# Supporting Information

## Copper-Catalyzed Chemoselective C–H Functionalization of Quinoxalin-2(1*H*)-ones with Hexafluoroisopropanol

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## Contents

## 1. General Information

$^{1}H$ NMR (TMS as the internal standard) were recorded on a Bruker AM 400 or 600 spectrometer, $^{13}C$ NMR and $^{19}F$ NMR ($CFCl_3$ as outside standard and low field is positive) spectra were recorded on a Bruker AM 400 or 600 spectrometer. For the determination of $^{19}F$ NMR yield, $PhCF_3$ was used as an internal standard and the relaxation delay (d1) was set to 5 s. Chemical shifts (δ) were reported in per million (ppm), and coupling constants (*J*) were in Hertz (Hz). The following abbreviations were used to explain the multiplicities: s = singlet, d = doublet, t = triplet, q = quartet, quint = quintet, m = multiplet. High resolution mass spectra (HRMS) were obtained on a GC-TOF mass spectrometer.

**Materials:** Unless otherwise noted, all reagents were obtained commercially and used without further purification. Substrates were purchased from commercial sources or prepared according to literature procedures. Reactions were performed using glassware that was flame-dried under vacuum.

## 2. Preparation of Substrates

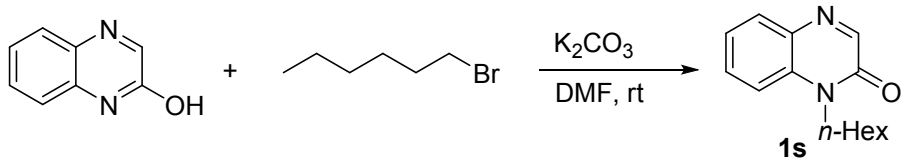
Substrates **1t** (*CAS: 1196-57-2*) and **1u** (*CAS: 55687-34-8*) were obtained commercially and used without further purification.

Substrates **1a, 1c-1n** were prepared according to the reported literature.[1]

Substrates **1b, 1o, 1q, 1r** were prepared according to the reported literature.[2]

Substrates **1p** were prepared according to the reported literature.[3]

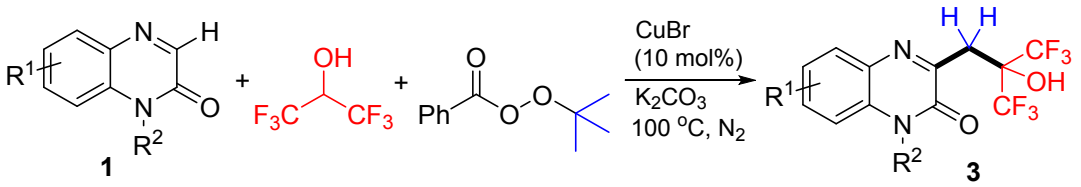
**1-Hexylquinoxalin-2(1*H*)-one (1s)**




**1s**

To a suspension of 2-quinoxalinone (0.73 g, 5.0 mmol) in DMF (15.0 mL) was added potassium carbonate (0.83 g, 6.0 mmol) and 1-bromohexane (1.12 mL, 8.0 mmol). The reaction mixture was stirred at rt overnight. EtOAc and water were added. The aqueous layer was extracted twice with EtOAc. The combined organic layers were washed with a saturated solution of $NH_4Cl$ and then with brine, dried over $Na_2SO_4$, filtered and evaporated under reduced pressure. The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **1s** (0.70 g, 61%) as a yellow oil. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 8.20 (s, 1H), 7.79 (dd, *J* = 8.3, 1.5 Hz, 1H), 7.52-7.48 (m, 1H), 7.30-7.22 (m, 2H), 4.14 (t, *J* = 8.0 Hz, 2H), 1.73-1.56 (m, 2H), 1.40-1.34 (m, 2H), 1.40-1.21 (m, 4H), 0.81 (t, *J* = 7.0 Hz, 3H); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 153.8, 149.2, 132.6, 131.4, 129.9, 129.7, 122.5, 112.8, 41.0, 30.4, 26.2, 25.6, 21.5, 13.0; **IR** (thin film) ν 2928, 1654, 1601, 1587, 1556, 1463, 1311, 1067, 750 $cm^{-1}$; **MS** (ESI): *m/z* 231.1 $[M+H]^+$ ; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{14}H_{19}N_2O$ $[M+H]^+$: 231.1492; Found: 231.1492.

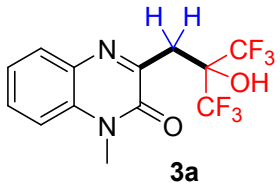
## 3. General Procedures for Hydroxyhexafluoroisobutylation of Quinoxalin-2(1*H*)-ones




1 3

To a sealed tube equipped with a stir bar were added **1** (0.2 mmol, 1.0 equiv), CuBr (2.8 mg, 0.02 mmol, 10 mol%), and $K_2CO_3$ (41.5 mg, 0.3 mmol, 1.5 equiv). The tube was evacuated and backfilled with pure $N_2$ for three times. Then, *tert*-butyl peroxybenzoate (116.4 mg, 0.6 mmol, 3.0 equiv) and hexafluoroisopropanol (3.0 mL) was added. The tube was sealed and the mixture was heated at 100 °C for 12 h. After the reaction was complete, the volatile components were removed under reduced pressure. Water was added, and the resulting mixture was extracted with EtOAc for three times. The combined organic layer was washed with brine, dried over anhydrous $Na_2SO_4$, and concentrated under reduced pressure. The resulting residue was purified by silica gel flash column chromatography to give the product **3.**

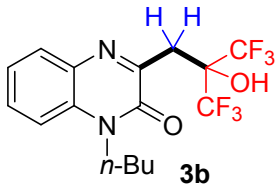
**1-Methyl-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-2(1*H*)-one (3a)**



**3a**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **3a** (49.0 mg, 72%) as a yellow solid. Mp 82-84 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 8.27 (s, 1H), 7.93 (d, $J$ = 7.9 Hz, 1H), 7.70 (t, $J$ = 7.7 Hz, 1H), 7.55-7.41 (m, 2H), 3.82 (s, 3H), 3.64 (s, 2H); **$^{19}$F NMR** (377MHz, $CDCl_3$) δ ppm -77.17 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 156.5, 153.4, 132.6, 132.5, 131.7, 130.3, 125.0, 122.9 (q, $J$ = 289.9 Hz), 114.2, 77.5 (quint, $J$ = 29.3 Hz), 35.7, 29.8; **IR** (thin film) $\nu$ 2920, 1654, 1623, 1598, 1274, 1238, 1195, 1144, 1002, 969, 770 cm$^{-1}$; **MS** (ESI): $m/z$ 341.0 $[M+H]^+$; **HRMS** (ESI-TOF): $m/z$ Calculated for $C_{13}H_{11}F_6N_2O_2$ $[M+H]^+$: 341.0719; Found: 341.0716.

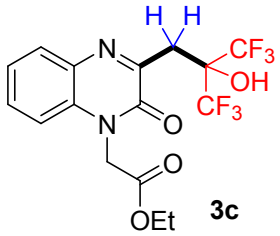
**1-Butyl-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-2(1*H*)-one (3b)**




**3b**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **3b** (50.4 mg, 66%) as a yellow oil. **$^{1}$H NMR** (400 MHz, $CDCl_3$) δ ppm 8.21 (s, 1H), 7.83 (dd, *J* = 8.0, 1.6 Hz, 1H), 7.60-7.56 (m, 1H), 7.43-7.28 (m, 2H), 4.25 (t, *J* = 7.7 Hz, 2H), 3.53 (s, 2H), 1.82-1.62 (m, 2H), 1.44-1.35 (m, 2H), 0.92 (t, *J* = 7.4 Hz, 3H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -77.20 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 155.3, 152.4, 132.0, 130.7, 130.5, 129.6, 123.7, 121.9 (q, *J* = 289.9 Hz), 113.2, 76.5 (quint, *J* = 29.3 Hz), 41.9, 35.0, 28.3, 19.1, 12.7; **IR** (thin film) *v* 2934, 1627, 1585, 1270, 1202, 1184, 1145, 1035, 976, 755 $cm^{-1}$; **MS** (ESI): *m*/*z* 383.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m*/*z* Calculated for $C_{16}H_{17}F_6N_2O_2$ $[M+H]^+$: 383.1189; Found: 383.1185.

