

Electronic Supporting Information

Ionic liquid-supported sulfonyl hydrazine: A useful reagent for traceless synthesis of pyrazoles

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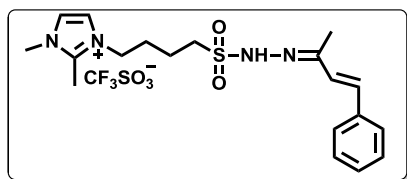
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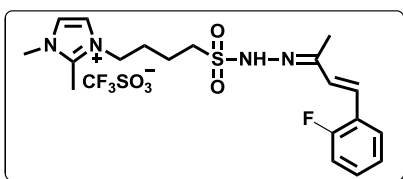
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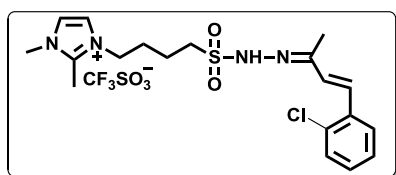
1. Physical and spectroscopic data of ionic liquid-supported sulfonyl hydrazones **9** & **10**.



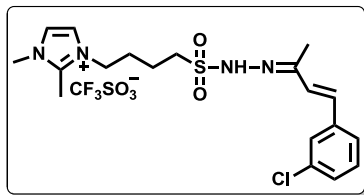
Compound 9a: Yield 86%; White solid; mp 150-151 °C; ^1H NMR (300 MHz, $\text{DMSO-}d_6$) δ 10.27 (s, 1H), 7.64 (d, $J = 2.0$ Hz, 1H), 7.61 (dd, $J = 3.5, 1.7$ Hz, 2H), 7.58 (s, 1H), 7.39 (t, $J = 7.2$ Hz, 2H), 7.35 – 7.30 (m, 1H), 7.10 (d, $J = 16.6$ Hz, 1H), 6.84 (d, $J = 16.6$ Hz, 1H), 4.16 (t, $J = 7.1$ Hz, 2H), 3.73 (s, 3H), 3.33 – 3.24 (m, 2H), 2.59 (s, 3H), 2.08 (s, 3H), 1.90-1.81(m, 2H), 1.78 – 1.65 (m, 2H); ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$) δ 154.5, 144.8, 136.5, 134.2, 129.3, 129.0, 128.7, 127.4, 122.8, 121.3, 121.1 (q, $J_{\text{C-F}} = 320.25$ Hz), 49.4, 47.3, 35.1, 28.1, 20.1, 12.9, 9.6; HRMS: Calcd. for $\text{C}_{19}\text{H}_{27}\text{N}_4\text{O}_2\text{S}^+$ 375.1849, found 375.1858 [$\text{M} - \text{CF}_3\text{SO}_3^-$] $^+$.



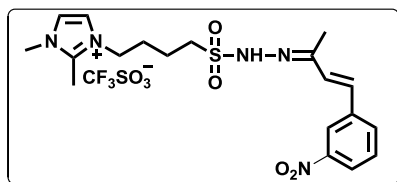
Compound 9b: Yield 83%; Colorless solid; mp 146-147 °C; ^1H NMR (300 MHz, $\text{DMSO-}d_6$) δ 10.39 (s, 1H), 7.75 (t, $J = 7.7$ Hz, 1H), 7.64 (d, $J = 6.2$ Hz, 2H), 7.40 – 7.33 (m, 1H), 7.29 – 7.20 (m, 2H), 7.11 (d, $J = 16.8$ Hz, 1H), 6.93 (d, $J = 16.7$ Hz, 1H), 4.18 (t, $J = 6.9$ Hz, 2H), 3.75 (s, 3H), 3.35 – 3.24 (m, 2H), 2.60 (s, 3H), 2.09 (s, 3H), 1.92 – 1.81 (m, 2H), 1.80 – 1.66 (m, 2H); ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$) δ 160.3 (d, $J_{\text{C-F}} = 249.0$ Hz), 154.1, 144.8, 131.6 (d, $J_{\text{C-F}} = 5.6$ Hz), 130.7 (d, $J_{\text{C-F}} = 8.5$ Hz), 128.6 (d, $J_{\text{C-F}} = 3.1$ Hz), 126.0 (d, $J_{\text{C-F}} = 2.9$ Hz), 125.3 (d, $J_{\text{C-F}} = 3.3$ Hz), 124.1 (d, $J_{\text{C-F}} = 11.5$ Hz), 121.1 (q, $J_{\text{C-F}} = 320.25$ Hz), 116.4 (d, $J_{\text{C-F}} = 22.0$ Hz), 49.5, 47.3, 35.1, 28.1, 20.1, 12.8, 9.6; HRMS: Calcd. for $\text{C}_{19}\text{H}_{26}\text{FN}_4\text{O}_2\text{S}^+$ 393.1755, found 393.1736 [$\text{M} - \text{CF}_3\text{SO}_3^-$] $^+$.



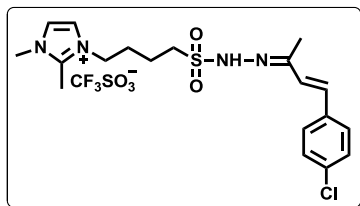
Compound 9c: Yield 81%; Colorless solid; mp 129-131 °C; ^1H NMR (300 MHz, $\text{DMSO-}d_6$) δ 10.44 (s, 1H), 7.86 – 7.79 (m, 1H), 7.64 (d, $J = 3.2$ Hz, 1H), 7.62 (d, $J = 1.9$ Hz, 1H), 7.53 – 7.48 (m, 1H), 7.40 – 7.33 (m, 2H), 7.26 (d, $J = 16.4$ Hz, 1H), 6.89 (d, $J = 16.4$ Hz, 1H), 4.17 (t, $J = 7.1$ Hz, 2H), 3.74 (s, 3H), 3.33 – 3.24 (m, 2H), 2.59 (s, 3H), 2.10 (s, 3H), 1.92 – 1.80 (m, 2H), 1.76-1.69 (m, 2H); ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$) δ 153.8, 144.8, 134.1, 132.9, 132.0, 130.5, 130.3, 129.0, 128.2, 127.7, 122.8, 121.3, 121.1 (q, $J_{\text{C-F}} = 320.25$ Hz), 49.5, 47.3, 35.1, 28.1, 20.1, 13.0, 9.6; Calcd. for $\text{C}_{19}\text{H}_{26}\text{ClN}_4\text{O}_2\text{S}^+$ 409.1460, found 409.1443 [$\text{M} - \text{CF}_3\text{SO}_3^-$] $^+$.



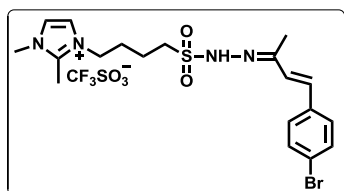
Compound 9d: Yield 84%; Yellow solid; mp 150-153 °C; ^1H NMR (300 MHz, $\text{DMSO-}d_6$) δ 10.31 (s, 1H), 7.67 (s, 1H), 7.63 (d, $J = 2.0$ Hz, 1H), 7.61 (d, $J = 2.0$ Hz, 1H), 7.57 (d, $J = 7.3$ Hz, 1H), 7.42 (d, $J = 8.1$ Hz, 1H), 7.40 – 7.36 (m, 1H), 7.09 (d, $J = 16.6$ Hz, 1H), 6.91 (d, $J = 16.6$ Hz, 1H), 4.16 (t, $J = 7.1$ Hz, 2H), 3.74 (s, 3H), 3.33 – 3.23 (m, 2H), 2.58 (s, 3H), 2.06 (s, 3H), 1.92 – 1.79 (m, 2H), 1.77 – 1.64 (m, 2H); ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$) δ 154.0, 144.8, 138.8, 134.1, 132.7, 131.1, 130.4, 128.6, 127.1, 125.9, 122.8, 121.3, 121.1 (q, $J_{\text{C-F}} = 320.25$ Hz), 49.4, 47.3, 35.1, 28.1, 20.1, 12.9, 9.6; Calcd. for $\text{C}_{19}\text{H}_{26}\text{ClN}_4\text{O}_2\text{S}^+$ 409.1460, found 409.1451 $[\text{M} - \text{CF}_3\text{SO}_3^-]^+$.



Compound 9e: Yield 79%; White solid; mp 153-155 °C; ^1H NMR (300 MHz, $\text{DMSO-}d_6$) δ 10.37 (s, 1H), 8.40 (s, 1H), 8.15 (dd, $J = 8.1, 1.7$ Hz, 1H), 8.09 (d, $J = 7.8$ Hz, 1H), 7.69 (d, $J = 8.0$ Hz, 1H), 7.63 (d, $J = 1.9$ Hz, 1H), 7.61 (d, $J = 2.0$ Hz, 1H), 7.27 (d, $J = 16.6$ Hz, 1H), 7.03 (d, $J = 16.6$ Hz, 1H), 4.17 (t, $J = 7.1$ Hz, 2H), 3.74 (s, 3H), 3.35 – 3.25 (m, 2H), 2.59 (s, 3H), 2.09 (s, 3H), 1.92 – 1.80 (m, 2H), 1.78 – 1.67 (m, 2H); ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$) δ 153.7, 148.8, 144.8, 138.5, 133.2, 131.9, 131.5, 130.8, 123.3, 122.8, 122.0, 121.3, 49.5, 47.3, 35.0, 28.1, 20.1, 12.8, 9.6; Calcd. for $\text{C}_{19}\text{H}_{26}\text{N}_5\text{O}_4\text{S}^+$ 420.1700, found 420.1715 $[\text{M} - \text{CF}_3\text{SO}_3^-]^+$.

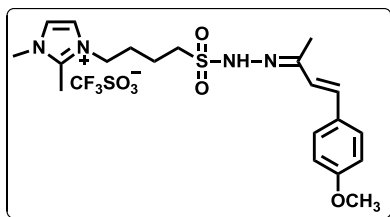


Compound 9f: Yield 74%; Pale yellow solid; mp 155-157 °C; ^1H NMR (300 MHz, $\text{DMSO-}d_6$) δ 10.31 (s, 1H), 7.68 – 7.58 (m, 4H), 7.43 (d, $J = 8.4$ Hz, 2H), 7.10 (d, $J = 16.6$ Hz, 1H), 6.86 (d, $J = 16.6$ Hz, 1H), 4.17 (t, $J = 7.0$ Hz, 2H), 3.74 (s, 3H), 3.33 – 3.23 (m, 2H), 2.59 (s, 3H), 2.07 (s, 3H), 1.91-1.81 (m, 2H), 1.76-1.70 (m, 2H); ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$) δ 154.2, 144.8, 135.5, 133.3, 132.9, 129.6, 129.3, 129.1, 122.8, 121.3, 121.1 (q, $J_{\text{C-F}} = 320.25$ Hz), 49.4, 47.3, 35.1, 28.1, 20.1, 12.9, 9.6; Calcd. for $\text{C}_{19}\text{H}_{26}\text{ClN}_4\text{O}_2\text{S}^+$ 409.1460, found 409.1452 $[\text{M} - \text{CF}_3\text{SO}_3^-]^+$.



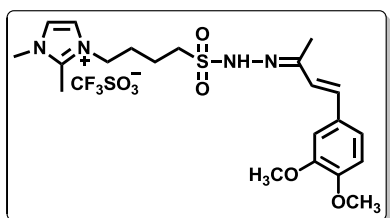
Compound 9g: Yield 87%; Pale yellow solid; mp 141-142 °C; ^1H NMR (300 MHz, $\text{DMSO-}d_6$) δ 10.32 (s, 1H), 7.64 (d, $J = 1.7$ Hz, 2H), 7.62 (d, $J = 1.9$ Hz, 1H), 7.60 – 7.52 (m, 3H), 7.08 (d, $J = 16.6$

$J_{C-F} = 320.25$ Hz), 49.3, 47.3, 35.1, 28.1, 21.3, 20.1, 12.9, 9.6; Calcd. for $C_{19}H_{29}N_4O_2S^+$ 389.2006, found 389.1987 $[M - CF_3SO_3]^-$.



Compound 9k: Yield 92%; Yellow solid; mp 128-130 °C; 1H NMR (300 MHz, DMSO- d_6) δ 10.17 (s, 1H), 7.64 (d, $J = 2.0$ Hz, 1H), 7.62 (d, $J = 2.0$ Hz, 1H), 7.53 (d, $J = 8.8$ Hz, 2H), 7.04 (d, $J = 16.8$ Hz, 1H), 6.96 (t, $J = 7.0$ Hz, 2H), 6.71 (d, $J = 16.5$ Hz, 1H), 4.16 (t, $J = 7.1$ Hz, 2H), 3.78 (s, 3H), 3.74 (s, 3H),

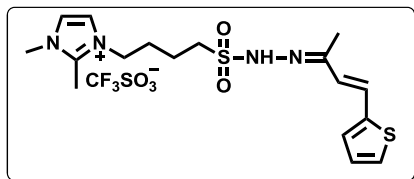
3.31 – 3.23 (m, 2H), 2.59 (s, 3H), 2.05 (s, 3H), 1.92 – 1.78 (m, 2H), 1.77 – 1.64 (m, 2H); ^{13}C NMR (75 MHz, DMSO- d_6) δ 160.1, 154.9, 144.8, 134.0, 129.1, 128.9, 126.5, 122.8, 121.3, 121.1 (q, $J_{C-F} = 320.25$ Hz), 114.7, 55.7, 49.3, 47.3, 35.1, 28.1, 20.1, 12.9, 9.6; Calcd. for $C_{19}H_{29}N_4O_3S^+$ 405.1955, found 405.1969 $[M - CF_3SO_3]^-$.



Compound 9l: Yield 71%; Yellow solid; mp 106-108 °C; 1H NMR (300 MHz, DMSO- d_6) δ 10.19 (s, 1H), 7.65 (d, $J = 2.0$ Hz, 1H), 7.62 (d, $J = 2.0$ Hz, 1H), 7.21 (d, $J = 1.6$ Hz, 1H), 7.13 – 7.04 (m, 1H), 6.97 (dd, $J = 11.0, 5.7$ Hz, 2H), 6.76 (d, $J = 16.5$ Hz, 1H), 4.17 (t, $J = 7.1$ Hz, 2H), 3.81 (s, 3H), 3.77 (s, 3H), 3.74

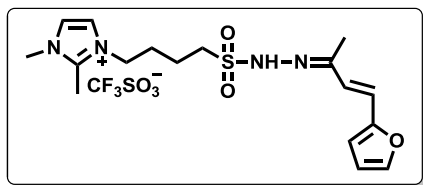
(s, 3H), 3.31 – 3.23 (m, 2H), 2.59 (s, 3H), 2.06 (s, 3H), 1.91-1.81 (m, 2H), 1.74-1.69 (m, 2H); ^{13}C NMR (75 MHz, DMSO- d_6) δ 155.0, 149.9, 149.4, 144.8, 134.4, 129.4, 126.6, 122.8, 121.3, 121.3, 121.1 (q, $J_{C-F} = 320.25$ Hz), 112.1, 109.8, 55.96, 55.95, 49.3, 47.3, 35.1, 28.1, 20.1, 12.9, 9.6; Calcd. for $C_{19}H_{31}N_4O_4S^+$ 435.2061, found 435.2096 $[M - CF_3SO_3]^-$.

Compound 9m: Yield 80%; White solid; mp 138-140 °C; 1H NMR (300 MHz, DMSO- d_6) δ

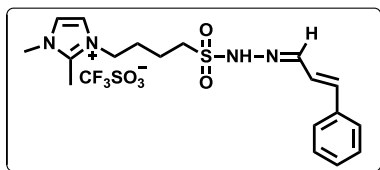


10.26 (s, 1H), 7.64 (d, $J = 1.8$ Hz, 1H), 7.61 (d, $J = 2.1$ Hz, 1H), 7.54 (d, $J = 5.1$ Hz, 1H), 7.29 (dd, $J = 9.8, 6.4$ Hz, 2H), 7.09 (dd, $J = 5.1, 3.6$ Hz, 1H), 6.54 (d, $J = 16.3$ Hz, 1H), 4.16 (t, $J = 7.1$ Hz, 2H), 3.74 (s, 3H), 3.32 – 3.23 (m, 2H), 2.59 (s,

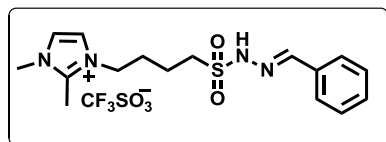
3H), 2.03 (s, 3H), 1.88-1.81 (m, 2H), 1.75-1.69 (m, 2H); ^{13}C NMR (75 MHz, DMSO- d_6) δ 157.2, 154.0, 144.8, 141.6, 128.8, 127.9, 127.5, 127.2, 122.8, 121.3, 121.1 (q, $J_{C-F} = 320.25$ Hz), 49.3, 47.9, 35.1, 28.1, 20.1, 12.8, 9.6; Calcd. for $C_{17}H_{25}N_4O_2S_2^+$ 381.1413, found 381.1437 $[M - CF_3SO_3]^-$.



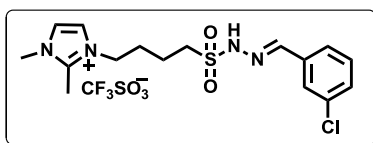
Compound 9n: Yield 88%; Brown solid; mp 145-146 °C; ^1H NMR (300 MHz, $\text{DMSO-}d_6$) δ 10.30 (s, 1H), 7.73 (d, $J = 0.9$ Hz, 1H), 7.65 (d, $J = 1.8$ Hz, 1H), 7.63 (d, $J = 1.9$ Hz, 1H), 6.95 (d, $J = 16.4$ Hz, 1H), 6.67 (d, $J = 3.3$ Hz, 1H), 6.63 (s, 1H), 6.57 (d, $J = 3.8$ Hz, 1H), 4.17 (t, $J = 6.9$ Hz, 2H), 3.75 (s, 3H), 3.32 – 3.24 (m, 2H), 2.60 (s, 3H), 2.03 (s, 3H), 1.91-1.81 (m, 2H), 1.76-1.68 (m, 2H); ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$) δ 154.1, 152.3, 144.8, 144.4, 126.6, 122.8, 122.0, 121.3, 121.1 (q, $J_{\text{C-F}} = 320.25$ Hz), 112.8, 111.6, 49.4, 47.3, 35.1, 28.1, 20.0, 12.7, 9.6; Calcd. for $\text{C}_{17}\text{H}_{25}\text{N}_4\text{O}_3\text{S}^+$ 365.1642, found 365.1671 [$\text{M} - \text{CF}_3\text{SO}_3^-$] $^+$.



Compound 9o: Yield 59%; Light Brown solid; mp 129-131 °C; ^1H NMR (300 MHz, $\text{DMSO-}d_6$) δ 11.35 (s, 1H), 7.87 (d, $J = 8.7$ Hz, 1H), 7.66 (d, $J = 2.1$ Hz, 1H), 7.63 (d, $J = 2.1$ Hz, 1H), 7.61 (d, $J = 1.4$ Hz, 1H), 7.58 (s, 1H), 7.43 – 7.31 (m, 3H), 7.02 (d, $J = 16.1$ Hz, 1H), 6.91 (dd, $J = 16.1, 8.7$ Hz, 1H), 4.16 (t, $J = 7.1$ Hz, 2H), 3.74 (s, 3H), 3.29 – 3.19 (m, 2H), 2.59 (s, 3H), 1.90-1.81 (m, 2H), 1.75-1.66 (m, 2H); ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$) δ 149.1, 144.8, 139.2, 136.2, 129.3, 127.5, 125.3, 123.3, 122.8, 121.3, 121.1 (q, $J_{\text{C-F}} = 320.25$ Hz), 49.9, 47.3, 35.1, 28.0, 20.1, 9.6; Calcd. for $\text{C}_{18}\text{H}_{25}\text{N}_4\text{O}_2\text{S}^+$ 361.1693, found 361.1706 [$\text{M} - \text{CF}_3\text{SO}_3^-$] $^+$.

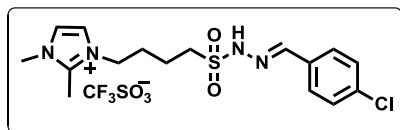


Compound 10a: Yield 88%; Pale yellow solid; mp 135-137 °C; ^1H NMR (300 MHz, $\text{DMSO-}d_6$) δ 11.39 (s, 1H), 8.06 (s, 1H), 7.66 (d, $J = 4.1$ Hz, 1H), 7.65 – 7.61 (m, 2H), 7.59 (d, $J = 2.0$ Hz, 1H), 7.45 (d, $J = 1.2$ Hz, 1H), 7.43 (d, $J = 2.2$ Hz, 2H), 4.16 (t, $J = 7.1$ Hz, 2H), 3.73 (s, 3H), 3.35 – 3.25 (m, 2H), 2.57 (s, 3H), 1.91 - 1.81 (m, 2H), 1.79 – 1.66 (m, 2H); ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$) δ 146.90, 144.8, 134.3, 130.5, 129.3, 127.3, 122.8, 121.3, 121.1 (q, $J_{\text{C-F}} = 320.25$ Hz), 50.0, 47.3, 35.1, 28.0, 20.1, 9.6; Calcd for $\text{C}_{16}\text{H}_{23}\text{N}_4\text{O}_2\text{S}^+$ 335.1536, found 335.1523 [$\text{M} - \text{CF}_3\text{SO}_3^-$] $^+$.



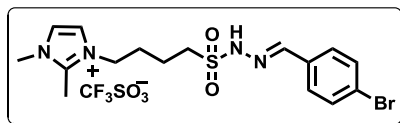
Compound 10b: Yield 76%; Pale yellow solid; mp 136-137 °C; ^1H NMR (300 MHz, $\text{DMSO-}d$) δ 11.63 (s, 1H), 8.07 (s, 1H), 7.73 (s, 1H), 7.64 (d, $J = 2.1$ Hz, 1H), 7.60 (d, $J = 1.9$ Hz, 1H),

7.48 (dd, $J = 3.7, 1.9$ Hz, 1H), 4.17 (t, $J = 7.1$ Hz, 1H), 3.74 (s, 1H), 3.38 – 3.28 (m, 1H), 2.59 (s, 1H), 1.93 – 1.80 (m, 2H), 1.78-1.70 (m, 2H); ^{13}C NMR (75 MHz, DMSO- d_6) δ 145.1, 144.8, 136.5, 134.1, 131.2, 130.1, 126.4, 126.2, 122.8, 121.3, 121.1 (q, $J_{\text{C-F}} = 320.25$ Hz), 50.1, 47.3, 35.1, 28.0, 20.1, 9.6; Calcd for $\text{C}_{16}\text{H}_{22}\text{ClN}_4\text{O}_2\text{S}^+$ 369.1147, found 369.1171 $[\text{M} - \text{CF}_3\text{SO}_3]^\dagger$.



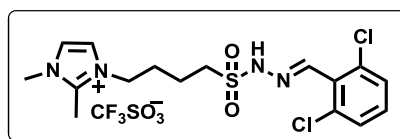
Compound 10c: Yield 72%; White solid; mp 154-155 °C; ^1H NMR (300 MHz, DMSO- d_6) δ 11.52 (s, 1H), 8.06 (s, 1H), 7.69 (d, $J = 1.7$ Hz, 1H), 7.66 (d, $J = 3.5$ Hz, 1H), 7.64 (d, $J = 2.1$

Hz, 1H), 7.60 (d, $J = 2.0$ Hz, 1H), 7.52 (s, 1H), 7.49 (d, $J = 1.6$ Hz, 1H), 4.16 (t, $J = 7.1$ Hz, 2H), 3.74 (s, 3H), 3.36 – 3.25 (m, 2H), 2.58 (s, 3H), 1.90 – 1.79 (m, 2H), 1.78 – 1.66 (m, 2H); ^{13}C NMR (75 MHz, DMSO- d_6) δ 145.5, 144.8, 134.9, 133.3, 129.3, 128.9, 122.8, 121.3, 121.1 (q, $J_{\text{C-F}} = 320.25$ Hz), 50.1, 47.3, 35.1, 28.0, 20.1, 9.6; Calcd for $\text{C}_{16}\text{H}_{22}\text{ClN}_4\text{O}_2\text{S}^+$ 369.1147, found 369.1165 $[\text{M} - \text{CF}_3\text{SO}_3]^\dagger$.



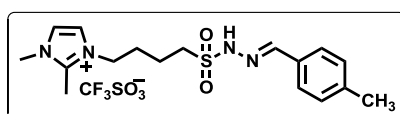
Compound 10d: Yield 79%; White solid; mp 132-133 °C; ^1H NMR (300 MHz, DMSO- d_6) δ 11.55 (s, 1H), 8.05 (s, 1H), 7.66 (d, $J = 2.3$ Hz, 1H), 7.64 (d, $J = 2.3$ Hz, 2H), 7.62 – 7.58 (m,

3H), 4.16 (t, $J = 7.1$ Hz, 2H), 3.74 (s, 3H), 3.34 – 3.26 (m, 2H), 2.58 (s, 3H), 1.90 – 1.79 (m, 2H), 1.78 – 1.66 (m, 2H); ^{13}C NMR (75 MHz, DMSO- d_6) δ 145.6, 144.8, 133.6, 132.2, 129.2, 123.7, 122.8, 121.3, 121.1 (q, $J_{\text{C-F}} = 320.25$ Hz), 50.1, 47.3, 35.1, 28.0, 20.1, 9.6; Calcd for $\text{C}_{16}\text{H}_{22}\text{BrN}_4\text{O}_2\text{S}^+$ 413.0641, found 413.0659 $[\text{M} - \text{CF}_3\text{SO}_3]^\dagger$ and 415.0643 $[\text{M} + 2 - \text{CF}_3\text{SO}_3]^\dagger$.



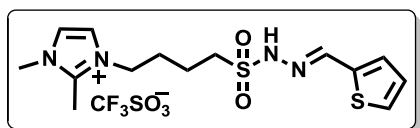
Compound 10e: Yield 77%; White solid; mp 152-154 °C; ^1H NMR (300 MHz, DMSO- d_6) δ 11.75 (s, 1H), 8.16 (s, 1H), 7.63 (d, $J = 2.0$ Hz, 1H), 7.61 (d, $J = 2.0$ Hz, 1H), 7.58 (d, $J =$

1.2 Hz, 1H), 7.55 (s, 1H), 7.45 (dd, $J = 9.0, 7.0$ Hz, 1H), 4.16 (t, $J = 7.1$ Hz, 2H), 3.75 (s, 3H), 3.36 – 3.27 (m, 2H), 2.59 (s, 3H), 1.91-1.82 (m, 2H), 1.80 – 1.67 (m, 2H); ^{13}C NMR (75 MHz, DMSO- d_6) δ 144.8, 141.6, 134.3, 131.8, 130.4, 129.6, 122.8, 121.3, 121.1 (q, $J_{\text{C-F}} = 320.25$ Hz), 50.4, 47.3, 35.1, 28.0, 20.2, 9.6; Calcd for $\text{C}_{16}\text{H}_{21}\text{Cl}_2\text{N}_4\text{O}_2\text{S}^+$ 403.0757, found 403.0728 $[\text{M} - \text{CF}_3\text{SO}_3]^\dagger$.



Compound 10f: Yield 89%; White solid; mp 131-132 °C; ^1H NMR (300 MHz, DMSO- d_6) δ 8.02 (s, 1H), 7.63 (d, $J = 2.1$

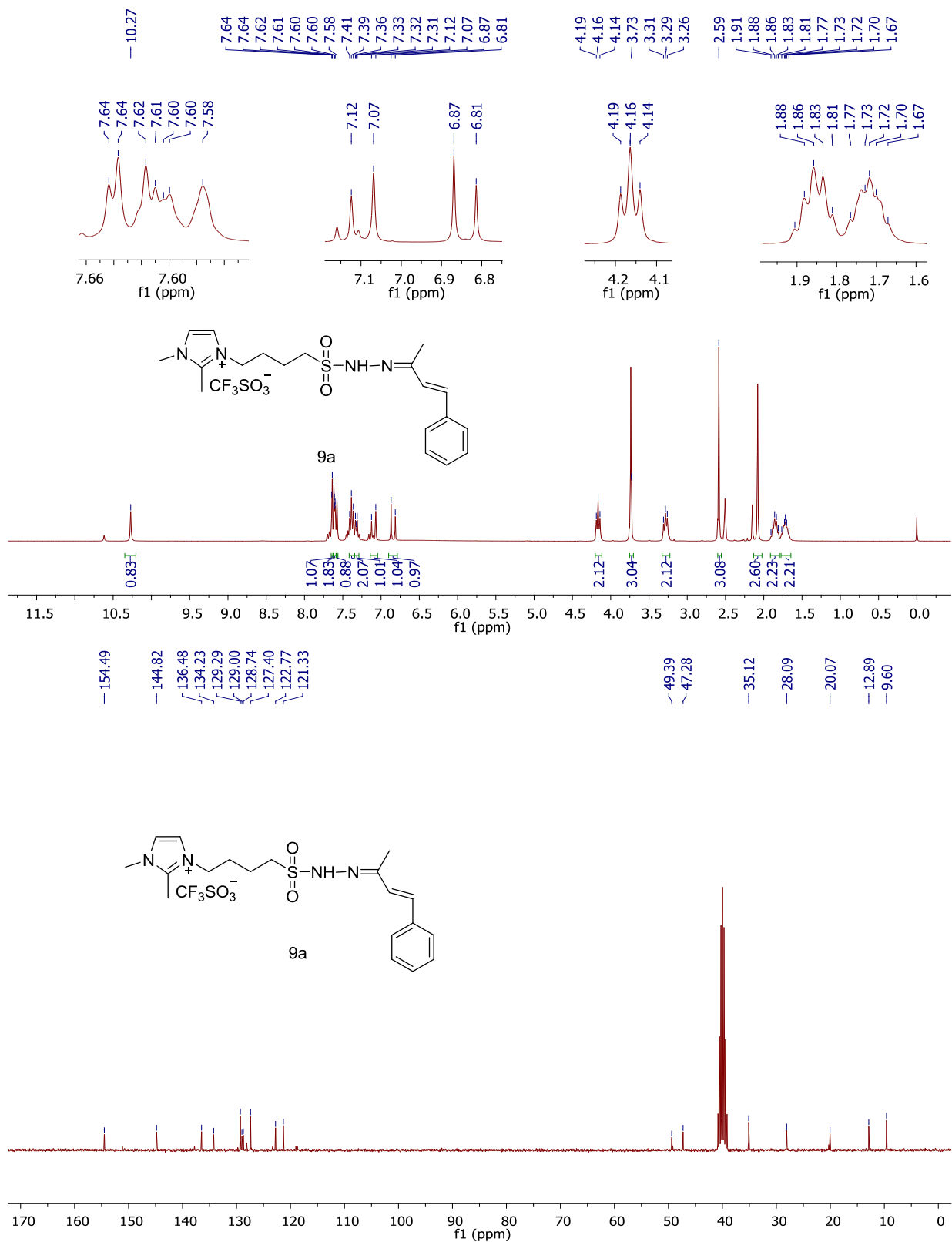
Hz, 1H), 7.59 (d, $J = 2.0$ Hz, 1H), 7.54 (d, $J = 8.1$ Hz, 2H), 7.25 (d, $J = 8.0$ Hz, 2H), 4.16 (t, $J = 7.1$ Hz, 2H), 3.73 (s, 3H), 3.34 – 3.24 (m, 2H), 2.58 (s, 3H), 2.33 (s, 3H), 1.89 – 1.79 (m, 2H), 1.78 – 1.65 (m, 2H); ^{13}C NMR (75 MHz, DMSO- d_6) δ 147.1, 144.8, 140.3, 131.6, 129.8, 127.3, 122.8, 121.3, 121.1 (q, $J_{\text{C-F}} = 320.25$ Hz), 49.9, 47.3, 35.1, 28.0, 21.4, 20.1, 9.6; Calcd for $\text{C}_{17}\text{H}_{25}\text{N}_4\text{O}_2\text{S}^+$ 349.1693, found 349.1682 $[\text{M} - \text{CF}_3\text{SO}_3]^+$.

