

Supporting Information

Palladium-Catalyzed Amination of 2,3,3-Trifluoroallyl Esters: Synthesis of Trifluoromethylenamines by the Intramolecular Fluorine Shift and CF₃ Group Construction

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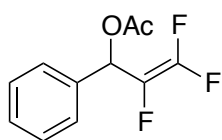
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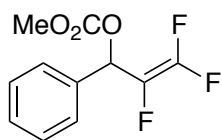
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General and Materials: All manipulations were carried out under a nitrogen atmosphere. NMR spectra were recorded on a JEOL EX-270 (270 MHz for ^1H , 67.5 MHz for ^{13}C) or JEOL JNM ECP-500 spectrometer (500 MHz for ^1H , 125 MHz for ^{13}C and 470 MHz for ^{19}F). Chemical shifts are reported in δ ppm referenced to an internal SiMe_4 standard for ^1H NMR and an internal C_6F_6 standard for ^{19}F NMR. Residual chloroform (δ 77.0 for ^{13}C) was used as internal reference for ^{13}C NMR. ^1H and ^{13}C NMR spectra were recorded in CDCl_3 at 25 $^\circ\text{C}$ unless otherwise noted. The NMR yields were determined by ^1H NMR using an internal standard (Phenanthrene or trioxane). All 2,3,3-trifluoroallyl esters **1a**, **1a'** and **1a''-k** were prepared according to the literature,¹ or by the similar reaction of corresponding allylic alcohols¹ with acetic anhydride, methyl chloroformate or Boc_2O in the presence of pyridine or using $n\text{BuLi}$. $[\text{Pd}(\text{C}_3\text{H}_5)(\text{cod})]\text{BF}_4$ and $[\text{Pd}(\text{PhC}_3\text{H}_4)(\text{cod})]\text{BF}_4$ were prepared according to the reported procedure.² All other chemicals including palladium salts, phosphine ligands and silver salts were purchased from commercial sources and used without further purification.

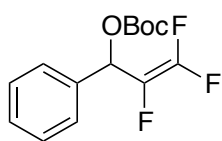
Characterization of 2,3,3-trifluoroallyl esters:



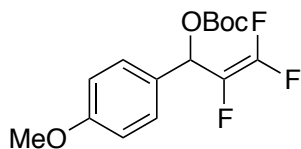
2,3,3-Trifluoro-1-phenylallyl acetate (1a**)**¹: Pale yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 2.15 (s, 3H), 6.54 (d, $J_{\text{HF}} = 25.5$ Hz, 1H), 7.33–7.41 (m, 5H). ^{13}C NMR (125 MHz, CDCl_3): δ 19.9, 68.0 (d, $J_{\text{CF}} = 20.3$ Hz), 126.5, 126.6 (ddd, $J_{\text{CF}} = 240.0, 49.2, 16.7$ Hz), 128.4, 128.6, 134.3, 153.1 (ddd, $J_{\text{CF}} = 291.5, 280.7, 44.3$ Hz), 169.0. ^{19}F NMR (470 MHz, CDCl_3): δ -23.54 (ddd, $J_{\text{FF}} = 115.7, 33.4$ Hz, $J_{\text{FH}} = 25.8$ Hz, 1F), 45.76 (dd, $J_{\text{FF}} = 115.7, 69.7$ Hz, 1F), 61.16 (dd, $J_{\text{FF}} = 69.7, 33.4$ Hz, 1F).



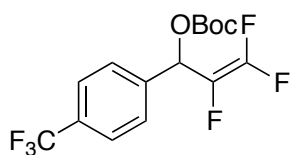
Methyl (2,3,3-trifluoro-1-phenylallyl) carbonate (1a'**)**: Pale yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 3.84 (s, 3H), 6.37 (d, $J_{\text{HF}} = 26.0$ Hz, 1H), 7.39–7.44 (m, 5H). ^{13}C NMR (125 MHz, CDCl_3): δ 55.0, 71.9 (d, $J_{\text{CF}} = 20.3$ Hz), 126.0 (ddd, $J_{\text{CF}} = 241.2, 49.2, 16.9$ Hz), 126.7, 128.6, 129.0, 133.6, 153.2 (ddd, $J_{\text{CF}} = 292.6, 281.9, 44.4$ Hz), 154.5. ^{19}F NMR (470 MHz, CDCl_3): δ -24.23 (ddd, $J_{\text{FF}} = 115.8, 32.9$ Hz, $J_{\text{FH}} = 25.9$ Hz, 1F), 46.45 (dd, $J_{\text{FF}} = 115.8, 67.7$ Hz, 1F), 62.14 (dd, $J_{\text{FF}} = 67.7, 32.9$ Hz, 1F). IR (KBr) 3035, 2961, 2361, 1790, 1756, 1443, 1314, 1265, 1087, 949, 838, 698 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{11}\text{H}_{10}\text{F}_3\text{O}_3$: 247.05820, found: 247.05835.



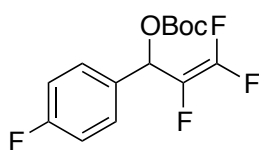
tert-Butyl (2,3,3-trifluoro-1-phenylallyl) carbonate (1a''): Pale yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 1.55 (s, 9H), 6.31(d, $J_{\text{HF}} = 25.5$ Hz, 1H), 7.37–7.44 (m, 5H). ^{13}C NMR (125 MHz, CDCl_3): δ 27.4, 70.9 (d, $J_{\text{CF}} = 20.3$ Hz), 83.0, 126.4 (ddd, $J_{\text{CF}} = 241.1$, 49.1, 16.7 Hz), 126.5, 128.5, 128.7, 134.1, 152.1, 153.1 (ddd, $J_{\text{CF}} = 291.5$, 279.4, 43.1 Hz). ^{19}F NMR (470 MHz, CDCl_3): δ -23.80 (ddd, $J_{\text{FF}} = 115.8$, 33.4, $J_{\text{FH}} = 25.9$ Hz, 1F), 45.6 (dd, $J_{\text{FF}} = 115.8$, 69.6 Hz, 1F), 61.3 (dd, $J_{\text{FF}} = 69.6$, 33.4 Hz, 1F). IR (KBr) 2981, 1789, 1746, 1455, 1370, 1312, 1274, 1162, 1089, 878, 753, 696 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{Na}]^+$ $\text{C}_{14}\text{H}_{15}\text{F}_3\text{NaO}_3$: 311.08710, found: 311.08555.



tert-Butyl (2,3,3-trifluoro-1-(4-methoxyphenyl)allyl) carbonate (1b): Pale yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 1.49 (s, 9H), 3.81 (s, 3H), 6.25 (d, $J_{\text{HF}} = 25.0$ Hz, 1H), 6.91 (d, $J = 9.0$ Hz, 2H), 7.36 (d, $J = 9.0$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 27.2, 54.7, 70.6 (d, $J_{\text{CF}} = 20.3$ Hz), 82.8, 113.8, 126.1, 126.6 (ddd, $J_{\text{CF}} = 239.8$, 49.2, 15.5 Hz), 128.0, 152.1, 153.0 (ddd, $J_{\text{CF}} = 291.5$, 280.7, 44.4 Hz), 160.0. ^{19}F NMR (470 MHz, CDCl_3): δ -24.13 (ddd, $J_{\text{FF}} = 115.5$, 32.9, $J_{\text{FH}} = 25.4$ Hz, 1F), 45.30 (dd, $J_{\text{FF}} = 111.5$, 67.8 Hz, 1F), 60.93 (dd, $J_{\text{FF}} = 67.8$, 32.9 Hz, 1F). IR (KBr) 2983, 1787, 1605, 1513, 1372, 1257, 1177, 1088, 873, 832 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{15}\text{H}_{18}\text{F}_3\text{O}_4$: 319.11572, found: 319.11573.

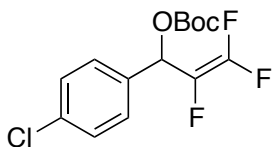


tert-Butyl (2,3,3-trifluoro-1-(4-(trifluoromethyl)phenyl)allyl) carbonate (1c): White solid. Mp 67–70 $^{\circ}\text{C}$. ^1H NMR (500 MHz, CDCl_3): δ 1.50 (s, 9H), 6.36 (d, $J_{\text{HF}} = 25.0$ Hz, 1H), 7.55 (d, $J = 7.5$ Hz, 2H), 7.67 (d, $J = 7.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 27.5, 70.4 (d, $J_{\text{CF}} = 20.3$ Hz), 83.9, 123.8 (q, $J_{\text{CF}} = 272.4$ Hz), 125.7 (q, $J_{\text{CF}} = 3.6$ Hz), 125.9 (ddd, $J_{\text{CF}} = 241.2$, 49.2, 16.8 Hz), 127.1, 131.3 (q, $J_{\text{CF}} = 32.3$ Hz), 138.1, 152.0, 153.3 (ddd, $J_{\text{CF}} = 292.6$, 280.7, 43.1 Hz). ^{19}F NMR (470 MHz, CDCl_3): δ -24.32 (ddd, $J_{\text{FF}} = 115.7$, 32.9 Hz, $J_{\text{FH}} = 25.4$ Hz, 1F), 46.36 (dd, $J_{\text{FF}} = 115.7$, 67.7 Hz, 1F), 62.64 (dd, $J_{\text{FF}} = 67.7$, 32.9 Hz, 1F), 99.18 (s, 3F). IR (KBr) 2982, 1791, 1746, 1374, 1326, 1273, 1168, 1127, 1068, 881, 819 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}-\text{H}]^-$ $\text{C}_{15}\text{H}_{13}\text{F}_6\text{O}_3$: 355.07689, found: 355.07751.



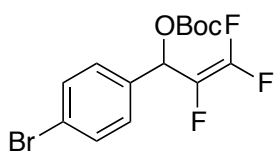
tert-Butyl (2,3,3-trifluoro-1-(4-fluorophenyl)allyl) carbonate (1d):

Pale yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 1.49 (s, 9H), 6.30 (d, $J_{\text{HF}} = 25.5$ Hz, 1H), 7.05–7.09 (m, 2H), 7.40–7.43 (m, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 27.6, 70.4 (d, $J_{\text{CF}} = 20.3$ Hz), 83.5, 115.7 (d, $J_{\text{CF}} = 22.7$ Hz), 126.2 (ddd, $J_{\text{CF}} = 241.1, 49.1, 16.7$ Hz), 128.7 (d, $J_{\text{CF}} = 8.4$ Hz), 130.1, 152.1, 153.2 (ddd, $J_{\text{CF}} = 291.4, 280.6, 43.1$ Hz), 163.0 (d, $J_{\text{CF}} = 248.2$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ -24.30 (ddd, $J_{\text{FF}} = 113.9, 32.9$ Hz, $J_{\text{FH}} = 25.9$ Hz, 1F), 45.80 (dd, $J_{\text{FF}} = 113.9, 65.8$ Hz, 1F), 49.49–49.54 (m, 1F), 61.70 (dd, $J_{\text{FF}} = 65.8, 32.9$ Hz, 1F). IR (KBr) 2984, 2938, 1790, 1749, 1608, 1512, 1371, 1313, 1273, 1158, 1084, 883, 850, 820 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{14}\text{H}_{15}\text{F}_4\text{O}_3$: 307.09573, found: 307.09274.



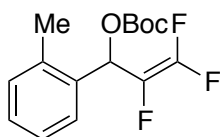
tert-Butyl (1-(4-chlorophenyl)-2,3,3-trifluoroallyl) carbonate (1e):

Pale yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 1.47 (s, 9H), 6.29 (d, $J_{\text{HF}} = 25.5$ Hz, 1H), 7.37–7.39 (m, 4H). ^{13}C NMR (125 MHz, CDCl_3): δ 27.6, 70.3 (d, $J_{\text{CF}} = 20.3$ Hz), 83.3, 126.1 (ddd, $J_{\text{CF}} = 239.9, 49.0, 16.8$ Hz), 128.0, 128.8, 132.7, 135.0, 152.0, 153.2 (ddd, $J_{\text{CF}} = 292.6, 280.7, 43.1$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ -24.34 (ddd, $J_{\text{FF}} = 115.7, 32.9$ Hz, $J_{\text{FH}} = 25.8$ Hz, 1F), 45.94 (dd, $J_{\text{FF}} = 115.7, 67.7$ Hz, 1F), 62.02 (dd, $J_{\text{FF}} = 67.7, 32.9$ Hz, 1F). IR (KBr) 2983, 2937, 1789, 1748, 1599, 1493, 1371, 1275, 1159, 1087, 881, 846, 808 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}-\text{H}]^-$ $\text{C}_{14}\text{H}_{13}\text{ClF}_3\text{O}_3$: 321.05053, found: 321.05169.

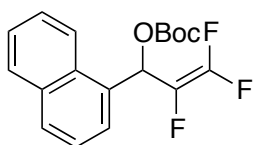


1-(4-Bromophenyl)-2,3,3-trifluoroallyl tert-butyl carbonate (1f):

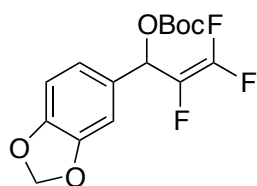
Pale yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 1.49 (s, 9H), 6.28 (d, $J_{\text{HF}} = 25.0$ Hz, 1H), 7.30 (d, $J = 8.5$ Hz, 2H), 7.51 (d, $J = 8.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 27.4, 70.2 (d, $J_{\text{CF}} = 20.5$ Hz), 83.2, 122.9, 126.0 (ddd, $J_{\text{CF}} = 241.1, 49.1, 16.8$ Hz), 128.2, 131.7, 133.1, 151.9, 153.1 (ddd, $J_{\text{CF}} = 291.5, 280.7, 43.2$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ -24.37 (ddd, $J_{\text{FF}} = 115.8, 33.4$ Hz, $J_{\text{FH}} = 25.9$ Hz, 1F), 45.97 (dd, $J_{\text{FF}} = 115.8, 67.8$ Hz, 1F), 62.07 (dd, $J_{\text{FF}} = 67.8, 33.4$ Hz, 1F). IR (KBr) 2983, 2937, 1789, 1748, 1593, 1489, 1371, 1313, 1273, 1158, 1075, 880, 844 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{14}\text{H}_{15}\text{BrF}_3\text{O}_3$: 367.01567, found: 367.01675.



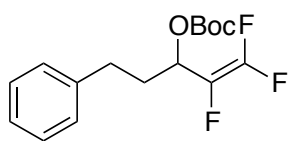
tert-Butyl (2,3,3-trifluoro-1-(o-tolyl)allyl) carbonate (1g): Pale yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 1.48 (s, 9H), 2.33 (s, 3H), 6.51 (d, $J_{\text{HF}} = 26.0$ Hz, 1H), 7.17–7.19 (m, 1H), 7.24–7.26 (m, 2H), 7.54–7.55 (m, 1H). ^{13}C NMR (125 MHz, CDCl_3): δ 18.6, 27.4, 68.2 (d, $J_{\text{CF}} = 20.3$ Hz), 83.1, 125.6 (ddd, $J_{\text{CF}} = 241.1, 49.2, 15.6$ Hz), 126.3, 126.9, 128.7, 130.5, 132.3, 134.7, 152.1, 153.2 (ddd, $J_{\text{CF}} = 291.4, 279.5, 44.4$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ –22.82 (ddd, $J_{\text{FF}} = 113.9, 32.9$ Hz, $J_{\text{FH}} = 25.9$ Hz, 1F), 45.79 (dd, $J_{\text{FF}} = 113.9, 69.7$ Hz, 1F), 61.28 (dd, $J_{\text{FF}} = 69.7, 32.9$ Hz, 1F). IR (KBr) 2982, 2936, 1787, 1461, 1371, 1219, 1112, 1035, 970, 880, 843, 754 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{15}\text{H}_{18}\text{F}_3\text{O}_3$: 303.12080, found: 303.11804.



tert-Butyl (2,3,3-trifluoro-1-(naphthalen-1-yl)allyl) carbonate (1h): White solid. Mp 62–65 °C. ^1H NMR (500 MHz, CDCl_3): δ 1.50 (s, 9H), 7.10 (d, $J_{\text{HF}} = 24.0$ Hz, 1H), 7.50–7.55 (m, 2H), 7.58 (t, $J = 7.0$ Hz, 1H), 7.78 (d, $J = 7.0$ Hz, 1H), 7.87–7.91 (m, 3H). ^{13}C NMR (125 MHz, CDCl_3): δ 27.6, 68.3 (d, $J_{\text{CF}} = 20.3$ Hz), 83.5, 121.8, 125.2, 125.3, 125.9, 126.2 (ddd, $J_{\text{CF}} = 239.8, 49.1, 15.6$ Hz), 126.9, 129.1, 129.4, 129.6, 129.8, 133.7, 152.2, 153.1 (ddd, $J_{\text{CF}} = 292.7, 280.7, 44.4$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ –21.93 (ddd, $J_{\text{FF}} = 115.3, 32.9$ Hz, $J_{\text{FH}} = 23.5$ Hz, 1F), 46.57 (dd, $J_{\text{FF}} = 115.3, 69.7$ Hz, 1F), 61.66 (dd, $J_{\text{FF}} = 69.7, 32.9$ Hz, 1F). IR (KBr) 2980, 2936, 1788, 1743, 1511, 1372, 1254, 1086, 1039, 969, 772, 626 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}]$ $\text{C}_{18}\text{H}_{17}\text{F}_3\text{O}_3$: 338.11298, found: 338.11423.

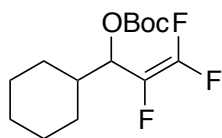


1-(Benzo[d][1,3]dioxol-5-yl)-2,3,3-trifluoroallyl tert-butyl carbonate (1i): Pale yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 1.49 (s, 9H), 5.96 (s, 2H), 6.21 (d, $J_{\text{HF}} = 25.0$ Hz, 1H), 6.80 (d, $J = 8.0$ Hz, 1H), 6.88 (d, $J = 8.0$ Hz, 1H), 6.93 (s, 1H). ^{13}C NMR (125 MHz, CDCl_3): δ 27.6, 70.8 (d, $J_{\text{CF}} = 20.3$ Hz), 83.4, 101.3, 107.4, 108.3, 120.6, 126.4 (ddd, $J_{\text{CF}} = 239.8, 47.9, 15.6$ Hz), 127.9, 148.0, 148.1, 152.1, 153.0 (ddd, $J_{\text{CF}} = 292.7, 280.7, 44.3$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ –24.2 (ddd, $J_{\text{FF}} = 115.7, 32.9$ Hz, $J_{\text{FH}} = 25.9$ Hz, 1F), 45.4 (dd, $J_{\text{FF}} = 115.7, 69.6$ Hz, 1F), 61.1 (dd, $J_{\text{FF}} = 69.6, 32.9$ Hz, 1F). IR (KBr) 2983, 2904, 2361, 1789, 1747, 1492, 1447, 1371, 1314, 1273, 1160, 1080, 1040, 857, 804 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{15}\text{H}_{16}\text{F}_3\text{O}_5$: 333.09498, found: 333.09235.



tert-Butyl (1,1,2-trifluoro-5-phenylpent-1-en-3-yl) carbonate (1j):

Pale yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 1.49 (s, 9H), 2.08–2.28 (m, 2H), 2.69 (t, $J = 7.5$ Hz, 2H), 5.23 (dt, $J_{\text{HF}} = 25.5$ Hz, $J = 7.5$ Hz, 1H), 7.16–7.23 (m, 3H), 7.28–7.31 (m, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 27.6, 31.1, 31.5, 69.4 (d, $J_{\text{CF}} = 21.6$ Hz), 83.0, 126.2 (ddd, $J_{\text{CF}} = 239.8$, 50.0, 16.7 Hz), 126.3, 128.2, 128.5, 139.9, 152.3, 153.5 (ddd, $J_{\text{CF}} = 292.6$, 280.7, 44.3 Hz). ^{19}F NMR (470 MHz, CDCl_3): δ –27.15 (ddd, $J_{\text{FF}} = 113.9$, 32.9, $J_{\text{FH}} = 25.9$ Hz, 1F), 46.05 (dd, $J_{\text{FF}} = 113.9$, 67.7 Hz, 1F), 61.8 (dd, $J_{\text{FF}} = 67.7$, 32.9 Hz, 1F). IR (KBr) 2982, 2936, 1789, 1746, 1497, 1371, 1315, 1276, 1160, 1035, 850, 751, 699 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{16}\text{H}_{20}\text{F}_3\text{O}_3$: 317.13645, found: 317.13382.

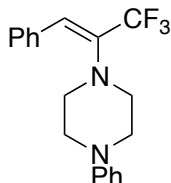


tert-Butyl (1-cyclohexyl-2,3,3-trifluoroallyl) carbonate (1k):

White solid. Mp 40–44 °C. ^1H NMR (500 MHz, CDCl_3): δ 0.91–1.06 (m, 2H), 1.10–1.31 (m, 3H), 1.47 (s, 9H), 1.61–1.78 (m, 4H), 1.82–1.92 (m, 2H), 4.96 (dd, $J_{\text{HF}} = 27.5$ Hz, $J = 9.5$ Hz, 1H). ^{13}C NMR (125 MHz, CDCl_3): δ 25.3, 25.4, 25.9, 27.6, 28.3, 28.9, 37.7, 74.1 (d, $J_{\text{CF}} = 20.3$ Hz), 82.7, 125.7 (ddd, $J_{\text{CF}} = 239.8$, 50.3, 15.6 Hz), 152.7, 153.9 (ddd, $J_{\text{CF}} = 291.5$, 279.5, 44.4 Hz). ^{19}F NMR (470 MHz, CDCl_3): δ –26.17 (ddd, $J_{\text{FF}} = 115.8$, 32.9, $J_{\text{FH}} = 29.6$ Hz, 1F), 44.60 (dd, $J_{\text{FF}} = 115.8$, 71.5 Hz, 1F), 61.24 (dd, $J_{\text{FF}} = 71.5$, 32.9 Hz, 1F). IR (KBr) 2981, 2938, 2861, 1789, 1741, 1313, 1256, 1158, 1065, 958, 847 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}]$ $\text{C}_{14}\text{H}_{21}\text{F}_3\text{O}_3$: 294.14428, found: 294.14700.

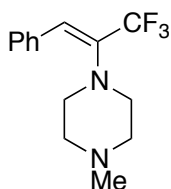
General procedure for the palladium-catalyzed amination of 1a'' with amines. The reaction conditions and results are shown in Tables 1-5. A typical procedure is given for the reaction of *tert*-butyl (2,3,3-trifluoro-1-phenylallyl) carbonate (**1a''**) with 1-phenylpiperazine (**2a**) (Table 1, Entry 8).

To a solution of Pd(OAc)₂ (1.9 mg, 0.0085 mmol), DPPF (9.4 mg, 0.017 mmol) and *tert*-butyl (2,3,3-trifluoro-1-phenylallyl) carbonate (**1a''**) (50 mg, 0.17 mmol) in dioxane (1.0 mL) was added 1-phenylpiperazine (**2a**) (38.9 mg, 0.24 mmol), then the reaction mixture was stirred at 60 °C for 12 h. The reaction mixture was quenched with water, and extracted with ethyl acetate. The combined organic layers were dried over MgSO₄ and concentrated *in vacuo*. The NMR yield (trioxane as an internal standard) was determined to be 92% yield by 500 MHz ¹H NMR for crude material. The residue was chromatographed on silica gel (hexane/EtOAc = 95/5) to give 46.1 mg (88%) of **3aa** as a white solid (Mp 101–103 °C). Recrystallization from CH₂Cl₂/hexane gave a single crystal, which is a suitable for X-ray study.



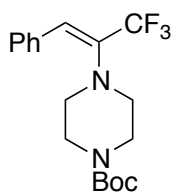
(Z)-1-Phenyl-4-(3,3,3-trifluoro-1-phenylprop-1-en-2-yl)piperazine (3aa**):**

Isolated yield: 88%. White solid. Mp 101–103 °C. ¹H NMR (500 MHz, CDCl₃): δ 3.12–3.13 (m, 4H), 3.21–3.22 (m, 4H), 6.56 (s, 1H), 6.88 (t, *J* = 7.5 Hz, 1H), 6.94 (d, *J* = 7.5 Hz, 2H), 7.25–7.30 (m, 3H), 7.34 (t, *J* = 7.0 Hz, 2H), 7.71 (d, *J* = 7.5 Hz, 2H). ¹³C NMR (125 MHz, CDCl₃): δ 49.8, 50.2, 116.4, 120.2, 122.5 (q, *J*_{CF} = 4.8 Hz), 123.1 (q, *J*_{CF} = 280.7 Hz), 128.3, 128.5, 129.2, 129.7, 133.8, 136.1 (q, *J*_{CF} = 27.7 Hz), 151.3. ¹⁹F NMR (470 MHz, CDCl₃): δ 98.78 (s, 3F). IR (KBr) 2886, 2828, 1599, 1503, 1448, 1382, 1327, 1163, 1111, 1010, 757, 689 cm⁻¹. HRMS (ESI): *m/z*: calcd for [M+H]⁺ C₁₉H₂₀F₃N₂: 333.15786, found: 333.15719.

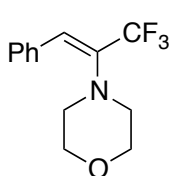


(Z)-1-Methyl-4-(3,3,3-trifluoro-1-phenylprop-1-en-2-yl)piperazine (3ab**):**

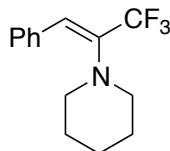
Isolated yield: 63%. Colorless oil. ¹H NMR (500 MHz, CDCl₃): δ 2.32 (s, 3H), 2.44–2.50 (m, 4H), 2.98 (t, *J* = 4.5 Hz, 4H), 6.51 (s, 1H), 7.29 (t, *J* = 8.0 Hz, 1H), 7.35 (t, *J* = 8.0 Hz, 2H), 7.65 (d, *J* = 8.0 Hz, 2H). ¹³C NMR (125 MHz, CDCl₃): δ 46.3, 49.9, 55.4, 121.7 (q, *J*_{CF} = 4.8 Hz), 123.0 (q, *J*_{CF} = 280.7 Hz), 128.2, 128.3, 129.6, 133.9, 136.3 (q, *J*_{CF} = 27.7 Hz). ¹⁹F NMR (470 MHz, CDCl₃): δ 98.57 (s, 3F). IR (KBr) 2938, 2846, 2795, 1450, 1375, 1266, 1168, 1112, 1008, 757, 694 cm⁻¹. HRMS (ESI): *m/z*: calcd for [M+H]⁺ C₁₄H₁₈F₃N₂: 271.14221, found: 271.14201.



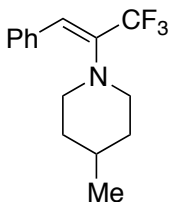
(Z)-tert-Butyl 4-(3,3,3-trifluoro-1-phenylprop-1-en-2-yl)piperazine-1-carboxylate (3ac): Isolated yield: 83%. Colorless oil. ^1H NMR (500 MHz, CDCl_3): δ 1.46 (s, 9H), 2.88–2.92 (m, 4H), 3.46–3.49 (m, 4H), 6.55 (s, 1H), 7.28–7.32 (m, 1H), 7.35 (t, $J = 7.5$ Hz, 2H), 7.67 (d, $J = 7.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 28.3, 43.6, 49.9, 79.8, 122.9 (q, $J_{\text{CF}} = 280.7$ Hz), 123.0 (q, $J_{\text{CF}} = 4.8$ Hz), 128.3, 128.6, 129.6, 133.6, 136.1 (q, $J_{\text{CF}} = 27.5$ Hz), 154.7. ^{19}F NMR (470 MHz, CDCl_3): δ 98.68 (s, 3F). IR (KBr) 2976, 2858, 1698, 1419, 1366, 1266, 1164, 1115, 1008, 758, 695 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{Na}]^+$ $\text{C}_{18}\text{H}_{23}\text{F}_3\text{N}_2\text{NaO}_2$: 379.16093, found: 379.16168.



(Z)-4-(3,3,3-Trifluoro-1-phenylprop-1-en-2-yl)morpholine (3ad): Isolated yield: 75%. White solid. Mp 44–46 °C. ^1H NMR (500 MHz, CDCl_3): δ 2.95–2.96 (m, 4H), 3.74 (t, $J = 4.5$ Hz, 4H), 6.54 (s, 1H), 7.30 (t, $J = 7.5$ Hz, 1H), 7.37 (t, $J = 7.5$ Hz, 2H), 7.70 (d, $J = 7.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 50.3, 67.1, 122.6 (q, $J_{\text{CF}} = 6.0$ Hz), 123.0 (q, $J_{\text{CF}} = 280.7$ Hz), 128.3, 128.6, 129.6, 133.8, 136.0 (q, $J_{\text{CF}} = 27.5$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ 98.71 (s, 3F). IR (KBr) 2965, 2854, 1652, 1260, 1115, 1010, 891, 764, 697 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{Na}]^+$ $\text{C}_{13}\text{H}_{14}\text{F}_3\text{NNaO}$: 280.09252, found: 280.09248.

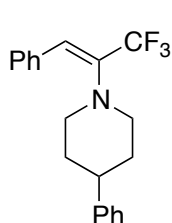


(Z)-1-(3,3,3-Trifluoro-1-phenylprop-1-en-2-yl)piperidine (3ae): Isolated yield: 61%. Colorless oil. ^1H NMR (500 MHz, CDCl_3): δ 1.50–1.54 (m, 2H), 1.58–1.63 (m, 4H), 2.87 (t, $J = 4.5$ Hz, 4H), 6.45 (s, 1H), 7.27 (t, $J = 7.5$ Hz, 1H), 7.35 (t, $J = 7.5$ Hz, 2H), 7.69 (d, $J = 7.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 23.9, 26.2, 51.3, 121.5 (q, $J_{\text{CF}} = 4.8$ Hz), 123.3 (q, $J_{\text{CF}} = 281.9$ Hz), 128.1, 128.2, 129.7, 134.4, 137.4 (q, $J_{\text{CF}} = 26.2$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ 99.00 (s, 3F). IR (KBr) 2937, 2853, 1449, 1386, 1266, 1229, 1165, 1111, 1002, 756, 694 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{14}\text{H}_{17}\text{F}_3\text{N}$: 256.13131, found: 256.13078.



(Z)-4-Methyl-1-(3,3,3-trifluoro-1-phenylprop-1-en-2-yl)piperidine (3af): Isolated yield: 56%. Yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 0.96 (d, $J = 6.5$ Hz, 3H), 1.24–1.32 (m, 2H), 1.39–1.47 (m, 1H), 1.57–1.62 (m, 2H), 2.75–2.80 (m, 2H), 2.97–3.01 (m, 2H), 6.45 (s, 1H), 7.27 (t, $J = 7.5$ Hz, 1H), 7.35 (t, $J = 7.5$ Hz, 2H), 7.66 (d, $J = 7.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 22.1, 30.3, 34.6, 50.6, 121.3 (q, $J_{\text{CF}} = 4.8$ Hz), 123.2 (q, $J_{\text{CF}} = 281.9$ Hz), 128.1, 128.2, 129.6, 134.4, 137.2

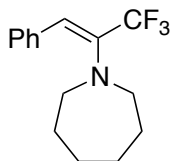
(q, $J_{CF} = 26.4$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ 98.94 (s, 3F). IR (KBr) 3062, 2925, 2843, 2361, 1636, 1450, 1387, 1266, 1165, 1111, 974, 756, 694 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+ \text{C}_{15}\text{H}_{19}\text{F}_3\text{N}$: 270.14696, found: 270.14424.



(Z)-4-Phenyl-1-(3,3,3-trifluoro-1-phenylprop-1-en-2-yl)piperidine (3ag):

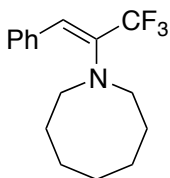
Isolated yield: 79%. Colorless oil. ^1H NMR (500 MHz, CDCl_3): δ 1.82 (m, 4H), 2.58 (quin, $J = 7.5$ Hz, 1H), 2.91–2.98 (m, 2H), 3.12–3.15 (m, 2H), 6.51 (s, 1H), 7.20–7.40 (m, 6H), 7.38 (t, $J = 8.0$ Hz, 2H), 7.69 (d, $J = 8.0$ Hz, 2H).

^{13}C NMR (125 MHz, CDCl_3): δ 33.6, 41.9, 51.1, 121.8 (q, $J_{CF} = 4.8$ Hz), 123.3 (q, $J_{CF} = 281.9$ Hz), 126.2, 126.7, 128.2, 128.4, 129.6, 134.2, 136.9 (q, $J_{CF} = 26.4$ Hz), 146.1. ^{19}F NMR (470 MHz, CDCl_3): δ 98.87 (s, 3F). IR (KBr) 3027, 2935, 2831, 2361, 1450, 1386, 1267, 1159, 1111, 995, 929, 756, 697 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+ \text{C}_{20}\text{H}_{21}\text{F}_3\text{N}$: 332.16261, found: 332.16432.



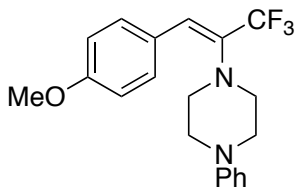
(Z)-1-(3,3,3-Trifluoro-1-phenylprop-1-en-2-yl)azepane (3ah): Isolated yield: 49%. Colorless oil. ^1H NMR (500 MHz, CDCl_3): δ 1.58–1.67 (m, 8H), 2.98–3.03 (m, 4H), 6.44 (s, 1H), 7.26 (t, $J = 8.0$ Hz, 1H), 7.34 (t, $J = 8.0$ Hz, 2H), 7.42 (d, $J = 8.0$ Hz, 2H).

^{13}C NMR (125 MHz, CDCl_3): δ 27.8, 29.5, 53.4, 120.1 (q, $J_{CF} = 5.0$ Hz), 123.2 (q, $J_{CF} = 280.7$ Hz), 127.7, 128.2, 129.1, 134.8, 138.2 (q, $J_{CF} = 27.7$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ 97.11 (s, 3F). IR (KBr) 3054, 2924, 2852, 2361, 1635, 1601, 1518, 1455, 1358, 1264, 1114, 756, 698 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+ \text{C}_{15}\text{H}_{19}\text{F}_3\text{N}$: 270.14696, found: 270.14424.

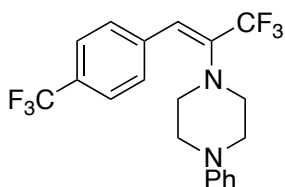


(Z)-1-(3,3,3-Trifluoro-1-phenylprop-1-en-2-yl)azocane (3ai): Isolated yield: 24%. Colorless oil. ^1H NMR (500 MHz, CDCl_3): δ 1.45–1.55 (m, 10H), 2.92 (t, $J = 5.5$ Hz, 4H), 6.49 (s, 1H), 7.18–7.29 (m, 5H).

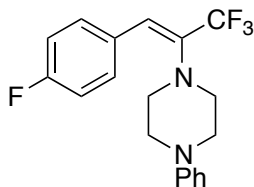
^{13}C NMR (125 MHz, CDCl_3): δ 25.2, 26.8, 28.4, 53.8, 121.4 (q, $J_{CF} = 4.8$ Hz), 123.2 (q, $J_{CF} = 278.2$ Hz), 127.8, 128.1, 129.1, 134.7, 138.7 (q, $J_{CF} = 28.8$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ 96.30 (s, 3F). IR (KBr) 2923, 2852, 1635, 1447, 1412, 1267, 1165, 1114, 1065, 754, 696 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+ \text{C}_{16}\text{H}_{21}\text{F}_3\text{N}$: 284.16261, found: 284.16185.



(Z)-1-Phenyl-4-(3,3,3-trifluoro-1-(4-methoxyphenyl)prop-1-en-2-yl)piperazine (3ba): Isolated yield: 88%. White solid. Mp 81–84 °C. ^1H NMR (500 MHz, CDCl_3): δ 3.11–3.14 (m, 4H), 3.23–3.27 (m, 4H), 3.81 (s, 3H), 6.53 (s, 1H), 6.87–6.81 (m, 3H), 6.95 (d, J = 8.5 Hz, 2H), 7.27 (t, J = 8.0 Hz, 2H), 7.76 (d, J = 8.5 Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 49.8, 50.0, 55.2, 113.7, 116.3, 120.0, 123.3 (q, J_{CF} = 280.7 Hz), 123.4 (q, J_{CF} = 4.8 Hz), 126.2, 129.1, 131.3, 134.0 (q, J_{CF} = 26.4 Hz), 151.4, 159.8. ^{19}F NMR (470 MHz, CDCl_3): δ 99.38 (s, 3F). IR (KBr) 2848, 1605, 1510, 1383, 1258, 1159, 1131, 1113, 1009, 904, 757 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{20}\text{H}_{22}\text{F}_3\text{N}_2\text{O}$: 363.16842, found: 363.16628.

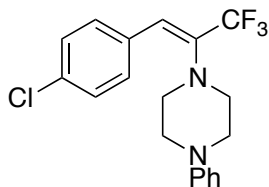


(Z)-1-Phenyl-4-(3,3,3-trifluoro-1-(4-(trifluoromethyl)phenyl)prop-1-en-2-yl)piperazine (3ca): Isolated yield: 77%. Yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 3.11–3.14 (m, 4H), 3.18–3.23 (m, 4H), 6.52 (s, 1H), 6.88–6.96 (m, 3H), 7.27 (t, J = 7.0 Hz, 2H), 7.60 (d, J = 8.0 Hz, 2H), 7.77 (d, J = 8.0 Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 49.7, 50.2, 116.4, 119.5 (q, J_{CF} = 4.8 Hz), 120.3, 122.6 (q, J_{CF} = 280.7 Hz), 123.9 (q, J_{CF} = 272.2 Hz), 125.2 (q, J_{CF} = 3.5 Hz), 129.1, 129.6, 130.0 (q, J_{CF} = 32.4 Hz), 137.5, 138.2 (q, J_{CF} = 27.5 Hz), 151.2. ^{19}F NMR (470 MHz, CDCl_3): δ 98.42 (s, 3F), 99.10 (s, 3F). IR (KBr) 2962, 2831, 2361, 1600, 1496, 1383, 1321, 1265, 1117, 1067, 1014, 904, 760, 693 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}]$ $\text{C}_{20}\text{H}_{18}\text{F}_6\text{N}_2$: 400.13742, found: 400.13445.



(Z)-1-Phenyl-4-(3,3,3-trifluoro-1-(4-fluorophenyl)prop-1-en-2-yl)piperazine (3da): Isolated yield: 93%. White solid. Mp 103–105 °C. ^1H NMR (500 MHz, CDCl_3): δ 3.10–3.13 (m, 4H), 3.21–3.25 (m, 4H), 6.53 (s, 1H), 6.89 (t, J = 8.0 Hz, 1H), 6.94 (d, J = 8.0 Hz, 2H), 7.04 (t, J = 8.0 Hz, 2H), 7.27 (t, J = 8.0 Hz, 2H), 7.73–7.78 (m, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 49.8, 50.1, 115.3 (d, J_{CF} = 21.6 Hz), 116.4, 120.2, 121.8 (q, J_{CF} = 4.8 Hz), 123.0 (q, J_{CF} = 281.9 Hz), 129.1, 129.8 (d, J_{CF} = 3.6 Hz), 131.5 (d, J_{CF} = 8.4 Hz), 135.7 (q, J_{CF} = 26.4 Hz), 151.3, 162.5 (d, J_{CF} = 249.5 Hz). ^{19}F NMR (470 MHz, CDCl_3): δ 50.15 (s, 1F), 98.90 (s, 3F). IR (KBr) 2831, 1600, 1505, 1453, 1381, 1268, 1224, 1158, 1010, 900, 760, 691 cm^{-1} . HRMS

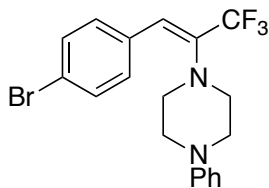
(ESI): m/z : calcd for $[M+H]^+$ $C_{19}H_{19}F_4N_2$: 351.14844, found: 351.14759.



(Z)-1-(1-(4-Chlorophenyl)-3,3,3-trifluoroprop-1-en-2-yl)-4-phenylpiperazine (3ea):

Isolated yield: 81%. Yellow oil. 1H NMR (500 MHz, $CDCl_3$): δ 3.09–3.12 (m, 4H), 3.19–3.22 (m, 4H), 6.49 (s, 1H), 6.89 (t, J = 7.5 Hz, 1H), 6.93 (d, J = 8.0 Hz, 2H), 7.25–7.33 (m, 4H),

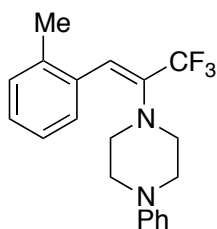
7.66 (d, J = 8.0 Hz, 2H). ^{13}C NMR (125 MHz, $CDCl_3$): δ 49.8, 50.1, 116.4, 120.2, 121.0 (q, J_{CF} = 4.8 Hz), 122.8 (q, J_{CF} = 280.7 Hz), 128.5, 129.1, 130.8, 132.2, 134.1, 136.6 (q, J_{CF} = 27.7 Hz), 151.2. ^{19}F NMR (470 MHz, $CDCl_3$): δ 98.74 (s, 3F). IR (KBr) 2973, 2831, 2361, 1599, 1491, 1451, 1383, 1262, 1165, 1114, 1013, 908, 733 cm^{-1} . HRMS (ESI): m/z : calcd for $[M-H]^-$ $C_{19}H_{17}ClF_3N_2$: 365.10324, found: 365.10441.



(Z)-1-(1-(4-Bromophenyl)-3,3,3-trifluoroprop-1-en-2-yl)-4-phenylpiperazine (3fa):

Isolated yield: 71%. White solid. Mp 60–63 °C. 1H NMR (500 MHz, $CDCl_3$): δ 3.08–3.13 (m, 4H), 3.18–3.22 (m, 4H), 6.46 (s, 1H), 6.86–6.95 (m, 3H), 7.25–7.29 (m, 2H), 7.47–7.49 (m,

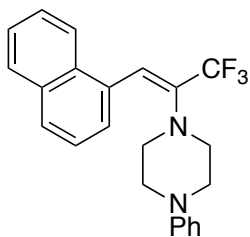
2H), 7.57–7.61 (m, 2H). ^{13}C NMR (125 MHz, $CDCl_3$): δ 49.7, 50.1, 116.4, 120.2, 120.9 (q, J_{CF} = 4.9 Hz), 122.4, 122.8 (q, J_{CF} = 280.7 Hz), 129.1, 131.1, 131.5, 132.7, 136.7 (q, J_{CF} = 27.6 Hz), 151.3. ^{19}F NMR (470 MHz, $CDCl_3$): δ 98.71 (s, 3F). IR (KBr) 2855, 2815, 1600, 1494, 1261, 1158, 1109, 1012, 888, 816, 760, 691 cm^{-1} . HRMS (ESI): m/z : calcd for $[M+H]^+$ $C_{19}H_{19}BrF_3N_2$: 411.06837, found: 411.06634.



(Z)-1-Phenyl-4-(3,3,3-trifluoro-1-(o-tolyl)prop-1-en-2-yl)piperazine (3ga):

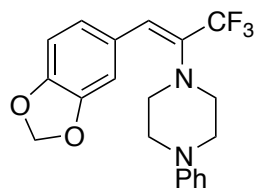
Isolated yield: 88%. Yellow oil. 1H NMR (500 MHz, $CDCl_3$): δ 2.22 (s, 3H), 2.90–2.93 (m, 4H), 2.90–3.02 (m, 4H), 6.48 (s, 1H), 6.76–6.81 (m, 3H), 7.08–7.12 (m, 3H), 7.16 (t, J = 8.0 Hz, 2H), 7.39–7.41 (m, 1H). ^{13}C NMR (125 MHz, $CDCl_3$): δ 20.0, 49.7, 50.2, 116.3, 118.1 (q,

J_{CF} = 4.8 Hz), 120.0, 122.9 (q, J_{CF} = 279.6 Hz), 125.5, 127.9, 129.0, 129.4, 129.9, 133.5, 136.4, 137.1 (q, J_{CF} = 28.8 Hz), 151.3. ^{19}F NMR (470 MHz, $CDCl_3$): δ 97.86 (s, 3F). IR (KBr) 2956, 2830, 1638, 1599, 1503, 1450, 1381, 1293, 1265, 1167, 1115, 1014, 900, 758, 692 cm^{-1} . HRMS (ESI): m/z : calcd for $[M+H]^+$ $C_{20}H_{22}F_3N_2$: 347.17351, found: 347.17072.



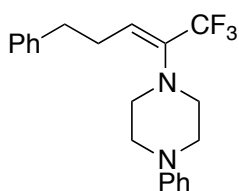
(Z)-1-Phenyl-4-(3,3,3-trifluoro-1-(naphthalen-1-yl)prop-1-en-2-yl)piperazine (3ha):

Isolated yield: 83%. Yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 2.93–2.99 (m, 8H), 6.77–6.83 (m, 3H), 6.96 (s, 1H), 7.19 (t, $J = 7.5$ Hz, 2H), 7.43–7.53 (m, 4H), 7.78 (d, $J = 7.5$ Hz, 1H), 7.84 (d, $J = 7.5$ Hz, 1H), 7.94 (d, $J = 7.5$ Hz, 1H). ^{13}C NMR (125 MHz, CDCl_3): δ 49.6, 50.1, 115.5 (q, $J_{\text{CF}} = 4.8$ Hz), 116.2, 120.0, 122.8 (q, $J_{\text{CF}} = 278.3$ Hz), 124.7, 125.1, 126.0, 126.3, 127.2, 128.3, 128.5, 129.0, 131.5, 131.7, 133.4, 138.4 (q, $J_{\text{CF}} = 28.8$ Hz), 151.2. ^{19}F NMR (470 MHz, CDCl_3): δ 97.79 (s, 3F). IR (KBr) 3059, 2884, 2829, 1599, 1504, 1383, 1269, 1165, 1115, 1010, 911, 780, 758 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{23}\text{H}_{22}\text{F}_3\text{N}_2$: 383.17351, found: 383.17079.



(Z)-1-(1-(Benzo[d][1,3]dioxol-5-yl)-3,3,3-trifluoroprop-1-en-2-yl)-4-phenylpiperazine (3ia):

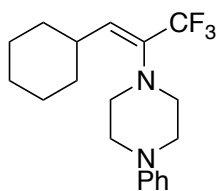
Isolated yield: 89%. Yellow solid. Mp 75–79 °C. ^1H NMR (500 MHz, CDCl_3): δ 3.11–3.16 (m, 4H), 3.23–3.28 (m, 4H), 5.97 (s, 2H), 6.49 (s, 1H), 6.79 (d, $J = 8.0$ Hz, 1H), 6.89 (t, $J = 7.0$ Hz, 1H), 6.95 (d, $J = 8.0$ Hz, 2H), 7.09 (d, $J = 8.0$ Hz, 1H), 7.22–7.31 (m, 2H), 7.62 (s, 1H). ^{13}C NMR (125 MHz, CDCl_3): δ 49.8, 50.1, 101.2, 108.1, 109.1, 116.3, 120.1, 123.2 (q, $J_{\text{CF}} = 280.7$ Hz), 123.4 (q, $J_{\text{CF}} = 4.8$ Hz), 125.0, 127.7, 129.1, 134.3 (q, $J_{\text{CF}} = 26.4$ Hz), 147.6, 147.9, 151.3. ^{19}F NMR (470 MHz, CDCl_3): δ 99.33 (s, 3F). IR (KBr) 2835, 1600, 1489, 1357, 1237, 1168, 1105, 1037, 927, 758 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{20}\text{H}_{20}\text{F}_3\text{N}_2\text{O}_2$: 377.14769, found: 377.14554.



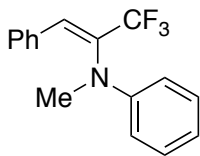
(Z)-1-Phenyl-4-(1,1,1-trifluoro-5-phenylpent-2-en-2-yl)piperazine (3ja):

Isolated yield: 85%. Colorless oil. ^1H NMR (500 MHz, CDCl_3): δ 2.58–2.64 (m, 2H), 2.72 (t, $J = 7.5$ Hz, 2H), 2.85–2.94 (m, 4H), 3.11–3.17 (m, 4H), 5.96 (t, $J = 7.5$ Hz, 1H), 6.86 (t, $J = 7.5$ Hz, 1H), 6.92 (d, $J = 8.0$ Hz, 2H), 7.15–7.22 (m, 3H), 7.24–7.30 (m, 4H). ^{13}C NMR (125 MHz, CDCl_3): δ 28.3, 34.8, 50.1, 50.6, 116.3, 119.9, 123.0 (q, $J_{\text{CF}} = 280.5$ Hz), 126.1, 128.41, 128.45, 129.0, 130.0 (q, $J_{\text{CF}} = 4.7$ Hz), 137.5 (q, $J_{\text{CF}} = 28.8$ Hz), 141.0, 151.5. ^{19}F NMR (470 MHz, CDCl_3): δ 97.80 (s, 3F). IR (KBr) 3026, 2954, 2832, 2361, 1600, 1497, 1382,

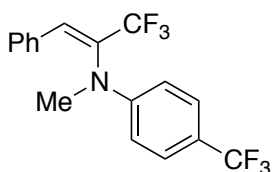
1232, 1161, 1113, 1003, 757, 697 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{21}\text{H}_{24}\text{F}_3\text{N}_2$: 361.18916, found: 361.18689. (*E*)-**3ja**: ^1H NMR (500 MHz, CDCl_3): δ 2.53–2.59 (m, 2H), 2.72 (t, $J = 7.5$ Hz, 2H), 2.85–2.93 (m, 4H), 3.19–3.24 (m, 4H), 5.21 (t, $J = 7.5$ Hz, 1H), 6.86–6.97 (m, 3H), 7.17–7.22 (m, 3H), 7.23–7.32 (m, 4H). ^{13}C NMR (125 MHz, CDCl_3): δ 28.5, 36.1, 49.3, 51.3, 116.2, 120.0, 120.6, 122.6 (q, $J_{\text{CF}} = 278.2$ Hz), 126.0, 128.41, 128.44, 129.1, 140.2 (q, $J_{\text{CF}} = 28.8$ Hz), 141.0, 151.1. ^{19}F NMR (470 MHz, CDCl_3): δ 101.54 (s, 3F).



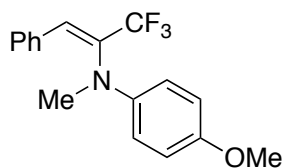
(Z)-1-(1-Cyclohexyl-3,3,3-trifluoroprop-1-en-2-yl)-4-phenylpiperazine (3ka): Isolated yield: 75%. White solid. Mp 112–114 $^{\circ}\text{C}$. ^1H NMR (500 MHz, CDCl_3): δ 1.08–1.35 (m, 6H), 1.61–1.78 (m, 4H), 2.62–2.72 (m, 1H), 3.03–3.04 (m, 4H), 3.18–3.22 (m, 4H), 5.79 (d, $J = 9.5$ Hz, 1H), 6.87 (t, $J = 7.5$ Hz, 1H), 6.95 (d, $J = 7.5$ Hz, 2H), 7.27 (t, $J = 7.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 25.6, 25.8, 32.2, 35.8, 50.2, 51.3, 116.4, 119.9, 123.3 (q, $J_{\text{CF}} = 279.5$ Hz), 129.1, 135.5 (q, $J_{\text{CF}} = 27.5$ Hz), 137.3 (q, $J_{\text{CF}} = 4.8$ Hz), 151.7. ^{19}F NMR (470 MHz, CDCl_3): δ 97.14 (s, 3F). IR (KBr) 2930, 2852, 1602, 1506, 1449, 1277, 1241, 1172, 1157, 1109, 1007, 926, 754, 687 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{19}\text{H}_{26}\text{F}_3\text{N}_2$: 339.20481, found: 339.20348. (*E*)-**3ka**: ^1H NMR (500 MHz, CDCl_3): δ 1.01–1.10 (m, 2H), 1.12–1.21 (m, 1H), 1.26–1.36 (m, 2H), 1.63–1.76 (m, 5H), 2.40–2.49 (m, 1H), 2.87–2.91 (m, 4H), 3.19–3.26 (m, 4H), 5.03 (d, $J = 10.0$ Hz, 1H), 6.87 (t, $J = 7.5$ Hz, 1H), 6.93 (d, $J = 7.5$ Hz, 2H), 7.26–7.29 (m, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 25.6, 25.8, 33.5, 36.1, 49.3, 51.6, 116.2, 119.9, 122.9 (q, $J_{\text{CF}} = 277.1$ Hz), 128.1, 129.1, 138.0 (q, $J_{\text{CF}} = 30.0$ Hz), 151.2. ^{19}F NMR (470 MHz, CDCl_3): δ 101.83 (s, 3F).



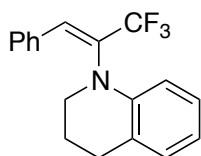
(Z)-N-Methyl-N-(3,3,3-trifluoro-1-phenylprop-1-en-2-yl)aniline (5aa): Isolated yield: 77%. Pale yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 3.12 (s, 3H), 6.78–6.83 (m, 3H), 7.11 (s, 1H), 7.21–7.30 (m, 5H), 7.45 (d, $J = 7.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 37.7, 113.2, 118.6, 123.0 (q, $J_{\text{CF}} = 279.4$ Hz), 128.8, 129.1, 129.5, 129.9, 131.4 (q, $J_{\text{CF}} = 31.2$ Hz), 132.0, 132.9 (q, $J_{\text{CF}} = 3.5$ Hz), 146.2. ^{19}F NMR (470 MHz, CDCl_3): δ 96.39 (s, 3F). IR (KBr) 3063, 2895, 2361, 1600, 1500, 1394, 1294, 1268, 1164, 1121, 1008, 750, 692 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{16}\text{H}_{15}\text{F}_3\text{N}$: 278.11566, found: 278.11823. (*E*)-**5aa**: Selected ^1H NMR (500 MHz, CDCl_3): δ 3.19 (s, 3H), other peaks overlap with major (*Z*)-isomer. ^{19}F NMR (470 MHz, CDCl_3): δ 102.01 (s, 3F).



(Z)-N-Methyl-N-(3,3,3-trifluoro-1-phenylprop-1-en-2-yl)-4-(trifluoromethyl)aniline (5ab): Isolated yield: 74%. White solid. Mp 51–54 °C. ^1H NMR (500 MHz, CDCl_3): δ 3.17 (s, 3H), 6.82 (d, J = 8.5 Hz, 2H), 7.18 (s, 1H), 7.28–7.36 (m, 3H), 7.39 (d, J = 7.5 Hz, 2H), 7.46 (d, J = 7.5 Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 37.8, 112.5, 120.3 (q, J_{CF} = 32.4 Hz), 122.7 (q, J_{CF} = 244.7 Hz), 124.9 (q, J_{CF} = 236.3 Hz), 126.6 (q, J_{CF} = 4.8 Hz), 129.0, 129.4, 130.2 (q, J_{CF} = 31.2 Hz), 130.3, 131.4, 133.8 (q, J_{CF} = 3.5 Hz), 148.8. ^{19}F NMR (470 MHz, CDCl_3): δ 95.83 (s, 3F), 100.55 (s, 3F). IR (KBr) 3075, 2951, 2914, 1617, 1523, 1474, 1383, 1339, 1270, 1198, 1065, 1003, 833, 757, 703 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{17}\text{H}_{14}\text{F}_6\text{N}$: 346.10304, found: 346.10424. **(E)-5ab:** Selected ^1H NMR (500 MHz, CDCl_3): δ 3.24 (s, 3H), other peaks overlap with major (Z)-isomer. In the ^{19}F NMR, all peaks overlap with major (Z)-isomer.

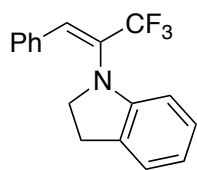


(Z)-4-Methoxy-N-methyl-N-(3,3,3-trifluoro-1-phenylprop-1-en-2-yl)aniline (5ac): Isolated yield: 87%. Yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 3.09 (s, 3H), 3.74 (s, 3H), 6.75 (d, J = 9.0 Hz, 2H), 6.81 (d, J = 9.0 Hz, 2H), 7.05 (s, 1H), 7.28–7.31 (m, 3H), 7.47–7.51 (m, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 38.1, 55.5, 114.6, 114.7, 123.1 (q, J_{CF} = 280.7 Hz), 128.7, 129.4, 129.7, 131.9 (q, J_{CF} = 3.5 Hz), 132.1 (q, J_{CF} = 30.0 Hz), 132.3, 140.3, 152.8. ^{19}F NMR (470 MHz, CDCl_3): δ 96.85 (s, 3F). IR (KBr) 2937, 2832, 1509, 1269, 1245, 1162, 1122, 1038, 819, 692 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{17}\text{H}_{17}\text{F}_3\text{NO}$: 308.12622, found: 308.12783. **(E)-5ac:** In the ^1H NMR, all peaks overlap with major (Z)-isomer. ^{19}F NMR (470 MHz, CDCl_3): δ 102.79 (s, 3F).

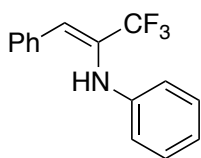


(Z)-1-(3,3,3-Trifluoro-1-phenylprop-1-en-2-yl)-1,2,3,4-tetrahydroquinoline (5ad): Isolated yield: 84%. Yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 1.88–2.05 (m, 2H), 2.78–2.89 (m, 2H), 3.31–3.48 (m, 2H), 6.65 (d, J = 7.5 Hz, 1H), 6.69 (t, J = 7.5 Hz, 1H), 6.97 (t, J = 7.5 Hz, 1H), 7.03 (d, J = 7.5 Hz, 1H), 7.12 (s, 1H), 7.28–7.31 (m, 3H), 7.50–7.54 (m, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 21.9, 27.4, 49.0, 113.5, 118.1, 122.7, 123.0 (q, J_{CF} = 280.7 Hz), 127.0, 128.7, 129.4, 129.7, 130.9 (q,

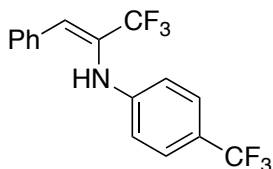
$J_{CF} = 29.9$ Hz), 132.3, 133.3 (q, $J_{CF} = 3.5$ Hz), 142.2. ^{19}F NMR (470 MHz, CDCl_3): δ 97.21 (s, 3F). IR (KBr) 3026, 2933, 2847, 2361, 1603, 1493, 1397, 1269, 1168, 1114, 939, 748, 692 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{18}\text{H}_{17}\text{F}_3\text{N}$: 304.13131, found: 304.13279. (*E*)-**5ac**: In the ^1H NMR, all peaks overlap with major (*Z*)-isomer. ^{19}F NMR (470 MHz, CDCl_3): δ 101.77 (s, 3F).



(Z)-1-(3,3,3-Trifluoro-1-phenylprop-1-en-2-yl)indoline (5ae): Isolated yield: 81%. Yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 3.16 (t, $J = 8.5$ Hz, 2H), 3.82 (t, $J = 8.5$ Hz, 2H), 6.15 (d, $J = 7.5$ Hz, 1H), 6.66 (t, $J = 7.5$ Hz, 1H), 6.87 (t, $J = 7.5$ Hz, 1H), 6.98 (s, 1H), 7.13 (d, $J = 7.5$ Hz, 1H), 7.21–7.24 (m, 3H), 7.37–7.80 (m, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 28.6, 51.1, 108.5, 118.7, 122.6, (q, $J_{CF} = 279.4$ Hz), 124.6, 126.9, 127.2 (q, $J_{CF} = 30.0$ Hz), 127.8 (q, $J_{CF} = 4.8$ Hz), 128.4, 129.0, 129.2, 129.6, 132.6, 146.9. ^{19}F NMR (470 MHz, CDCl_3): δ 97.04 (s, 3F). IR (KBr) 3030, 2935, 2866, 1638, 1603, 1486, 1419, 1266, 1111, 733, 693 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{17}\text{H}_{15}\text{F}_3\text{N}$: 290.11566, found: 290.11782. (*E*)-**5ae**: In the ^1H NMR, all peaks overlap with major (*Z*)-isomer. ^{19}F NMR (470 MHz, CDCl_3): δ 101.03 (s, 3F).

