**Supporting Information**

# Scope of the Suzuki-Miyaura Cross-Coupling Reactions of Potassium Heteroaryltrifluoroborates

*Gary A. Molander* Belgin Canturk and Lauren Kennedy*

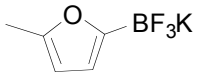
*Roy and Diana Vagelos Laboratories, Department of Chemistry*

*University of Pennsylvania, Philadelphia, Pennsylvania 19104-6323*

gmolandr@sas.upenn.edu

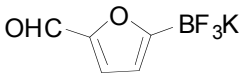
**General Considerations:** $Pd(OAc)_2$, RuPhos and $Na_2CO_3$ were used as received. Ethanol was degassed prior to use. Standard benchtop techniques were employed for handling air-sensitive reagents. Melting points ($^oC$) were determined using a Thomas-Hoover melting point apparatus and are uncorrected. $^1H$, $^{13}C$, and $^{19}F$ NMR spectra were recorded at 500.4, 125.8, and 470.8 MHz, respectively. $^{19}F$ NMR chemical shifts were referenced to external $CFCl_3$ (0.0 ppm). $^{11}B$ NMR spectra at 128.4 MHz were obtained on a spectrometer equipped with the appropriate decoupling accessories. All $^{11}B$ NMR chemical shifts were referenced to external $BF_3{\cdot}OEt_2$ (0.0 ppm) with a negative sign indicating an upfield shift. Analytical thin-layer chromatography (TLC) was performed on Merck silica gel (60F-254) plates (0.25 mm) precoated with a fluorescent indicator. Standard flash chromatography procedures were followed using 32-63 μm silica gel.

**Preparation of Heteroaryltrifluoroborates (2b-2v; 1)**

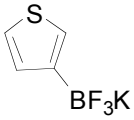



**Potassium 5-Methylfuran-2-yltrifluoroborate (2b).** The general procedure was used employing 5-methylfuran-2-ylboronic acid, and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (6 h) with acetone (50 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetone (25 mL). The addition of ether (30 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 59% yield (0.90 g, 4.79 mmol) as a white solid. mp: > 200 $^oC$. $^1H$ NMR (500 MHz, DMSO-$d_6$) δ 5.91 (m, 1H), 5.74 (m, 1H), 2.2 (s, 3H). $^{13}C$ NMR (125.8 MHz, DMSO-$d_6$) δ 149.3, 111.0, 104.6, 13.4. $^{19}F$

NMR (470.8 MHz, DMSO-$d_6$) δ -138.9. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 1.0. FT-IR (KBr) 2923, 1701, 1654, 1604, 1534, 1228, 997 cm$^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_5H_5BF_3O$ (M-K) 149.0390, found 149.0386.



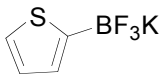
**Potassium 5-Formylfuran-2-yltrifluoroborate (2c).** The general procedure was used employing 5-formylfuran-2-ylboronic acid, and the reaction was complete in 10 min. The crude solid was dissolved in acetone (10 mL), sonicated, and then filtered (x 3). The combined filtrates were concentrated *in vacuo*. The crude solid was redissolved in a minimal amount of acetone (10 mL). The addition of ether (20 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 61% yield (0.12 g, 0.61 mmol) as an orange solid. mp: > 200 $^{o}$C dec. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 9.45 (s, 1H), 7.26 (d, 1H, *J* = 3.2 Hz), 4.63 (d, 1H, *J* = 3.4 Hz). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 177.1, 152.9, 114.1. $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -140.3. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 0.5. FT-IR (KBr) 2345, 1718, 1654, 1560, 1161, 1017 cm$^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_5H_3BF_3O_2K$ (M-K) 163.0181, found 163.0178.



**Potassium Thiophen-3-yltrifluoroborate (2d).**[1] The general procedure was used employing thiophen-3-ylboronic acid, and the reaction was complete in 10 min. The crude solid was purified by

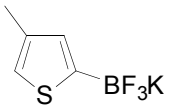
(1) Molander, G. A.; Biolatto, B. *J. Org. Chem.* **2003**, *68*, 4302-4314.

continuous Soxhlet extraction (4 h) with acetone (50 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetone (10 mL). The addition of ether (25 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 85% yield (1.20 g, 6.62 mmol) as a white solid. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 7.17 (m, 1H), 7.01-7.00 (m, 1H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 131.8, 124.2, 122.4.

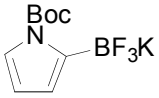



**Potassium Thiophen-2-yltrifluoroborate (2e).**[2] The general procedure was used employing thiophen-2-ylboronic acid, and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (4 h) with acetone (50 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetone (10 mL). The addition of ether (25 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 95% yield (1.41 g, 7.40 mmol) as a white solid. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 7.22 (m, 1H), 6.92-6.81 (m, 2H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 127.5, 126.9, 124.4

(2) Molander, G.; Fumagalli T. *J. Org. Chem.* **2006,** *71*, 5743-5747.



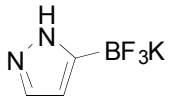

**Potassium 4-Methylthiophen-2-yltrifluoroborate (2f).** The general procedure was used employing 4-methylthiophen-2-ylboronic acid, and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (4 h) with acetone (50 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetone (10 mL). The addition of ether (25 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 69% yield (0.99 g, 4.86 mmol) as a white solid. mp: > 200 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 6.75 (s, 1H), 6.64 (s, 1H), 2.15 (s, 3H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 136.2, 129.8, 119.3, 15.2. $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -134.6. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 1.51. FT-IR (KBr) 2939, 2861, 1718, 1456 cm$^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_5H_5BF_3S$ (M-K) 165.0147, found 165.0157.




**Potassium 1-(*tert*-Butoxycarbonyl)-1*H*-pyrrol-2-yltrifluoroborate (2g).** The general procedure was used employing 1-(*tert*-butoxycarbonyl)-1*H*-pyrrol-2-ylboronic acid, and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (6 h) with acetone (35 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetone (4 mL). The addition of ether (8 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 66% yield (0.18 g, 0.66 mmol) as a white solid. mp: 190-

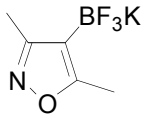
191 °C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 7.09 (m, 1H), 6.03 (m, 1H), 5.96 (t, 1H, $J$ = 2.8 Hz), 1.52 (s, 9H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 150.3, 120.6, 116.6, 110.0, 81.2, 27.6. $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -137.1. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 0.8. FT-IR (KBr) 2982, 1734, 1560, 1391, 1342, 1140 cm$^{-1}$. HRMS (ESI) $m/z$ calcd. for $C_9H_{12}BF_3NO_2$ (M-K) 234.0914, found 234.0913.

**Potassium 1*H*-Pyrazol-4-yltrifluoroborate (2h).** The general procedure was used employing 1*H*-pyrazol-4-ylboronic acid, and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (8 h) with acetonitrile (35 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetonitrile (10 mL). The addition of ether (20 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 31% yield (0.24 g, 1.39 mmol). mp: > 200 °C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 6.68 (s, 2H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 141.9, 128.8. $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -133.2. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 2.6. FT-IR (KBr) 3456, 3020, 2326, 1466, 1113 cm$^{-1}$. HRMS (ESI) $m/z$ calcd. for $C_3H_3BF_3N_2$ (M-K) 135.0344, found 135.0341.



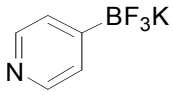
**Potassium 1*H*-Pyrazol-5-yltrifluoroborate (2i).** The general procedure was used

employing 1*H*-pyrazol-5-ylboronic acid, and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (8 h) with acetonitrile (50 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetonitrile (15 mL). The addition of ether (30 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 49% yield (0.76 g, 4.36 mmol) as a white solid. mp: 177-180 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 7.18 (m, 1H), 5.90 (m, 1H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 137.0, 106.1. $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -136.6. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 2.0. FT-IR (KBr) 3386, 3123, 1540, 1302, 1206, 936 cm$^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_3H_3BF_3N_2$ (M-K) 135.0340, found 135.0341.

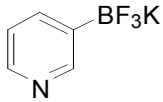



**Potassium 3,5-Dimethylisoxazol-4-yltrifluoroborate (2j).** The general procedure was used employing 3,5-dimethylisoxazol-4-ylboronic acid, and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (16 h) with acetone (50 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetone (20 mL). The addition of ether (30 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 72% yield (1.04 g, 5.11 mmol) as a white solid. mp: > 200 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 2.22 (s, 3H), 2.07 (s, 3H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 141.9, 128.8. $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -140.1. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 1.7. FT-IR (KBr) 2929, 1611, 1417, 1261,

1201 $cm^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_5H_6BF_3NO$ (M-K) 164.0499, found 164.0495.

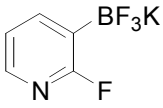



**Potassium Pyridin-4-yltrifluoroborate (2k).** The general procedure was used employing pyridin-4-ylboronic acid, and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (18 h) with acetone (70 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetone (20 mL). The addition of ether (30 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired product, along with the zwitterionic potassium pyridinium-4-trifluoroborate salt (1.5:1) in 94% yield (5.65 g, 30.54 mmol) as a white solid. The mixture was used without further purification. $^1$H NMR (500 MHz, DMSO-$d_6$) δ 8.22 (d, 2H, $J$ = 5.3 Hz), 7.3 (d, 2H, $J$ = 5.2 Hz). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 147.1, 127.2. $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ - 141.6. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 3.04. HRMS (ESI) *m*/*z* calcd. for $C_5H_4BF_3N$ (M-K) 146.0397, found 146.0389.

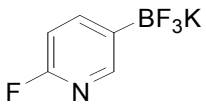



**Potassium Pyridin-3-yltrifluoroborate (2l).**[1] The general procedure was used employing pyridin-3-ylboronic acid, and the reaction was complete in 10 min. The crude mixture was dissolved in acetone (3 mL) and sonicated, and filtered (x 3). The filtrate was concentrated and redissolved in a minimal amount of acetone (2 mL). The addition of ether (6 mL) led to the precipitation of the product. The product

was filtered, collected, and dried *in vacuo* to afford the desired product, along with the zwitterionic potassium pyridinium-3-trifluoroborate salt (2:1) in 71% yield (0.13 g, 0.71 mmol) as a light brown solid. The mixture was used without further purification. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 8.48 (s, 1H), 8.26 (m, 1H), 7.62 (d, 1H, $J$ = 7.2 Hz), 7.09 (m, 1H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 152.6, 146.4, 138.6, 122.3.

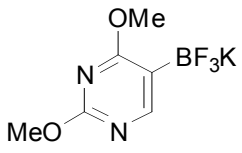



**Potassium 2-Fluoropyridin-3-yltrifluoroborate (2m).** The general procedure was used employing 2-fluoropyridin-3-ylboronic acid, and the reaction was complete in 3 min. The crude solid was purified by continuous Soxhlet extraction (10 h) with acetone (50 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetone (8 mL). The addition of ether (24 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 97% yield (2.80 g, 13.77 mmol) as a white solid. mp: > 200 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 7.92 (m, 1H), 7.79 (m, 1H), 7.04 (m, 1H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 166.82 (d, $J$ = 233.7 Hz), 145.3 (d, $J$ = 12.2 Hz), 145.16 (d, $J$ = 14.8 Hz), 121.06 (d, $J$ = 3.1 Hz).$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -63.3, -138.9. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 1.7. FT-IR (KBr) 3055, 1592, 1412, 1220, 1042 cm$^{-1}$. HRMS (ESI) $m/z$ calcd. for $C_5H_3BF_4N$ (M-K) 164.0295, found 164.0295.



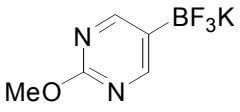

**Potassium 6-Fluoropyridin-3-yltrifluoroborate (2n).** The general procedure was used

employing 6-fluoropyridin-3-ylboronic acid, and the reaction was complete in 3 min. The crude solid was purified by continuous Soxhlet extraction (10 h) with acetone (50 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetone (20 mL). The addition of ether (30 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 81% yield (1.84 g, 9.07 mmol) as a white solid. mp: > 200 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 8.09 (s, 1H), 7.81 (m, 1H), 6.86 (m, 1H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 162.71 (d, $J$ = 232.5 Hz), 150.1 (d, $J$ = 12.6 Hz), 145.12 (d, $J$ = 5.3 Hz), 107.7 (d, $J$ = 34.9 Hz). $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -73.8, -139.3. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 2.4. FT-IR (KBr) 3110, 3075, 3042, 1601, 1478, 1351, 1197 cm$^{-1}$. HRMS (ESI) *m/z* calcd. for $C_5H_3BF_4N$ (M-K) 164.0295, found 164.0295.

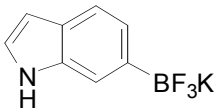



**Potassium 2,4-Dimethoxypyrimidin-5-yltrifluoroborate (2o).** The general procedure was used employing 2,4-dimethoxypyrimidin-5-boronic acid, and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (6 h) with acetone (35 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetone (12 mL). The addition of ether (25 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 71% yield (175.0 mg, 0.71 mmol) as a white solid. mp: > 200 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 8.06 (s, 1H), 3.81 (s, 3H), 3.77 (s, 3H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 173.7, 164.1,

160.8, 53.5, 52.4. $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -138.2. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 1.7. FT-IR (KBr) 2979, 2886, 1584, 1460, 1390, 1294, 1200, 1083 cm$^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_6H_7BF_3N_2O_2$ (M-K) 207.0553, found 207.0553.

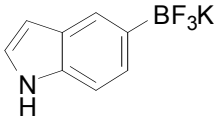



**Potassium 2-Methoxypyrimidin-5-yltrifluoroborate (2p).** The general procedure was used employing 2-methoxypyrimidin-5-ylboronic acid, and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (8 h) with acetone (50 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetone (10 mL). The addition of ether (25 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 67% yield (0.47 g, 2.17 mmol) as a white solid. mp: > 200 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 8.35 (s, 2H), 3.81 (s, 3H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 164.1, 161.7, 53.6. $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -139.0. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 2.1. FT-IR (KBr) 2968, 1592, 1476, 1411, 1320, 1215 cm$^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_5H_5BF_3N_2O$ (M-K) 177.0457, found 177.0447.



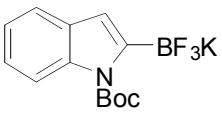

**Potassium 1*H*-Indol-6-yltrifluoroborate (2q).** The general procedure was used employing 1*H*-indol-6-ylboronic acid, and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (6 h) with acetone (35 mL). The collected solvent was concentrated, and

then redissolved in a minimal amount of acetone (12 mL). The addition of ether (25 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 71% yield (158.0 mg, 0.71 mmol) as a white solid. mp: > 200 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 10.50 (brs, 1H), 7.44 (s, 1H), 7.27 (d, 1H, $J$ = 7.8 Hz), 7.11 (m, 1H), 7.05 (d, 1H, $J$ = 7.8 Hz), 6.26 (s, 1H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 136.2 125.5, 123.2, 122.7, 117.6, 113.8, 100.3. $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -138.2. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 3.2. FT-IR (KBr) 3398, 3106, 3042, 3021, 1918, 1706, 1618, 1506, 1452, 1287, 1174, cm$^{-1}$. HRMS (ESI) *m*/*z* HRMS (ESI) *m*/*z* calcd. for $C_8H_6BF_3O$ (M-K) 184.0542, found 184.0545.

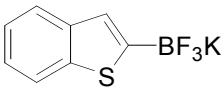



**Potassium 1*H*-Indol-5-yltrifluoroborate (2r).** The general procedure was used employing 1*H*-indol-5-ylboronic acid, and the reaction was complete in 10 min. The crude mixture was dissolved in acetone (3 mL), sonicated, and then filtered (x 3). The filtrate was concentrated and redissolved in a minimal amount of acetone (2 mL). The addition of ether (6 mL) led to the precipitation of the product. The solvents were removed via pipet (x 2), and the product was dried overnight *in vacuo* to give the desired pure product in 78% yield (174 mg, 0.78 mmol) as an off-white solid. mp: > 200 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 10.51 (brs, 1H), 7.44 (s, 1H), 7.11-7.08 (m, 3H), 6.23 (m, 1H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 134.8, 127.0, 125.5, 122.8, 122.4, 108.9, 100.5. $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -137.8. $^{11}$B NMR

(128.4 MHz, DMSO-$d_6$) δ 3.2. FT-IR (KBr) 3396, 1700, 1614, 1511, 1413, 1341, 1304 $cm^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_8H_6BF_3O$ (M-K) 184.0549, found 184.0545.




**Potassium 1-(*tert*-Butoxycarbonyl)-1*H*-indol-2-yltrifluoroborate (2s).**[3] The general procedure was used employing 1-(*tert*-butoxycarbonyl)-1*H*-indol-2-ylboronic acid, and the reaction was complete in 10 min. The crude solid was dissolved in acetone (10 mL), sonicated, and then filtered (x 3). The combined filtrates were concentrated *in vacuo*. The crude solid was redissolved in a minimal amount of hot acetone (5 mL). The addition of hexane (20 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 58% yield (0.72 g, 2.23 mmol) as a white solid. $^1$H NMR (500 MHz, DMSO-$d_6$) δ 8.02 (d, 1H, *J* = 7.9 Hz), 7.40 (d, 1H, *J* = 7.2 Hz), 7.12-7.03 (m, 2H), 6.45 (s, 1H), 1.60 (s, 9H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 151.3, 137.5, 130.7, 121.6, 121.2, 119.2, 114.5, 111.6, 81.4, 27.7. $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -137.8. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 2.9. FT-IR (KBr) 3552, 2978, 1730, 1696, 1451, 1372, 1335, 1251, 1123, 991$cm^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_{13}H_{14}BF_3NO_2$ (M-K) 284.1048, found 284.1070.

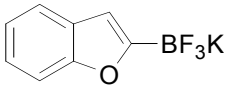



**Potassium Benzo[*b*]thiophen-2-yltrifluoroborate (2t).**[4] The general procedure was

(3) Mizuta, M.; Seio, K.; Miyata, K.; Sekine, M. *J. Org. Chem*. **2007,** *72,* 5046-5055.

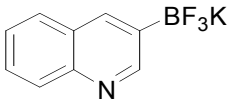
(4) Murphy, J. M.; Tzschucke, C. C.; Hartwig, J. F. *Org. Lett.* **2007,** *9,* 757-760.

used employing benzo[*b*]thiophen-2-ylboronic acid, and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (12 h) with acetone (50 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetone (15 mL). The addition of ether (30 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 76% yield (1.03 g, 4.29 mmol) as a white solid. mp: > 200 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 7.80 (d, 1H, $J$ = 7.9 Hz), 7.68 (d, 1H, $J$ = 7.9 Hz), 7.21- (m, 1H), 7.15 (m, 1H), 7.11 (s, 1H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 141.5, 141.0, 123.3, 122.8, 122.1, 121.9, 121.8. FT-IR (KBr) 3058, 2365, 1518, 1295, 1143, 962, 865 cm$^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_8H_5BF_3S$ (M-K) 201.0154, found 201.0157.

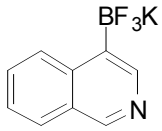



**Potassium Benzofuran-2-yltrifluoroborate (2u).**[4] The general procedure was used employing benzofuran-2-ylboronic acid, and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (12 h) with acetone (50 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetone (10 mL). The addition of ether (20 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 73% yield (1.01 g, 4.51 mmol) as a white solid. mp: > 200 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 7.45 (d, 1H, $J$ = 7.3 Hz), 7.40 (d, 1H, $J$ = 7.5 Hz), 7.11-7.02 (m, 2H), 6.46 (s, 1H). $^{13}$C NMR

(125.8 MHz, DMSO-$d_6$) δ 129.1, 121.7, 121.1, 119.7, 110.3, 106.8. FT-IR (KBr) 3057, 2362, 1560, 1243, 1140, 966, 735 $cm^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_8H_5BF_3O$ (M-K) 185.0391, found 185.0386.




**Potassium Quinolin-3-yltrifluoroborate (2v).** The general procedure was used employing quinolin-3-ylboronic acid, and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (6 h) with acetone (50 mL). The collected solvent was concentrated, and then redissolved in a minimal amount of acetone (15 mL). The addition of ether (30 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 84% yield (1.16 g, 4.91 mmol) as a white solid. mp: > 200 °C. $^1$H NMR (500 MHz, DMSO-$d_6$) δ 8.92 (d, 1H, *J* = 1.0 Hz), 8.13 (s, 1H), 7.91 (d, 1H, *J* = 8.4 Hz), 7.83 (m, 1H), 7.59 (m, 1H), 7.46 (m, 1H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 155.2, 146.8, 137.4, 128.5, 128.1, 127.6, 127.3, 125.1. $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -139.4. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 2.5. FT-IR (KBr) 3019, 1571, 1494, 1356, 1281, 1177 $cm^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_9H_6BF_3N$ (M-K) 196.0542, found 196.0545.



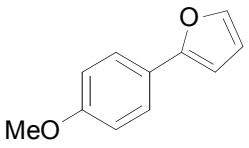

**Potassium Isoquinolin-4-yltrifluoroborate (1).** Method A: The general procedure was used employing isoquinolin-4-ylboronic acid and the reaction was complete in 10 min. The crude solid was purified by continuous Soxhlet extraction (8 h) with acetone (50 mL). The collected solvent was concentrated,

and then redissolved in a minimal amount of acetone (12 mL). The addition of ether (25 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 34% yield (0.23 g, 0.98 mmol) as a light pink solid. mp: > 200 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 9.05 (s, 1H), 8.47(s, 1H), 8.37 (d, 1H, $J$ = 8.4 Hz), 7.94 (d, 1H, $J$ = 8.1 Hz) 7.62 (m, 1H), 7.52 (m, 1H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 149.5, 144.5, 139.1, 128.9, 128.4, 127.8, 127.3, 125.6 $^{19}$F NMR (470.8 MHz, DMSO-$d_6$) δ -135.9. $^{11}$B NMR (128.4 MHz, DMSO-$d_6$) δ 2.5. FT-IR (KBr) 3079, 3050, 1624, 1579, 1497, 1402, 1279, 1151, 1103 cm$^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_9H_6BF_3N$ (M-K) 196.0537, found 196.0545.

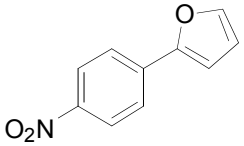
Method B: A 100 mL 3-neck flask was fitted with a mechanical stirrer, thermometer adapter with a low temperature thermometer, and a rubber septum. The flask was evacuated under vacuum, flame-dried, and refilled with $N_2$ (x 3). Anhydrous THF (5 mL) was added to the flask via syringe. Then a solution of 4-bromoisoquinoline (1.27 g, 6.1 mmol) in THF (5 mL) was added followed by triisopropyl borate (1.38 mL, 1.12 g, 4.84 mmol) via syringe at -78 $^{o}$C. A solution of 2.5 M *n*-BuLi in hexane (3.2 mL, 4.5 mmol, 1.4 M) was added dropwise via a syringe pump over 20 min at -78 $^{o}$C. After the addition of *n*-BuLi was complete, the reaction mixture was stirred at -78 $^{o}$C for 2.5 h. The reaction flask was removed from the Dry Ice/acetone bath and allowed to warm to 0 $^{o}$C (~ 30 min). Solid $KHF_2$ (1.05 g, 13.5 mmol) was added directly to the reaction mixture in one portion. Deionized water (3 mL) was added dropwise to the stirring mixture. After the addition of water was complete, the mixture was stirred for 30 min. The crude solid was purified by continuous

Soxhlet extraction (8 h) with acetone (50 mL), concentrated, and then redissolved in a minimal amount of acetone (15 mL). The addition of ether (25 mL) led to the precipitation of the product. The product was filtered, collected, and dried *in vacuo* to afford the desired pure product in 62% yield (0.89 g, 3.78 mmol) as a light pink solid.

**Suzuki-Miyaura Cross-Coupling Reactions (3b-3i; 4a-4i; 5a-5f; 6a-6g; 7a-7j)**



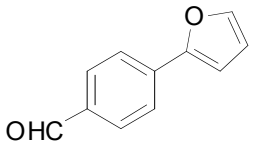

**2-(4-Methoxyphenyl)furan (3b).**[5] The general procedure was used employing 4-bromoanisole and potassium furan-2-yltrifluoroborate. The reaction was heated for 12 h. The product was obtained in 85% yield (37.02 mg, 0.21 mmol) as a white solid. $^{1}$H NMR (500 MHz, $CDCl_3$) δ 7.62 (d, 2H, $J$ = 8.8), 7.44 (m, 1H), 6.93 (d, 2H, $J$ = 8.8 Hz), 6.52 (d, 1H, $J$ = 3.3 Hz), 6.46 (dd, 1H, $J$ = 1.7, 3.3 Hz), 3.81 (s, 3H). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ159.2, 154.2, 141.5, 125.4, 124.3, 114.3, 111.7, 103.5, 55.4. FT-IR (neat) 3117, 2957, 2835, 1615, 1514, 1485, 1297, 1253, 1177, 1026 $cm^{-1}$.



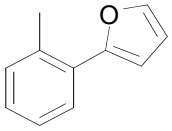

**2-(4-Nitrophenyl)furan (3c).** The general procedure was used employing 1-bromo-4-nitrobenzene and potassium furan-2-yltrifluoroborate. The reaction was heated for 36 h. The product was obtained in 94% yield (44.46 mg, 0.24 mmol) as a yellow solid after silica gel chromatography (elution with

(5) Clennan, E. L.; Mehrsheikh-Mohammadi, M. E. *Mag. Reson. Chem.* **1985,** *23,* 985-987.

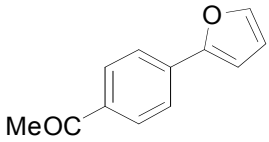
hexane/EtOAc 7:1). mp: 130-131 °C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 8.24 (d, 2H, $J$ = 9.0 Hz), 7.79 (d, 2H, $J$ = 9.0 Hz), 7.57 (m, 1H), 6.88 (dd, 1H, $J$ = 0.4, 3.5 Hz), 6.55 (dd, 1H, $J$ = 1.7, 3.4 Hz). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 151.9, 146.7, 144.3, 136.6, 124.5, 124.1, 112.6, 109.1. FT-IR (neat) 2921, 2354, 2338, 1937, 1597, 1512, 133, 1107, 1016, 852 cm$^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_{10}H_8NO_3$ ($MH^+$) 190.0498, found 190.0504.




**4-(Furan-2-yl)benzaldehyde (3d).** The general procedure was used employing 4-bromobenzaldehyde and potassium furan-2-yltrifluoroborate. The reaction was heated for 24 h. The product was obtained in 93% yield (40.0 mg, 0.23 mmol) as a yellow solid after silica gel chromatography (elution with hexane/EtOAc 7:1). $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 9.99 (s, 1H), 7.94 (d, 1H, $J$ = 8.4 Hz), 7.90 (d, 2H, $J$ = 8.4 Hz), 7.20 (d, 1H, $J$ = 3.4 Hz). 6.67 (dd, 1H, $J$ = 1.8, 3.4 Hz). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 192.7, 152.4, 145.1, 135.9, 135.3, 130.8, 124.2, 113.1, 109.6. FT-IR (neat) 3019, 2916, 2848, 1698, 1607, 1564, 1478, 1213, 1168, 1014 cm$^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_{11}H_8O_2$ ($M^+$) 172.0504, found 172.0524.



**2-*o*-Tolyfuran (3e).**[6] The general procedure was used employing 2-bromotoluene and potassium furan-2-yltrifluoroborate. The reaction was heated for 24 h. The product was obtained in 94% yield (37.15 mg, 0.24 mmol) as a colorless oil after silica gel chromatography (elution with hexane/EtOAc 20:1). $^{1}$H NMR (500 MHz, $CDCl_3$) δ 7.70 (d, 1H, *J* = 7.7), 7.52 (m, 1H), 7.29-7.19 (m, 3H), 6.55 (d, 1H, *J* = 3.3 Hz), 6.51 (dd, 1H, *J* = 1.8, 3.3 Hz), 2.51 (s, 3H). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 153.8, 141.8, 134.8, 131.3, 130.4, 127.6, 127.3, 126.1, 111.4, 108.6, 21.9. HRMS (CI) *m*/*z* calcd. for $C_{11}H_{10}O$ ($M^+$) 158.0720, found 158.0731.

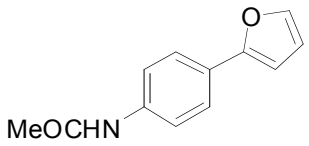


**1-(4-(Furan-2-yl)phenyl)ethanone (3f).**[7] The general procedure was used employing 1-(4-bromophenyl)ethanone and potassium furan-2-yltrifluoroborate. The reaction heated for 16 h. The product was obtained in 89% yield (41.40 mg, 0.22 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 5:1). $^{1}$H NMR (500 MHz, $CDCl_3$) δ 7.96 (d, 2H, *J* = 8.5), 7.73 (d, 2H, *J* = 8.5), 7.52 (m, 1H), 6.78 (d, 1H, *J* = 3.3 Hz), 6.50 (dd, 1H, *J* = 1.8, 3.5 Hz), 2.58 (s, 3H). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 197.4, 153.0, 143.4, 135.7, 135.0, 129.1, 123.7, 112.2, 107.6, 26.6. HRMS (ESI) *m*/*z* calcd. for $C_{12}H_{10}O_2$ ($M^+$Na) 209.0571, found 209.0578.

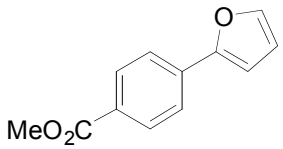
---

(6) Reuter, K. H.; Scott, W. *J. Org. Chem.* **1993,** *58,* 4722-4726.

(7) Ohta, A.; Akita, Y.; Ohkuwa, T.; Chiba M.; Fukunaga, R.; Miyafuji A.; Nakata, T.; Tani N.; Aoyagi, Y. *Heterocycles* **1990,** 31.

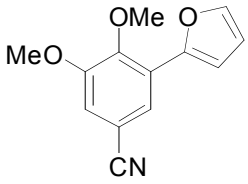



***N*-(4-(Furan-2-yl)phenyl)acetamide (3g).** The general procedure was used employing *N*-(4-bromophenyl)acetamide and potassium furan-2-yltrifluoroborate. The reaction was heated for 36 h. The product was obtained in 91% yield (45.74 mg, 0.23 mmol) as an off-white solid after silica gel chromatography (elution with hexane/EtOAc 1:3). mp: 175-177 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 10.00 (brs, 1H), 7.68 (d, 1H, $J$ = 1.5 Hz), 7.65-7.59 (m, 4H), 6.80 (d, 1H, $J$ = 3.2 Hz). 6.55 (dd, 1H, $J$ = 1.8, 3.3 Hz), 2.05 (s, 1H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 168.2, 153.0, 142.2, 138.6, 125.2, 123.8, 119.1, 111.9, 104.6, 23.9. FT-IR (neat) 3294, 2359, 1665, 1599, 1534, 1412, 1318, 1008, 800 cm$^{-1}$. HRMS (CI) *m*/*z* calcd. for $C_{12}H_{12}NO_2$ ($MH^+$) 202.0872, found 202.0868.

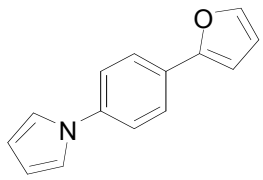



**Methyl-4-(furan-2-yl)benzoate (3h).** The general procedure was used employing methyl 4-bromobenzoate and potassium furan-2-yltrifluoroborate. The reaction was heated for 8 h. The product was obtained in 92% yield (46.47 mg, 0.23 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 10:1). mp: 116-117 $^{o}$C. $^{1}$H NMR (500 MHz, $CDCl_3$) δ 8.05 (d, 2H, $J$ = 8.5 Hz), 7.71 (d, 2H, $J$ = 8.5), 7.51 (d, 1H, $J$ = 1.0 Hz), 6.77 (d, 1H, $J$ = 3.25 Hz), 6.50 (dd, 1H, $J$ = 1.7, 3.3 Hz), 2.58 (s, 3H). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 167.0, 153.1, 143.2, 134.9, 130.2, 128.7, 123.5, 112.1, 107.3, 52.2.

FT-IR (neat) 3115, 2990, 1707, 1609, 1414, 1281, 1112, 1011 $cm^{-1}$. HRMS (CI) *m/z* calcd. for $C_{12}H_{10}O_3$ ($M^+$) 202.0632, found 202.0630.

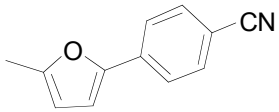



**3-(furan-2-yl)-4,5-dimethoxybenzonitrile (3i).** The general procedure was used employing 3-chloro-4,5-dimethoxybenzonitrile and potassium furan-2-yltrifluoroborate. The reaction was heated for 12 h. The product was obtained in 78% yield (44.67 mg, 0.20 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 5:1). mp: 65-67 $^oC$. $^1H$ NMR (500 MHz, $CDCl_3$) δ 7.77 (d, 1H, $J$ = 1.8 Hz), 7.50 (d, 1H, $J$ = 1.2 Hz), 7.05-7.01 (m, 2H), 6.52 (dd, 1H, $J$ = 1.8, 3.4 Hz), 3.92 (d, 6H, $J$ = 4.4 Hz). $^{13}C$ NMR (125.8 MHz, $CDCl_3$) δ 153.6, 148.8, 148.2, 142.5, 126.1, 122.9, 118.9, 113.9, 112.3, 111.5, 107.8, 60.1, 56.4. FT-IR (neat) 2945, 2224, 1583, 1492, 1465, 1334, 1294, 1263 $cm^{-1}$. HRMS (ESI) *m/z* calcd. for $C_{13}H_{11}NO_3Na$ ($M+Na^+$) 252.0625, found 252.0637.

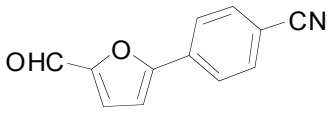



**1-(4-(Furan-2-yl)phenyl)-1*H*-pyrrole (3j).** The general procedure was used employing 1-(4-chloro)phenyl-1*H*-pyrrole and potassium furan-2-yltrifluoroborate. The reaction was heated for 16 h. The product was obtained in 99% yield (51.75 mg, 0.25 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 20:1). mp: 156-158 $^oC$. $^1H$ NMR (500 MHz, $CDCl_3$) δ 7.73 (d,

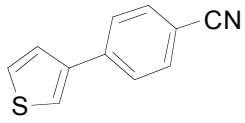
2H, $J$ = 8.7 Hz), 7.49 (d, 1H, $J$ = 1.0 Hz), 7.42 (d, 2H, $J$ = 8.7 Hz), 7.13 (t, 2H, $J$ = 2.0 Hz), 6.66 (d, 1H, $J$ = 3.0 Hz), 6.50 (dd, 1H, $J$ = 1.8, 3.4 Hz), 6.34 (t, 2H, $J$ = 2.0 Hz). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 153.4, 142.3, 139.8, 128.5, 125.1, 120.7, 119.3, 111.9, 110.7, 105.1. FT-IR (neat) 2922, 1523, 1330, 1079, 1006 $cm^{-1}$. HRMS (ESI) $m/z$ calcd. for $C_{14}H_{12}NO$ $(MH)^+$ 210.0911, found 210.0919.




**4-(5-Methylfuran-2-yl)benzonitrile (4a).** The general procedure was used employing 4-bromobenzonitrile and potassium 5-methylfuran-2-yltrifluoroborate. The reaction was heated for 8 h. The product was obtained in 95% yield (43.46 mg, 0.24 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 7:1). mp: 113-115 $^{o}$C. $^{1}$H NMR (500 MHz, $CDCl_3$) δ 7.68 (d, 2H, $J$ = 8.6 Hz), 7.61 (d, 2H, $J$ = 8.6 Hz), 6.70 (d, 1H, $J$ = 3.4 Hz), 6.11 (m, 1H), 2.39 (s, 3H). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 154.1, 150.5, 135.1, 132.7, 123.5, 119.2, 109.7, 109.5, 108.6, 13.9. FT-IR (neat) 3124, 2952, 2227, 1611, 1542, 1415, 1023, 832 $cm^{-1}$. HRMS (ESI) $m/z$ calcd. for $C_{12}H_9NONa$ $(M+Na^+)$ 206.0586, found 206.0582.