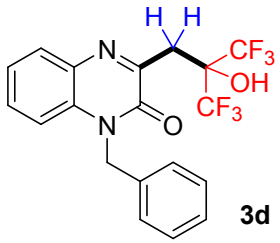
**Ethyl 2-(2-oxo-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-1(2*H*)-yl)acetate (3c)**




**3c**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 6:1) to afford **3c** (55.2 mg, 67%) as a yellow oil. **$^{1}$H NMR** (400 MHz, $CDCl_3$) δ ppm 7.83-7.84 (m, 2H), 7.54-7.57 (m, 1H), 7.36-7.39 (m, 1H), 7.10-7.12 (m, 1H), 5.00 (s, 2H), 4.17 (q, *J* = 7.1 Hz, 2H), 3.55 (s, 2H), 1.19 (t, *J* = 7.2 Hz, 3H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -77.22 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 166.2, 156.0, 153.5, 132.5, 131.8, 131.7, 130.6, 125.1, 122.9 (q, *J* = 289.9 Hz), 113.6, 76.54 (quint, *J* = 29.3 Hz), 62.5, 44.1, 35.0, 14.0; **IR** (thin film) *v* 2922, 1747, 1632, 1264, 1200, 1183, 1146, 1001, 755, 454 $cm^{-1}$; **MS** (ESI): *m*/*z* 413.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m*/*z* Calculated for $C_{16}H_{15}F_6N_2O_4$ $[M+H]^+$: 413.0931; Found: 413.0929.

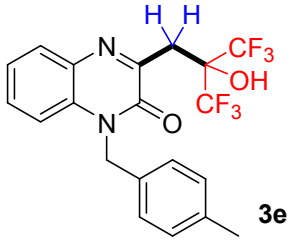
**1-Benzyl-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-2(1*H*)-one (3d)**




**3d**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **3d** (49.9 mg, 60%) as yellow solid. Mp 64-66 °C. **$^{1}$H NMR** (400 MHz, $CDCl_3$) δ ppm 8.08 (s, 1H), 7.83-7.81 (m, 1H), 7.50-7.40 (m, 1H), 7.29-7.33 (m, 1H), 7.29-7.16 (m, 4H), 7.10-7.12 (m, 2H), 5.47 (s, 2H), 3.59 (s, 2H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -77.09 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 156.7, 153.6, 134.2, 132.9, 131.9, 131.6, 130.5, 129.2, 128.1, 126.7, 125.0, 122.9 (q, $J$ = 289.9 Hz), 115.0, 76.6 (quint, $J$ = 29.3 Hz), 46.6, 35.9; **IR** (thin film) $\nu$ 2926, 1628, 1599, 1244, 1144, 1038, 1055, 922, 754, 697 $cm^{-1}$; **MS** (ESI): $m/z$ 417.0 $[M+H]^+$; **HRMS** (ESI-TOF): $m/z$ Calculated for $C_{19}H_{15}F_6N_2O_2$ $[M+H]^+$: 417.1032; Found: 417.1029.

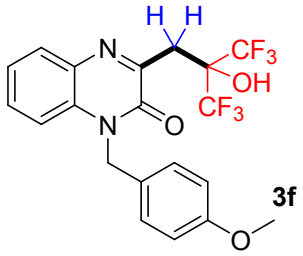
**1-(4-Methylbenzyl)-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-2(1*H*)-one (3e)**




**3e**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **3e** (51.6 mg, 60%) as a yellow oil. **$^{1}$H NMR** (400 MHz, $CDCl_3$) δ ppm 8.11 (s, 1H), 7.81 (d, $J$ = 8.0 Hz, 1H), 7.56-7.40 (m, 1H), 7.28-7.33 (m, 2H), 7.00-7.08 (m, 4H), 5.43 (s, 2H), 3.59 (s, 2H), 2.21 (s, 3H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -77.10 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 156.7, 153.6, 138.0, 133.0, 131.9, 131.6, 131.2, 130.4, 129.8, 126.7, 124.9, 122.9 (q, $J$ = 289.9 Hz), 115.0, 76.6 (quint, $J$ = 29.3 Hz), 46.4, 36.0, 21.1; **IR** (thin film) $\nu$ 2924, 1628, 1586, 1272, 1200, 1178, 1145, 1038, 996, 756 $cm^{-1}$; **MS** (ESI): $m/z$ 431.0 $[M+H]^+$; **HRMS** (ESI-TOF): $m/z$ Calculated for $C_{20}H_{17}F_6N_2O_2$ $[M+H]^+$: 431.1189; Found: 431.1186.

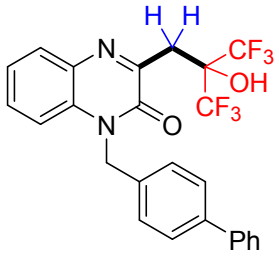
**1-(4-Methoxybenzyl)-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-2(1*H*)-one (3f)**




**3f**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **3f** (50.0 mg, 56%) as a yellow solid. Mp 74-77 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 8.13 (s, 1H), 7.80 (d, *J* = 8.1 Hz, 1H), 7.44-7.48 (m, 1H), 7.29-7.33 (m, 2H), 7.07 (d, *J* = 8.7 Hz, 2H), 6.76 (d, *J* = 8.7 Hz, 2H), 5.40 (s, 2H), 3.67 (s, 3H), 3.58 (s, 2H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -77.10 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 159.4, 156.7, 153.6, 133.0, 131.8, 131.5, 130.5, 128.3, 126.2, 124.9, 122.9 (q, *J* = 289.9 Hz), 115.0, 114.5, 76.6 (quint, *J* = 29.3 Hz), 55.3, 46.1, 36.0; **IR** (thin film) *v* 2920, 1654, 1512, 1269, 1210, 1175, 1140, 1029, 754, 719 $cm^{-1}$; **MS** (ESI): *m/z* 447.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{20}H_{17}F_6N_2O_3$ $[M+H]^+$: 447.1138; Found: 447.1136.

**1-([1,1'-Biphenyl]-4-ylmethyl)-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-2(1*H*)-one (3g)**

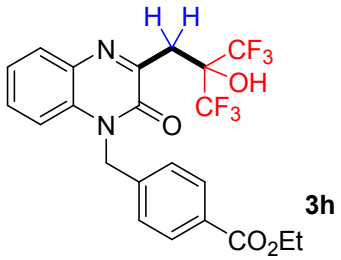



**3g**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **3g** (49.3 mg, 50%) as a yellow oil. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 8.08 (s, 1H), 7.81 (dd, *J* = 8.1, 1.5 Hz, 1H), 7.46-7.38 (m, 4H), 7.35-7.27 (m, 6H), 7.27-7.21 (m, 1H), 7.06 (d, *J* = 7.9 Hz, 1H), 5.51 (s, 2H), 3.60 (s, 2H); **$^{19}$F NMR** (565 MHz, $CDCl_3$) δ ppm -77.04 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 156.7, 153.6, 142.3, 140.3, 134.7, 133.0, 131.9, 131.7, 130.5, 129.7, 128.9, 127.7, 127.1, 127.0, 125.4 (d, *J* = 6.1 Hz), 125.1, 122.9 (q, *J* = 289.9 Hz), 115.0, 76.7 (quint, *J* =29.3 Hz), 46.7, 36.0; **IR** (thin film) *v* 2922, 1599, 1265, 1202, 1144, 1038,

993, 752, 698, 469 $cm^{-1}$; **MS** (ESI): *m/z* 493.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{25}H_{19}F_6N_2O_2$ $[M+H]^+$: 493.1345; Found: 493.1342.

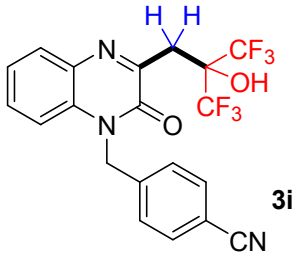
**Ethyl 4-((2-oxo-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-1(2*H*)-yl)methyl)benzoate (3h)**



**3h**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 6:1) to afford **3h** (62.5 mg, 64%) as a yellow solid. Mp 110-112 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 7.96 (s, 1H), 7.94 (s, 1H), 7.92 (s, 1H), 7.84 (dd, *J* = 8.0, 1.5 Hz, 1H), 7.47-7.43 (m, 1H), 7.36-7.32 (m, 1H), 7.20-7.16 (m, 3H), 5.53 (s, 2H), 4.27 (q, *J* = 7.1 Hz, 2H), 3.60 (s, 2H), 1.28 (t, *J* = 7.1 Hz, 3H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -77.12 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 165.9, 156.5, 153.7, 139.1, 132.9, 131.7, 131.6, 130.6, 130.44, 130.42, 126.6, 125.2, 122.9 (q, *J* = 289.9 Hz), 114.7, 76.6 (quint, *J* = 29.3 Hz), 61.2, 46.4, 35.7, 14.3; **IR** (thin film) *v* 2921, 1707, 1629, 1587, 1278, 1228, 1169, 1020, 998, 753, 430 $cm^{-1}$; **MS** (ESI): *m/z* 489.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{22}H_{19}F_6N_2O_4$ $[M+H]^+$: 489.1244; Found: 489.1240.