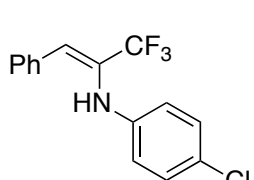


(Z)-N-(3,3,3-Trifluoro-1-phenylprop-1-en-2-yl)aniline (5af): Isolated yield: 66%. Yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 5.21 (s, 1H), 6.63 (d, $J = 8.0$ Hz, 2H), 6.77–6.82 (m, 2H), 7.10 (t, $J = 8.0$ Hz, 2H), 7.18–7.23 (m, 3H), 7.40 (m, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 115.4, 120.3, 122.5 (q, $J_{CF} = 275.9$ Hz), 122.8 (q, $J_{CF} = 3.6$ Hz), 125.3 (q, $J_{CF} = 31.1$ Hz), 128.3, 128.7, 129.0, 129.6, 132.6, 141.9. ^{19}F NMR (470 MHz, CDCl_3): δ 91.53 (s, 3F). IR (KBr) 3358, 3061, 1682, 1601, 1498, 1450, 1274, 1167, 1065, 937, 841, 752, 692 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{15}\text{H}_{13}\text{F}_3\text{N}$: 264.10001, found: 264.10290.



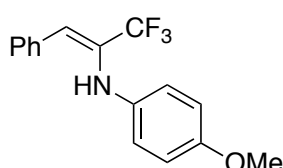
(Z)-N-(3,3,3-Trifluoro-1-phenylprop-1-en-2-yl)-4-(trifluoromethyl)aniline (5ag): Isolated yield: 84%. Yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 5.37 (s, 1H), 6.67 (d, $J = 8.5$ Hz, 2H), 6.94 (s, 1H), 7.21–7.27 (m, 3H), 7.36 (d, $J = 8.5$ Hz, 2H), 7.40–7.43 (m, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 114.6, 122.1 (q, $J_{CF} = 33.5$ Hz), 122.4 (q, $J_{CF} = 274.6$ Hz), 124.3 (q, $J_{CF} = 32.3$ Hz), 124.5 (q, $J_{CF} = 269.9$ Hz), 126.1 (q, $J = 3.5$ Hz), 126.5 (q, $J_{CF} = 3.6$ Hz), 128.6, 129.4, 129.7, 132.0, 145.2.

^{19}F NMR (470 MHz, CDCl_3): δ 91.47 (s, 3F), 100.28 (s, 3F). IR (KBr) 3648, 2361, 1698, 1508, 1325, 1186, 1067, 454, 420 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}-\text{H}]^- \text{C}_{16}\text{H}_{11}\text{F}_6\text{N}$: 330.07174, found: 330.07456.



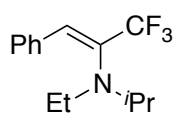
(Z)-4-Chloro-*N*-(3,3,3-trifluoro-1-phenylprop-1-en-2-yl)aniline (5ah):

Isolated yield: 60%. Yellow oil. ^1H NMR (500 MHz, acetone- d_6): δ 6.73 (d, $J = 8.5$ Hz, 2H), 7.00 (s, 1H), 7.08 (d, $J = 8.5$ Hz, 2H), 7.17 (s, 1H), 7.25–7.29 (m, 3H), 7.53–7.57 (m, 2H). ^{13}C NMR (125 MHz, acetone- d_6): δ 117.2, 123.7 (q, $J_{\text{CF}} = 274.6$ Hz), 124.3, 125.3 (q, $J_{\text{CF}} = 3.6$ Hz), 126.2 (q, $J_{\text{CF}} = 31.1$ Hz), 129.1, 129.5, 129.8, 130.5, 133.6, 143.0. ^{19}F NMR (470 MHz, acetone- d_6): δ 94.16 (s, 3F). IR (KBr) 3399, 3062, 1596, 1492, 1274, 1172, 1118, 1066, 817, 754, 693 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}-\text{H}]^- \text{C}_{15}\text{H}_{10}\text{ClF}_3\text{N}$: 296.04539, found: 296.04312.



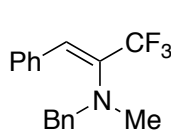
(Z)-4-Methoxy-*N*-(3,3,3-trifluoro-1-phenylprop-1-en-2-yl)aniline (5ai):

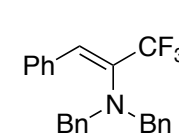
Isolated yield: 45%. Yellow oil. ^1H NMR (500 MHz, acetone- d_6): δ 3.65 (s, 3H), 6.50–6.58 (m, 4H), 6.61–6.72 (m, 2H), 7.04–7.11 (m, 3H), 7.31–7.39 (m, 2H). ^{13}C NMR (125 MHz, acetone- d_6): δ 55.6, 115.0, 117.6, 121.3 (q, $J_{\text{CF}} = 4.8$ Hz), 123.8 (q, $J_{\text{CF}} = 274.4$ Hz), 127.4 (q, $J_{\text{CF}} = 31.1$ Hz), 128.9, 129.1, 130.4, 134.1, 137.0, 154.5. ^{19}F NMR (470 MHz, acetone- d_6): δ 94.47 (s, 3F). IR (KBr) 3339, 2937, 2838, 1703, 1512, 1244, 1161, 1115, 1032, 828, 695 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+ \text{C}_{16}\text{H}_{15}\text{F}_3\text{NO}$: 294.11057, found: 294.11337.

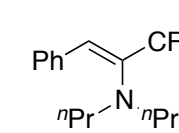


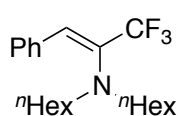
(Z)-*N*-Ethyl-3,3,3-trifluoro-*N*-isopropyl-1-phenylprop-1-en-2-amine (7aa):

Isolated yield: 65%. Colorless oil. ^1H NMR (500 MHz, CDCl_3): δ 1.01 (t, $J = 7.0$ Hz, 3H), 1.09 (d, $J = 6.5$ Hz, 6H), 2.94 (q, $J = 7.0$ Hz, 2H), 3.28 (sep, $J = 6.5$ Hz, 1H), 6.63 (s, 1H), 7.26 (t, $J = 7.5$ Hz, 1H), 7.33 (t, $J = 7.5$ Hz, 2H), 7.73 (d, $J = 7.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 14.3, 21.1, 40.5, 53.1, 123.4 (q, $J_{\text{CF}} = 283.1$ Hz), 125.8 (q, $J_{\text{CF}} = 4.8$ Hz), 128.1, 128.2, 129.6, 134.2 (q, $J_{\text{CF}} = 27.5$ Hz), 134.7. ^{19}F NMR (470 MHz, CDCl_3): δ 99.53 (s, 3F). IR (KBr) 2975, 2931, 2876, 2361, 1449, 1264, 1159, 1112, 740, 696 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}-\text{H}]^- \text{C}_{14}\text{H}_{17}\text{F}_3\text{N}$: 256.13131 found: 256.12982. (*E*)-7aa: Selected ^1H NMR (500 MHz, CDCl_3): δ 6.27 (s, 1H), other peaks overlap with major (*Z*)-isomer. ^{19}F NMR (470 MHz, CDCl_3): δ 101.86 (s, 3F).


(Z)-N-Benzyl-3,3,3-trifluoro-N-methyl-1-phenylprop-1-en-2-amine (7ab): Isolated yield: 82%. Yellow oil. ¹H NMR (500 MHz, CDCl₃): δ 2.53 (s, 3H), 3.95 (s, 2H), 6.55 (s, 1H), 7.22–7.33 (m, 8H), 7.37 (d, *J* = 8.0 Hz, 2H). ¹³C NMR (125 MHz, CDCl₃): δ 39.6, 59.0, 120.6 (q, *J*_{CF} = 4.8 Hz), 123.2 (q, *J*_{CF} = 280.5), 127.2, 127.9, 128.1, 128.3, 128.6, 129.4, 134.3, 136.9 (q, *J*_{CF} = 27.5 Hz), 137.8. ¹⁹F NMR (470 MHz, CDCl₃): δ 98.42 (s, 3F). IR (KBr) 3028, 2854, 1634, 1449, 1269, 1160, 1112, 1051, 734, 697 cm⁻¹. HRMS (ESI): *m/z*: calcd for [M] C₁₇H₁₆F₃N: 291.12348, found: 291.12151. **(E)-7ab:** Selected ¹H NMR (500 MHz, CDCl₃): δ 4.08 (s, 2H), 6.13 (s, 1H), other peaks overlap with major (Z)-isomer. ¹⁹F NMR (470 MHz, CDCl₃): δ 103.66 (s, 3F).

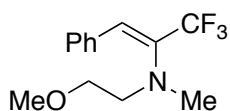

(Z)-N,N-Dibenzyl-3,3,3-trifluoro-1-phenylprop-1-en-2-amine (7ac): Isolated yield: 76%. White solid. Mp 48–49 °C. ¹H NMR (500 MHz, CDCl₃): δ 3.89 (s, 4H), 6.49 (s, 1H), 6.79 (d, *J* = 7.5 Hz, 2H), 7.12–7.35 (m, 13H). ¹³C NMR (125 MHz, CDCl₃): δ 54.8, 118.6 (q, *J*_{CF} = 4.8 Hz), 123.3 (q, *J*_{CF} = 278.3 Hz), 127.4, 127.5, 127.8, 128.4, 128.8, 134.4, 135.2 (q, *J*_{CF} = 28.8 Hz), 137.4. ¹⁹F NMR (470 MHz, CDCl₃): δ 99.61 (s, 3F). IR (KBr) 3063, 3029, 1622, 1494, 1454, 1428, 1268, 1163, 1074, 984, 754, 700, 597 cm⁻¹. HRMS (ESI): *m/z*: calcd for [M+Na]⁺ C₂₃H₂₀F₃NNa: 390.14455, found: 390.14473. **(E)-7ac:** Selected ¹H NMR (500 MHz, CDCl₃): δ 4.09 (s, 4H), 6.06 (s, 1H), other peaks overlap with major (Z)-isomer. ¹⁹F NMR (470 MHz, CDCl₃): δ 102.98 (s, 3F).


(Z)-3,3,3-Trifluoro-1-phenyl-N,N-dipropylprop-1-en-2-amine (7ad): Isolated yield: 77%. Colorless oil. ¹H NMR (500 MHz, CDCl₃): δ 0.80 (t, *J* = 7.5 Hz, 6H), 1.45–1.54 (m, 4H), 2.83 (t, *J* = 7.5 Hz, 4H), 6.45 (s, 1H), 7.25 (t, *J* = 7.5 Hz, 1H), 7.32 (t, *J* = 7.5 Hz, 2H), 7.53 (d, *J* = 7.5 Hz, 2H). ¹³C NMR (125 MHz, CDCl₃): δ 11.4, 21.5, 54.4, 120.5 (q, *J*_{CF} = 4.8 Hz), 123.2 (q, *J*_{CF} = 280.7 Hz), 127.7, 128.1, 129.3, 134.7, 135.2 (q, *J*_{CF} = 27.5 Hz). ¹⁹F NMR (470 MHz, CDCl₃): δ 98.92 (s, 3F). IR (KBr) 2964, 2875, 1629, 1449, 1258, 1158, 1114, 753, 695 cm⁻¹. HRMS (ESI): *m/z*: calcd for [M+H]⁺ C₁₅H₂₁F₃N: 272.16261, found: 272.16418. **(E)-7ad:** Selected ¹H NMR (500 MHz, CDCl₃): δ 6.18 (s, 1H), other peaks overlap with major (Z)-isomer. ¹⁹F NMR (470 MHz, CDCl₃): δ 102.74 (s, 3F).



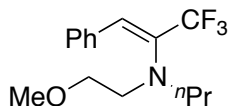
(Z)-N-Hexyl-N-(3,3,3-trifluoro-1-phenylprop-1-en-2-yl)hexan-1-amine

(7ae): Isolated yield: 97%. Yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 0.85 (t, $J = 6.5$ Hz, 6H), 1.14–1.28 (m, 12H), 1.41–1.48 (m, 4H), 2.85 (t, $J = 8.5$ Hz, 4H), 6.45 (s, 1H), 7.24 (t, $J = 7.5$ Hz, 1H), 7.32 (t, $J = 7.5$ Hz, 2H), 7.52 (d, $J = 7.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 13.9, 22.6, 26.7, 28.2, 31.6, 52.5, 120.3 (q, $J_{\text{CF}} = 4.8$ Hz), 123.2 (q, $J_{\text{CF}} = 281.9$ Hz), 127.7, 128.0, 129.3, 134.7, 135.2 (q, $J_{\text{CF}} = 27.5$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ 98.93 (s, 3F). IR (KBr) 2930, 2858, 1629, 1449, 1262, 1159, 1115, 752, 695 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{21}\text{H}_{33}\text{F}_3\text{N}$: 356.25651, found: 356.25883. **(E)-7ae**: Selected ^1H NMR (500 MHz, CDCl_3): δ 6.16 (s, 1H), other peaks overlap with major (Z)-isomer. ^{19}F NMR (470 MHz, CDCl_3): δ 99.06 (s, 3F).



(Z)-3,3,3-Trifluoro-N-(2-methoxyethyl)-N-methyl-1-phenylprop-1-en-2

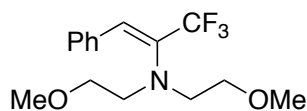
-amine (7af): Isolated yield: 70%. Pale yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 2.72 (s, 3H), 3.08 (t, $J = 5.5$ Hz, 2H), 3.31 (s, 3H), 3.46 (t, $J = 5.5$ Hz, 2H), 6.45 (s, 1H), 7.25 (t, $J = 7.5$ Hz, 1H), 7.34 (t, $J = 7.5$ Hz, 2H), 7.56 (d, $J = 7.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 41.3, 53.4, 58.6, 70.9, 120.3 (q, $J_{\text{CF}} = 4.8$ Hz), 123.1 (q, $J_{\text{CF}} = 280.7$ Hz), 127.9, 128.1, 129.5, 134.3, 136.0 (q, $J_{\text{CF}} = 27.5$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ 98.25 (s, 3F). IR (KBr) 2878, 1635, 1449, 1405, 1268, 1159, 1111, 1065, 759, 696 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{13}\text{H}_{17}\text{F}_3\text{NO}$: 260.12622, found: 260.12739. **(E)-7af**: All peaks overlap with major (Z)-isomer. ^{19}F NMR (470 MHz, CDCl_3): δ 103.47 (s, 3F).



(Z)-3,3,3-Trifluoro-N-(2-methoxyethyl)-1-phenyl-N-propylprop-1-en-

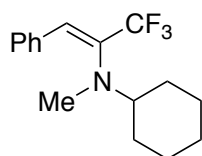
2-amine (7ag): Isolated yield: 87%. Pale yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 0.79 (t, $J = 8.0$ Hz, 3H), 1.45–1.52 (m, 2H), 2.87 (t, $J = 8.0$ Hz, 2H), 3.13 (t, $J = 6.0$ Hz, 2H), 3.29 (s, 3H), 3.43 (t, $J = 6.0$ Hz, 2H), 6.47 (s, 1H), 7.25 (t, $J = 7.5$ Hz, 1H), 7.33 (t, $J = 7.5$ Hz, 2H), 7.58 (d, $J = 7.5$ Hz, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 11.2, 21.6, 51.3, 55.5, 58.5, 71.3, 121.0 (q, $J_{\text{CF}} = 4.8$ Hz), 123.1 (q, $J_{\text{CF}} = 280.7$ Hz), 127.9, 128.1, 129.4, 134.4, 134.7 (q, $J_{\text{CF}} = 27.5$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ 98.87 (s, 3F). IR (KBr) 2964, 2876, 2361, 1631, 1449, 1265, 1159, 1111, 1013, 755, 696 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{15}\text{H}_{21}\text{F}_3\text{NO}$: 288.15752, found: 288.15997. **(E)-7ag**: Selected ^1H NMR (500 MHz,

CDCl₃): δ 6.32 (s, 1H), other peaks overlap with major (Z)-isomer. ¹⁹F NMR (470 MHz, CDCl₃): δ 102.63 (s, 3F).



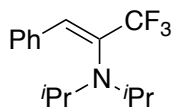
(Z)-3,3,3-Trifluoro-N,N-bis(2-methoxyethyl)-1-phenylprop-1-en-2-amine (7ah):

Isolated yield: 80%. Colorless oil. ¹H NMR (500 MHz, CDCl₃): δ 3.17 (t, J = 5.5 Hz, 4H), 3.29 (s, 6H), 3.42 (t, J = 5.5 Hz, 4H), 6.49 (s, 1H), 7.26 (t, J = 7.5 Hz, 1H), 7.33 (t, J = 7.5 Hz, 2H), 7.63 (d, J = 7.5 Hz, 2H). ¹³C NMR (125 MHz, CDCl₃): δ 52.4, 58.5, 71.4, 121.4 (q, J_{CF} = 4.7 Hz), 123.0 (q, J_{CF} = 281.8 Hz), 128.0, 128.2, 129.5, 133.8, 134.2 (q, J_{CF} = 27.5 Hz). ¹⁹F NMR (470 MHz, CDCl₃): δ 98.69 (s, 3F). IR (KBr) 3062, 2877, 2361, 1632, 1450, 1266, 1160, 1109, 1013, 835, 757, 697 cm⁻¹. HRMS (ESI): m/z : calcd for [M+H]⁺ C₁₅H₂₁F₃NO₂: 304.15244, found: 304.14970. **(E)-7ah**: All peaks overlap with major (Z)-isomer. ¹⁹F NMR (470 MHz, CDCl₃): δ 102.53 (s, 3F).



(Z)-N-Methyl-N-(3,3,3-trifluoro-1-phenylprop-1-en-2-yl)cyclohexanamine (7ai):

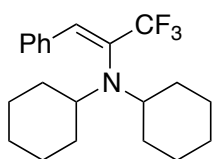
Isolated yield: 80%. Pale yellow oil. ¹H NMR (500 MHz, CDCl₃): δ 1.00–1.32 (m, 5H), 1.52–1.58 (m, 1H), 1.68–1.73 (m, 2H), 1.83–1.90 (m, 2H), 2.59 (s, 3H), 2.81–2.89 (m, 1H), 6.48 (s, 1H), 7.23–7.27 (m, 1H), 7.30–7.35 (m, 2H), 7.59–7.62 (m, 2H). ¹³C NMR (125 MHz, CDCl₃): δ 25.5, 25.7, 30.7, 35.3, 60.4, 121.9 (q, J_{CF} = 4.8 Hz), 123.4 (q, J_{CF} = 281.9 Hz), 127.9, 128.0, 129.5, 134.7, 136.4 (q, J_{CF} = 27.5 Hz). ¹⁹F NMR (470 MHz, CDCl₃): δ 99.39 (s, 3F). IR (KBr) 2933, 2857, 2361, 1628, 1450, 1266, 1157, 1111, 1046, 695 cm⁻¹. HRMS (ESI): m/z : calcd for [M+H]⁺ C₁₆H₂₁F₃N: 284.16261, found: 284.16076. **(E)-7ai**: Selected ¹H NMR (500 MHz, CDCl₃): δ 6.09 (s, 1H), other peaks overlap with major (Z)-isomer. ¹⁹F NMR (470 MHz, CDCl₃): δ 103.74 (s, 3F).



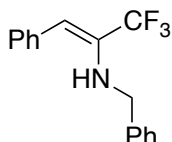
(Z)-3,3,3-Trifluoro-N,N-diisopropyl-1-phenylprop-1-en-2-amine (7aj):

Isolated yield: 53%. Colorless oil. ¹H NMR (500 MHz, CDCl₃): δ 1.10 (d, J = 7.0 Hz, 12H), 3.53–3.62 (m, 2H), 6.90 (s, 1H), 7.28–7.35 (m, 3H), 7.95 (d, J = 7.5 Hz, 2H). ¹³C NMR (125 MHz, CDCl₃): δ 20.6, 48.3, 124.1 (q, J_{CF} = 284.2 Hz), 128.0 (q, J_{CF} = 39.6 Hz), 128.1, 129.1, 130.4, 134.4, 134.5 (q, J_{CF} = 4.8 Hz). ¹⁹F NMR (470 MHz,

CDCl₃): δ 99.69 (s, 3F). IR (KBr) 2973, 2939, 1705, 1451, 1386, 1199, 1053, 934, 755, 717, 693 cm⁻¹. HRMS (ESI): m/z : calcd for [M+H]⁺ C₁₅H₂₁F₃N: 272.16261, found: 272.16184. (*E*)-**7aj**: Selected ¹H NMR (500 MHz, CDCl₃): δ 1.15 (d, J = 7.0 Hz, 12H), 3.39–3.45 (m, 2H), 6.82 (s, 1H), other peaks overlap with major (*Z*)-isomer. ¹⁹F NMR (470 MHz, CDCl₃): δ 101.89 (s, 3F).

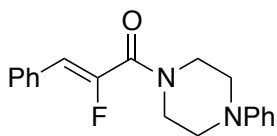


(Z)-N-Cyclohexyl-N-(3,3,3-trifluoro-1-phenylprop-1-en-2-yl)cyclohexanamine (7ak): Isolated yield: 31%. Colorless oil. ¹H NMR (500 MHz, CDCl₃): δ 1.01–1.13 (m, 2H), 1.16–1.38 (m, 8H), 1.58–1.62 (m, 2H), 1.65–1.73 (m, 4H), 1.90–1.99 (m, 4H), 3.13–3.22 (m, 2H), 6.84 (s, 1H), 7.28–7.36 (m, 3H), 7.92–7.96 (m, 2H). ¹³C NMR (125 MHz, CDCl₃): δ 25.9, 26.1, 30.8, 56.5, 124.3 (q, J_{CF} = 285.5 Hz), 128.2, 129.0, 130.0, 132.7 (q, J_{CF} = 27.7 Hz), 134.3 (q, J_{CF} = 3.6 Hz), 134.6. ¹⁹F NMR (470 MHz, CDCl₃): δ 100.23 (s, 3F). IR (KBr) 2931, 2855, 2361, 1449, 1257, 1158, 1108, 934, 741, 694 cm⁻¹. HRMS (ESI): m/z : calcd for [M+H]⁺ C₂₁H₂₉F₃N: 352.22521, found: 352.22319. (*E*)-**7ak**: Selected ¹H NMR (500 MHz, CDCl₃): δ 2.91–3.00 (m, 2H), other peaks overlap with major (*Z*)-isomer. ¹⁹F NMR (470 MHz, CDCl₃): δ 105.86 (s, 3F).

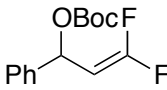


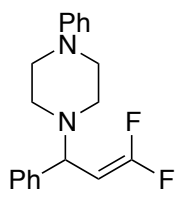
(Z)-N-Benzyl-3,3,3-trifluoro-1-phenylprop-1-en-2-amine (7al): Isolated yield: 12%. Yellow oil. ¹H NMR (500 MHz, acetone-*d*₆): δ 4.12 (d, J = 7.0 Hz, 2H), 4.86 (brs, 1H), 6.05 (s, 1H), 7.18 (d, J = 7.5 Hz, 2H), 7.20–7.29 (m, 4H), 7.35 (t, J = 7.5 Hz, 2H), 7.41 (d, J = 7.5 Hz, 2H). ¹³C NMR (125 MHz, acetone-*d*₆): δ 50.2, 107.7 (q, J_{CF} = 4.8 Hz), 123.6 (q, J_{CF} = 274.6 Hz), 127.7, 127.9, 128.6, 129.0, 129.1, 129.7, 133.8 (q, J_{CF} = 30.0 Hz), 135.8, 140.2. ¹⁹F NMR (470 MHz, acetone-*d*₆): δ 95.91. IR (KBr) 3031, 2962, 2361, 1697, 1455, 1261, 1175, 1115, 802, 751, 698 cm⁻¹. HRMS (ESI): m/z : calcd for [M+H]⁺ C₁₆H₁₅F₃N: 278.11566, found: 278.11429.

Information of the reaction without Pd-catalyst:



We confirmed that the reaction of **1a''** with **2aa** provided 2-fluoro-3-phenyl-1-(4-phenylpiperazin-1-yl)prop-2-en-1-one in >90% isolated yield (Table 1, entry 1). ^1H NMR (500 MHz, CDCl_3): δ 3.21–3.26 (m, 4H), 3.81–3.86 (m, 4H), 6.62 (d, $J_{\text{HF}} = 39.0$ Hz, 1H), 6.90–6.96 (m, 3H), 7.27–7.43 (m, 5H), 7.58–7.61 (m, 2H). ^{13}C NMR (125 MHz, CDCl_3): δ 49.6, 115.8 (d, $J_{\text{CF}} = 4.8$ Hz), 116.7, 120.6, 128.7, 128.9, 129.2, 129.7 (d, $J_{\text{CF}} = 7.1$ Hz), 131.6, 150.2, 150.8, 152.4, 161.9 (d, $J_{\text{CF}} = 28.8$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ 47.76 (d, $J = 38.6$ Hz 1F). IR (KBr) 2921, 2818, 1613, 1492, 1440, 1266, 1232, 1131, 1015, 933, 752, 689 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{19}\text{H}_{20}\text{FN}_2\text{O}$: 311.15597, found: 311.15813.

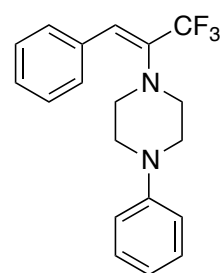
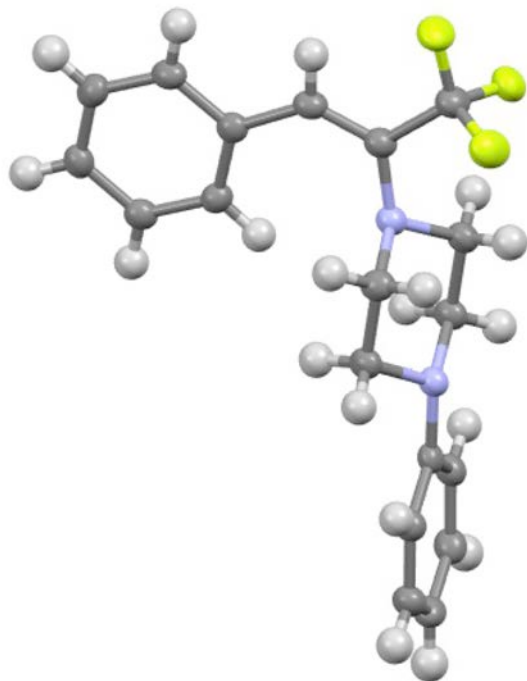

tert-Butyl (3,3-difluoro-1-phenylallyl) carbonate (8): Pale yellow oil. ^1H NMR (500 MHz, CDCl_3): δ 1.47 (s, 9H), 4.64 (dd, $J_{\text{HF}} = 23.5$ Hz, $J = 10.0$ Hz, 1H), 6.25 (d, $J = 10.0$ Hz, 1H), 7.30–7.39 (m, 5H). ^{13}C NMR (125 MHz, CDCl_3): δ 27.7, 71.7 (d, $J_{\text{CF}} = 9.5$ Hz), 80.2 (dd, $J_{\text{CF}} = 25.1, 17.8$ Hz), 82.7, 126.1, 128.4, 128.7, 138.6, 152.4, 157.1 (t, $J_{\text{CF}} = 292.6$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ 77.06 (d, $J_{\text{FF}} = 31.1$ Hz, 1F), 77.73 (dd, $J_{\text{FF}} = 31.1$ Hz, $J_{\text{FH}} = 24.0$ Hz, 1F). IR (KBr) 2982, 1750, 1457, 1273, 1159, 1080, 931, 881, 754, 698 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}-\text{H}]^-$ $\text{C}_{14}\text{H}_{17}\text{F}_2\text{O}_3$: 269.09893, found: 269.10156.


1-(3,3-Difluoro-1-phenylallyl)-4-phenylpiperazine (9): Yield: 18%. White solid. Mp 67–70 $^{\circ}\text{C}$. ^1H NMR (500 MHz, CDCl_3): δ 2.50–2.72 (m, 4H), 3.13–3.22 (m, 4H), 4.06 (d, $J = 10.5$ Hz, 1H), 4.50 (dd, $J_{\text{HF}} = 24.0$ Hz, $J = 10.5$ Hz, 1H), 6.84 (t, $J = 7.5$ Hz, 1H), 6.90 (d, $J = 9.0$ Hz, 2H), 7.21–7.30 (m, 3H), 7.32–7.40 (m, 4H). ^{13}C NMR (125 MHz, CDCl_3): δ 49.2, 50.6, 63.9 (d, $J_{\text{CF}} = 6.0$ Hz), 80.3 (dd, $J_{\text{CF}} = 20.4, 17.9$ Hz), 115.9, 119.6, 127.6, 128.6, 129.0, 141.0, 151.2, 156.6 (t, $J_{\text{CF}} = 289.0$ Hz). ^{19}F NMR (470 MHz, CDCl_3): δ 73.57 (dd, $J_{\text{FF}} = 40.0$ Hz, $J_{\text{FH}} = 24.0$ Hz, 1F), 76.13 (d, $J_{\text{FF}} = 40.0$ Hz, 1F). IR (KBr) 2810, 1743, 1601, 1495, 1454, 1332, 1279, 1180, 1004, 926, 762, 697 cm^{-1} . HRMS (ESI): m/z : calcd for $[\text{M}+\text{H}]^+$ $\text{C}_{19}\text{H}_{21}\text{F}_2\text{N}_2$: 315.16728, found: 315.16455.

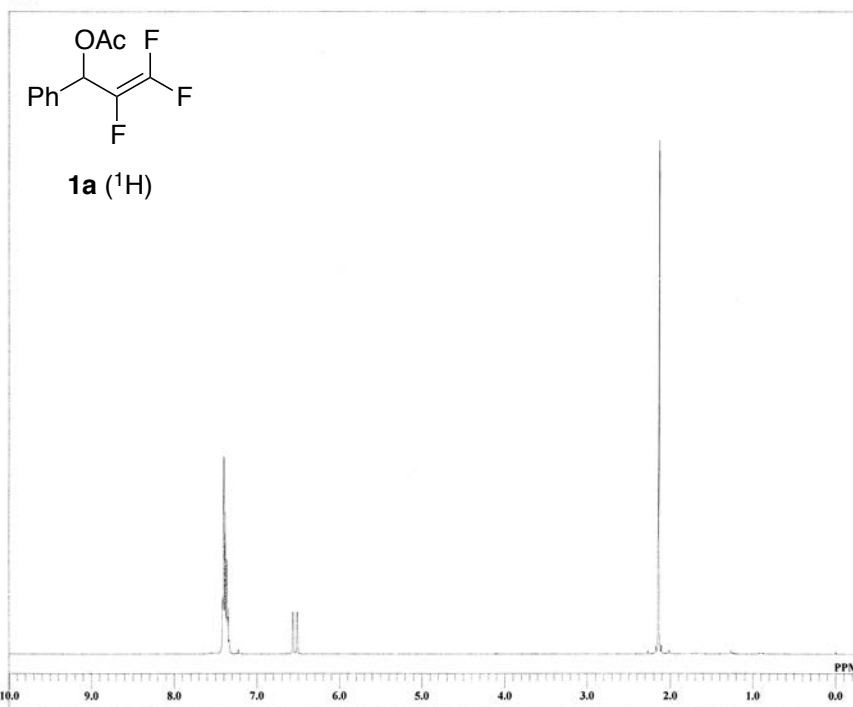
References

1. (a) Kawatsura, M.; Wada, S.; Hayase, S.; Itoh, T. *Synlett* **2006**, 2483–2485. (b) Takagi, Y.; Nakatani, T.; Itoh, T.; Oshiki, T. *Tetrahedron Lett.* **2000**, *41*, 7889–7892. (c) Takagi, Y.; Kashiwagi, M.; Kihara, H.; Itoh, T. *Tetrahedron Lett.* **1999**, *40*, 2801–2802. (d) Normant, J. F.; Foulon, J. P.; Masure, D.; Sauvêtre, R.; Villieras, J. *Synthesis* **1975**, 122–124. (e) Sauvêtre, R.; Normant, J. F. *Tetrahedron Lett.* **1981**, *22*, 957–958.
2. (a) White, D. A. *Inorg. Synth.* **1972**, *13*, 55–65. (b) Welch, A. J.; Murrall, N. W. *J. Organomet. Chem.* **1986**, *301*, 109–130.

X-ray structure of (**Z**)-**3aa**: CCDC number 1037126.

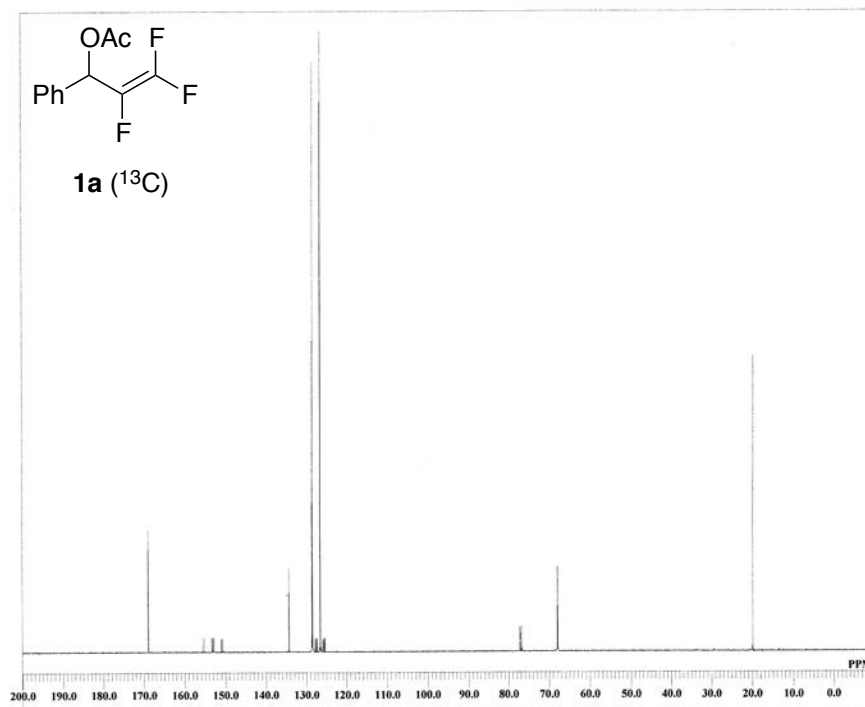


1a-1H



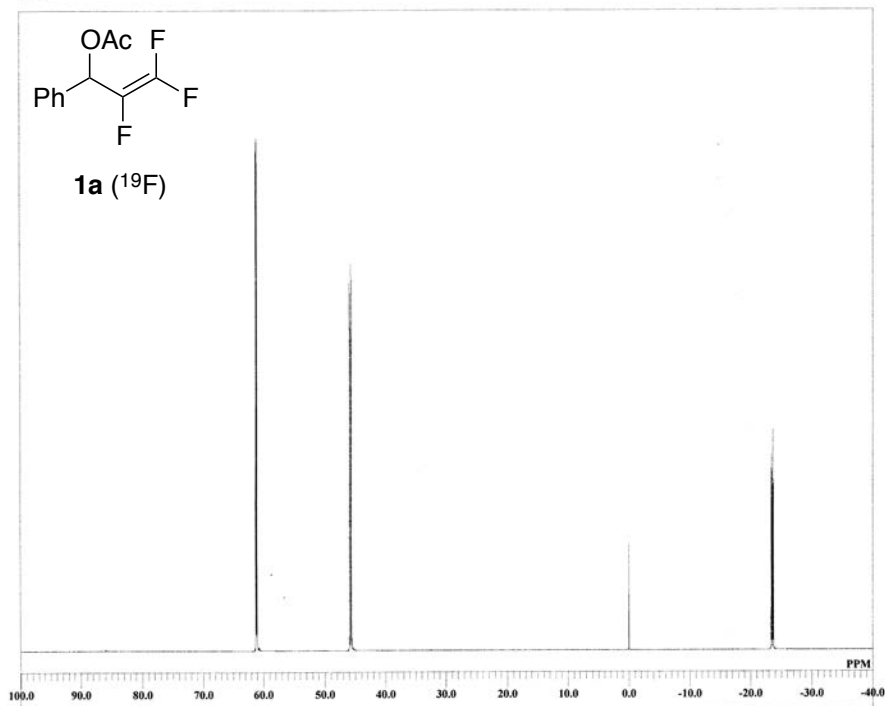
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 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
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 CTEMP 23.6 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 26

1a-13C



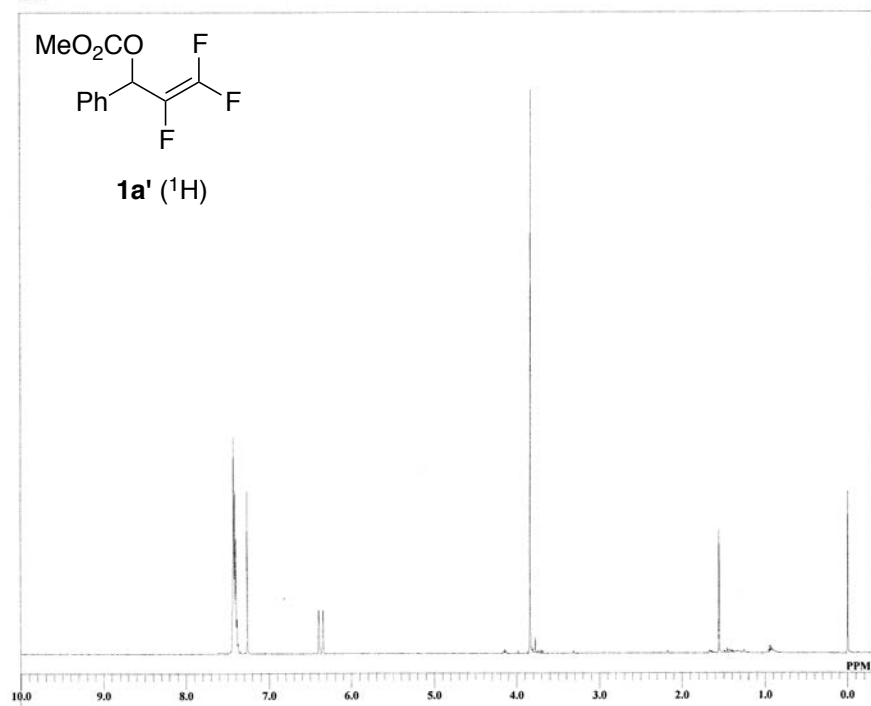
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 PD 2.0000 sec
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 BF 0.12 Hz
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1a-19F



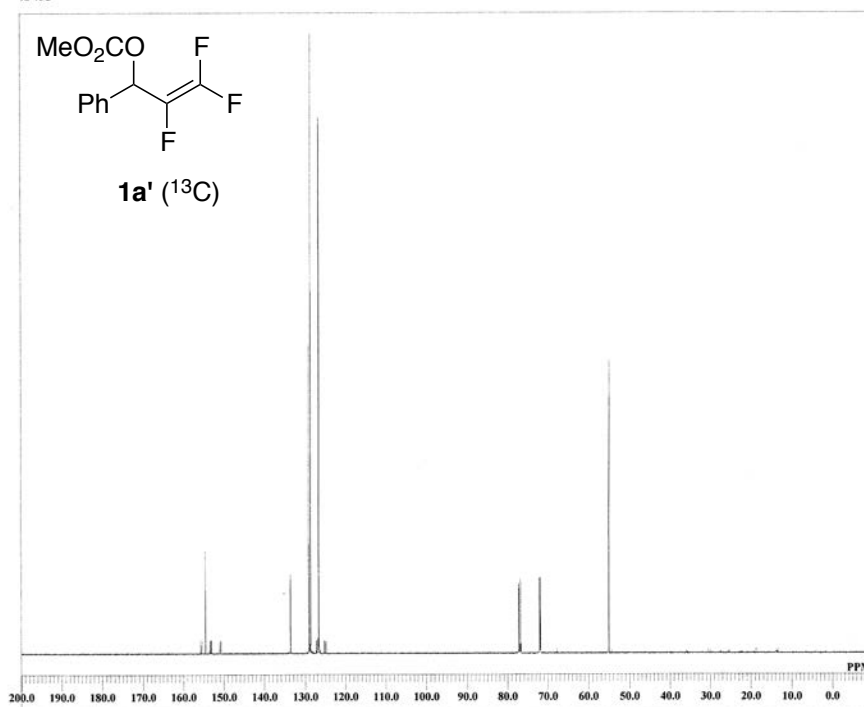
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 PD 5.0000 sec
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 BF 0.12 Hz
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1a'-1H



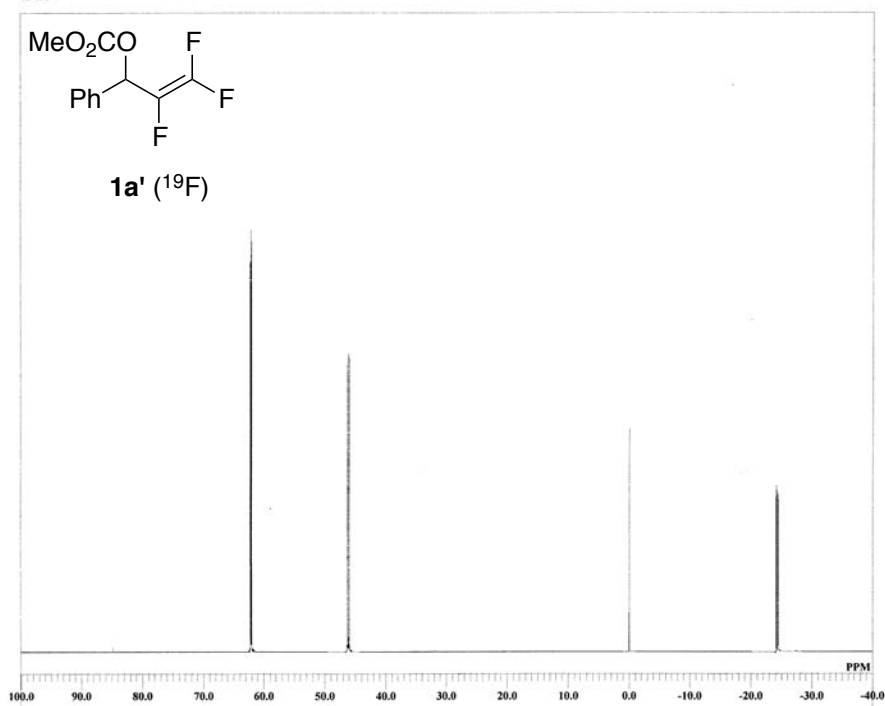
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 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
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 BF 0.12 Hz
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1a'-13C



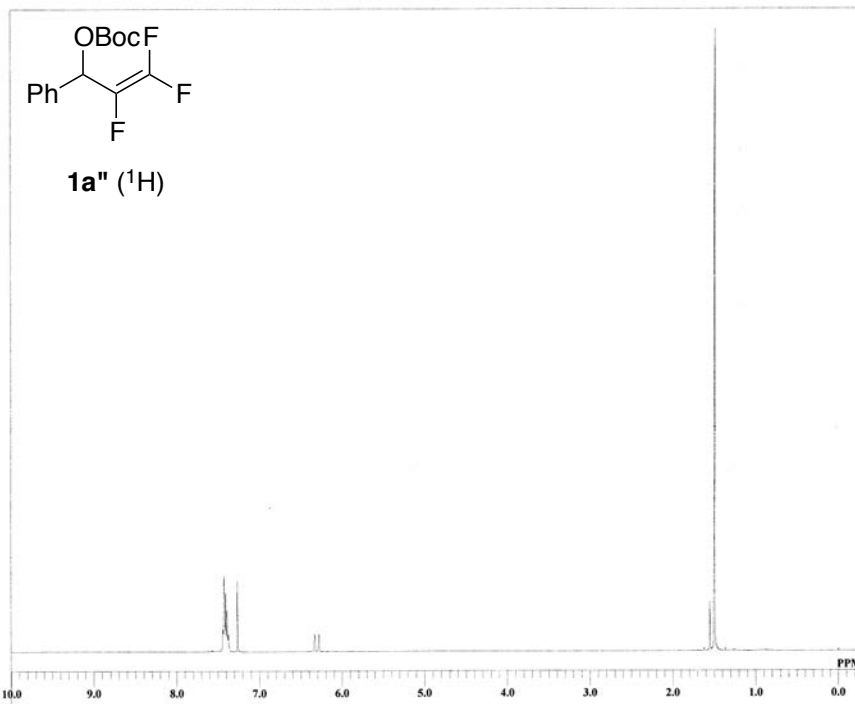
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 BF 0.12 Hz
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1a'-19F



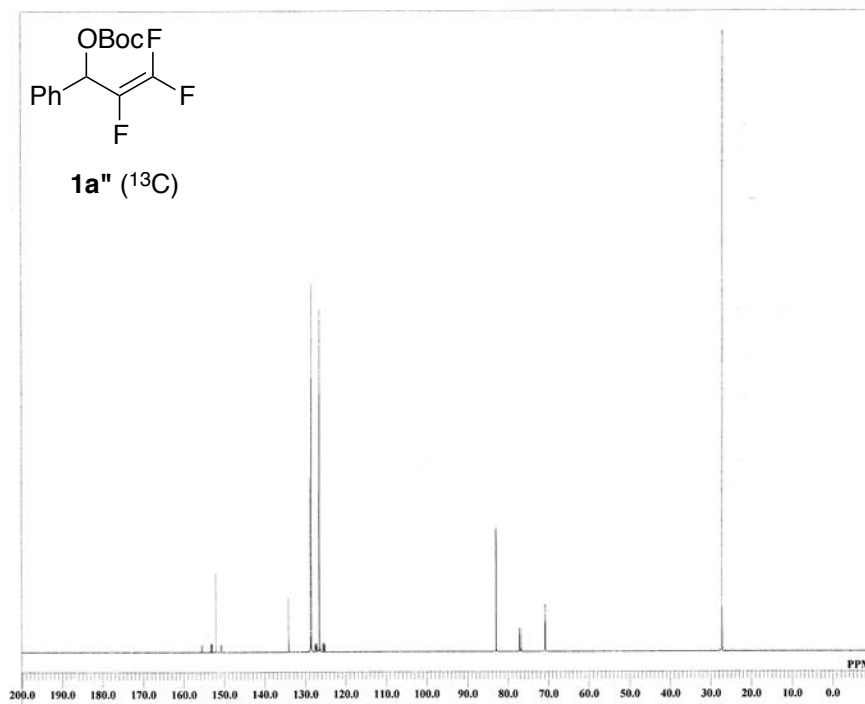
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 BF 0.12 Hz
 RGAIN 30

1a"-1H

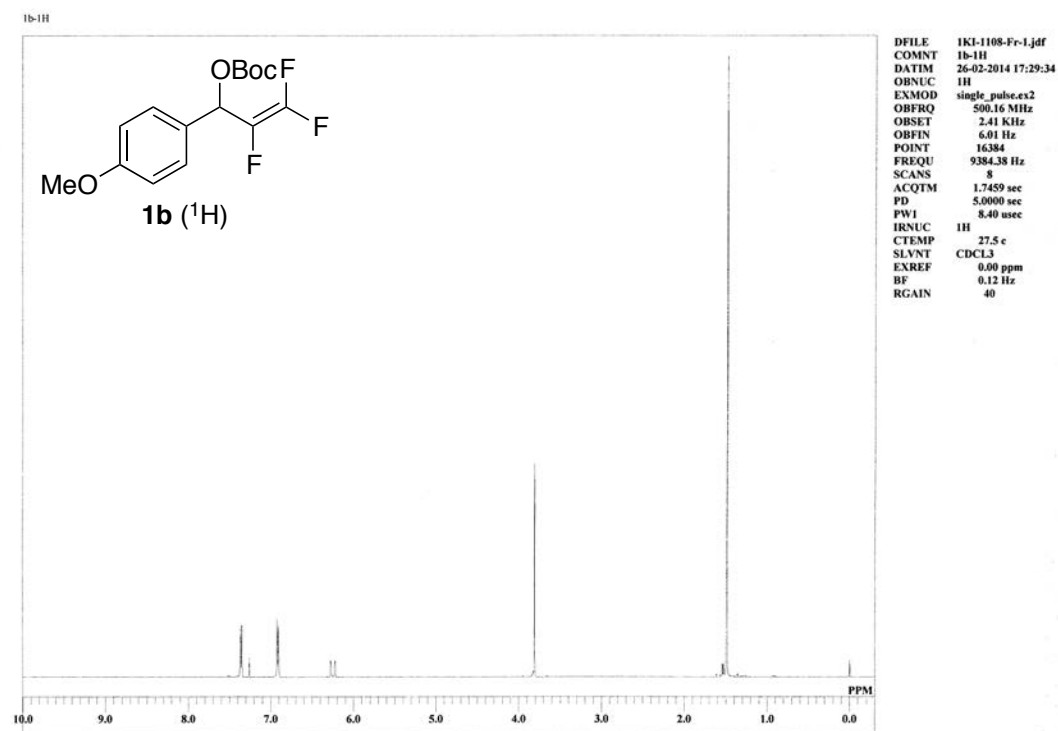
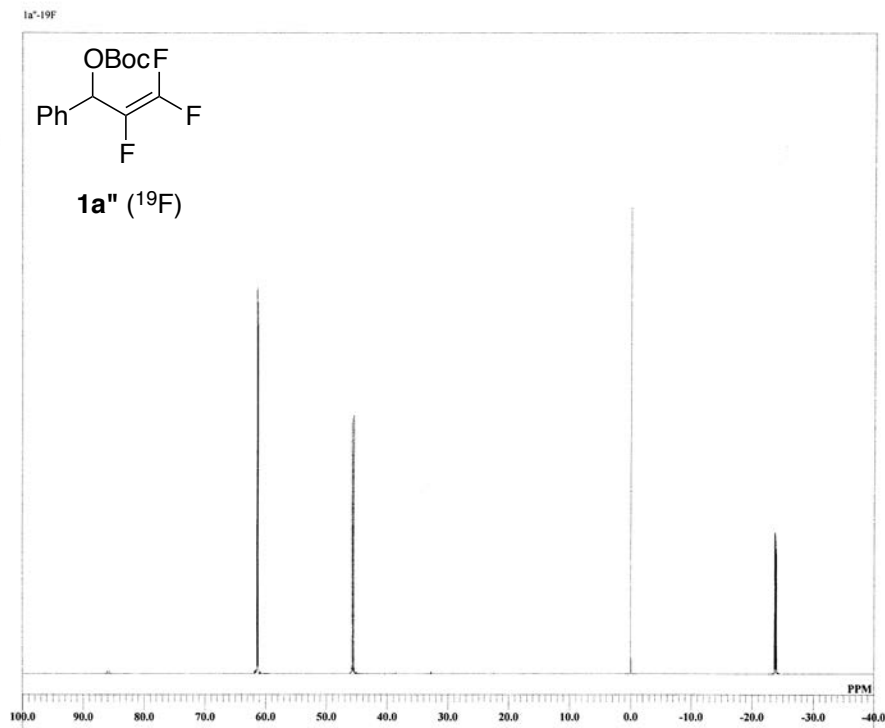


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 RGAIN 50

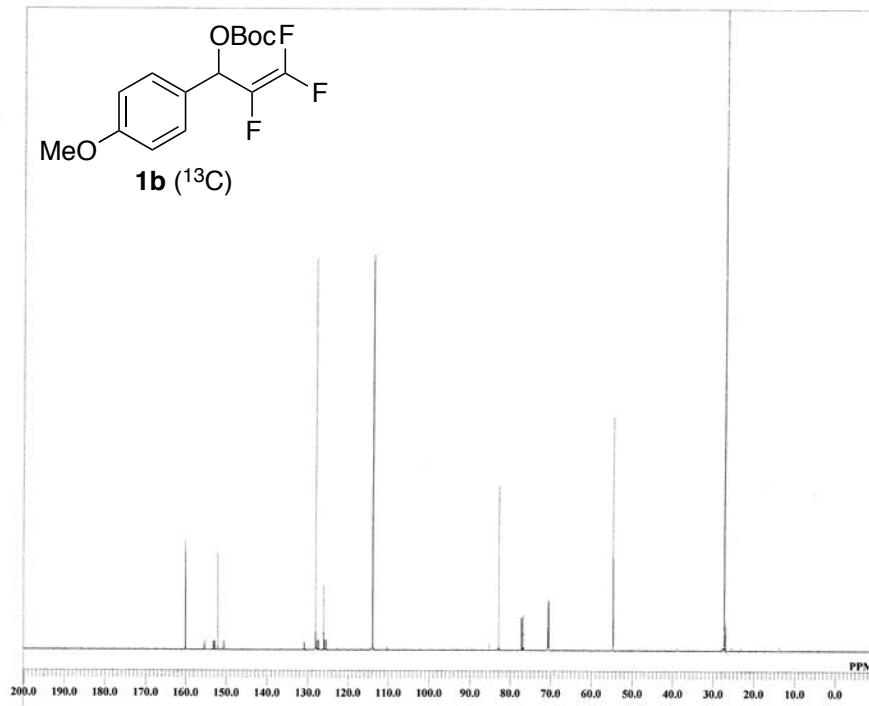
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 EXMOD single_pulse_dec
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 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 256
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 22.4 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 52

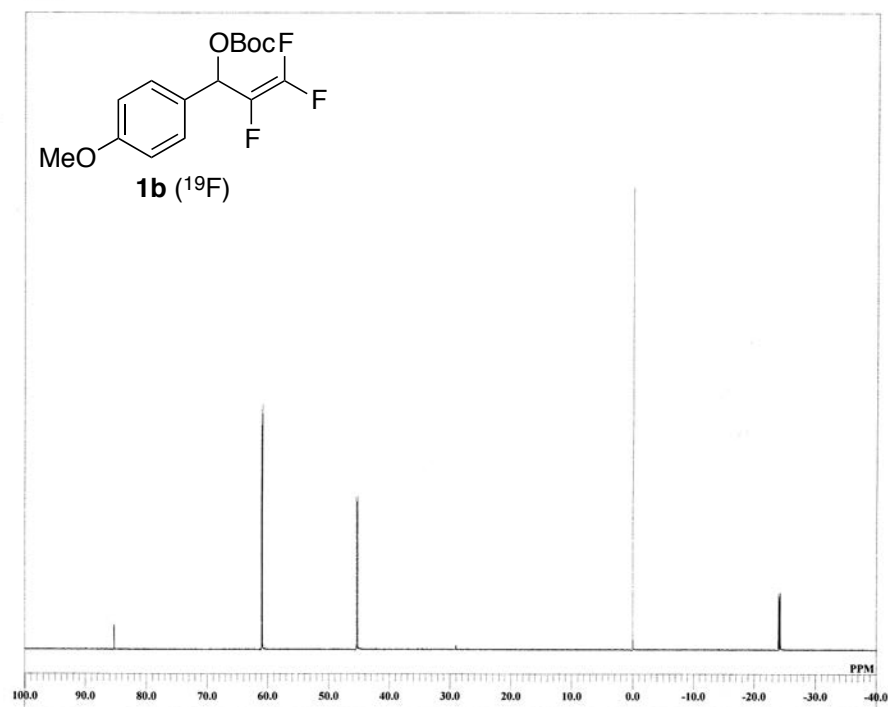


1b-13C



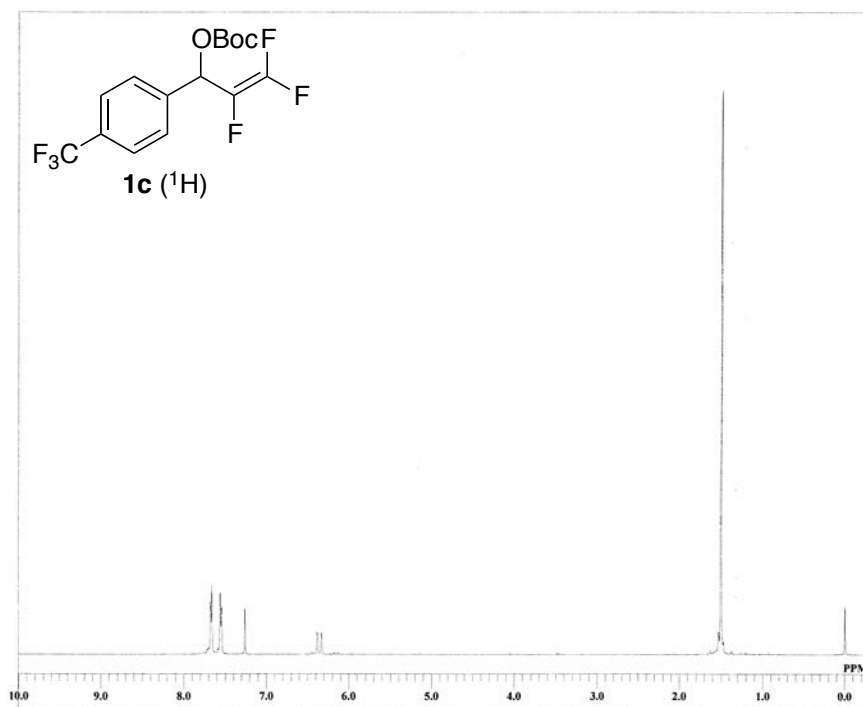
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 SCANS 64
 ACQTM 0.8336 sec
 PD 2.0000 sec
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 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 54

1b-19F



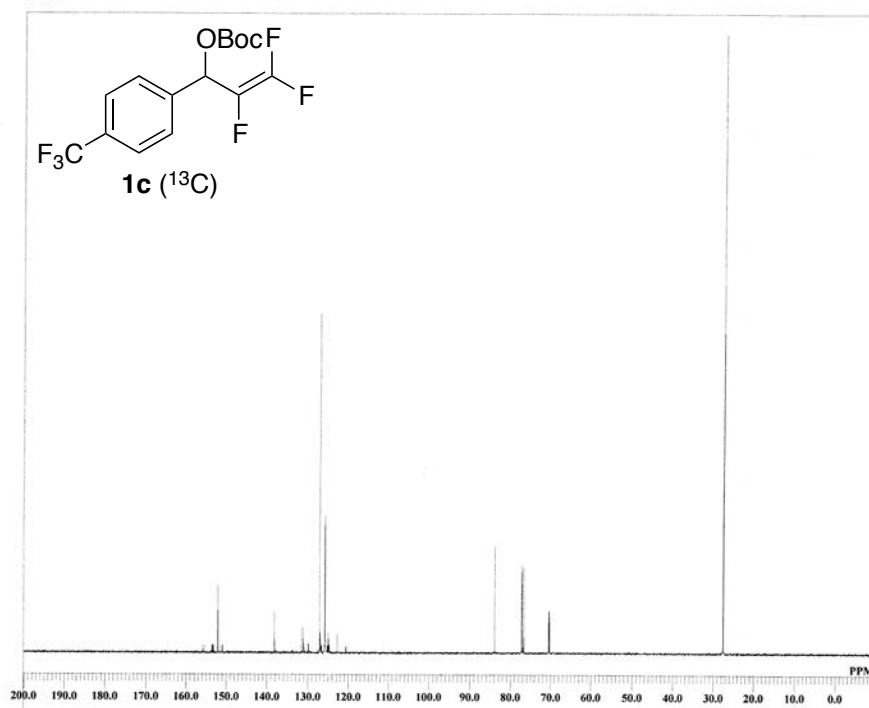
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 POINT 131072
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 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 8.60 usec
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 CTEMP 27.7 c
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 BF 0.12 Hz
 RGAIN 36