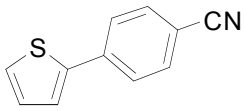

**4-(5-Formylfuran-2-yl)benzonitrile (4b).**[8] The general procedure was used employing 4-bromobenzonitrile and potassium 5-formylfuran-2-yltrifluoroborate. The reaction was heated for 48 h. The product was obtained in 39% yield (19.21 mg, 0.10 mmol) as a yellow solid after silica gel chromatography (elution with hexane/EtOAc 3:1). $^{1}$H NMR (500 MHz, $CDCl_3$) δ 9.71 (s, 1H), 7.91 (d, 2H, *J* = 8.7 Hz), 7.73 (d, 2H, *J* = 8.7 Hz), 7.34 (d, 1H, *J* = 3.6 Hz), 6.98 (d, 1H, *J* = 3.6 Hz). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 177.6, 156.8, 153.0, 133.0, 132.9, 125.7, 122.8, 118.4, 113.0, 110.2.



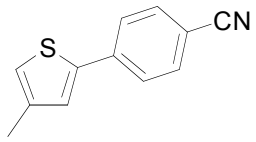

**4-(Thiophen-3-yl)benzonitrile (4c).**[9] The general procedure was used employing 4-bromobenzonitrile and potassium thiophen-3-yltrifluoroborate. The reaction was heated for 5 h. The product was obtained in 93% yield (43.07 mg, 0.23 mmol) as an off-white solid after silica gel chromatography (elution with hexane/EtOAc 7:1). $^{1}$H NMR (500 MHz, $CDCl_3$) δ 7.68-7.65 (m, 4H), 7.56 (m, 1H), 7.43 (m, 1H), 7.38 (m, 1H).$^{13}$C NMR (125.8 MHz, $CDCl_3$) δ140.5, 140.1, 132.8, 127.2, 127.0, 126.0, 122.7, 119.0, 110.6. HRMS (CI) *m*/*z* calcd. for $C_{11}H_7NS$ ($M^+$) 185.0294, found 185.0299.

(8) Hosoya, T.; Aoyama, H.; Ikemoto, T.; Kihara, Y.; Hiramatsu, T.; Endo, M.; Suzuki, M. *Bioorg. Med. Chem*. **2003,** *11*, 663-673.

(9) Billingsley, K. L.; Barder, T. E.; Buchwald, S. L. *Angew. Chem., Int. Ed.* **2007,** *46,* 5359-5363.



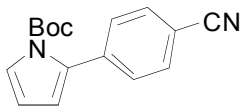

**4-(Thiophen-2-yl)benzonitrile (4d).**[10] The general procedure was used employing 4-bromobenzonitrile and potassium thiophen-2-yltrifluoroborate. The reaction was heated for 2 h. The product was obtained in 98% yield (45.31 mg, 0.25 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 5:1). $^{1}$H NMR (500 MHz, $CDCl_3$) δ 7.68 (d, 2H, *J* = 7.1 Hz), 7.63 (d, 2H, *J* = 7.1 Hz), 7.43-7.37 (m, 2H), 7.12 (m, 1H).$^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 142.2, 138.8, 132.8, 128.6, 127.2, 126.2, 125.2, 118.9, 110.7.



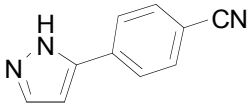

**4-(5-Methylthiophen-2-yl)benzonitrile (4e).** The general procedure was used employing 4-chlorobenzonitrile and potassium 4-methylthiophen-2-yltrifluoroborate. The reaction was heated for 12 h. The product was obtained in 74% yield (36.0 mg, 0.19 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 7:1). mp: 101-103 $^{o}$C. $^{1}$H NMR (500 MHz, $CDCl_3$) δ 7.65 (d, 2H, *J* = 8.6 Hz), 7.64 (d, 2H, *J* = 8.6 Hz), 7.22 (m, 1H), 6.97 (m, 1H), 2.30 (s, 3H).$^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 141.8, 139.4, 139.0, 132.8, 127.6, 126.0, 122.7, 119.0, 110.6, 15.9. FT-IR (neat) 3081, 2924, 2358,

(10) Denmark, S. E.; Baird, J. D.; Regens, C. S. *J. Org. Chem*. **2008,** *73,* 1440-1455.

2225, 1604, 1504, 1430, 1408, 1110 $cm^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_{13}H_{10}NS$ ($MH^+$) 200.0526, found 200.0534.

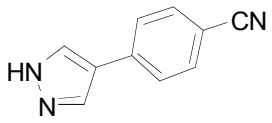



***tert*-Butyl 2-(4-cyanophenyl)-1*H*-pyrrole-1-carboxylate (4f).** The general procedure was used employing 4-bromobenzonitrile and potassium 1-(*tert*-butoxycarbonyl)-1*H*-pyrrol-2-yltrifluoroborate. The reaction was heated for 5 h. The product was obtained in 90% yield (60.33 mg, 0.23 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 2:1). mp: 110-112 °C. $^1$H NMR (500 MHz, $CDCl_3$) δ 7.64 (d, 2H, *J* = 8.0 Hz), 7.45 (d, 2H, *J* = 8.0 Hz), 7.38 (m, 1H), 6.27-6.24 (m, 2H), 1.41 (s, 9H). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 149.0, 138.0, 133.2, 131.5, 129.7, 124.1, 119.1, 116.2, 111.2, 110.7, 84.5, 27.8. FT-IR (neat) 3465, 3152, 3111, 2980, 2227, 1746, 1608, 1507, 1467, 1370, 1313, 1147 $cm^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_{16}H_{17}N_2O_2$ ($MH^+$) 269.1295, found 269.1290.

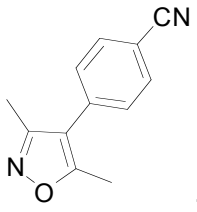



**4-(1*H*-Pyrazol-5-yl)benzonitrile (4g).** The general procedure was used employing 4-chlorobenzonitrile and potassium 1*H*-pyrazol-5-yltrifluoroborate. The reaction was heated for 48 h. The product was obtained in 84% yield (38.89 mg, 0.23 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 1:2). mp: 139-140 °C. $^1$H NMR (500 MHz, $CDCl_3$) δ 7.91 (d, 2H, *J* = 8.5 Hz), 7.70 (d, 2H, *J* = 8.5 Hz), 7.66 (d, 1H, *J* = 2.4 Hz), 6.70 (d, 1H, *J* = 2.4 Hz). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ

137.5, 132.7, 131.2, 126.3, 118.8, 111.4, 103.6. FT-IR (neat) 3262, 2221, 1610, 1448, 1186, 1052 $cm^{-1}$. HRMS (CI) *m*/*z* calcd. for $C_{10}H_7N_3$ ($M^+$) 169.0637, found 169.0639.

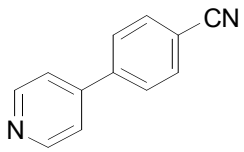



**4-(1*H*-Pyrazol-4-yl)benzonitrile (4h).** The general procedure was used employing 4-chlorobenzonitrile and potassium 1*H*-pyrazol-4-yltrifluoroborate. The reaction was heated for 48 h. The product was obtained in 37% yield (15.64 mg, 0.09 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 1:2). mp: 155-157 °C. $^1$H NMR (500 MHz, $CDCl_3$) δ 7.94-7.92 (m, 2H), 7.67 (d, 2H, *J* = 8.5 Hz), 7.61 (d, 2H, *J* = 8.5 Hz). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 137.3, 133.0, 126.2, 119.1, 110.1. FT-IR (neat) 3162, 2927, 2358, 228, 1609, 1573, 1374, 833 $cm^{-1}$. HRMS (CI) *m*/*z* calcd. for $C_{11}H_8N_3$ ($MH^+$) 170.0759, found 170.0718.

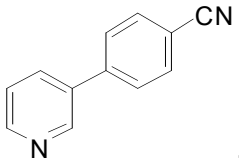



**4-(3,5-Dimethylisoxazol-4-yl)benzonitrile (4i).** The general procedure was used employing 4-chlorobenzonitrile and potassium 3,5-dimethylisoxazol-4-yltrifluoroborate. The reaction was heated for 12 h. The product was obtained in 71% yield (35.16 mg, 0.18 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 2:1). $^1$H NMR (500 MHz, $CDCl_3$) δ 7.73 (d, 2H, *J* = 8.3 Hz), 7.38 (d, 2H, *J* = 8.3 Hz), 2.42 (s, 3H), 2.28 (s, 3H). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 166.2, 158.2, 135.7,

132.8, 129.7, 118.6, 111.6, 29.8, 11.8, 10.9. FT-IR (neat) 2924, 2853, 2224, 1633, 1426, 1244 $cm^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_{12}H_{10}N_2ONa$ ($M+Na^+$) 221.0683, found 221.0691.




**4-(Pyridin-4-yl)benzonitrile (5a).**[11] The general procedure was used employing 4-bromobenzonitrile and potassium pyridin-4-yltrifluoroborate. The reaction was heated for 12 h. The product was obtained in 90% yield (40.52 mg, 0.23 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 1:2). $^1$H NMR (500 MHz, $CDCl_3$) δ 8.69 (d, 2H, *J* = 5.4 Hz), 7.76 (d, 2H, *J* = 8.5 Hz), 7.70 (d, 2H, *J* = 8.5 Hz), 7.47 (d, 2H, *J* = 6.1 Hz).$^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 150.7, 146.4, 142.7, 132.9, 127.8, 121.6, 118.4, 112.9. HRMS (ESI) *m*/*z* calcd. for $C_{12}H_9N_2$ ($MH^+$) 181.0763, found 181.0766.

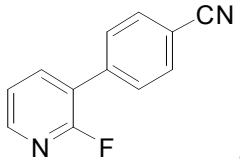



**4-(Pyridin-3-yl)benzonitrile (5b).**[12] The general procedure was used employing 4-bromobenzonitrile and potassium pyridin-3-yltrifluoroborate. The reaction was heated for 16 h. The product was obtained in 75% yield (39.62 mg, 0.22 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 2:1). $^1$H NMR (500 MHz, $CDCl_3$) δ 8.83 (s, 1H), 8.64 (d, 1H, *J* = 4.6 Hz), 7.87 (m, 1H),

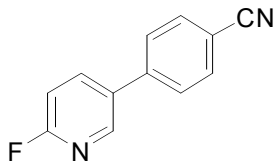
(11) Cho, S.-D.; Kim, H.-K; Yim, H.-S; Kim, M.-R.; Lee, J.-K.; Kim, J.-J.; Yoon, Y.-J. *Tetrahedron* **2006,** *63*, 1345-1352.

(12) Sase, S.; Jaric, M.; Metzger, A.; Malakhov, V.; Knochel, P. *J. Org. Chem*. **2008,** *73,* 7380-7382.

7.75 (d, 2H, *J* = 8.5 Hz), 7.67 (d, 2H, *J* = 8.5 Hz), 7.39 (m, 1H). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 149.9, 148.3, 142.4, 134.8, 134.5, 132.9, 127.9, 123.8, 118.6, 112.0. HRMS (ESI) *m*/*z* calcd. for $C_{12}H_8N_2$ ($MH^+$) 181.0763, found 181.0766.

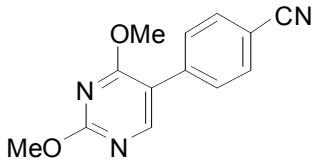



**4-(2-Fluoropyridin-3-yl)benzonitrile (5c).** The general procedure was used employing 4-bromobenzonitrile and potassium 2-fluoropyridin-3-yltrifluoroborate. The reaction was heated for 12 h. The product was obtained in 73% yield (37.17 mg, 0.18 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 4:1). $^1$H NMR (500 MHz, $CDCl_3$) δ 8.27 (m, 1H), 7.88 (m, 1H), 7.75 (d, 2H, *J* = 7.6 Hz), 7.68 (d, 2H, *J* = 7.6 Hz), 7.33 (m, 1H). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 161.3, 159.3, 148.0 (d, *J* = 14.9 Hz), 147.9, 140.8, 140.8, 138.6, 132.6, 129.7, 129.6, 122.2, 122.2, 122.1, 118.5, 112.5. $^{19}$F NMR (470.8 MHz $CDCl_3$) δ -70.7. FT-IR (neat) 2920, 2227, 1602, 1439, 1399, 1245, 843 $cm^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_{13}H_8FN_2$ ($MH^+$) 199.0668, found 199.0672.

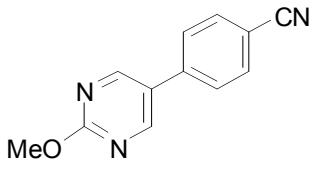



**4-(6-Fluoropyridin-3-yl)benzonitrile (5d).** The general procedure was used employing 4-bromobenzonitrile and potassium 6-fluoropyridin-3-yltrifluoroborate. The reaction was heated for 12 h. The product was obtained in 61% yield (30.23 mg, 0.15 mmol) as a white solid after silica gel

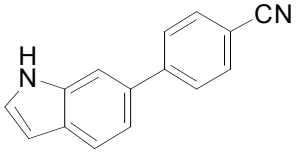
chromatography (elution with hexane/EtOAc 3:1). mp: 163-165 °C. $^{1}$H NMR (500 MHz, $CDCl_3$) δ 8.44 (m, 1H), 7.99 (m, 1H), 7.76 (d, 2H, $J$ = 8.3 Hz), 7.65 (d, 2H, $J$ = 8.3 Hz), 7.10 (m, 1H). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 164.8, 162.9, 146.3 (d, $J$ = 14.9 Hz), 141.2, 140.0, 139.9, 133.0, 132.0, 127.8, 118.5, 112.2, 110.2, 109.9. $^{19}$F NMR (470.8 MHz, $CDCl_3$) δ -68.5. FT-IR (neat) 3049, 2225, 1589, 1480, 1369, 1249, 823 cm$^{-1}$. HRMS (ESI) $m/z$ calcd. for $C_{13}H_8FN_2$ ($MH^+$) 199.0672, found 199.0672.



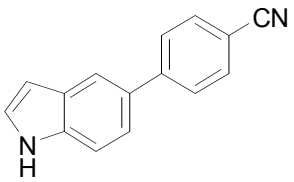

**4-(2,4-Dimethoxypyrimidin-5-yl)benzonitrile (5e).** The general procedure was used employing 4-bromobenzonitrile and potassium 2,4-dimethoxypyrimidin-5-yltrifluoroborate. The reaction was heated for 12 h. The product was obtained in 88% yield (50.70 mg, 0.22 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 2:1). mp: 145-146 °C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 8.48 (s, 1H), 7.90 (d, 2H, $J$ = 8.5 Hz), 7.76 (d, 2H, $J$ = 8.5 Hz), 3.97 (d, 6H, $J$ = 2.6 Hz). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 167.4, 164.6, 158.3, 137.9, 132.2, 129.4, 118.7, 113.8, 110.0, 54.6, 54.1. FT-IR (neat) 2960, 2227, 1603, 1563, 1468, 1400, 1080 cm$^{-1}$. HRMS (ESI) $m/z$ calcd. for $C_{14}H_{12}N_3O_2$ ($MH^+$) 242.0917, found 242.0939.



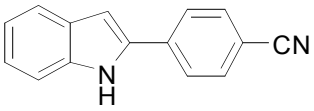

**4-(2-Methoxypyrimidin-5-yl)benzonitrile (5f).** The general procedure was used employing 4-chlorobenzonitrile and potassium 2-methoxypyrimidin-5-yltrifluoroborate. The reaction was heated for 12 h. The product was obtained in 96% yield (50.70 mg, 0.24 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 5:1). mp: 180-181 $^{o}$C. $^{1}$H NMR (500 MHz, $CDCl_3$) δ 8.74 (s, 2H), 7.76 (d, 2H, $J$ = 8.2 Hz), 7.63 (d, 2H, $J$ = 8.2 Hz), 4.07 (s, 3H). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 165.8, 157.6, 139.2, 133.2, 127.1, 126.7, 118.5, 112.2, 55.4. FT-IR (neat) 3000, 2227, 1612, 1477, 1415, 1033, 840 cm$^{-1}$. HRMS (CI) *m*/*z* calcd. for $C_{12}H_{10}N_3O$ ($MH^+$) 212.0832, found 212.0824.




**4-(1*H*-indol-6-yl)benzonitrile (6a).** The general procedure was used employing 4-bromobenzonitrile and potassium 1*H*-indol-6-yltrifluoroborate. The reaction was heated for 8 h. The product was obtained in 96% yield (48.02 mg, 0.22 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 2:1). mp: 181-183 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 7.90-7.88 (m, 4H), 7.74 (m, 1H), 7.66 (d, 1H, $J$ = 8.6 Hz), 7.44 (m, 1H), 7.38 (m, 1H), 6.48 (m, 1H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 146.2, 136.3, 133.7, 131.2, 128.1, 127.3, 127.2, 120.7, 119.0, 118.2, 110.0, 108.8, 101.1. FT-IR (neat) 3392, 2354, 2221, 1351, 814 cm$^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_{15}H_{11}N_2$ ($MH^+$) 219.0924, found 219.0922.

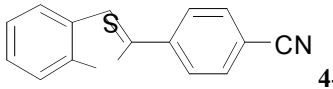



**4-(1*H*-Indol-5-yl)benzonitrile (6b).** The general procedure was used employing 4-bromobenzonitrile and potassium 1*H*-indol-5-yltrifluoroborate. The reaction was heated for 6 h. The product was obtained in 98% yield (52.38 mg, 0.24 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 4:1). mp: 176-178 $^{o}$C. $^{1}$H NMR (500 MHz, $CDCl_3$) δ 8.27 (brs, 1H), 7.88 (m, 1H), 7.72 (dd, 4H, *J* = 8.4, 18.4 Hz), 7.50 (d, 1H, *J* = 8.5 Hz), 7.44 (m, 1H), 7.28 (m, 1H), 6.64 (m, 1H).$^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 147.3, 136.1, 132.6, 131.4, 128.7, 127.9, 125.5, 121.7, 119.9, 119.4, 111.8, 109.9, 103.4. FT-IR (neat) 3333, 2366, 2229, 1600, 1318, 1095 cm$^{-1.}$ HRMS (CI) *m*/*z* calcd. for $C_{15}H_{10}N_2$ ($M^+$) 218.0830, found 218.0844.

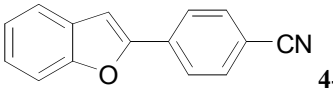



**4-(1*H*-Indol-2-yl)benzonitrile (6c).** The general procedure was used employing 4-chlorobenzonitrile and potassium 1-(*tert*-butoxycarbonyl)-1*H*-indol-2-yltrifluoroborate. The reaction was heated for 6 h. The product was obtained in 81% yield (50.66 mg, 0.22 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 4:1). mp: 190-191 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 8.04 (d, 2H, *J* = 8.2 Hz), 7.90 (d, 2H, *J* = 8.2 Hz), 7.58 (d, 1H, *J* = 7.8 Hz), 7.44 (d, 1H, *J* = 8.0 Hz), 7.18-7.12 (m, 2H), 7.04 (m, 1H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 137.6, 136.5, 135.5, 132. 8, 128.3, 125.3, 122.7,

120.6, 119.7, 118.9, 111.5, 109.1, 101.5. FT-IR (neat) 3049, 2221, 1299, 833, 790 $cm^{-1}$. HRMS (ESI) *m/z* calcd. for $C_{15}H_9N_2$ ($M\text{-}H^-$) 217.0764, found 217.0766.

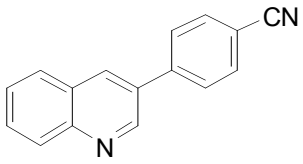



**4-(Benzo[*b*]thiophen-2-yl)benzonitrile (6d).** The general procedure was used employing 4-chlorobenzonitrile and potassium benzo[*b*]thiophen-2-yltrifluoroborate. The reaction was heated for 7 h. The product was obtained in 82% yield (48.24 mg, 0.21 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 20:1). mp: 182-184 $^oC$. $^1H$ NMR (500 MHz, $CDCl_3$) δ 7.85 (m, 1H), 7.83-7.79 (m, 3H), 7.70 (d, 2H, *J* = 8.5 Hz), 7.66 (s, 1H), 7.41-7.34 (m, 2H). $^{13}C$ NMR (125.8 MHz, $CDCl_3$) δ 141.9, 140.5, 140.2, 138.9, 132.9, 126.9, 125.5, 125.1, 124.3, 122.6, 122.0, 118.8, 111.6. FT-IR (neat) 2917, 2849, 2225.4, 1431, 1232, 1334, 823 $cm^{-1}$. HRMS (ESI) *m/z* calcd. for $C_{15}H_9NS$ ($M^+$) 235.0452, found 235.0456.

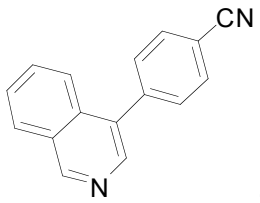



**4-(Benzofuran-2-yl)benzonitrile (6e).** The general procedure was used employing 4-chlorobenzonitrile and potassium benzofuran-2-yltrifluoroborate. The reaction was heated for 12 h. The product was obtained in 92% yield (47.43 mg, 0.23 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 10:1). $^1H$ NMR (500 MHz, $CDCl_3$) δ 7.90 (d, 2H, *J* = 8.3 Hz), 7.68 (d, 2H, *J* = 8.3 Hz), 7.61 (d, 1H, *J* = 7.5 Hz), 7.53 (d, 1H, *J* = 8.3 Hz), 7.35 (m, 1H), 7.27 (m, 1H), 7.14 (s, 1H). $^{13}C$ NMR (125.8 MHz, $CDCl_3$) δ 155.4, 153.6, 134.5, 132.7, 128.8, 125.7, 125.2, 123.6, 121.6, 118.8,

111.6, 111.5, 104.4. FT-IR (neat) 2924, 2853, 2226, 1608, 1449, 1265, 812 $cm^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_{15}H_9NO$ ($M^+$) 219.0680, found 219.0684.

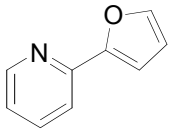



**4-(Quinolin-3-yl)benzonitrile (6f).** The general procedure was used employing 4-bromobenzonitrile and potassium quinolin-3-yltrifluoroborate. The reaction was heated for 12 h. The product was obtained in 88% yield (57.57 mg, 0.22 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 2:1). mp: 161-163 $^oC$. $^1H$ NMR (500 MHz, $CDCl_3$) 9.16 (d, 1H, *J* = 2.2 Hz), 8.33 (d, 1H, *J* = 2.2 Hz), 8.16 (d, 1H, *J* = 8.4 Hz), 7.91 (d, 1H, *J* = 7.9 Hz), 7.82 (m, 4H), 7.78 (m, 1H), 7.62 (m, 1H). $^{13}C$ NMR (125.8 MHz, $CDCl_3$) δ149.3, 148.1, 142.6, 134.1, 133.1, 132.0, 130.4, 129.6, 128.3, 128.2, 127.9, 127.7, 118.7, 112.1. FT-IR (neat) 3031, 2360, 2226, 1603, 1492, 1363, 834 $cm^{-1}$. HRMS (ESI) *m*/*z* calcd. for $C_{16}H_{10}N_2$ ($M^+$) 230.0837, found 230.0844.

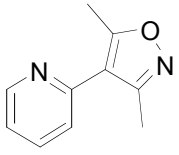



**4-(Isoquinolin-3-yl)benzonitrile (6g)**. The general procedure was used employing 4-chlorobenzonitrile and potassium isoquinolin-3-yltrifluoroborate. The reaction was heated for 24 h. The product was obtained in 85% yield (mg, mmol) as a light pink solid after silica gel chromatography (elution

with hexane/EtOAc 2:1). mp: 100-101 °C. $^1$H NMR (500 MHz, $CDCl_3$) 9.31 (s, 1H), 8.47 (s, 1H), 8.08 (d, 1H, $J$ = 8.0 Hz), 7.87-7.77 (m, 3H), 7.76-7.60 (m, 4H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 153.2, 143.0, 142.2, 133.7, 132.6, 131.3, 131.0, 128.4, 127.8, 124.1, 118.7, 112.2. FT-IR (neat) 3582, 3042, 2226, 1606, 1508, 1390, 841 1cm$^{-1}$. HRMS (ESI) *m/z* calcd. for $C_{16}H_{11}N_2$ ($MH^+$) 231.0919, found 231.0922.



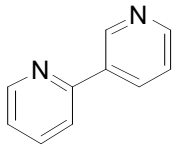
**2-(Furan-2-yl)pyridine (7a).**[13] The general procedure was used employing 2-chloropyridine and potassium furan-2-yltrifluoroborate. The reaction was heated for 28 h. The product was obtained in 67% yield (24.48 mg, 0.17 mmol) as a colorless oil after silica gel chromatography (elution with hexane/EtOAc 3:1). $^1$H NMR (500 MHz, $CDCl_3$) δ 8.58 (d, 1H, $J$ = 4.8 Hz), 7.71-7.66 (m, 2H), 7.52 (m, 1H), 7.13 (m, 1H), 7.04 (d, 1H, $J$ = 3.4 Hz), 6.52 (m, 1H). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 153.8, 149.7, 149.6, 143.4, 136.7, 122.0, 118.7, 112.2, 108.7.



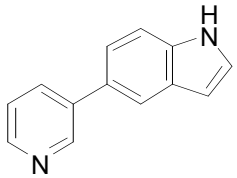
**3,5-Dimethyl-4-(pyridine-2-yl)isoxazole (7b)**.The general procedure was used employing 2-chloropyridine and potassium 3,5-dimethylisoxazol-4-yltrifluoroborate. The reaction was heated for 16 h. The product was obtained in 95% yield (41.37 mg, 0.24 mmol) as a white solid after silica gel

(13) Wang, L.; Wang, Z.-X. *Org. Lett.* **2007,** *9,* 4335-4338.

chromatography (elution with hexane/EtOAc 1:1). $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 8.66 (dd, 1H, $J$ = 0.8, 4.7 Hz), 7.72 (m, 1H), 7.30 (d, 1H, $J$ = 7.9 Hz), 7.20 (m, 1H), 2.55 (s, 3H), 2.40 (s, 3H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 167.4, 158.8, 151.0, 150.0, 136.5, 123.0, 121.8, 116.2, 12.4, 11.5. FT-IR (neat) 2926, 1624, 1587, 1565, 1469, 1428, 1245, 1035, 791 cm$^{-1}$. HRMS (ESI) $m/z$ calcd. for $C_{10}H_{10}NO_2$ ($M^+$) 174.0798, found 174.0793.



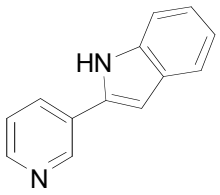
**2,3'-Bipyridine (7c).**[14] The general procedure was used employing 2-chloropyridine and potassium pyridin-3-yltrifluoroborate. The reaction was heated for 16 h. The product was obtained in 82% yield (32.02 mg, 0.21 mmol) as a colorless oil after silica gel chromatography (elution with hexane/EtOAc 5:1). $^{1}$H NMR (500 MHz, $CDCl_3$) δ 9.16 (m, 1H), 8.69 (d, 1H, $J$ = 4.7 Hz), 8.62 (d, 1H, $J$ = 4.6 Hz), 8.28 (m, 1H), 7.78-7.68 (m, 2H), 7.35 (m, 1H), 7.25 (m, 1H). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 154.9, 150.2, 150.0, 148.4, 137.0, 135.0 134.4, 123.6, 122.9, 120.7.



**6-(Pyridin-3-yl)-1*H*-indole (7d).** The general procedure was used employing 3-choloropyridine and potassium 1*H*-indol-6-yltrifluoroborate. The reaction was heated for 16 h. The product

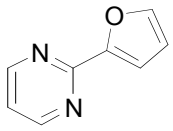
(14) Cioffi, C. L.; Spencer, W. T.; Richards, J. J.; Herr, R. J. *J. Org. Chem*. **2004,** *69,* 2210.

was obtained in 93% yield (45.12 mg, 0.23 mmol) solid as a white solid after silica gel chromatography (elution with hexane/EtOAc 2:1). mp: 146-148 $^{o}$C. $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 8.90 (s, 1H), 8.50 (d, 1H, $J$ = 4.5 Hz), 8.04 (m, 1H), 7.89 (m, 1H), 7.53 (m, 1H), 7.45-7.39 (m, 3H), 6.52 (m, 1H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 147.6, 147.2, 137.2, 135.8, 133.8, 128.3, 128.0, 126.3, 123.7, 120.2, 118.5, 112.1, 101.6. FT-IR (neat) 3582, 2917, 2351, 1713, 1681, 1650, 1632, 1555, 1537, 1503, 1469, 1019, 797 cm$^{-1}$. HRMS (CI) *m*/*z* calcd. for $C_{13}H_{10}N_2$ ($M^+$) 194.0837, found 194.0844.

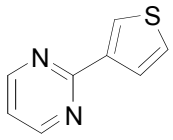



**2-(Pyridin-3-yl)-1*H*-indole (7e).**[15] The general procedure was used employing 3-chloropyridine and potassium 1-(*tert*-butoxycarbonyl)-1*H*-indol-2-yltrifluoroborate. The reaction was heated for 16 h. The product was obtained in 57% yield (27.65 mg, 0.14 mmol) as a yellow solid after silica gel chromatography (elution with hexane/EtOAc 1:2). $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 8.90 (d, 1H, $J$ = 1.6 Hz), 8.50 (dd, 1H, $J$ = 1.3, 4.6 Hz), 8.20 (m, 1H), 7.56 (d, 1H, $J$ = 7.9 Hz), 7.48 (m, 1H), 7.42 (m, 1H), 7.13 (m, 1H), 7.04-7.01 (m, 2H). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 148.1, 146.2, 137.3, 134.5, 132.0, 128.4, 128.1, 123.8, 122.0, 119.6, 111.4, 99.8.

(15) Kraus, G. A.; Guo, H. *Org. Lett.* **2008,** *10,* 3061-3063.

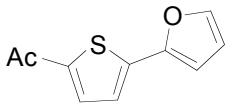


**2-(Furan-2-yl)pyrimidine (7f).** The general procedure was used employing 2-chloropyrimidine and potassium furan-2-yltrifluoroborate. The reaction was heated for 16 h. The product was obtained in 92% yield (33.59 mg, 0.23 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 1:1). mp: 67-69 $^{o}$C. $^{1}$H NMR (500 MHz, $CDCl_3$) δ 8.74 (d, 2H, $J$ = 4.9 Hz), 7.62 (d, 1H, $J$ = 0.77 Hz), 7.33 (d, 1H, $J$ = 3.4 Hz), 7.11 (m, 1H), 6.57 (dd, 1H, $J$ = 1.7, 3.5 Hz). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 158.0, 157.5, 145.3, 118.8, 113.6, 112.4. FT-IR (neat) 3428, 3112, 3043, 2926, 1566, 1487, 1435, 1318, 1219, 1168, 1105, 1008, 802 cm$^{-1}$. HRMS (CI) $m/z$ calcd. for $C_8H_6N_2O$ ($M^+$) 146.0479, found 146.0480.

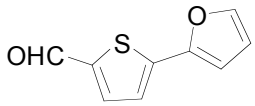


**2-(Thiophen-3-yl)pyrimidine (7g).**[16] The general procedure was used employing 2-chloropyrimidine and potassium thiophen-3-yltrifluoroborate. The reaction was heated for 12 h. The product was obtained in 52% yield (21.09 mg, 0.13 mmol) as a white solid after silica gel chromatography (elution with hexane/EtOAc 7:1). $^{1}$H NMR (500 MHz, $CDCl_3$) δ 8.72 (d, 2H, $J$ = 4.8 Hz), 8.29 (m, 1H), 7.89 (d, 1H $J$ = 5.0 Hz), 7.37 (m, 1H), 7.10 (m, 1H).$^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 162.2, 157.4, 141.8, 128.1, 127.5, 126.2, 118.7.

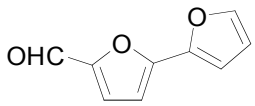
(16) Billingsley, K.; Buchwald S. L. *J. Am. Chem. Soc.* **2007,** *129,* 3358-3366.




**1-(5-(Furan-2-yl)thiophen-2-yl)ethanone (7h).** The general procedure was used employing 5-acetyl-2-chlorothiophene and potassium furan-2-yltrifluoroborate. The reaction was heated for 16 h. The product was obtained in 77% yield (36.97 mg, 0.19 mmol) as a light yellow solid after silica gel chromatography (elution with hexane/EtOAc 1:2). mp: 103-105 $^{o}$C. $^{1}$H NMR (500 MHz, $CDCl_3$) δ 7.59 (d, 1H, $J$ = 1.5 Hz), 7.46 (m, 1H), 7.20 (d, 1H, $J$ = 1.5 Hz), 6.67 (m, 1H), 6.48 (m, 1H), 2.54 (s, 3H). $^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 190.5, 148.7, 143.2, 142.4, 141.6, 133.3, 123.0, 108.1, 26.7. FT-IR (neat) 3140, 2349, 1632, 1487, 1337, 1203, 1076, 1023 cm$^{-1}$. HRMS (ESI) $m/z$ calcd. for $C_9H_5O_2S$ (M-Me) 177.0010, found 177.0010.

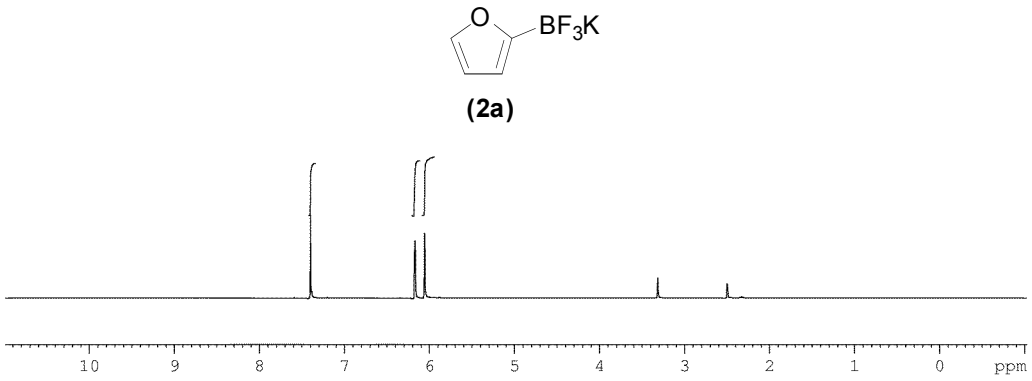



**5-(Furan-2-yl)thiophene-2-carbaldehyde (7i).** The general procedure was used employing 5-formyl-2-chlorothiophene and potassium furan-2-yltrifluoroborate. The reaction was heated for16 h. The product was obtained in 64% yield (27.87 mg, 0.16 mmol) as a light orange solid after silica gel chromatography (elution with hexane/EtOAc 20:1). $^{1}$H NMR (500 MHz, DMSO-$d_6$) δ 9.88 (s, 1H), 7.98 (d, 1H, $J$ = 4.0 Hz), 7.81 (m, 1H), 7.54 (d, 1H, $J$ = 4.0 Hz), 7.09 (d, 1H, $J$ = 3.4 Hz), 6.66 (dd, 1H, $J$ = 1.7, 3.3 Hz). $^{13}$C NMR (125.8 MHz, DMSO-$d_6$) δ 184.1, 147.7, 144.7, 141.4, 141.2, 139.1, 124.0, 109.8. HRMS (ESI) $m/z$ calcd. for $C_{10}H_7O_2S$ ($MH^+$) 179.0180, found 179.0167.



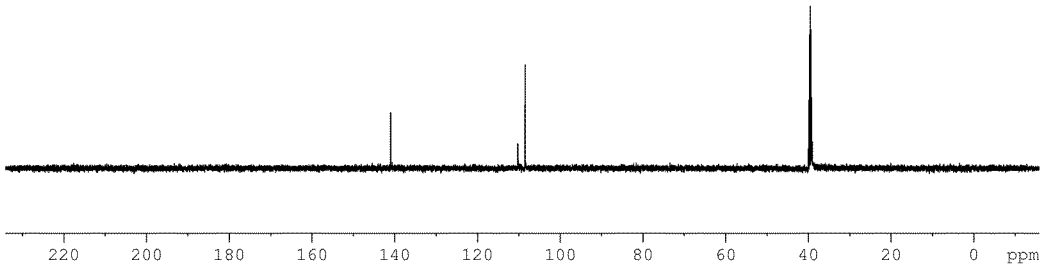

**2,2'-Bifuran-5-carbaldheyde (7j).**[17] The general procedure was used employing 5-formyl-2-chlorofuran and potassium furan-2-yltrifluoroborate. The reaction was heated for 16 h. The product was obtained in 81% yield (32.81mg, 0.20 mmol) as an orange solid after silica gel chromatography (elution with hexane/EtOAc 7:1). $^{1}$H NMR (500 MHz, $CDCl_3$) δ 9.61 (s, 1H), 7.59 (m, 1H), 7.28 (d, 1H, $J$ = 3.7 Hz), 6.89 (d, 1H, $J$ = 3.4 Hz), 6.71 (d, 1H, $J$ = 3.7 Hz), 6.51 (dd, 1H, $J$ = 1.8, 3.5 Hz).$^{13}$C NMR (125.8 MHz, $CDCl_3$) δ 177.0, 151.8, 151.5, 145.0, 144.1, 123.4, 112.2, 109.7, 107.5.

