

2-chloro-N-isopropyl-5-(5-(trifluoromethyl)pyridin-2-yl)benzenesulfonamide (I3).

Yield: 81%. Melting point: 166-168 °C. ^1H NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.97 (s, 1H), 8.76 (d, J = 2.3 Hz, 1H), 8.29 (d, J = 8.4, 1H), 8.04 (s, 1H), 7.94 (d, J = 8.5 Hz, 1H), 7.68 (d, J = 8.4 Hz, 1H), 4.88 (s, 1H), 3.49 (s, 1H), 1.14 (s, 3H), 1.12 (s, 3H).
Anal. Calcd. (%) for $\text{C}_{15}\text{H}_{14}\text{ClF}_3\text{N}_2\text{O}_2\text{S}$: C, 47.56; H, 3.73; N, 7.40. Found: C, 47.58; H, 3.75; N, 7.41.

2-chloro-N-methoxy-5-(5-(trifluoromethyl)pyridin-2-yl)benzenesulfonamide (I4).

Yield: 67%, a yellow liquid. ^1H NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.98 (s, 1H), 8.79 (s, 1H), 8.36 (d, J = 6.2 Hz, 1H), 8.04 (s, 1H), 7.97 (dd, J = 8.3, 2.2 Hz, 2H), 7.70 (d, J = 8.4 Hz, 1H), 3.82 (s, 3H). Anal. Calcd. (%) for $\text{C}_{13}\text{H}_{10}\text{ClF}_3\text{N}_2\text{O}_3\text{S}$: C, 42.57; H, 2.75; N, 7.64. Found: C, 42.59; H, 2.74; N, 7.62.

2-chloro-N-methyl-5-(5-(trifluoromethyl)pyridin-2-yl)benzenesulfonamide (I5).

Yield: 80%, a yellow liquid. ^1H NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.97 (s, 1H), 8.74 (d, J = 2.2 Hz, 1H), 8.30 (dd, J = 8.3, 2.2 Hz, 1H), 8.05 (d, J = 8.3 Hz, 1H), 7.93 (d, J = 8.3 Hz, 1H), 7.69 (d, J = 8.4 Hz, 1H), 4.96 (s, 1H), 2.69 (d, J = 5.3 Hz, 3H).
Anal. Calcd. (%) for $\text{C}_{13}\text{H}_{10}\text{ClF}_3\text{N}_2\text{O}_2\text{S}$: C, 44.52; H, 2.87; N, 7.99. Found: C, 44.53 H, 2.89; N, 7.77.

Phenethyl 2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)benzenesulfonate

(II1). Yield: 78%, a yellow liquid. ^1H NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.87 (s, 1H), 8.51 (d, J = 2.2 Hz, 1H), 8.09 (d, J = 1.4 Hz, 1H), 7.99 (dd, J = 8.3, 2.2 Hz, 1H), 7.64 (d, J = 8.3 Hz, 1H), 7.24 – 7.19 (m, 2H), 7.18 – 7.10 (m, 3H), 4.39 (t, J = 7.1 Hz,

2H), 3.06 (t, $J = 7.0$ Hz, 2H). Anal. Calcd. (%) for $C_{20}H_{14}Cl_2F_3NO_3S$: C, 50.43; H, 2.96; N, 2.94. Found: C, 50.44; H, 2.99; N, 2.98.

Allyl 2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)benzenesulfonate (II2).

Yield: 79%, a yellow liquid. 1H NMR (300 MHz, $CDCl_3$) δ_H (ppm) = 8.88 (s, 1H), 8.56 (d, $J = 2.2$ Hz, 1H), 8.10 (s, 1H), 8.02 (dd, $J = 8.3, 2.2$ Hz, 1H), 7.71 (d, $J = 8.3$ Hz, 1H), 5.90 – 5.84 (m, 1H), 5.46 – 5.21 (m, 2H), 4.76 – 4.66 (m, 2H). Anal. Calcd. (%) for $C_{15}H_{10}Cl_2F_3NO_3S$: C, 43.71; H, 2.45; N, 3.40. Found: C, 43.72; H, 2.45; N, 3.43.

