4672760
C	2.1844760	1.3334300	-1.3253860	H	2.3026000	-3.2089750	-2.9731860
H	1.1220660	1.0693720	-1.2969350	H	4.0356950	-2.9553970	-3.1844210
H	2.5036000	1.3084220	-2.3711420	C	3.5291570	-4.7265970	-2.0517120
C	2.4341440	2.7371400	-0.7885430	H	2.7483120	-5.0759150	-1.3681130
H	3.5035370	2.9717050	-0.8139440	H	3.5393760	-5.3907910	-2.9196380
H	2.0958930	2.8481490	0.2451140	H	4.4925660	-4.8232620	-1.5406960
C	4.3566230	0.4842790	-0.3770370	C	1.7030200	3.7539280	-1.6726910
H	4.8865420	-0.4683430	-0.4211880	H	2.0724640	3.6690720	-2.7015560
H	4.6975630	1.0881860	-1.2234200	H	0.6330340	3.5170070	-1.7060660
C	4.6976980	1.1548620	0.9473130	C	1.8967480	5.1822310	-1.1690650
H	4.4254130	0.5000180	1.7830120	H	2.9583580	5.4481560	-1.1508690
H	4.1633360	2.0987960	1.0797930	H	1.3803460	5.8990660	-1.8122510
N	2.9015760	0.1648500	-0.6659710	H	1.5040580	5.2942660	-0.1535680
C	2.8857230	-0.9410370	-1.7242640				
H	1.8630550	-0.9641370	-2.1090350	**A**			
H	3.5600350	-0.5975770	-2.5143860	C	3.0031580	-1.9660170	-0.9207920
C	3.2692200	-2.3380260	-1.2593530	C	4.2334540	-1.3195490	-0.8425470
H	4.2563970	-2.3590540	-0.7842640	C	4.3413870	-0.1240850	-0.1344300
H	2.5395600	-2.7108300	-0.5356230	C	3.2236830	0.4212390	0.4930290
C	2.1472370	-0.3647820	0.5400570	C	1.9791680	-0.2149560	0.4444760

C	1.8955560	-1.4148740	-0.2771740
C	0.8152140	0.4203510	1.1427440
C	0.1958980	1.6102840	0.4940000
C	-0.7533600	2.3981520	1.1644600
C	-1.3630160	3.4759230	0.5309050
C	-1.0336410	3.7989200	-0.7869820
C	-0.0853300	3.0331740	-1.4609660
C	0.5224520	1.9504660	-0.8268780
C	0.4010830	-0.0974630	2.3059260
S	0.3671180	-2.3445050	-0.4120910
N	-0.6214090	-1.2059570	-1.1137440
O	0.5678290	-3.3718270	-1.4361760
O	-0.0373470	-2.8172620	0.9157170
C	-2.3597180	0.3137650	-1.3925600
C	-1.7277870	-0.6899670	-0.5743690
C	-2.3208650	-0.9947300	0.7017930
C	-3.4448880	-0.3114440	1.1100570
C	-4.0291280	0.6780810	0.2984080
C	-3.4809620	0.9807140	-0.9594440
H	2.8899480	-2.8883510	-1.4795150
H	5.0988140	-1.7461840	-1.3379090
H	5.2959160	0.3882610	-0.0722530
H	3.3054340	1.3590330	1.0352890
H	-1.0198120	2.1766520	2.1927930
H	-2.0966480	4.0678330	1.0696800
H	-1.5101480	4.6407070	-1.2794410
H	0.1803710	3.2709510	-2.4863540
H	1.2439750	1.3522990	-1.3752640
H	-0.4381540	0.3119210	2.8585800
H	0.8863210	-0.9729930	2.7230080
H	-1.9022610	0.5307150	-2.3517430
H	-1.8694350	-1.7477180	1.3324360
H	-3.8843850	-0.5379080	2.0757700
H	-4.9094180	1.2079220	0.6464820
H	-3.9345970	1.7446060	-1.5814820

TS_{A-B}

C	3.4954460	-0.1356500	-0.3139050
C	4.2921880	1.0038400	-0.2618090
C	3.7397000	2.2186150	0.1460480
C	2.3962720	2.2931110	0.4923950
C	1.5744760	1.1547260	0.4735500
C	2.1541570	-0.0587420	0.0573740
C	0.1497700	1.2496800	0.8339270
C	-0.6617660	2.3620290	0.3221510
C	-1.7968600	2.7965630	1.0302850
C	-2.5939370	3.8210350	0.5321300
C	-2.2756100	4.4286230	-0.6841240
C	-1.1523980	4.0074400	-1.3972290
C	-0.3478360	2.9881090	-0.8977380
C	-0.4356540	0.1757180	1.4683870
S	1.2907500	-1.6292800	0.0004280
N	-0.2642340	-1.1306750	-0.2602150
O	1.7552830	-2.3609260	-1.1827540
O	1.5032900	-2.2986160	1.2928890
C	-2.5197960	-1.6073350	-0.7782850
C	-1.3037320	-2.0582810	-0.2213830
C	-1.2410700	-3.3551740	0.3312940
C	-2.3634540	-4.1752710	0.2919050
C	-3.5624220	-3.7212140	-0.2614440
C	-3.6364270	-2.4295550	-0.7923200
H	3.9056830	-1.0807180	-0.6555160
H	5.3366160	0.9434690	-0.5475300
H	4.3559930	3.1103410	0.1880040
H	1.9647970	3.2408160	0.7998280
H	-2.0355450	2.3463620	1.9891540
H	-3.4594650	4.1522810	1.0965780
H	-2.8983700	5.2282420	-1.0721000
H	-0.9047830	4.4705920	-2.3467990
H	0.5147260	2.6552420	-1.4667810
H	-1.5121640	0.1425020	1.6047660
H	0.1502320	-0.5121180	2.0692460
H	-2.5529970	-0.6048480	-1.1946940
H	-0.3229030	-3.7135040	0.7820510
H	-2.3030260	-5.1765490	0.7060690
H	-4.4334120	-4.3679360	-0.2780470
H	-4.5646330	-2.0695800	-1.2240050

B

C	3.3727750	-0.2854540	-0.4841260

C	4.1807890	0.8381820	-0.6428470
C	3.6295710	2.1074380	-0.4398000
C	2.2901700	2.2613390	-0.1200220
C	1.4206850	1.1468080	0.0142530
C	2.0345680	-0.1248380	-0.1526030
C	0.0300530	1.2839880	0.3303850
C	-0.6721840	2.5686700	0.3454960
C	-1.6281180	2.8295260	1.3462600
C	-2.3357620	4.0269980	1.3637280
C	-2.1208370	4.9843600	0.3713350
C	-1.1950880	4.7306420	-0.6416500
C	-0.4772930	3.5386890	-0.6561550
C	-0.7765860	0.0640020	0.6959420
S	1.1363230	-1.6178720	0.1554670
N	-0.4230520	-1.0815930	-0.1704830
O	1.4886720	-2.6346470	-0.8295460
O	1.2745360	-1.9763440	1.5707160
C	-1.5653540	-2.7827840	-1.4799220
C	-1.3892500	-2.1507640	-0.2483880
C	-2.1365950	-2.5423100	0.8637790
C	-3.0751760	-3.5654100	0.7341130
C	-3.2522290	-4.2041420	-0.4925410
C	-2.4933190	-3.8142630	-1.5972440
H	3.7772650	-1.2838470	-0.6200200
H	5.2261890	0.7231850	-0.9052000
H	4.2571060	2.9884160	-0.5253720
H	1.9017210	3.2560420	0.0612280
H	-1.7998590	2.0980730	2.1310630
H	-3.0558490	4.2131320	2.1540720
H	-2.6765540	5.9163300	0.3819880
H	-1.0381010	5.4588850	-1.4309380
H	0.2124820	3.3380080	-1.4700430
H	-1.8375360	0.2550070	0.5256030
H	-0.6453040	-0.1910370	1.7606380
H	-0.9724620	-2.4575910	-2.3280360
H	-1.9894050	-2.0565040	1.8231900
H	-3.6613180	-3.8665220	1.5961890
H	-3.9811950	-5.0022260	-0.5886400
H	-2.6304680	-4.3067320	-2.5543640

D

C	3.2068090	0.3900260	-1.4448970
C	4.0144510	1.5256400	-1.4576110
C	3.5328130	2.7154700	-0.9214410
C	2.2535260	2.7672570	-0.3684490
C	1.4249460	1.6406110	-0.3267670
C	1.9357820	0.4525410	-0.8803510
C	0.0621680	1.7833620	0.2758900
C	-0.2392450	1.0455420	1.5313500
C	-1.5389600	0.6073980	1.8167670
C	-1.8167100	-0.0602930	3.0076080
C	-0.7997470	-0.2959160	3.9329610
C	0.4980420	0.1375190	3.6578240
C	0.7765590	0.7955150	2.4632950
C	-0.8159670	2.6258210	-0.2850110
S	1.0167340	-1.0843970	-0.9012910
N	-0.4446940	-0.5317500	-1.4716900
O	1.5945430	-1.9385140	-1.9429560
O	0.9709120	-1.6350860	0.4551110
C	-2.7608150	-0.3320340	-1.6165670
C	-1.6230600	-1.0224430	-1.0738910
C	-1.8580460	-2.1216560	-0.1781390
C	-3.1511610	-2.4777120	0.1413310
C	-4.2457040	-1.7732000	-0.3870050
C	-4.0412980	-0.6983720	-1.2694560
H	3.5489050	-0.5403810	-1.8851770
H	5.0061760	1.4771140	-1.8938430
H	4.1487580	3.6087430	-0.9324050
H	1.8798170	3.6955890	0.0523540
H	-2.3329120	0.7664690	1.0908850
H	-2.8263590	-0.4070430	3.2060340
H	-1.0155270	-0.8197010	4.8588580
H	1.2955600	-0.0444010	4.3713870
H	1.7923280	1.1167050	2.2482900
H	-1.7880040	2.8094950	0.1627360
H	-0.5802960	3.1473620	-1.2074650
H	-2.5658610	0.4946380	-2.2916360
H	-1.0193380	-2.6576660	0.2457010
H	-3.3241890	-3.3090080	0.8162840
H	-5.2547050	-2.0633360	-0.1144010

H	-4.8908380	-0.1606750	-1.6758740

TS_{D-E}

C	3.8681700	0.0088140	-0.5062220
C	4.6004960	1.1795300	-0.3195790
C	3.9944890	2.2982250	0.2551250
C	2.6571270	2.2611950	0.6500880
C	1.9132960	1.0920820	0.4797970
C	2.5404700	-0.0057980	-0.0995100
C	0.4735400	1.0050360	0.8980900
C	0.1624420	0.4712560	2.2481960
C	-1.1675070	0.3552190	2.6854580
C	-1.4565570	-0.1486270	3.9505140
C	-0.4249530	-0.5519920	4.7971740
C	0.8995040	-0.4530140	4.3688900
C	1.1910560	0.0494880	3.1046130
C	-0.3995940	1.9054330	0.2800930
S	1.5452260	-1.4624000	-0.2519820
N	0.0984780	-0.6729760	-0.3413770
O	1.8220170	-2.1236680	-1.5325500
O	1.7446720	-2.2927870	0.9446650
C	-2.2466840	-0.8007070	-0.6496850
C	-1.0999030	-1.3000070	0.0015570
C	-1.2510050	-2.2988980	0.9854630
C	-2.5178350	-2.8048780	1.2668380
C	-3.6454500	-2.3066440	0.6159460
C	-3.5055870	-1.2952050	-0.3412640
H	4.3094310	-0.8677390	-0.9703700
H	5.6383570	1.2221590	-0.6313420
H	4.5663320	3.2098980	0.3924200
H	2.1895650	3.1342980	1.0957480
H	-1.9887480	0.6380900	2.0336760
H	-2.4904810	-0.2347120	4.2688240
H	-0.6510600	-0.9443950	5.7835040
H	1.7083460	-0.7688800	5.0196260
H	2.2254680	0.1165340	2.7825970
H	-1.3942440	2.0968330	0.6615810
H	-0.1034480	2.3980430	-0.6383920
H	-2.1158540	-0.0246360	-1.3980420
H	-0.3834340	-2.6617940	1.5227830
H	-2.6239620	-3.5809200	2.0182340
H	-4.6292620	-2.6987190	0.8528170
H	-4.3794480	-0.9016570	-0.8503720

E

C	3.3937280	0.4993350	-1.4524440
C	4.0759970	1.6596900	-1.0982040
C	3.4210490	2.6829700	-0.4009680
C	2.0768690	2.5724580	-0.0514560
C	1.3836990	1.4169900	-0.4061410
C	2.0530780	0.4186890	-1.0928940
C	-0.0864320	1.1306730	-0.1074650
C	-0.3257580	0.8537550	1.3791810
C	-1.5888070	1.0759230	1.9356320
C	-1.8498720	0.7342790	3.2619510
C	-0.8504950	0.1601990	4.0458320
C	0.4110030	-0.0692160	3.4961740
C	0.6715340	0.2747970	2.1710270
C	-0.9301310	2.2472710	-0.6407150
S	0.9927270	-0.9684760	-1.3467120
N	-0.3667350	-0.0941630	-0.9310850
O	0.9024210	-1.3804860	-2.7466250
O	1.3069570	-2.0328870	-0.3885710
C	-2.6533540	-0.4977220	-1.6387020
C	-1.6014890	-0.8065410	-0.7748070
C	-1.7641610	-1.7663370	0.2286510
C	-2.9878050	-2.4206160	0.3580160
C	-4.0449380	-2.1078700	-0.4974990
C	-3.8789390	-1.1452820	-1.4938240
H	3.8830640	-0.3068620	-1.9889670
H	5.1214770	1.7707580	-1.3639910
H	3.9698230	3.5789700	-0.1306160
H	1.5754990	3.3699940	0.4889910
H	-2.3819090	1.5011720	1.3268250
H	-2.8363350	0.9118290	3.6783350
H	-1.0521350	-0.1068520	5.0783290
H	1.1954410	-0.5161250	4.0985310
H	1.6573590	0.0836680	1.7563350
H	-1.2112890	3.0698270	0.0040630
H	-0.9945430	2.3637180	-1.7154130
H	-2.4976890	0.2450290	-2.4146010

H	-0.9375820	-1.9863900	0.8970810
H	-3.1172700	-3.1687750	1.1332650
H	-4.9980260	-2.6155080	-0.3883860
H	-4.6988350	-0.9039560	-2.1622850

8. X-ray Crystallography

Crystals of **2ag** and **2ah** were recrystallized using the vapor diffusion method from $CHCl_3$ (inner) and hexane (outer). X-ray single crystal analysis was conducted with Rigaku VariMax with Saturn equipped with a Hypix-6000 as a detector. Graphite-monochromated Mo Kα radiation (λ = 0.71075 Å) was used. Details of the crystal data and a summary of the intensity data collection parameters are listed in Table S10 and Figures S28 and S29. The structure was solved with SHELXT and refined by full-matrix least-squares techniques against F^2 (SHELXL).[23] The non-hydrogen atoms were refined anisotropically. Hydrogen atoms were placed using AFIX instructions. Calculations were performed by using Olex2.[24]

Table S10. Crystal data and structure refinement for **2ag** and **2ah**

compound	**2ag**	**2ah**
Identification code	CCDC 2443897	CCDC 2443898
Empirical formula	$C_{20}H_{14}ClNO_2S$	$C_{20}H_{14}BrNO_2S$
Formula weight	367.83	412.29
Temperature/K	143	143
Crystal system	monoclinic	monoclinic
Space group	$P2_1/n$	$P2_1/n$
a/Å	13.2630(5)	13.3833(4)
b/Å	7.5605(3)	7.5806(3)
c/Å	17.4051(6)	17.5543(6)
α/°	90	90
β/°	104.751(4)	104.787(3)
γ/°	90	90
Volume/Å^3	1687.77(11)	1721.96(11)
Z	4	4
ρ_{calc}g/cm^3	1.448	1.590
μ/mm^{-1}	0.363	2.522
F(000)	760.0	832.0
Crystal size/mm^3	0.49 × 0.09 × 0.05	0.33 × 0.14 × 0.07
Radiation	Mo Kα (λ = 0.71073)	Mo Kα (λ = 0.71073)
2Θ range for data collection/°	6.938 to 59.512	7.086 to 59.198
Index ranges	$-18 \le h \le 17$ $-9 \le k \le 10$ $-23 \le l \le 23$	$-17 \le h \le 17$ $-9 \le k \le 10$ $-24 \le l \le 22$
Reflections collected	13280	13614
Independant reflections	4091 [R_{int} = 0.0362, R_{sigma} = 0.0383]	4133 [R_{int} = 0.0306, R_{sigma} = 0.0333]
Data/restraints/parameter	4091/0/226	4133/0/226
Goodness-of-fit on F^2	1.128	1.020
Final R indexes [I>=2σ (I)]	R_1 = 0.0587, wR_2 = 0.1546	R_1 = 0.0319, wR_2 = 0.0711
Final R indexes [all data]	R_1 = 0.0696, wR_2 = 0.1603	R_1 = 0.0403, wR_2 = 0.0738
Largest diff. peak/hole/ e Å^3	1.60/-0.42	0.52/-0.39

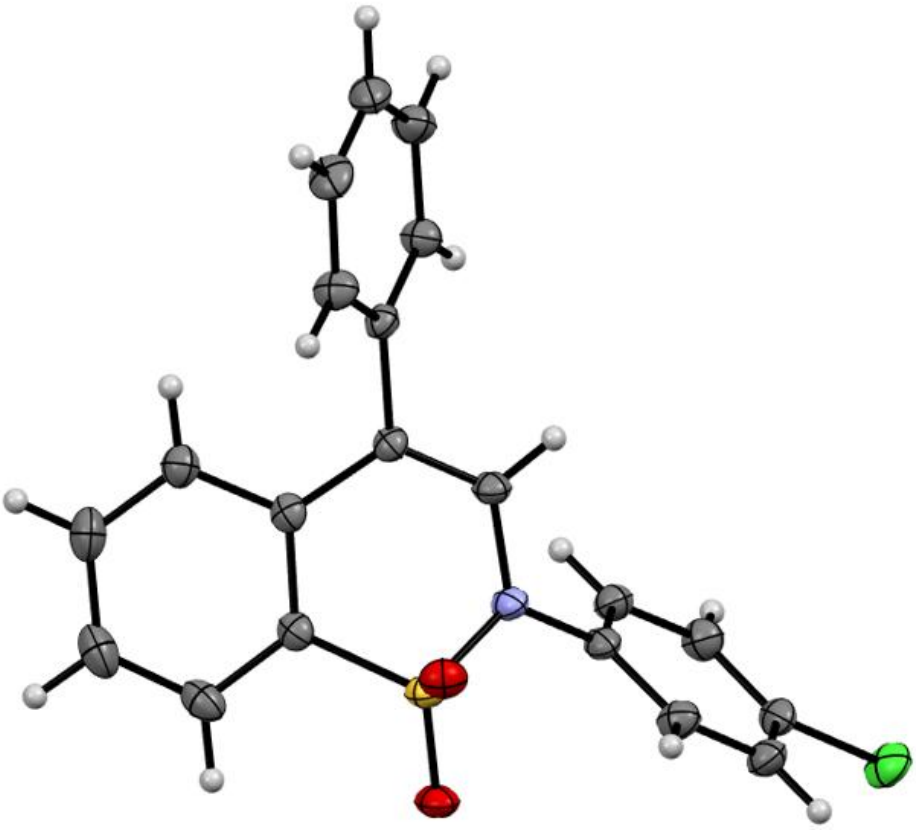


Figure S28. ORTEP drawing of **2ag** with 50% thermal ellipsoids.

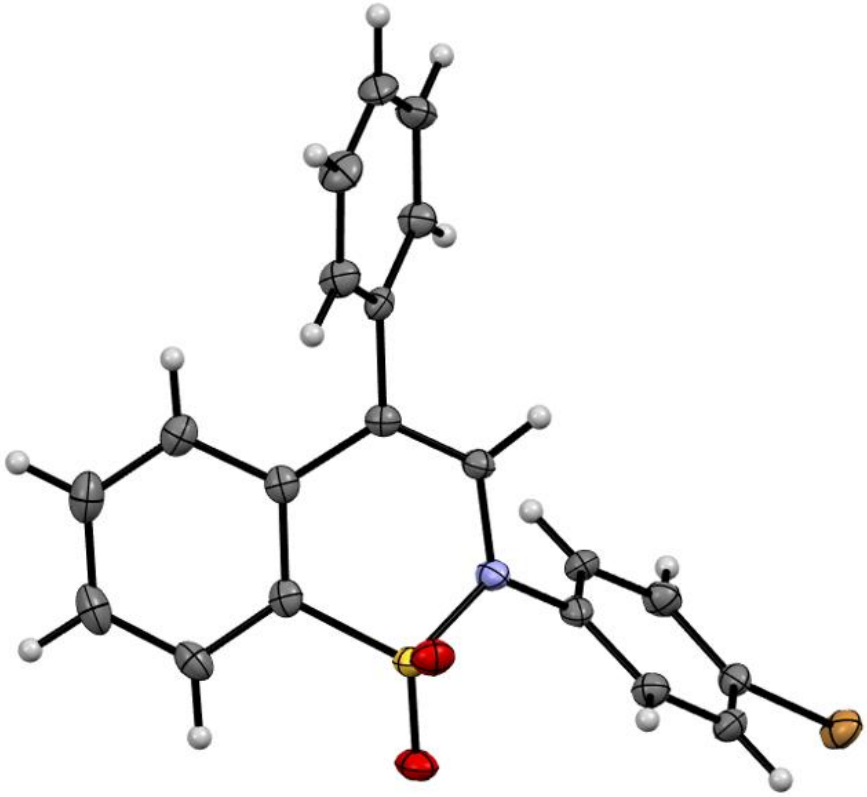


Figure S29. ORTEP drawing of **2ah** with 50% thermal ellipsoids.

9. References

(1) Hu, T.-J.; Zhang, G.; Chen, Y.-H.; Feng, C.-G.; Lin, G.-Q. Borylation of Olefin C–H Bond via Aryl to Vinyl Palladium 1,4-Migration. *J. Am. Chem. Soc.* **2016**, *138*, 2897–2900.

(2) Wei, D.; Hu, T.-J.; Feng, C.-G.; Lin, G.-Q. Synthesis of Substituted Naphthalenes by 1,4-Palladium Migration Involved Annulation with Internal Alkynes. *Chin. J. Chem.* **2018**, *36*, 743–748.

(3) Chang, X.; Ma, P.-L.; Chen, H.-C.; Li, C.-Y.; Wang, P. Asymmetric Synthesis and Application of Chiral Spirosilabiindanes. *Angew. Chem., Int. Ed.* **2020**, *59*, 8937–8940.

(4) Ye, Z.-H.; Gou, F.-H., Wu, Y.; Li, C.-Y.; Wang, P. Diverse Synthesis of Alkenylsilanes via Pd-Catalyzed Alkenyl C–H Silylation. *Org. Lett.* **2023**, *25*, 2145–2150.

(5) Hemric, B. N.; Shen, K.; Wang, Q. Copper-Catalyzed Amino Lactonization and Amino Oxygenation of Alkenes Using *O*-Benzoylhydroxylamines. *J. Am. Chem. Soc.* **2016**, *138*, 5813–5816.

(6) Lin, C.-K.; Prabhakar, C.; Yang, J.-S. *o*-Amino Conjugation Effect on the Photochemistry of *trans*-Aminostilbenes. *J. Phys. Chem. A* **2011**, *115*, 3233–3242.

(7) Maity, S.; Zheng, N. A Visible-Light-Mediated Oxidative C–N Bond Formation/Aromatization Cascade: Photocatalytic Preparation of *N*-Arylindoles. *Angew. Chem., Int. Ed.* **2012**, *51*, 9562–9566.

(8) Pan, Z.; Wang, S. Brethorst, J. T.; Douglas, C. J. Palladium and Lewis-Acid-Catalyzed Intramolecular Aminocyanation of Alkenes: Scope, Mechanism, and Stereoselective Alkene Difunctionalizations. *J. Am. Chem. Soc.* **2018**, *140*, 3331–3338.

(9) Kong, W.; Fuentes, N.; Garcia-Domínguez, A.; Merino, E.; Nevado, C. Stereoselective Synthesis of Highly Functionalized Indanes and Dibenzocycloheptadienes through Complex Radical Cascade Reactions. *Angew. Chem., Int. Ed.* **2015**, *54*, 2487–2491.

(10) Mitsuod, K.; Okumura, Y.; Yohena, K.; Kurimoto, Y.; Sato, E.; Suga, S. Electrochemical Synthesis of Sultone Derivatives via Dehydrogenative C–O Bond Formation. *Org. Lett.* **2023**, *25*, 3476–3481.

(11) Gao, F.; Hoveyda, A. H. α-Selective Ni-Catalyzed Hydroalumination of Aryl- and Alkyl-Substituted Terminal Alkynes: Practical Syntheses of Internal Vinyl Aluminums, Halides, or Boronates. *J. Am. Chem. Soc.* **2010**, *132*, 10961–10963.

(12) Němec, V.; Hylsová, M.; Maier, L.; Flegel, J.; Sievers, S.; Ziegler, S.; Schröder, M.; Berger, B.-T.; Chaikuad, A.; Valčíková, B.; Uldrijan, S.; Drápela, S.; Souček, K.; Waldmann, H.; Knapp, S.; Paruch, K. Furo[3,2-*b*]pyridine: A Privileged Scaffold for Highly Selective Kinase Inhibitors and Effective Modulators of the Hedgehog Pathway. *Angew. Chem., Int. Ed.* **2018**, *58*, 1062–1066.

(13) Liwosz, T. W.; Chemler, S. R. Copper-Catalyzed Oxidative Amination and Allylic Amination of Alkenes. *Chem. Eur. J.* **2013**, *19*, 12771–12777.

(14) Ji, X.-S.; Zuo, H.-D.; Shen, Y.-T.; Hao, W.-J.; Tu, S.-J.; Jiang, B. Electrochemical selective Annulative amino-ketallization and amino-oxygenation of 1,6-ethynes. *Chem. Commun.* **2022**, *58*, 10420–10423.

(15) Xia, W.; Yang, B.; Wang, J.; Li, B. Regioselective Ortho Olefination of Aryl Sulfonamide via Rhodium-Catalyzed Direct C–H Bond Activation. *J. Org. Chem.* **2014**, *79*, 8278–8287.

(16) Kim, S.; Chung, Y. K. Rhodium-Catalyzed Carbonylative [3 + 2 + 1] Cycloaddition of Alkyne-Tethered Alkylidenecyclopropanes to Phenols in the Presence of Carbon Monoxide. *Org. Lett.* **2014**, *16*, 4352–4355.

(17) Ohmatsu, K.; Fujimori, H.; Minami, K.; Nomura, K.; Kiyokawa, M.; Ooi, T. Thioamidate Ion as Effective Cocatalyst for Photoinduced C–H Alkylation via Multisite Proton-coupled Electron Transfer. *Chem. Lett.* **2022**, *51*, 445–447.

(18) Gaussian 16, Revision C.01, Frisch, M. J.; Trucks, G. W.; Schlegel, H. B.; Scuseria, G. E.; Robb, M. A.; Cheeseman, J. R.; Scalmani, G.; Barone, V.; Petersson, G. A.; Nakatsuji, H.; Li, X.; Caricato, M.; Marenich, A. V.; Bloino, J.; Janesko, B. G.; Gomperts, R.; Mennucci, B.; Hratchian, H. P.; Ortiz, J. V.; Izmaylov, A. F.; Sonnenberg, J. L.; Williams-Young, D.; Ding, F.; Lipparini, F.; Egidi, F.; Goings, J.; Peng, B.; Petrone, A.; Henderson, T.; Ranasinghe, D.; Zakrzewski, V. G.; Gao, J.; Rega, N.; Zheng, G.; Liang, W.; Hada, M.; Ehara, M.; Toyota, K.; Fukuda, R.; Hasegawa, J.; Ishida, M.; Nakajima, T.; Honda, Y.; Kitao, O.; Nakai, H.; Vreven, T.; Throssell, K.; Montgomery, J. A., Jr.; Peralta, J. E.; Ogliaro, F.; Bearpark, M. J.; Heyd, J. J.; Brothers, E. N.; Kudin, K. N.; Staroverov, V. N.; Keith, T. A.; Kobayashi, R.; Normand, J.; Raghavachari, K.; Rendell, A. P.; Burant, J. C.; Iyengar, S. S.; Tomasi, J.; Cossi, M.; Millam, J. M.; Klene, M.; Adamo, C.; Cammi, R.; Ochterski, J. W.; Martin, R. L.; Morokuma, K.; Farkas, O.; Foresman, J. B.; Fox, D. J. Gaussian, Inc., Wallingford CT, 2016.

(19) a) Zhao, Y.; Truhlar, D. G. The M06 suite of density functionals for main group thermochemistry, thermochemical kinetics, noncovalent interactions, excited states, and transition elements: two new functionals and systematic testing of four M06-class functionals and 12 other functionals. *Theor. Chem. Acc.* **2008**, *120*, 215–241. b) Zhao, Y.; Truhlar, D. G. Density Functionals with Broad Applicability in Chemistry. *Acc. Chem. Res.* **2008**, *41*, 157–167.

(20) a) Barone, V.; Cossi, M. Quantum Calculation of Molecular Energies and Energy Gradients in Solution by a Conductor Solvent Model. *J. Phys. Chem. A* **1998**, *102*, 1995–2001. b) Cossi, M.; Rega, G.; Scalmani, G.; Barone, V. *J. Comput. Chem.* **2003**, *24*, 669–681.

(21) Glendening, E. D.; Badenhoop, J. K.; Reed, A. E.; Carpenter, J. E.; Bohmann, J. A.; Morales, C. M.; Karafiglou, P.; Landis, C. R. *NBO 7.0.* Theoretical Chemistry Institute, University of Wisconsin, Madison, WI 2018.

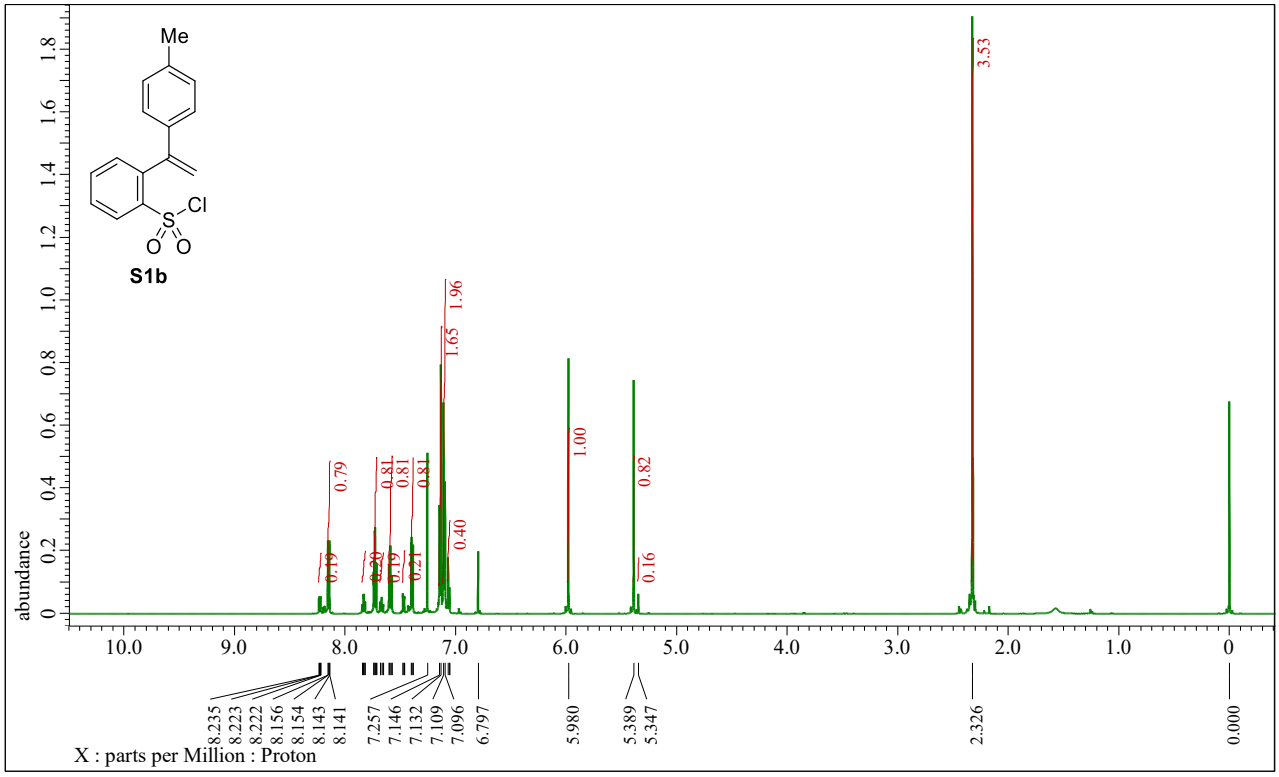
(22) CYL view20; Legault, Y. Université de Sherbrooke, 2020 (http://www.cylview.org).

(23) SHELX, Program for the Solution of Crystal Structures (a) Sheldrick, G. M. University of Göttingen: Göttingen, Germany, 2014. b) Sheldrick, G. M. A short history of SHELX. *Acta Cryst.* **2008**, *A64*, 112–122.

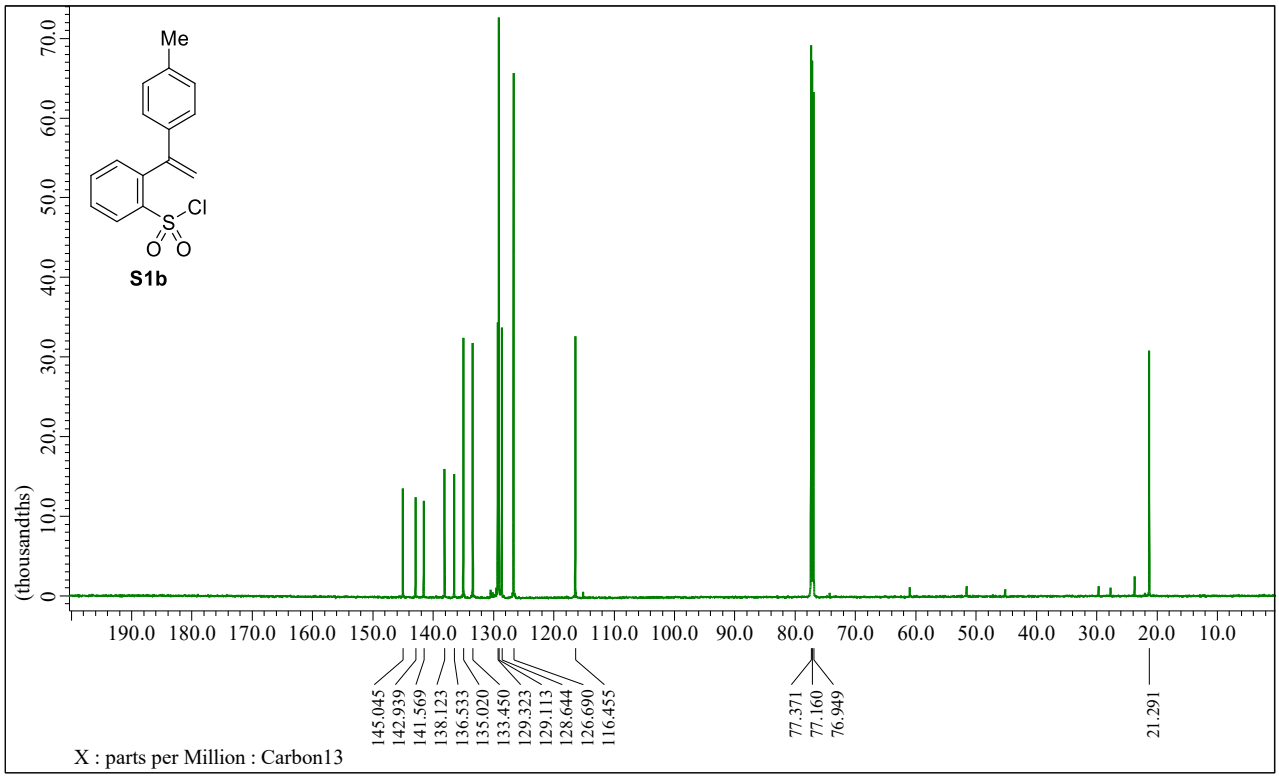
(24) Dolomanov, O. V.; Bourhis, L. J.; Gildea, R. J.; Howard, J. A. K.; Puschmann, H. *OLEX2*: a complete structure solution, refinement and analysis program. *J. Appl. Cryst.* **2009**, *42*, 339–341.

10. NMR Spectra

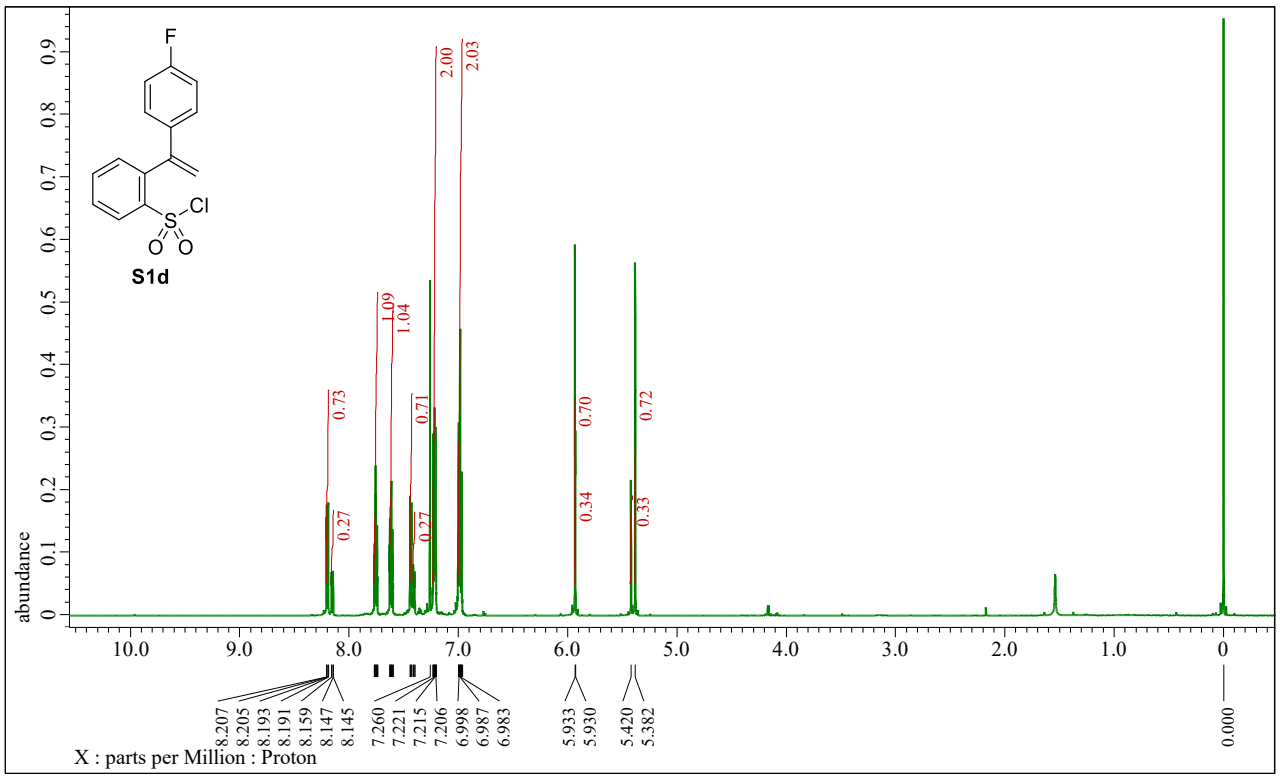
2-(1-(*p*-Tolyl)vinyl)benzenesulfonyl Chloride (S1b) ^{1}H NMR (600 MHz, $CDCl_3$)



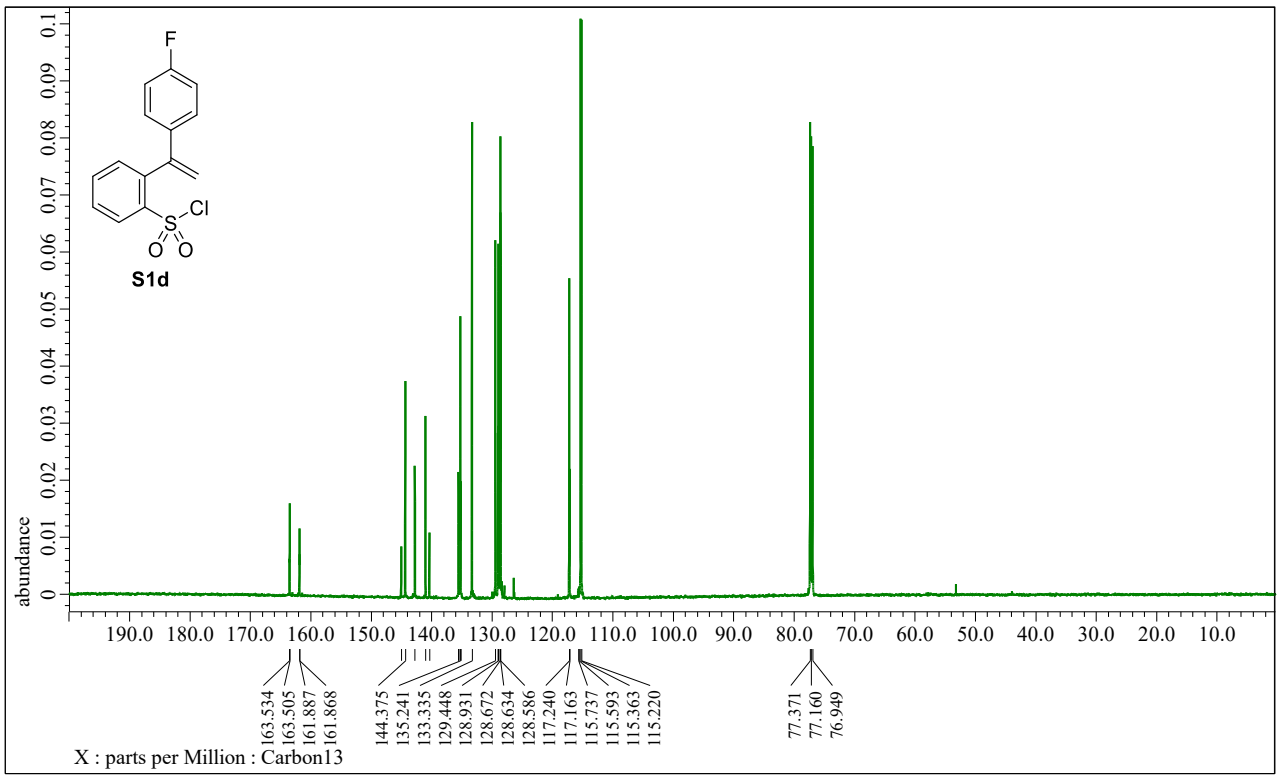
2-(1-(*p*-Tolyl)vinyl)benzenesulfonyl Chloride (S1b) ^{13}C NMR (150 MHz, $CDCl_3$)



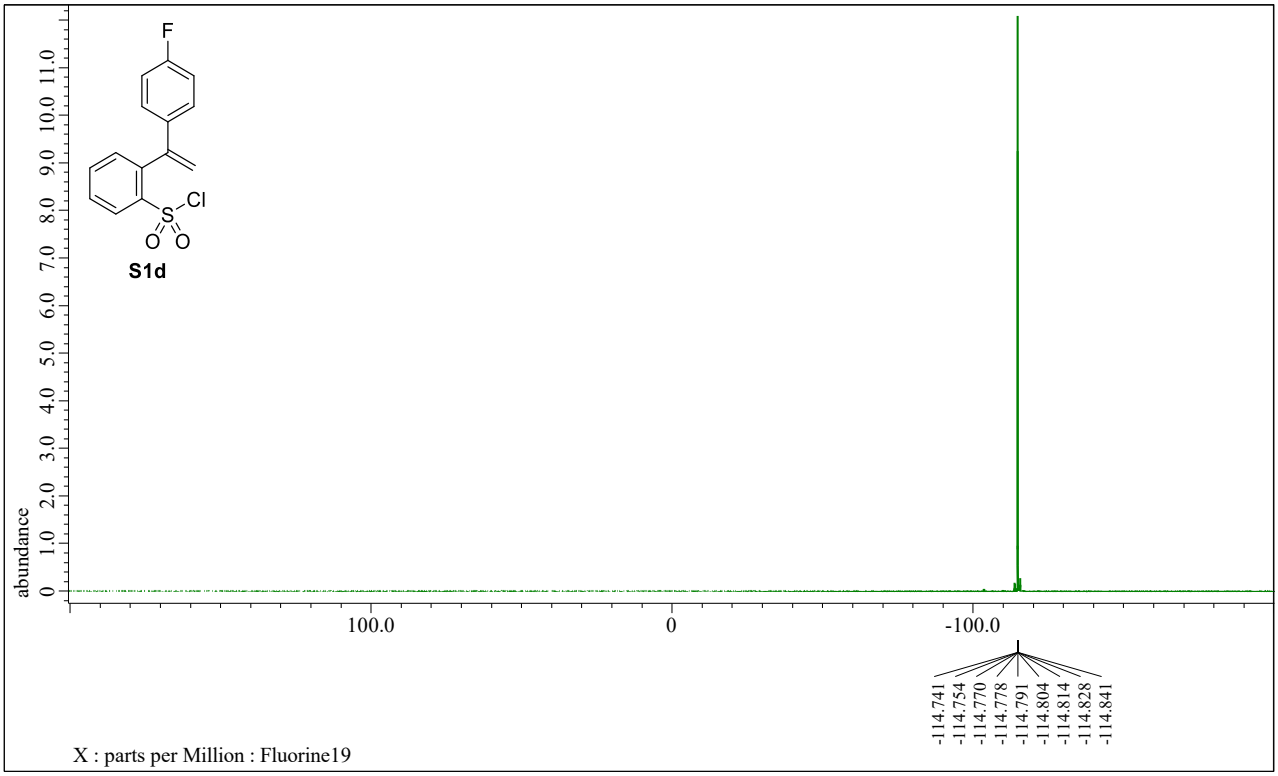
2-(1-(4-Fluorophenyl)vinyl)benzenesulfonyl Chloride (S1d) ^{1}H NMR (600 MHz, $CDCl_3$)



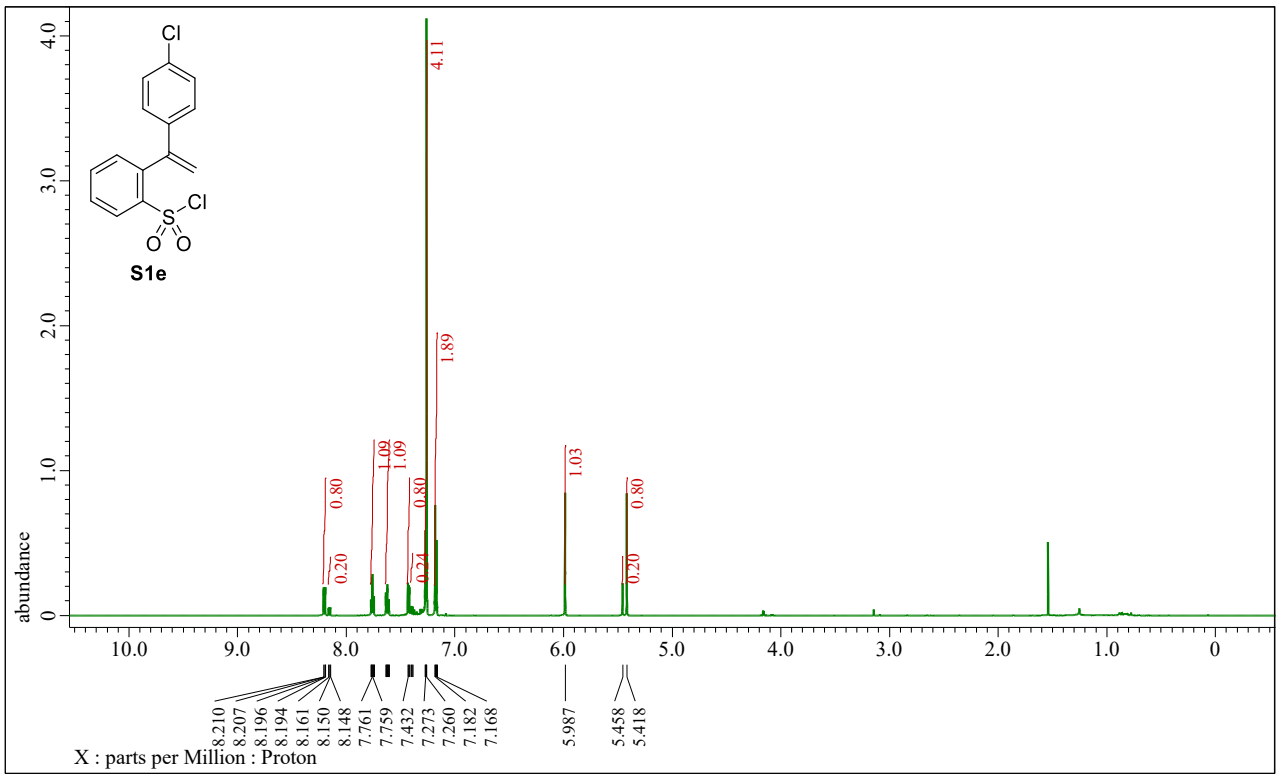
2-(1-(4-Fluorophenyl)vinyl)benzenesulfonyl Chloride (S1d) ^{13}C NMR (150 MHz, $CDCl_3$)



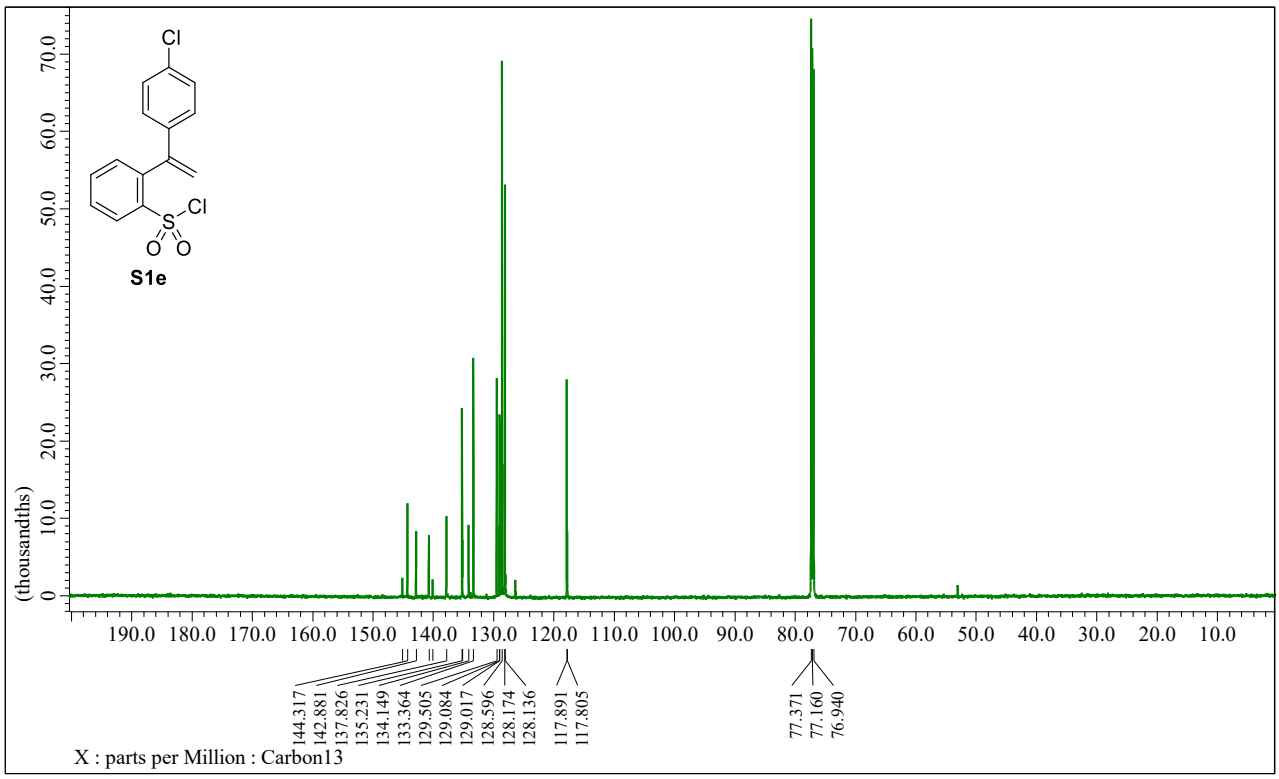
2-(1-(4-Fluorophenyl)vinyl)benzenesulfonyl Chloride (S1d) ^{19}F NMR (376 MHz, $CDCl_3$)



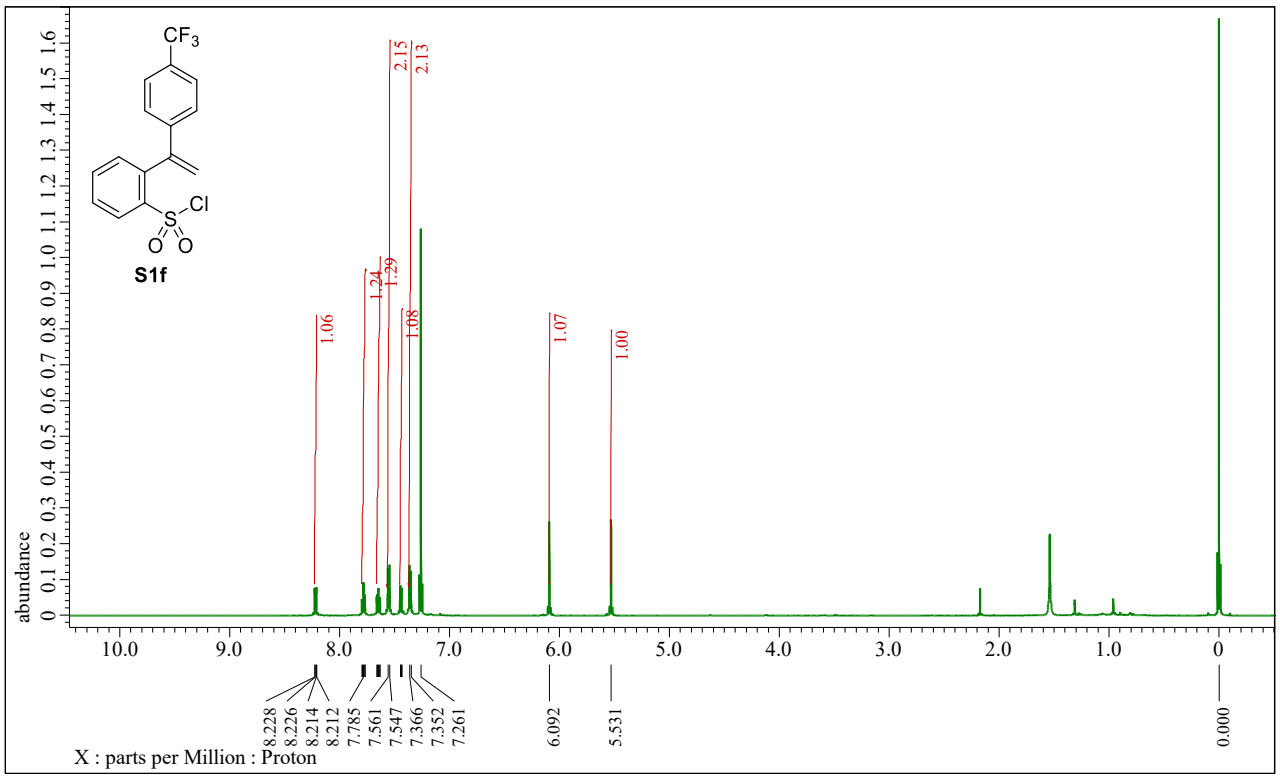
2-(1-(4-Chlorophenyl)vinyl)benzenesulfonyl Chloride (S1e) ^{1}H NMR (600 MHz, $CDCl_3$)



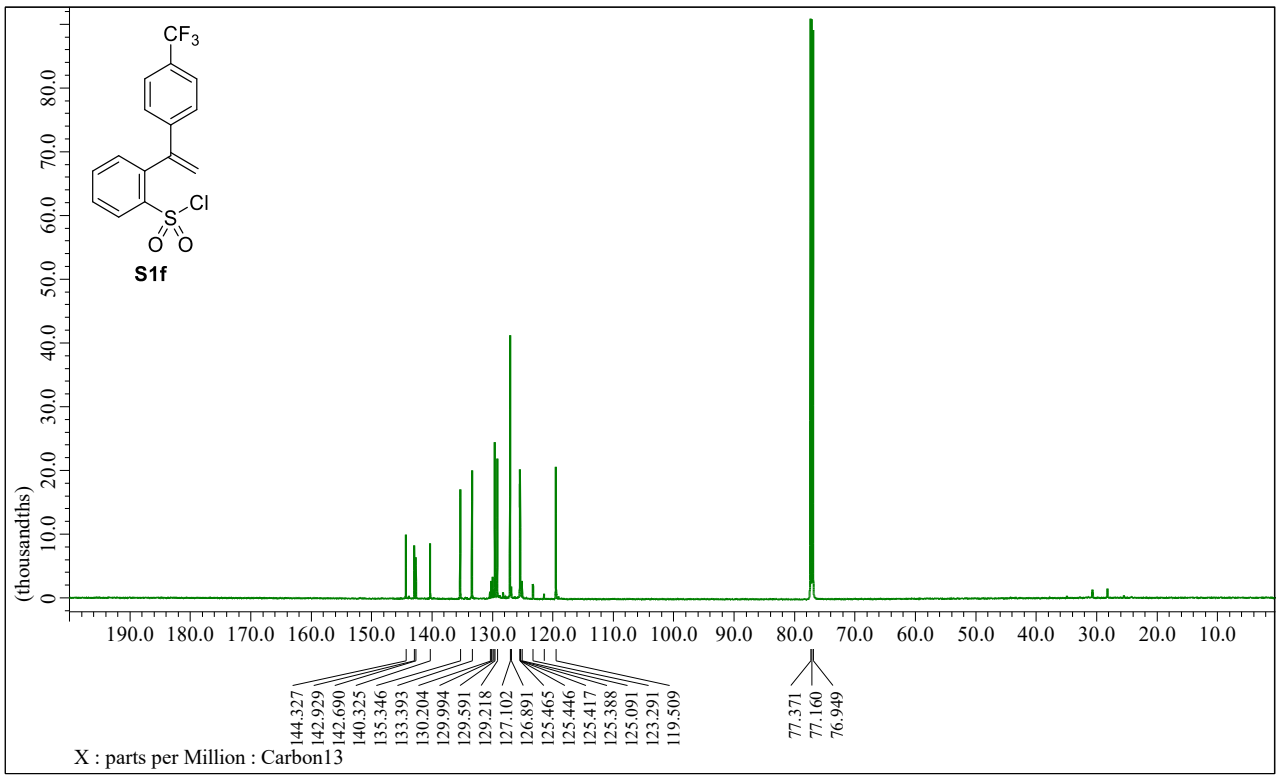
2-(1-(4-Chlorophenyl)vinyl)benzenesulfonyl Chloride (S1e) ^{13}C NMR (150 MHz, $CDCl_3$)



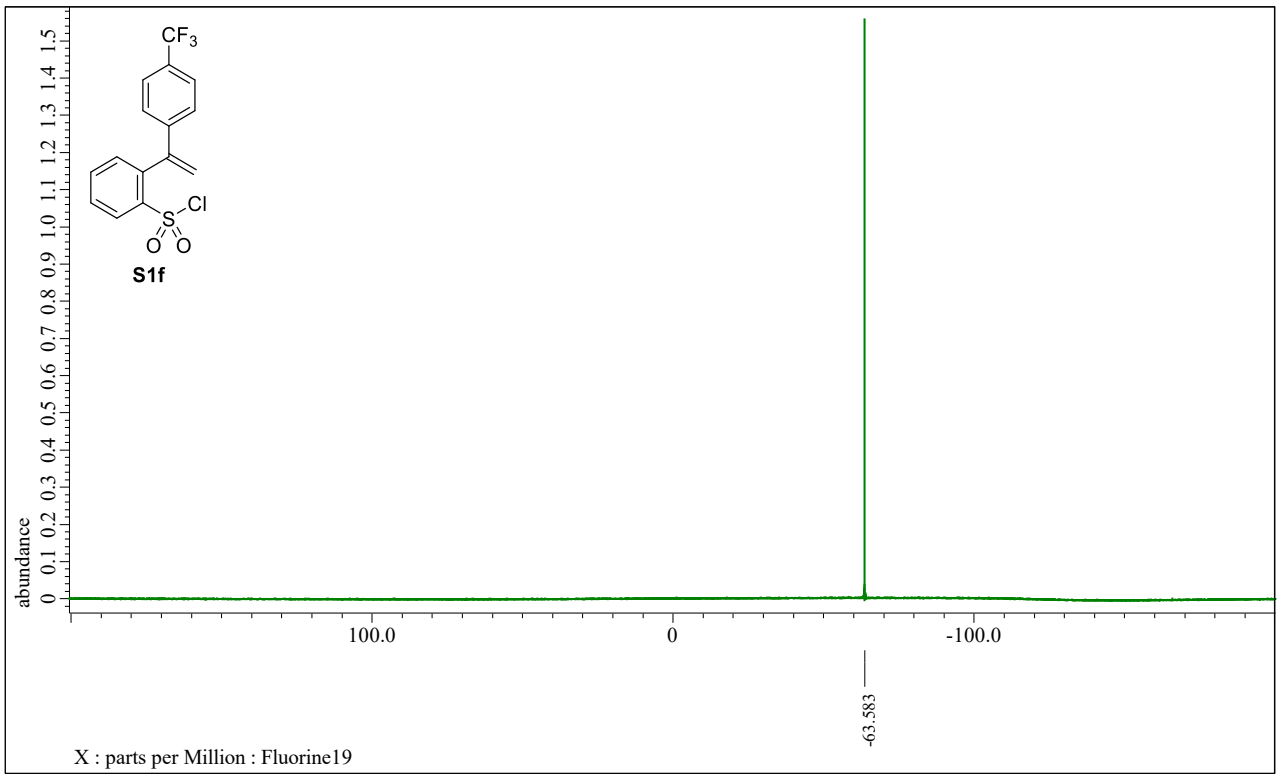
2-(1-(4-(Trifluoromethyl)phenyl)vinyl)benzenesulfonyl Chloride (S1f) ^{1}H NMR (600 MHz, $CDCl_3$)



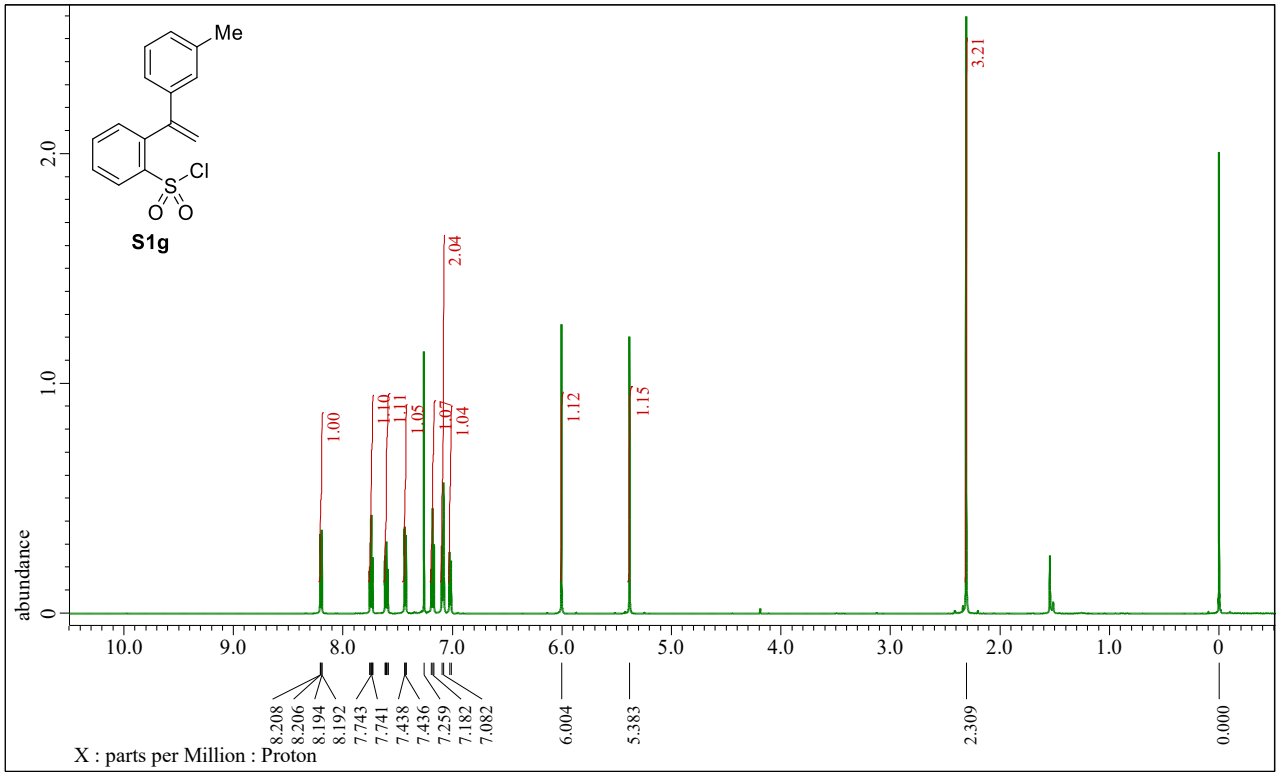
2-(1-(4-(Trifluoromethyl)phenyl)vinyl)benzenesulfonyl Chloride (S1f) ^{13}C NMR (150 MHz, $CDCl_3$)



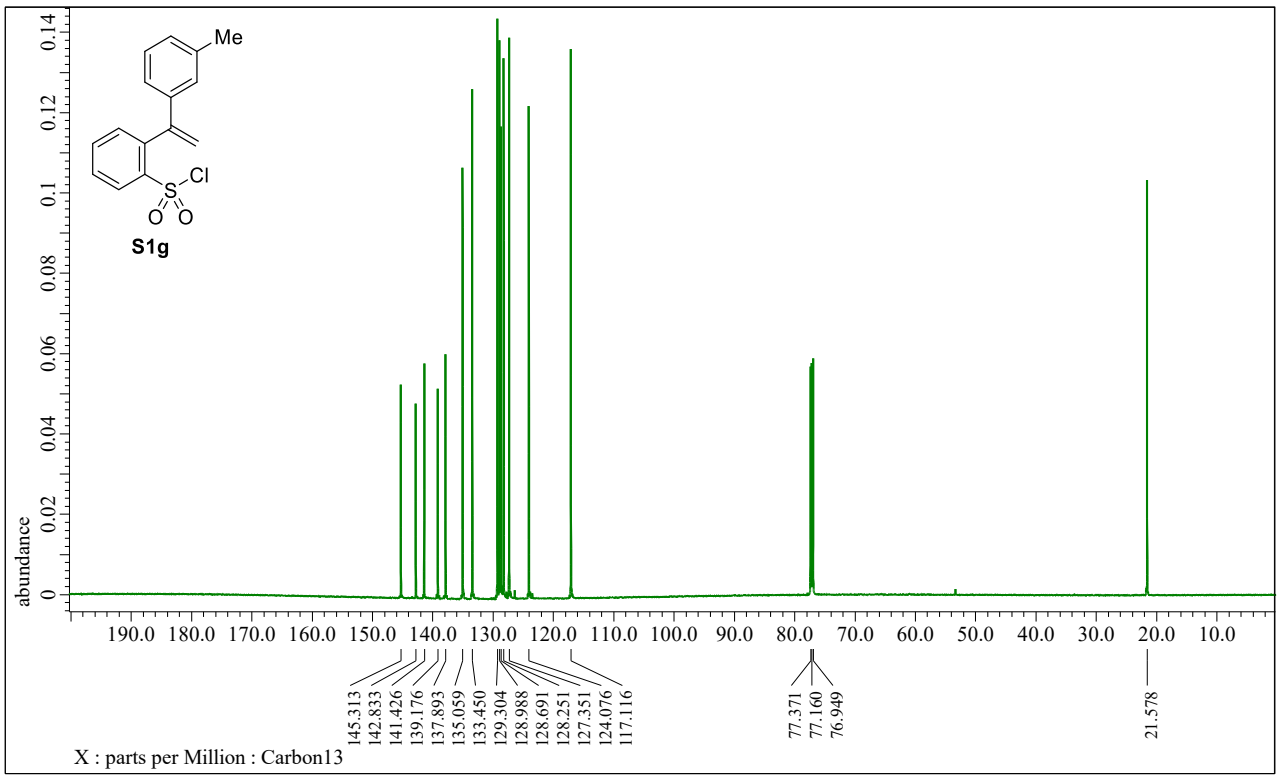
2-(1-(4-(Trifluoromethyl)phenyl)vinyl)benzenesulfonyl Chloride (S1f) ^{19}F NMR (376 MHz, $CDCl_3$)