**4-((2-Oxo-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-1(2*H*)-yl)methyl)benzonitrile (3i)**

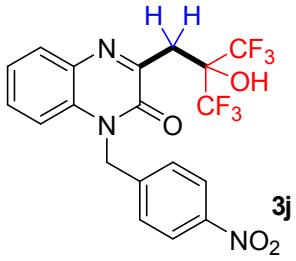


**3i**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 6:1) to afford **3i** (59.1 mg, 67%) as a yellow solid. Mp 108-110 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 7.87 (s, 1H), 7.85 (dd, *J* = 8.0, 1.5 Hz, 1H), 7.57-7.52 (m, 2H), 7.51-7.46 (m, 1H), 7.38-7.34 (m, 1H), 7.22 (d, *J* = 8.2 Hz, 2H), 7.16 (dd, *J* = 8.5, 1.1 Hz, 1H), 5.53 (s, 2H), 3.59 (s, 2H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -

77.11 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 155.4, 152.7, 138.5, 132.0, 131.8, 130.8, 130.5, 129.7, 126.4, 124.3, 121.9 (q, *J* = 289.9 Hz), 117.1, 113.3, 111.2, 75.5 (quint, *J* = 29.3 Hz), 45.1, 34.4; **IR** (thin film) *v* 2918, 2230, 1627, 1585, 1272, 1201, 1150, 993, 760, 602 $cm^{-1}$; **MS** (ESI): *m/z* 442.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{20}H_{14}F_6N_3O_2$ $[M+H]^+$: 442.0985; Found: 442.0982.

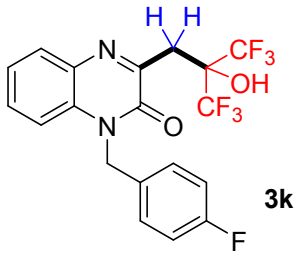
**1-(4-Nitrobenzyl)-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-2(1*H*)-one (3j)**



**3j**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 6:1) to afford **3j** (55.3 mg, 60%) as a yellow solid. Mp 118-120 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 8.24 (s, 1H), 8.21 (s, 1H), 7.98-7.95 (m, 2H), 7.62-7.58 (m, 1H), 7.50-7.46 (m, 1H), 7.39 (d, *J* = 8.3 Hz, 2H), 7.29-7.25 (m, 1H), 5.68 (s, 2H), 3.71 (s, 2H); **$^{19}$F NMR** (377 MHz, $CDCl_3$) δ ppm -77.11 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 156.4, 153.7, 147.7, 141.5, 132.8, 131.9, 131.4, 130.8, 127.6, 125.4, 124.4, 122.9 (q, *J* = 289.9 Hz), 114.4, 76.6 (quint, *J* = 29.3 Hz), 45.9, 35.4; **IR** (thin film) *v* 3152, 1632, 1525, 1348, 1201, 1151, 1037, 755, 711, 595 $cm^{-1}$; **MS** (ESI): *m/z* 462.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{19}H_{14}F_6N_3O_4$ $[M+H]^+$: 462.0883; Found: 462.0878.

**1-(4-Fluorobenzyl)-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-2(1*H*)-one (3k)**

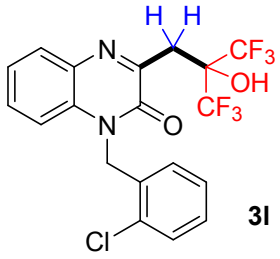


**3k**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 6:1) to afford **3k** (46.0 mg, 53%) as a yellow oil. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 8.02 (s, 1H), 7.92-7.80 (m, 1H), 7.50-7.46 (m, 1H), 7.36-7.32 (m,

1H), 7.28-7.26 (m, 1H), 7.14-7.11 (m, 2H), 6.96-6.92 (m, 2H), 5.44 (s, 2H), 3.59 (s, 2H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -77.13 (s, 6F), -113.49 to -113.56 (m, 1F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 162.3 (d, *J* = 252.5 Hz), 156.5, 153.6, 132.9, 131.7, 130.6, 130.0 (d, *J* = 4.0 Hz), 128.7 (d, *J* = 8.1 Hz), 125.1, 122.9 (q, *J* = 289.9 Hz), 116.3, 116.1, 114.7, 76.6 (quint, *J* = 29.3 Hz), 45.9, 35.8; **IR** (thin film) *v* 2926, 1585, 1273, 1200, 1145, 1038, 1055, 993, 752, 722 $cm^{-1}$; **MS** (ESI): *m/z* 435.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{19}H_{14}F_7N_2O_2$ $[M+H]^+$: 435.0938; Found: 435.0935.

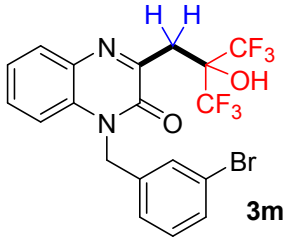
**1-(2-Chlorobenzyl)-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-2(1*H*)-one (3l)**




**3l**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 6:1) to afford **3l** (45.0 mg, 50%) as a yellow solid. Mp 68-70 °C. **$^{1}$H NMR** (400 MHz, $CDCl_3$) δ ppm 7.94 (s, 1H), 7.91-7.78 (m, 1H), 7.52-7.42 (m, 1H), 7.41-7.32 (m, 2H), 7.18-7.14 (m, 1H), 7.09-7.02 (m, 2H), 6.57-6.55 (m, 1H), 5.56 (s, 2H), 3.61 (s, 2H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -77.10 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 156.7, 153.6, 132.8, 132.6, 131.8, 131.6, 131.3, 130.5, 130.0, 129.3, 127.6, 126.5, 125.2, 122.9 (q, *J* = 289.9 Hz), 114.8, 76.6 (quint, *J* = 29.3 Hz), 44.2, 35.8; **IR** (thin film) *v* 3168, 2918, 1632, 1233, 1202, 1144, 1035, 992, 756, 506 $cm^{-1}$; **MS** (ESI): *m/z* 451.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{19}H_{14}ClF_6N_2O_2$ $[M+H]^+$: 451.0643; Found: 451.0639.

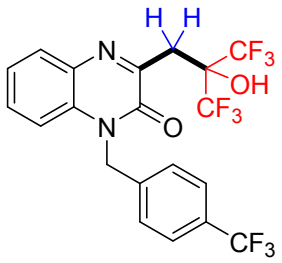
**1-(3-Bromobenzyl)-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-2(1*H*)-one (3m)**




**3m**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 6:1) to afford **3m** (62.3 mg, 63%) as a yellow oil. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 7.96 (s, 1H), 7.85 (d, *J* = 8.0 Hz, 1H), 7.51-7.47 (m, 1H), 7.37-7.34 (m, 2H), 7.29 (s, 1H), 7.23-7.21 (m, 1H), 7.14-7.10 (m, 1H), 7.03-7.01 (m, 1H), 5.44 (s, 2H), 3.60 (s, 2H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -77.12 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 156.5, 153.7, 136.4, 132.8, 131.8, 131.6, 131.4, 130.8, 130.6, 129.8, 125.3, 125.2, 123.2, 122.9 (q, *J* = 289.9 Hz), 114.7, 76.6 (quint, *J* = 29.3 Hz), 45.9, 35.6; **IR** (thin film) *v* 2926, 1629, 1586, 1265, 1200, 1179, 1144, 933, 754, 724 $cm^{-1}$; **MS** (ESI): *m/z* 494.9 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{19}H_{14}BrF_6N_2O_2$ $[M+H]^+$: 495.0137; Found: 495.0135.

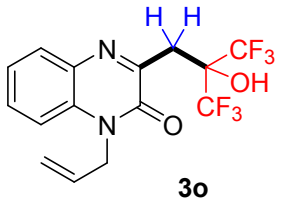
**3-(3,3,3-Trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)-1-(4-(trifluoromethyl)benzyl)quinoxalin-2(1*H*)-one (3n)**




**3n**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 6:1) to afford **3n** (53.3 mg, 55%) as a yellow solid. Mp 84-87 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 8.05 (s, 1H), 7.97 (d, *J* = 7.9 Hz, 1H), 7.64-7.62 (m, 2H), 7.59-7.57 (m, 1H), 7.49-7.45 (m, 1H), 7.38-7.29 (m, 3H), 5.65 (s, 2H), 3.71 (s, 2H); **$^{19}$F NMR** (377 MHz, $CDCl_3$) δ ppm -62.73 (s, 3F), -77.12 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 156.5, 153.7, 138.2, 132.9, 131.8, 131.6, 130.7, 130.3, 127.0, 126.2 (q, *J* = 4.0 Hz), 125.3, 123.8 (q, *J* = 273.7 Hz), 122.9 (q, *J* = 289.9 Hz), 114.6, 76.6 (quint, *J* = 29.3 Hz), 46.1, 35.7; **IR** (thin film) *v* 2919, 1630, 1321, 1205, 1165, 1111, 1066, 988, 756, 592 $cm^{-1}$; **MS** (ESI): *m/z* 485.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{20}H_{14}F_9N_2O_2$ $[M+H]^+$: 485.0906; Found: 485.0904.