1c-1H

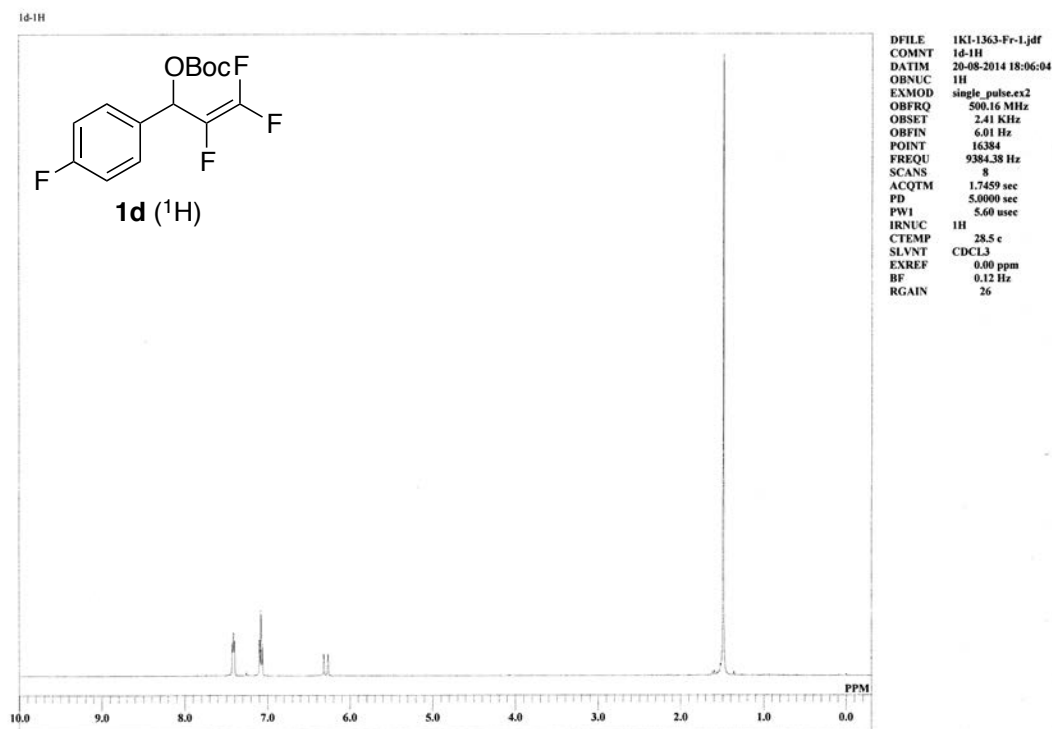
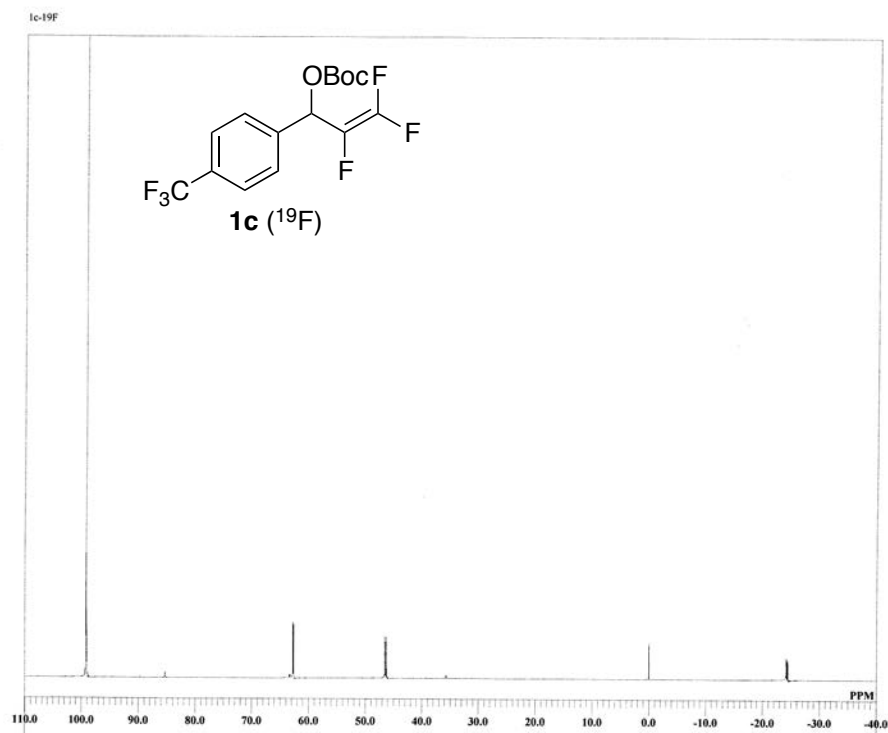


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 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
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 IRNUC 1H
 CTEMP 26.2 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 50

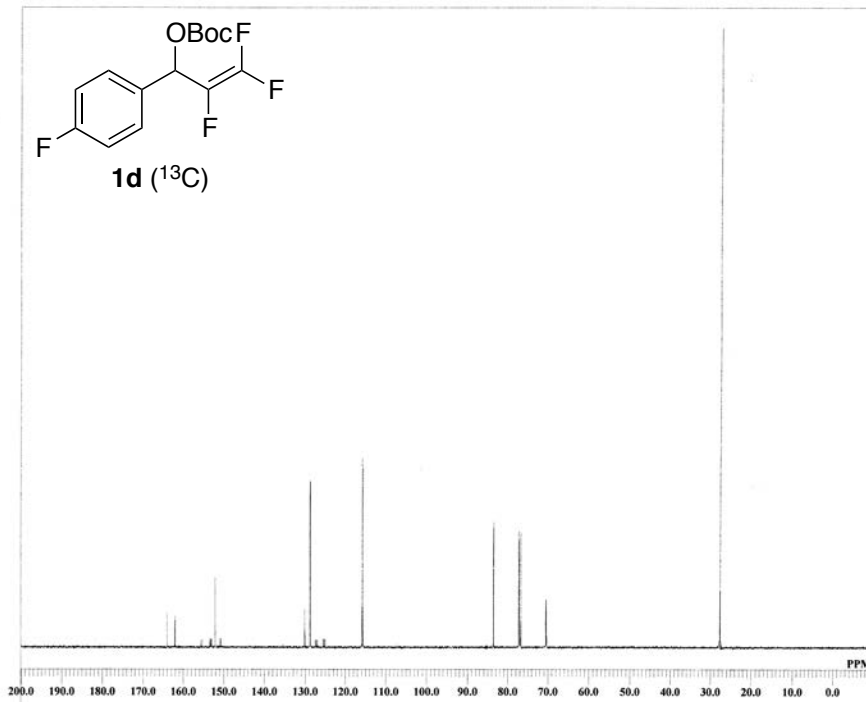
1c-13C



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 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 64
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 13C
 CTEMP 24.0 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 54

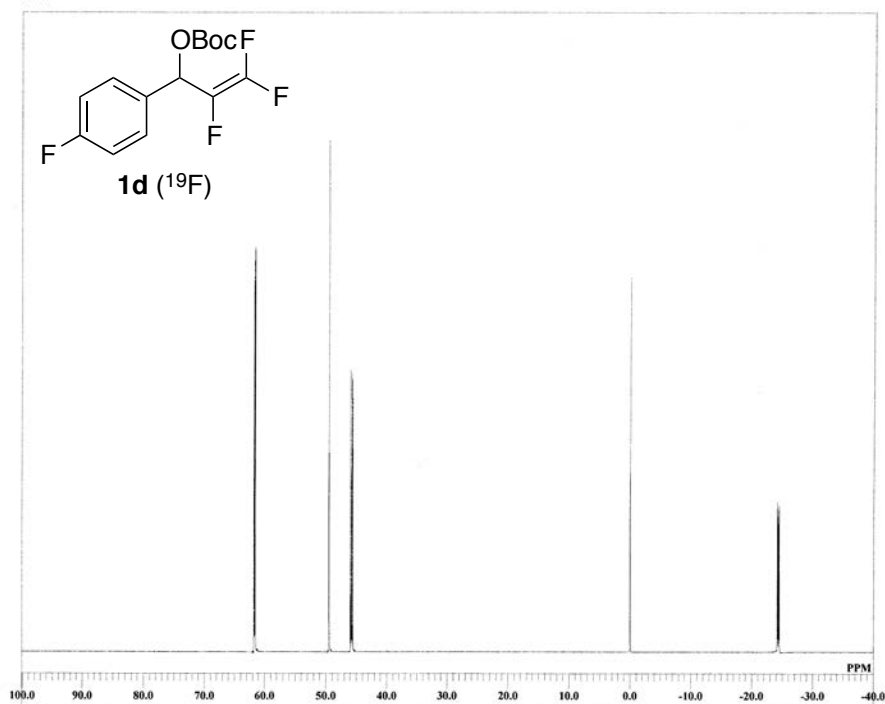


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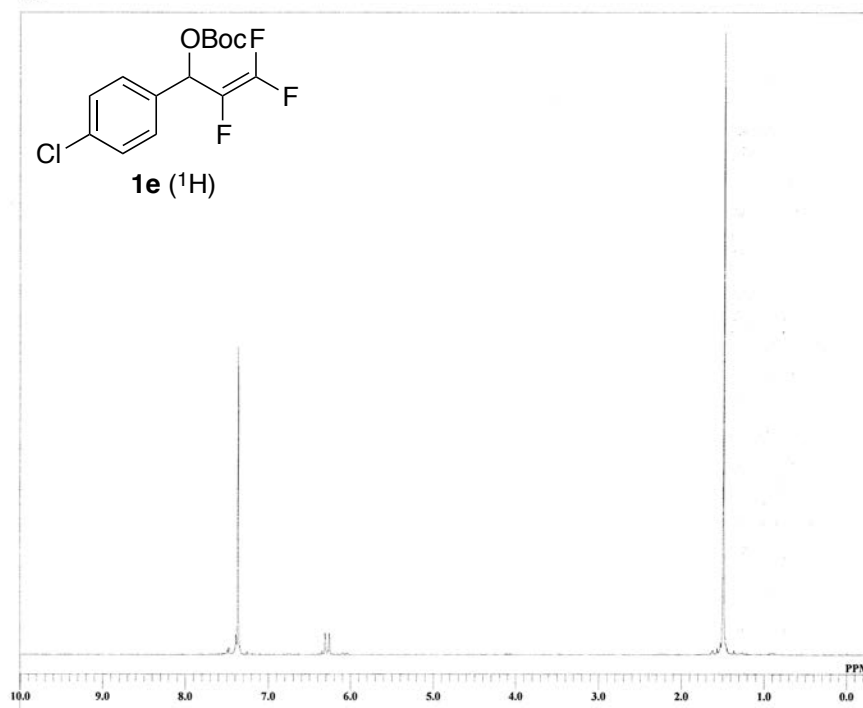
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 OBFIN 4.21 Hz
 POINT 32768
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 SCANS 128
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 PD 2.0000 sec
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 BF 0.12 Hz
 RGAIN 58

1d-19F



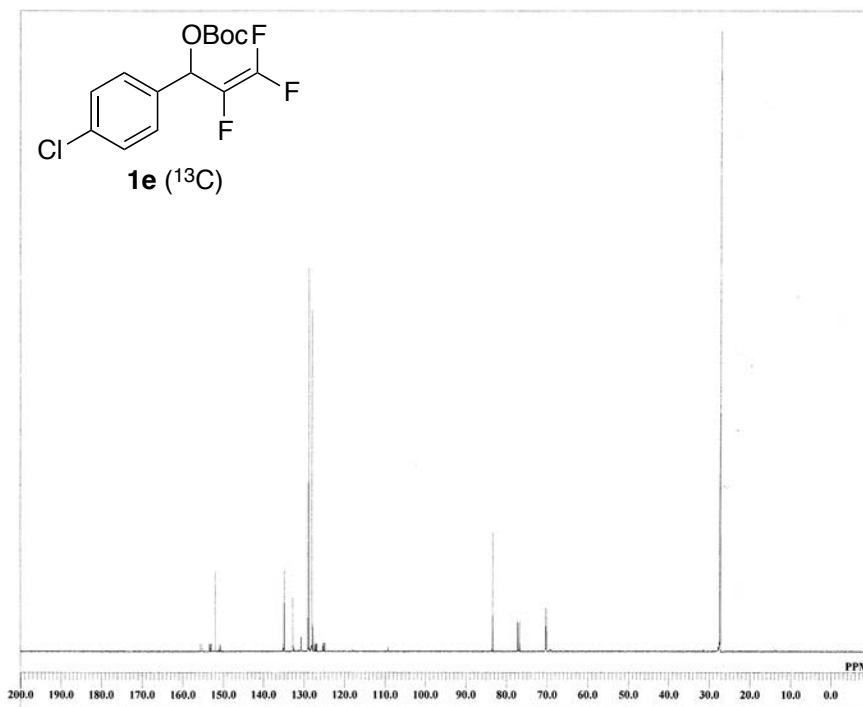
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 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
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 BF 0.12 Hz
 RGAIN 36

1e-1H



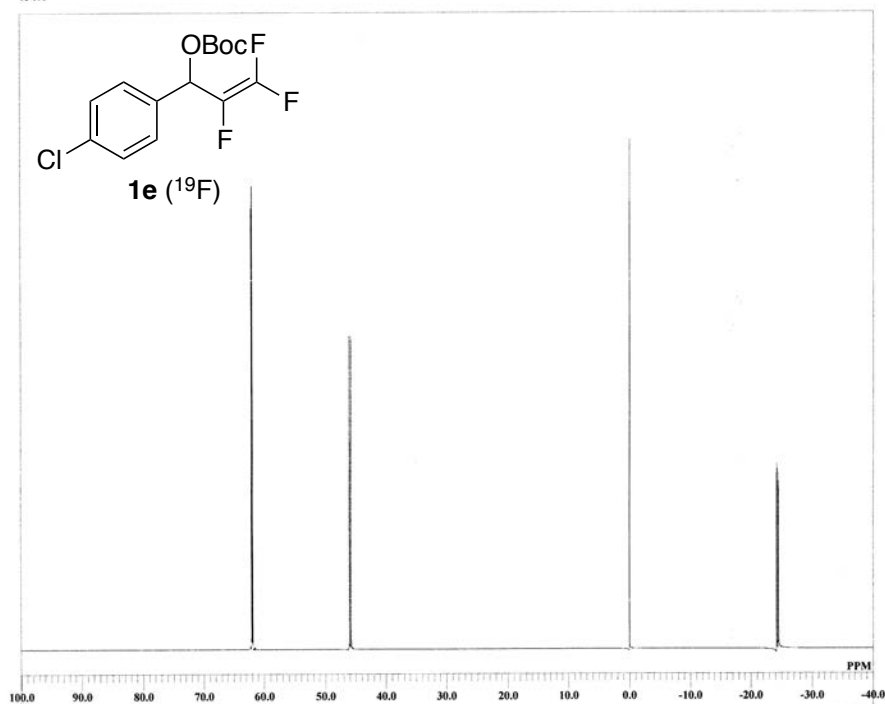
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 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
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 CTEMP 23.5 c
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 BF 0.12 Hz
 RGAIN 24

1e-13C



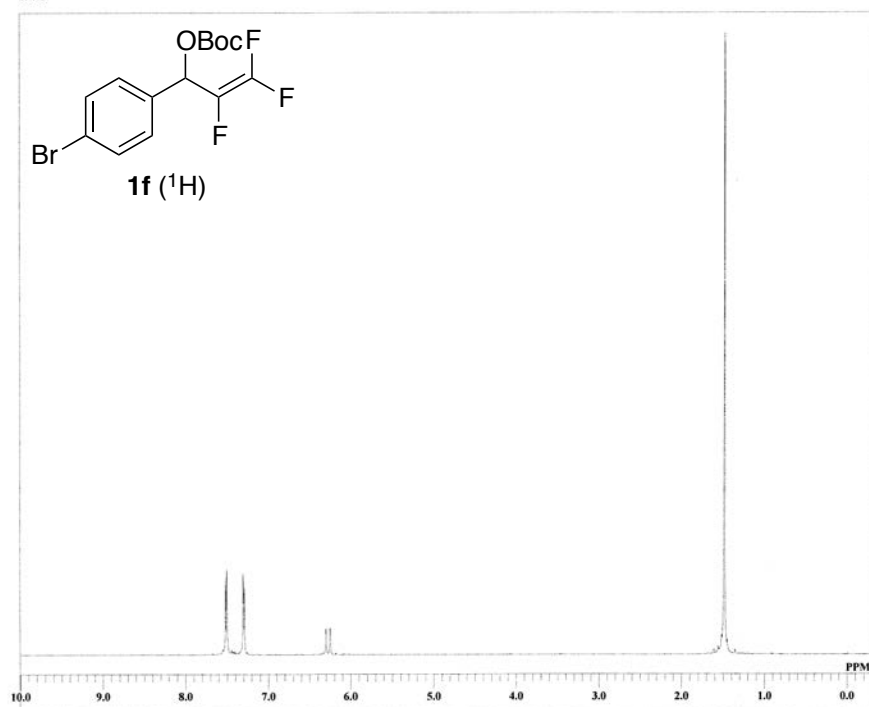
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 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 64
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
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 CTEMP 24.2 c
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 BF 0.12 Hz
 RGAIN 54

1e-19F



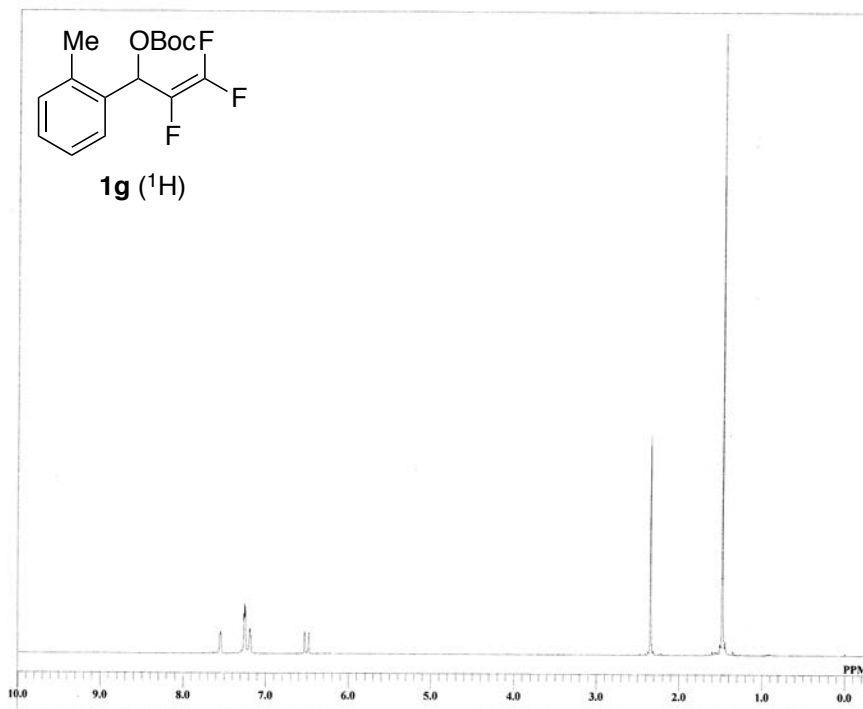
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 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
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 BF 0.12 Hz
 RGAIN 42

1f-1H



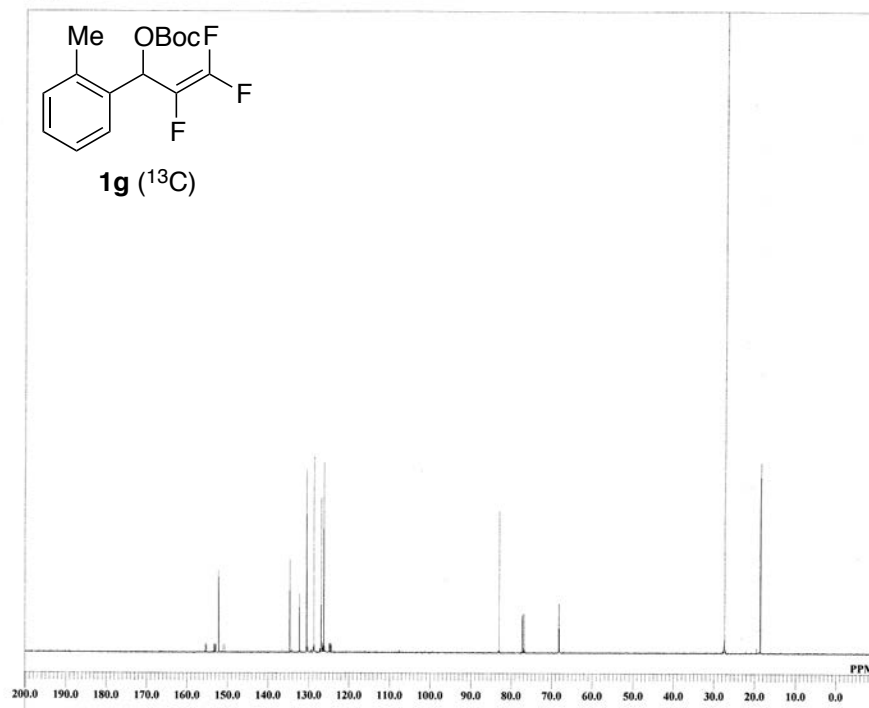
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 OBFIN 6.01 Hz
 POINT 16384
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 PD 5.0000 sec
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 BF 0.12 Hz
 RGAIN 20

1g-1H



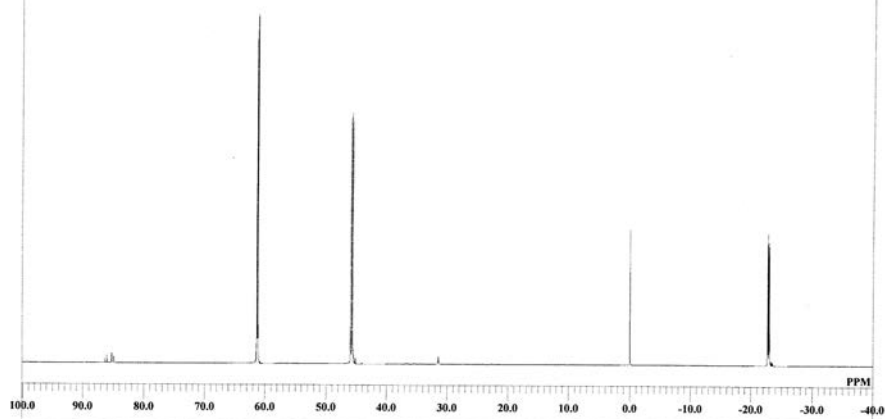
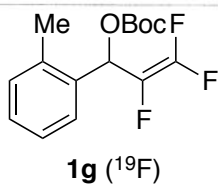
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 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
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 CTEMP 23.5 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 26

1g-13C



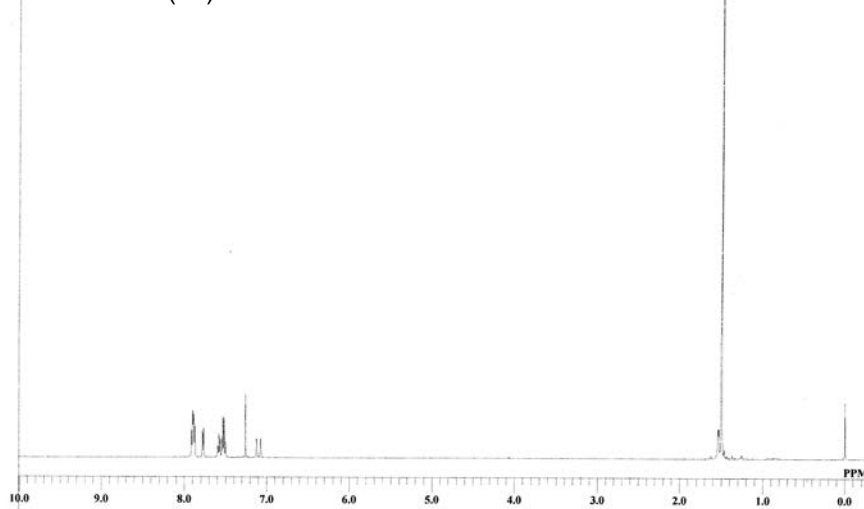
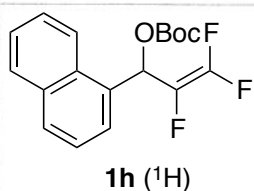
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 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 64
 ACQTM 0.8336 sec
 PD 2.0000 sec
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 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 54

1g-19F



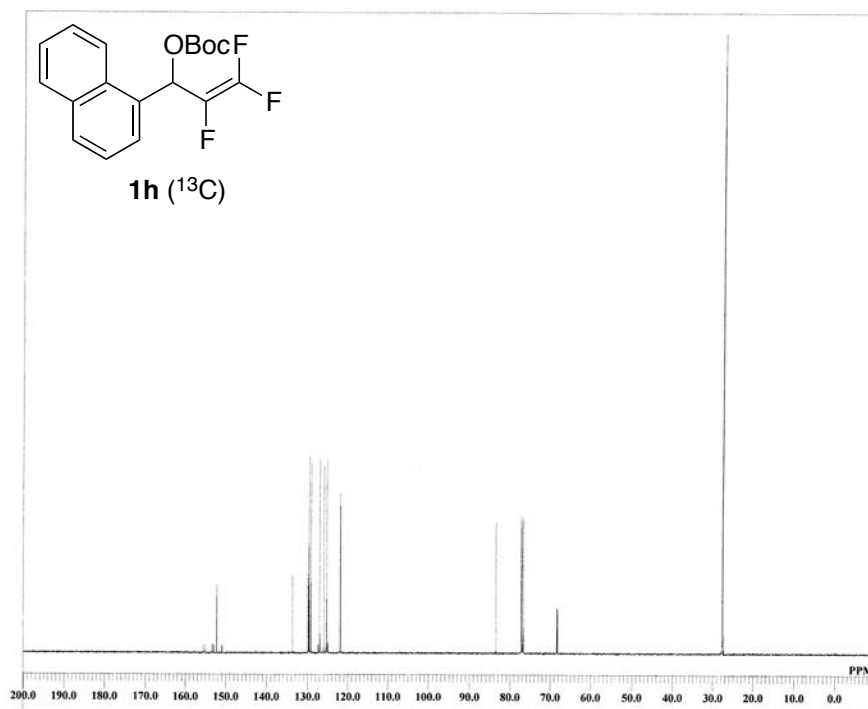
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 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
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 BF 0.12 Hz
 RGAIN 30

1h-1H



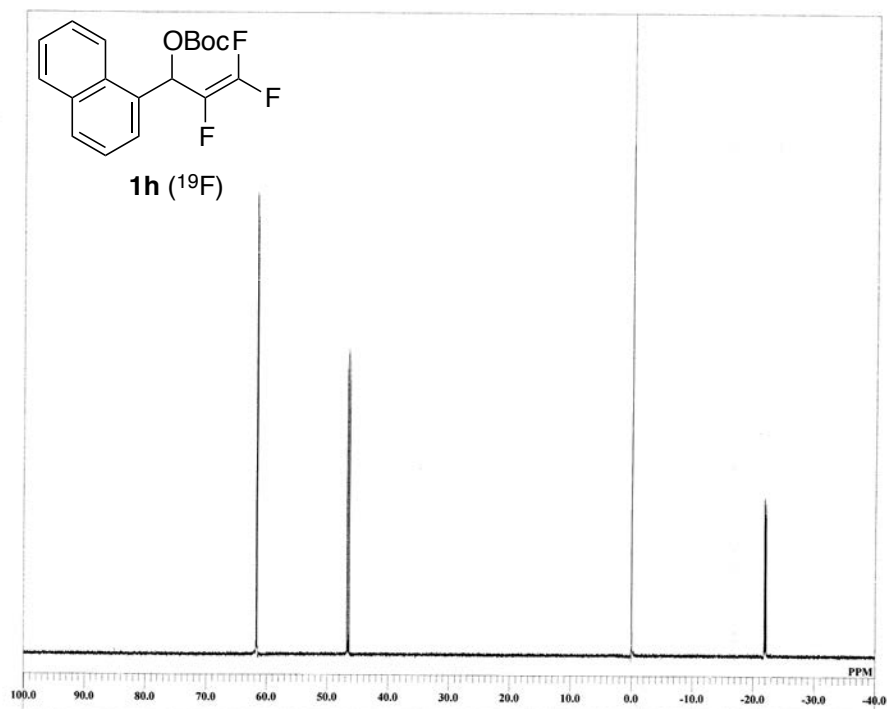
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 POINT 16384
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 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
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 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 50

1b-13C

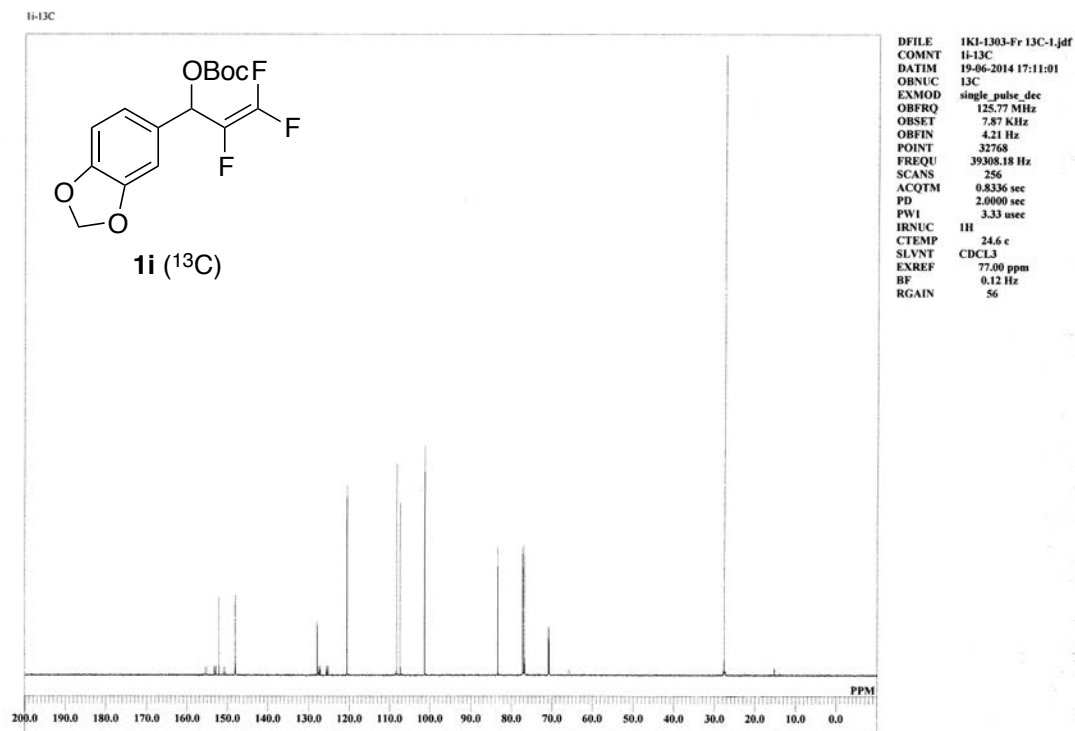
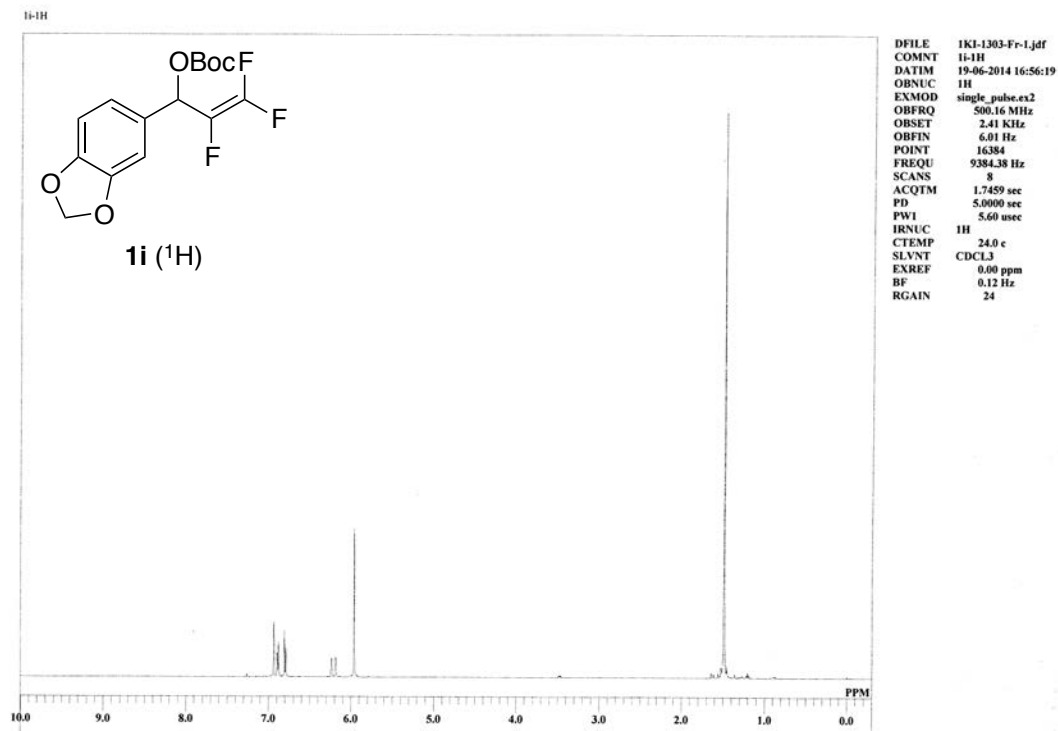


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 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 256
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 26.2 c
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 BF 0.12 Hz
 RGAIN 58

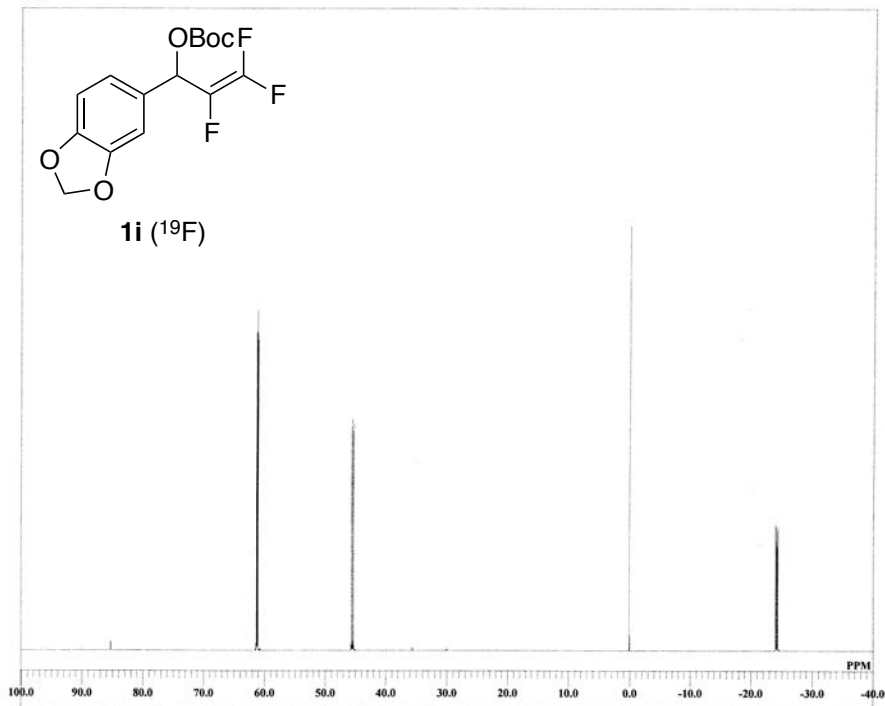
1b-19F



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 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 25.7 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 54

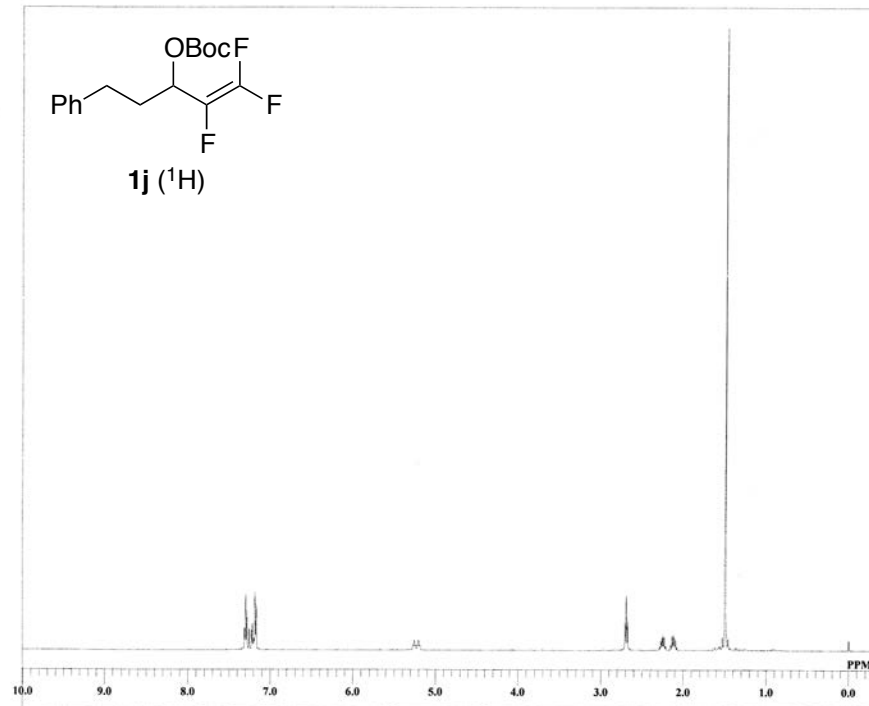


1i-19F



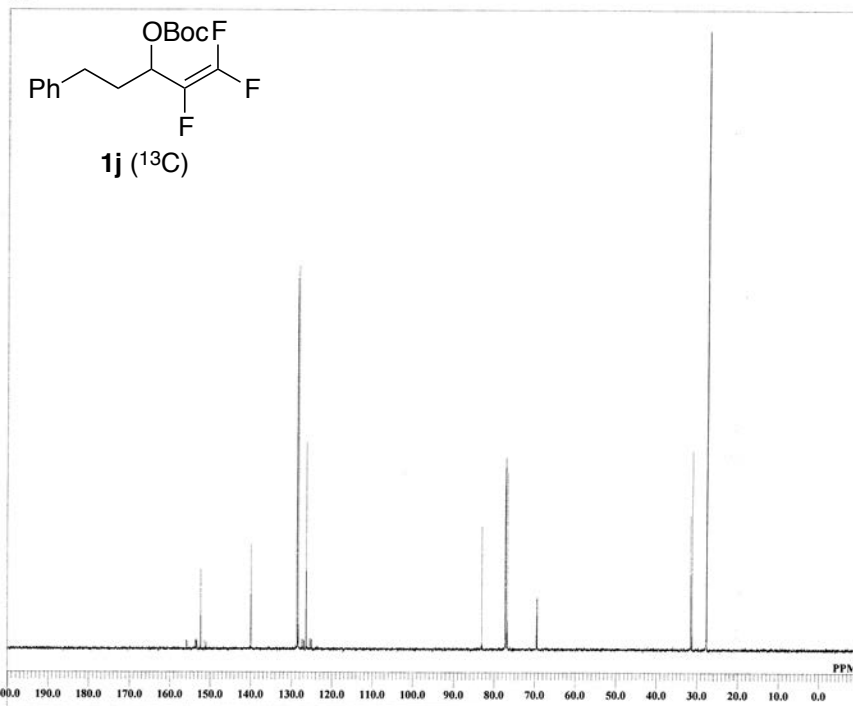
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 POINT 131072
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 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
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 RGAIN 38

1j-1H



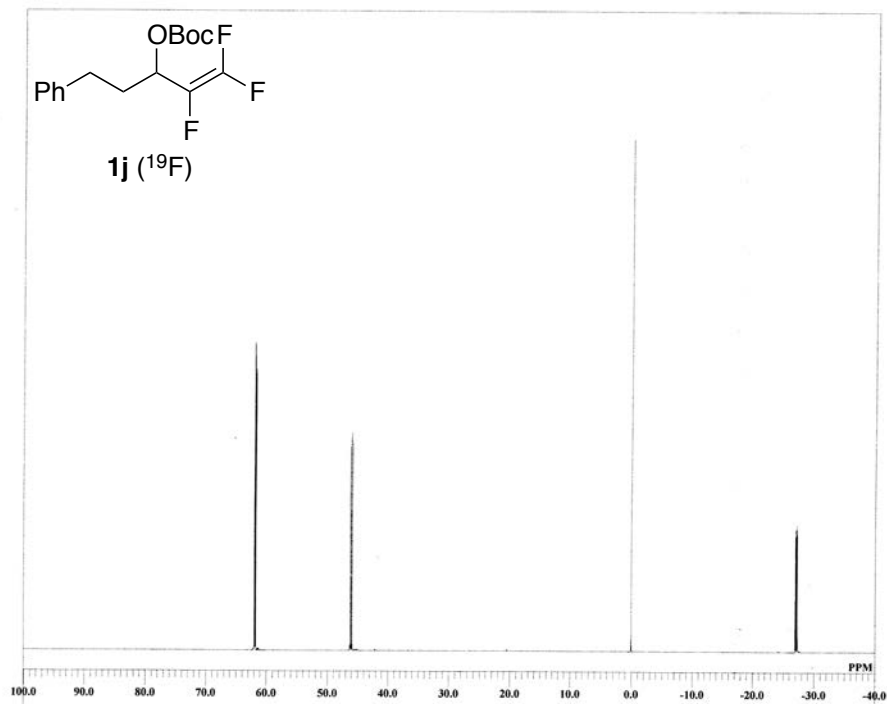
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 EXMOD single_pulse.ex2
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 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 23.6 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 38

1j-13C



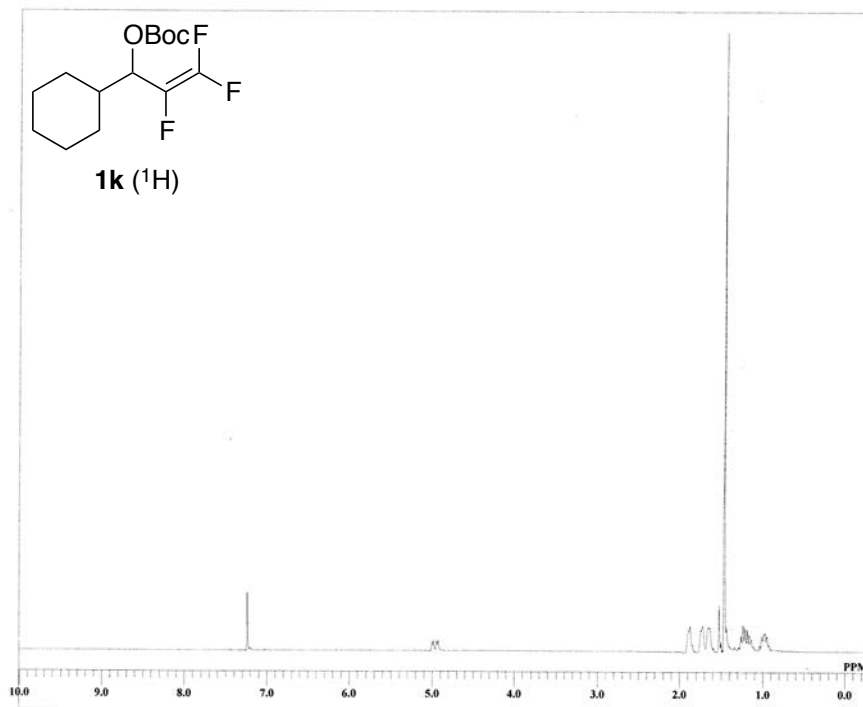
DFILE 1K1-1107-Fr1 13C-1.jdf
 COMNT 1j-13C
 DATIM 26-06-2014 10:05:36
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 128
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 24.2 c
 SLVNT CDCl3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 56

1j-19F



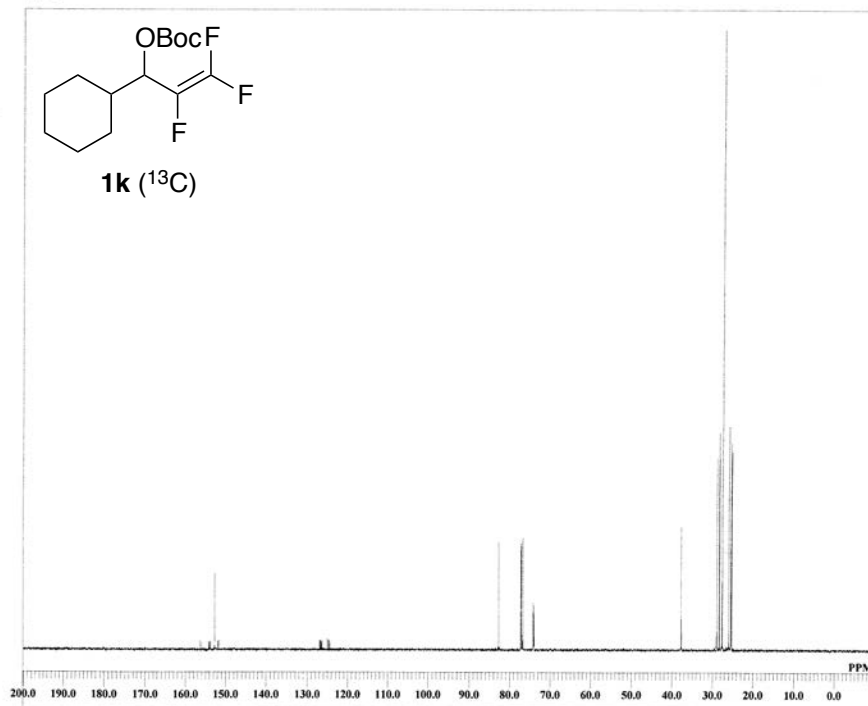
DFILE 1K1-1107-Fr1 19F-1.jdf
 COMNT 1j-19F
 DATIM 26-06-2014 10:11:21
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 23.8 c
 SLVNT CDCl3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 42

1k-1H



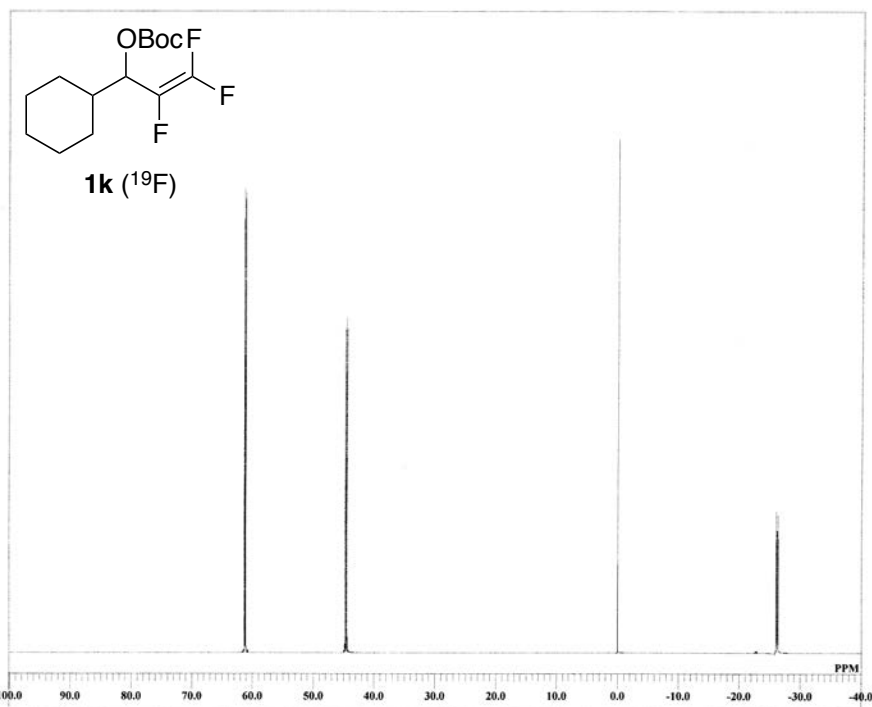
DFILE 3S1-46-FR3-1.jdf
 COMINT 1k-1H
 DATIM 28-06-2014 14:12:12
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFREQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 23.9 c
 SLVNT CDCL3
 EXREF 7.24 ppm
 BF 0.12 Hz
 RGAIN 46

1k-13C

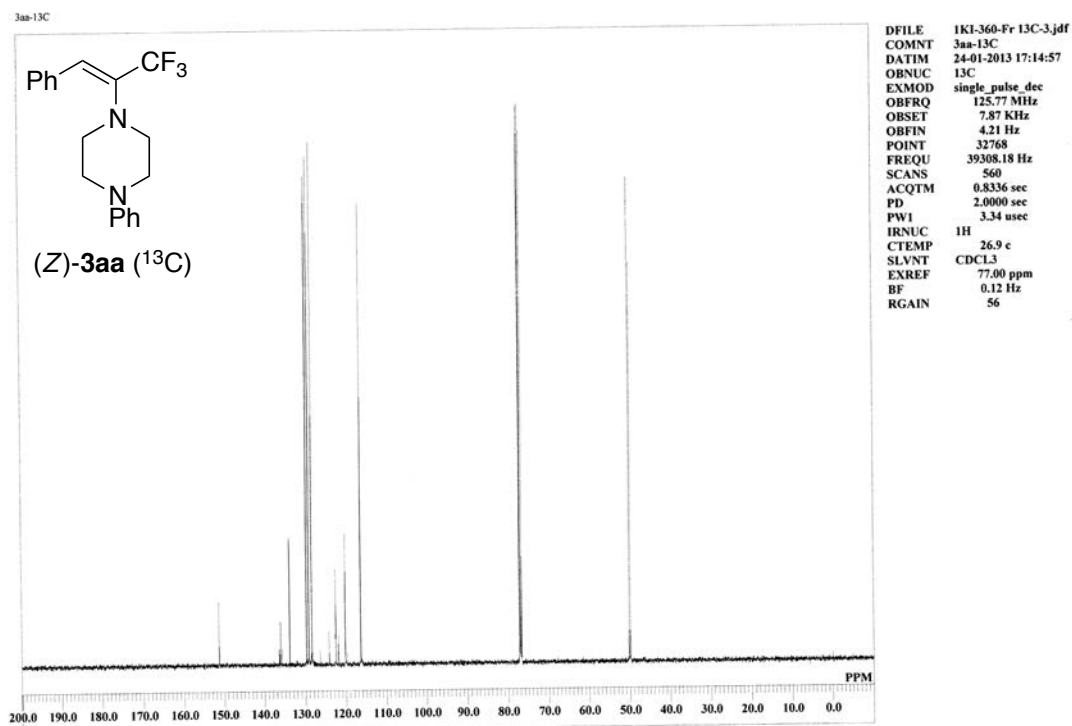
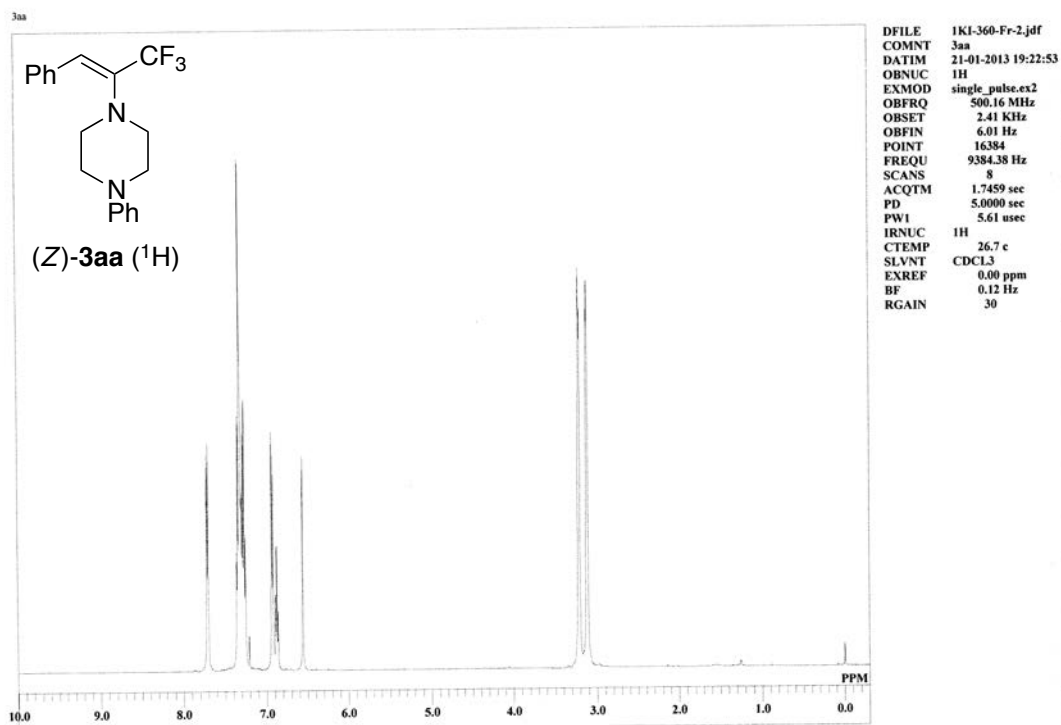


DFILE 3S1-46-FR3-13C-1.jdf
 COMINT 1k-13C
 DATIM 25-06-2014 13:08:56
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFREQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 64
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 24.5 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 58

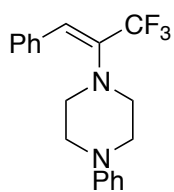
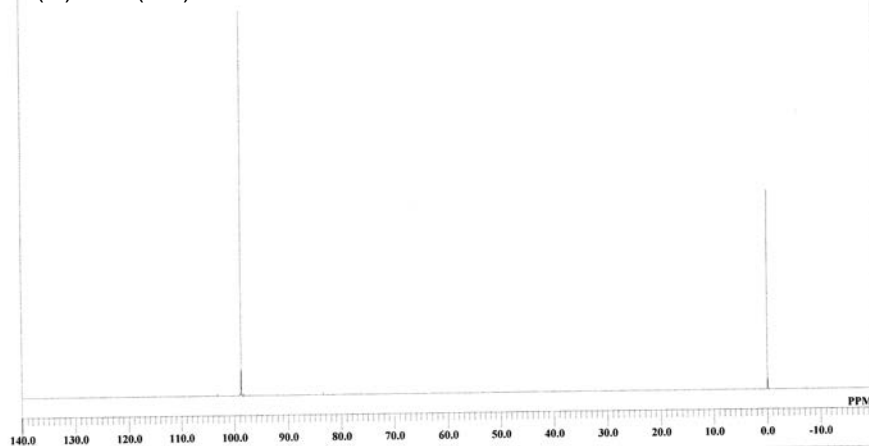
1k-19F



DFILE 351-46-FR3 19F-1.jdf
 COMINT 1k-19F
 DATIM 25-06-2014 13:16:52
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.34 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 24.1 c
 SLVNT CDCl3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 38

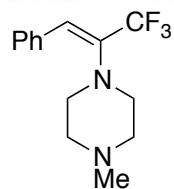
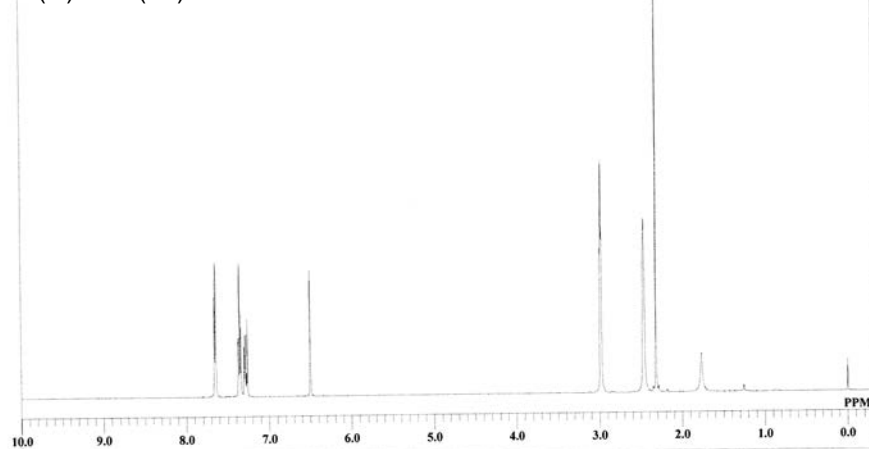


3aa-19F

(Z)-3aa (^{19}F)

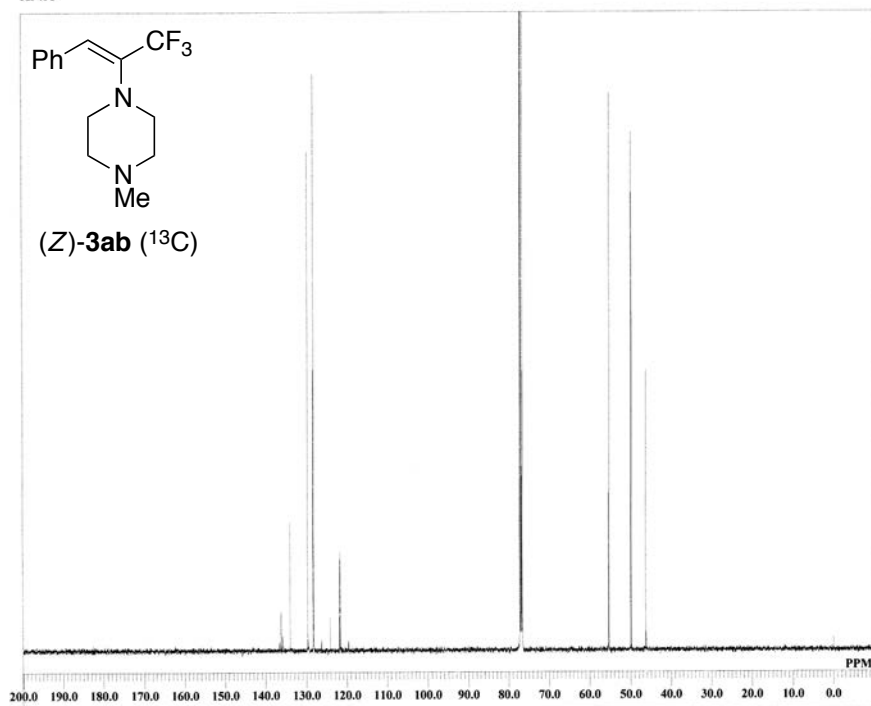
DFILE 1K1-360-Fr 19F-1.jdf
 COMNT 3aa-19F
 DATIM 24-01-2013 17:50:20
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 kHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 26.3 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 40

3ab-1H

(Z)-3ab (^1H)

DFILE 3SY-30-Fr-1.jdf
 COMNT 3ab-1H
 DATIM 11-06-2014 20:41:53
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 kHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 23.0 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 46