(17) Parry, P R.; Bryce, M. R.; Tarbit, B. *Org. Biomol. Chem.* **2003,** *1,* 1447-1449.

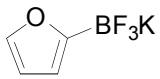



**(2a)**

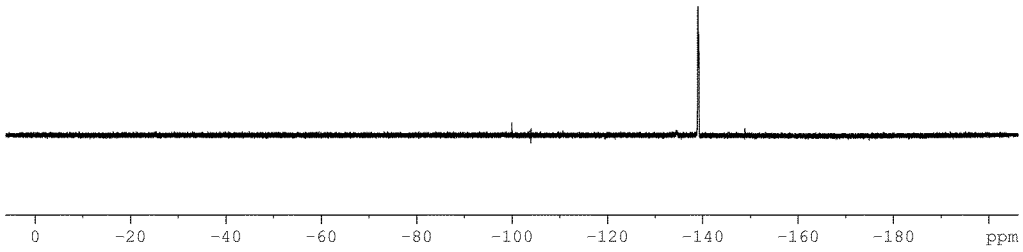
$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Furan-2-yltrifluoroborate **(2a)**



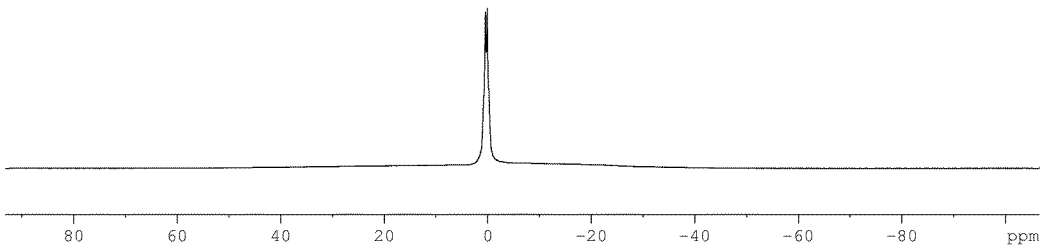

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium Furan-2-yltrifluoroborate **(2a)**



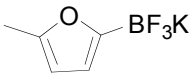

**(2a)**



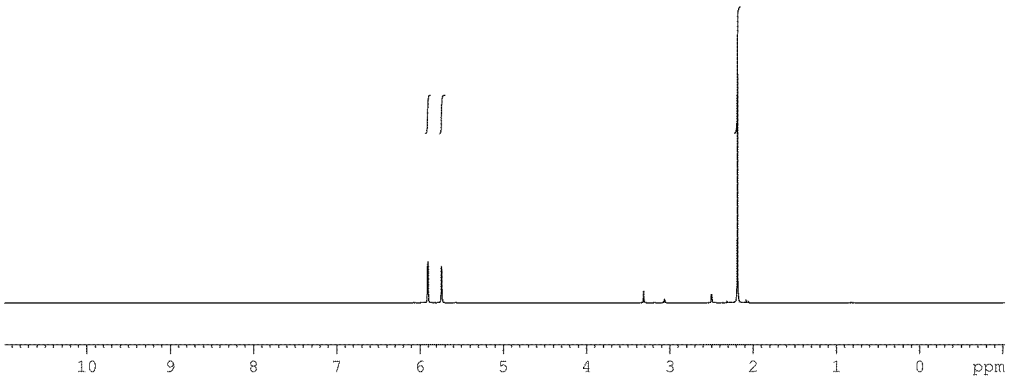

$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium Furan-2-yltrifluoroborate **(2a)**



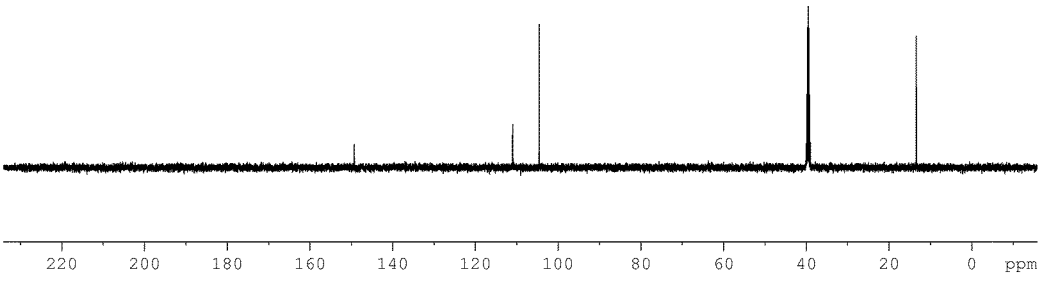

$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium Furan-2-yltrifluoroborate **(2a)**



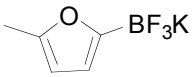

**(2b)**



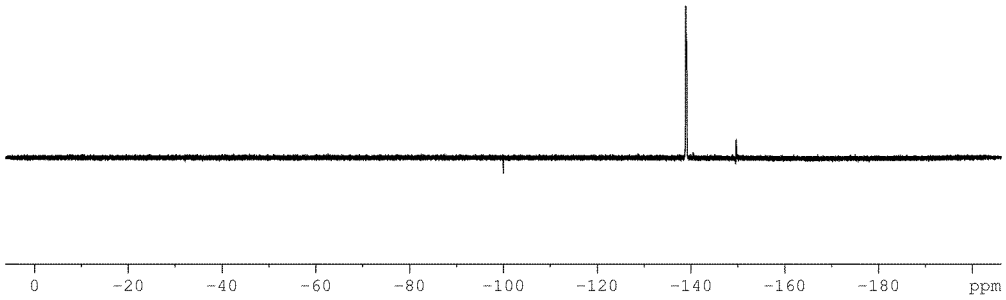

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium 5-Methylfuran-2-yltrifluoroborate **(2b)**



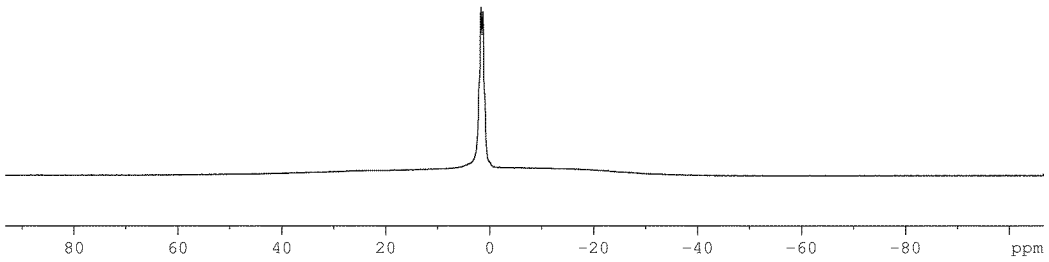

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium 5-Methylfuran-2-yltrifluoroborate **(2b)**



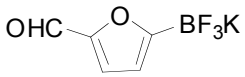

**(2b)**



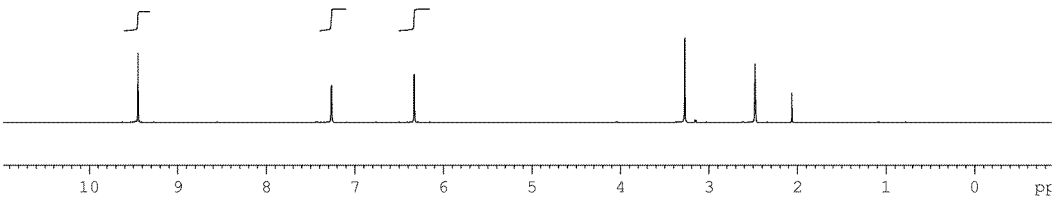

$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium 5-Methylfuran-2-yltrifluoroborate **(2b)**



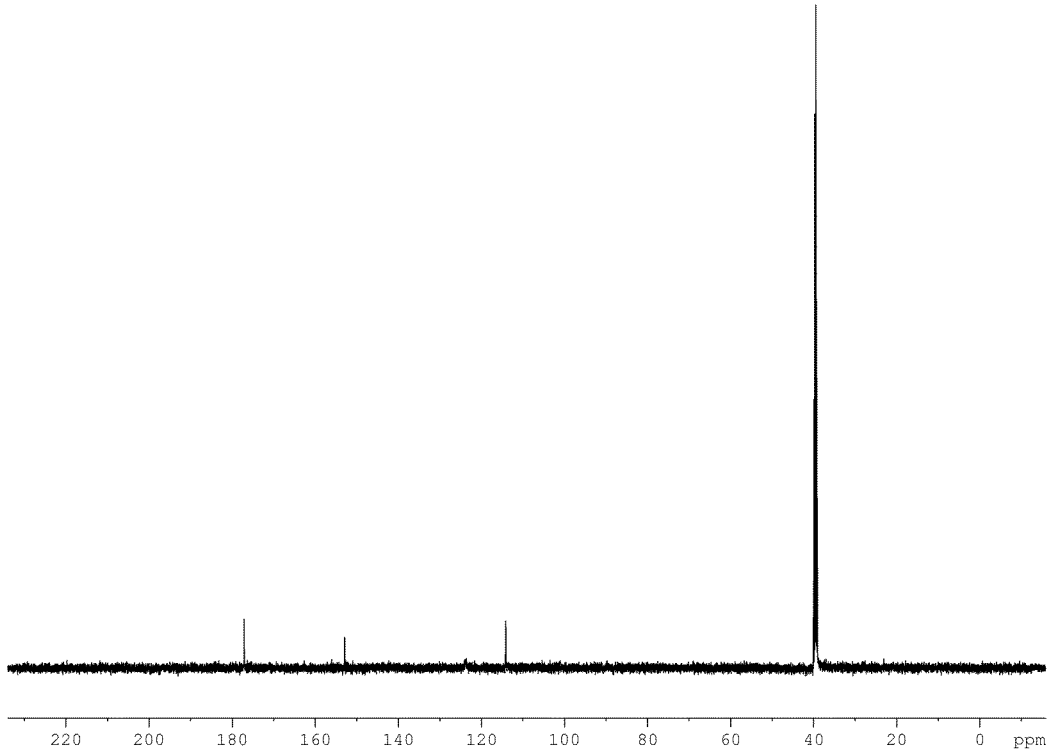

$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium 5-Methylfuran-2-yltrifluoroborate **(2b)**



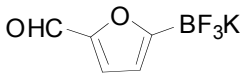

**(2c)**



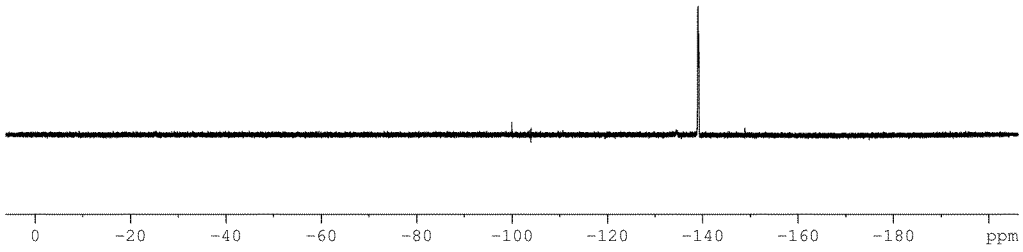

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium 5-Formylfuran-2-yltrifluoroborate **(2c)**



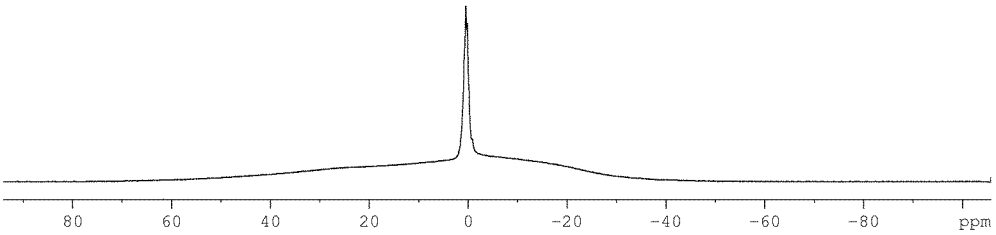

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium 5-Formylfuran-2-yltrifluoroborate **(2c)**




**(2c)**

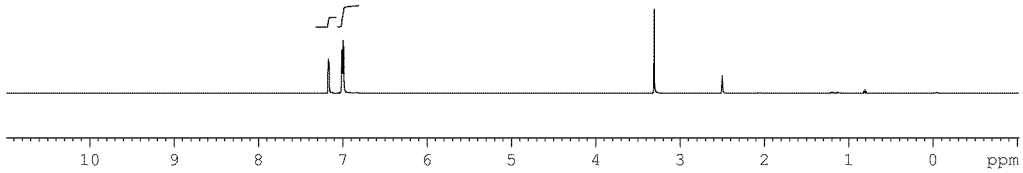



$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium 5-Formylfuran-2-yltrifluoroborate **(2c)**

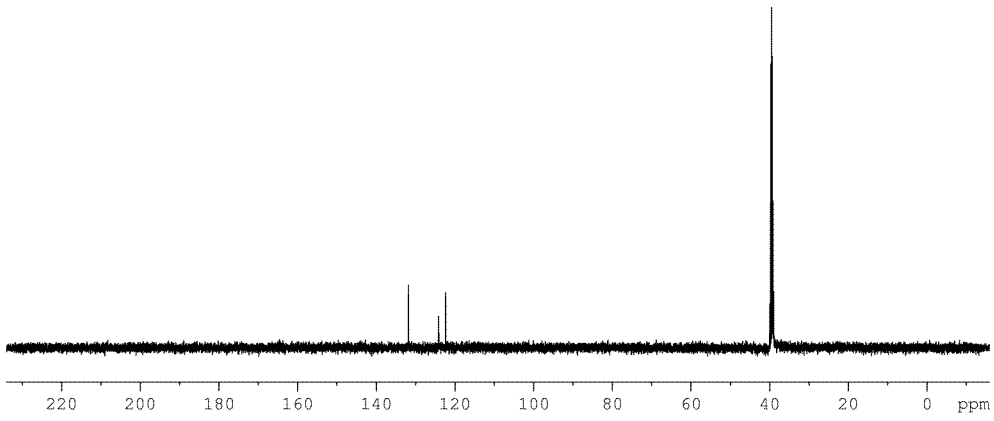



$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium 5-Formylfuran-2-yltrifluoroborate **(2c)**

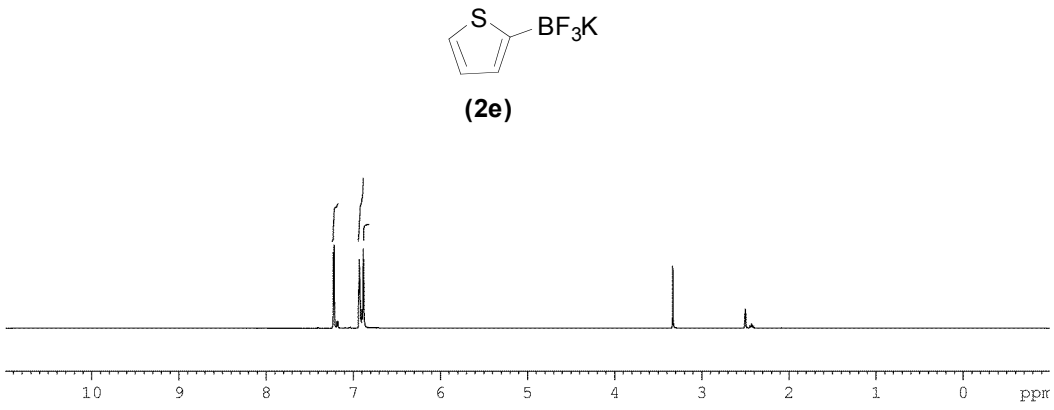

**(2d)**




$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium Thiophen-3-yltrifluoroborate (**2d**)

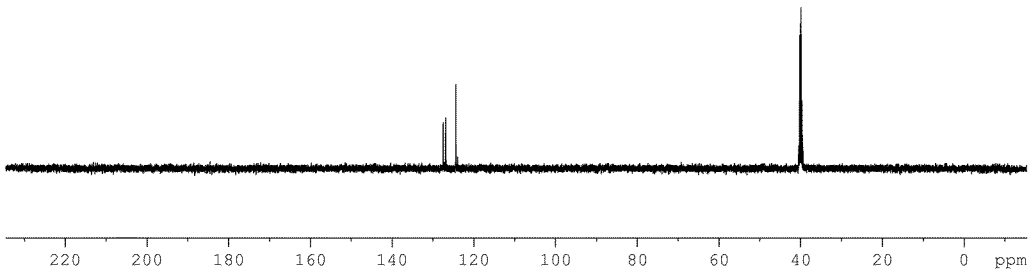



$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium Thiophen-3-yltrifluoroborate **(2d)**

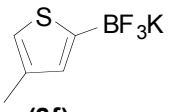



**(2e)**

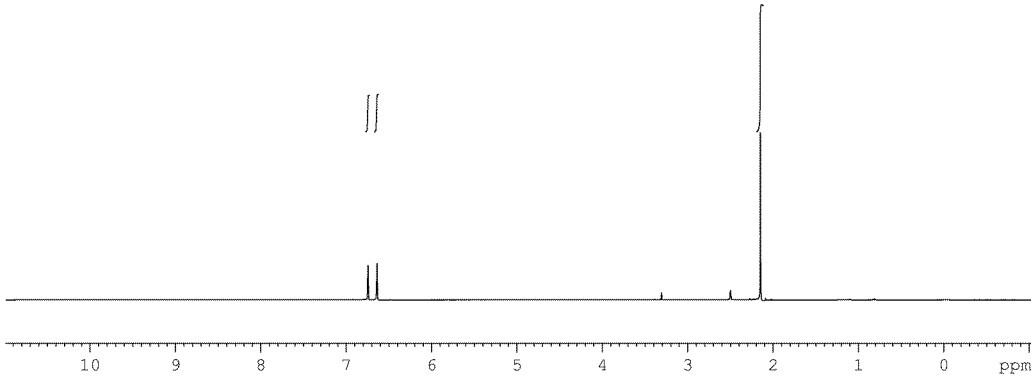
$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium Thiophen-2-yltrifluoroborate **(2e)**



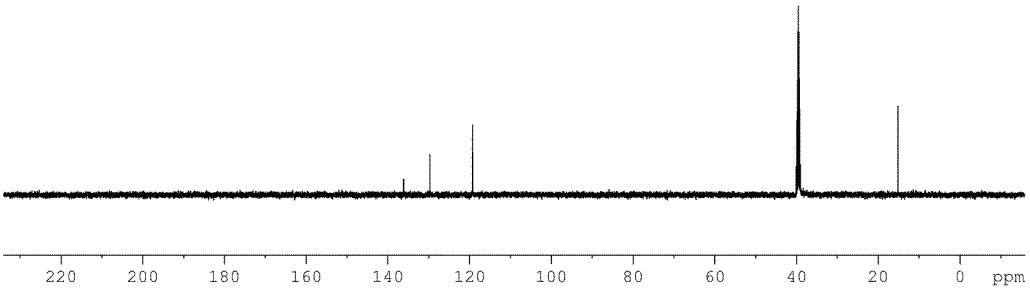

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium Thiophen-2-yltrifluoroborate **(2e)**



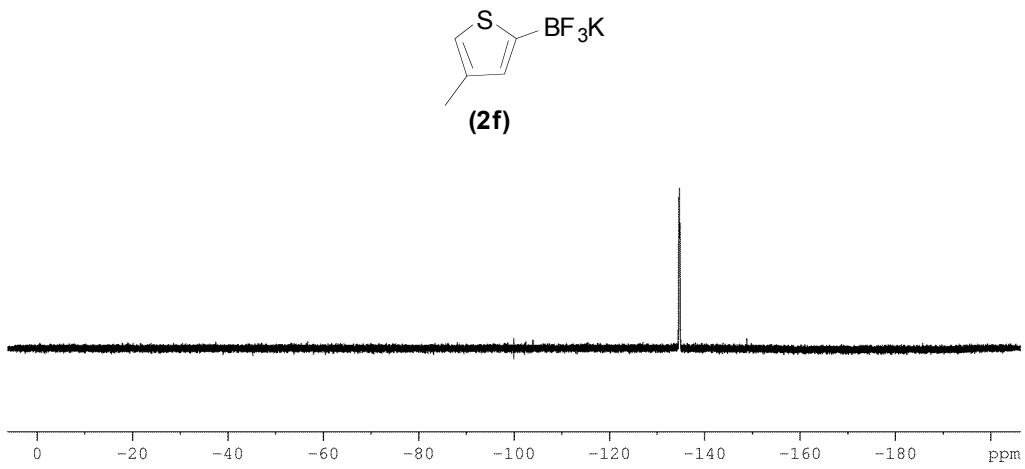

**(2f)**




$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium 4-Methylthiophen-2-yltrifluoroborate **(2f)**

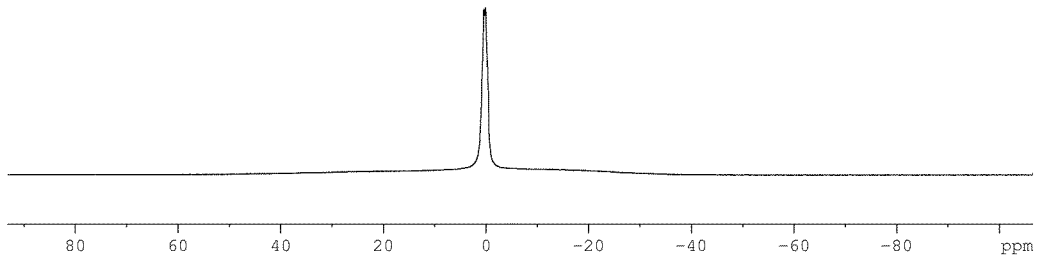



$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium 4-Methylthiophen-2-yltrifluoroborate **(2f**



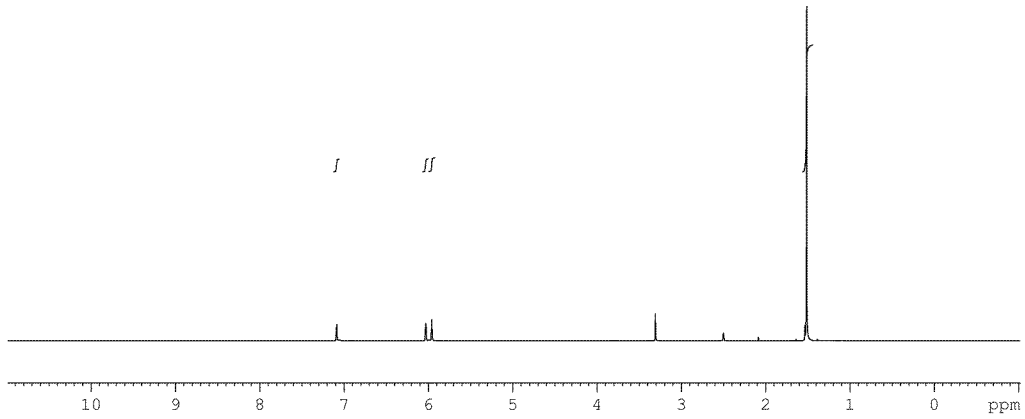

**(2f)**

$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium 4-Methylthiophen-2-yltrifluoroborate **(2f)**

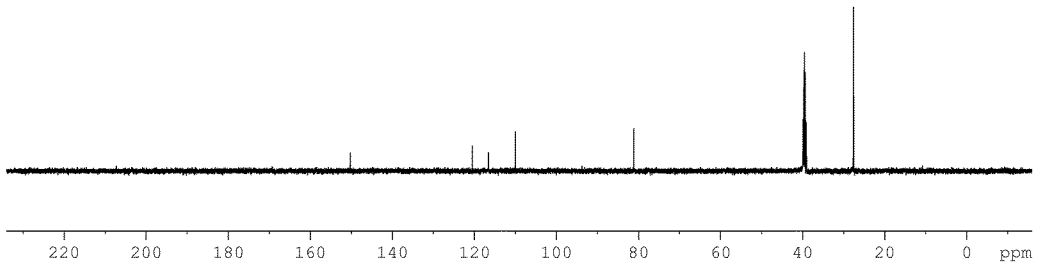



$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium 4-Methylthiophen-2-yltrifluoroborate **(2f)**

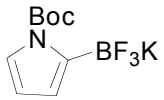

**(2g)**



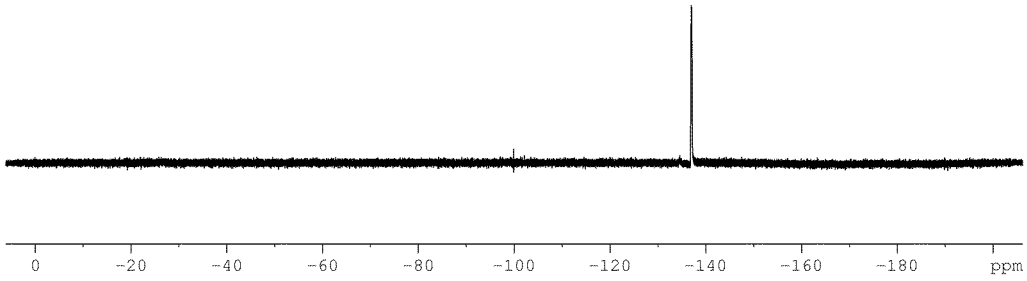

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium
1-(tert-Butoxycarbonyl)-1*H*-pyrrol-2-yltrifluoroborate **(2e)**



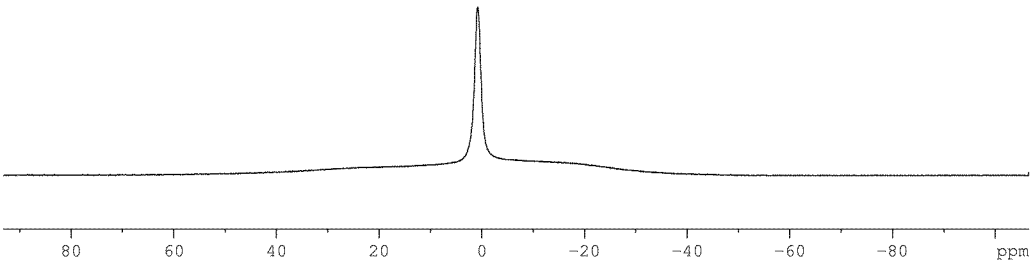

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium
1-(tert-Butoxycarbonyl)-1*H*-pyrrol-2-yltrifluoroborate **(2e)**



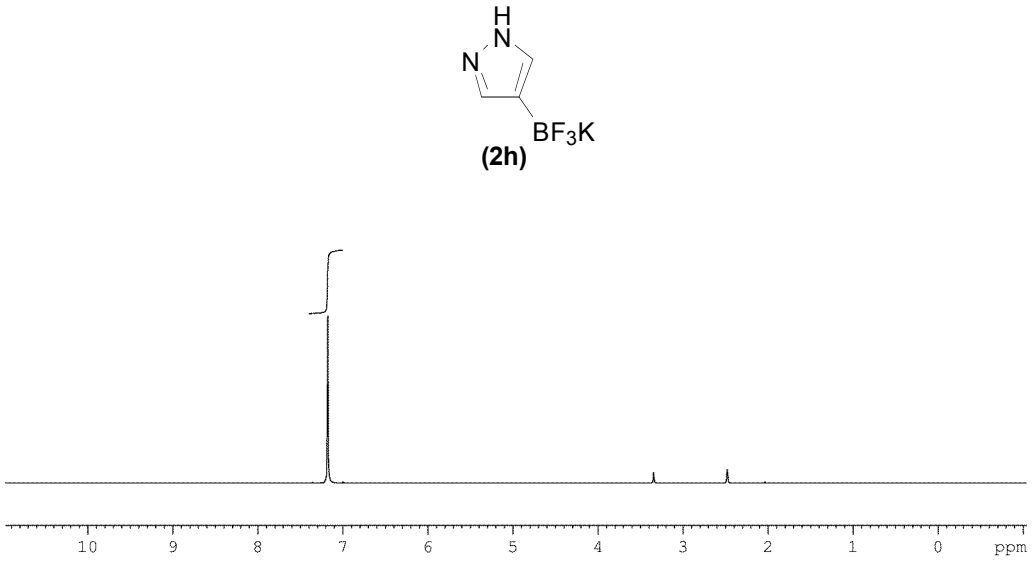

**(2g)**




$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium 1-(tert-Butoxycarbonyl)-1*H*-pyrrol-2-yltrifluoroborate **(2g)**

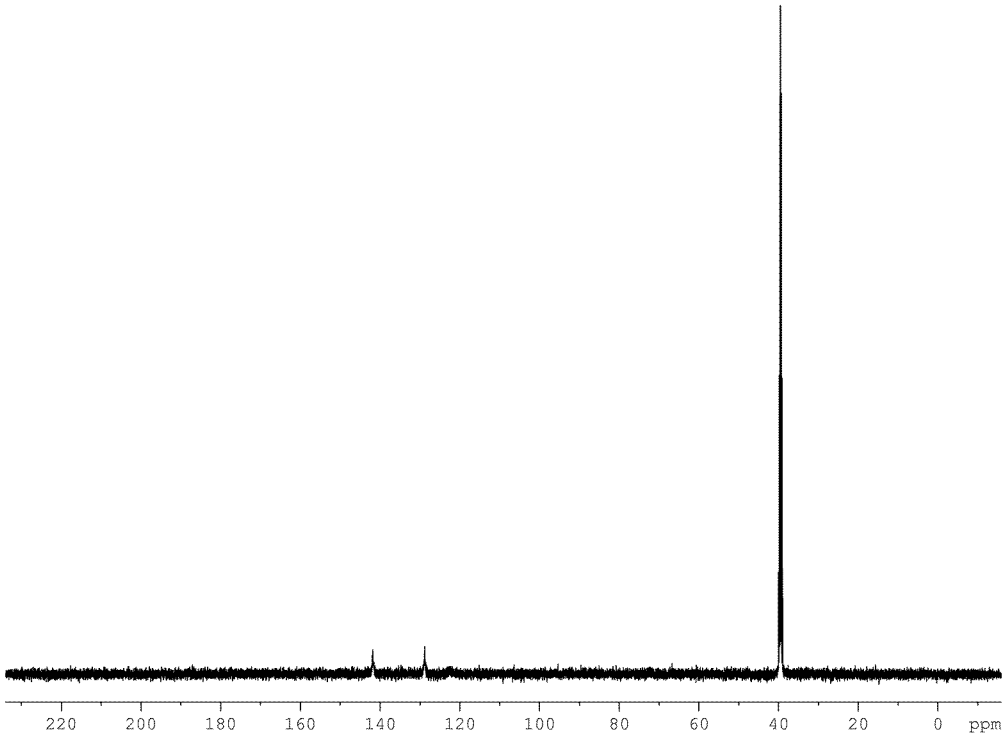



$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium 1-(tert-Butoxycarbonyl)-1*H*-pyrrol-2-yltrifluoroborate **(2g)**

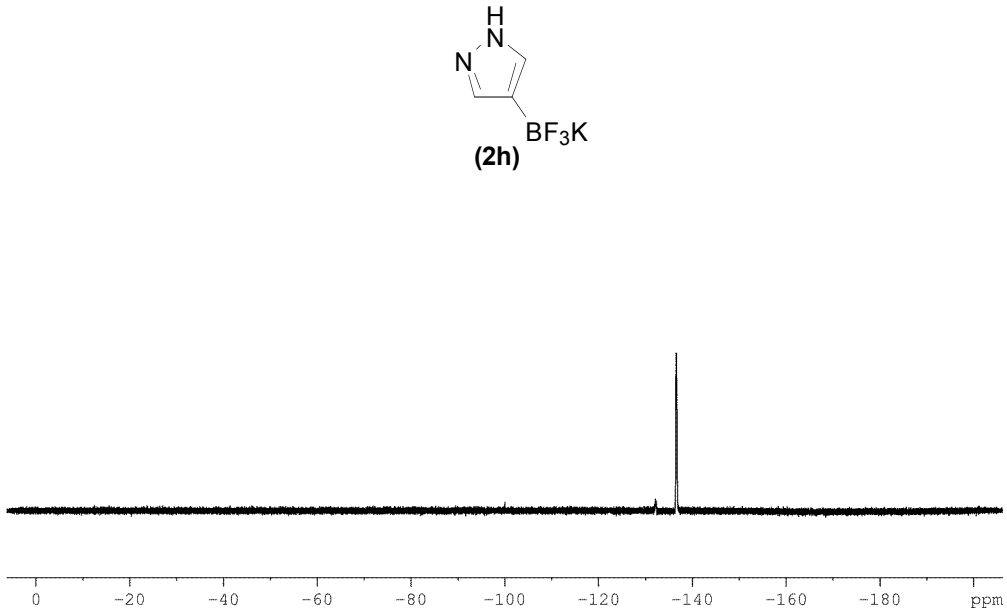



**(2h)**

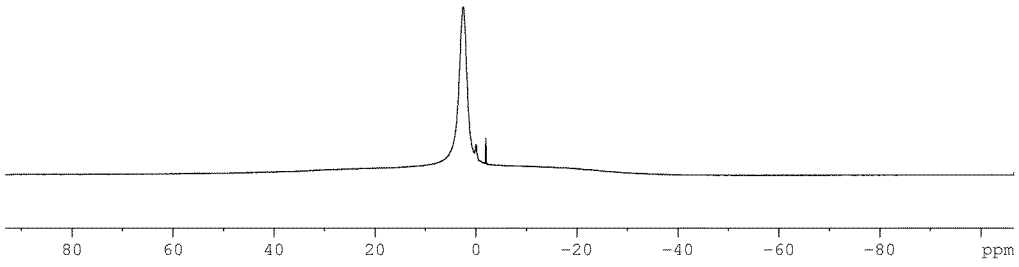
$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Pyrazol-4-yltrifluoroborate **(2h)**



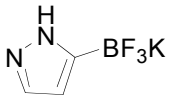

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Pyrazol-4-yltrifluoroborate **(2h)**



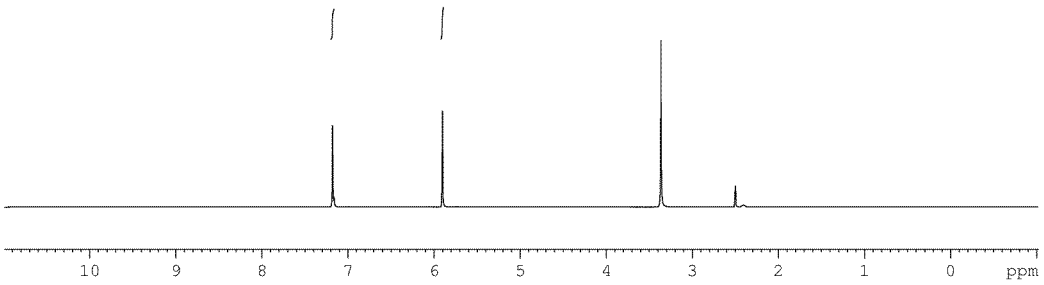

$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Pyrazol-4-yltrifluoroborate **(2h)**



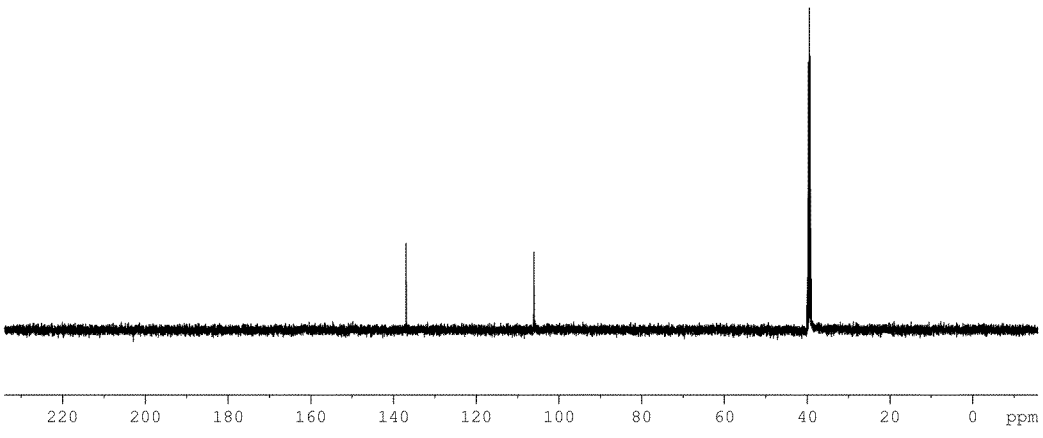

$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Pyrazol-4-yltrifluoroborate **(2h)**