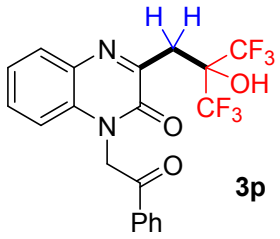
**1-Allyl-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-2(1*H*)-one(3o)**




**3o**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **3o** (29.3 mg, 40%) as a yellow solid. Mp 48-51 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 8.06 (s, 1H), 7.84 (d, *J* = 8.1 Hz, 1H), 7.62-7.49 (m, 1H), 7.39-7.35 (m, 1H), 7.31 (d, *J* = 8.5 Hz, 1H), 5.91-5.83 (m, 1H), 5.24 (dd, *J* = 10.4, 1.3Hz, 1H), 5.05 (dd, *J* = 17.2, 1.6 Hz, 1H), 4.96-4.83 (m, 2H), 3.56 (s, 2H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -77.18 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 156.1, 153.6, 132.8, 131.7, 131.5, 130.4, 129.5, 124.9, 122.9 (q, *J* = 289.9 Hz), 118.7, 114.7, 76.6 (quint, *J* = 29.3 Hz), 45.2, 35.7; **IR** (thin film) *v* 2919, 1631, 1588, 1210, 1186, 1142, 1034, 962, 757, 707 $cm^{-1}$; **MS** (ESI): *m/z* 367.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{15}H_{13}F_6N_2O_2$ $[M+H]^+$: 367.0876; Found: 367.0874.

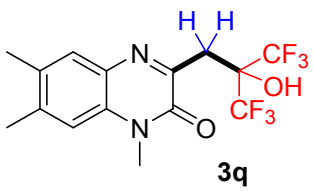
**1-(2-Oxo-2-phenylethyl)-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-2(1*H*)-one (3p)**




**3p**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 6:1) to afford **3p** (49.7 mg, 56%) as a yellow solid. Mp 112-114 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 7.97 (s, 1H), 7.95 (d, *J* = 1.3 Hz, 1H), 7.93 (s, 1H), 7.82 (dd, *J* = 8.1, 1.6 Hz, 1H), 7.62-7.58 (m, 1H), 7.48-7.42 (m, 3H), 7.34-7.30 (m, 1H), 6.96 (d, *J* = 8.0 Hz, 1H), 5.70 (s, 2H), 3.54 (s, 2H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -77.15 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 189.0, 155.1, 152.3, 133.7, 133.1, 131.6, 131.0, 130.6, 129.5, 128.2, 127.1, 124.0, 121.9 (q, *J* = 289.9 Hz), 112.9, 75.5 (quint, *J* = 29.3 Hz), 48.0, 34.1; **IR** (thin film) *v* 2951, 1657, 1226, 1198, 1179, 1164, 1024, 976, 755, 687 $cm^{-1}$; **MS** (ESI): *m/z* 445.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{20}H_{15}F_6N_2O_3$ $[M+H]^+$: 445.0981; Found: 445.0981.

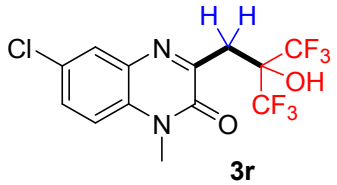
**1,6,7-Trimethyl-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-2(1*H*)-one (3q)**




**3q**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **3q** (30.9 mg, 42%) as a yellow solid. Mp 96-98 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 8.28 (s, 1H), 7.56 (s, 1H), 7.09 (s, 1H), 3.67 (s, 3H), 3.49 (s, 2H), 2.37 (s, 3H), 2.29 (s, 3H); **$^{19}$F NMR** (377 MHz, $CDCl_3$) δ ppm -77.19 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 155.5, 150.9, 140.9, 133.2, 130.2, 129.6, 129.2, 122.0 (q, *J* = 289.9 Hz), 113.6, 75.6 (quint, *J* = 29.3 Hz), 34.7, 28.7, 19.6, 18.2; **IR** (thin film) *v* 2922, 1603, 1261, 1228, 1203, 1141, 1039, 1019, 965, 803, 579 $cm^{-1}$; **MS** (ESI): *m/z* 369.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{15}H_{15}F_6N_2O_2$ $[M+H]^+$: 369.1032; Found: 369.1031.

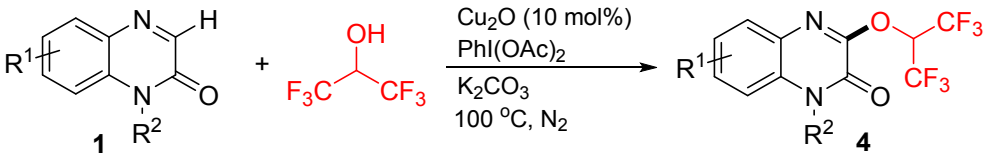
**6-Chloro-1-methyl-3-(3,3,3-trifluoro-2-hydroxy-2-(trifluoromethyl)propyl)quinoxalin-2(1*H*)-one (3r)**




**3r**

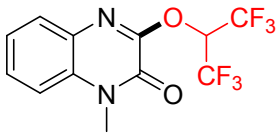
The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 6:1) to afford **3r** (36.7 mg, 49%) as a yellow solid. Mp 84-86 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 7.87 (s, 1H), 7.83 (d, *J* = 2.4 Hz, 1H), 7.55 (dd, *J* = 9.0, 2.4 Hz, 1H), 7.29 (d, *J* = 8.9 Hz, 1H), 3.71 (s, 3H), 3.53 (s, 2H); **$^{19}$F NMR** (377 MHz, $CDCl_3$) δ ppm -77.15 (s, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 155.2, 154.0, 132.1, 130.6, 130.2, 129.5, 128.6, 128.9 (q, *J* = 289.9 Hz), 114.3, 75.5 (quint, *J* = 29.3 Hz), 35.0, 29.0; **IR** (thin film) *v* 2918, 1627, 1581, 1421, 1265, 1213, 1191, 1141, 1043, 969, 817, 716 $cm^{-1}$; **MS** (ESI): *m/z* 375.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{13}H_{10}ClF_6N_2O_2$ $[M+H]^+$: 375.0330; Found: 375.0326.

## 4. General Procedures for Hexafluoroisopropoxylation of Quinoxalin-2(1*H*)-ones




To a sealed tube equipped with a stir bar were added **1** (0.2 mmol, 1.0 equiv), $Cu_2O$ (2.9 mg, 0.02 mmol, 10 mol%), $PhI(OAc)_2$ (193.2 mg, 0.6 mmol, 3.0 equiv), and $K_2CO_3$ (41.4 mg, 0.3 mmol, 1.5 equiv). The tube was evacuated and backfilled with pure $N_2$ for three times. Then HFIP (3.0 mL) was added. The tube was sealed and the mixture was heated at 100 °C for 12 h. After the reaction was complete, the volatile components were removed under reduced pressure. Water was added, the resulting mixture was extracted with EtOAc for three times. The combined organic layer was washed with brine, dried over anhydrous $Na_2SO_4$, and concentrated under reduced pressure. The resulting residue was purified by silica gel flash column chromatography to give the product **4**.

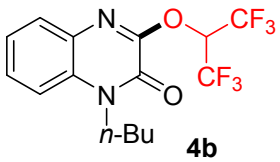
**3-((1,1,1,3,3,3-Hexafluoropropan-2-yl)oxy)-1-methylquinoxalin-2(1*H*)-one (4a)**




**4a**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **4a** (47.0 mg, 72%) as a white solid. Mp 152-154 °C. **$^1$H NMR** (600 MHz, $CDCl_3$) δ ppm 7.70 (d, *J* = 7.9 Hz, 1H), 7.57-7.54 (m, 1H), 7.40-7.34 (m, 2H), 6.57-6.53 (m, 1H), 3.78 (s, 3H); **$^{19}$F NMR** (565 MHz, $CDCl_3$) δ ppm -72.75 (d, *J* = 6.1 Hz, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 150.4, 149.5, 132.6, 129.1, 128.9, 128.1, 124.4, 120.7 (q, *J* = 281.8 Hz), 113.9, 68.2 (quint, *J* = 34.9 Hz), 29.7; **IR** (thin film) *v* 2970, 1673, 1621, 1232, 1190, 1104, 1086, 1013, 765, 687 $cm^{-1}$; **MS** (ESI): *m/z* 327.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{12}H_9F_6N_2O_2$ $[M+H]^+$: 327.0563; Found: 327.0564.