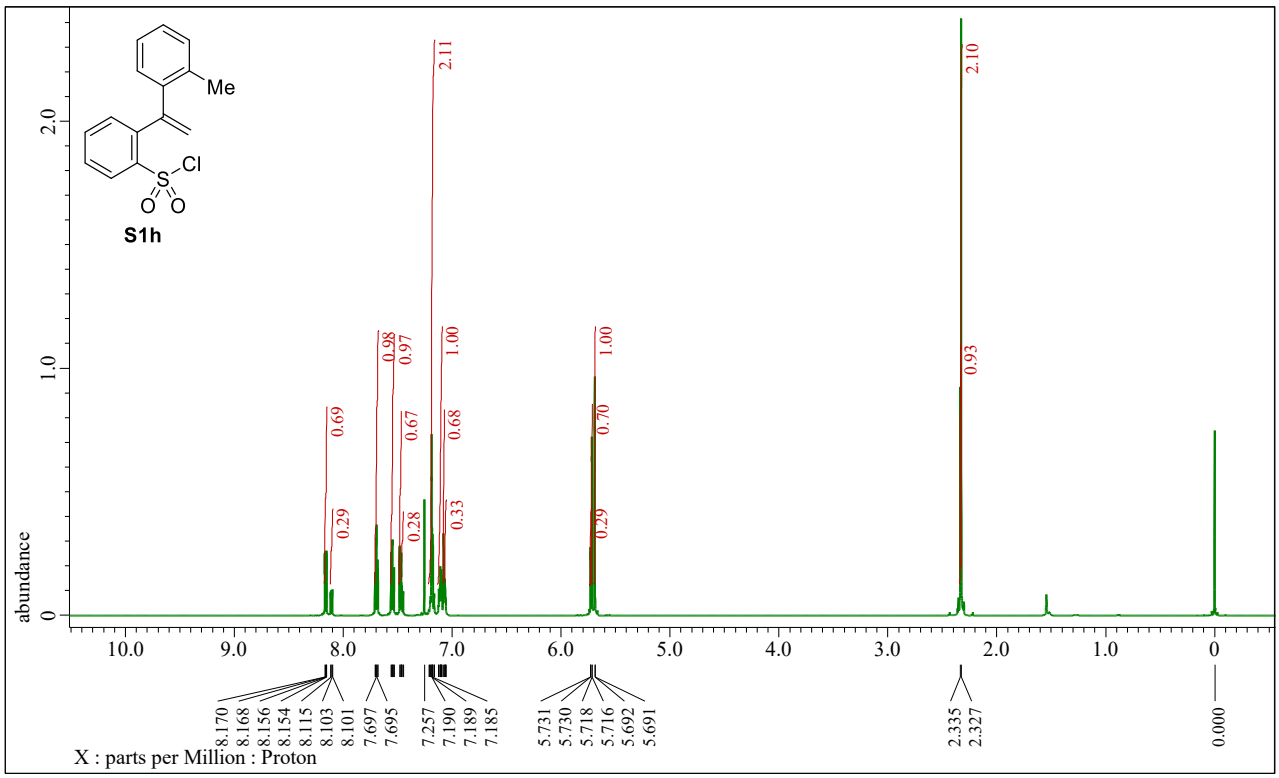
2-(1-(*m*-tolyl)vinyl)benzenesulfonyl Chloride (S1g) ^{1}H NMR (600 MHz, $CDCl_3$)



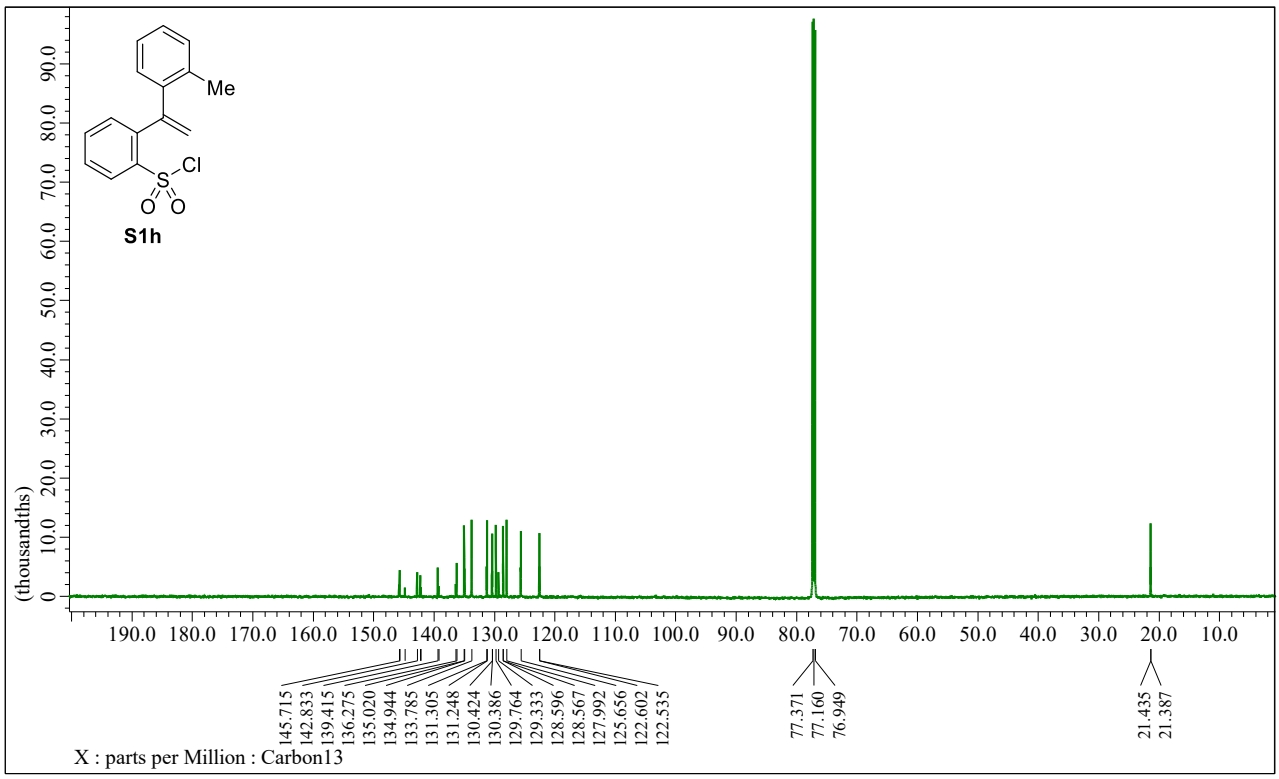
2-(1-(*m*-tolyl)vinyl)benzenesulfonyl Chloride (S1g) ^{13}C NMR (150 MHz, $CDCl_3$)



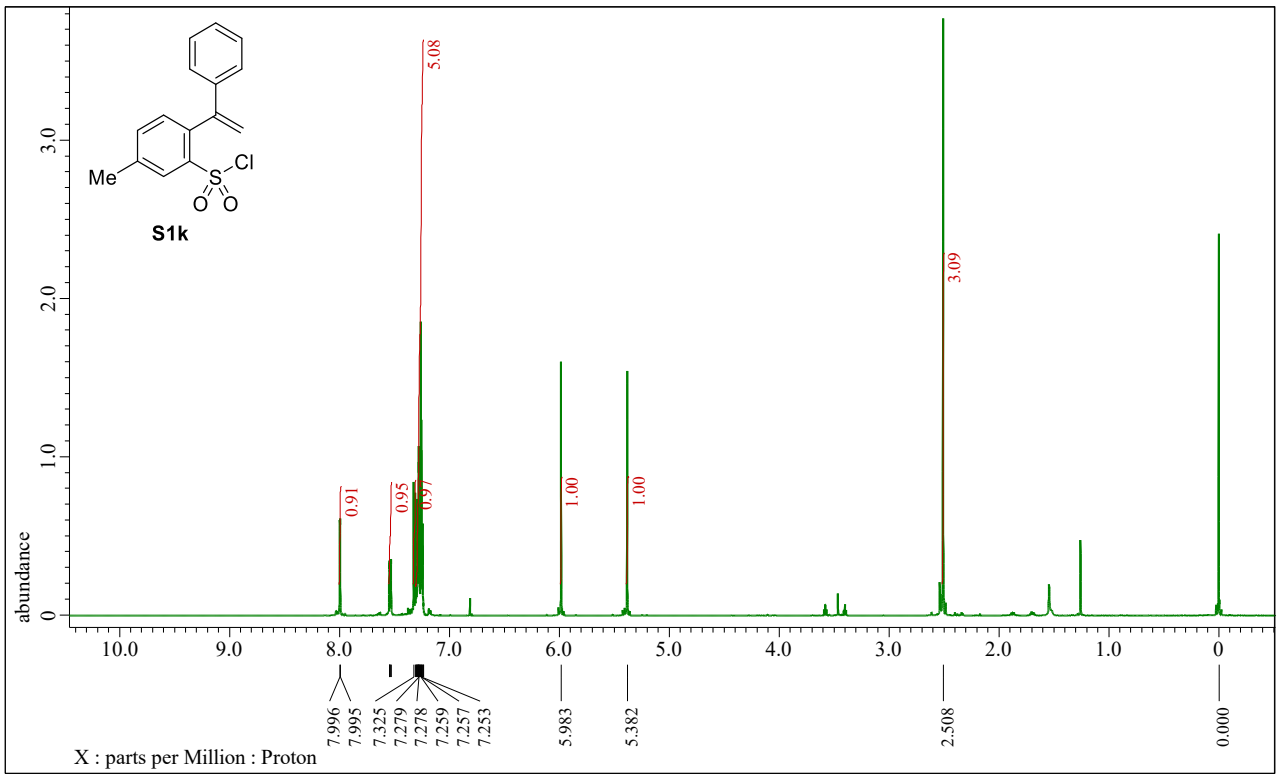
2-(1-(*o*-tolyl)vinyl)benzenesulfonyl Chloride (S1g) ^{1}H NMR (600 MHz, $CDCl_3$)



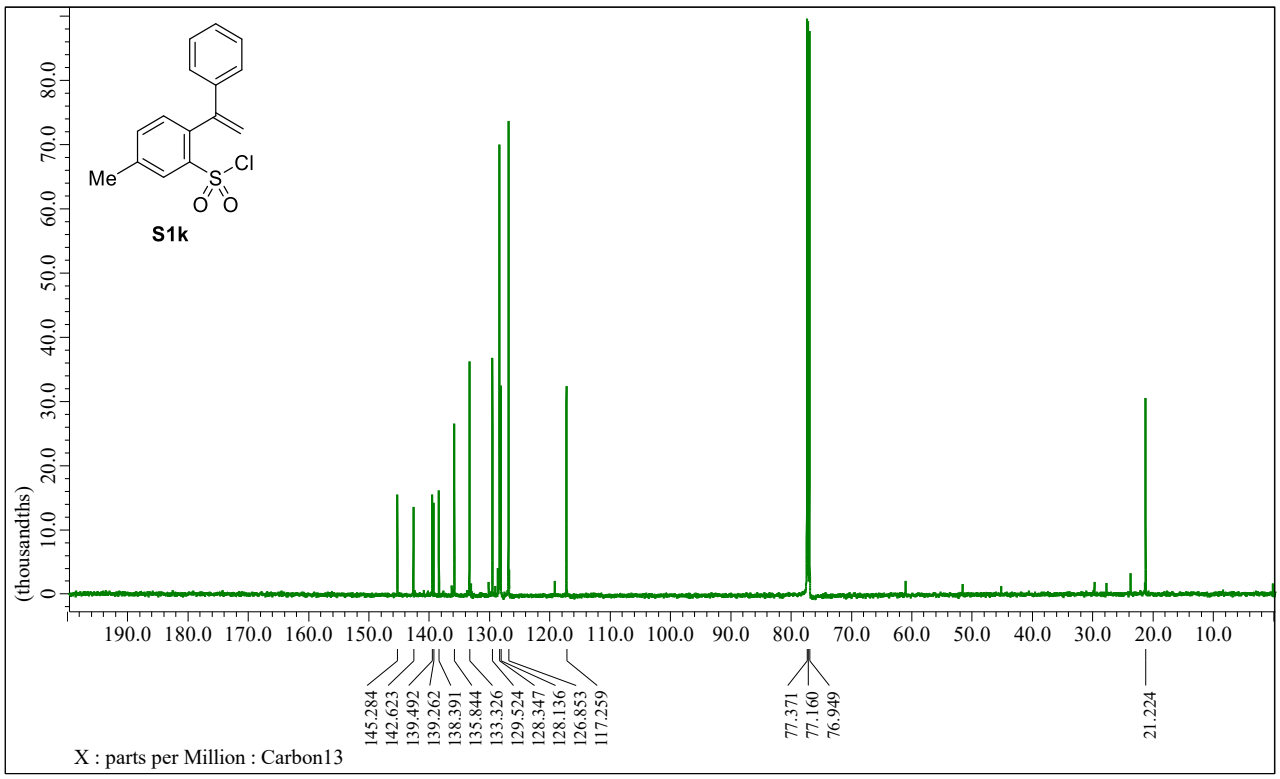
2-(1-(*o*-tolyl)vinyl)benzenesulfonyl Chloride (S1g) ^{13}C NMR (150 MHz, $CDCl_3$)



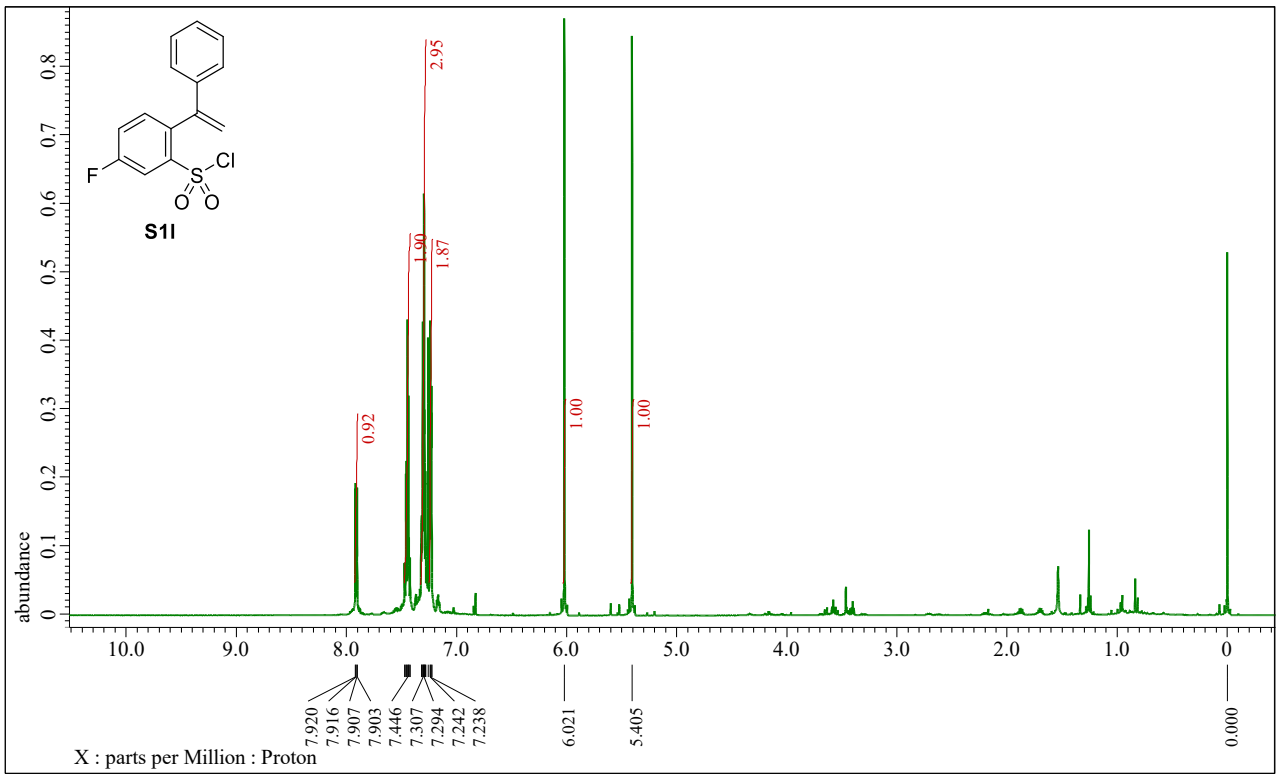
5-Methyl-2-(1-phenylvinyl)benzenesulfonyl Chloride (S1k) ^{1}H NMR (600 MHz, $CDCl_3$)



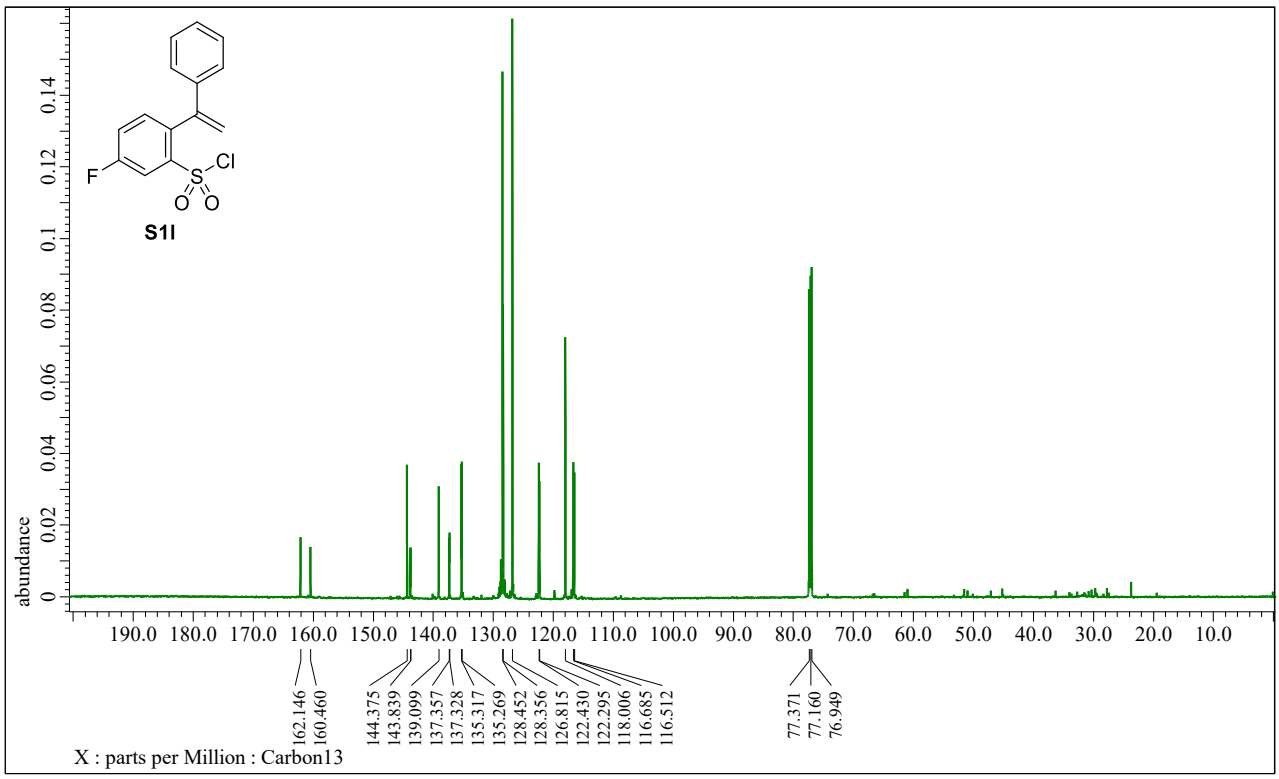
5-Methyl-2-(1-phenylvinyl)benzenesulfonyl Chloride (S1k) ^{13}C NMR (150 MHz, $CDCl_3$)



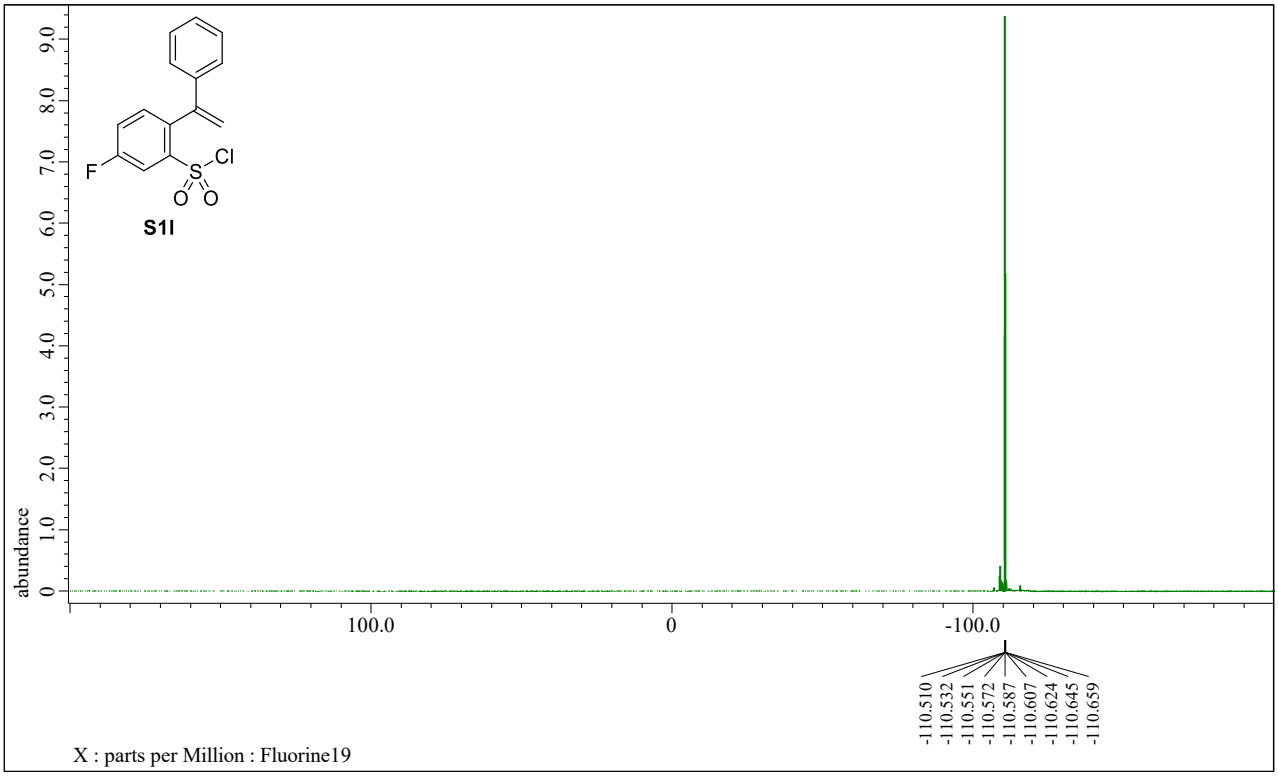
5-Fluoro-2-(1-phenylvinyl)benzenesulfonyl Chloride (S1l) ^{1}H NMR (600 MHz, $CDCl_3$)



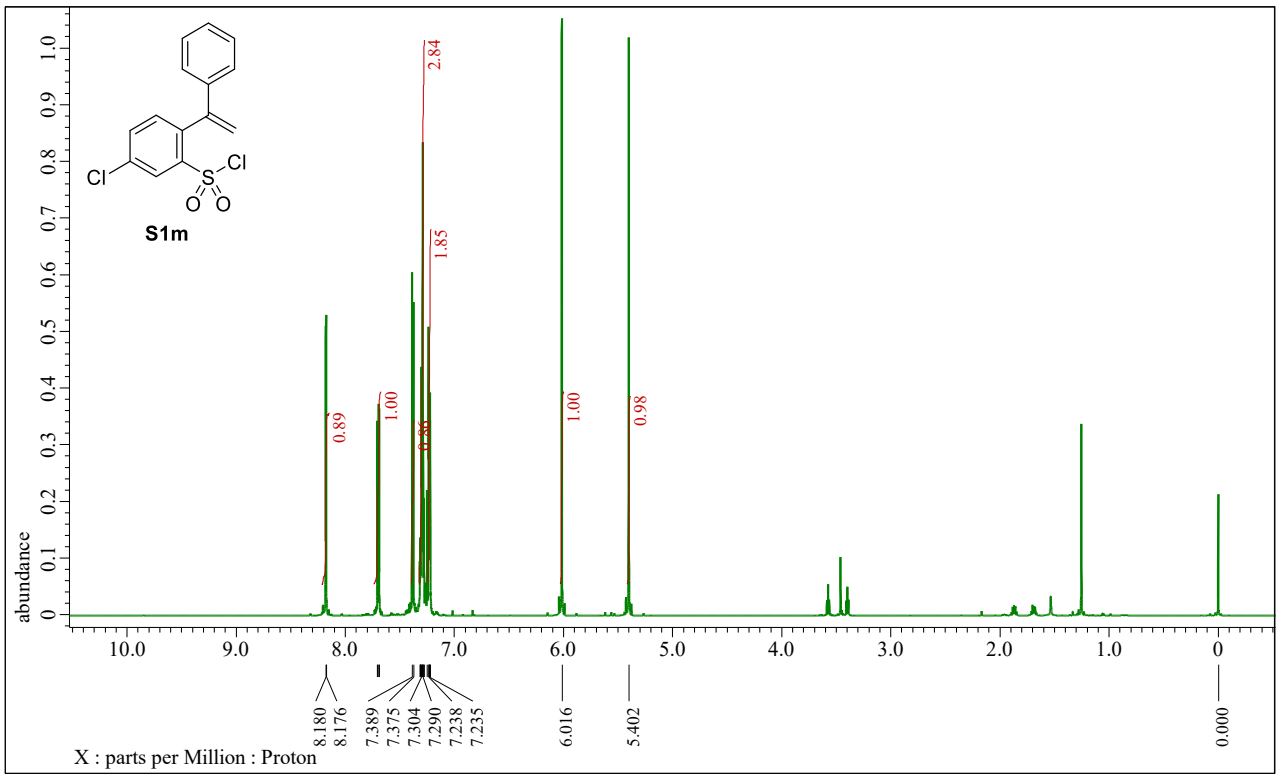
5-Fluoro-2-(1-phenylvinyl)benzenesulfonyl Chloride (S1l) ^{13}C NMR (150 MHz, $CDCl_3$)



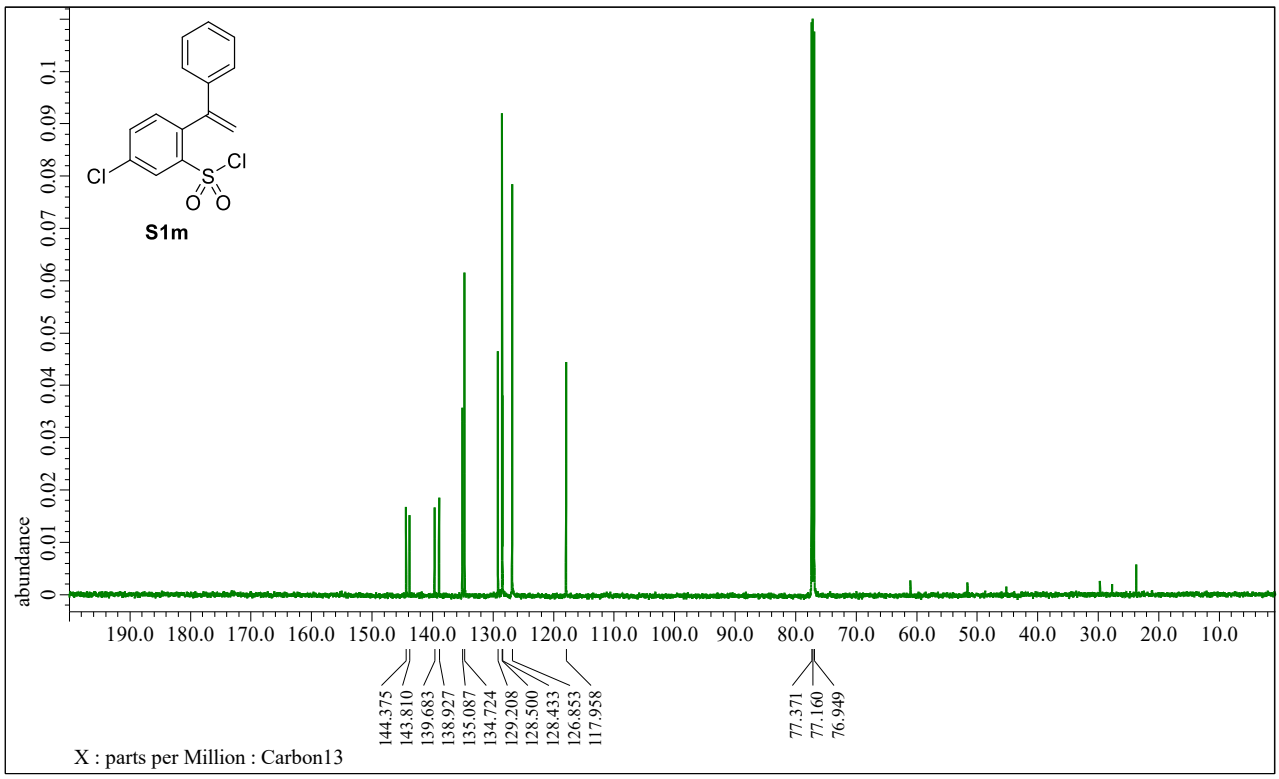
5-Fluoro-2-(1-phenylvinyl)benzenesulfonyl Chloride (S1l) ^{19}F NMR (376 MHz, $CDCl_3$)



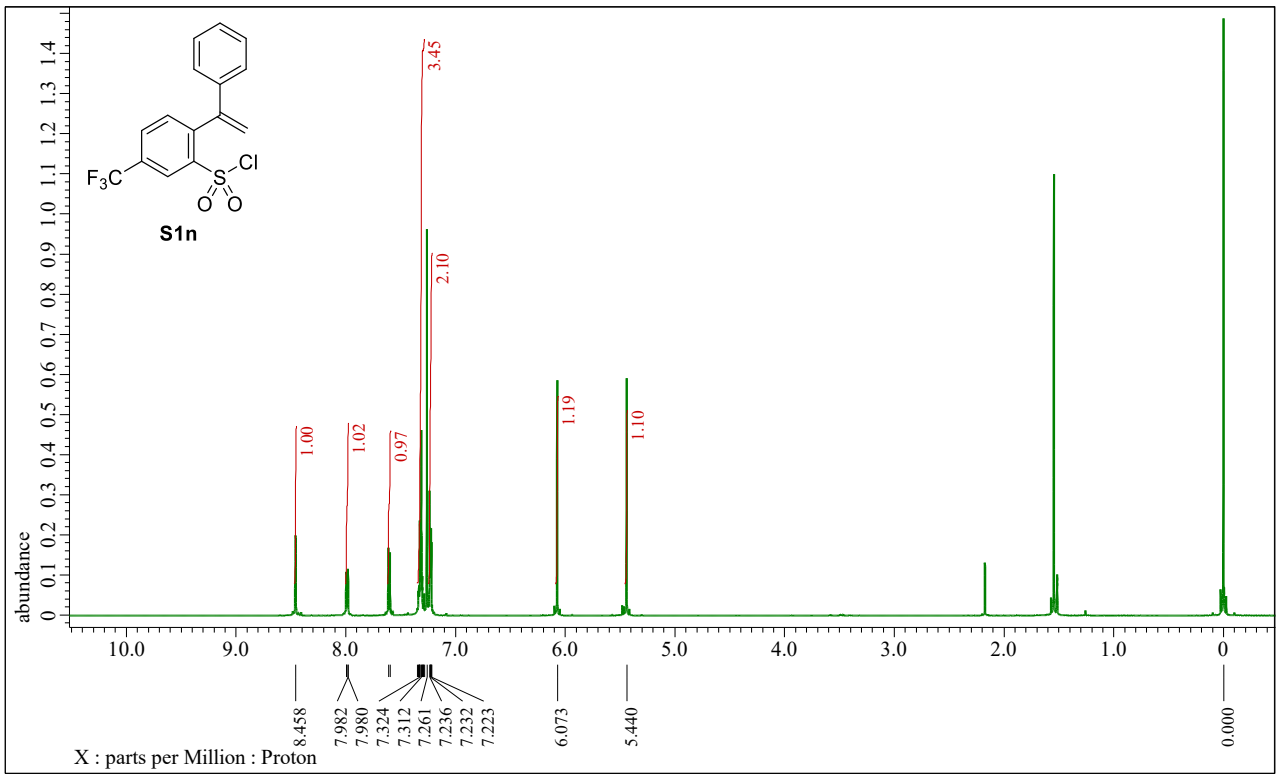
5-Chloro-2-(1-phenylvinyl)benzenesulfonyl Chloride (S1m) ^{1}H NMR (600 MHz, $CDCl_3$)



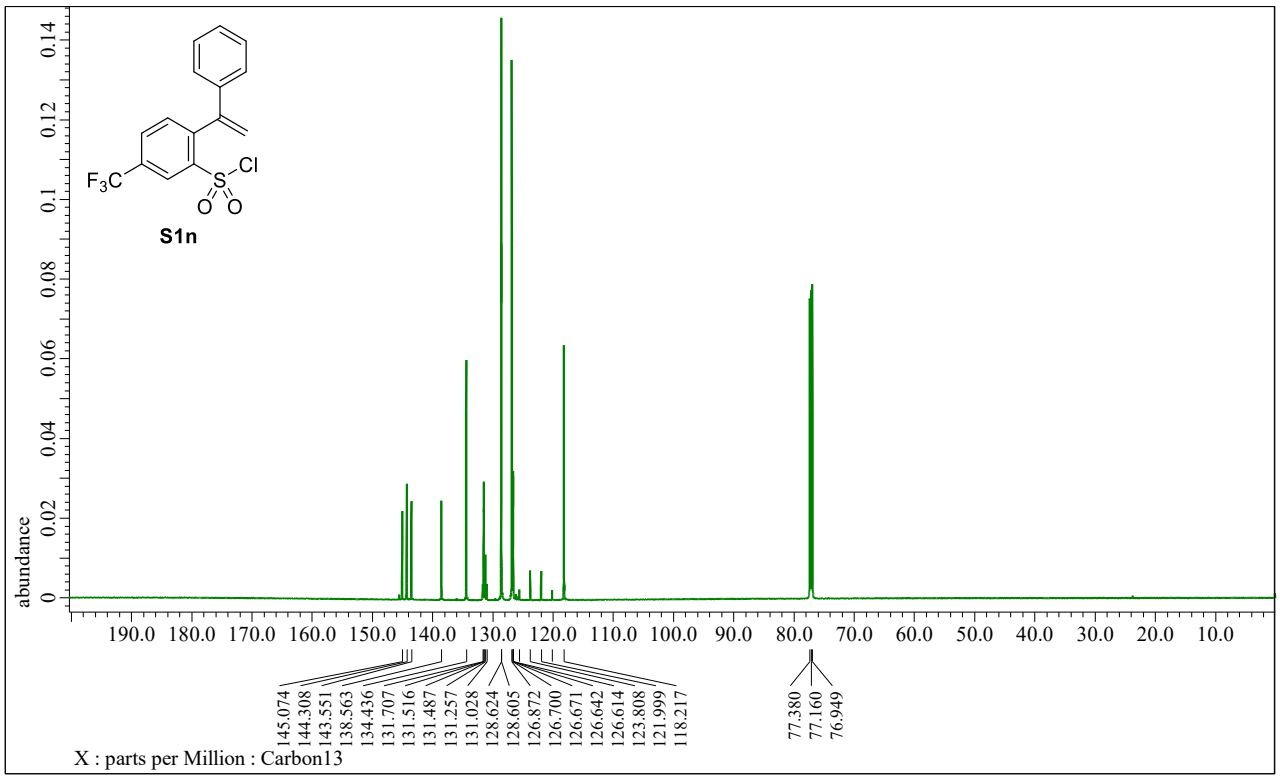
5-Chloro-2-(1-phenylvinyl)benzenesulfonyl Chloride (S1m) ^{13}C NMR (150 MHz, $CDCl_3$)



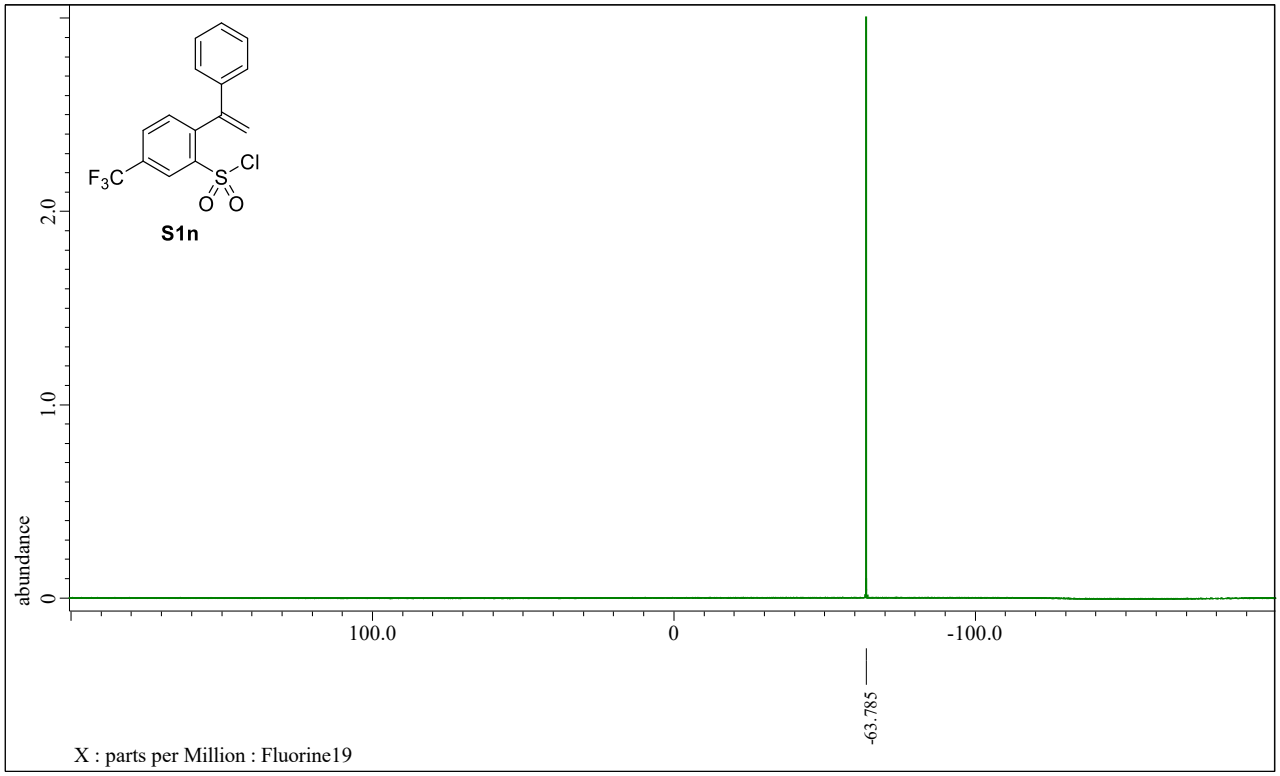
2-(1-Phenylvinyl)-5-(trifluoromethyl)benzenesulfonyl Chloride (S1n) ^{1}H NMR (600 MHz, $CDCl_3$)



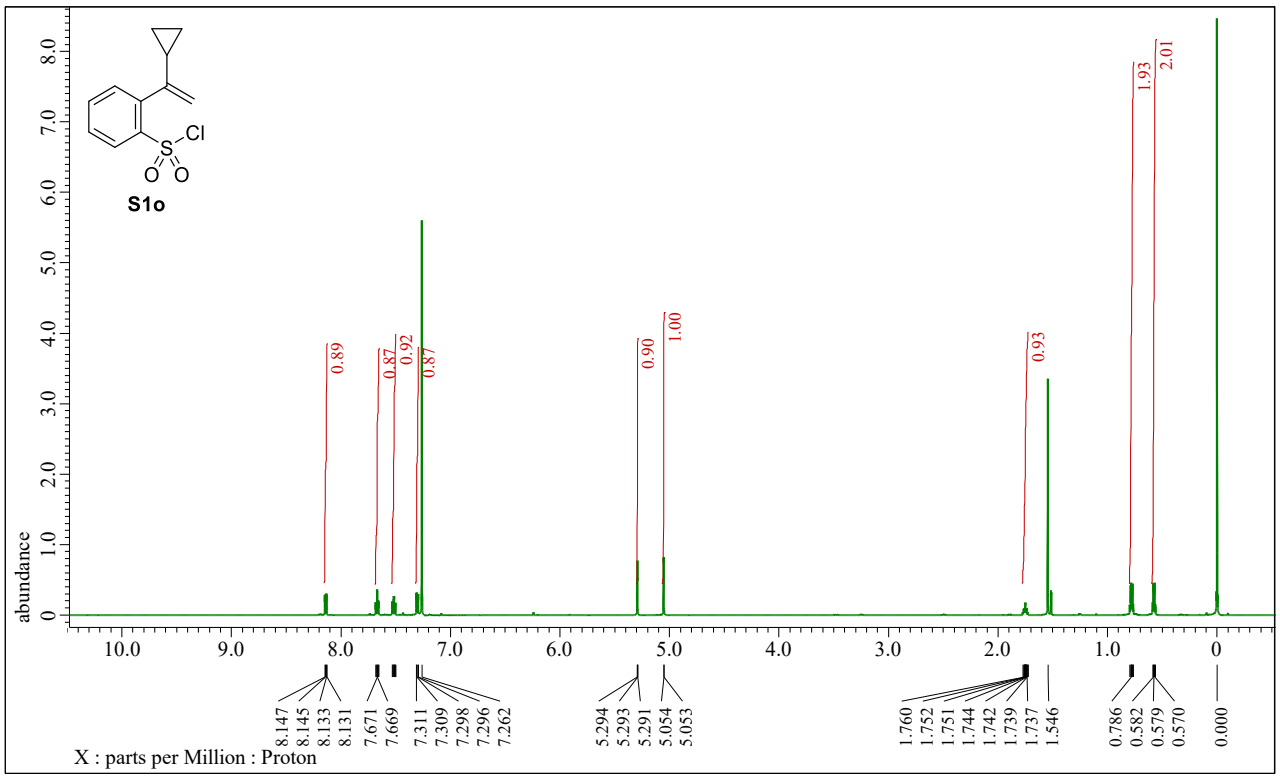
2-(1-Phenylvinyl)-5-(trifluoromethyl)benzenesulfonyl Chloride (S1n) ^{13}C NMR (150 MHz, $CDCl_3$)



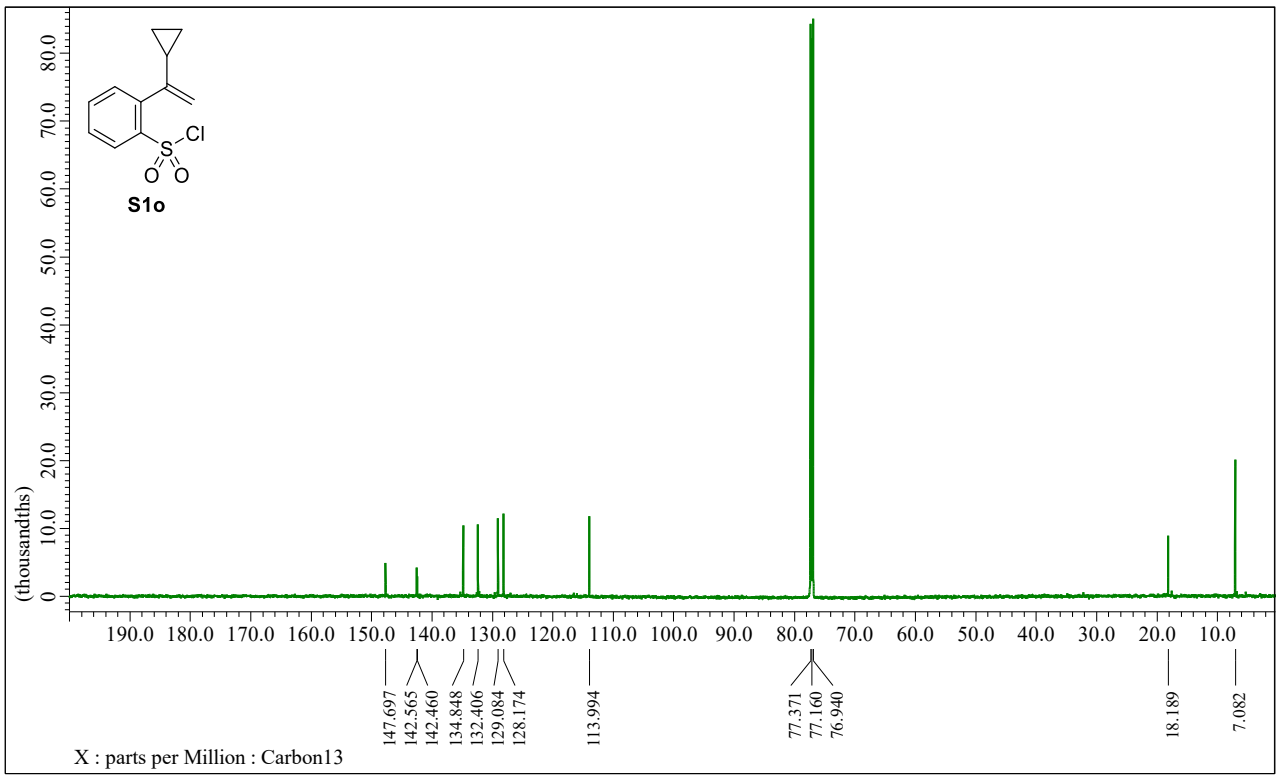
2-(1-Phenylvinyl)-5-(trifluoromethyl)benzenesulfonyl Chloride (S1n) ^{19}F NMR (376 MHz, $CDCl_3$)



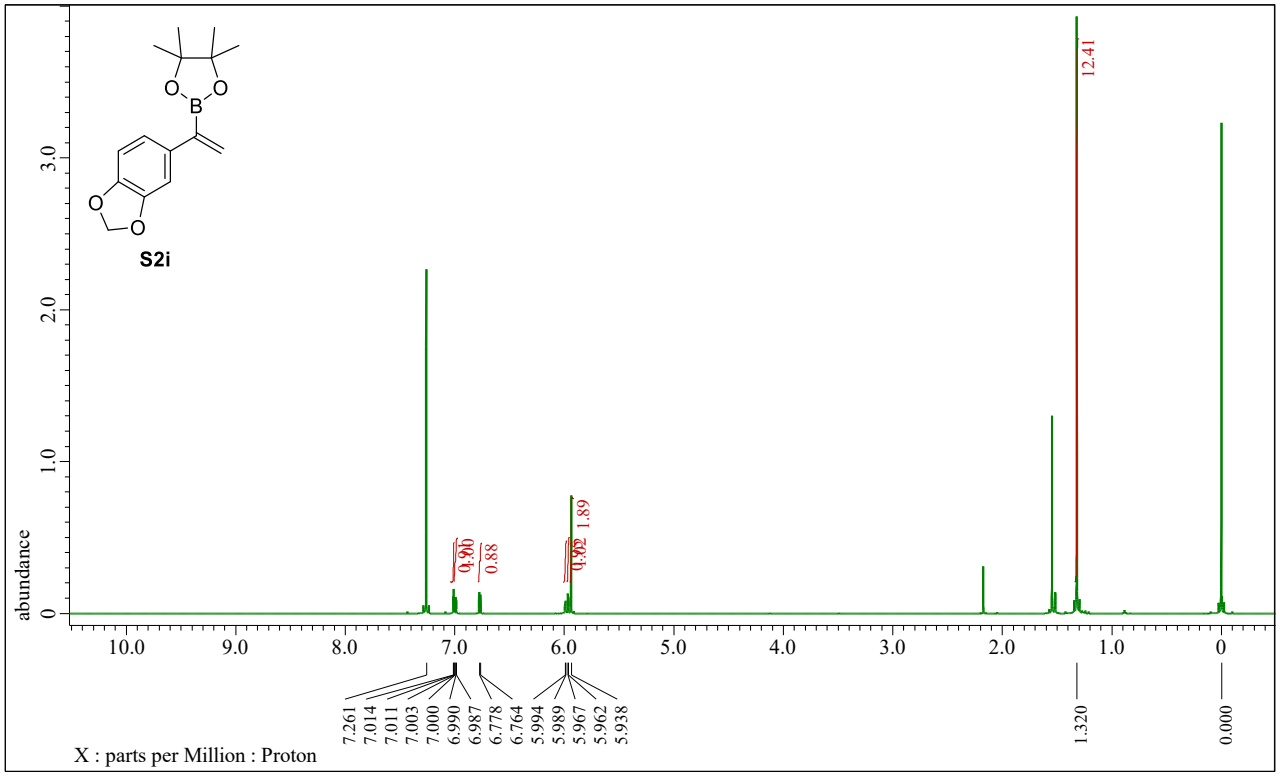
2-(1-Cyclopropylvinyl)benzenesulfonyl Chloride (S1o) ^{1}H NMR (600 MHz, $CDCl_3$)



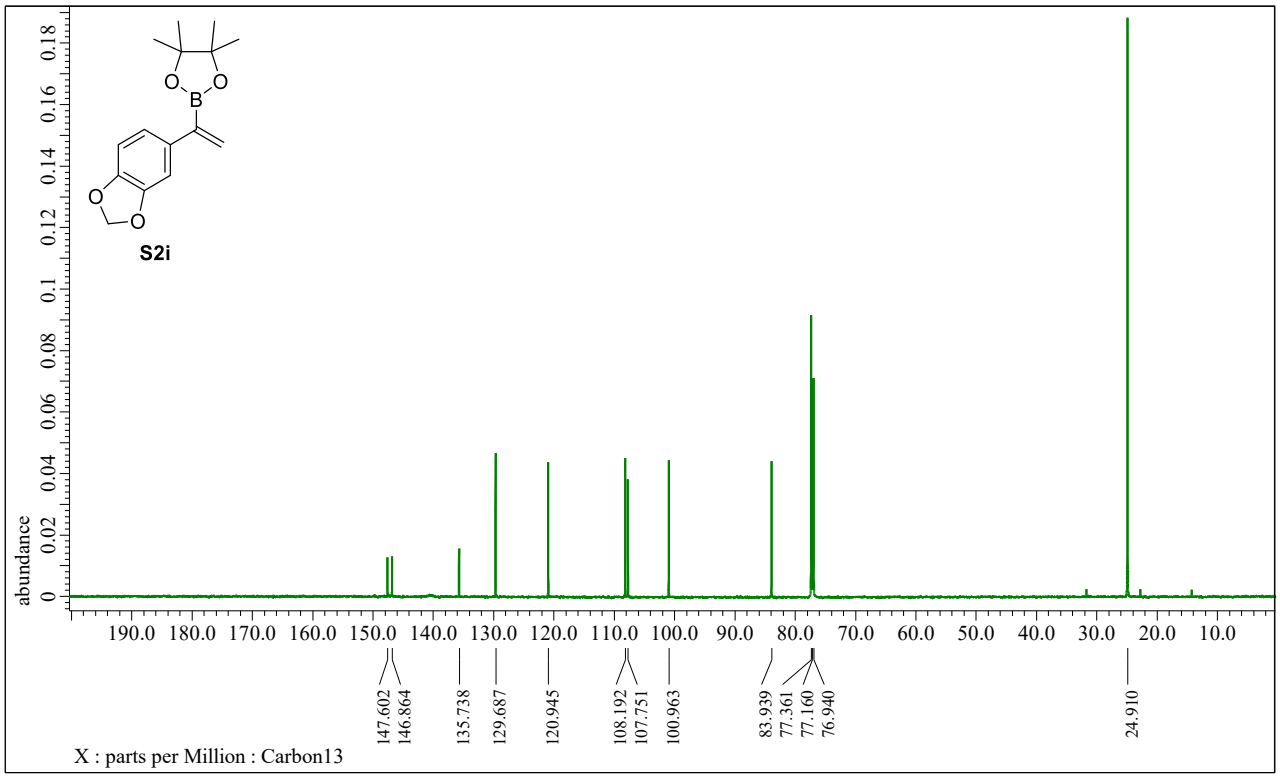
2-(1-Cyclopropylvinyl)benzenesulfonyl Chloride (S1o) ^{13}C NMR (150 MHz, $CDCl_3$)



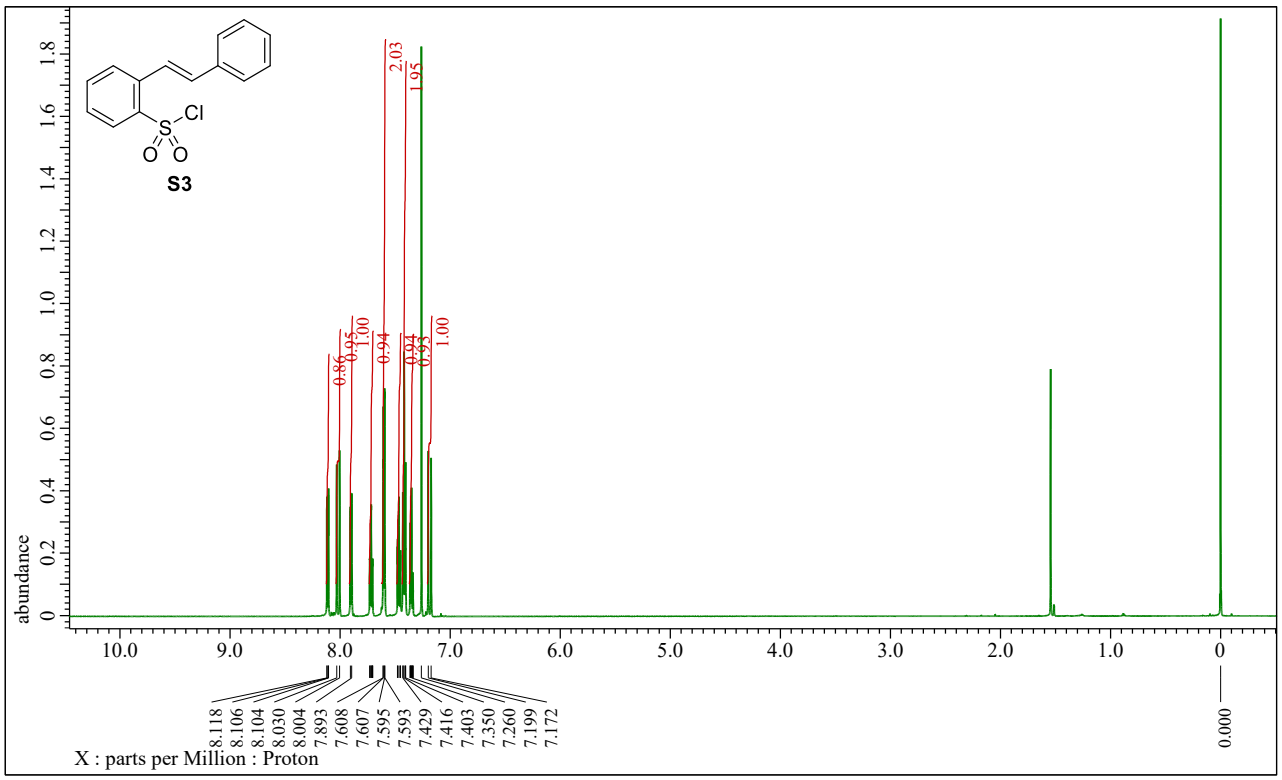
2-(1-(Benzo[*d*][1,3]dioxol-5-yl)vinyl)-4,4,5,5-tetramethyl-1,3,2-dioxabolane (S2i) ^{1}H NMR (600 MHz, $CDCl_3$)



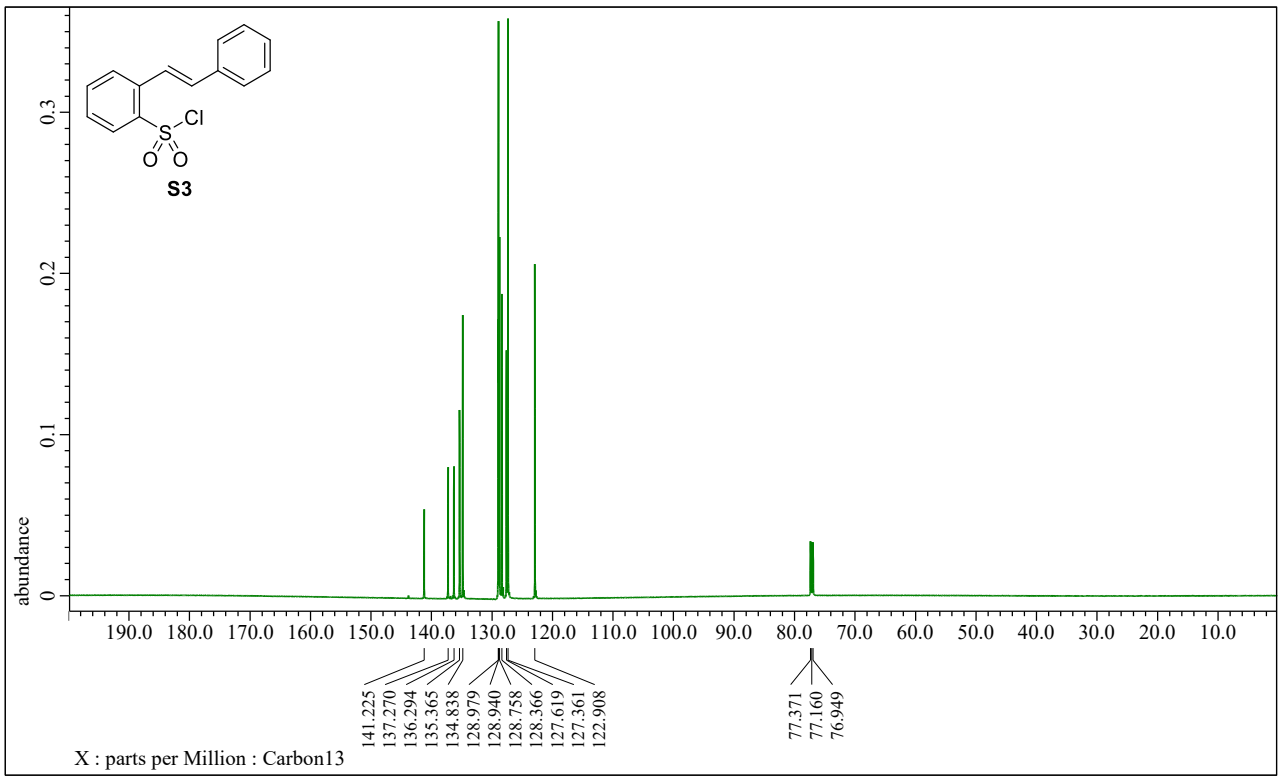
2-(1-(Benzo[*d*][1,3]dioxol-5-yl)vinyl)-4,4,5,5-tetramethyl-1,3,2-dioxabolane (S2i) ^{13}C NMR (150 MHz, $CDCl_3$)



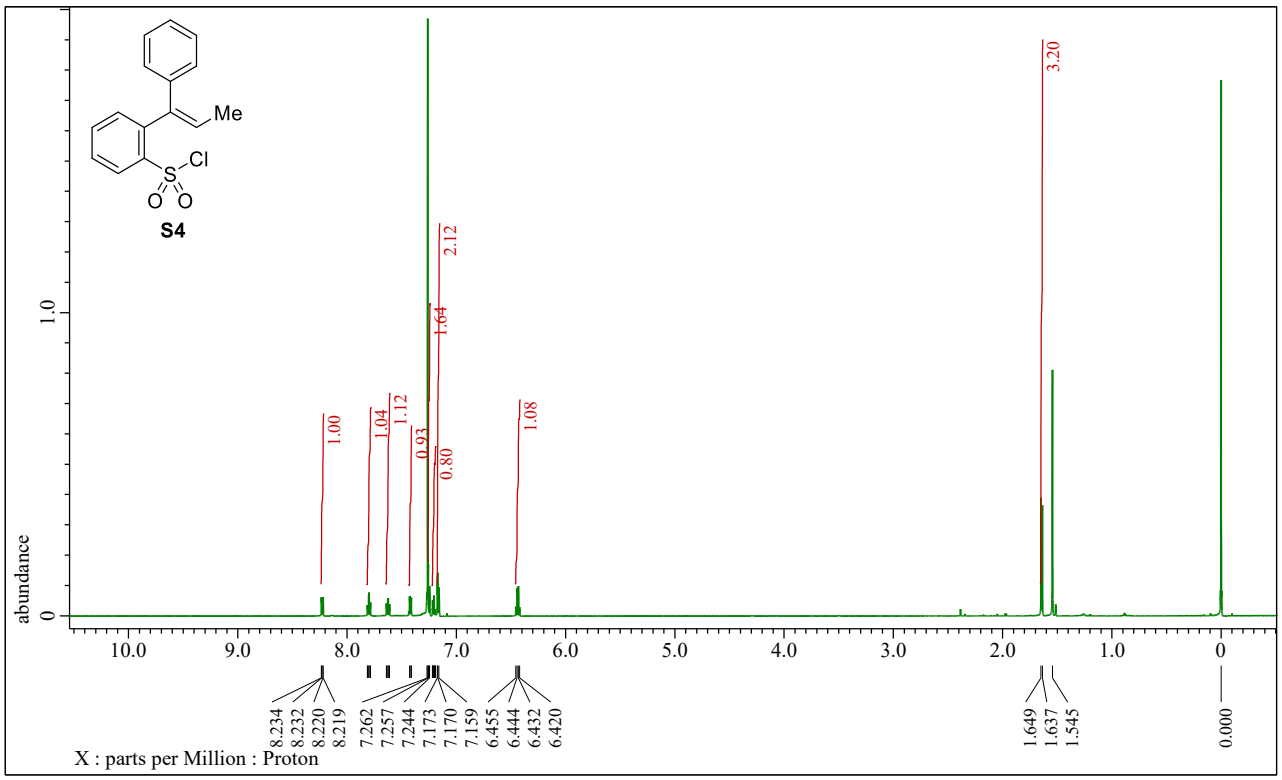
(*E*)-2-Styrylbenzenesulfonyl Chloride (S3) ^{1}H NMR (600 MHz, $CDCl_3$)



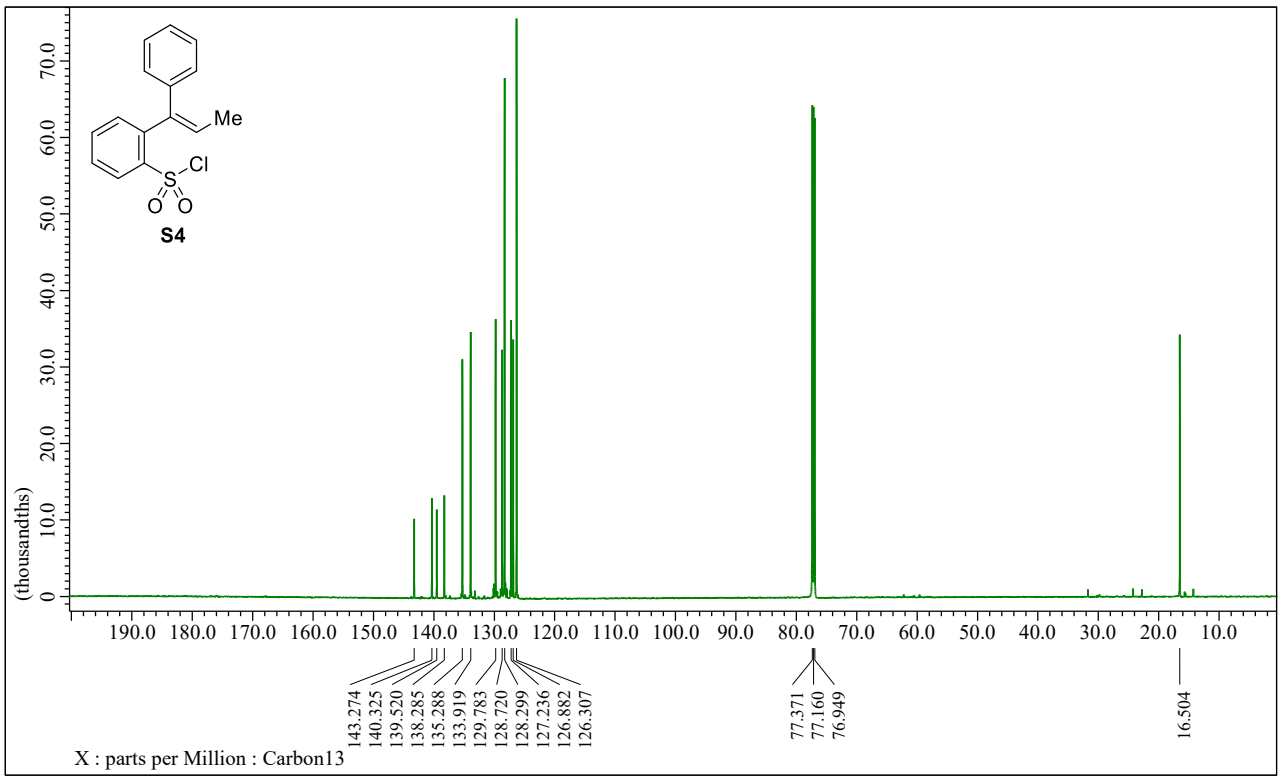
(*E*)-2-Styrylbenzenesulfonyl Chloride (S3) ^{13}C NMR (150 MHz, $CDCl_3$)



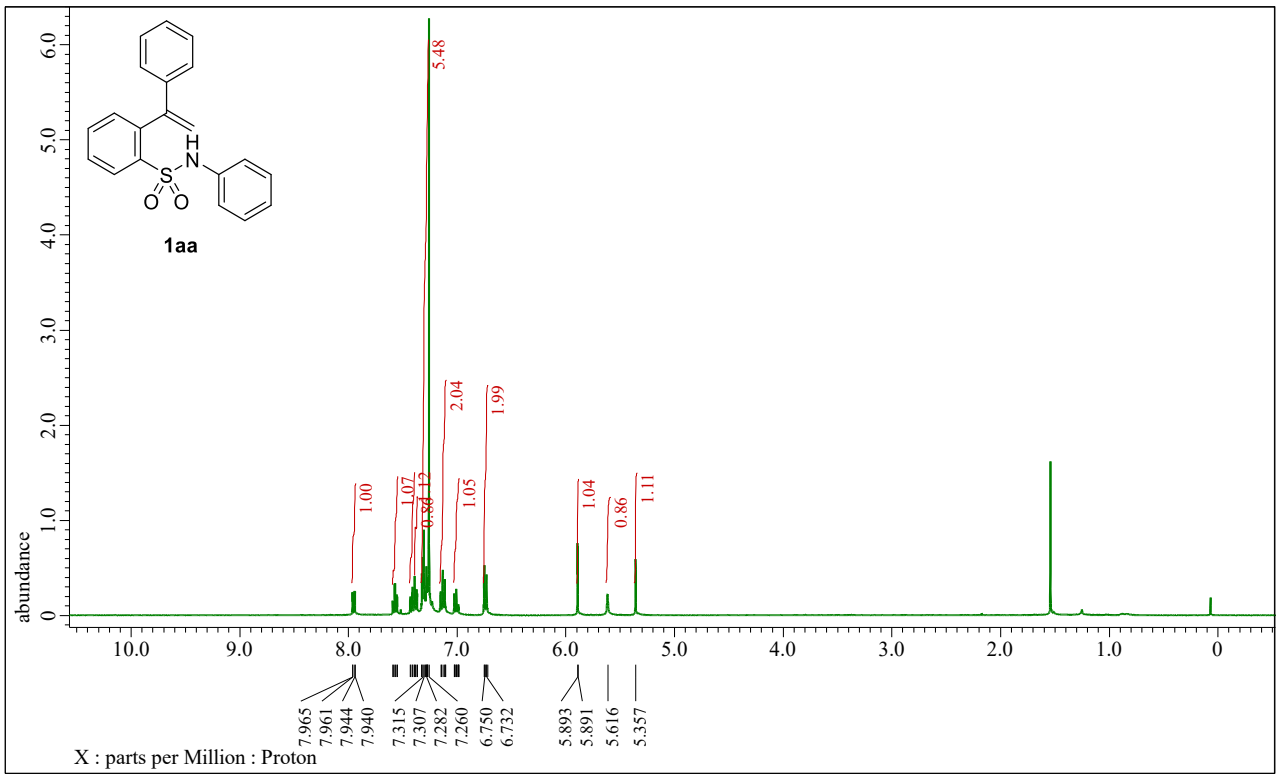
(*E*)-2-(1-Phenylprop-1-en-1-yl)benzenesulfonyl Chloride (S4) ^{1}H NMR (600 MHz, $CDCl_3$)



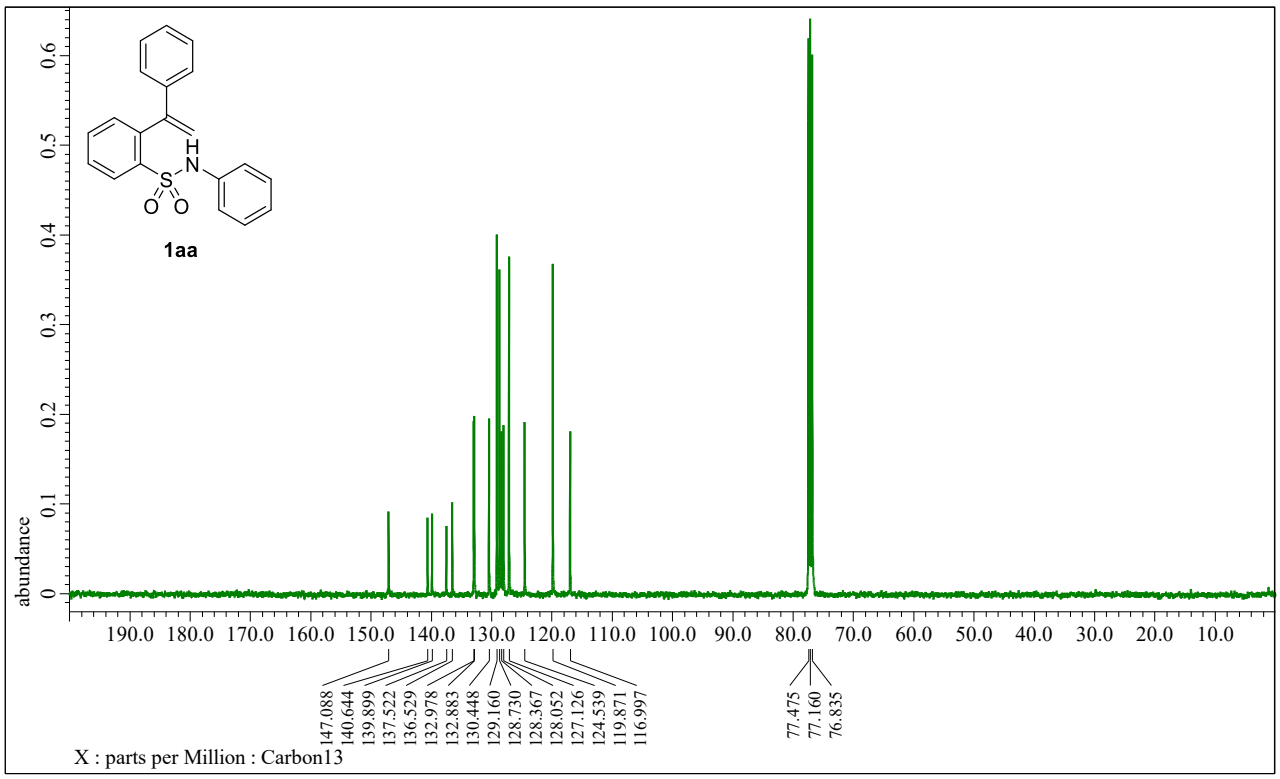
(*E*)-2-(1-Phenylprop-1-en-1-yl)benzenesulfonyl Chloride (S4) ^{13}C NMR (150 MHz, $CDCl_3$)