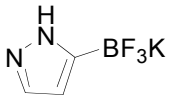

**(2i)**



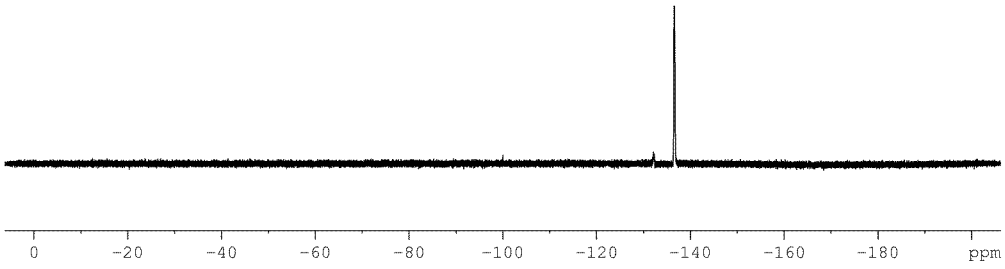

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Pyrazol-4-yltrifluoroborate **(2i)**



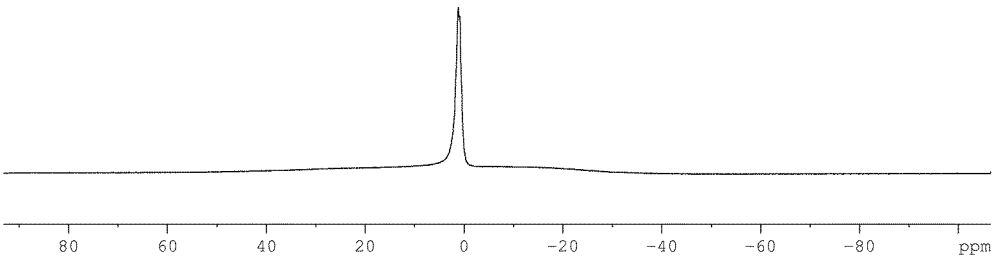

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Pyrazol-4-yltrifluoroborate **(2i)**



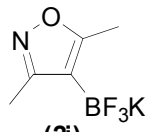

**(2i)**



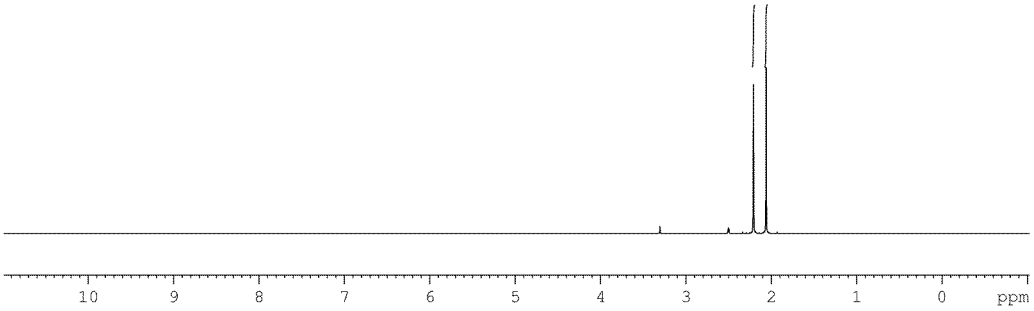

$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Pyrazol-5-yltrifluoroborate **(2i)**




$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Pyrazol-5-yltrifluoroborate **(2i)**

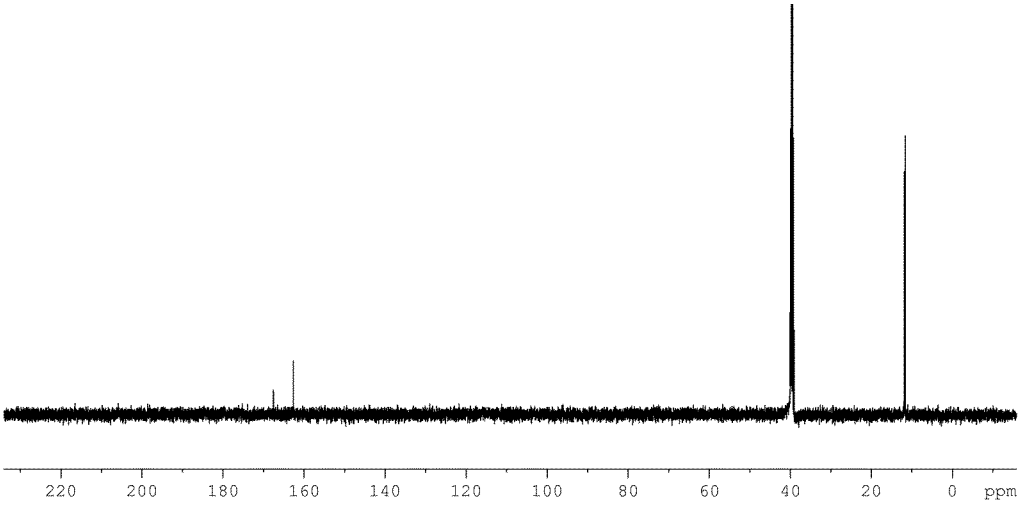



**(2j)**



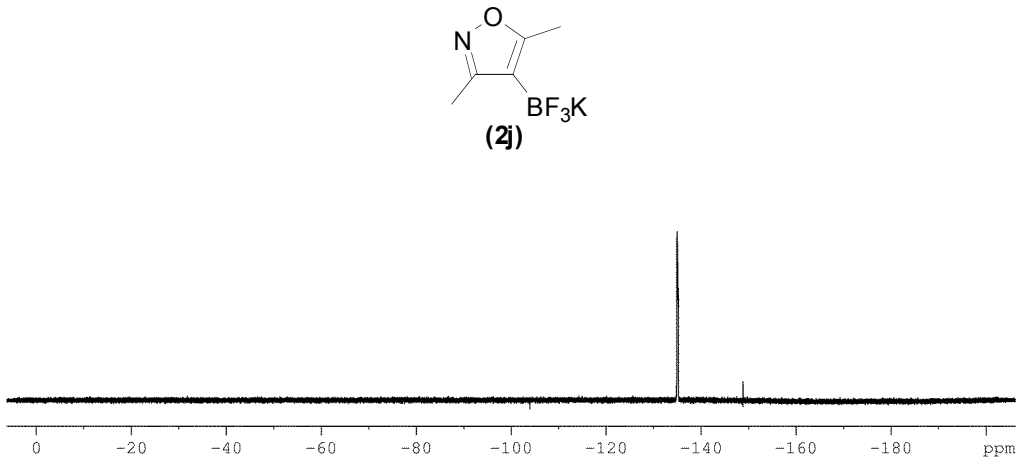

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium

3,5-Dimethylisoxazol-4-yltrifluoroborate **(2j)**

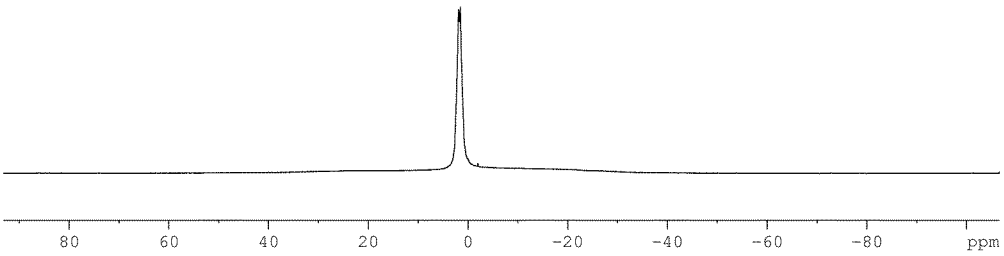



$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium

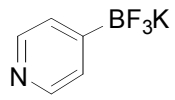
3,5-Dimethylisoxazol-4-yltrifluoroborate **(2j)**



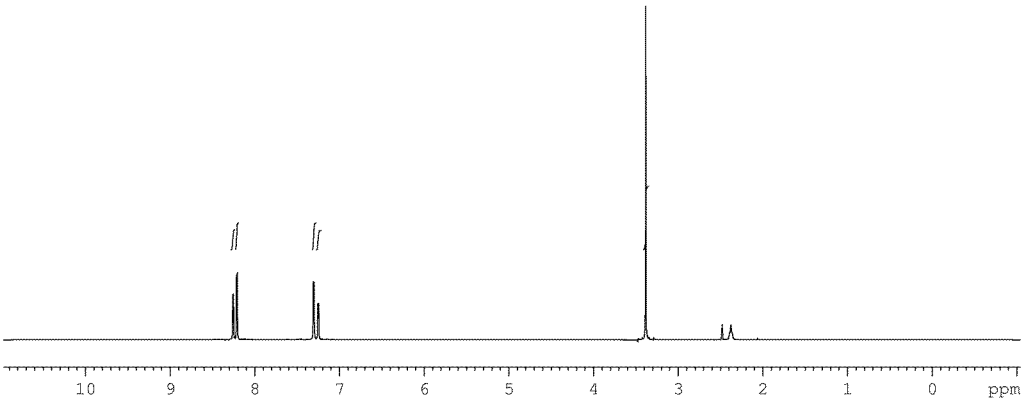

$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium 3,5-Dimethylisoxazol-4-yltrifluoroborate **(2j)**



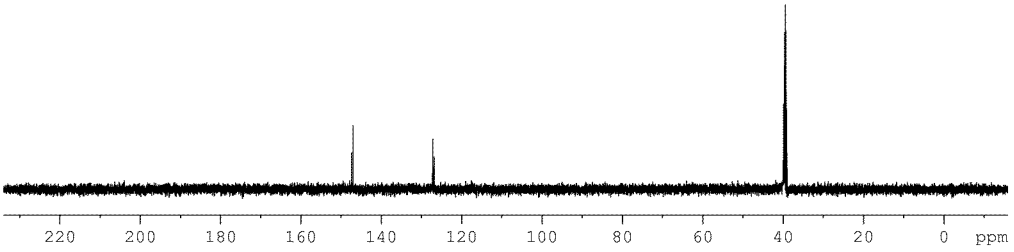

$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium 3,5-Dimethylisoxazol-4-yltrifluoroborate **(2j)**



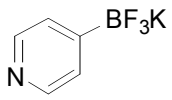

**(2k)**



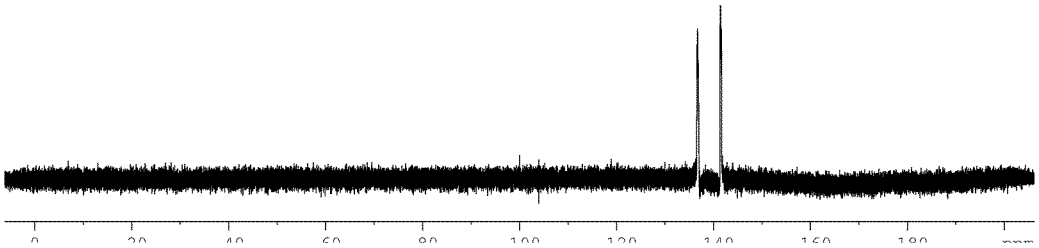

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium Pyridin-4-yltrifluoroborate **(2k)**



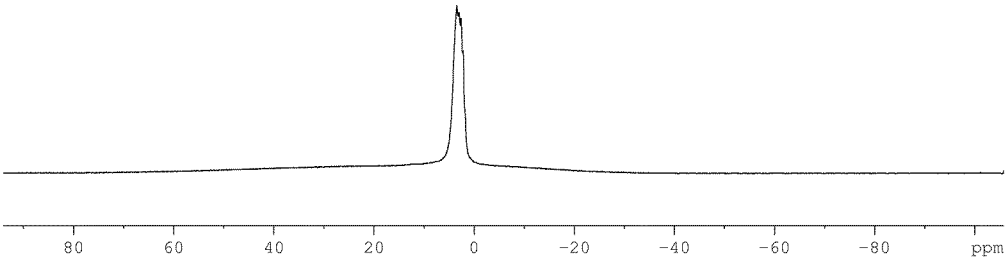

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium Pyridin-4-yltrifluoroborate **(2k)**



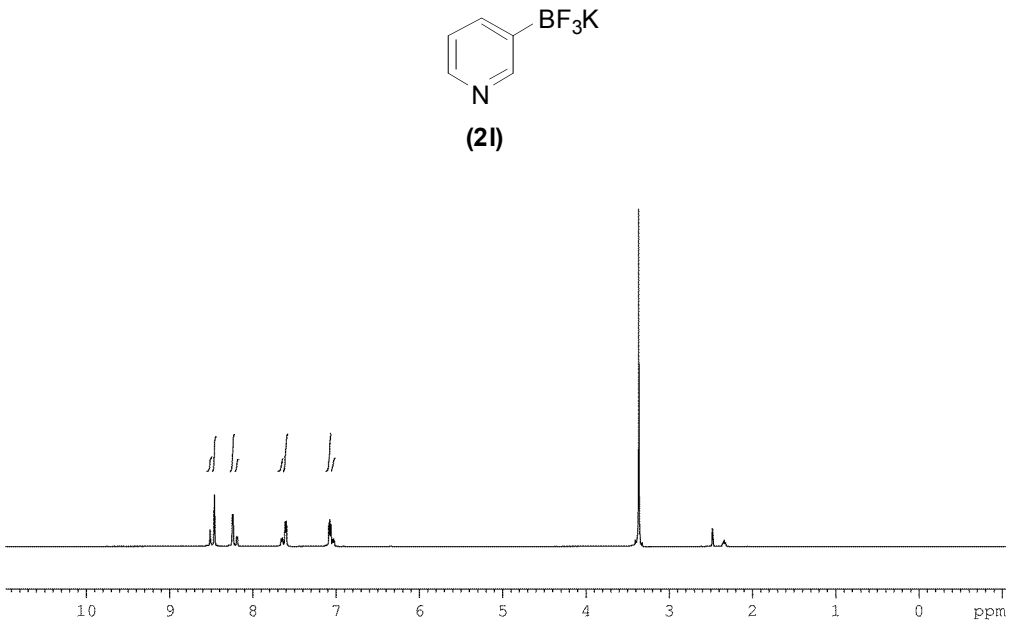

**(2k)**



$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium Pyridin-4-yltrifluoroborate **(2k)**

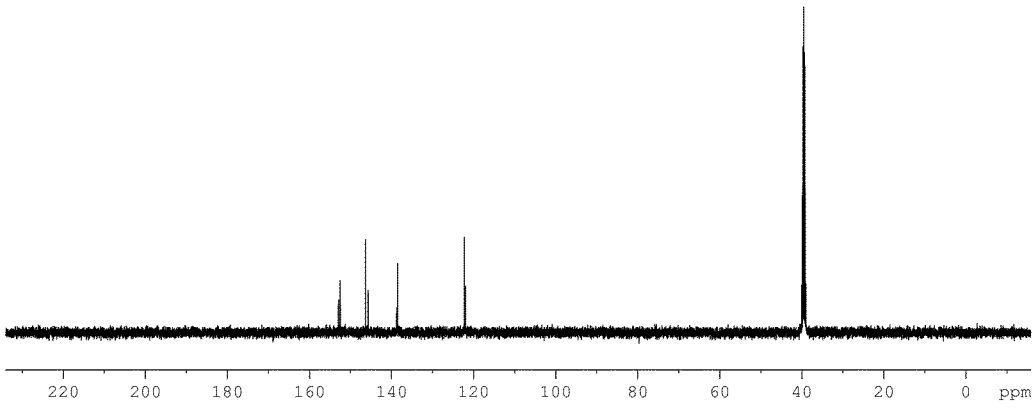



$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium Pyridin-3-yltrifluoroborate **(2k)**

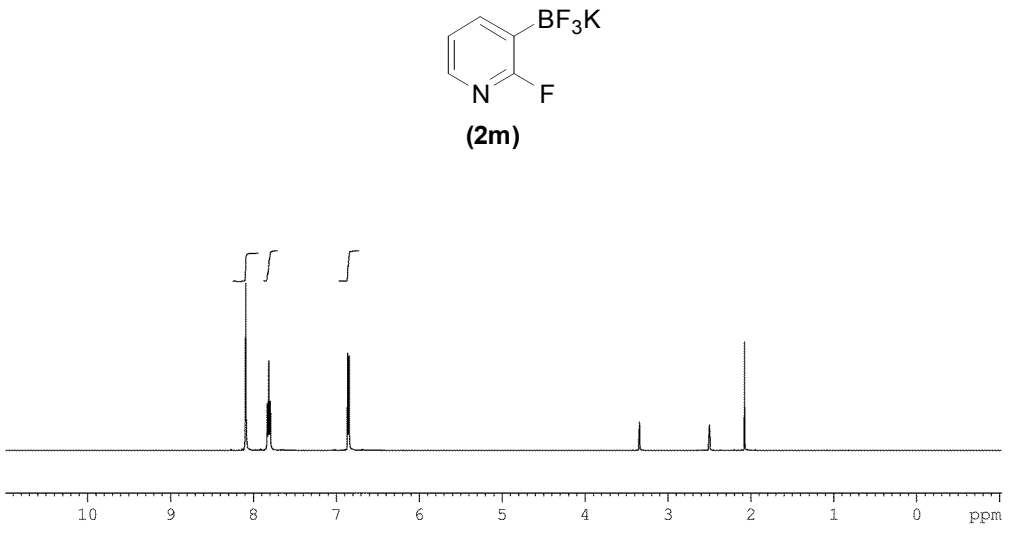



**(2l)**

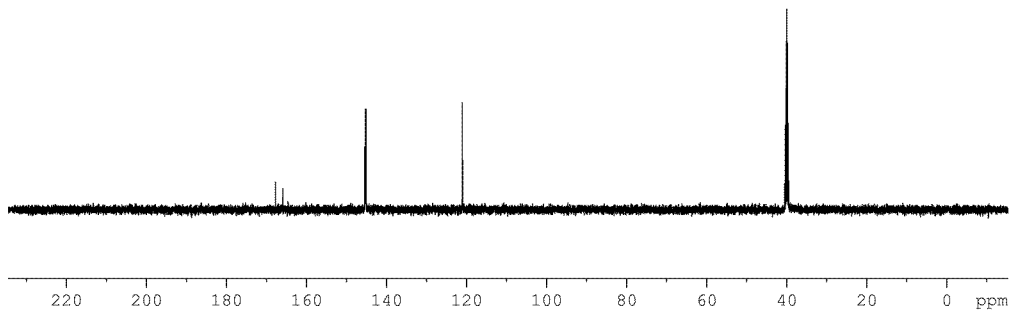
$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium Pyridin-3-yltrifluoroborate **(2l)**



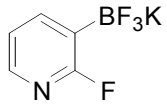

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium Pyridin-3-yltrifluoroborate **(2l)**



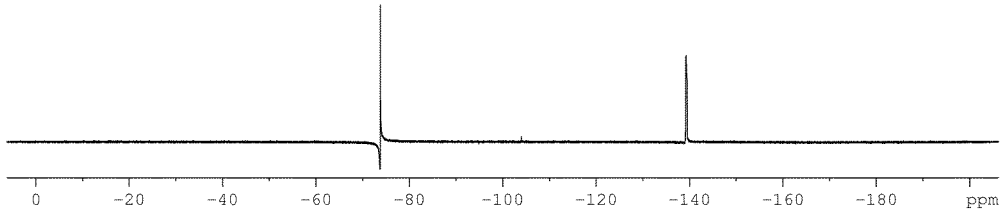

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium 2-Fluoropyridin-3-yltrifluoroborate **(2m)**



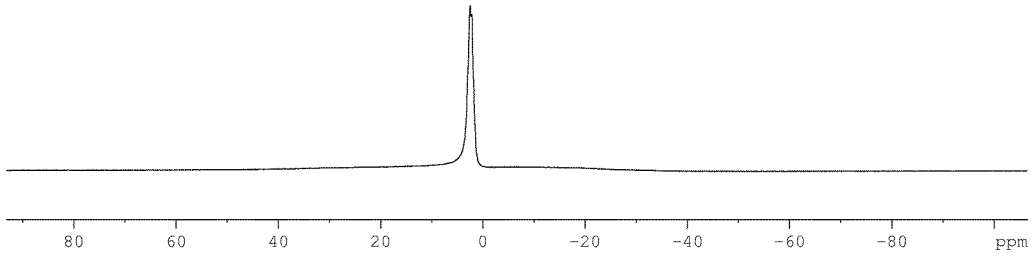

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium 2-Fluoropyridin-3-yltrifluoroborate **(2m)**



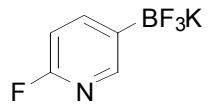

**(2m)**



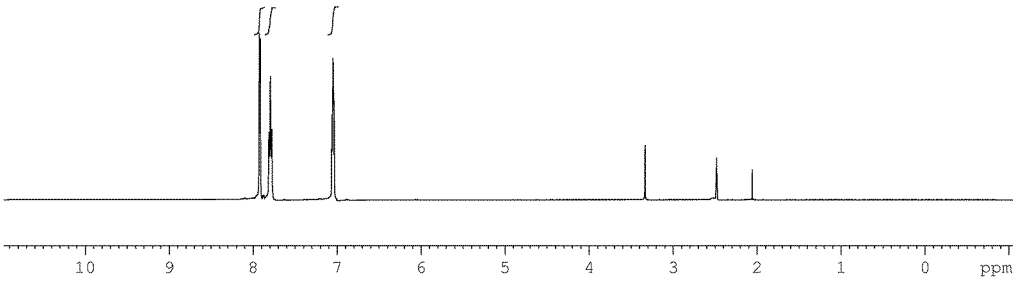

$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium 2-Fluoropyridin-3-yltrifluoroborate **(2m)**



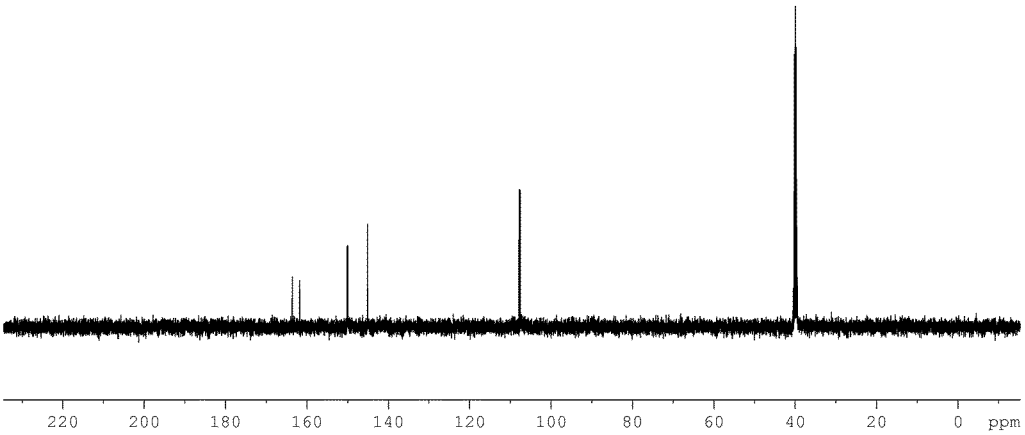

$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium 2-Fluoropyridin-3-yltrifluoroborate **(2m)**



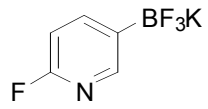

**(2n)**



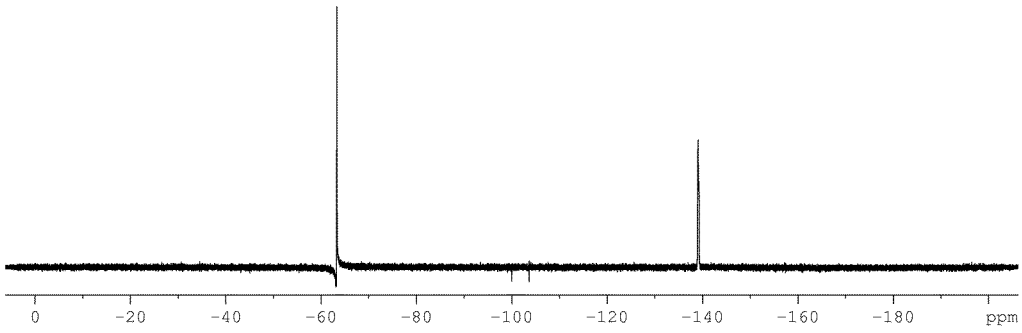

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium 6-Fluoropyridin-3-yltrifluoroborate **(2n)**



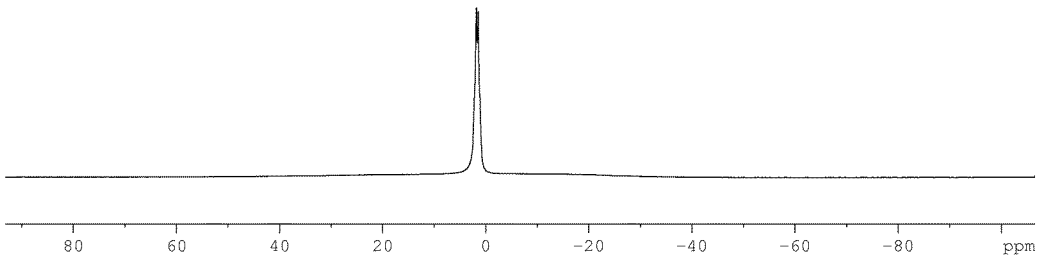

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium 6-Fluoropyridin-3-yltrifluoroborate **(2n)**



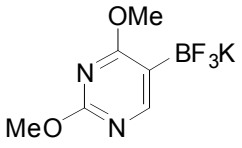

**(2n)**



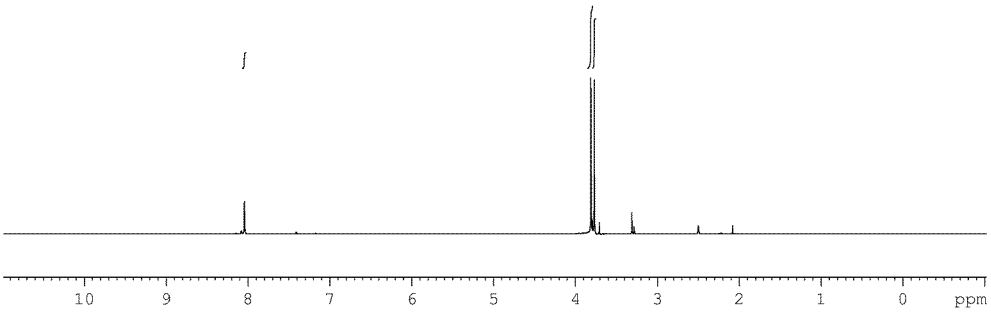

$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium 6-Fluoropyridin-3-yltrifluoroborate **(2n)**




$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium 6-Fluoropyridin-3-yltrifluoroborate **(2n)**

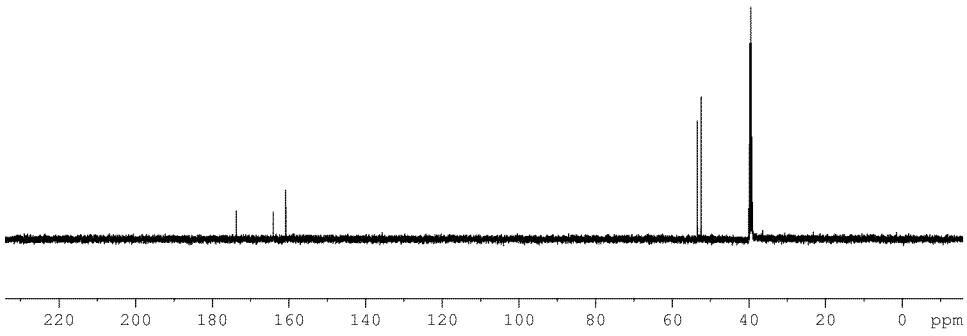



**(2o)**



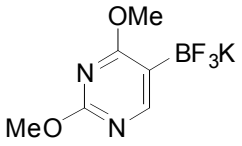

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium

2,4-Dimethoxypyrimidin-5-yltrifluoroborat **(2o)**

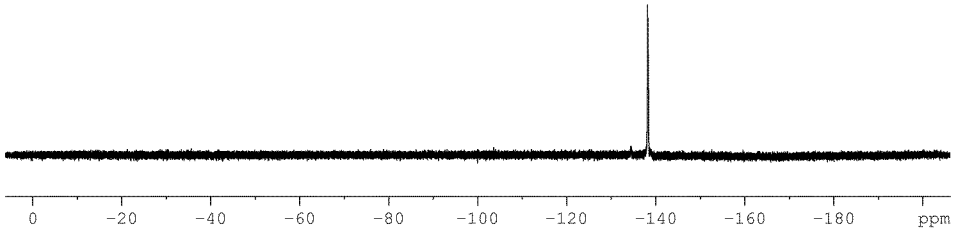



$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium

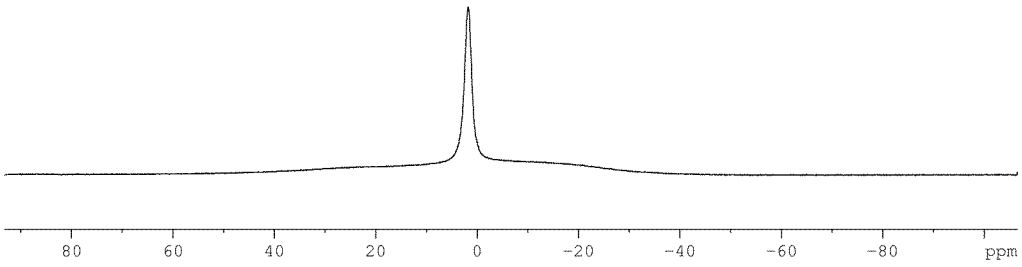
2,4-Dimethoxypyrimidin-5-yltrifluoroborate **(2o)**



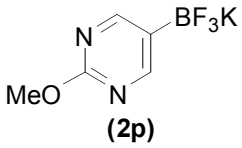

**(2o)**



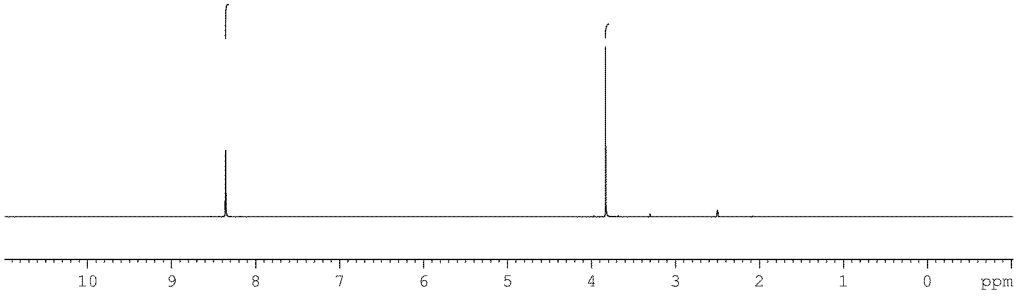

$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium 2,4-Dimethoxypyrimidin-5-yltrifluoroborate **(2o)**




$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium 2,4-Dimethoxypyrimidin-5-yltrifluoroborate **(2o)**

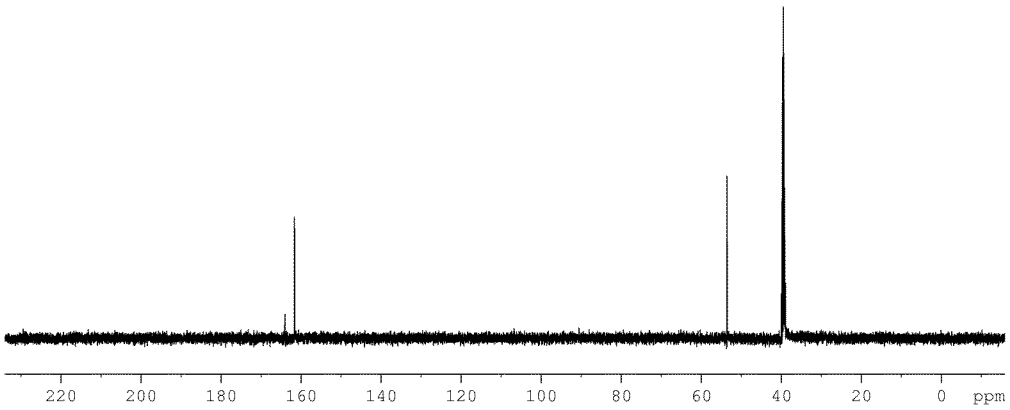



**(2p)**



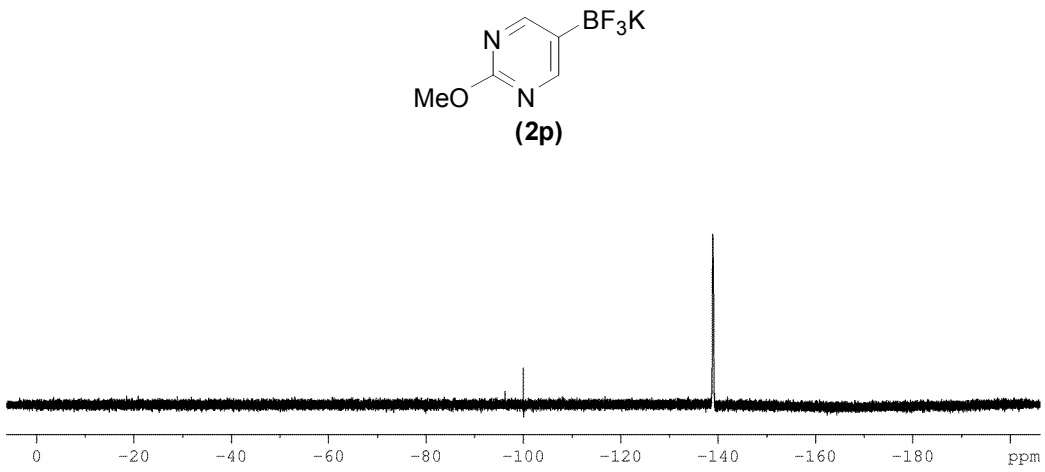

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium

2-Methoxypyrimidin-5-yltrifluoroborate **(2p)**

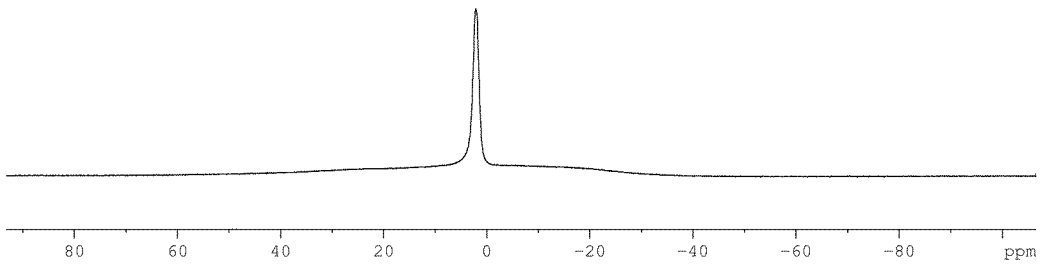



$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium

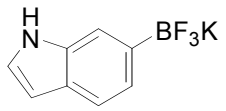
2-Methoxypyrimidin-5-yltrifluoroborate **(2p)**



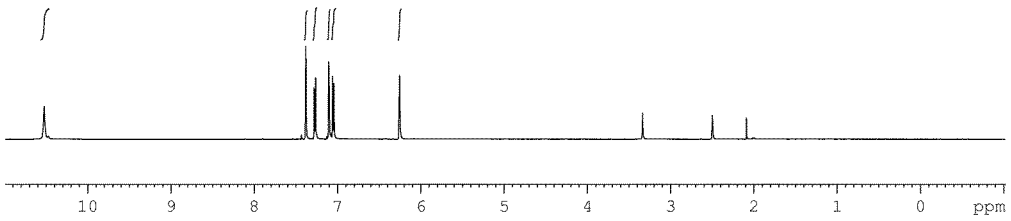

$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium
2-Methoxypyrimidin-5-yltrifluoroborate **(2p)**