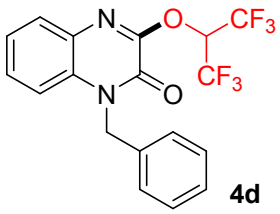
**1-Butyl-3-((1,1,1,3,3,3-hexafluoropropan-2-yl)oxy)quinoxalin-2(1*H*)-one (4b)**



**4b**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **4b** (42.7 mg, 58%) as a yellow solid. Mp 62-64 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 7.59 (dd, *J* = 8.1, 1.6 Hz, 1H), 7.51-7.39 (m, 1H), 7.30-7.22 (m, 2H), 6.49-6.40 (m, 1H), 4.21 (t, *J* = 8.0 Hz, 2H), 1.80-1.62 (m, 2H), 1.47-1.37 (m, 2H), 0.93 (t, *J* = 7.4 Hz, 3H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -72.75 (d, *J* = 6.0 Hz, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 149.4, 148.2, 130.8, 128.2, 128.0, 127.3, 123.2, 119.7 (q, *J* = 283.9 Hz), 113.0, 67.2 (quint, *J* = 283.9 Hz), 41.9, 28.2, 19.2, 12.7; **IR** (thin film) *v* 2954, 1681, 1374, 1230, 1185, 1099, 1053, 871, 754, 690 cm$^{-1}$; **MS** (ESI): *m*/*z* 369.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m*/*z* Calculated for $C_{15}H_{15}F_6N_2O_2$ $[M+H]^+$: 369.1032; Found: 369.1035.

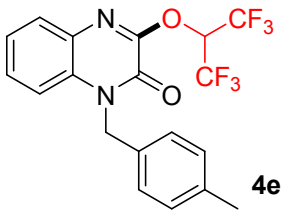
**1-Benzyl-3-((1,1,1,3,3,3-hexafluoropropan-2-yl)oxy)quinoxalin-2(1*H*)-one (4d)**



**4d**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **4d** (49.0 mg, 61%) as a yellow solid. Mp 99-101 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 7.59 (dd, *J* = 7.9, 1.5 Hz, 1H), 7.34-7.30 (m, 1H), 7.27-7.19 (m, 7H), 6.51-6.44 (m, 1H), 5.45 (s, 2H); **$^{19}$F NMR** (377 MHz, $CDCl_3$) δ ppm -72.63 (d, *J* = 6.1 Hz, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 149.4, 148.8, 133.6, 130.9, 128.1, 128.03, 127.99, 127.2, 126.9, 126.0, 123.4, 119.7 (q, *J* = 284.8 Hz ), 113.8, 67.3 (quint, *J* = 34.3 Hz), 45.6; **IR** (thin film) *v* 2967, 1657, 11621, 1238, 1189, 1105, 1088, 761, 701, 689 cm$^{-1}$; **MS** (ESI): *m*/*z* 403.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m*/*z* Calculated for $C_{18}H_{13}F_6N_2O_2$ $[M+H]^+$: 403.0876; Found: 403.0878.

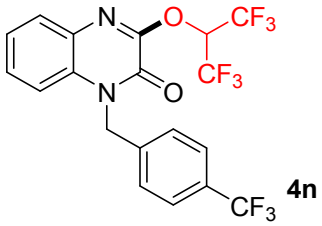
**1-((1,1,1,3,3,3-Hexafluoropropan-2-yl)oxy)-1-(4-methylbenzyl)quinoxalin-2(1*H*)-one (4e)**




**4e**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **4e** (34.1 mg, 41%) as a white solid. Mp 106-108 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 7.58 (dd, *J* = 7.9, 1.4 Hz, 1H), 7.37-7.28 (m, 1H), 7.27-7.17 (m, 2H), 7.11 (d, *J* = 7.9 Hz, 2H), 7.04 (d, *J* = 7.9 Hz, 2H), 6.50-6.44 (m, 1H), 5.40 (s, 2H), 2.22 (s, 3H); **$^{19}$F NMR** (377 MHz, $CDCl_3$) δ -72.63 (d, *J* = 6.1 Hz, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 149.4, 148.7, 136.8, 130.9, 130.6, 128.6, 128.1, 128.0, 127.1, 126.1, 123.4, 119.7 (q, *J* = 281.8 Hz), 113.8, 67.3 (quint, *J* = 34.3 Hz), 45.4, 20.0; **IR** (thin film) *v* 2963, 1683, 1622, 1260, 1235, 1184, 1095, 1074, 867, 745, 687 cm$^{-1}$; **MS** (ESI): *m/z* 416.9 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{19}H_{15}F_6N_2O_2$ $[M+H]^+$: 417.1032; Found: 417.1035.

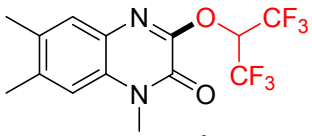
**3-((1,1,1,3,3,3-Hexafluoropropan-2-yl)oxy)-1-(4-(trifluoromethyl)benzyl)quinoxalin-2(1*H*)-one (4n)**




**4n**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **4n** (39.5 mg, 42%) as a yellow solid. Mp 96-98 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 7.62 (dd, *J* = 7.9, 1.5 Hz, 1H), 7.51 (d, *J* = 8.1 Hz, 2H), 7.38-7.29 (m, 3H), 7.28-7.24 (m, 1H), 7.17-7.02 (m, 1H), 6.50-6.44 (m, 1H), 5.50 (s, 2H); **$^{19}$F NMR** (377 MHz, $CDCl_3$) δ -62.75 (s, 3F), -72.67 (d, *J* = 6.1 Hz, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 149.4, 148.7, 137.7, 130.7, 129.4 (q, *J* = 3.3 Hz), 128.2, 128.1, 127.4, 126.4, 125.0 (q, *J* = 3.7 Hz), 123.7, 128.8 (q, *J* = 272.7 Hz), 119.7 (q, *J* = 283.8 Hz), 113.4, 67.4 (quint, *J* = 33.3Hz), 45.2; **IR** (thin film) *v* 2963, 1678, 1619, 1241, 1192, 1166, 1103, 1066, 1003, 748, 690 cm$^{-1}$; **MS** (ESI): *m/z* 471.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{19}H_{12}F_9N_2O_2$ $[M+H]^+$: 471.0750; Found: 471.0752.

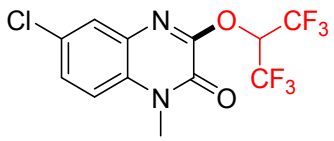
**2-((1,1,1,3,3,3-Hexafluoropropan-2-yl)oxy)-1,6,7-trimethylquinoxalin-2(1*H*)-one (4q)**



**4q**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **4q** (46.0 mg, 65%) as a yellow solid. Mp 140-142 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 7.35 (s, 1H), 6.99 (s, 1H), 6.46-6.40 (m, 1H), 3.63 (s, 3H), 2.32 (s, 3H), 2.25 (s, 3H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -72.79 (d, *J* = 6.2 Hz, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 148.8, 148.5, 137.7, 132.4, 129.5, 127.2, 125.9, 119.8 (q, *J* = 284.8 Hz), 113.5, 67.1 (quint, *J* = 35.4 Hz), 28.6, 19.3, 18.1; **IR** (thin film) *v* 2970, 1672, 1626, 1259, 1232, 1188, 1103, 1083, 880, 688 $cm^{-1}$; **MS** (ESI): *m/z* 355.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{14}H_{13}F_6N_2O_2$ $[M+H]^+$: 355.0876; Found: 355.0877.

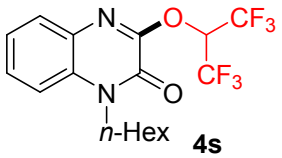
**6-Chloro-3-((1,1,1,3,3,3-hexafluoropropan-2-yl)oxy)-1-methylquinoxalin-2(1*H*)-one (4r)**



**4r**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **4r** (41.8 mg, 58%) as a yellow solid. Mp 106-108 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 7.61 (d, *J* = 2.4 Hz, 1H), 7.42 (dd, *J* = 8.9, 2.4 Hz, 1H), 7.22-7.16 (m, 1H), 6.42-6.36 (m, 1H), 3.67 (s, 3H); **$^{19}$F NMR** (377 MHz, $CDCl_3$) δ ppm -72.72 (d, *J* = 6.0 Hz, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 150.2, 148.1, 130.2, 128.8, 128.6, 128.1, 126.5, 119.5 (q, *J* = 285.8 Hz), 114.0, 67.4 (quint, *J* = 35.3 Hz ), 28.9; **IR** (thin film) *v* 2919, 1676, 1614, 1220, 1196, 1104, 1080, 1011, 803, 685 $cm^{-1}$; **MS** (ESI): *m/z* 361.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{12}H_8ClF_6N_2O_2$ $[M+H]^+$: 361.0173; Found: 361.0173.