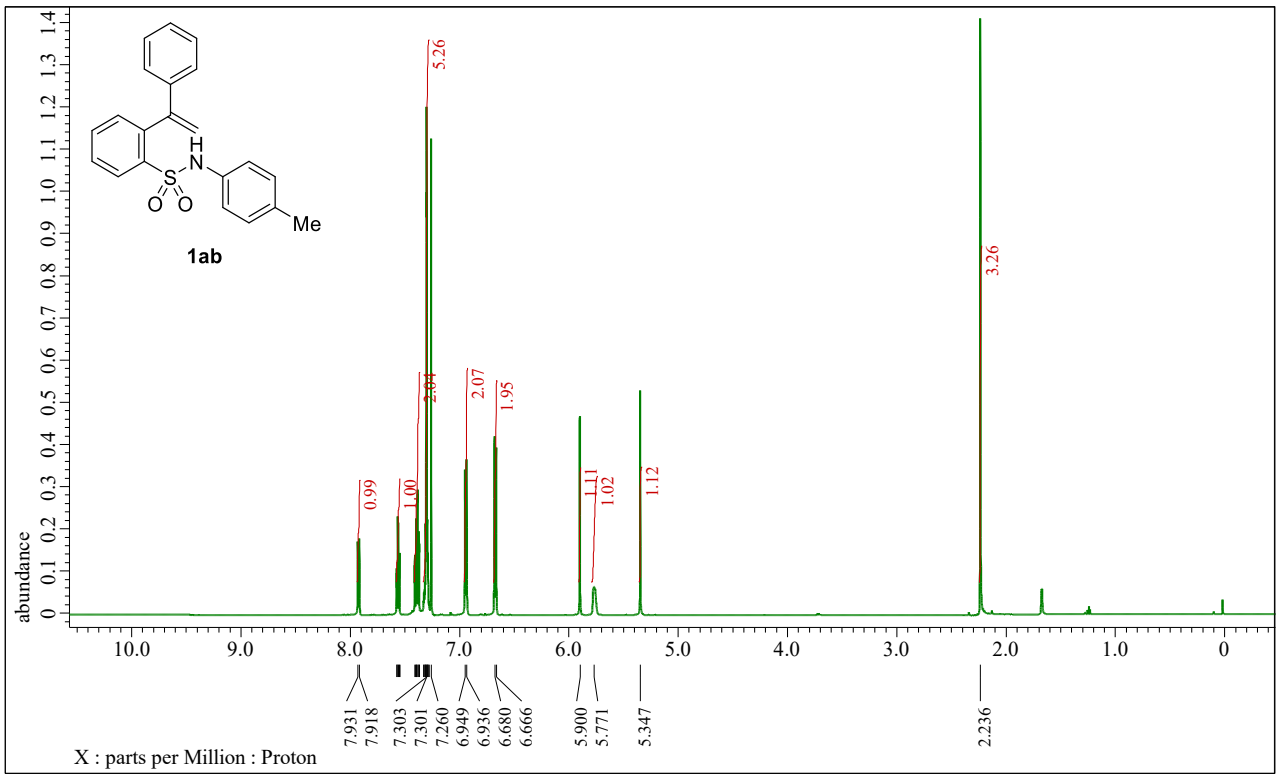
***N*-Phenyl-2-(1-phenylvinyl)benzenesulfonamide (1aa) ^{1}H NMR (400 MHz, $CDCl_3$)**



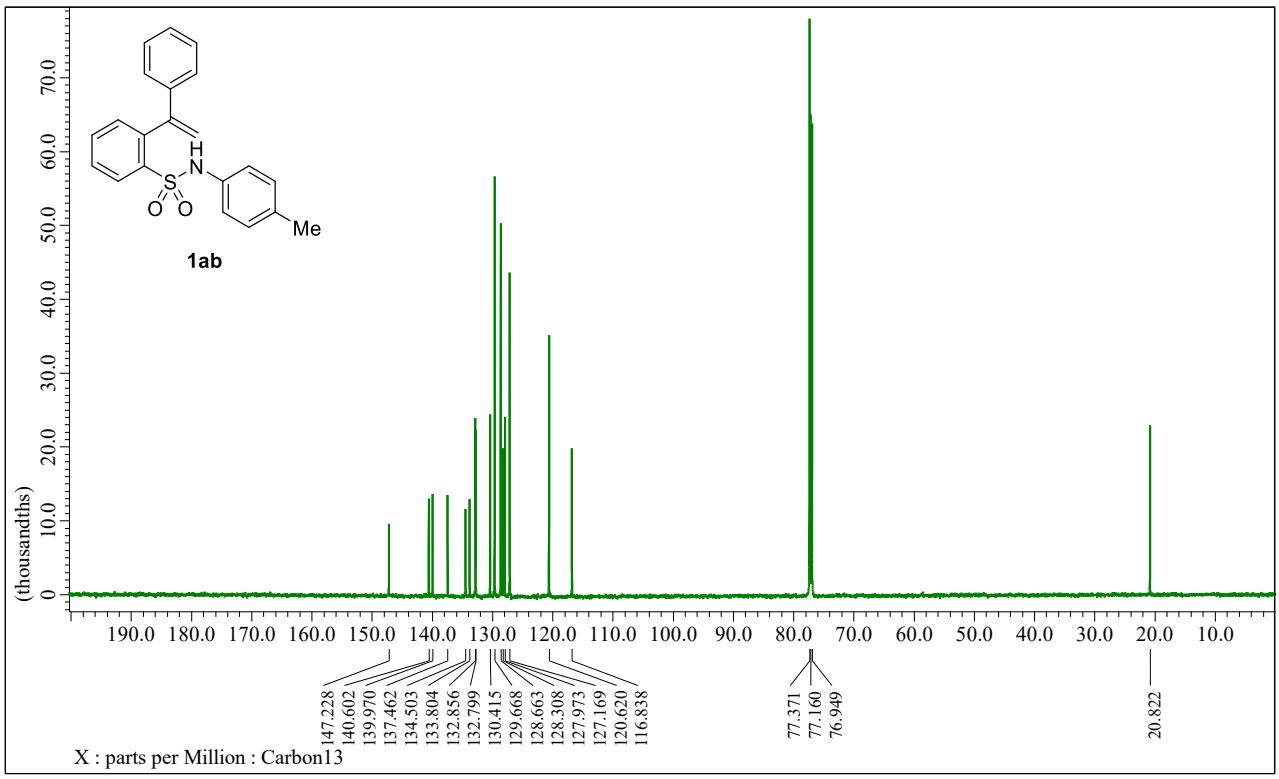
***N*-Phenyl-2-(1-phenylvinyl)benzenesulfonamide (1aa) ^{13}C NMR (100 MHz, $CDCl_3$)**



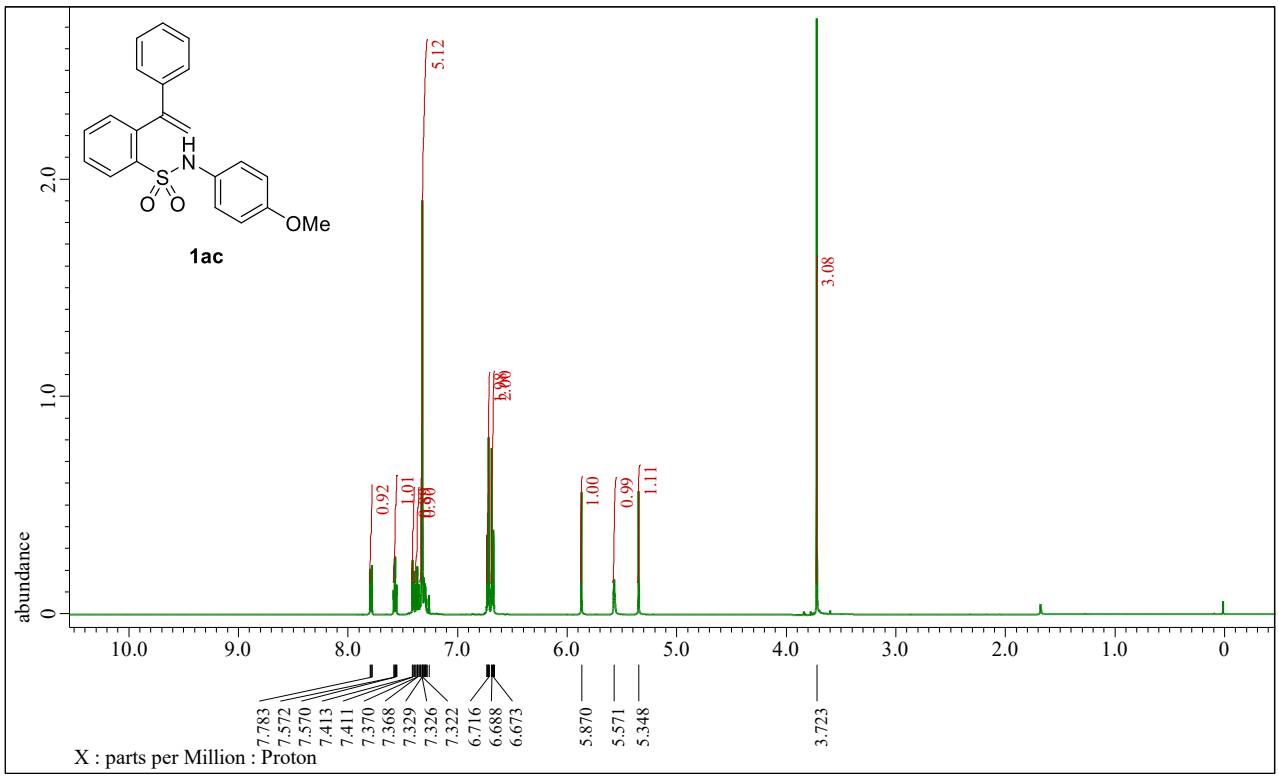
2-(1-Phenylvinyl)-*N*-(*p*-tolyl)benzenesulfonamide (1ab) ^{1}H NMR (600 MHz, $CDCl_3$)



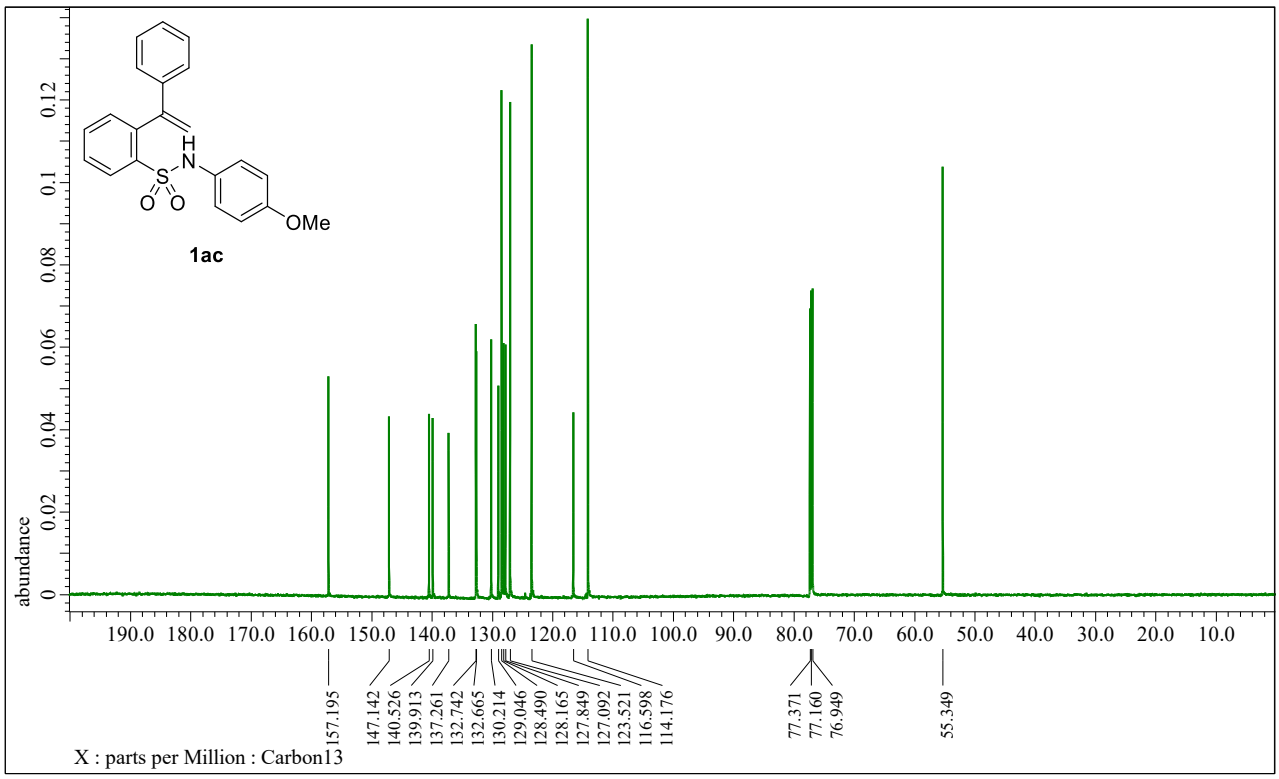
2-(1-Phenylvinyl)-*N*-(*p*-tolyl)benzenesulfonamide (1ab) ^{13}C NMR (150 MHz, $CDCl_3$)



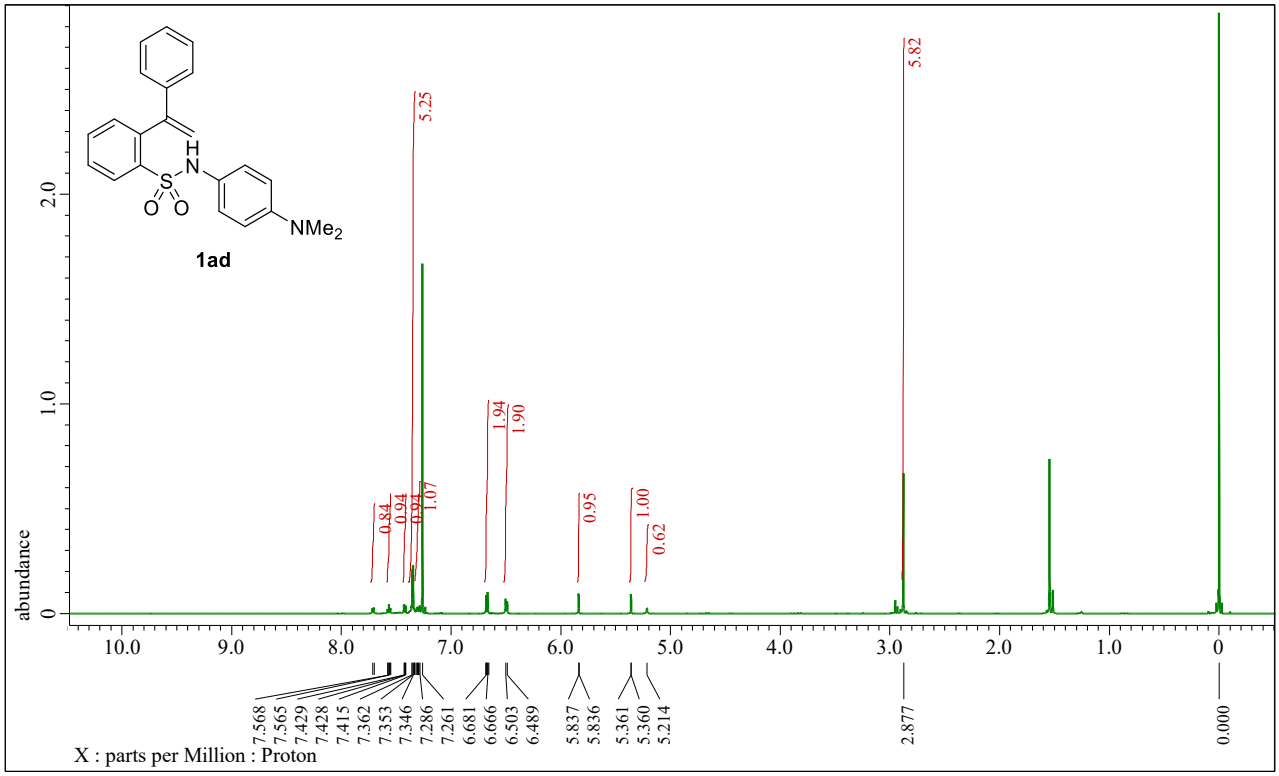
***N*-(4-Methoxyphenyl)-2-(1-phenylvinyl)benzenesulfonamide (1ac) ^{1}H NMR (600 MHz, $CDCl_3$)**



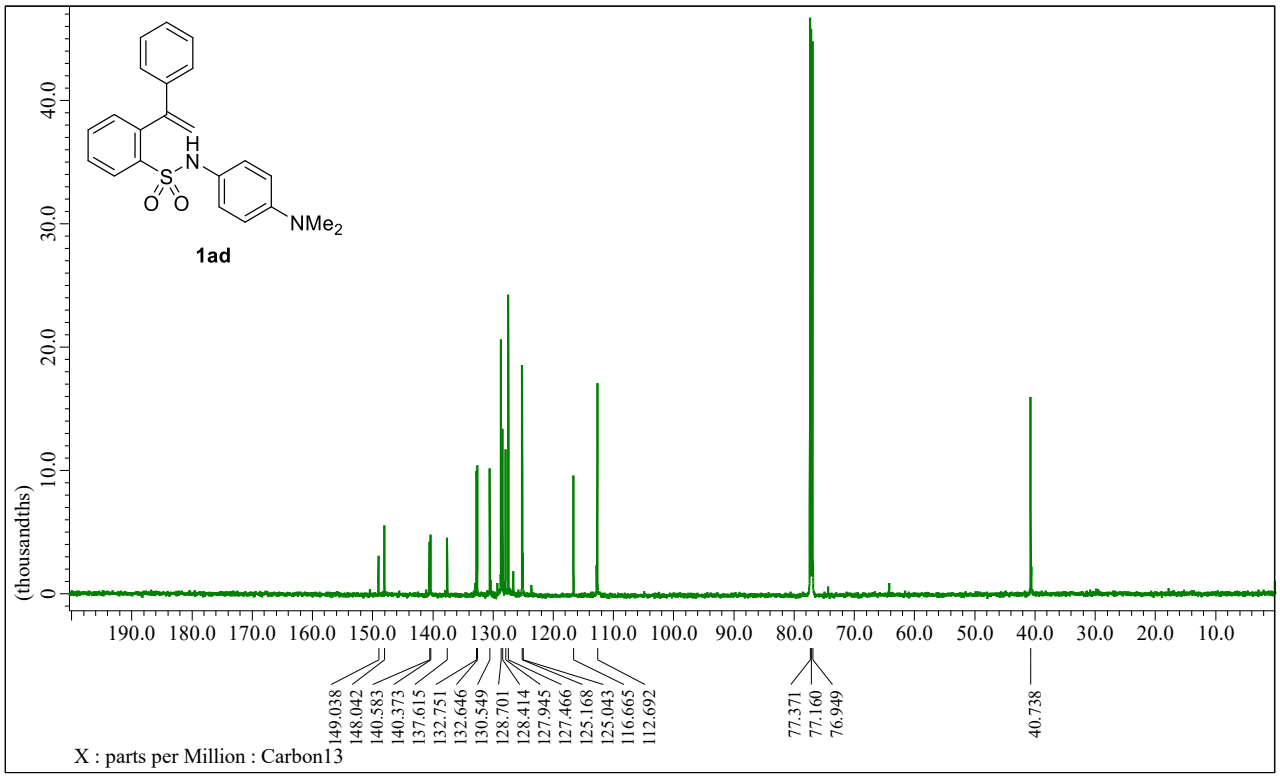
***N*-(4-Methoxyphenyl)-2-(1-phenylvinyl)benzenesulfonamide (1ac) ^{13}C NMR (150 MHz, $CDCl_3$)**



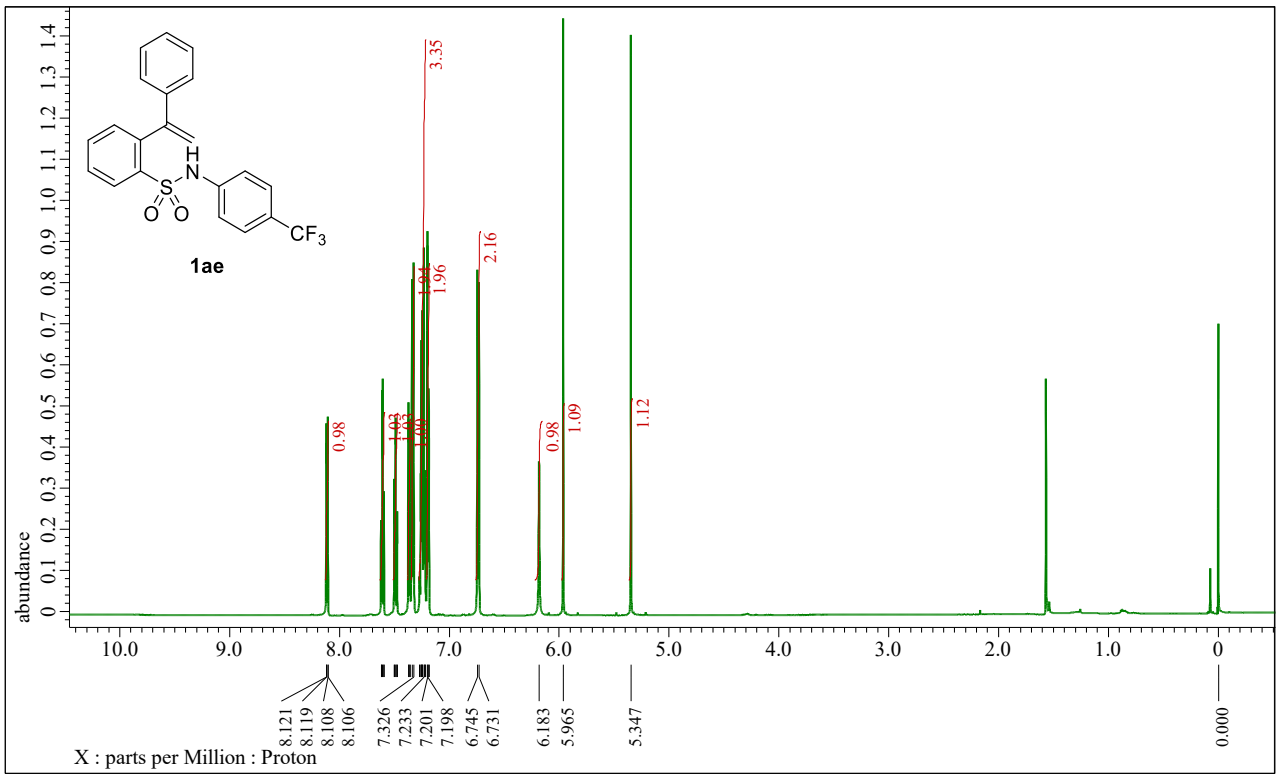
***N*-(4-(Dimethylamino)phenyl)-2-(1-phenylvinyl)benzenesulfonamide (1ad) ^{1}H NMR (600 MHz, $CDCl_3$)**



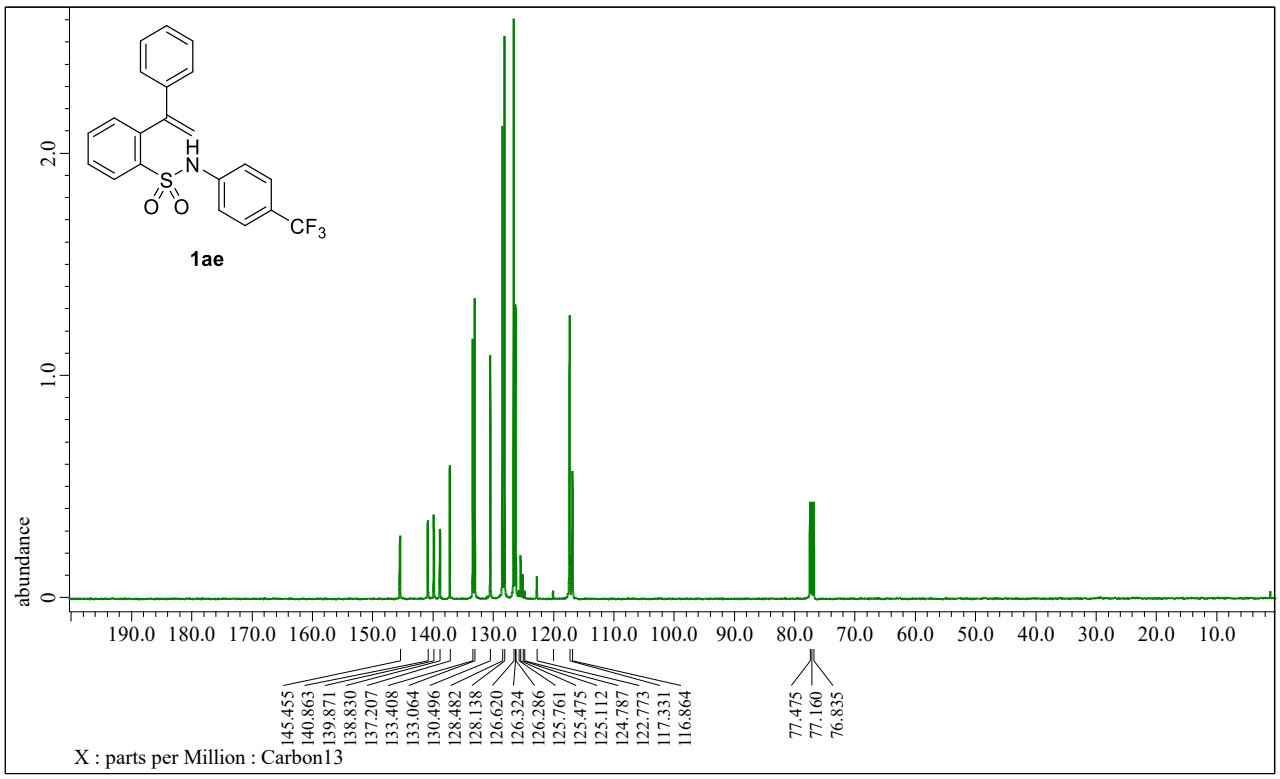
***N*-(4-(Dimethylamino)phenyl)-2-(1-phenylvinyl)benzenesulfonamide (1ad) ^{13}C NMR (150 MHz, $CDCl_3$)**



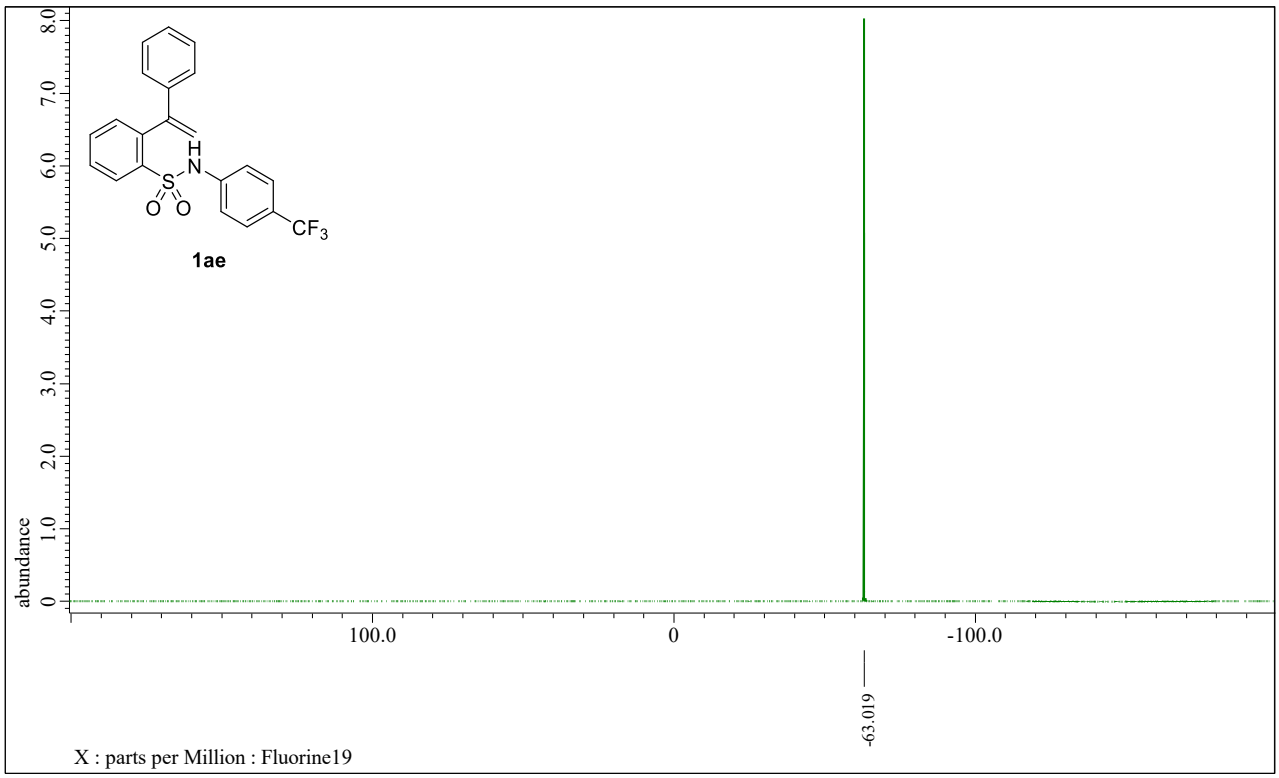
2-(1-Phenylvinyl)-*N*-(4-(trifluoromethyl)phenyl)benzenesulfonamide (1ae) ^{1}H NMR (600 MHz, $CDCl_3$)



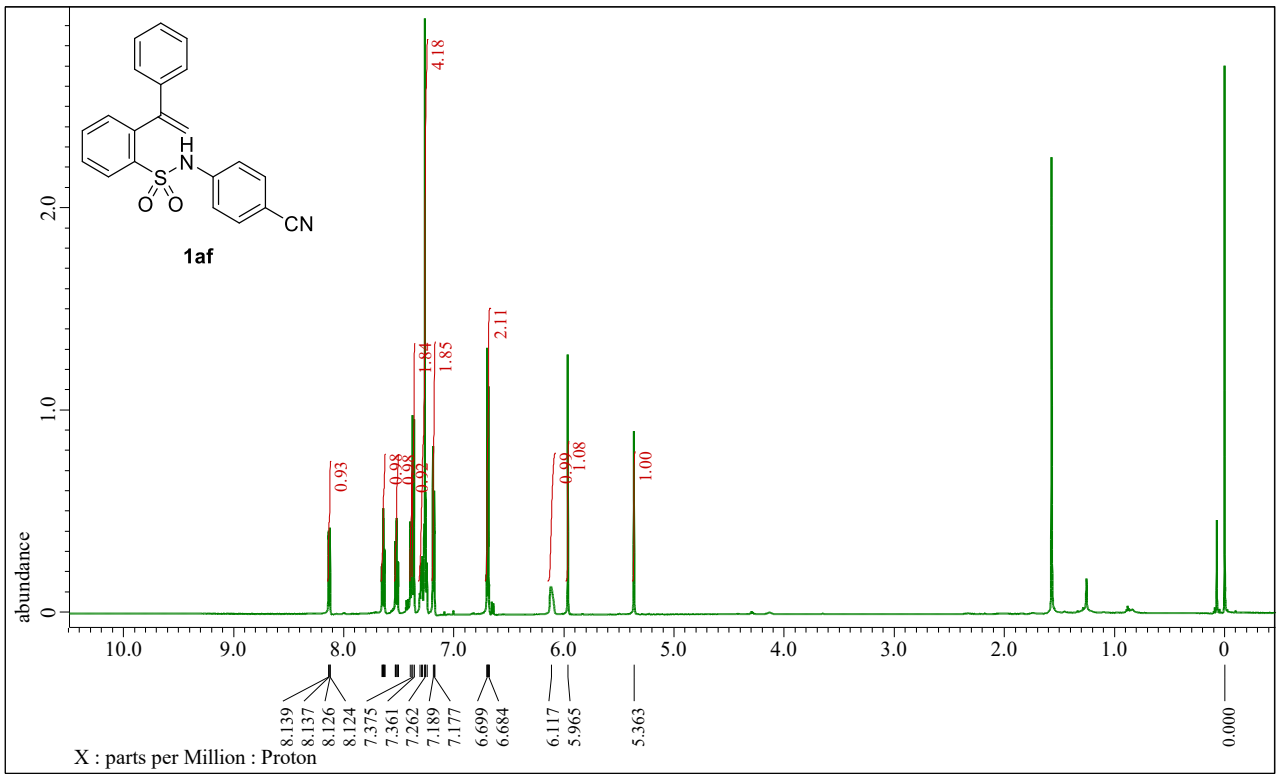
2-(1-Phenylvinyl)-*N*-(4-(trifluoromethyl)phenyl)benzenesulfonamide (1ae) ^{13}C NMR (100 MHz, $CDCl_3$)



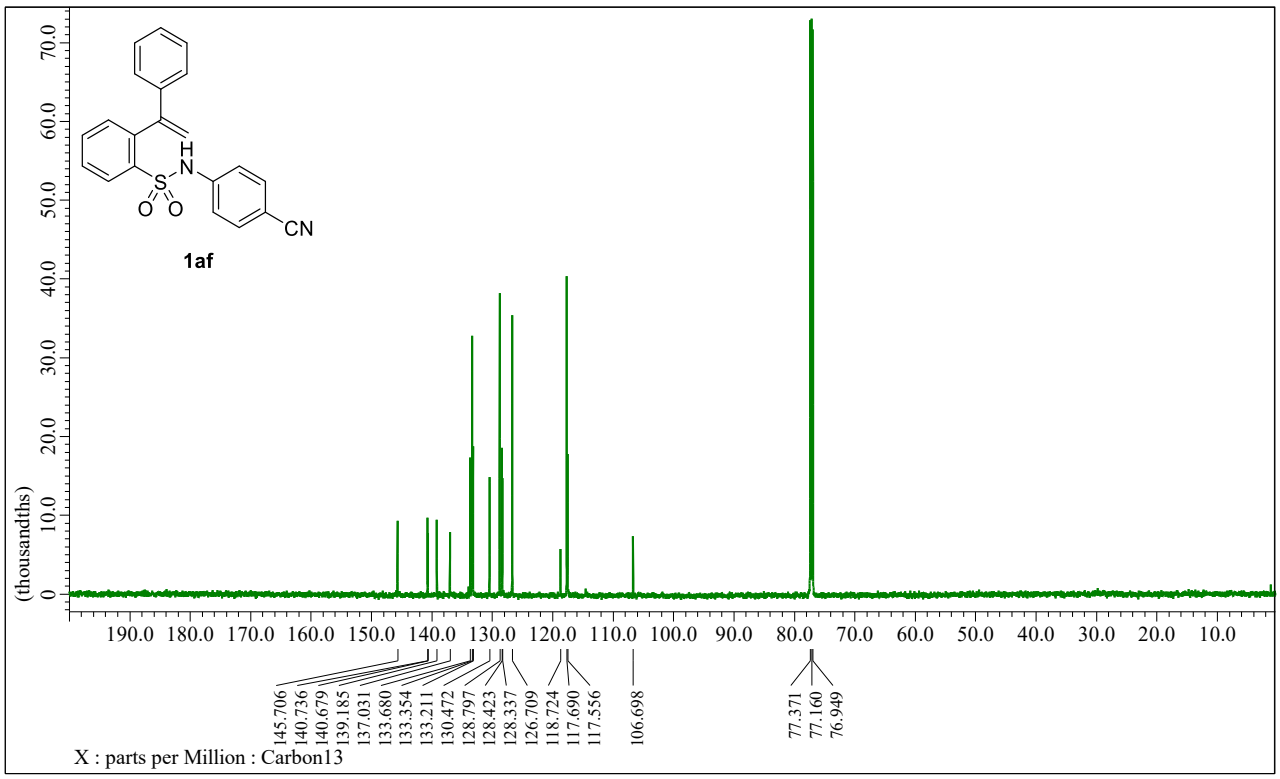
2-(1-Phenylvinyl)-*N*-(4-(trifluoromethyl)phenyl)benzenesulfonamide (1ae) ^{19}F NMR (376 MHz, $CDCl_3$)



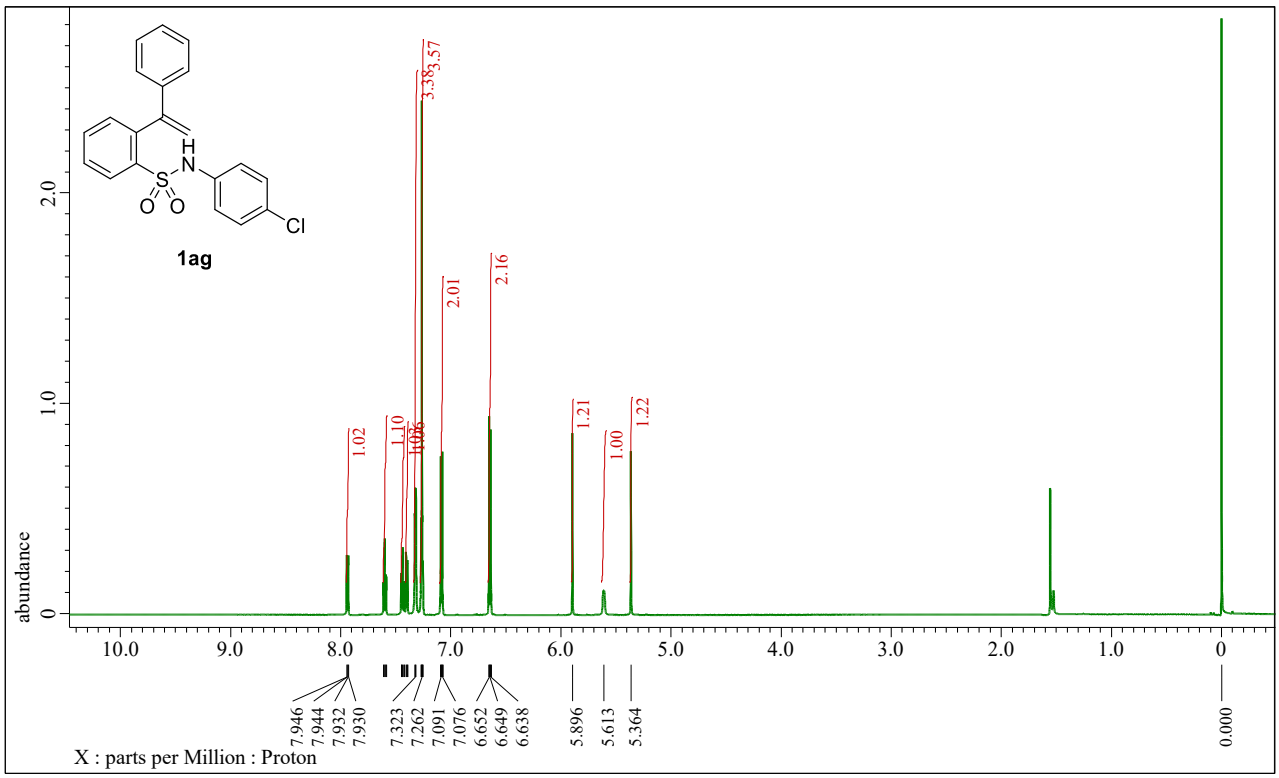
***N*-(4-Cyanophenyl)-2-(1-phenylvinyl)benzenesulfonamide (1af) ^{1}H NMR (600 MHz, $CDCl_3$)**



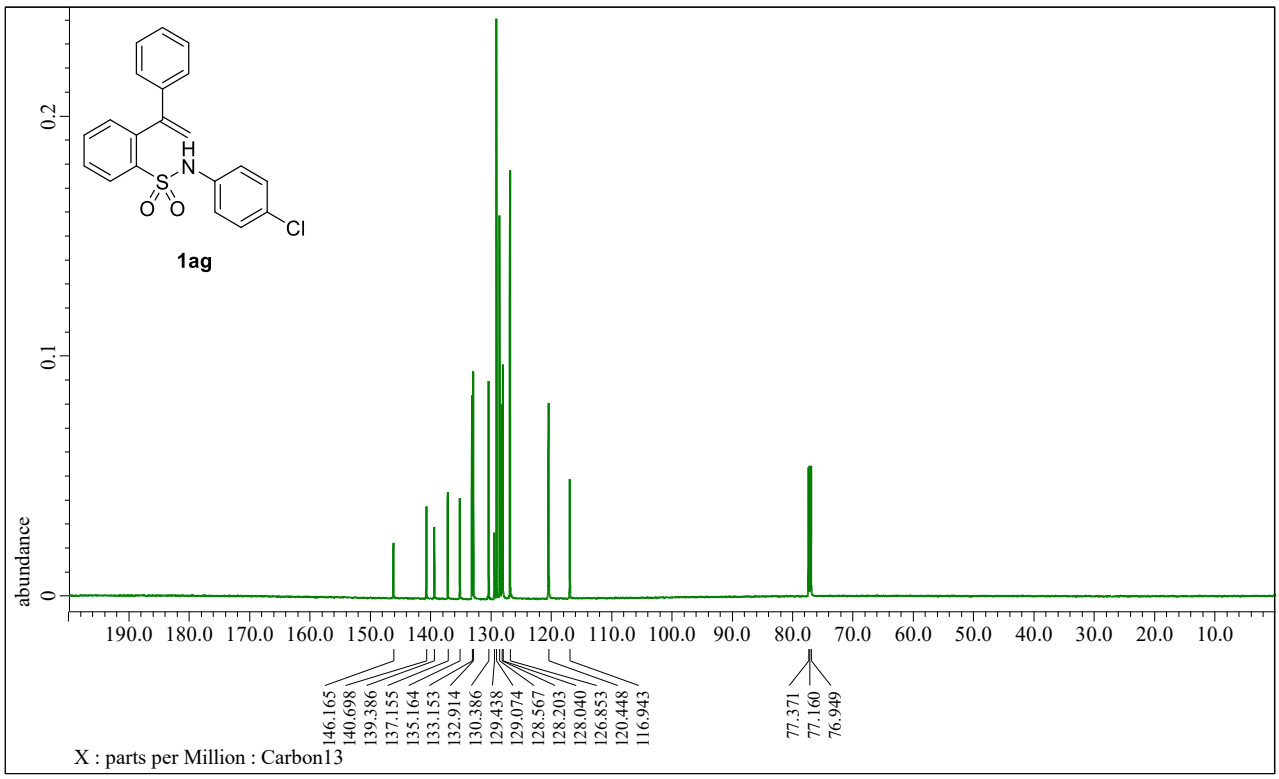
***N*-(4-Cyanophenyl)-2-(1-phenylvinyl)benzenesulfonamide (1af) ^{13}C NMR (150 MHz, $CDCl_3$)**



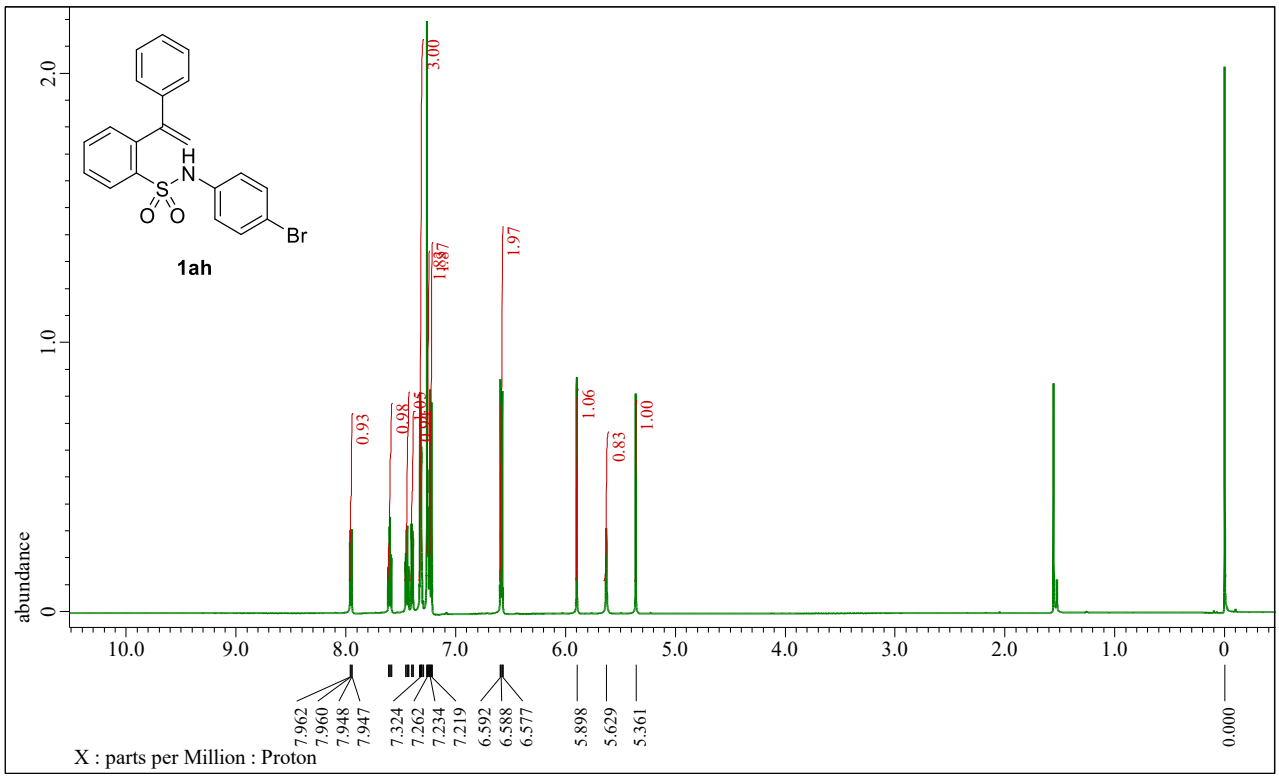
***N*-(4-Chlorophenyl)-2-(1-phenylvinyl)benzenesulfonamide (1ag) ^{1}H NMR (600 MHz, $CDCl_3$)**



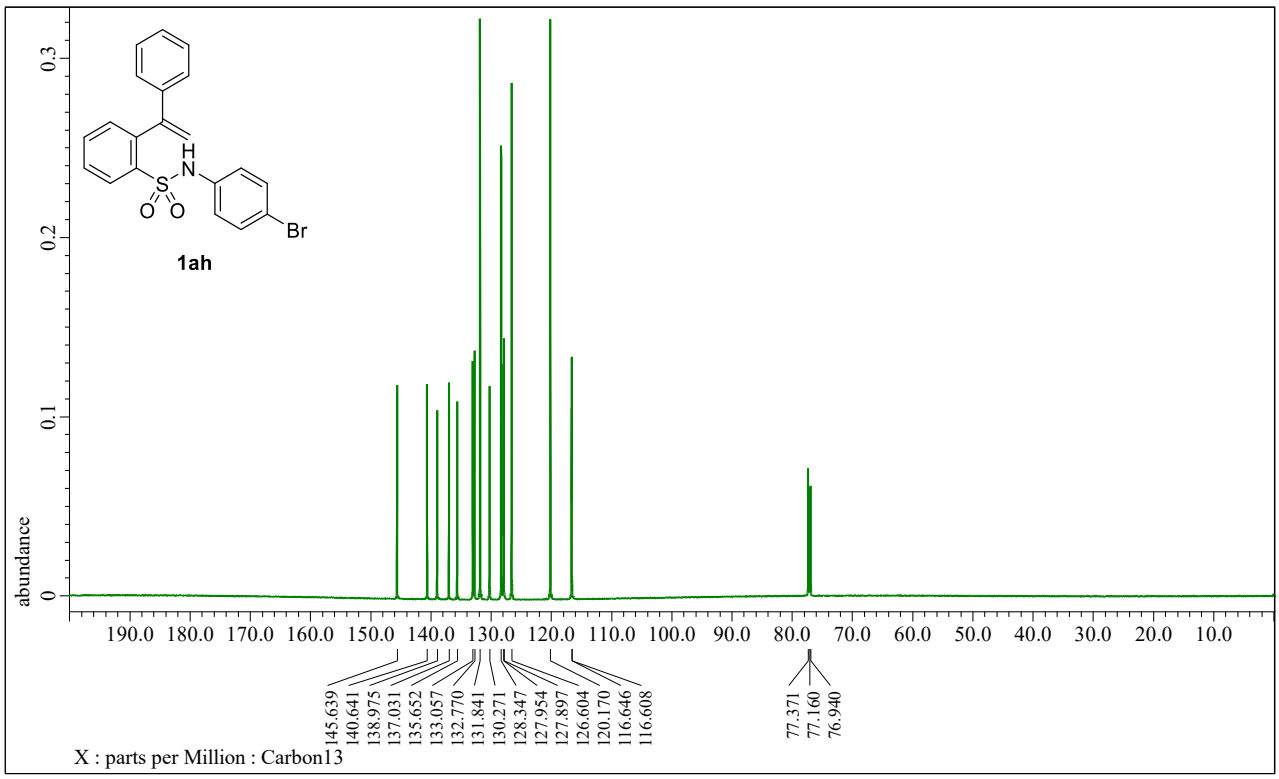
***N*-(4-Chlorophenyl)-2-(1-phenylvinyl)benzenesulfonamide (1ag) ^{13}C NMR (150 MHz, $CDCl_3$)**



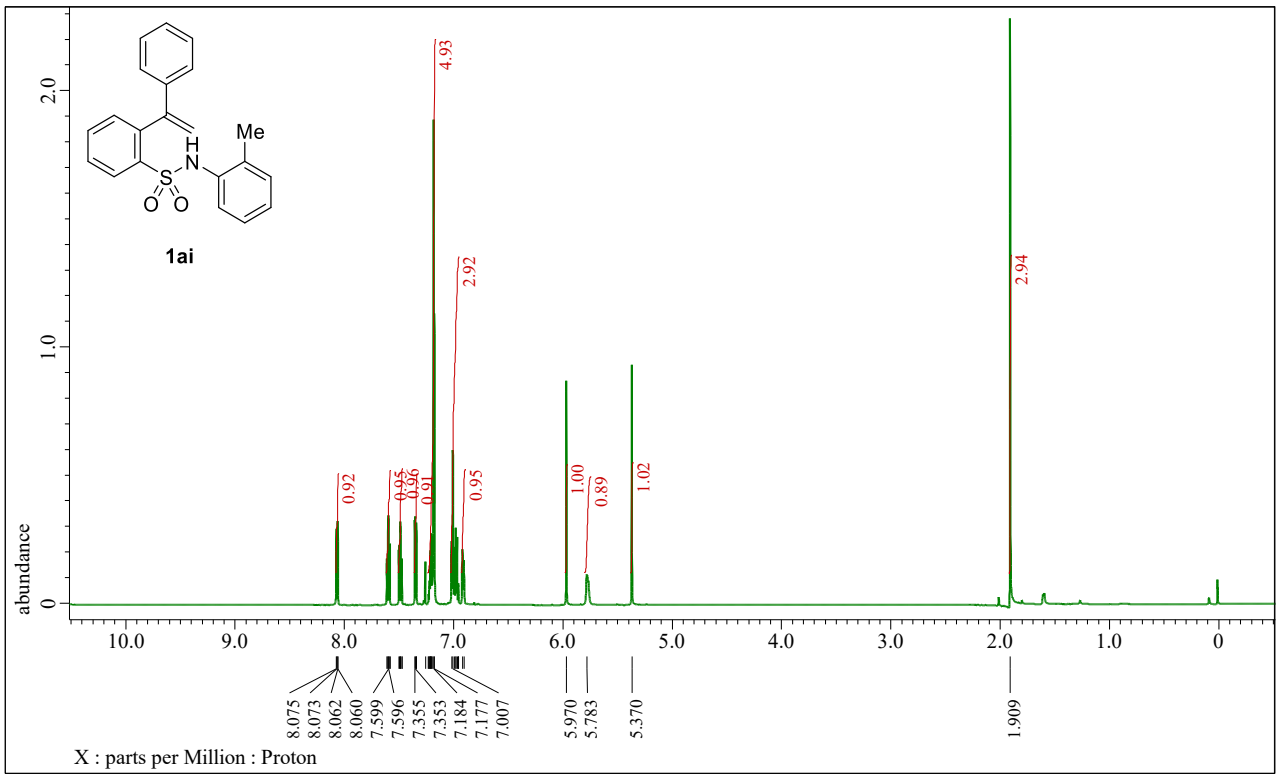
***N*-(4-Bromophenyl)-2-(1-phenylvinyl)benzenesulfonamide (1ah) ^{1}H NMR (600 MHz, $CDCl_3$)**



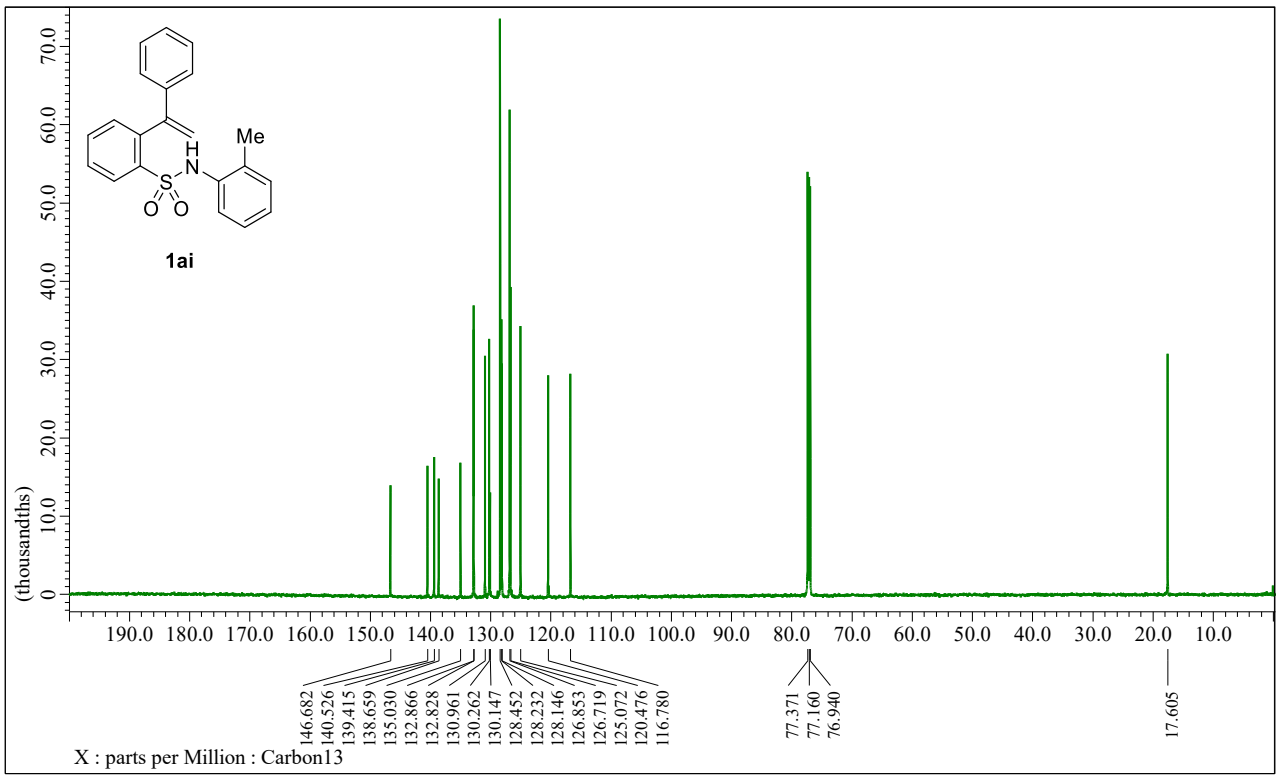
***N*-(4-Bromophenyl)-2-(1-phenylvinyl)benzenesulfonamide (1ah) ^{13}C NMR (150 MHz, $CDCl_3$)**



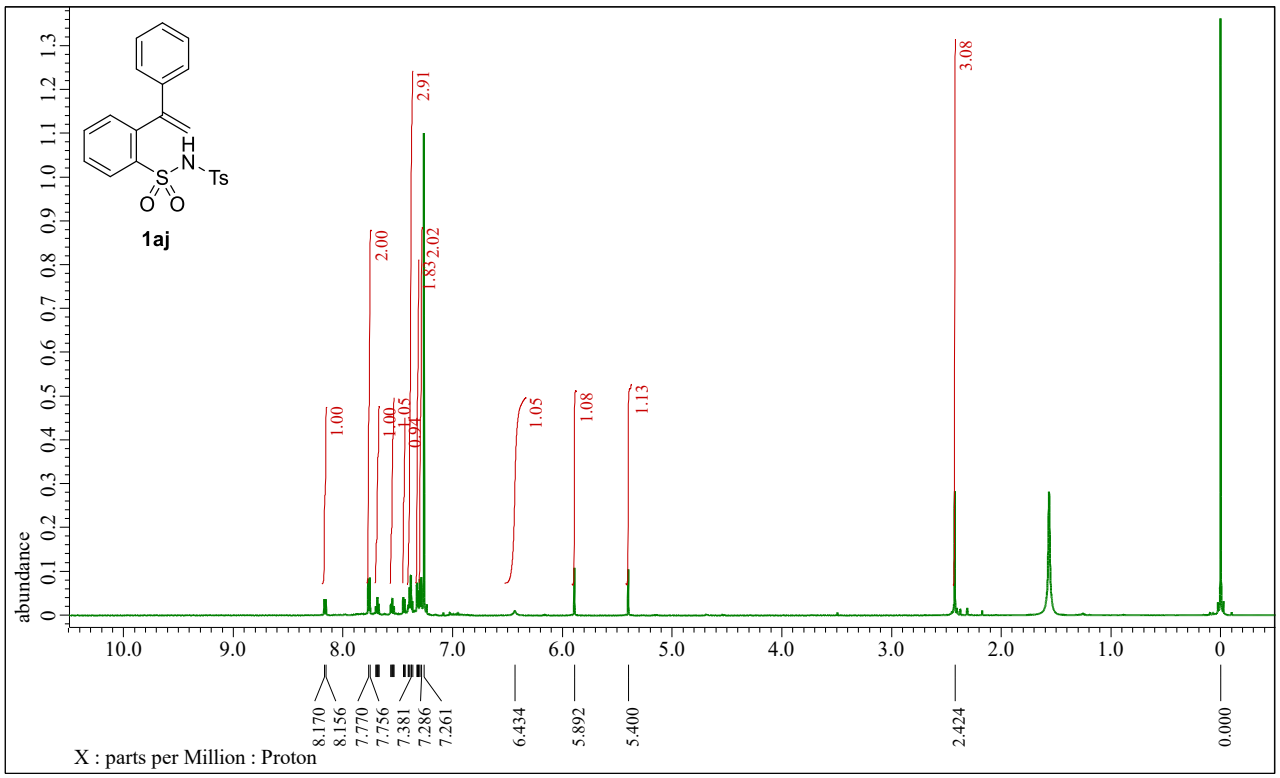
2-(1-Phenylvinyl)-*N*-(*o*-tolyl)benzenesulfonamide (1ai) ^{1}H NMR (600 MHz, $CDCl_3$)



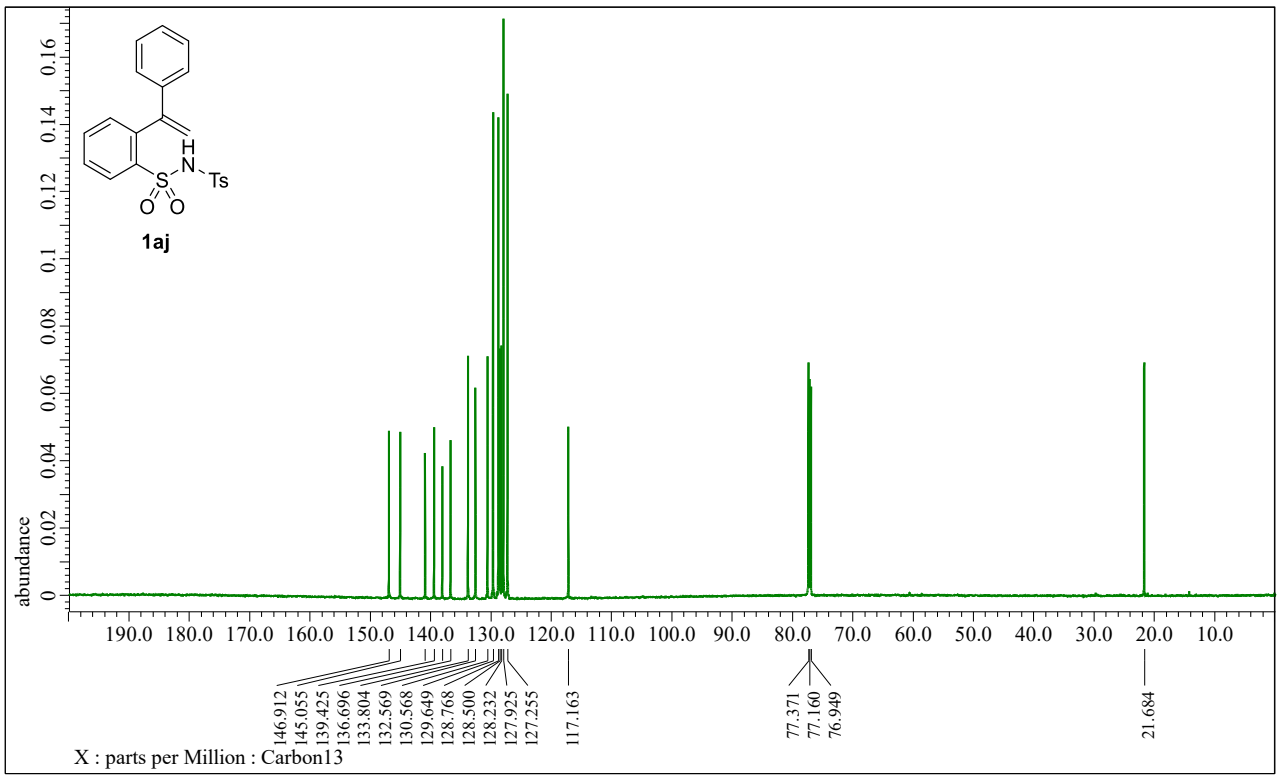
2-(1-Phenylvinyl)-*N*-(*o*-tolyl)benzenesulfonamide (1ai) ^{13}C NMR (150 MHz, $CDCl_3$)



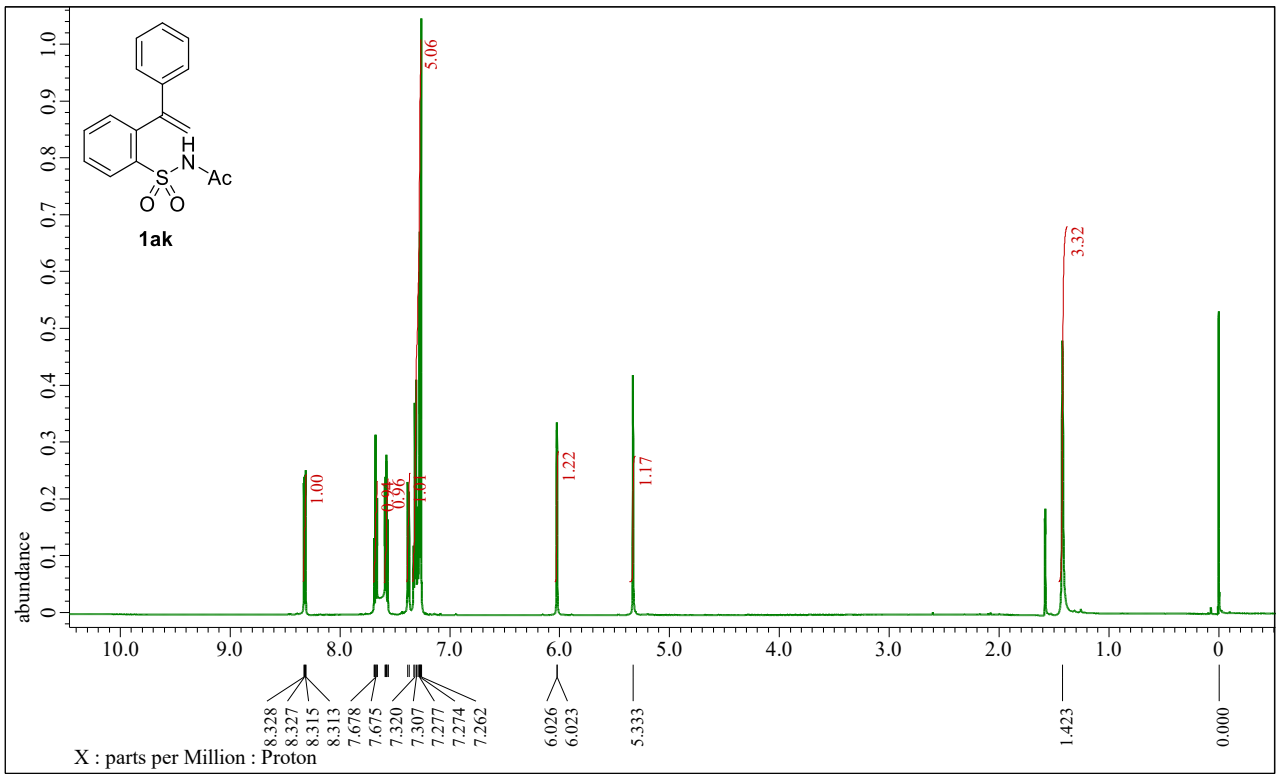
2-(1-Phenylvinyl)-*N*-tosylbenzenesulfonamide (1aj) ^{1}H NMR (600 MHz, $CDCl_3$)



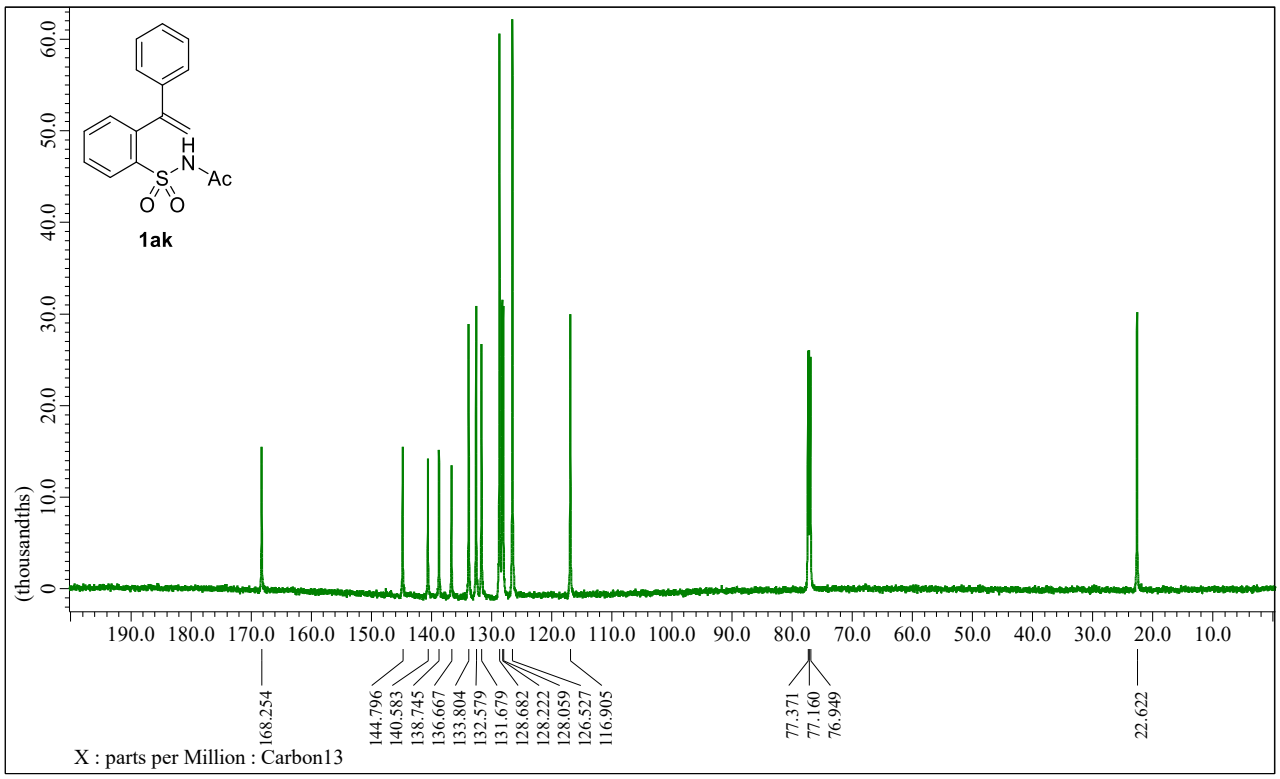
2-(1-Phenylvinyl)-*N*-tosylbenzenesulfonamide (1aj) ^{13}C NMR (150 MHz, $CDCl_3$)



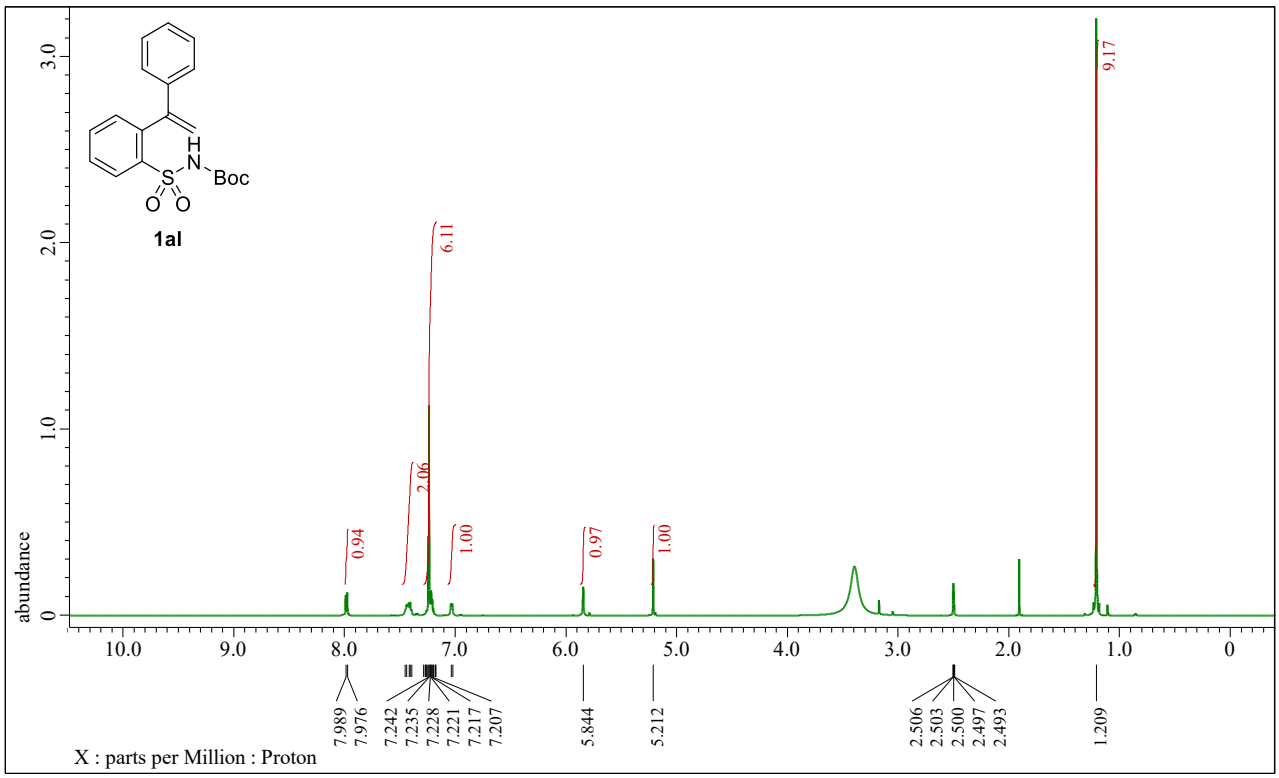
***N*-((2-(1-Phenylvinyl)phenyl)sulfonyl)acetoamide (1ak) ^{1}H NMR (600 MHz, $CDCl_3$)**