3ab-13C



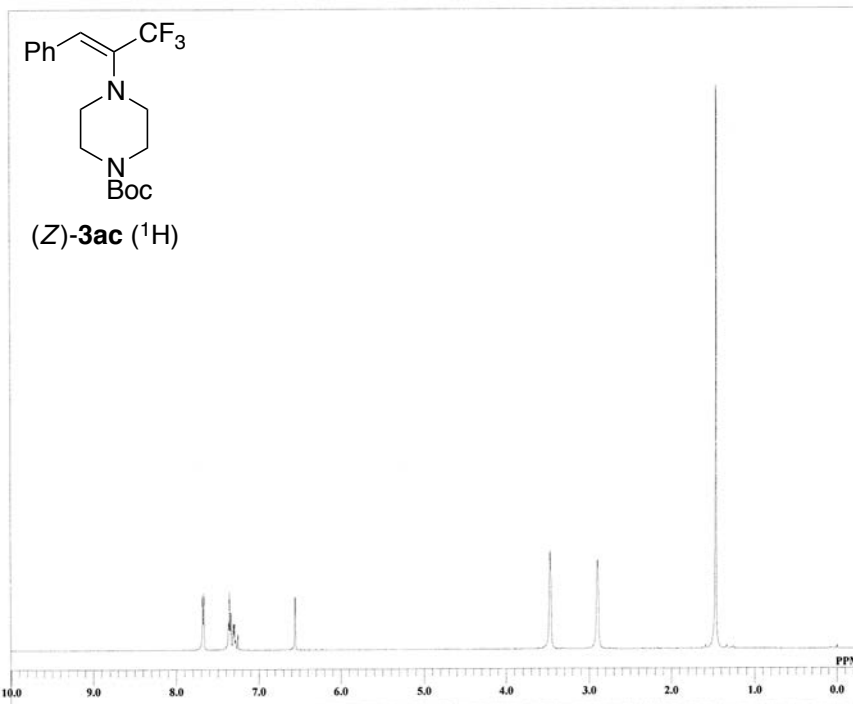
DFILE 3SY-30-Fr 13C-1.jdf
 COMNT 3ab-13C
 DATIM 11-06-2014 23:58:54
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 4096
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 23.3 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 56

3ab-19F



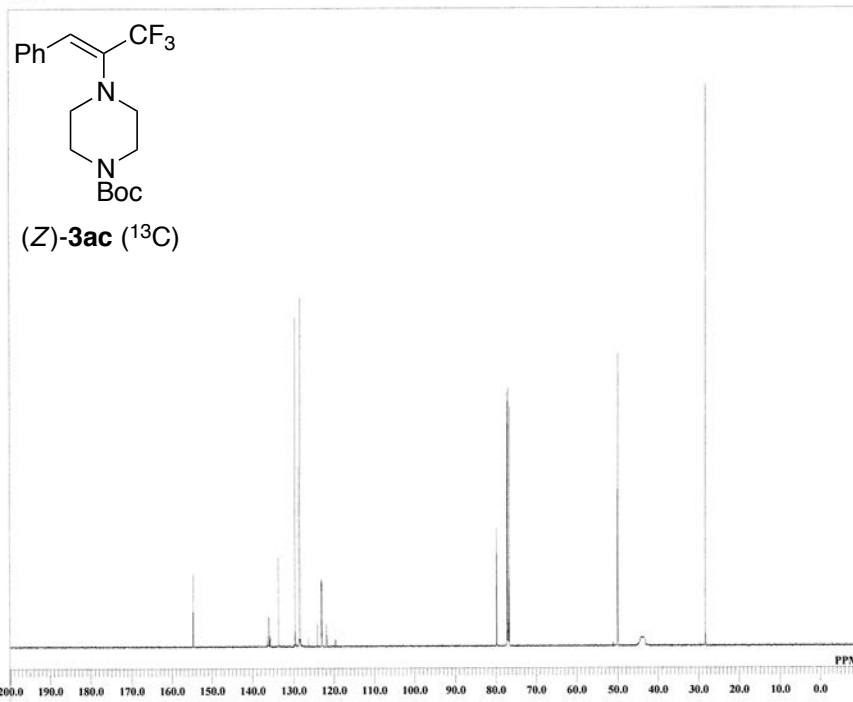
DFILE 3SY-30-Fr 19F-1.jdf
 COMNT 3ab-19F
 DATIM 12-06-2014 08:52:26
 OBNUC 19F
 EXMOD single_pulse_ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 22.6 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 50

3ac-1H



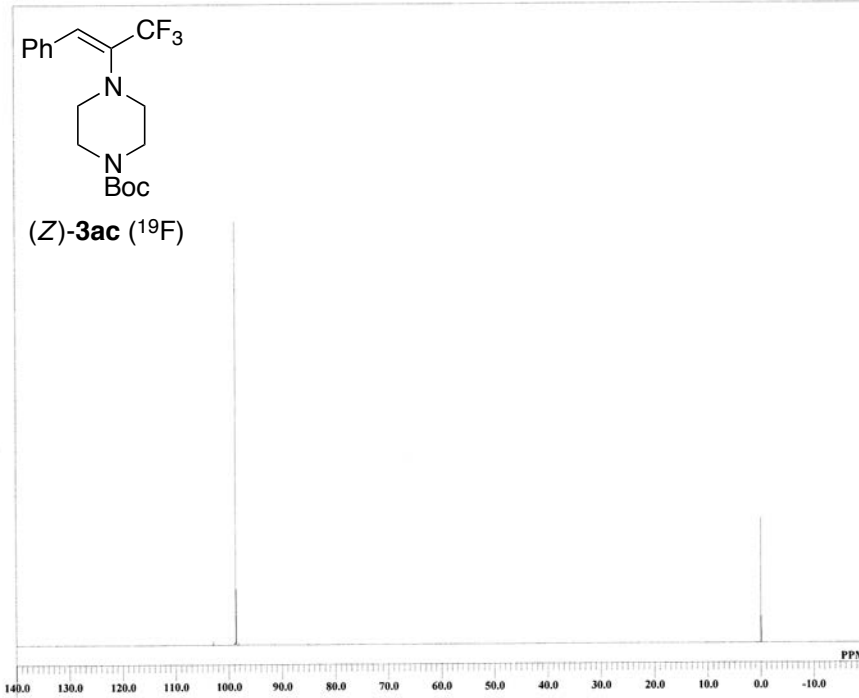
DFILE 1K1-339-Fr-2.jdf
 COMNT 3ac-1H
 DATIM 28-01-2013 17:02:25
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFREQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.61 usec
 IRNUC 1H
 CTEMP 26.6 c
 SLVNT CDCl3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 28

3ac-13C



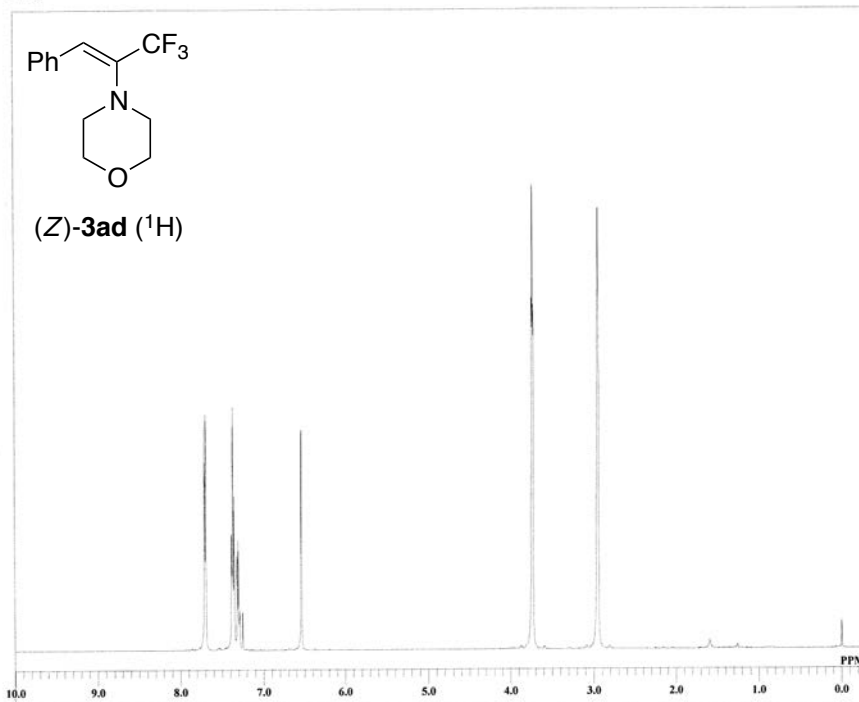
DFILE 1K1-339-Fr 13C-2.jdf
 COMNT 3ac-13C
 DATIM 28-01-2013 18:01:20
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFREQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 1120
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.34 usec
 IRNUC 13C
 CTEMP 26.9 c
 SLVNT CDCl3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 56

3ac-19F



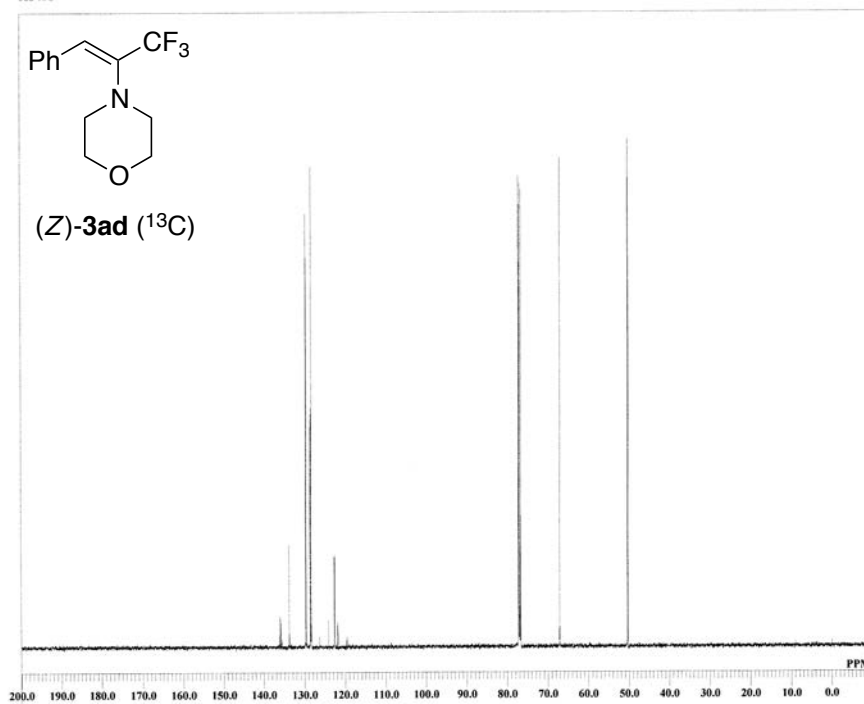
DFILE 1K1-339-Fr 19F-1.jdf
 COMNT 3ac-19F
 DATIM 25-01-2013 18:54:08
 ORNUC 19F
 EXMOD single_pulse.ex2
 OBFREQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 26.8 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 40

3ad-1H



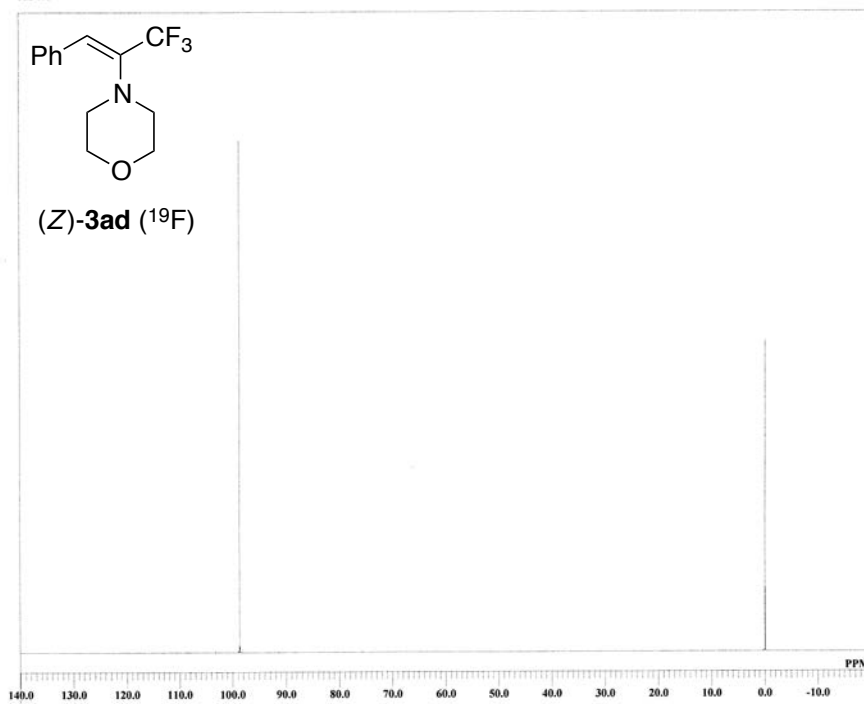
DFILE 1K1-361-Fr-2.jdf
 COMNT 3ad-1H
 DATIM 21-01-2013 18:43:55
 ORNUC 1H
 EXMOD single_pulse.ex2
 OBFREQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.61 usec
 IRNUC 1H
 CTEMP 26.5 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 36

3ad-13C



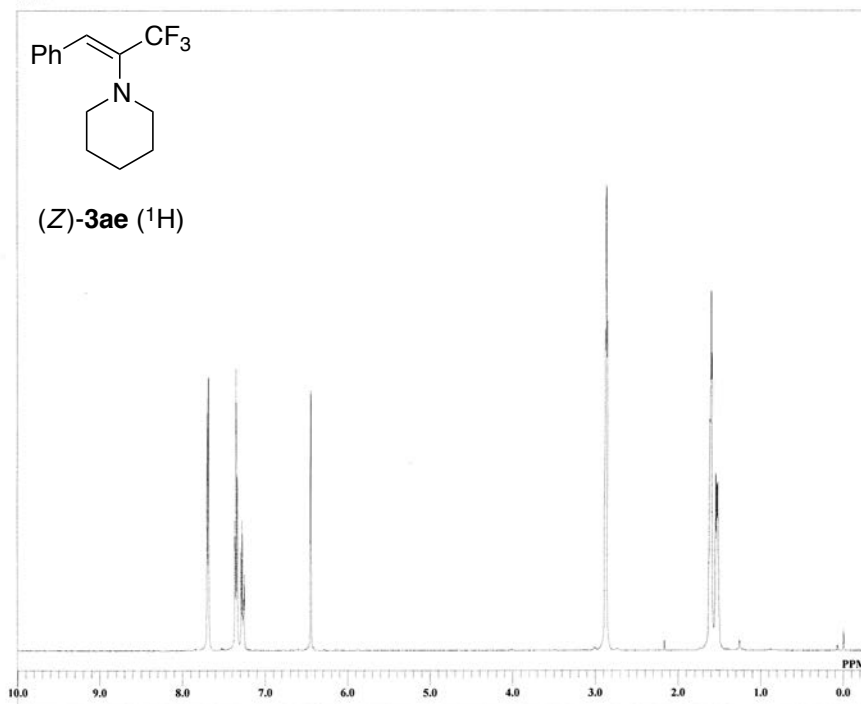
DFILE 1K1-361-Fr 13C-1.jdf
 COMNT 3ad-13C
 DATIM 21-01-2013 19:15:02
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 kHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 560
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.34 usec
 IRNUC 1H
 CTEMP 26.8 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 58

3ad-19F



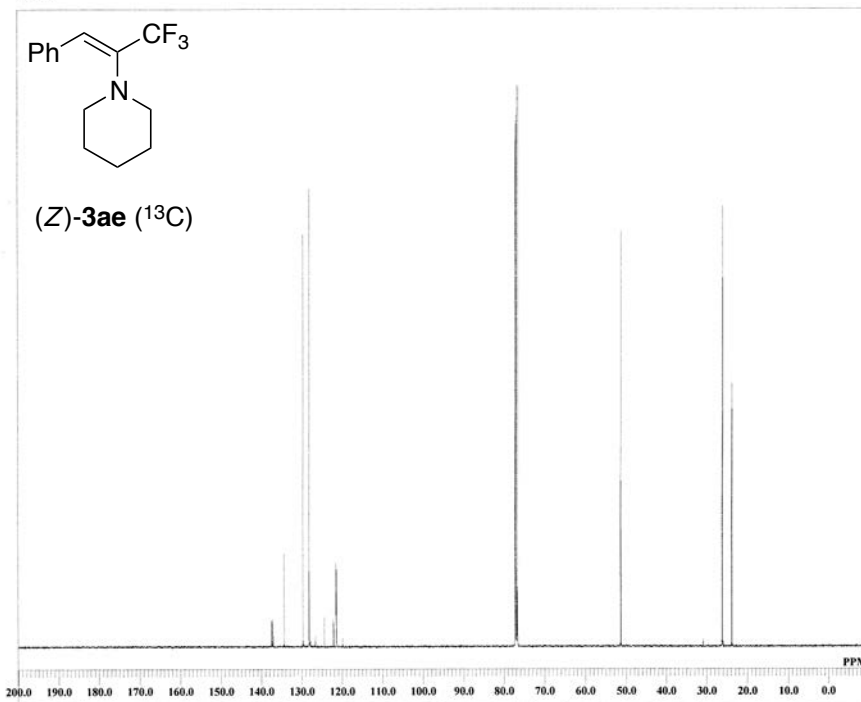
DFILE 1K1-361-Fr 19F-1.jdf
 COMNT 3ad-19F
 DATIM 24-01-2013 17:58:04
 OBNUC 19F
 EXMOD single_pulse.ac2
 OBFRQ 470.62 MHz
 OBSET 0.46 kHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 26.6 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 40

3ae-1H

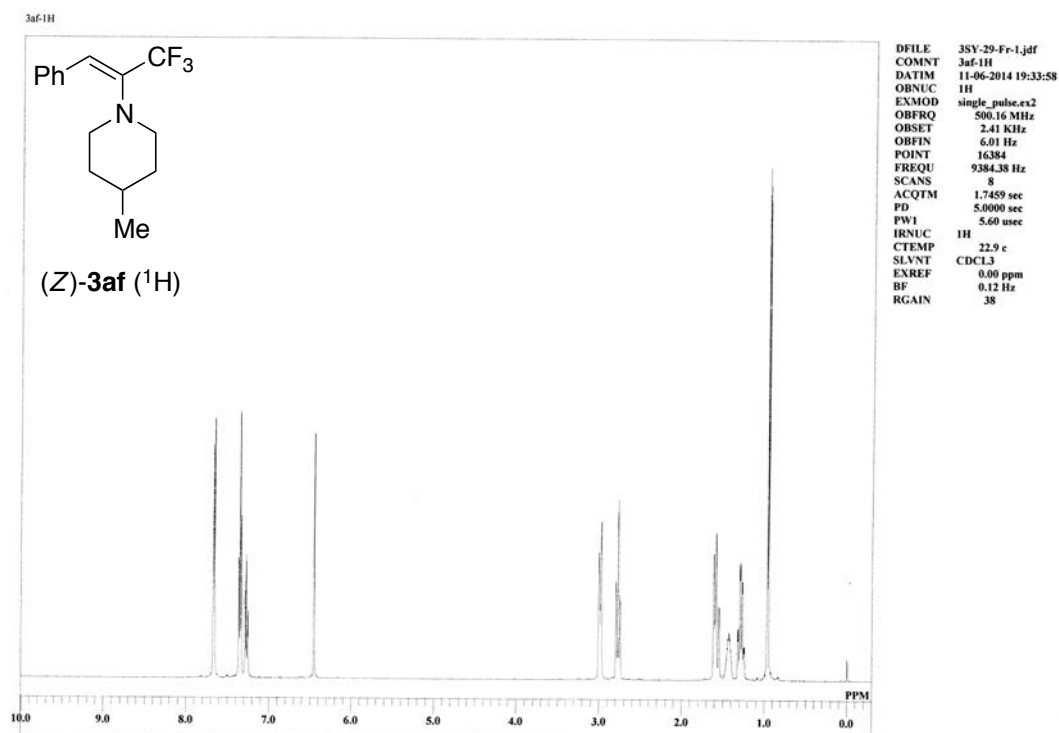
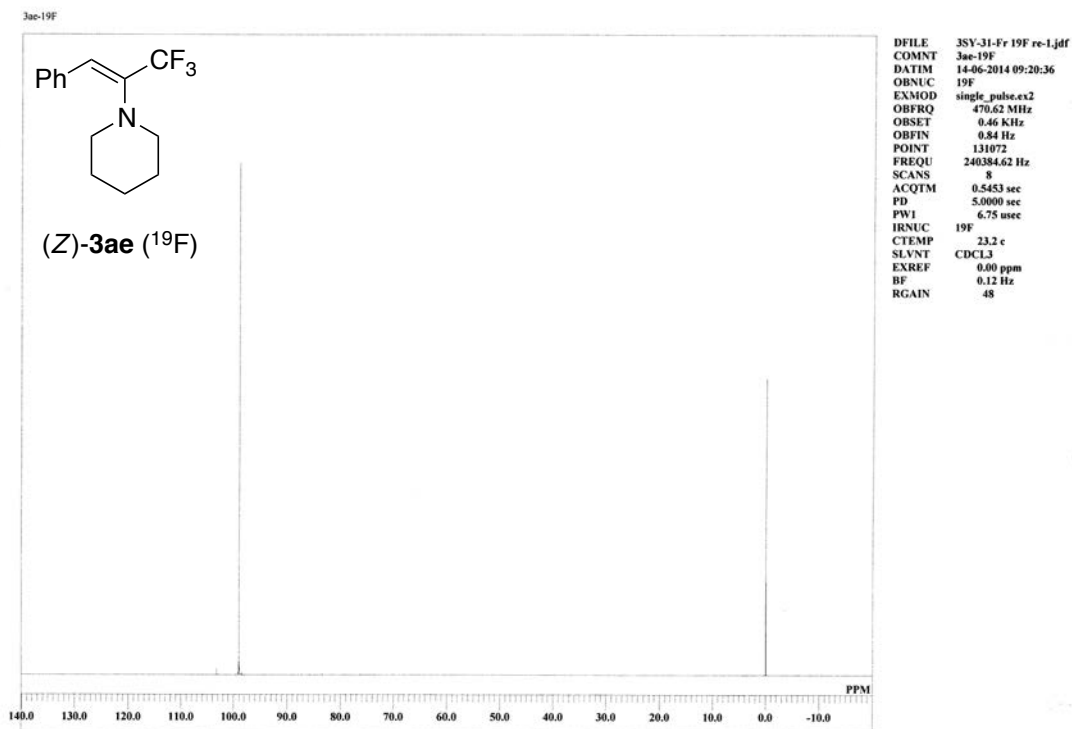


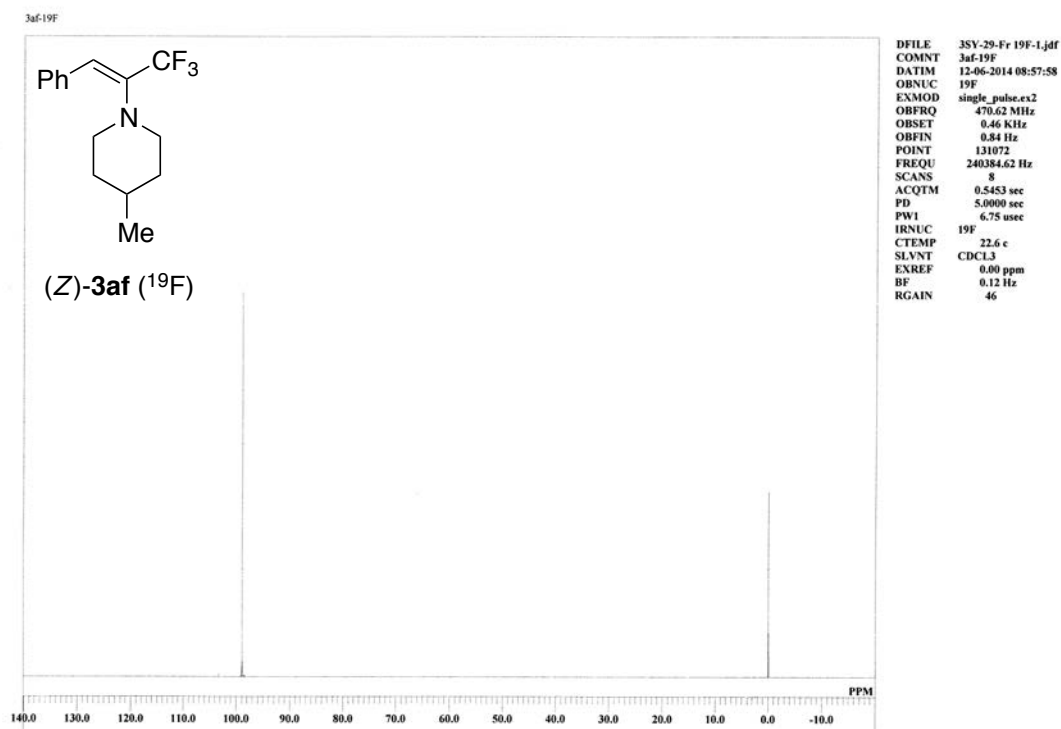
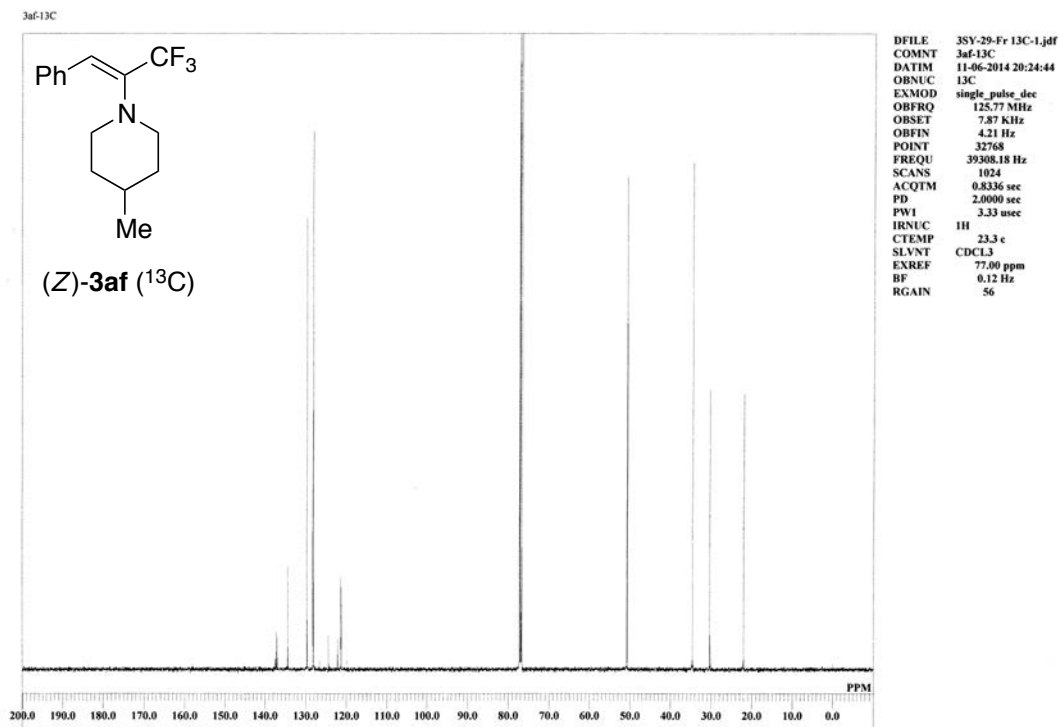
DFILE 3SV-31-Fr-1.jdf
 COMNT 3ae-1H
 DATIM 12-06-2014 16:56:39
 OBNUC ^1H
 EXMOD single_pulse.ex2
 OBFRO 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC ^1H
 CTEMP 23.1 c
 SLVNT CDCL₃
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 36

3ae-13C

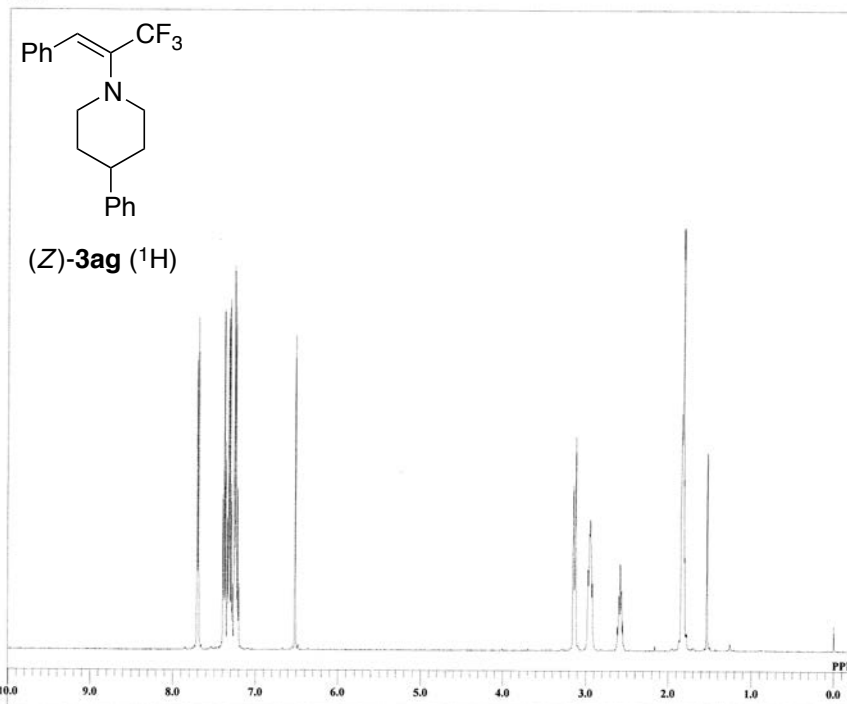


DFILE 3SV-31-Fr-13C-1.jdf
 COMNT 3ae-13C
 DATIM 14-06-2014 00:05:31
 OBNUC ^{13}C
 EXMOD single_pulse_dec
 OBFRO 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 4096
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC ^{13}C
 CTEMP 23.8 c
 SLVNT CDCL₃
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 58



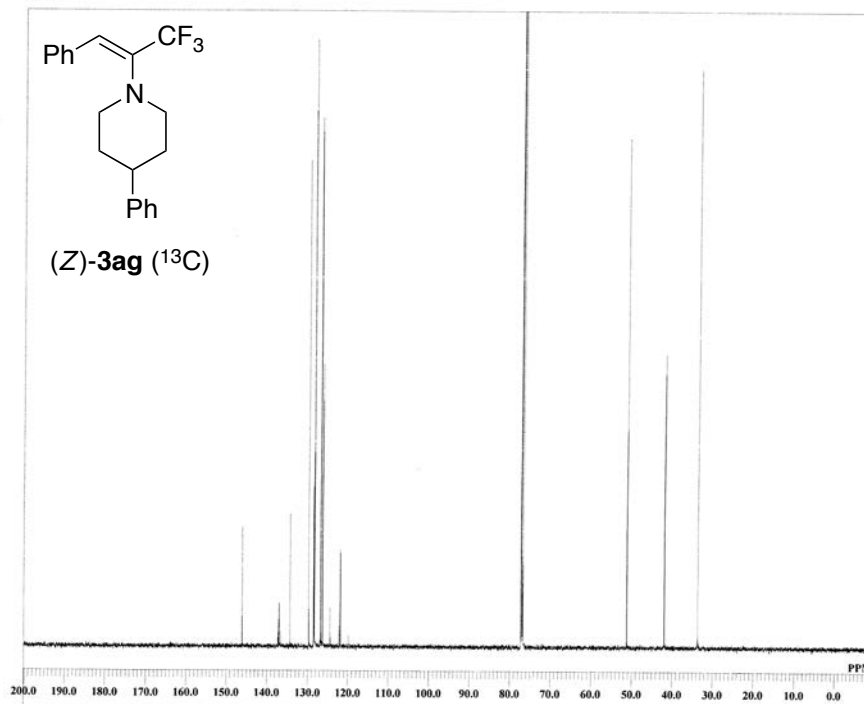


3ag-1H

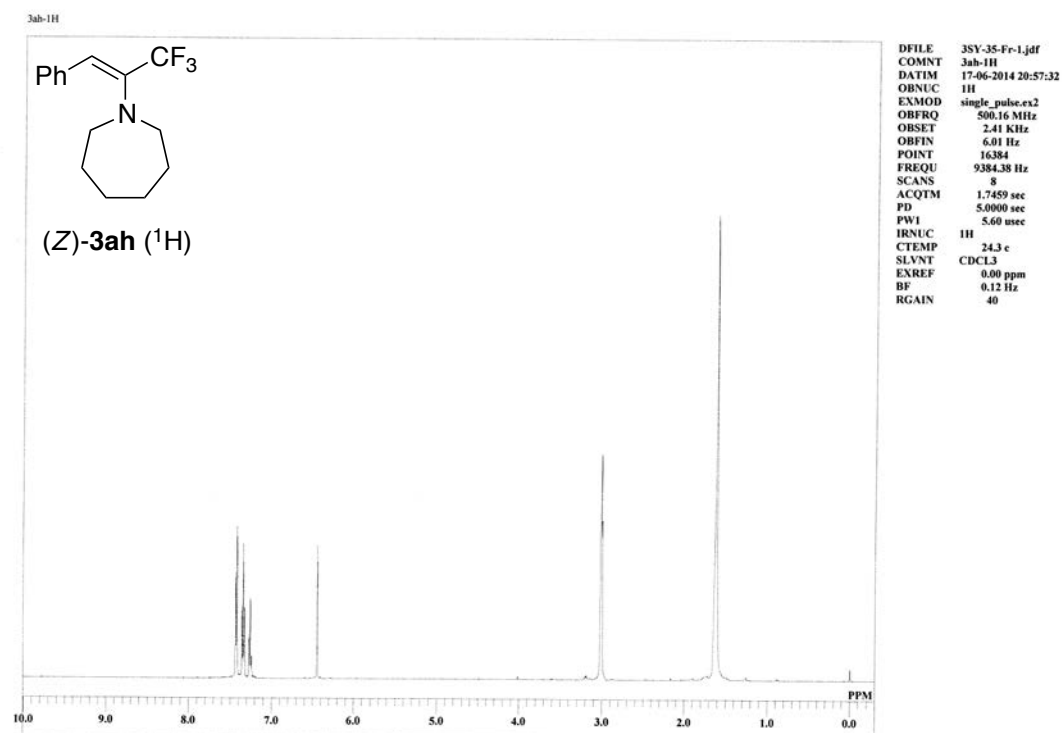
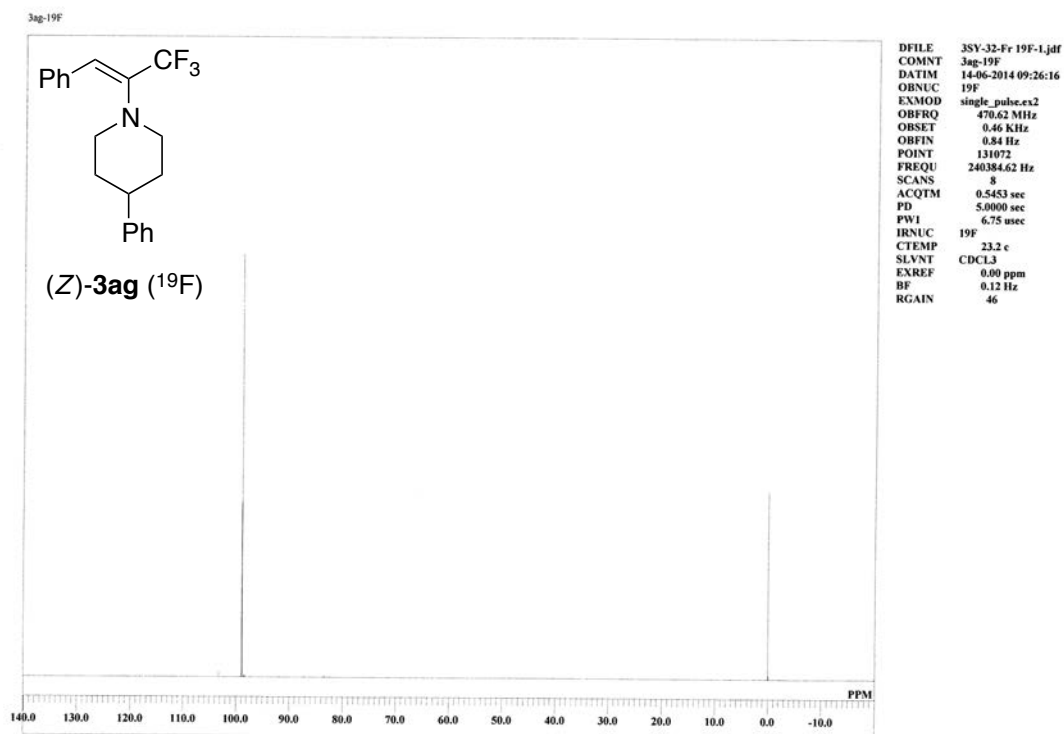


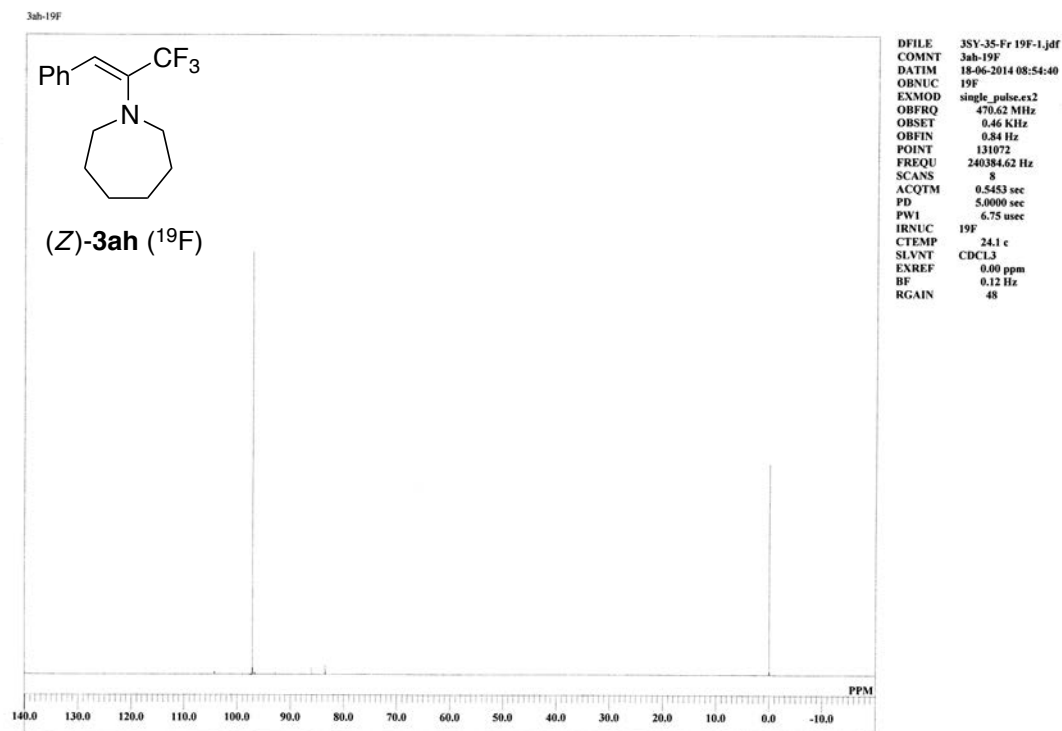
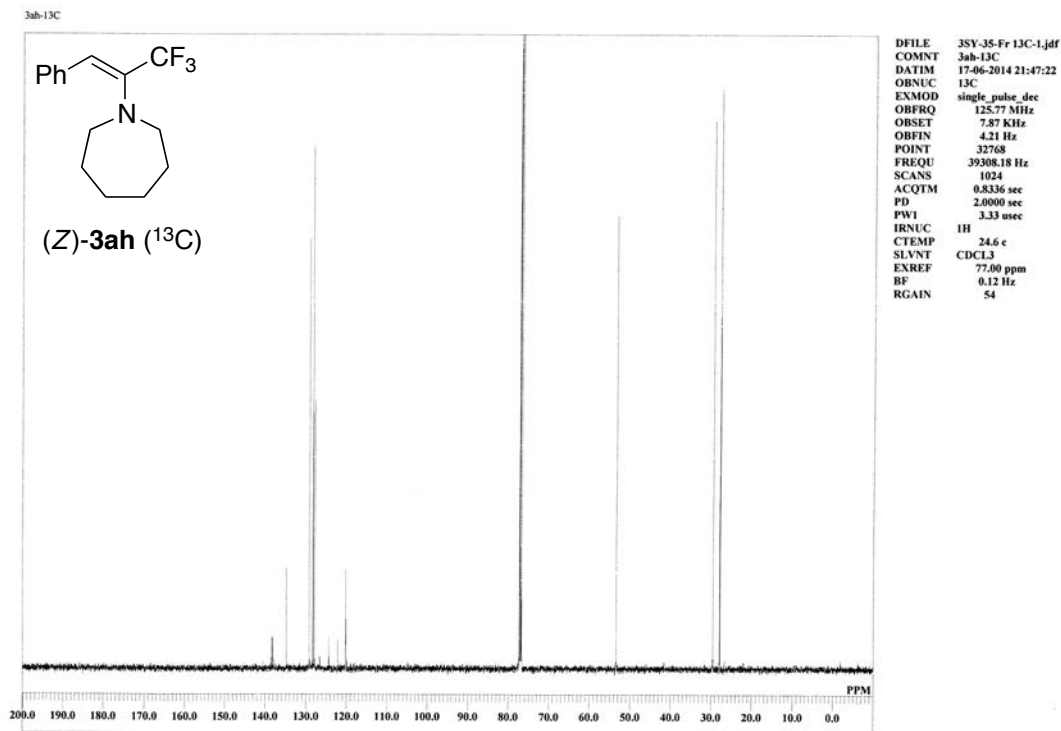
DFILE 3SY-32-Fr-1.jdf
 COMNT 3ag-1H
 DATIM 12-06-2014 17:03:27
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 23.2 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 34

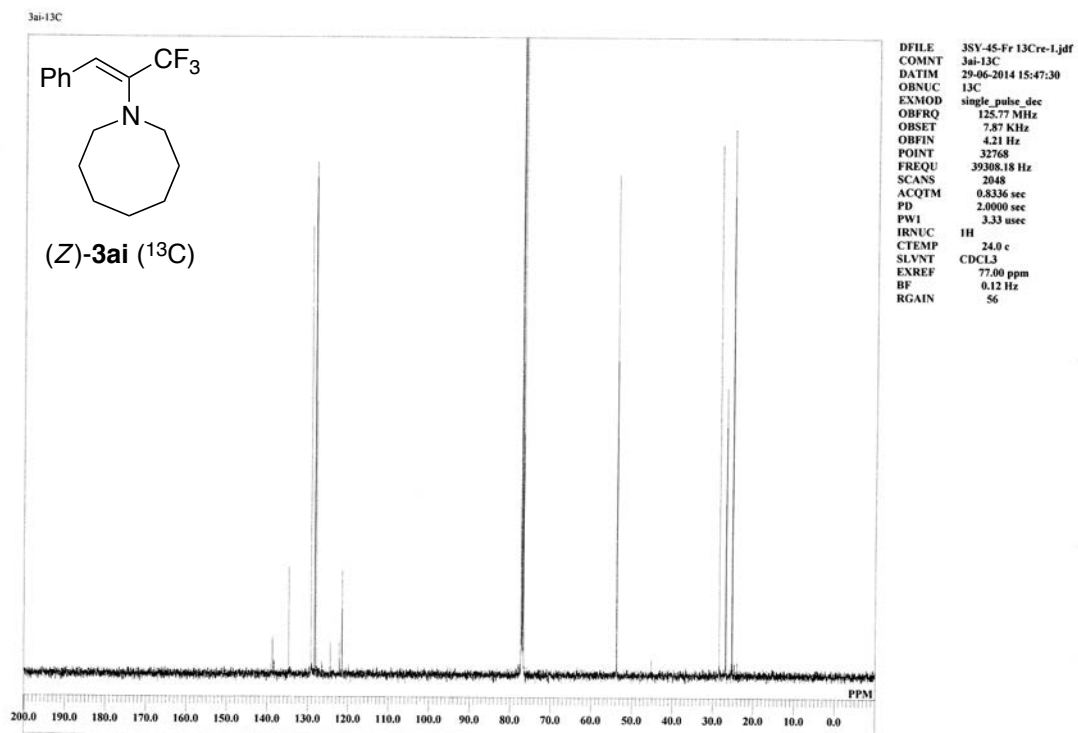
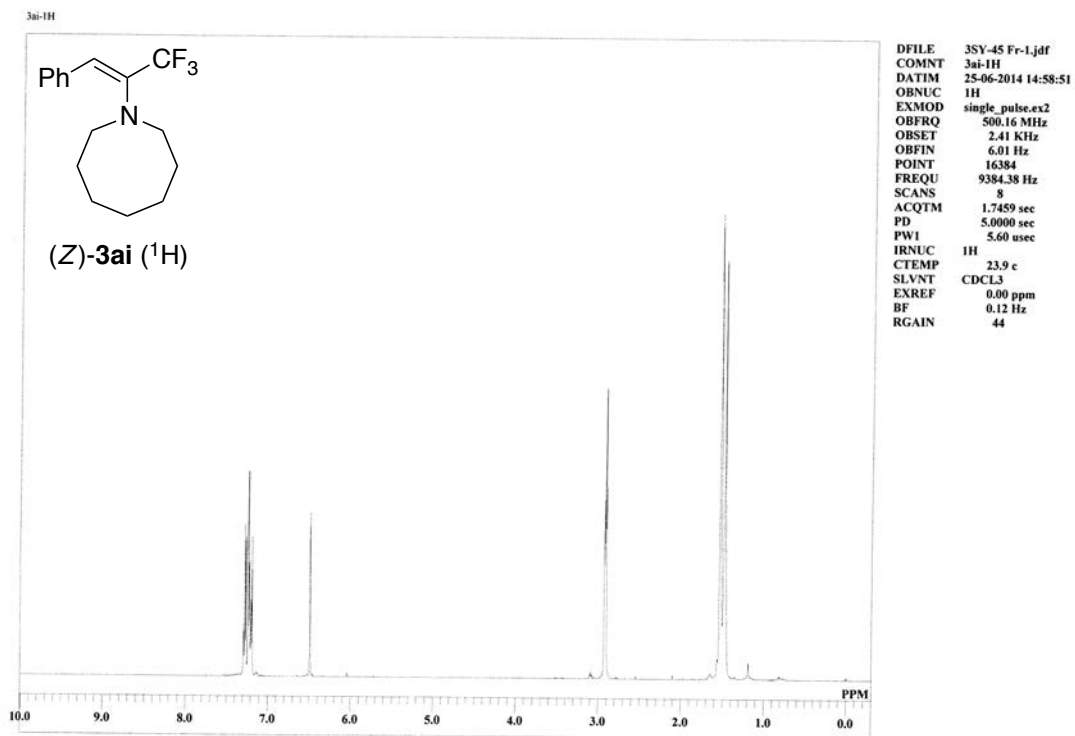
3ag-13C

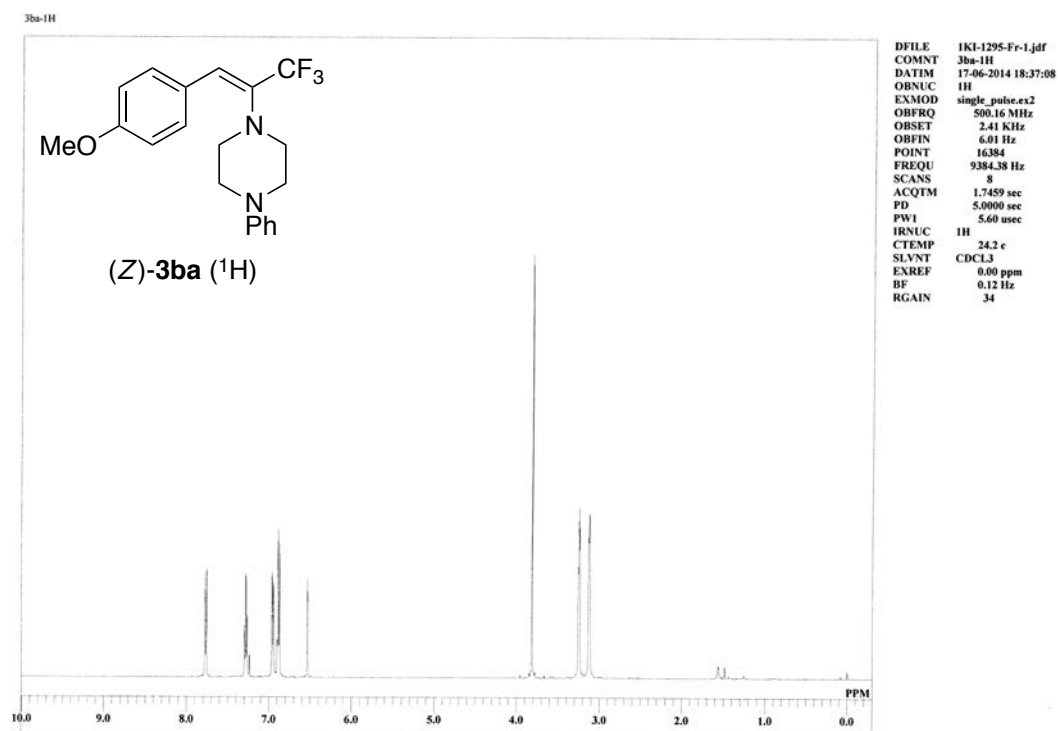
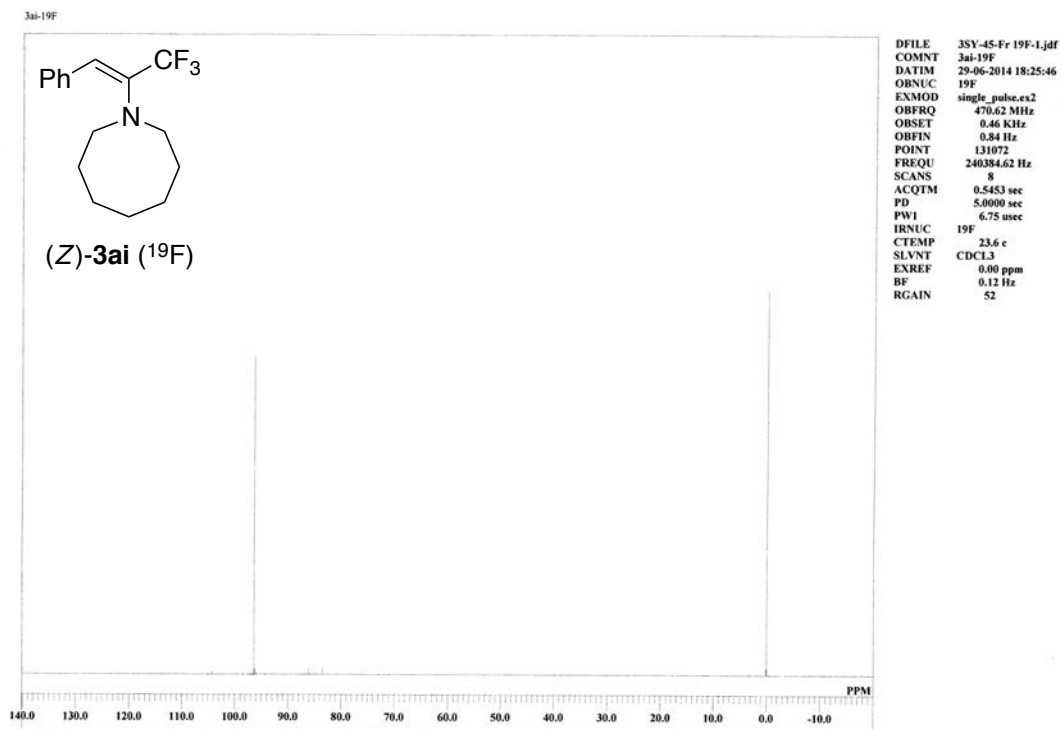


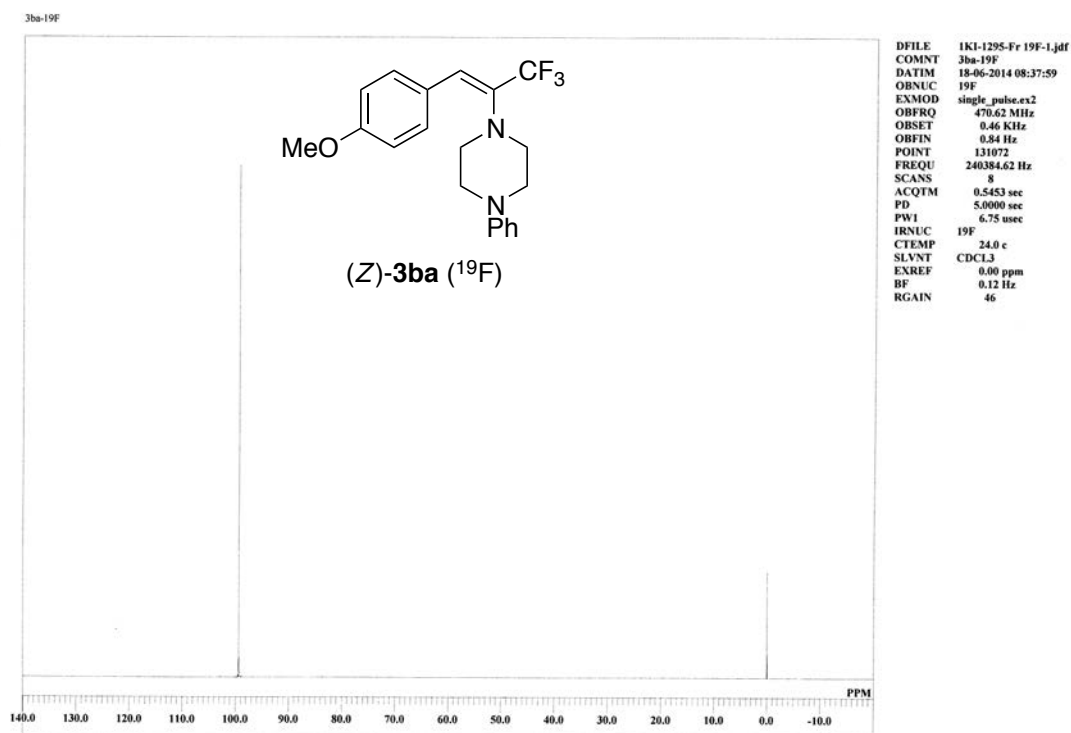
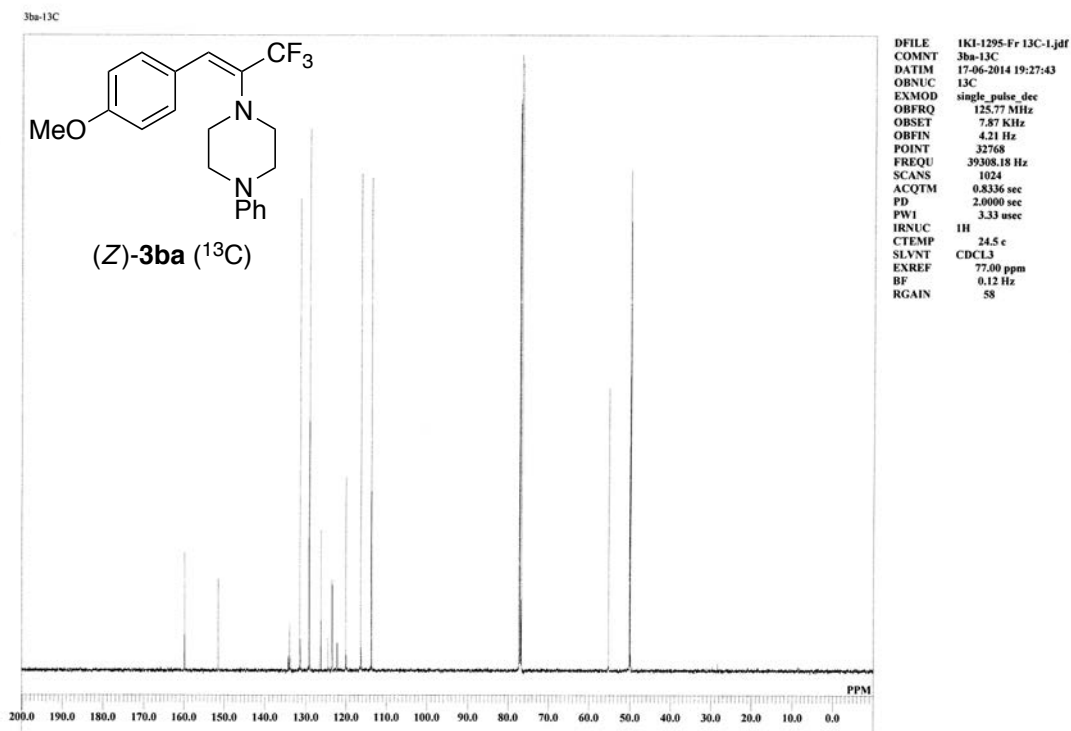
DFILE 3SY-32-Fr-13C-1.jdf
 COMNT 3ag-13C
 DATIM 12-06-2014 17:53:25
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 23.5 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 56

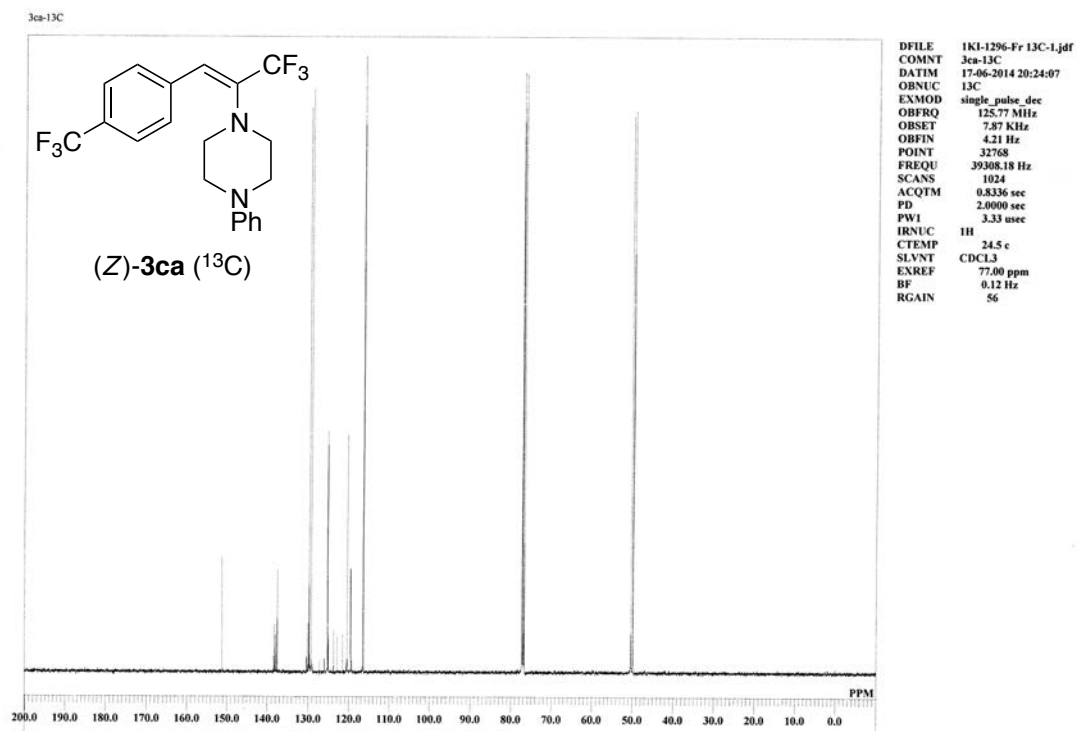
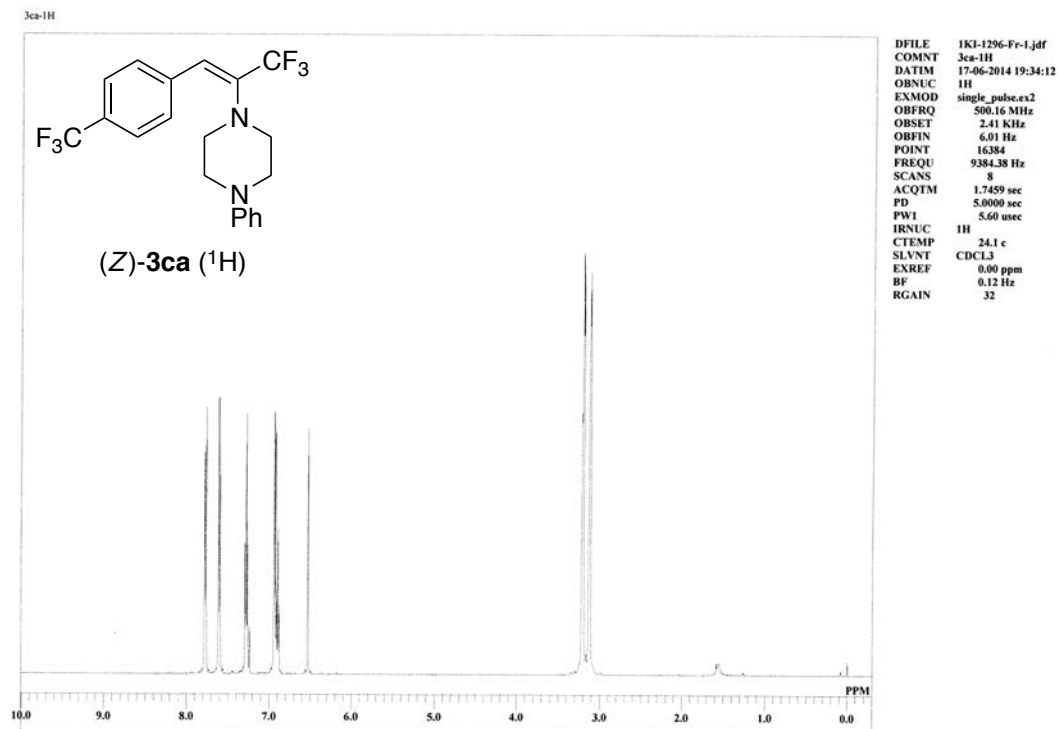