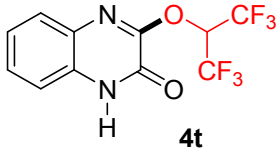
**3-((1,1,1,3,3,3-Hexafluoropropan-2-yl)oxy)-1-hexylquinoxalin-2(1*H*)-one (4s)**



**4s**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 10:1) to afford **4s** (49.9 mg, 63%) as a white solid. Mp 86-88 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 7.65-7.57 (m, 1H), 7.46-7.42 (m, 1H), 7.28-7.23 (m, 2H), 6.47-6.41 (m, 1H), 4.20 (t, *J* = 10.6 Hz, 2H), 1.74-1.67 (m, 2H), 1.40-1.36 (m, 2H), 1.31-1.24 (m, 4H), 0.82 (t, *J* = 7.0 Hz, 3H); **$^{19}$F NMR** (377 MHz, $CDCl_3$) δ ppm -72.74 (d, *J* = 6.1 Hz, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 149.4, 148.2, 130.8, 128.2, 128.0, 127.3, 123.2, 119.7 (q, *J* = 283.8 Hz), 112.9, 67.2 (quint, *J* = 34.3 Hz), 42.1, 30.4, 26.1, 25.6, 21.5, 12.9; **IR** (thin film) *v* 2966, 1683, 1621, 1262, 1217, 1186, 1100, 1079, 754, 690 cm$^{-1}$; **MS** (ESI): *m/z* 397.1 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{17}H_{19}F_6N_2O_2$ $[M+H]^+$: 397.1345; Found: 397.1347.

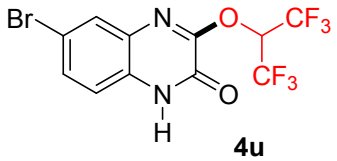
**3-((1,1,1,3,3,3-Hexafluoropropan-2-yl)oxy)quinoxalin-2(1*H*)-one (4t)**




**4t**

The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 6:1) to afford **4t** (31.2 mg, 50%) as a white solid. Mp 142-144 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ ppm 12.26 (s, 1H), 7.60 (dd, *J* = 8.0, 1.3 Hz, 1H), 7.56-7.47 (m, 1H), 7.47-7.38 (m, 1H), 7.32-7.27(m, 1H), 6.54-6.48 (m, 1H); **$^{19}$F NMR** (376 MHz, $CDCl_3$) δ ppm -72.76 (d, *J* = 6.0 Hz, 6F); **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ ppm 150.9, 150.7, 130.4, 129.3, 129.2, 127.1, 125.0, 120.7 (q, *J* = 282.8 Hz), 116.2, 68.3 (quint, *J* = 34.3 Hz); **IR** (thin film) *v* 2971, 2902, 1691, 1587, 1374, 1290, 1238, 1183, 1107, 1081, 872, 754, 466 cm$^{-1}$; **MS** (ESI): *m/z* 313.0 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{11}H_7F_6N_2O_2$ $[M+H]^+$: 313.0406; Found: 313.0406.

**6-Bromo-3-((1,1,1,3,3,3-hexafluoropropan-2-yl)oxy)quinoxalin-2(1*H*)-one (4u)**

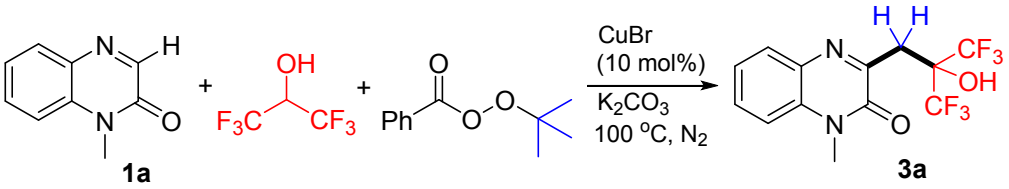



**4u**

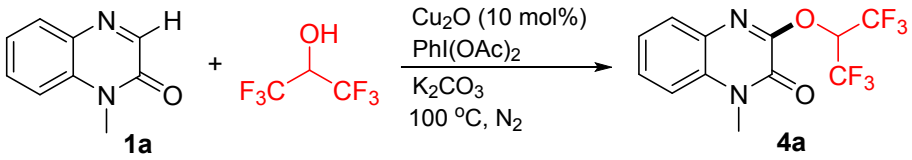
The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 6:1) to afford **4u** (32.8 mg, 42%) as a yellow solid. Mp 122-124 °C. **$^1$H NMR** (400 MHz, DMSO-$d_6$) δ ppm 12.96 (s, 1H), 7.81-7.79 (m, 1H), 7.70-7.66 (m, 1H), 7.38-7.29 (m, 1H), 7.27-7.23 (m, 1H); **$^{19}$F NMR** (376 MHz, DMSO-$d_6$) δ ppm -72.04 (d, *J* = 5.9 Hz, 6F); **$^{13}$C NMR** (101 MHz, DMSO-$d_6$) δ ppm 152.2, 149.5, 131.8, 131.3, 129.9, 129.0, 121.2 (q, *J* = 283.8 Hz), 117.7, 115.4, 68.1 (quint, *J* = 33.3

Hz); **IR** (thin film) *v* 2922, 1680, 1612, 1259, 1198, 1104, 1079, 1002, 873, 688, 518 $cm^{-1}$; **MS** (ESI): *m/z* 390.9 $[M+H]^+$; **HRMS** (ESI-TOF): *m/z* Calculated for $C_{11}H_6BrF_6N_2O_2$ $[M+H]^+$: 390.9511; Found: 390.9515.

## 5. Scale-Up Experiments



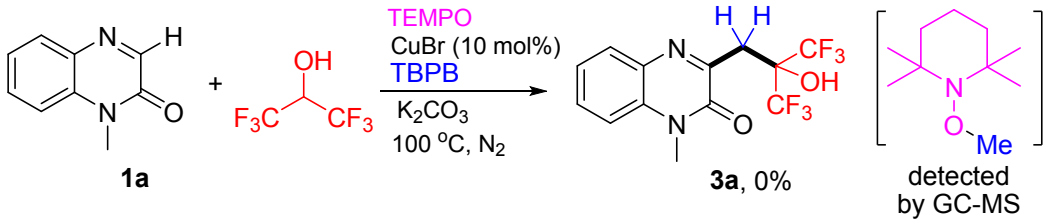

To a sealed tube equipped with a stir bar were added **1a** (160.2 mg, 1.0 mmol), CuBr (14.3 mg, 0.1 mmol), and $K_2CO_3$ (207.3 mg, 1.5 mmol). The tube was evacuated and backfilled with pure $N_2$ for three times. Then, *tert*-butyl peroxybenzoate (582.7 mg, 3.0 mmol) and hexafluoroisopropanol (15.0 mL) was added. The tube was sealed and the mixture was heated at 100 °C for 12 h. After the reaction was complete, the volatile components were removed under reduced pressure. Water was added, and the resulting mixture was extracted with EtOAc for three times. The combined organic layer was washed with brine, dried over anhydrous $Na_2SO_4$, and concentrated under reduced pressure. The resulting residue was purified by silica gel flash column chromatography (hexane/EtOAc = 10:1) to give **3a** (198.0 mg, 58%) as a yellow solid.



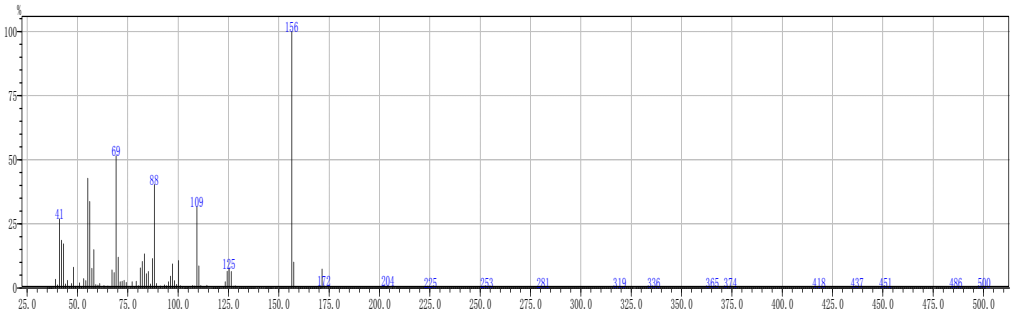

To a sealed tube equipped with a stir bar were added **1a** (160.2 mg, 1.0 mmol), $Cu_2O$ (14.3 mg, 0.1 mmol), $PhI(OAc)_2$ (966.3 mg, 3.0 mmol), and $K_2CO_3$ (207.3 mg, 1.5 mmol). The tube was evacuated and backfilled with pure $N_2$ for three times. Then hexafluoroisopropanol (15.0 mL) was added. The tube was sealed and the mixture was heated at 100 °C for 12 h. After the reaction was complete, the volatile components were removed under reduced pressure. Water was added, and the resulting mixture was extracted with EtOAc for three times. The combined organic layer was washed with brine, dried over anhydrous $Na_2SO_4$, and concentrated under reduced pressure. The resulting residue was purified by silica gel flash column chromatography (hexane/EtOAc = 10:1) to give **4a** (198.3 mg, 61%) as a white solid.