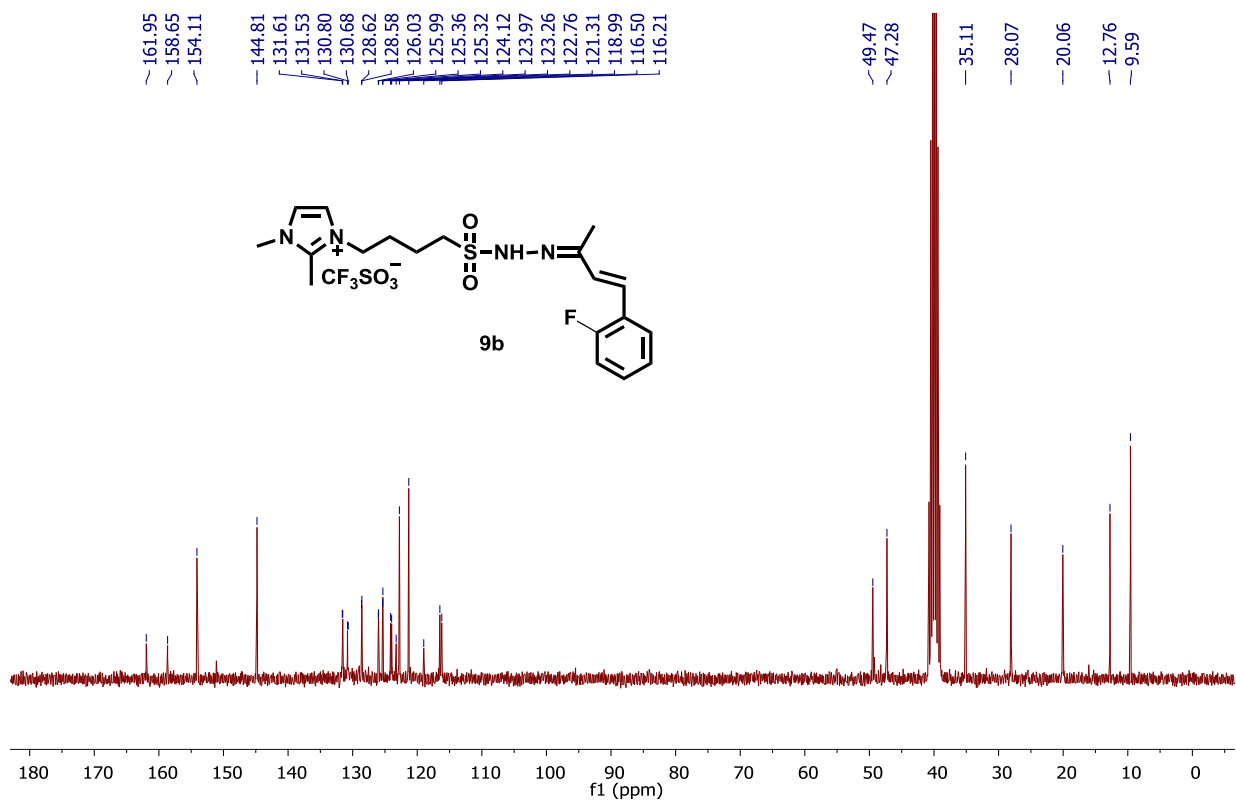
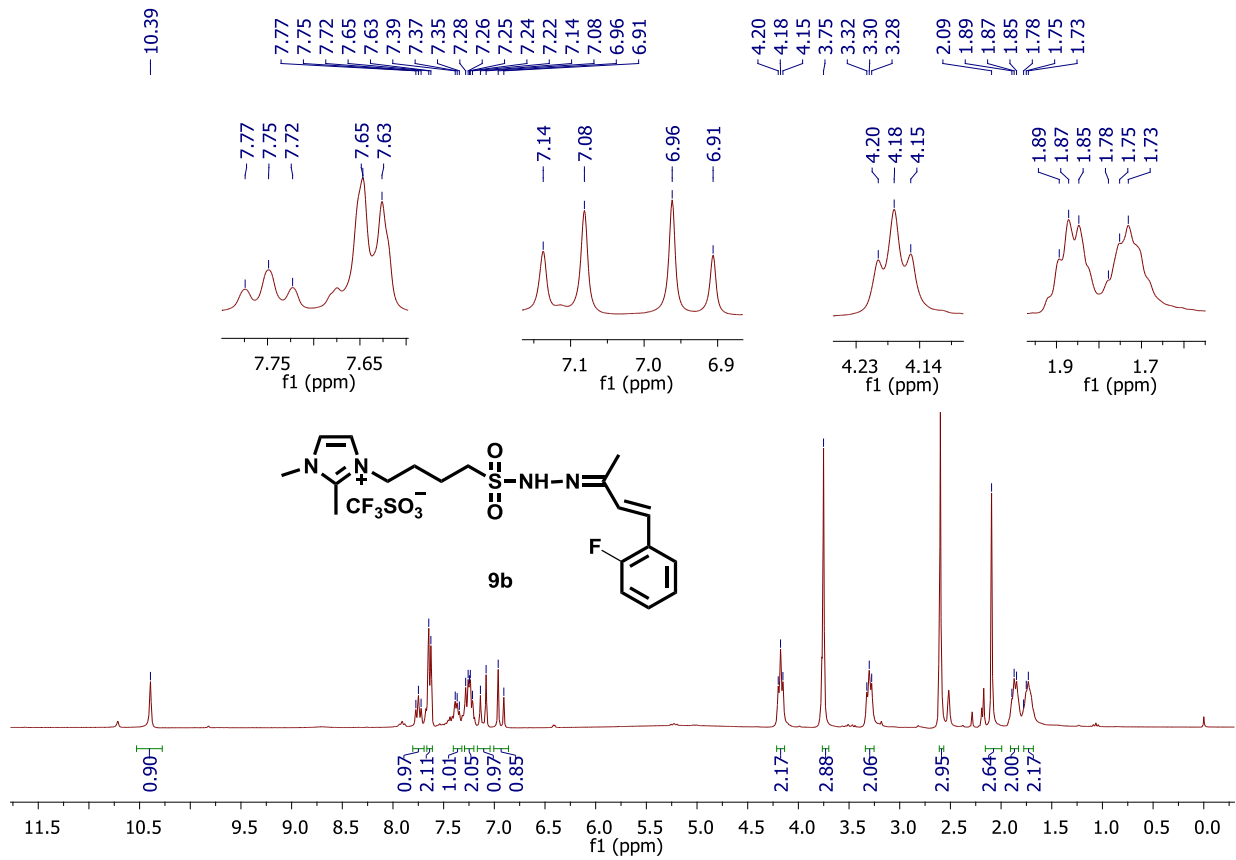


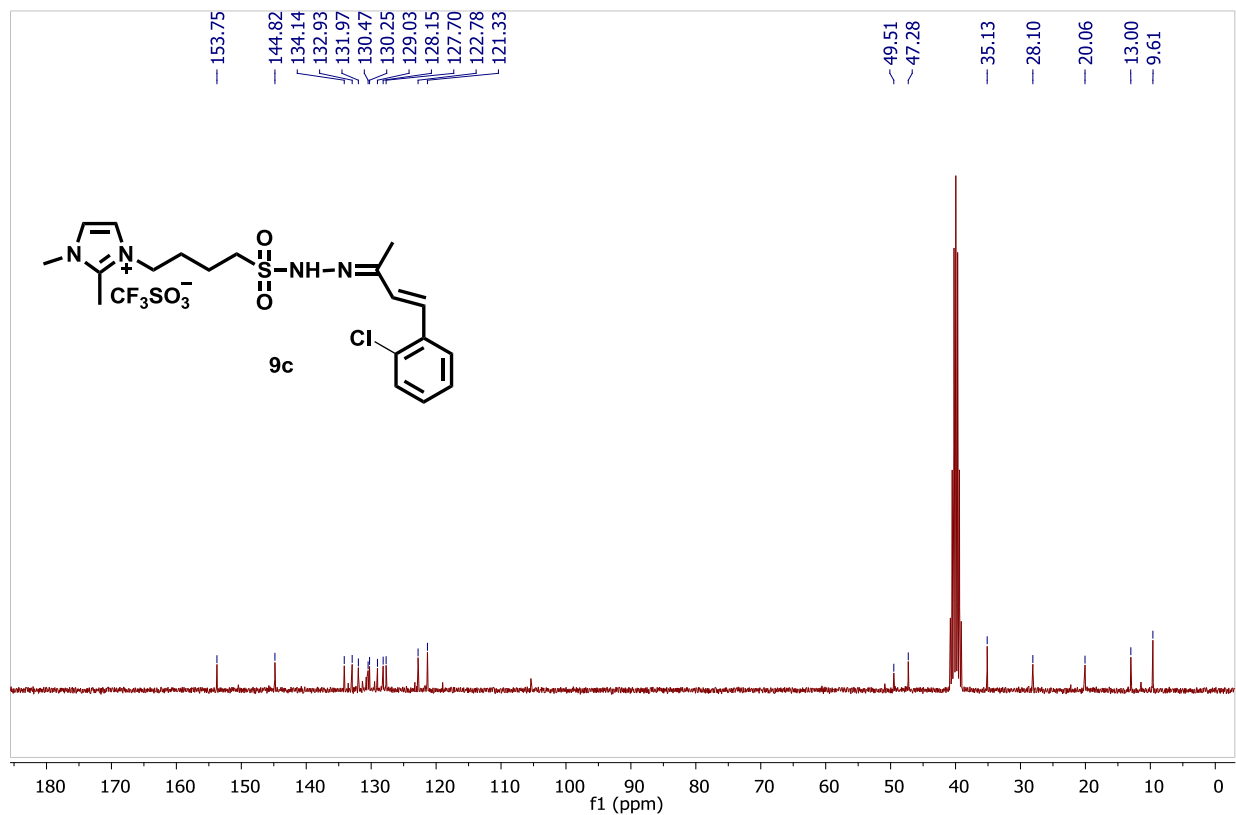
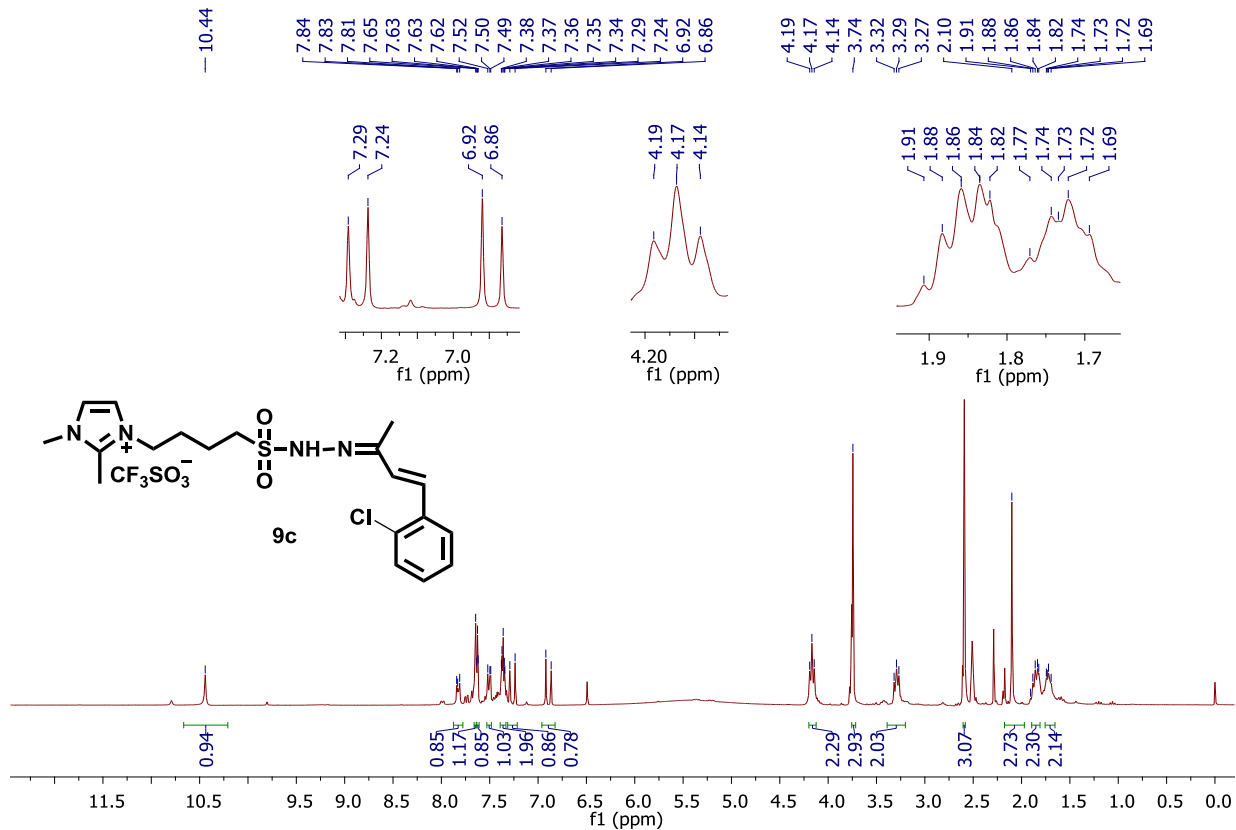
Compound 10g: Yield 88%; Pale yellow solid; mp 126-127

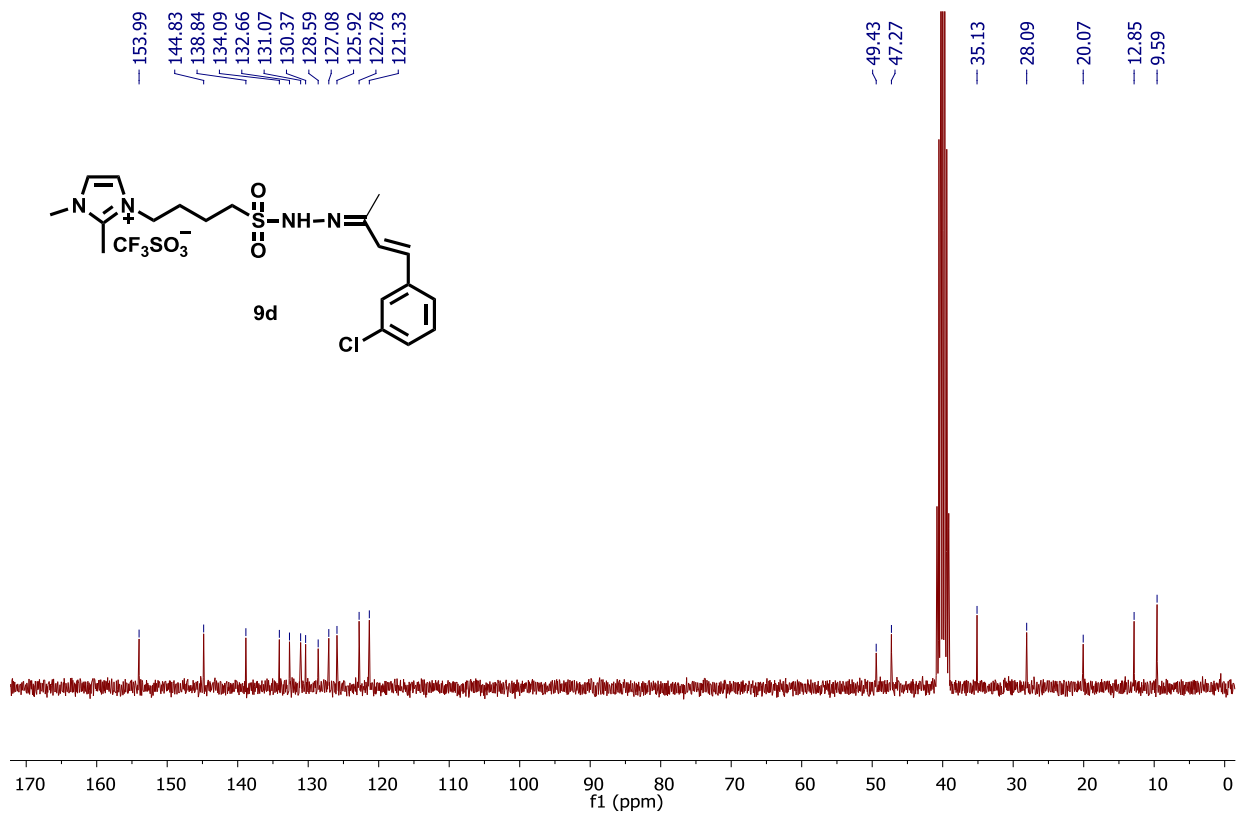
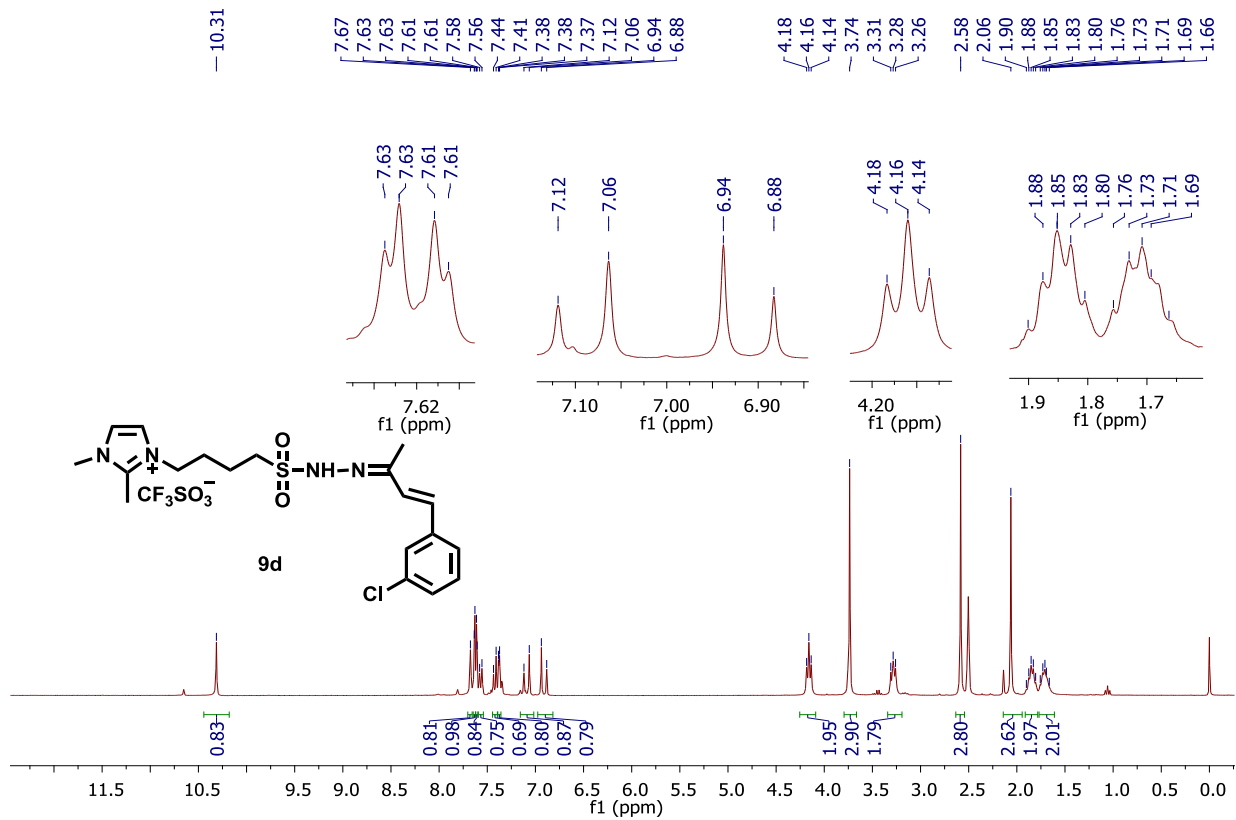
$^{\circ}\text{C}$; ^1H NMR (300 MHz, DMSO- d_6) δ 11.37 (s, 1H), 8.25 (s, 1H), 7.66 – 7.62 (m, 2H), 7.60 (d, $J = 2.1$ Hz, 1H), 7.42 (dd, $J = 3.6, 0.9$ Hz, 1H), 7.12 (dd, $J = 5.0, 3.6$ Hz, 1H), 4.16 (t, $J = 7.1$ Hz, 2H), 3.74 (s, 3H), 3.28 – 3.17 (m, 2H), 2.58 (s, 3H), 1.89 – 1.79 (m, 2H), 1.76 -1.67 (m, 2H); ^{13}C NMR (75 MHz, DMSO- d_6) δ 144.8, 142.2, 138.8, 131.1, 129.1, 128.3, 122.8, 121.3, 121.1 (q, $J_{\text{C-F}} = 320.25$ Hz), 50.1, 47.3, 35.1, 28.0, 20.1, 9.6; Calcd for $\text{C}_{14}\text{H}_{21}\text{N}_4\text{O}_2\text{S}_2^+$ 341.1100, found 341.1092 $[\text{M} - \text{CF}_3\text{SO}_3]^+$.

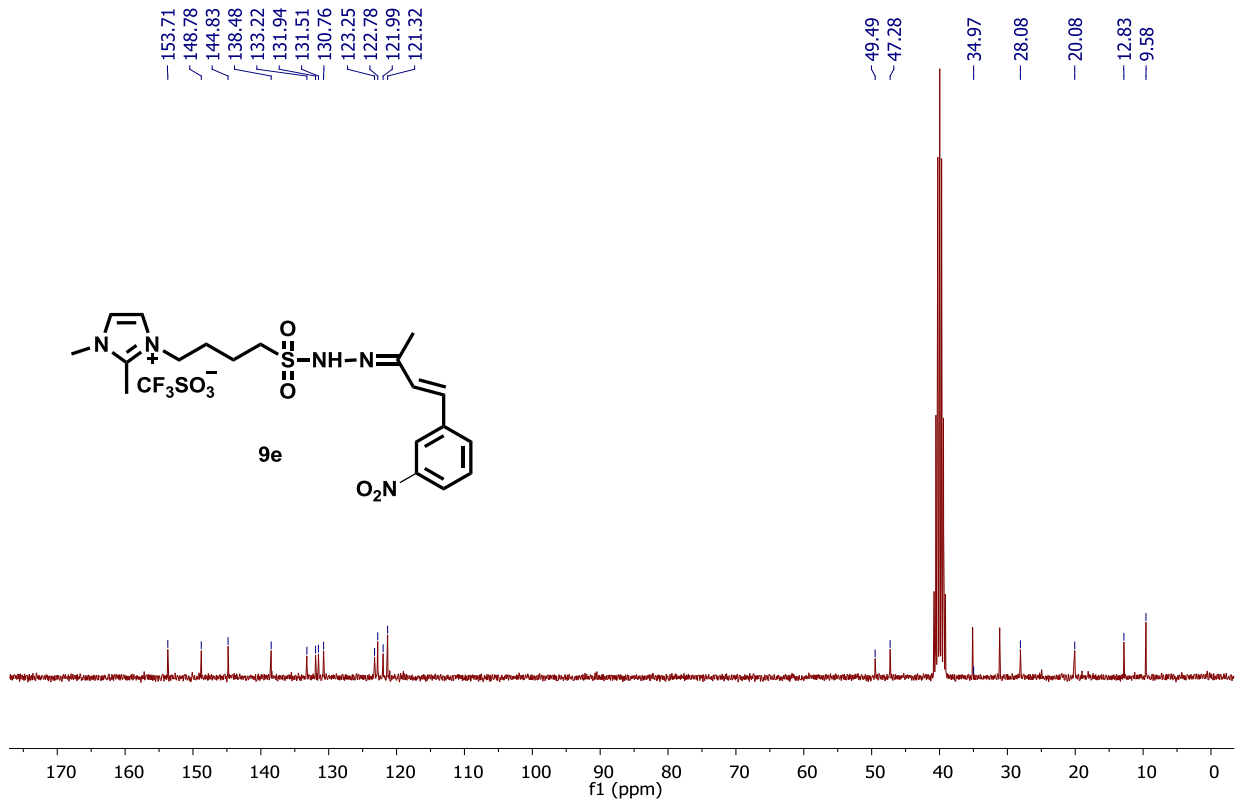
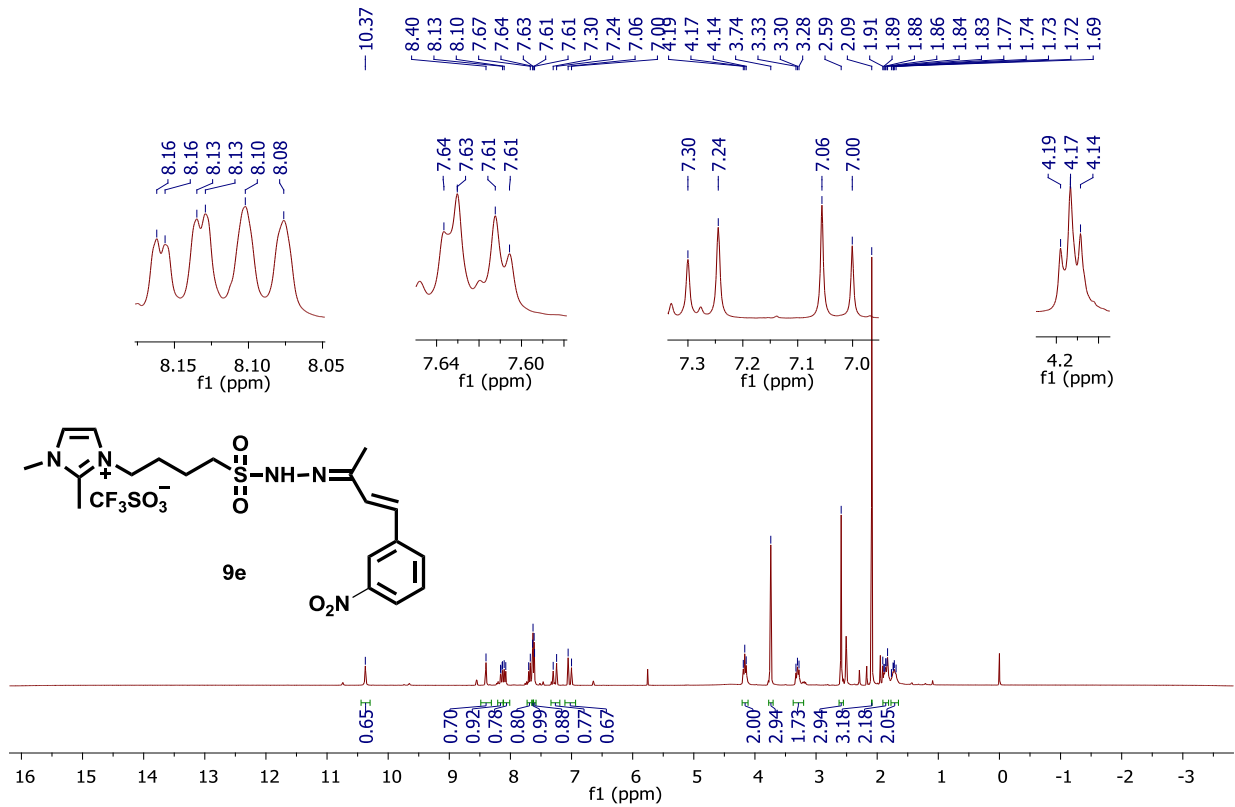
2. Copies of ^1H and ^{13}C NMR of ionic liquid-supported sulfonyl hydrazones **9** & **10**.

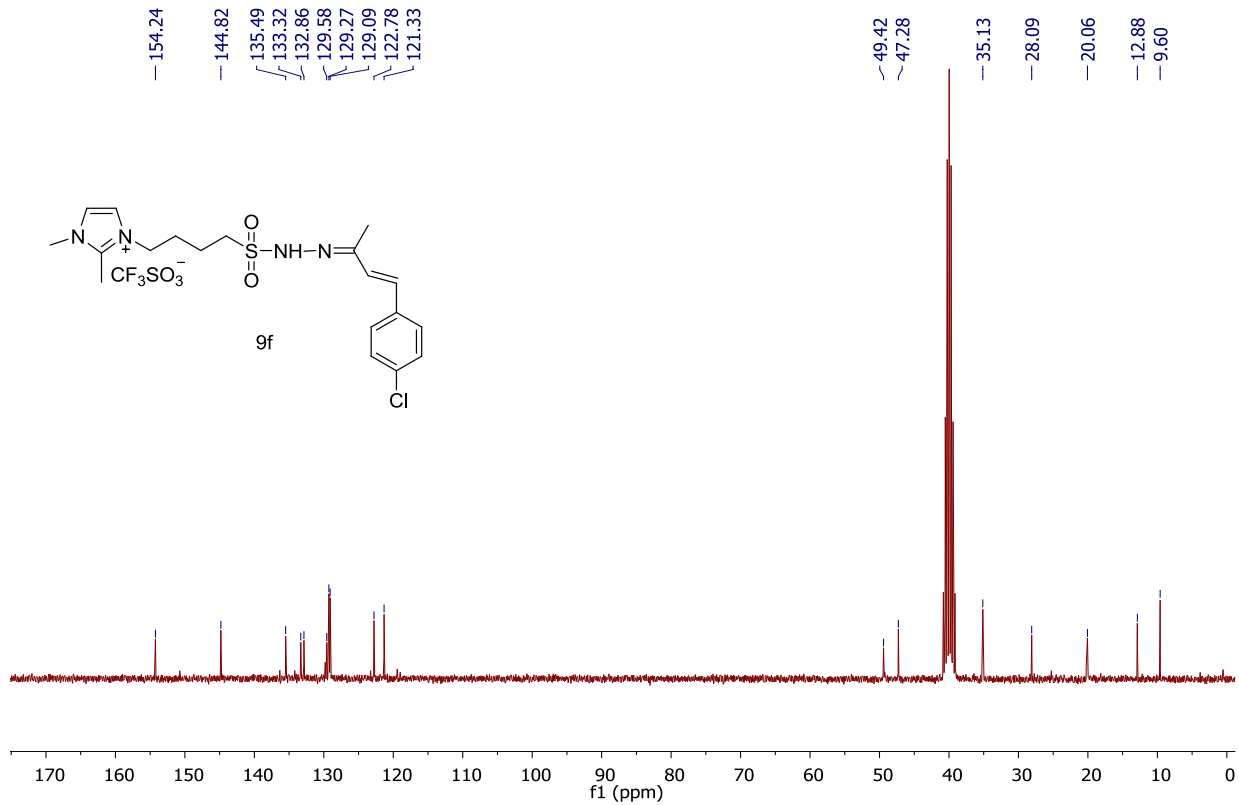
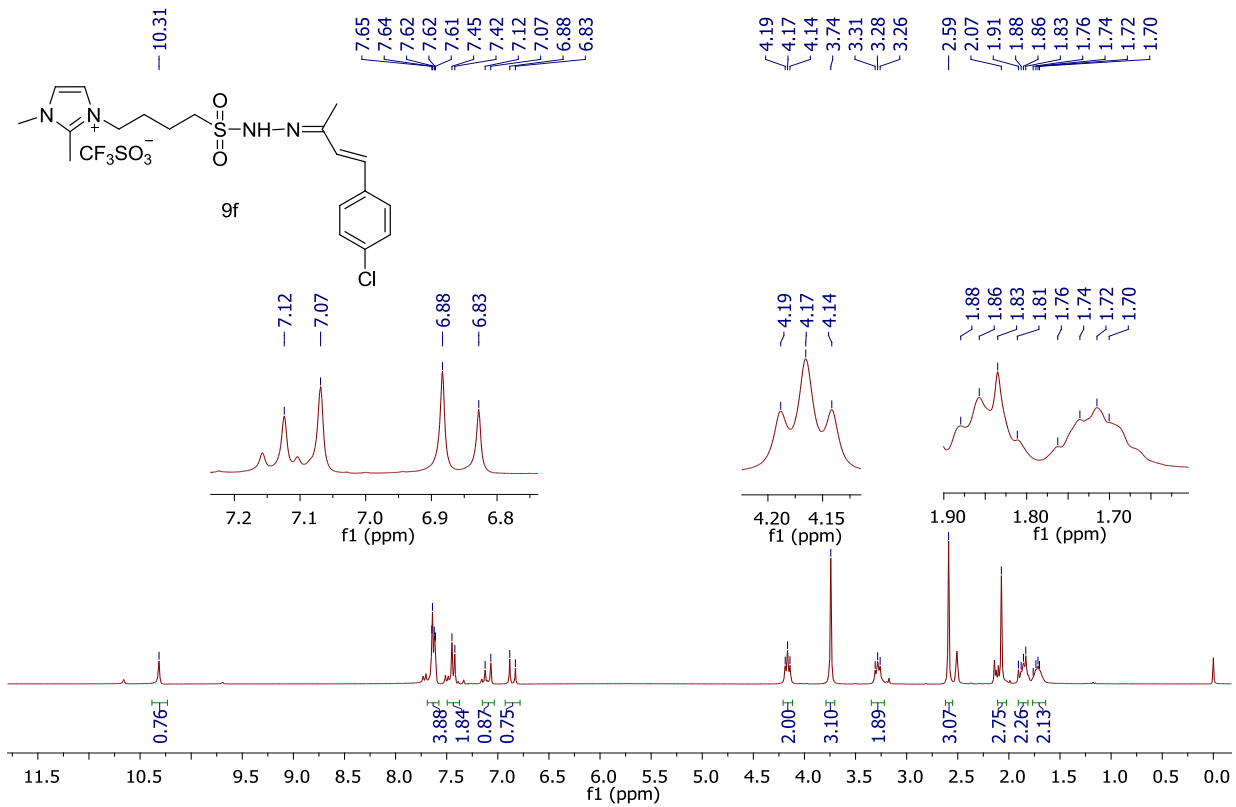


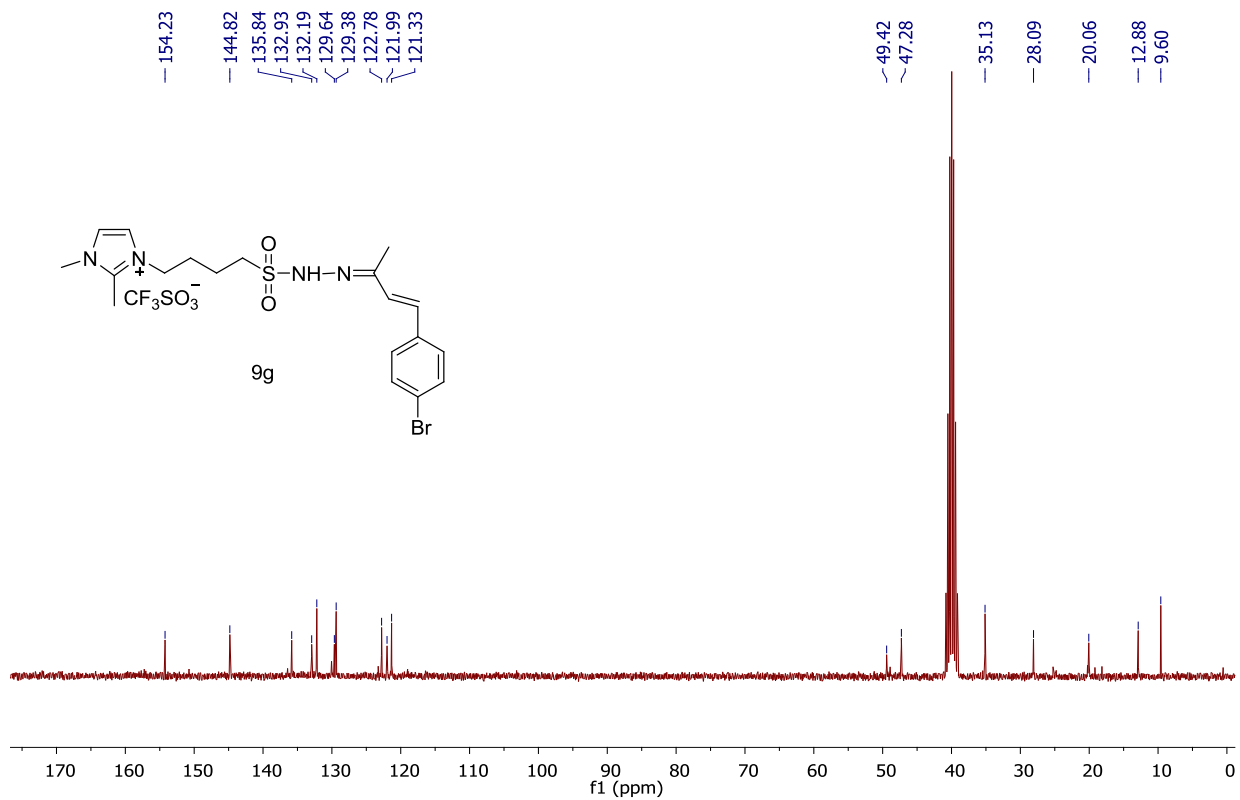
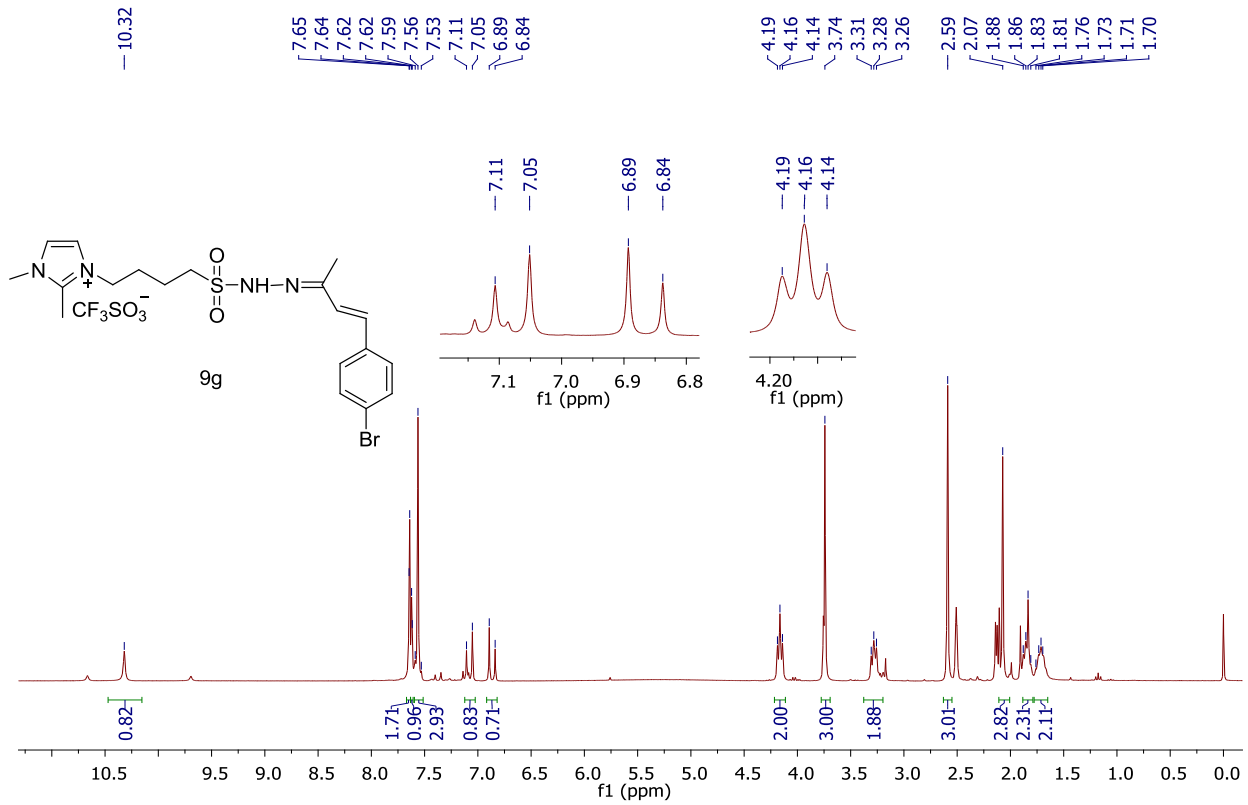