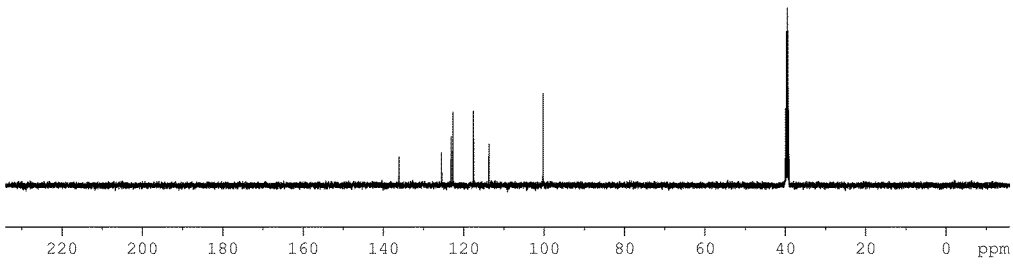

$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium
2-Methoxypyrimidin-5-yltrifluoroborate **(2p)**



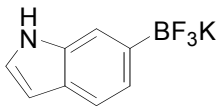

**(2q)**



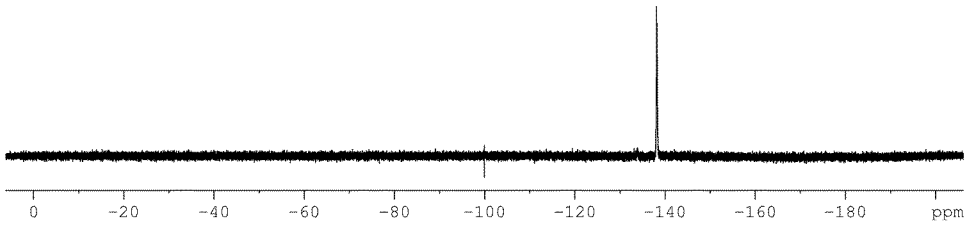

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Indol-6-yltrifluoroborate **(2q)**



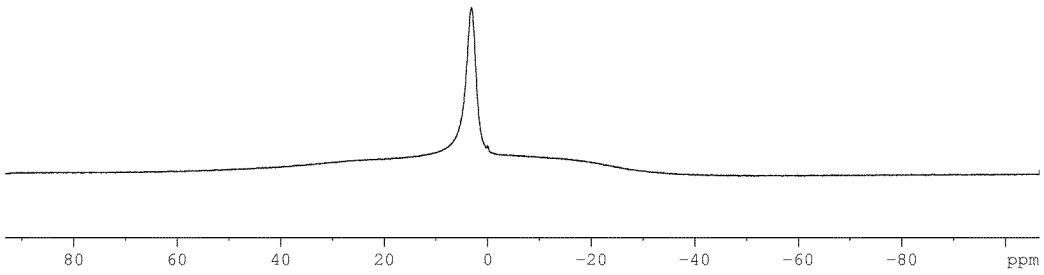

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Indol-6-yltrifluoroborate **(2q)**



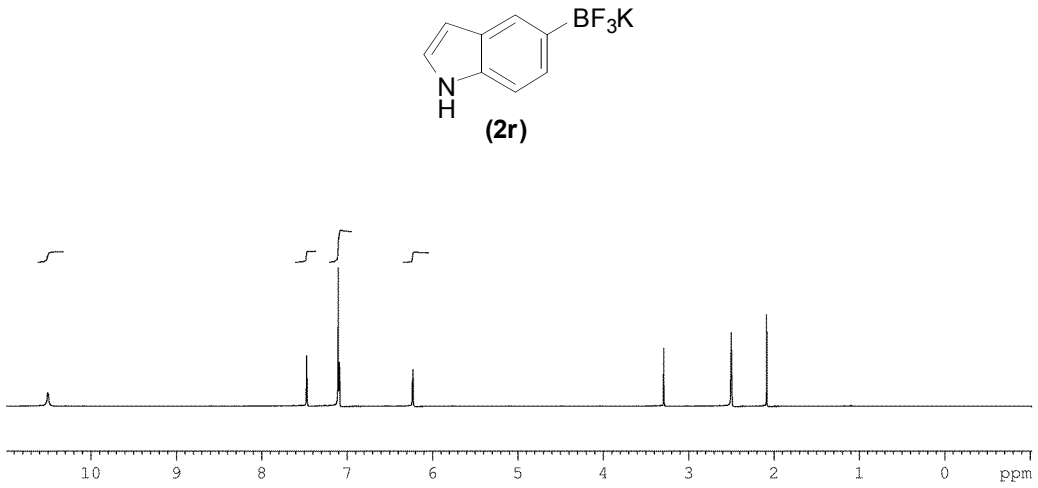

**(2q)**



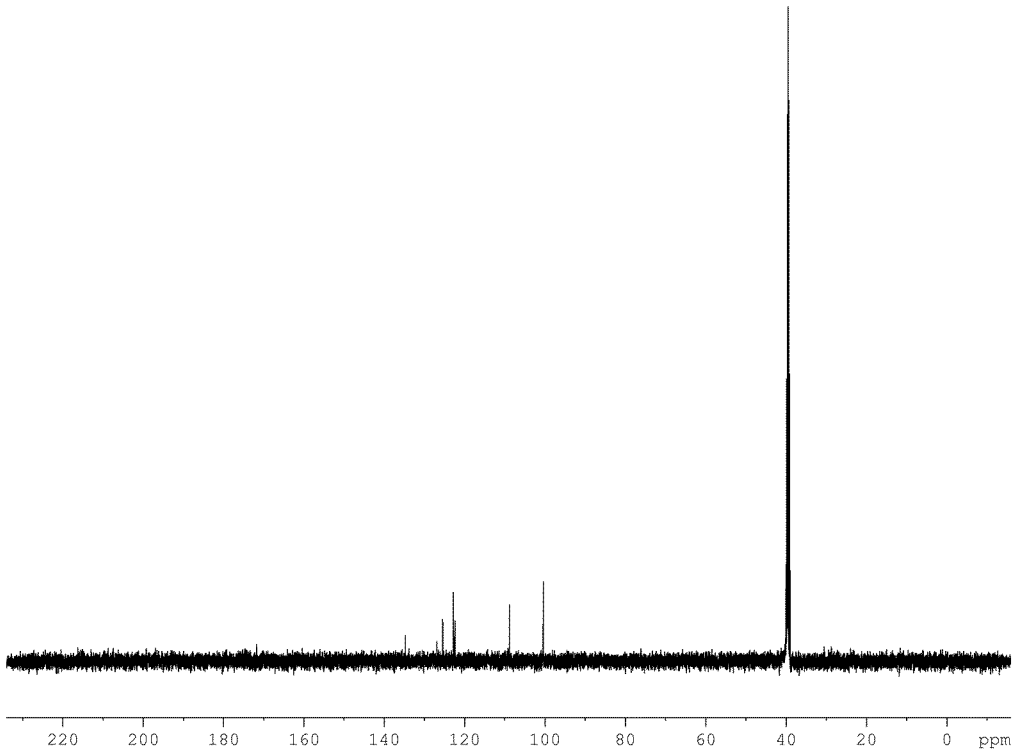

$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Indol-6-yltrifluoroborate **(2q)**



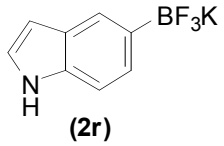

$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Indol-6-yltrifluoroborate **(2q)**



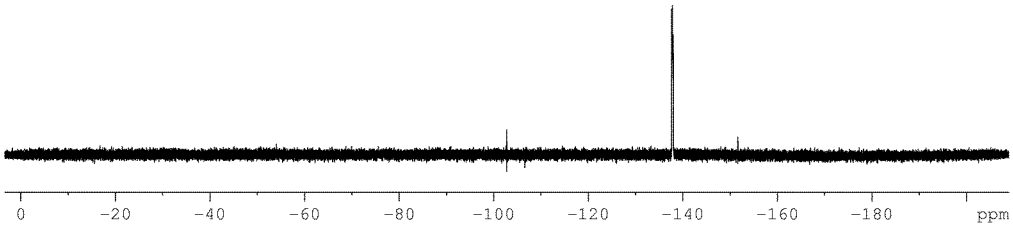

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Indol-5-yltrifluoroborate **(2r)**



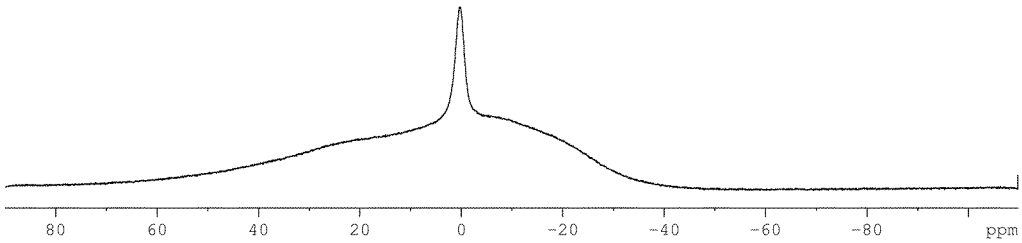

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Indol-5-yltrifluoroborate **(2r)**



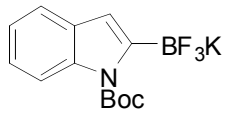

**(2r)**



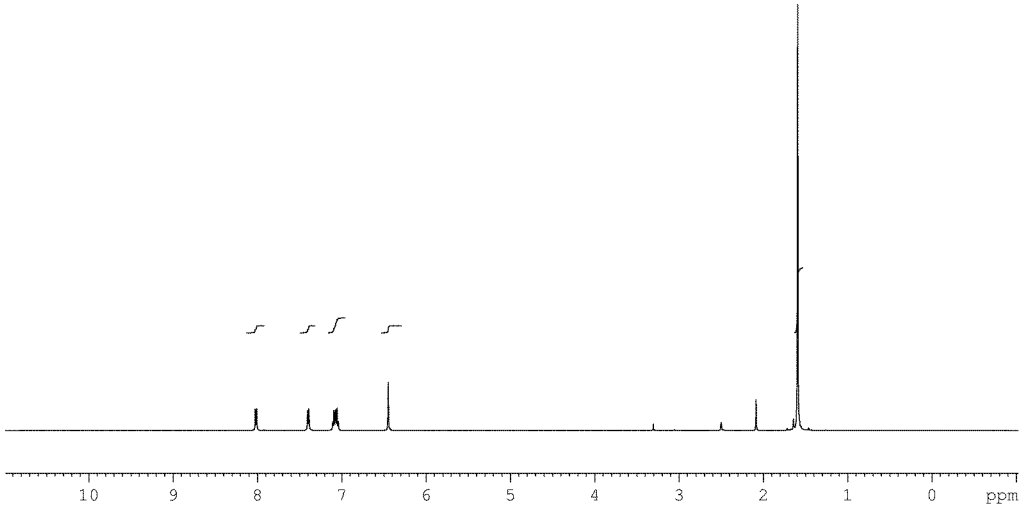

$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Indol-5-yltrifluoroborate **(2r)**



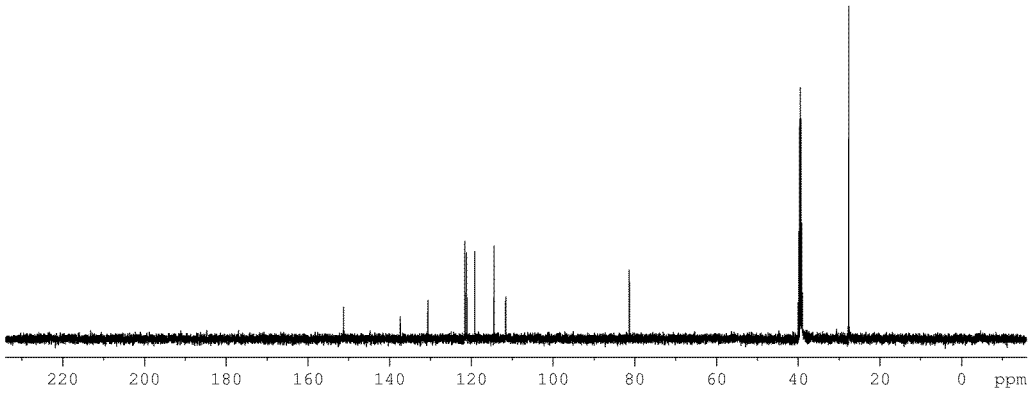

$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium 1*H*-Indol-5-yltrifluoroborate **(2r)**



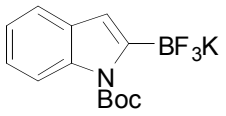

**(2s)**



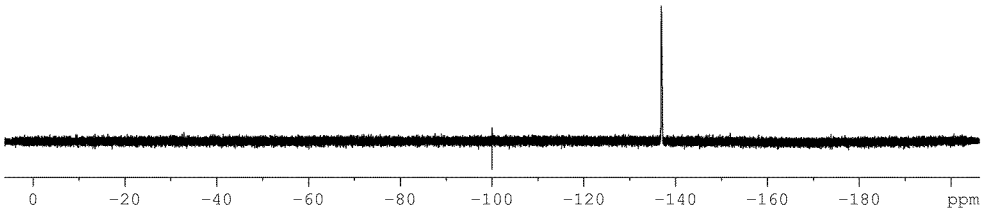

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium
1-(*tert*-Butoxycarbonyl)-1*H*-indol-2-yltrifluoroborate **(2s)**



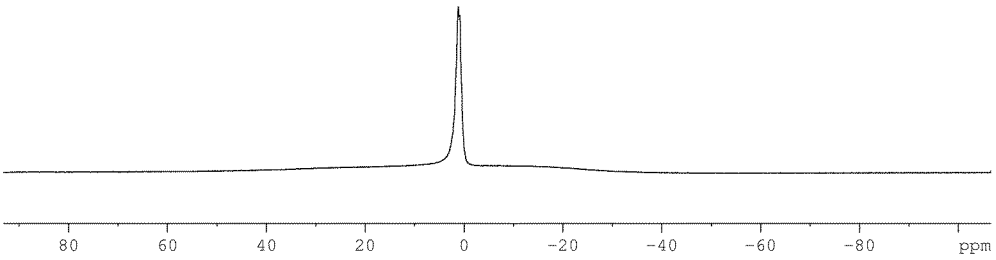

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium
1-(*tert*-Butoxycarbonyl)-1*H*-indol-2-yltrifluoroborate **(2s)**



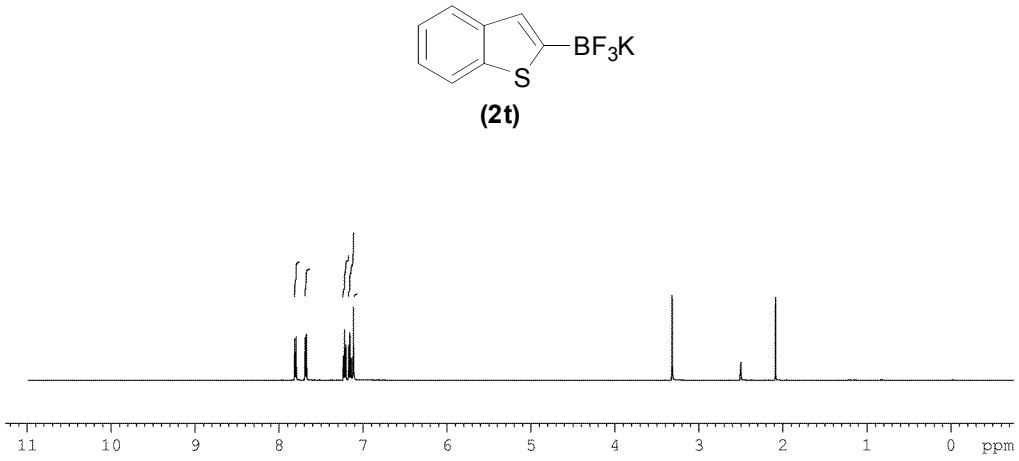

**(2s)**




$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium 1-(*tert*-Butoxycarbonyl)-1*H*-indol-2-yltrifluoroborate **(2s)**

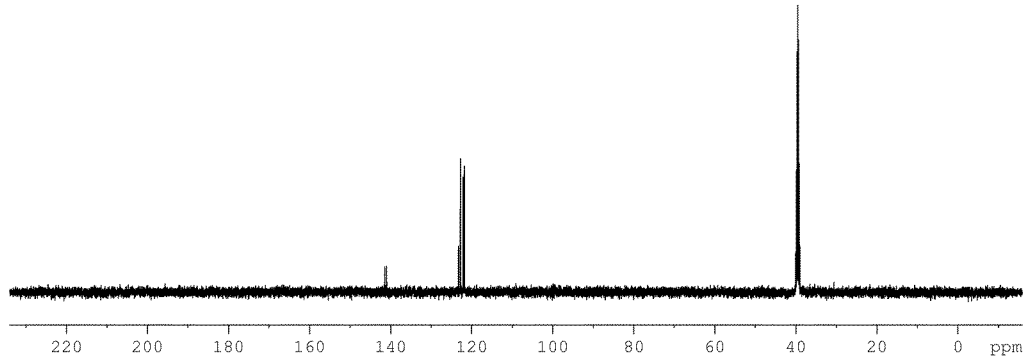



$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium 1-(*tert*-Butoxycarbonyl)-1*H*-indol-2-yltrifluoroborate **(2s)**

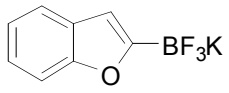



**(2t)**

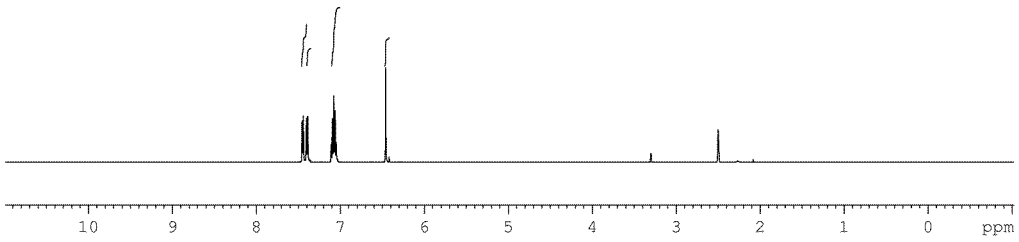
$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium Benzo[*b*]thiophen-2-yltrifluoroborate **(2t)**



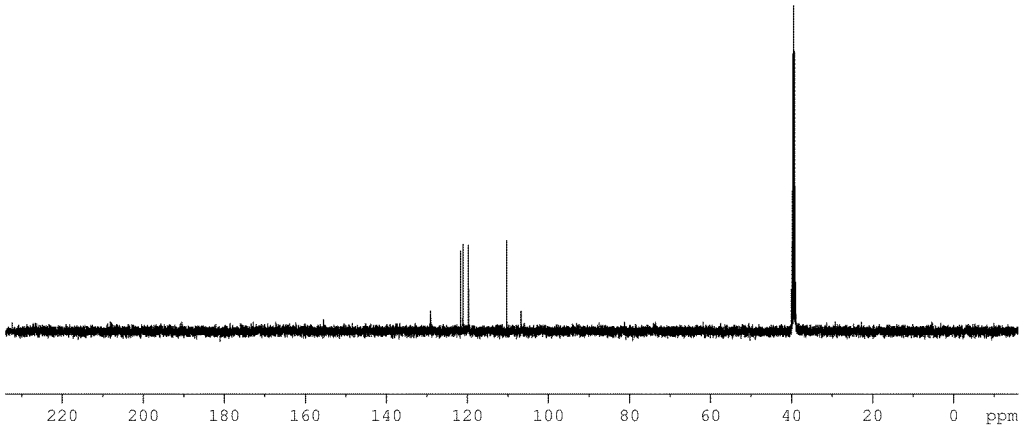

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium Benzo[*b*]thiophen-2-yltrifluoroborate **(2t)**



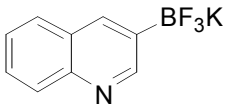

**(2u)**



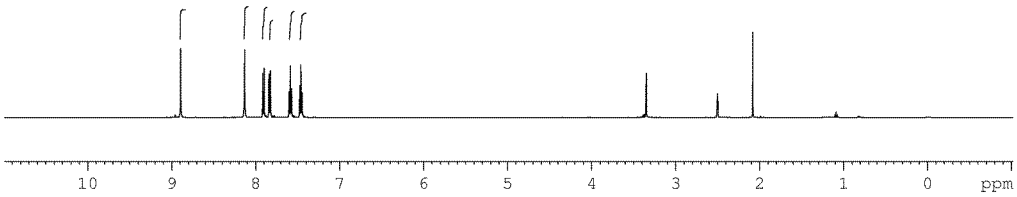

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium Benzofuran-2-yltrifluoroborate **(2u)**



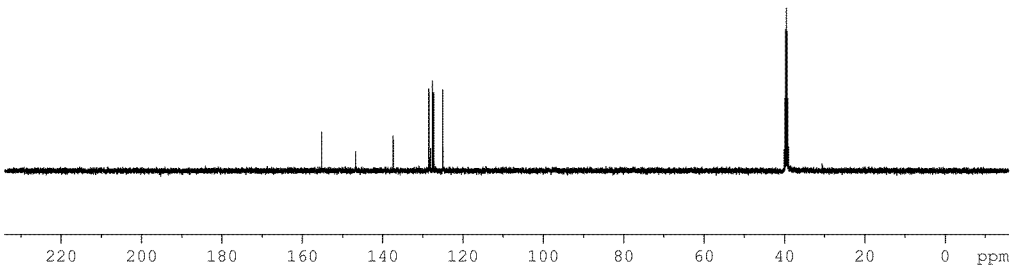

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium Benzofuran-2-yltrifluoroborate **(2u)**



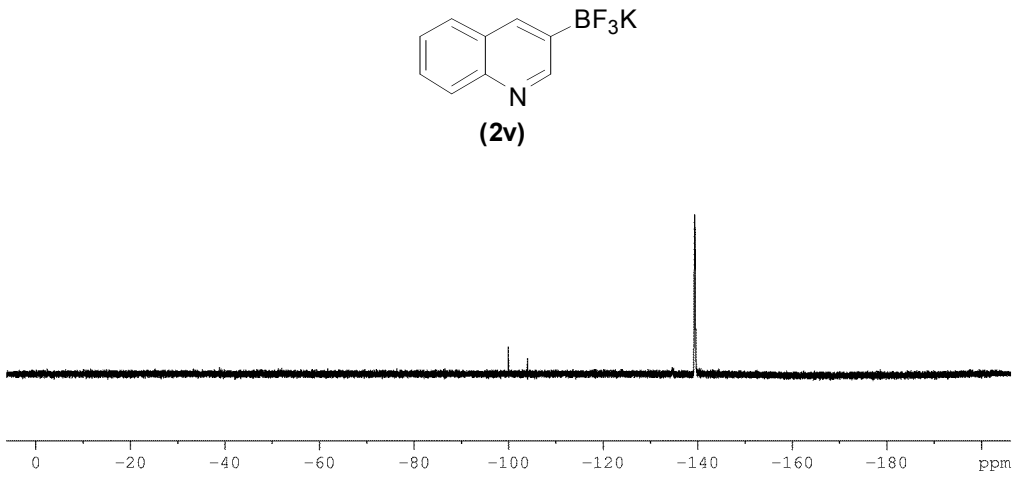

**(2v)**




$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium Quinolin-3-yltrifluoroborate **(2v)**

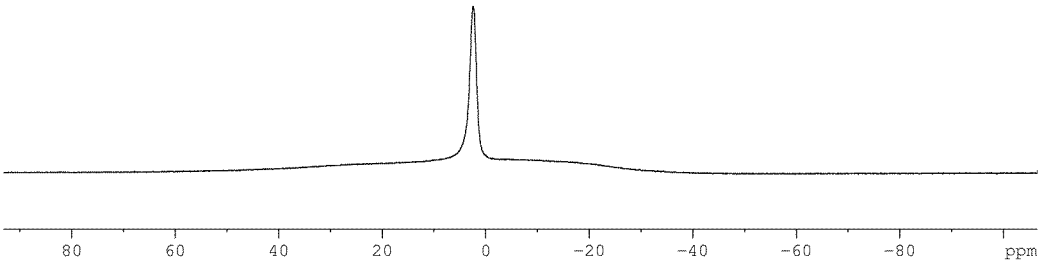



$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium Quinolin-3-yltrifluoroborate **(2v)**

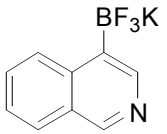



**(2v)**

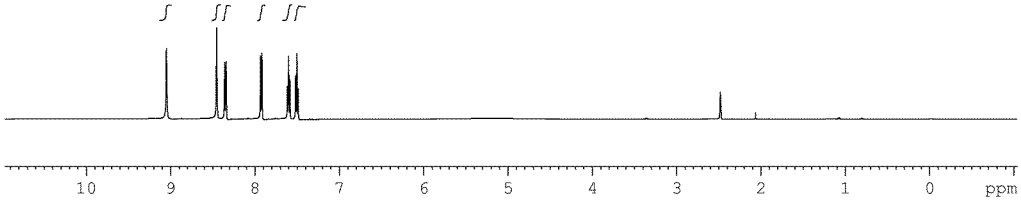
$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium Quinolin-3-yltrifluoroborate **(2v)**



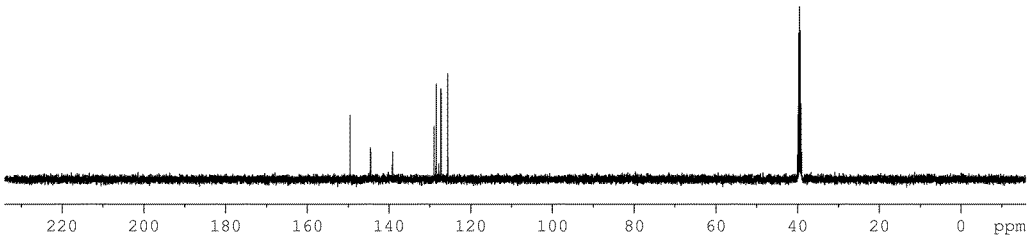

$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium Quinolin-3-yltrifluoroborate **(2v)**



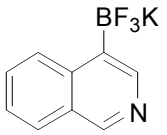

**(1)**



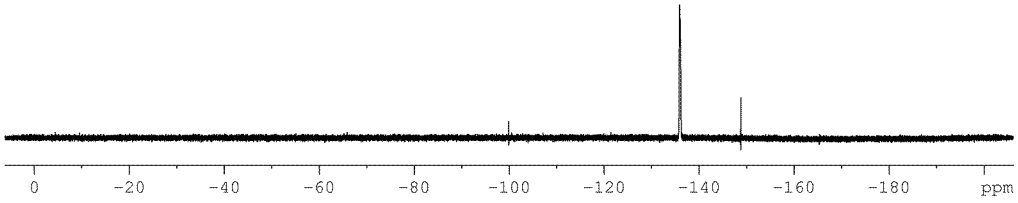

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of Potassium Isoquinolin-4-yltrifluoroborate **(1)**



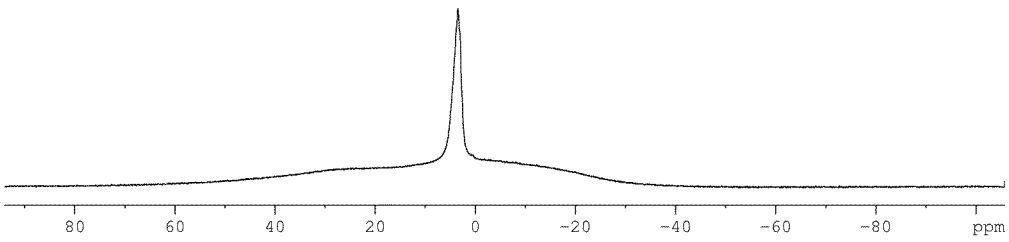

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of Potassium Isoquinolin-4-yltrifluoroborate **(1)**



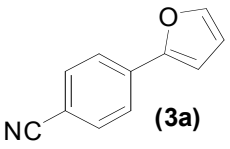

**(1)**



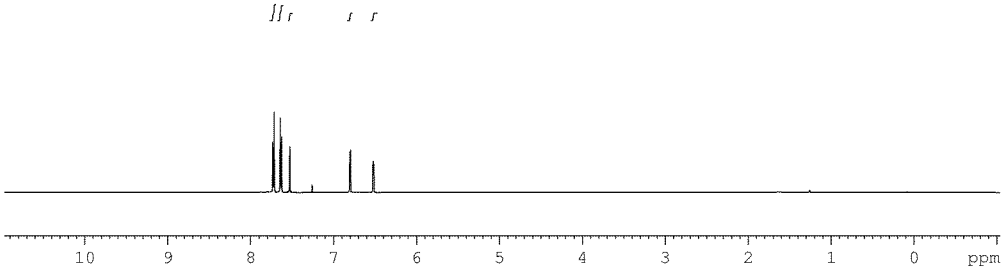

$^{19}$F NMR (470.8 MHz, DMSO-$d_6$) Spectrum of Potassium Isoquinolin-4-yltrifluoroborate **(1)**



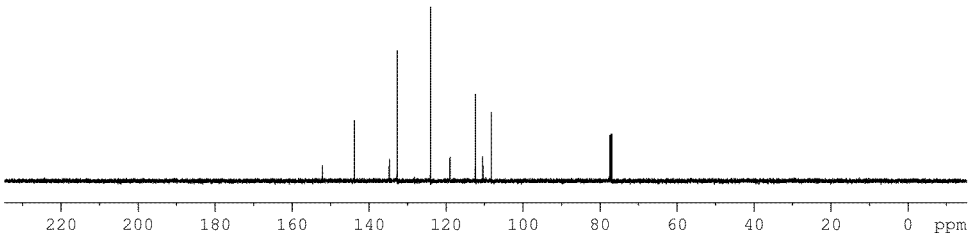

$^{11}$B NMR (128.4 MHz, DMSO-$d_6$) Spectrum of Potassium Isoquinolin-4-yltrifluoroborate **(1)**



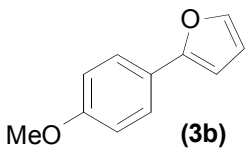

**(3a)**



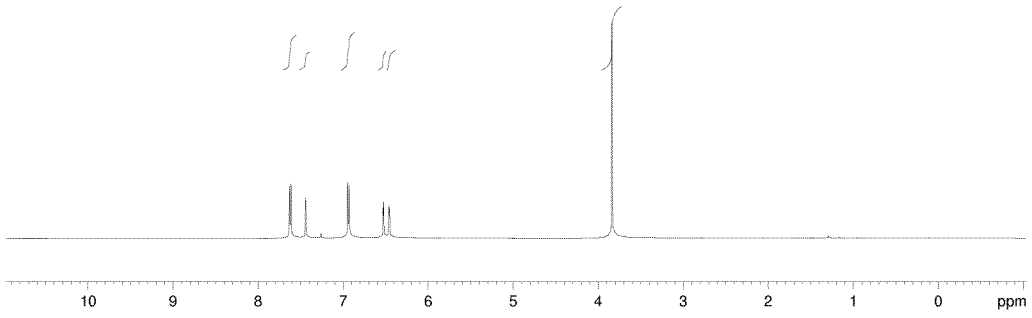

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(Furan-2-yl)benzonitrile **(3a)**



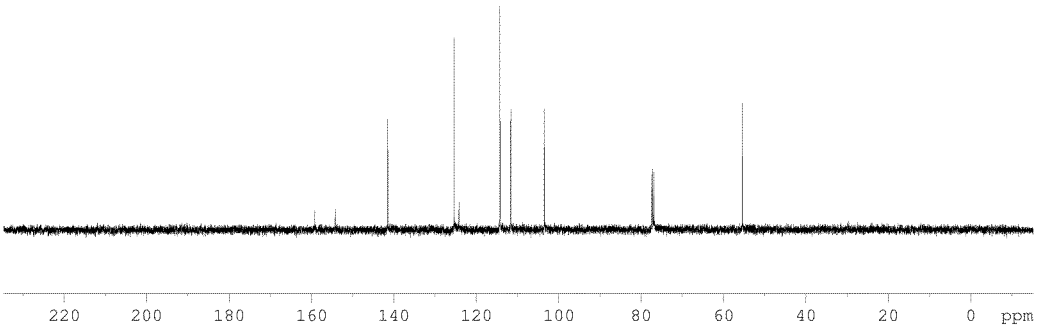

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(Furan-2-yl)benzonitrile **(3a)**



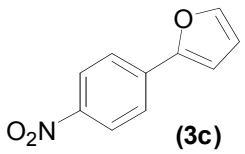

**(3b)**



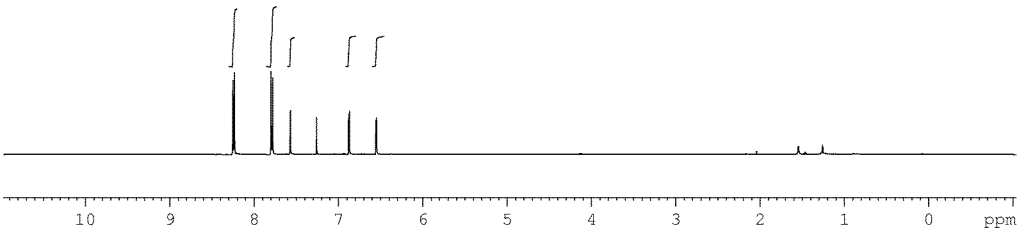

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 2-(4-Methoxyphenyl)furan **(3b)**



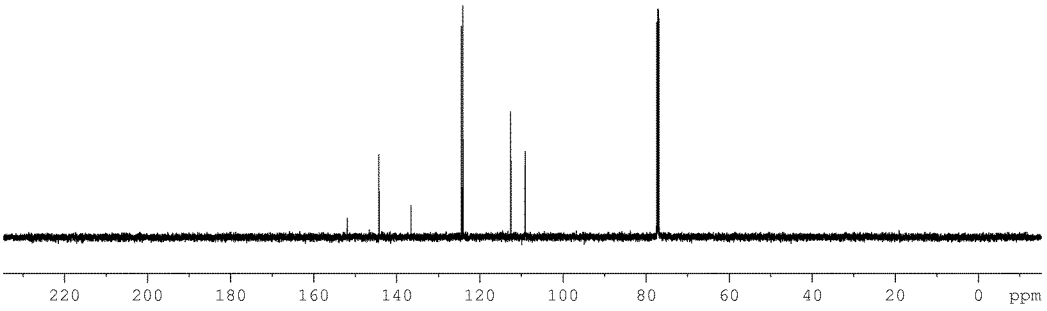

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 2-(4-Methoxyphenyl)furan **(3b)**



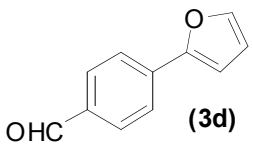

**(3c)**



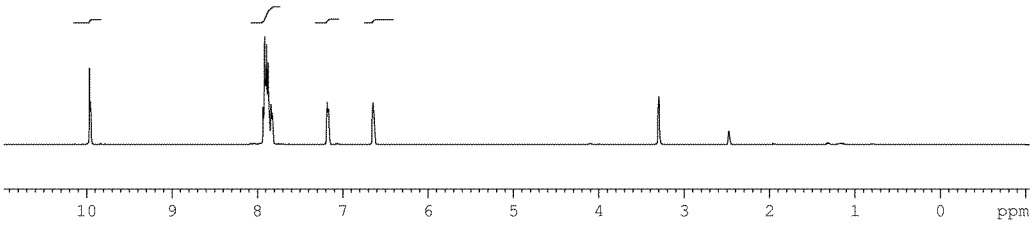

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 2-(4-Nitrophenyl)furan **(3c)**



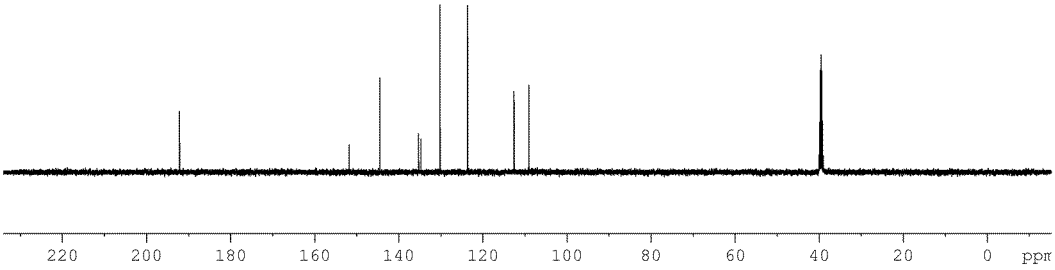

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 2-(4-Nitrophenyl)furan **(3c)**



