Supporting Information

Nucleophilic Difluoromethylation of Primary Alkyl Halides Using Difluoromethyl Phenyl Sulfone as A Difluoromethyl Anion Equivalent

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General:

Unless otherwise mentioned, all other chemicals were purchased from commercial sources. Potassium *t*-butoxide (95 %, Aldrich) was used as received. DMF was distilled over calcium hydride, and stored over activated molecular sieve. Difluoromethyl phenyl sulfone (**1**) was prepared using known procedures.^[1-3] Some alkyl iodides were prepared from corresponding alkyl bromides (using NaI in acetone) or alcohols.^[4] Silica gel column chromatography was used to isolate the products using 60-200 mesh silica gel (from J. T. Baker), mostly using hexane-ethyl acetate (9:1) as eluent. ¹H, ¹³C and ¹⁹F NMR spectra were recorded on 500 MHz or 360 MHz NMR spectrometer. ¹H NMR chemical shifts were determined relative to internal (CH₃)₄Si (TMS) at δ 0.0 or to the signal of a residual protonated solvent: CDCl₃ δ 7.26. ¹³C NMR chemical shifts were determined relative to internal TMS at δ 0.0 or to the ¹³C signal of solvent: CDCl₃ δ 77.0. ¹⁹F NMR chemical shifts were determined relative to internal CFC₃ at δ 0.0. GC-MS data were recorded on a GC-MS spectrometer with a mass selective detector at 70 eV. High-resolution mass data of low boiling compounds were recorded on a GC chromatograph with micromass GCT (time of flight) mass spectrometer. Other high-resolution mass data were recorded on a high-resolution mass spectrometer in the EI mode.

Typical Procedure for Nucleophilic Substitution Reactions of Difluoromethyl Phenyl Sulfone with Alkyl Iodides.^[5] Under an argon atmosphere, into a Schlenk flask containing difluoromethyl phenyl sulfone (192 mg, 1 mmol) and *n*-heptyl iodide (904 mg, 4 mmol) in DMF (4 mL) at – 50 °C, was added dropwise via a syringe *t*-BuOK (224 mg, 2 mmol) in DMF (4 mL). The reaction mixture was stirred at – 50 °C for 1 h, and the completion of the reaction was monitored by ¹⁹F NMR. The reaction mixture was then quenched by adding 1N HCl aqueous solution (5 mL) at – 50 °C, followed by warming to room temperature. A saturated NaCl aqueous solution (10 mL) was added, and the mixture was extracted with Et₂O (15 mL x 3). The combined organic phase was dried over MgSO₄, filtered, and the solvent was removed in a rotary evaporator. The residue was further purified by silica gel column chromatography (hexane:ethyl acetate = 9:1) to give 1,1-difluorooctyl phenyl sulfone (**3a**) (230 mg, 79 % yield) as a colorless oily liquid.

^1H NMR (500 MHz, CDCl_3): δ 0.88 (t, $J = 6.9$ Hz, 3 H); 1.28 (m, 8 H); 1.64 (m, 2 H); 2.33 (m, 2H); 7.60 (t, $J = 8.3$ Hz, 2H); 7.73 (t, $J = 7.3$ Hz, 1H); 7.99 (d, $J = 7.9$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 13.9; 20.7 (t, $J = 3.4$ Hz); 22.4; 28.7; 29.0; 29.1; 31.4; 124.6 (t, $J = 286$ Hz); 129.1; 130.6; 132.7; 135.1. ^{19}F NMR (470 MHz, CDCl_3): $\delta - 104.2$ (t, $J = 19$ Hz). GC-MS (EI, m/z): 291 ($\text{M}^+ + 1$); 142; 77. HRMS (EI): m/z calcd for $\text{C}_{14}\text{H}_{21}\text{F}_2\text{O}_2\text{S}$ ($\text{M}^+ + \text{H}$) 291.1230, found 291.1222.