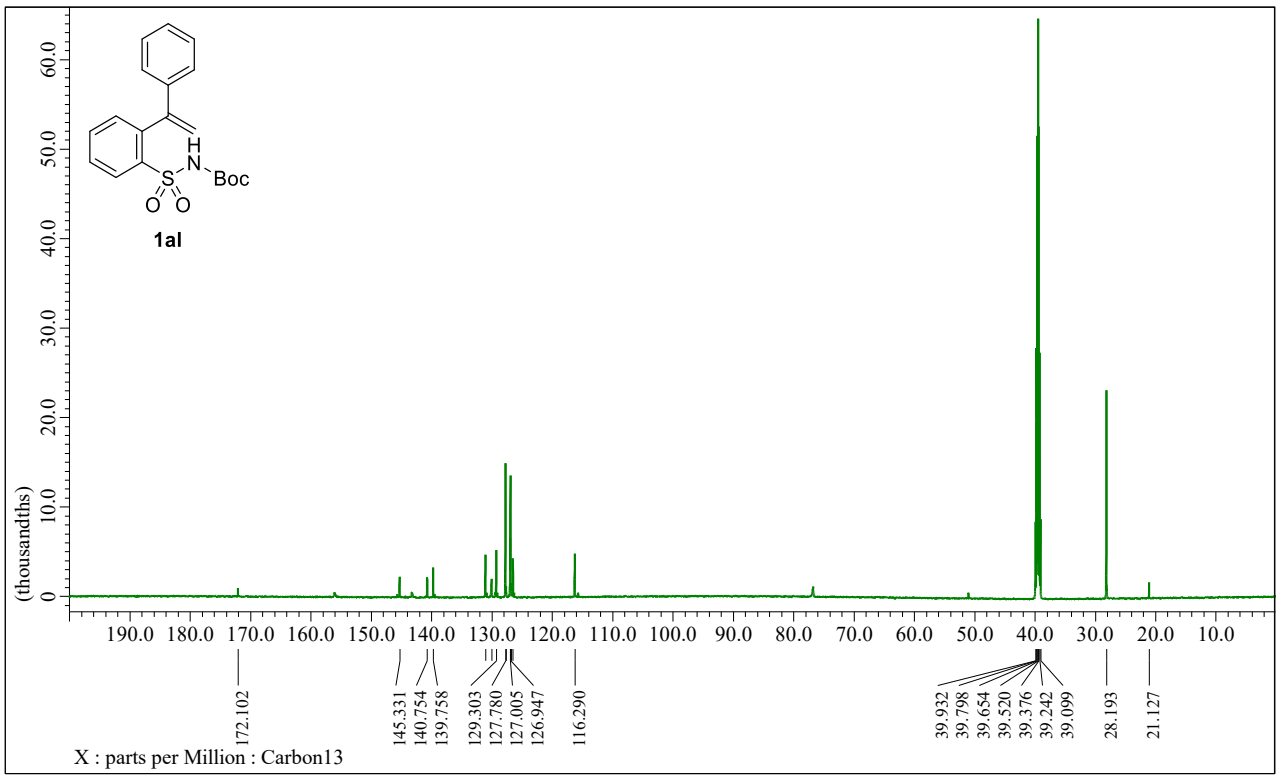
***N*-((2-(1-Phenylvinyl)phenyl)sulfonyl)acetoamide (1ak) ^{13}C NMR (150 MHz, $CDCl_3$)**



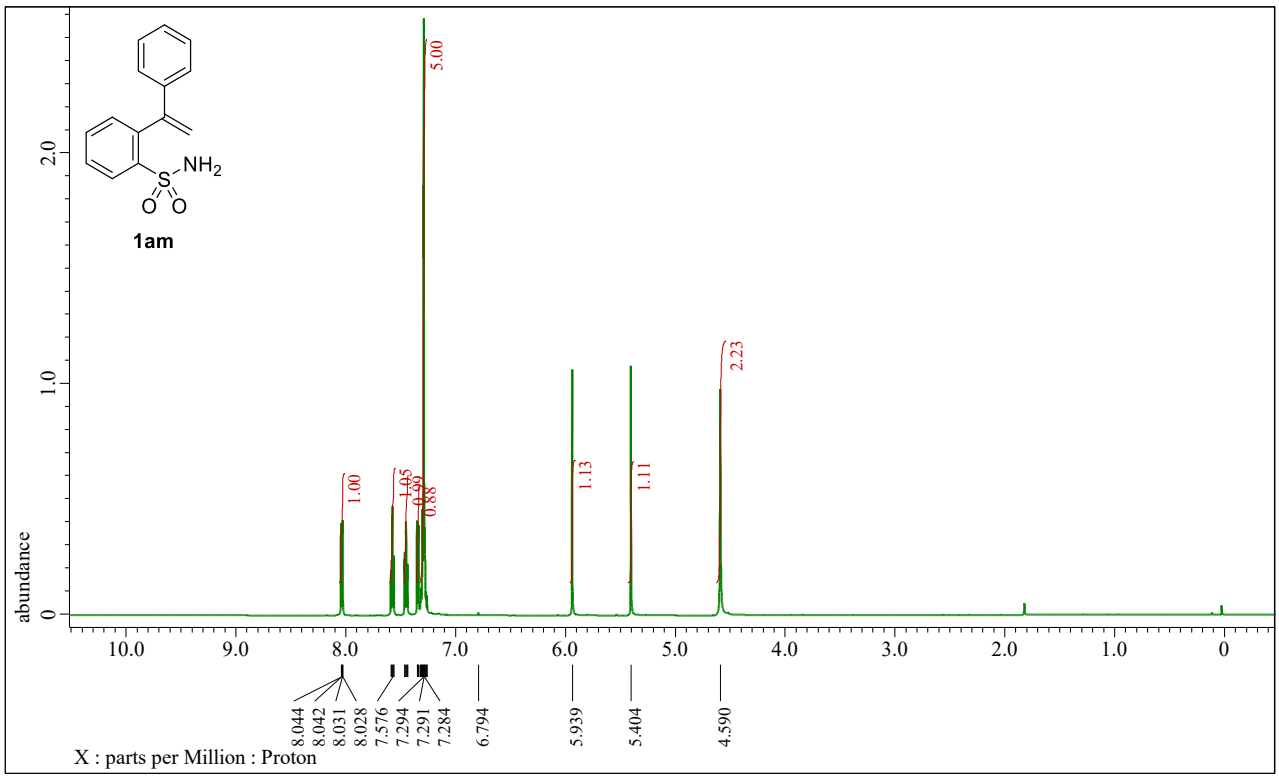
***tert*-Butyl ((2-(1-Phenylvinyl)phenyl)sulfonyl)carbamate (1al) ^{1}H NMR (600 MHz, DMSO-d_6)**



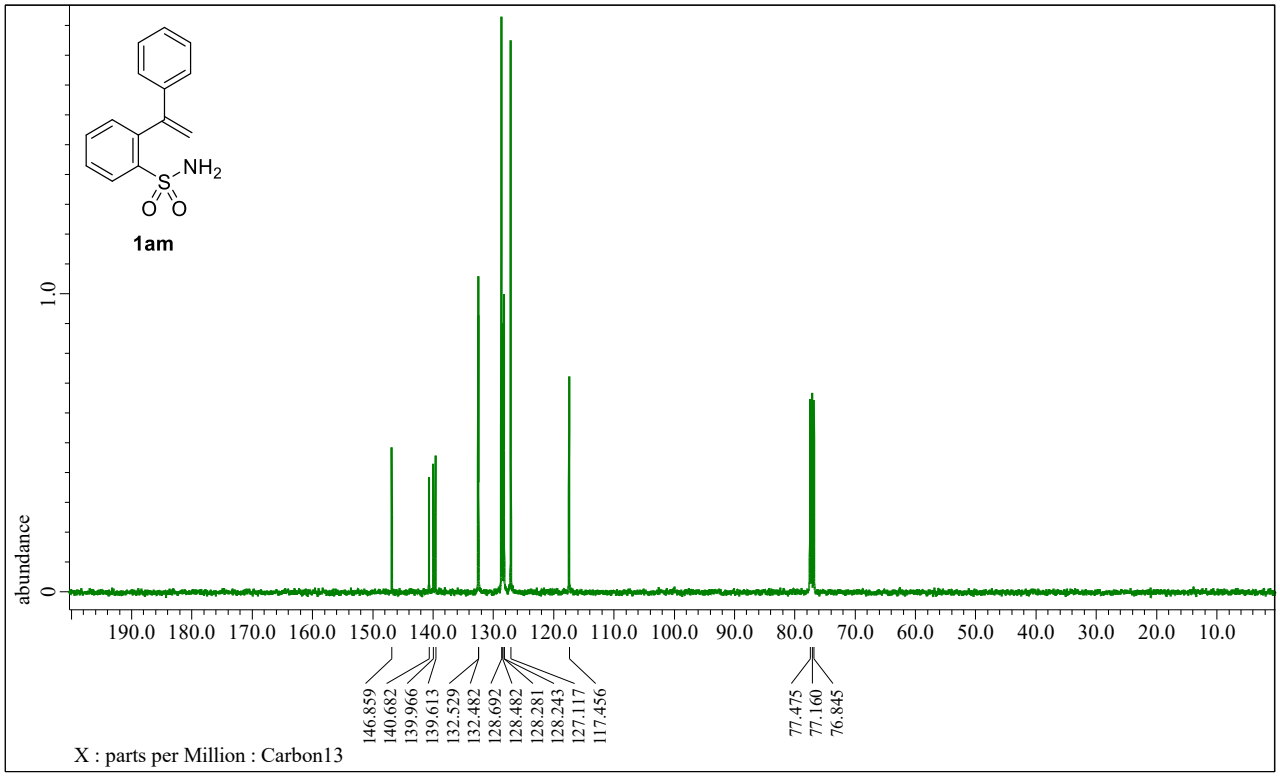
***tert*-Butyl ((2-(1-Phenylvinyl)phenyl)sulfonyl)carbamate (1al) ^{13}C NMR (150 MHz, DMSO-d_6)**



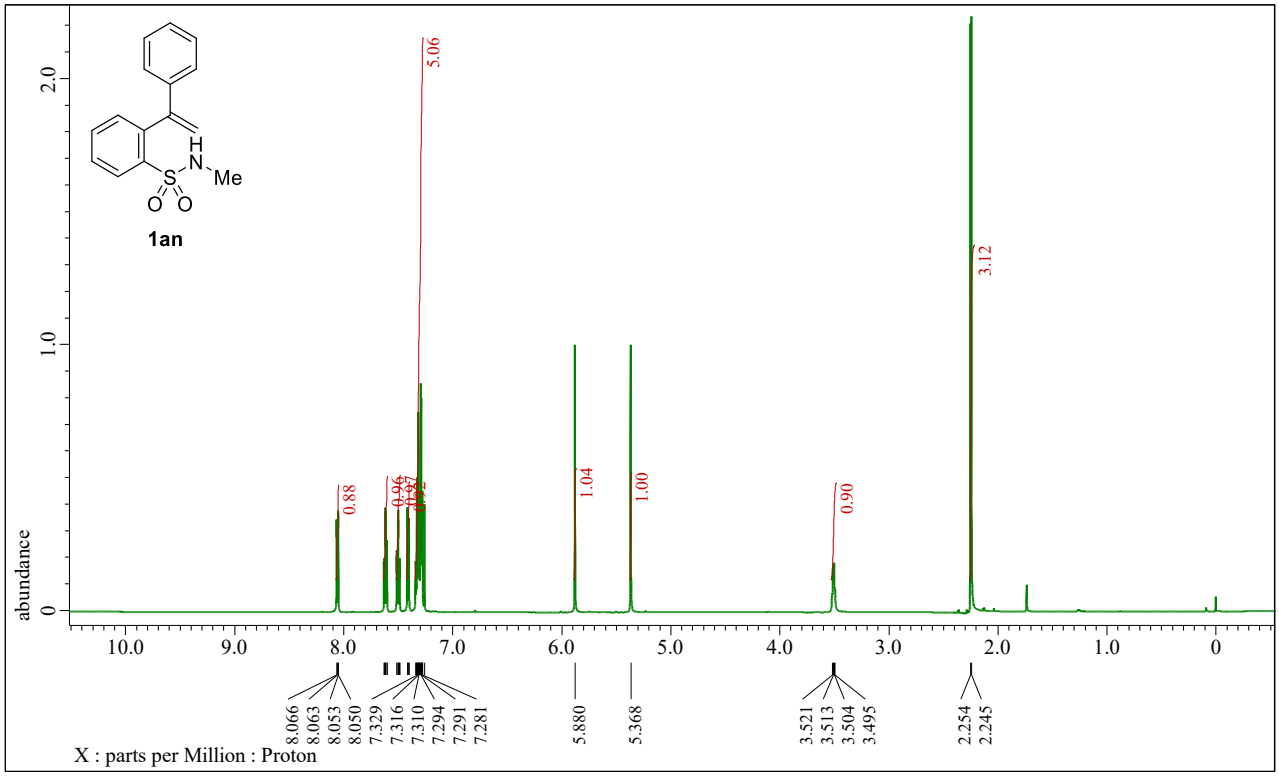
2-(1-Phenylvinyl)benzenesulfonamide (1am) ^{1}H NMR (600 MHz, $CDCl_3$)



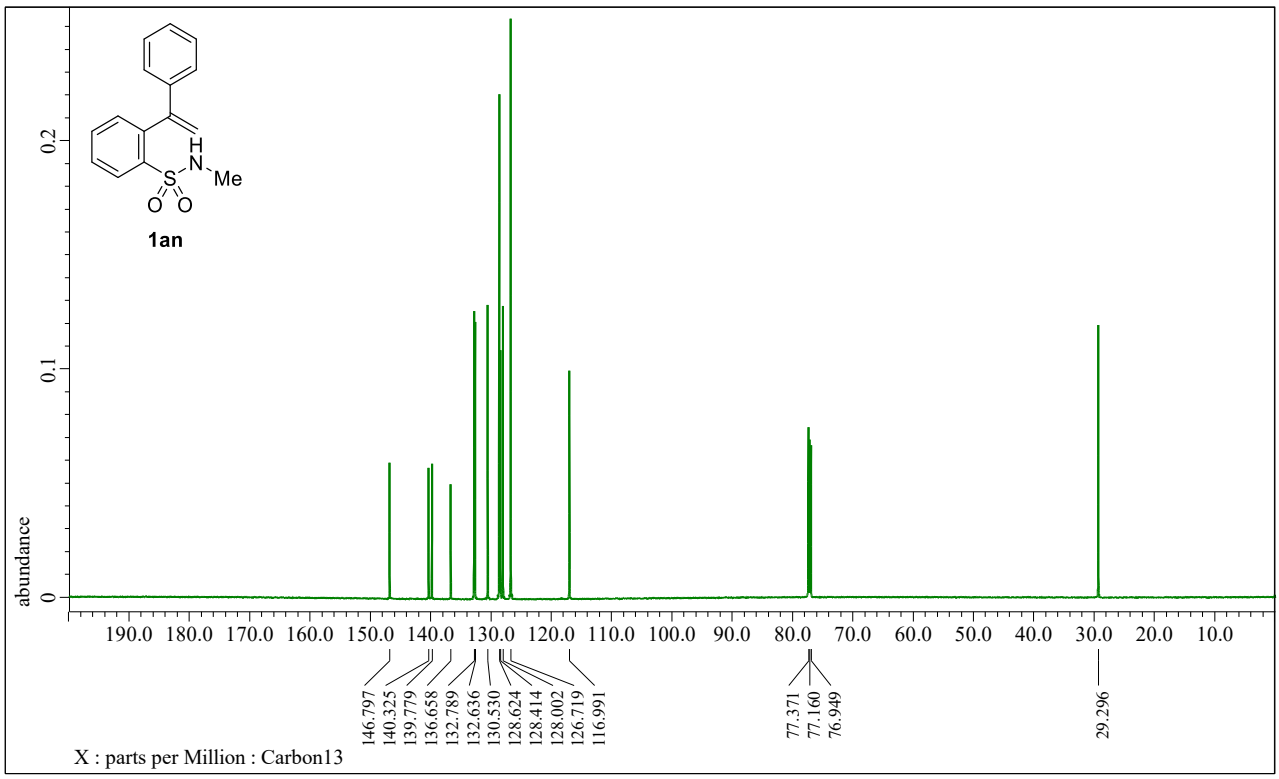
2-(1-Phenylvinyl)benzenesulfonamide (1am) ^{1}H NMR (600 MHz, $CDCl_3$)



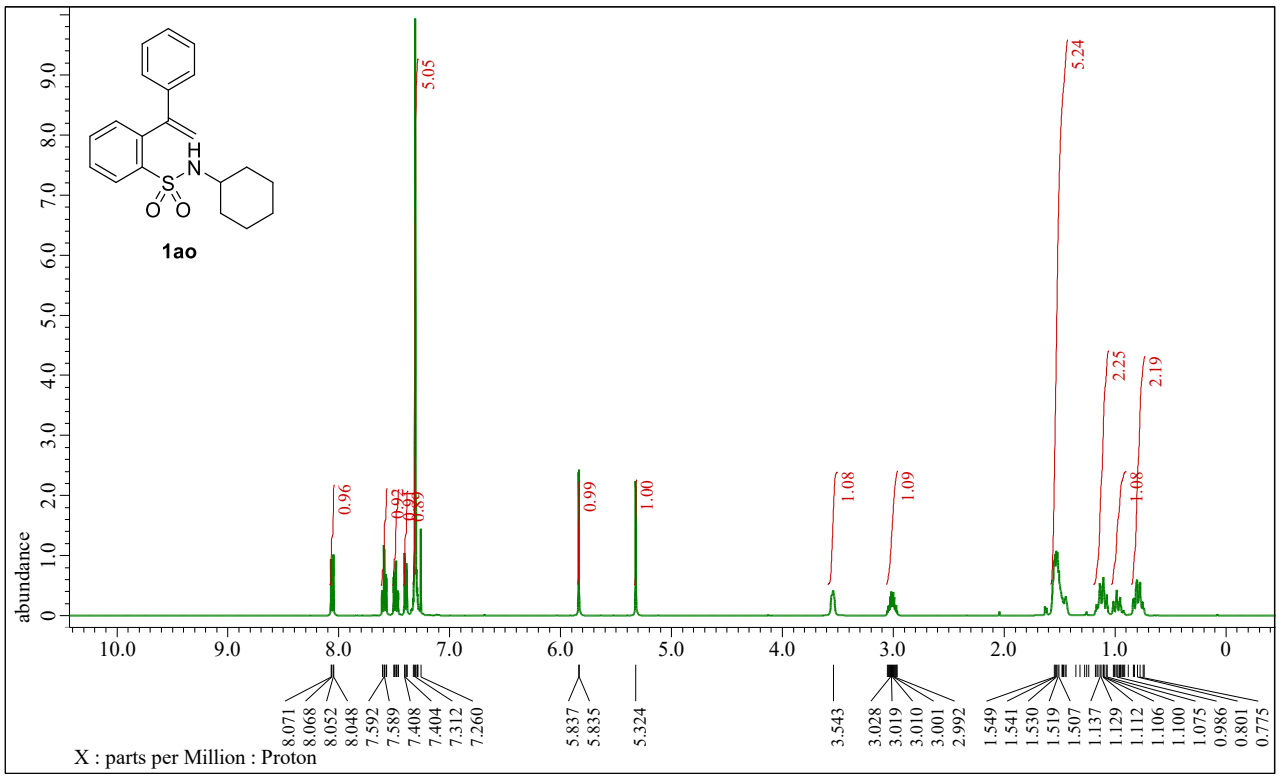
***N*-Methyl-2-(1-phenylvinyl)benzenesulfonamide (1an) ^{1}H NMR (600 MHz, $CDCl_3$)**



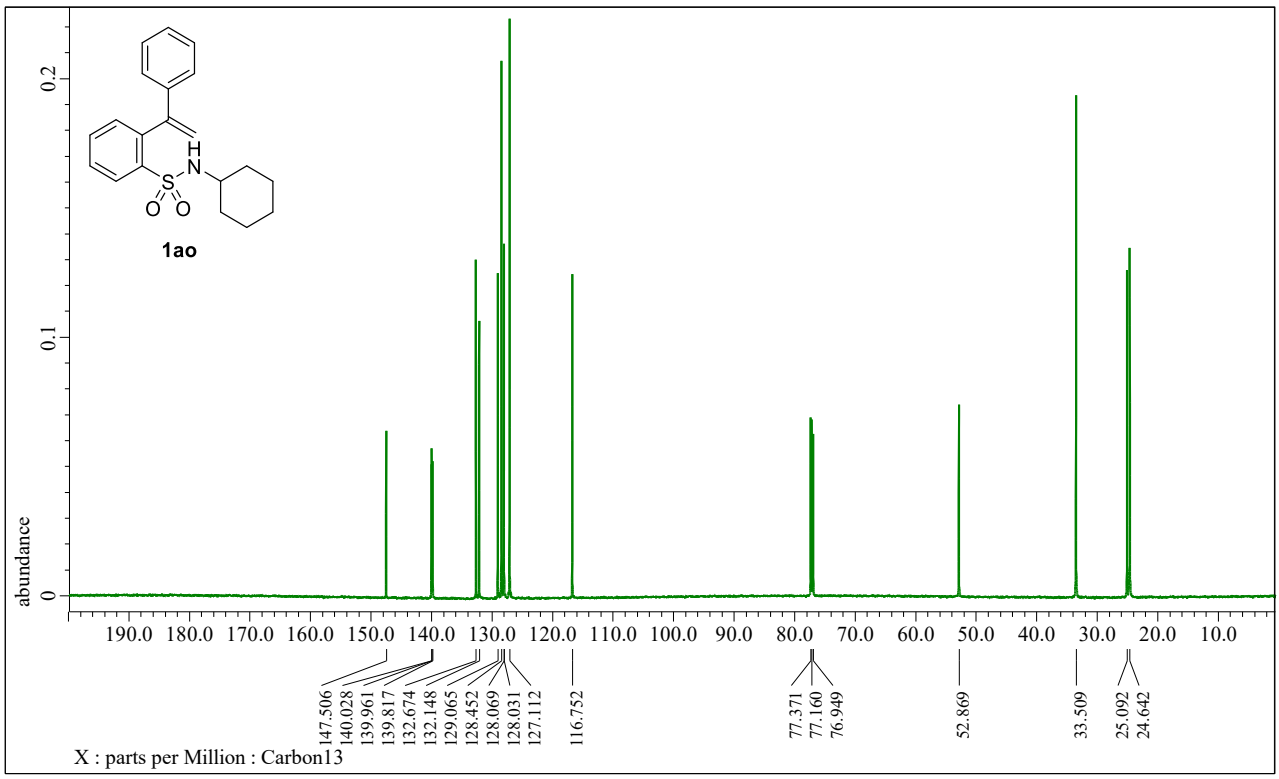
***N*-Methyl-2-(1-phenylvinyl)benzenesulfonamide (1an) ^{1}H NMR (600 MHz, $CDCl_3$)**



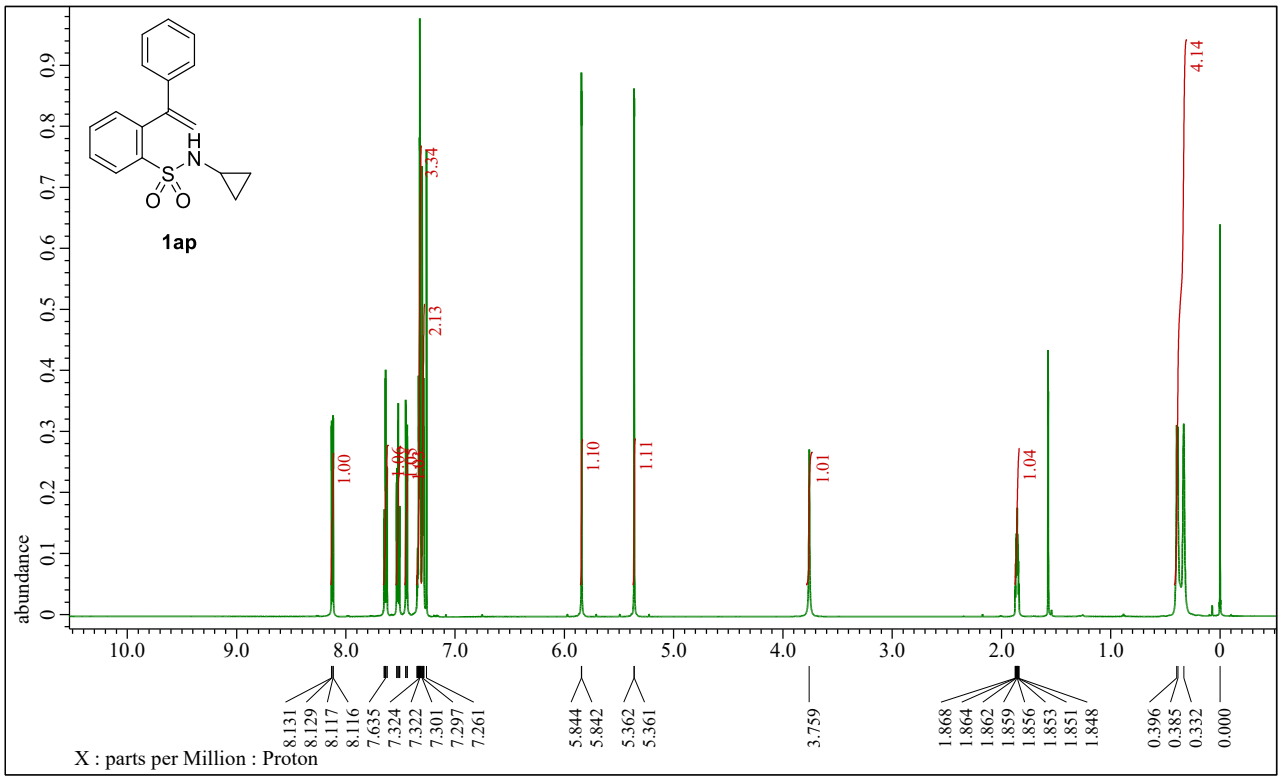
***N*-Cyclohexyl-2-(1-phenylvinyl)benzenesulfonamide (1ao) ^{1}H NMR (400 MHz, $CDCl_3$)**



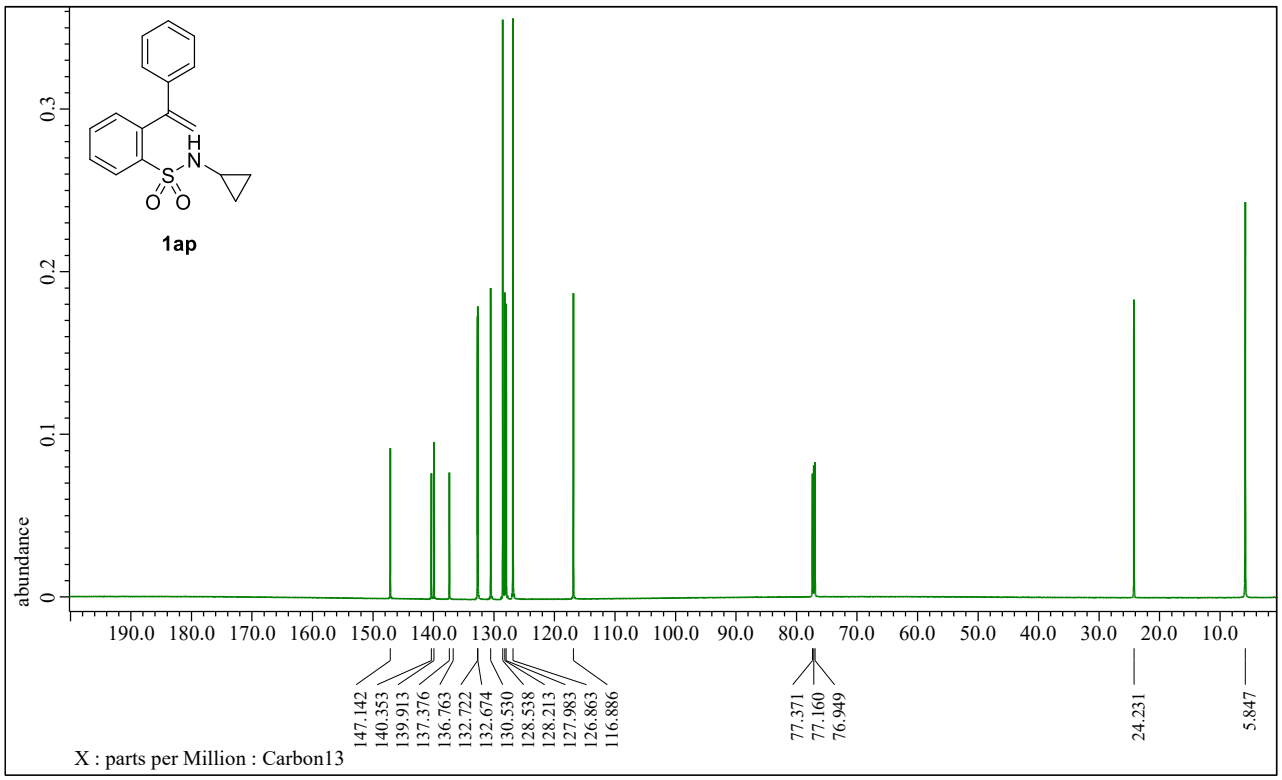
***N*-Cyclohexyl-2-(1-phenylvinyl)benzenesulfonamide (1ao) ^{13}C NMR (150 MHz, $CDCl_3$)**



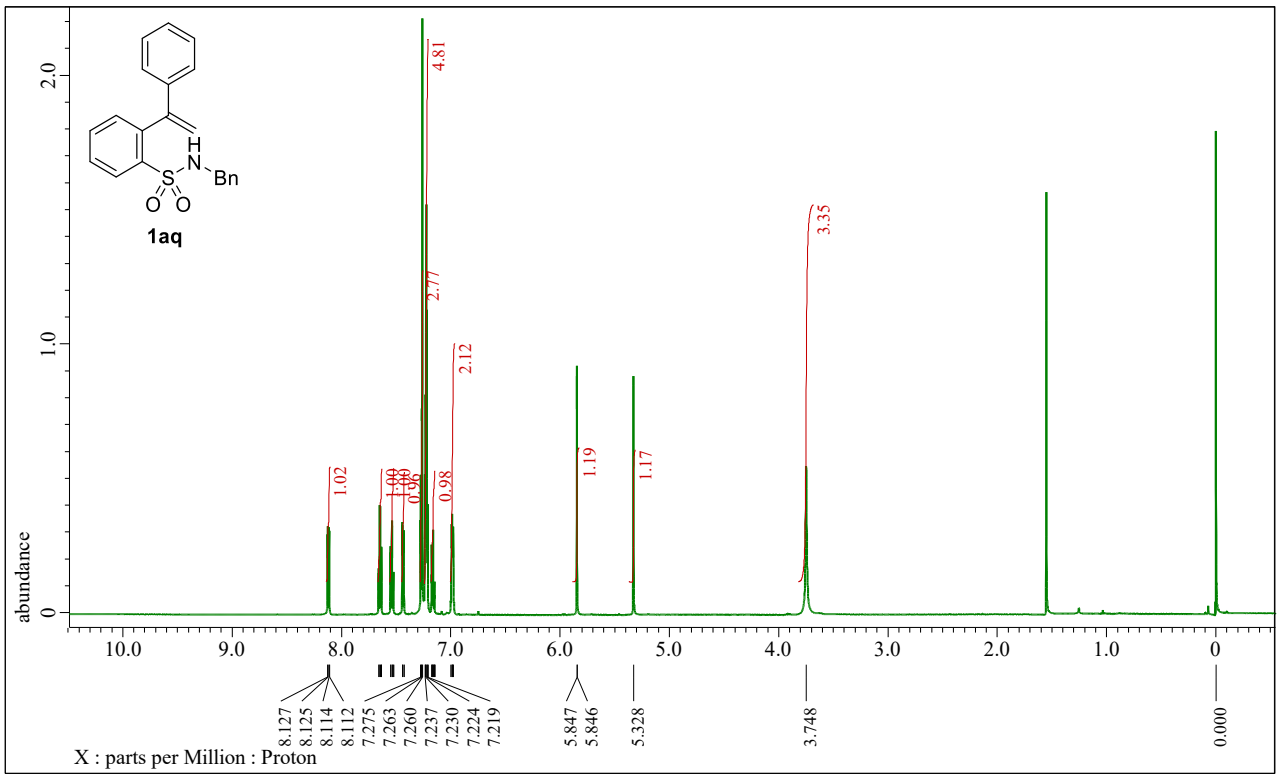
***N*-cyclopropyl-2-(1-phenylvinyl)benzenesulfonamide (1ap) ^{1}H NMR (600 MHz, $CDCl_3$)**



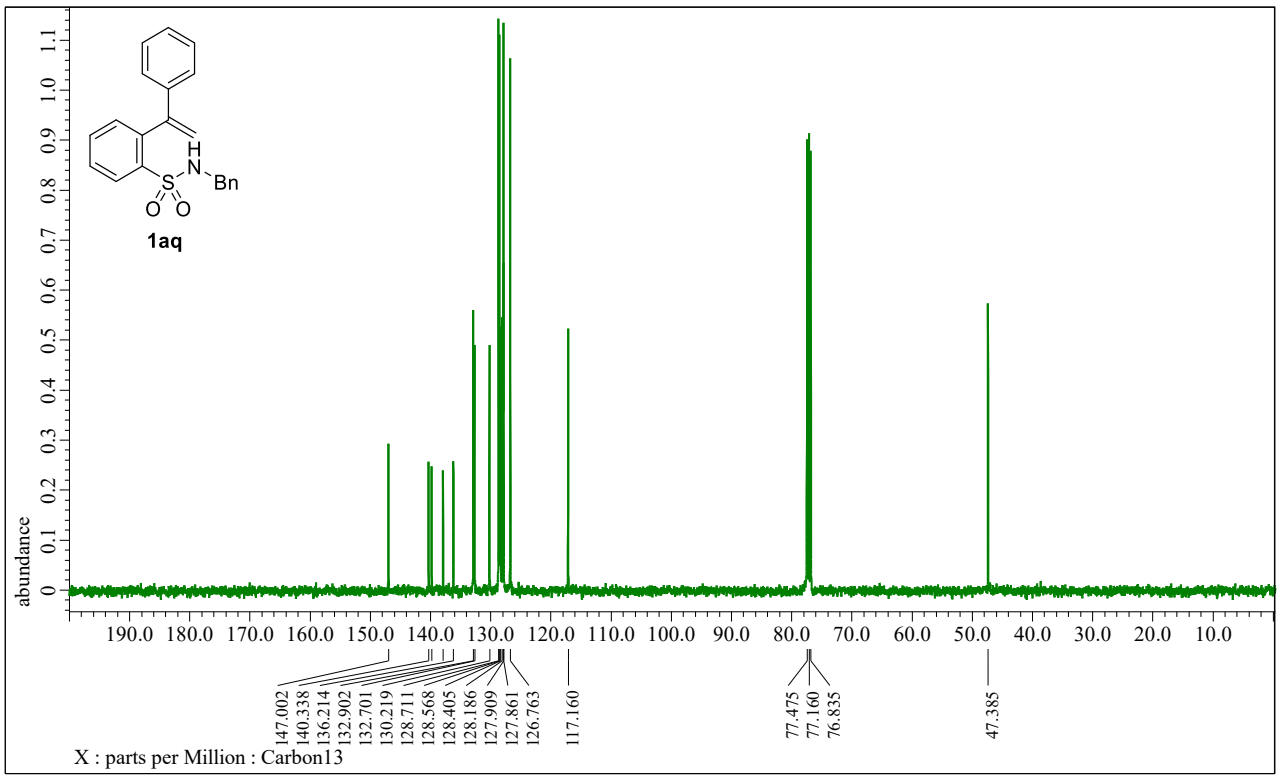
***N*-cyclopropyl-2-(1-phenylvinyl)benzenesulfonamide (1ap) ^{13}C NMR (150 MHz, $CDCl_3$)**



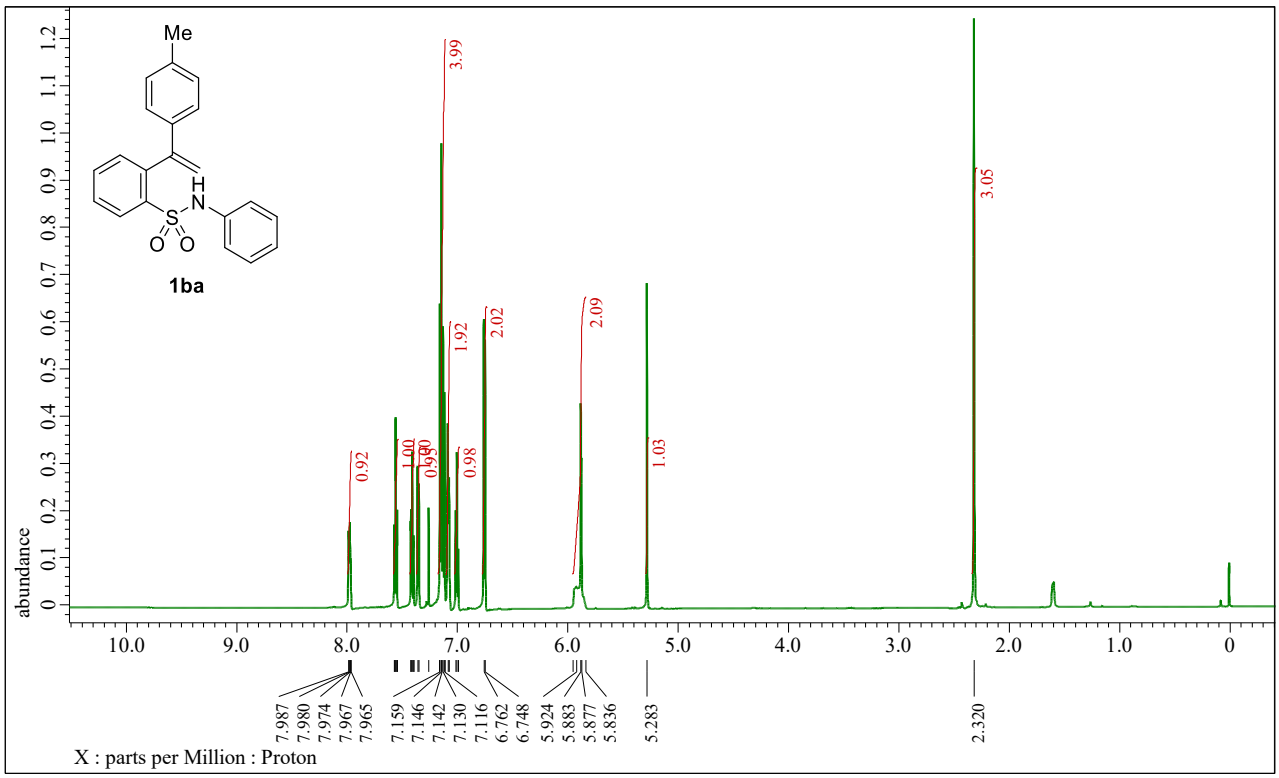
***N*-Benzyl-2-(1-phenylvinyl)benzenesulfonamide (1aq) ^{1}H NMR (600 MHz, $CDCl_3$)**



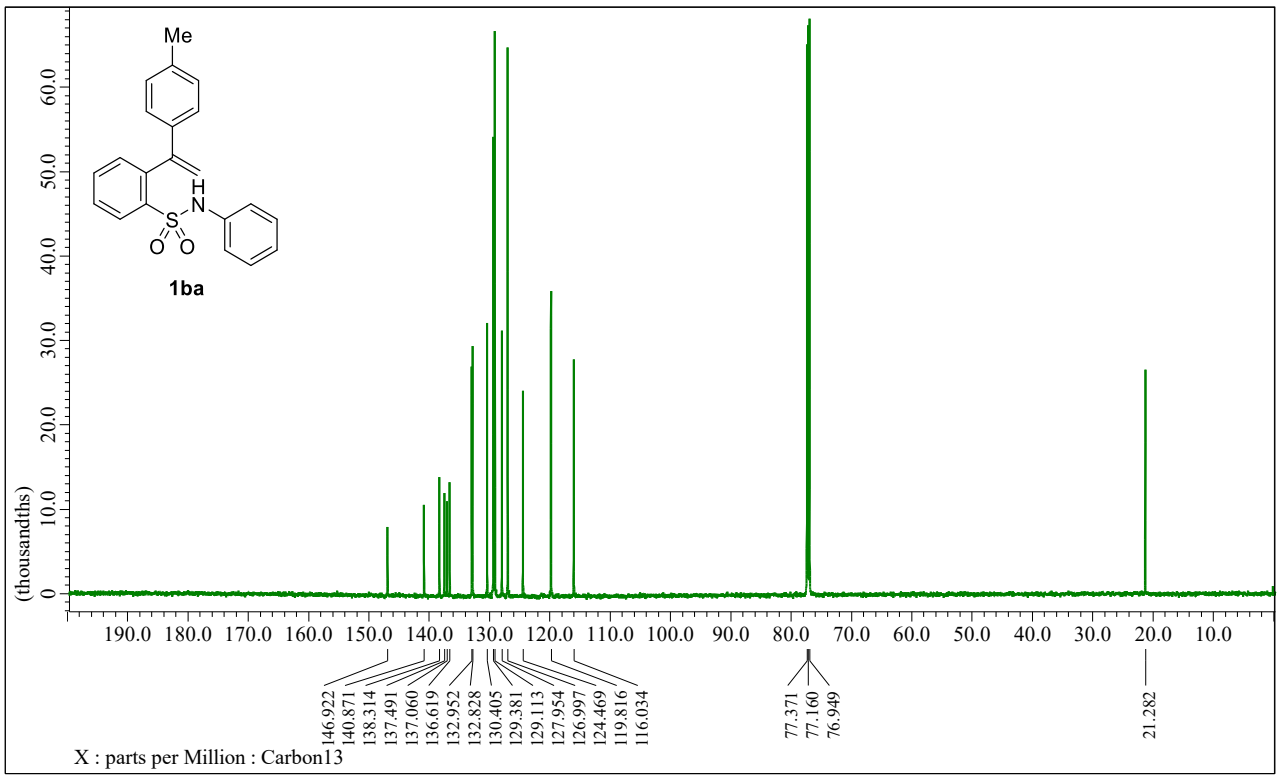
***N*-Benzyl-2-(1-phenylvinyl)benzenesulfonamide (1aq) ^{13}C NMR (100 MHz, $CDCl_3$)**



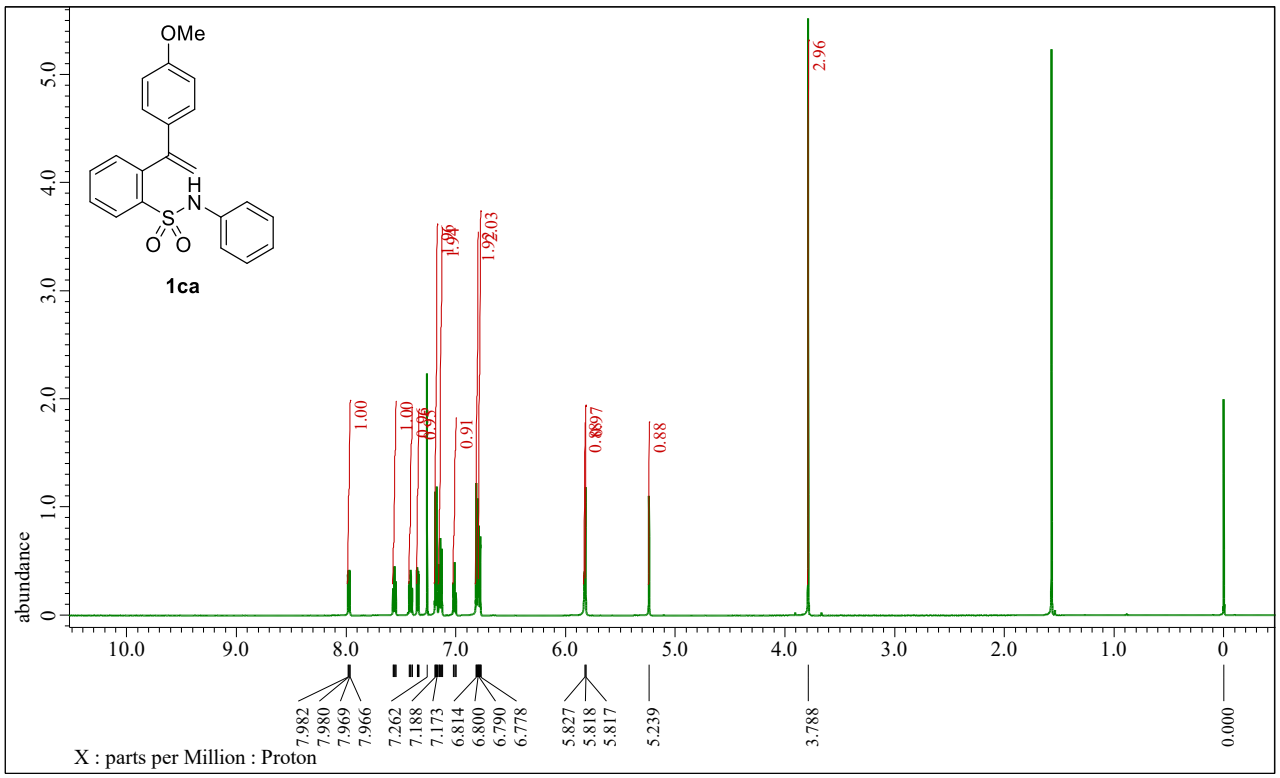
***N*-Phenyl-2-(1-(*p*-tolyl)vinyl)benzenesulfonamide (1ba) ^{1}H NMR (600 MHz, $CDCl_3$)**



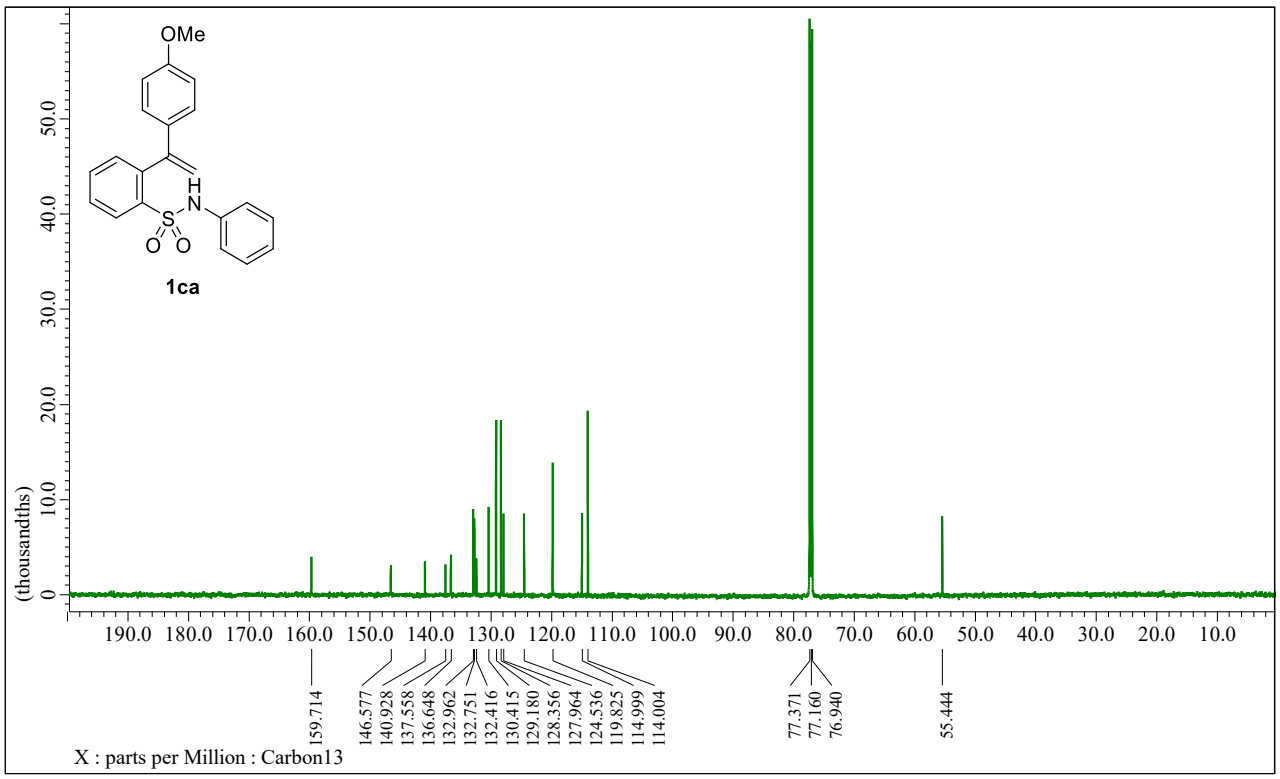
***N*-Phenyl-2-(1-(*p*-tolyl)vinyl)benzenesulfonamide (1ba) ^{13}C NMR (150 MHz, $CDCl_3$)**



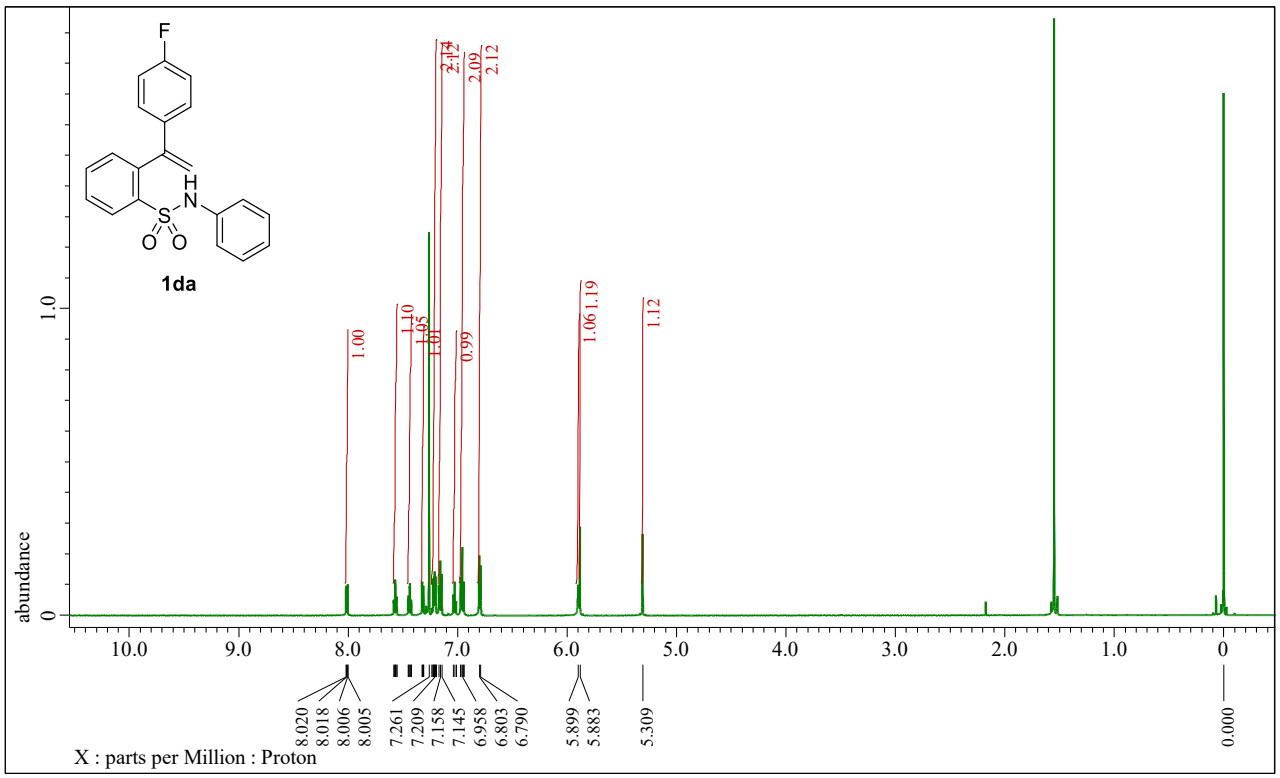
2-(1-(4-Methoxyphenyl)vinyl)-*N*-phenylbenzenesulfonamide (1ca) ^{1}H NMR (600 MHz, $CDCl_3$)



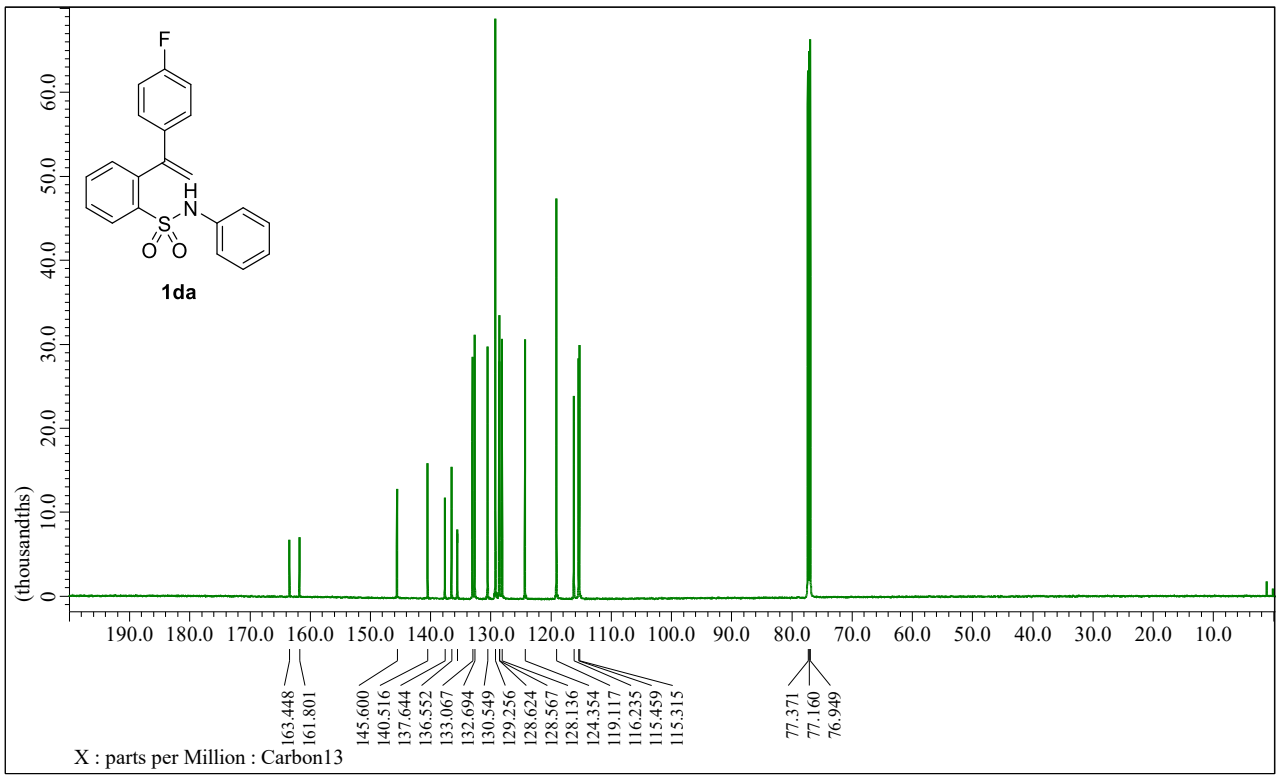
2-(1-(4-Methoxyphenyl)vinyl)-*N*-phenylbenzenesulfonamide (1ca) ^{13}C NMR (150 MHz, $CDCl_3$)



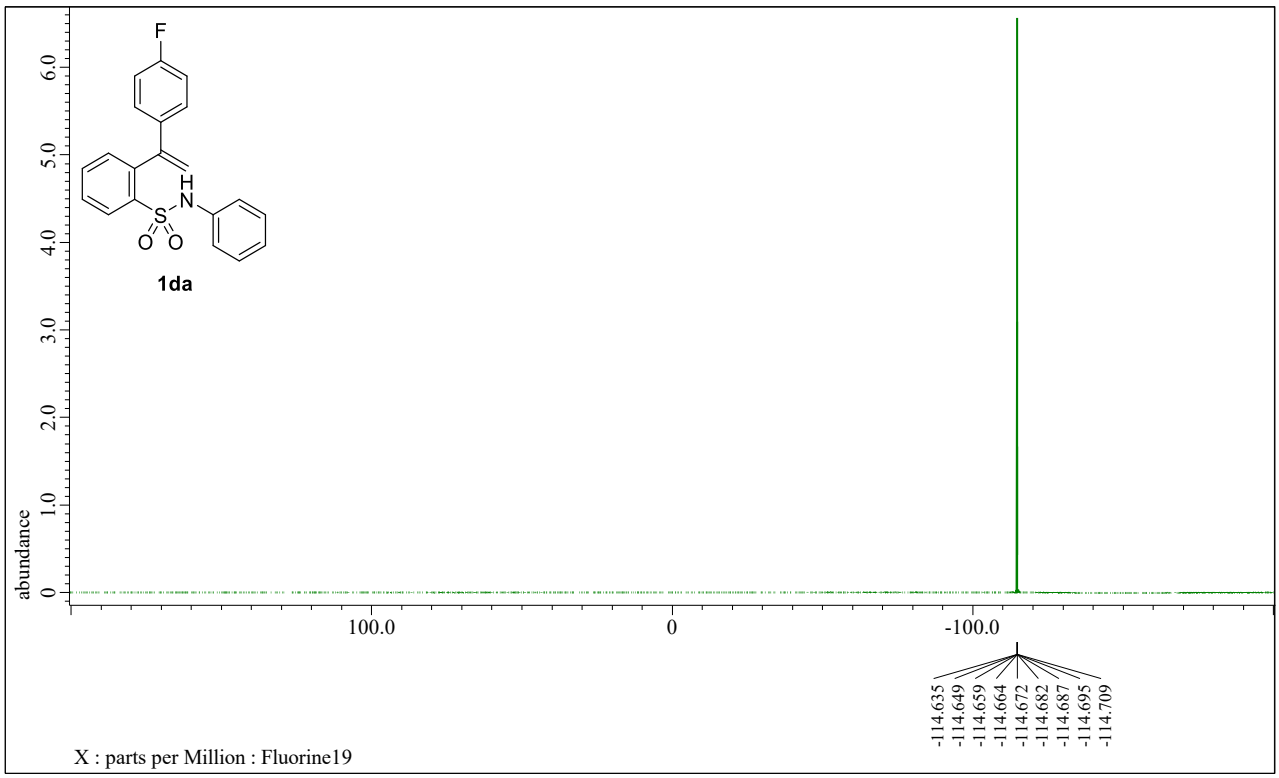
2-(1-(4-Fluorophenyl)vinyl)-*N*-phenylbenzenesulfonamide (1da) ^{1}H NMR (600 MHz, $CDCl_3$)



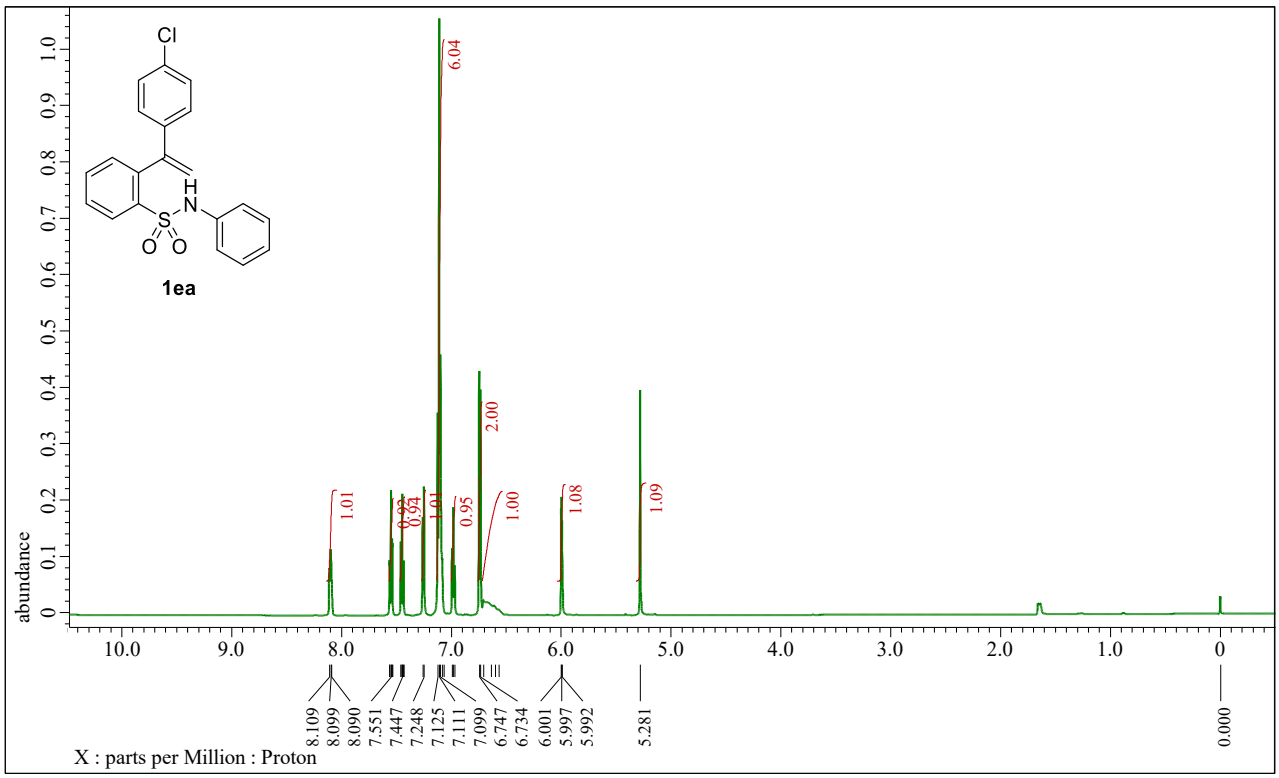
2-(1-(4-Fluorophenyl)vinyl)-*N*-phenylbenzenesulfonamide (1da) ^{13}C NMR (150 MHz, $CDCl_3$)



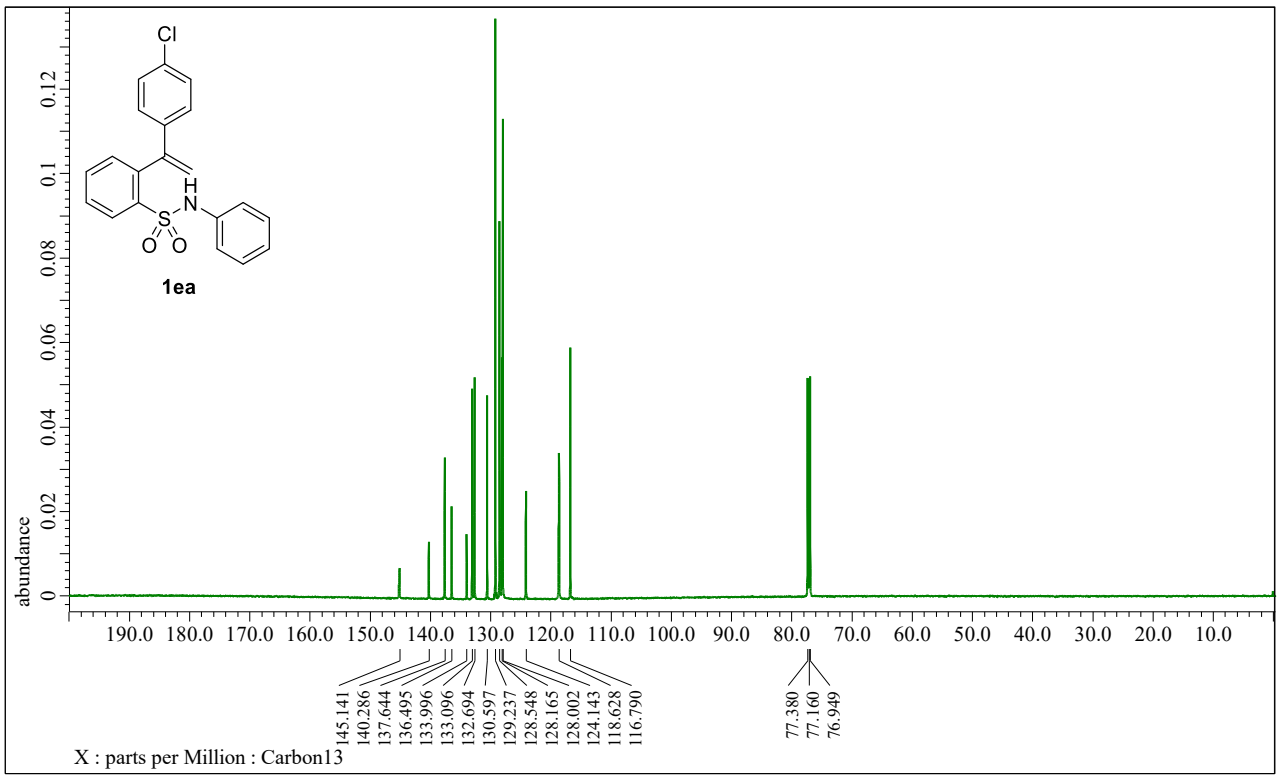
2-(1-(4-Fluorophenyl)vinyl)-*N*-phenylbenzenesulfonamide (1da) ^{19}F NMR (376 MHz, $CDCl_3$)



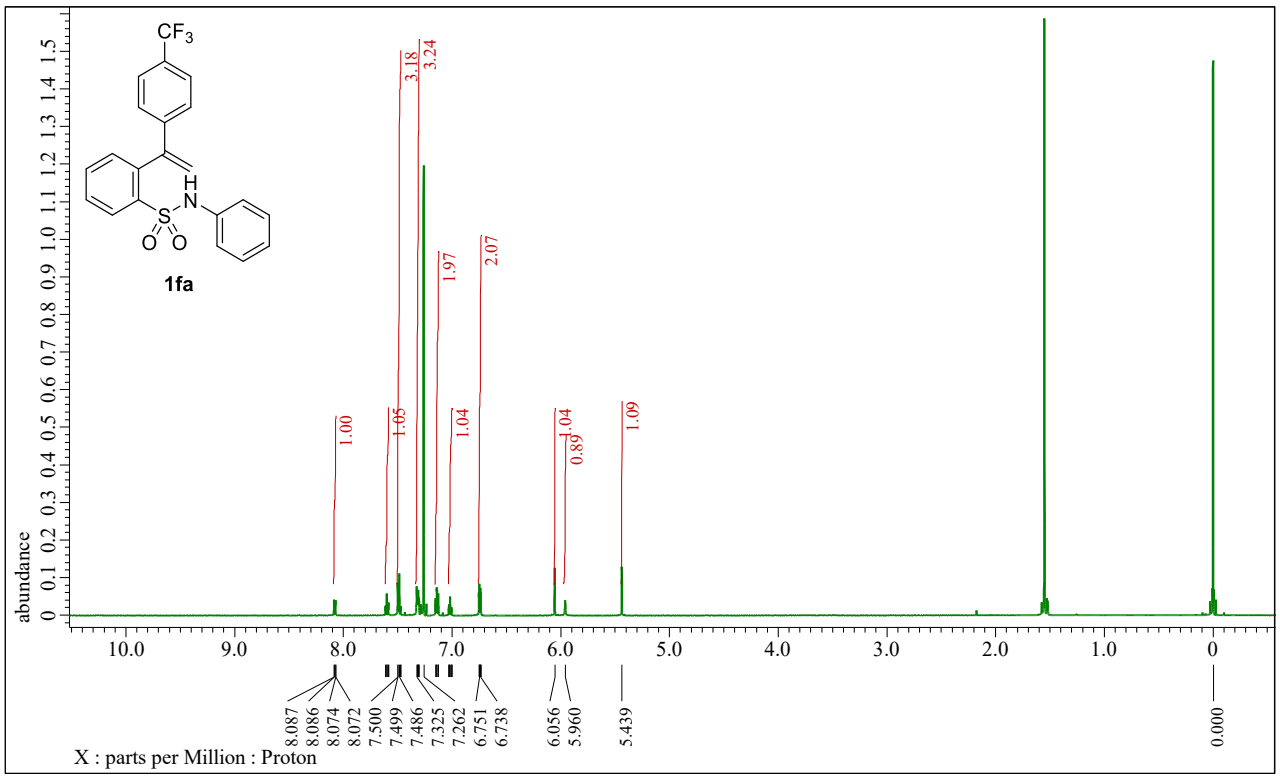
2-(1-(4-Chlorophenyl)vinyl)-*N*-phenylbenzenesulfonamide (1ea) ^{1}H NMR (600 MHz, $CDCl_3$)