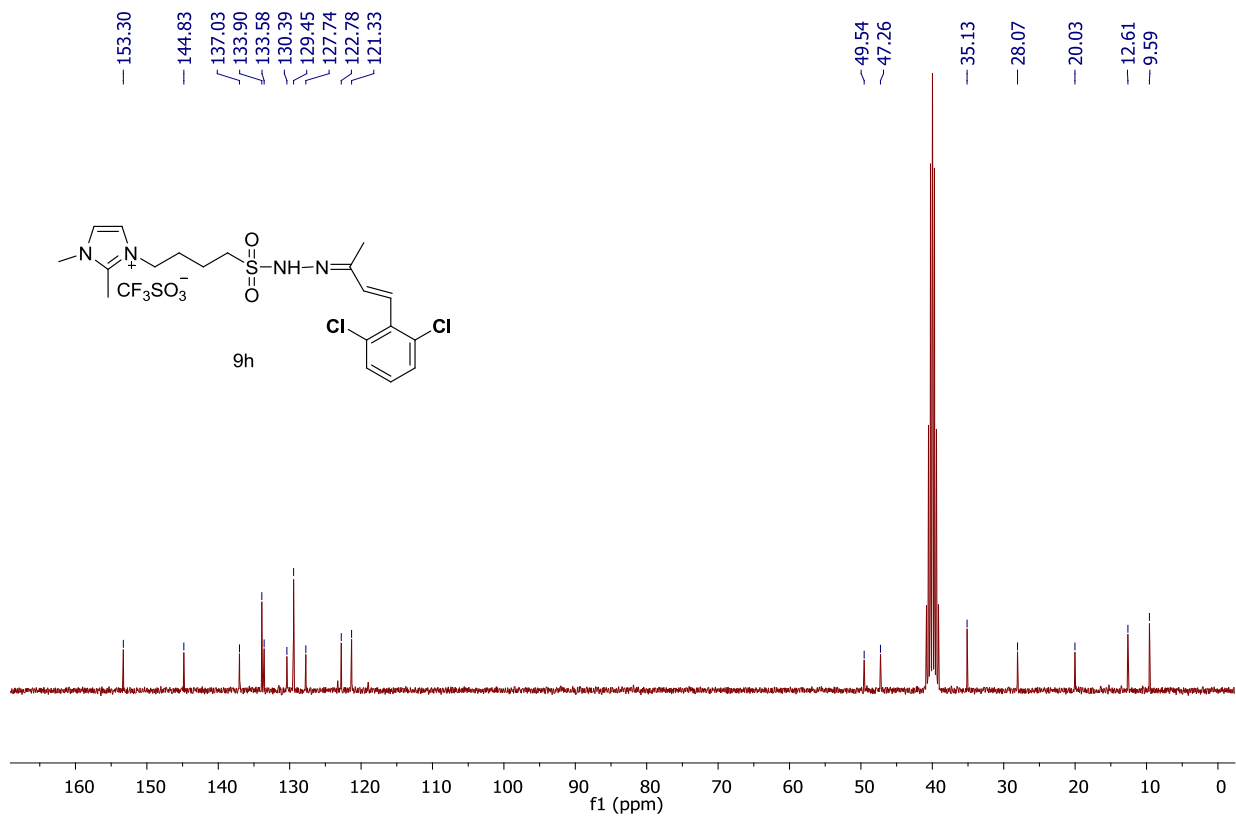
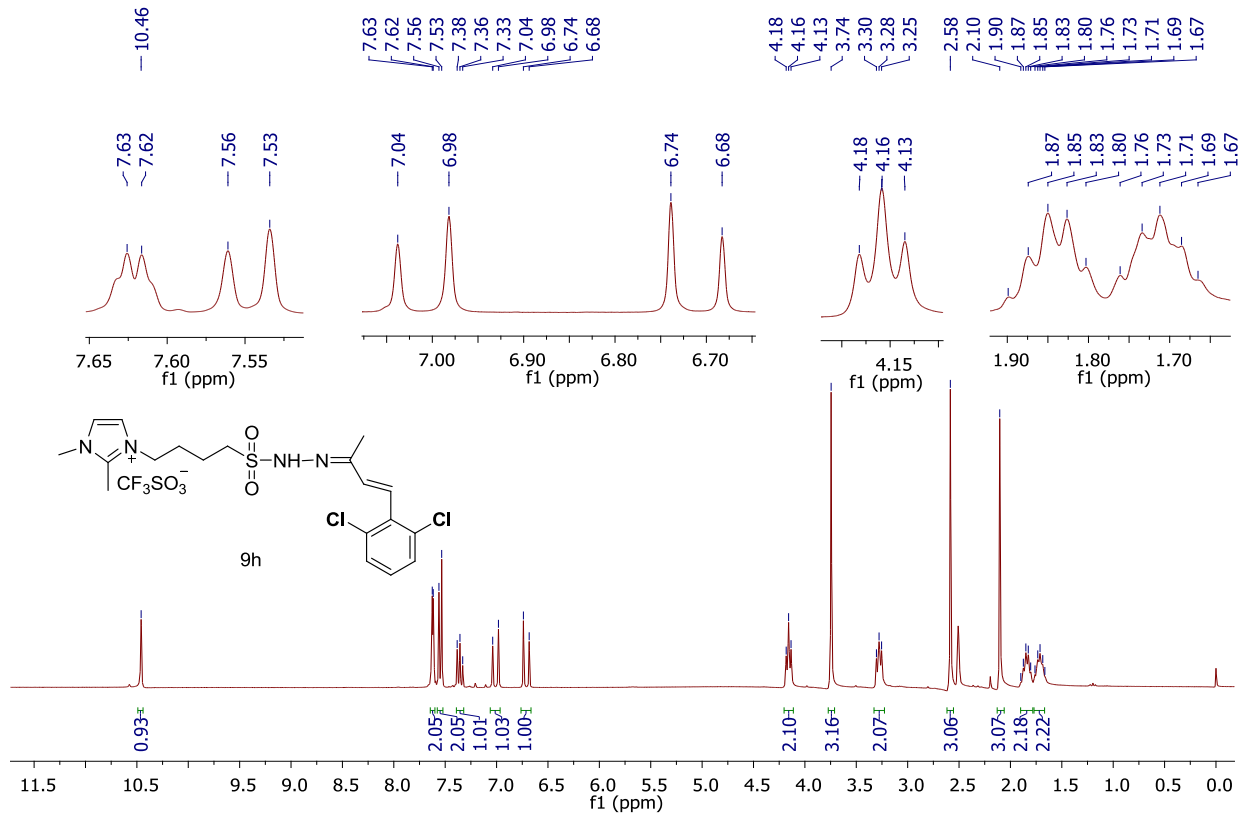


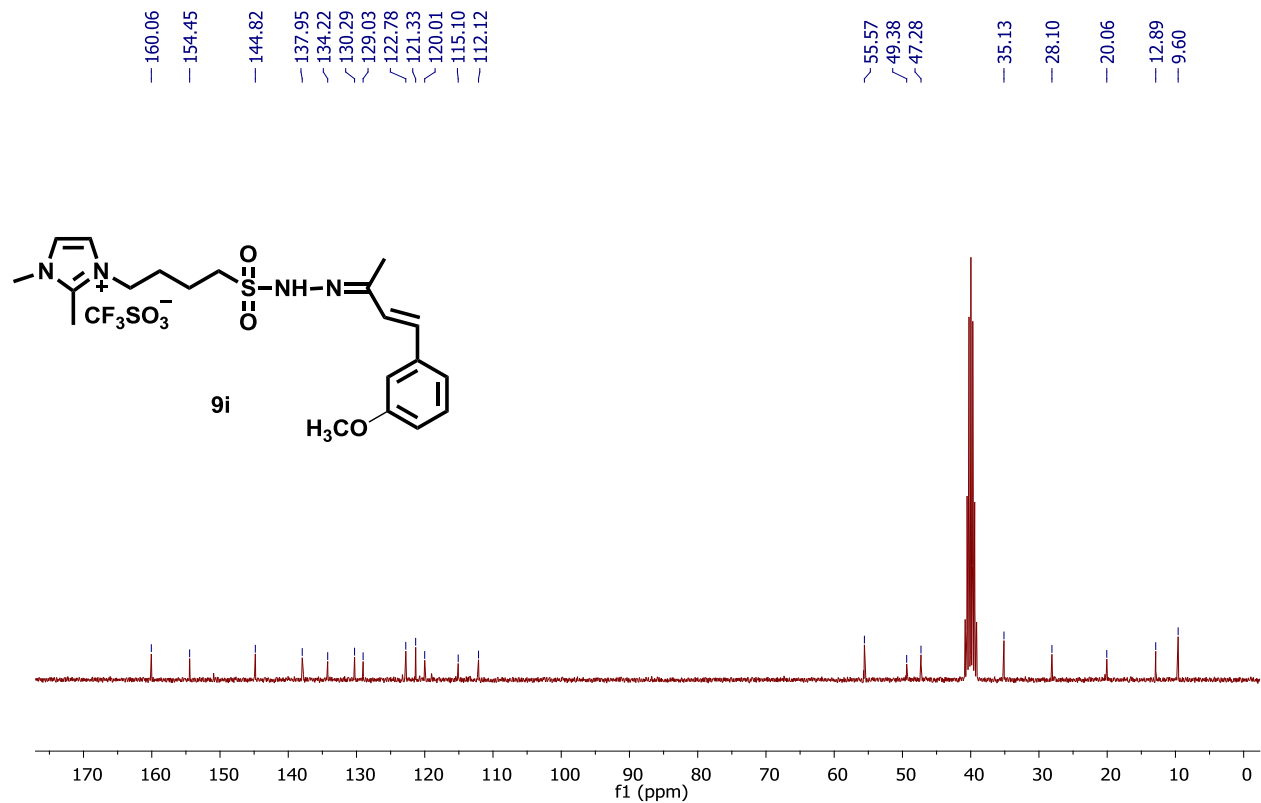
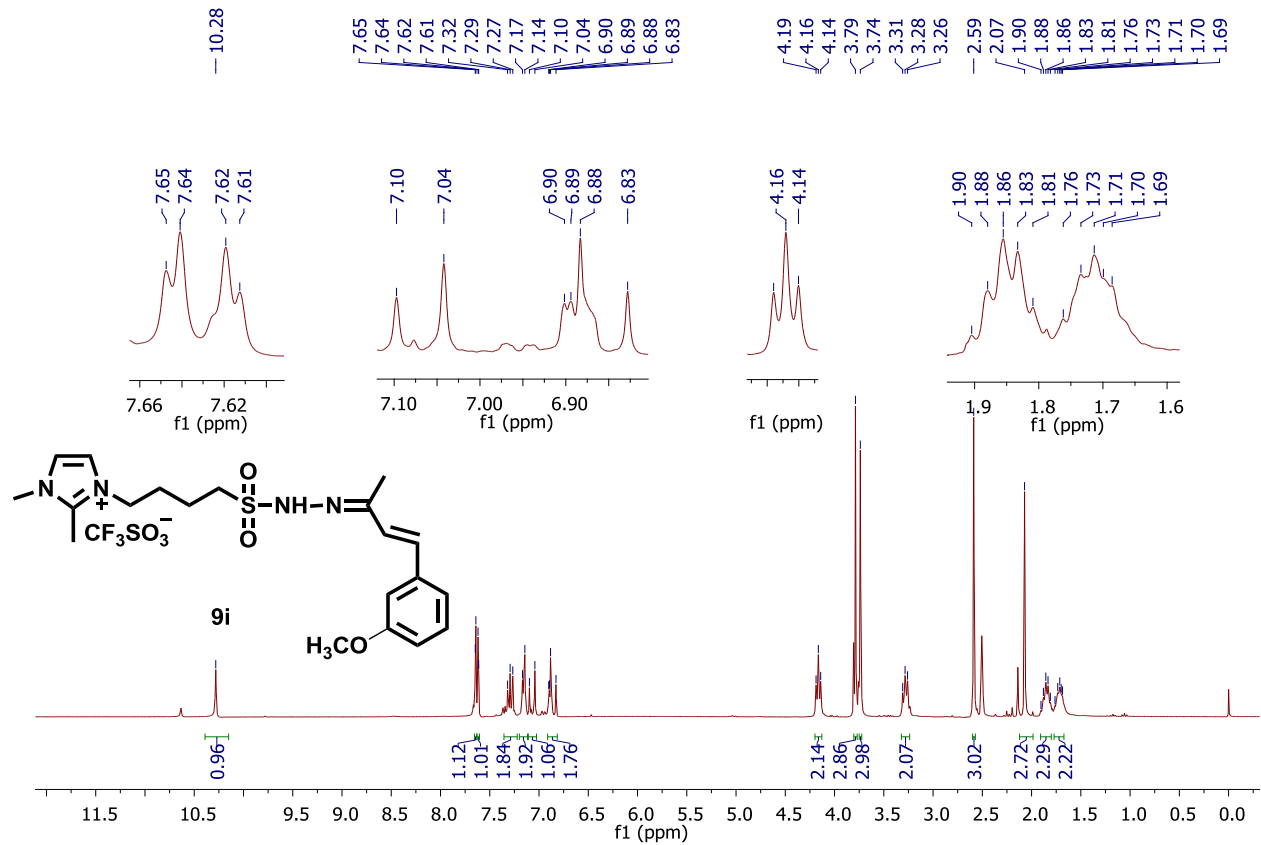


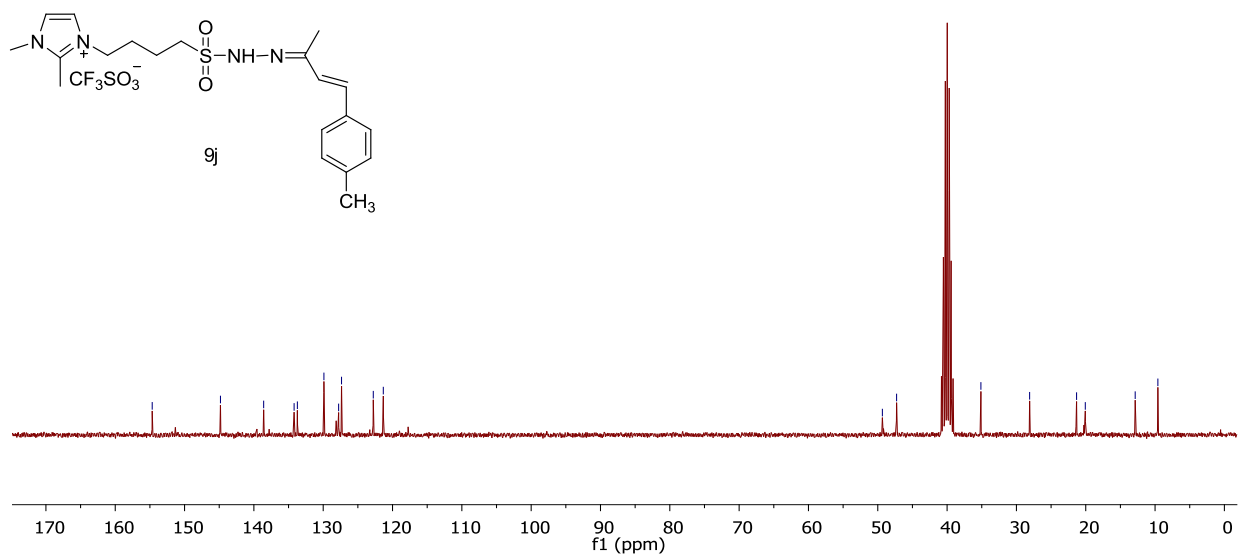
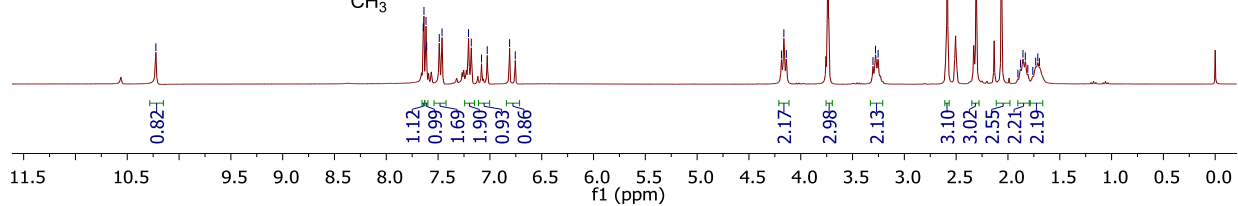
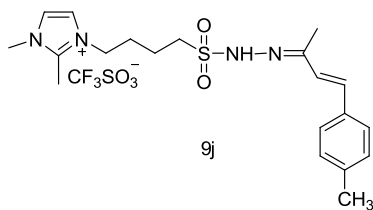
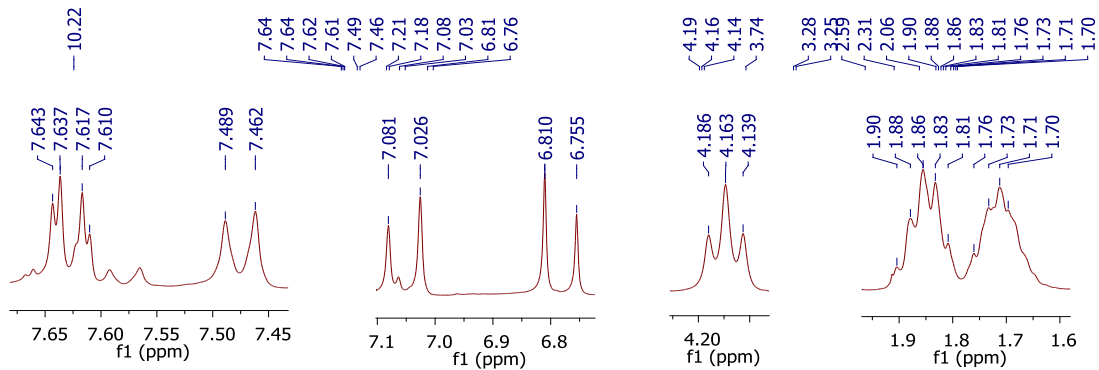


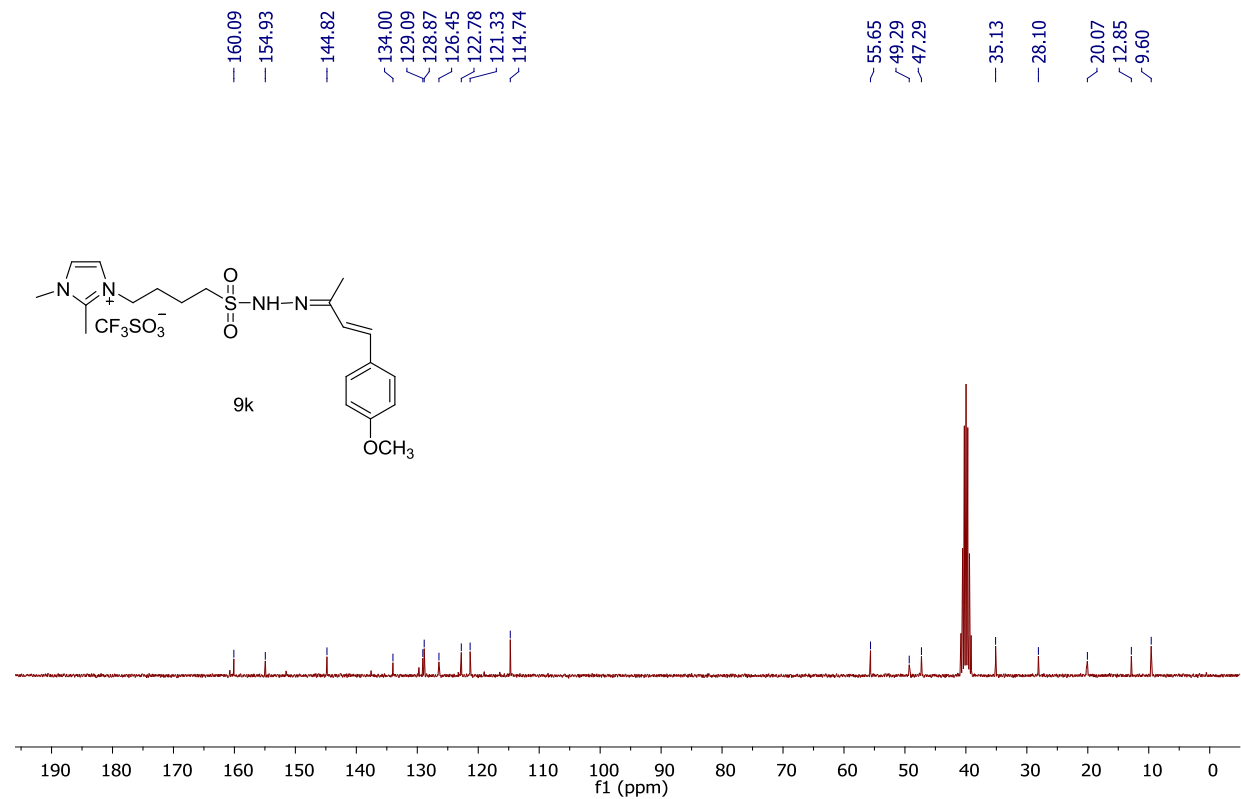
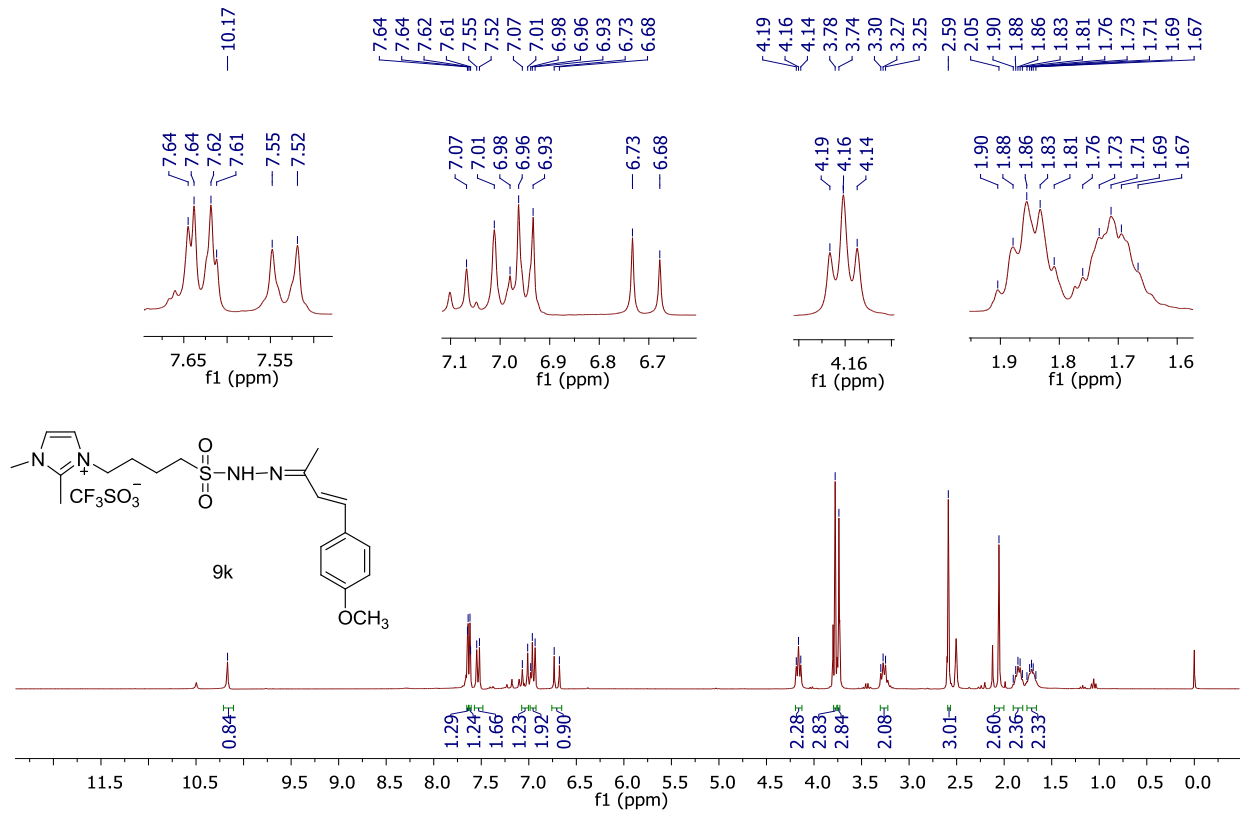


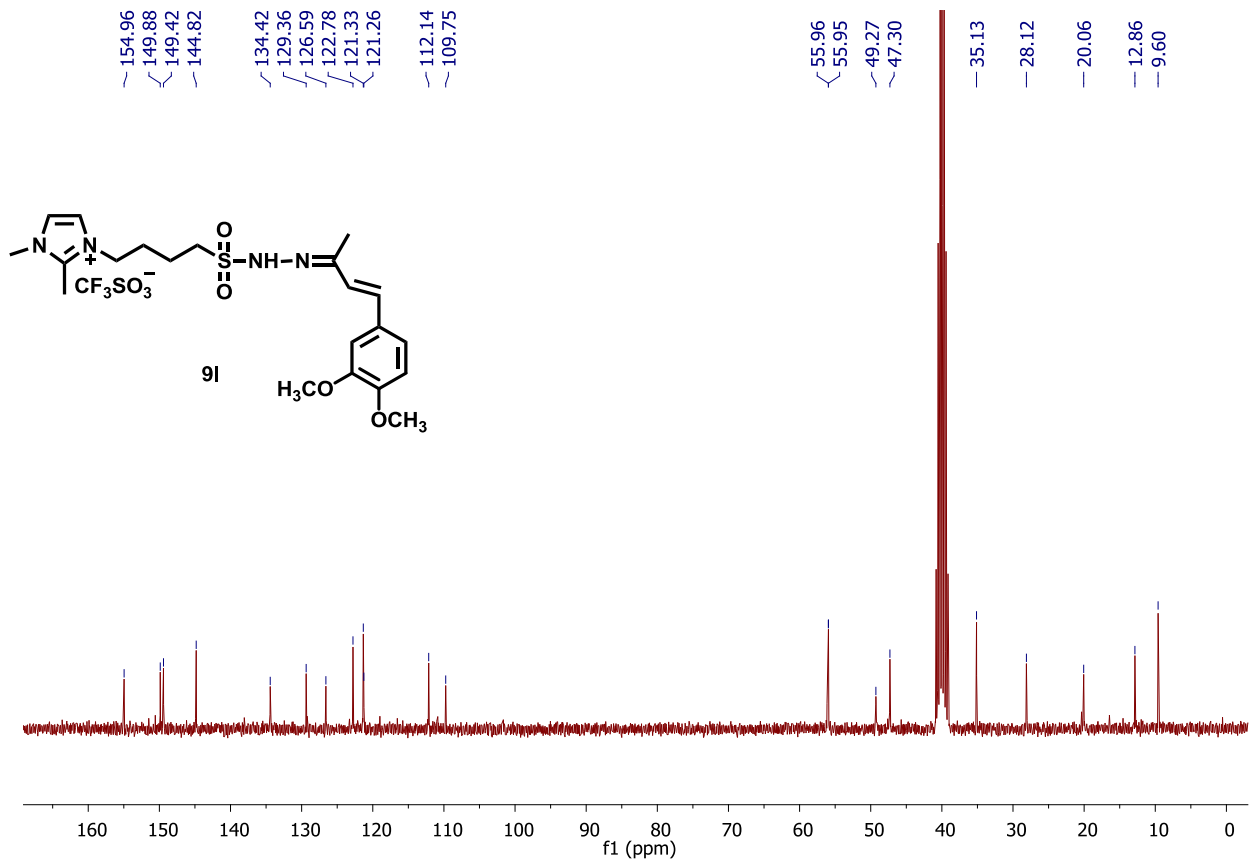
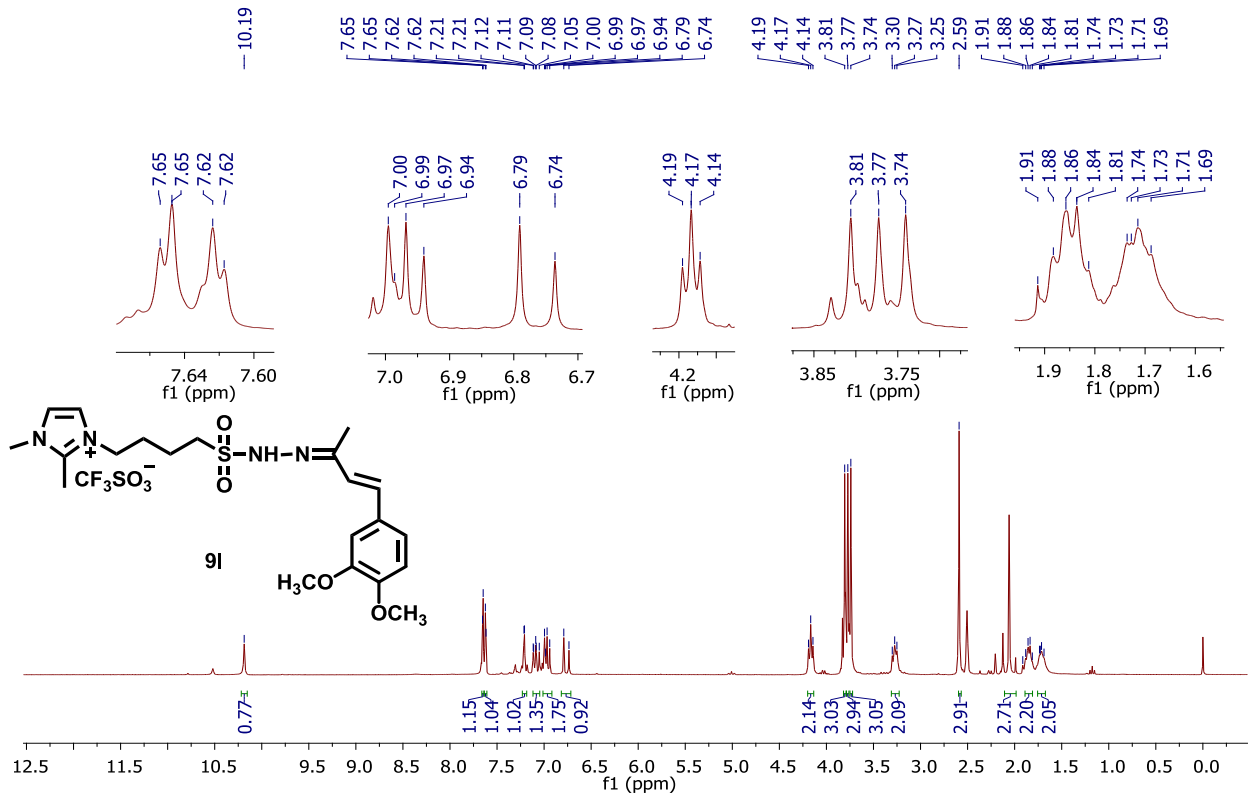