1,1-Difluorohexyl Phenyl Sulfone (3b): colorless liquid, yield: 80 %. ^1H NMR (500 MHz, CDCl_3): δ 0.90 (t, 3H); 1.37 (m, 4H); 1.62 (m, 2H); 2.30 (m, 2H); 7.60 (t, 2H); 7.78 (t, 1H); 8.00 (2, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 13.7; 20.4; 22.2; 29.1 (t, $J = 20.4$ Hz); 31.2; 124.7 (t, $J = 286$ Hz); 129.2; 130.7; 132.5; 135.2. ^{19}F NMR (470 MHz, CDCl_3): $\delta - 104.6$ (t, $J = 19$ Hz). GC-MS (EI, m/z): 262 (M^+); 142; 77. HRMS (EI): m/z calcd for $\text{C}_{12}\text{H}_{17}\text{F}_2\text{O}_2\text{S}$ ($\text{M}^+ + \text{H}$) 263.0917, found 263.0904.

1,1-Difluoropentyl Phenyl Sulfone (3c): colorless liquid, yield: 84 %. ^1H NMR (500 MHz, CDCl_3): δ 0.93 (t, $J = 7.3$ Hz); 1.42 (m, 2H); 1.62 (m, 2H); 2.32 (m, 2H); 7.60 (t, $J = 7.3$ Hz, 2H); 7.74 (t, $J = 7.3$ Hz, 1 H); 7.97 (d, $J = 7.9$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 13.5; 22.3; 22.8 (t, $J = 3.5$ Hz); 28.9 (t, $J = 20$ Hz); 124.7 (t, $J = 286$ Hz); 129.2; 130.7; 132.7; 135.1. ^{19}F NMR (470 MHz, CDCl_3): $\delta - 104.1$ (t, $J = 19$ Hz). GC-MS (EI, m/z): 248 (M^+); 142; 77. HRMS (EI): m/z calcd for $\text{C}_{11}\text{H}_{15}\text{F}_2\text{O}_2\text{S}$ ($\text{M}^+ + \text{H}$) 249.0761, found 249.0749.

1,1-Difluorobutyl Phenyl Sulfone (3d): colorless liquid, yield: 73 %. ^1H NMR (360 MHz, CDCl_3): δ 0.98 (t, $J = 7.2$ Hz, 3H); 1.63 (m, 2H); 2.27 (m, 2H); 7.57 (t, $J = 7.8$ Hz); 7.71 (t, $J = 7.6$ Hz, 1H); 7.95 (d, $J = 7.7$ Hz, 2H). ^{13}C NMR (90 MHz, CDCl_3): δ 13.6; 14.4 (t, $J = 3.6$ Hz); 30.9 (t, $J = 20$ Hz); 124.5 (t, $J = 286$ Hz); 129.2; 130.5; 132.4; 135.1. ^{19}F NMR (338 MHz, CDCl_3): $\delta - 104.1$ (t, $J = 20$ Hz). GC-MS (EI, m/z): 234 (M^+); 142; 77. HRMS (EI): m/z calcd for $\text{C}_{10}\text{H}_{12}\text{F}_2\text{O}_2\text{S}$ ($\text{M}^+ + \text{H}$) 235.0604, found 235.0

1,1-Difluoro-4-phenylbutyl Phenyl Sulfone (3e): colorless liquid, yield 71 %. ^1H NMR (360 MHz, CDCl_3): δ 2.01 (m, 2H); 2.39 (m, 2H); 2.74 (t, $J = 7.5$ Hz, 2 H); 7.21 (m, 3H); 7.32 (t, $J = 7.3$ Hz, 2H); 7.62 (t, $J = 7.6$ Hz, 2H); 7.76 (t, $J = 7.7$ Hz, 1H); 8.00 (d, $J = 7.9$ Hz, 2H). ^{13}C NMR (90 MHz, CDCl_3): δ 22.5 (t, $J = 4$ Hz); 28.6 (t, $J = 20$ Hz); 35.0; 124.5 (t, $J = 286$ Hz); 126.2; 128.3; 128.5; 129.2; 130.6; 132.3; 135.2; 140.5. ^{19}F

NMR (338 MHz, CDCl_3): δ – 103.9 (t, J = 19 Hz). MS (EI, m/z): 310 (M^+); 165; 149; 104. HRMS (EI): m/z calcd for $\text{C}_{16}\text{H}_{16}\text{F}_2\text{O}_2\text{S}$ (M^+) 310.0839, found 310.0829.