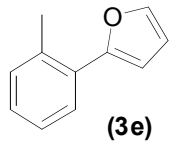

**(3d)**



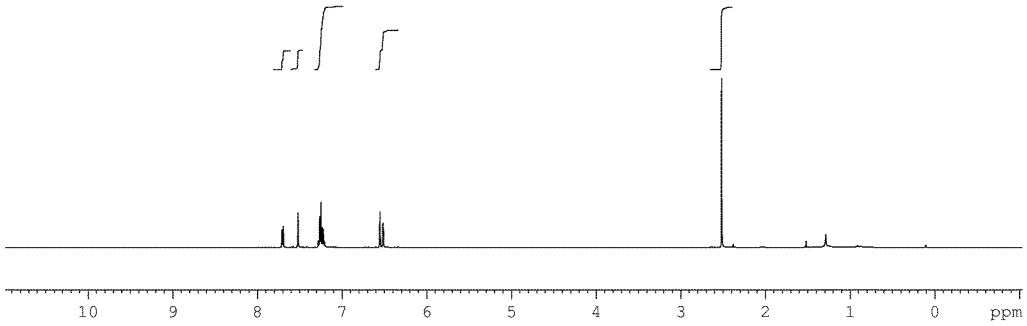

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of 4-(Furan-2-yl)benzaldehyde **(3d)**



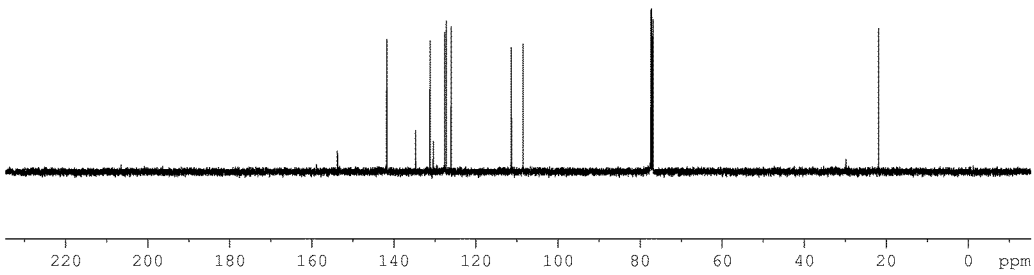

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of 4-(Furan-2-yl)benzaldehyde **(3d)**



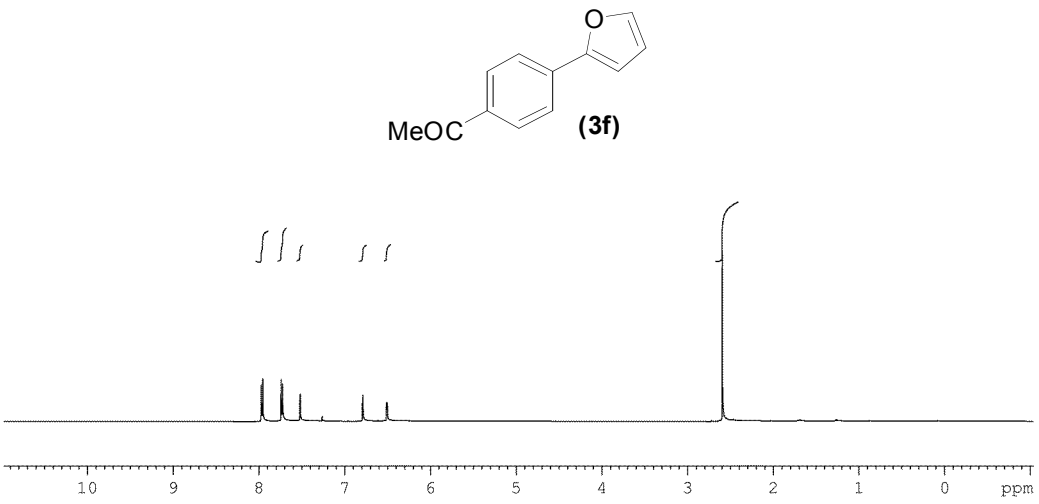
**(3e)**



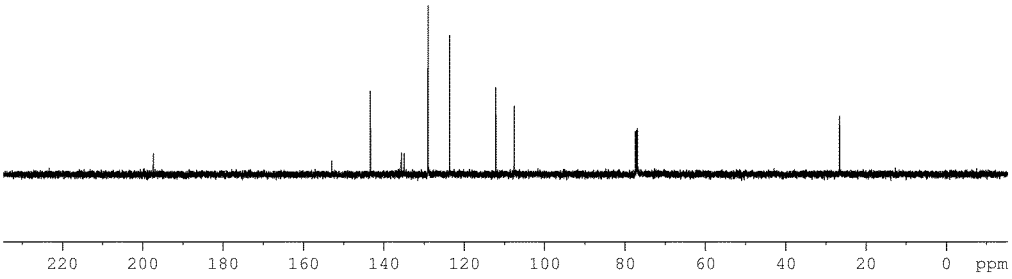

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 2-*o*-Tolyfuran **(3e)**



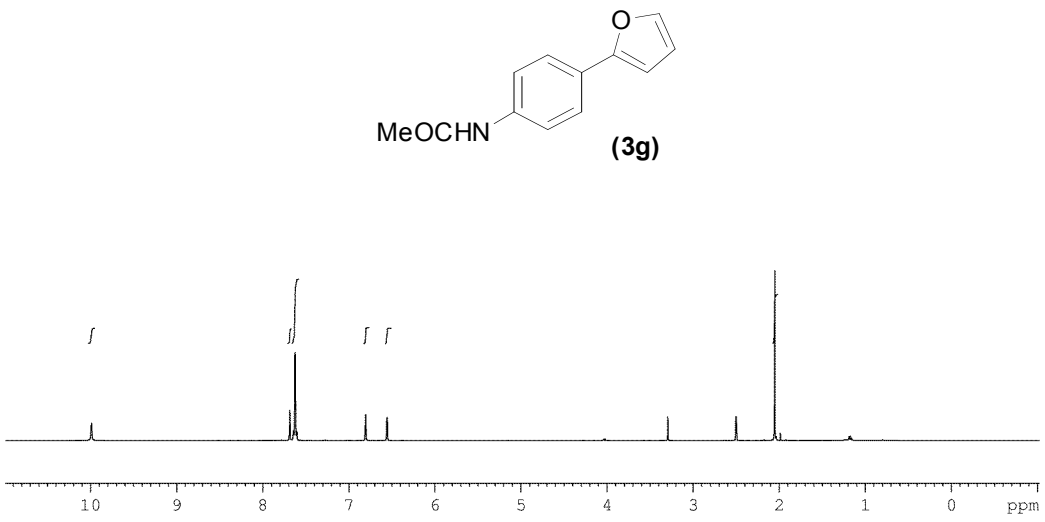

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 2-*o*-Tolyfuran **(3e)**



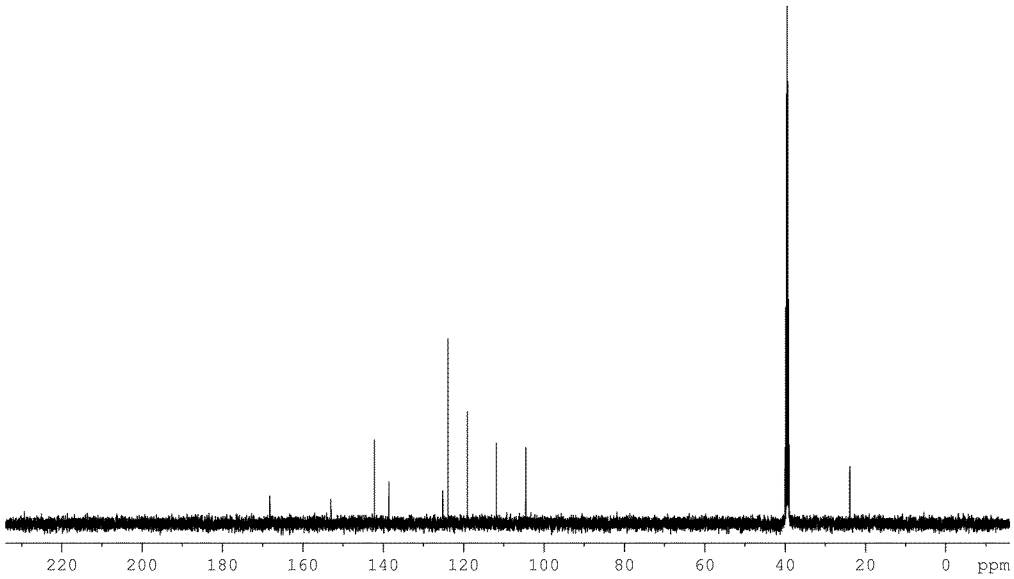

$^{1}$H NMR (500 MHz, DMSO-$d_6$) 1-(4-(Furan-2-yl)phenyl)ethanone **(3f)**



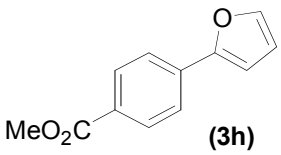

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of 1-(4-(Furan-2-yl)phenyl)ethanone **(3f)**



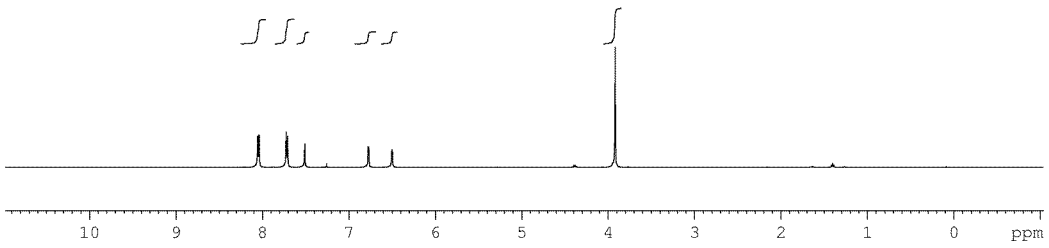

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of *N*-(4-(Furan-2-yl)phenyl)acetamide **(3g)**



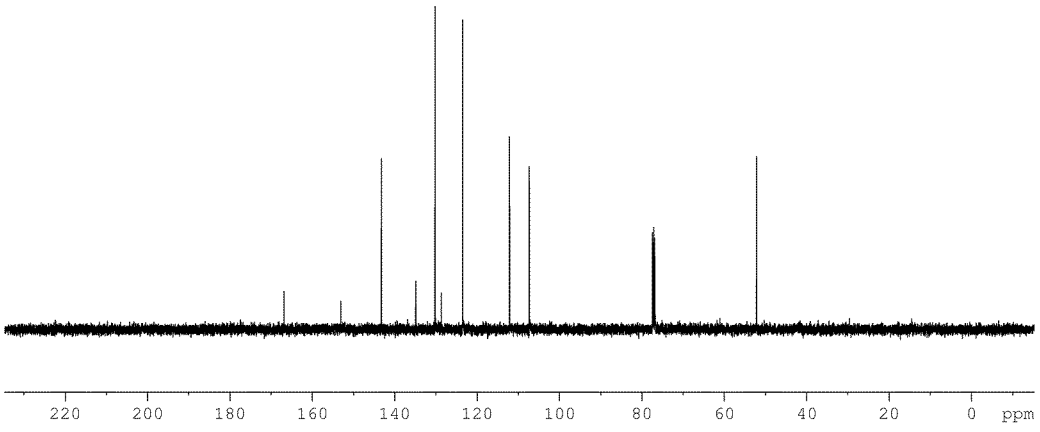

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of *N*-(4-(Furan-2-yl)phenyl)acetamide **(3g)**



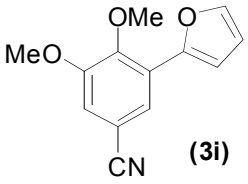

**(3h)**



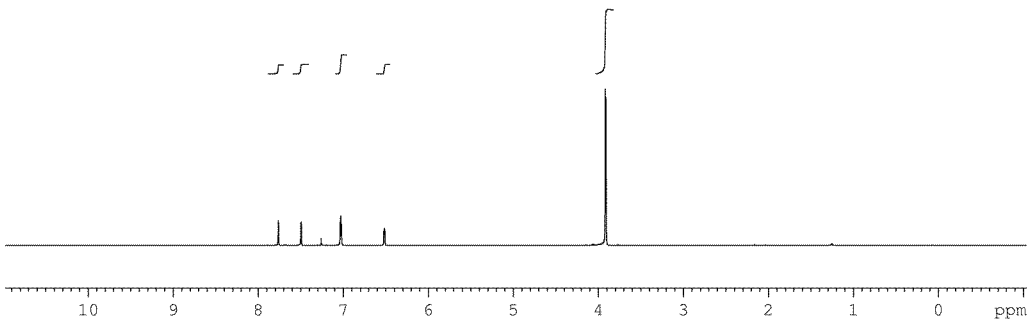

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of Methyl-4-(furan-2-yl)benzoate **(3h)**



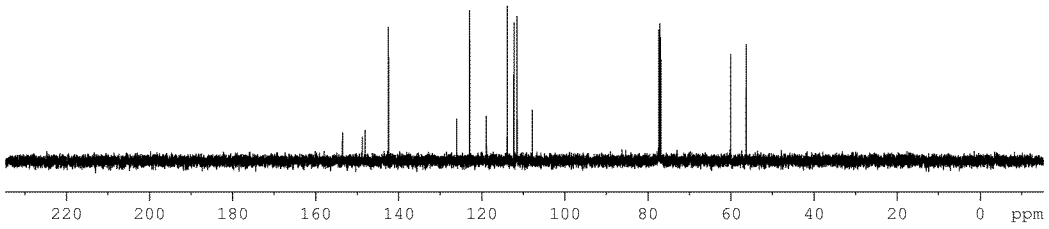

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of Methyl-4-(furan-2-yl)benzoate **(3h)**




**(3i)**

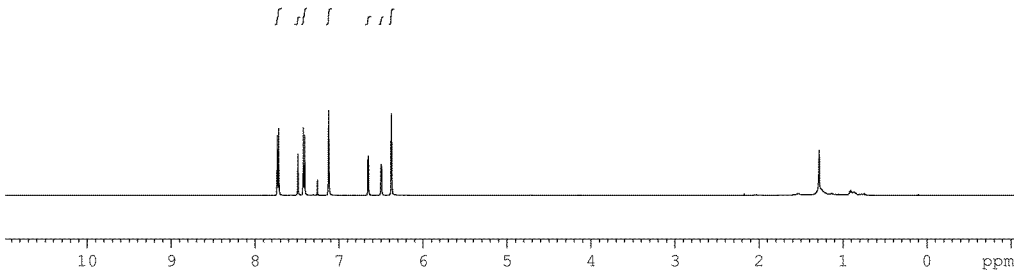



$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 3-(furan-2-yl)-4,5-dimethoxybenzonitrile **(3i)**

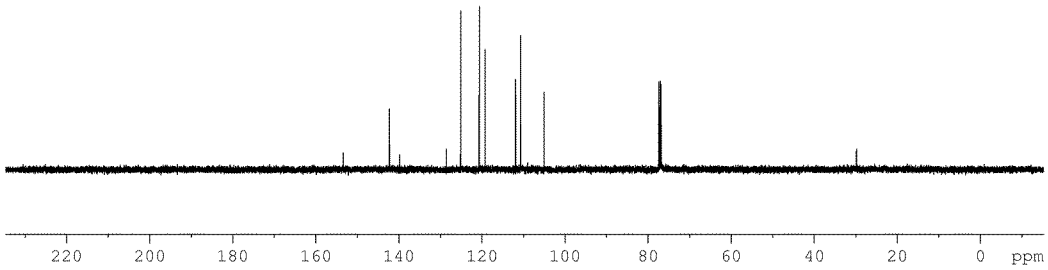



$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 3-(furan-2-yl)-4,5-dimethoxybenzonitrile **(3i)**

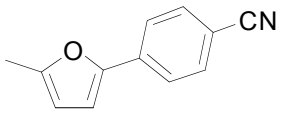

**(3j)**



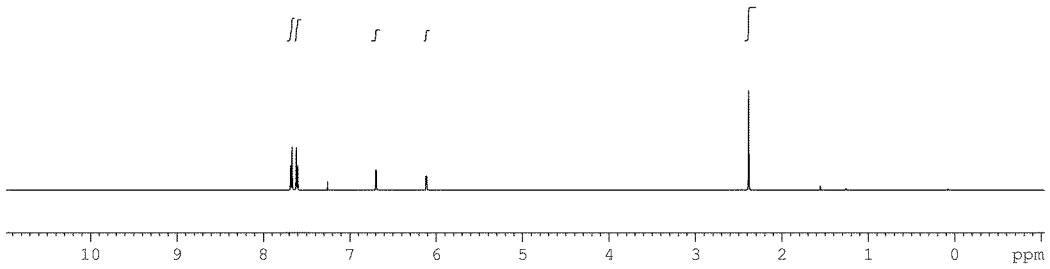

$^{1}$H NMR (500 MHz, $CDCl_3$) 1-(4-(Furan-2-yl)phenyl)-1*H*-pyrrole **(3j)**



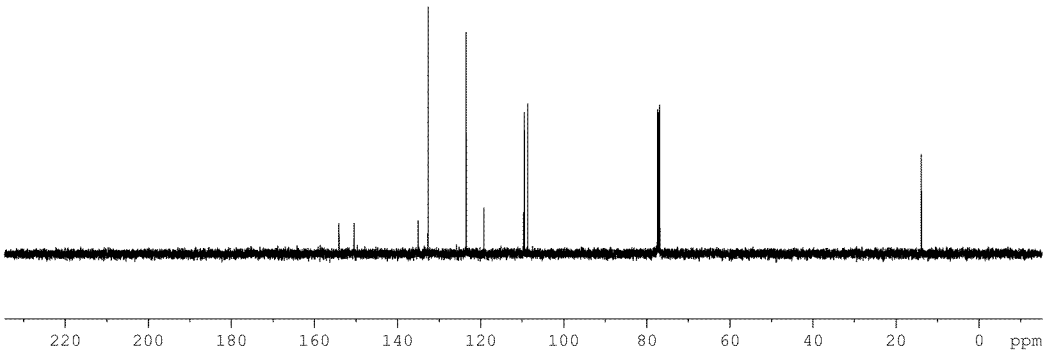

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 1-(4-(Furan-2-yl)phenyl)-1*H*-pyrrole **(3j)**



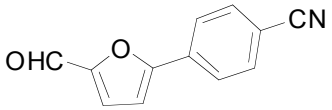

**(4a)**



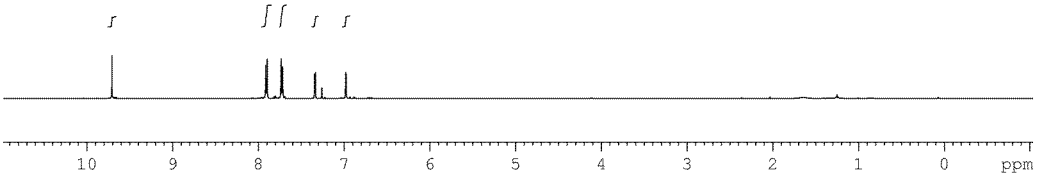

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(5-Methylfuran-2-yl)benzonitrile **(4a)**



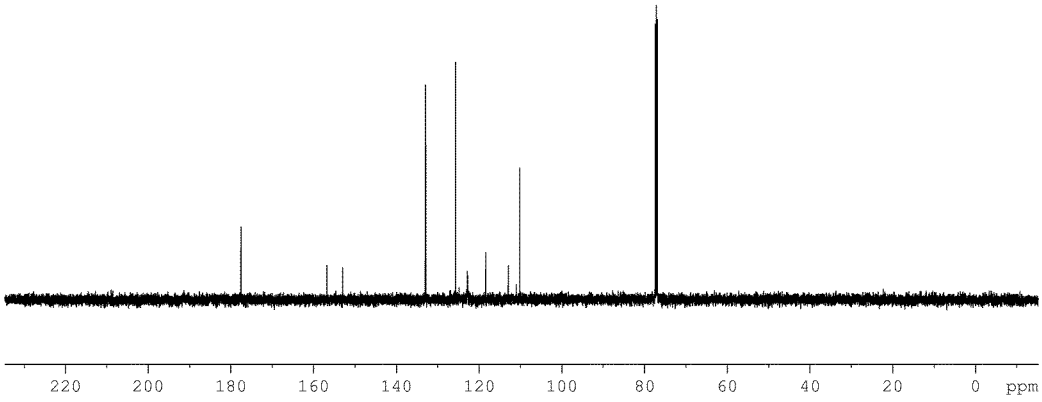

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(5-Methylfuran-2-yl)benzonitrile **(4a)**



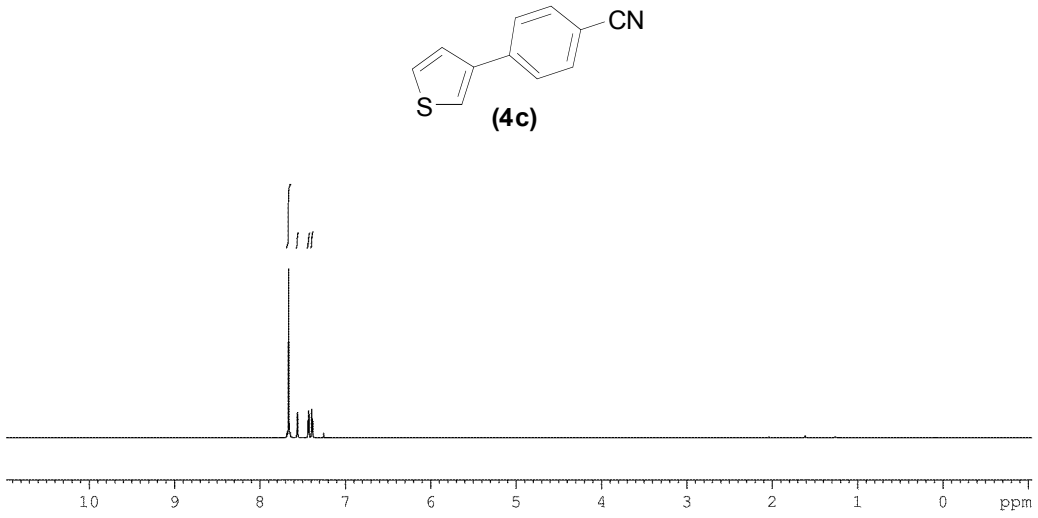

**(4b)**



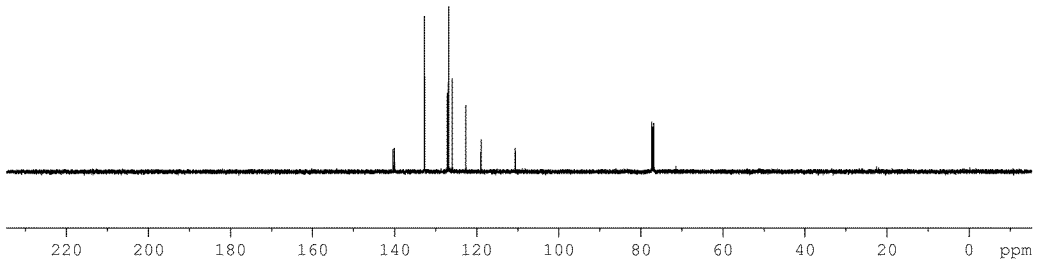

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(5-Formylfuran-2-yl)benzonitrile **(4b)**




$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(5-Formylfuran-2-yl)benzonitrile **(4b)**

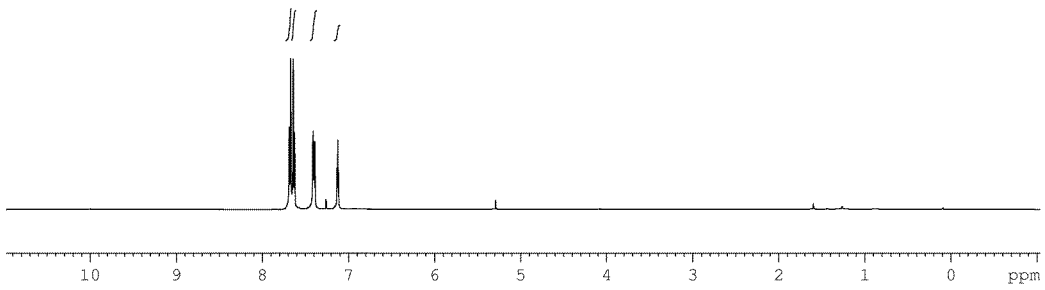



$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(Thiophen-3-yl)benzonitrile **(4c)**

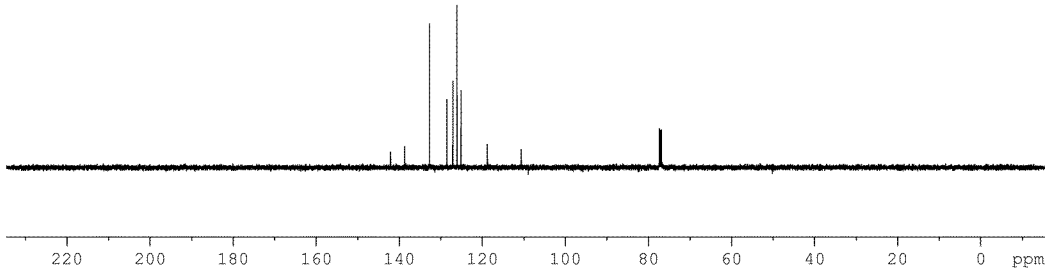



$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(Thiophen-3-yl)benzonitrile **(4c)**

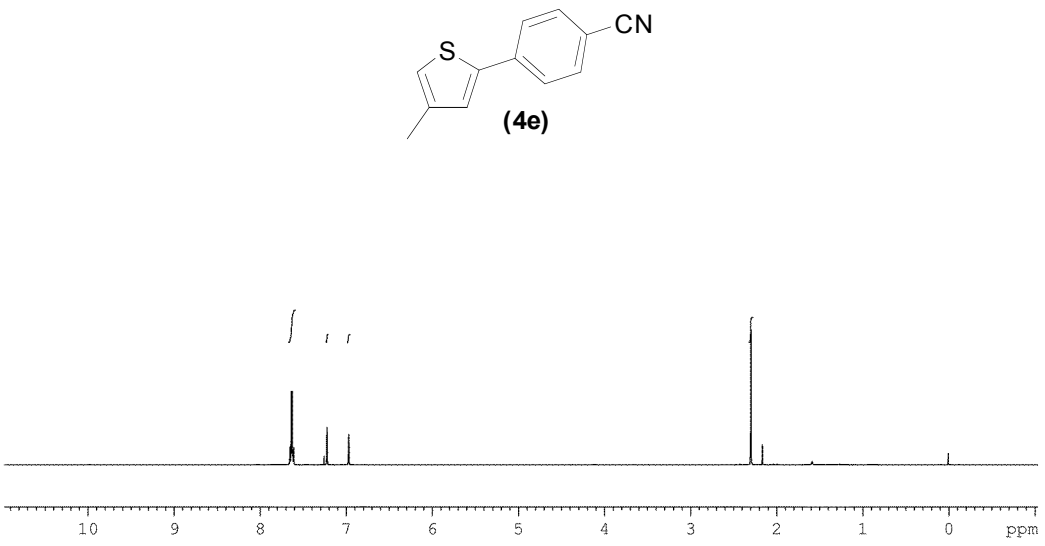

**(4d)**



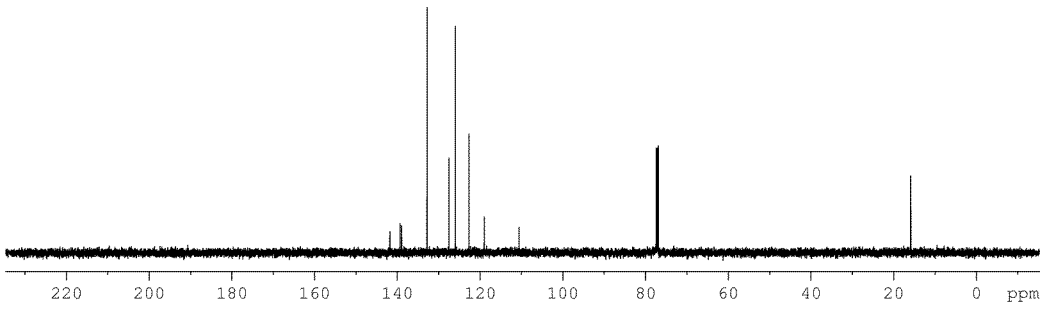

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(Thiophen-2-yl)benzonitrile **(4d)**



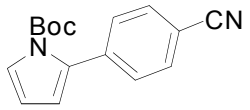

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(Thiophen-2-yl)benzonitrile **(4d)**



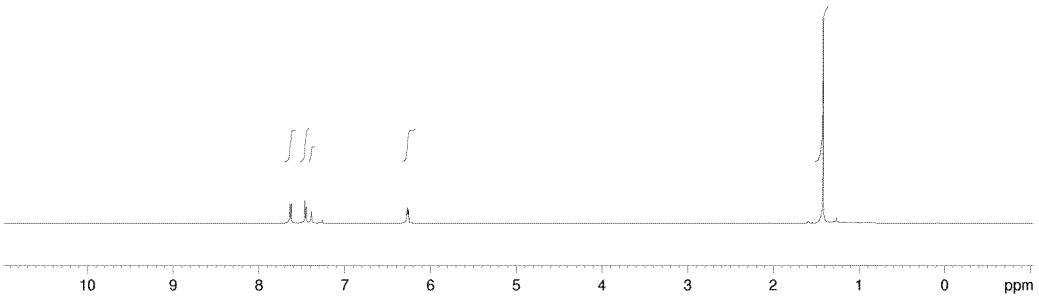

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(5-Methylthiophen-2-yl)benzonitrile **(4e)**




$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(5-Methylthiophen-2-yl)benzonitrile **(4e)**

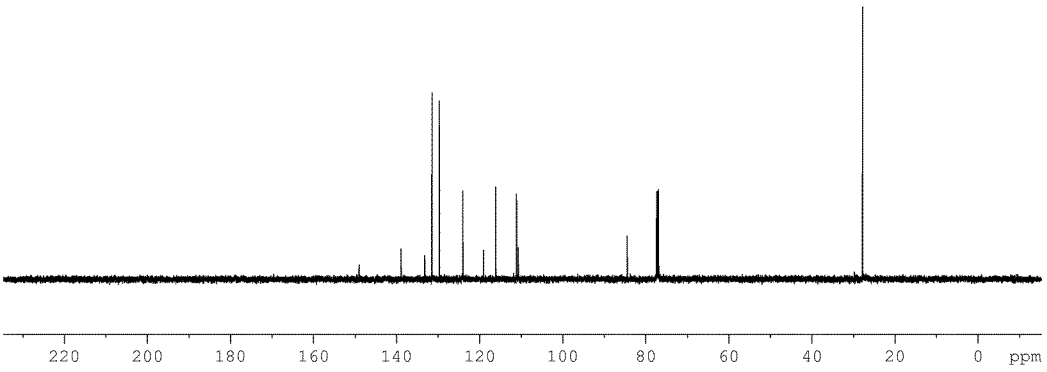



**(4f)**



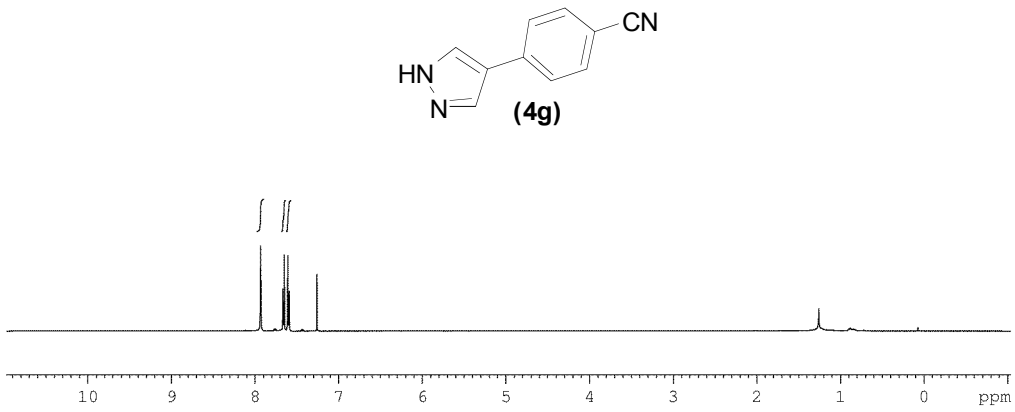

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of

*tert*-Butyl 2-(4-cyanophenyl)-1*H*-pyrrole-1-carboxylate **(4f)**

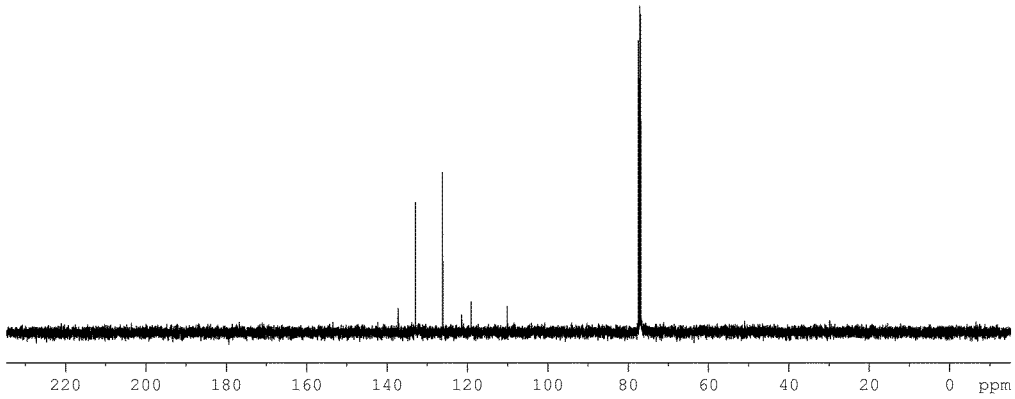



$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of

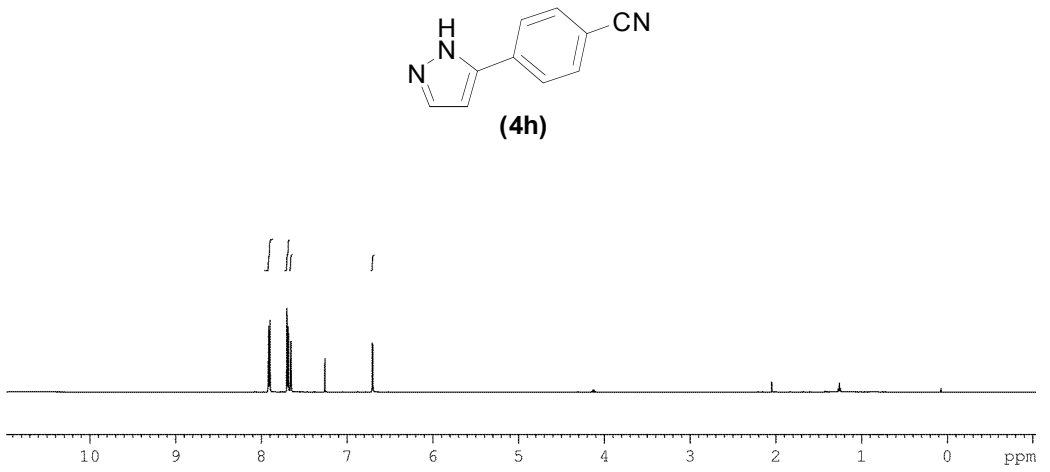
*tert*-Butyl 2-(4-cyanophenyl)-1*H*-pyrrole-1-carboxylate **(4f)**




$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(1*H*-Pyrazol-4-yl)benzonitrile **(4g)**