2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)-N-cyclopropylbenzenesulfo

namide (II3). Yield: 87%, a yellow liquid. 1H NMR (300 MHz, $CDCl_3$) δ_H (ppm) = 8.88 (s, 1H), 8.57 (d, $J = 2.2$ Hz, 1H), 8.10 (s, 1H), 7.97 (dd, $J = 8.3, 2.2$ Hz, 1H), 7.72 – 7.62 (m, 2H), 4.97 (s, 1H), 2.78 – 2.59 (m, 4H). Anal. Calcd. (%) for $C_{15}H_{11}Cl_2F_3N_2O_2S$: C, 43.81; H, 2.70; N, 6.81. Found: C, 43.84; H, 2.72; N, 6.79.

2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)-N-methylbenzenesulfonami

de (II4). Yield: 84%, a yellow liquid. 1H NMR (300 MHz, $CDCl_3$) δ_H (ppm) = 8.86 (s, 1H), 8.57 (d, $J = 2.1$ Hz, 1H), 8.09 (s, 1H), 7.97 (dd, $J = 8.3, 2.2$ Hz, 1H), 7.68 (d, $J = 8.3$ Hz, 1H), 5.50 (s, 1H). ^{13}C NMR (75 MHz, $CDCl_3$) δ 156.42, 144.56, 144.51, 135.99, 135.74, 135.68, 135.54, 134.02, 133.39, 131.74, 130.33, 120.09, 63.47. Anal. Calcd. (%) for $C_{13}H_6Cl_2F_3N_3O_2S$: C, 39.41; H, 1.53; N, 10.61. Found: C, 39.42; H, 1.55; N, 10.60.

2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)-N-(cyanomethyl)benzenesulfonamide (II5). Yield: 82%, [a yellow liquid](#). ^1H NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.86 (dd, $J = 1.9, 0.8$ Hz, 1H), 8.52 (d, $J = 2.2$ Hz, 1H), 8.13 – 8.03 (m, 1H), 7.96 (dd, $J = 8.3, 2.2$ Hz, 1H), 7.73 – 7.63 (m, 1H), 5.67 (t, $J = 5.3$ Hz, 1H), 3.88 (t, $J = 7.3$ Hz, 2H). Anal. Calcd. (%) for $\text{C}_{14}\text{H}_8\text{Cl}_2\text{F}_3\text{N}_3\text{O}_2\text{S}$: C, 40.99; H, 1.97; N, 10.24. Found: C, 40.98; H, 1.98; N, 10.28.

2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)-N',N'-dimethylbenzenesulfonohydrazide (II11). Yield: 83%, [a yellow liquid](#). ^1H NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.96 (s, 1H), 8.61 (d, $J = 2.2$ Hz, 1H), 8.18 (s, 1H), 8.02 (dd, $J = 8.3, 2.2$ Hz, 1H), 7.76 (d, $J = 8.2$ Hz, 1H), 5.45 (s, 1H), 3.04 (s, 6H). Anal. Calcd. (%) for $\text{C}_{14}\text{H}_{12}\text{Cl}_2\text{F}_3\text{N}_3\text{O}_2\text{S}$: C, 40.59; H, 2.92; N, 10.14; Found: C, 40.60; H, 2.94; N, 10.16.

2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)-N'-methylbenzenesulfonohydrazide (II12). Yield: 82%, [a yellow liquid](#). ^1H NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.96 (s, 1H), 8.61 (d, $J = 2.2$ Hz, 1H), 8.18 (s, 1H), 8.02 (dd, $J = 8.3, 2.2$ Hz, 1H), 7.76 (d, $J = 8.2$ Hz, 1H), 4.315 (s, 1H), 4.10 (s, 1H), 2.56 (s, 3H). Anal. Calcd. (%) for $\text{C}_{13}\text{H}_{10}\text{Cl}_2\text{F}_3\text{N}_3\text{O}_2\text{S}$: C, 39.01; H, 2.52; N, 10.50; Found: C, 39.03; H, 2.53; N, 10.53.