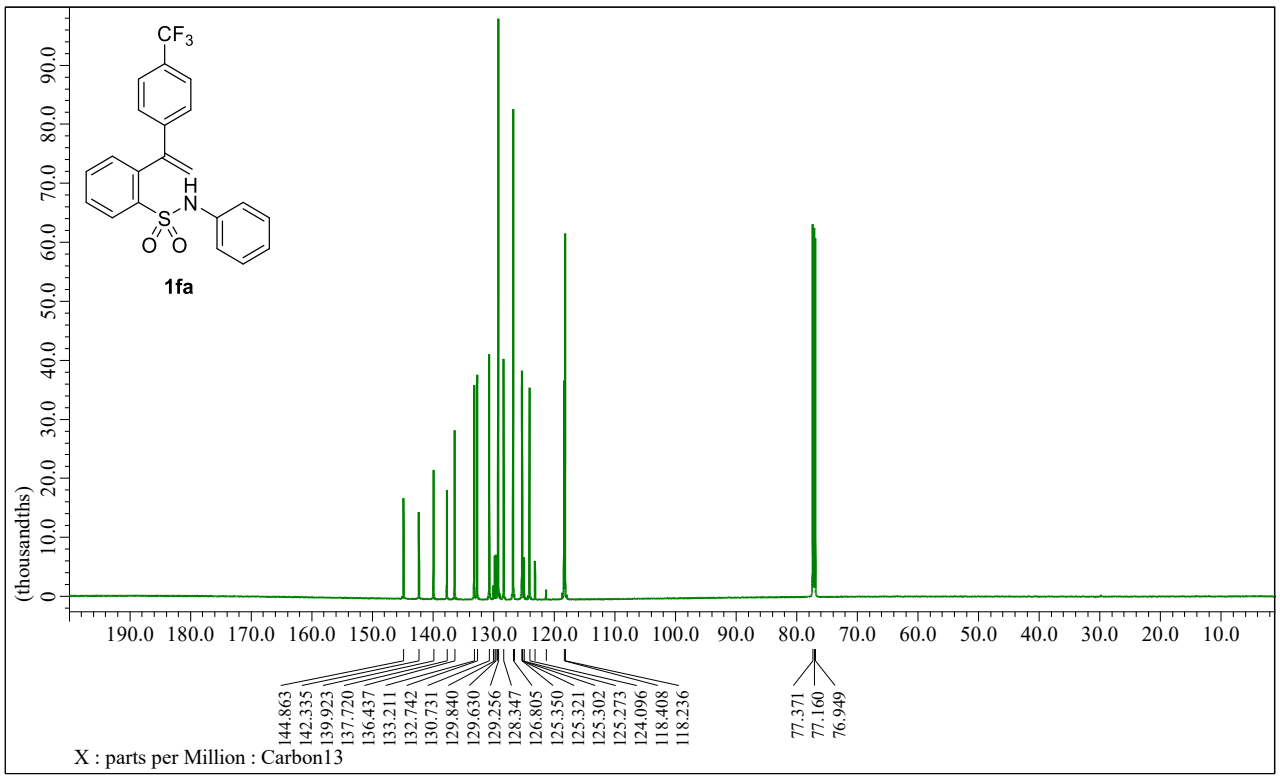
2-(1-(4-Chlorophenyl)vinyl)-*N*-phenylbenzenesulfonamide (1ea) ^{13}C NMR (150 MHz, $CDCl_3$)



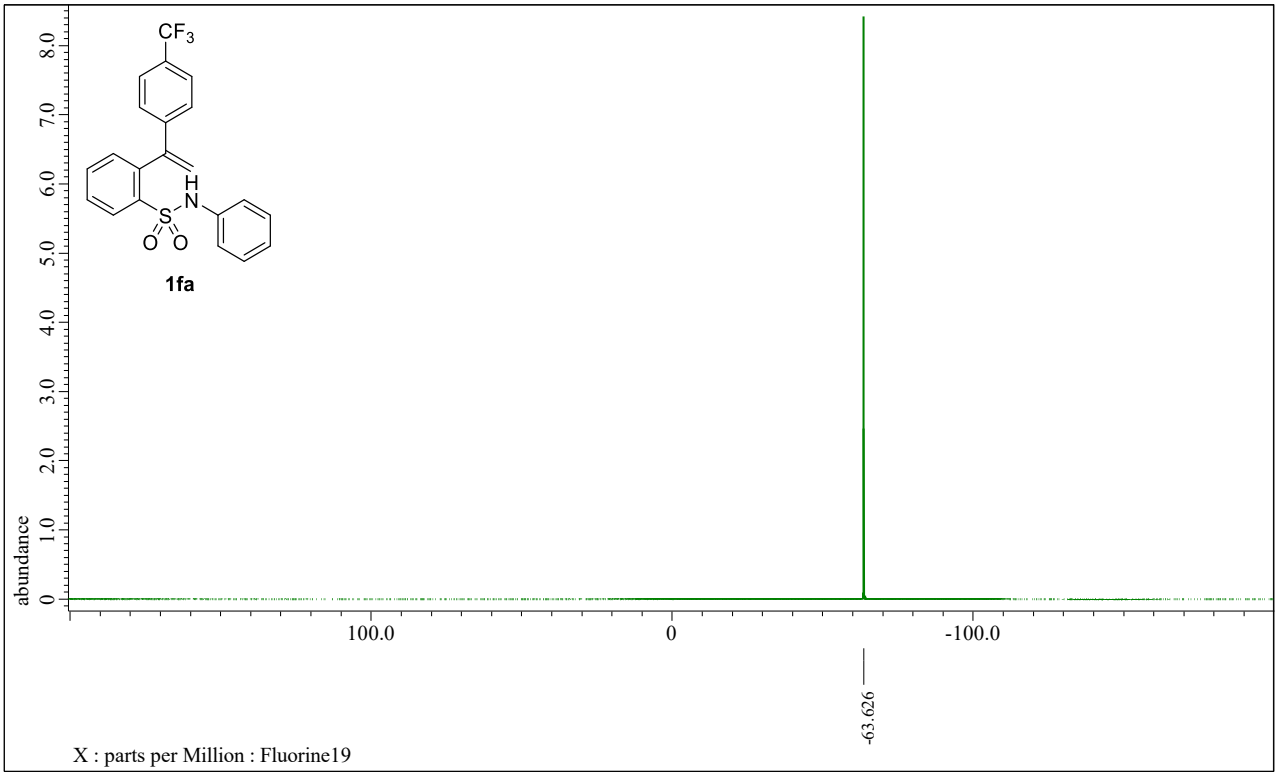
***N*-Phenyl-2-(1-(4-(trifluoromethyl)phenyl)vinyl)benzenesulfonamide (1fa) ^{1}H NMR (600 MHz, $CDCl_3$)**



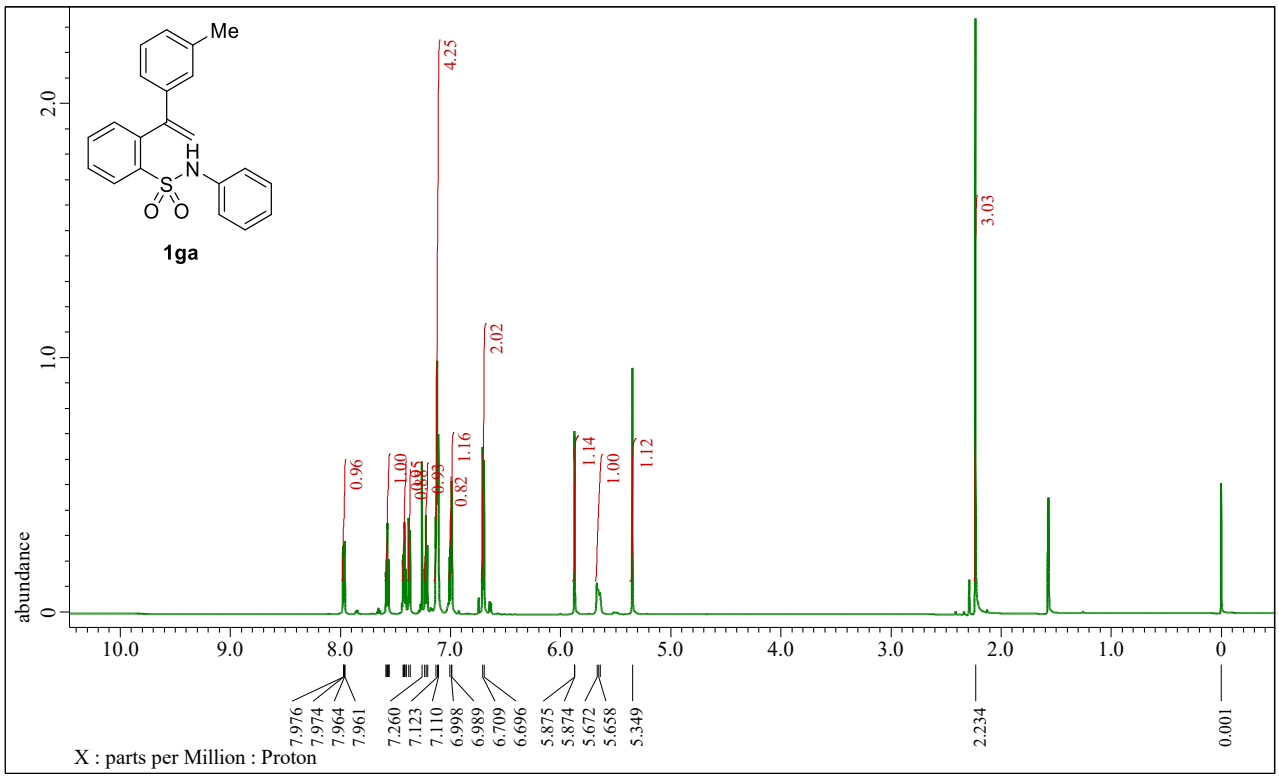
***N*-Phenyl-2-(1-(4-(trifluoromethyl)phenyl)vinyl)benzenesulfonamide (1fa) ^{13}C NMR (150 MHz, $CDCl_3$)**



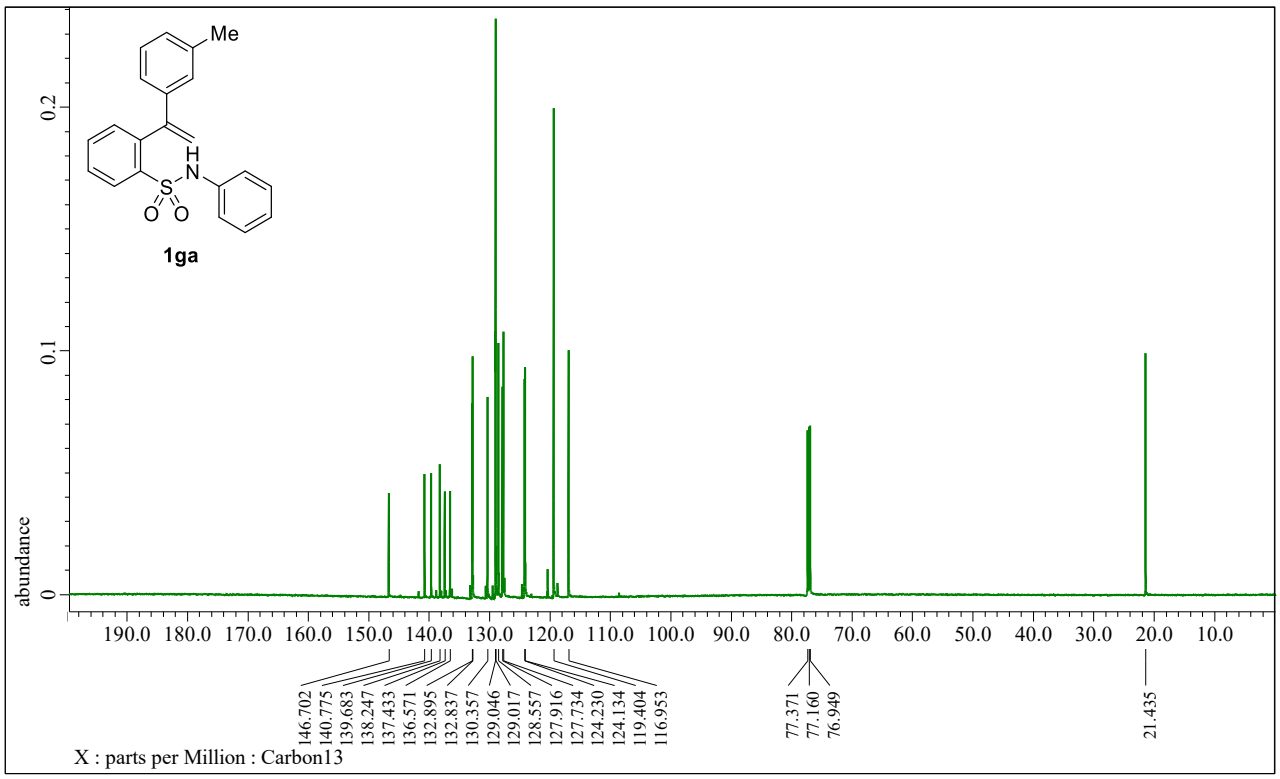
_N_-Phenyl-2-(1-(4-(trifluoromethyl)phenyl)vinyl)benzenesulfonamide (1fa) ^{19}F NMR (376 MHz, $CDCl_3$)



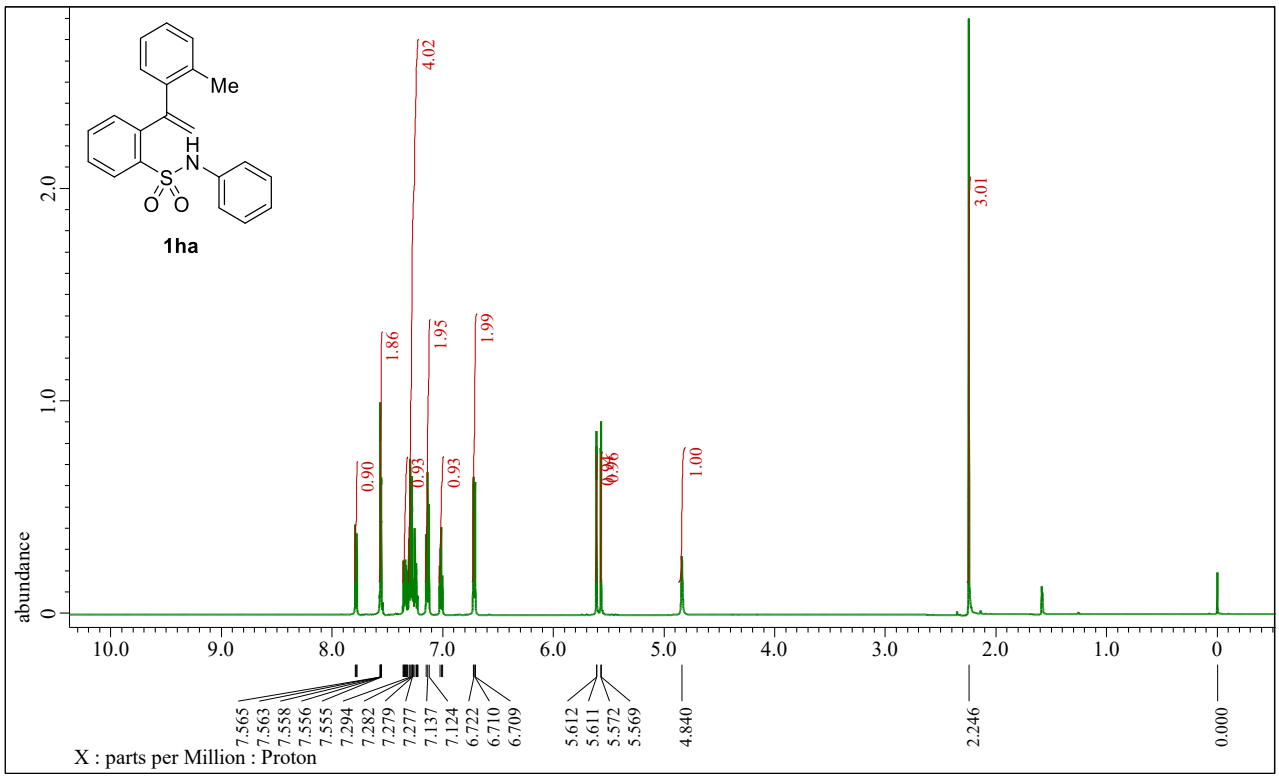
***N*-Phenyl-2-(1-(*m*-tolyl)vinyl)benzenesulfonamide (1ga) ^{1}H NMR (600 MHz, $CDCl_3$)**



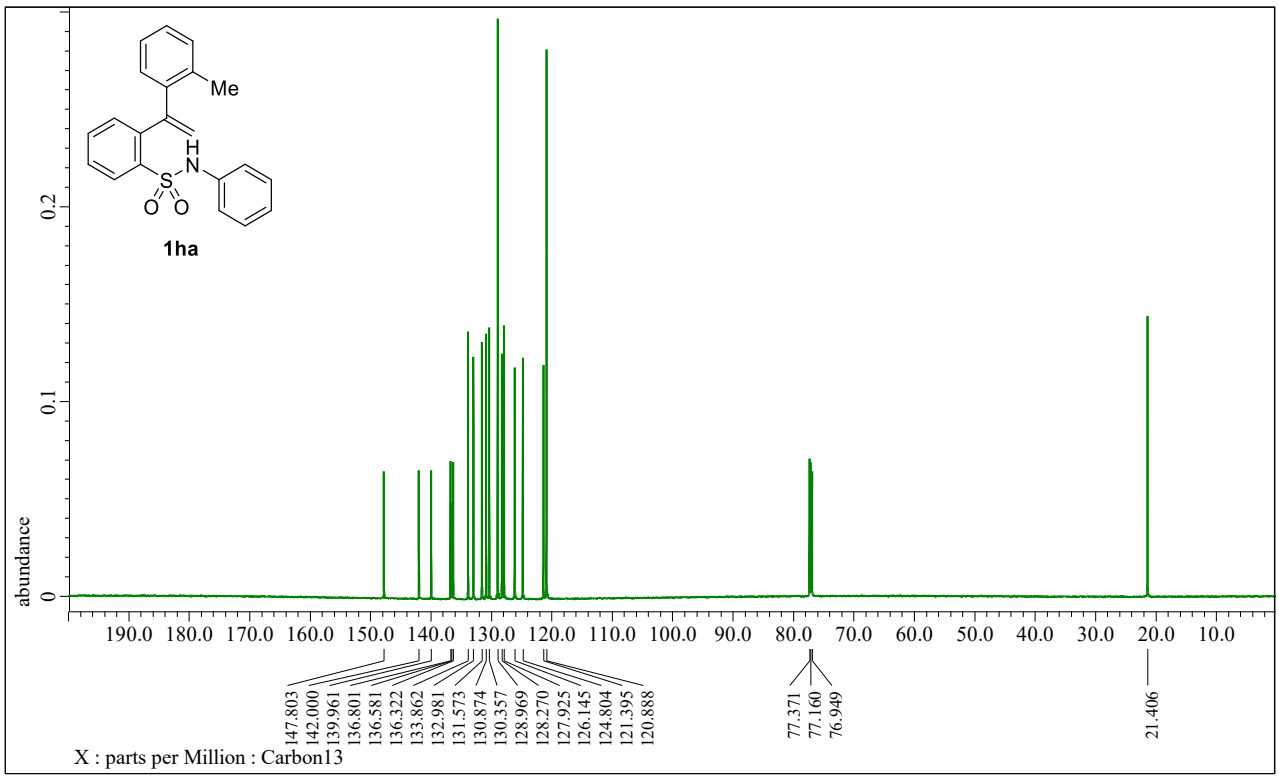
***N*-Phenyl-2-(1-(*m*-tolyl)vinyl)benzenesulfonamide (1ga) ^{1}H NMR (600 MHz, $CDCl_3$)**



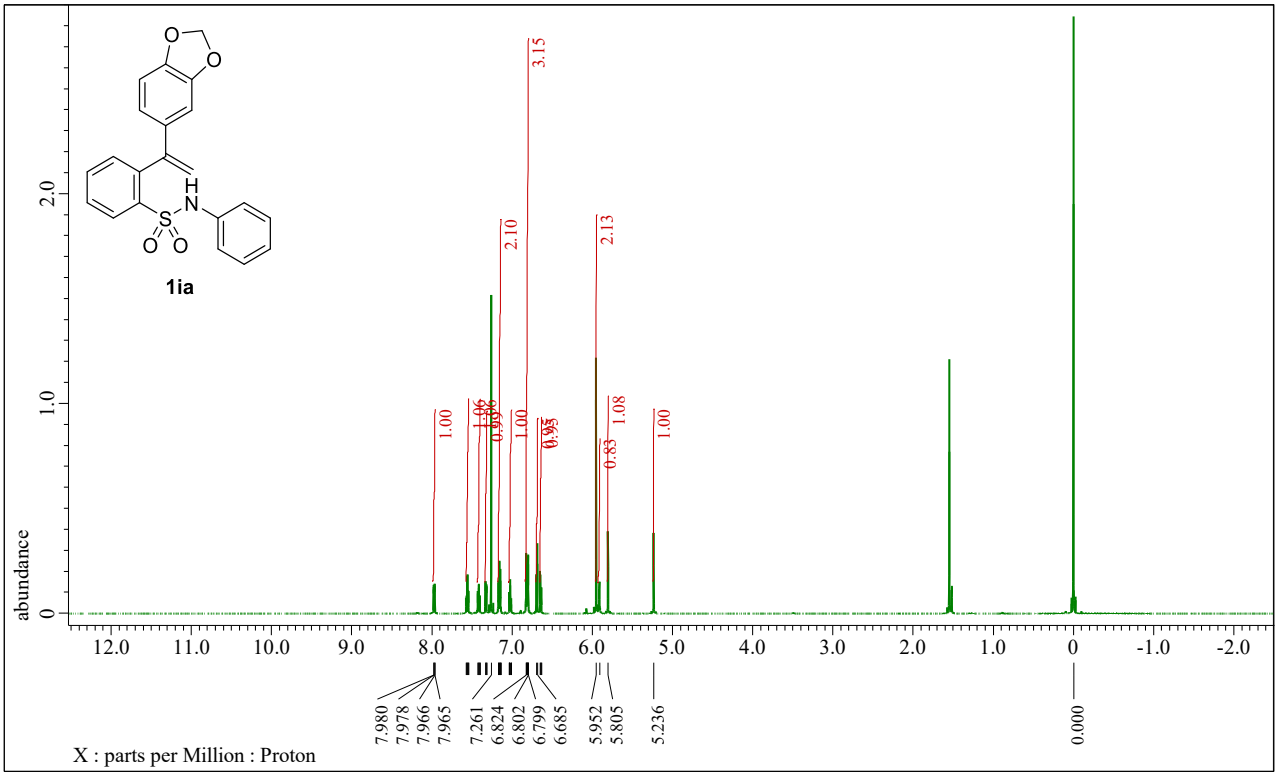
***N*-Phenyl-2-(1-(*o*-tolyl)vinyl)benzenesulfonamide (1ha) ^{1}H NMR (600 MHz, $CDCl_3$)**



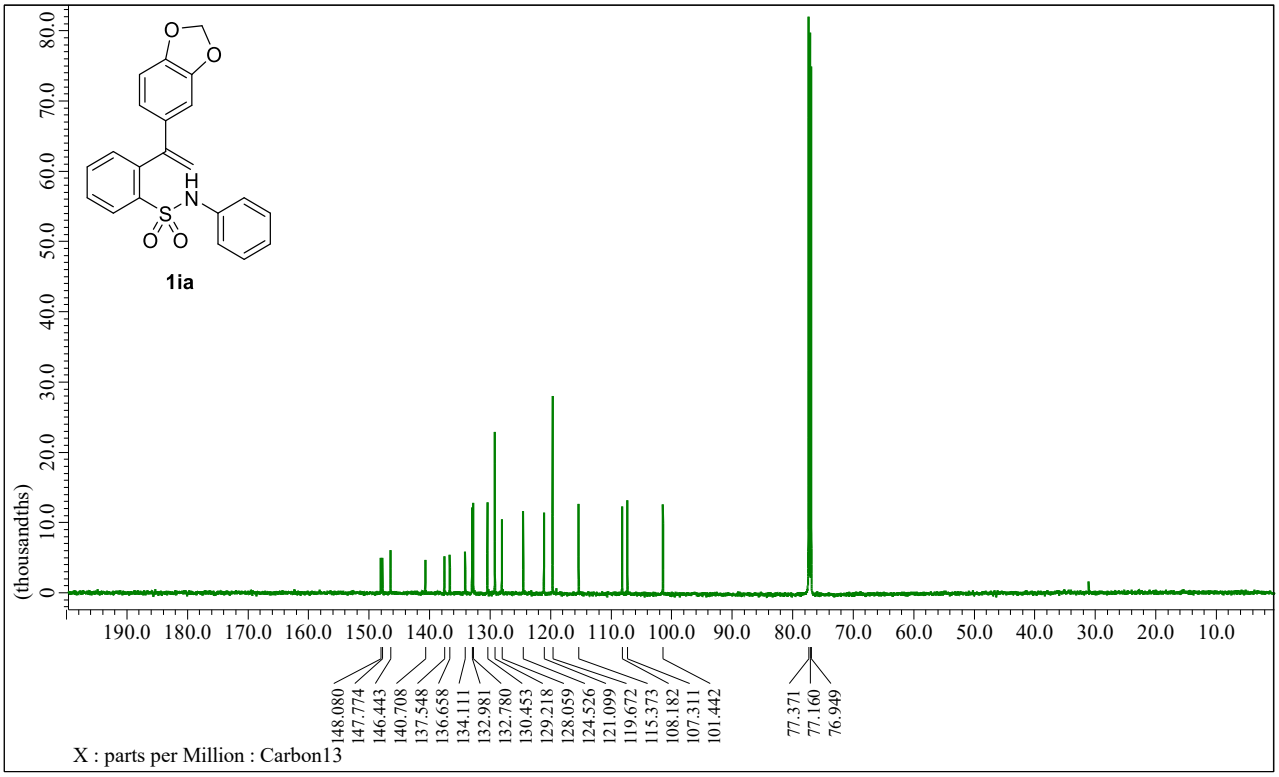
***N*-Phenyl-2-(1-(*o*-tolyl)vinyl)benzenesulfonamide (1ha) ^{13}C NMR (150 MHz, $CDCl_3$)**



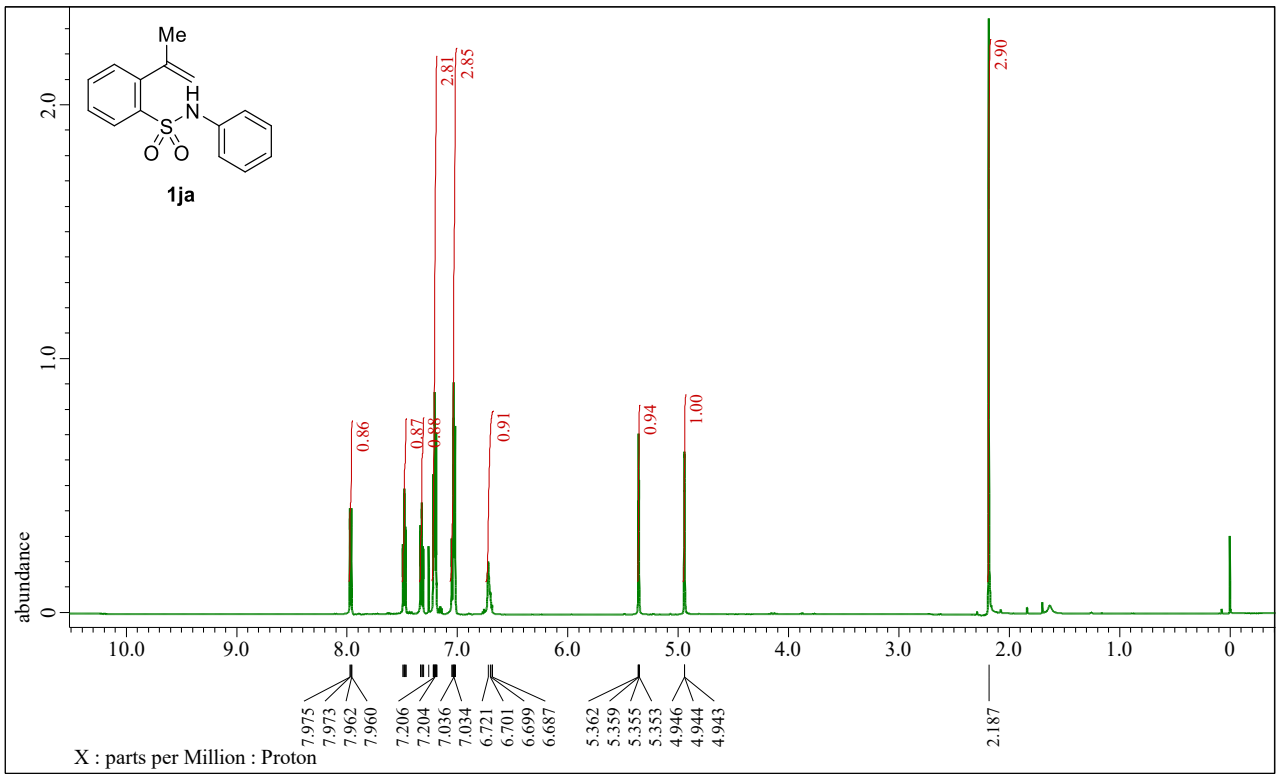
2-(1-Benzo[*d*][1,3]dioxol-5-yl)-*N*-phenylbenzenesulfonamide (1ia) ^{1}H NMR (600 MHz, $CDCl_3$)



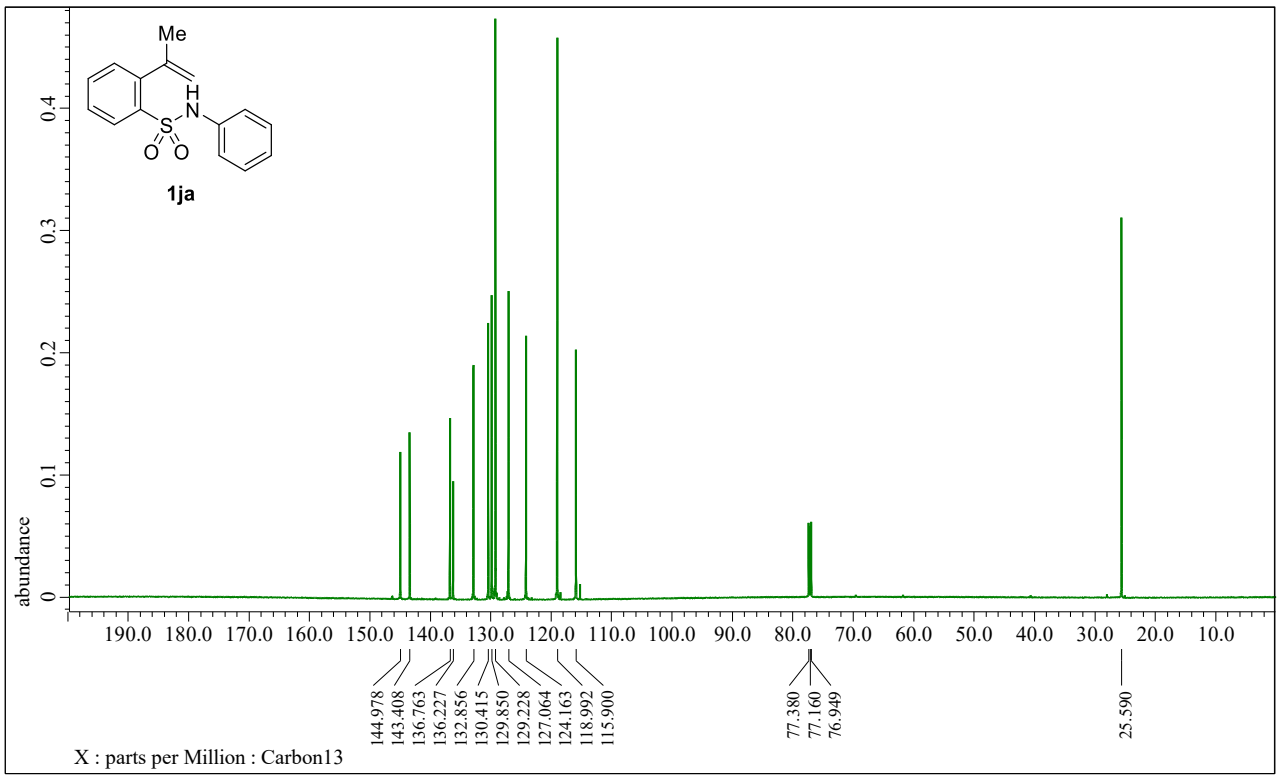
2-(1-Benzo[*d*][1,3]dioxol-5-yl)-*N*-phenylbenzenesulfonamide (1ia) ^{13}C NMR (150 MHz, $CDCl_3$)



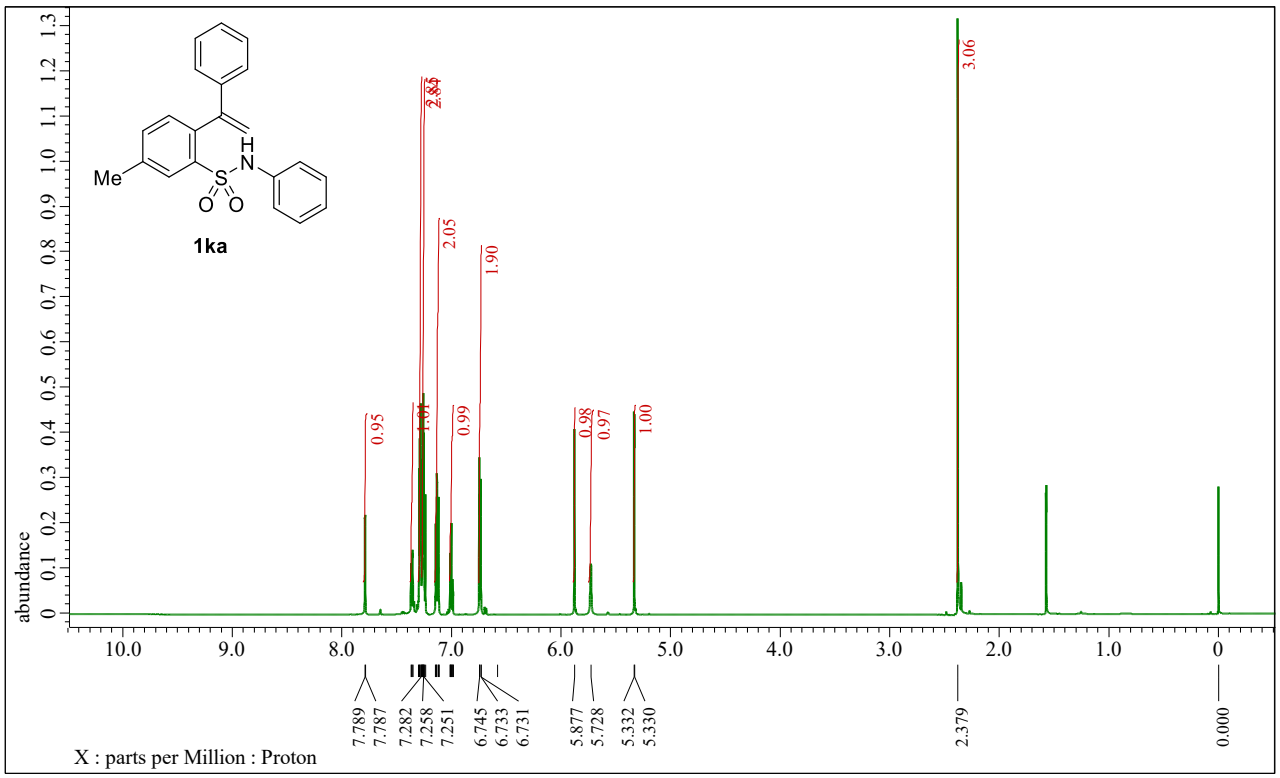
***N*-Phenyl-2-(prop-1-en-2-yl)benzenesulfonamide (1ja) ^{1}H NMR (600 MHz, $CDCl_3$)**



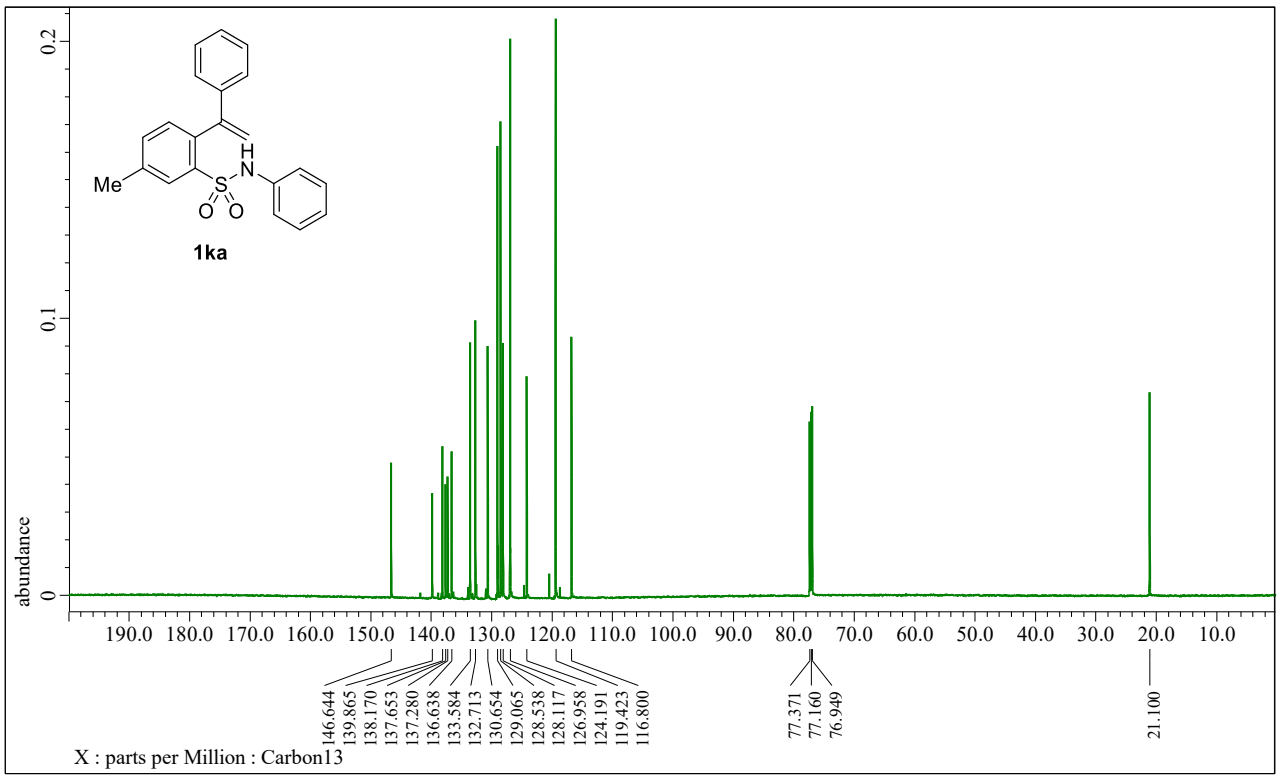
***N*-Phenyl-2-(prop-1-en-2-yl)benzenesulfonamide (1ja) ^{13}C NMR (150 MHz, $CDCl_3$)**



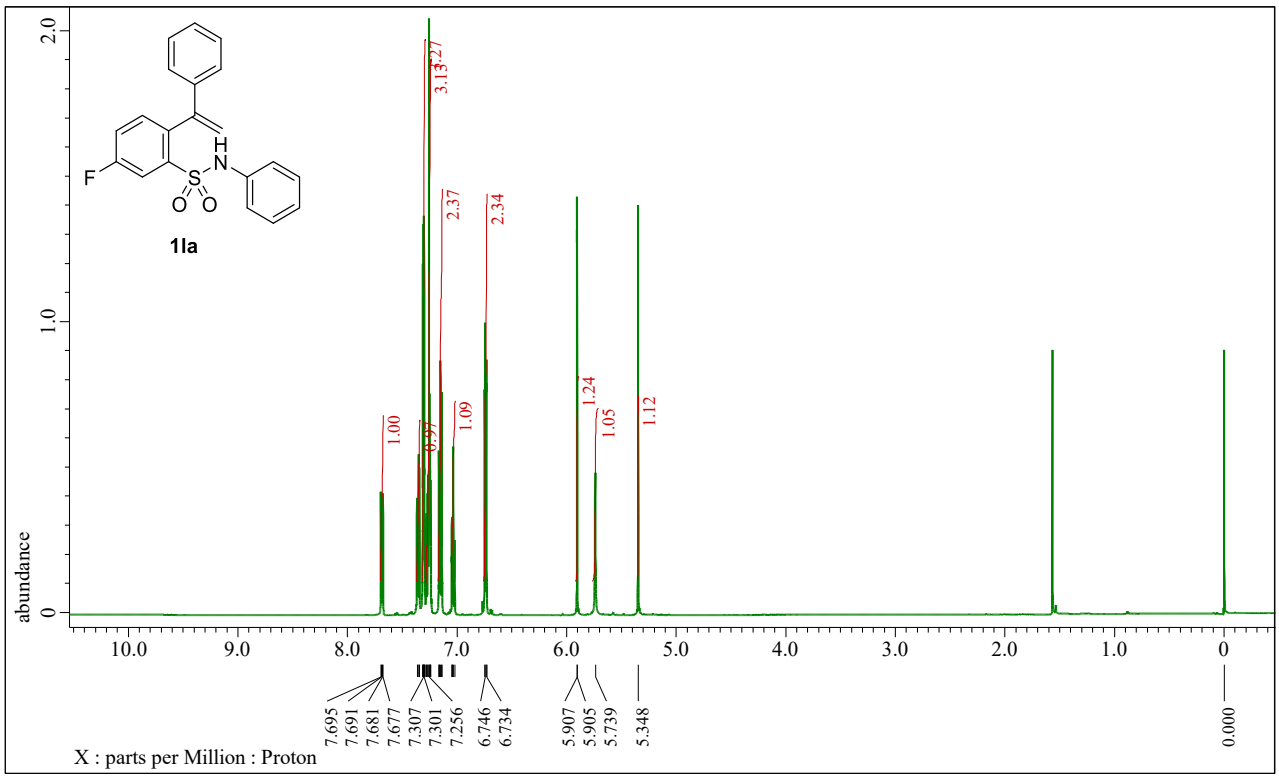
5-Methyl-*N*-phenyl-2-(1-phenylvinyl)benzenesulfonamide (1ka) ^{1}H NMR (600 MHz, $CDCl_3$)



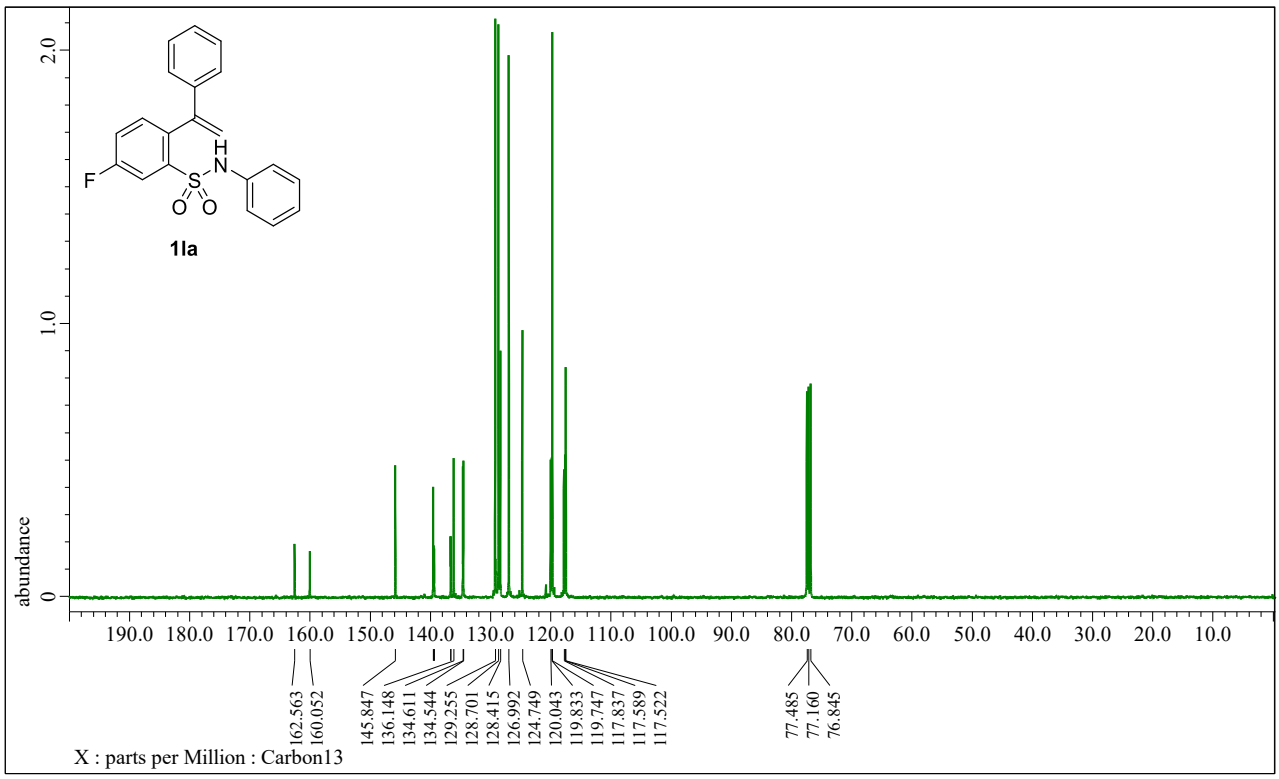
5-Methyl-*N*-phenyl-2-(1-phenylvinyl)benzenesulfonamide (1ka) ^{13}C NMR (150 MHz, $CDCl_3$)



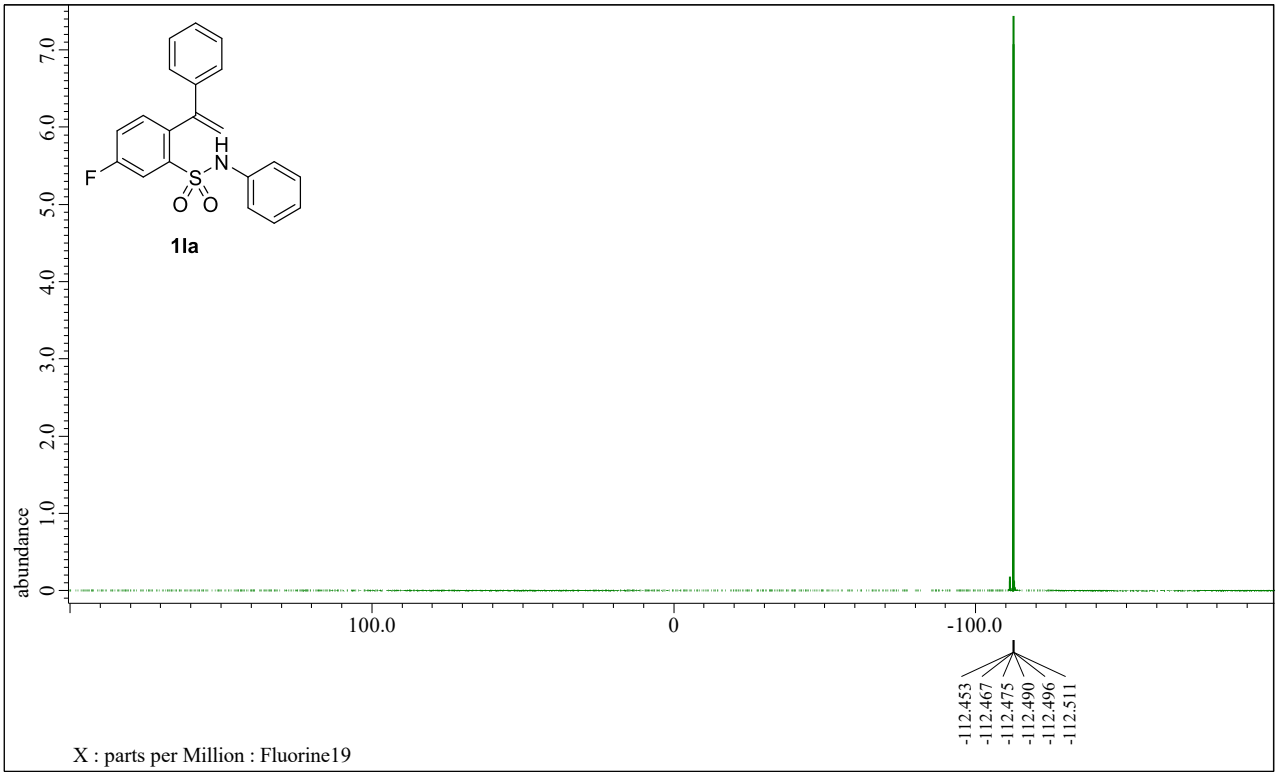
5-Fluoro-*N*-phenyl-2-(1-phenylvinyl)benzenesulfonamide (1la) ^{1}H NMR (600 MHz, $CDCl_3$)



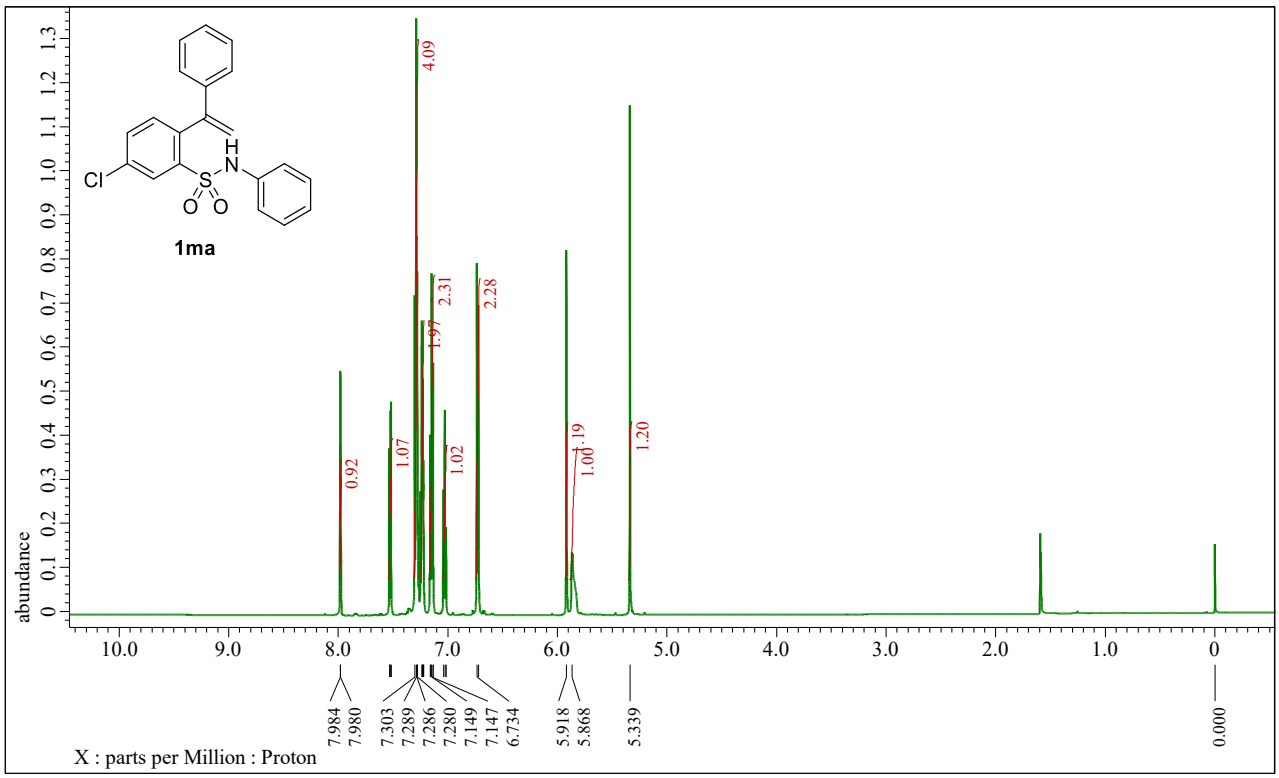
5-Fluoro-*N*-phenyl-2-(1-phenylvinyl)benzenesulfonamide (1la) ^{13}C NMR (150 MHz, $CDCl_3$)



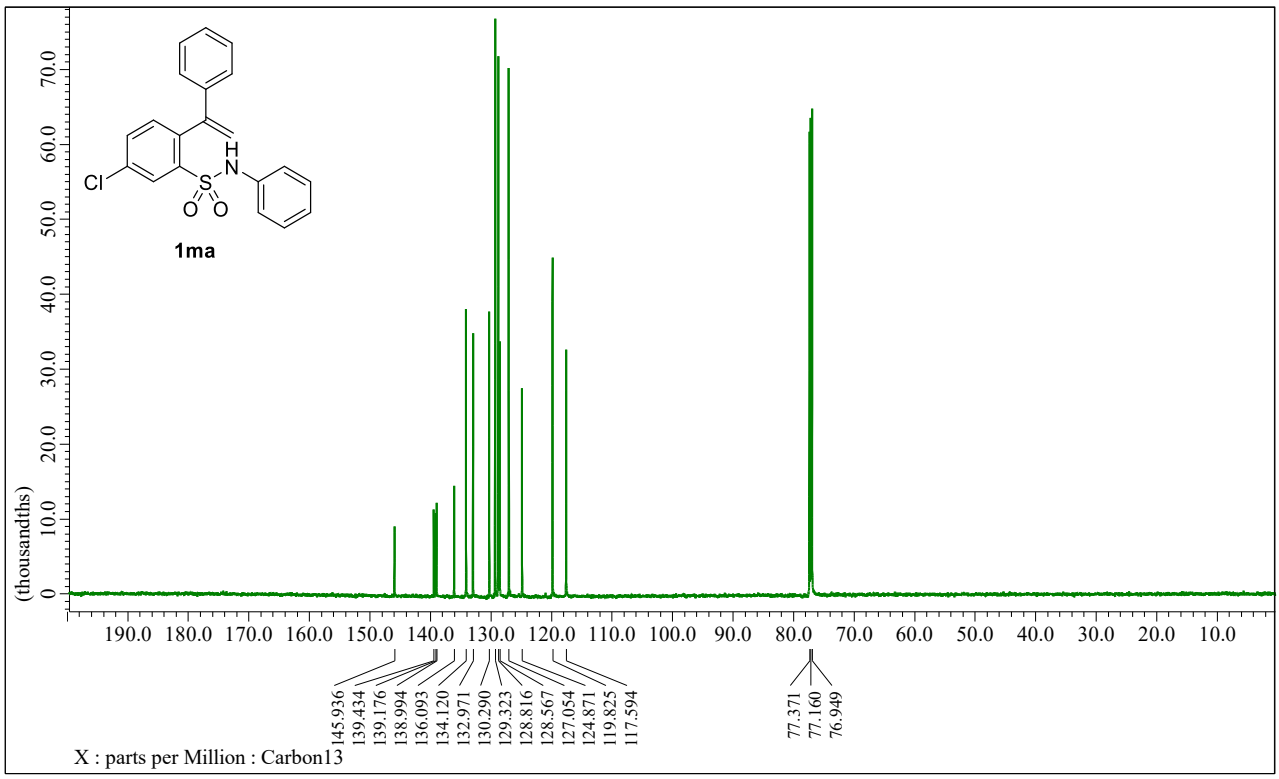
5-Fluoro-*N*-phenyl-2-(1-phenylvinyl)benzenesulfonamide (1la) ^{19}F NMR (376 MHz, $CDCl_3$)



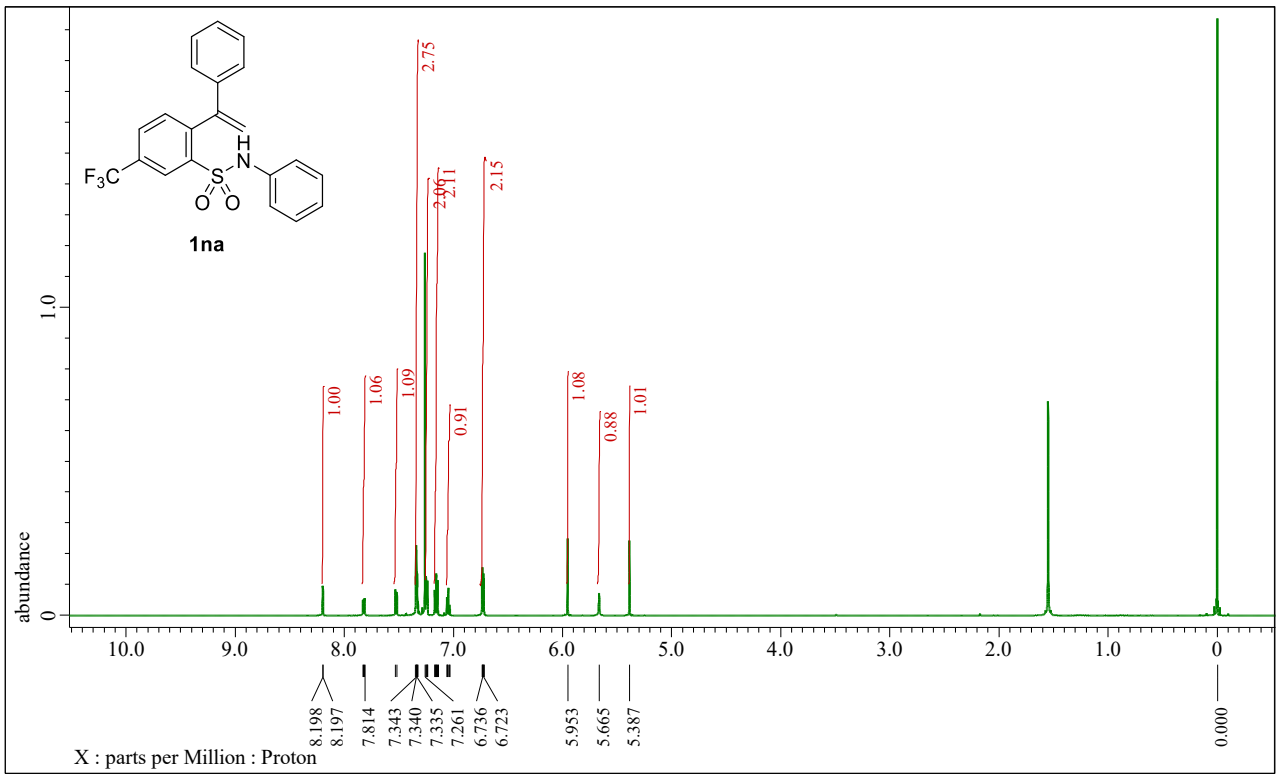
5-Chloro-*N*-phenyl-2-(1-phenylvinyl)benzenesulfonamide (1ma) ^{1}H NMR (600 MHz, $CDCl_3$)



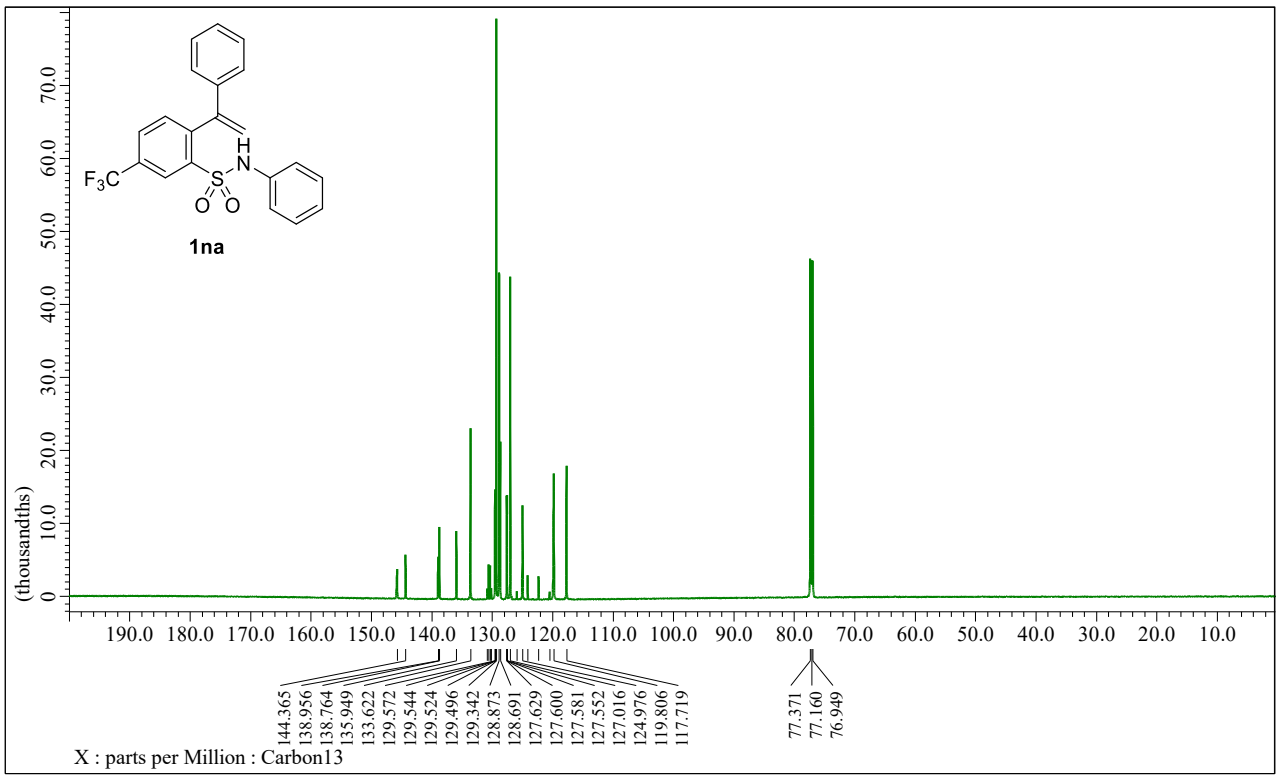
5-Chloro-*N*-phenyl-2-(1-phenylvinyl)benzenesulfonamide (1ma) ^{13}C NMR (150 MHz, $CDCl_3$)



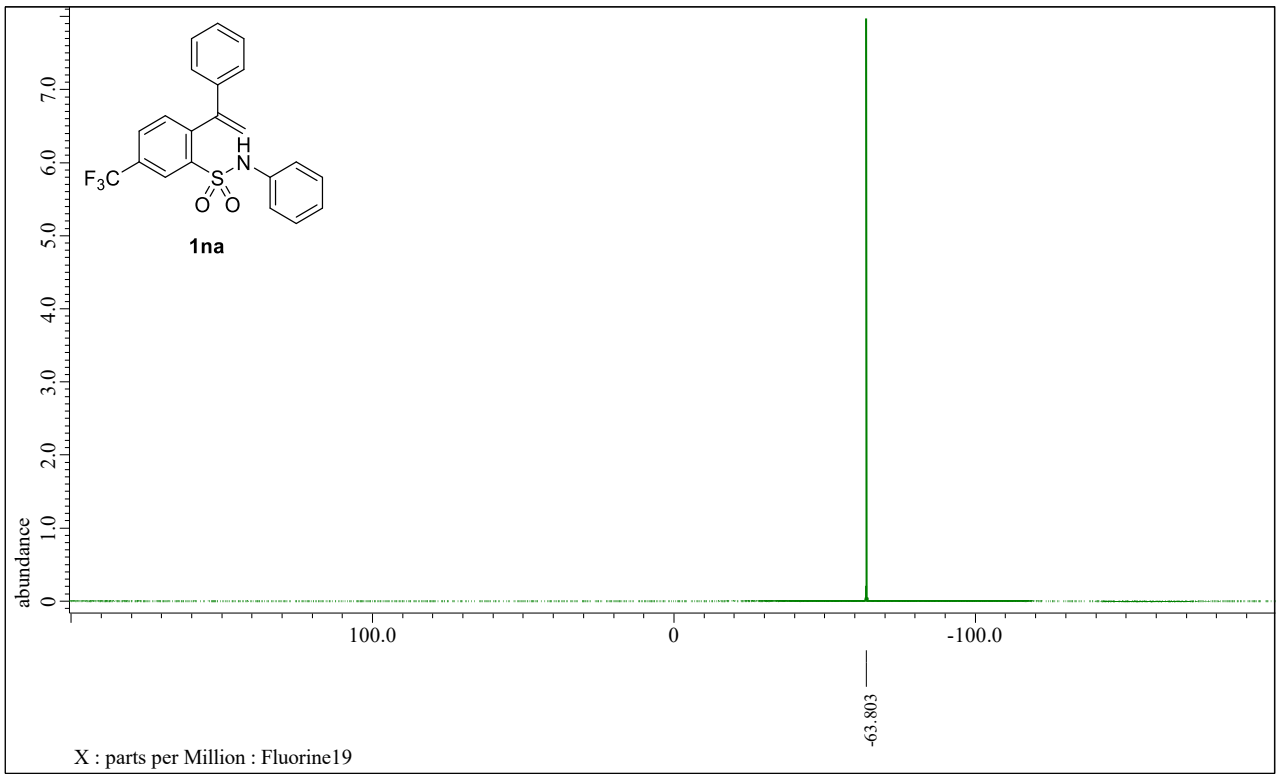
***N*-Phenyl-2-(1-phenylvinyl)-5-(trifluoromethyl)benzenesulfonamide (1na) ^{1}H NMR (600 MHz, $CDCl_3$)**



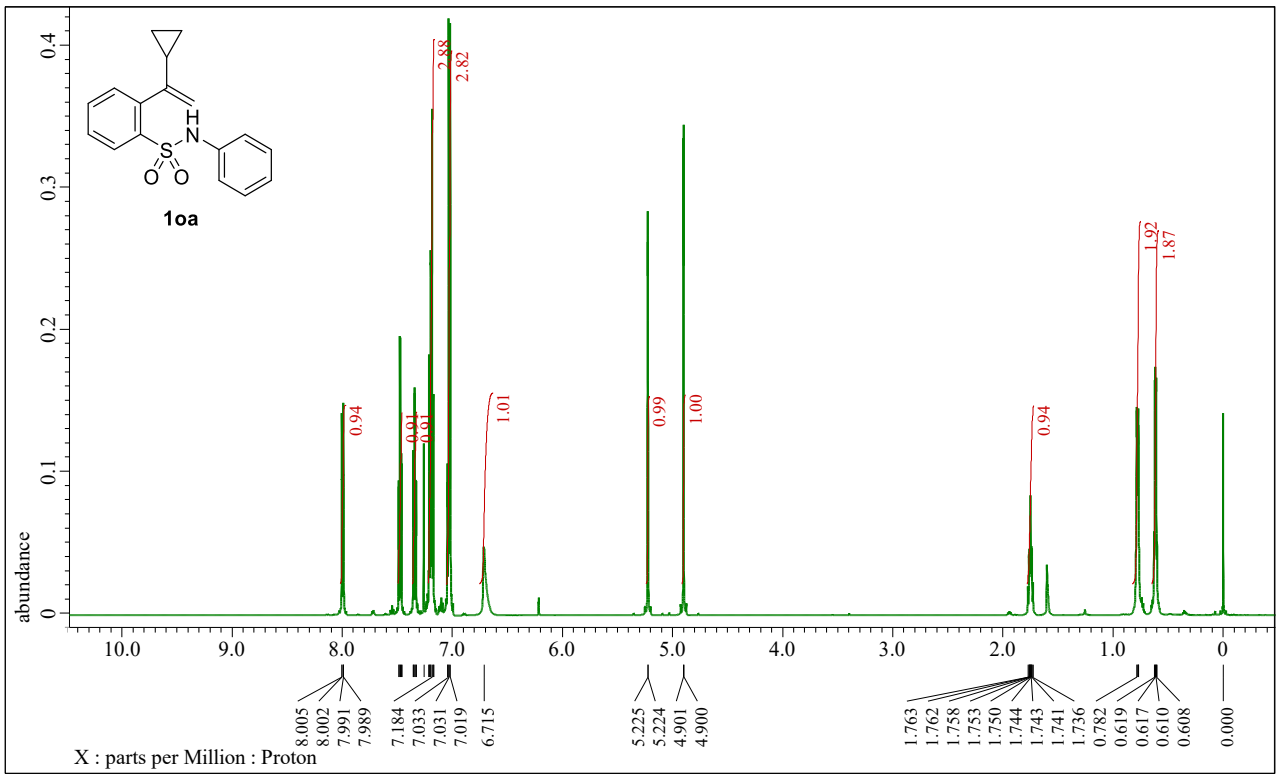
***N*-Phenyl-2-(1-phenylvinyl)-5-(trifluoromethyl)benzenesulfonamide (1na) ^{13}C NMR (150 MHz, $CDCl_3$)**



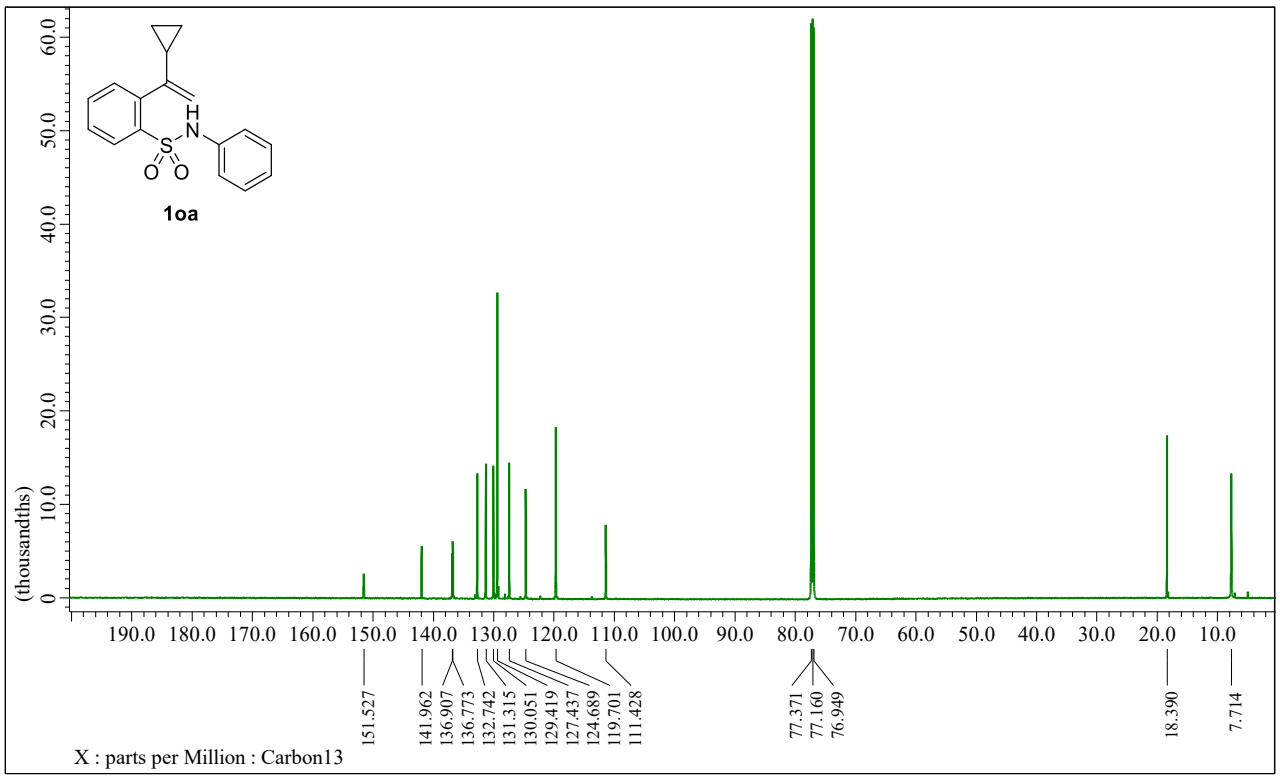
***N*-Phenyl-2-(1-phenylvinyl)-5-(trifluoromethyl)benzenesulfonamide (1na) ^{19}F NMR (376 MHz, $CDCl_3$)**