1,1-Difluoro-5-phenylpentyl Phenyl Sulfone (3f): colorless liquid, yield: 52 %. ^1H NMR (360 MHz, CDCl_3): δ 1.73 (m, 4H); 2.38 (m, 2H); 2.67 (t, J = 7.3 Hz, 2H); 7.19 (m, 3H); 7.30 (t, J = 7.3 Hz, 2H); 7.62 (t, J = 7.9 Hz, 2H); 7.76 (t, J = 7.8 Hz, 1H); 7.99 (d, J = 7.8 Hz, 2H). ^{13}C NMR (90 MHz, CDCl_3): δ 20.5 (t, J = 4 Hz); 29.0 (t, J = 20 Hz); 30.9; 35.4; 124.6 (t, J = 286 Hz); 125.9; 128.3; 128.4; 129.2; 130.7; 132.5; 135.2; 141.6. ^{19}F NMR (338 MHz, CDCl_3): δ – 104.1 (t, J = 18 Hz). HRMS (EI): m/z calcd for $\text{C}_{17}\text{H}_{18}\text{F}_2\text{O}_2\text{S}$ (M^+) 324.0996, found 324.1007.

1,1-Difluoro-6-phenylhexyl Phenyl Sulfone (3g): colorless thick liquid, yield: 59 %. ^1H NMR (500 MHz, CDCl_3): δ 1.46 (m 2H); 1.69 (m, 4H); 2.36 (m, 2H); 2.65 (t, J = 7.6 Hz, 2H); 7.21 (m, 3H); 7.31 (t, J = 7.4 Hz, 2H); 7.62 (t, J = 7.4 Hz, 2H); 7.76 (t, J = 7.5 Hz, 1H); 8.01 (d, J = 7.3 Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 20.6 (t, J = 4 Hz); 28.6; 29.1 (t, J = 18 Hz); 30.9; 35.5; 124.6 (t, J = 286 Hz); 125.7; 128.2; 128.3; 129.2; 130.6; 132.4; 135.2; 142.1. ^{19}F NMR (470 MHz, CDCl_3): δ – 104.1 (t, J = 18 Hz). HRMS (EI): m/z calcd for $\text{C}_{18}\text{H}_{20}\text{F}_2\text{O}_2\text{S}$ (M^+) 338.1152, found 338.1147.

1,1-Difluoro-7-phenylheptyl Phenyl Sulfone (3h): colorless thick liquid, yield: 50 %. ^1H NMR (500 MHz, CDCl_3): δ 1.41 (m, 4H); 1.66 (m, 4H); 2.34 (m, 2H); 2.62 (t, J = 7.3 Hz, 2H); 7.20 (m, 3H); 7.29 (t, J = 7.3 Hz, 2H); 7.62 (t, J = 7.5 Hz, 2H); 7.76 (t, J = 7.3 Hz, 1H); 8.00 (d, J = 7.5 Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 20.7 (t, J = 4 Hz); 28.8; 29.0; 29.1 (t, J = 20 Hz); 31.1; 35.8; 124.6 (t, J = 286 Hz); 125.6; 128.2; 128.3; 129.2; 130.7; 132.5; 135.2; 142.5. ^{19}F NMR (470 MHz, CDCl_3): δ – 104.1 (t, J = 19 Hz). HRMS (EI): m/z calcd for $\text{C}_{19}\text{H}_{22}\text{F}_2\text{O}_2\text{S}$ (M^+) 352.1308, found 352.1298.

1,1-Difluoro-4,4-diphenylbutyl Phenyl Sulfone (3i): colorless oily liquid, yield: 37 %. ^1H NMR (500 MHz, CDCl_3): δ 2.37 (m, 2H); 2.49 (m, 2H); 4.02 (t, J = 7.3 Hz, 1H); 7.23~7.36 (m, 10 H); 7.60 (t, J = 7.4 Hz, 2H); 7.74 (t, J = 7.5 Hz, 1H); 8.00 (d, J = 7.4 Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 26.7; 28.2 (t, J = 20 Hz); 50.6; 124.5 (t, J = 286 Hz); 126.6; 127.6; 128.6; 129.2; 130.6; 132.3; 135.2; 143.3. ^{19}F NMR (470 MHz, CDCl_3): δ – 103.3 (t, J = 19 Hz). MS (EI, m/z): 386 (M^+). HRMS (EI): m/z calcd for $\text{C}_{22}\text{H}_{20}\text{F}_2\text{O}_2\text{S}$ (M^+) 386.1147, found 386.1148.