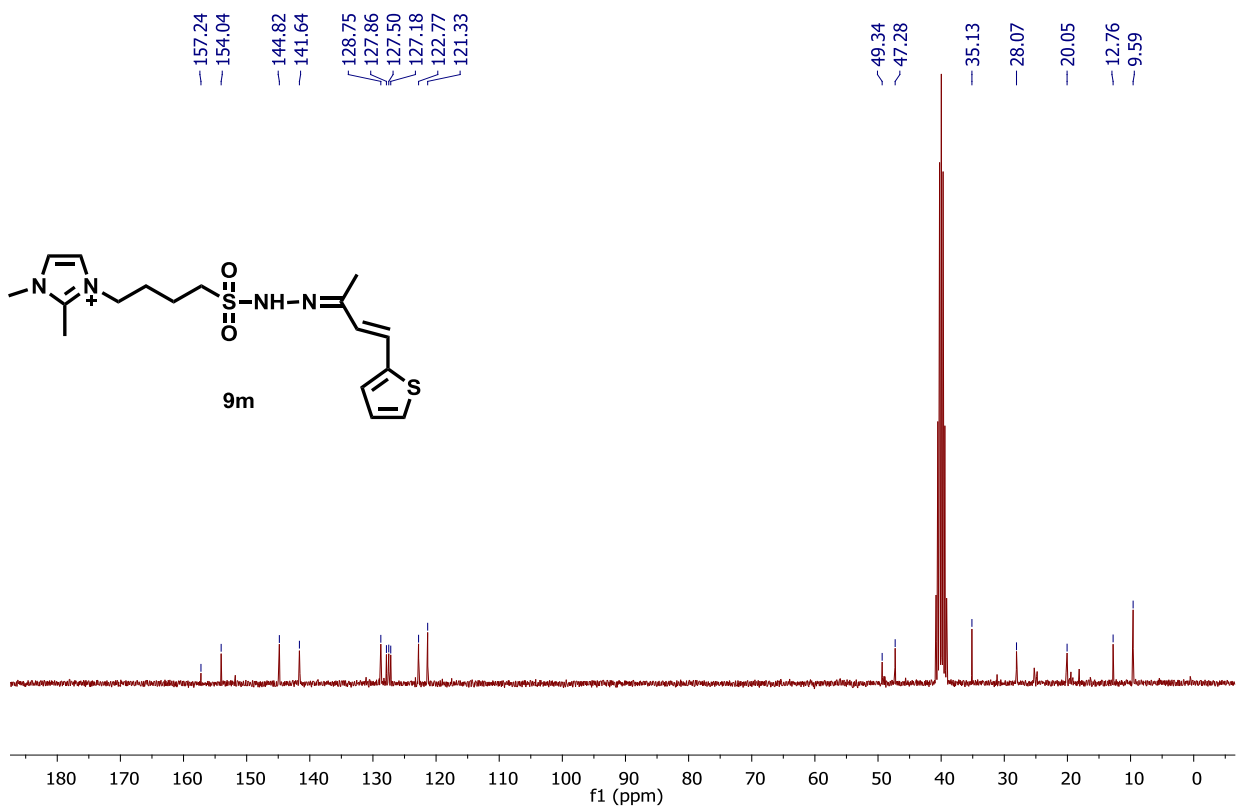
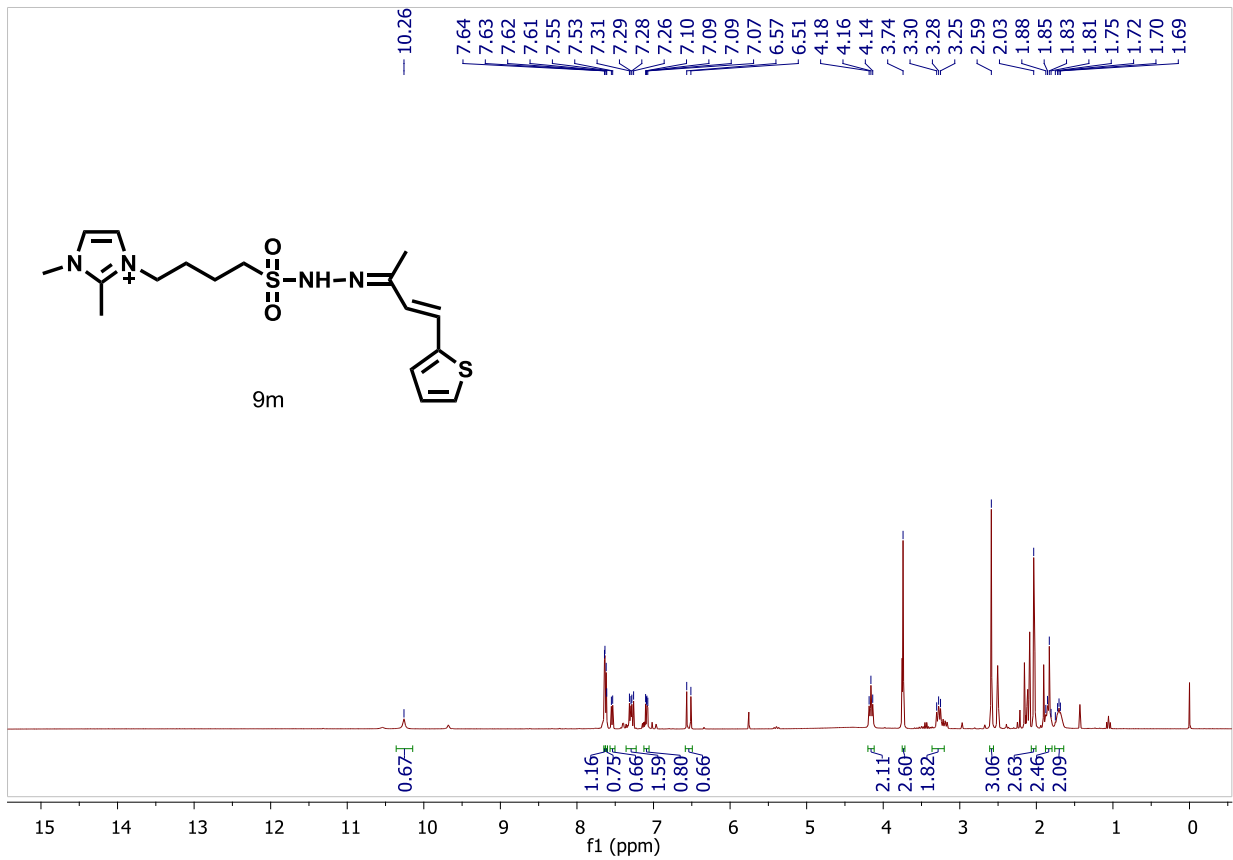


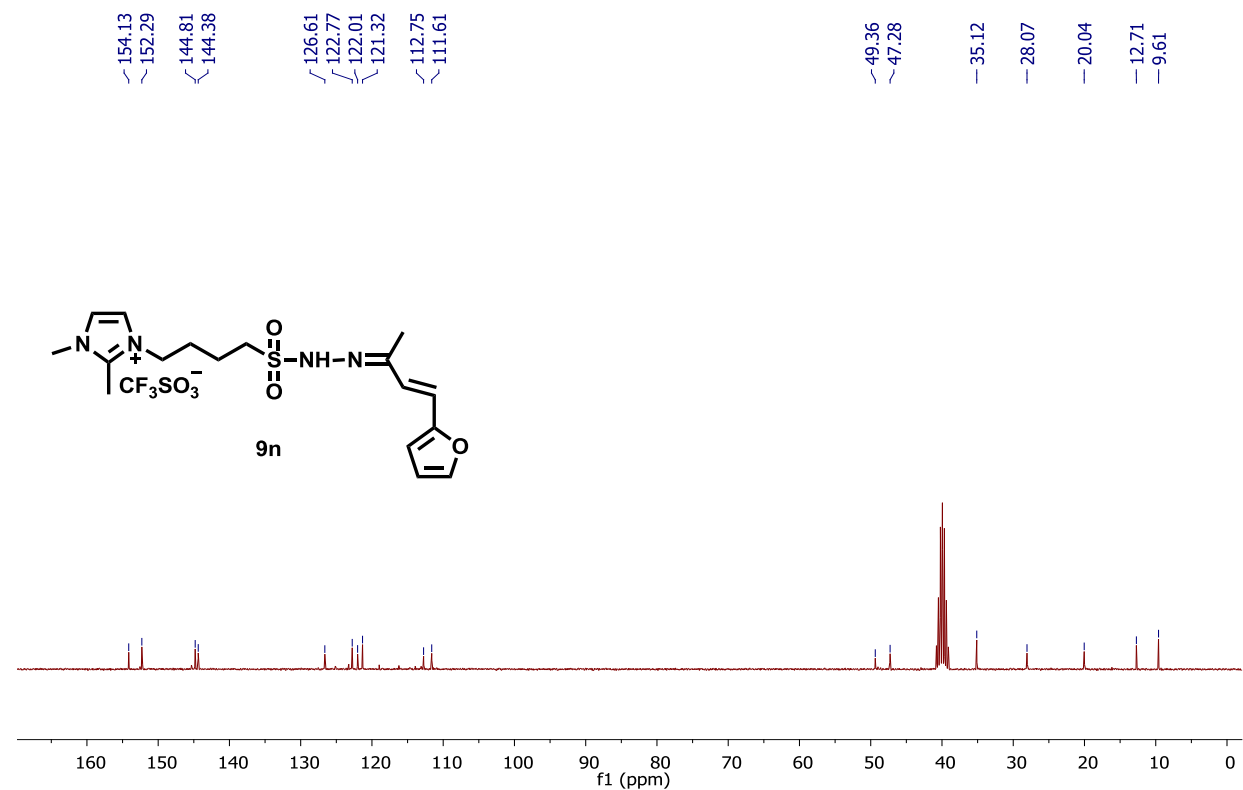
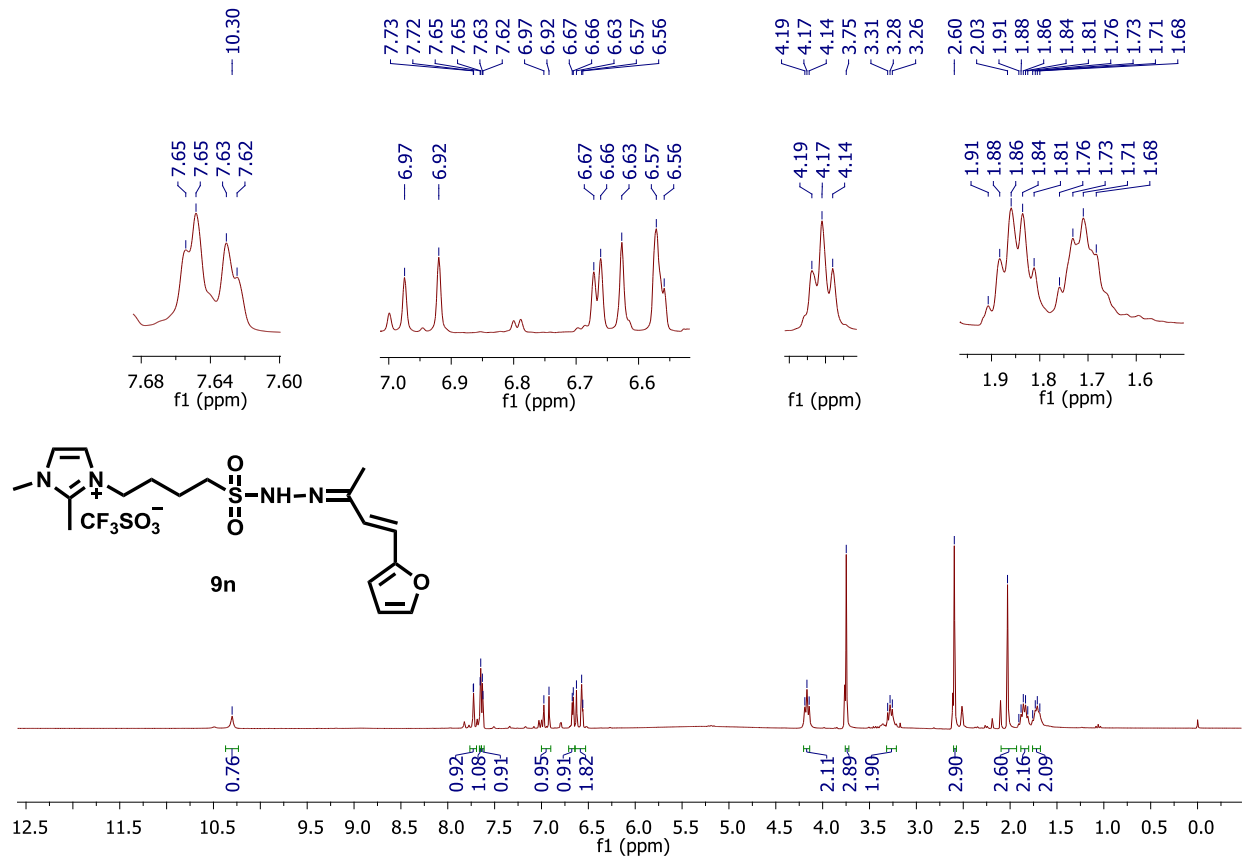


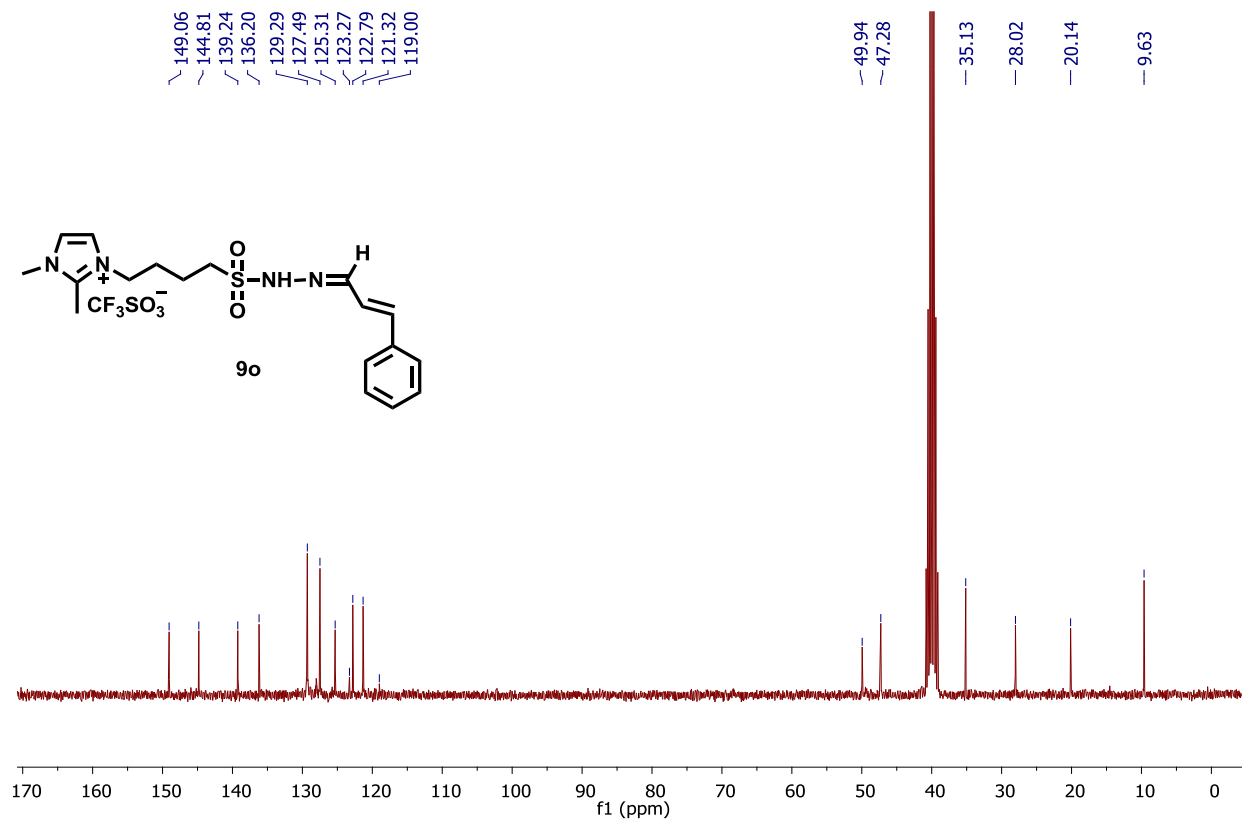
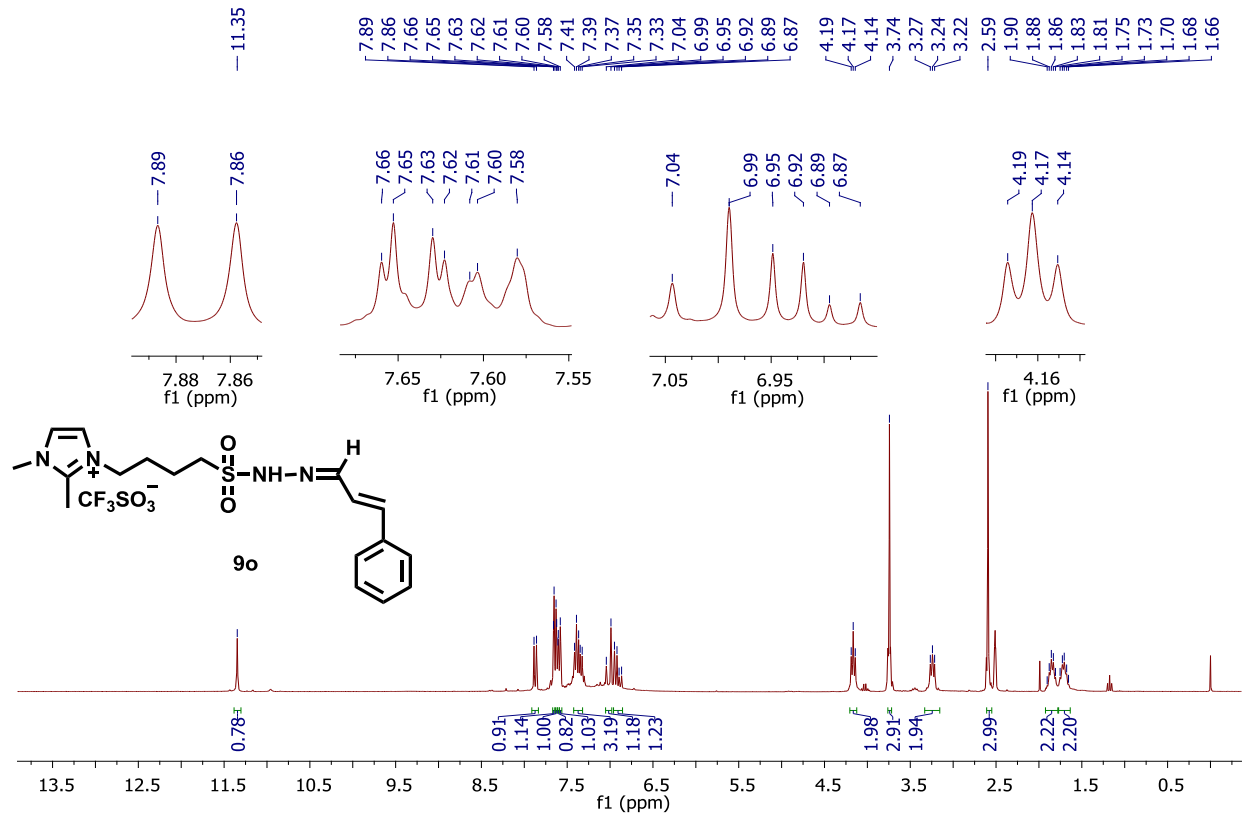


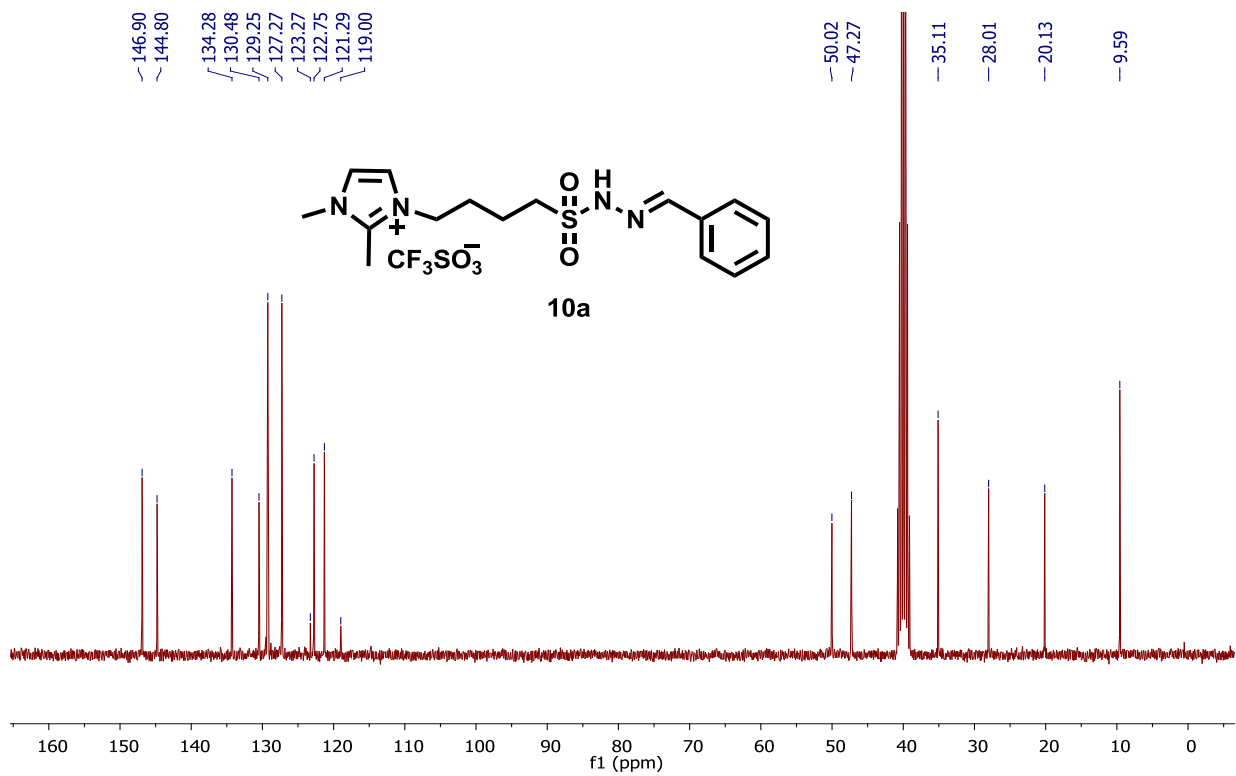
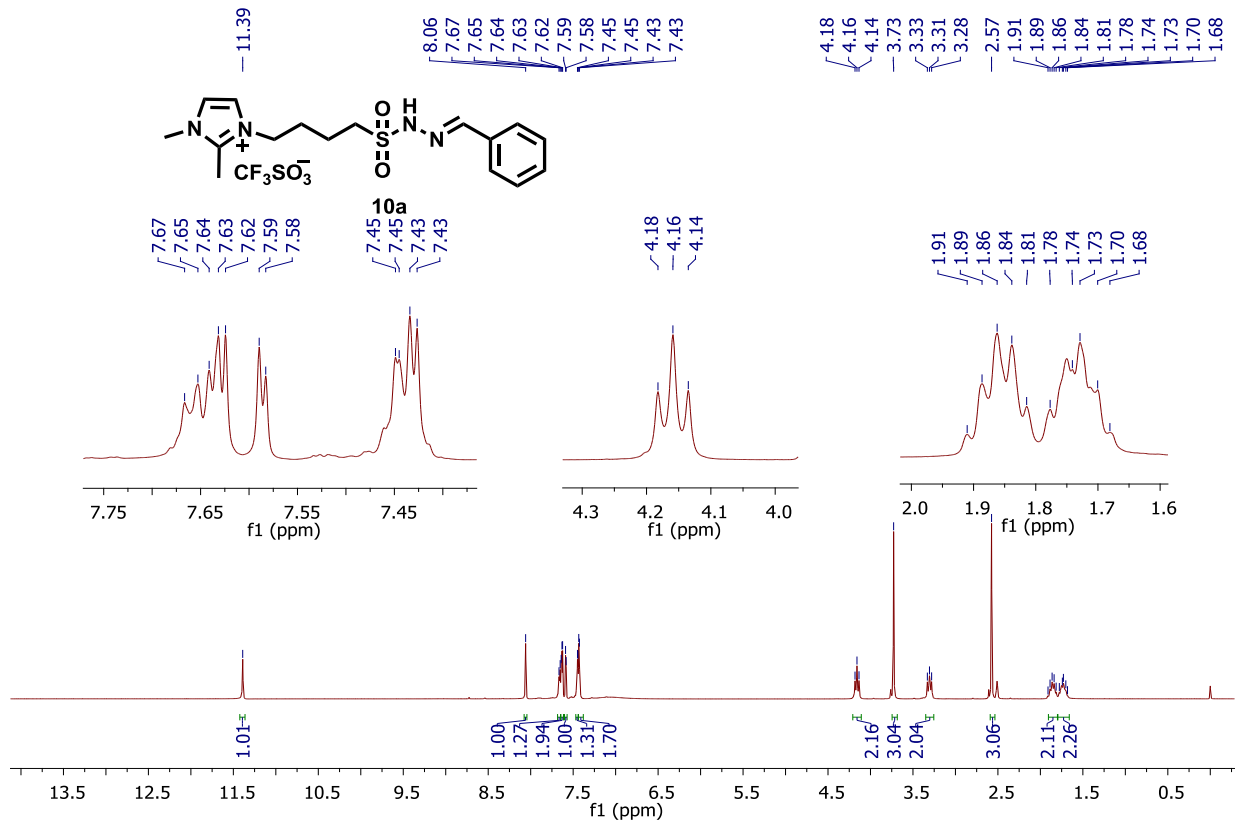


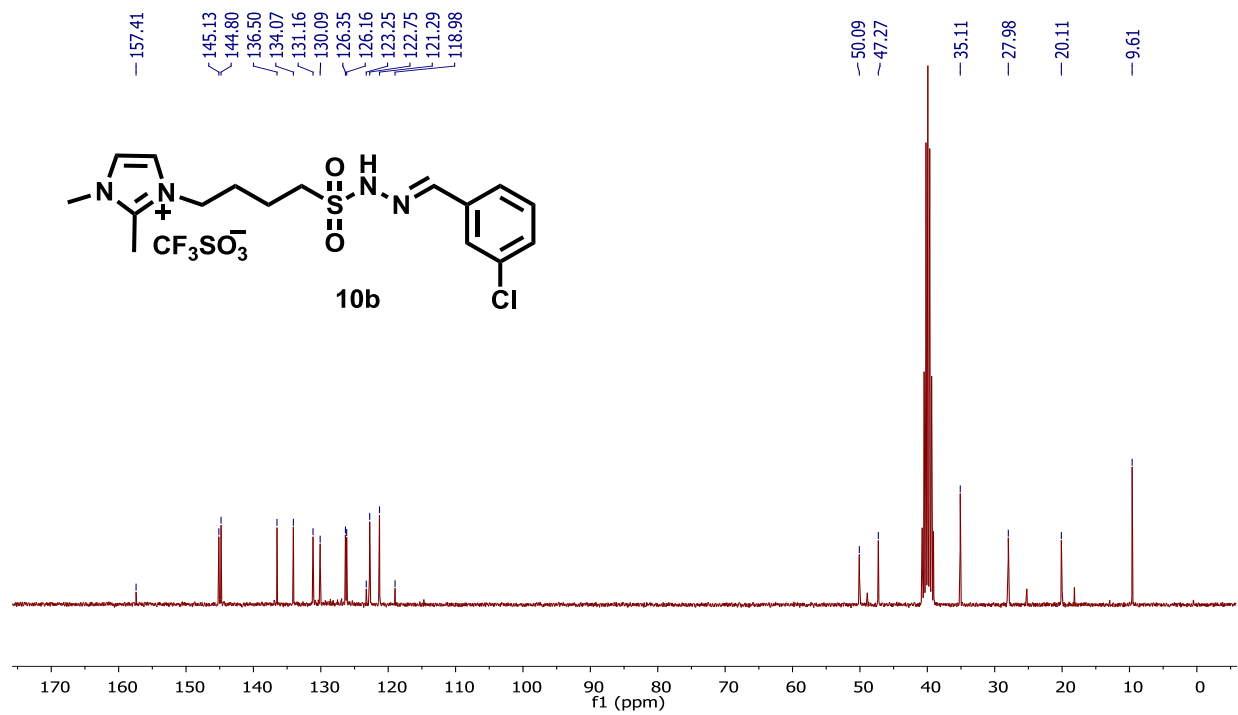
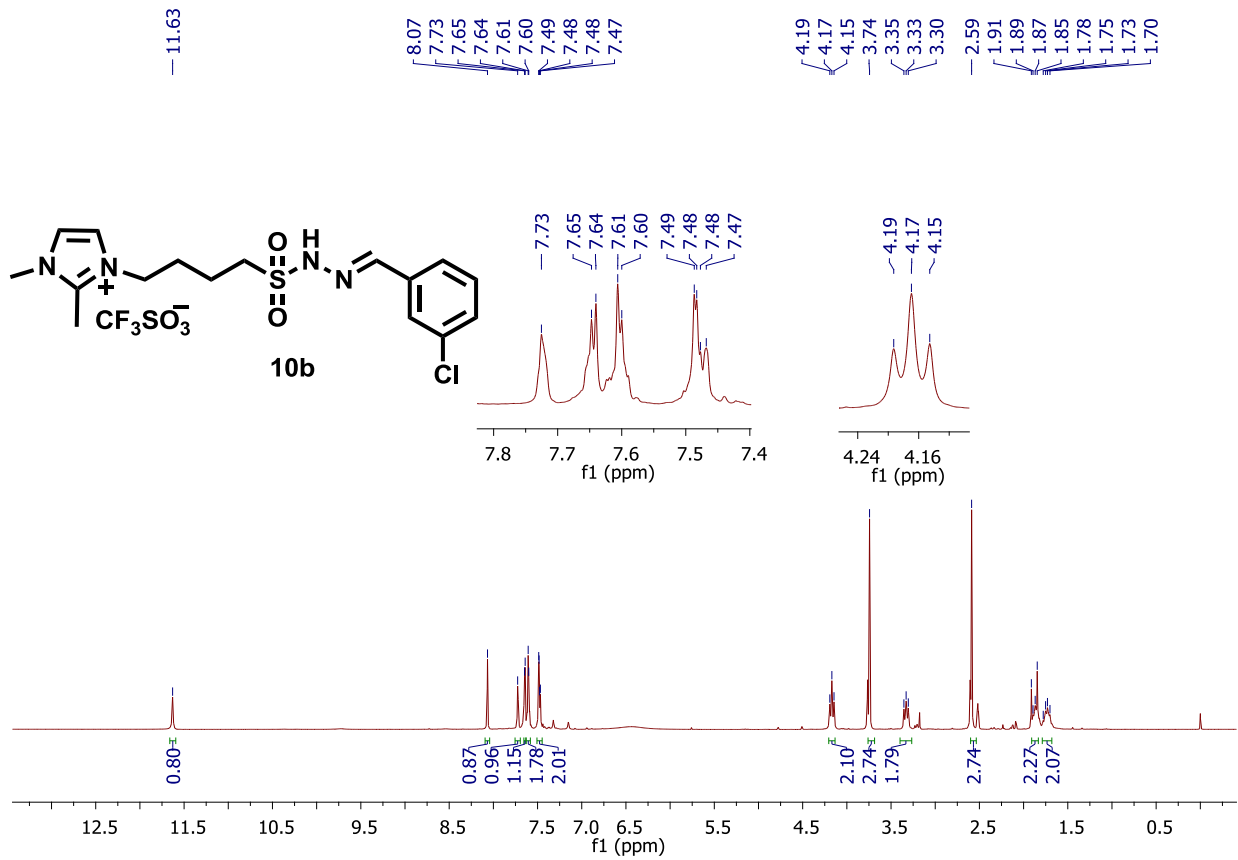


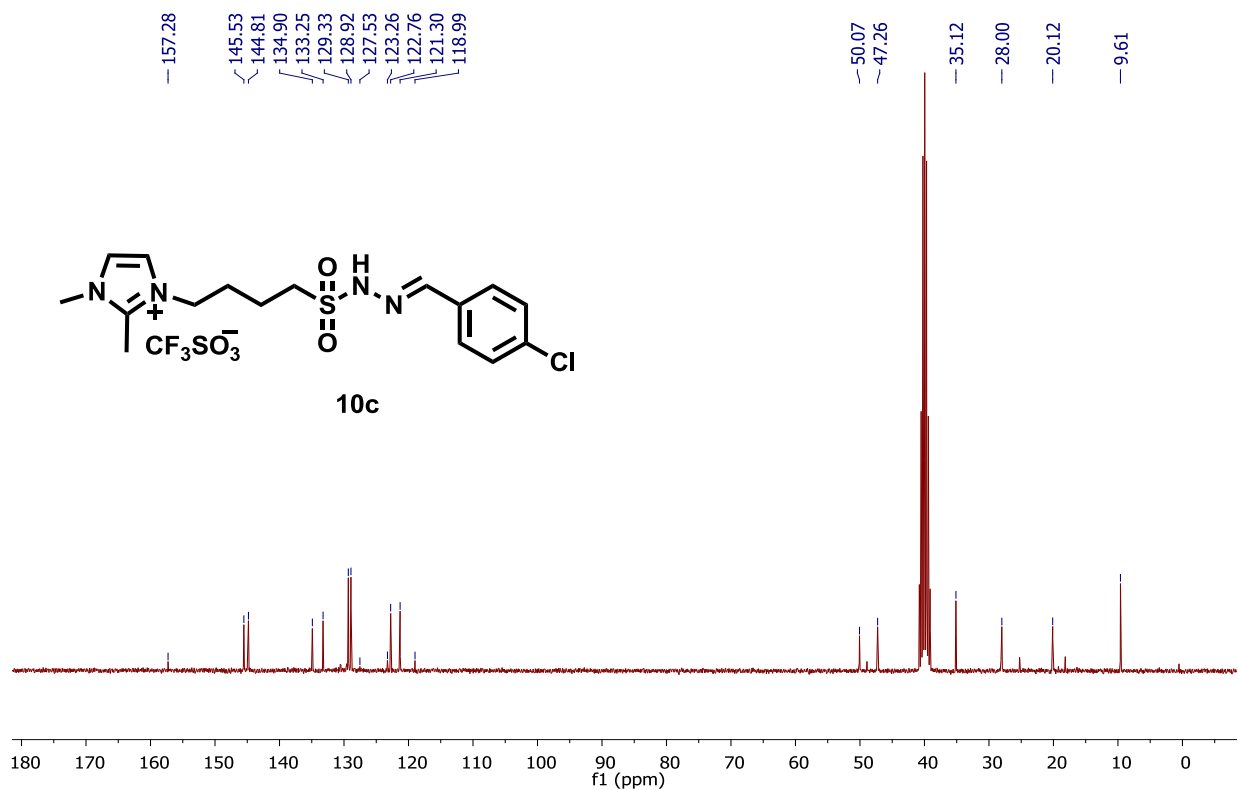
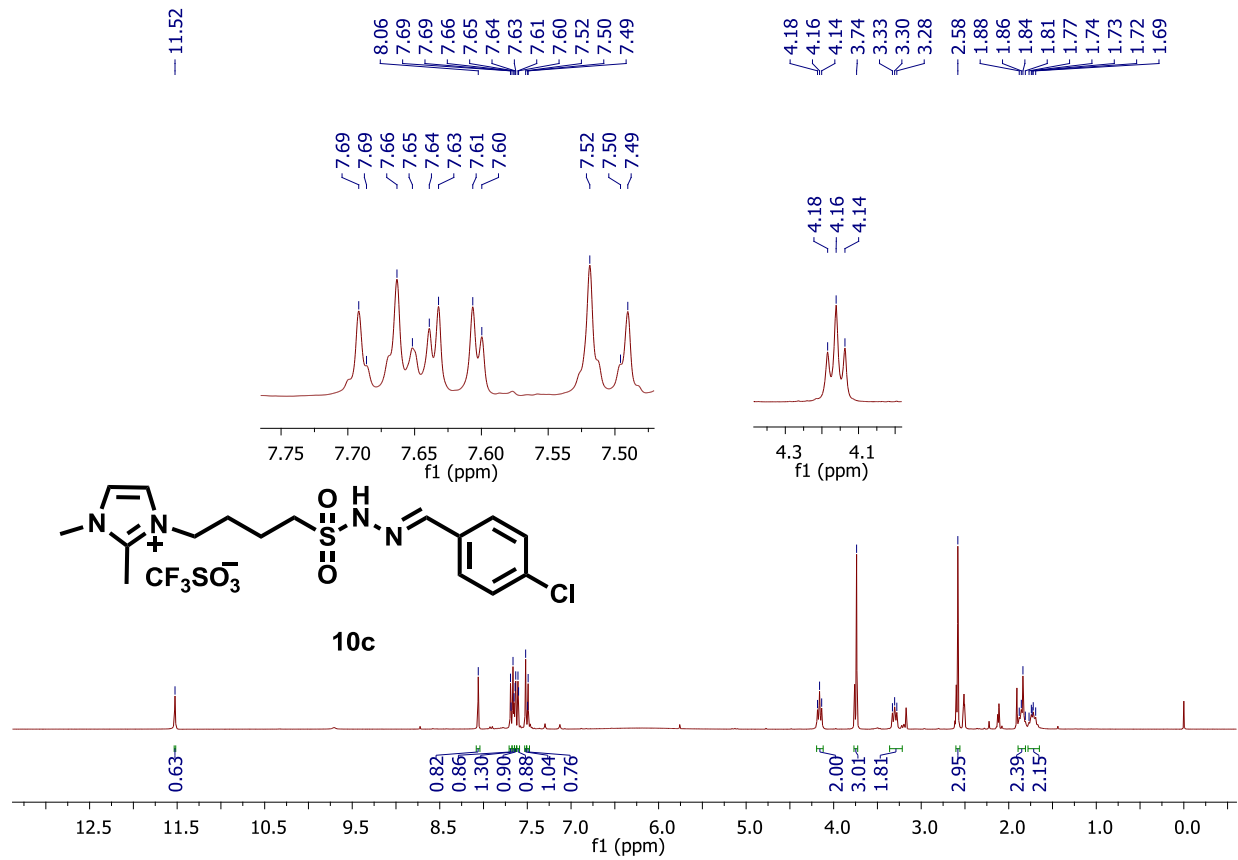