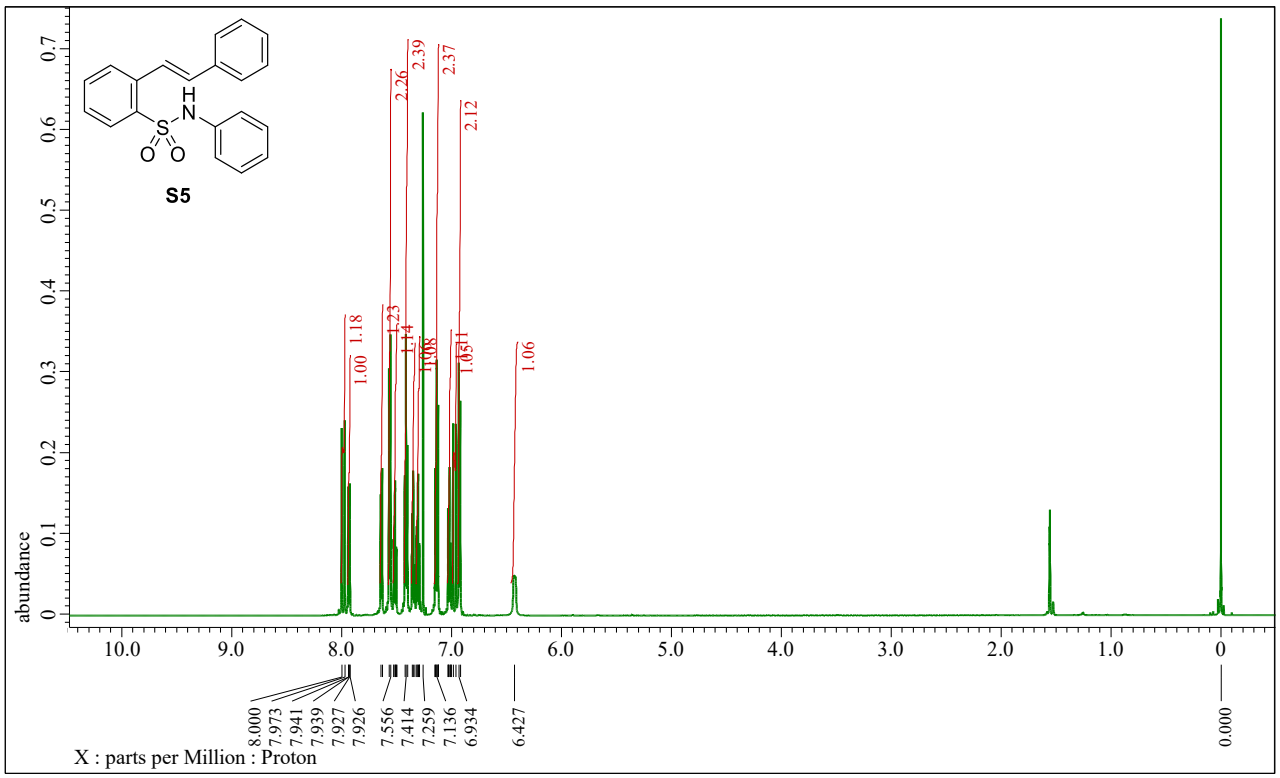
2-(1-(4-Cyclopropylphenyl)vinyl)-*N*-phenylbenzenesulfonamide (1oa) ^{1}H NMR (600 MHz, $CDCl_3$)



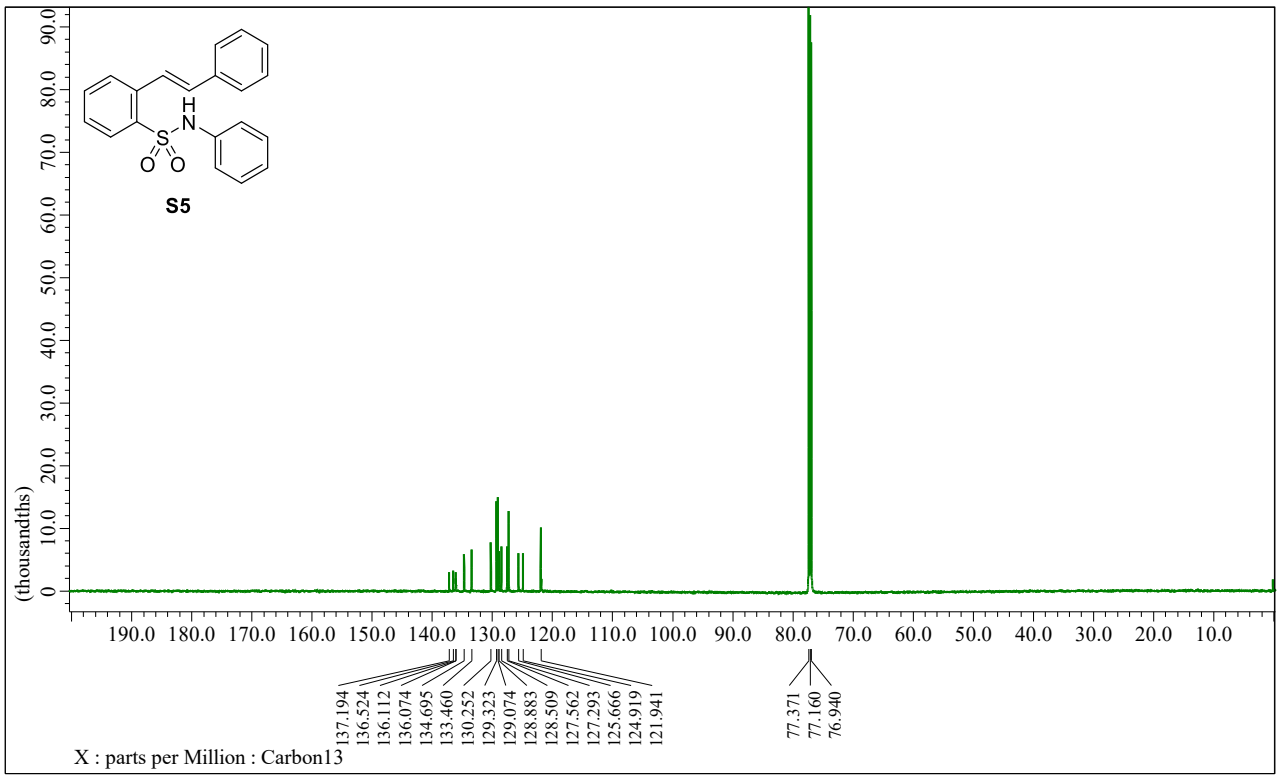
2-(1-(4-Cyclopropylphenyl)vinyl)-*N*-phenylbenzenesulfonamide (1oa) ^{13}C NMR (150 MHz, $CDCl_3$)



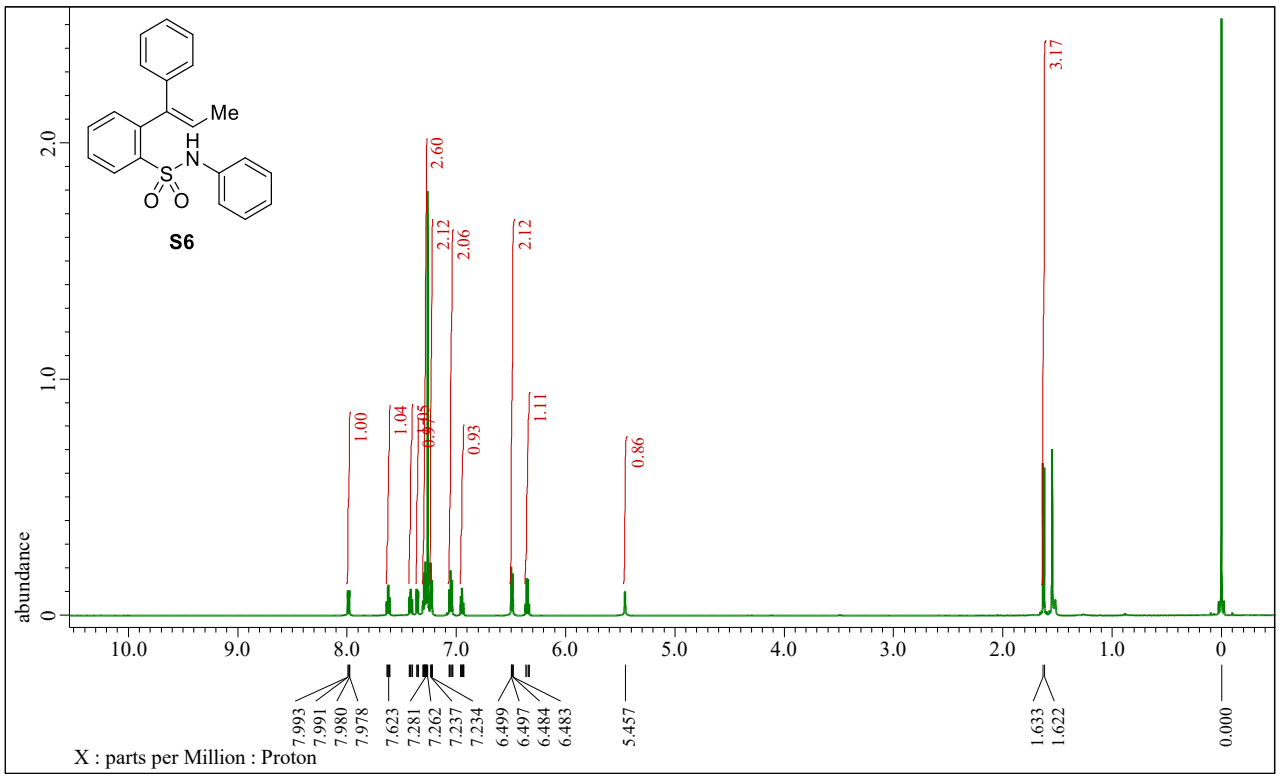
(*E*)-*N*-Phenyl-2-styrylbenzenesulfonamide (S5) ^{1}H NMR (600 MHz, $CDCl_3$)



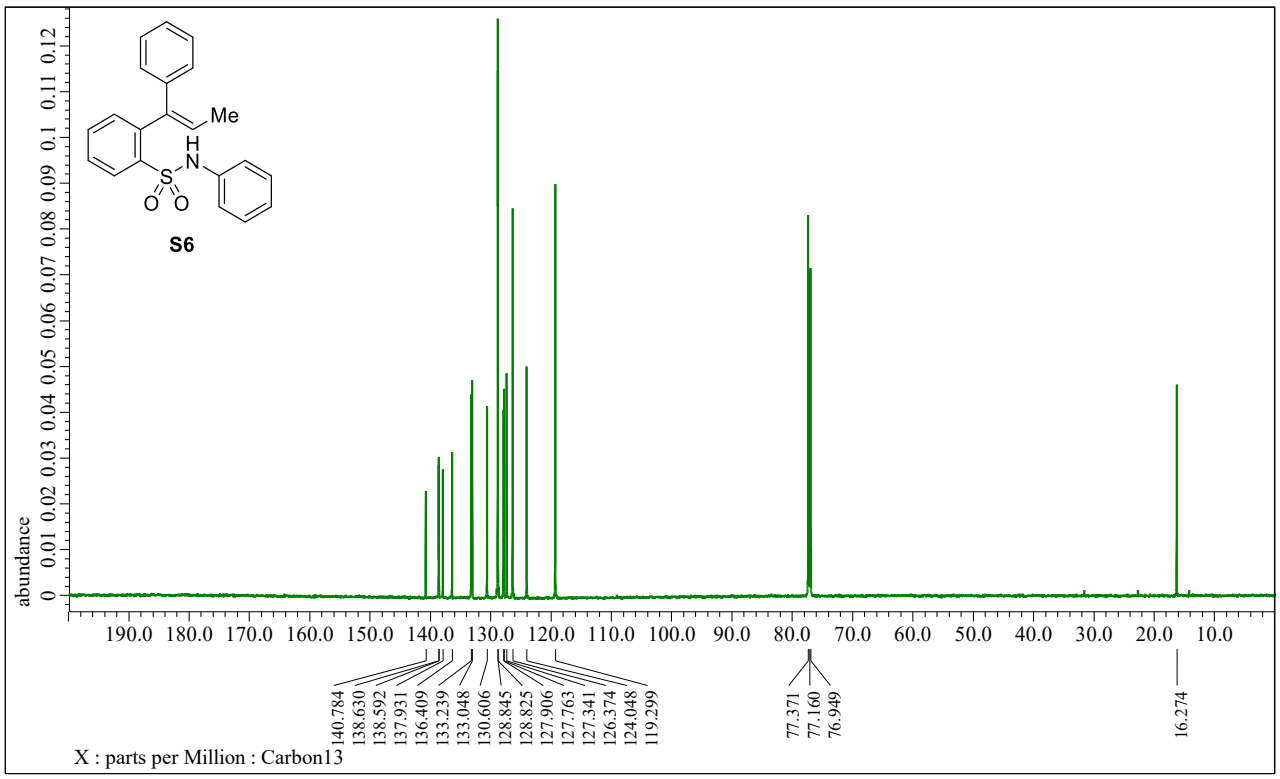
(*E*)-*N*-Phenyl-2-styrylbenzenesulfonamide (S5) ^{13}C NMR (150 MHz, $CDCl_3$)



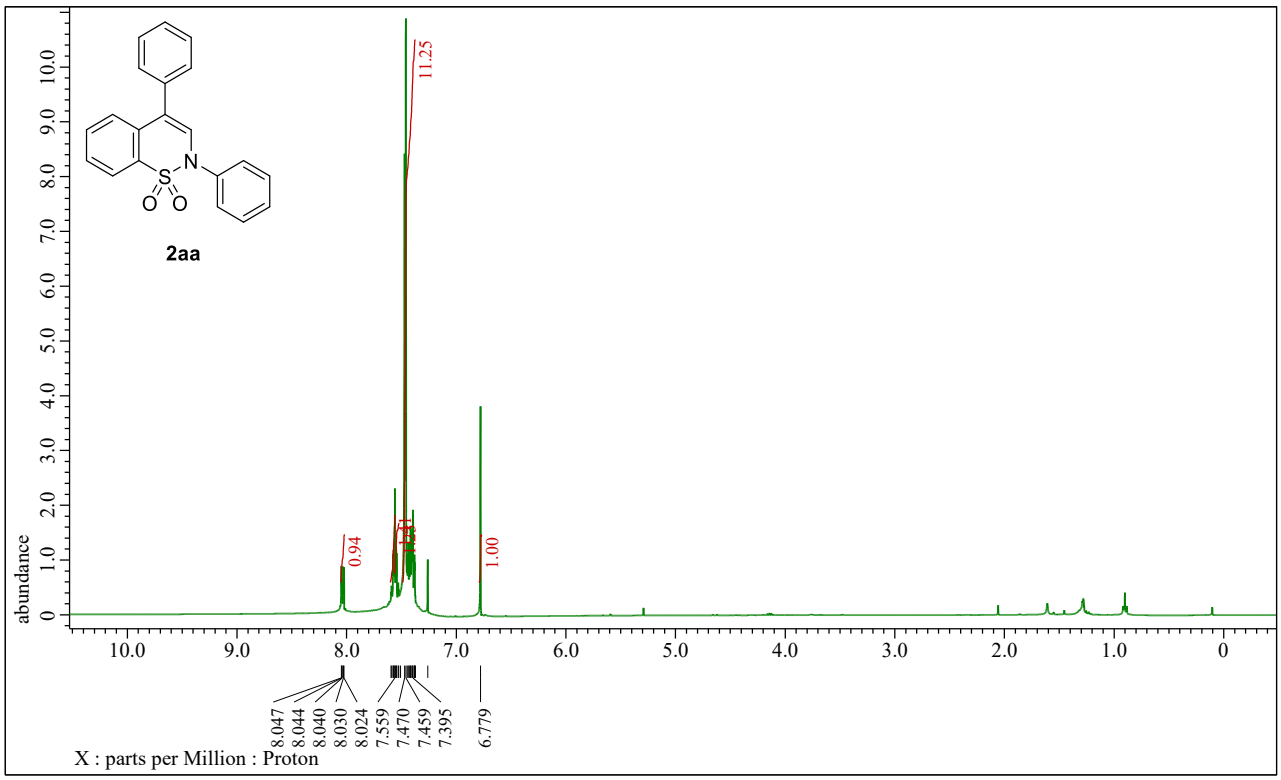
(*E*)-*N*-Phenyl-2-(1-phenylprop-1-en-1-yl)benzenesulfonamide (S6) ^{1}H NMR (600 MHz, $CDCl_3$)



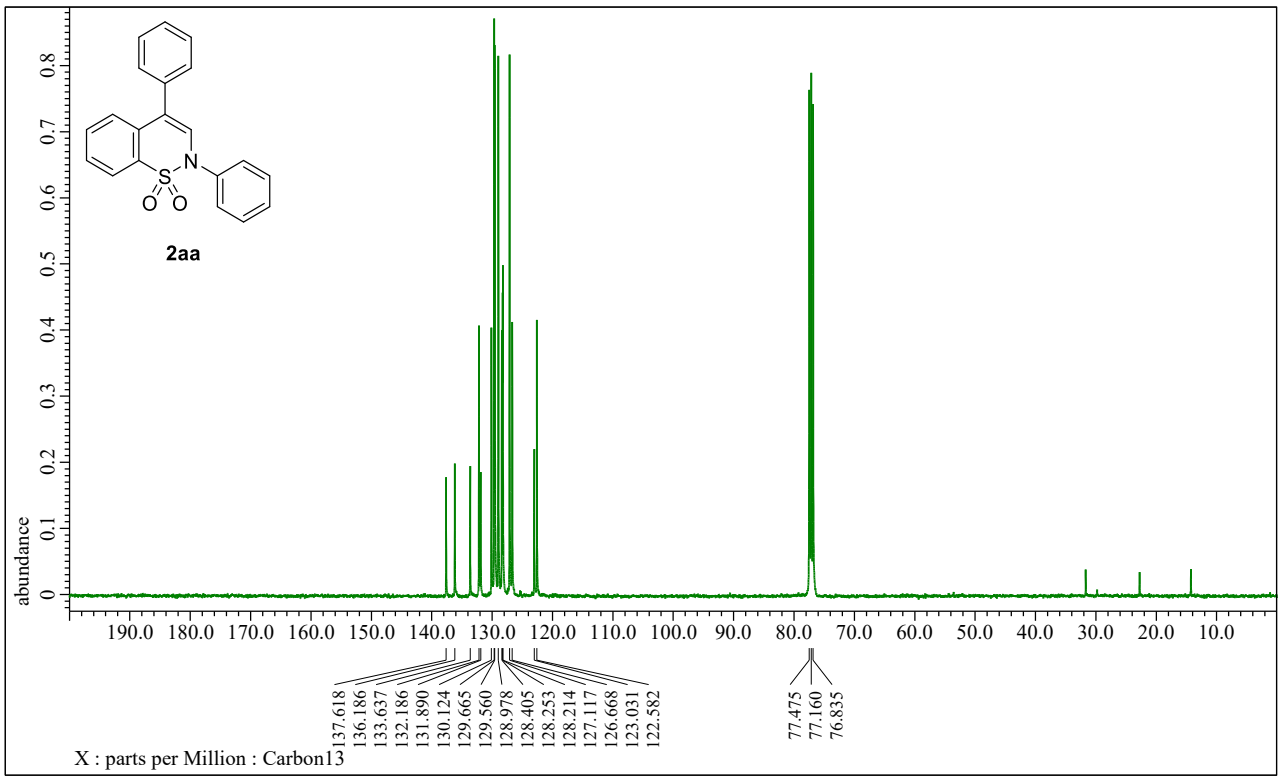
(*E*)-*N*-Phenyl-2-(1-phenylprop-1-en-1-yl)benzenesulfonamide (S6) ^{13}C NMR (150 MHz, $CDCl_3$)



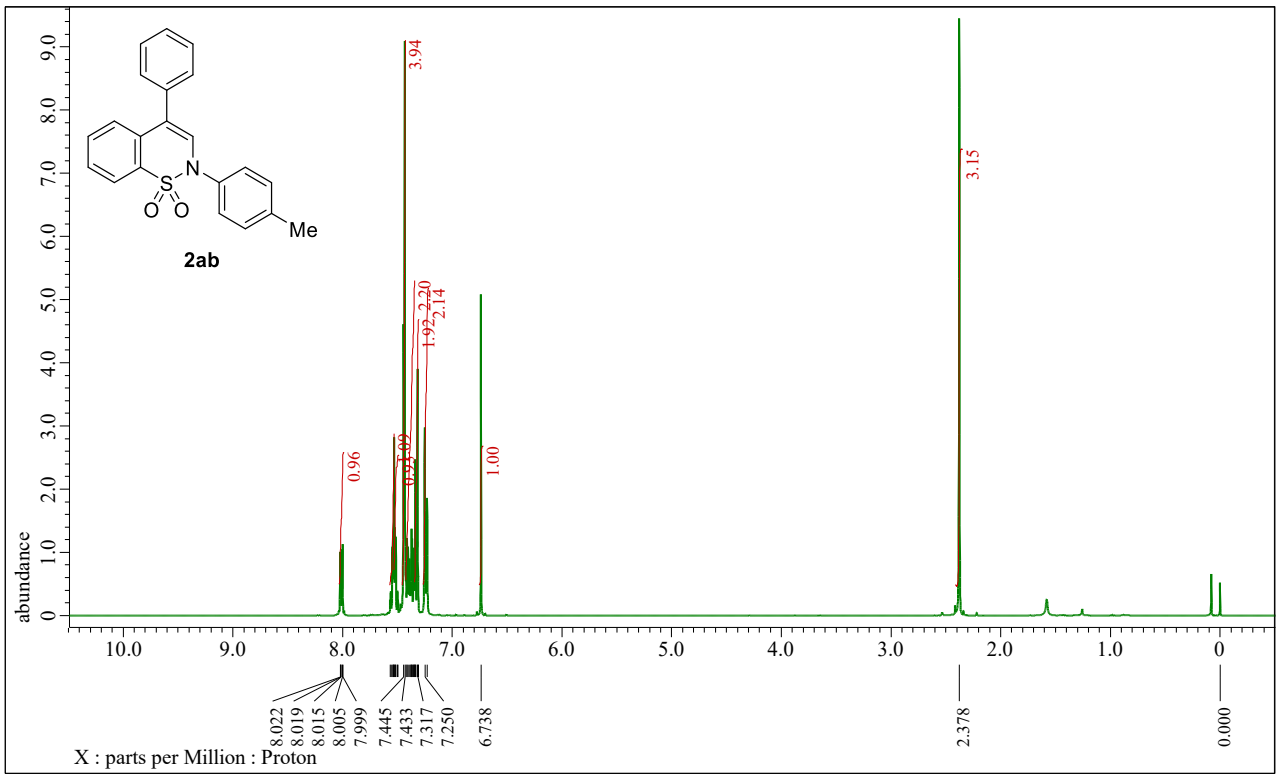
2,4-Diphenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2aa) ^{1}H NMR (400 MHz, $CDCl_3$)



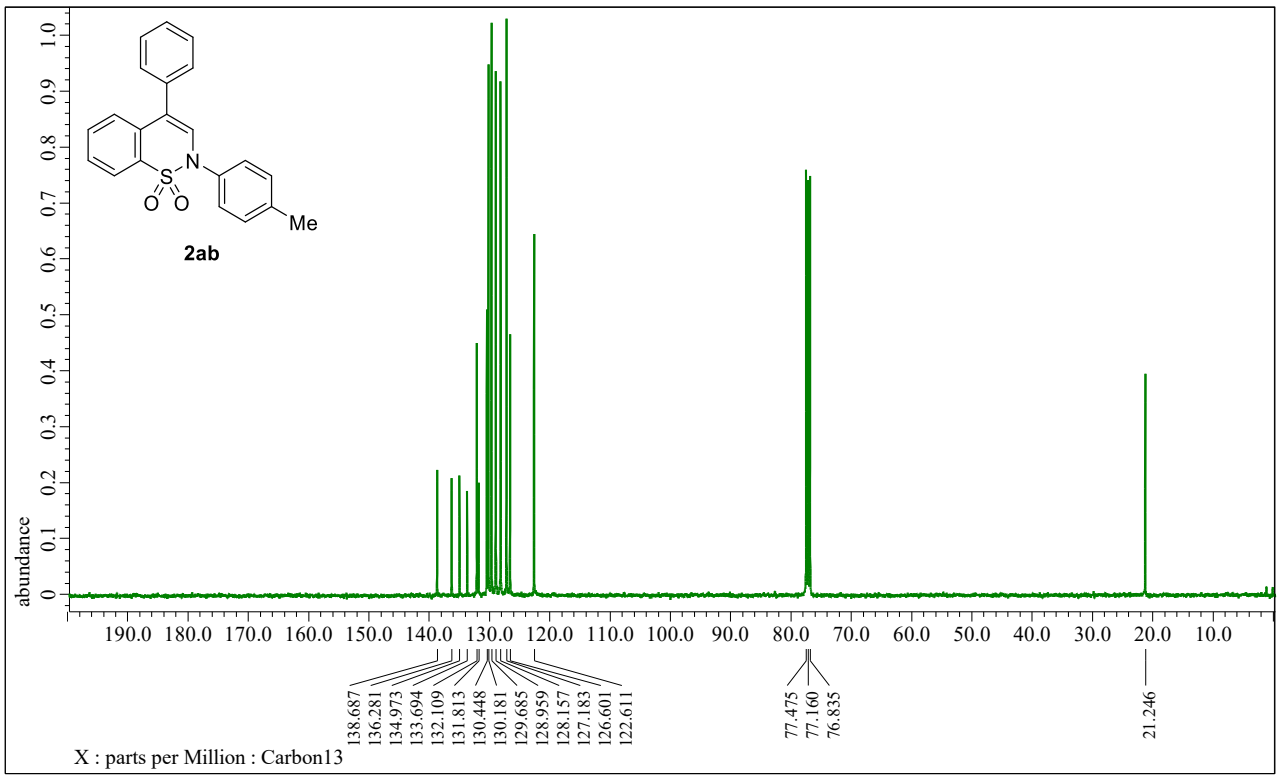
2,4-Diphenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2aa) ^{13}C NMR (100 MHz, $CDCl_3$)



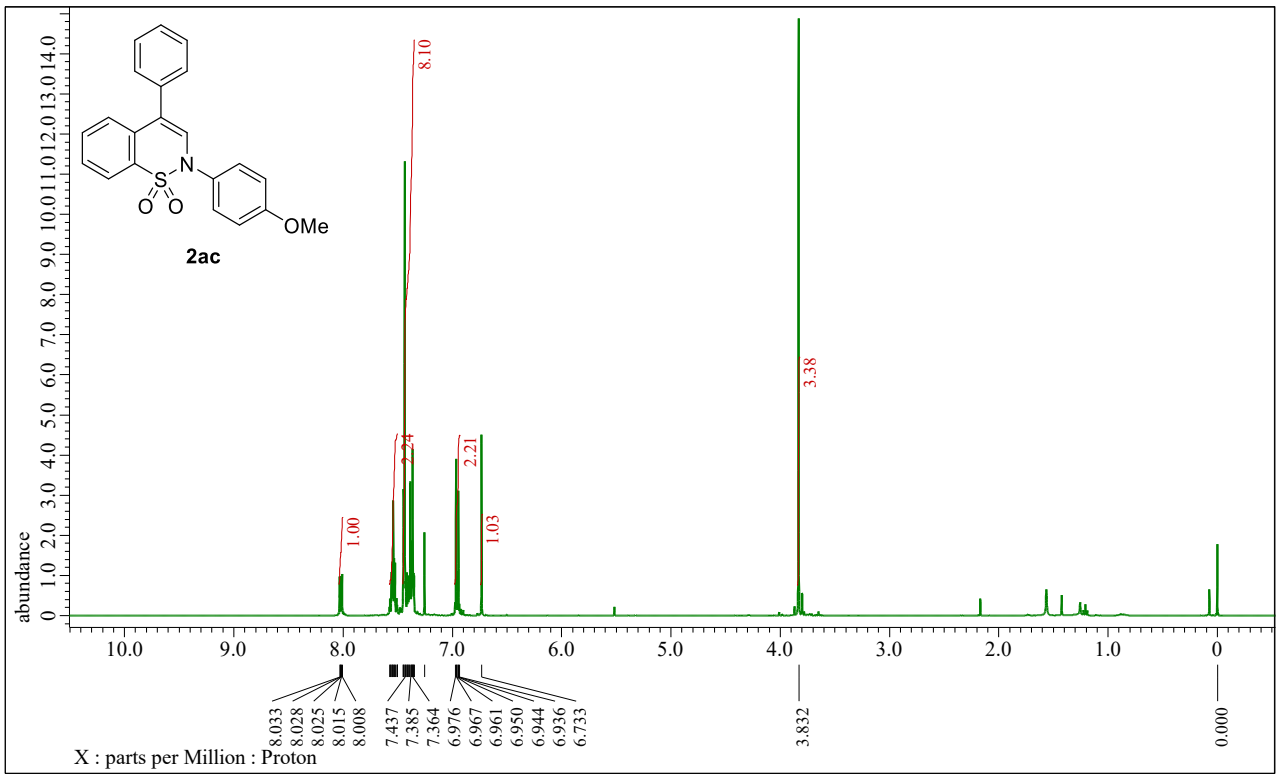
4-Phenyl-2-(*p*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ab) ^{1}H NMR (400 MHz, $CDCl_3$)



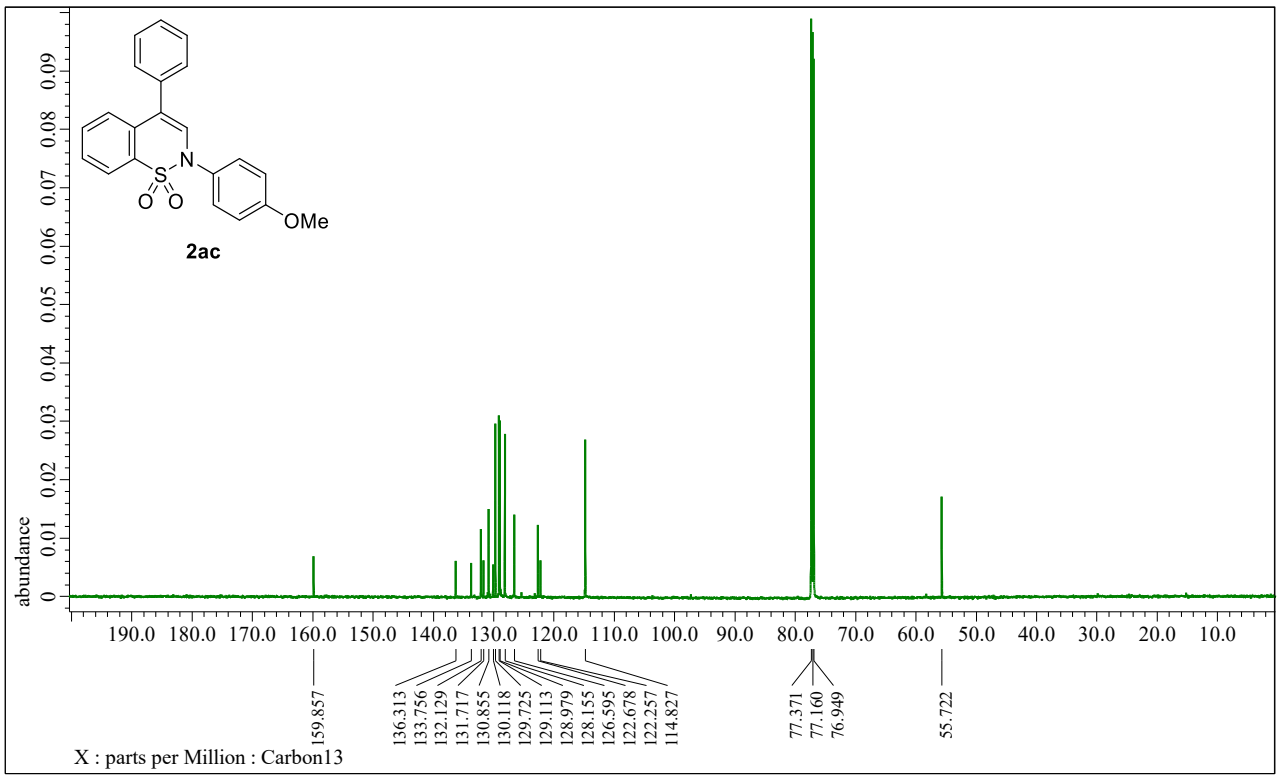
4-Phenyl-2-(*p*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ab) ^{13}C NMR (100 MHz, $CDCl_3$)



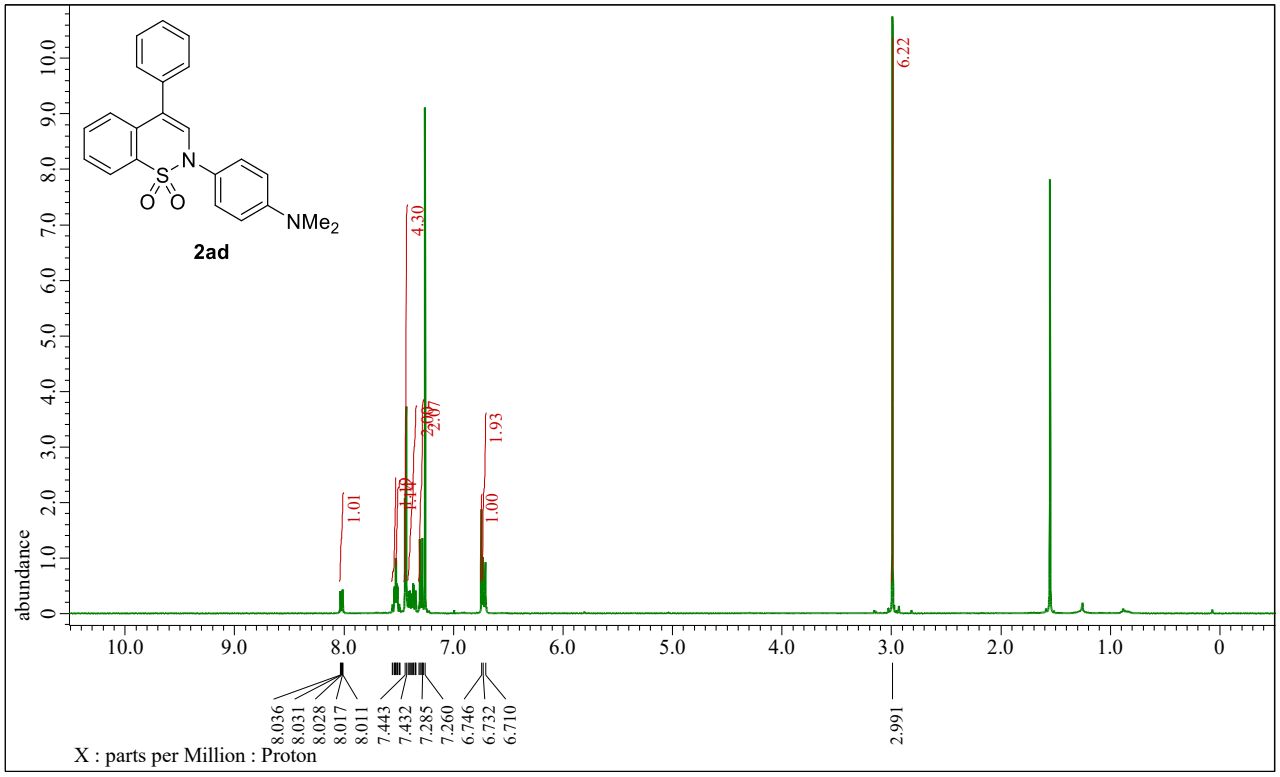
2-(4-Methoxyphenyl)-4-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ac) ^{1}H NMR (400 MHz, $CDCl_3$)



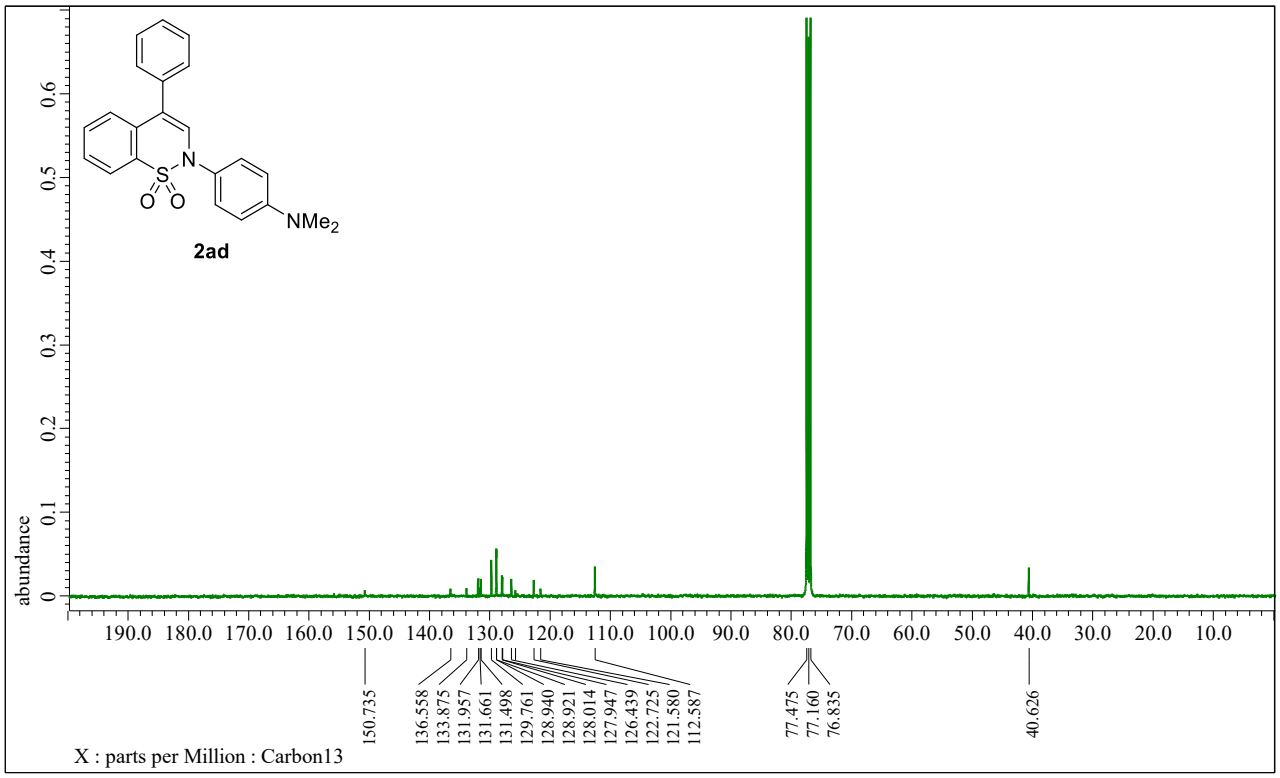
2-(4-Methoxyphenyl)-4-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ac) ^{13}C NMR (150 MHz, $CDCl_3$)



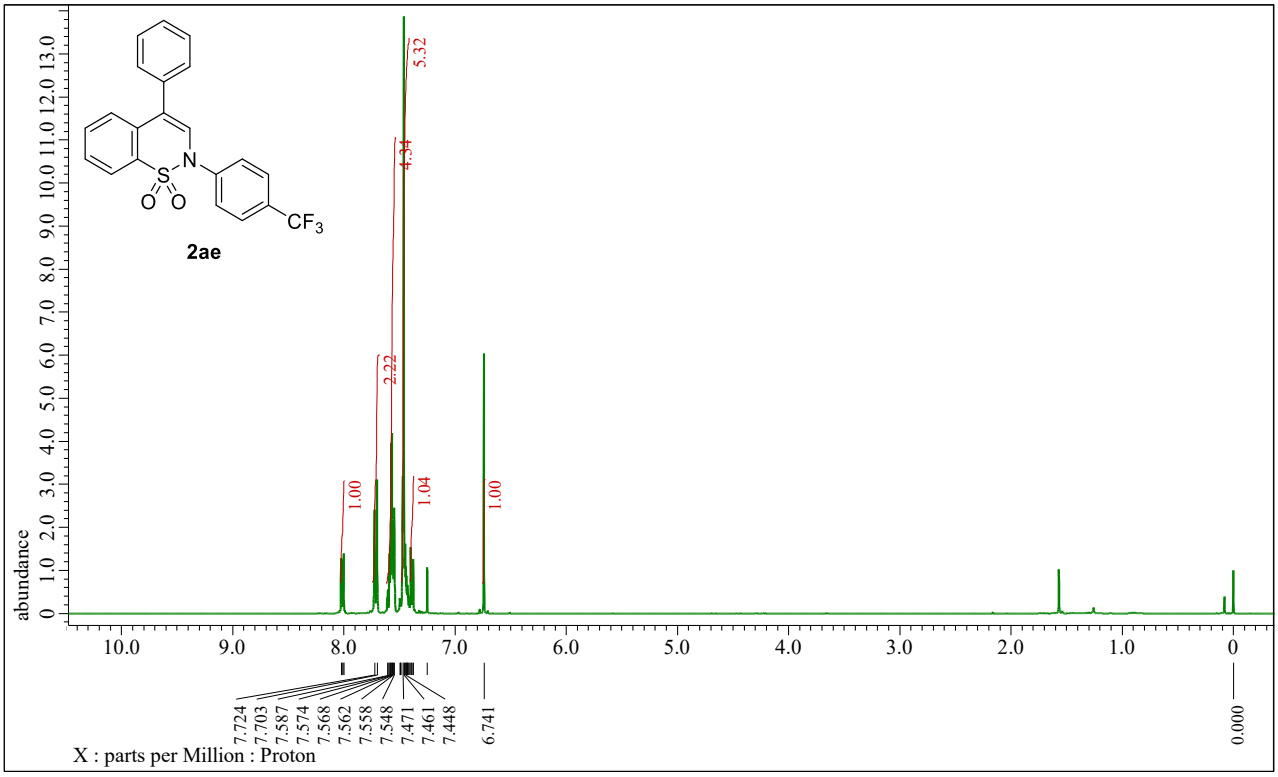
2-(4-(Dimethylamino)phenyl)-4-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ad) ^{1}H NMR (400 MHz, $CDCl_3$)



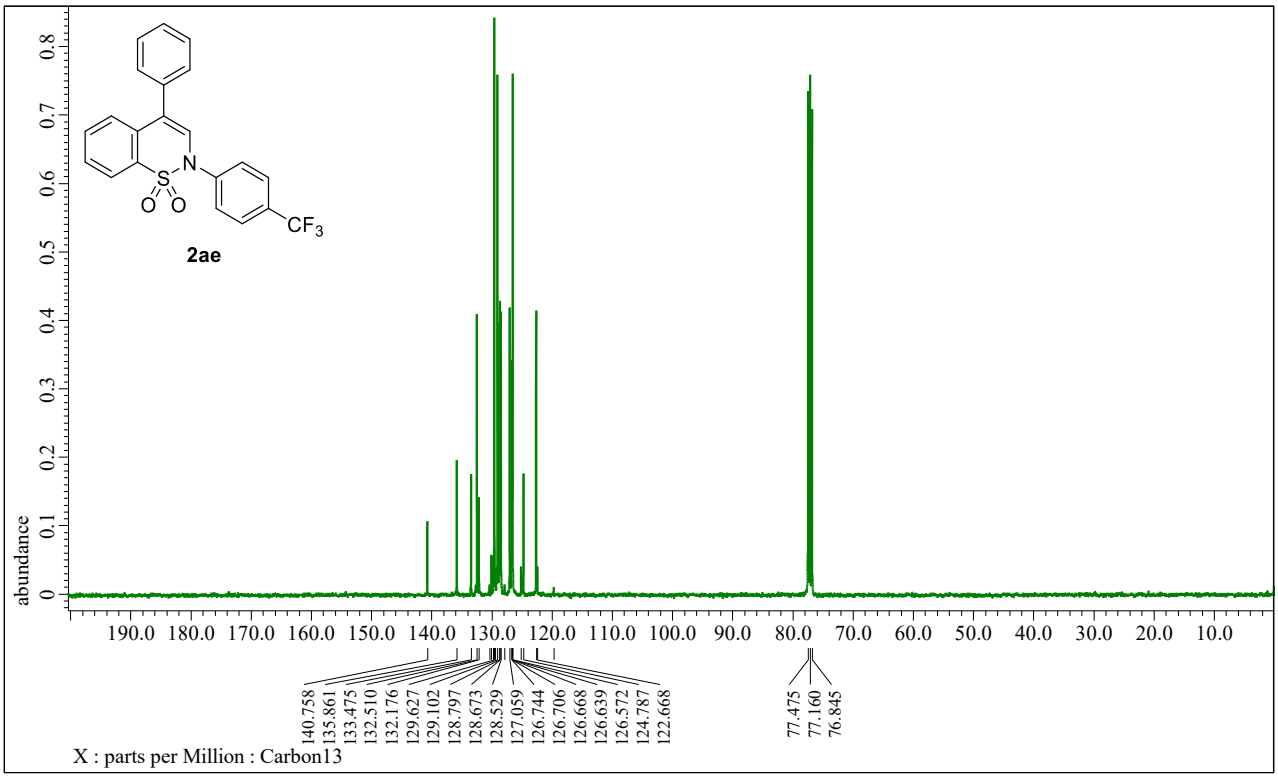
2-(4-(Dimethylamino)phenyl)-4-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ad) ^{13}C NMR (100 MHz, $CDCl_3$)



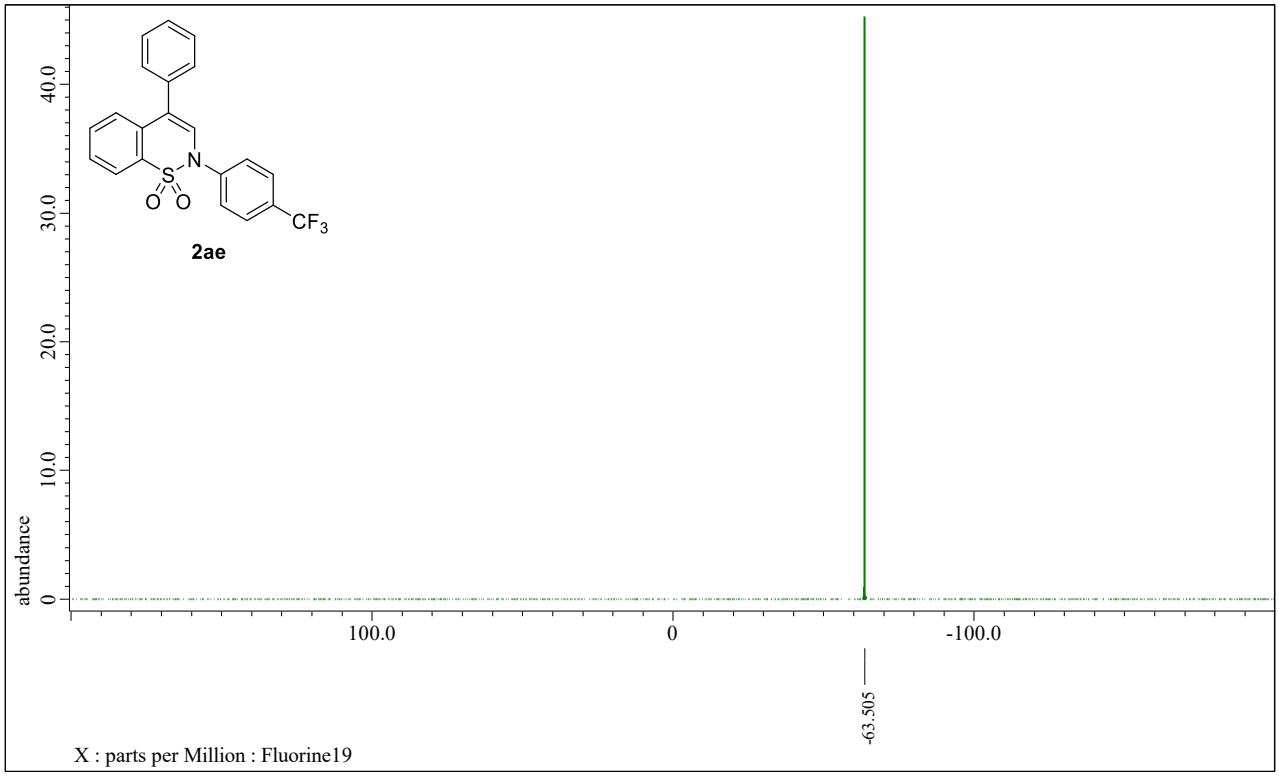
4-Phenyl-2-(4-(trifluoromethyl)phenyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ae) ^{1}H NMR (400 MHz, $CDCl_3$)



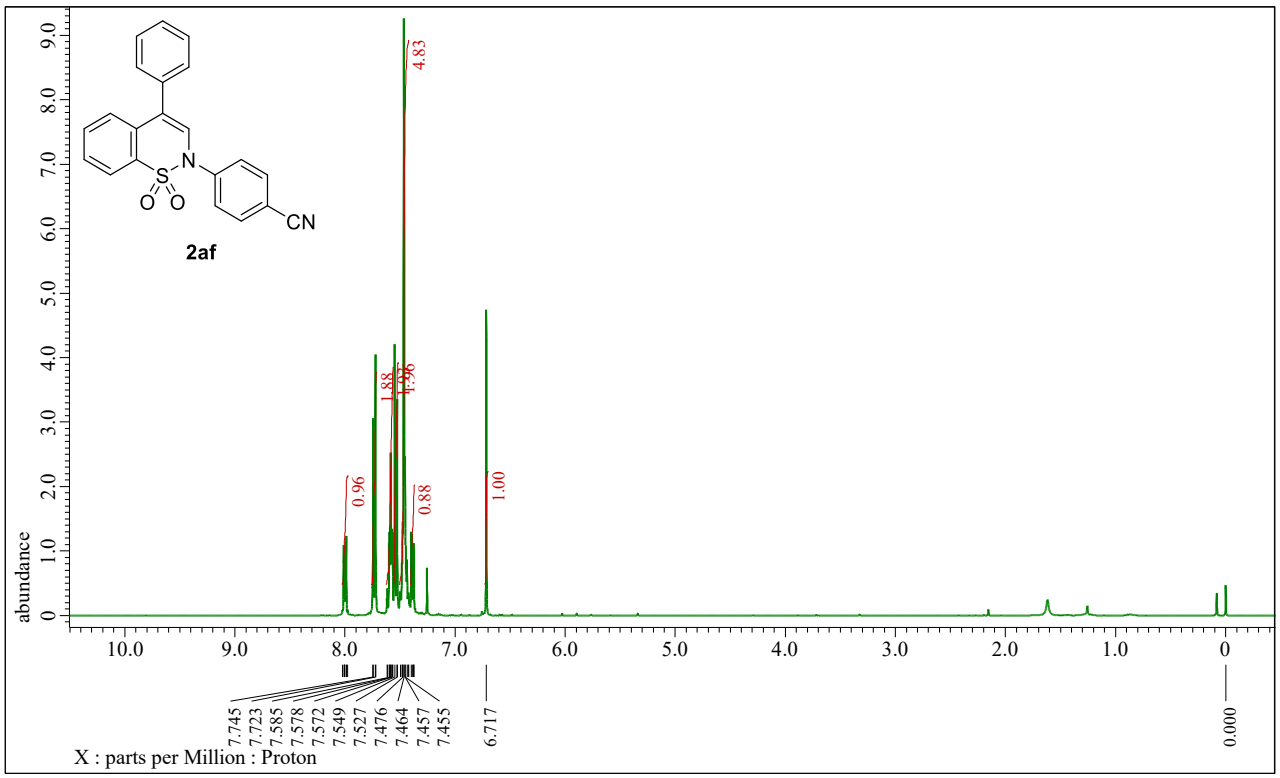
4-Phenyl-2-(4-(trifluoromethyl)phenyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ae) ^{13}C NMR (100 MHz, $CDCl_3$)



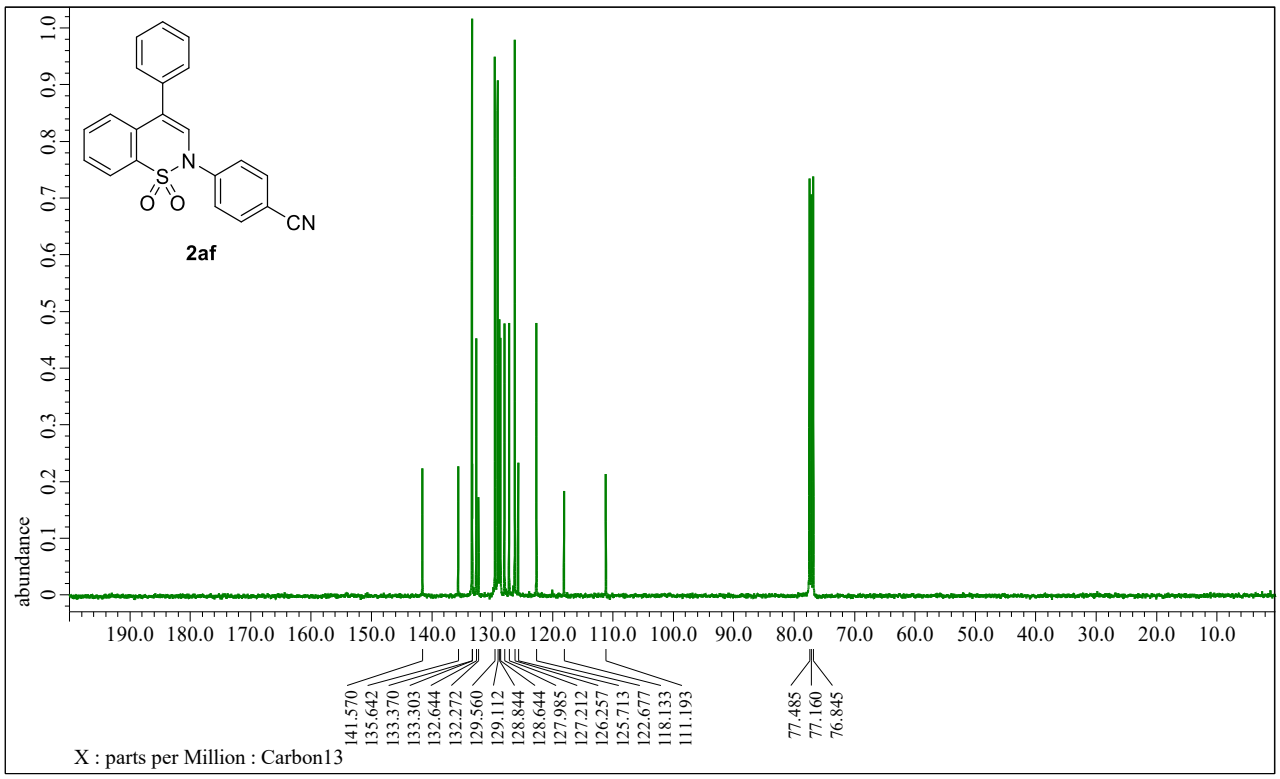
4-Phenyl-2-(4-(trifluoromethyl)phenyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ae) ^{19}F NMR (376 MHz, $CDCl_3$)



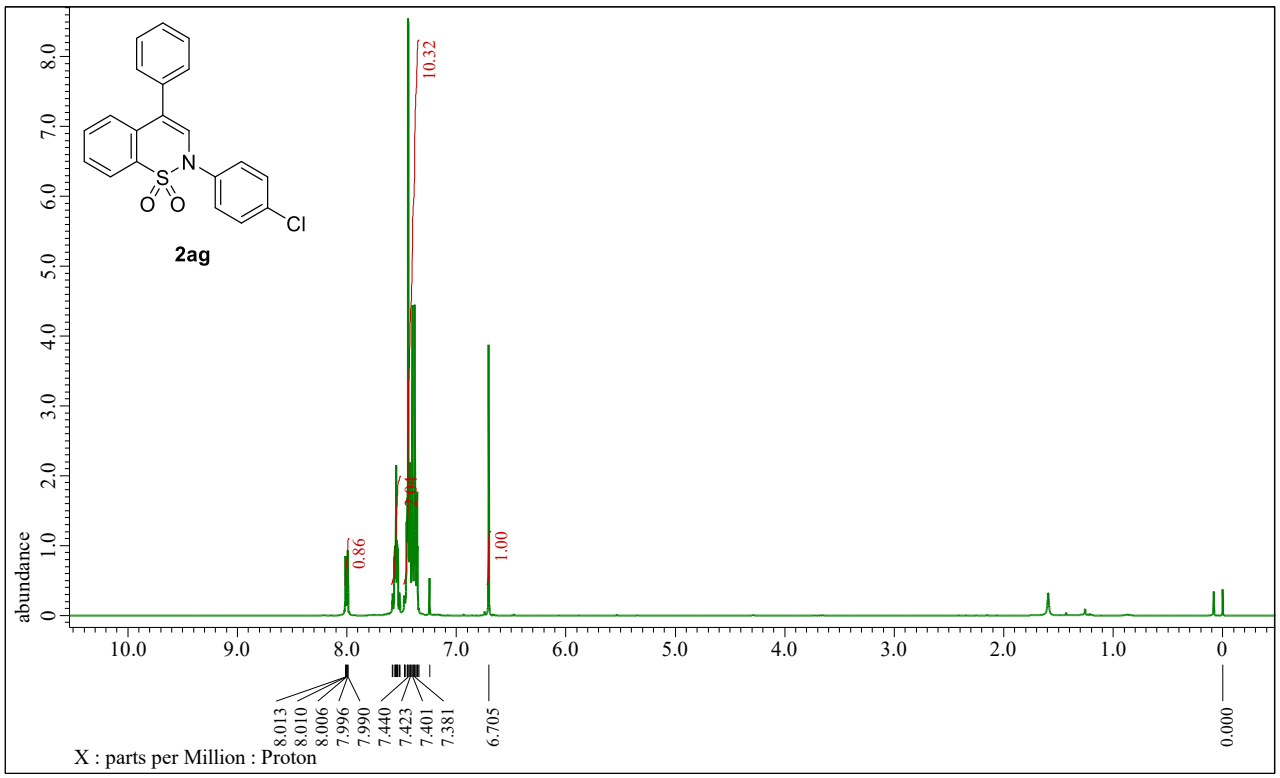
4-(1,1-Dioxido-4-phenyl-2*H*-benzo[*e*][1,2]thiazin-2-yl)benzonitrile (2af) ^{1}H NMR (400 MHz, $CDCl_3$)



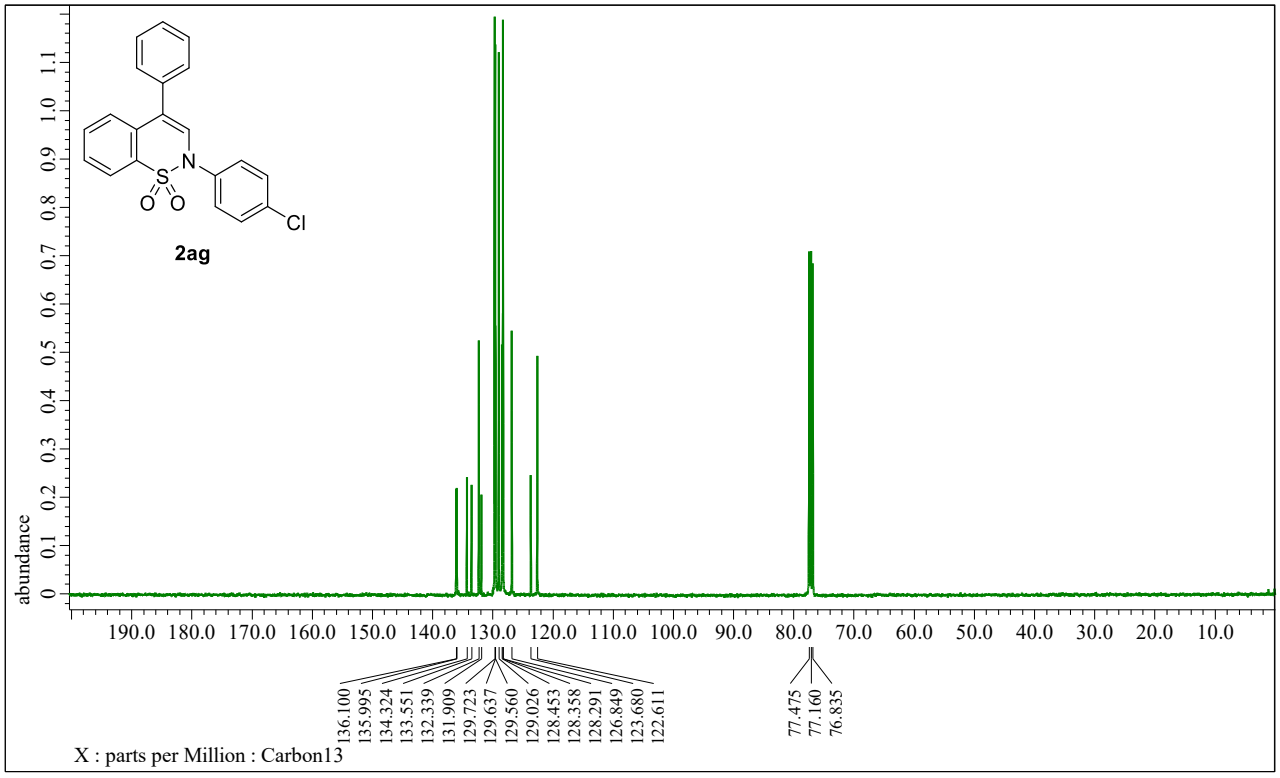
4-(1,1-Dioxido-4-phenyl-2*H*-benzo[*e*][1,2]thiazin-2-yl)benzonitrile (2af) ^{13}C NMR (100 MHz, $CDCl_3$)



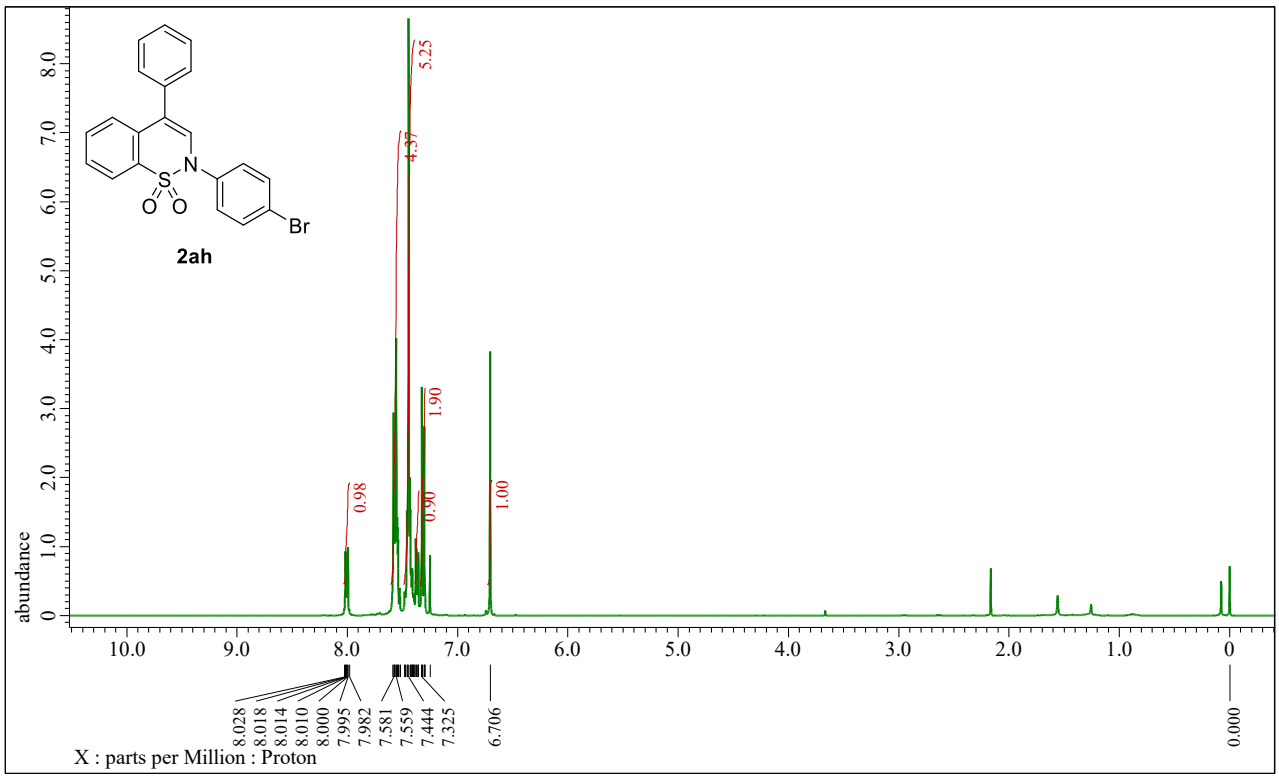
2-(4-Chlorophenyl)-4-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ag) ^{1}H NMR (400 MHz, $CDCl_3$)



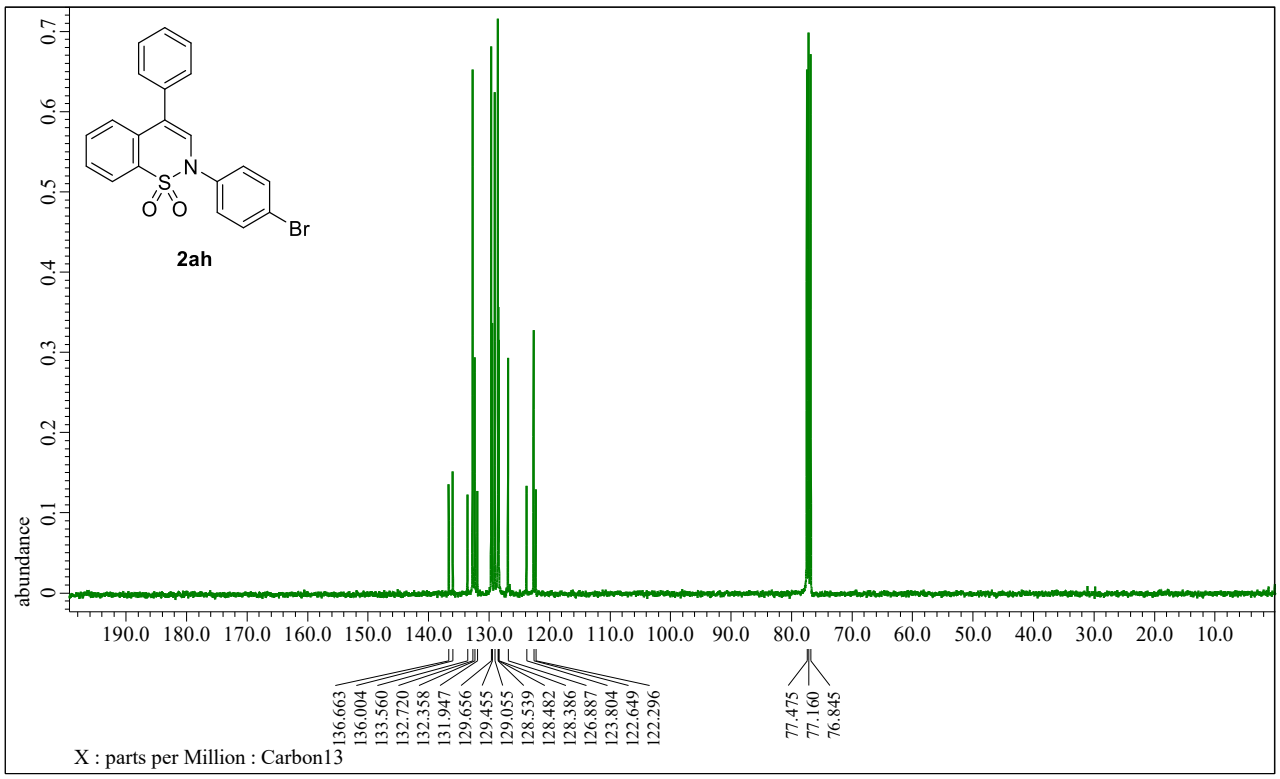
2-(4-Chlorophenyl)-4-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ag) ^{13}C NMR (100 MHz, $CDCl_3$)