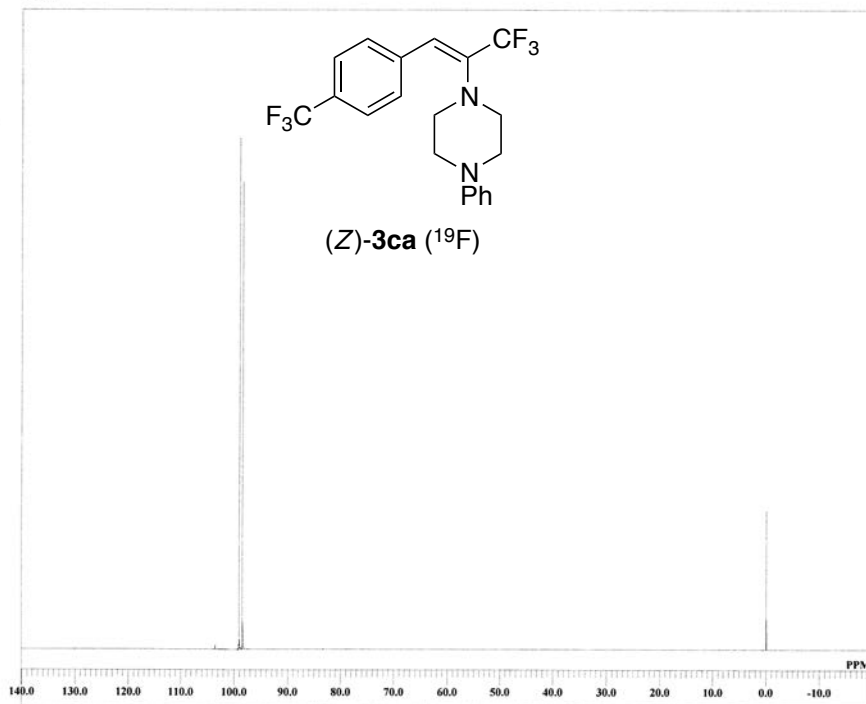






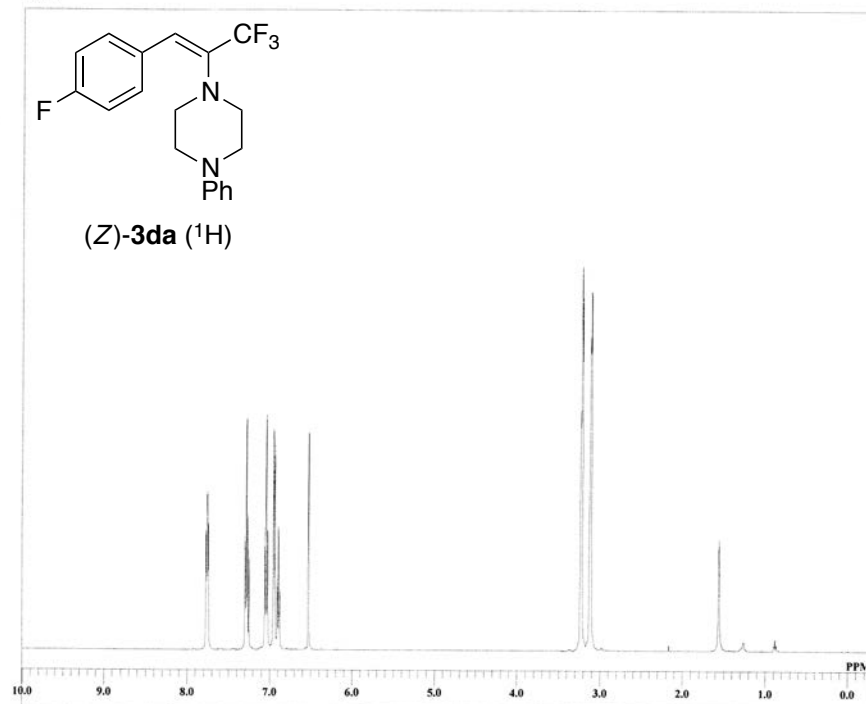


3ca-19F



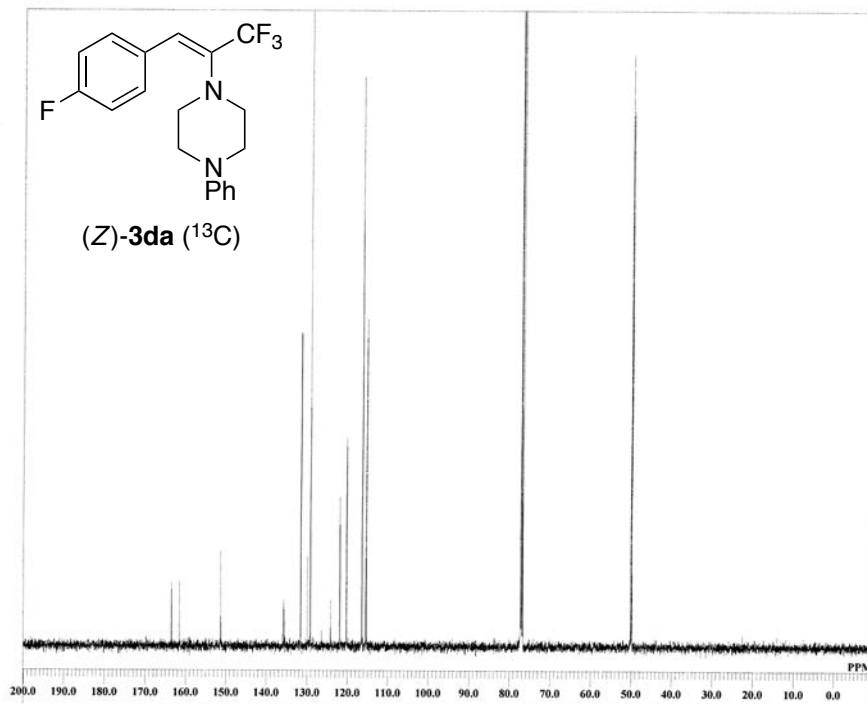
DFILE 1KI-1296-Fr 19F-1.jdf
 COMNT 3ca-19F
 DATIM 18-06-2014 08:44:20
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 24.1 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 40

3da-1H



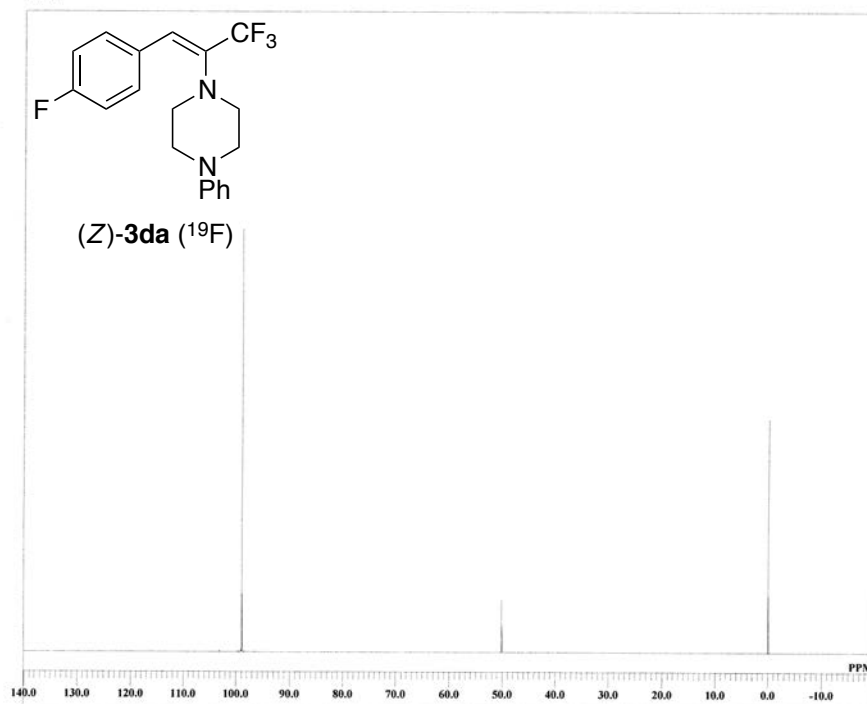
DFILE 1KI-1297-Fr-1.jdf
 COMNT 3da-1H
 DATIM 24-06-2014 15:30:02
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 24.1 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 40

3da-13C

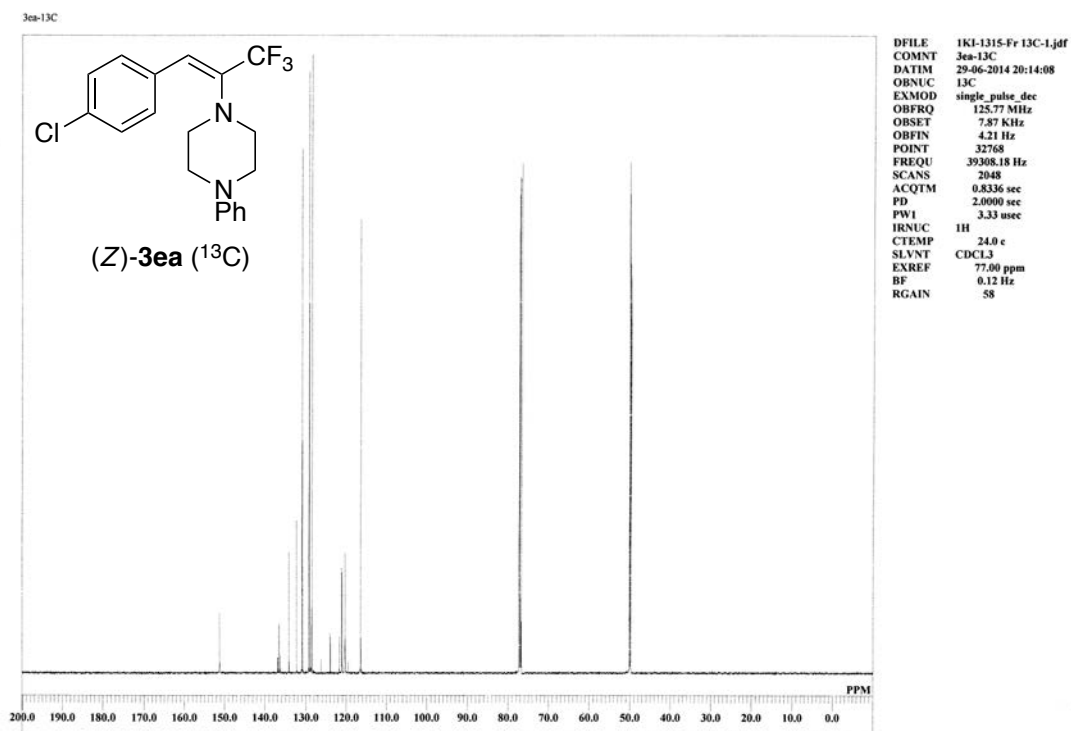
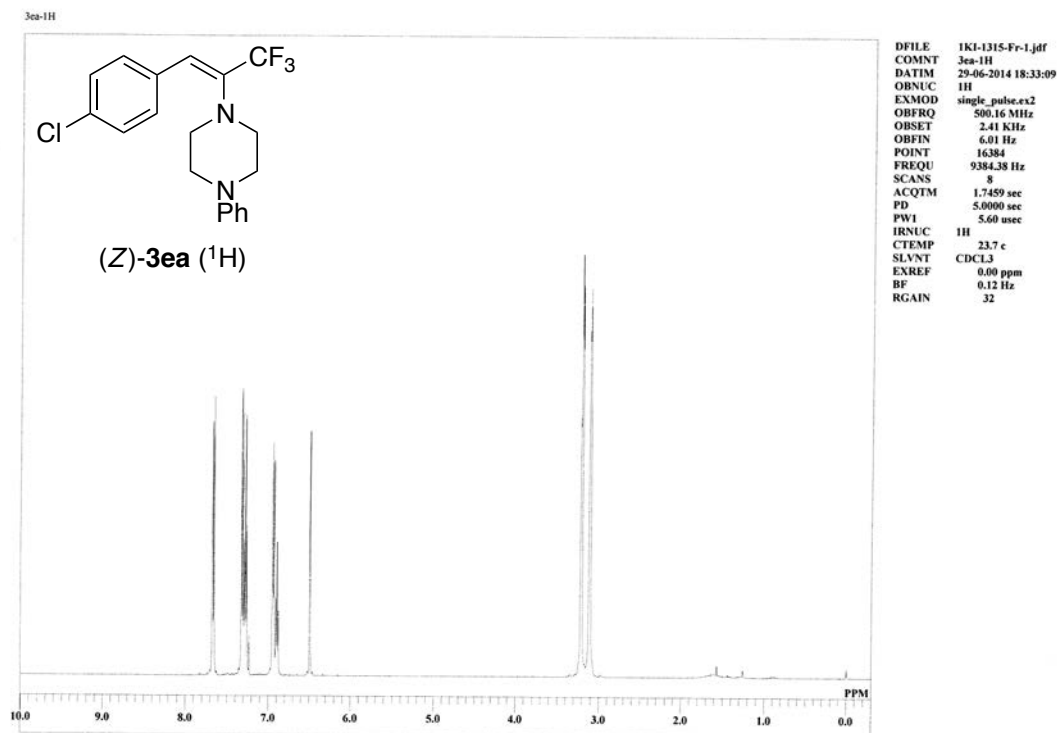


DFILE 1KI-1297-Fr 13C-1.jdf
 COMNT 3da-13C
 DATIM 24-06-2014 18:40:27
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 24.5 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 54

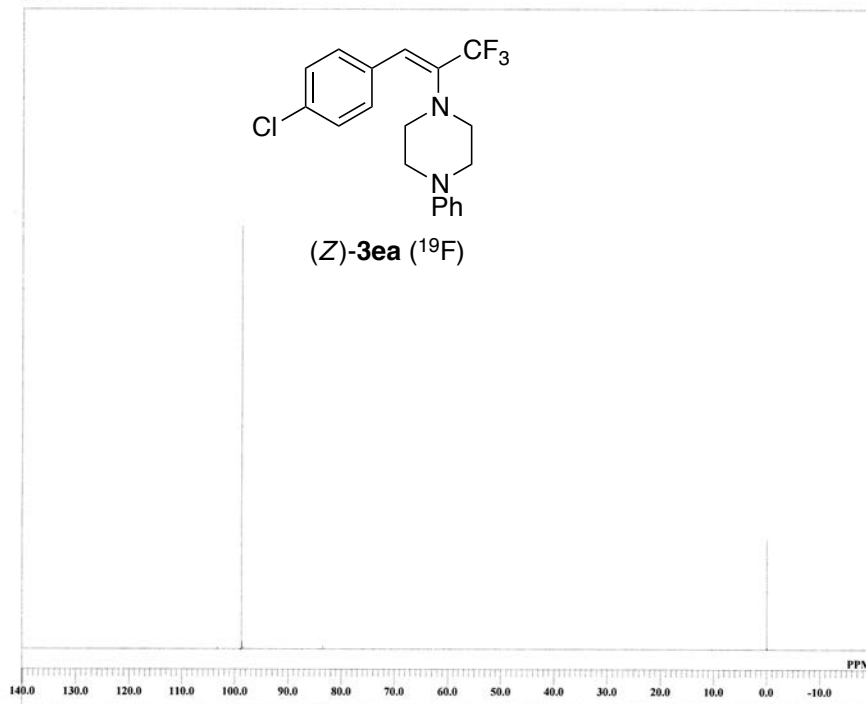
3da-19F



DFILE 1KI-1297-Fr 19F-1.jdf
 COMNT 3da-19F
 DATIM 24-06-2014 20:12:27
 OBNUC 19F
 EXMOD single_pulse_ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 23.9 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 48

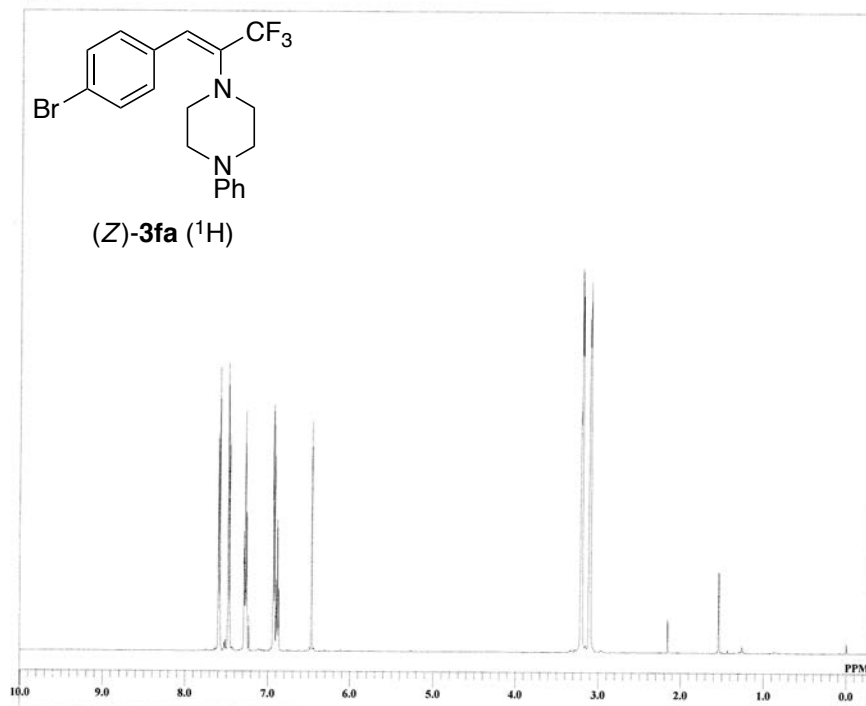


3ea-19F



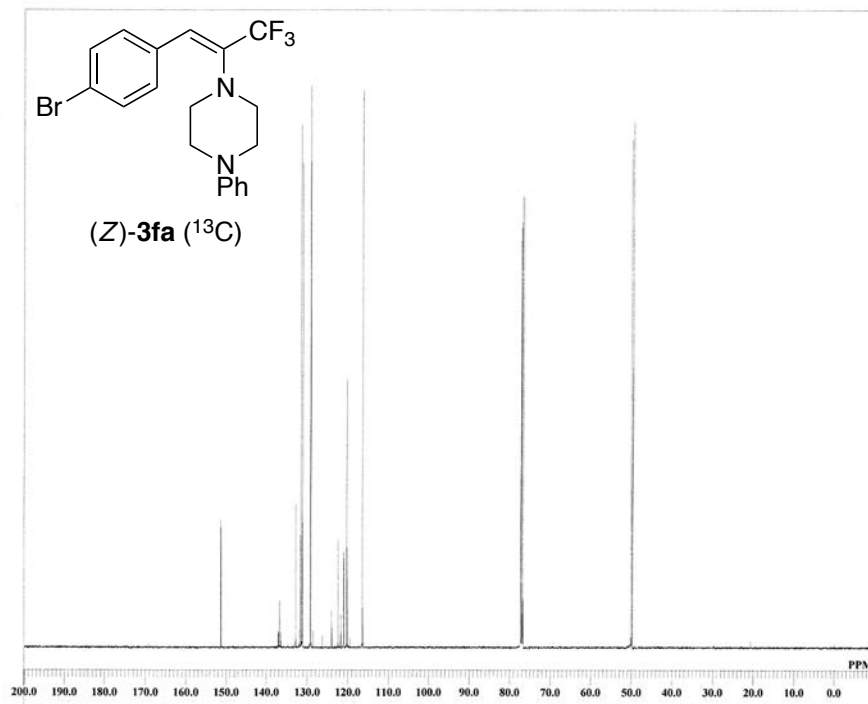
DFILE 1KI-1315-Fr-19F-1.jdf
 COMNT 3ea-19F
 DATIM 30-06-2014 09:00:27
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 23.4 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 44

3fa-1H



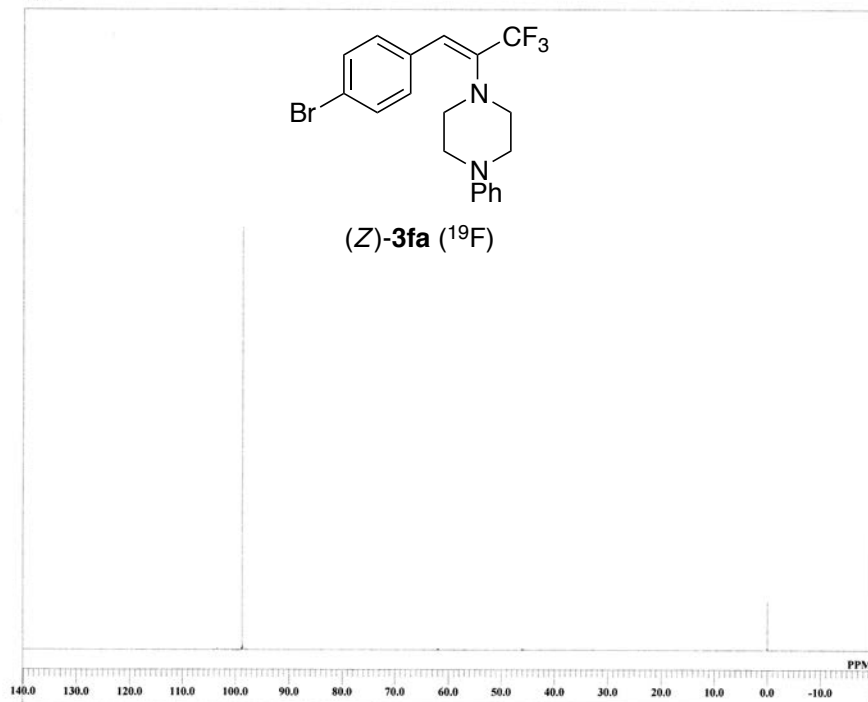
DFILE 1KI-1385-Fr-1.jdf
 COMNT 3fa-1H
 DATIM 20-08-2014 18:28:41
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 28.5 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 32

3fa-13C



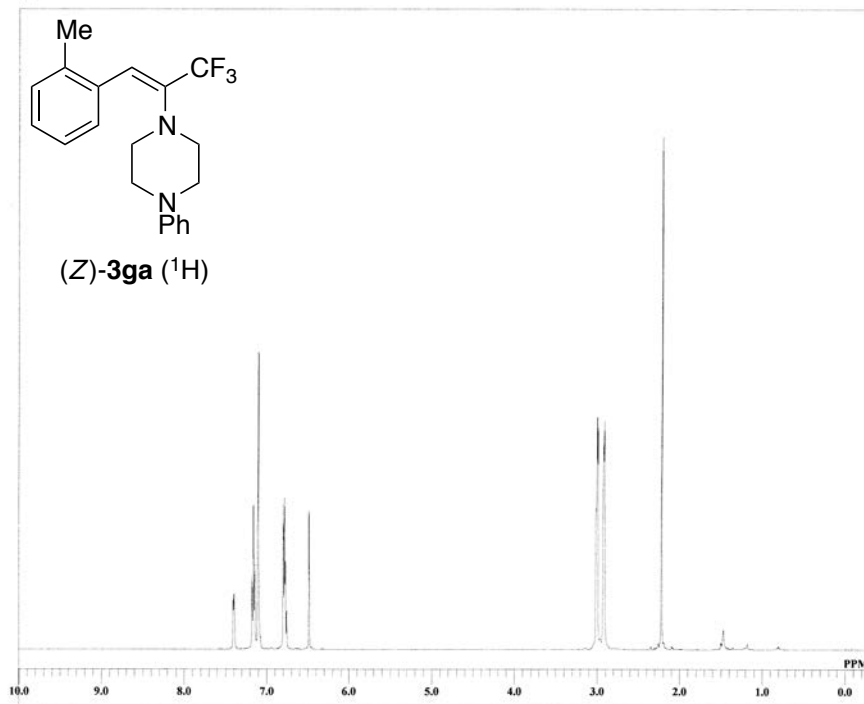
DFILE 1KI-1385-Fr 13C-1.jdf
 COMNT 3fa-13C
 DATIM 20-08-2014 20:09:26
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFREQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 99308.18 Hz
 SCANS 2048
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 28.8 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 54

3fa-19F



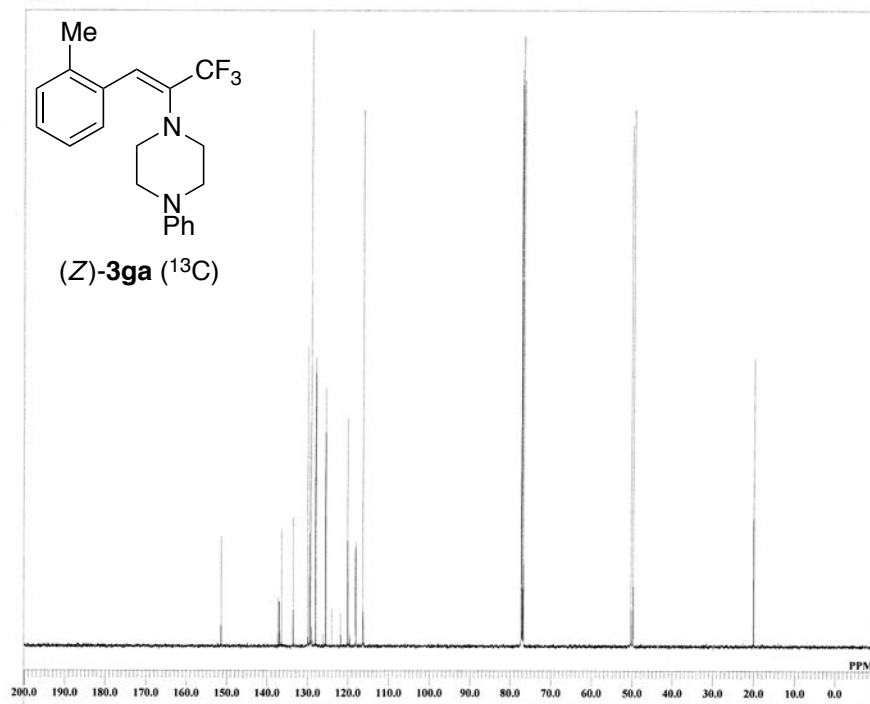
DFILE 1KI-1385-Fr 19F-1.jdf
 COMNT 3fa-19F
 DATIM 20-08-2014 20:14:28
 OBNUC 19F
 EXMOD single_pulse_ex2
 OBFREQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 28.3 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 44

3ga-1H

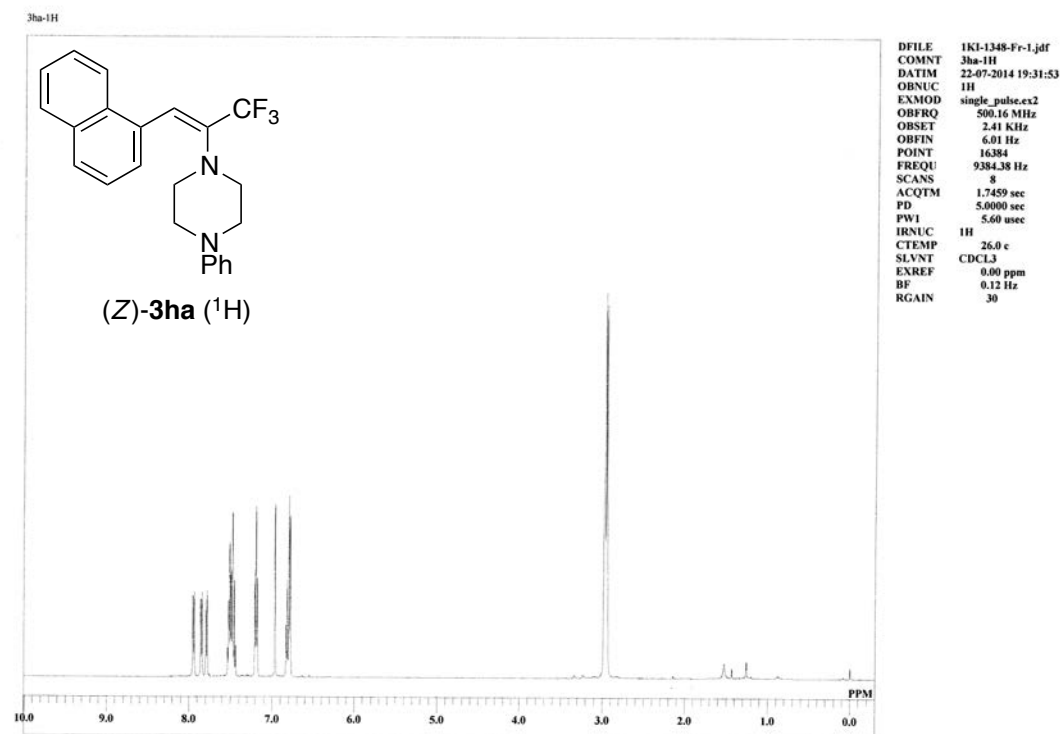
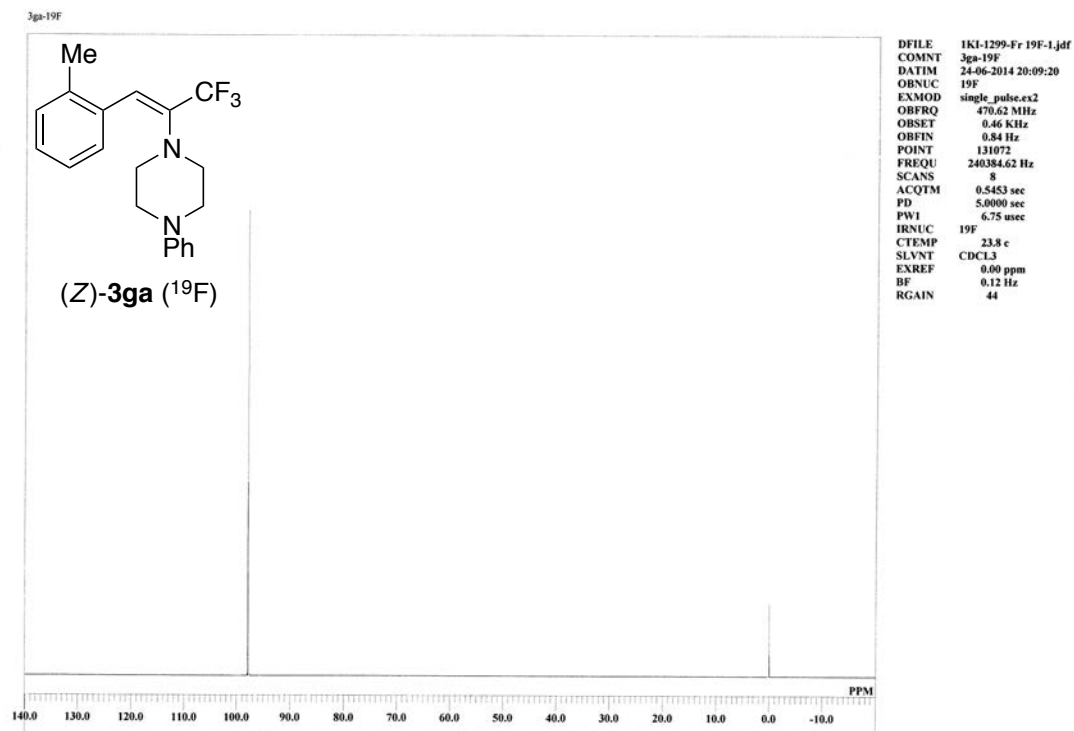


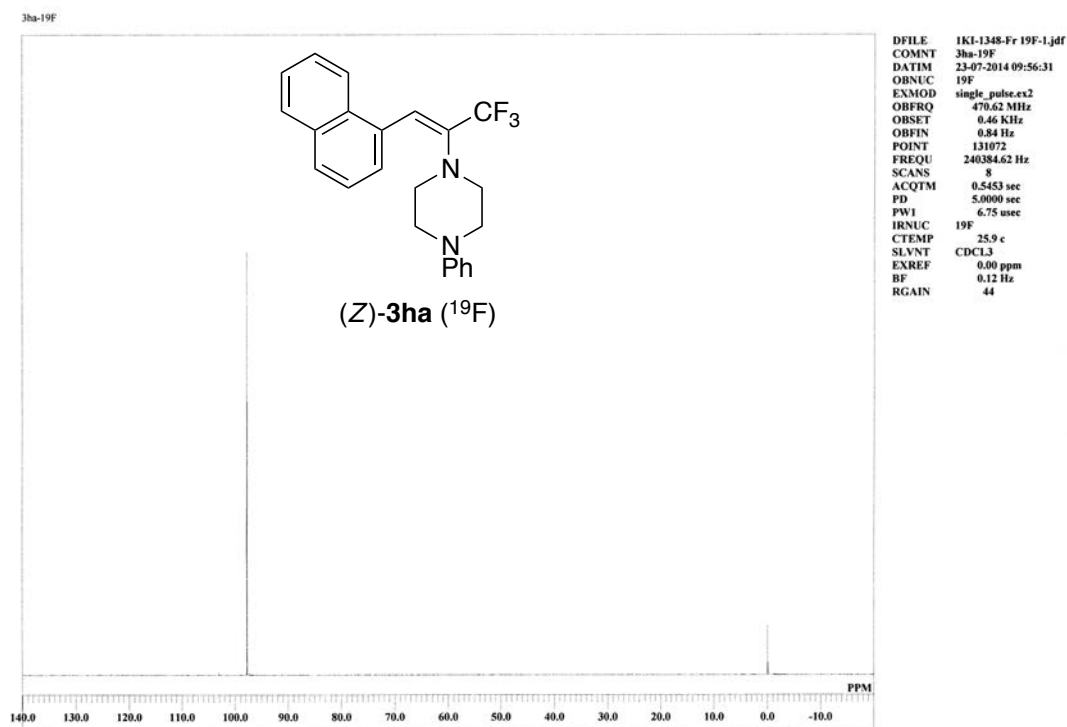
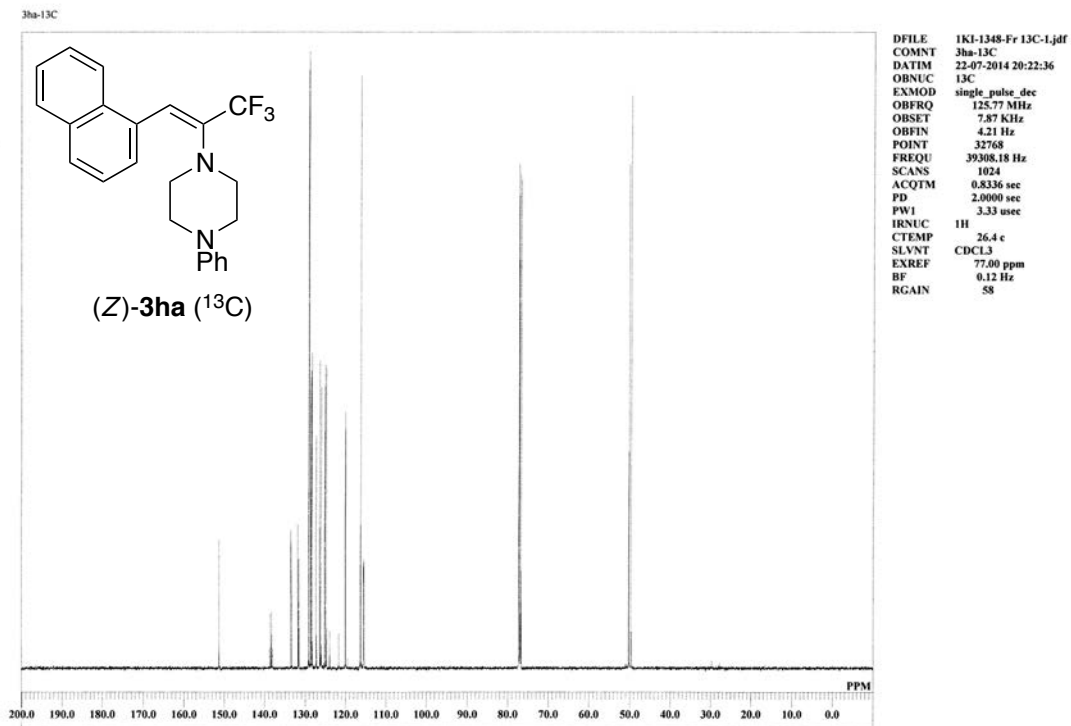
DFILE 1KI-1299-Fr-1.jdf
 COMNT 3ga-1H
 DATIM 24-06-2014 15:43:56
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFREQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 24.3 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 32

3ga-13C

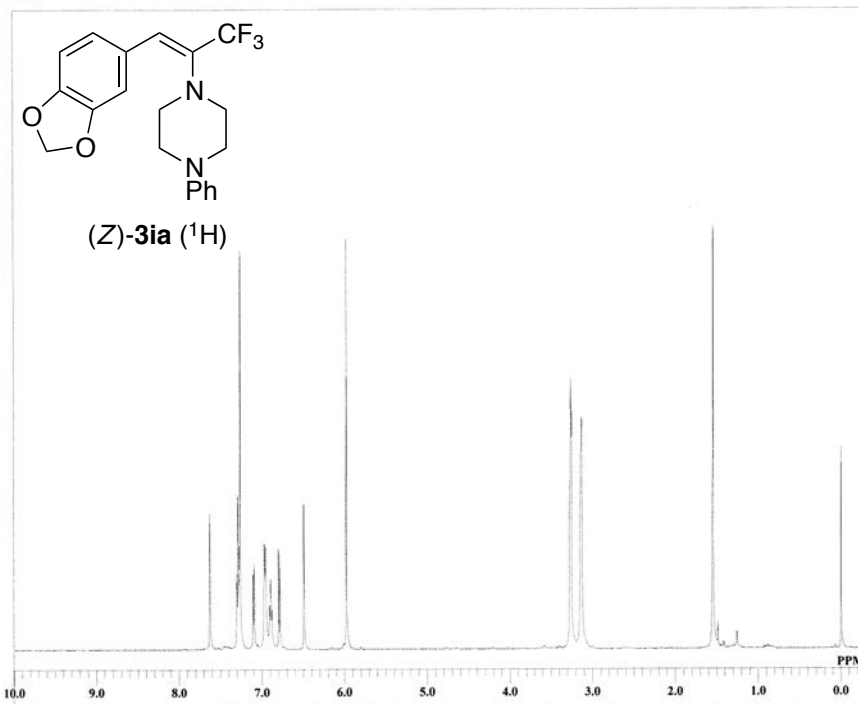


DFILE 1KI-1299-Fr-13C-1.jdf
 COMNT 3ga-13C
 DATIM 24-06-2014 19:38:29
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFREQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39368.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 13C
 CTEMP 24.4 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 54



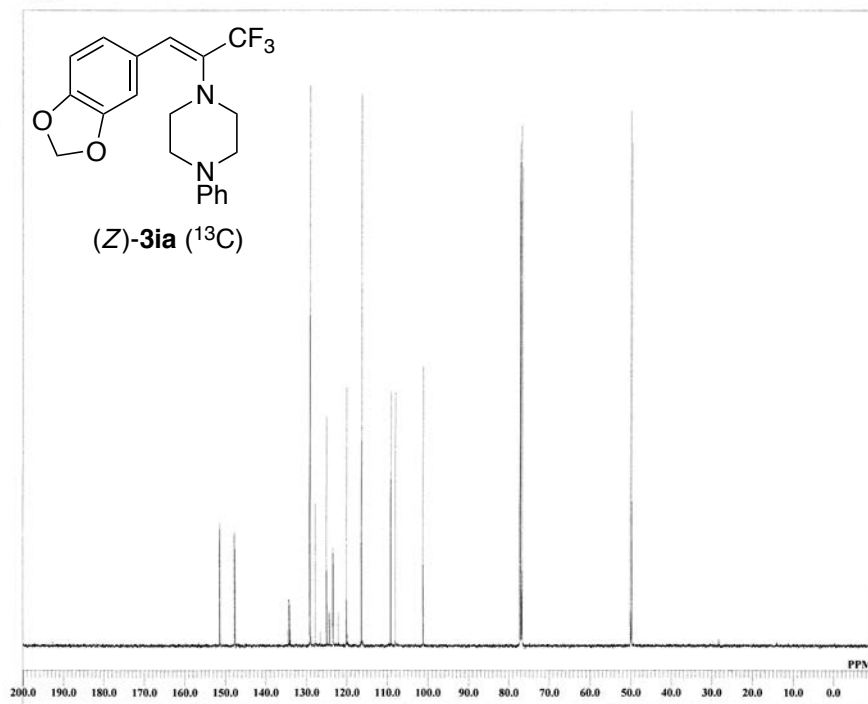


3ia-1H



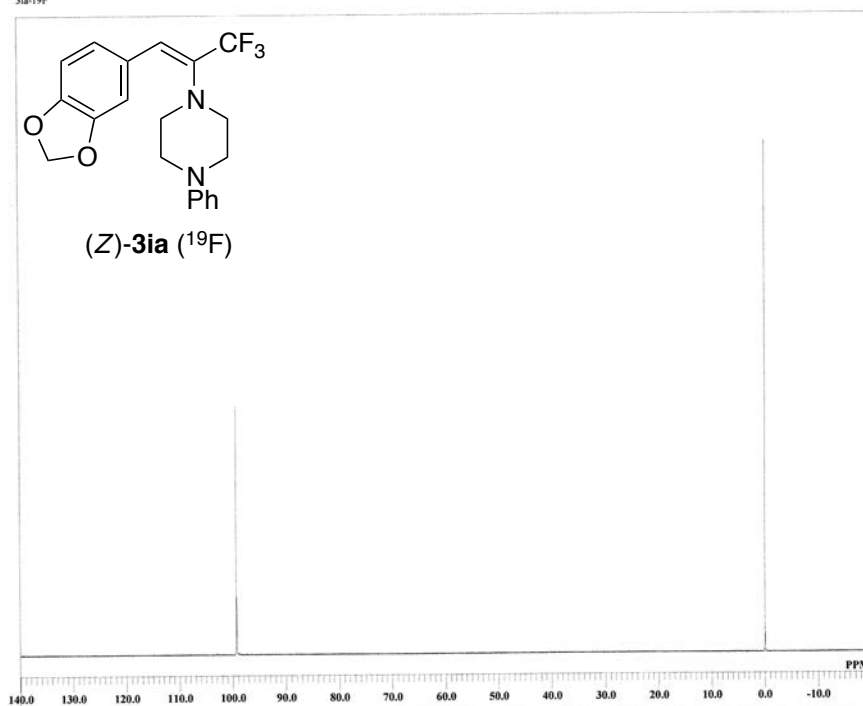
DFILE 1KI-1304-Fr re-1.jdf
 COMNT 3ia-1H
 DATIM 21-06-2014 16:14:24
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 24.5 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 50

3ia-13C



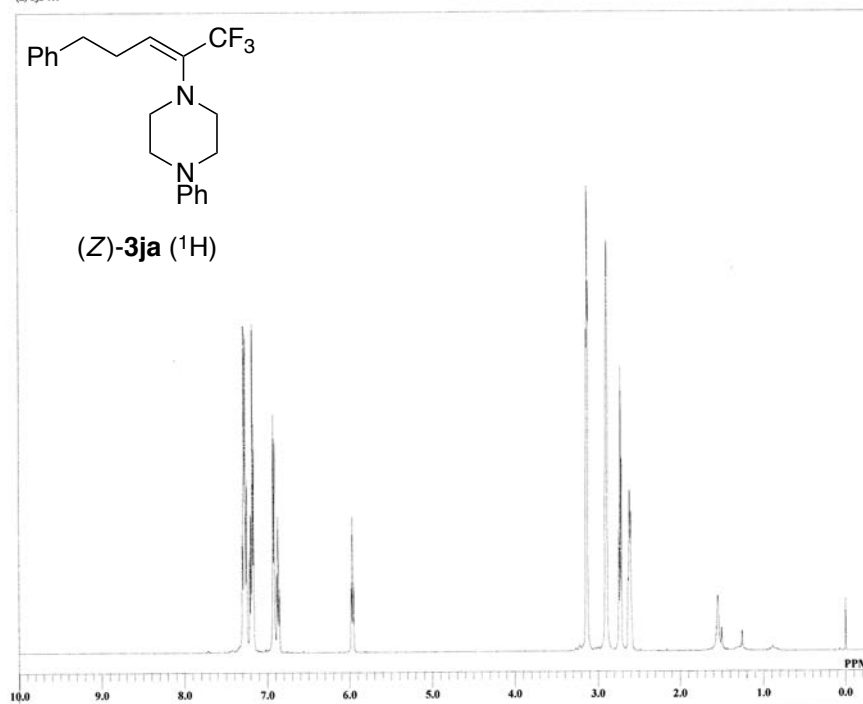
DFILE 1KI-1305-Fr 13C-1.jdf
 COMNT 3ia-13C
 DATIM 21-06-2014 14:39:41
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 24.9 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 56

3ia-19F



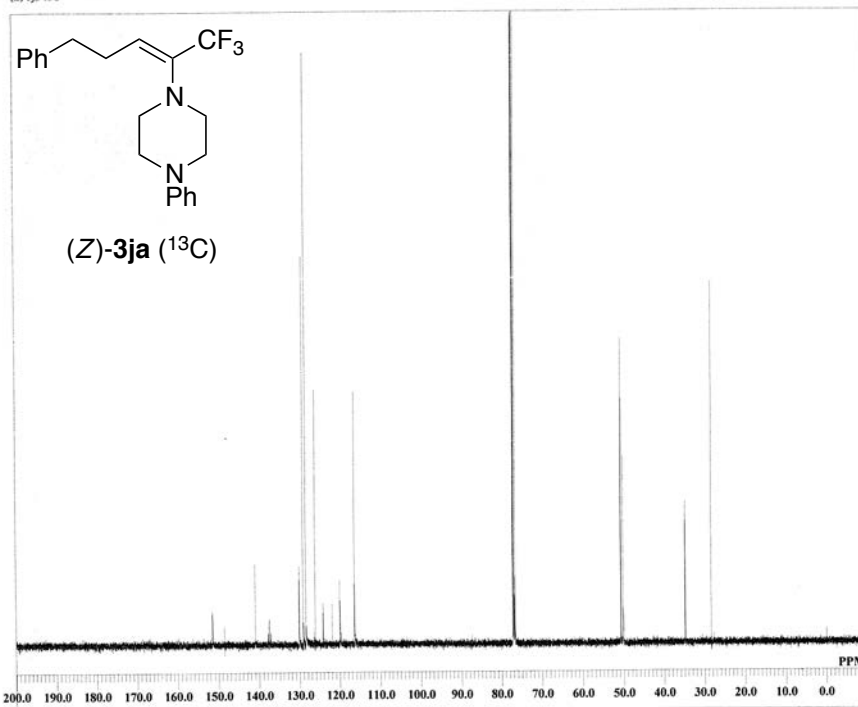
DFILE 1KI-1304-Fr 19F-1.jdf
 COMNT 3ia-19F
 DATIM 21-06-2014 18:11:30
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240354.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 24.6 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 50

(z)-3ja-1H



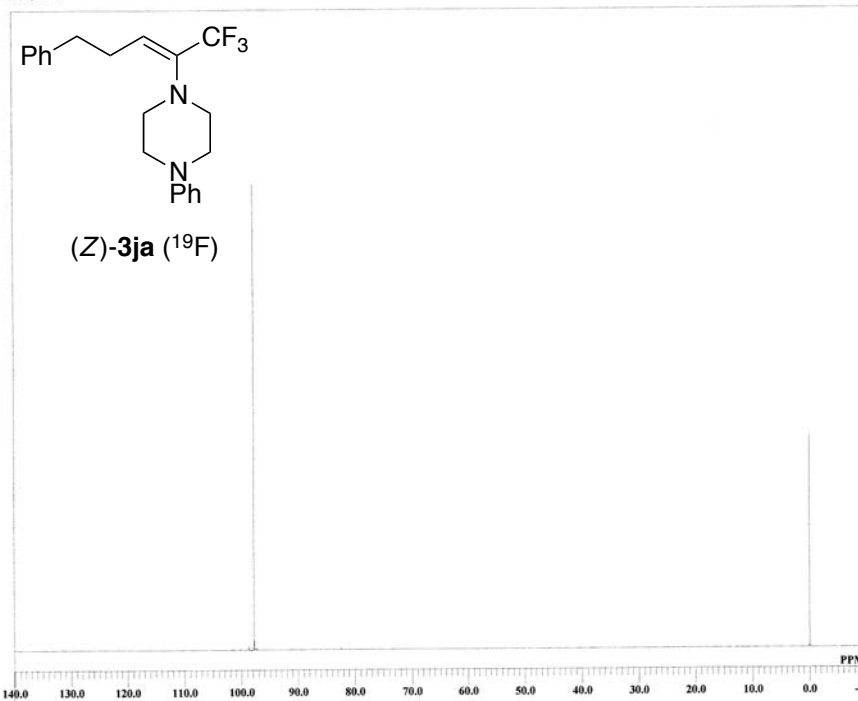
DFILE 1KI-1346-Fr1-1.jdf
 COMNT (z)-3ja-1H
 DATIM 22-07-2014 20:29:43
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 26.1 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 38

(Z)-3ja-13C



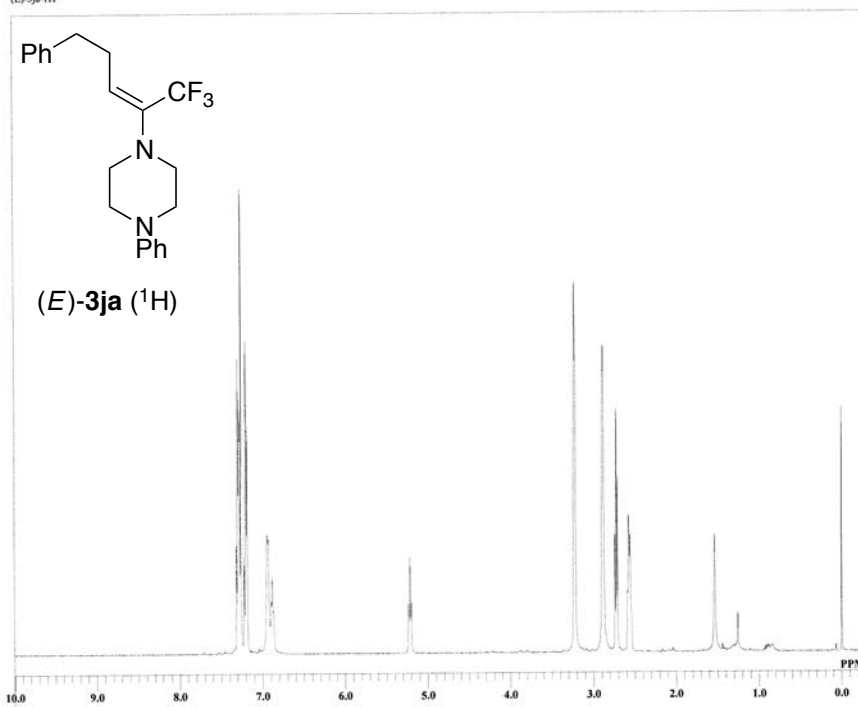
DFILE 1K1-1346-Fr1 13C-1.jdf
COMNT (Z)-3ja-13C
DATIM 22-07-2014 21:21:11
ORNUC 13C
EXMOD single_pulse_dec
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32768
FREQU 39308.18 Hz
SCANS 1024
ACQTM 0.8336 sec
PD 2.0000 sec
PW1 3.33 usec
IRNUC 1H
CTEMP 26.4 c
SLVNT CDCL3
EXREF 77.00 ppm
BF 0.12 Hz
RGAIN 58

(Z)-3ja-19F



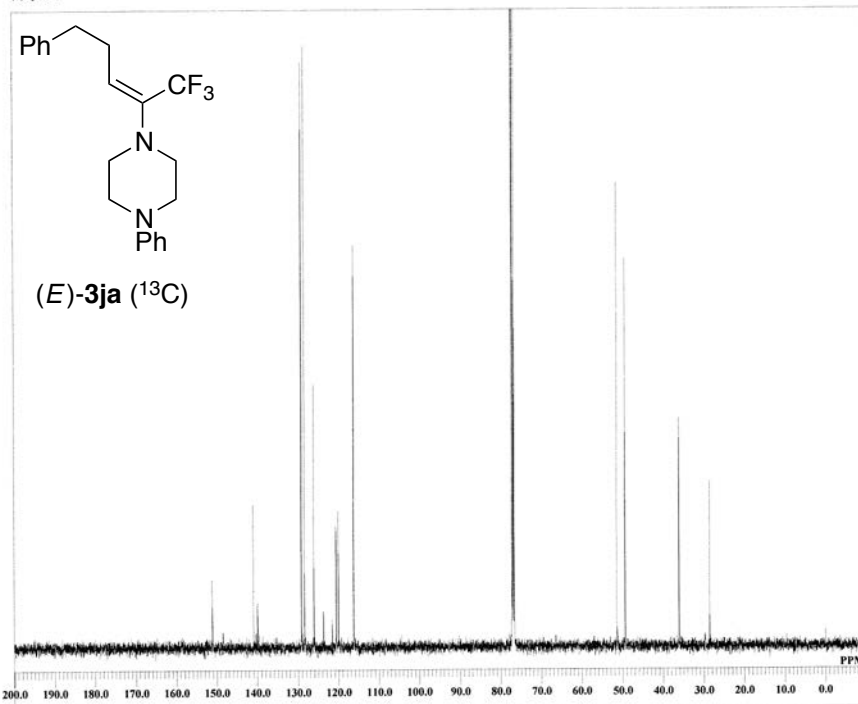
DFILE 1K1-1346-Fr1 19F-1.jdf
COMNT (Z)-3ja-19F
DATIM 23-07-2014 09:59:24
ORNUC 19F
EXMOD single_pulse_ex2
OBFRQ 470.62 MHz
OBSET 0.46 KHz
OBFIN 0.84 Hz
POINT 131072
FREQU 240384.62 Hz
SCANS 8
ACQTM 0.5453 sec
PD 5.0000 sec
PW1 6.75 usec
IRNUC 19F
CTEMP 25.9 c
SLVNT CDCL3
EXREF 0.00 ppm
BF 0.12 Hz
RGAIN 50

(E)-3ja-1H

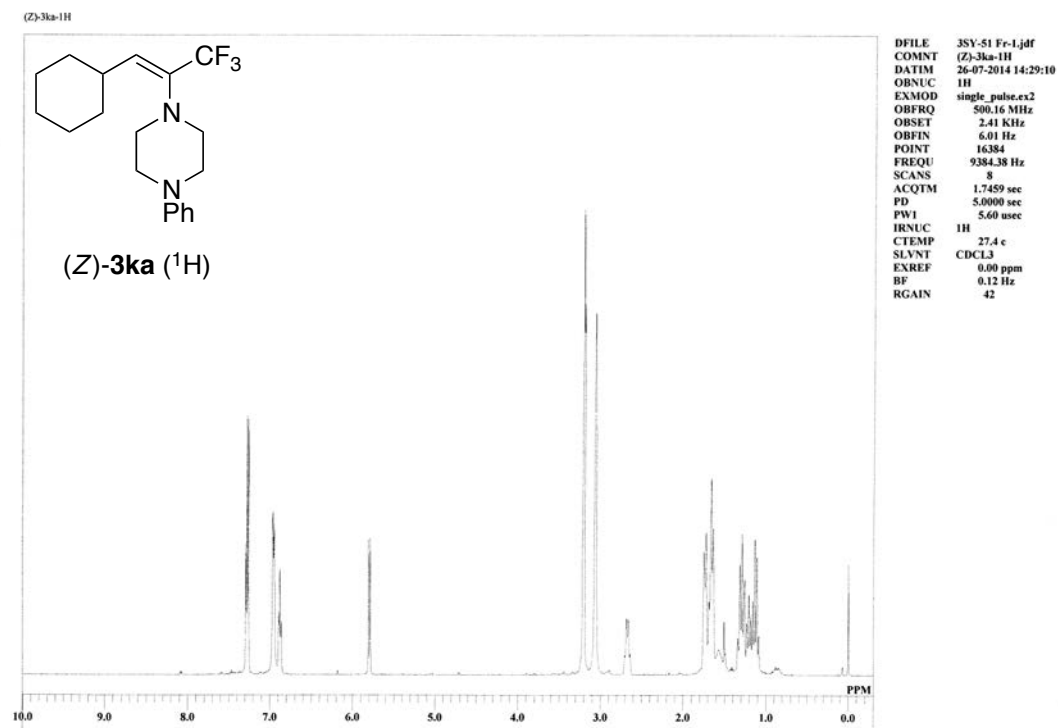
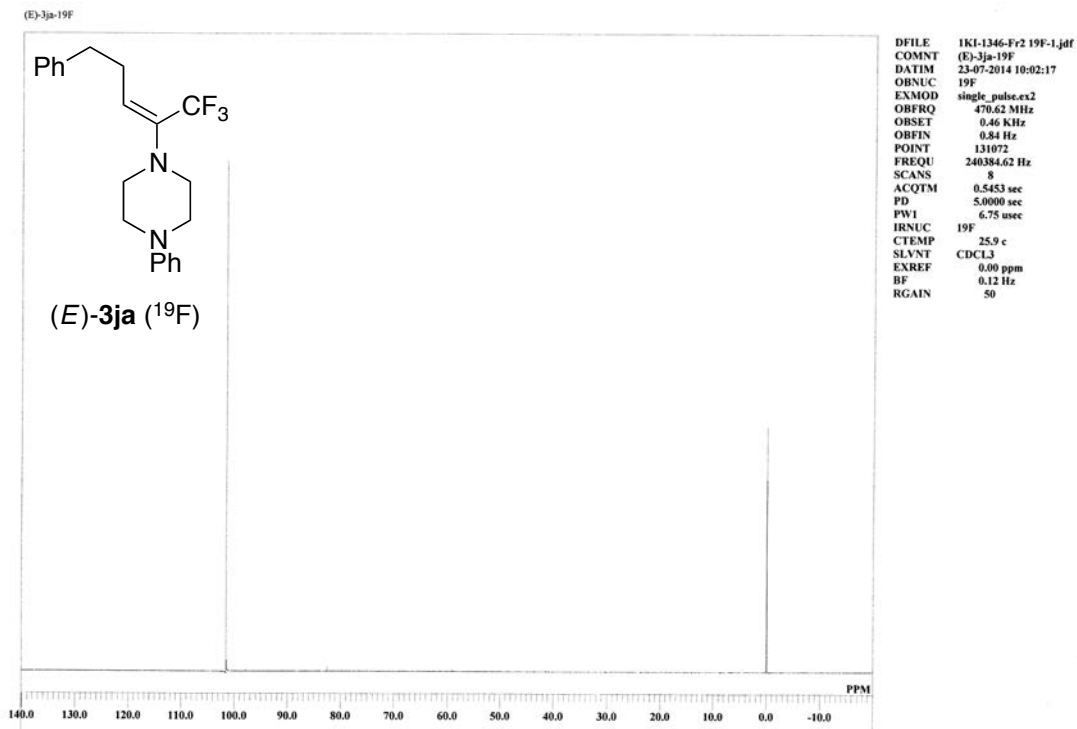