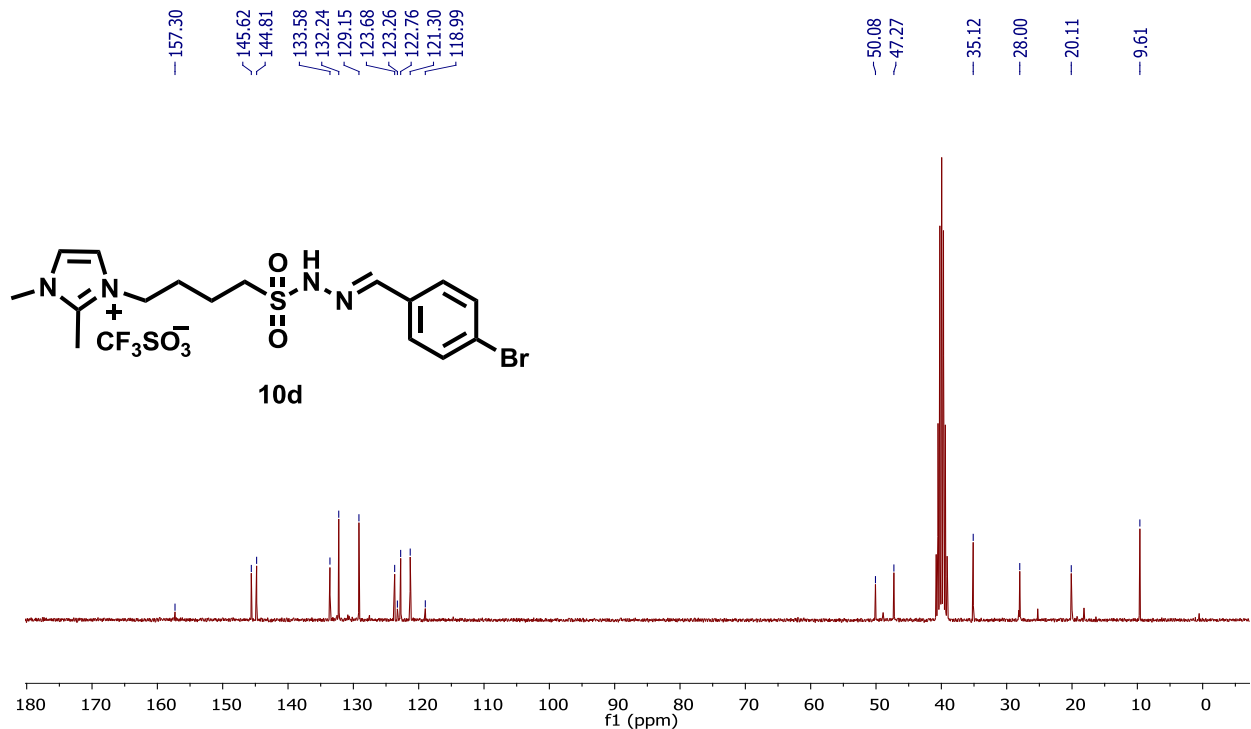
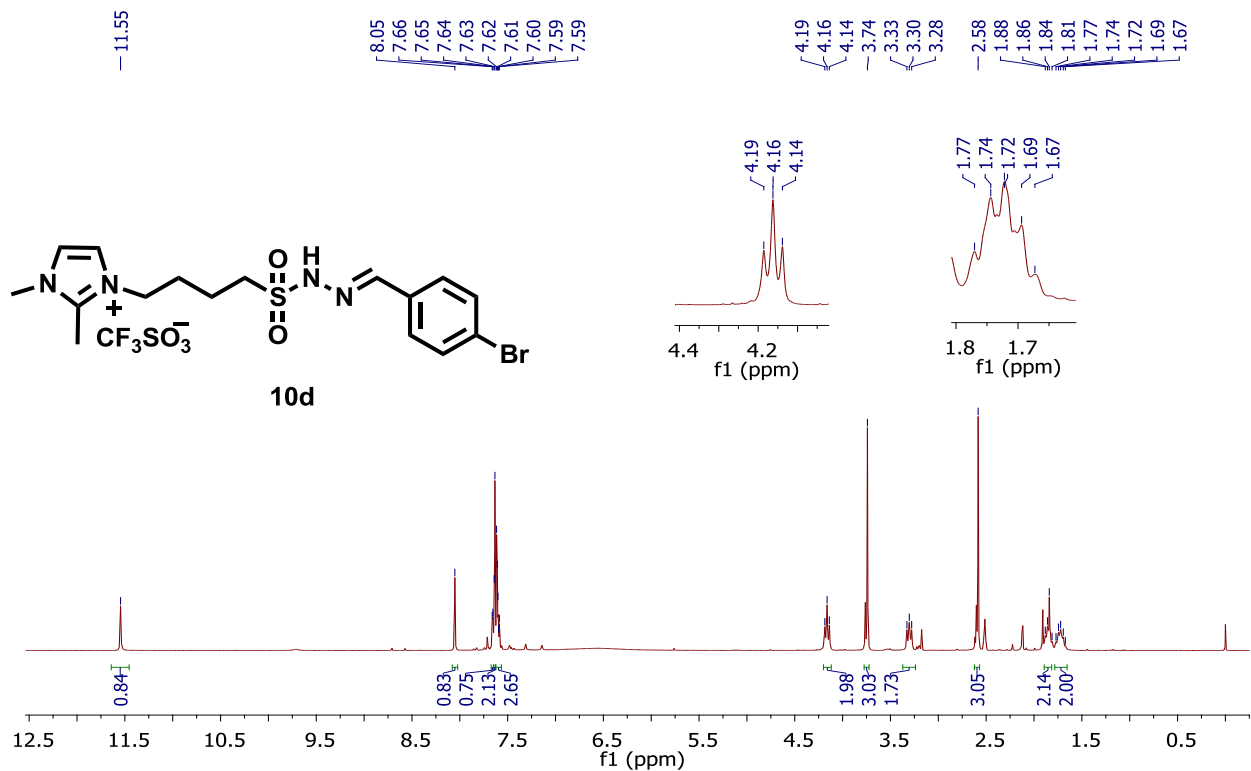


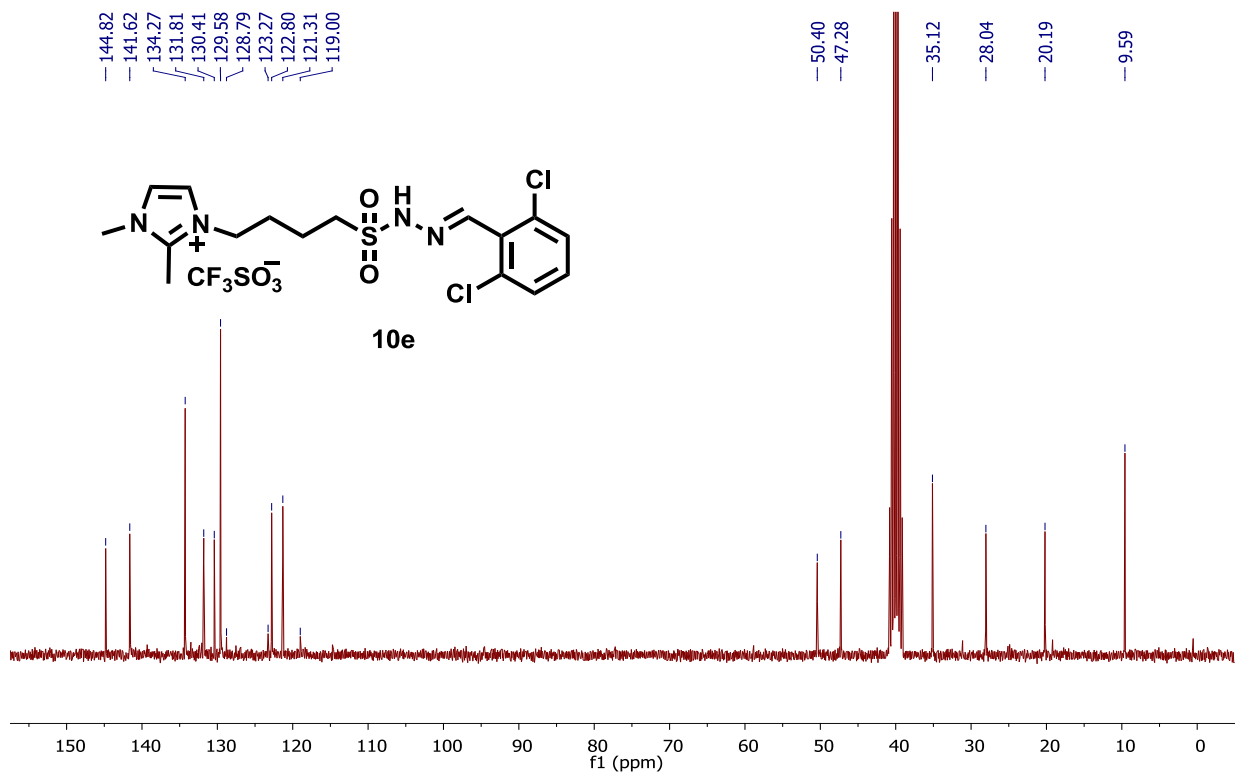
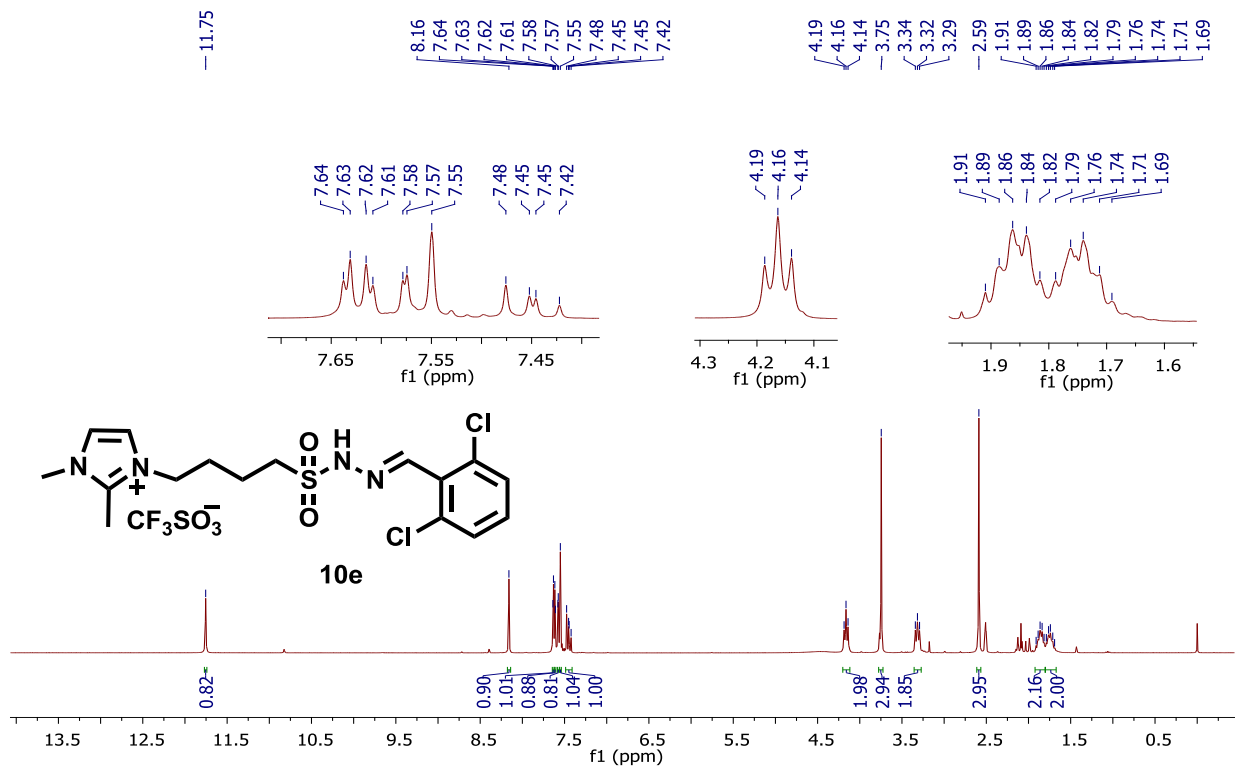




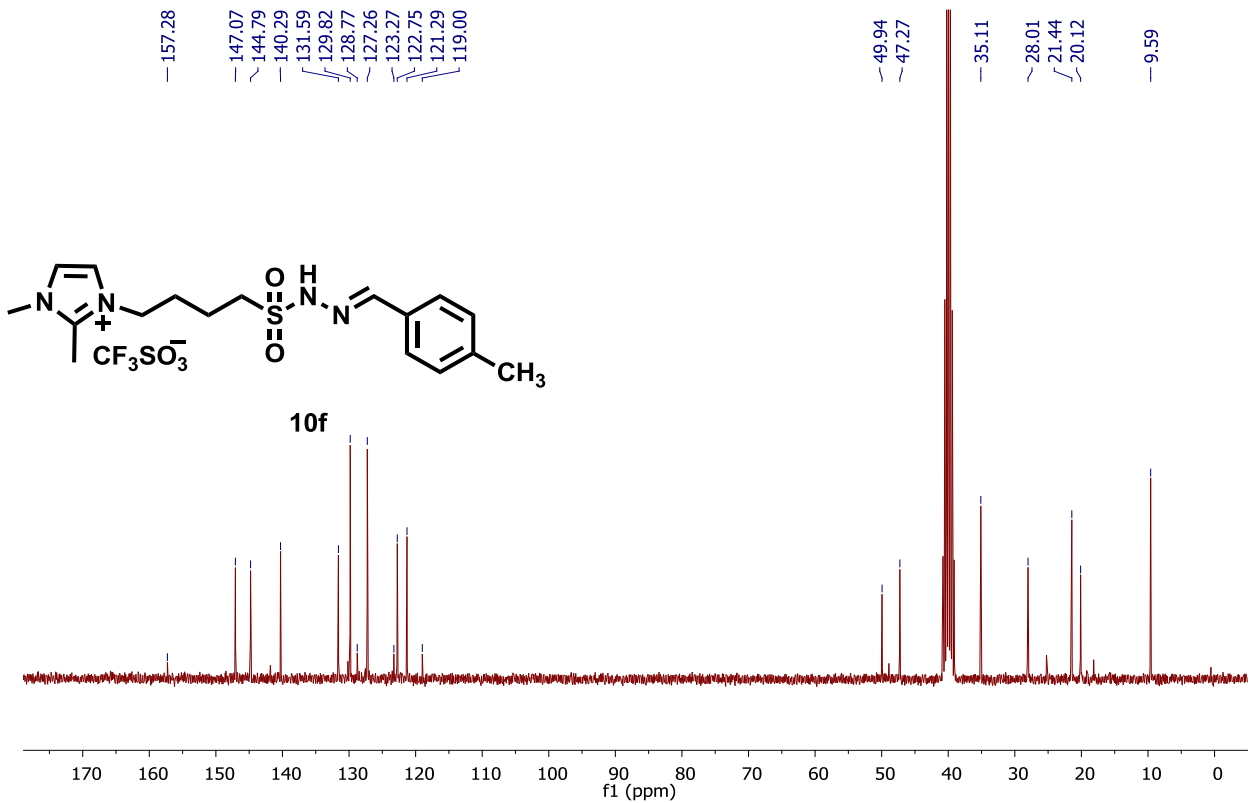
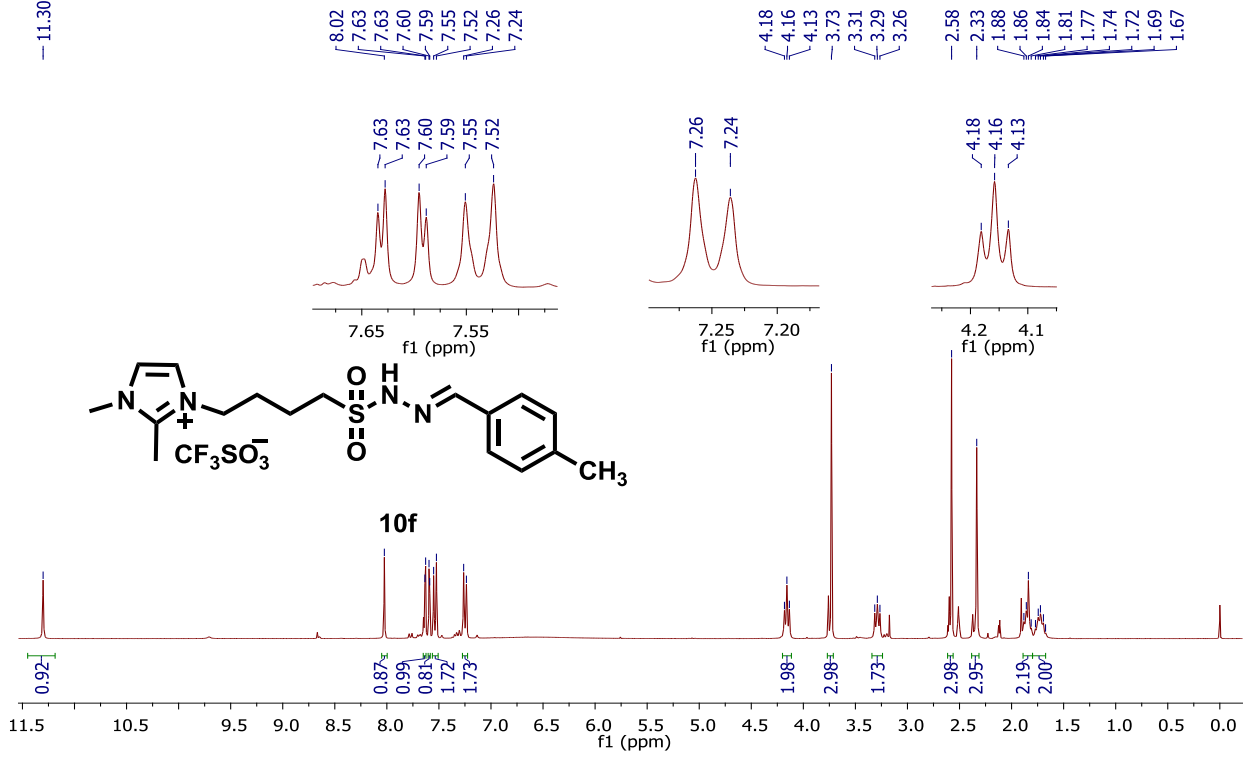


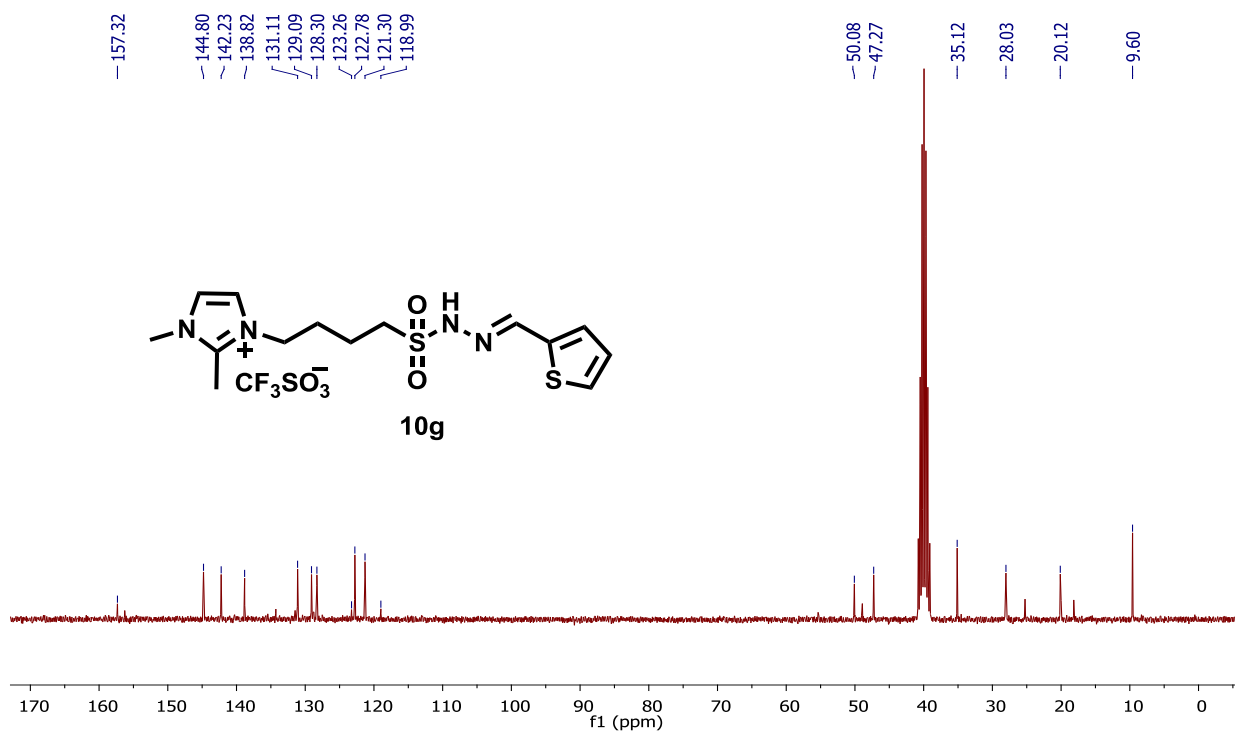
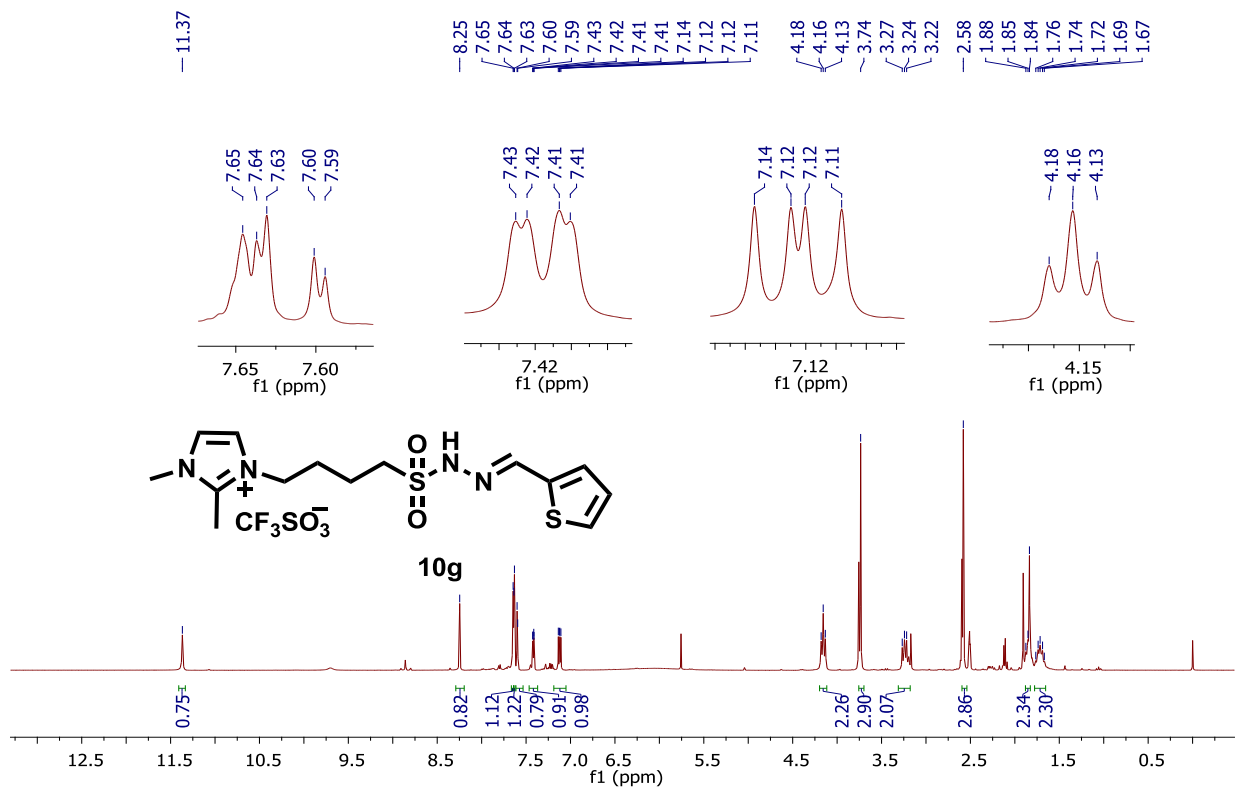




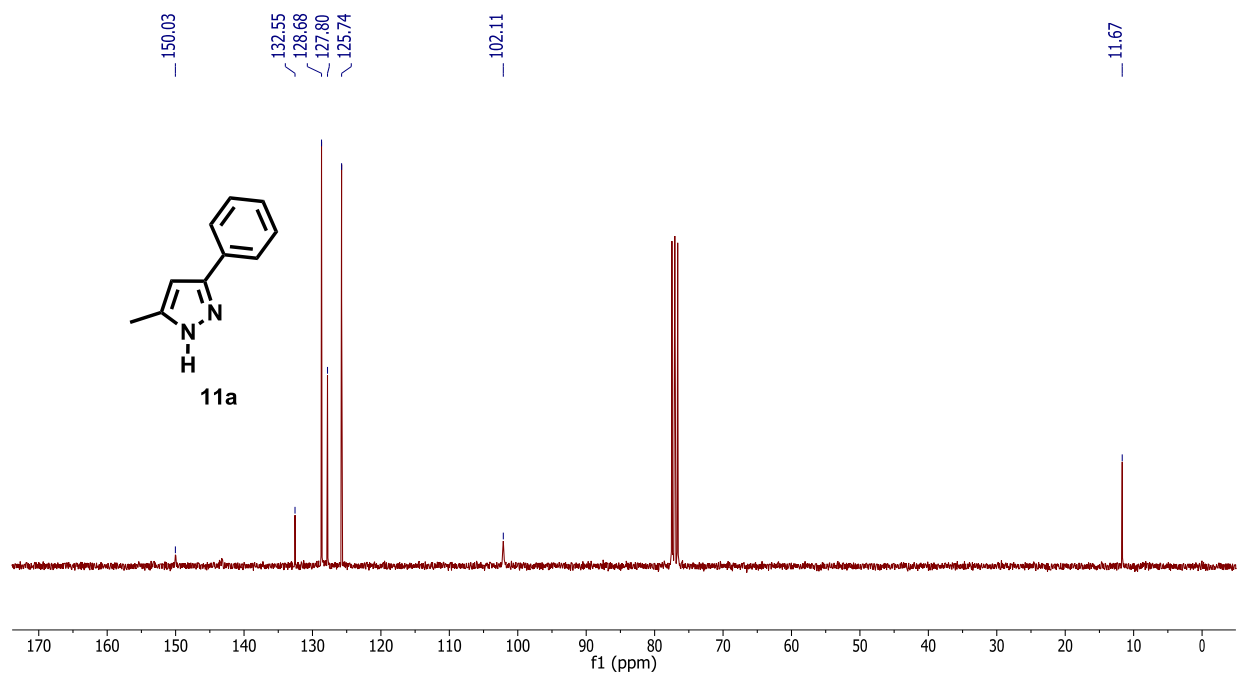
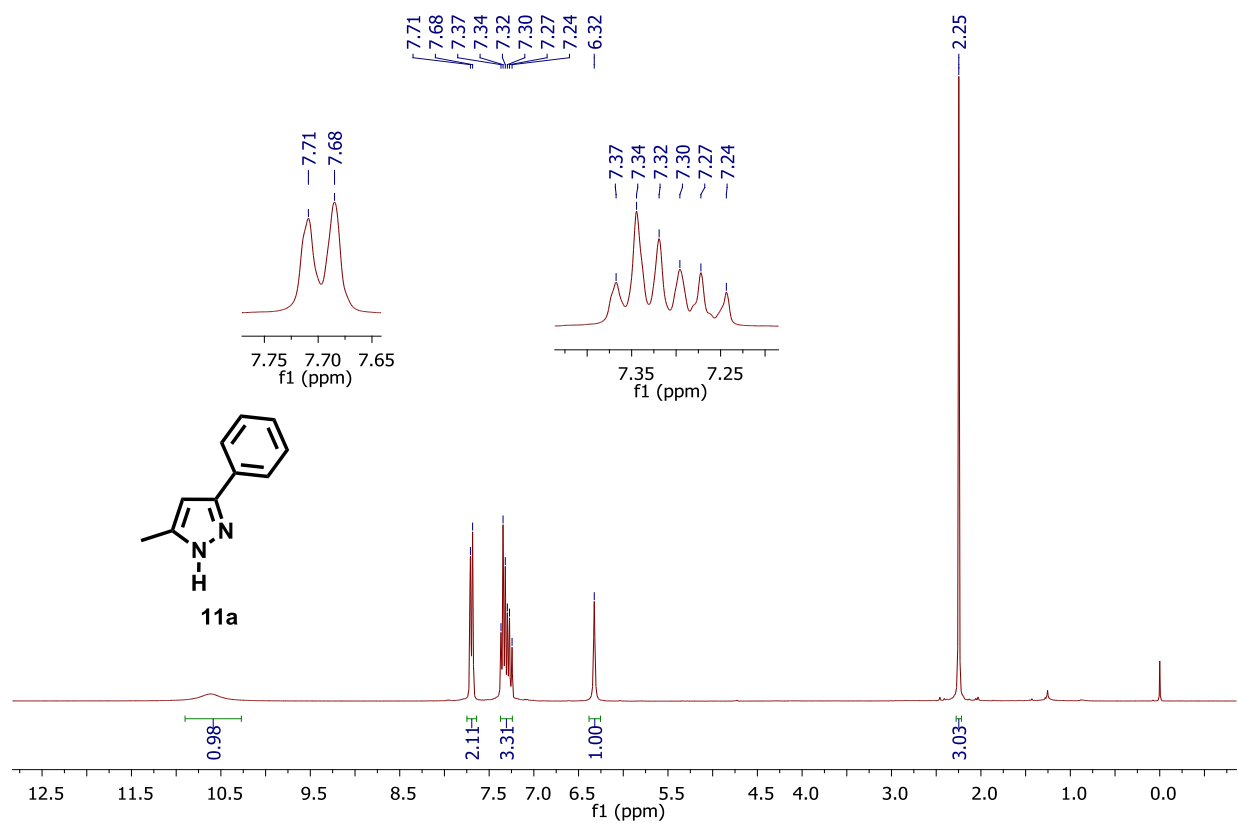