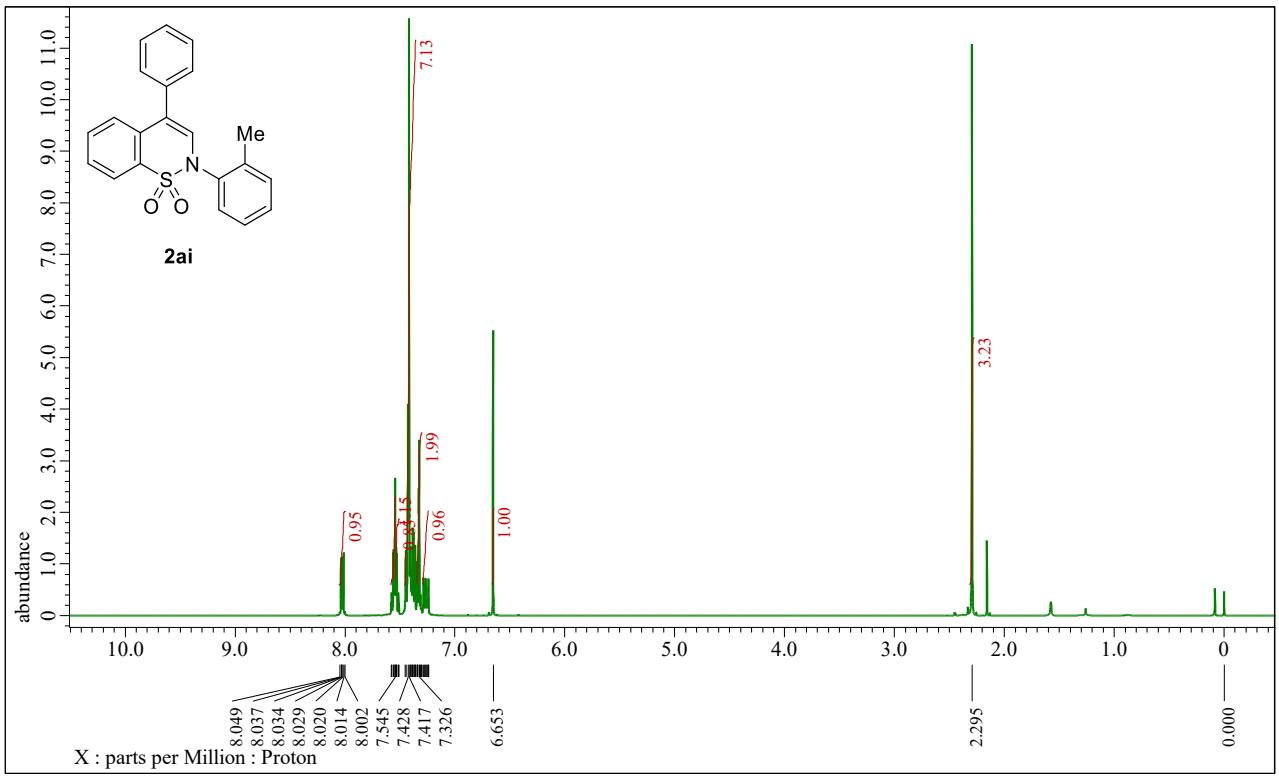
2-(4-Brorophenyl)-4-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ah) ^{1}H NMR (400 MHz, $CDCl_3$)



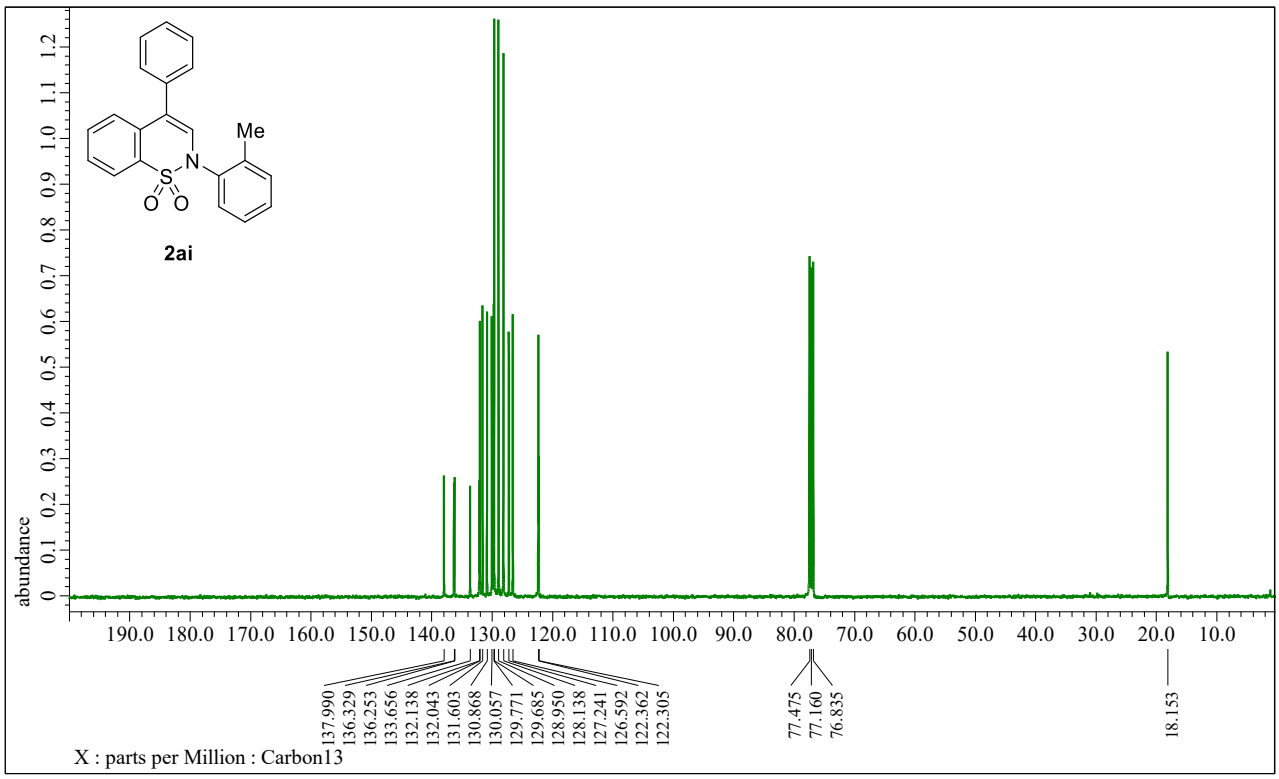
2-(4-Brorophenyl)-4-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ah) ^{1}H NMR (400 MHz, $CDCl_3$)



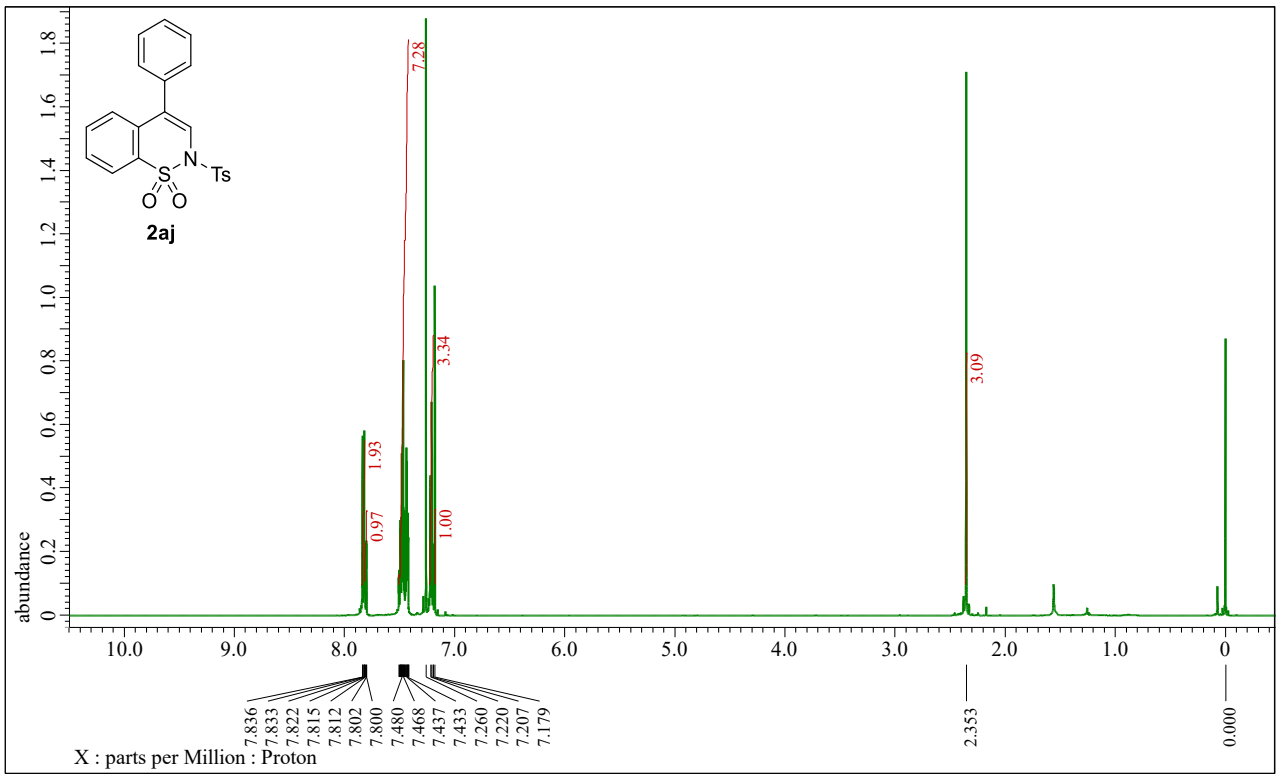
4-Phenyl-2-(*o*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ai) ^{1}H NMR (400 MHz, $CDCl_3$)



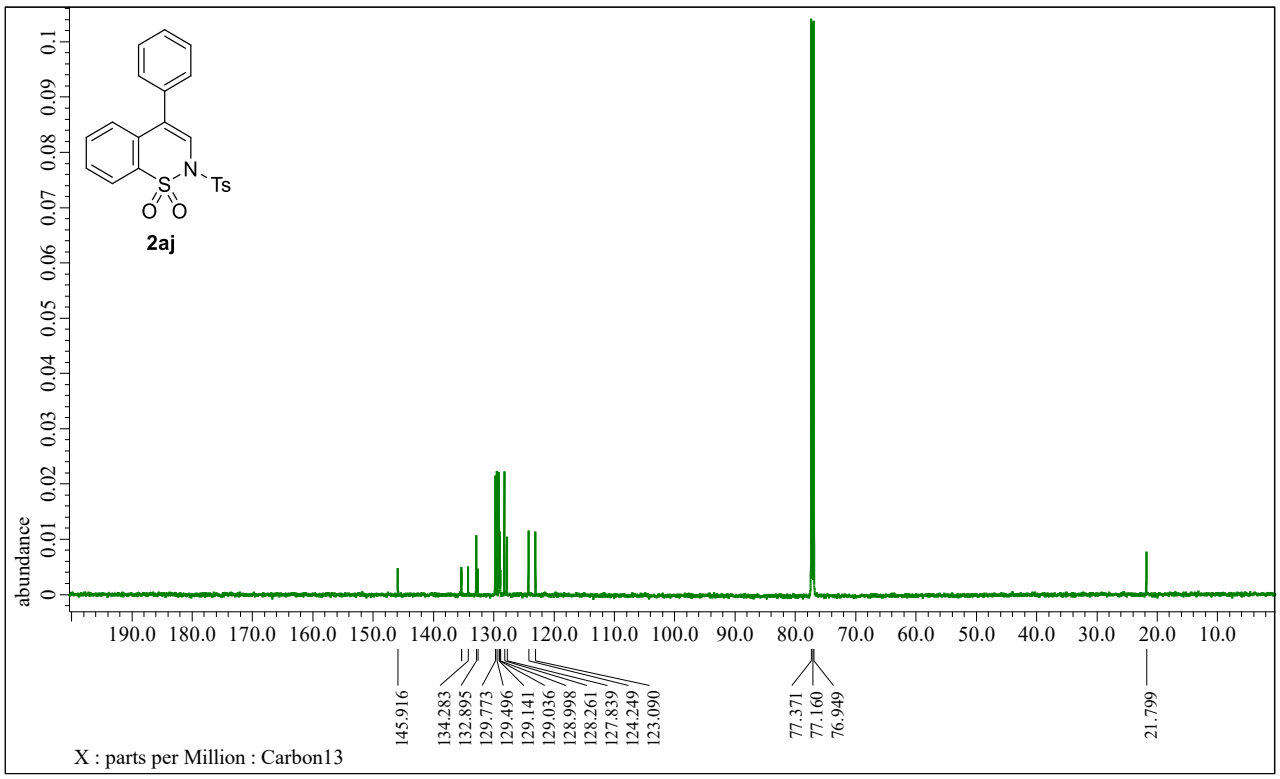
4-Phenyl-2-(*o*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ai) ^{13}C NMR (100 MHz, $CDCl_3$)



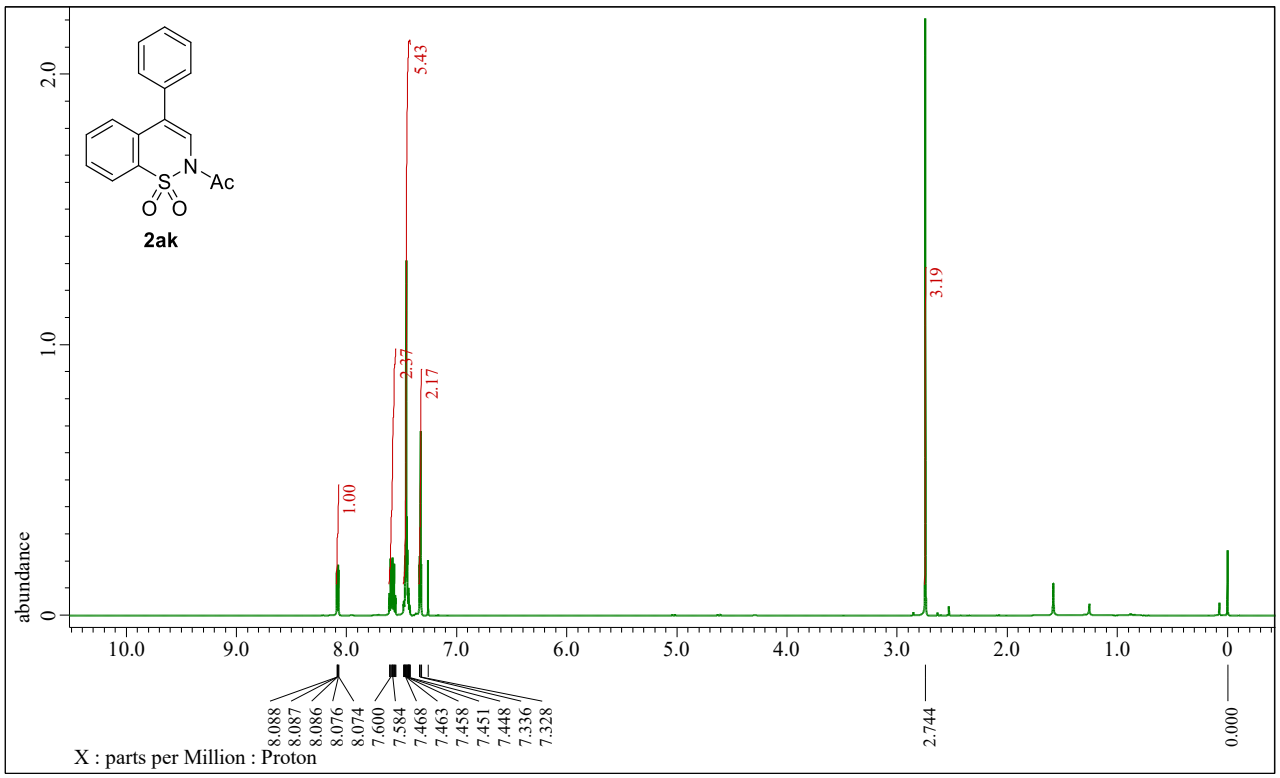
4-Phenyl-2-tosyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2aj) ^{1}H NMR (600 MHz, $CDCl_3$)



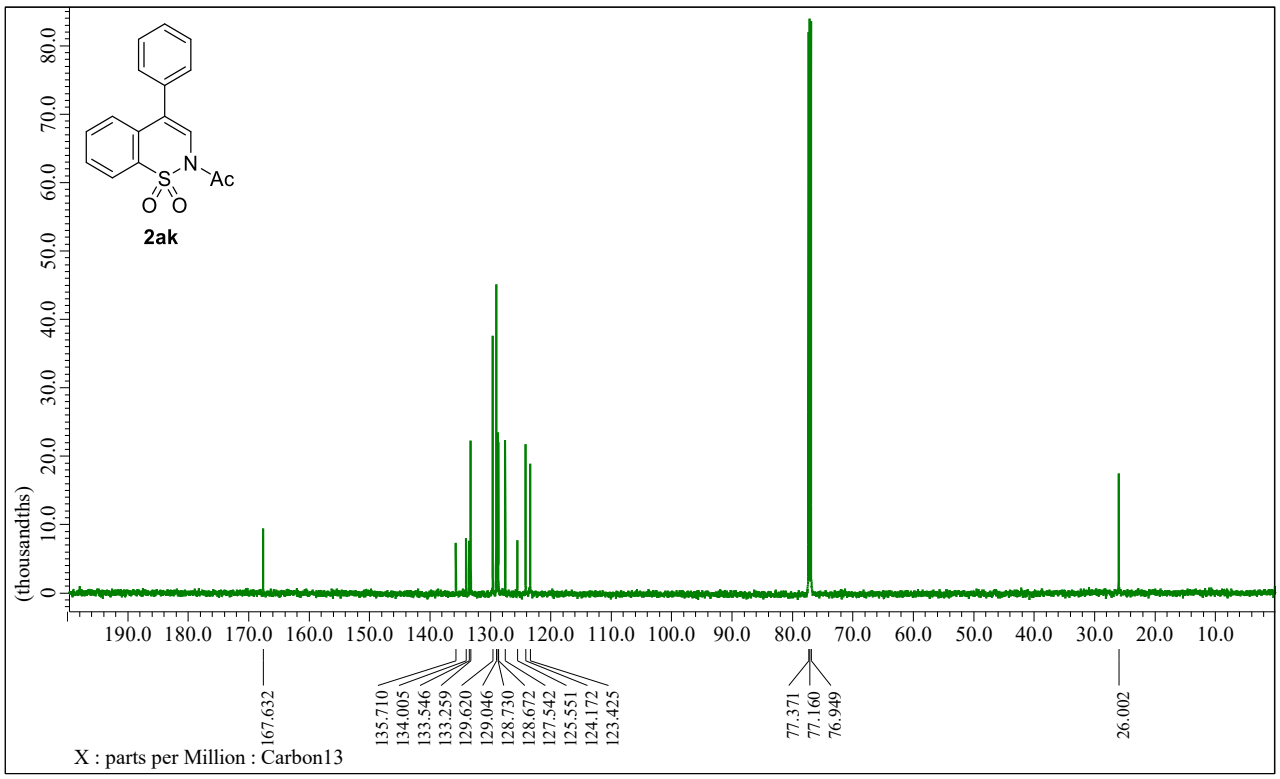
4-Phenyl-2-tosyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2aj) ^{13}C NMR (150 MHz, $CDCl_3$)



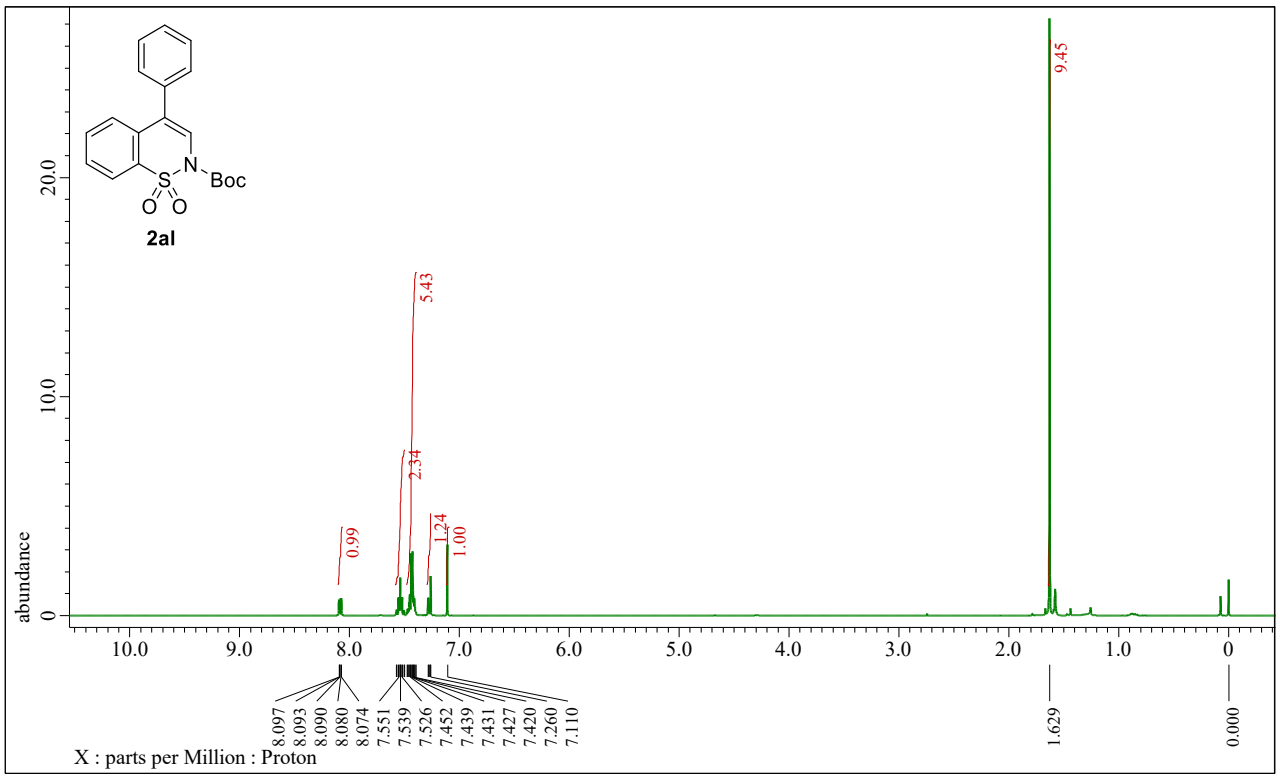
1-(1,1-Dioxido-4-phenyl-2*H*-benzo[*e*][1,2]thiazin-2-yl)ethan-1-one (2ak) ^{1}H NMR (600 MHz, $CDCl_3$)



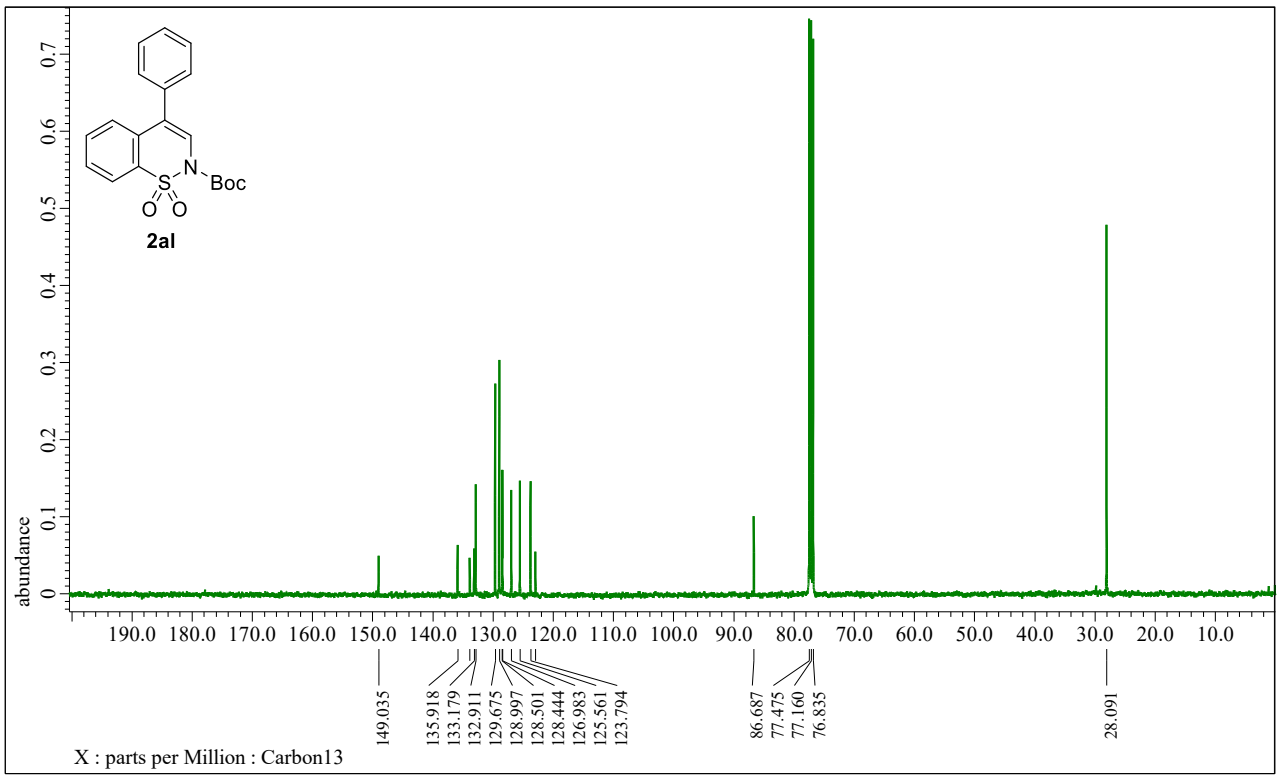
1-(1,1-Dioxido-4-phenyl-2*H*-benzo[*e*][1,2]thiazin-2-yl)ethan-1-one (2ak) ^{13}C NMR (150 MHz, $CDCl_3$)



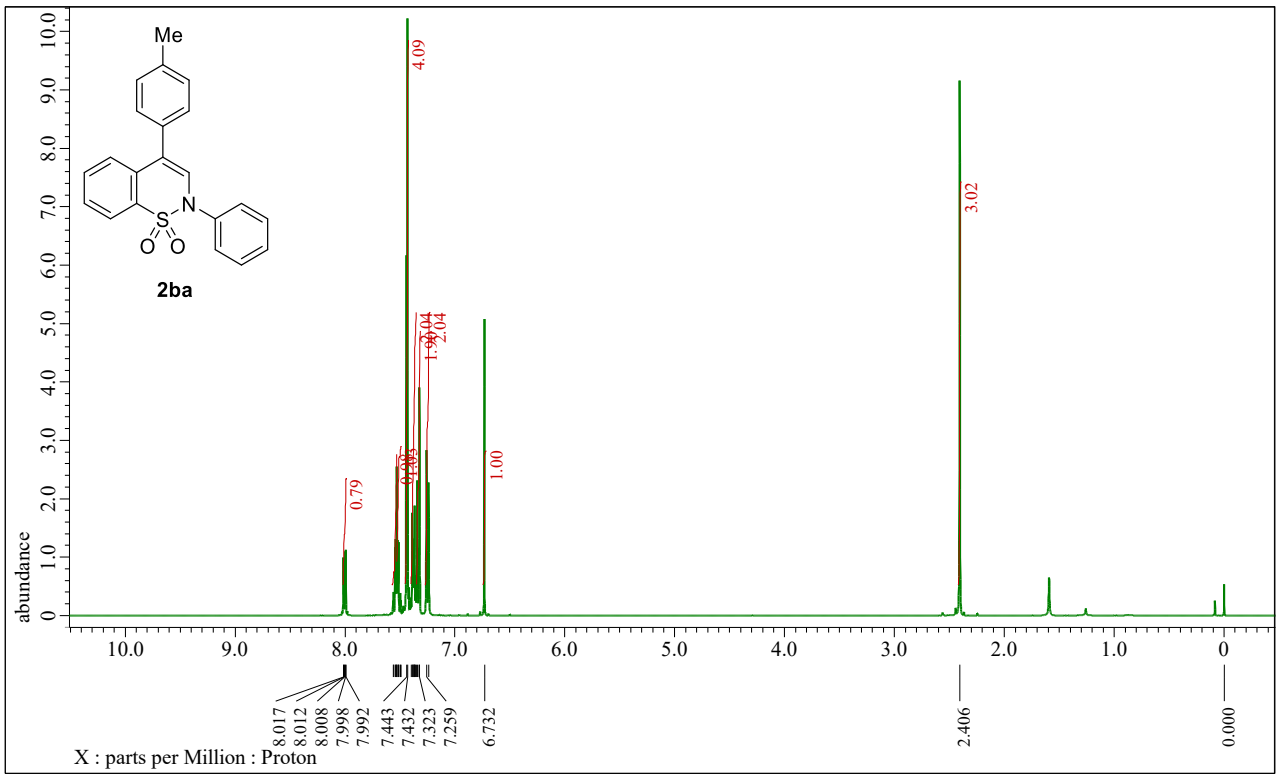
***tert*-Butyl 4-Phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2al) ^{1}H NMR (400 MHz, $CDCl_3$)**



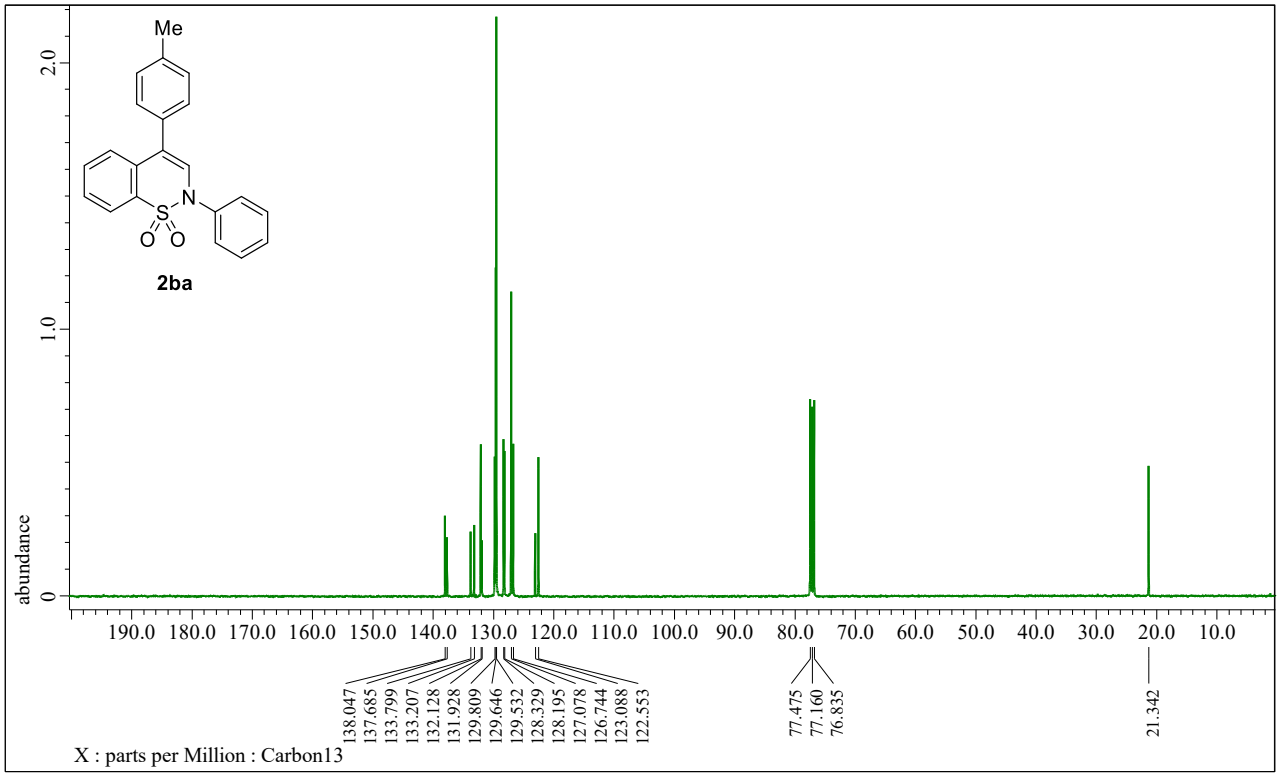
***tert*-Butyl 4-Phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2al) ^{13}C NMR (100 MHz, $CDCl_3$)**



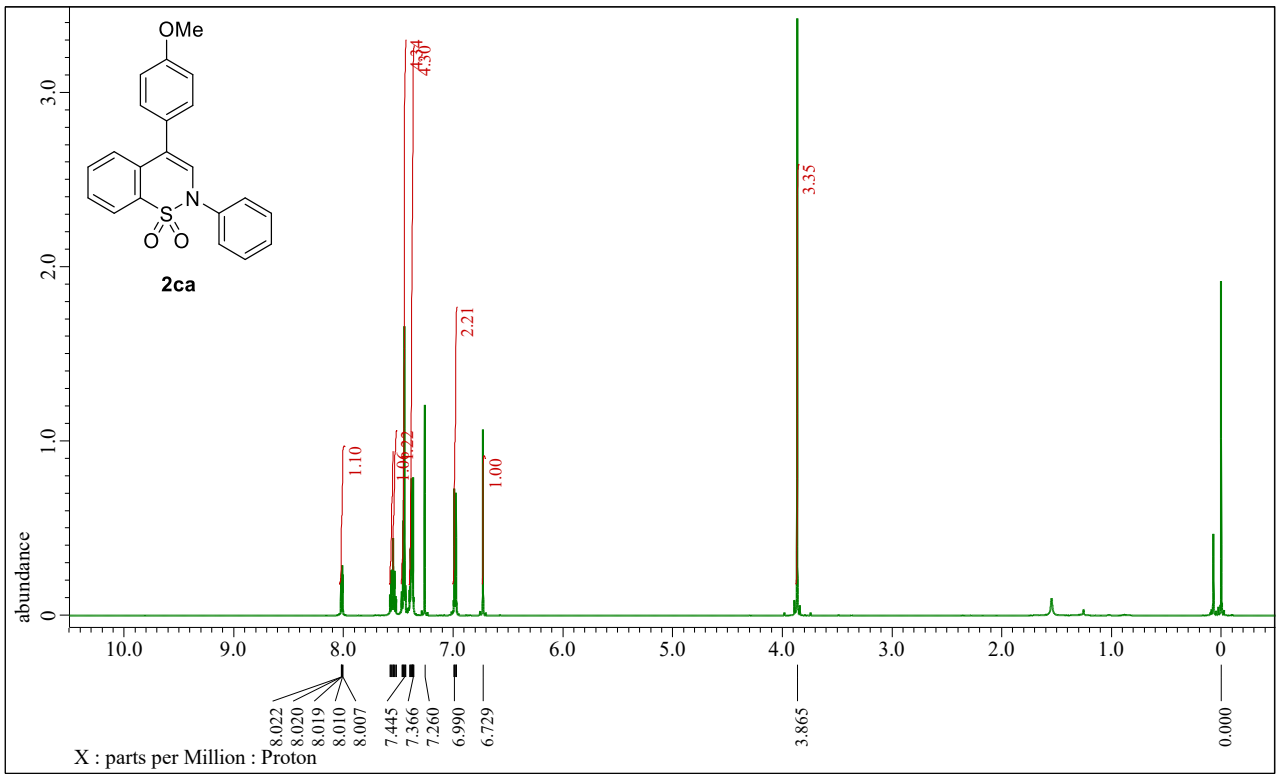
2-Phenyl-4-(*p*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ba) ^{1}H NMR (400 MHz, $CDCl_3$)



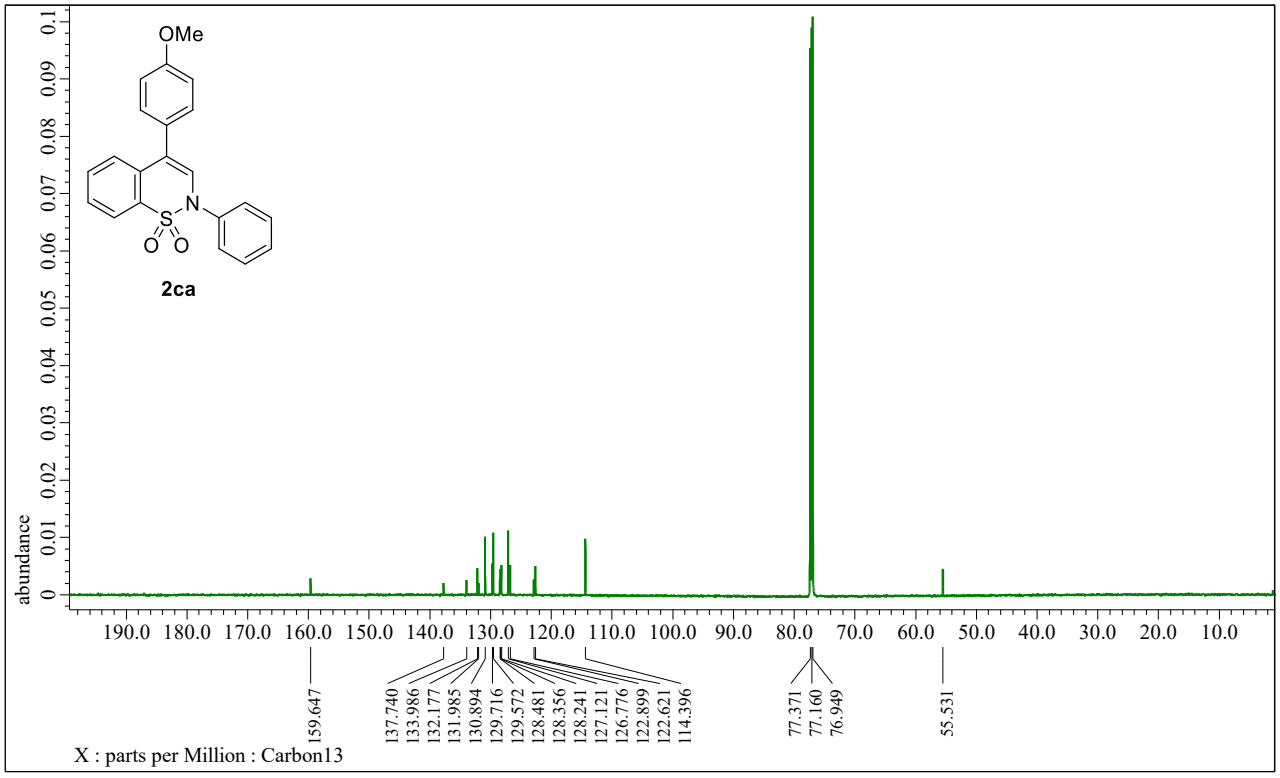
2-Phenyl-4-(*p*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ba) ^{13}C NMR (100 MHz, $CDCl_3$)



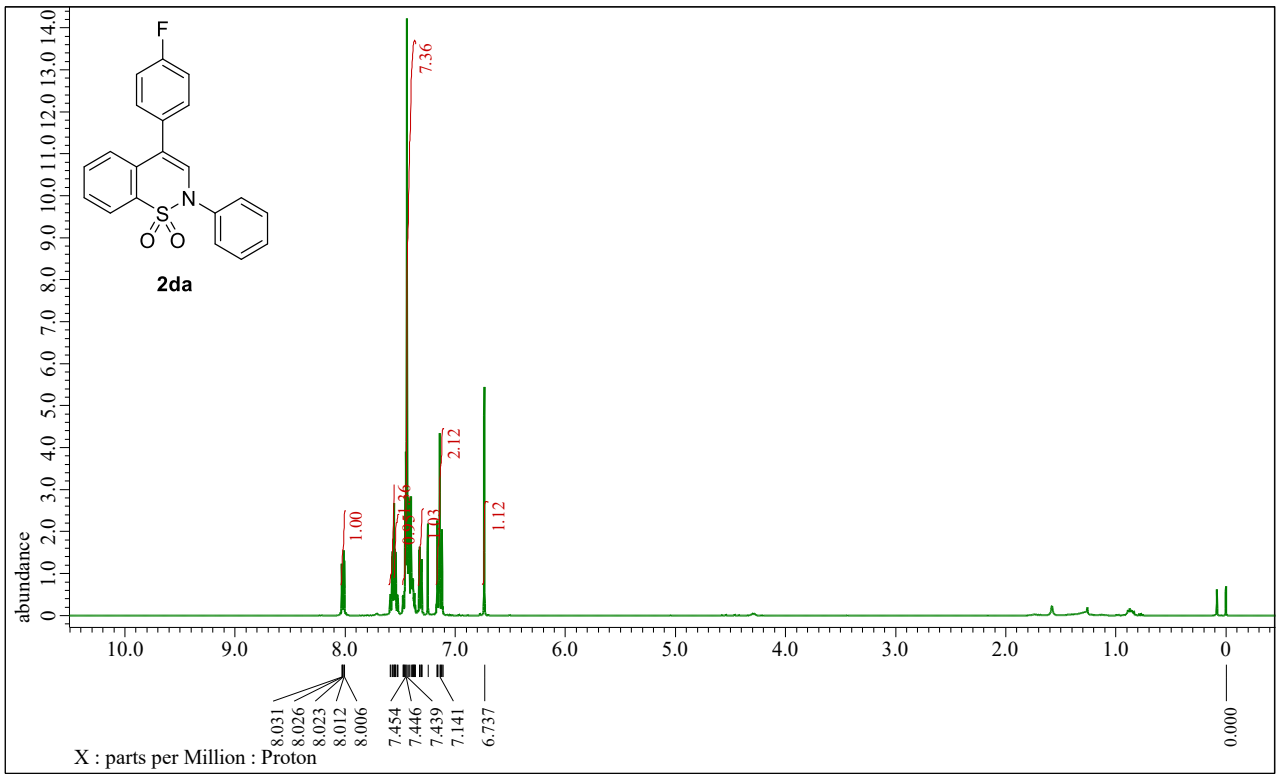
4-(4-Methoxyphenyl)-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ca) ^{1}H NMR (600 MHz, $CDCl_3$)



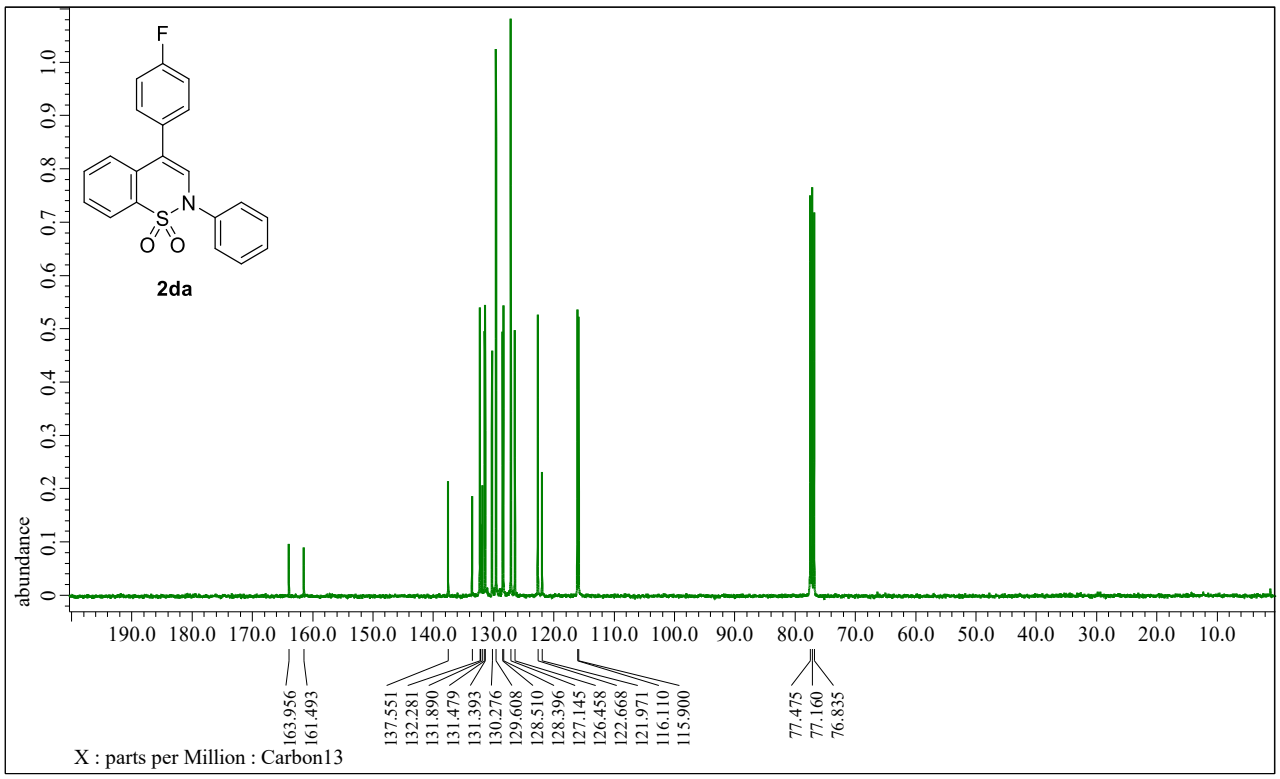
4-(4-Methoxyphenyl)-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ca) ^{13}C NMR (150 MHz, $CDCl_3$)



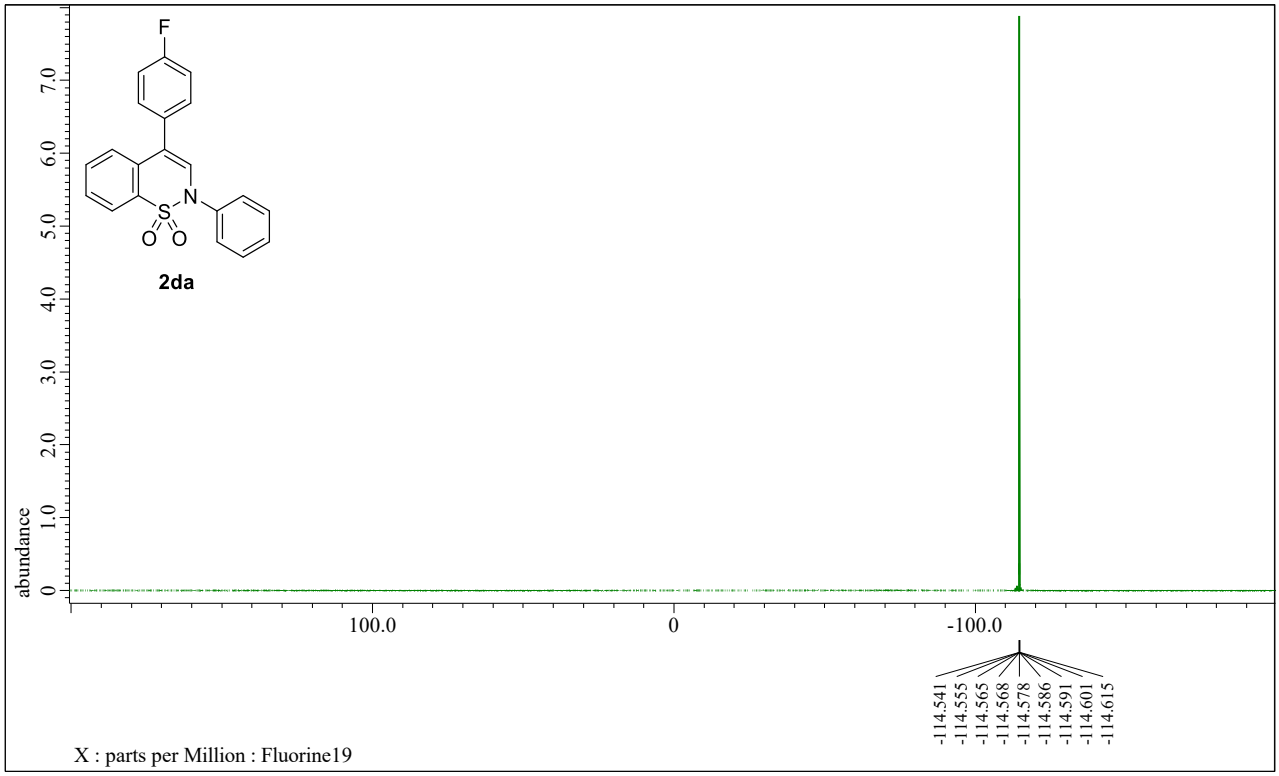
4-(4-Fluorophenyl)-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2da) ^{1}H NMR (400 MHz, $CDCl_3$)



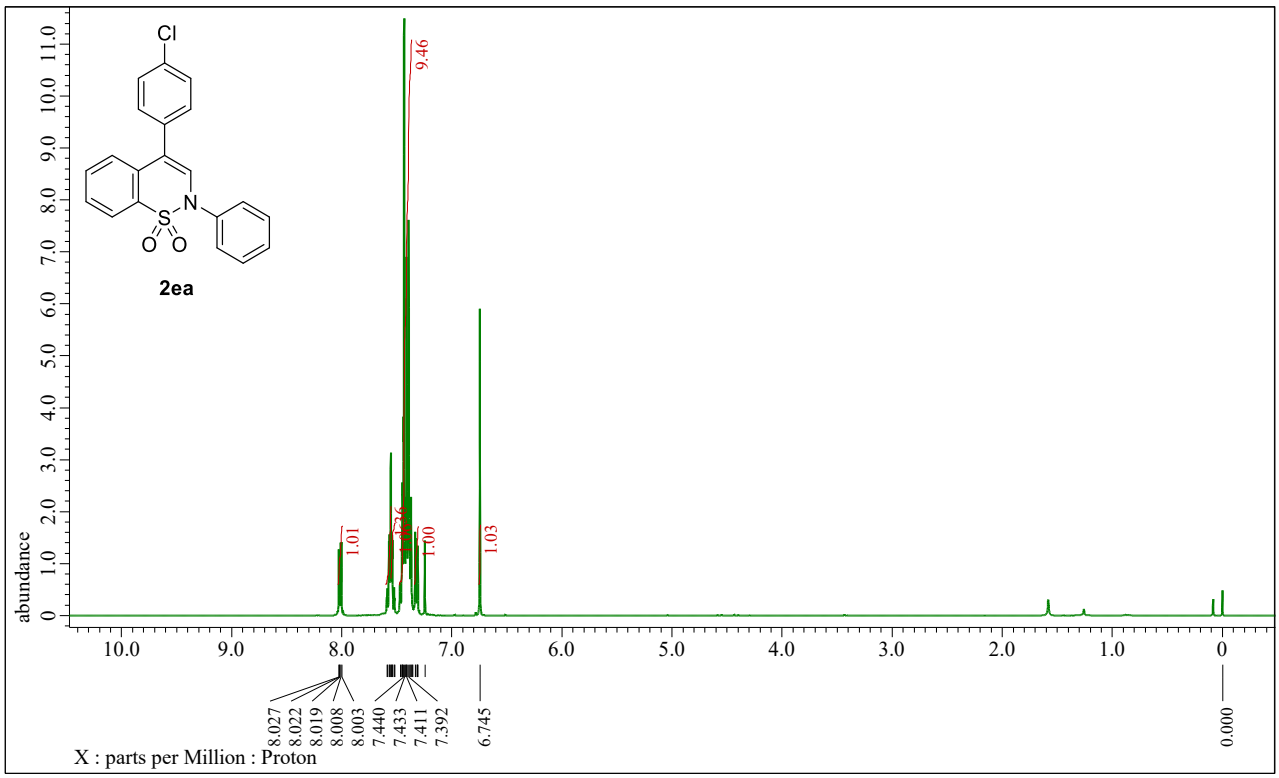
4-(4-Fluorophenyl)-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2da) ^{13}C NMR (100 MHz, $CDCl_3$)



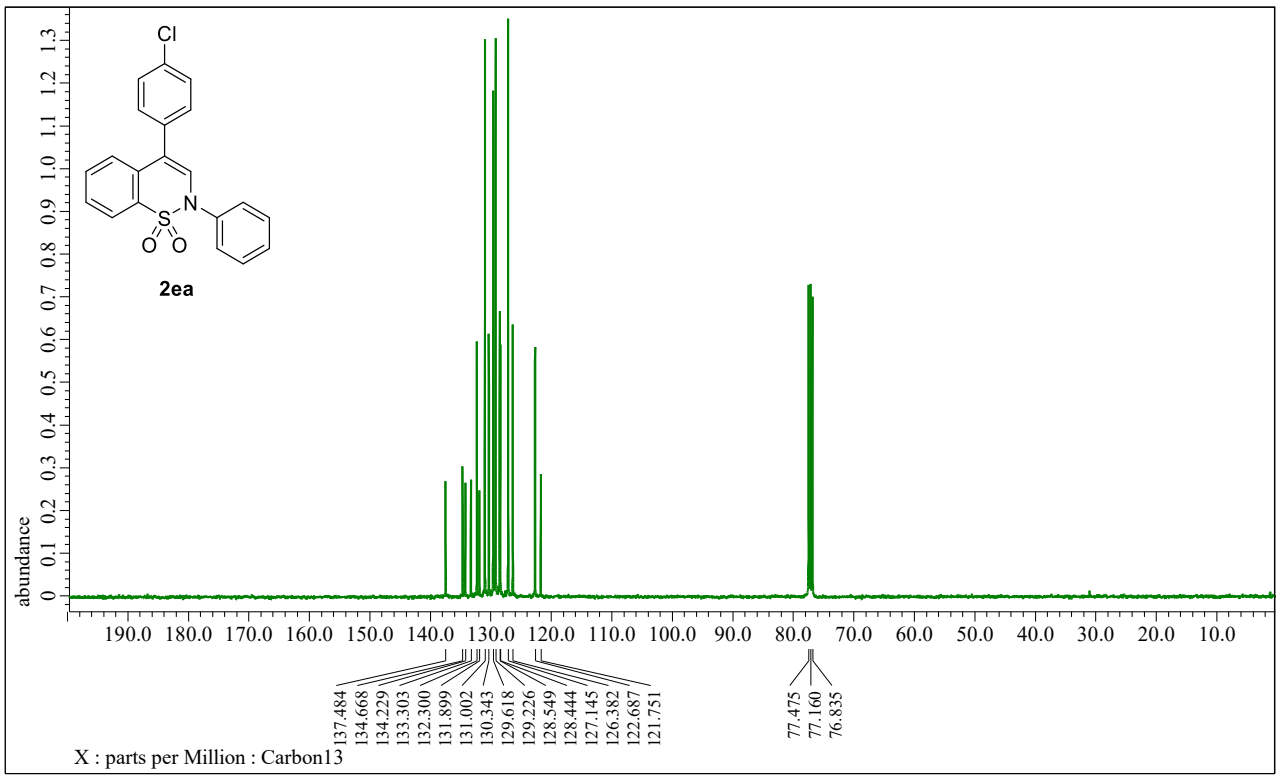
4-(4-Fluorophenyl)-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2da) ^{19}F NMR (376 MHz, $CDCl_3$)



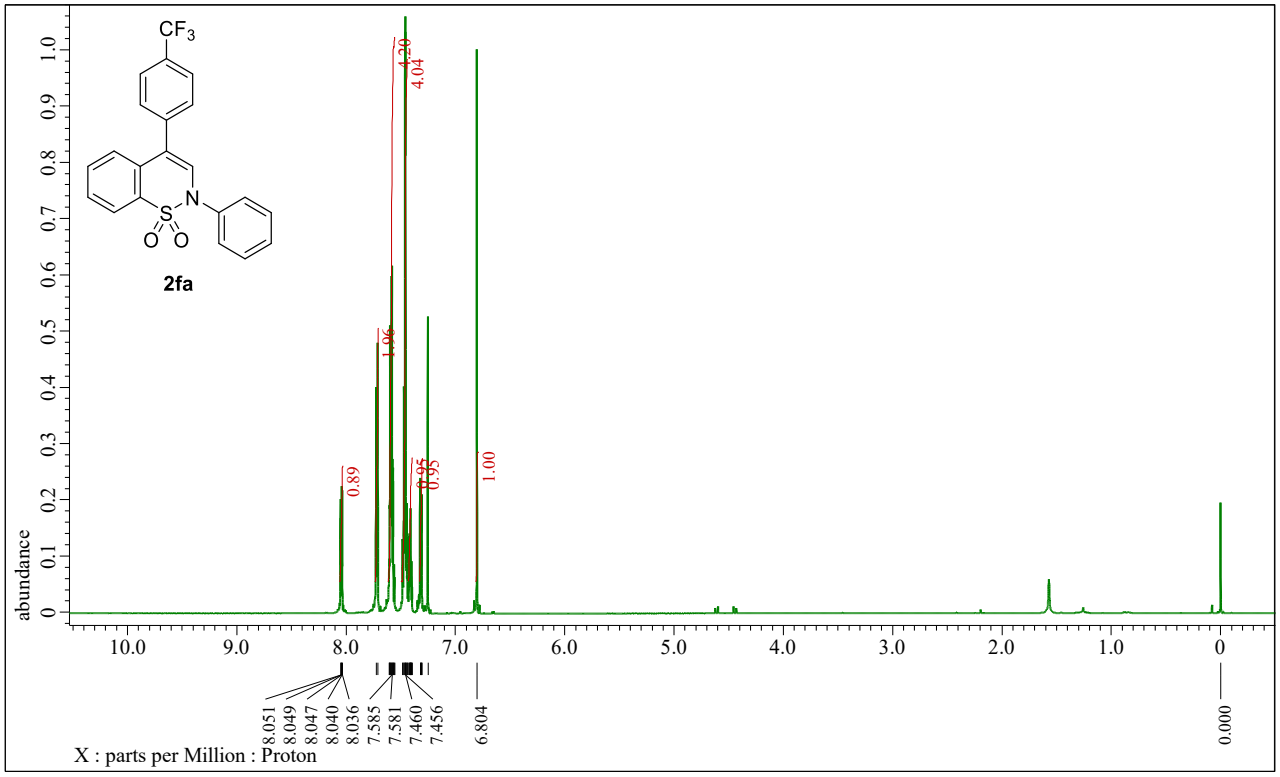
4-(4-Chlorophenyl)-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ea) ^{1}H NMR (400 MHz, $CDCl_3$)



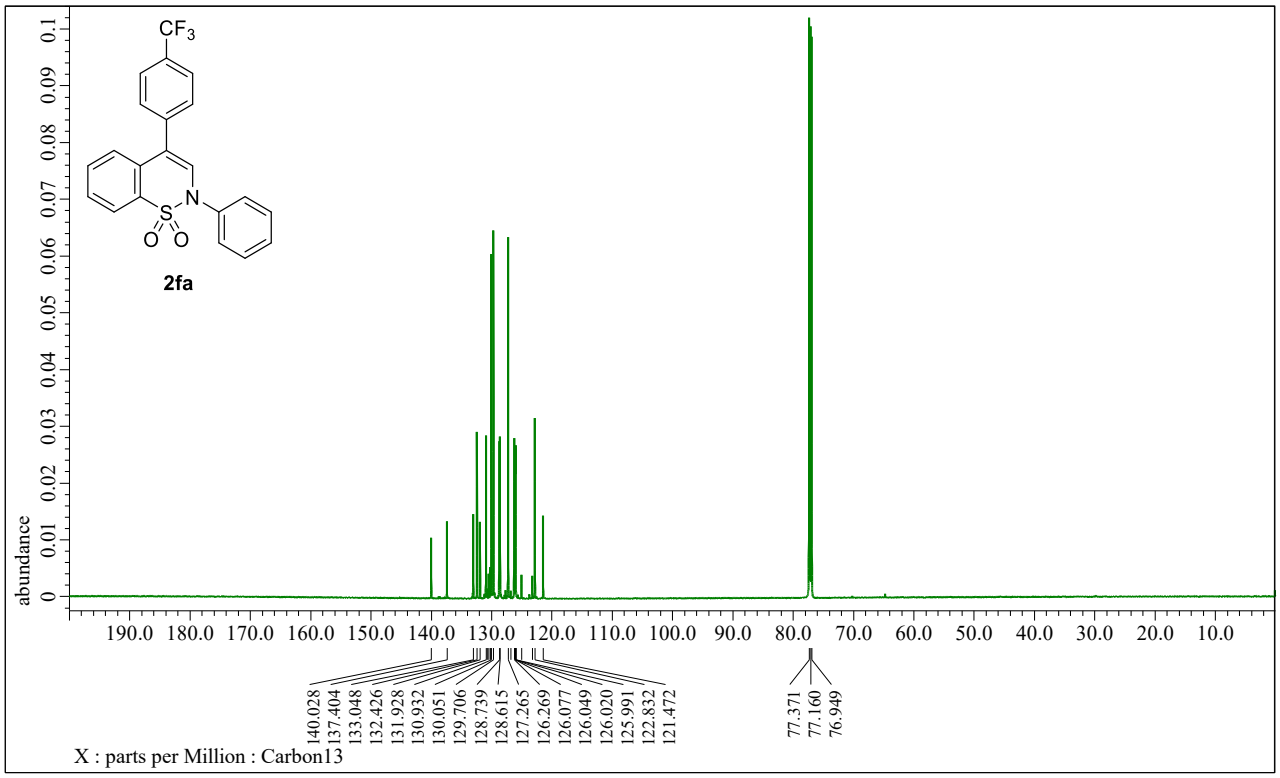
4-(4-Chlorophenyl)-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ea) ^{13}C NMR (100 MHz, $CDCl_3$)



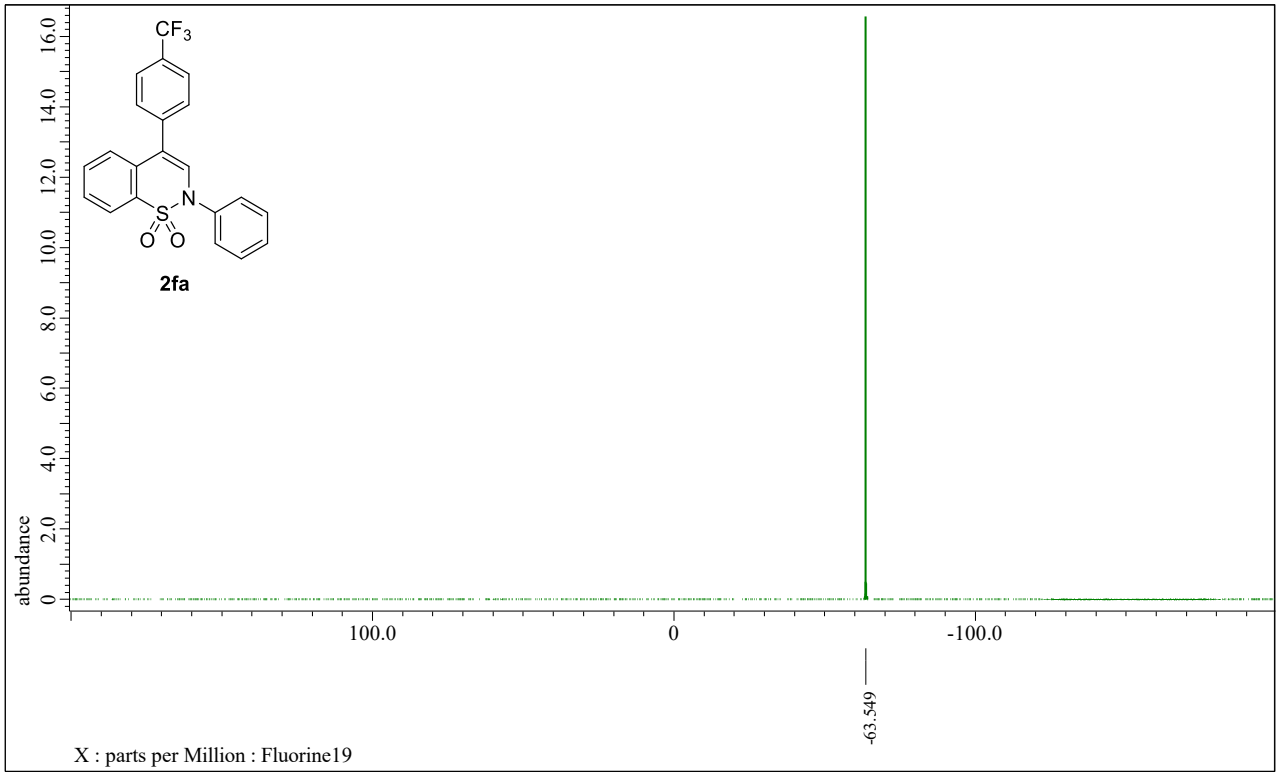
2-Phenyl-4-(4-(trifluoromethyl)phenyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2fa) ^{1}H NMR (600 MHz, $CDCl_3$)



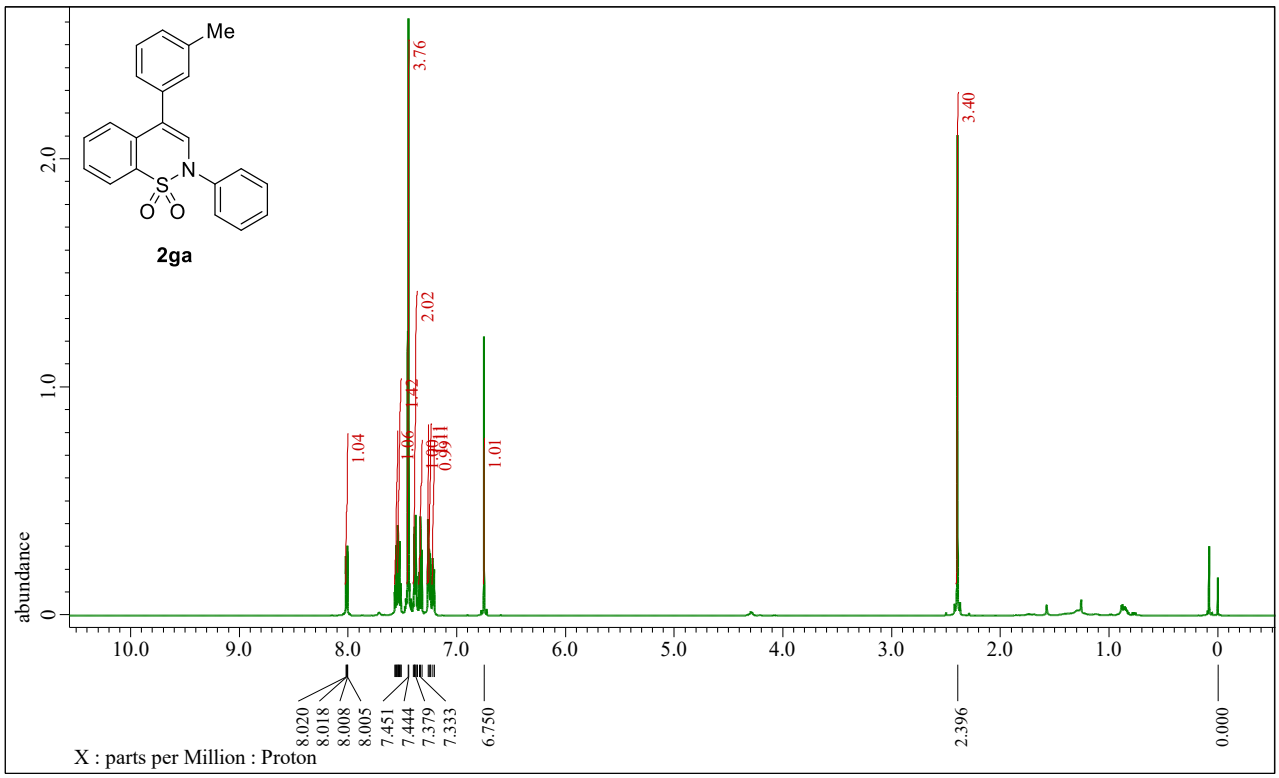
2-Phenyl-4-(4-(trifluoromethyl)phenyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2fa) ^{13}C NMR (150 MHz, $CDCl_3$)



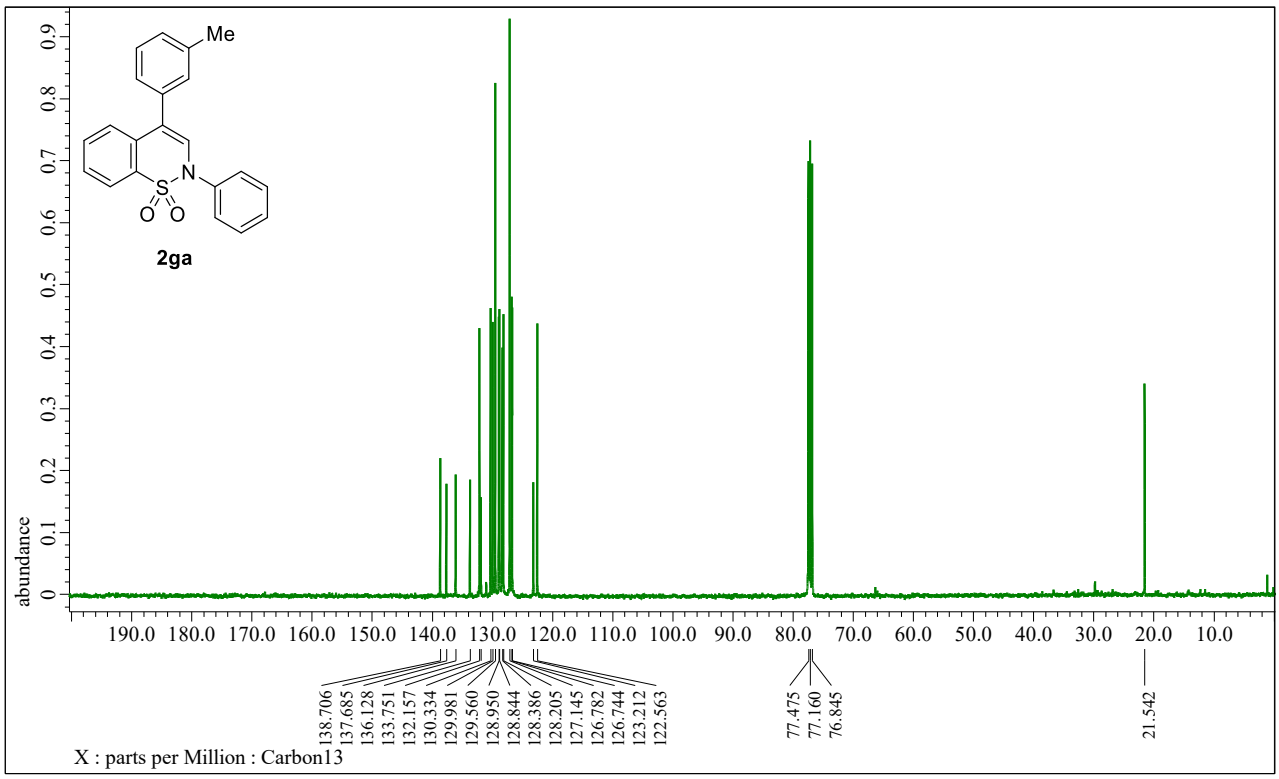
2-Phenyl-4-(4-(trifluoromethyl)phenyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2fa) ^{19}F NMR (376 MHz, $CDCl_3$)