DFILE 1K1-1346-Fr2re-1.jdf
COMNT (E)-3ja-1H
DATIM 24-07-2014 09:23:21
OBNUC 1H
EXMOD single_pulse.ex2
OBFRQ 500.16 MHz
OBSET 2.41 KHz
OBFIN 6.01 Hz
POINT 16384
FREQU 9384.38 Hz
SCANS 8
ACQTM 1.7459 sec
PD 5.0000 sec
PWI 5.60 usec
IRNUC 1H
CTEMP 26.6 c
SLVNT CDCL3
EXREF 0.00 ppm
BF 0.12 Hz
RGAIN 48

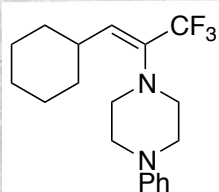
(E)-3ja-13C



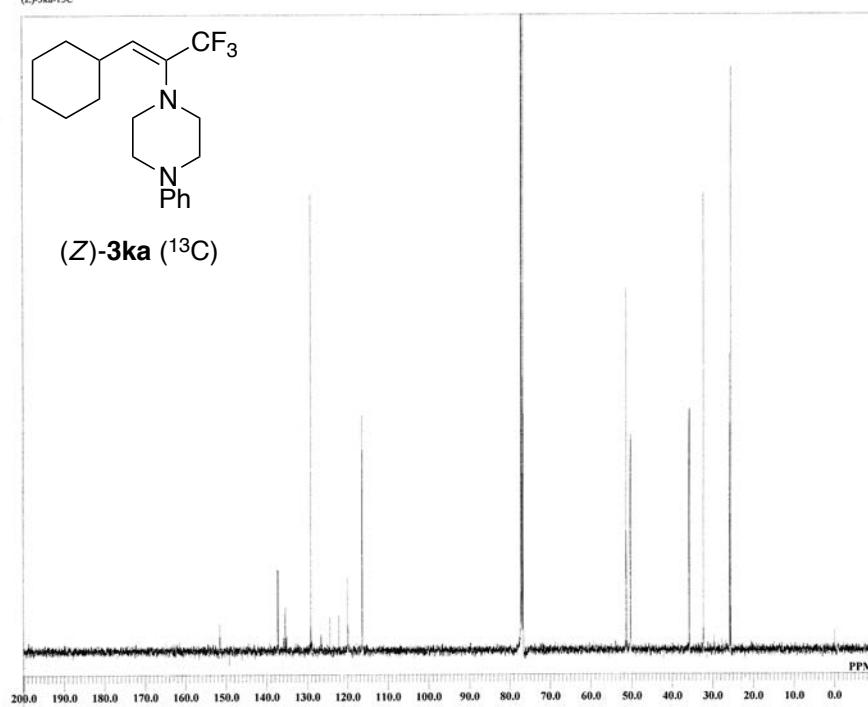
DFILE 1K1-1346-Fr2 13C re-1.jdf
COMNT (E)-3ja-13C
DATIM 23-07-2014 00:01:14
OBNUC 13C
EXMOD single_pulse_dec
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32768
FREQU 39368.18 Hz
SCANS 2048
ACQTM 0.8336 sec
PD 2.0000 sec
PWI 3.33 usec
IRNUC 1H
CTEMP 26.1 c
SLVNT CDCL3
EXREF 77.00 ppm
BF 0.12 Hz
RGAIN 58



(Z)-3ka-13C

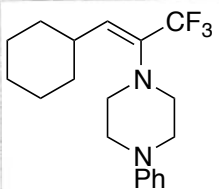


(Z)-3ka (¹³C)

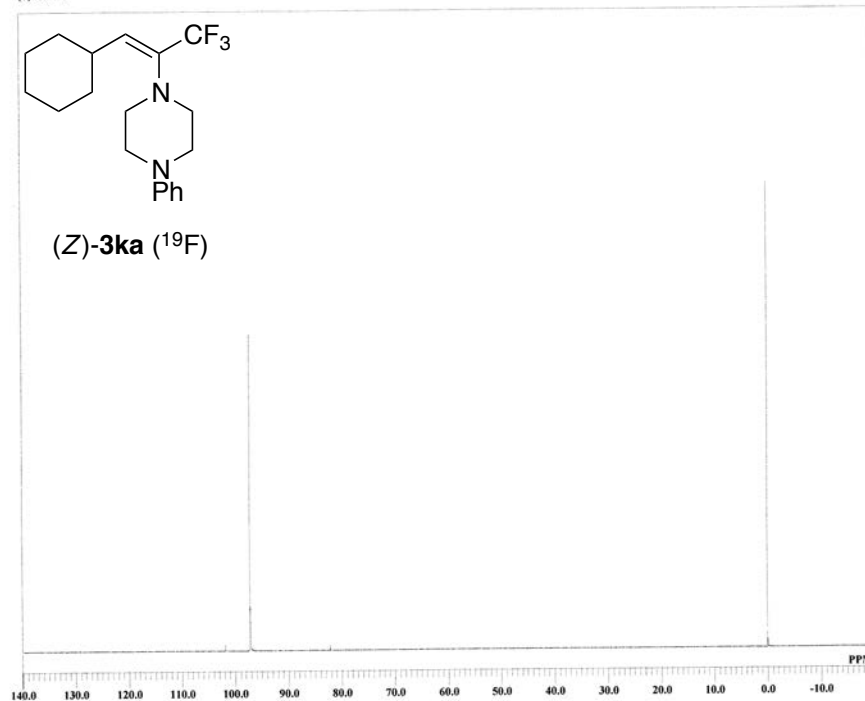


DFILE 3SV-51 Fr-13Cre-1.jdf
COMINT (Z)-3ka-13C
DATIM 26-07-2014 18:09:57
OBNUC 13C
EXMOD single_pulse_dec
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32768
FREQU 39308.18 Hz
SCANS 2048
ACQTM 0.8336 sec
PD 2.0000 sec
PWI 3.33 usec
IRNUC 1H
CTEMP 27.8 c
SLVNT CDCL3
EXREF 77.00 ppm
BF 0.12 Hz
RGAIN 58

(Z)-3ka-19F

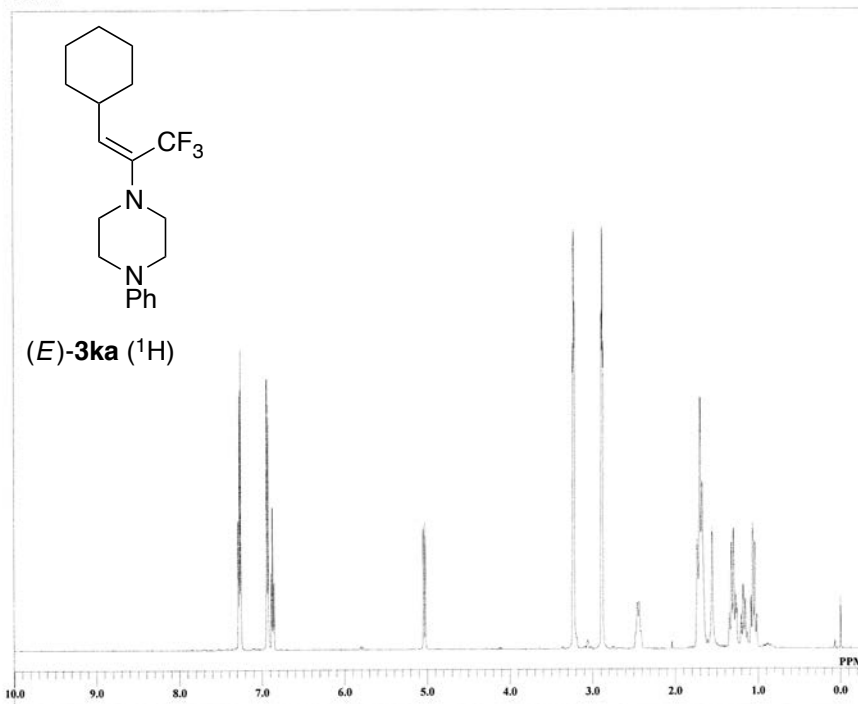


(Z)-3ka (¹⁹F)



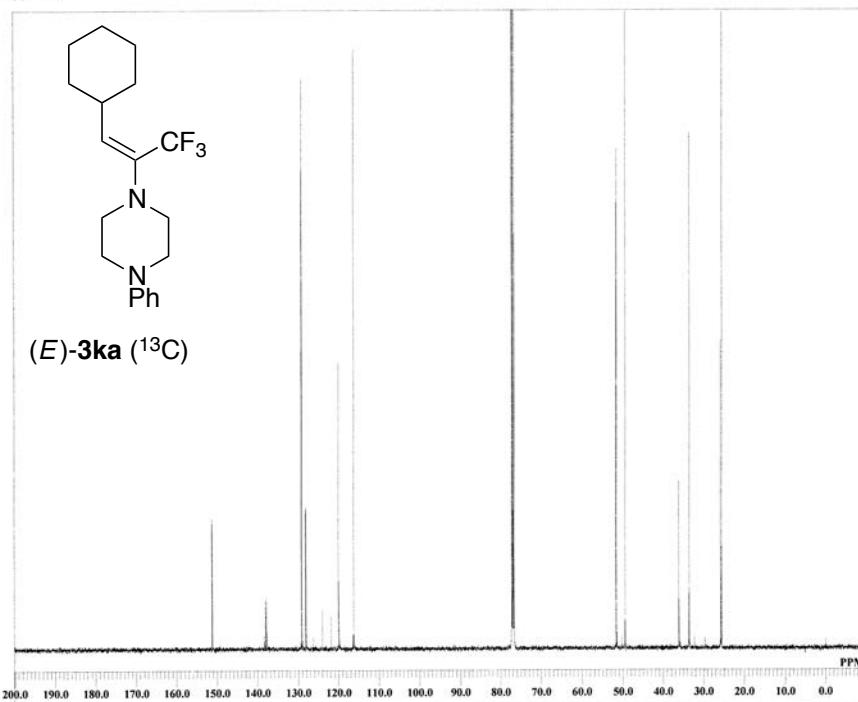
DFILE 3SV-51 Fr-19F-1.jdf
COMINT (Z)-3ka-19F
DATIM 26-07-2014 18:15:16
OBNUC 19F
EXMOD single_pulse_ex2
OBFRQ 470.62 MHz
OBSET 0.46 KHz
OBFIN 0.84 Hz
POINT 131072
FREQU 240384.62 Hz
SCANS 8
ACQTM 0.5453 sec
PD 5.0000 sec
PWI 6.75 usec
IRNUC 19F
CTEMP 27.2 c
SLVNT CDCL3
EXREF 0.00 ppm
BF 0.12 Hz
RGAIN 50

(E)-3ka-1H



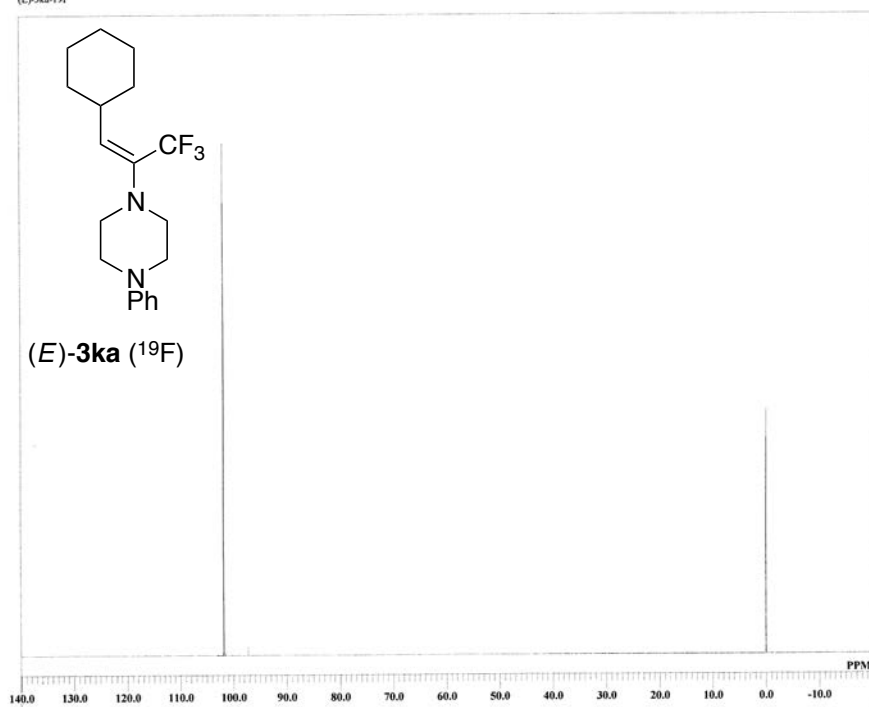
DFILE JSI-92, 93-Fr-1.jdf
COMNT (E)-3ka-1H
DATIM 20-08-2014 20:35:43
OBNUC 1H
EXMOD single_pulse.ac2
OBFREQ 500.16 MHz
OBSET 2.41 KHz
OBFIN 6.01 Hz
POINT 16384
FREQU 9384.38 Hz
SCANS 8
ACQTM 1.7459 sec
PD 5.0000 sec
PW1 5.60 usec
IRNUC 1H
CTEMP 28.3 c
SLVNT CDCL3
EXREF 0.00 ppm
BF 0.12 Hz
RGAIN 40

(E)-3ka-13C



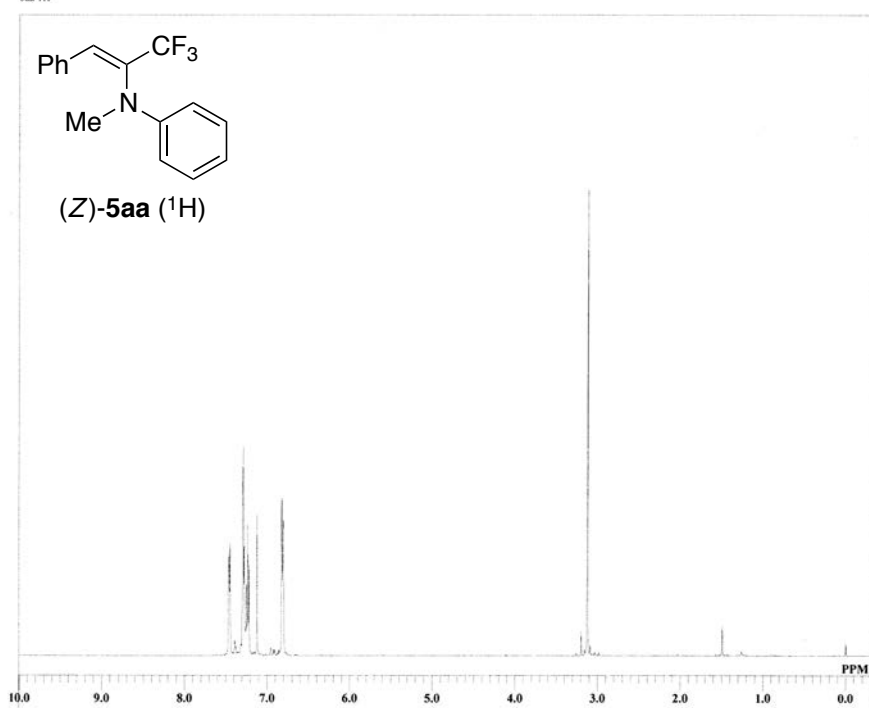
DFILE JSI-92, 93-Fr-13C-1.jdf
COMNT (E)-3ka-13C
DATIM 21-08-2014 03:06:49
OBNUC 13C
EXMOD single_pulse_dec
OBFREQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32768
FREQU 39308.18 Hz
SCANS 8192
ACQTM 0.8336 sec
PD 2.0000 sec
PW1 3.33 usec
IRNUC 1H
CTEMP 28.5 c
SLVNT CDCL3
EXREF 77.00 ppm
BF 0.12 Hz
RGAIN 56

(E)-3ka-19F



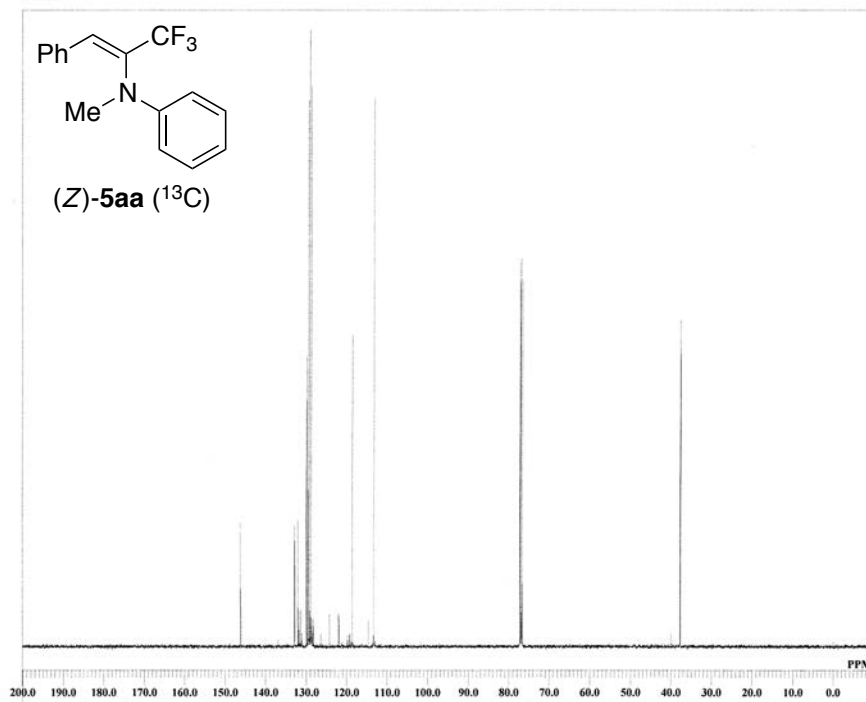
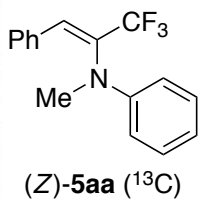
DFILE 3SI-92, 93-Fr 19F-1.jdf
COMNT (E)-3ka-19F
DATIM 21-08-2014 08:52:40
OBNUC 19F
EXMOD single_pulse.ex2
OBFRQ 470.62 MHz
OBSET 0.46 KHz
OBFIN 0.84 Hz
POINT 131072
FREQU 240384.62 Hz
SCANS 8
ACQTM 0.5453 sec
PD 5.0000 sec
PW1 6.75 usec
IRNUC 19F
CTEMP 28.0 c
SLVNT CDCL3
EXREF 0.00 ppm
BF 0.12 Hz
RGAIN 50

5aa-1H



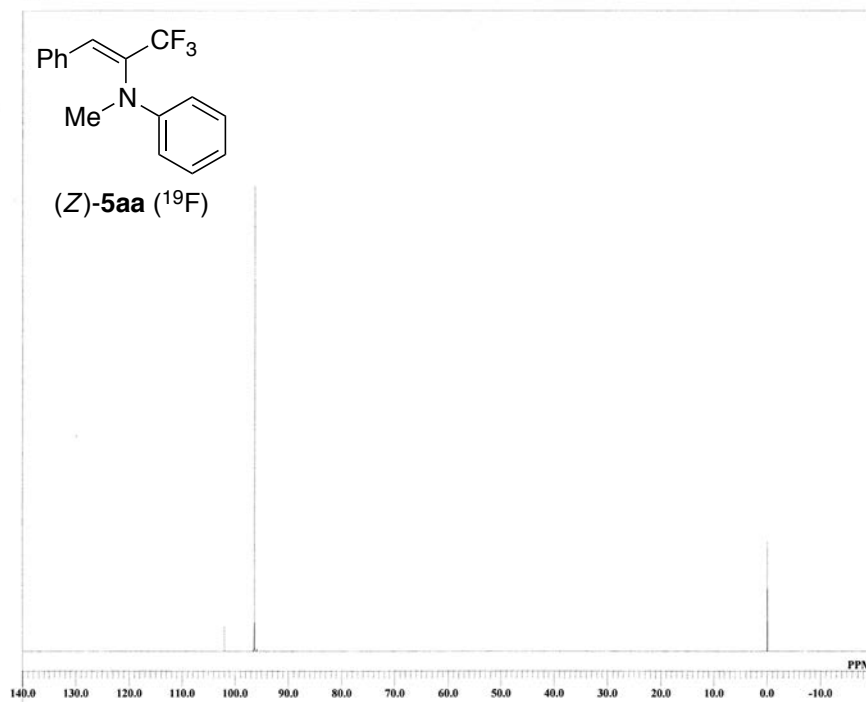
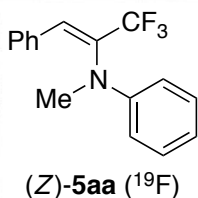
DFILE 1K1-1242-Fr re-1.jdf
COMNT 5aa-1H
DATIM 22-05-2014 09:18:06
OBNUC 1H
EXMOD single_pulse.ex2
OBFRQ 500.16 MHz
OBSET 2.41 KHz
OBFIN 6.01 Hz
POINT 16384
FREQU 9384.38 Hz
SCANS 8
ACQTM 1.7459 sec
PD 5.0000 sec
PW1 5.60 usec
IRNUC 1H
CTEMP 21.0 c
SLVNT CDCL3
EXREF 0.00 ppm
BF 0.12 Hz
RGAIN 30

5aa-13C



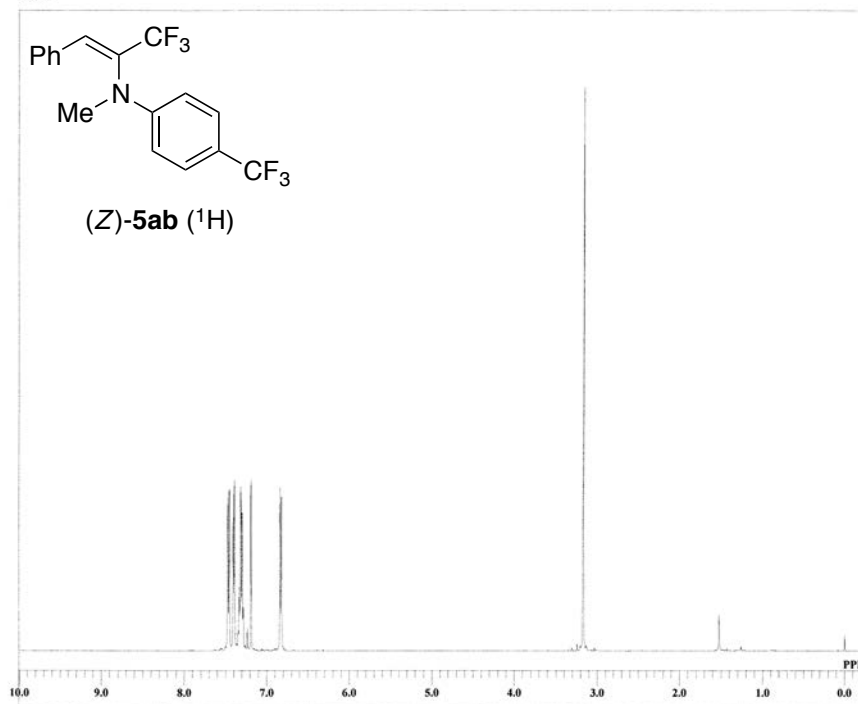
DFILE 1KI-1242-Fr 13C-1.jdf
 COMNT 5aa-13C
 DATIM 22-05-2014 09:45:40
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFREQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39368.18 Hz
 SCANS 512
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 21.7 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 56

5aa-19F



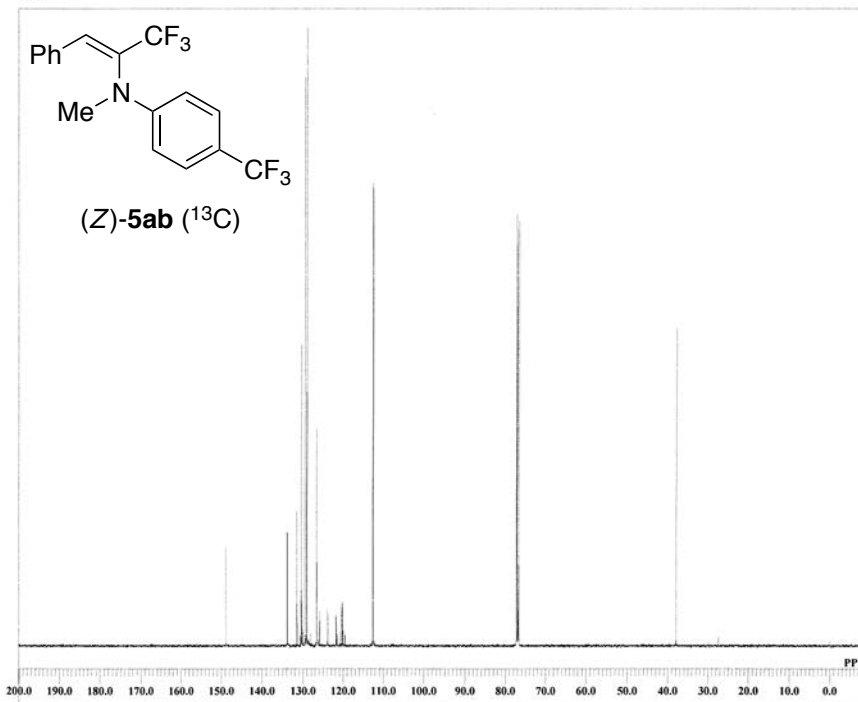
DFILE 1KI-1242-Fr 19F-1.jdf
 COMNT 5aa-19F
 DATIM 22-05-2014 09:53:02
 OBNUC 19F
 EXMOD single_pulse_ex2
 OBFREQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 21.1 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 40

5ab-1H



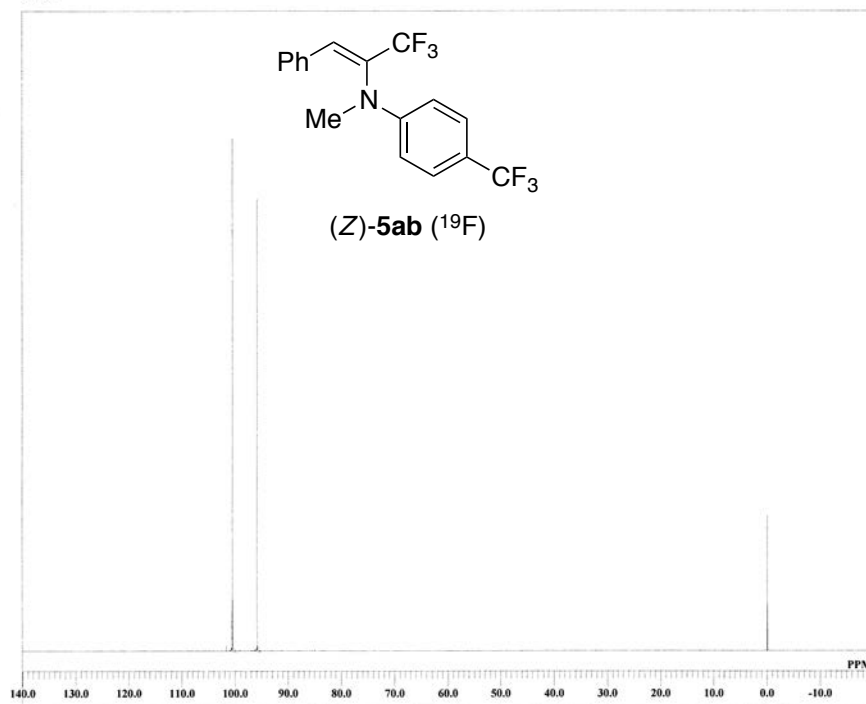
DFILE 1K1-1245-Fr-1.jdf
 COMNT 5ab-1H
 DATIM 22-05-2014 19:17:01
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFREQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 21.4 c
 SLVNT CDCl₃
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 30

5ab-13C



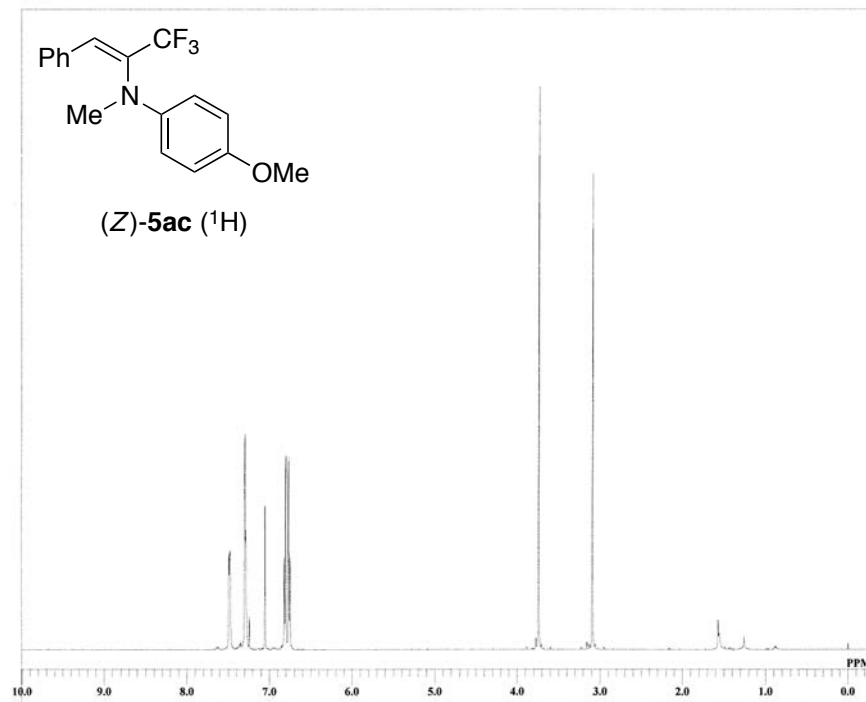
DFILE 1K1-1245-Fr-13C-1.jdf
 COMNT 5ab-13C
 DATIM 22-05-2014 20:07:38
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFREQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 21.8 c
 SLVNT CDCl₃
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 56

5ab-19F



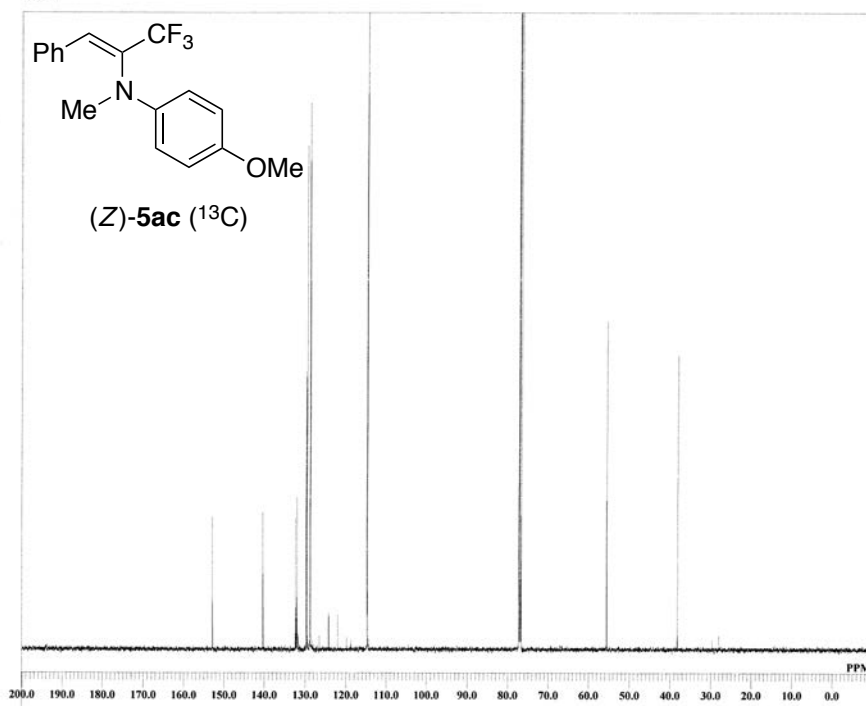
DFILE 1K1-1245-Fr-19F-1.jdf
 COMNT 5ab-19F
 DATIM 23-05-2014 09:30:30
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFREQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 21.1 c
 SLVNT CDCl3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 36

5ac-1H



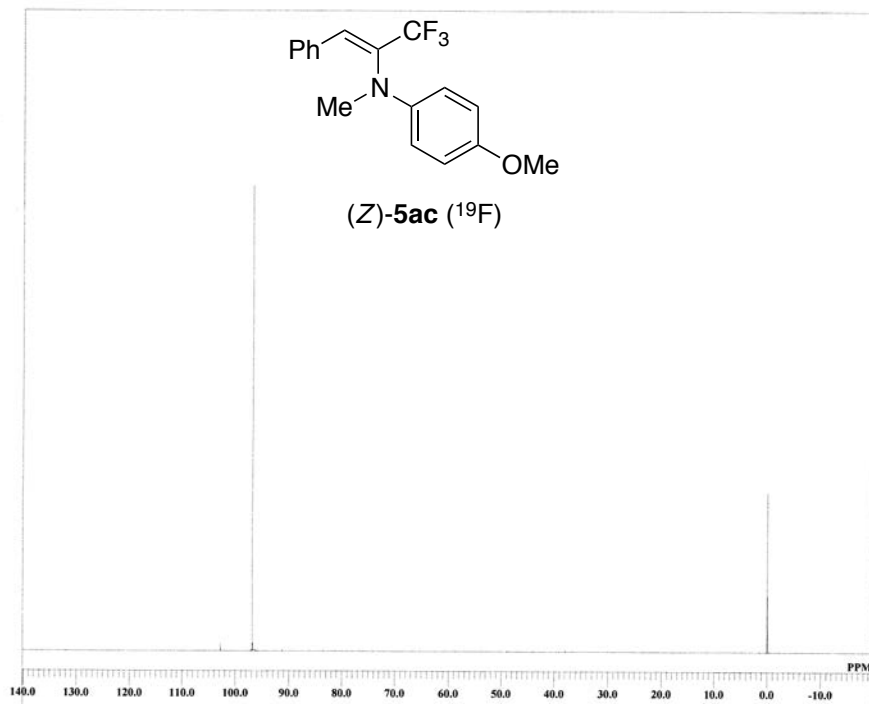
DFILE 1K1-1340-Fr-1.jdf
 COMNT 5ac-1H
 DATIM 12-07-2014 09:25:23
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFREQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 25.2 c
 SLVNT CDCl3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 36

5ac-13C



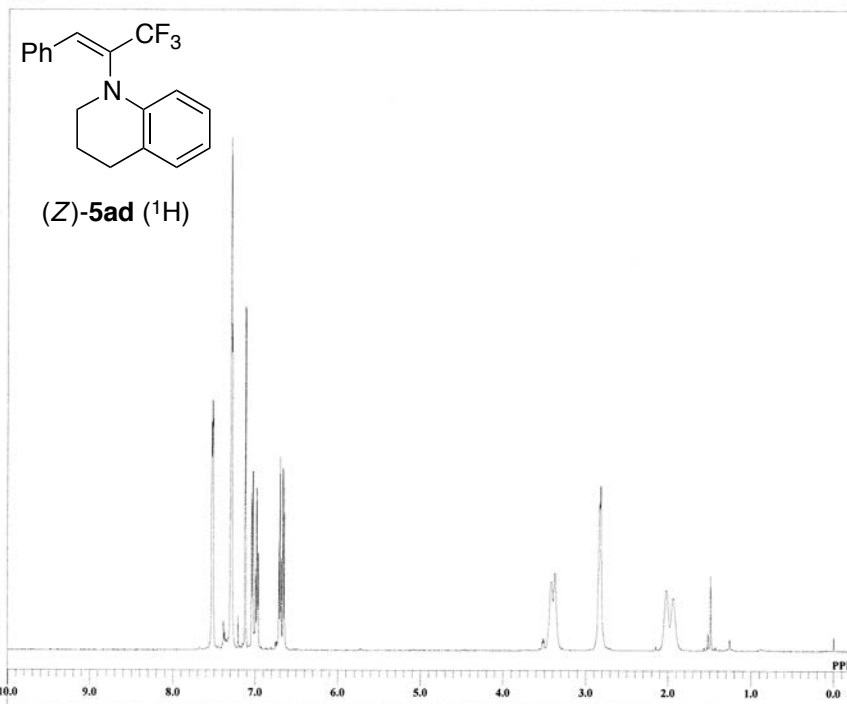
DFILE 1KI-1340-Fr 13C-1.jdf
COMINT 5ac-13C
DATIM 12-07-2014 10:16:53
OBNUC 13C
EXMOD single_pulse_dec
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32768
FREQU 39308.18 Hz
SCANS 1024
ACQTM 0.8336 sec
PD 2.0000 sec
PW1 3.33 usec
IRNUC 1H
CTEMP 25.9 c
SLVNT CDCl3
EXREF 77.00 ppm
BF 0.12 Hz
RGAIN 54

5ac-19F



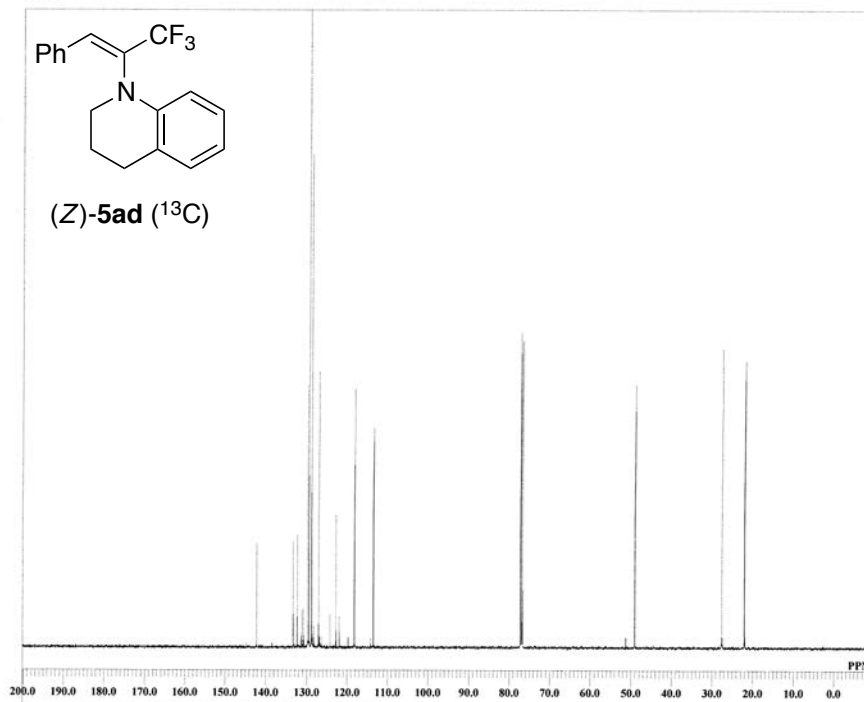
DFILE 1KI-1340-Fr 19F-1.jdf
COMINT 5ac-19F
DATIM 12-07-2014 10:23:38
OBNUC 19F
EXMOD single_pulse_ex2
OBFRQ 470.62 MHz
OBSET 0.46 KHz
OBFIN 0.84 Hz
POINT 131072
FREQU 240384.62 Hz
SCANS 8
ACQTM 0.5453 sec
PD 5.0000 sec
PW1 6.75 usec
IRNUC 19F
CTEMP 25.5 c
SLVNT CDCl3
EXREF 0.00 ppm
BF 0.12 Hz
RGAIN 46

5ad-1H



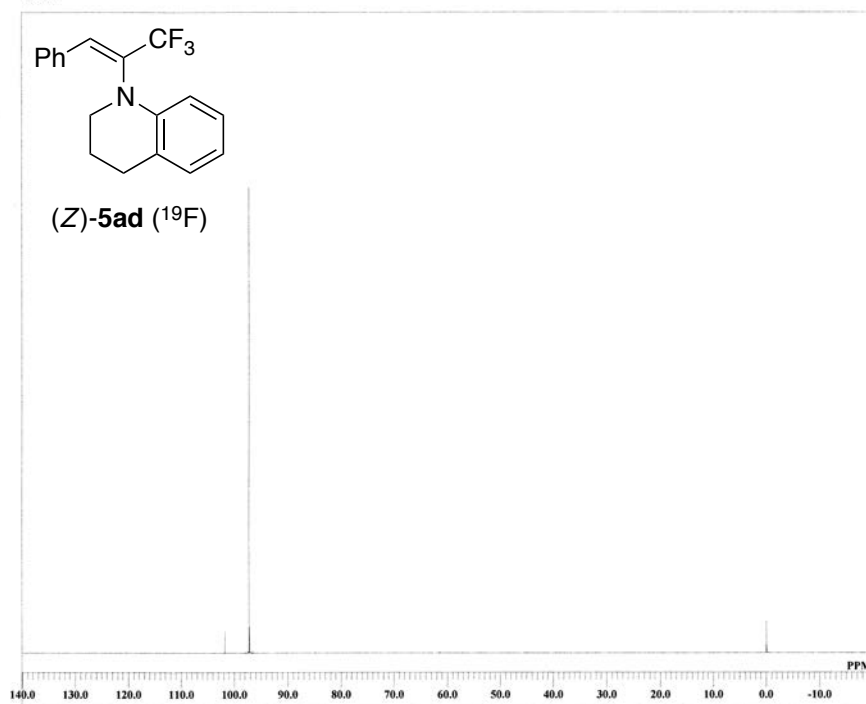
DFILE 1KI-1252-Fr-1.jdf
 COMNT 5ad-1H
 DATIM 27-05-2014 17:27:43
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFREQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 22.3 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 30

5ad-13C



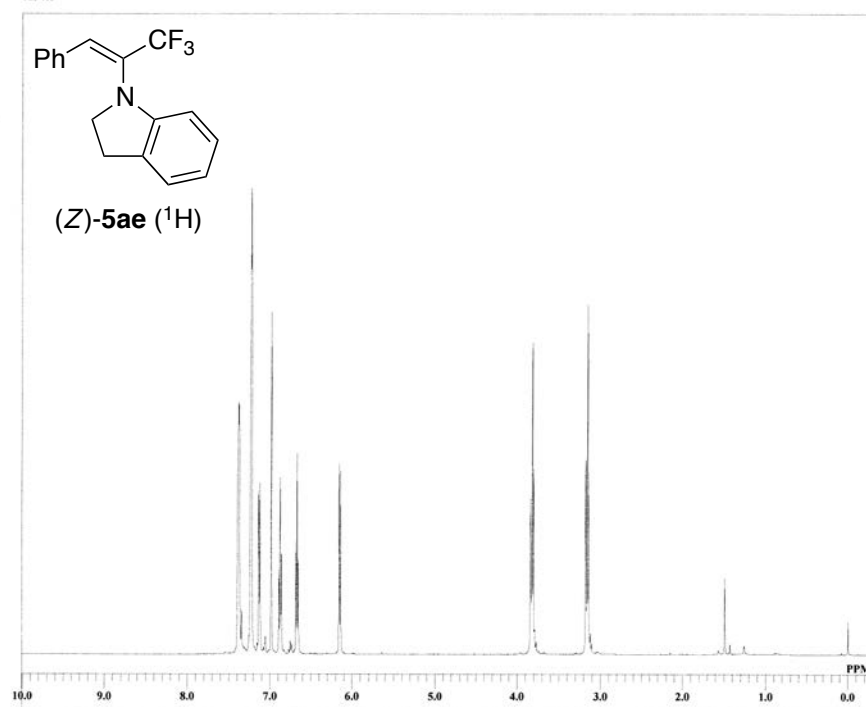
DFILE 1KI-1252-Fr-13C-1.jdf
 COMNT 5ad-13C
 DATIM 27-05-2014 17:53:52
 OBNUC 13C
 EXMOD single_pulse.dec
 OBFREQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 512
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 22.8 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 56

5ad-19F



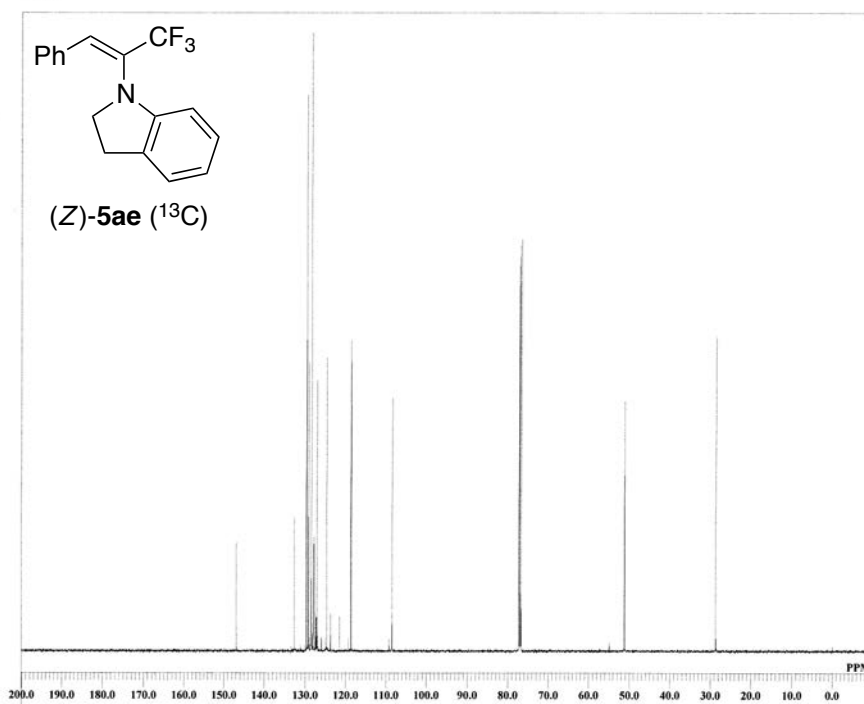
DFILE 1K1-1252-Fr 19F-1.jdf
 COMNT 5ad-19F
 DATIM 27-05-2014 18:02:15
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFRO 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 22.4 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 40

5ae-1H



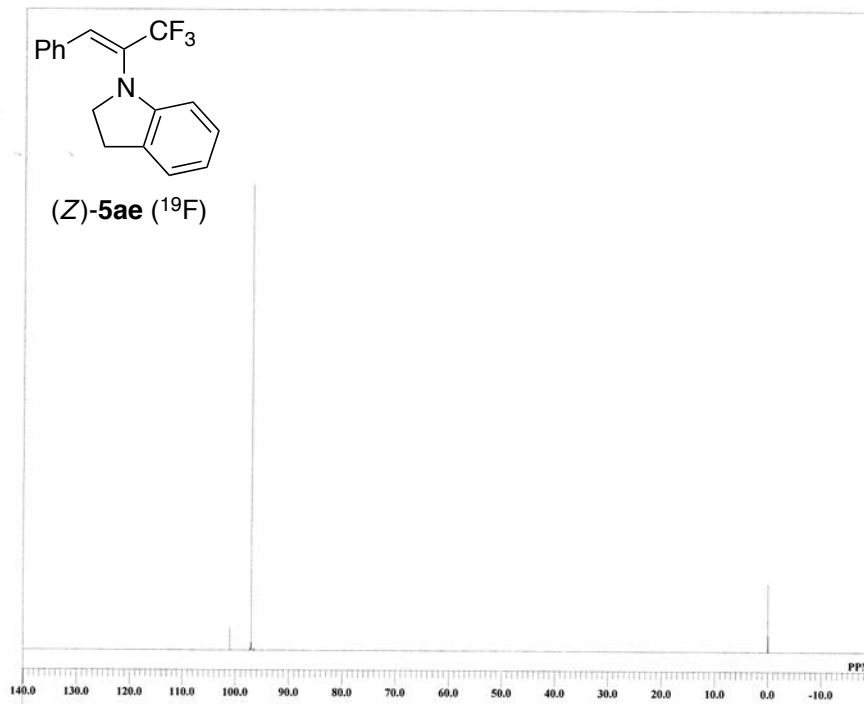
DFILE 1K1-1255-Fr-1.jdf
 COMNT 5ae-1H
 DATIM 29-05-2014 17:17:01
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRO 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 22.4 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 30

Sae-13C



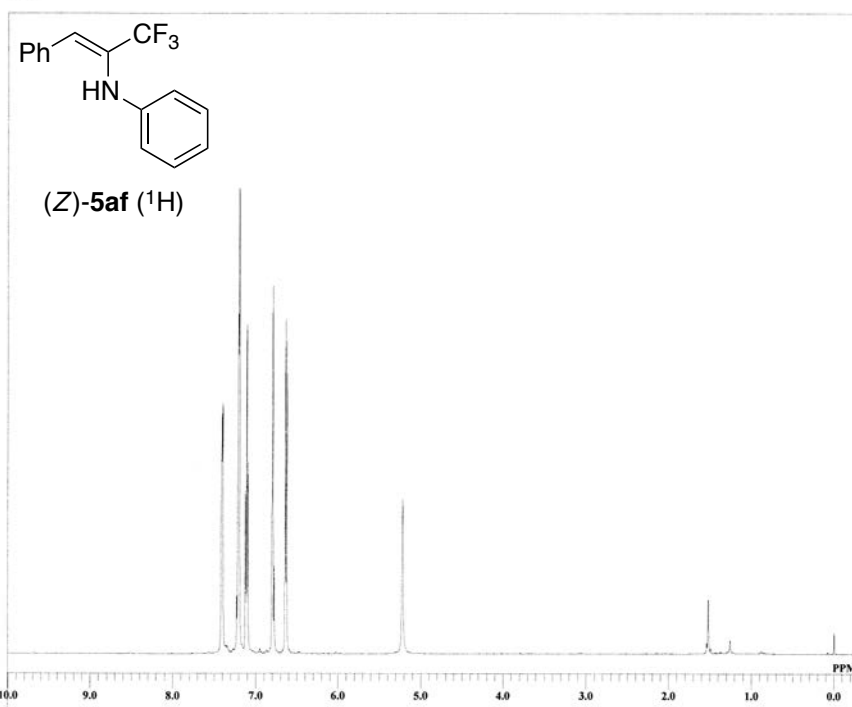
DFILE 1KI-1255-Fr 13C-1.jdf
 COMNT Sae-13C
 DATIM 29-05-2014 18:07:24
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39368.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 23.1 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 54

Sae-19F



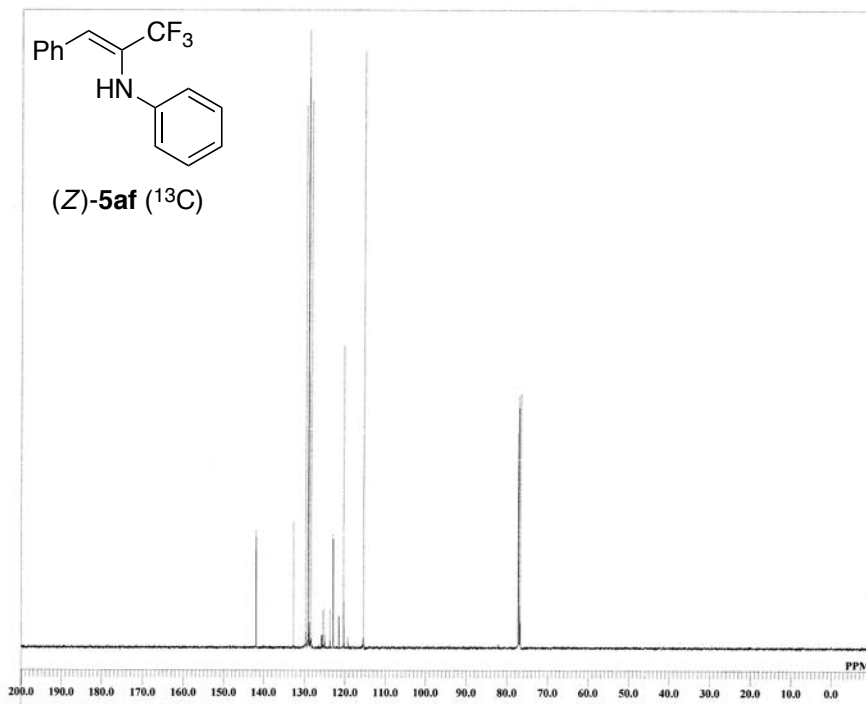
DFILE 1KI-1255-Fr 19F-1.jdf
 COMNT Sae-19F
 DATIM 29-05-2014 18:15:38
 OBNUC 19F
 EXMOD single_pulse_ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 22.7 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 42

5af-1H



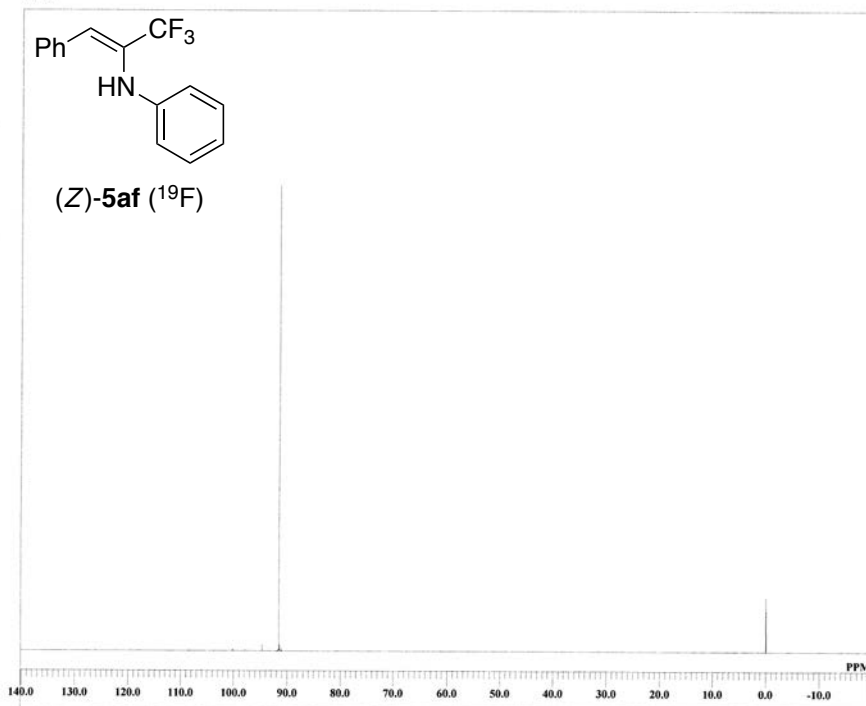
DFILE 1KI-1248-Fr-1.jdf
COMNT 5af-1H
DATIM 23-05-2014 16:15:28
OBNUC 1H
EXMOD single_pulse.ex2
OBFRQ 500.16 MHz
OBSET 2.41 KHz
OBFIN 6.01 Hz
POINT 16384
FREQU 9384.38 Hz
SCANS 8
ACQTM 1.7459 sec
PD 5.0000 sec
PW1 5.60 usec
IRNUC 1H
CTEMP 21.6 c
SLVNT CDCL3
EXREF 0.00 ppm
BF 0.12 Hz
RGAIN 34

5af-13C



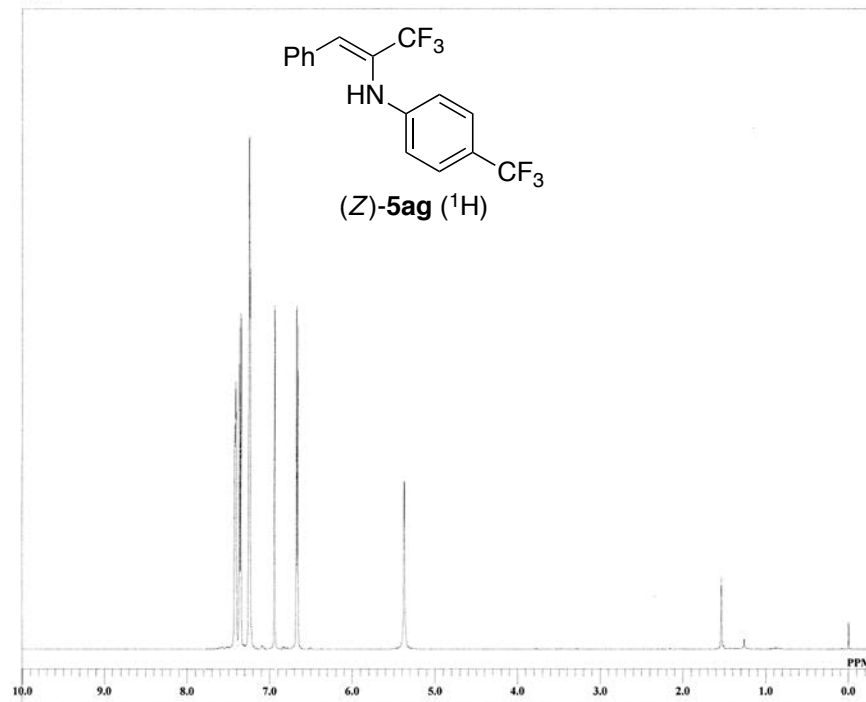
DFILE 1KI-1248-Fr-13C-1.jdf
COMNT 5af-13C
DATIM 23-05-2014 17:07:27
OBNUC 13C
EXMOD single_pulse_dec
OBFRQ 125.77 MHz
OBSET 7.87 KHz
OBFIN 4.21 Hz
POINT 32768
FREQU 39308.18 Hz
SCANS 1024
ACQTM 0.8336 sec
PD 2.0000 sec
PW1 3.33 usec
IRNUC 1H
CTEMP 22.1 c
SLVNT CDCL3
EXREF 77.00 ppm
BF 0.12 Hz
RGAIN 56