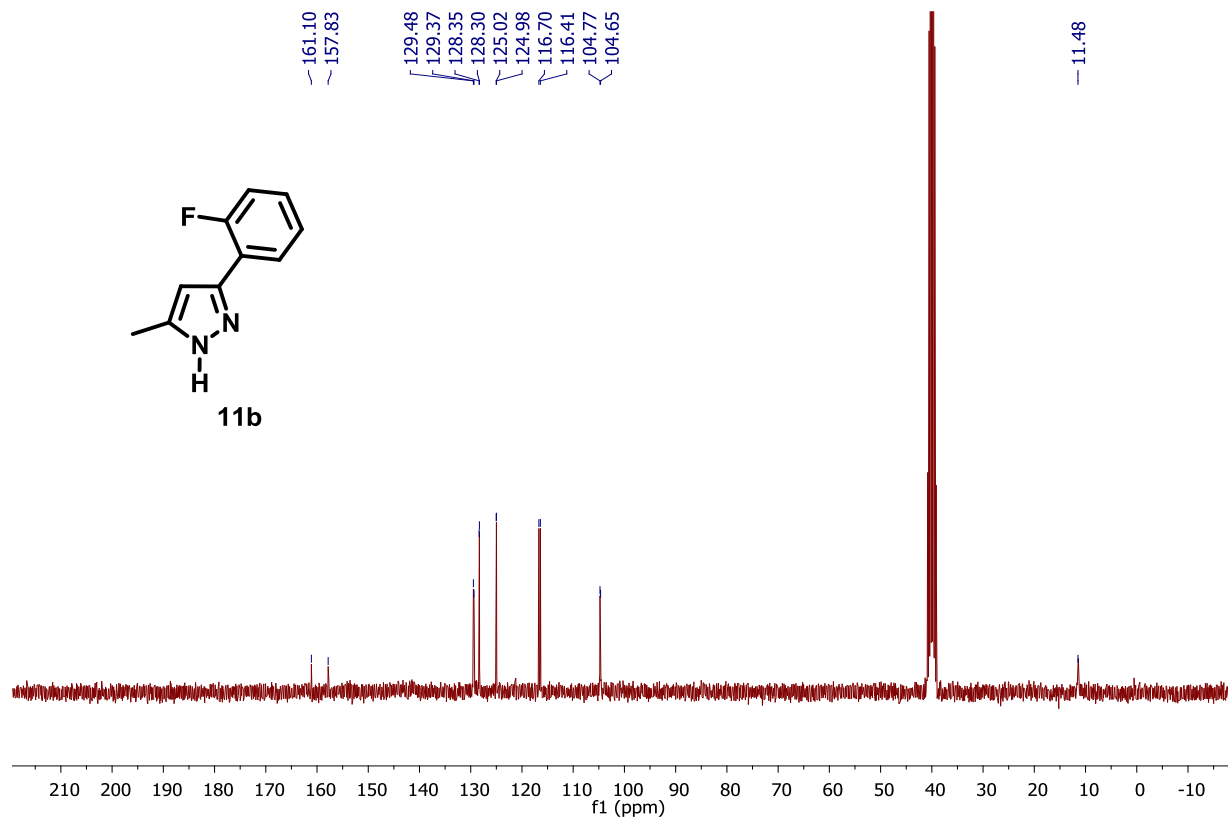
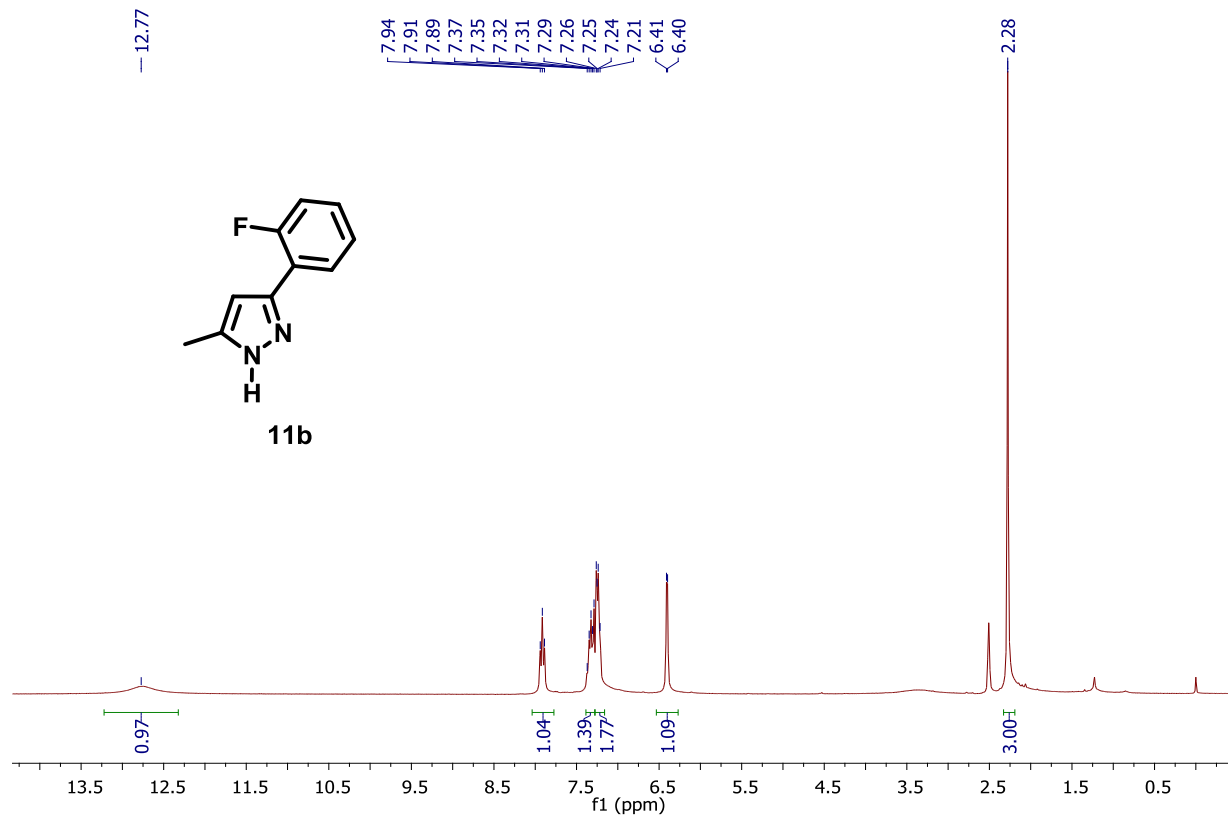
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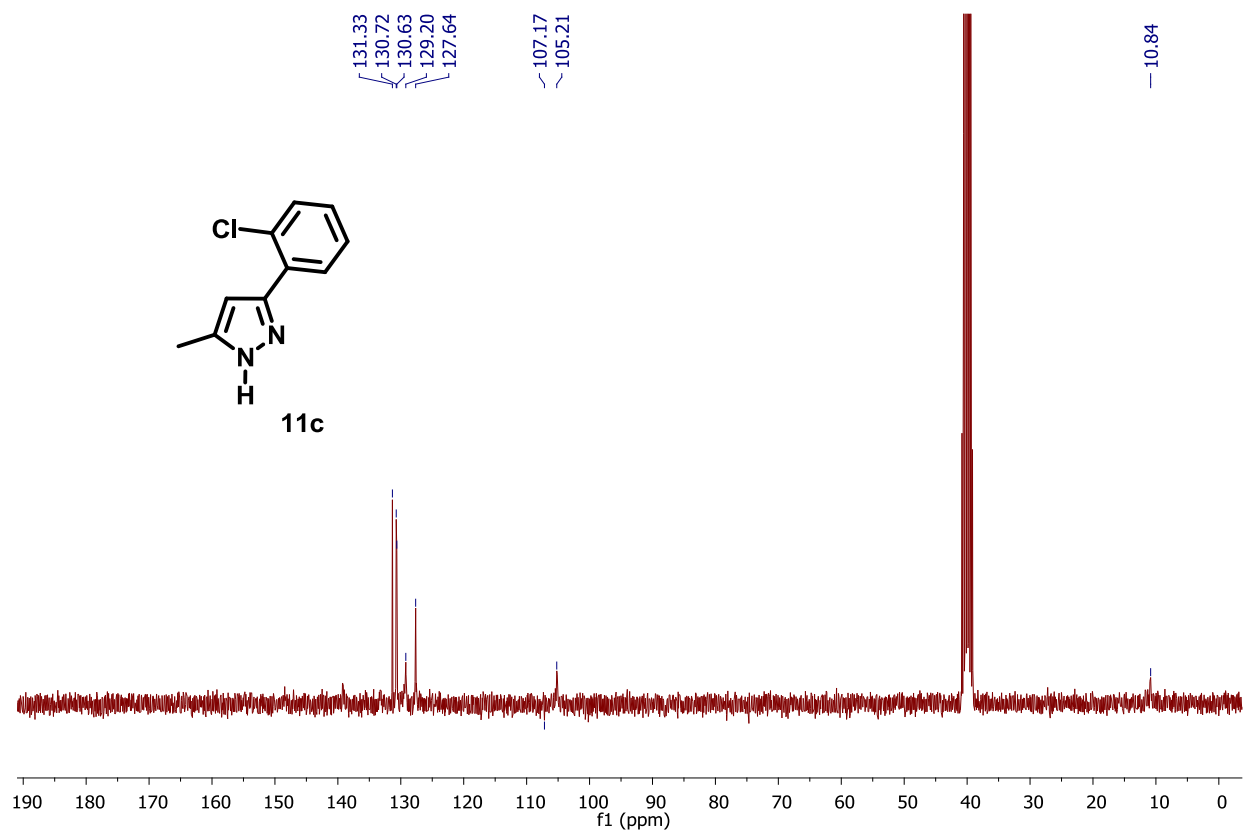
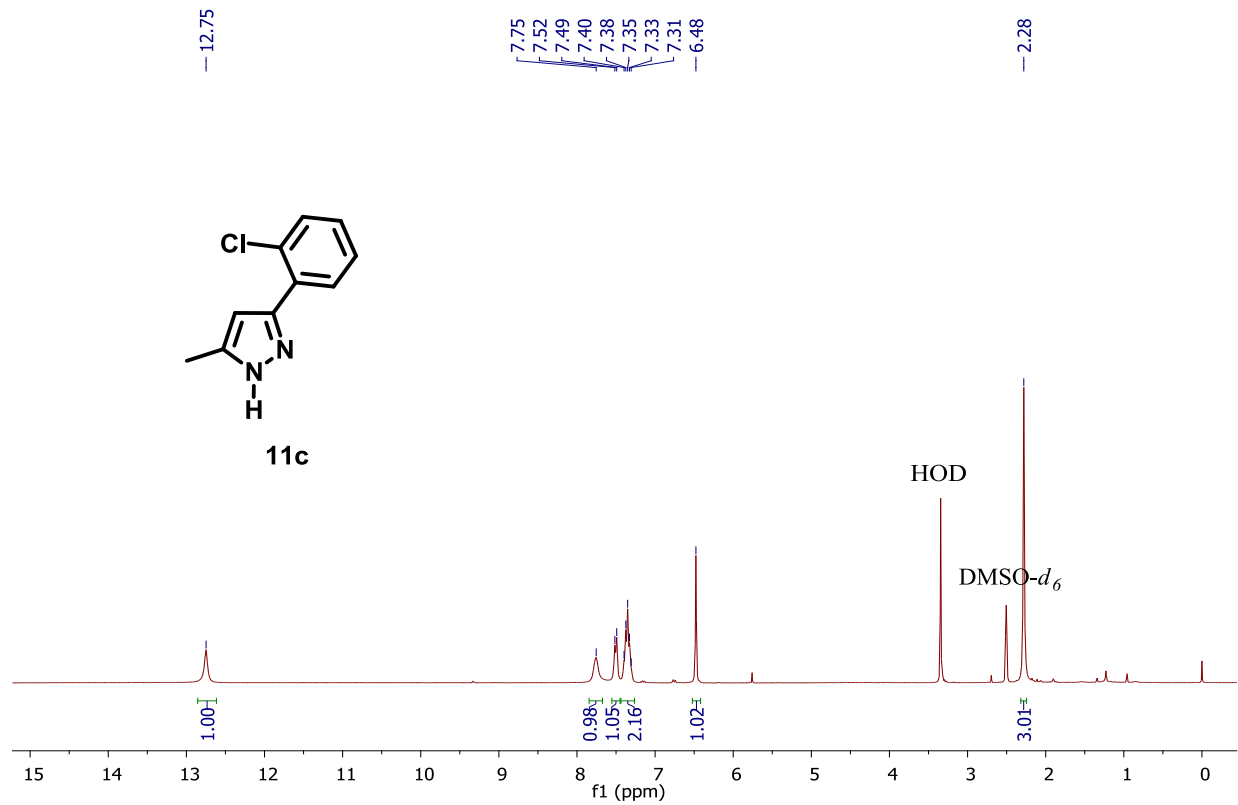


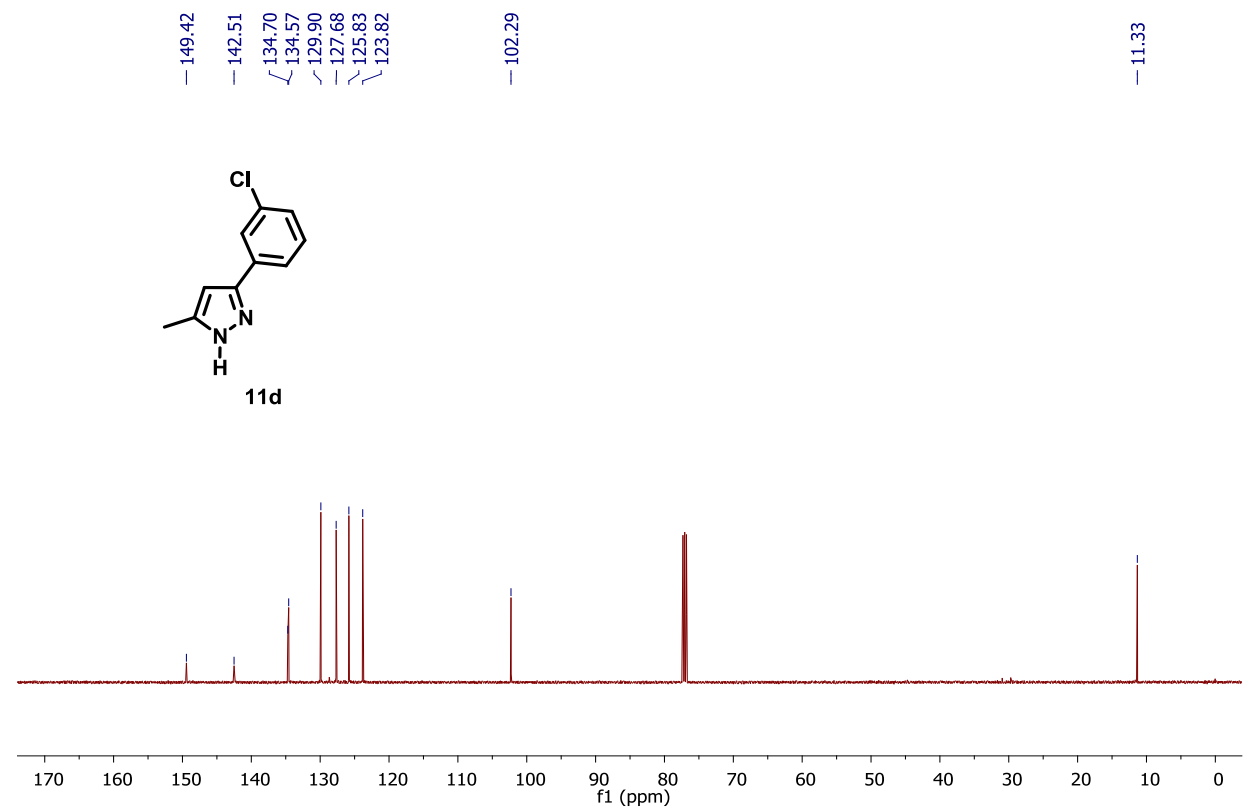
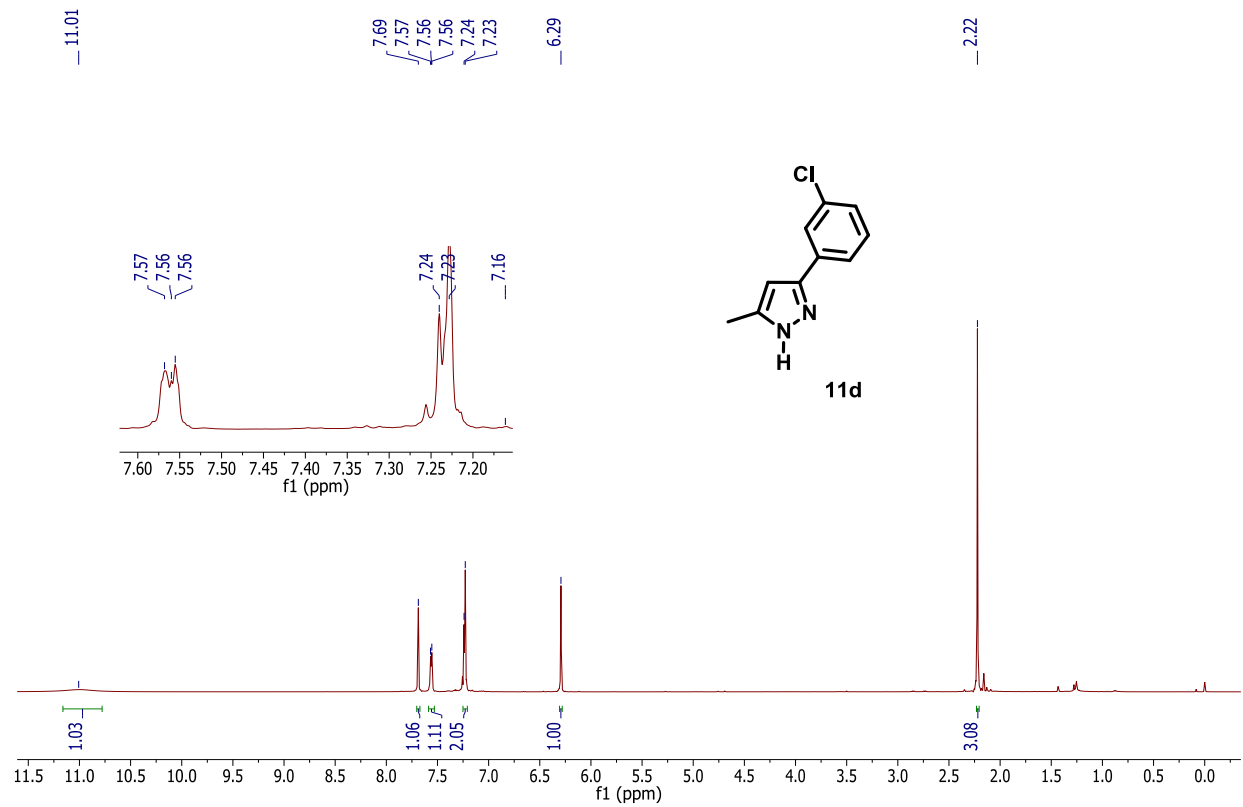


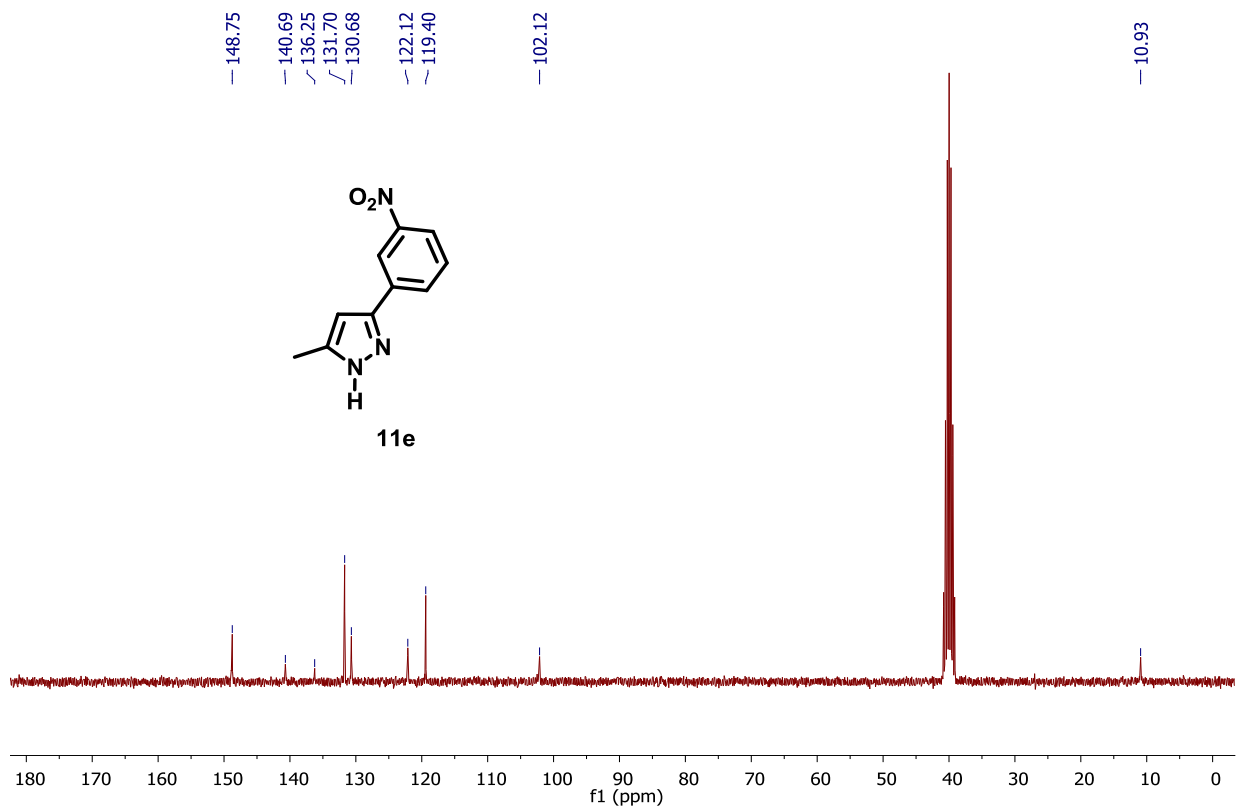
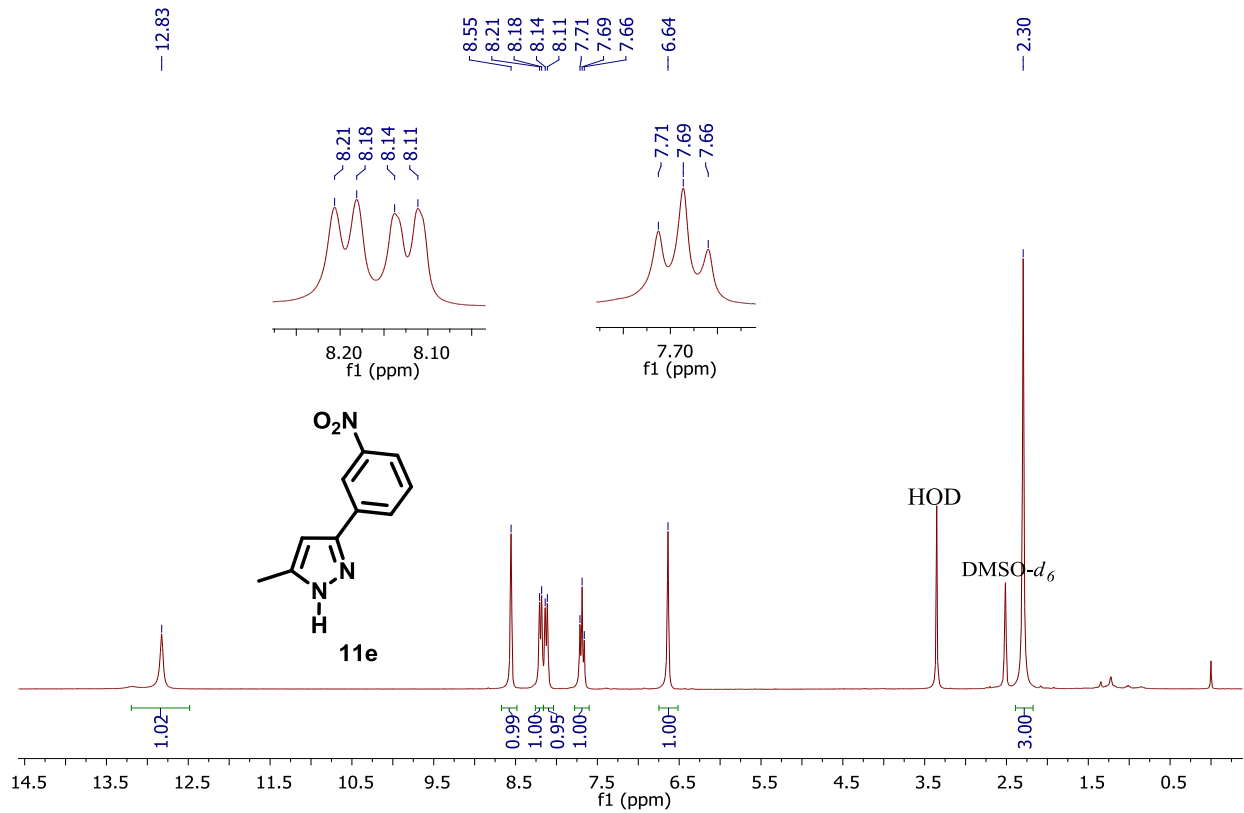
3. Copies of ^1H and ^{13}C NMR of pyrazoles **11** & **13**.

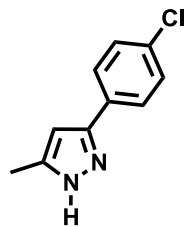




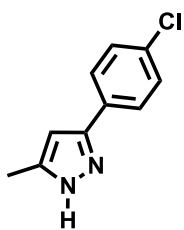
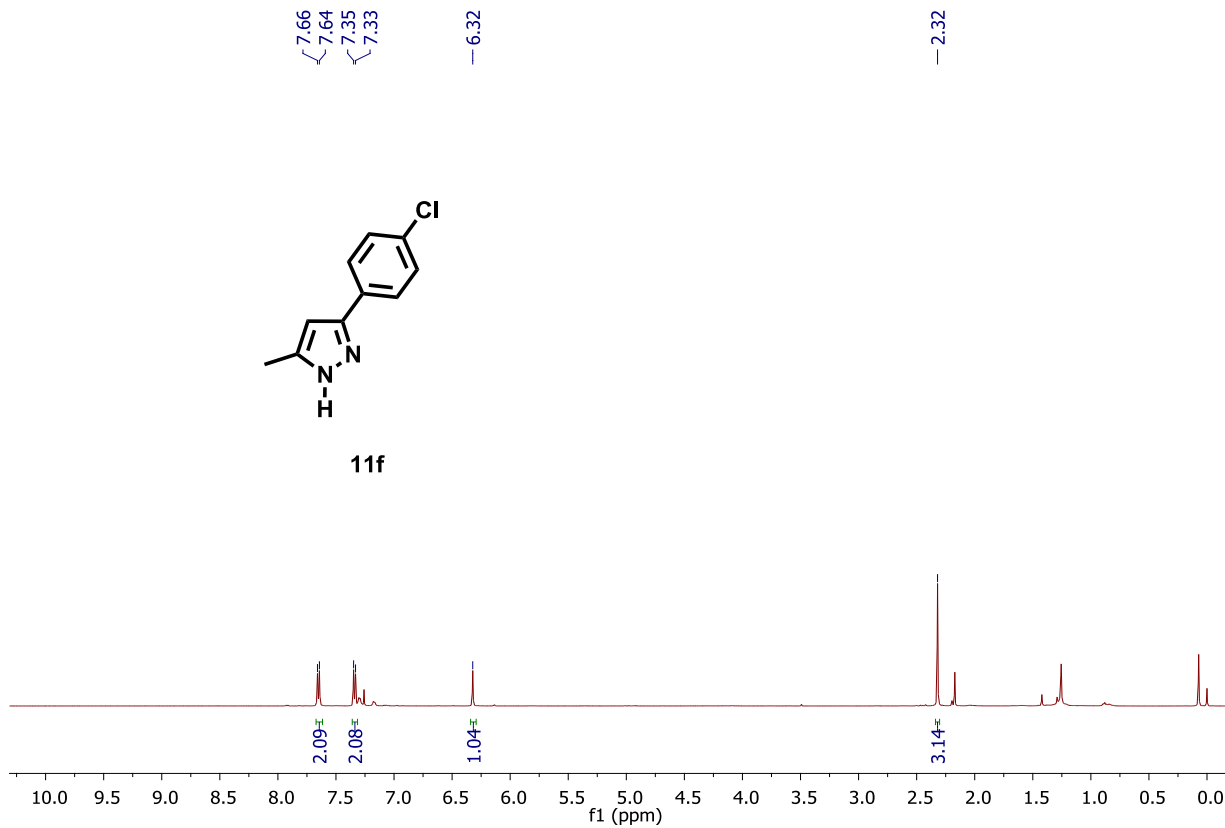




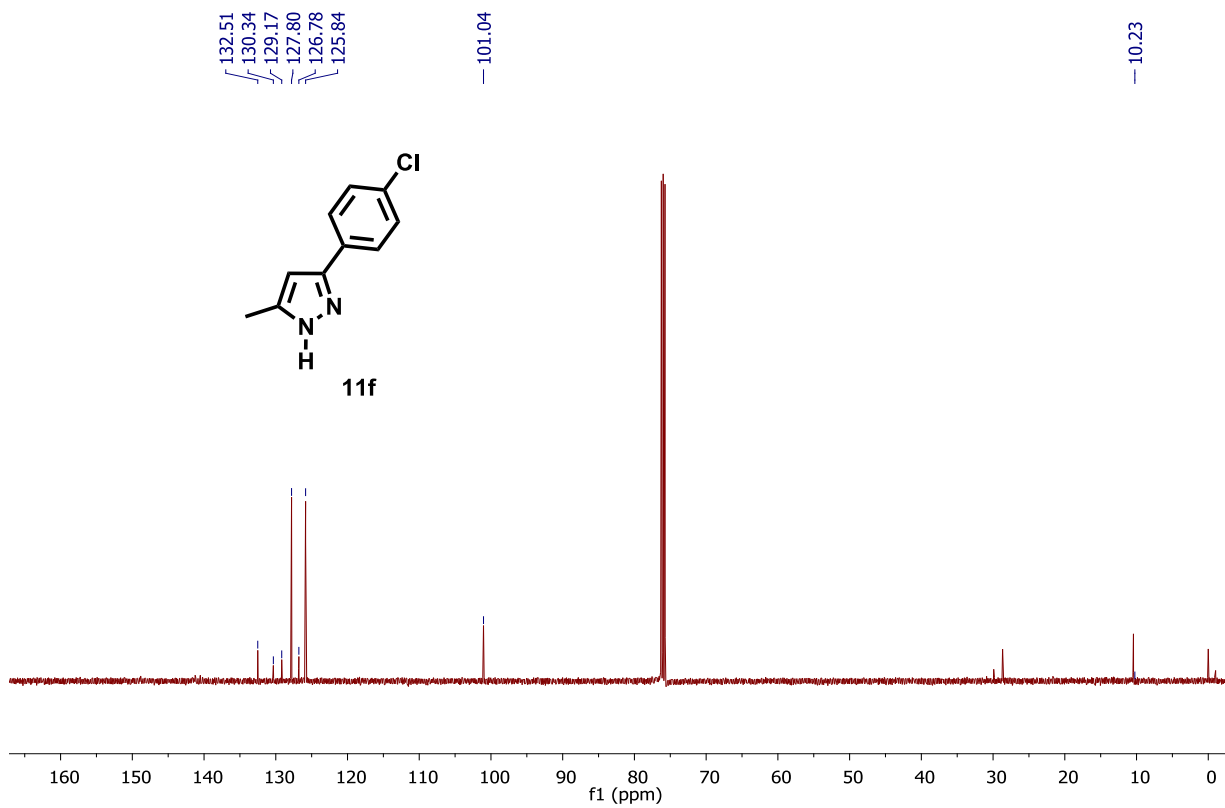


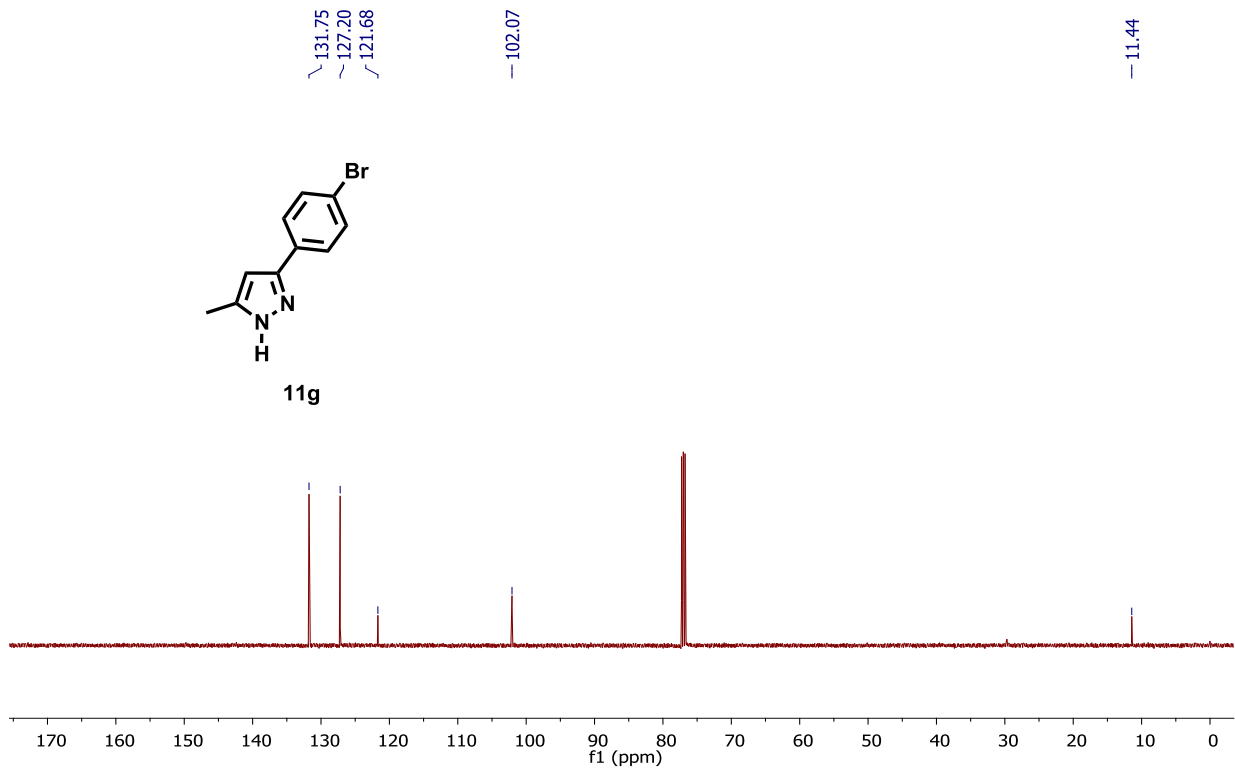
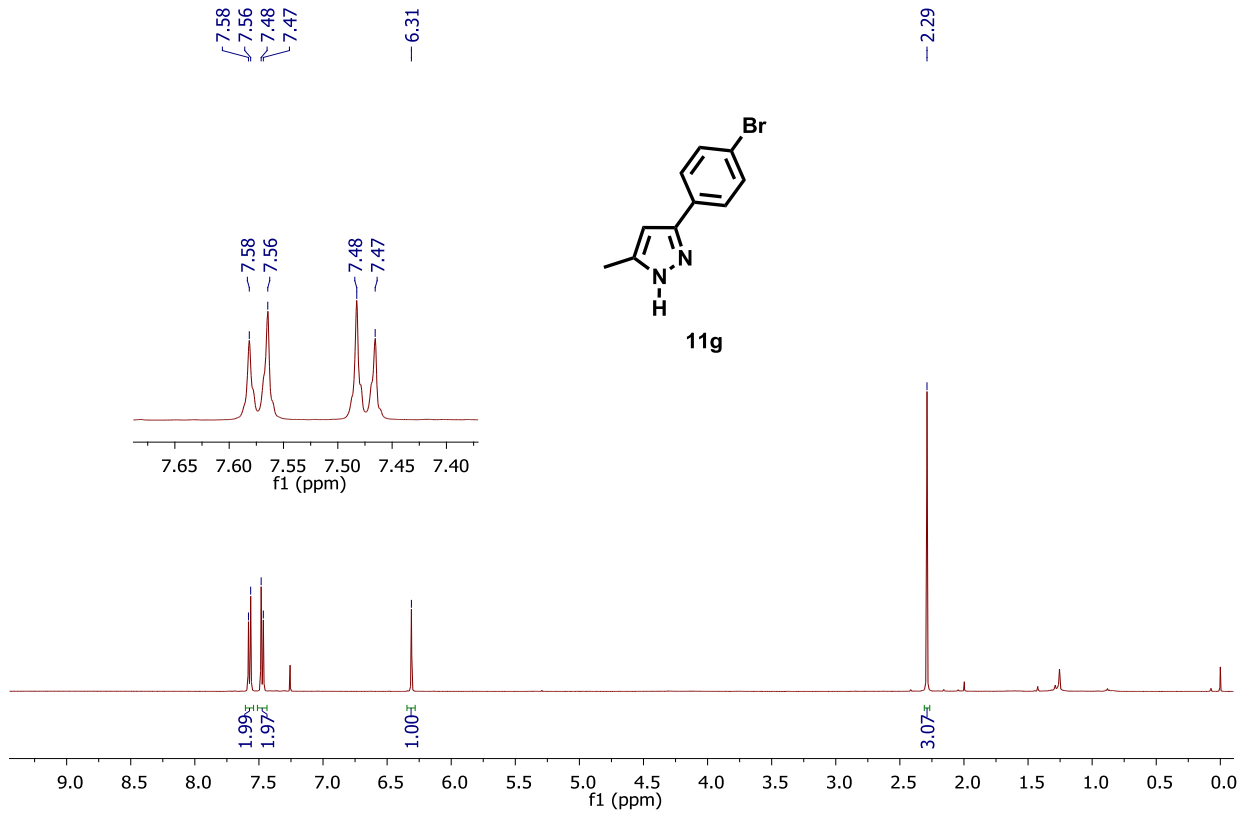