4-((2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)phenyl)sulfonyl)morpholine (II16). Yield: 84%, [a yellow liquid](#). ^1H NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.85 (s, 1H), 8.48 (d, $J = 2.2$ Hz, 1H), 8.07 (s, 1H), 7.94 (dd, $J = 8.3, 2.2$ Hz, 1H), 7.67 (d, $J = 8.3$ Hz, 1H), 3.60 (dd, $J = 11.3, 2.9$ Hz, 4H), 3.43 – 3.22 (m, 4H). Anal. Calcd. (%) for $\text{C}_{16}\text{H}_{13}\text{Cl}_2\text{F}_3\text{N}_2\text{O}_3\text{S}$: C, 43.55; H, 2.97; N, 6.35; Found: C, 43.57; H, 2.97; N, 6.36.

2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)-N-(cyanomethyl)-4-fluorobenzenesulfonamide (III1). Yield: 76%, a yellow liquid. ^1H NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.89 (s, 1H), 8.44 (t, $J = 7.1$ Hz, 1H), 8.09 (s, 1H), 7.43 (dd, $J = 8.8, 2.8$ Hz, 1H), 5.57 (t, $J = 5.3$ Hz, 1H), 3.83 (t, $J = 7.3$ Hz, 2H). Anal. Calcd. (%) for $\text{C}_{14}\text{H}_7\text{Cl}_2\text{F}_4\text{N}_3\text{O}_2\text{S}$: C, 39.27; H, 1.65; N, 9.81; Found: C, 39.28; H, 1.68; N, 9.83.

Ethyl

((2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)phenyl)sulfonyl)carbamate (II7). Yield: 31% of colorless crystals of melting point 72-74 °C. ^1H NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.90 (s, 1H), 8.77 (d, $J = 2.2$ Hz, 1H), 8.12 (s, 1H), 8.07 (dd, $J = 8.3, 2.2$ Hz, 1H), 7.89 (s, 1H), 7.72 (d, $J = 8.3$ Hz, 1H), 4.05 (dd, $J = 12.6, 6.3$ Hz, 2H), 1.08 (t, $J = 6.9$ Hz, 3H). ^{13}C NMR (75 MHz, CDCl_3) δ 149.89, 144.56, 144.45, 136.00, 135.69, 135.56, 134.30, 134.09, 133.46, 131.74, 131.43, 130.88, 130.37, 65.80, 29.67. Anal. Calcd. (%) for $\text{C}_{15}\text{H}_{11}\text{Cl}_2\text{F}_3\text{N}_2\text{O}_4\text{S}$: C, 40.65; H, 2.50; N, 6.32; Found: C, 40.63; H, 2.49; N, 6.35.

Isopropyl

((2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)phenyl)sulfonyl)carbamate (II8). Yield: 28% of colorless crystals of melting point 168-170 °C. ^1H NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.82 (s, 1H), 8.66 (s, 1H), 8.04 (d, $J = 2.0$ Hz, 1H), 7.47 (d, $J = 8.3$ Hz, 2H), 7.38 (dd, $J = 8.4, 2.1$ Hz, 1H), 5.04 (dt, $J = 12.6, 6.4$ Hz, 1H), 1.36 – 1.21 (m, 6H). Anal. Calcd. (%) for $\text{C}_{16}\text{H}_{13}\text{Cl}_2\text{F}_3\text{N}_2\text{O}_4\text{S}$: C, 42.03; H, 2.87; N, 6.13; Found: C, 42.06; H, 2.90; N, 6.14.

Butyl

((2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)phenyl)sulfonyl)carbamate (II9).

Yield: 34%, [a yellow liquid](#). ^1H NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.83 (s, 1H), 8.62 (d, J = 19.3 Hz, 1H), 8.03 (dd, J = 5.9, 2.1 Hz, 1H), 7.53 – 7.43 (m, 1H), 7.40 (dd, J = 8.3, 2.1 Hz, 1H), 7.20 (s, 1H), 4.16 (dt, J = 21.8, 6.7 Hz, 2H), 1.76 – 1.58 (m, 2H), 1.50 – 1.33 (m, 2H), 0.94 (q, J = 7.2 Hz, 3H). Anal. Calcd. (%) for $\text{C}_{17}\text{H}_{15}\text{Cl}_2\text{F}_3\text{N}_2\text{O}_4\text{S}$: C, 43.33; H, 3.21; N, 5.94; Found: C, 43.34; H, 3.22; N, 5.96.