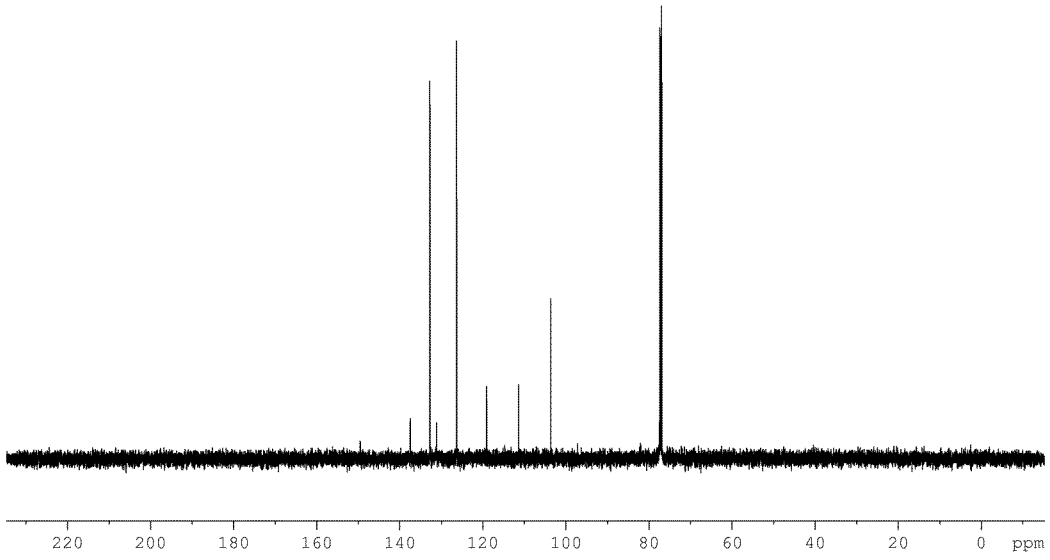



$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(1*H*-Pyrazol-4-yl)benzonitrile **(4g)**

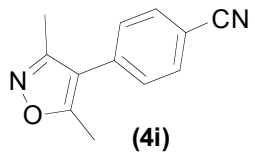



**(4h)**

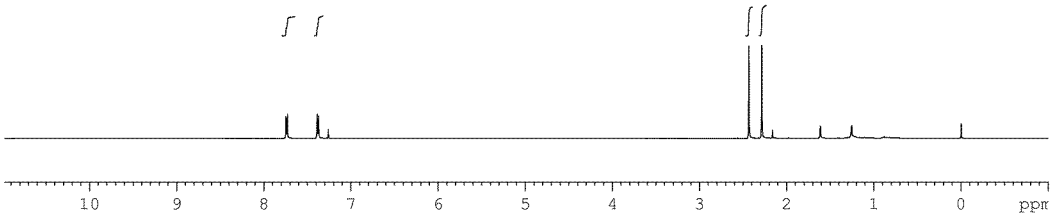
$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(1*H*-Pyrazol-5-yl)benzonitrile **(4h)**



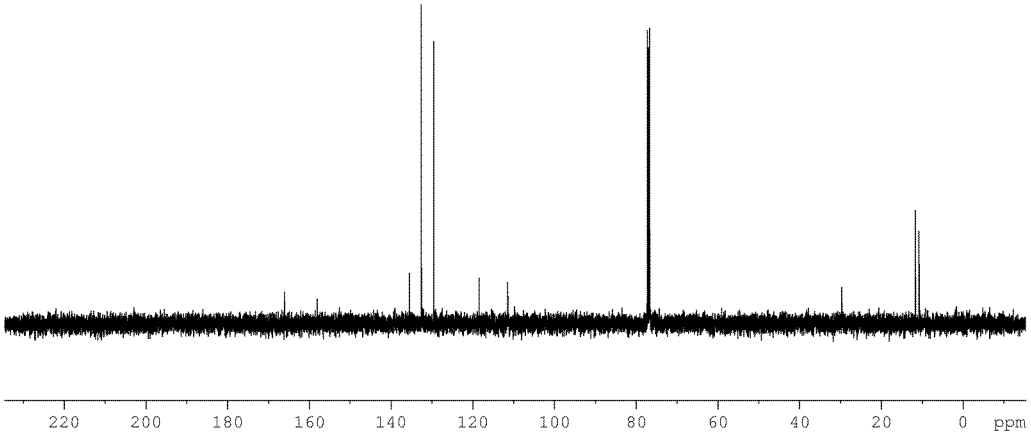

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(1*H*-Pyrazol-5-yl)benzonitrile **(4h)**



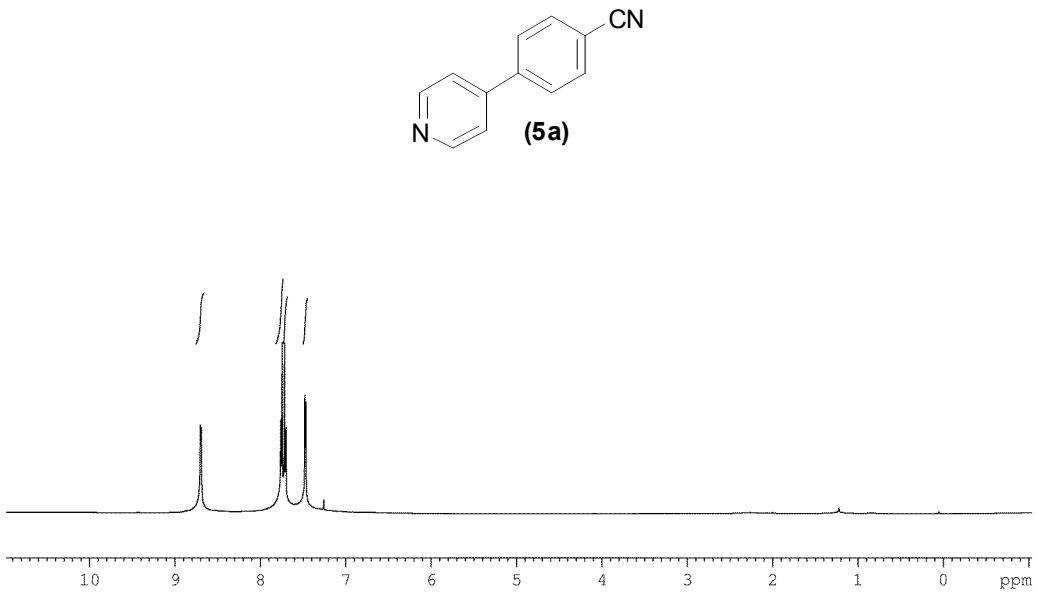

**(4i)**



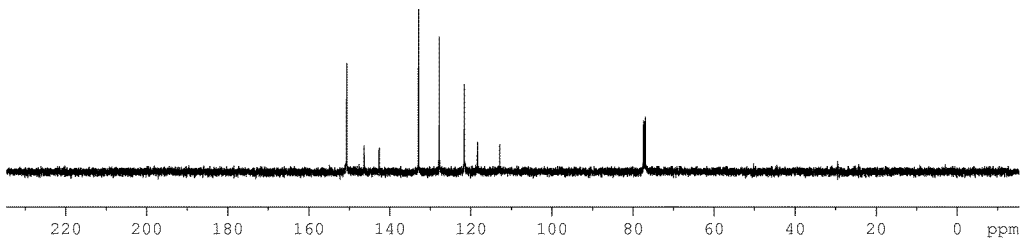

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(3,5-Dimethylisoxazol-4-yl)benzonitrile **(4i)**



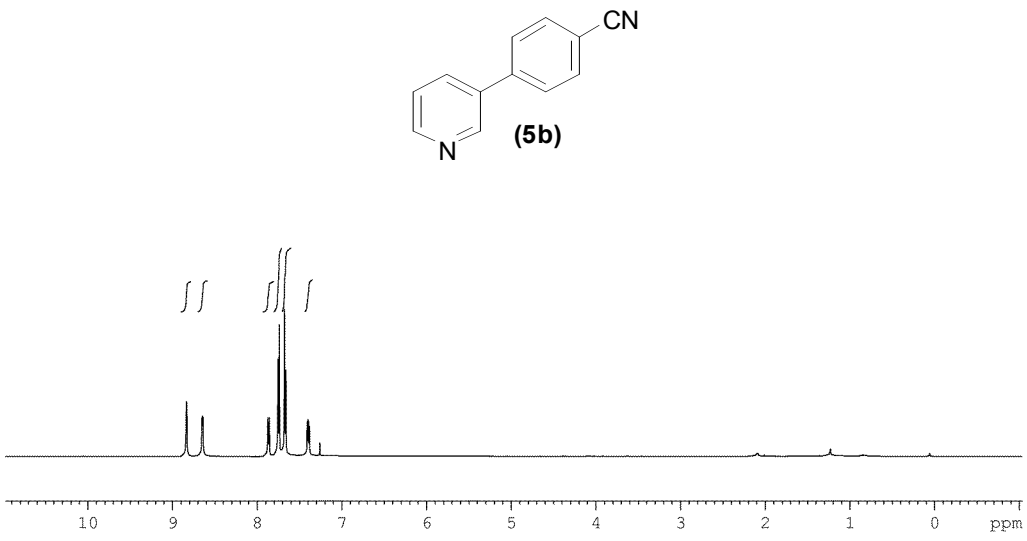

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(3,5-Dimethylisoxazol-4-yl)benzonitrile **(4i)**



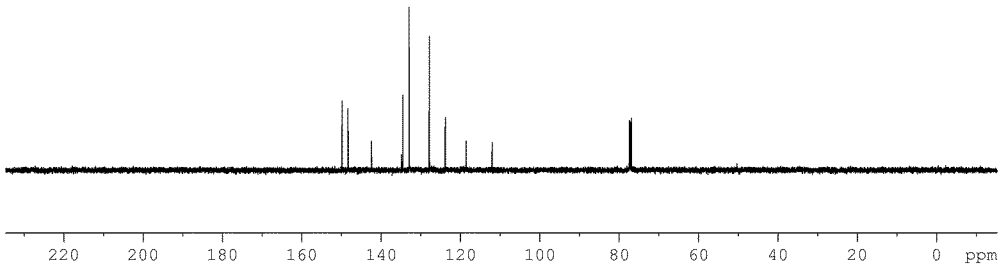

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(Pyridin-4-yl)benzonitrile **(5a)**



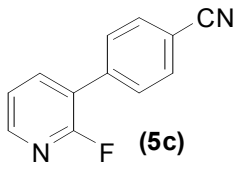

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(Pyridin-4-yl)benzonitrile **(5a)**

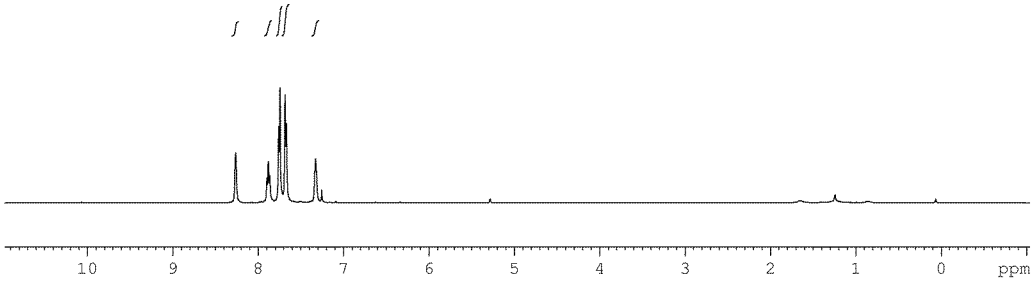



$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(Pyridin-3-yl)benzonitrile **(5b)**

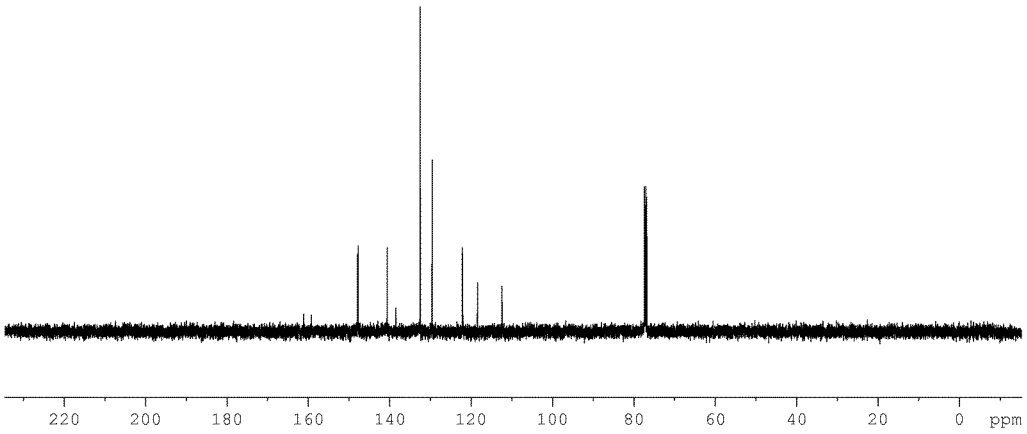



$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(Pyridin-3-yl)benzonitrile **(5b)**

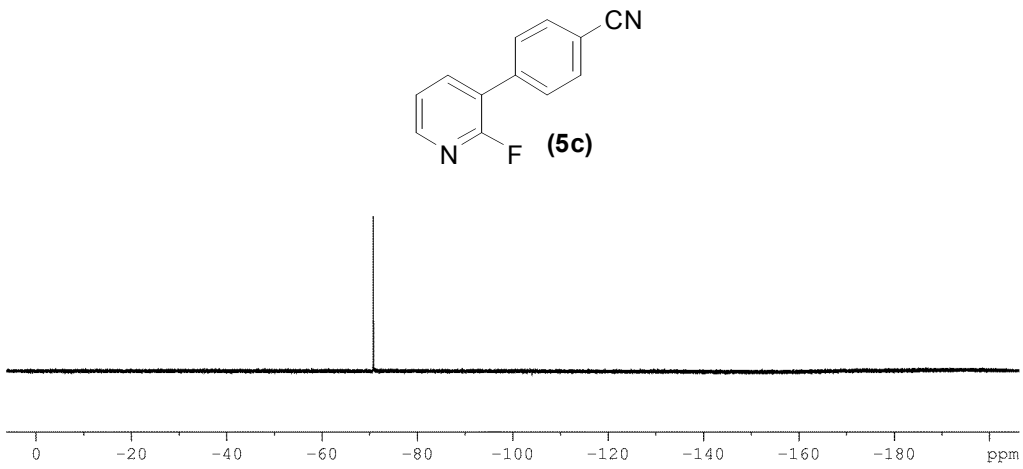


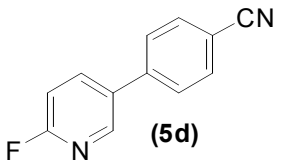

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(2-Fluoropyridin-3-yl)benzonitrile **(5c)**



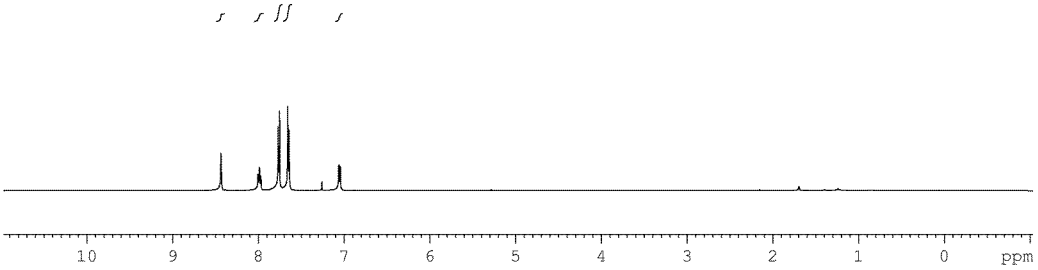

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(2-Fluoropyridin-3-yl)benzonitrile **(5c)**



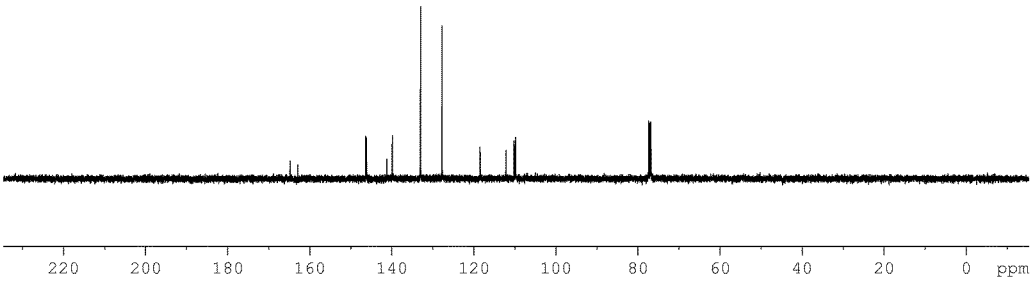

$^{19}F$ NMR (470.8 MHz, $CDCl_3$) Spectrum of 4-(2-Fluoropyridin-3-yl)benzonitrile **(5c)**



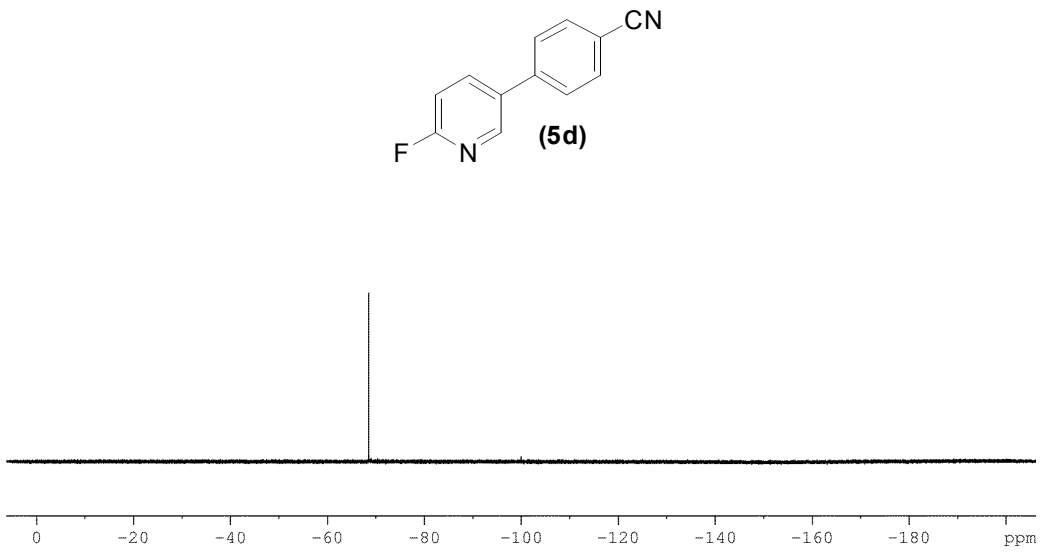

**(5d)**



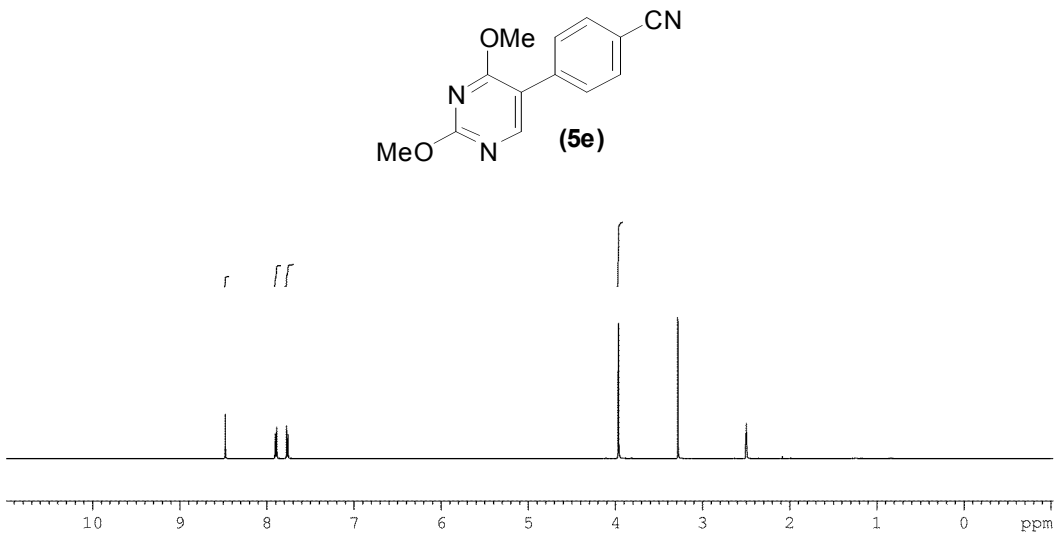

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(6-Fluoropyridin-3-yl)benzonitrile **(5d)**



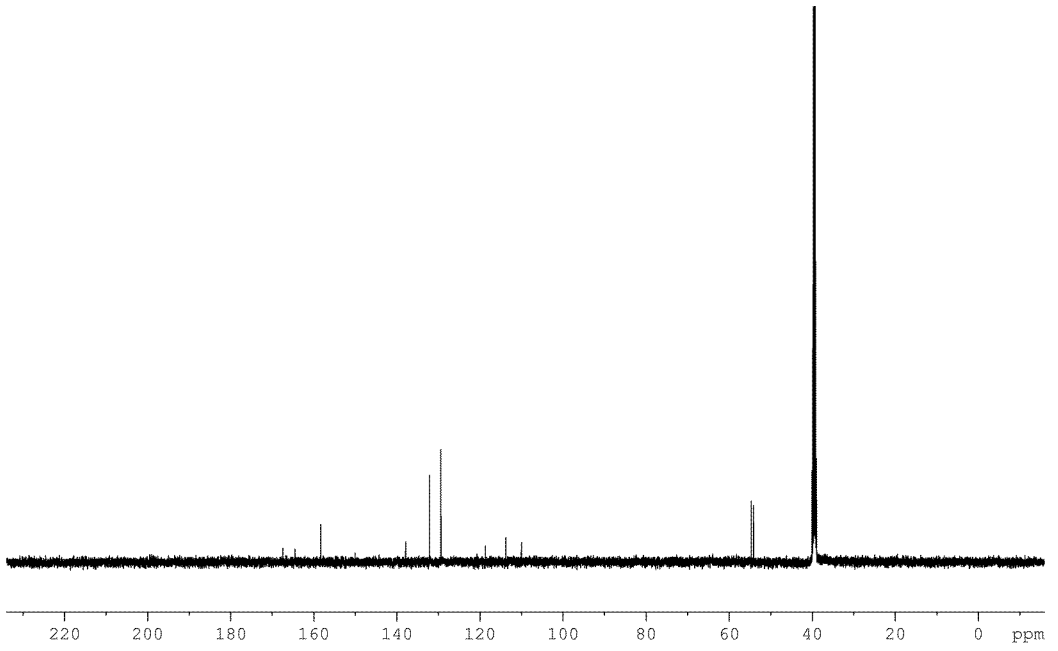

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(6-Fluoropyridin-3-yl)benzonitrile **(5d)**



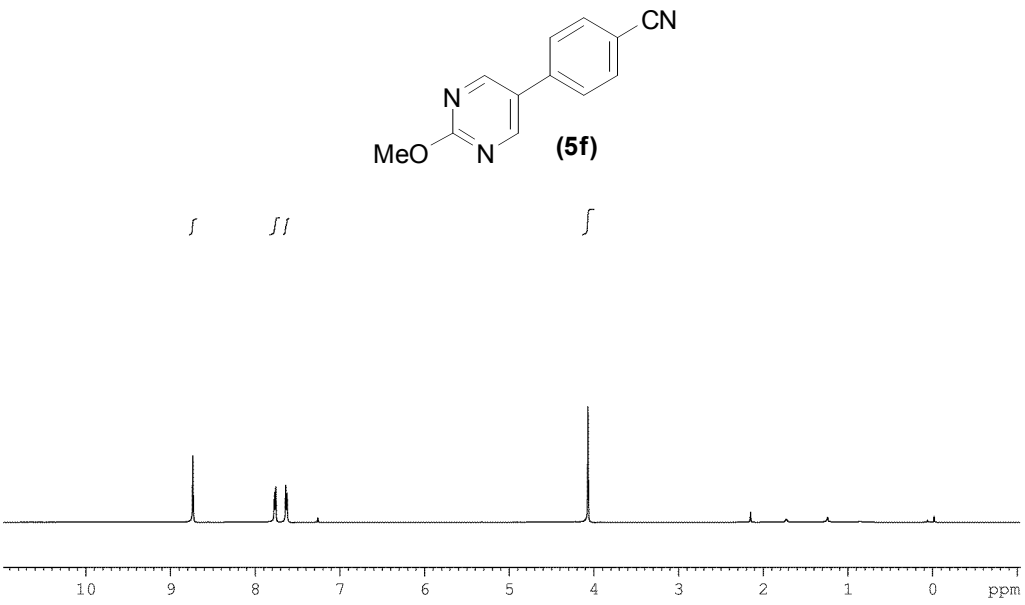

$^{19}F$ NMR (470.8 MHz, $CDCl_3$) Spectrum of 4-(6-Fluoropyridin-3-yl)benzonitrile **(5d)**



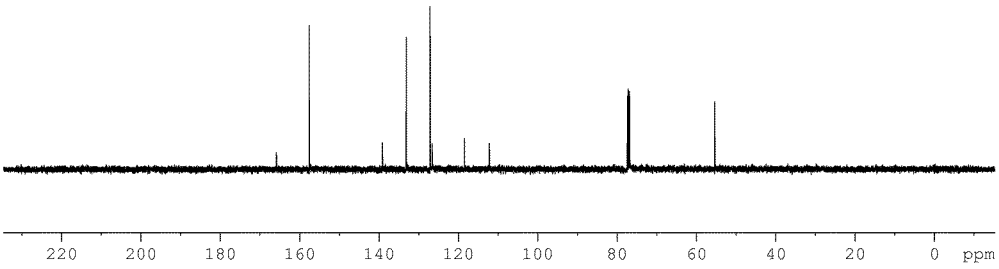

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of 4-(2,4-Dimethoxypyrimidin-5-yl)benzonitrile **(5e)**



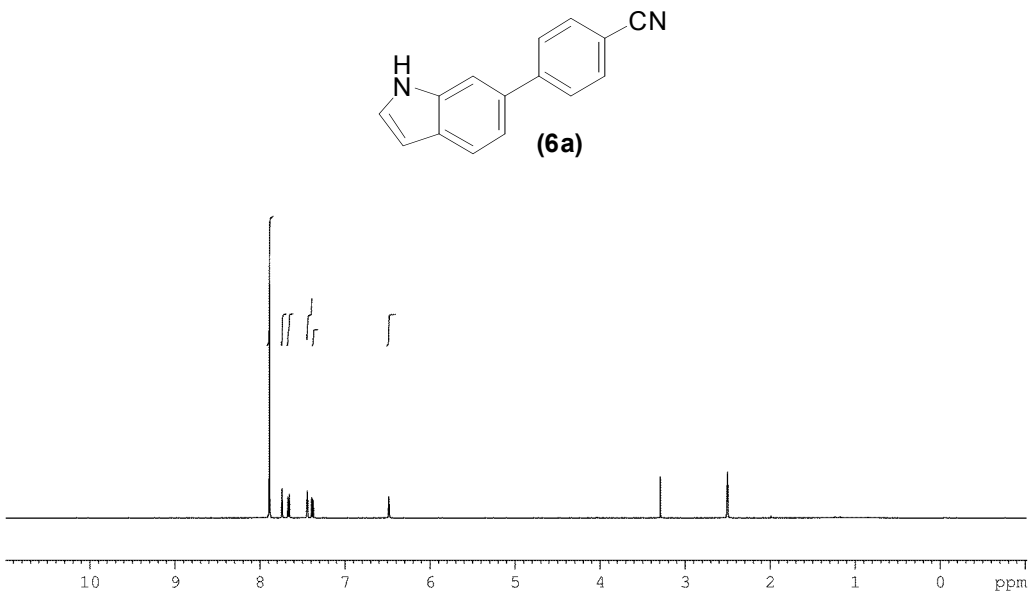

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of 4-(2,4-Dimethoxypyrimidin-5-yl)benzonitrile **(5e)**



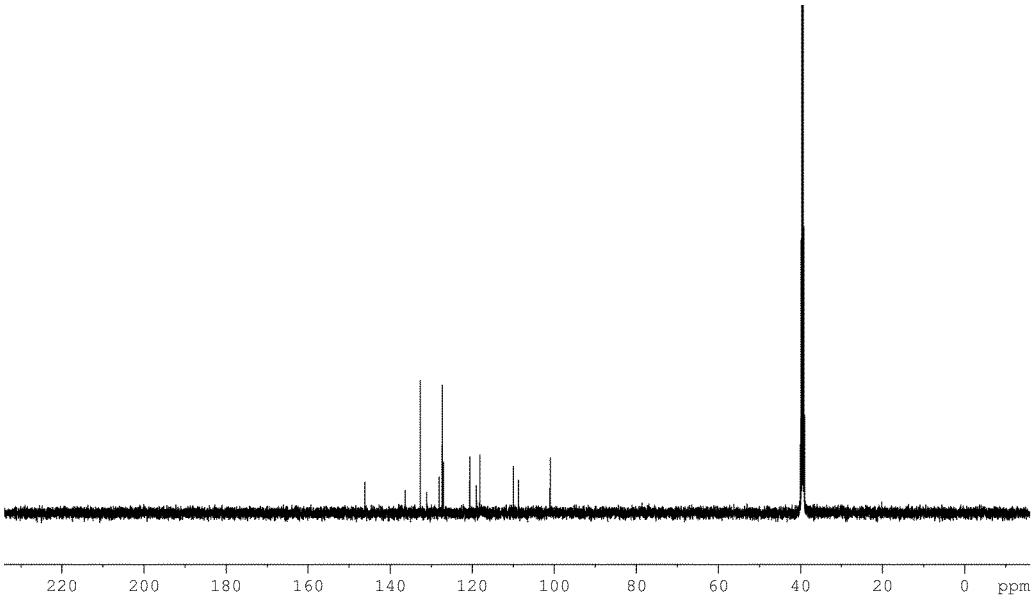

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(2-Methoxypyrimidin-5-yl)benzonitrile **(5f)**



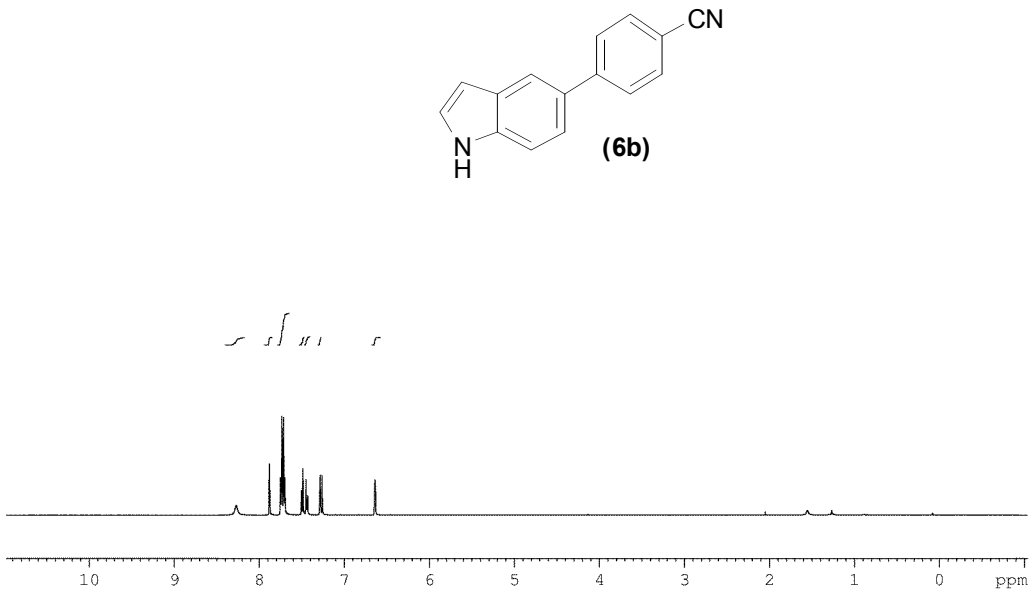

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(2-Methoxypyrimidin-5-yl)benzonitrile **(5f)**



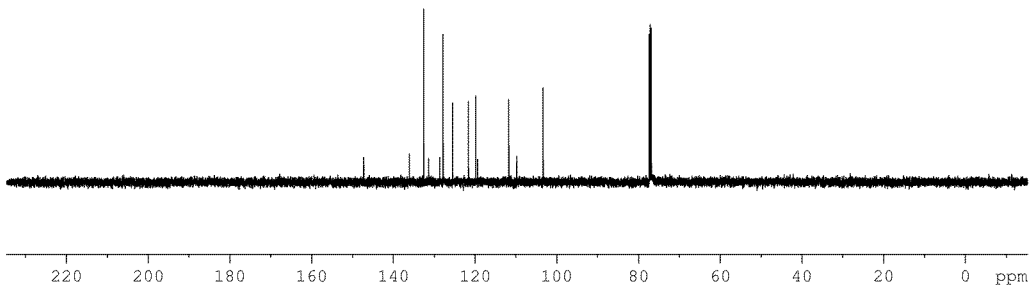

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of 4-(1*H*-indol-6-yl)benzonitrile **(6a)**



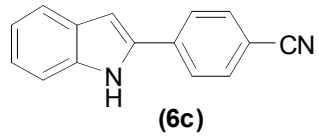

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of 4-(1*H*-indol-6-yl)benzonitrile **(6a)**



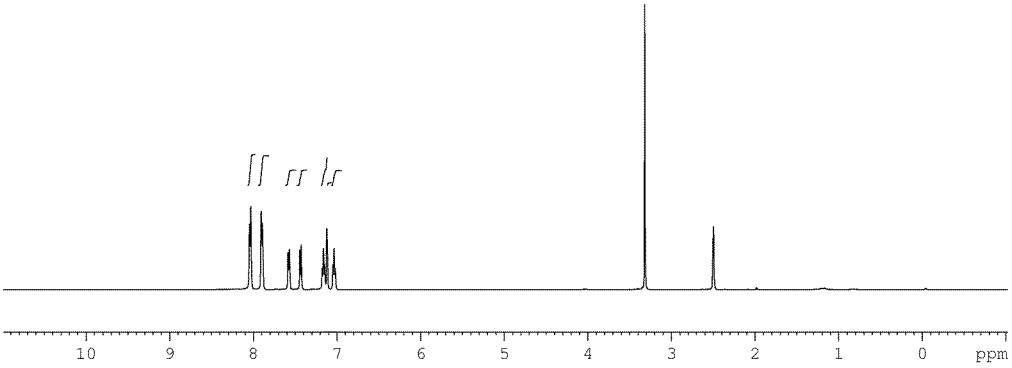

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(1*H*-Indol-5-yl)benzonitrile **(6b)**



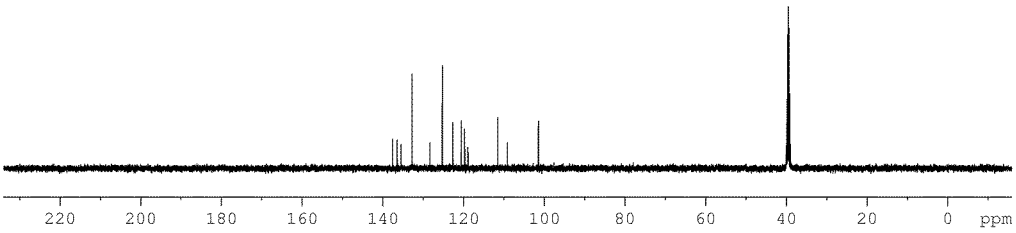

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(1*H*-Indol-5-yl)benzonitrile **(6b)**



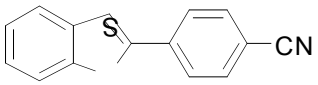

**(6c)**



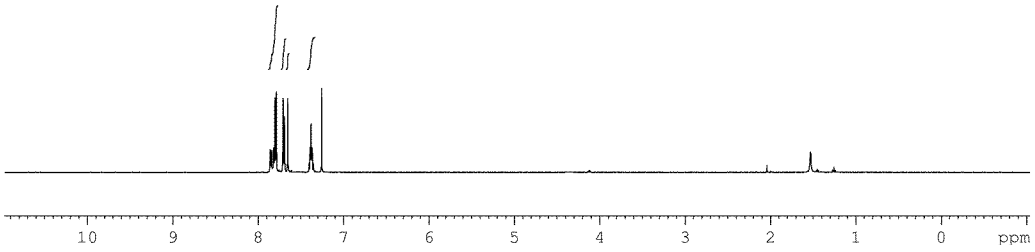

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of 4-(1*H*-Indol-2-yl)benzonitrile **(6c)**