5af-19F



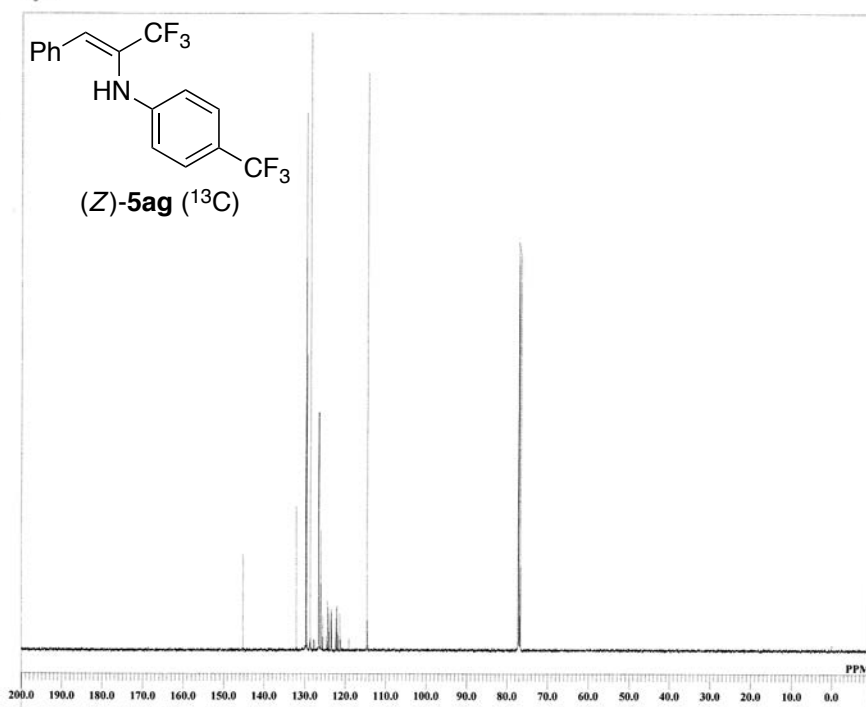
DFILE 1KI-1248-Fr 19F-1.jdf
COMNT 5af-19F
DATIM 23-05-2014 17:15:26
OBNUC 19F
EXMOD single_pulse.ex2
OBFRQ 470.62 MHz
OBSET 0.46 kHz
OBFIN 0.84 Hz
POINT 131072
FREQU 240384.62 Hz
SCANS 8
ACQTM 0.5453 sec
PD 5.0000 sec
PW1 6.75 usec
IRNUC 19F
CTEMP 21.7 c
SLVNT CDCL3
EXREF 0.00 ppm
BF 0.12 Hz
RGAIN 44

5ag-1H



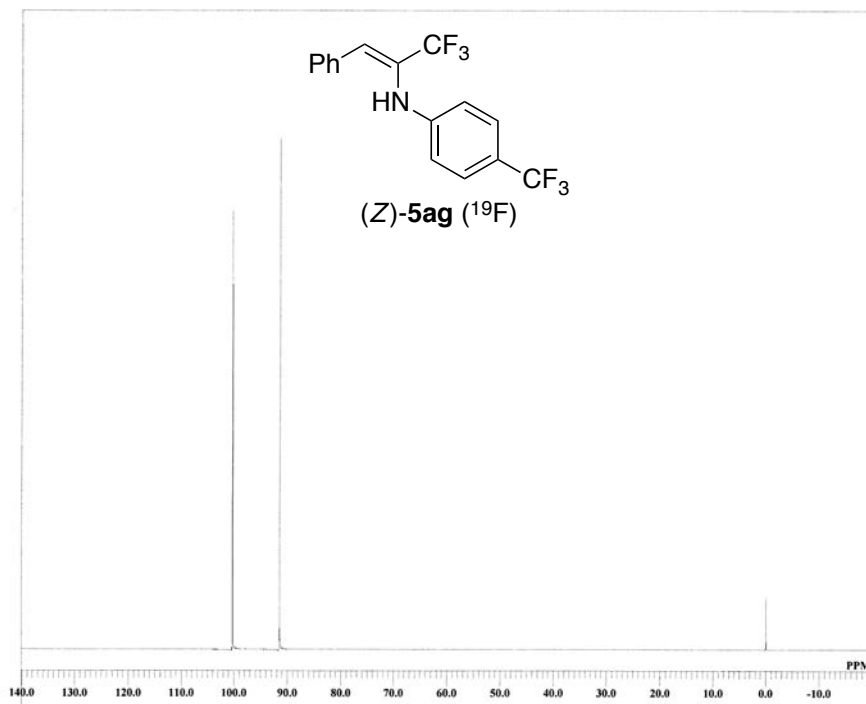
DFILE 3SY-64 Fr-1.jdf
COMNT 5ag-1H
DATIM 26-07-2014 15:30:08
OBNUC 1H
EXMOD single_pulse.ex2
OBFRQ 500.16 MHz
OBSET 2.41 kHz
OBFIN 6.01 Hz
POINT 16384
FREQU 9384.38 Hz
SCANS 8
ACQTM 1.7459 sec
PD 5.0000 sec
PW1 5.60 usec
IRNUC 1H
CTEMP 27.6 c
SLVNT CDCL3
EXREF 0.00 ppm
BF 0.12 Hz
RGAIN 36

5ag-13C



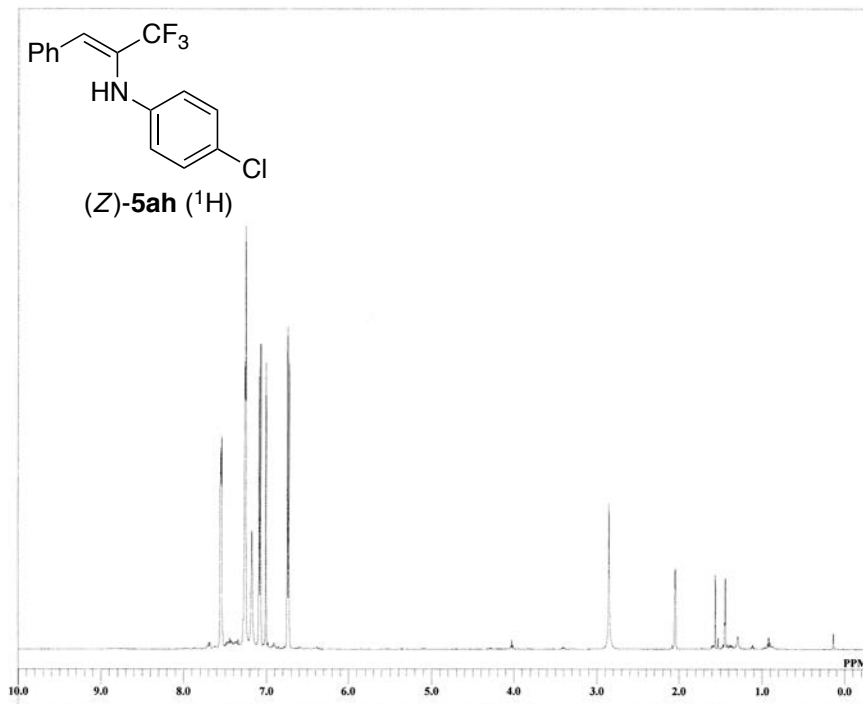
DFILE 3SY-64 Fr-13C-1.jdf
 COMNT 5ag-13C
 DATIM 26-07-2014 16:19:56
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFREQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 27.9 c
 SLVNT CDCl3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 58

5ag-19F



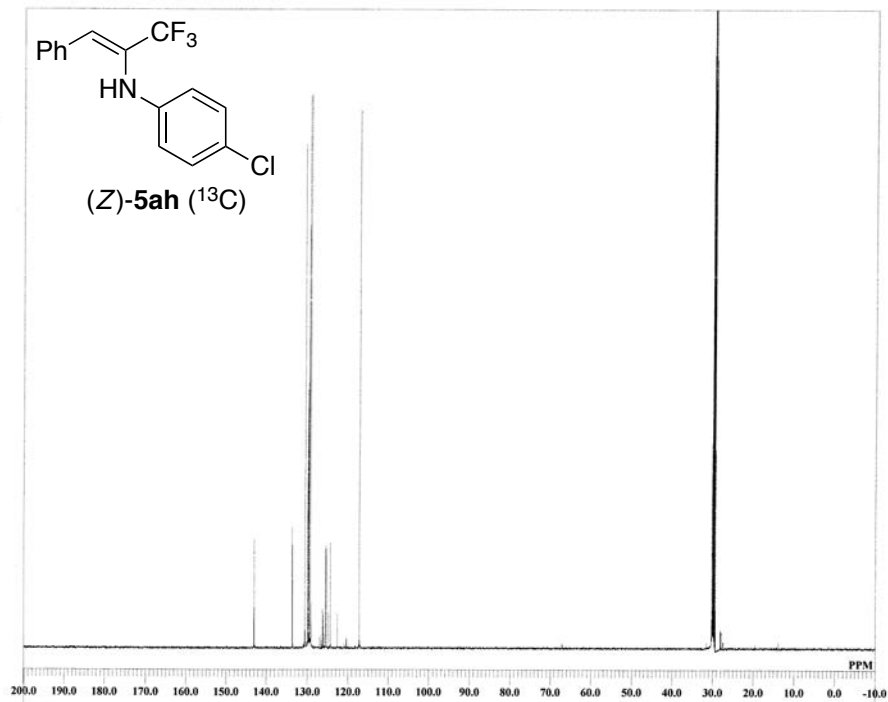
DFILE 3SY-64 Fr-19F-1.jdf
 COMNT 5ag-19F
 DATIM 26-07-2014 16:27:35
 OBNUC 19F
 EXMOD single_pulse_ex2
 OBFREQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 27.4 c
 SLVNT CDCl3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 38

5ah-Fr



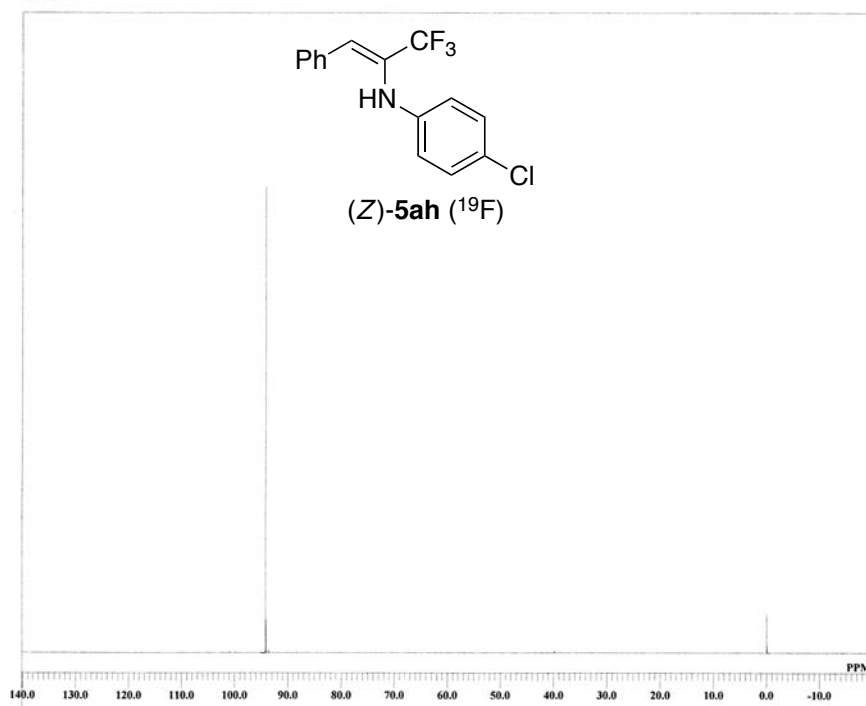
DFILE 3SV-65,69-Fr-1.jdf
 COMNT 5ah-Fr
 DATIM 30-07-2014 17:30:25
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 27.1 c
 SLVNT ACETN
 EXREF 2.86 ppm
 BF 0.12 Hz
 RGAIN 34

5ah-13C



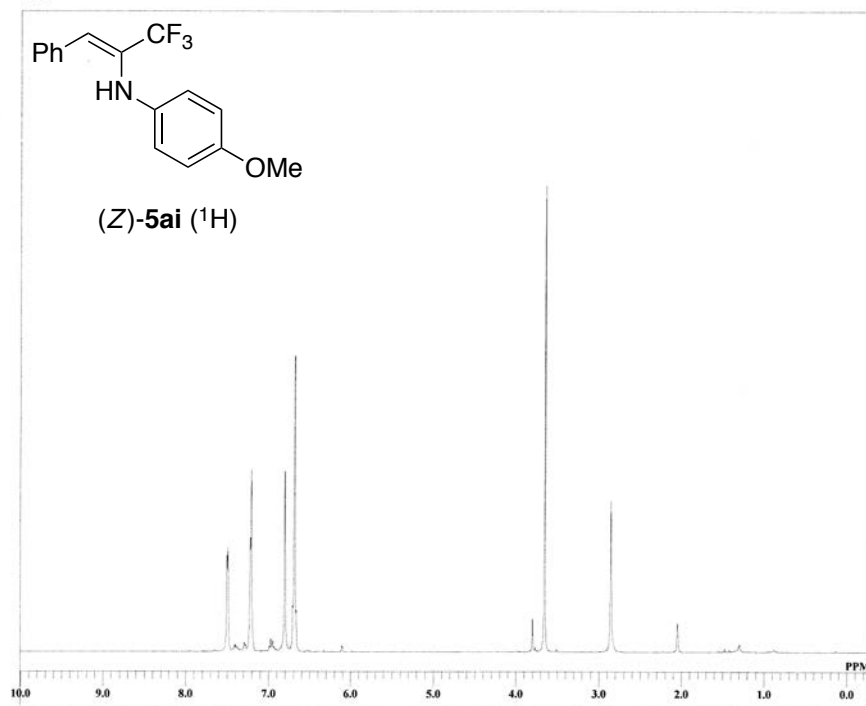
DFILE 3SV-65,69-Fr-13C-1.jdf
 COMNT 5ah-13C
 DATIM 30-07-2014 19:11:11
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 2048
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 27.3 c
 SLVNT ACETN
 EXREF 29.80 ppm
 BF 0.12 Hz
 RGAIN 54

5ah-19F

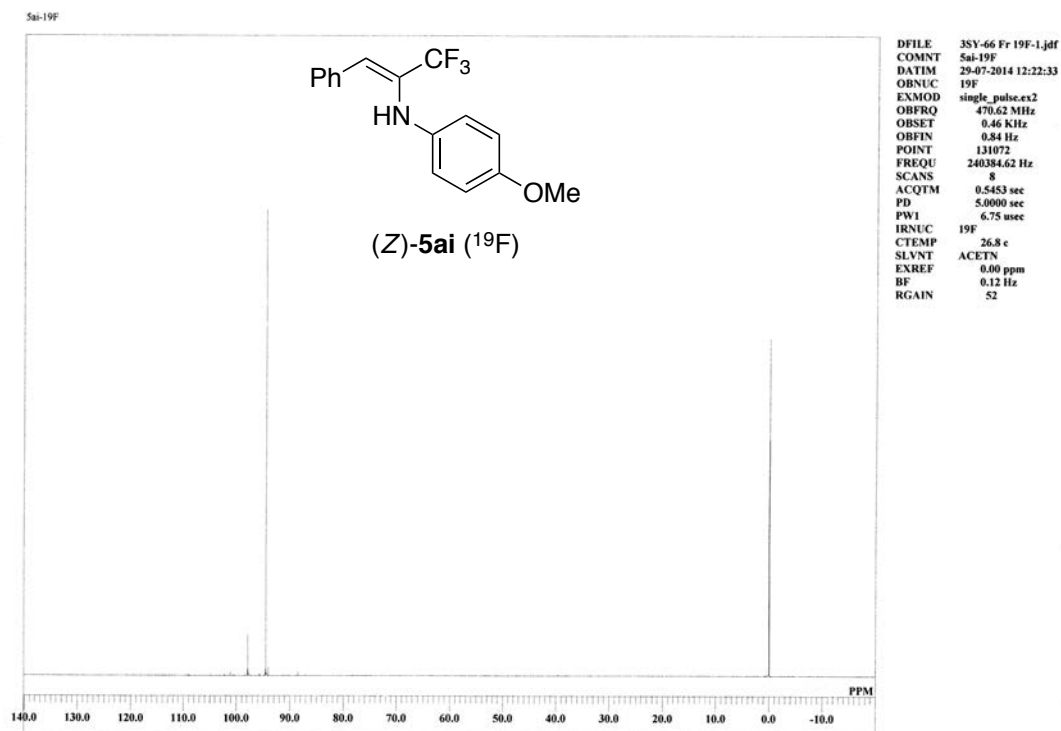
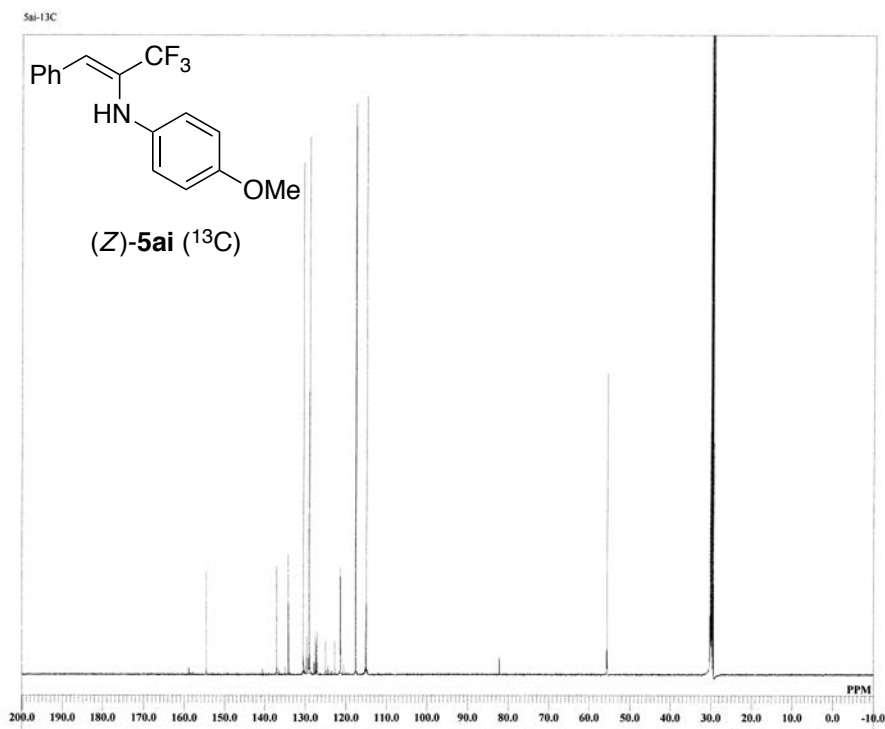


DFILE 3SY-65.69-Fr 19F-1.jdf
 COMINT 5ah-19F
 DATIM 30-07-2014 19:17:31
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 26.8 c
 SLVNT ACETN
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 44

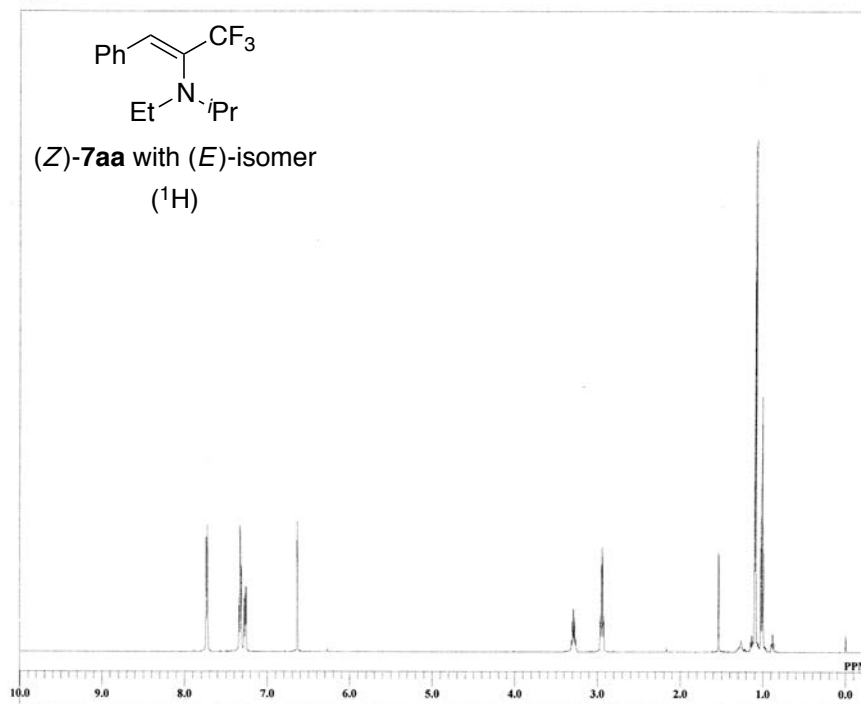
5ai-1H



DFILE 1KI-1398-Fr-1.jdf
 COMINT 5ai-1H
 DATIM 27-08-2014 19:05:15
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 26.8 c
 SLVNT ACETN
 EXREF 2.86 ppm
 BF 0.12 Hz
 RGAIN 36

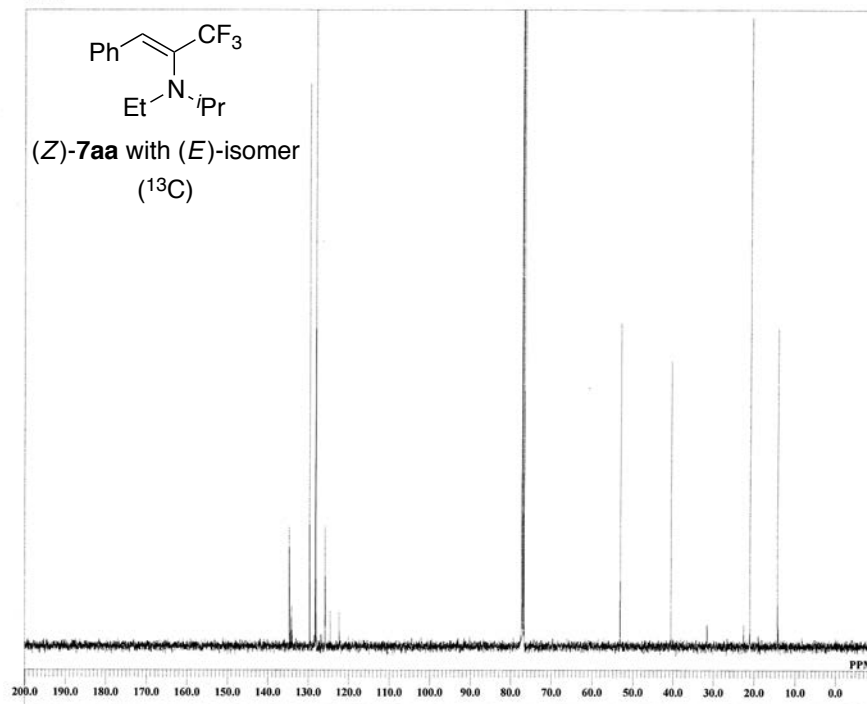


7aa-1H

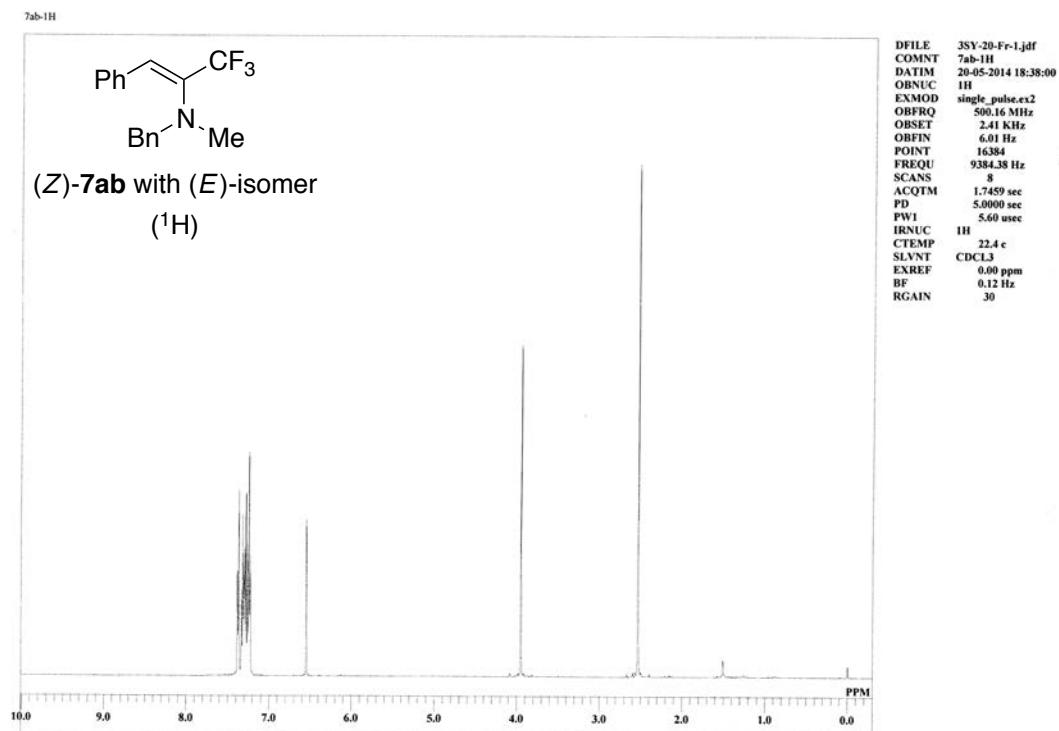
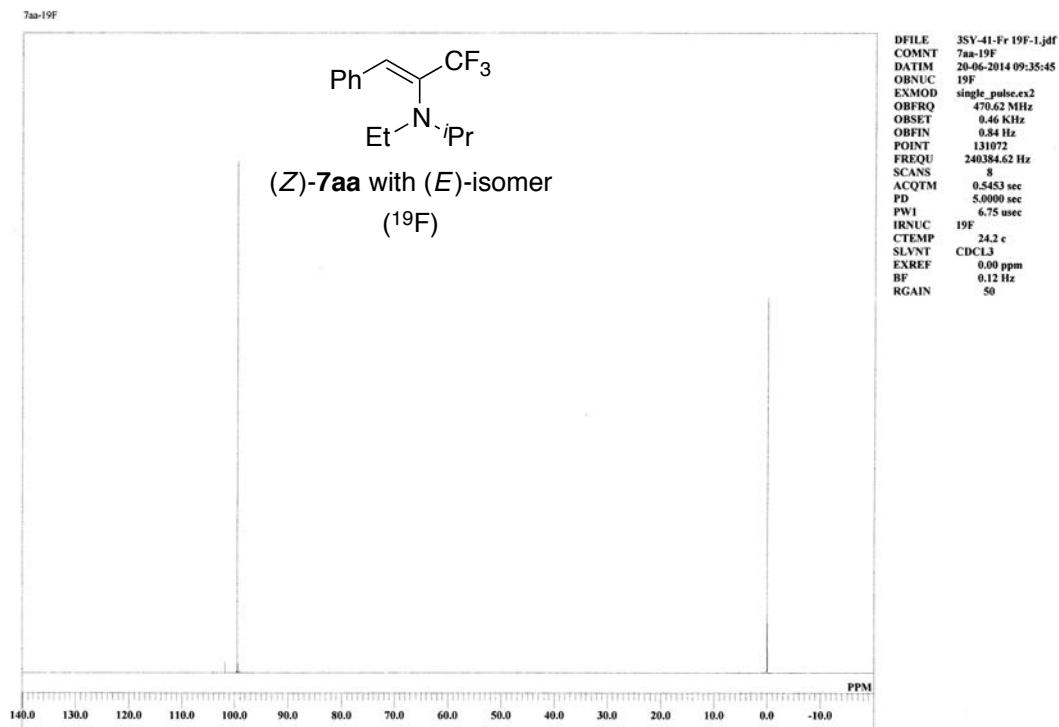


DFILE 3SY-41-Fr-1.jdf
 COMNT 7aa-1H
 DATIM 19-06-2014 20:00:49
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFREQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 24.3 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 40

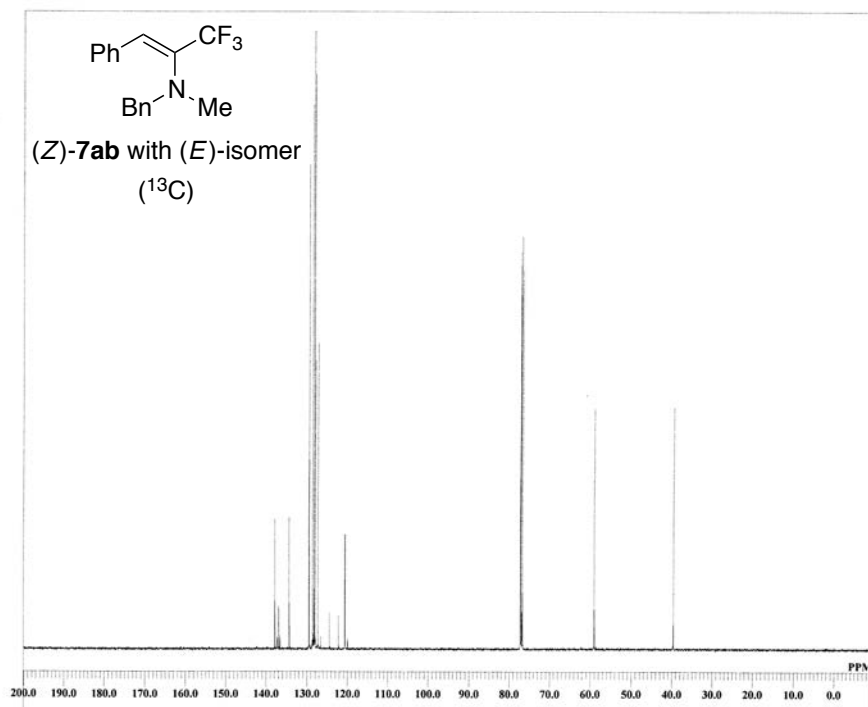
7aa-13C



DFILE 3SY-41-Fr-13C-1.jdf
 COMNT 7aa-13C
 DATIM 19-06-2014 20:50:43
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFREQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 13C
 CTEMP 24.8 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 56

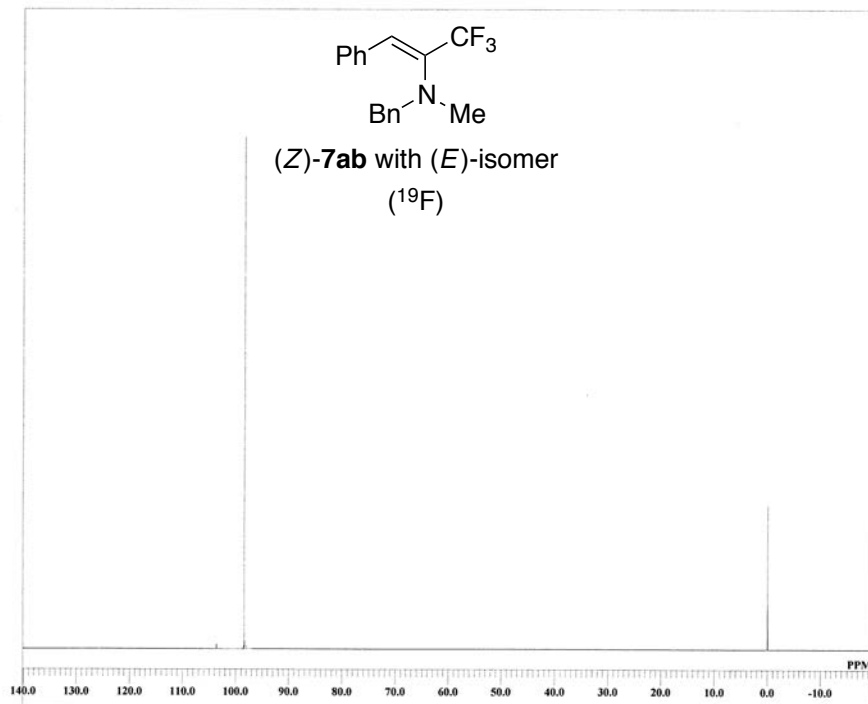


7ab-13C



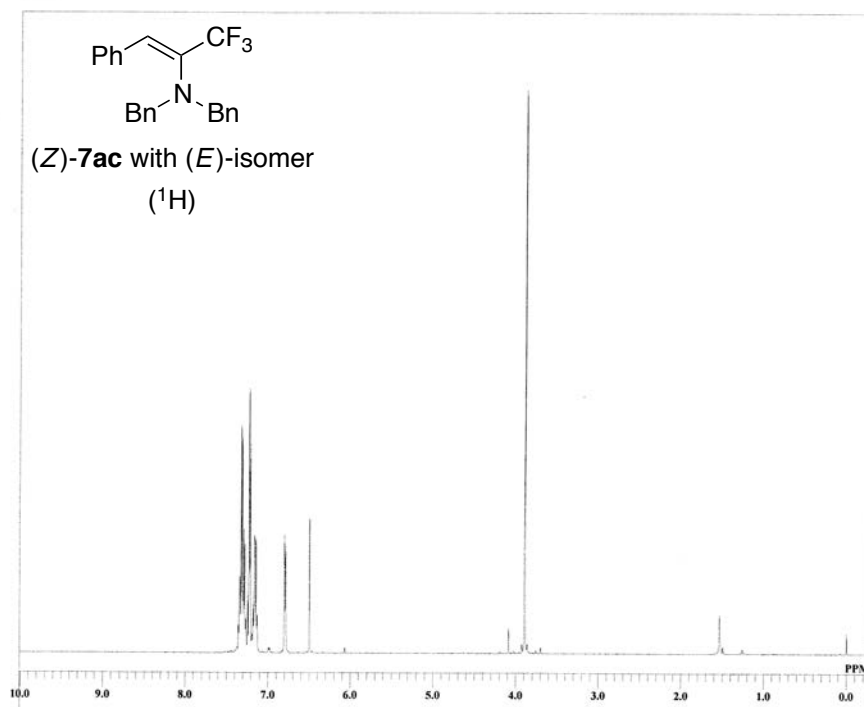
DFILE 3SV-20-Fr 13C-1.jdf
 COMINT 7ab-13C
 DATIM 20-05-2014 19:27:24
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 23.0 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 58

7ab-19F



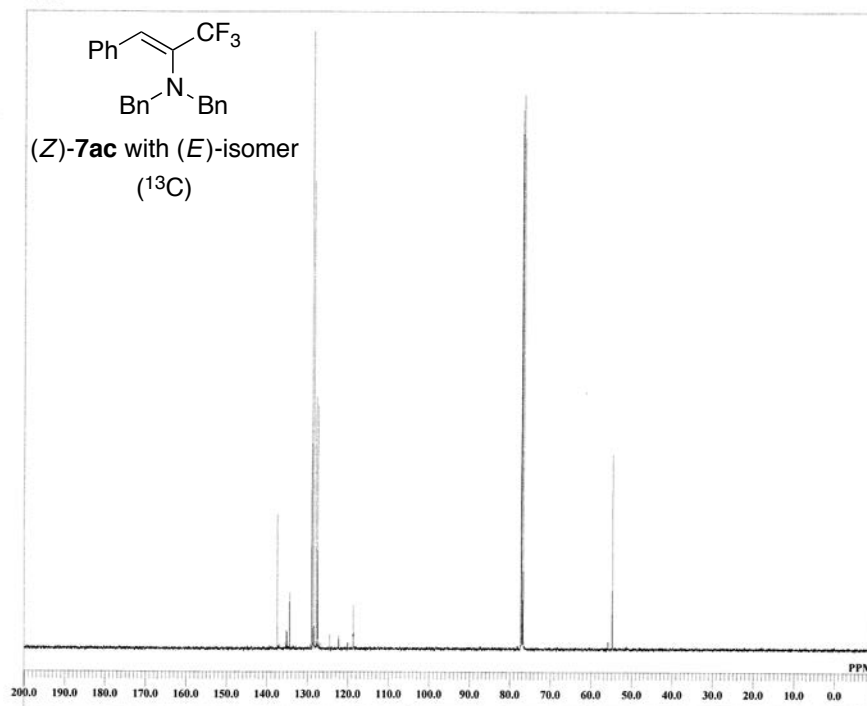
DFILE 3SV-20-Fr 19F-1.jdf
 COMINT 7ab-19F
 DATIM 21-05-2014 09:57:14
 OBNUC 19F
 EXMOD single_pulse_ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 21.6 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 42

7ac-1H



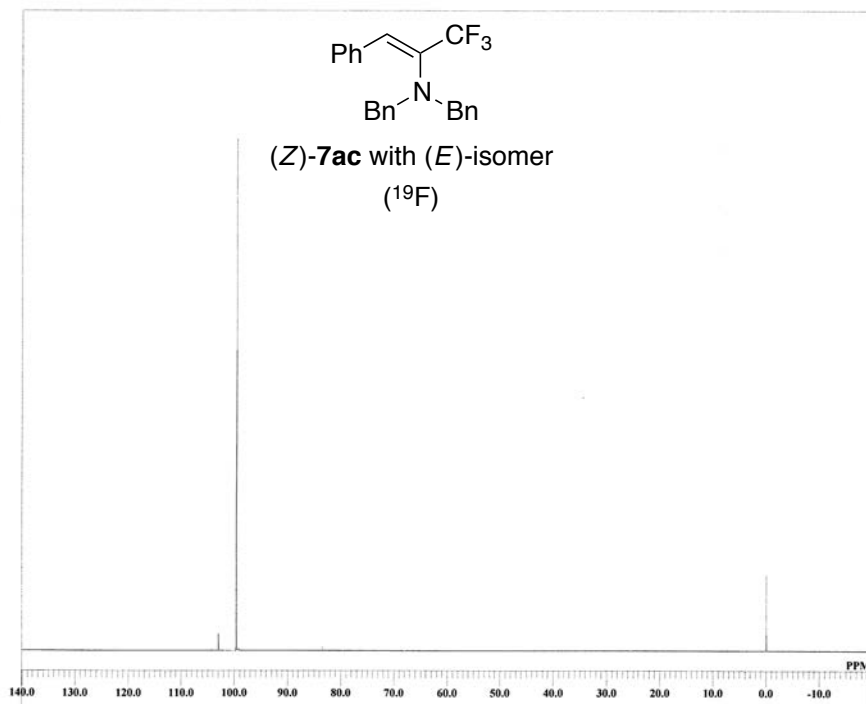
DFILE 3SY-42-Fr-1.jdf
 COMNT 7ac-1H
 DATIM 29-06-2014 16:11:19
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 23.6 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 38

7ac-13C



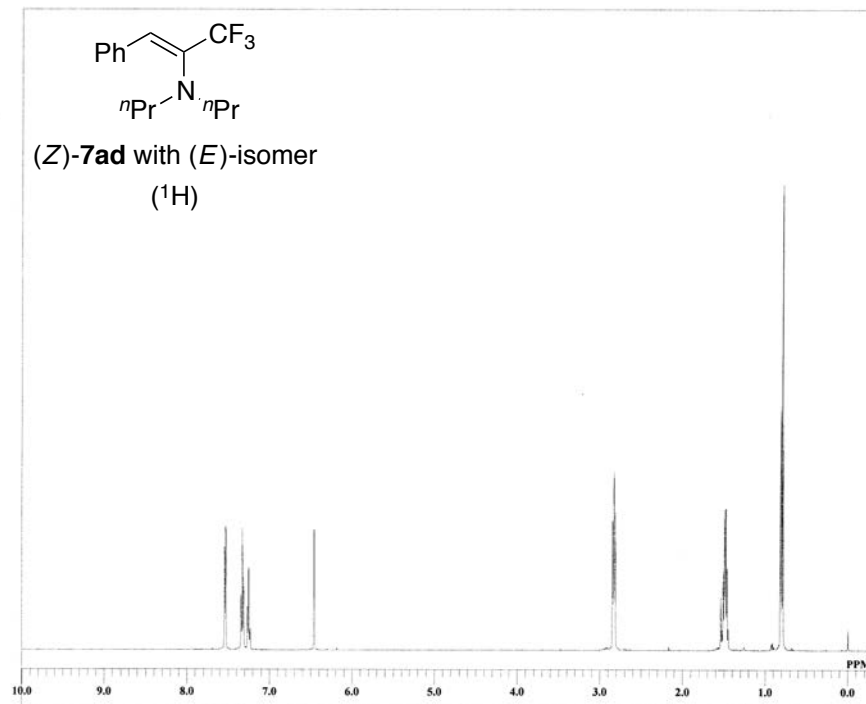
DFILE 3SY-42-Fr-13C-1.jdf
 COMNT 7ac-13C
 DATIM 29-06-2014 17:03:13
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 24.1 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 54

7ac-19F



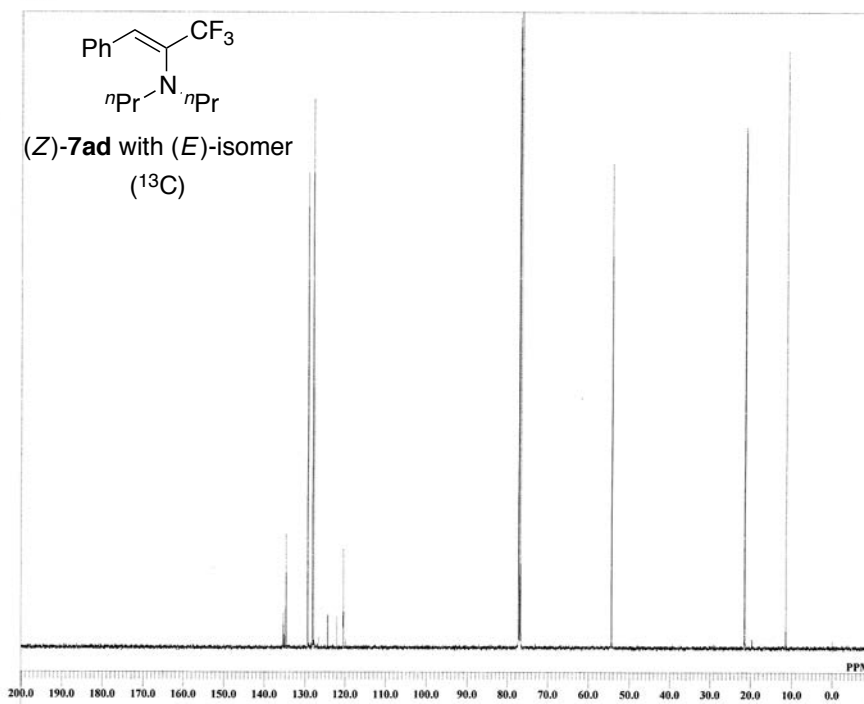
DFILE 3SY-42-Fr-19F-1.jdf
 COMINT 7ac-19F
 DATIM 29-06-2014 18:22:51
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 23.6 c
 SLVNT CDCl3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 50

7ad-1H



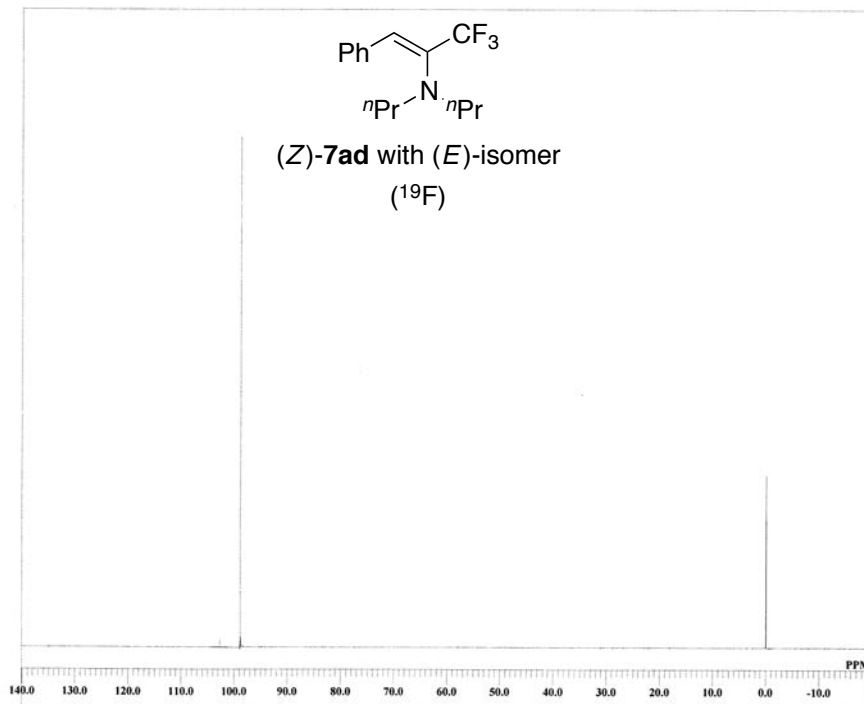
DFILE 3SY-21-Fr-1.jdf
 COMINT 7ad-1H
 DATIM 20-05-2014 19:54:03
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 22.6 c
 SLVNT CDCl3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 34

3ad-13C



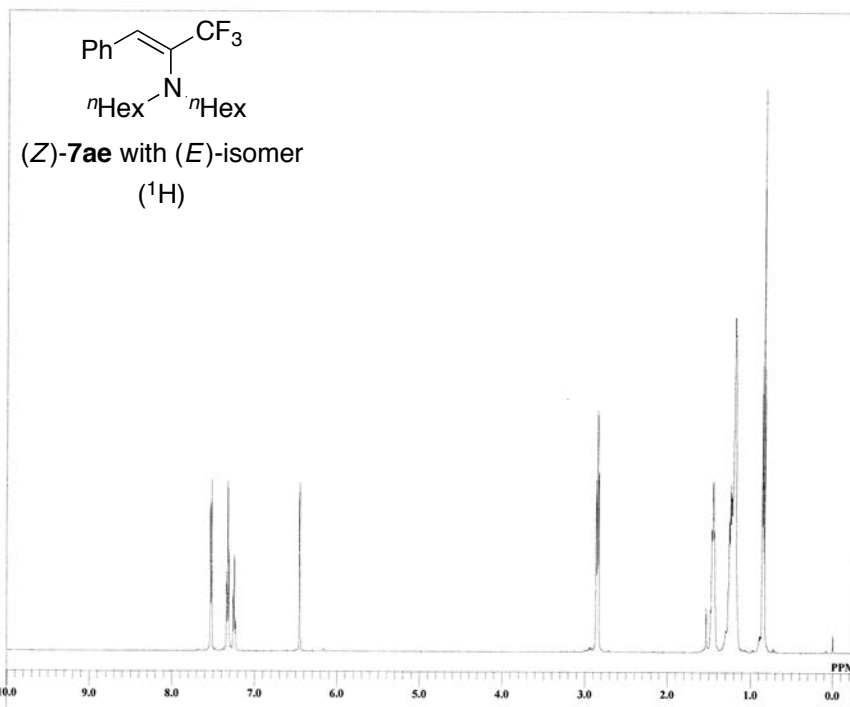
DFILE 3SV-21-Fr 13C-1.jdf
 COMINT 3ad-13C
 DATIM 20-05-2014 20:44:55
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 22.8 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 58

7ad-19F



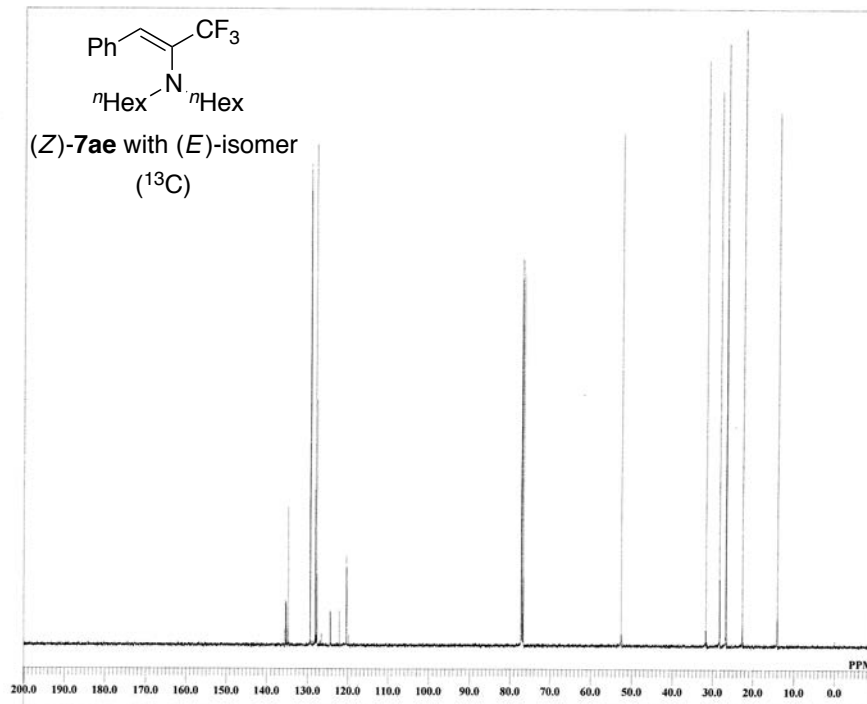
DFILE 3SV-21-Fr 19F-1.jdf
 COMINT 7ad-19F
 DATIM 21-05-2014 10:03:42
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 21.7 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 46

7ae-1H



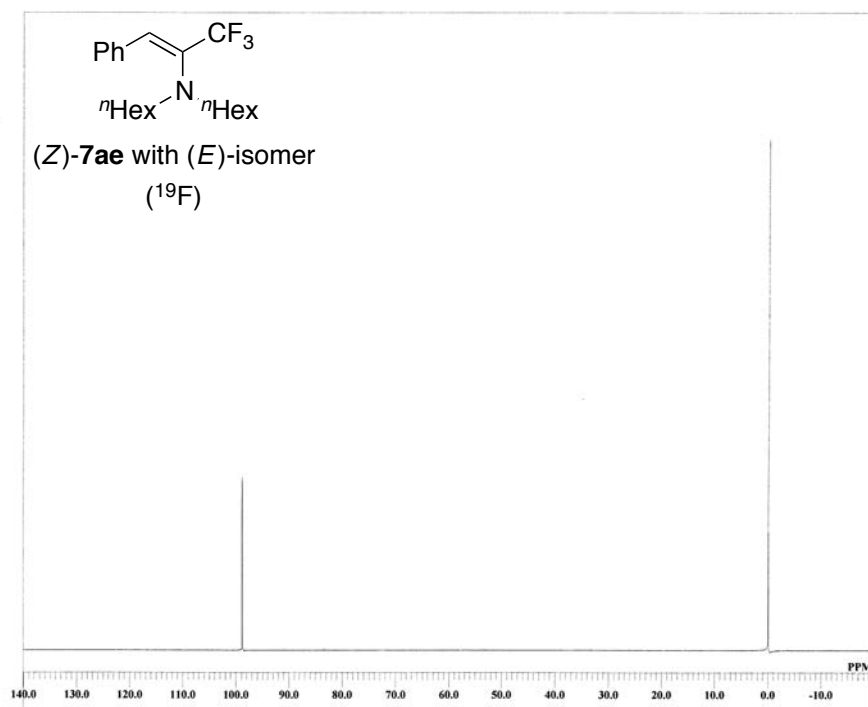
DFILE 3SV-22 Fr-1-jdf
 COMINT 7ae-1H
 DATIM 21-05-2014 14:09:13
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 21.5 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 26

7ae-13C



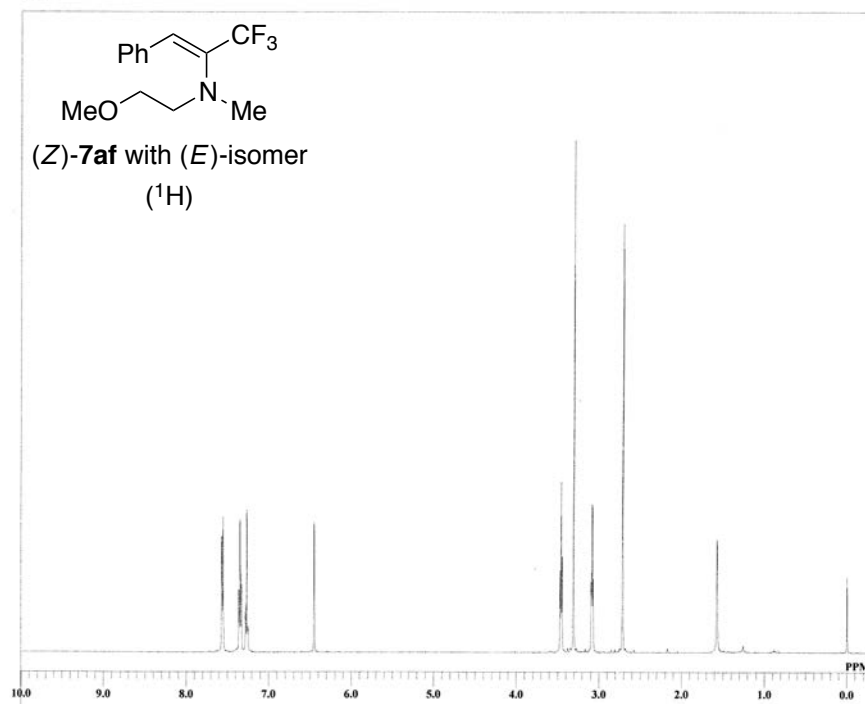
DFILE 3SV-22 Fr-13C-1-jdf
 COMINT 7ae-13C
 DATIM 21-05-2014 14:36:04
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 512
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 22.2 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 56

7ae-19F



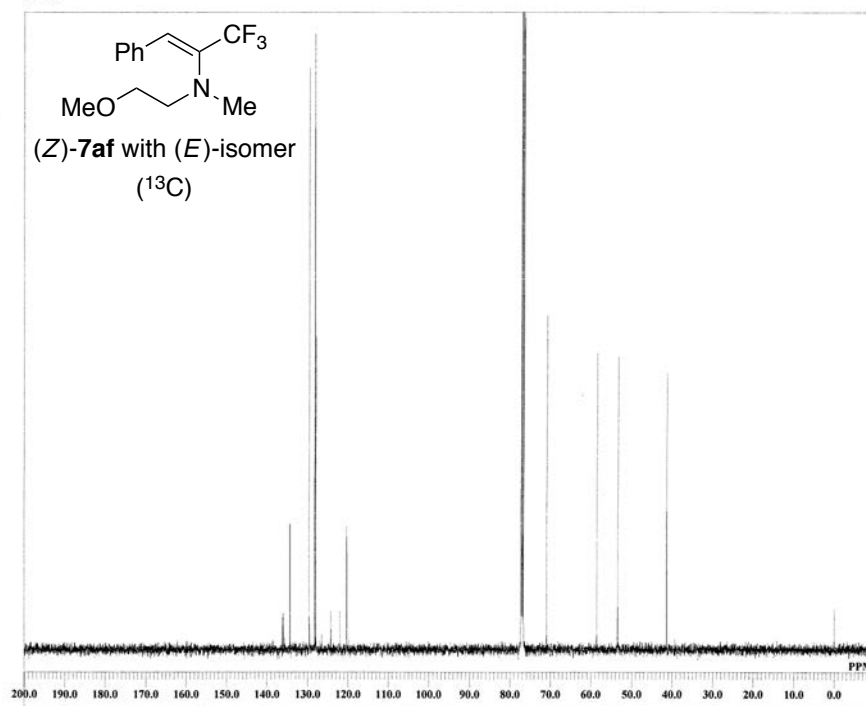
DFILE 3SV-22-Fr-19F-1.jdf
 COMNT 7ae-19F
 DATIM 18-06-2014 17:44:16
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 23.9 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 52

7af-1H



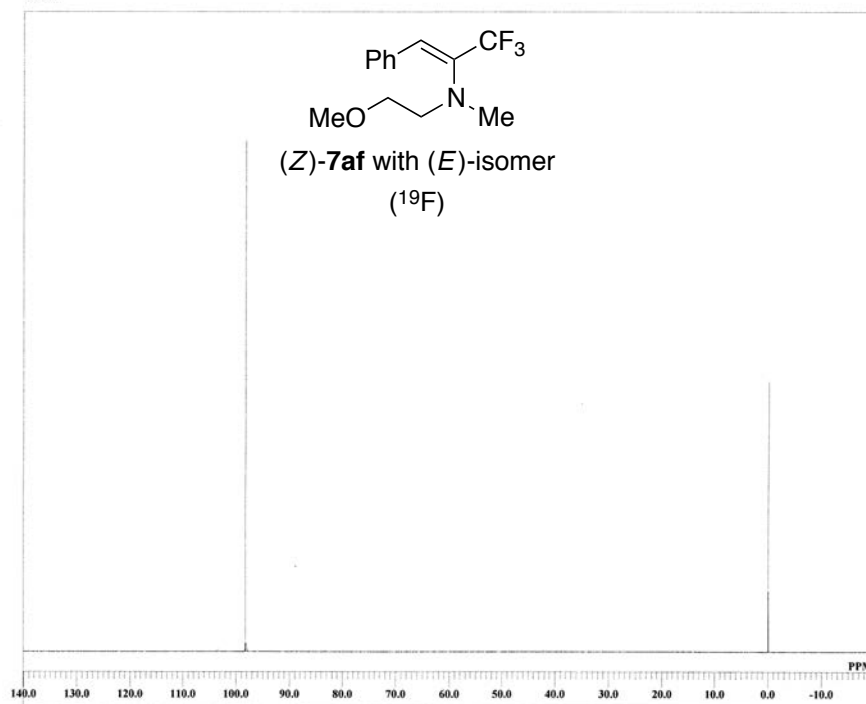
DFILE 3SV-24-Fr-1.jdf
 COMNT 7af-1H
 DATIM 22-05-2014 21:35:25
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 21.5 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 46

7af-13C



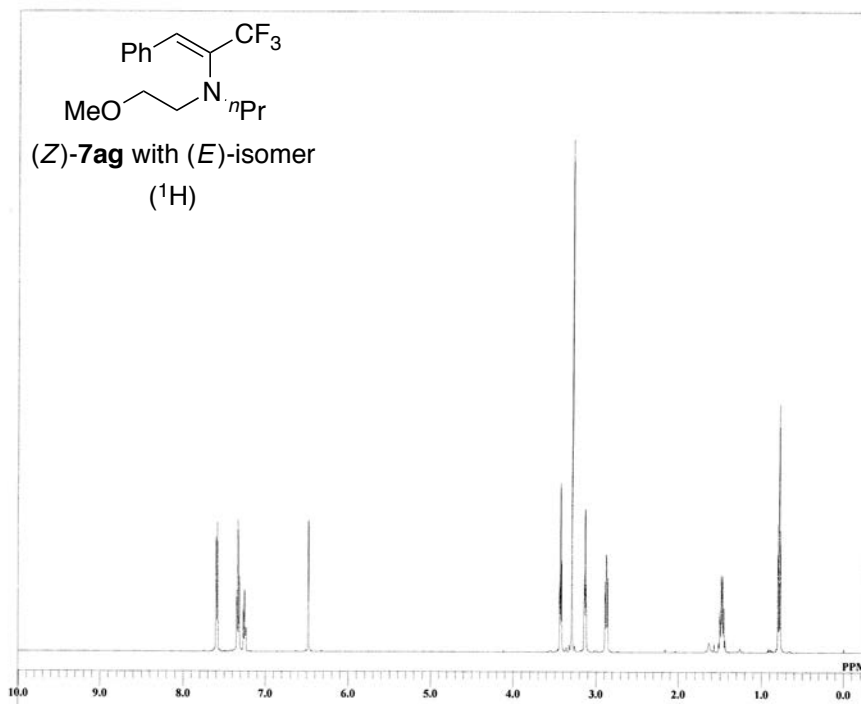
DFILE 3SY-24-Fr 13C-1.jdf
 COMNT 7af-13C
 DATIM 22-05-2014 23:14:18
 OBNLC 13C
 EXMOD single_pulse_dec
 OBFREQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39368.18 Hz
 SCANS 2048
 ACOTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 21.8 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 58