1,1-Difluoro-4-phenoxybutyl Phenyl Sulfone (3j): colorless oily liquid, yield: 71 %. ^1H NMR (360 MHz, CDCl_3): δ 2.17 (m, 2H); 2.61 (m, 2H); 4.04 (t, $J = 5.9$ Hz, 2H); 6.92 (d, $J = 7.7$ Hz, 2H); 7.00 (t, $J = 7.3$ Hz, 1H); 7.31 (t, $J = 7.1$ Hz, 2H); 7.63 (t, $J = 7.1$ Hz, 2H); 7.77 (t, $J = 7.6$ Hz, 1H); 8.02 (d, $J = 8.0$ Hz, 2H). ^{13}C NMR (90 MHz, CDCl_3): δ 21.2 (t, $J = 3.7$ Hz); 26.4; 66.1; 114.4; 120.9; 124.5 (t, $J = 286$ Hz); 129.3; 129.4; 130.7; 132.3; 135.3; 158.5. ^{19}F NMR (338 MHz, CDCl_3): δ -104.0 (t, $J = 18$ Hz). MS (EI, m/z): 326 (M^+); 233; 185; 125. HRMS (EI): m/z calcd for $\text{C}_{16}\text{H}_{16}\text{F}_2\text{O}_3\text{S}$ (M^+) 326.0788, found 326.0789.

1,1-Difluoro-5-phenoxybutyl Phenyl Sulfone (3k): colorless liquid, yield: 60 %. ^1H NMR (360 MHz, CDCl_3): δ 1.90 (m, 4H); 2.44 (m, 2H); 3.99 (t, $J = 5.8$ Hz, 2H); 6.85~6.98 (m, 3H); 7.29 (t, $J = 7.5$ Hz, 2H); 7.62 (t, $J = 7.6$ Hz, 2H); 7.77 (t, $J = 7.6$ Hz, 1H); 7.99 (d, $J = 7.6$ Hz, 2H). ^{13}C NMR (90 MHz, CDCl_3): δ 17.8 (t, $J = 3.6$ Hz); 28.6; 28.9 (t, $J = 20$ Hz); 66.8; 114.3; 120.6; 124.4 (t, $J = 286$ Hz); 129.2; 129.3; 130.6; 132.3; 135.2; 158.7. ^{19}F NMR (338 MHz, CDCl_3): δ -103.9 (t, $J = 18$ Hz). HRMS (EI): m/z calcd for $\text{C}_{17}\text{H}_{18}\text{F}_2\text{O}_3\text{S}$ (M^+) 340.0945, found 340.0951.

Typical Procedures for the Preparation of Difluoromethyl Compounds (6) by Reductive Desulfonylation of 3: Under an argon atmosphere, into a Schlenk flask containing 1,1-difluoro-5-phenylpentyl phenyl sulfone (**3f**) (100 mg, 0.31 mmol), anhydrous Na_2HPO_4 (308 mg, 2.2 mmol) in methanol (4 mL) at -20°C , was added 5 % Na/Hg amalgam beads (700 mg, ca. 1.5 mmol Na). The reaction mixture was stirred at $-20^\circ\text{C} \sim 0^\circ\text{C}$ for 1 h, and the completion of the reaction was monitored by ^{19}F NMR. The methanol solution was decanted out, and the residue solids were washed with Et_2O (5 mL x 3). The volatile solvents of the combined solution were removed under vacuum, and the crude product was purified by a flash chromatography to give 1,1-difluoro-5-phenylpentane (**6a**) (50 mg, 87 % yield) as a colorless liquid. ^1H NMR (500 MHz, CDCl_3): δ 1.51 (m, 2H); 1.70 (m, 2H); 1.86 (m, 2H); 2.64 (t, $J = 7.7$ Hz, 2H); 5.80 (tt, $J = 57$ Hz, 4.7 Hz, 1H); 7.19 (m, 3H); 7.30 (t, $J = 7.6$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 21.7 (t, $J = 5.4$ Hz); 30.8; 33.9 (t, $J = 21$ Hz); 117.3 (t, $J = 239$ Hz); 125.8; 128.3; 141.9. ^{19}F NMR (470 MHz, CDCl_3): δ -116.2 (dt, $J = 57$ Hz, 18 Hz, 1F). HRMS (EI): m/z calcd for $\text{C}_{11}\text{H}_{14}\text{F}_2$ (M^+) 184.1064, found 184.1062.