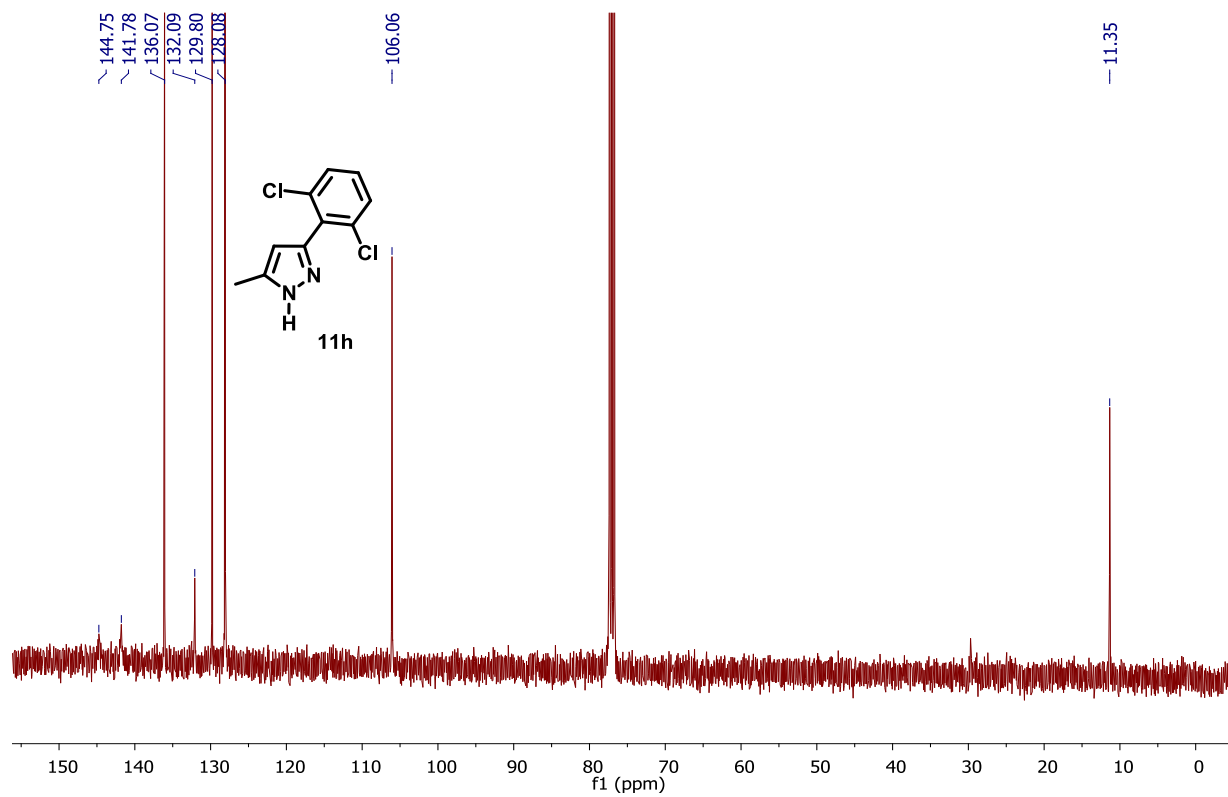
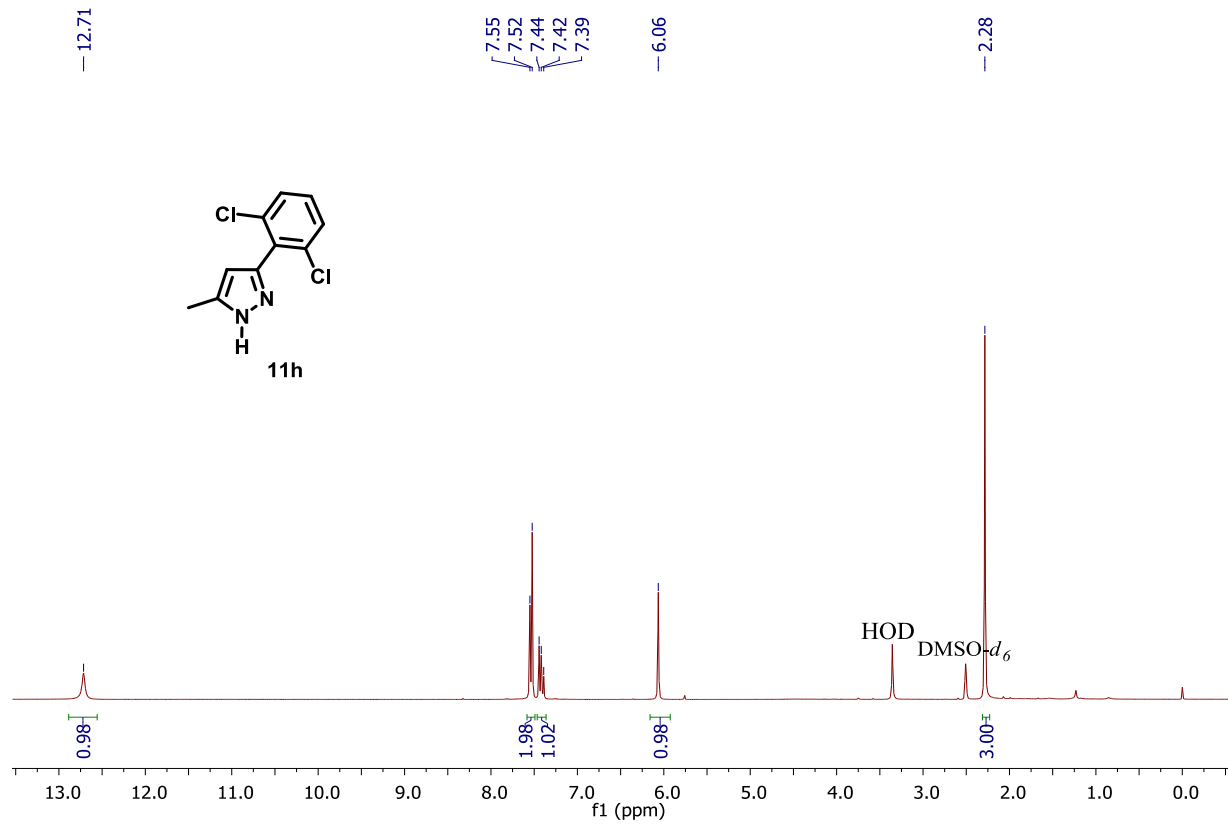
11f

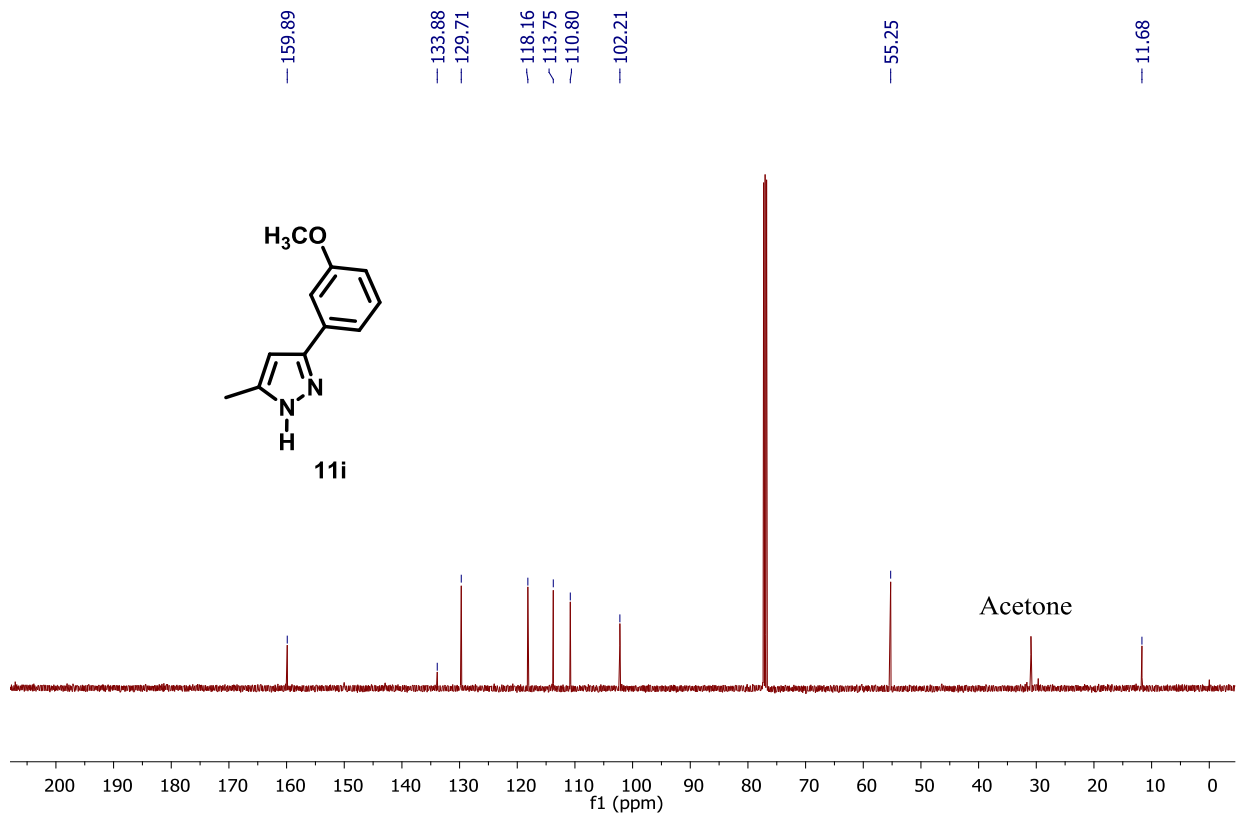
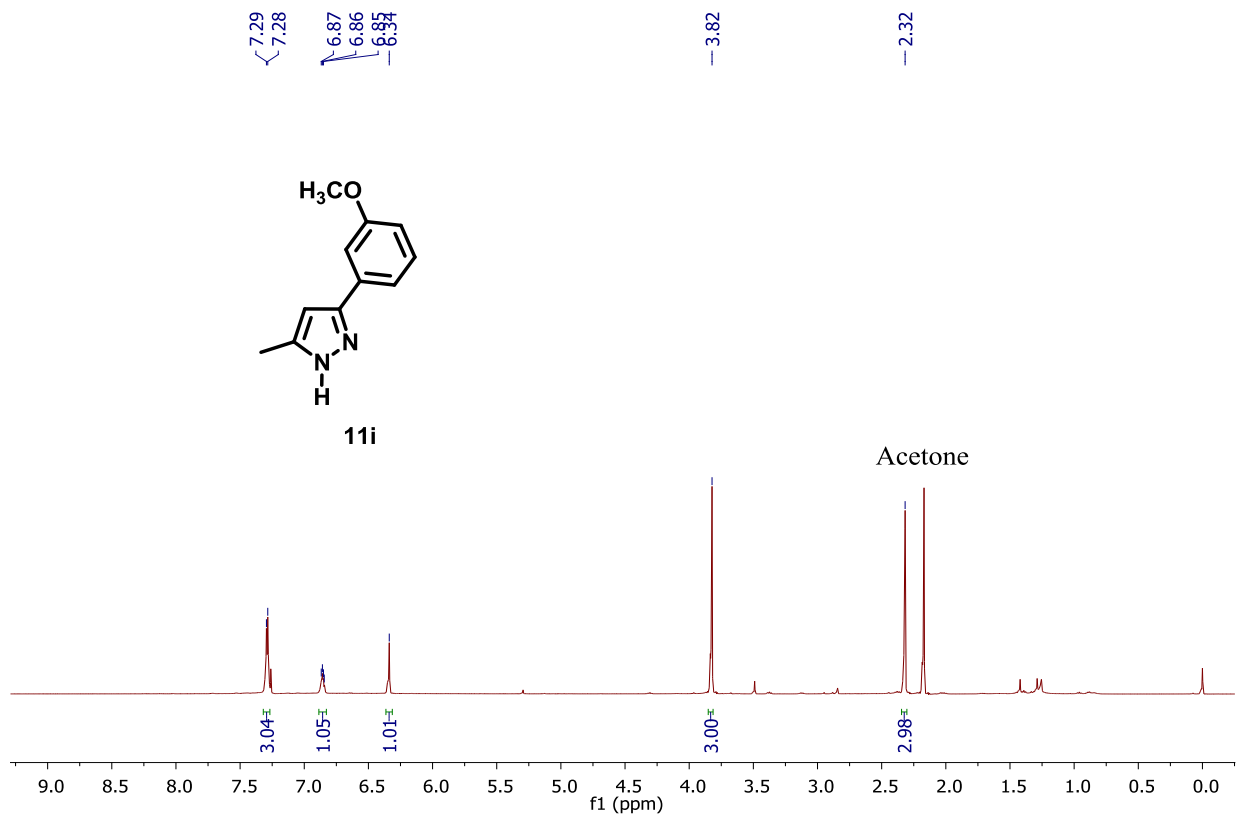


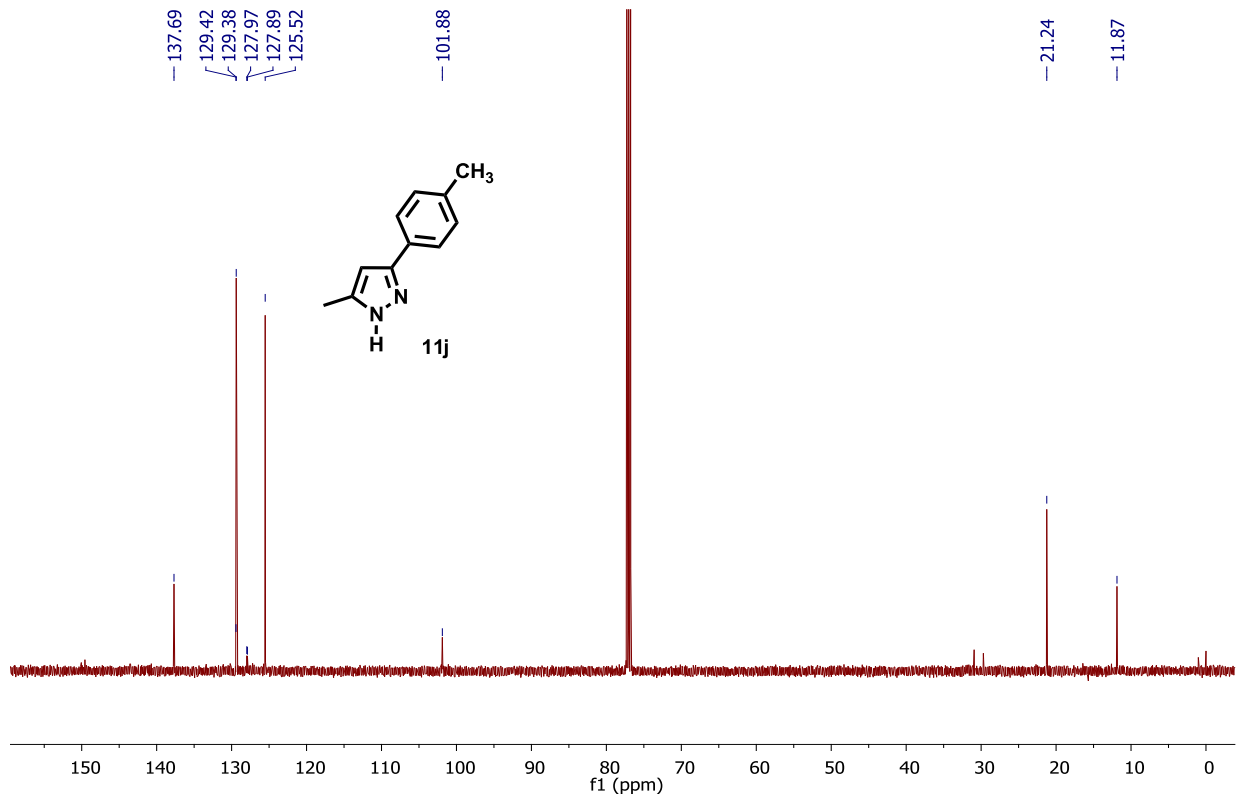
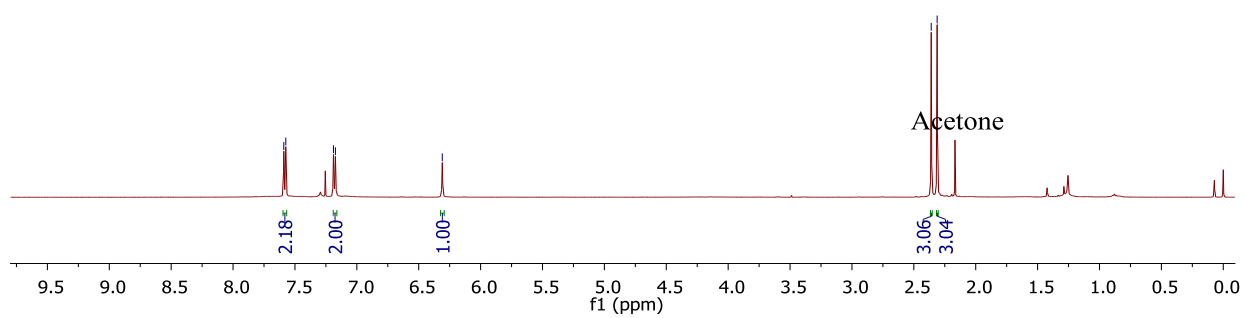
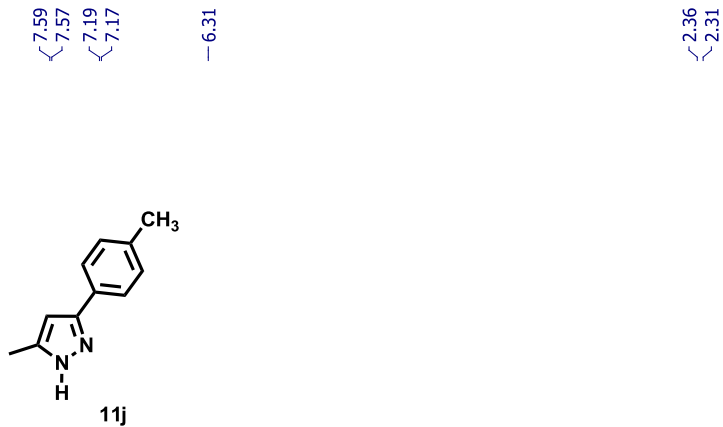
11f

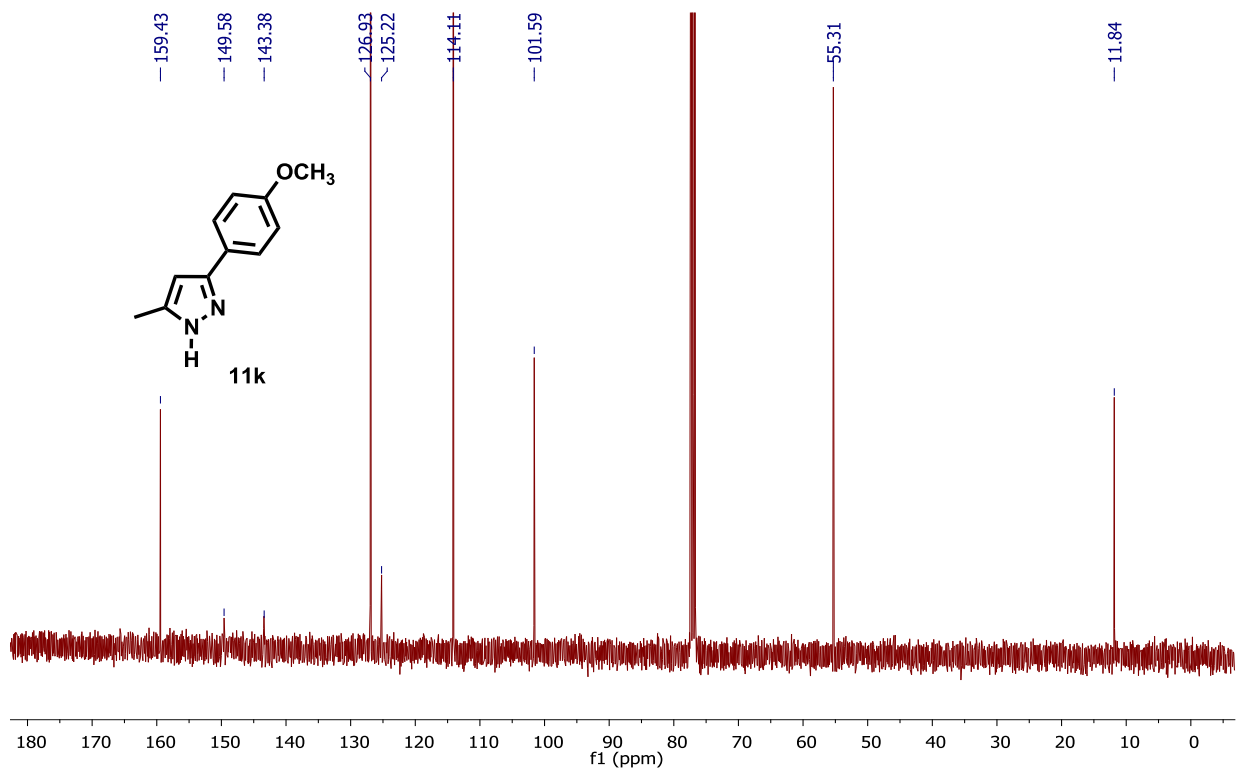
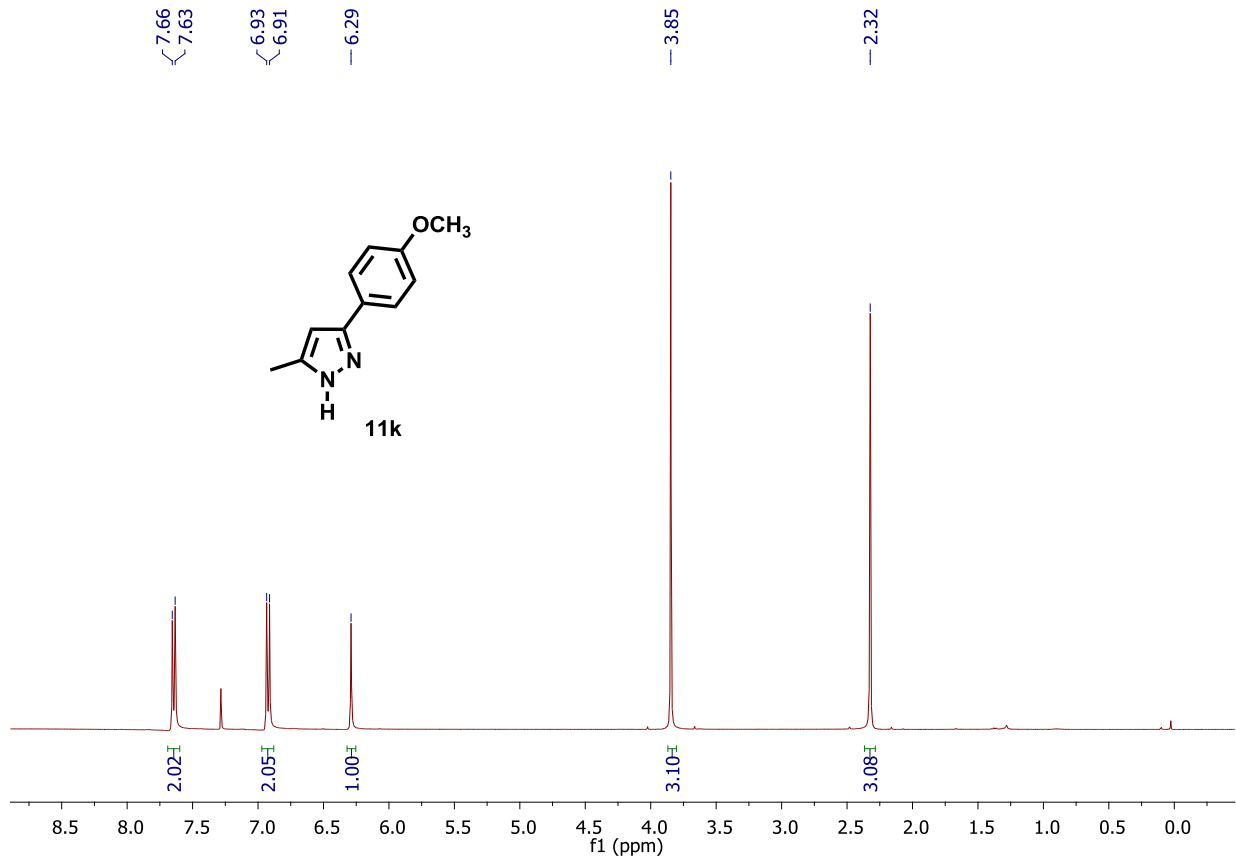


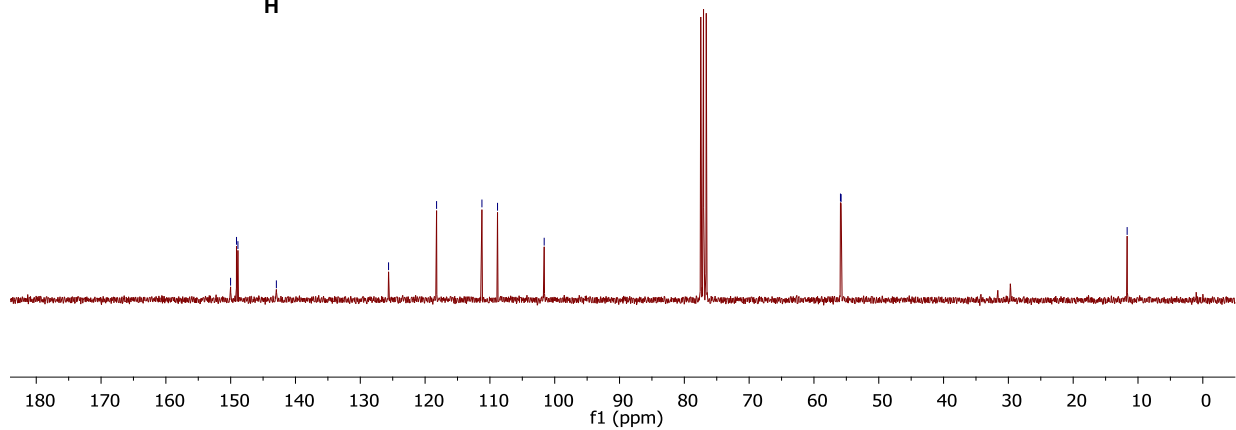
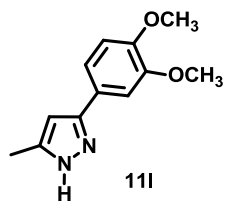
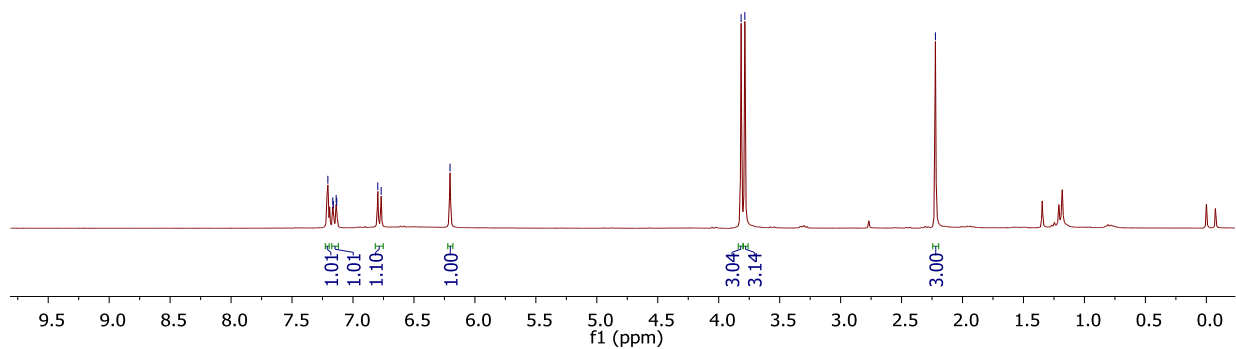
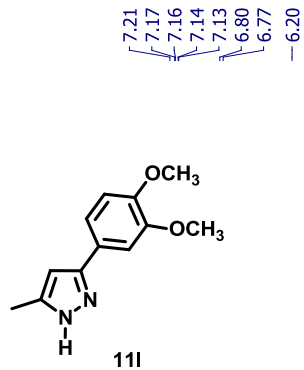


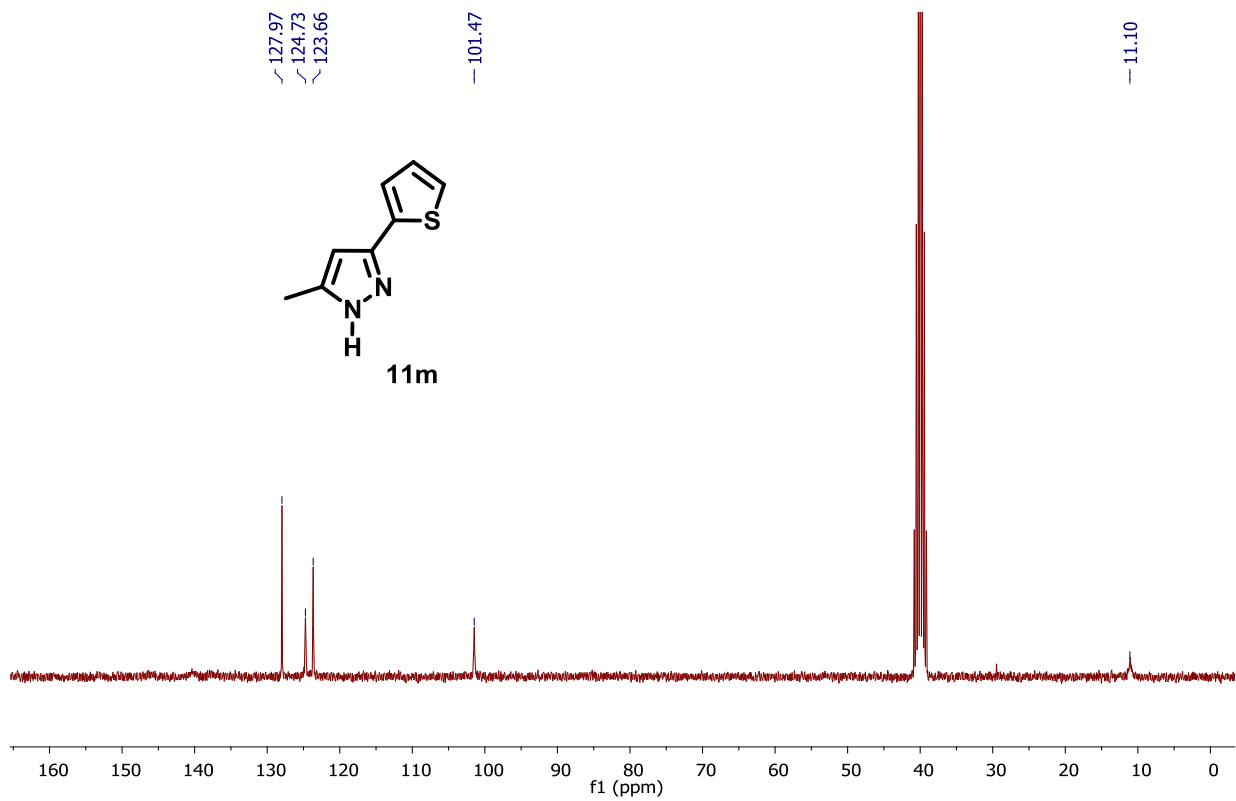
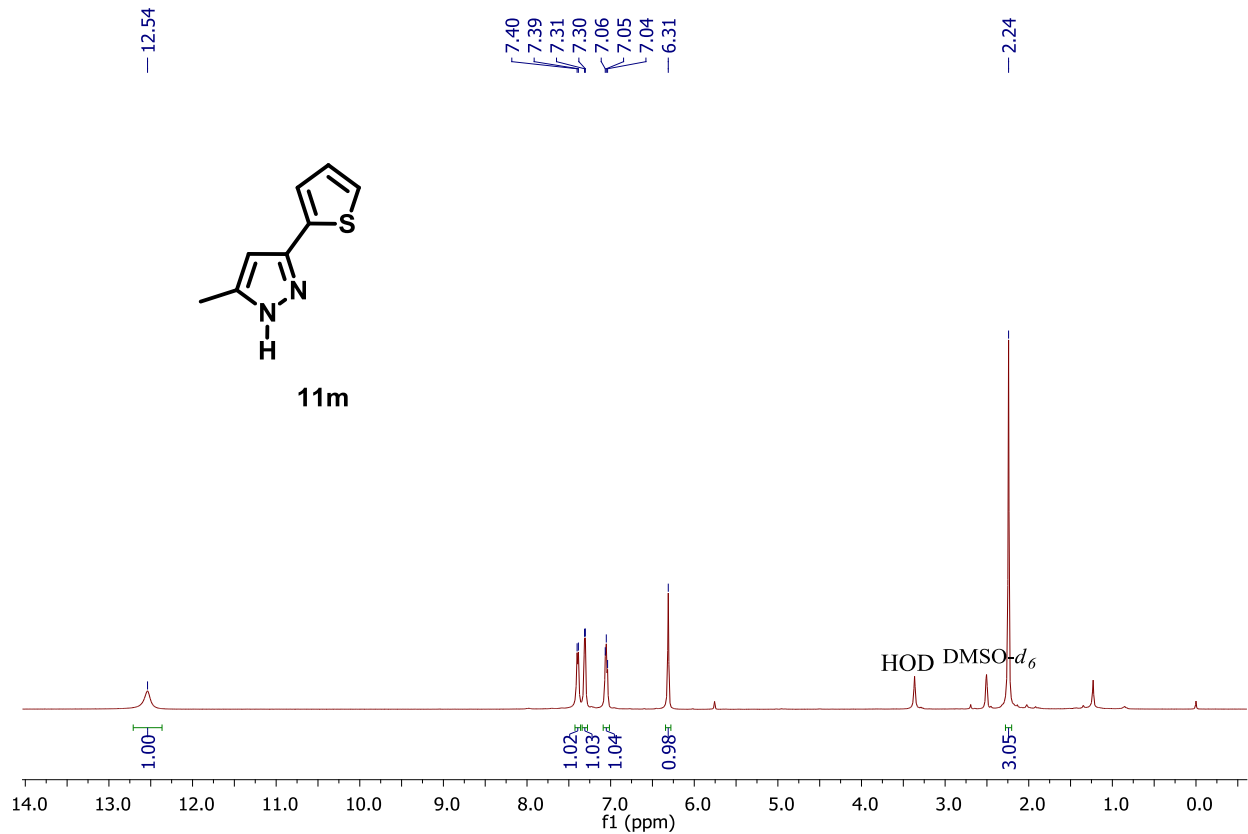