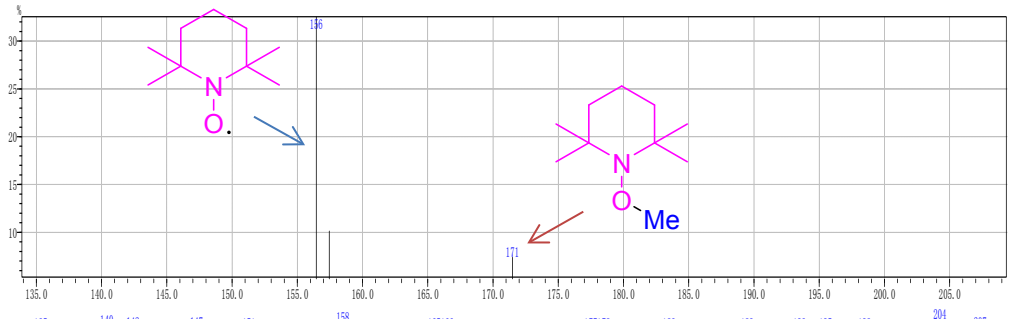
## 6. Control Experiments

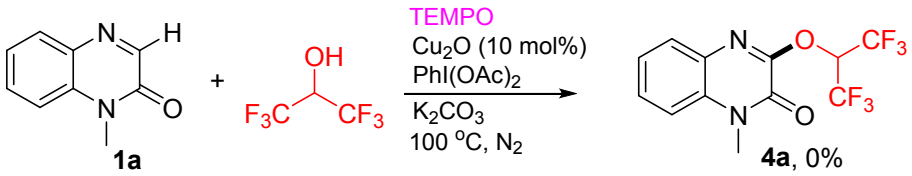
### Radical Inhibition Experiments




To a sealed tube equipped with a stir bar were added **1a** (16.0 mg, 0.1 mmol), CuBr (1.4 mg, 0.01 mmol), $K_2CO_3$ (20.7 mg, 0.15 mmol) and 2,2,6,6-tetramethylpiperidine-1-oxyl (TEMPO, 46.9 mg, 0.3 mmol). The tube was evacuated and backfilled with pure $N_2$ for three times. Then *tert*-butyl peroxybenzoate (58.3 mg, 0.3 mmol) and hexafluoroisopropanol (1.5 mL) was added. The tube was sealed and the mixture was heated at 100 °C for 12 h. The internal standard $PhCF_3$ (12.3 μL, 0.1 mmol) was added, and the solution was analyzed by $^{19}F$ NMR spectroscopy. The $^{19}F$ NMR spectroscopy indicated that the desired product **3a** was completely inhibited in the presence of TEMPO. Furthermore, the GC-MS of the reaction mixture indicated the formation of TEMPO-Me adduct.

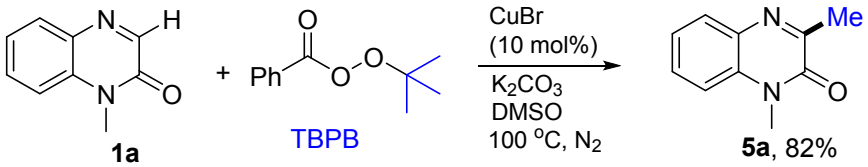






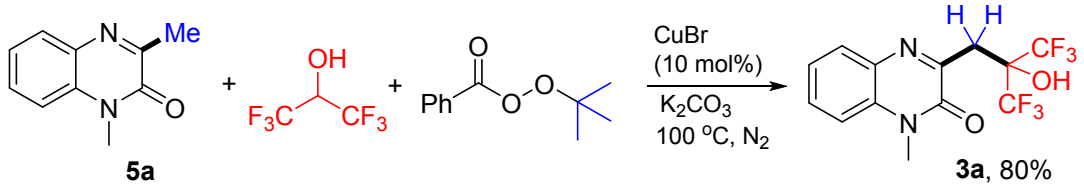

To a sealed tube equipped with a stir bar were added **1a** (16.0 mg, 0.1 mmol), $Cu_2O$ (1.4 mg, 0.01 mmol), $PhI(OAc)_2$ (96.6 mg, 0.3 mmol), TEMPO (46.9 mg, 0.3 mmol) and $K_2CO_3$ (20.7 mg, 0.15 mmol). The tube was evacuated and backfilled with pure $N_2$ for three times. Then hexafluoroisopropanol (1.5 mL) was added. The tube was sealed and the mixture was heated at 100 °C for 12 h. The internal standard $PhCF_3$ (12.3 μL, 0.1 mmol, 1.0 equiv) was added, and the solution was analyzed by $^{19}F$ NMR spectroscopy. The $^{19}F$ NMR spectroscopy indicated that the desired product **4a** was completely inhibited in the presence of TEMPO.

**Formation of 5a**




To a sealed tube equipped with a stir bar were added **1a** (48.1 mg, 0.3 mmol), CuBr (4.3 mg, 0.03 mmol), and $K_2CO_3$ (62.2 mg, 0.45 mmol). The tube was evacuated and backfilled with pure $N_2$ for three times. Then *tert*-butyl peroxybenzoate (174.6 mg, 0.9 mmol) and DMSO (2.0 mL) was added. The tube was sealed and the mixture was heated at 100 °C for 12 h. After the reaction was complete, water was added, and the resulting mixture was extracted with EtOAc for three times. The combined organic layer was washed with brine, dried over anhydrous $Na_2SO_4$, and concentrated under reduced pressure. The product mixture was purified by silica gel column chromatography (hexane/EtOAc = 5:1) to afford **5a** (42.8 mg, 82%) as a yellow solid. **$^1$H NMR** (600 MHz, $CDCl_3$) δ ppm 7.75 (d, $J$ = 6.7 Hz, 1H), 7.48 (s, 1H), 7.37-7.21 (m, 2H), 3.65 (s, 3H), 2.56 (s, 3H); **$^{13}$C NMR** (151 MHz, $CDCl_3$) δ ppm 158.3, 155.1, 133.2, 132.6, 129.5, 129.3, 123.6, 113.6, 29.0, 21.6. These assignments matched with those previously reported in the literature[4].

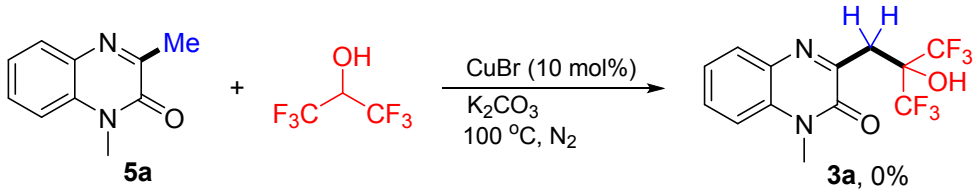
**Reaction of 5a with HFIP and TBPB**




**5a** **3a**, 80%

To a sealed tube equipped with a stir bar were added **5a** (34.8 mg, 0.2 mmol), CuBr (2.8 mg, 0.02 mmol), and $K_2CO_3$ (41.4 mg, 0.3 mmol). The tube was evacuated and backfilled with pure $N_2$ for three times. Then *tert*-butyl peroxybenzoate (116.5 mg, 0.6 mmol) and hexafluoroisopropanol (3.0 mL) was added. The tube was sealed and the mixture was heated at 100 °C for 12 h. After the reaction was complete, water was added, and the resulting mixture was extracted with EtOAc for three times. The combined organic layer was washed with brine, dried over anhydrous $Na_2SO_4$, and concentrated under reduced pressure. The resulting residue was purified by silica gel flash column chromatography (hexane/EtOAc = 10:1) to give **3a** (54.6 mg, 80%) as a yellow solid.

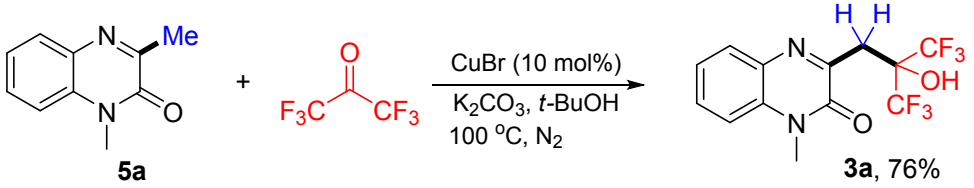
**Reaction of 5a with HFIP**




**5a** **3a**, 0%

To a sealed tube equipped with a stir bar were added **5a** (34.8 mg, 0.2 mmol), CuBr (2.8 mg, 0.02 mmol), and $K_2CO_3$ (41.4 mg, 0.3 mmol). The tube was evacuated and backfilled with pure $N_2$ for three times. Then hexafluoroisopropanol (3.0 mL) was added. The tube was sealed and the mixture was heated at 100 °C for 12 h. Thin-layer chromatography (TLC) of the reaction mixture indicated that most of **5a** was not converted, and none of **3a** could be detected by $^{19}F$ NMR spectroscopy.