2-methoxyethyl

((2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)phenyl)sulfonyl)carbamate (II10).

Yield: 40%, [a yellow liquid](#). ^1H NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.87 (s, 1H), 8.78 – 8.72 (m, 1H), 8.09 (s, 1H), 8.03 (d, J = 2.8 Hz, 1H), 7.70 (s, 1H), 4.32 – 4.15 (m, 2H), 3.65 – 3.42 (m, 2H), 3.31 (s, 3H). ^{13}C NMR (75 MHz, CDCl_3) δ 149.89, 144.56, 144.47, 136.01, 135.69, 135.58, 134.31, 134.07, 133.45, 131.74, 131.43, 130.89, 130.37, 69.84, 65.80, 58.8. Anal. Calcd. (%) for $\text{C}_{16}\text{H}_{13}\text{Cl}_2\text{F}_3\text{N}_2\text{O}_5\text{S}$: C, 40.61; H, 2.77; N, 5.92; Found: C, 40.63; H, 2.78; N, 5.95.

Methyl

((2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)phenyl)sulfonyl)(methyl)carbamate (II13).

Yield: 35% [of yellow crystals of melting point 166-168 °C](#). ^1H NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.88 (s, 1H), 8.73 (d, J = 2.2 Hz, 1H), 8.09 (s, 1H), 8.00 (dd, J = 8.3, 2.2 Hz, 1H), 7.65 (d, J = 8.3 Hz, 1H), 3.69 (s, 3H), 3.50 (s, 3H). Anal. Calcd. (%) for $\text{C}_{15}\text{H}_{11}\text{Cl}_2\text{F}_3\text{N}_2\text{O}_4\text{S}$: C, 40.65; H, 2.50; N, 6.32; Found: C, 40.63; H, 2.51; N, 6.35.

Ethyl

((2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)phenyl)sulfonyl)(methyl)carbamate (II14).

Yield: 32% of yellow crystals of melting point 164-166 °C. ^1H

NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.88 (s, 1H), 8.72 (d, J = 1.9 Hz, 1H), 8.10 (s, 1H), 8.01 (dd, J = 8.3, 2.1 Hz, 1H), 7.66 (d, J = 8.3 Hz, 1H), 4.12 (q, J = 7.1 Hz, 2H), 3.50 (s, 3H), 1.08 (t, J = 7.1 Hz, 3H). Anal. Calcd. (%) for $\text{C}_{16}\text{H}_{13}\text{Cl}_2\text{F}_3\text{N}_2\text{O}_4\text{S}$: C, 42.03; H, 2.87; N, 6.13; Found: C, 42.05; H, 2.88; N, 6.214.

Isopropyl

((2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)phenyl)sulfonyl)(methyl)carbamate (II15).

Yield: 31% of yellow crystals of melting point 100-102 °C. ^1H

NMR (300 MHz, CDCl_3) δ_{H} (ppm) = 8.91 (s, 1H), 8.70 (d, J = 2.2 Hz, 1H), 8.08 (d, J = 1.3 Hz, 1H), 8.00 (dd, J = 8.3, 2.2 Hz, 1H), 7.64 (d, J = 8.3 Hz, 1H), 4.88 (dt, J = 12.5, 6.3 Hz, 1H), 3.48 (s, 3H), 1.04 (d, J = 6.3 Hz, 6H). Anal. Calcd. (%) for $\text{C}_{17}\text{H}_{15}\text{Cl}_2\text{F}_3\text{N}_2\text{O}_4\text{S}$: C, 43.33; H, 3.21; N, 5.94; Found: C, 43.35; H, 3.20; N, 5.95.

II17. Yield: 57% of yellow crystals of melting point 168-170 °C. ^1H NMR (300 MHz,

CDCl_3) δ_{H} (ppm) = 8.90 (s, 1H), 8.76 (d, J = 2.2 Hz, 1H), 8.12 (s, 1H), 8.03 (d, J = 8.3 Hz, 1H), 7.68 (d, J = 8.4 Hz, 1H), 3.71 (s, 3H), 3.53 (s, 3H). Anal. Calcd. (%) for $\text{C}_{16}\text{H}_{11}\text{Cl}_2\text{F}_3\text{N}_2\text{O}_6\text{S}$: C, 39.44; H, 2.28; N, 5.75; Found: C, 39.45; H, 2.29; N, 5.78.