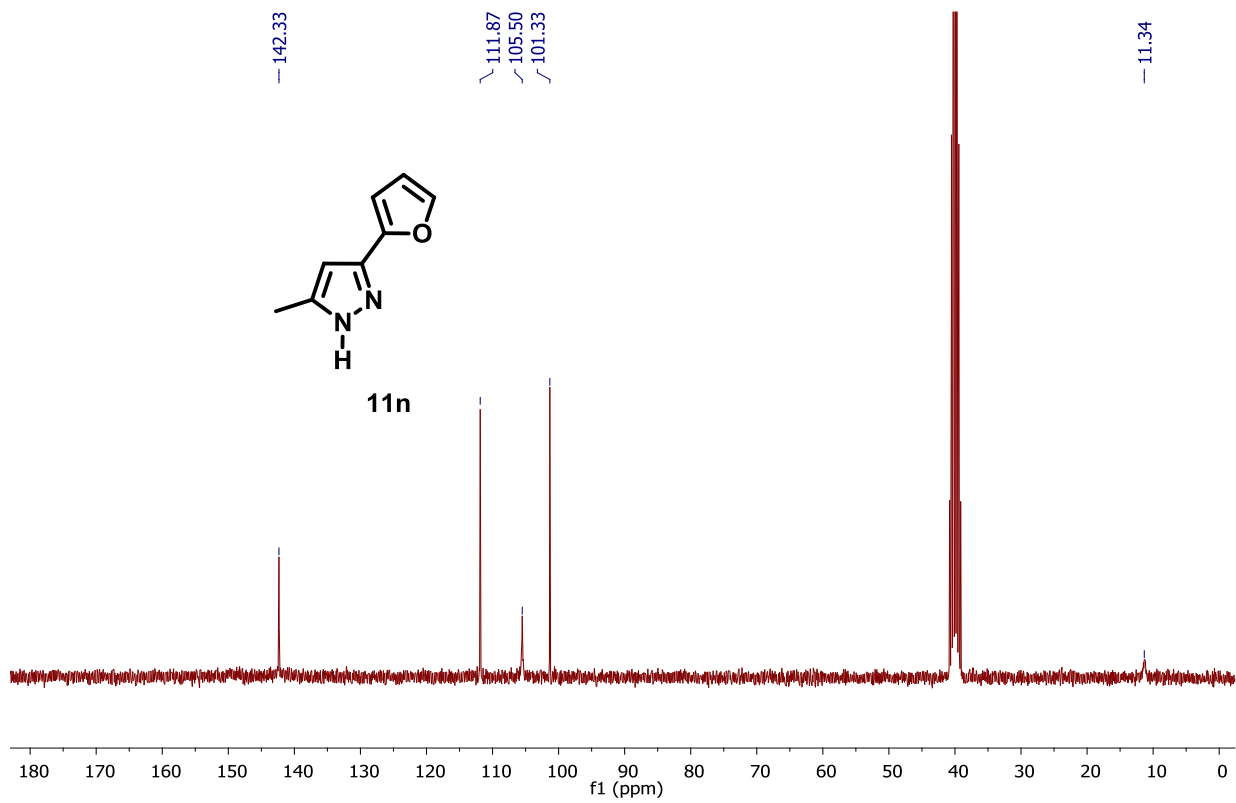
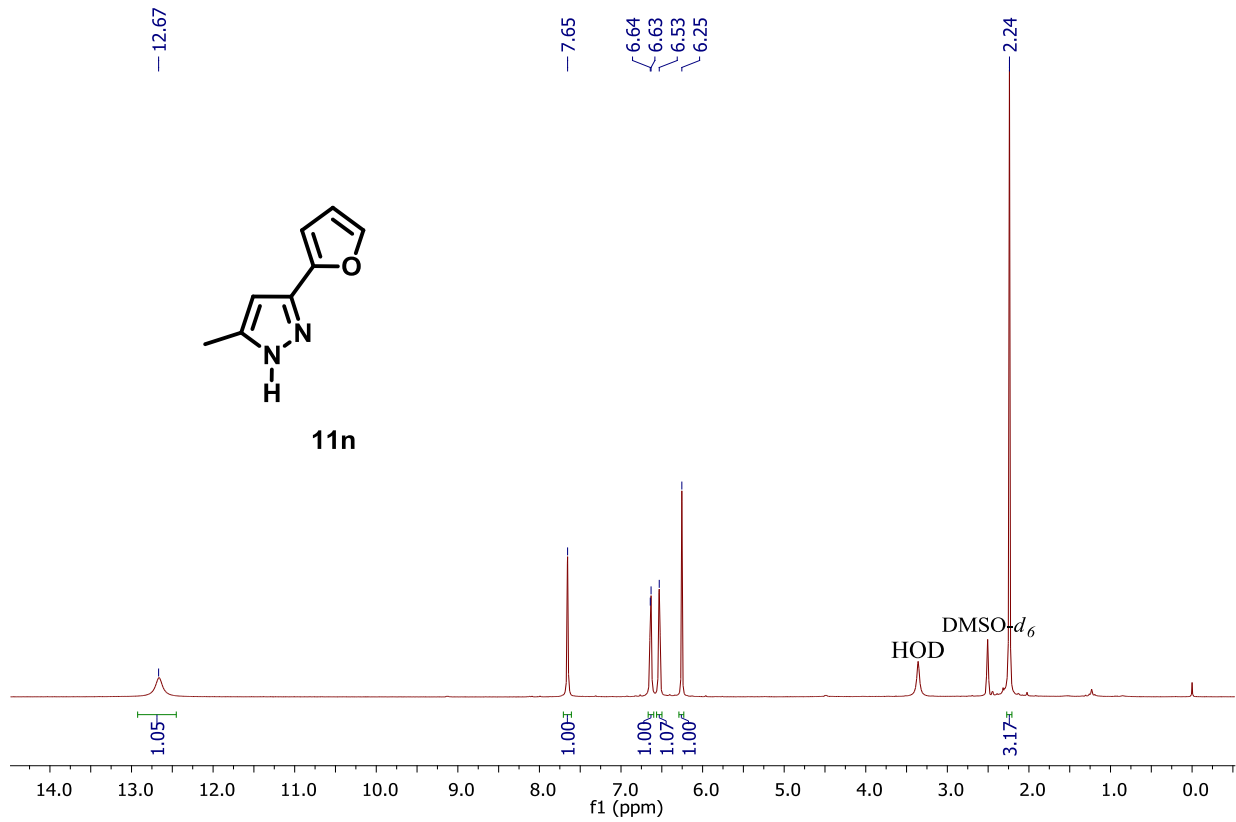






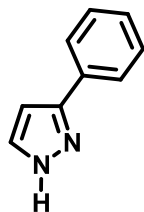




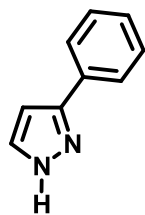
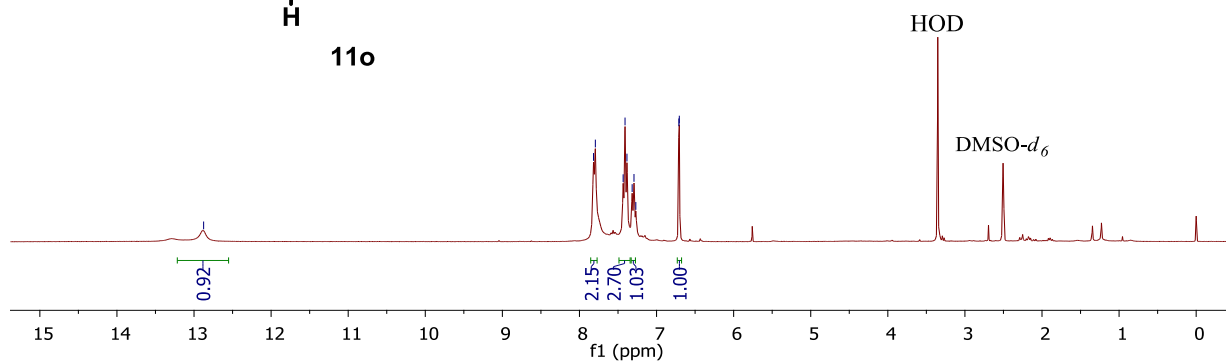


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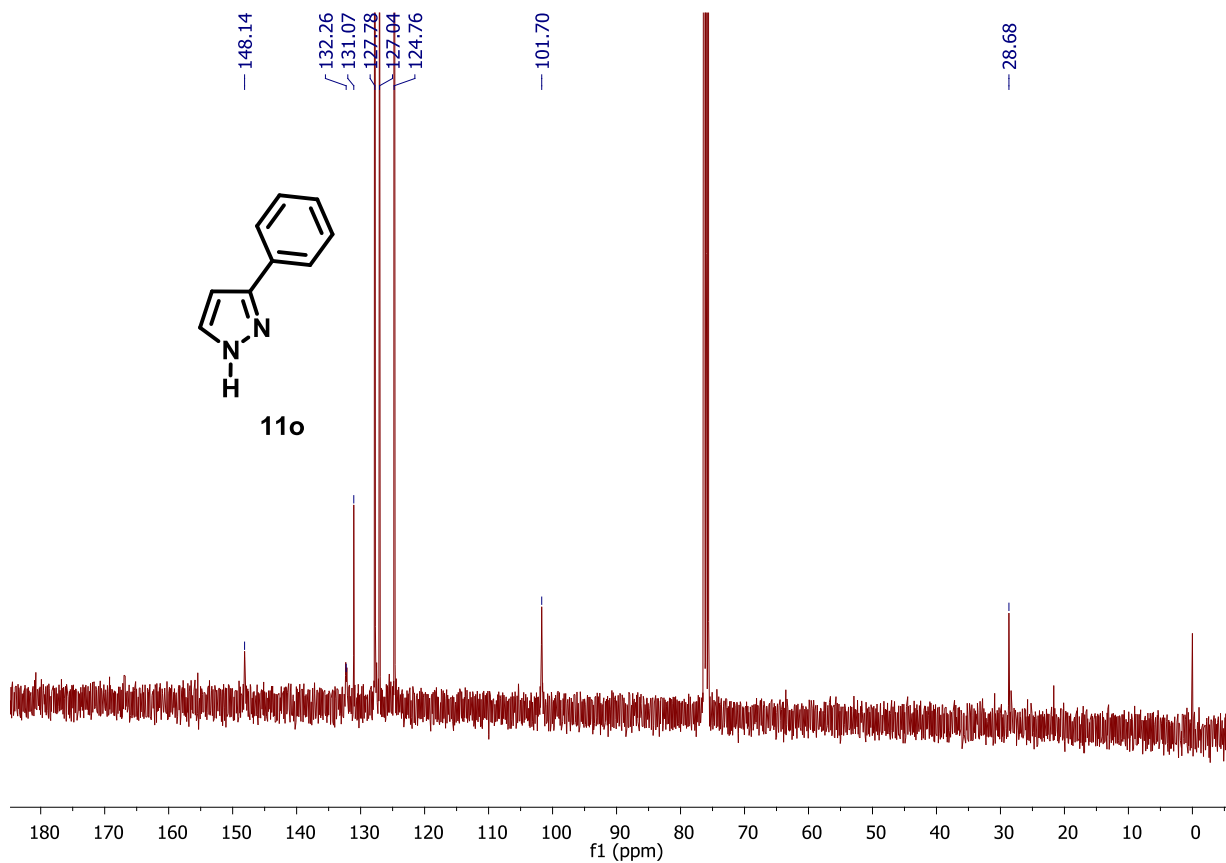
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6.70

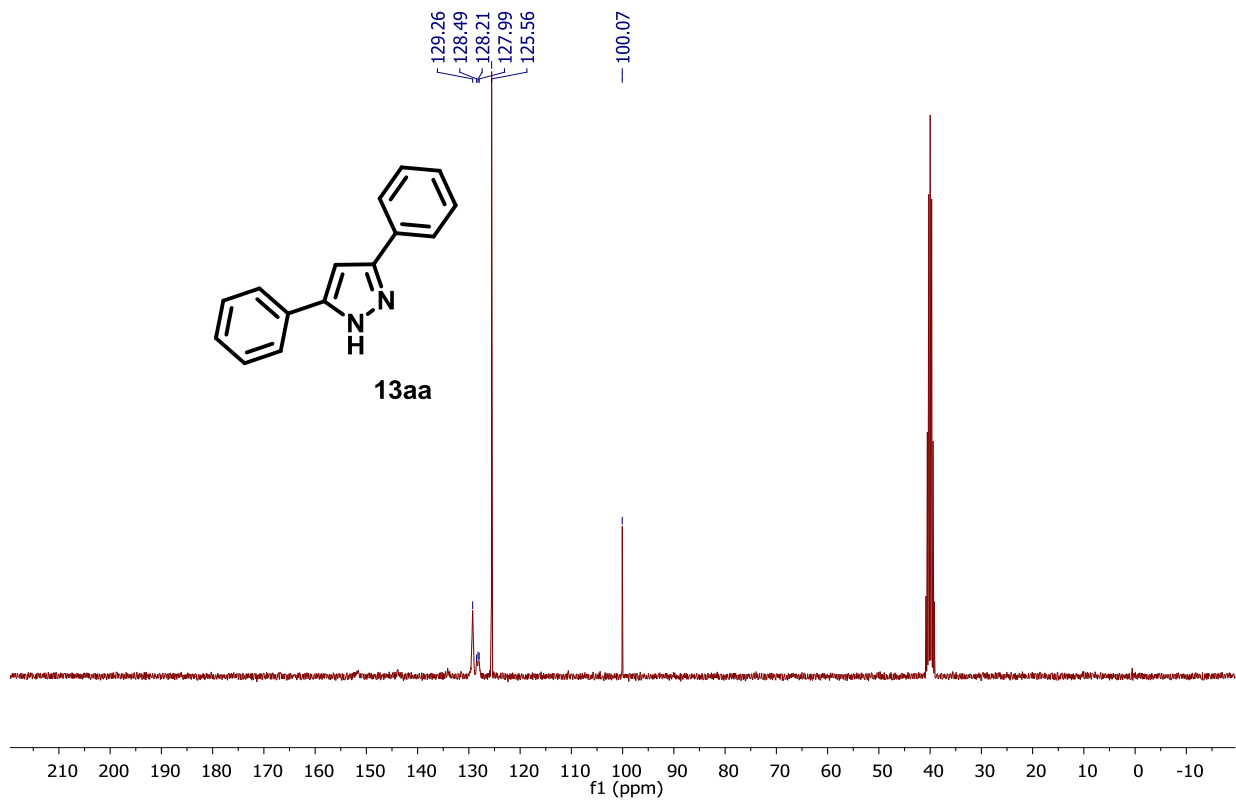
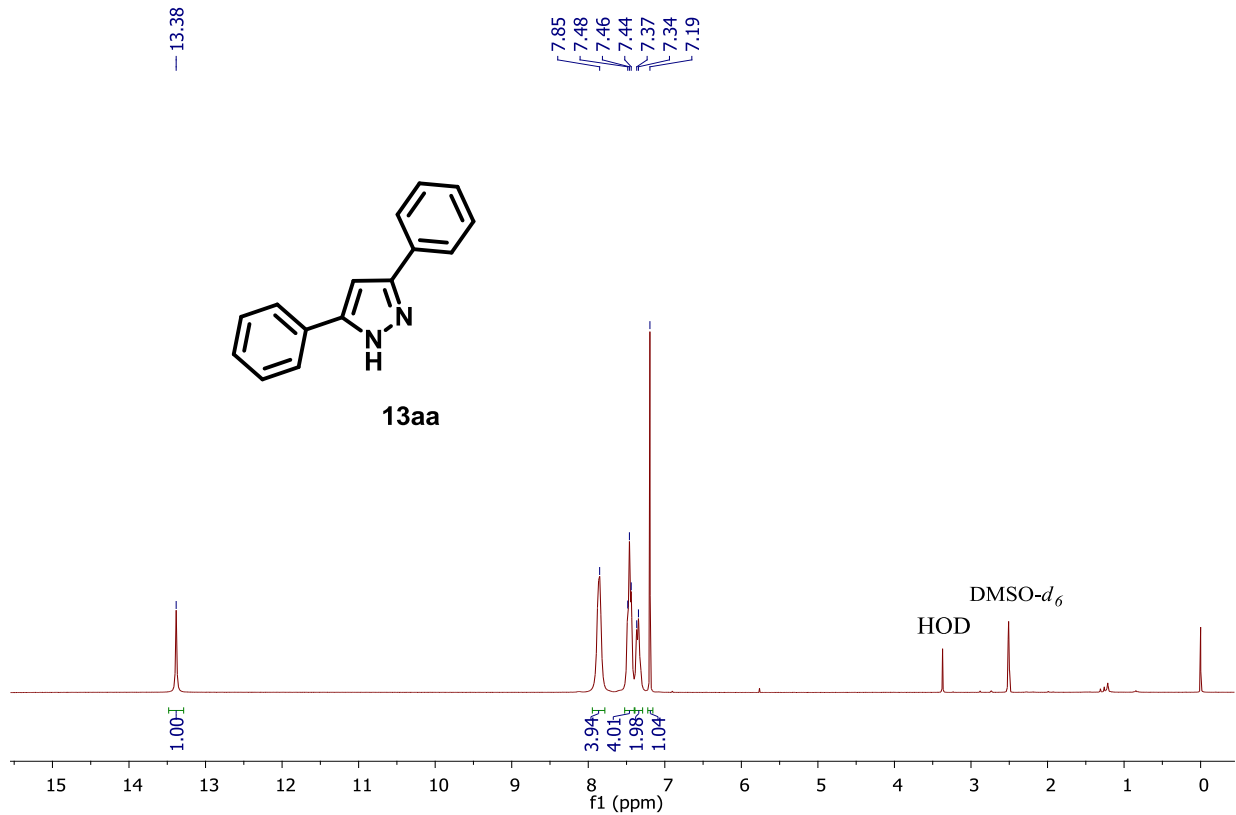


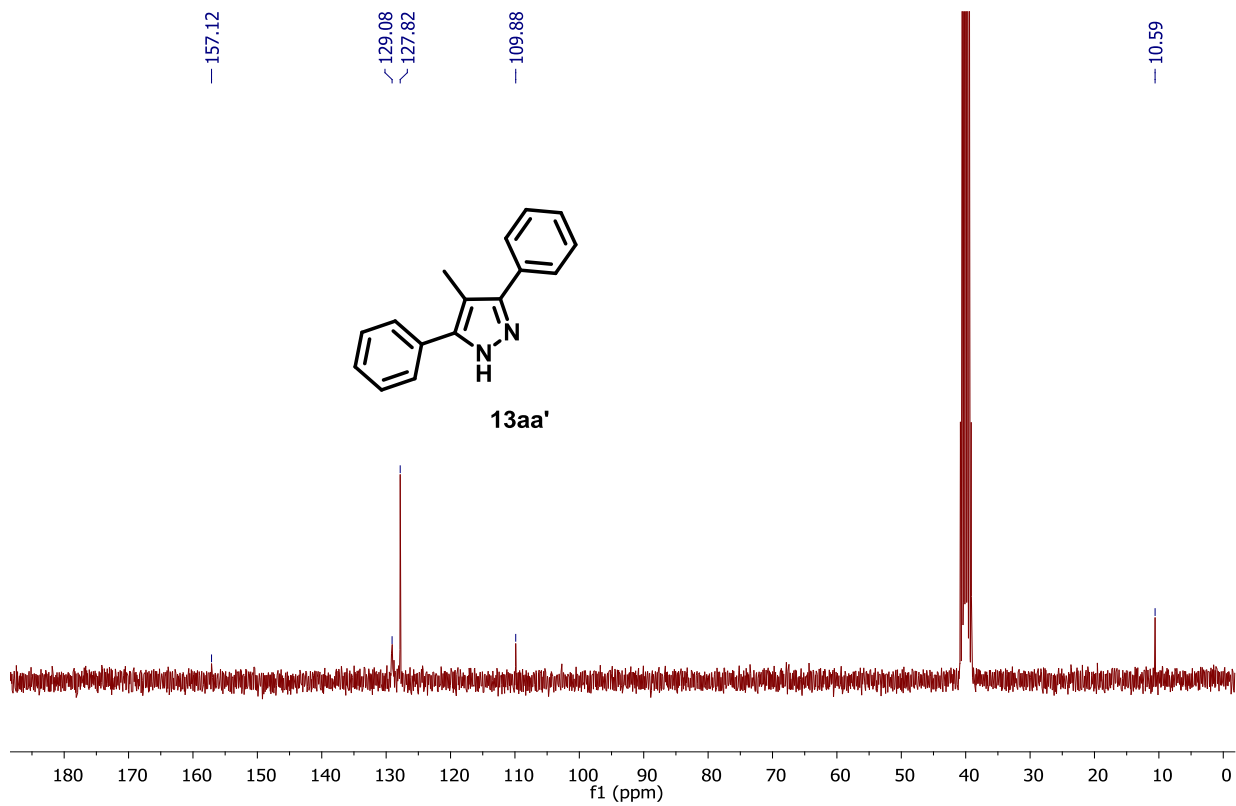
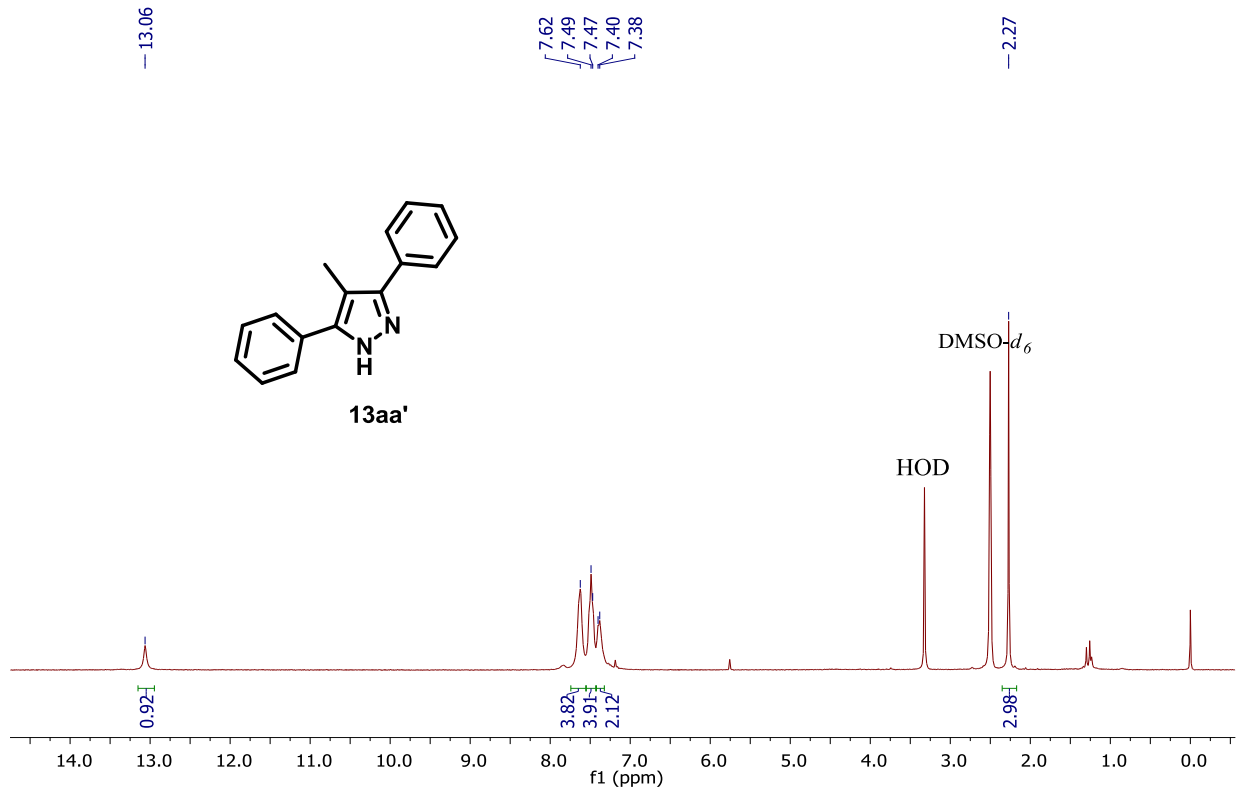
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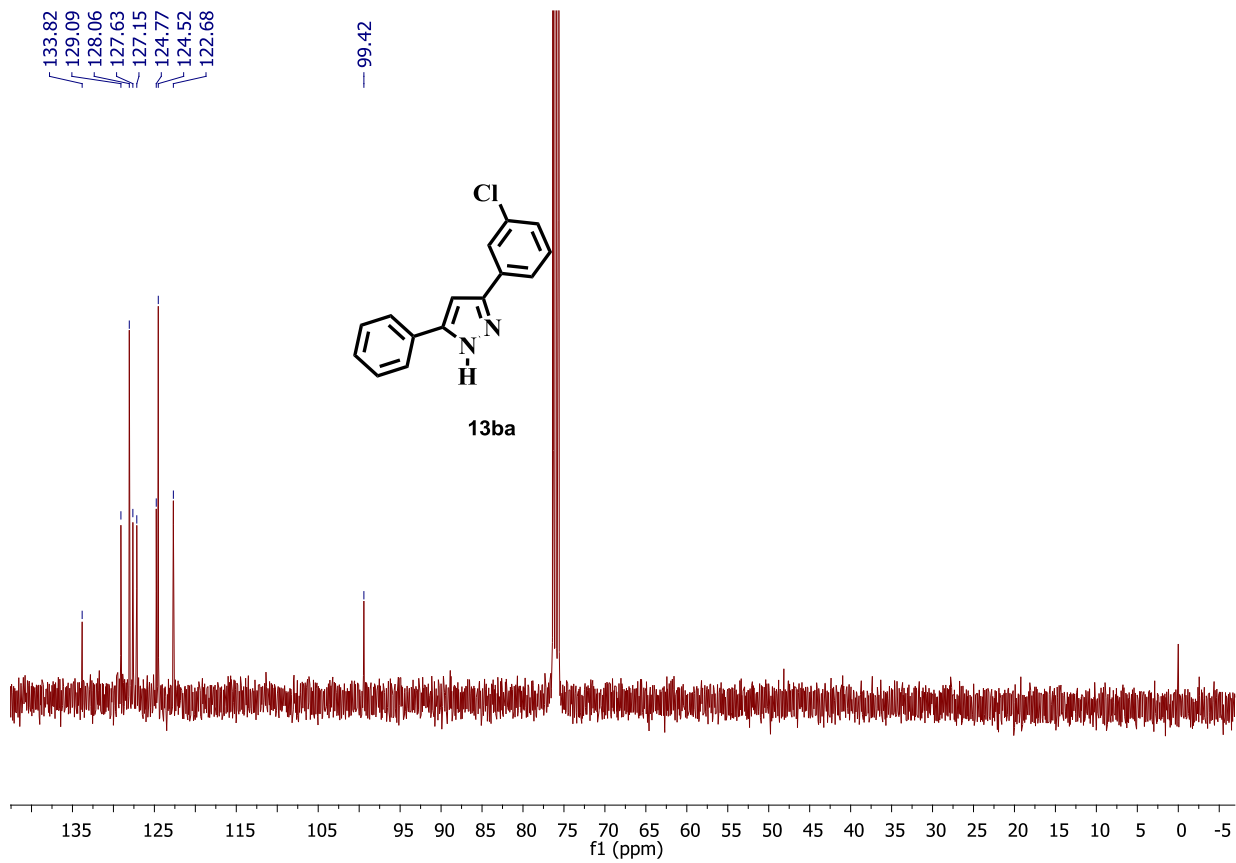
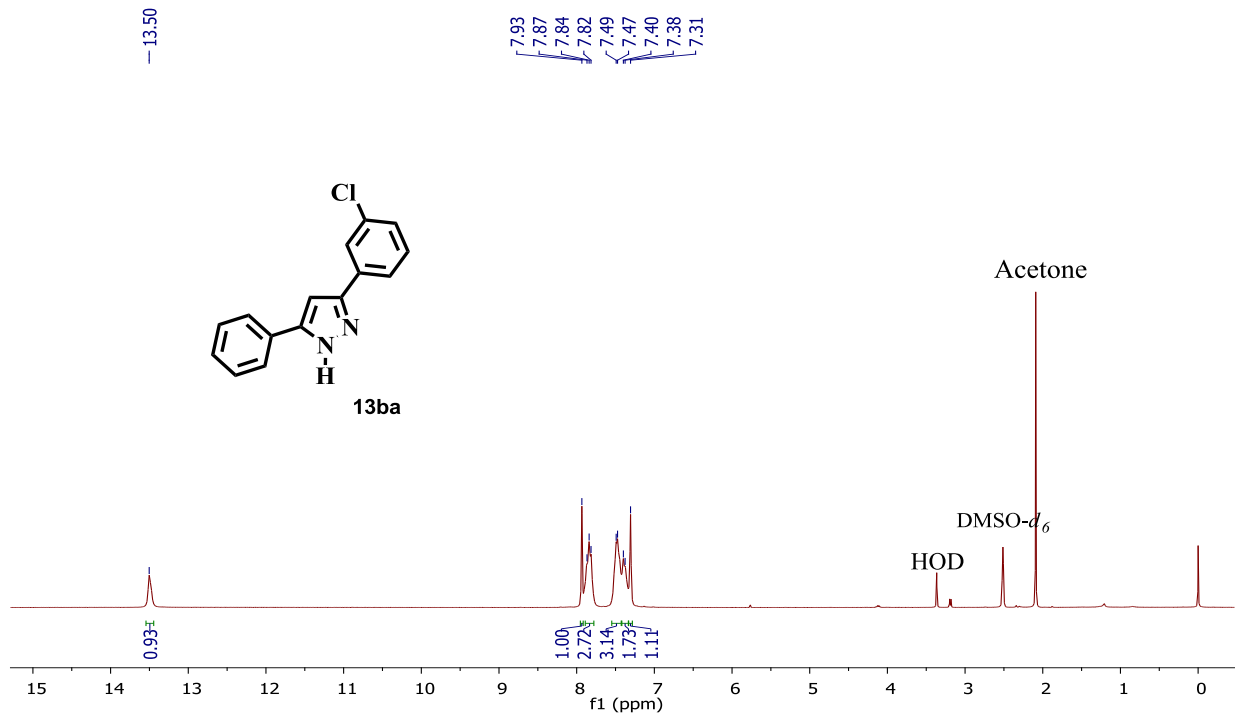


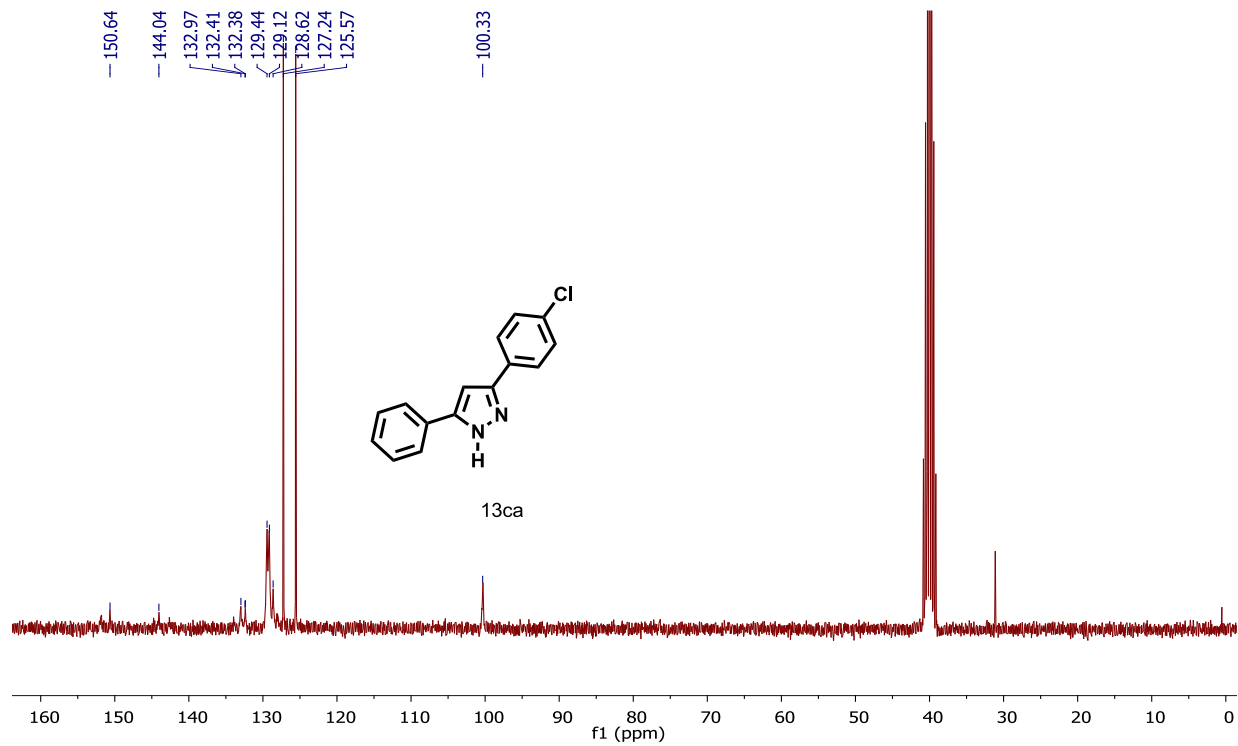
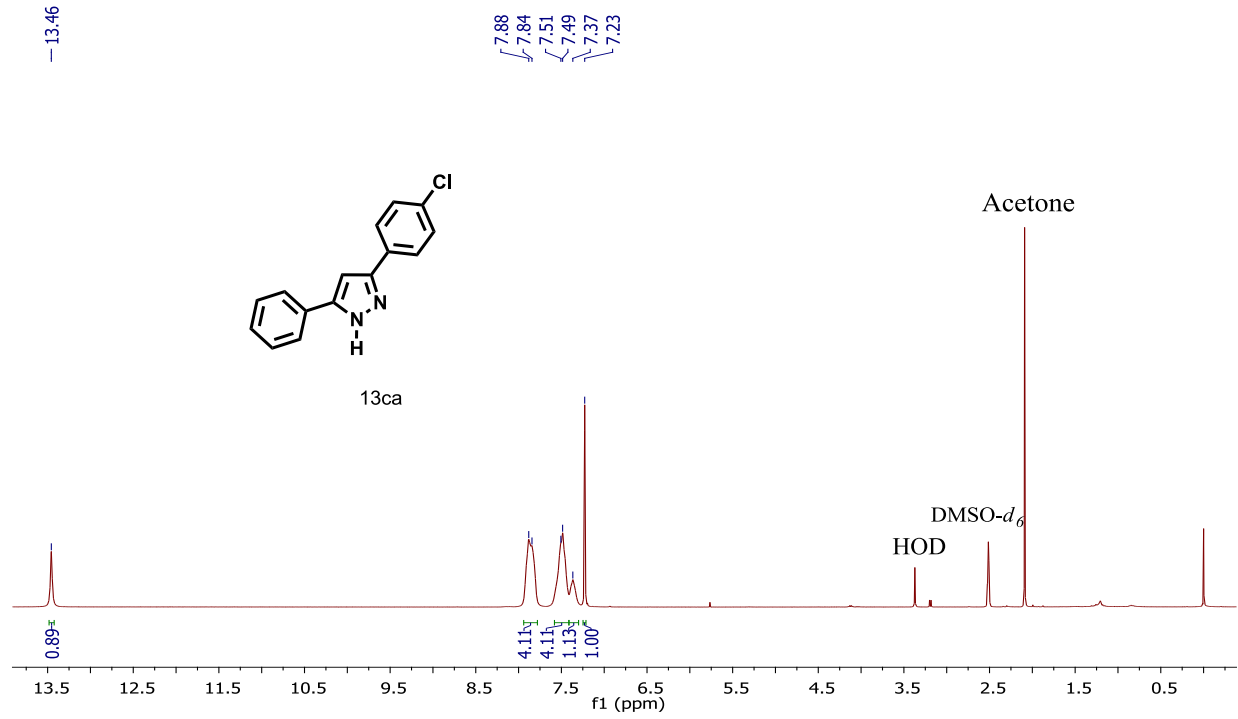
11o











-13.47