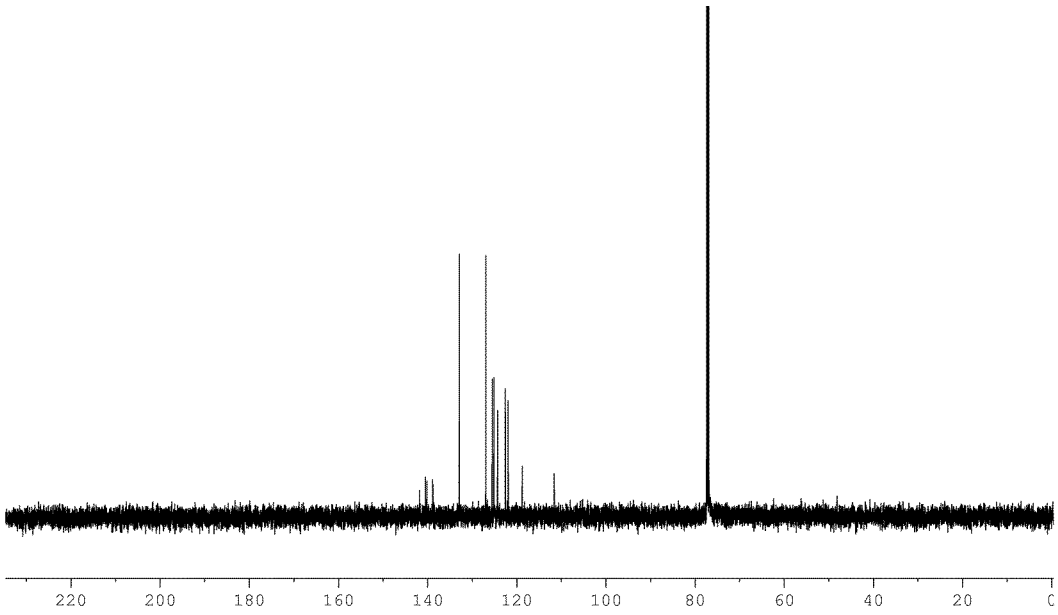

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of 4-(1*H*-Indol-2-yl)benzonitrile **(6c)**



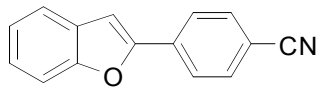

**(6d)**



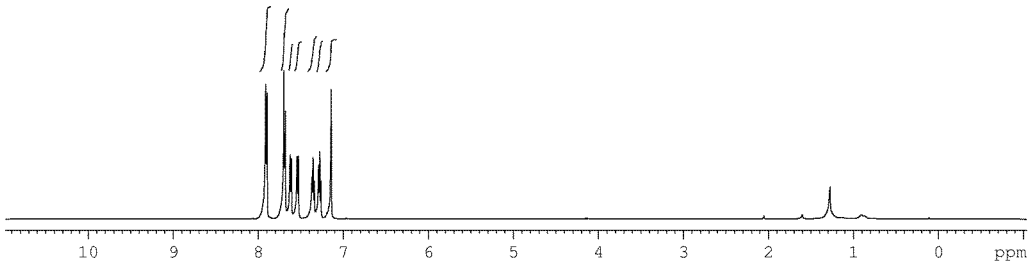

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(Benzo[*b*]thiophen-2-yl)benzonitrile **(6d)**



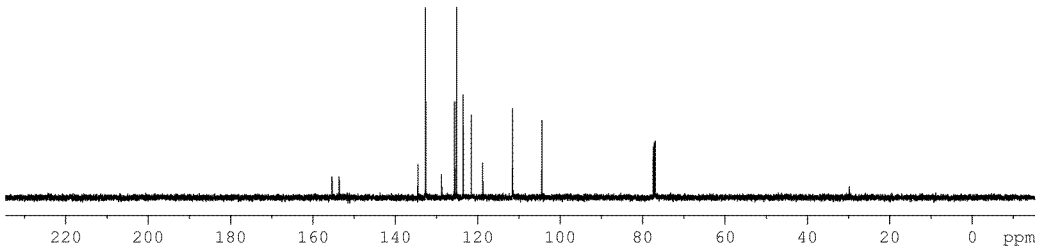

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(Benzo[*b*]thiophen-2-yl)benzonitrile **(6d)**



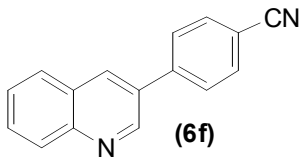

**(6e)**



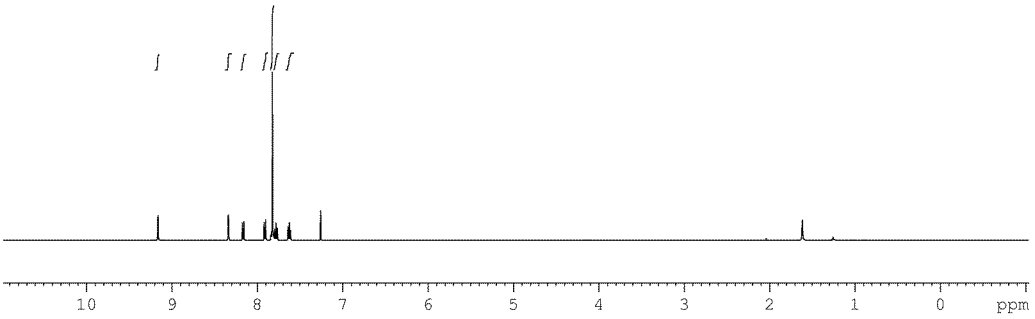

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(Benzofuran-2-yl)benzonitrile **(6e)**



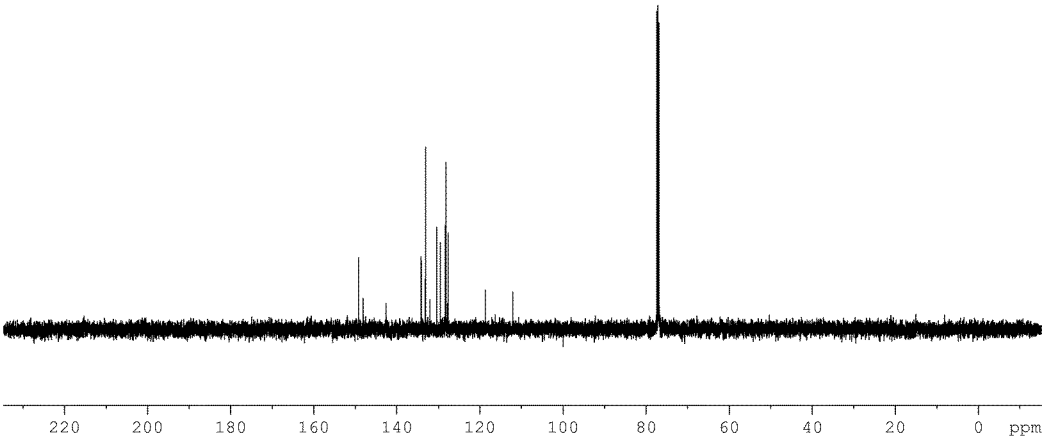

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(Benzofuran-2-yl)benzonitrile **(6e)**



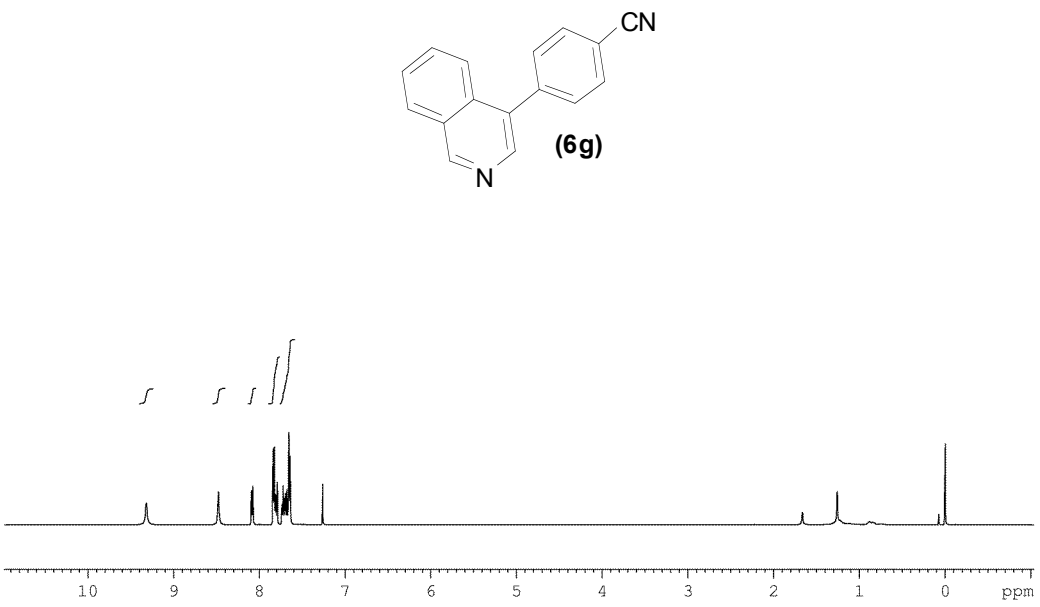

**(6f)**



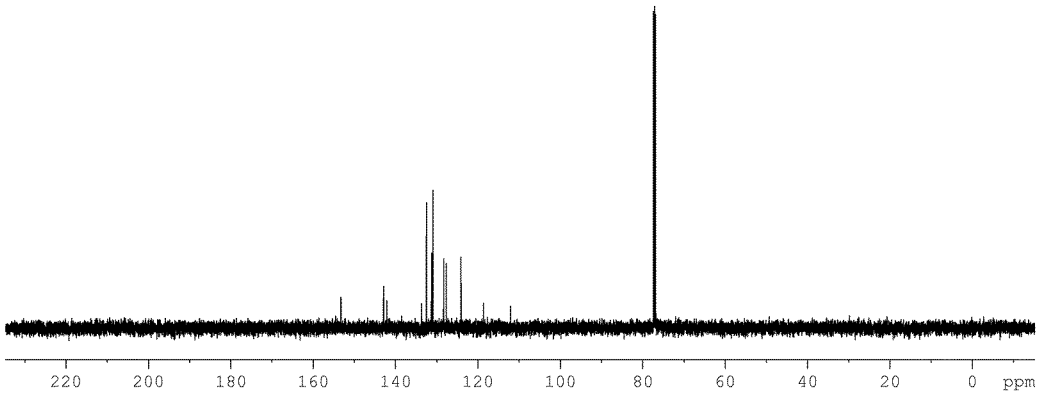

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(Quinolin-3-yl)benzonitrile **(6f)**



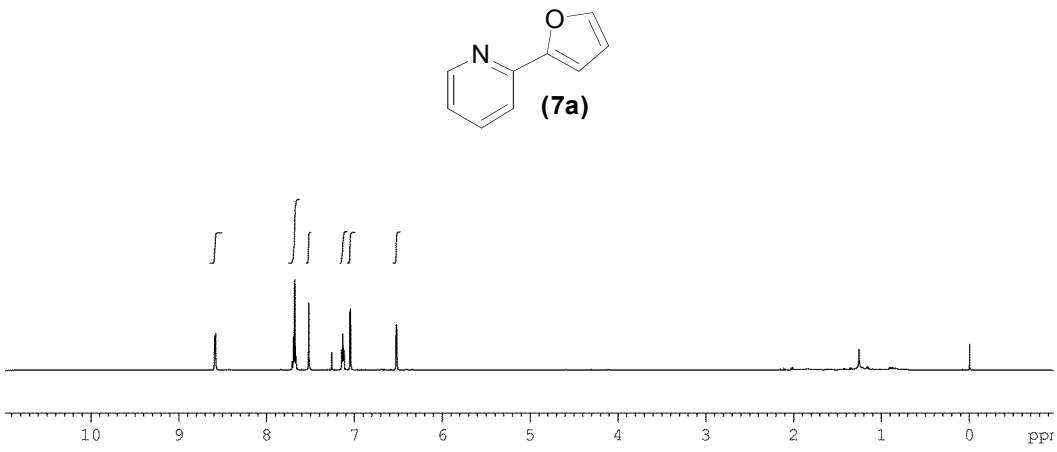

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(Quinolin-3-yl)benzonitrile **(6f)**



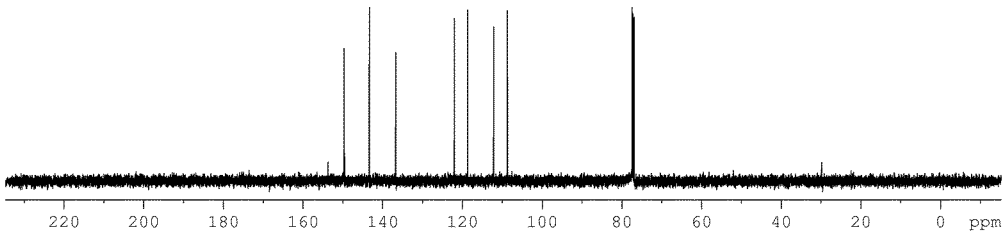

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 4-(Isoquinolin-3-yl)benzonitrile **(6g)**



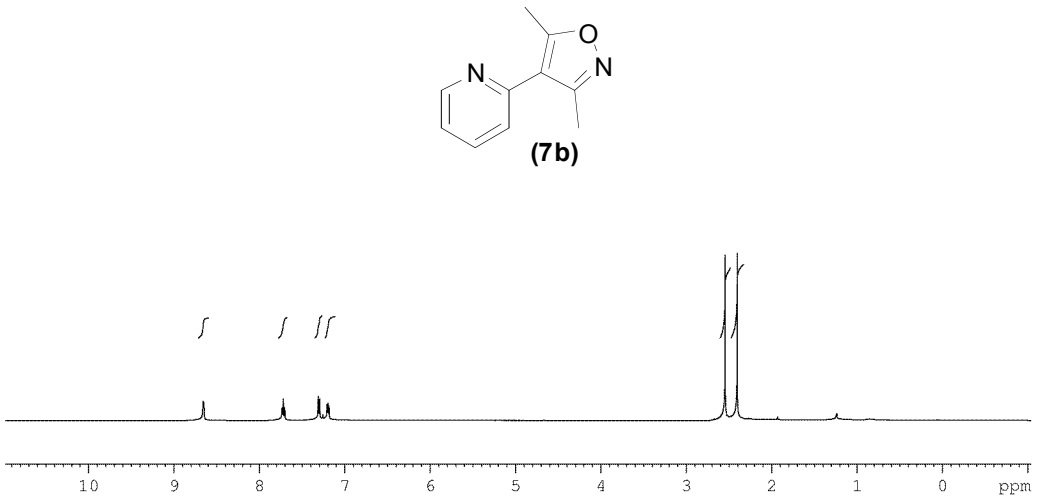

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 4-(Isoquinolin-3-yl)benzonitrile **(6g)**



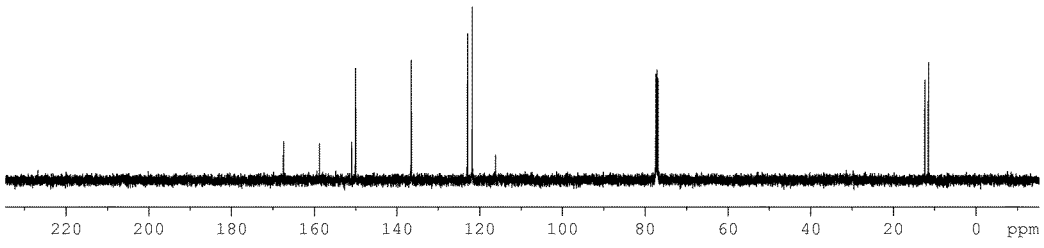

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 2-(Furan-2-yl)pyridine **(7a)**



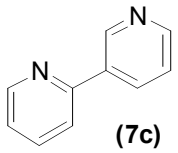

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 2-(Furan-2-yl)pyridine **(7a)**



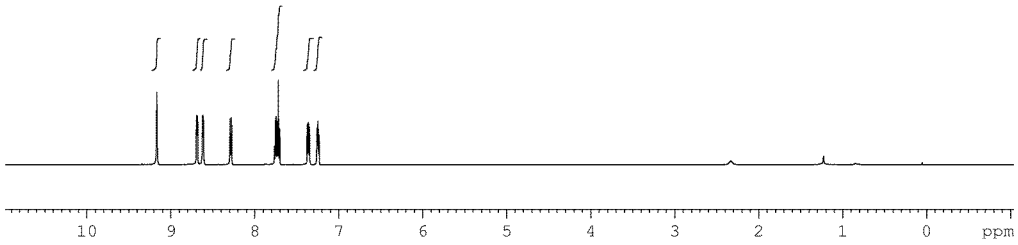

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 3,5-Dimethyl-4-(pyridine-2-yl)isoxazole **(7b)**



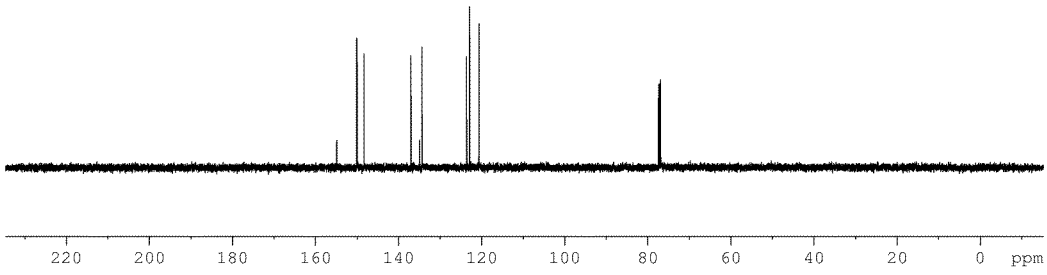

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 3,5-Dimethyl-4-(pyridine-2-yl)isoxazole **(7b)**



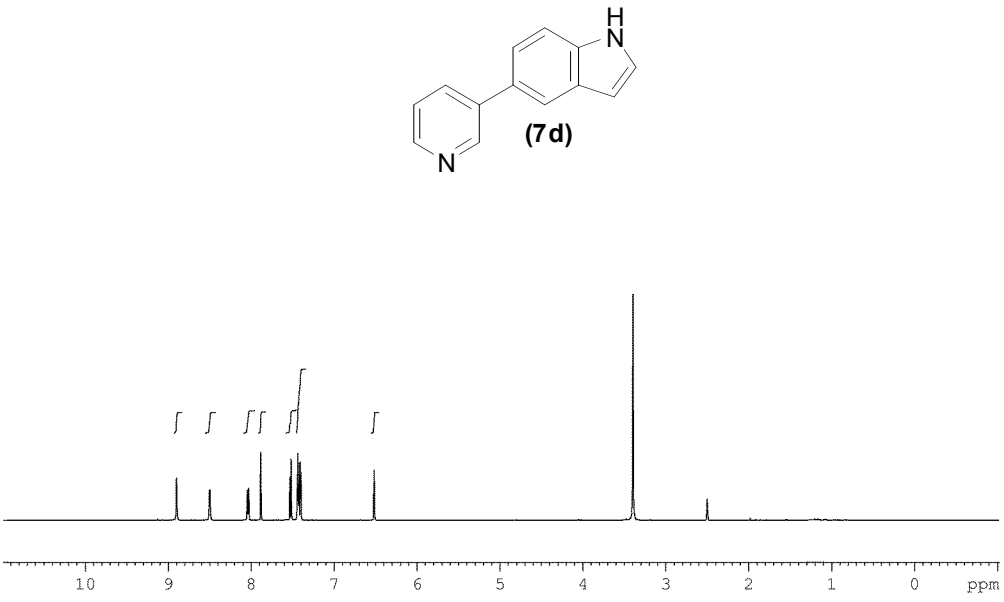

**(7c)**



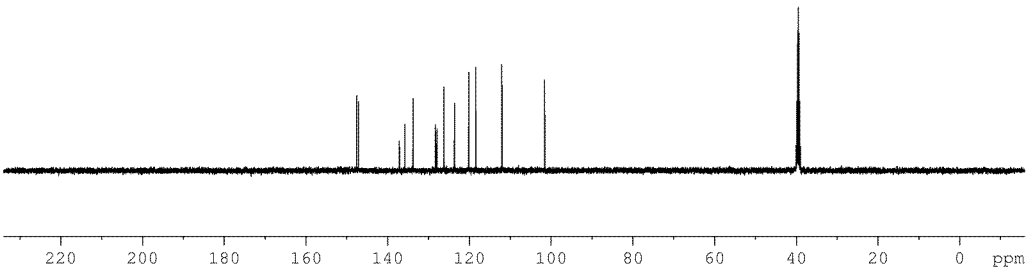

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 2,3'-Bipyridine **(7c)**



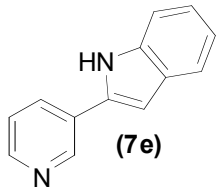

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 2,3'-Bipyridine **(7c)**



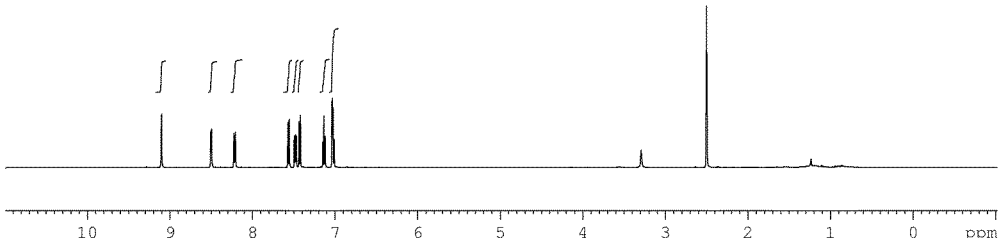

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of 6-(Pyridin-3-yl)-1*H*-indole **(7d)**



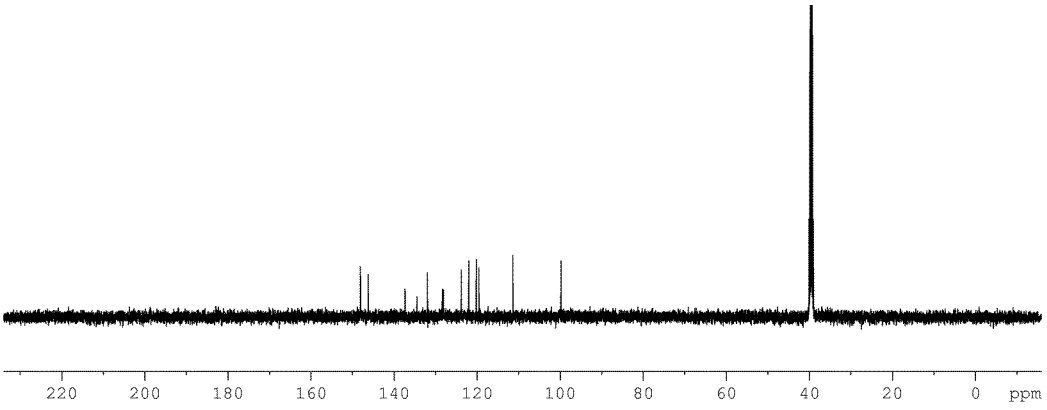

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of 6-(Pyridin-3-yl)-1*H*-indole **(7d)**



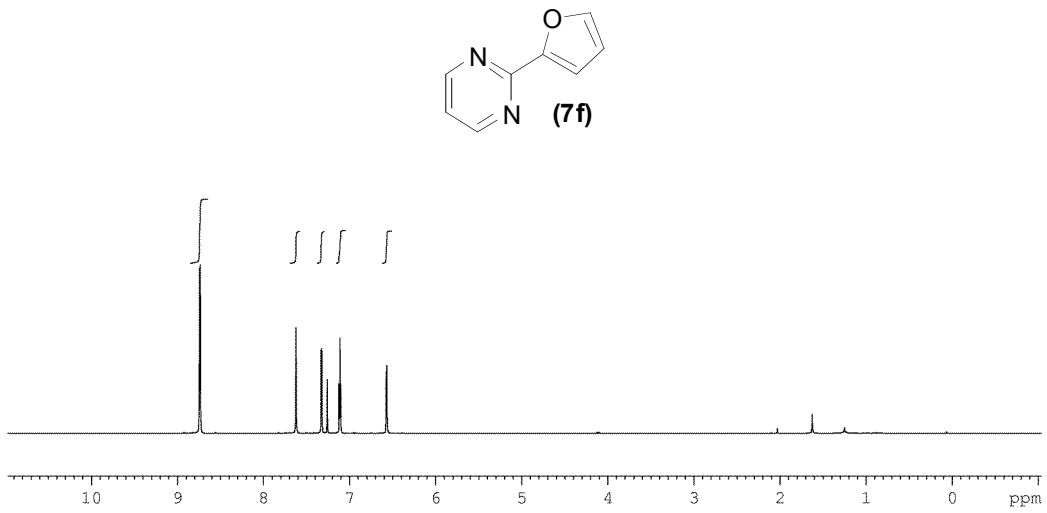

**(7e)**



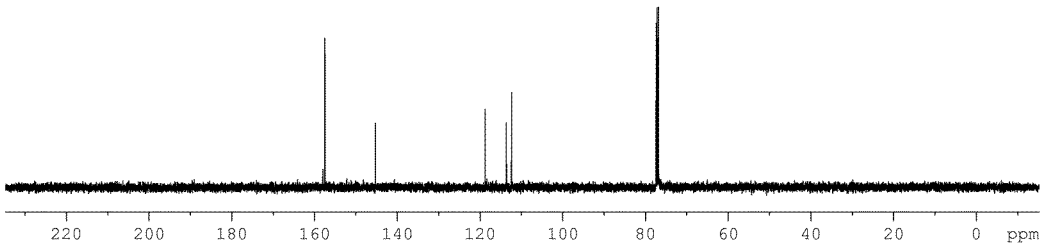

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of 2-(Pyridin-3-yl)-1*H*-indole **(7e)**



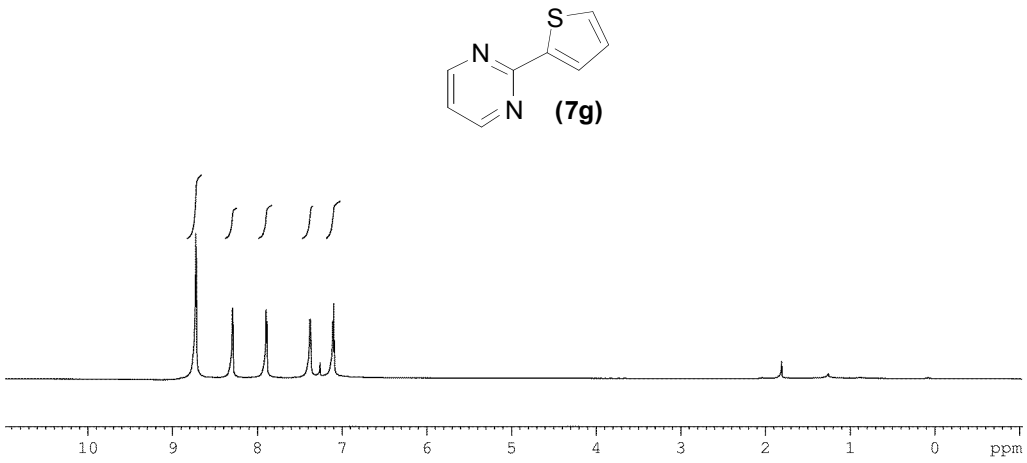

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of 2-(Pyridin-3-yl)-1*H*-indole **(7e)**



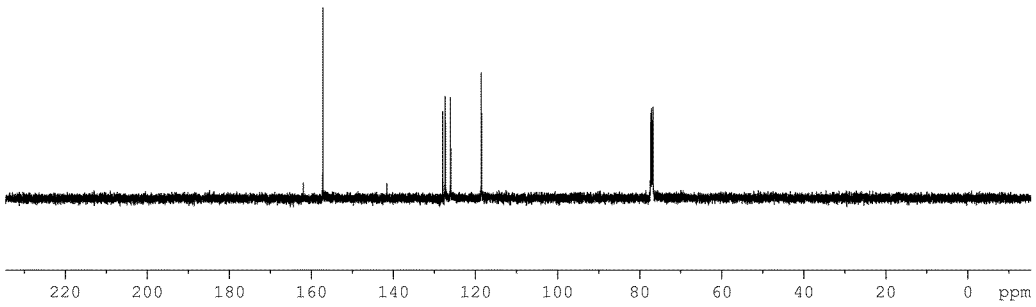

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 2-(Furan-2-yl)pyrimidine **(7f)**



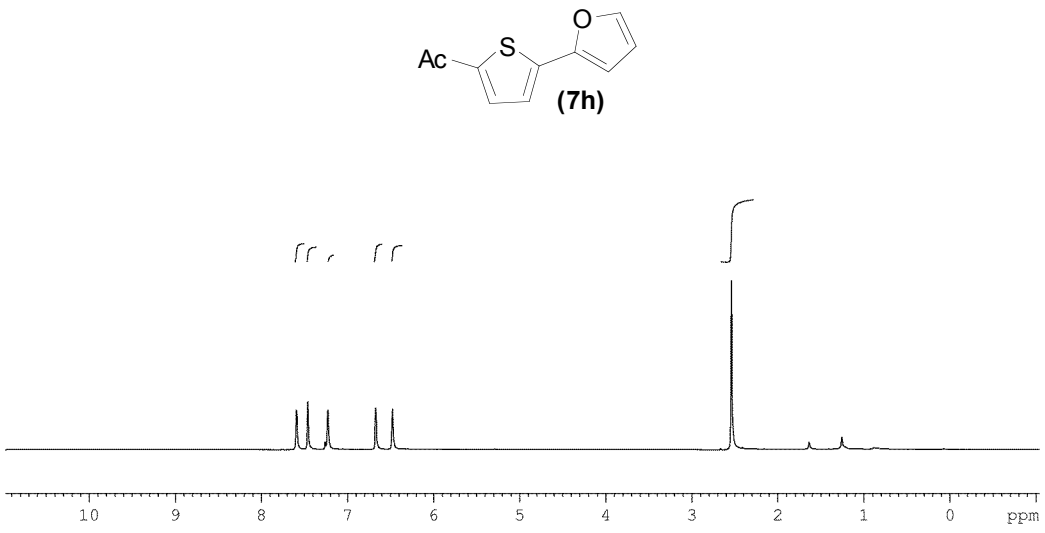

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 2-(Furan-2-yl)pyrimidine **(7f)**



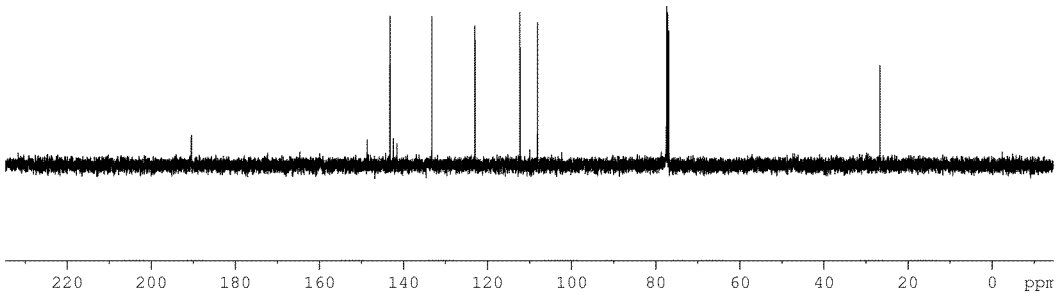

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 2-(Thiophen-3-yl)pyrimidine **(7g)**



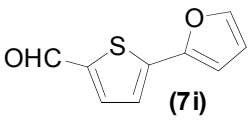

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 2-(Thiophen-3-yl)pyrimidine **(7g)**



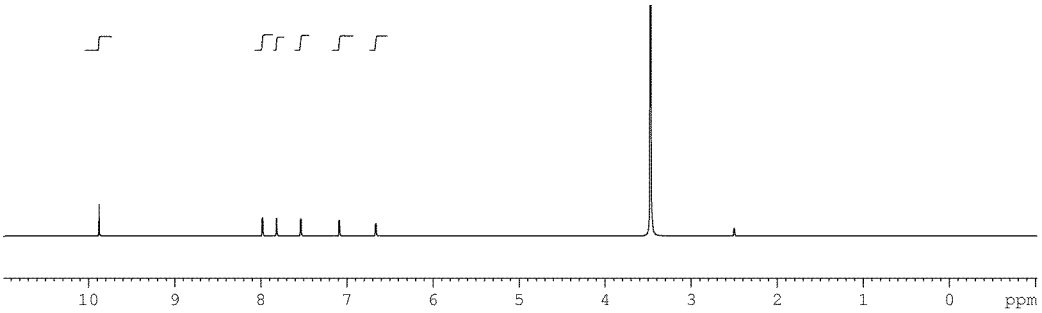

$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 1-(5-(Furan-2-yl)thiophen-2-yl)ethanone **(7h)**



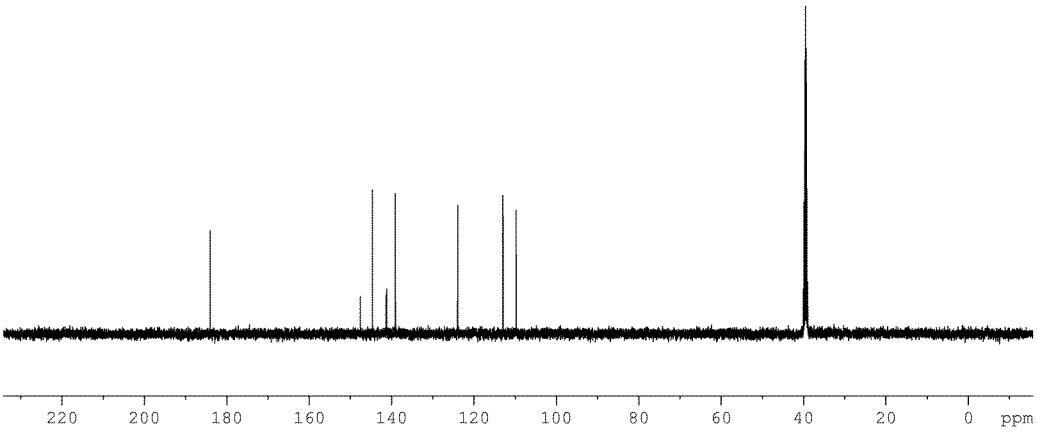

$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 1-(5-(Furan-2-yl)thiophen-2-yl)ethanone **(7h)**



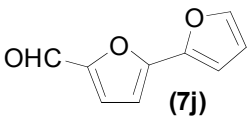

**(7i)**



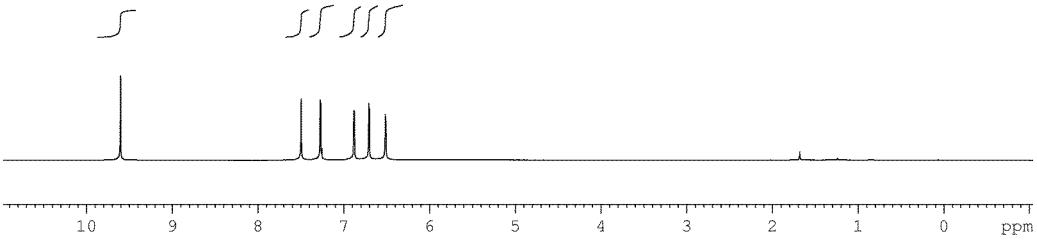

$^{1}$H NMR (500 MHz, DMSO-$d_6$) Spectrum of 5-(Furan-2-yl)thiophene-2-carbaldehyde **(7i)**



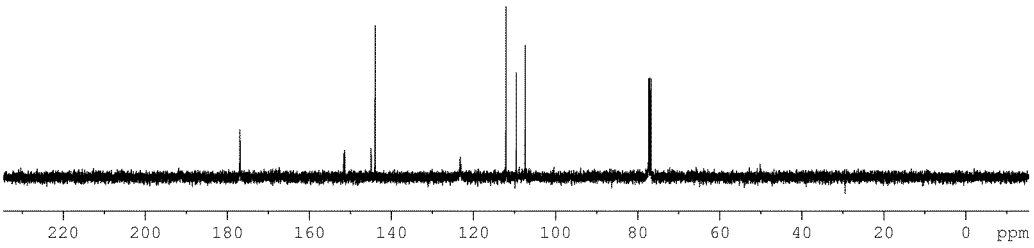

$^{13}$C NMR (125.8 MHz, DMSO-$d_6$) Spectrum of 5-(Furan-2-yl)thiophene-2-carbaldehyde **(7i)**




**(7j)**




$^{1}$H NMR (500 MHz, $CDCl_3$) Spectrum of 5-(Furan-2-yl)thiophene-2-carbaldehyde **(7j)**




$^{13}$C NMR (125.8 MHz, $CDCl_3$) Spectrum of 5-(Furan-2-yl)thiophene-2-carbaldehyde **(7j)**