II18. Yield: 60% of yellow crystals of melting point 92-94 °C. ^1H NMR (300 MHz,

CDCl_3) δ_{H} (ppm) = 8.90 (s, 1H), 8.76 (d, J = 2.2 Hz, 1H), 8.12 (s, 1H), 8.03 (d, J = 8.3 Hz, 1H), 7.68 (d, J = 8.4 Hz, 1H), 4.17 – 3.92 (m, 4H), 1.29 – 0.91 (m, 6H).

Anal. Calcd. (%) for $C_{18}H_{15}Cl_2F_3N_2O_6S$: C, 41.96; H, 2.93; N, 5.44; Found: C, 41.97; H, 2.95; N, 5.43.

((2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)-4-fluorophenyl)sulfonyl)carbamic acid (III2). Yield: 45% of colorless crystals of melting point 180-182 °C. 1H NMR (300 MHz, $CDCl_3$) δ_H (ppm) = 8.89 (s, 1H), 8.45 (d, J = 7.1 Hz, 1H), 8.10 (s, 1H), 7.75 (s, 1H), 7.43 (d, J = 8.8 Hz, 1H). ^{13}C NMR (75 MHz, $CDCl_3$) δ 158.42, 157.61, 150.53, 144.61, 144.52, 144.47, 135.77, 135.72, 135.61, 134.29, 133.95, 133.44, 131.80. Anal. Calcd. (%) for $C_{13}H_6Cl_2F_4N_2O_4S$: C, 36.05; H, 1.40; N, 6.47; Found: C, 36.07; H, 1.40; N, 6.46.

Methyl

((2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)-4-fluorophenyl)sulfonyl)carbamate (III3). Yield: 56%, a yellow liquid. 1H NMR (300 MHz, $CDCl_3$) δ_H (ppm) = 8.89 (s, 1H), 8.45 (d, J = 7.1 Hz, 1H), 8.10 (s, 1H), 7.75 (s, 1H), 7.43 (d, J = 8.8 Hz, 1H), 2.15 (s, 3H). Anal. Calcd. (%) for $C_{14}H_8Cl_2F_4N_2O_4S$: C, 37.60; H, 1.80; N, 6.26; Found: C, 37.62; H, 1.82; N, 6.27.

Ethyl

((2-chloro-5-(3-chloro-5-(trifluoromethyl)pyridin-2-yl)-4-fluorophenyl)sulfonyl)carbamate (III4). Yield: 59% of colorless crystals of melting point 112-114 °C. 1H NMR (300 MHz, $CDCl_3$) δ_H (ppm) = 8.89 (s, 1H), 8.44 (t, J = 7.1 Hz, 1H), 8.09 (s, 1H), 7.75 (s, 1H), 7.43 (dd, J = 8.8, 2.8 Hz, 1H), 4.15 (dq, J = 11.5, 7.1 Hz, 2H), 1.36 – 1.10 (m, 3H). ^{13}C NMR (75 MHz, $CDCl_3$) δ 158.40, 150.51, 144.57, 144.52, 144.47,

135.76, 135.71, 135.63, 134.27, 133.95, 133.44, 131.81, 127.32, 53.87, 29.67. Anal.

Calcd. (%) for $C_{15}H_{10}Cl_2F_4N_2O_4S$: C, 39.06; H, 2.19; N, 6.07; Found: C, 39.07; H, 2.17; N, 6.08.

III5. Yield: 59%, a yellow liquid. 1H NMR (300 MHz, $CDCl_3$) δ_H (ppm) = 8.89 (s, 1H), 8.44 (t, J = 7.1 Hz, 1H), 8.09 (s, 1H), 7.43 (dd, J = 8.8, 2.8 Hz, 1H), 3.69 (s, 3H), 3.50 (s, 3H). Anal. Calcd. (%) for $C_{16}H_{10}Cl_2F_4N_2O_6S$: C, 38.04; H, 2.00; N, 5.54; Found: C, 38.05; H, 2.03; N, 5.55.