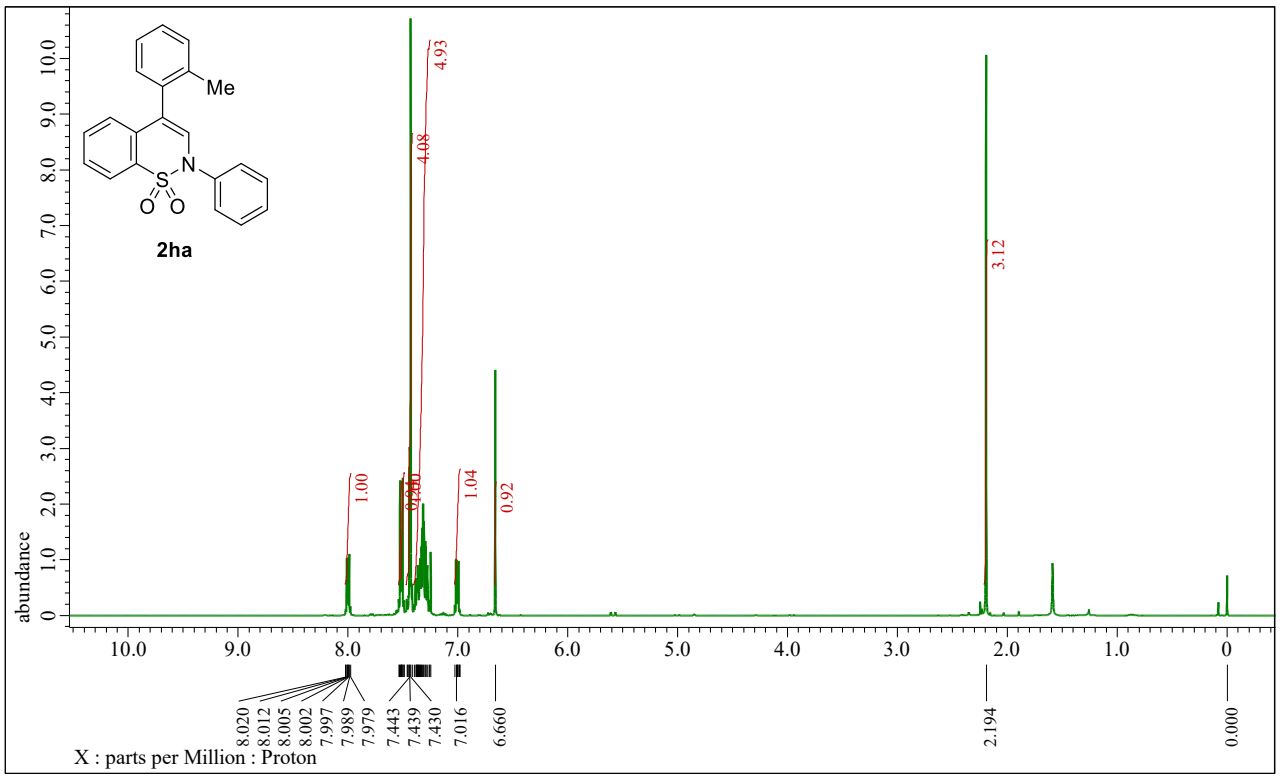
2-Phenyl-4-(*m*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ga) ^{1}H NMR (600 MHz, $CDCl_3$)



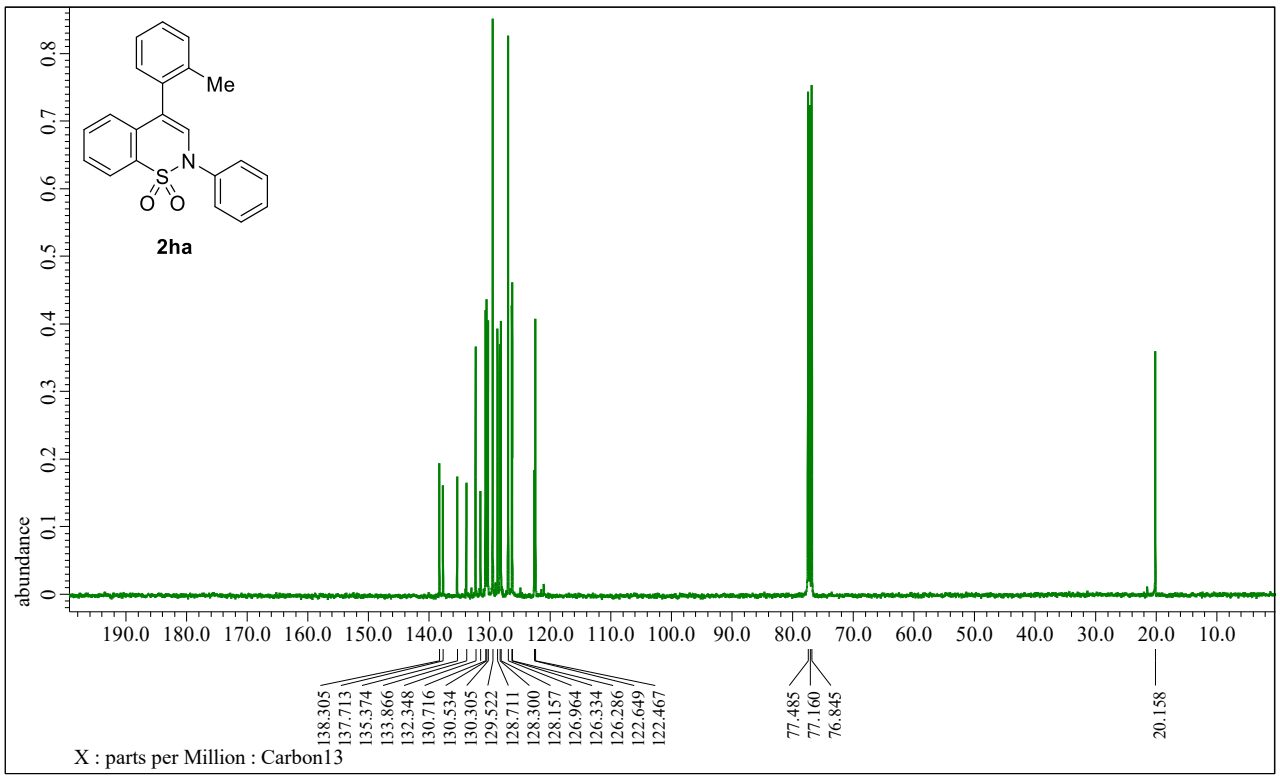
2-Phenyl-4-(*m*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ga) ^{13}C NMR (100 MHz, $CDCl_3$)



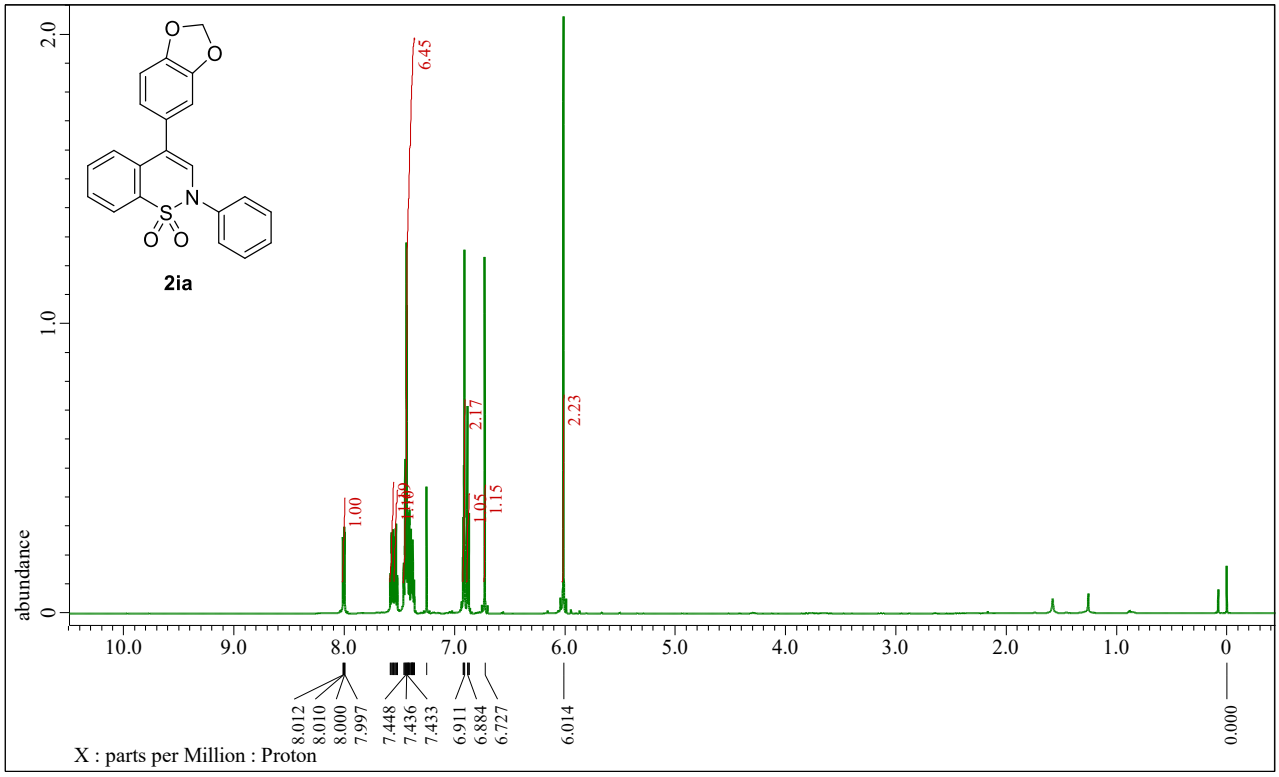
2-Phenyl-4-(*o*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ha) ^{1}H NMR (400 MHz, $CDCl_3$)



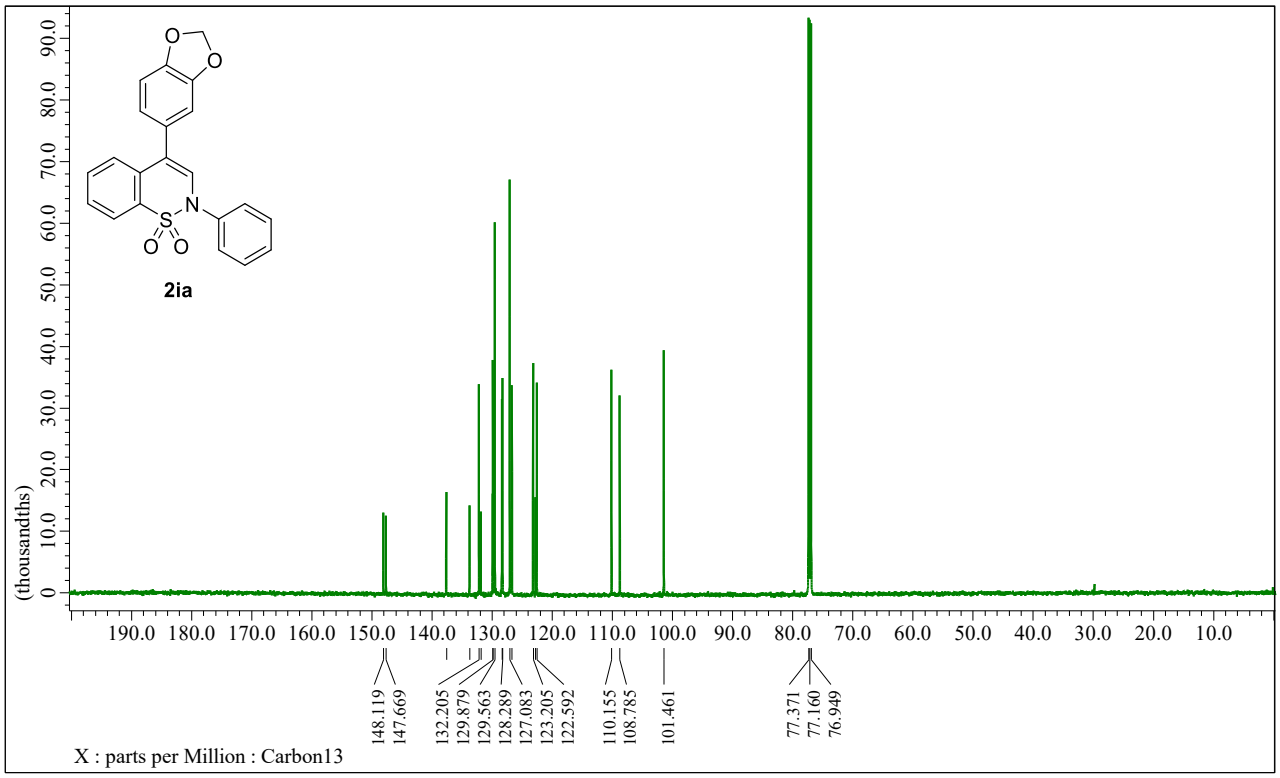
2-Phenyl-4-(*o*-tolyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ha) ^{13}C NMR (100 MHz, $CDCl_3$)



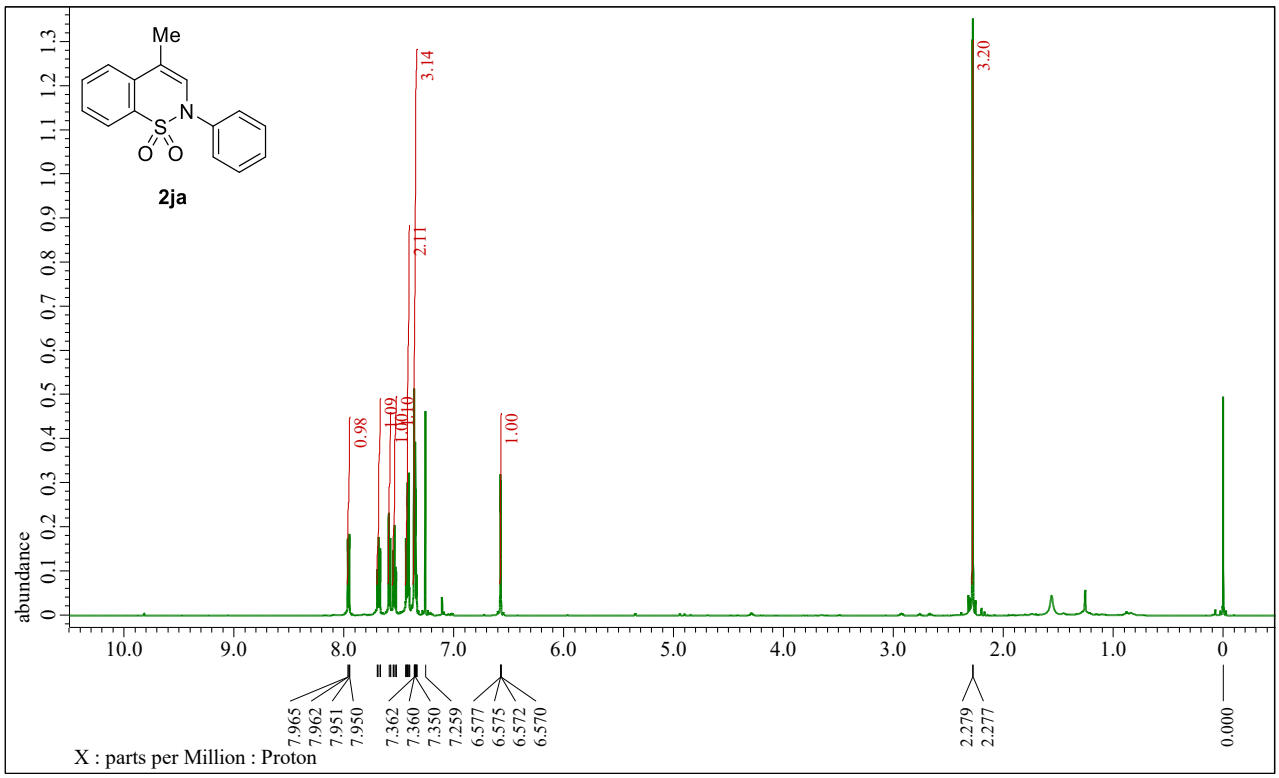
4-(Benzo[*d*][1,3]dioxol-5-yl)-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ia) ^{1}H NMR (600 MHz, $CDCl_3$)



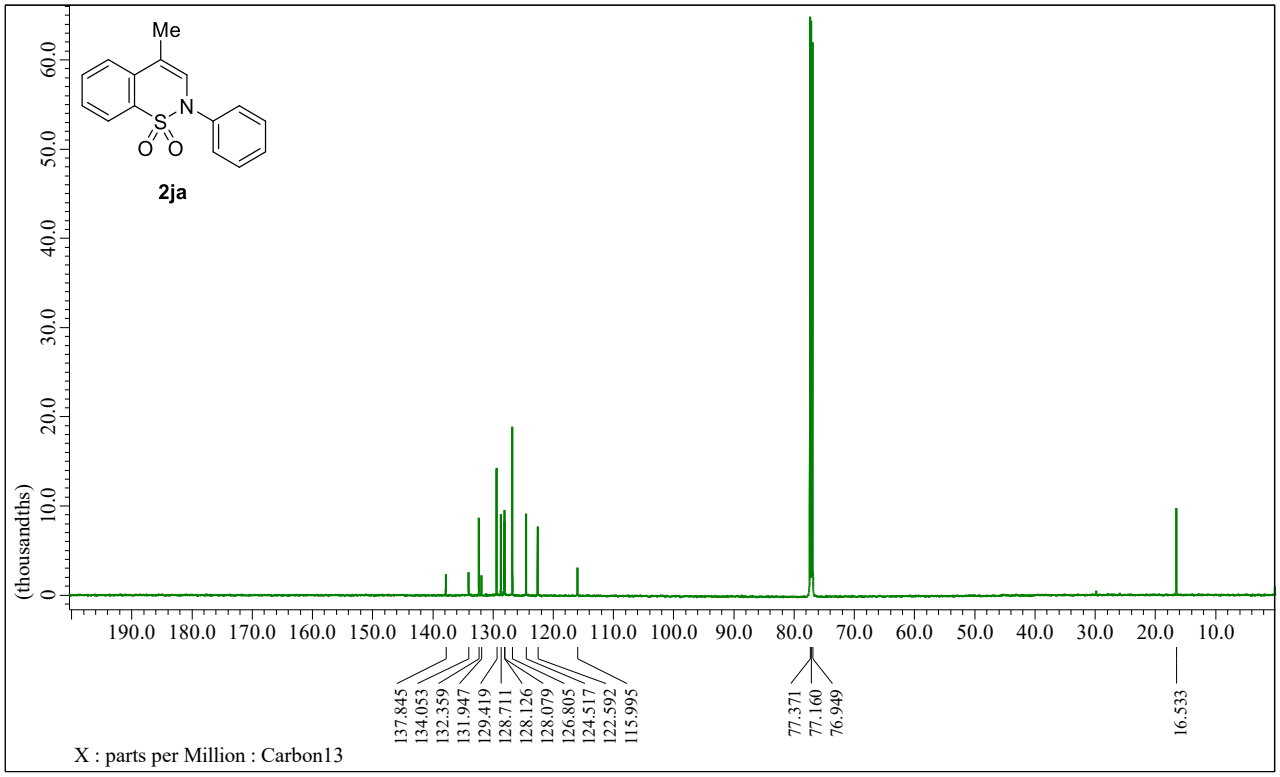
4-(Benzo[*d*][1,3]dioxol-5-yl)-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ia) ^{13}C NMR (150 MHz, $CDCl_3$)



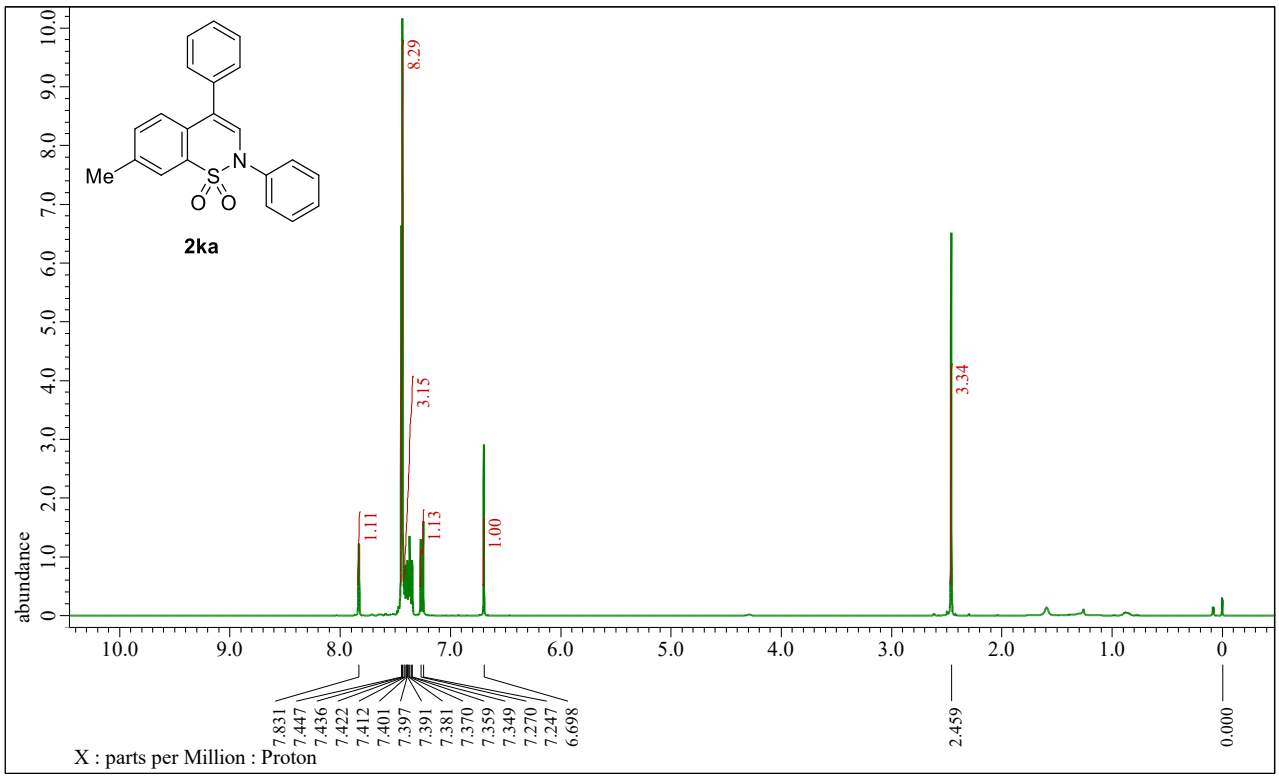
4-Methyl-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ja) ^{1}H NMR (600 MHz, $CDCl_3$)



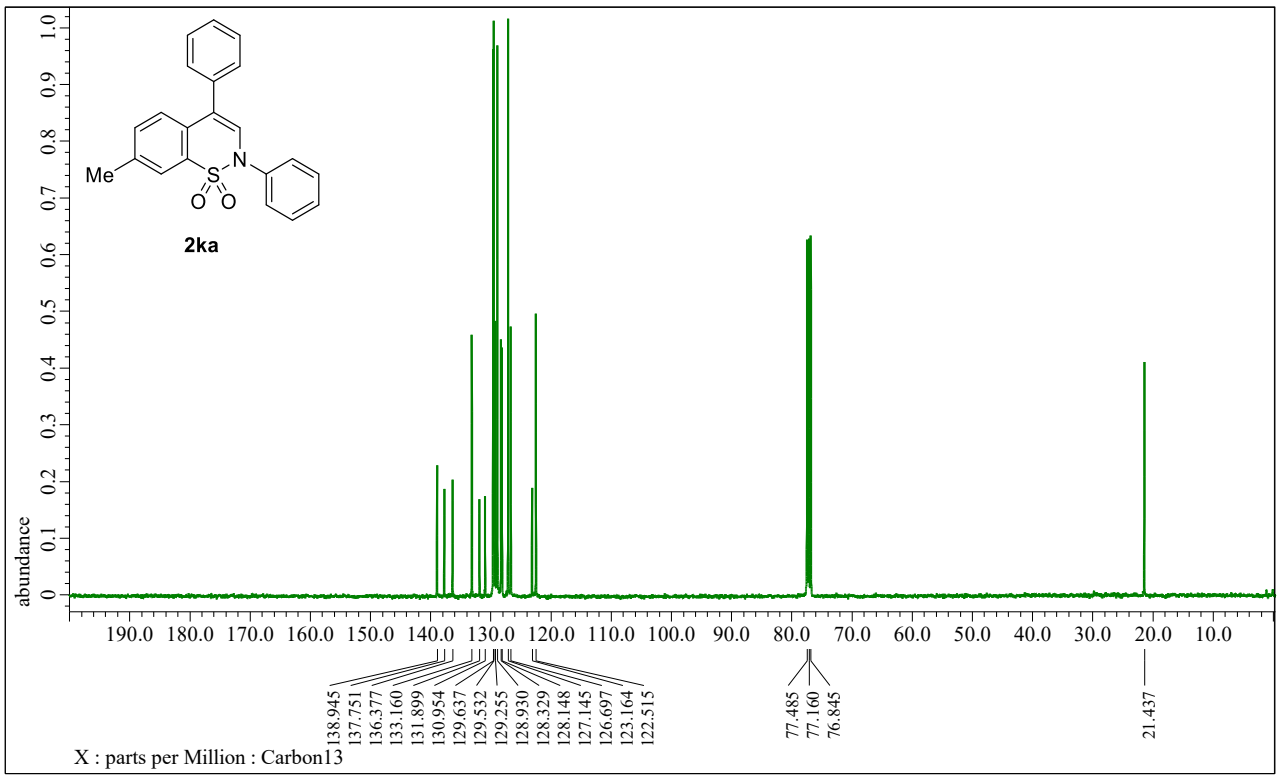
4-Methyl-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ja) ^{13}C NMR (150 MHz, $CDCl_3$)



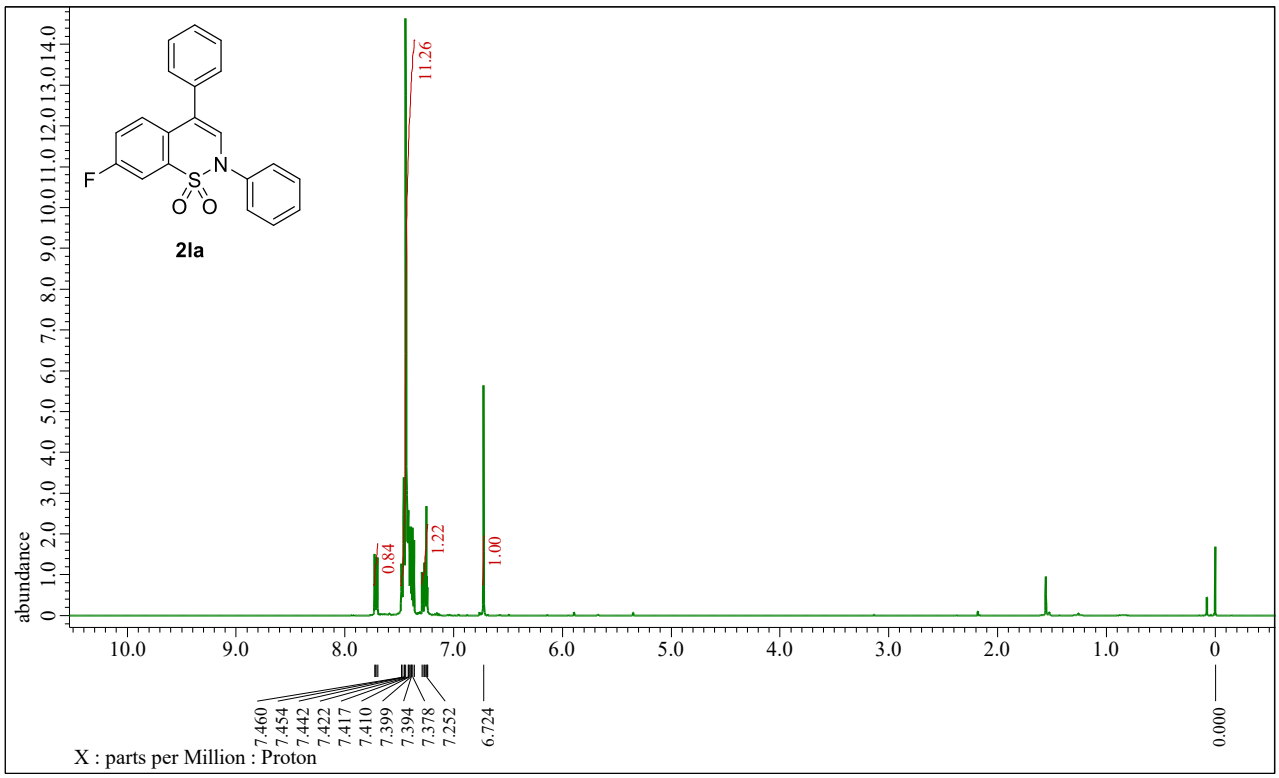
7-Methyl-2,4-diphenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ka) ^{1}H NMR (400 MHz, $CDCl_3$)



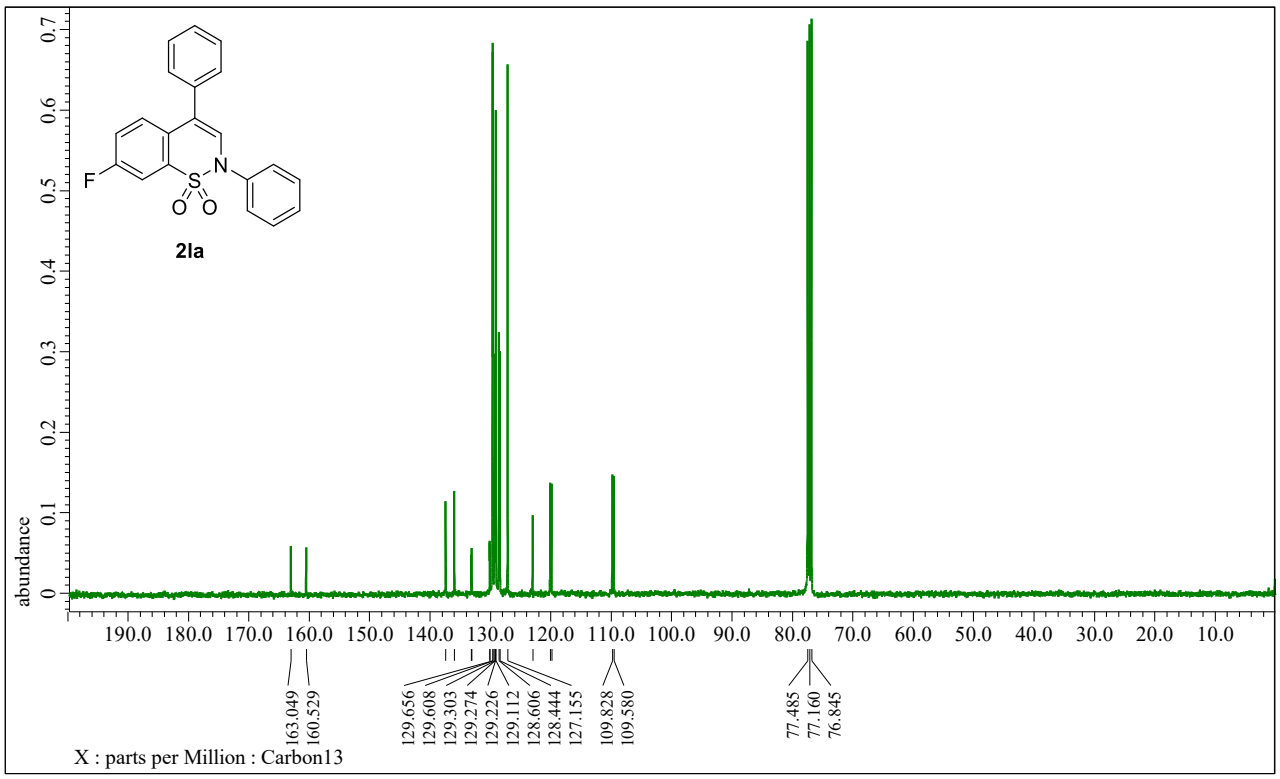
7-Methyl-2,4-diphenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ka) ^{13}C NMR (100 MHz, $CDCl_3$)



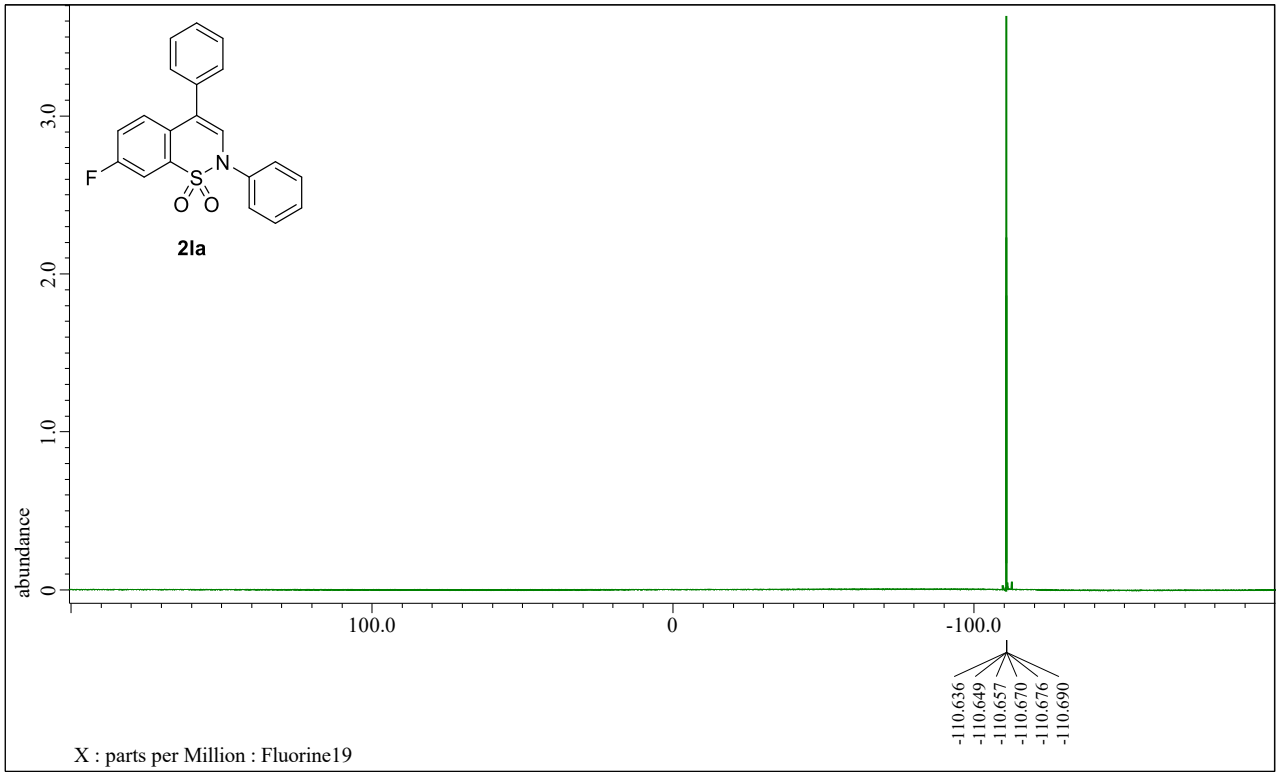
7-Fluoro-2,4-diphenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2la) ^{1}H NMR (400 MHz, $CDCl_3$)



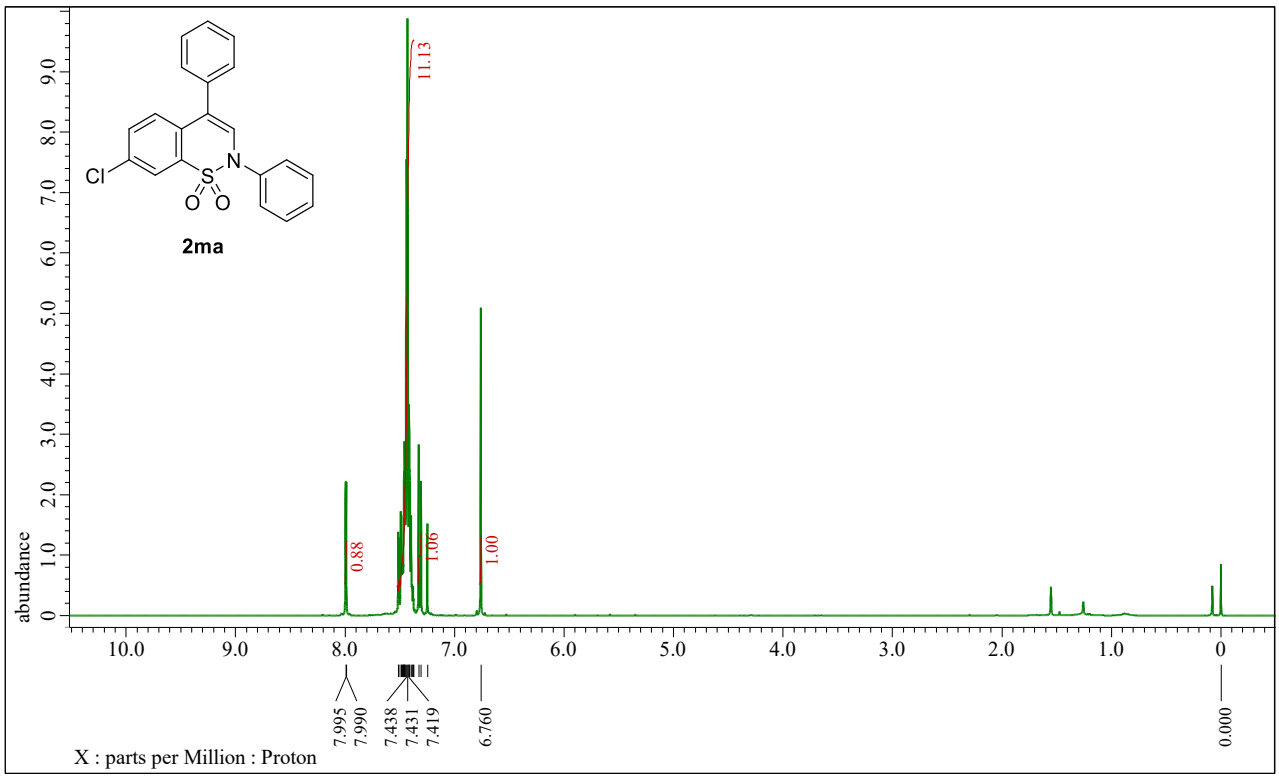
7-Fluoro-2,4-diphenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2la) ^{13}C NMR (100 MHz, $CDCl_3$)



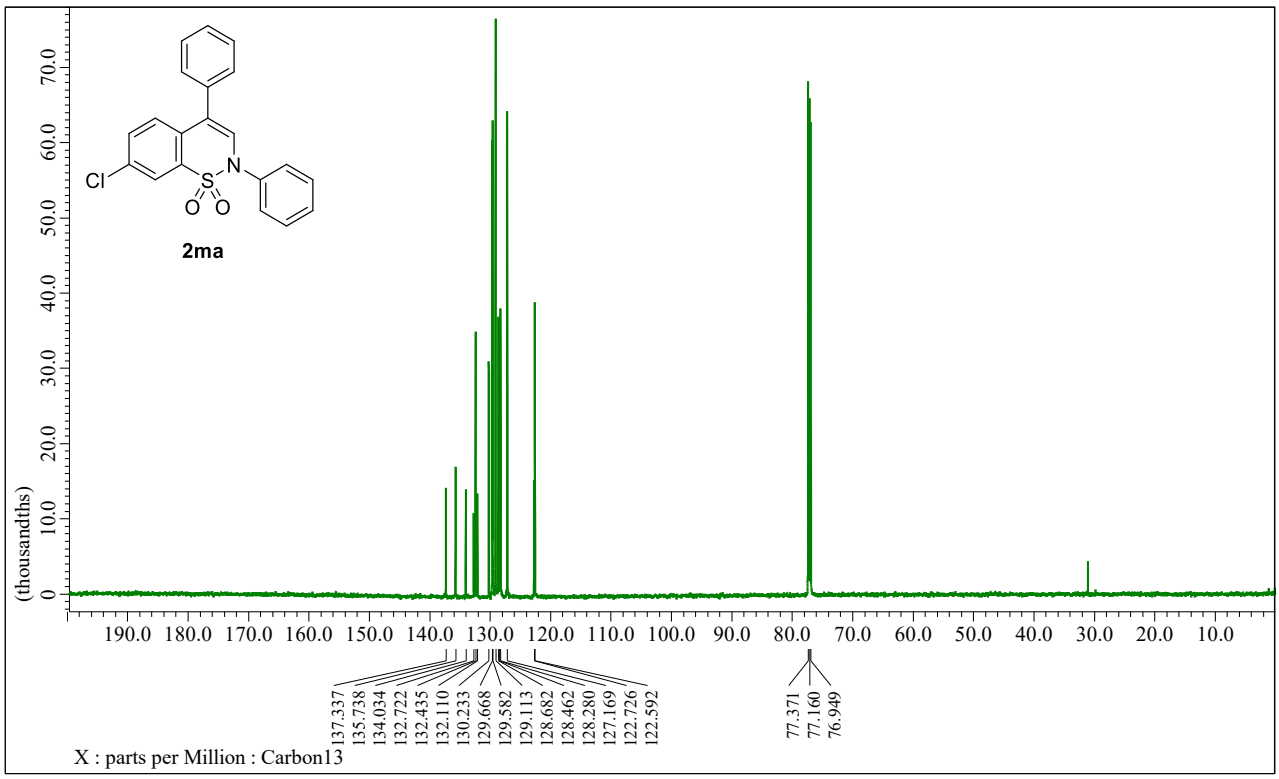
7-Fluoro-2,4-diphenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2la) ^{19}F NMR (376 MHz, $CDCl_3$)



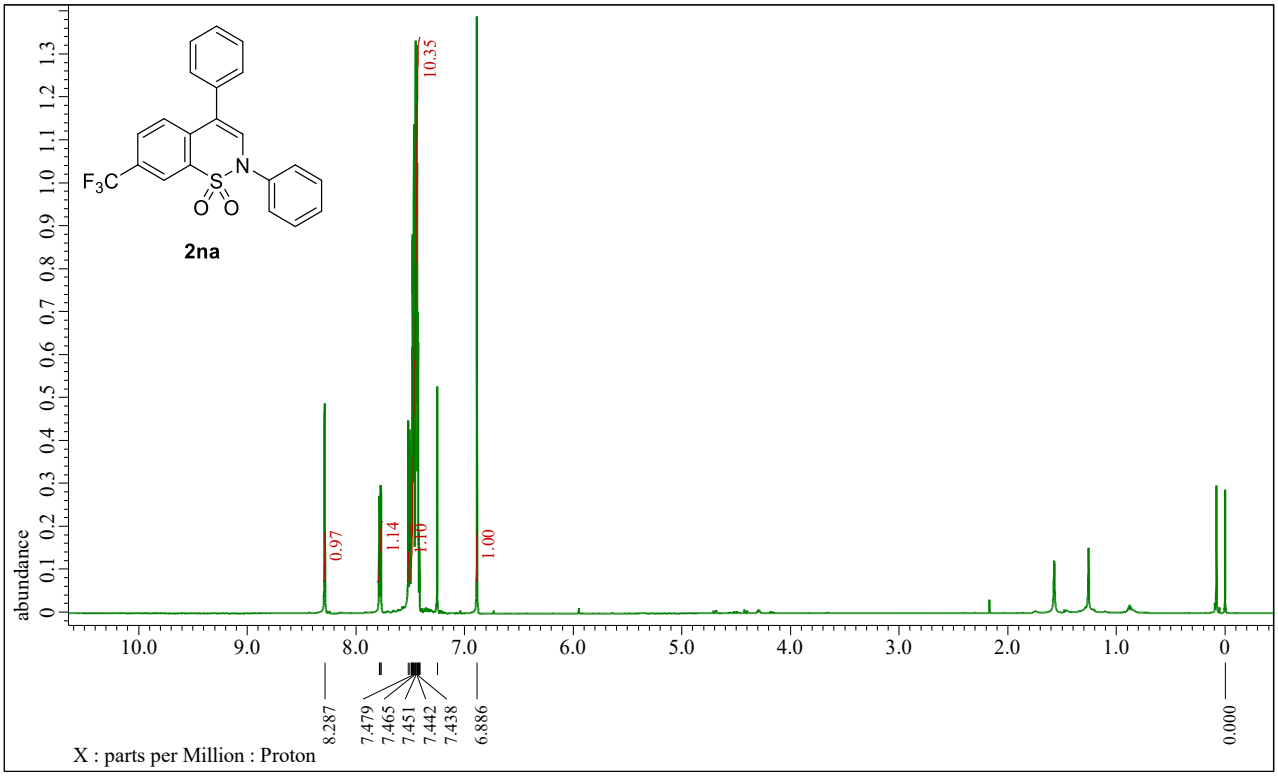
7-Chloro-2,4-diphenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ma) ^{1}H NMR (400 MHz, $CDCl_3$)



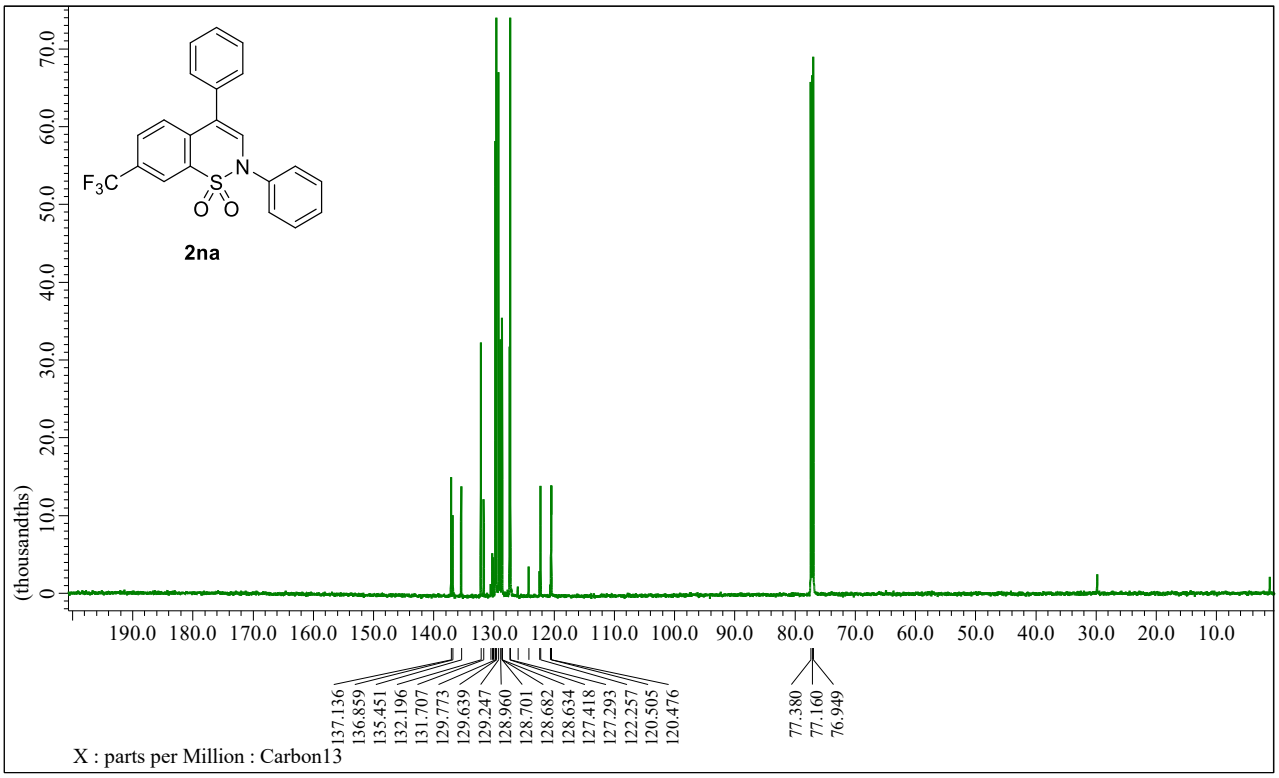
7-Chloro-2,4-diphenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2ma) ^{13}C NMR (150 MHz, $CDCl_3$)



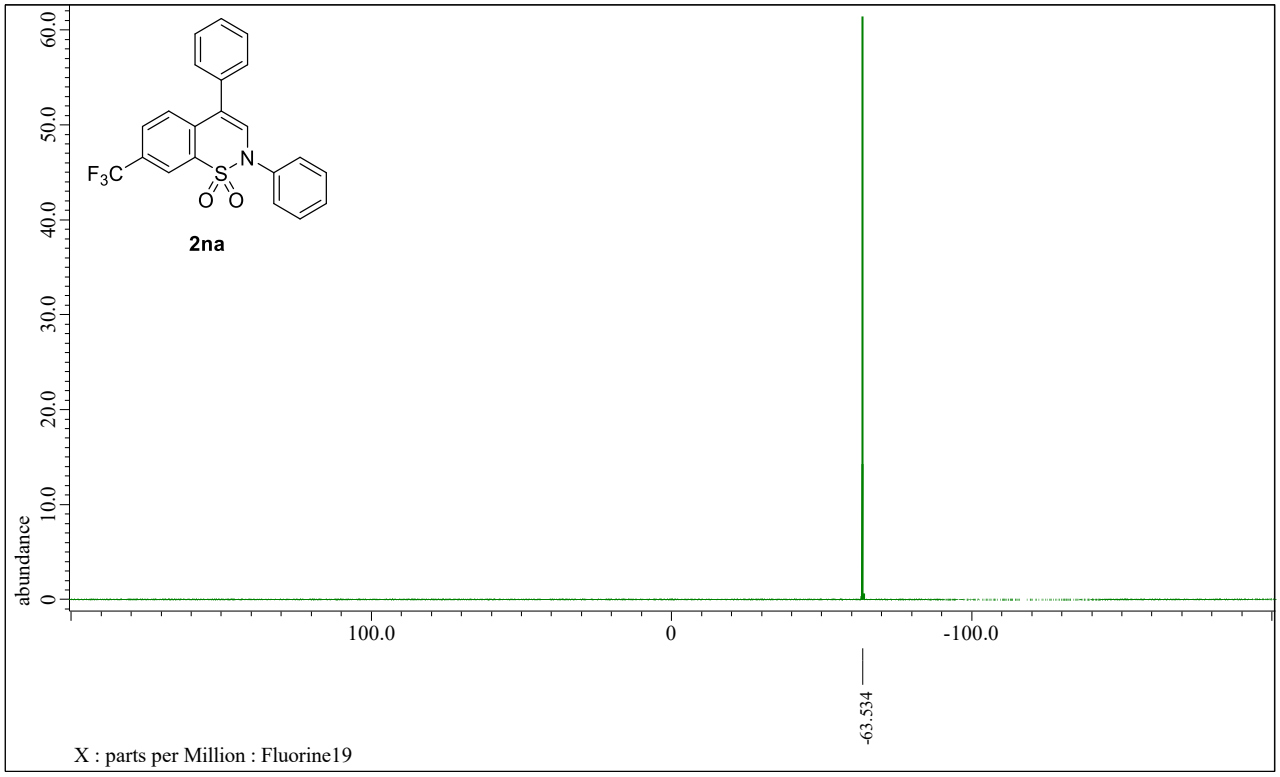
2,4-Diphenyl-7-(trifluoromethylphenyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2na) ^{1}H NMR (600 MHz, $CDCl_3$)



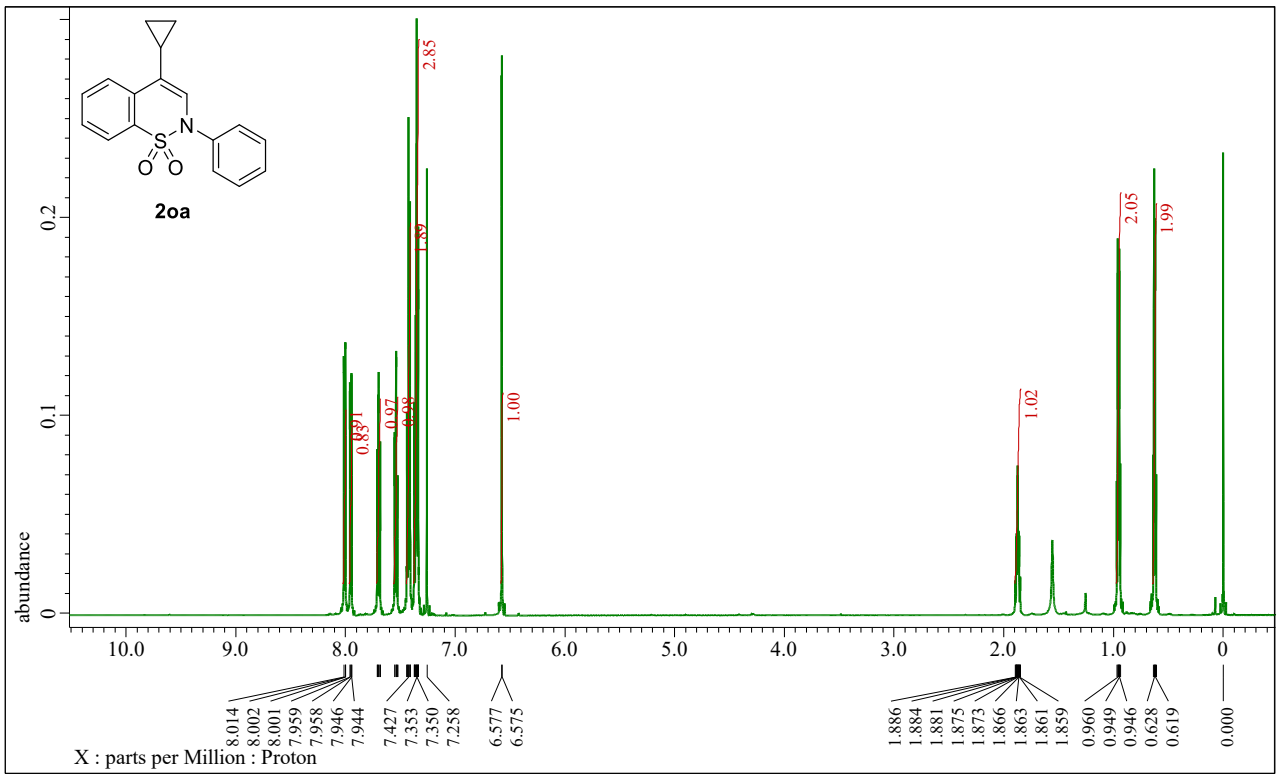
2,4-Diphenyl-7-(trifluoromethylphenyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2na) ^{13}C NMR (150 MHz, $CDCl_3$)



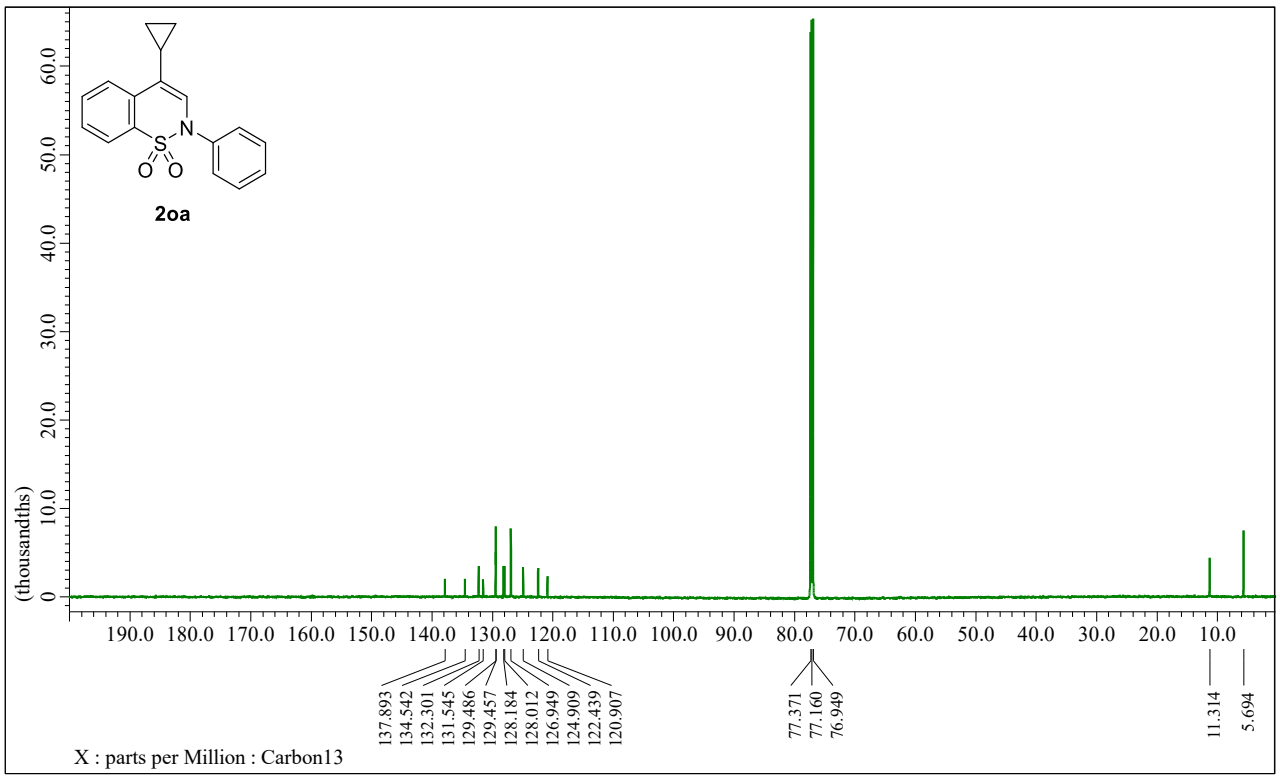
2,4-Diphenyl-7-(trifluoromethylphenyl)-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2na) ^{19}F NMR (376 MHz, $CDCl_3$)



4-Cyclopropyl-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2oa) ^{1}H NMR (600 MHz, $CDCl_3$)

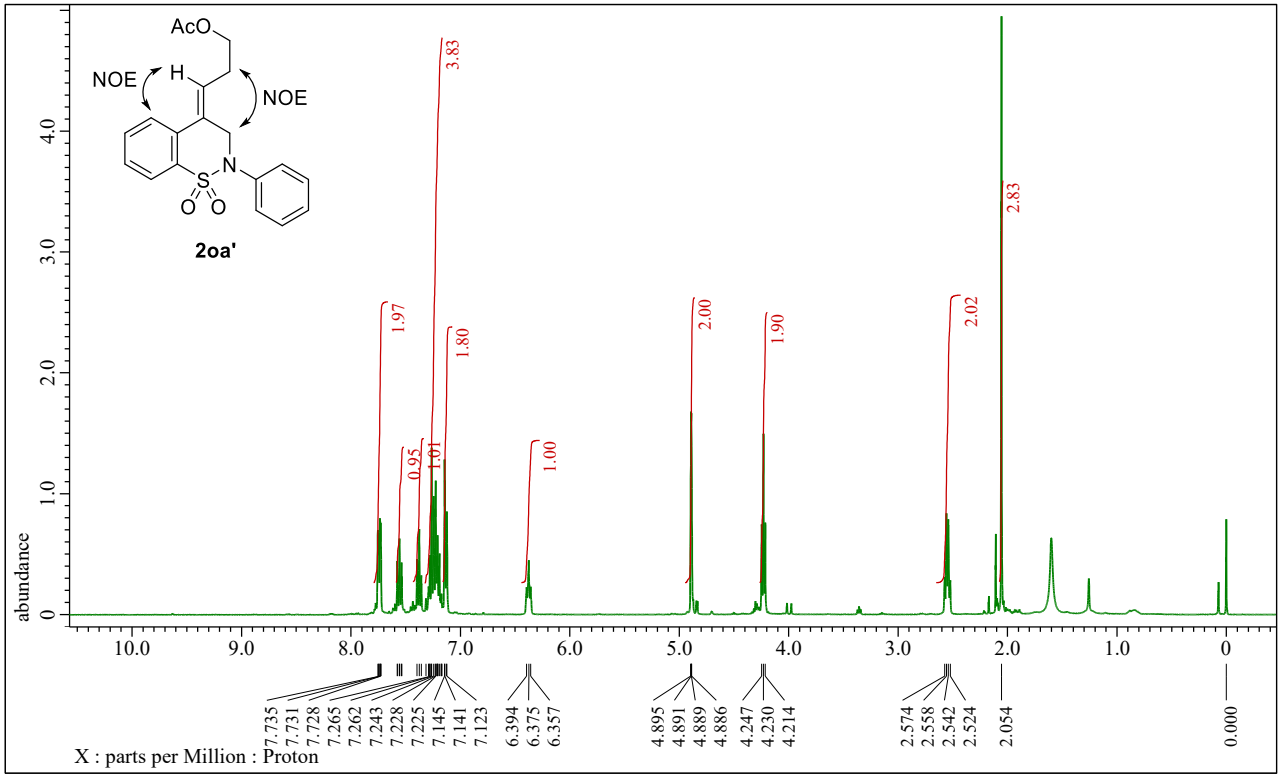


4-Cyclopropyl-2-phenyl-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2oa) ^{13}C NMR (150 MHz, $CDCl_3$)

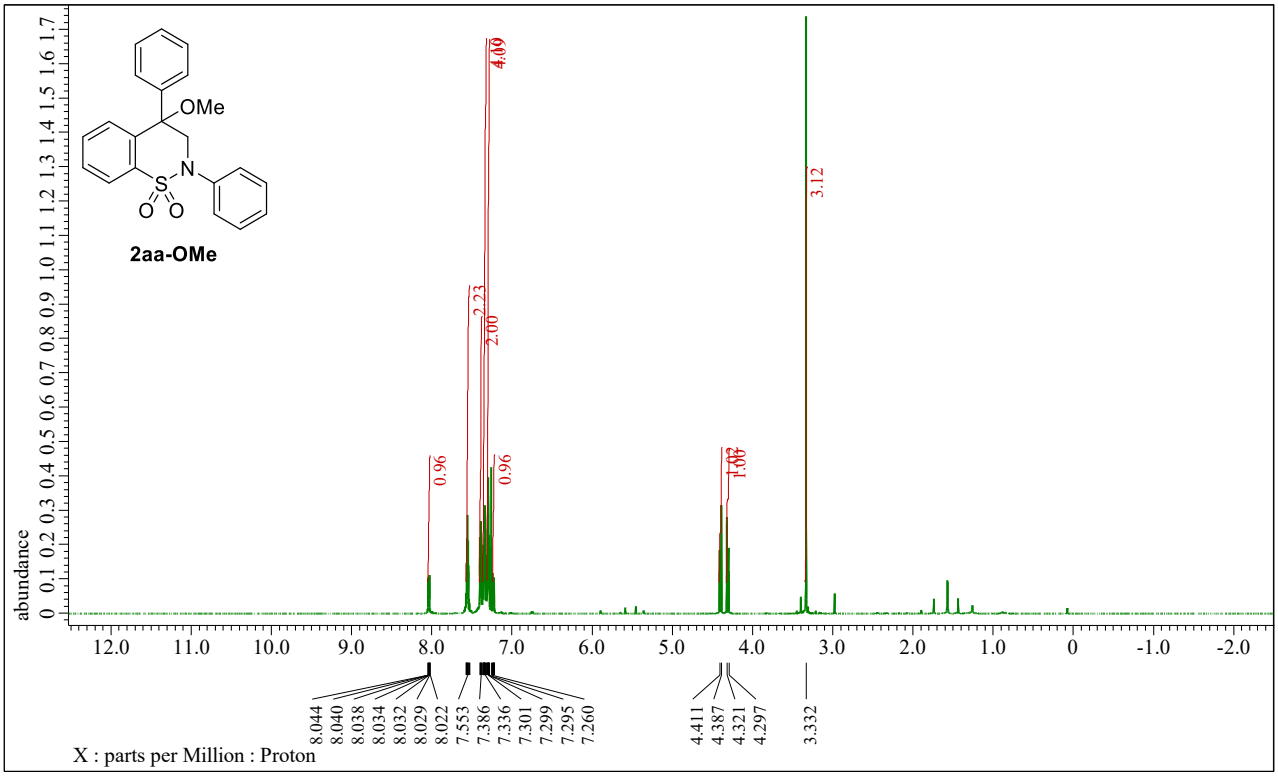


(*Z*)-3-(1,1-dioxido-2-phenyl-2,3-dihydro-4*H*-benzo[*e*][1,2]thiazin-4-ylidene)propyl acetate (2oa′)

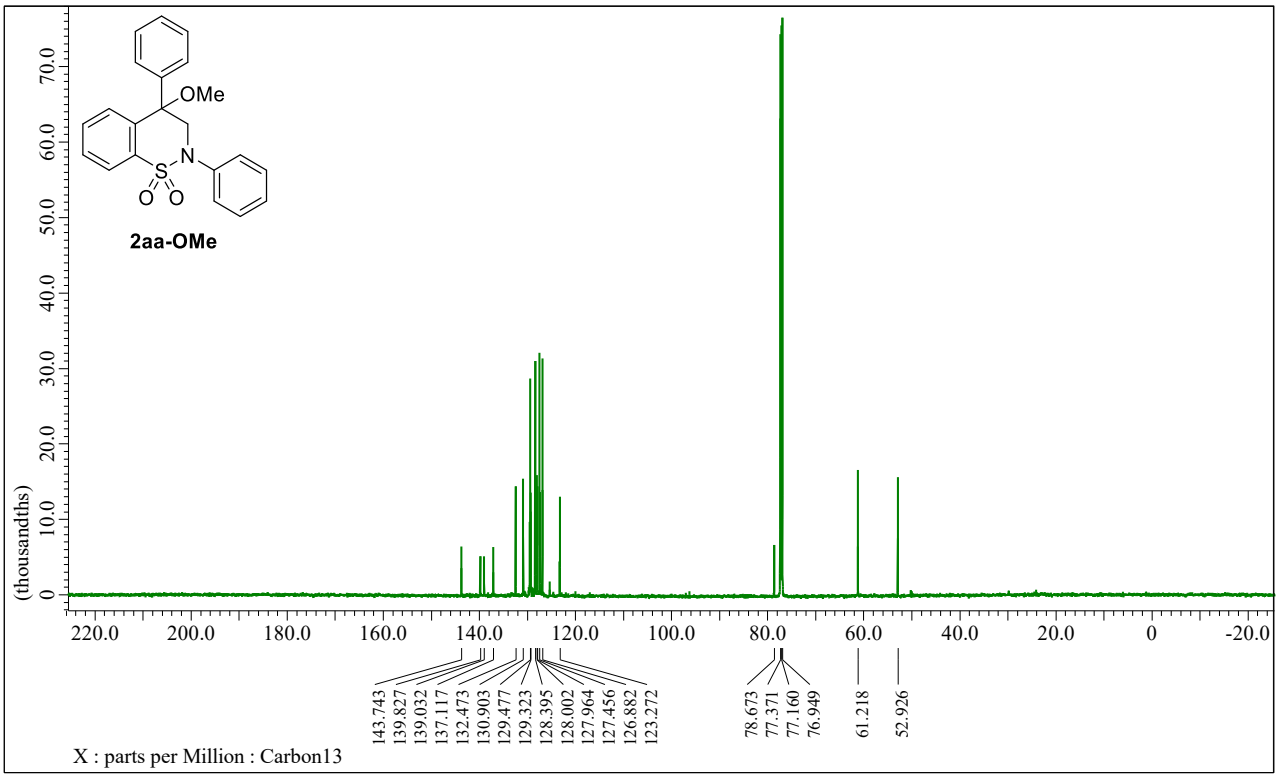
^{1}H NMR (400 MHz, $CDCl_3$)



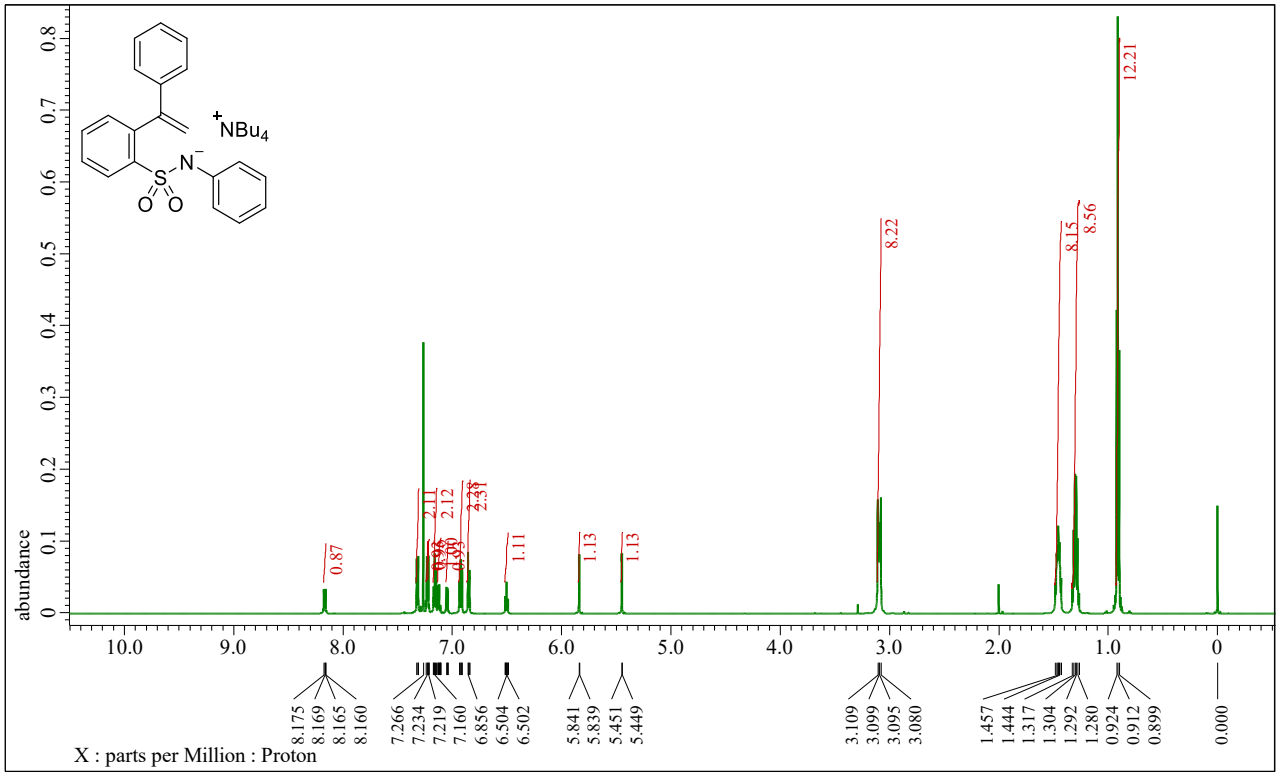
4-Methoxy-2,4-diphenyl-3,4-dihydro-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2aa-OMe) ^{1}H NMR (600 MHz, $CDCl_3$)



4-Methoxy-2,4-diphenyl-3,4-dihydro-2*H*-benzo[*e*][1,2]thiazine 1,1-Dioxide (2aa-OMe) ^{13}C NMR (150 MHz, $CDCl_3$)



Tetrabutylammonium Phenyl((2-(1-phenylvinyl)phenyl)sulfonyl)amide (Bu_4N^+ 1aa$^-$) ^{1}H NMR (600 MHz, $CDCl_3$)



Tetrabutylammonium Phenyl((2-(1-phenylvinyl)phenyl)sulfonyl)amide (Bu_4N^+ 1aa$^-$) ^{13}C NMR (150 MHz, $CDCl_3$)