1,1-Difluoro-6-phenylhexane (6b): colorless liquid, yield: 90 %. ^1H NMR (360 MHz, CDCl_3): δ 1.40 (m, 2H); 1.49 (m, 2H); 1.66 (m, 2H); 1.82 (m, 2H); 2.63 (t, $J = 7.6$ Hz, 2H); 5.79 (tt, $J = 57$ Hz, 4.5 Hz, 1H); 7.20 (m, 3H); 7.29 (t, $J = 7.6$ Hz, 2H). ^{13}C NMR (90 MHz, CDCl_3): δ 21.9 (t, $J = 5.4$ Hz); 28.6; 31.2; 34.0 (t, $J = 21$ Hz); 35.7; 117.4 (t, $J = 239$ Hz); 125.7; 128.3; 128.4; 142.4. ^{19}F NMR (338 MHz, CDCl_3): δ -116.4 (dt, $J = 57$ Hz, 18 Hz, 1F). HRMS (EI): m/z calcd for $\text{C}_{12}\text{H}_{16}\text{F}_2$ (M^+) 198.1220, found 198.1211.

1,1-Difluoro-7-phenylheptane (6c): colorless liquid, yield: 85 %. ^1H NMR (360 MHz, CDCl_3): δ 1.37 (m, 4H); 1.44 (m, 2H); 1.63 (m, 2H); 1.81 (m, 2H); 2.61 (t, $J = 7.5$ Hz, 2H); 5.79 (tt, $J = 57$ Hz, 4.5 Hz, 1H); 7.19 (m, 3H); 7.26 (t, $J = 7.5$ Hz, 2H). ^{13}C NMR (90 MHz, CDCl_3): δ 22.0 (t, $J = 5.5$ Hz); 28.9; 29.0; 31.2; 34.0 (t, $J = 21$ Hz); 35.8; 117.4 (t, $J = 239$ Hz); 125.6; 128.2; 128.4; 142.6. ^{19}F NMR (338 MHz, CDCl_3): δ -116.3 (dt, $J = 57$ Hz, 18 Hz, 1F). HRMS (EI): m/z calcd for $\text{C}_{13}\text{H}_{18}\text{F}_2$ (M^+) 212.1377, found 212.1372.

1,1-Difluoro-4,4-diphenylbutane (6d): colorless liquid, yield: 89 %. ^1H NMR (500 MHz, CDCl_3): δ 1.80 (m, 2H); 2.23 (m, 2H); 3.94 (t, $J = 7.4$ Hz, 1H); 5.83 (tt, $J = 57$ Hz, 4.7 Hz, 1H); 7.24 (m, 10H). ^{13}C NMR (125 MHz, CDCl_3): δ 27.7; 32.7 (t, $J = 21$ Hz); 50.7; 117.1 (t, $J = 239$ Hz); 126.6; 127.7; 128.6; 144.0. ^{19}F NMR (470 MHz, CDCl_3): δ -116.2 (dt, $J = 57$ Hz, 18 Hz, 1F). MS (EI, m/z): 246 [M^+]. HRMS (EI): m/z calcd for $\text{C}_{16}\text{H}_{16}\text{F}_2$ (M^+) 246.1215, found 246.1216.

1,1-Difluoro-5-(4'-methoxy)phenylpentane (6e): colorless liquid, yield: 80 %. ^1H NMR (360 MHz, CDCl_3): δ 1.48 (m, 2H); 1.65 (m, 2H); 1.83 (m, 2H); 2.58 (t, $J = 7.5$ Hz, 2H); 3.79 (s, 3H); 5.79 (tt, $J = 57$ Hz, 4.5 Hz, 1H); 6.84 (d, $J = 8.0$ Hz, 2H); 7.08 (d, $J = 8.0$ Hz). ^{13}C NMR (90 MHz, CDCl_3): δ 21.7 (t, $J = 5.5$ Hz); 31.1; 34.0 (t, $J = 21$ Hz); 34.7; 55.2; 113.8; 117.3 (t, $J = 239$ Hz); 129.2; 134.0; 157.8. ^{19}F NMR (338 MHz, CDCl_3): δ -116.2 (dt, $J = 57$ Hz, 18 Hz, 1F). HRMS (EI): m/z calcd for $\text{C}_{12}\text{H}_{16}\text{F}_2\text{O}$ (M^+) 214.1169, found 214.1170.