7af-19F



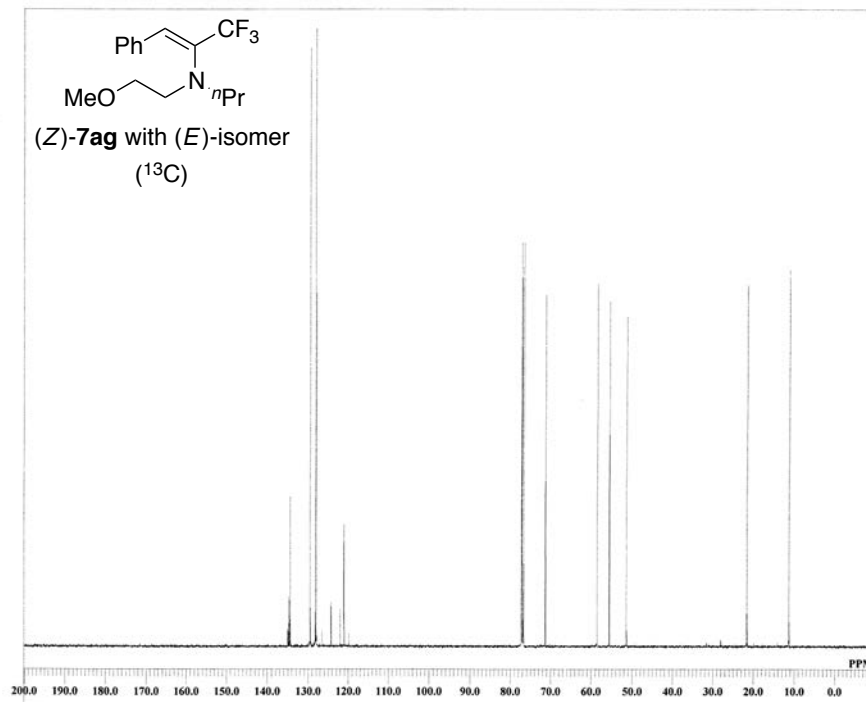
DFILE 3SY-24-Fr 19F-1.jdf
 COMNT 7af-19F
 DATIM 23-05-2014 09:34:03
 OBNLC 19F
 EXMOD single_pulse_ex2
 OBFREQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACOTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 21.0 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 46

7ag-1H



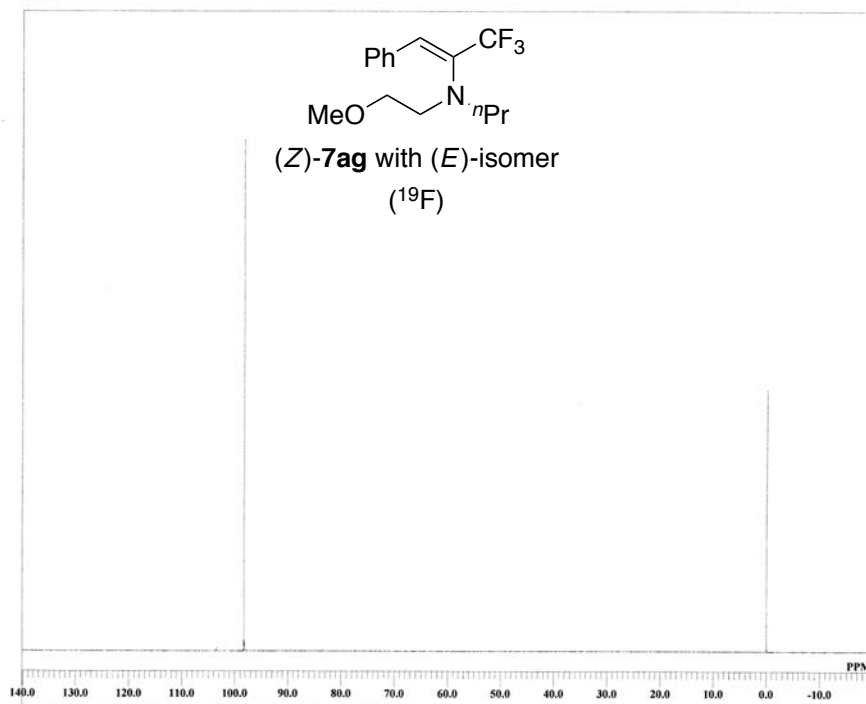
DFILE 3SV-27-Fr-1.jdf
 COMINT 7ag-1H
 DATIM 11-06-2014 18:27:04
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 22.9 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 30

7ag-13C



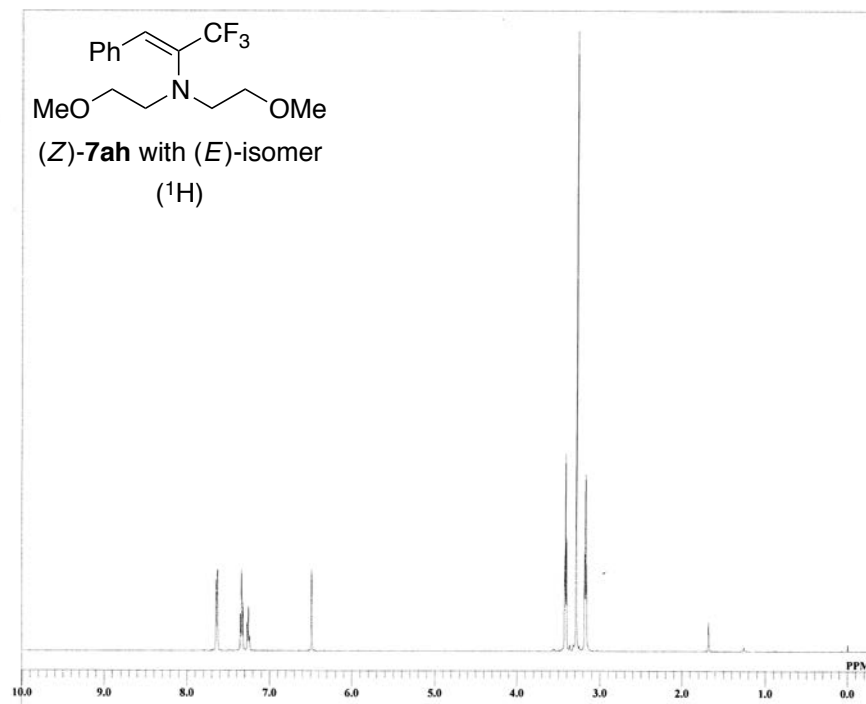
DFILE 3SV-27-Fr-13C-1.jdf
 COMINT 7ag-13C
 DATIM 11-06-2014 19:19:18
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 23.3 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 58

7ag-19F



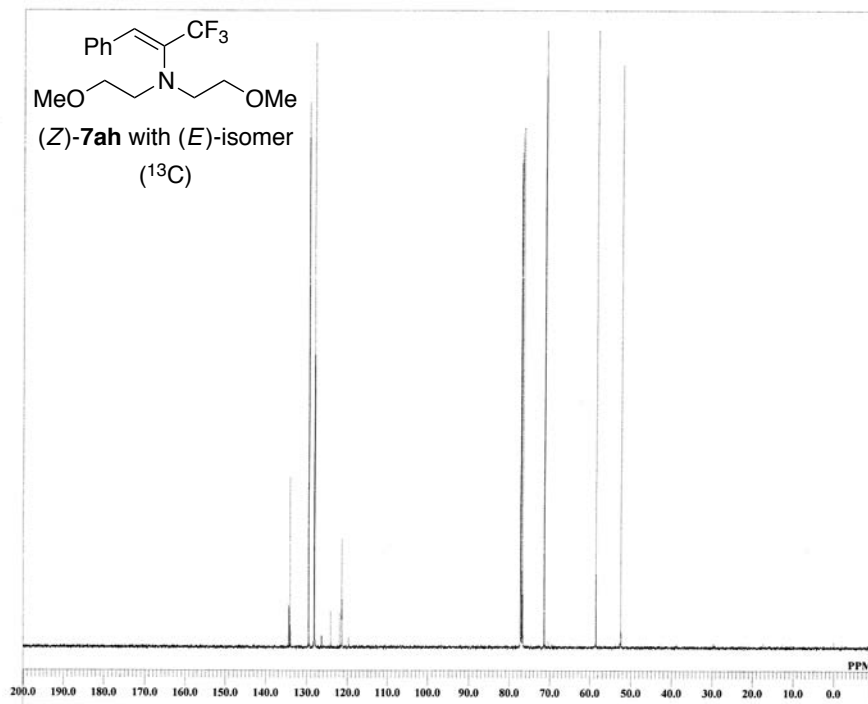
DFILE 3SY-24-Fr 19F-1.jdf
 COMNT 7ag-19F
 DATIM 23-05-2014 09:34:03
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 kHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 21.0 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 46

7ah-1H



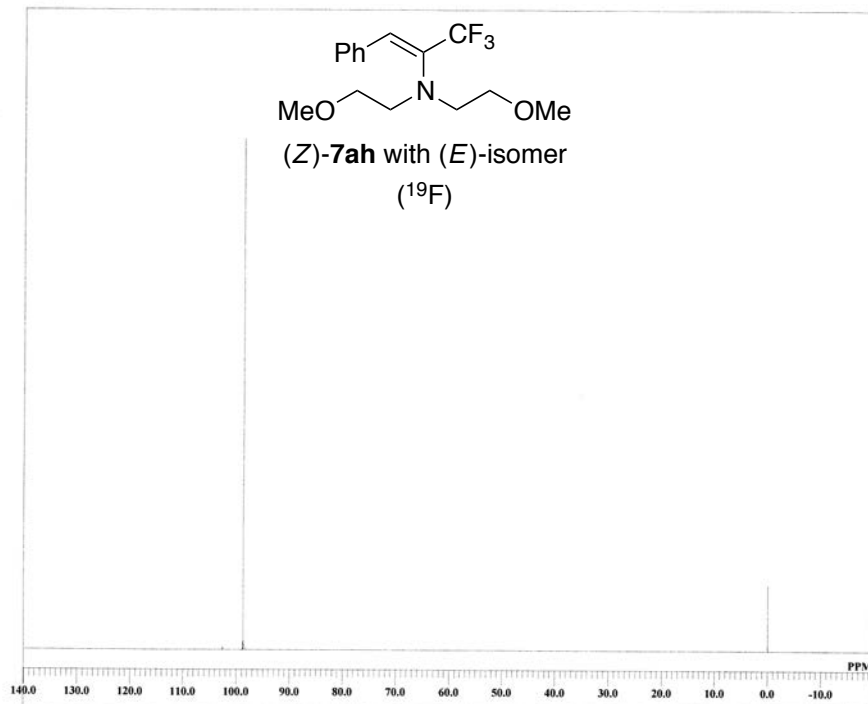
DFILE 1KI-1251-Fr-1.jdf
 COMNT 7ah-1H
 DATIM 28-05-2014 20:30:20
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 kHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 22.2 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 30

7ah-13C

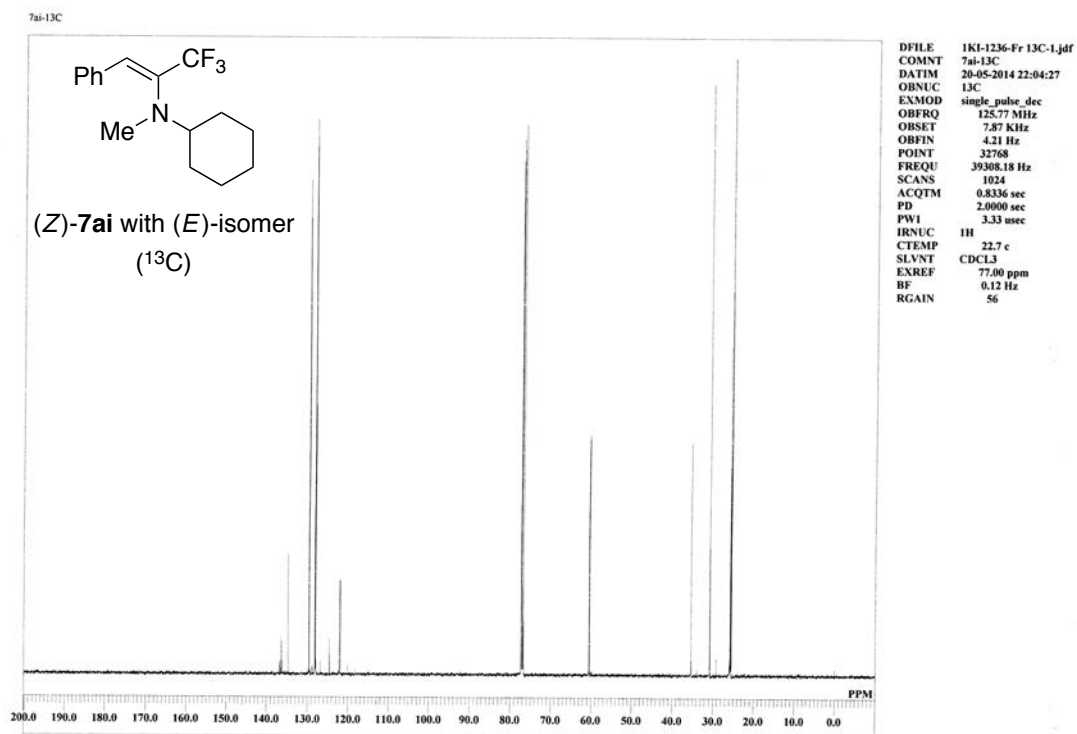
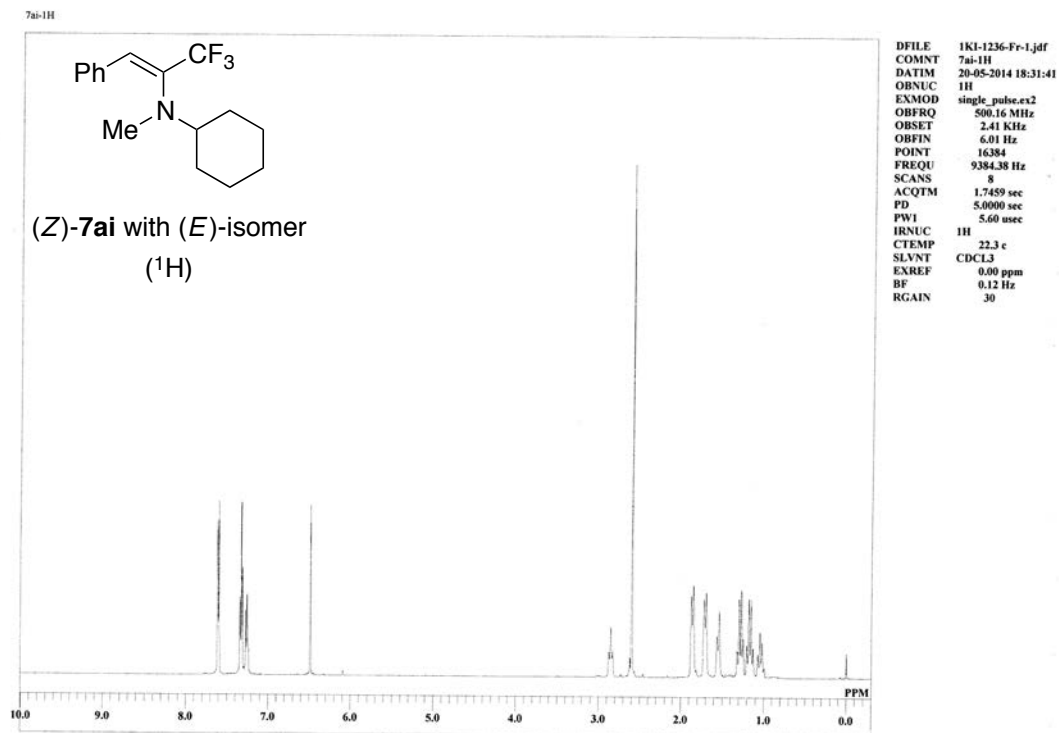


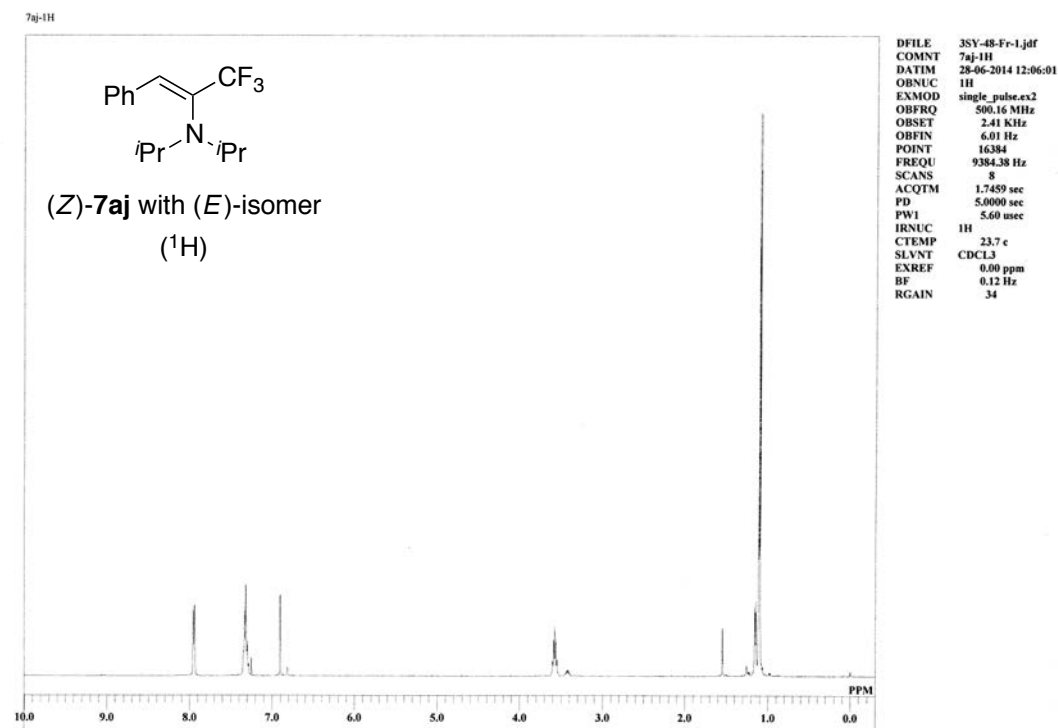
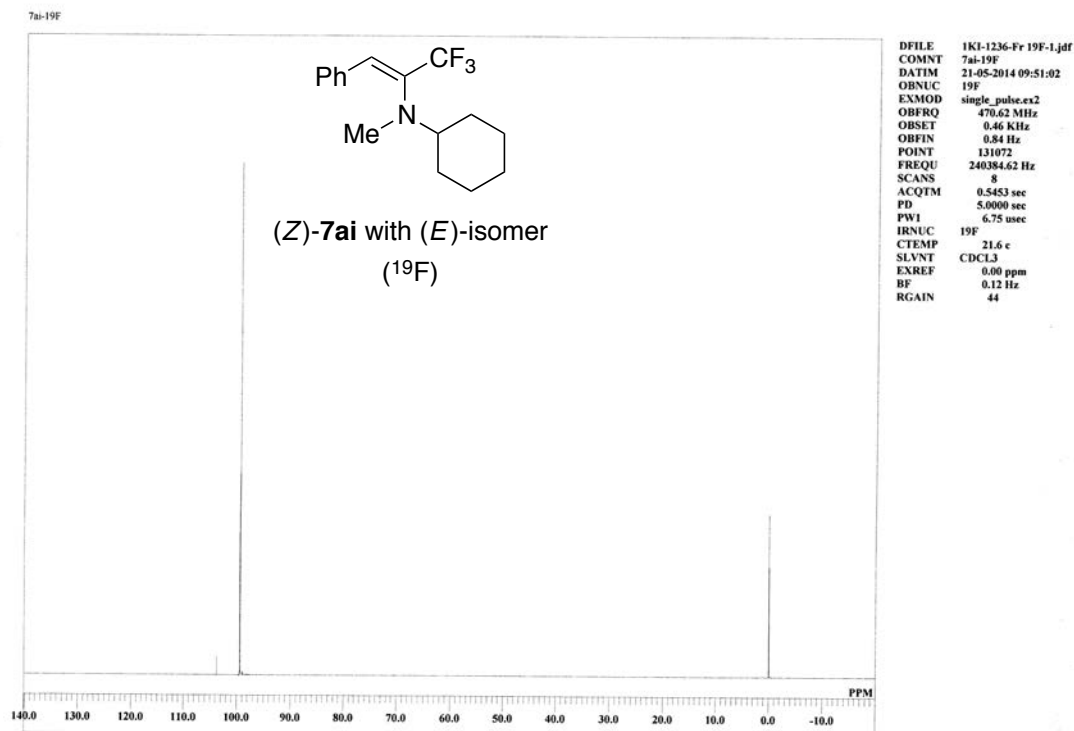
DFILE 1KI-1251-Fr 13C-1.jdf
 COMINT 7ah-13C
 DATIM 28-05-2014 21:21:11
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFREQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 22.8 c
 SLVNT CDCl3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 58

7ah-19F

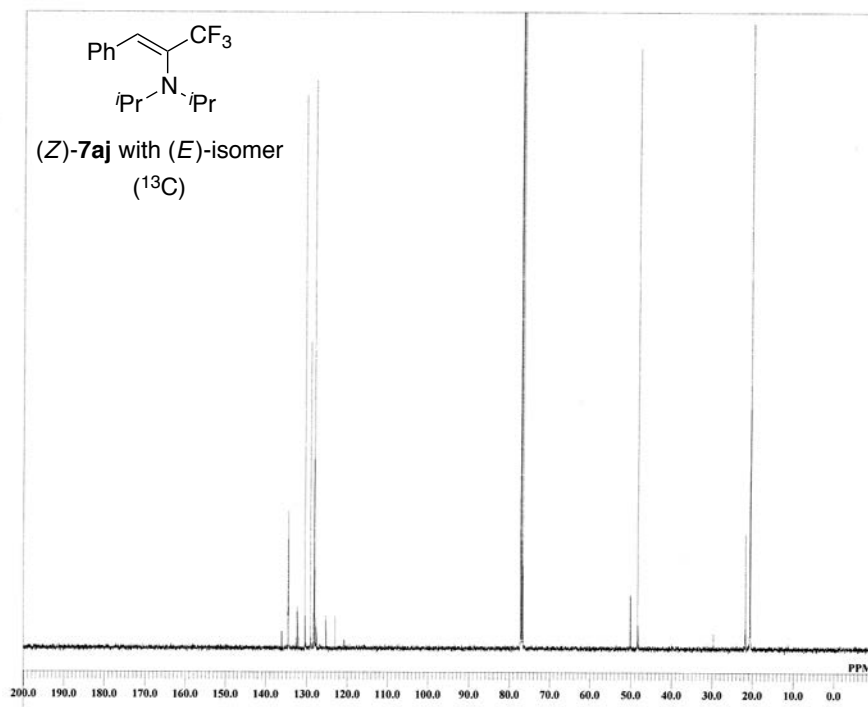


DFILE 1KI-1251-Fr 19F-1.jdf
 COMINT 7ah-19F
 DATIM 29-05-2014 09:08:02
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFREQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 22.0 c
 SLVNT CDCl3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 42



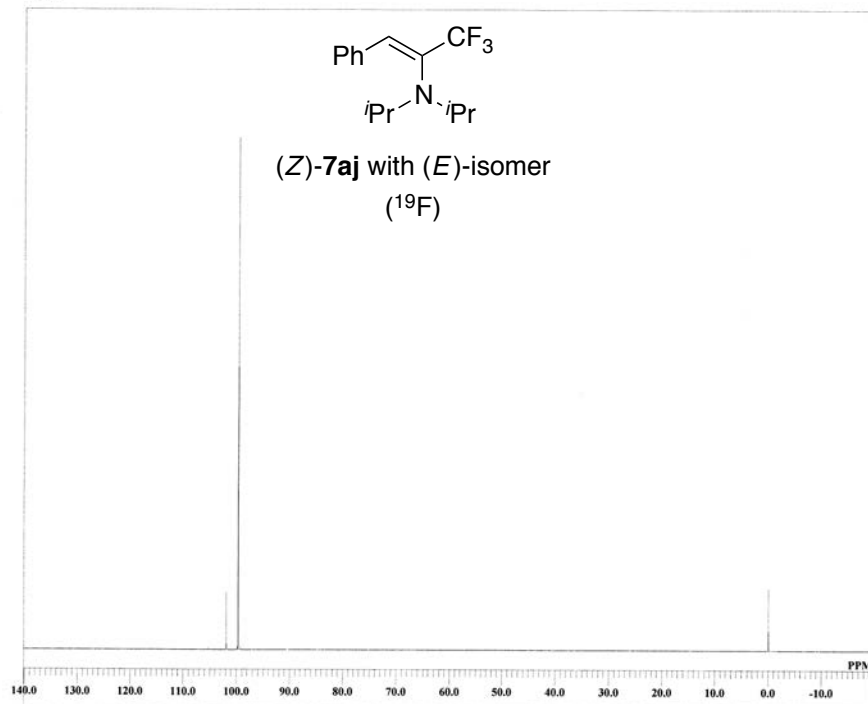


7aj-13C



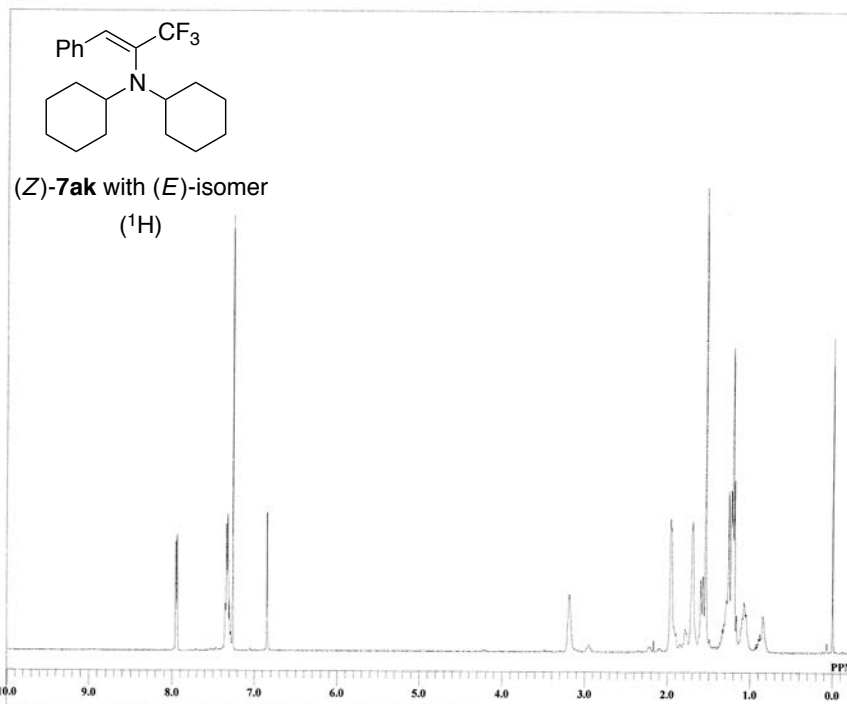
DFILE 3SY-48-Fr 13C-1.jdf
 COMINT 7aj-13C
 DATIM 28-06-2014 12:57:43
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 393008.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PWI 3.33 usec
 IRNUC 1H
 CTEMP 24.5 c
 SLVNT CDCl3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 58

7aj-19F



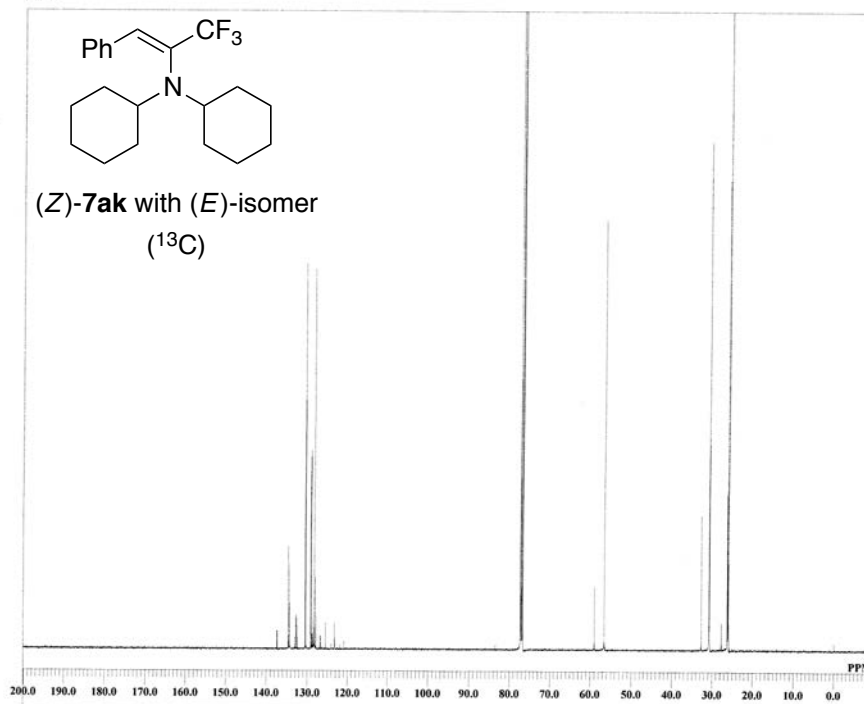
DFILE 3SY-48-Fr 19F-1.jdf
 COMINT 7aj-19F
 DATIM 28-06-2014 13:11:58
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PWI 6.75 usec
 IRNUC 19F
 CTEMP 24.1 c
 SLVNT CDCl3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 44

7ak-1H



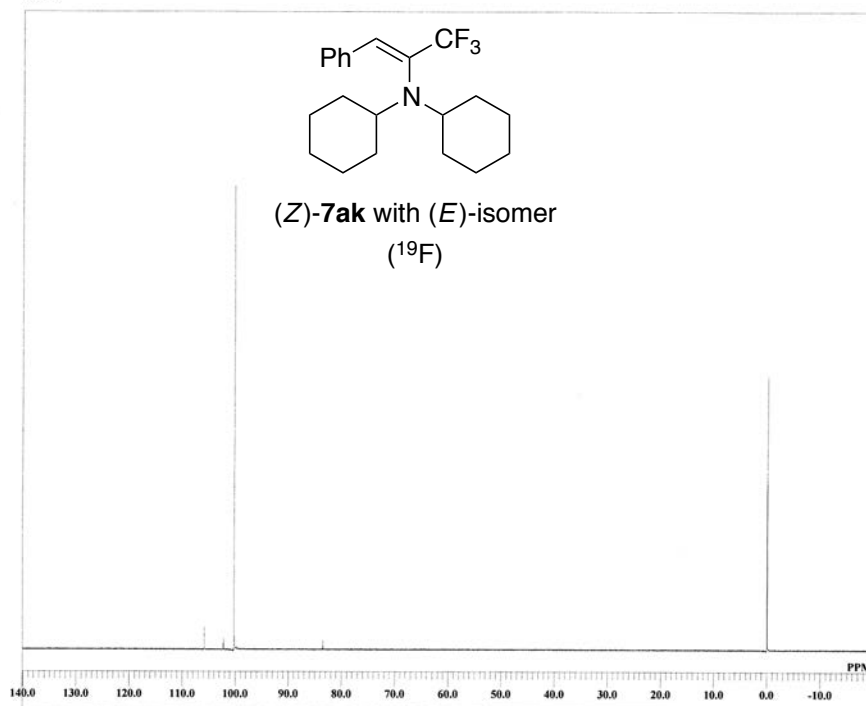
DFILE 3SY-50-Frere-1.jdf
 COMINT 7ak-1H
 DATIM 26-07-2014 18:28:52
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 27.3 c
 SLVNT CDCl3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 50

7ak-13C



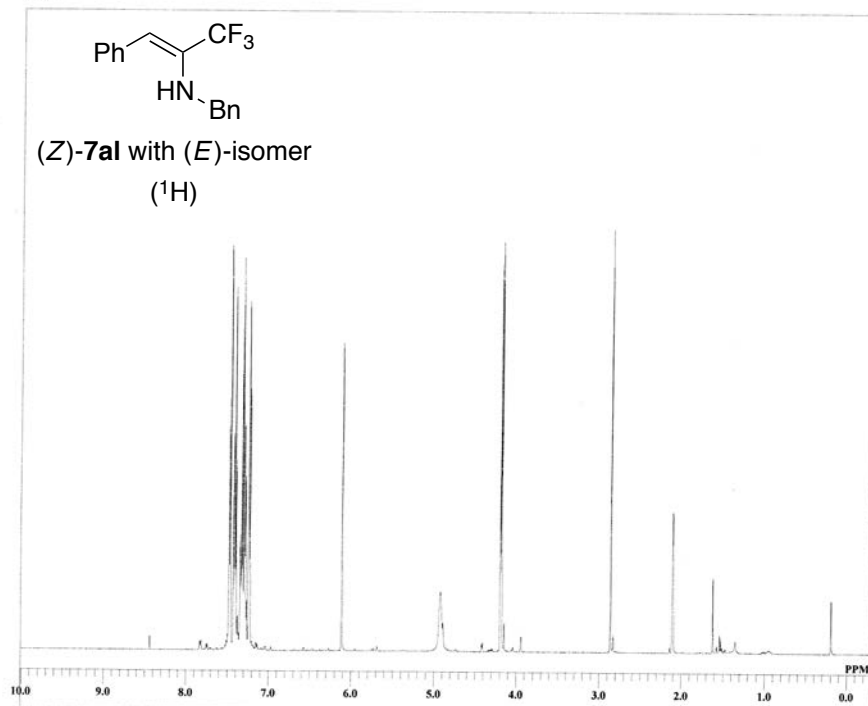
DFILE 3SY-44-Fr 13C-1.jdf
 COMINT 7ak-13C
 DATIM 20-09-2014 03:05:23
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 8192
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 26.1 c
 SLVNT CDCl3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 54

7ak-19F



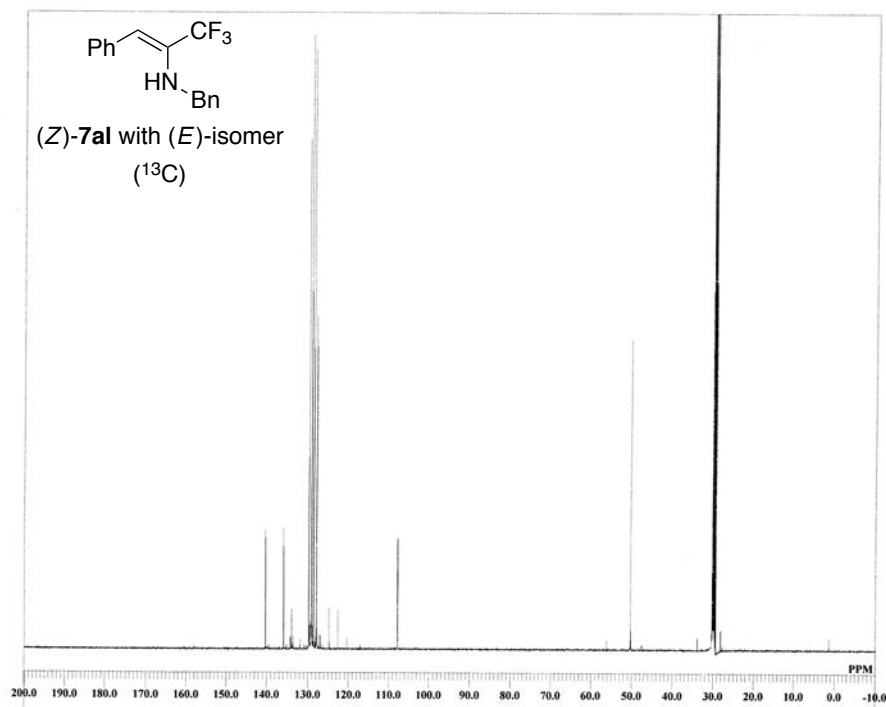
DFILE 3SV-50-Frrere 19F-1.jdf
 COMINT 7ak-19F
 DATIM 27-07-2014 14:24:58
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFREQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 27.0 c
 SLVNT CDCl3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 50

7al-1H



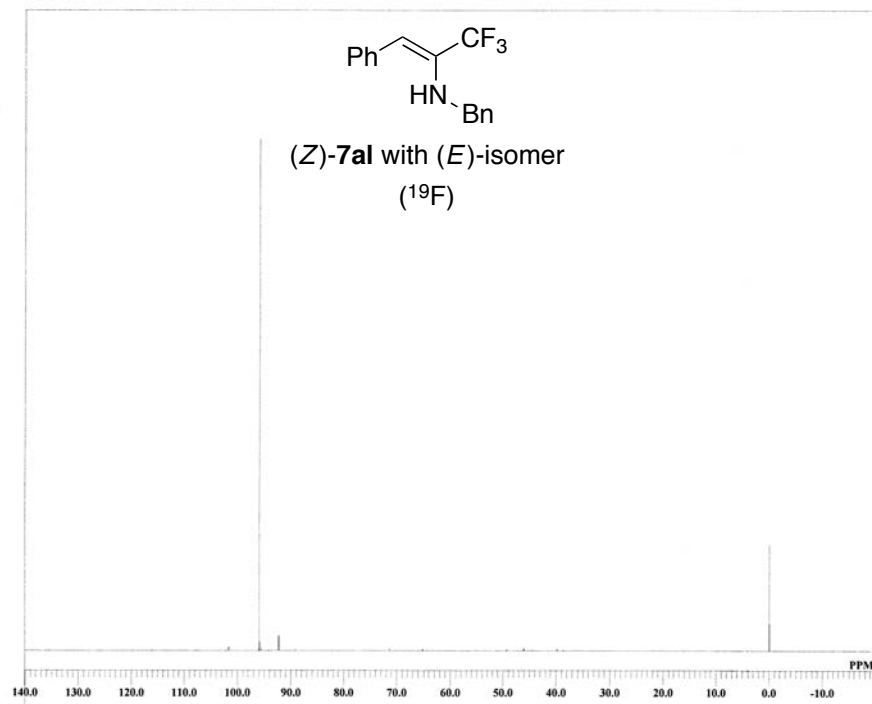
DFILE 3SV-48-Fr-1.jdf
 COMINT 7al-1H
 DATIM 30-07-2014 22:06:38
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFREQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 27.0 c
 SLVNT ACETN
 EXREF 2.86 ppm
 BF 0.12 Hz
 RGAIN 36

7al-13C



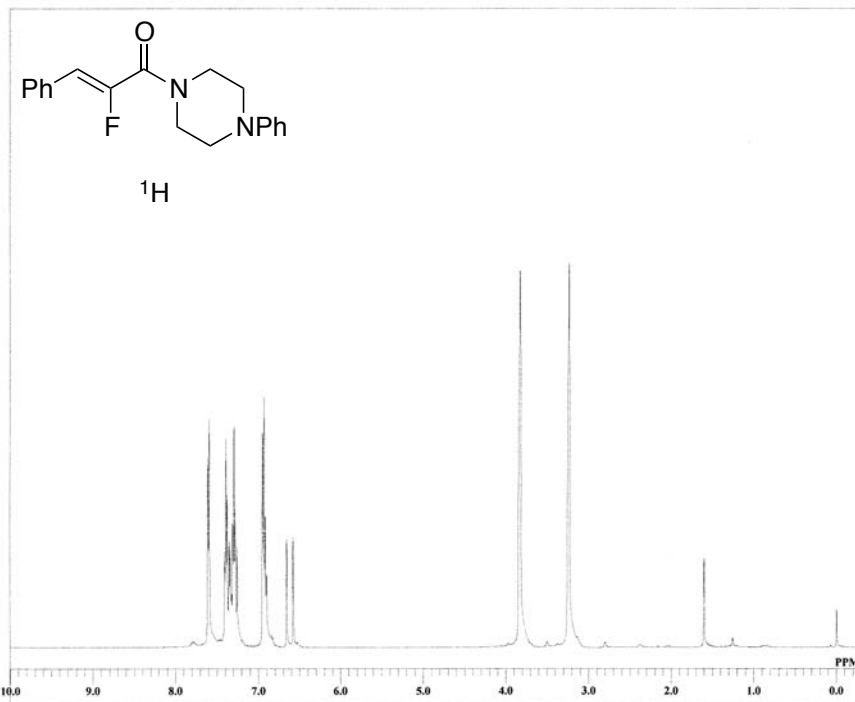
DFILE 3SY-68-Fr 13C-1.jdf
 COMINT 7al-13C
 DATIM 31-07-2014 04:39:43
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFREQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 8192
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 26.8 c
 SLVNT ACETN
 EXREF 29.80 ppm
 BF 0.12 Hz
 RGAIN 56

7al-19F



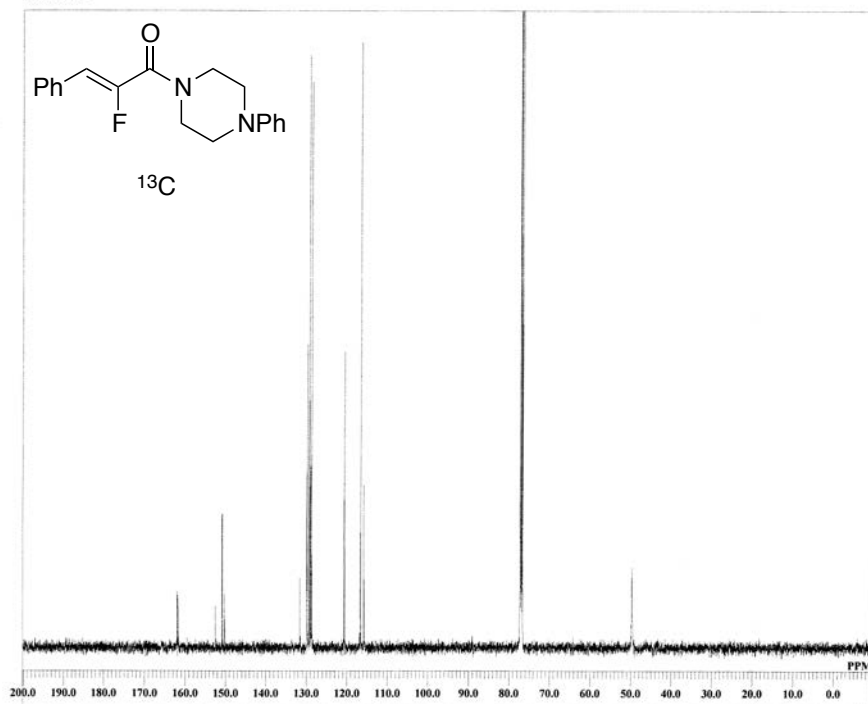
DFILE 3SY-68-Fr 19F-1.jdf
 COMINT 7al-19F
 DATIM 31-07-2014 08:30:23
 OBNUC 19F
 EXMOD single_pulse_ex2
 OBFREQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 26.3 c
 SLVNT ACETN
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 46

byproduct-1H



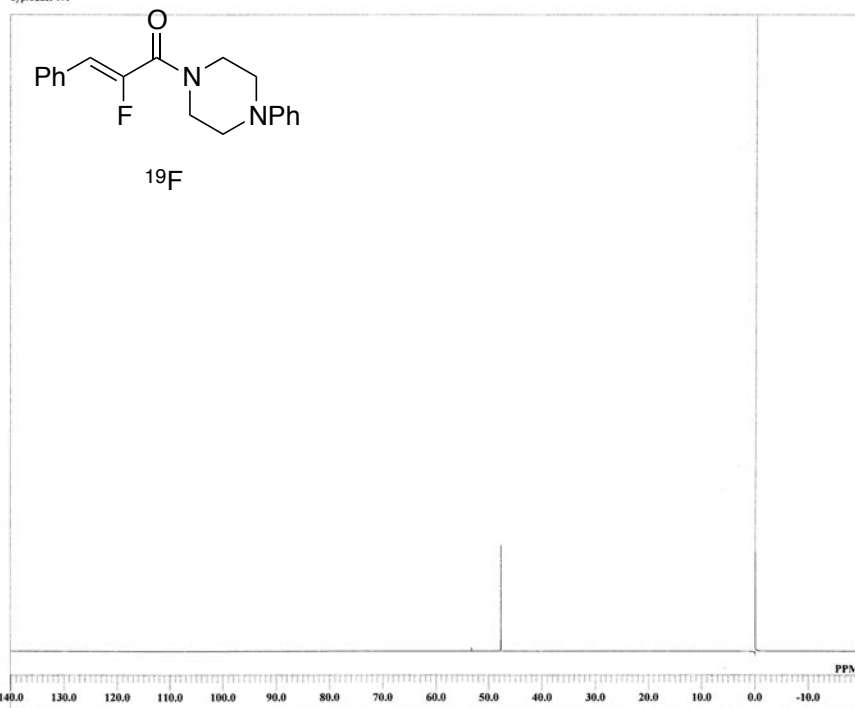
DFILE 3SY-78 Fr-1.jdf
 COMNT byproduct-1H
 DATIM 12-09-2014 09:39:01
 ORNUC 1H
 EXMOD single_pulse.ex2
 OBFRO 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 25.8 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 40

byproduct-13C



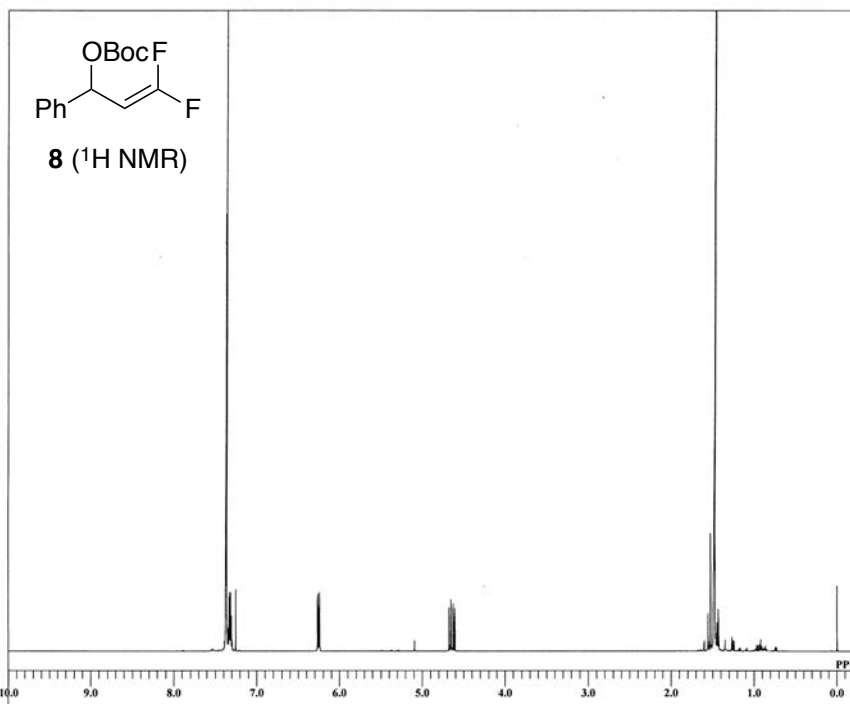
DFILE 3SY-78 Fr-13C-1.jdf
 COMNT byproduct-13C
 DATIM 12-09-2014 10:29:21
 ORNUC 13C
 EXMOD single_pulse_dec
 OBFRO 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 99308.18 Hz
 SCANS 1024
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 26.1 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.12 Hz
 RGAIN 56

byproduct-19F



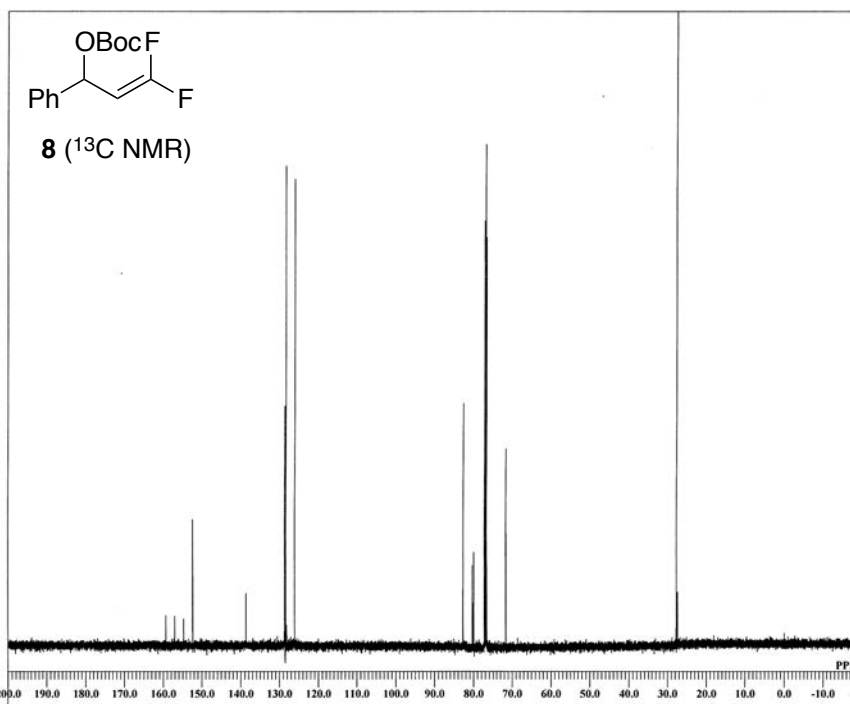
DEFILE 3SY-78 Fr 19F-1.jdf
 COMNT byproduct-19F
 DATIM 12-09-2014 11:18:05
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFREQ 470.62 MHz
 OBSET 0.46 kHz
 OBFIN 0.94 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 26.0 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.12 Hz
 RGAIN 54

1KI-1357-Frre



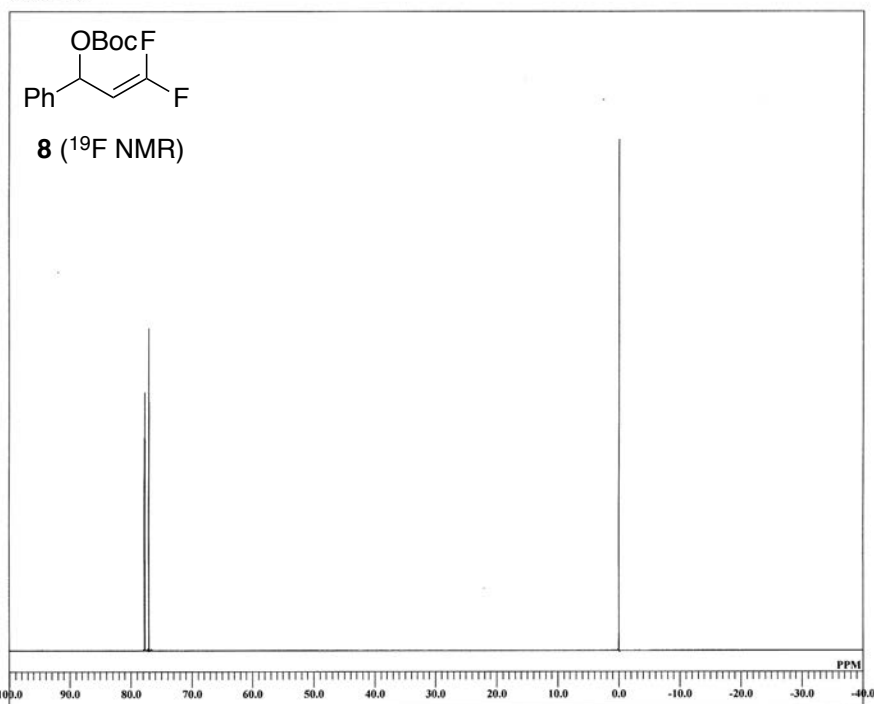
DFILE 1KI-1357-Frre-1.jdf
 COMNT 1KI-1357-Frre
 DATIM 28-07-2014 21:23:48
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFRQ 500.16 MHz
 OBSET 2.41 KHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 26.4 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.00 Hz
 RGAIN 34

1KI-1357-Frre 13C



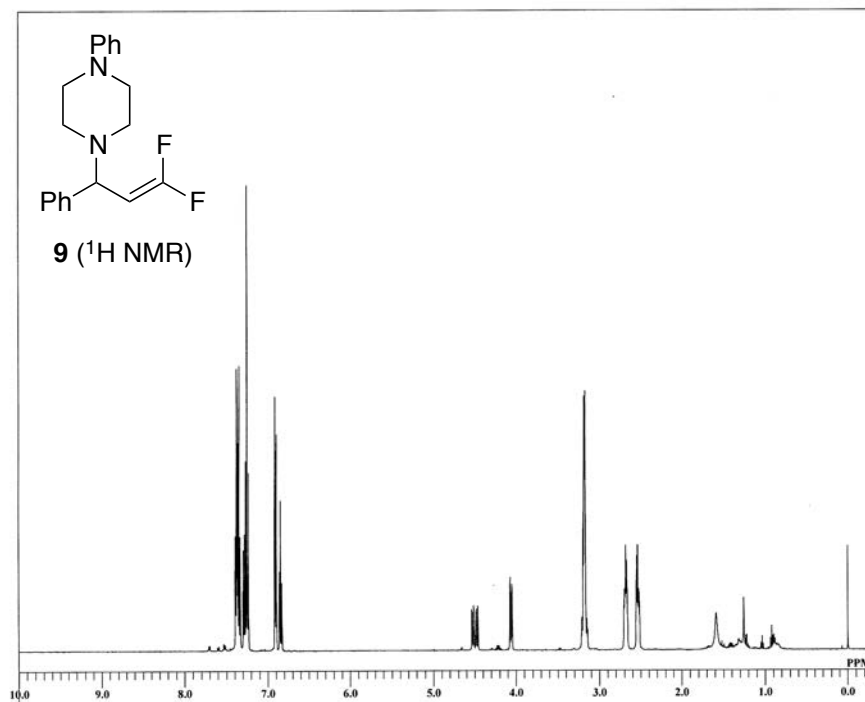
DFILE 1KI-1357-Frre 13C-1.jdf
 COMNT 1KI-1357-Frre 13C
 DATIM 28-07-2014 21:37:32
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 256
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 13C
 CTEMP 26.8 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.00 Hz
 RGAIN 56

1KI-1357-Fr 19F



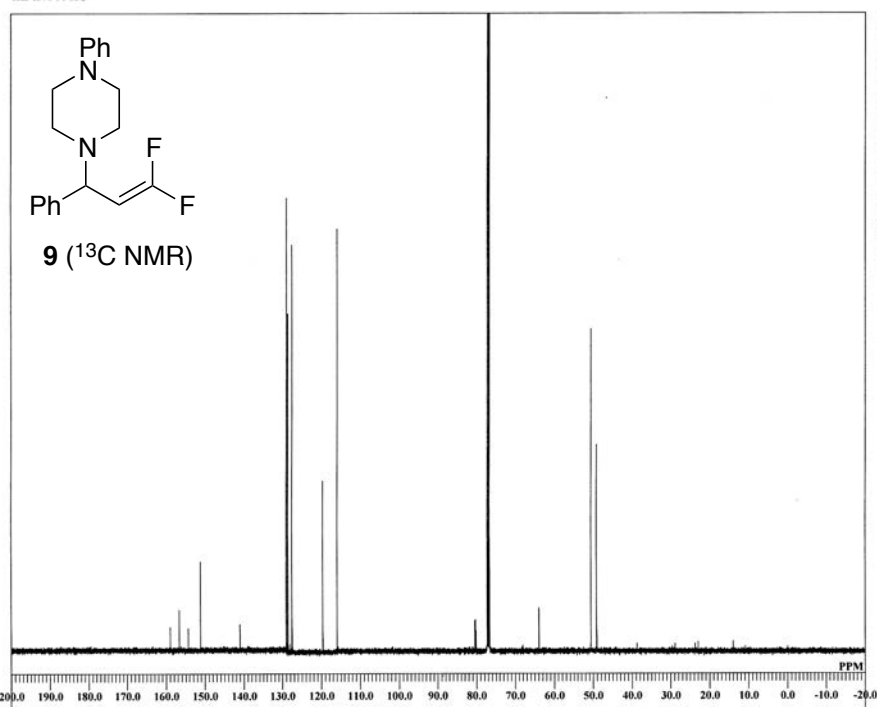
DFILE 1KI-1357-Fr 19F-1.jdf
 COMNT 1KI-1357-Fr 19F
 DATIM 28-07-2014 21:52:20
 OBNUC 19F
 EXMOD single_pulse.ex2
 OBFREQ 470.62 MHz
 OBSET 0.46 kHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 26.3 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.00 Hz
 RGAIN 50

1KI-1370-Fr



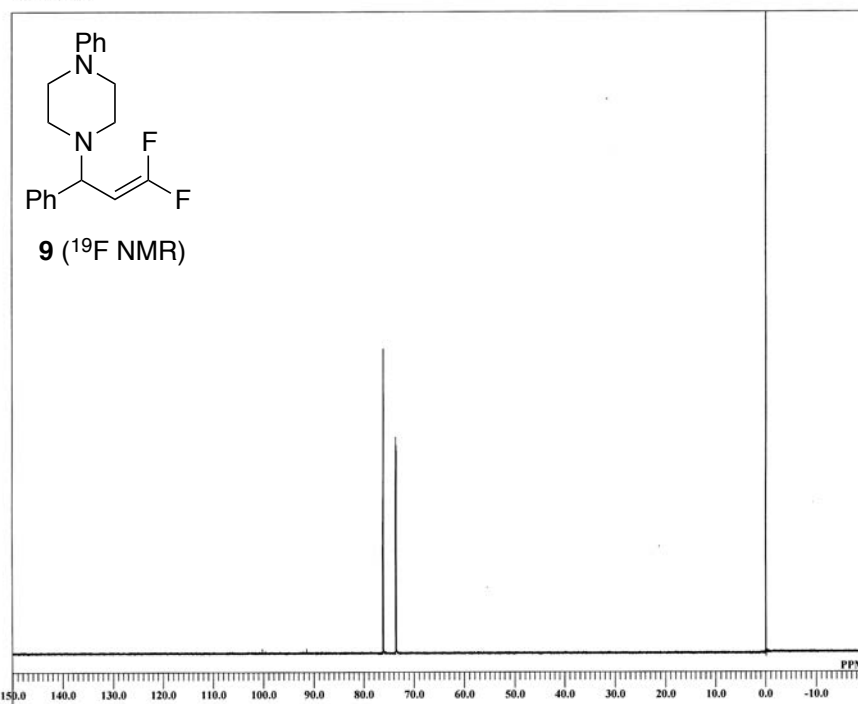
DFILE 1KI-1370-Fr-1.jdf
 COMNT 1KI-1370-Fr
 DATIM 18-08-2014 20:41:07
 OBNUC 1H
 EXMOD single_pulse.ex2
 OBFREQ 500.16 MHz
 OBSET 2.41 kHz
 OBFIN 6.01 Hz
 POINT 16384
 FREQU 9384.38 Hz
 SCANS 8
 ACQTM 1.7459 sec
 PD 5.0000 sec
 PW1 5.60 usec
 IRNUC 1H
 CTEMP 27.7 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.00 Hz
 RGAIN 42

1KI-1370-Fr 13C



DFILE 1KI-1370-Fr 13C-1.jdf
 COMINT 1KI-1370-Fr 13C
 DATIM 19-08-2014 00:00:45
 OBNUC 13C
 EXMOD single_pulse_dec
 OBFRQ 125.77 MHz
 OBSET 7.87 KHz
 OBFIN 4.21 Hz
 POINT 32768
 FREQU 39308.18 Hz
 SCANS 4096
 ACQTM 0.8336 sec
 PD 2.0000 sec
 PW1 3.33 usec
 IRNUC 1H
 CTEMP 27.8 c
 SLVNT CDCL3
 EXREF 77.00 ppm
 BF 0.00 Hz
 RGAIN 56

1KI-1370-Fr 19F



DFILE 1KI-1370-Fr 19F-1.jdf
 COMINT 1KI-1370-Fr 19F
 DATIM 19-08-2014 08:26:31
 OBNUC 19F
 EXMOD single_pulse_ex2
 OBFRQ 470.62 MHz
 OBSET 0.46 KHz
 OBFIN 0.84 Hz
 POINT 131072
 FREQU 240384.62 Hz
 SCANS 8
 ACQTM 0.5453 sec
 PD 5.0000 sec
 PW1 6.75 usec
 IRNUC 19F
 CTEMP 27.2 c
 SLVNT CDCL3
 EXREF 0.00 ppm
 BF 0.00 Hz
 RGAIN 54