1,1-Difluoro-4-phenoxybutane (6f): colorless liquid, yield: 91 %. ^1H NMR (500 MHz, CDCl_3): δ 2.06 (m, 4H); 4.07 (t, $J = 7.4$ Hz, 2H); 5.94 (tt, $J = 57$ Hz, 4.7 Hz, 1H); 6.92 (d, $J = 7.5$ Hz, 2H); 6.98 (t, $J = 7.4$ Hz, 1H); 7.31 (t, $J = 7.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 22.1 (t, $J = 5.9$ Hz); 31.0 (t, $J = 21$ Hz); 66.6; 114.4; 117.1 (t, $J = 239$ Hz); 120.8; 129.5; 158.7. ^{19}F NMR (470 MHz, CDCl_3): δ - 116.6 (dt, $J = 57$ Hz, 18 Hz, 1F). MS (EI, m/z): 186 [M^+]. HRMS (EI): m/z calcd for $\text{C}_{10}\text{H}_{12}\text{F}_2\text{O}$ (M^+) 186.0856, found 186.0857.

1,1-Difluoro-5-phenoxy pentane (6g): colorless liquid, yield: 88 %. ^1H NMR (500 MHz, CDCl_3): δ 1.67 (m, 2H); 1.86 (m, 2H); 1.93 (m, 2H); 3.99 (t, $J = 7.4$ Hz, 2H); 5.85 (tt, $J = 57$ Hz, 4.7 Hz, 1H); 6.91 (d, $J = 7.5$ Hz, 2H); 6.96 (t, $J = 7.4$ Hz, 1H); 7.30 (t, $J = 7.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 19.0 (t, $J = 5.9$ Hz); 28.7; 33.8 (t, $J = 21$ Hz); 67.2; 114.4; 117.2 (t, $J = 239$ Hz); 120.7; 129.4; 158.9. ^{19}F NMR (470 MHz, CDCl_3): δ - 116.4 (dt, $J = 57$ Hz, 18 Hz, 1F). HRMS (EI): m/z calcd for $\text{C}_{11}\text{H}_{14}\text{F}_2\text{O}$ (M^+) 200.1013, found 200.1012.

Nucleophilic Substitution Reactions of Difluoromethyl Phenyl Sulfone with Elemental Iodine. Under an argon atmosphere, into a Schlenk flask containing difluoromethyl phenyl sulfone (192 mg, 1 mmol) and elemental iodine (508 mg, 4 mmol) in DMF (4 mL) at -30 $^\circ\text{C}$, was added dropwise via a syringe *t*-BuOK (448 mg, 4 mmol) in DMF (4 mL). The reaction mixture was stirred at $-30 \sim -20$ $^\circ\text{C}$ for 1 h, and the completion of the reaction was monitored by ^{19}F NMR. The reaction mixture was then quenched by adding 1N HCl aqueous solution (5 mL) at -50 $^\circ\text{C}$, followed by warming to room temperature. A saturated NaCl aqueous solution (10 mL) was added, and the mixture was extracted with Et_2O (15 mL x 3). The combined organic phase was dried over MgSO_4 , filtered, and the solvent was removed in a rotary evaporator. The residue was further purified by silica gel column chromatography (hexane:ethyl acetate = 9:1) to give difluoroiodomethyl phenyl sulfone (**4**) (294 mg, 92 % yield) as a colorless solid, which readily turns to red under light. ^1H NMR (500 MHz, CDCl_3): δ 7.63 (t, $J = 7.4$ Hz, 2H); 7.79 (t, $J = 7.4$ Hz, 1H); 7.99 (d, $J = 7.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 102.5 (t, $J = 355$ Hz); 128.1; 129.7; 131.3; 136.1. ^{19}F NMR (470 MHz, CDCl_3): δ - 52.2. MS (EI, m/z): 318 (M^+); 177; 142; 127. HRMS (EI): m/z calcd for $\text{C}_7\text{H}_5\text{F}_2\text{IO}_2\text{S}$ (M^+) 317.9023, found 317.9013.

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