**Reaction of 5a with hexafluoroacetone**

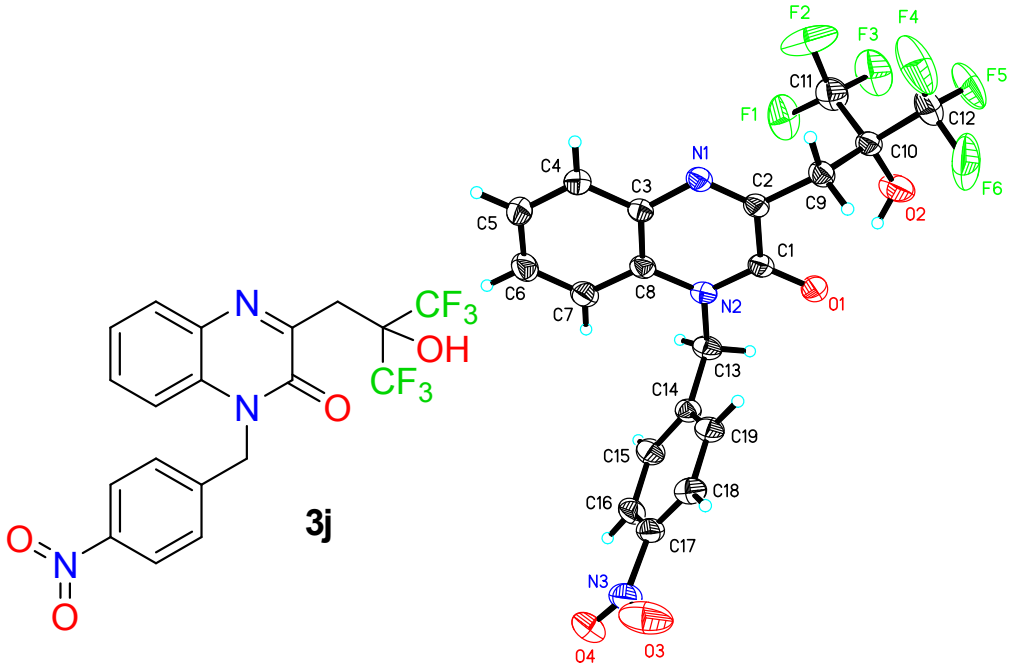



**5a** **3a**, 76%

To a sealed tube equipped with a stir bar were added **5a** (34.8 mg, 0.2 mmol), CuBr (2.8 mg, 0.02 mmol), and $K_2CO_3$ (41.4 mg, 0.3 mmol). The tube was evacuated and 2-methylpropan-2-ol (2.0 mL) was added followed by the addition of hexafluoroacetone gas (prepared from hexafluoroacetone trihydrate through dehydration with conc. $H_2SO_4$). The tube was sealed and the mixture was heated at 100 $^oC$ for 12 h. After the reaction was complete, water was added, and the resulting mixture was extracted with EtOAc for three times. The combined organic layer was washed with brine, dried over anhydrous $Na_2SO_4$, and concentrated under reduced pressure. The resulting residue was purified by silica gel flash column chromatography (hexane/EtOAc = 10:1) to give **3a** (51.7 mg, 76%) as a yellow solid.

## 7. ORTEP Drawing of the X-Ray Crystallographic Structure of Product 3j

The crystals were obtained from a solution of EtOAc and hexane upon slow volatilization. The X-ray intensity data were measured at 293(2) K, on a Rigaku AFC7R diffractometer.




The crystal structure has been deposited at the Cambridge Crystallographic Date Center and allocated the deposition number CCDC 2019594. The thermal ellipsoids are shown at the 30% probability level. This data can be obtained free of charge from the Cambridge Crystallographic Date Center via www.ccdc.cam.ac.uk/data_request/cif

# Crystal data and structure refinement for 3j

| | | |
|---|---|---|
| Identification code | **3j** | |
| Empirical formula | C19 H13 F6 N3 O4 | |
| Formula weight | 461.32 | |
| Temperature | 293(2) K | |
| Wavelength | 0.71073 Å | |
| Crystal system | Monoclinic | |
| Space group | P 21/n | |
| Unit cell dimensions | a = 10.5749(4) Å | α= 90°. |
| | b = 11.9556(4) Å | β= 94.2020(10)°. |
| | c = 15.5244(6) Å | γ = 90°. |
| Volume | 1957.46(12) $Å^3$ | |
| Z | 4 | |
| Density (calculated) | 1.565 $Mg/m^3$ | |
| Absorption coefficient | 0.148 $mm^{-1}$ | |
| F(000) | 936 | |
| Crystal size | 0.200 x 0.150 x 0.130 $mm^3$ | |
| Theta range for data collection | 2.575 to 25.498°. | |
| Index ranges | -12<=h<=12, -14<=k<=14, -18<=l<=18 | |
| Reflections collected | 28477 | |
| Independent reflections | 3625 [R(int) = 0.0385] | |
| Completeness to theta = 25.242° | 99.2 % | |
| Absorption correction | Semi-empirical from equivalents | |
| Max. and min. transmission | 0.7456 and 0.6586 | |
| Refinement method | Full-matrix least-squares on $F^2$ | |
| Data / restraints / parameters | 3625 / 1 / 345 | |
| Goodness-of-fit on $F^2$ | 1.056 | |
| Final R indices [I>2sigma(I)] | R1 = 0.0427, wR2 = 0.1047 | |
| R indices (all data) | R1 = 0.0549, wR2 = 0.1158 | |
| Extinction coefficient | 0.037(4) | |
| Largest diff. peak and hole | 0.289 and -0.169 $e.Å^{-3}$ | |

## 8. **References**

(1) S. Liu, Y. Huang, F.-L. Qing and X.-H. Xu, *Org. Lett.*, 2018, **20**, 5497.

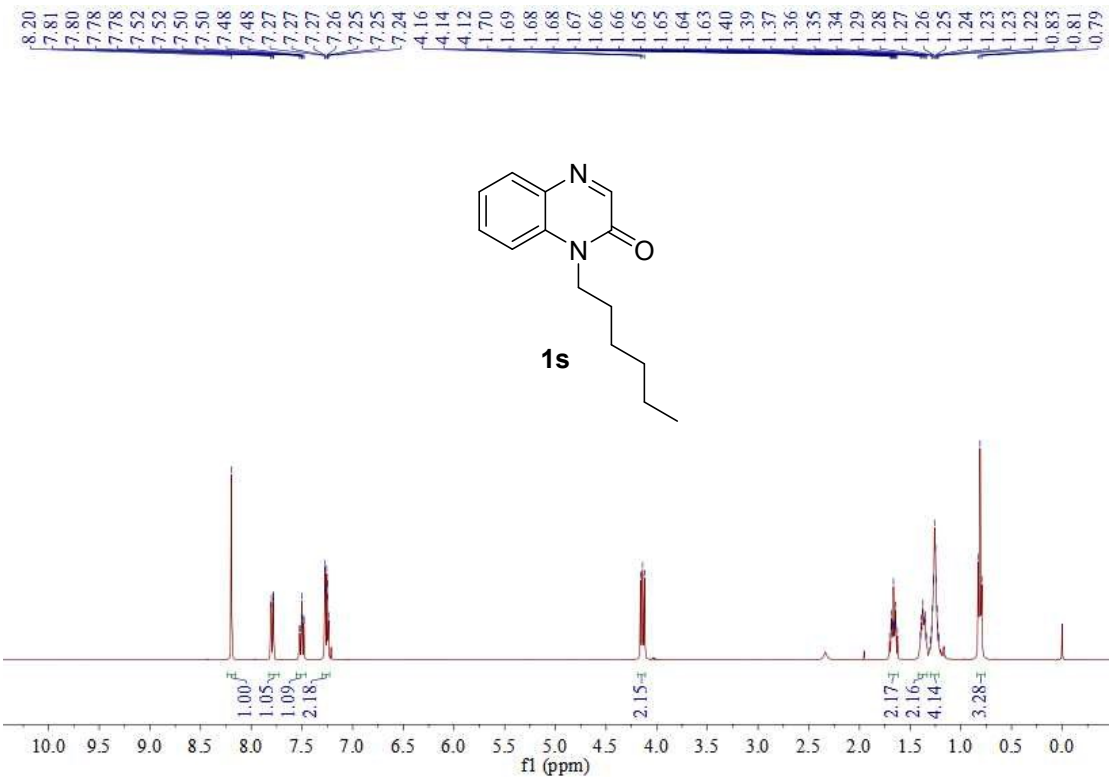
(2) J. Xu, H. Yang, H. Cai, H. Bao, W. Li and P. Zhan, *Org. Lett.*, 2019, **21**, 4698.

(3) J. Wang, B. Sun, L. Zhang, T. Xu, Y. Xie and C. Jin, *Org. Chem. Front.*, 2020, **7**, 113.

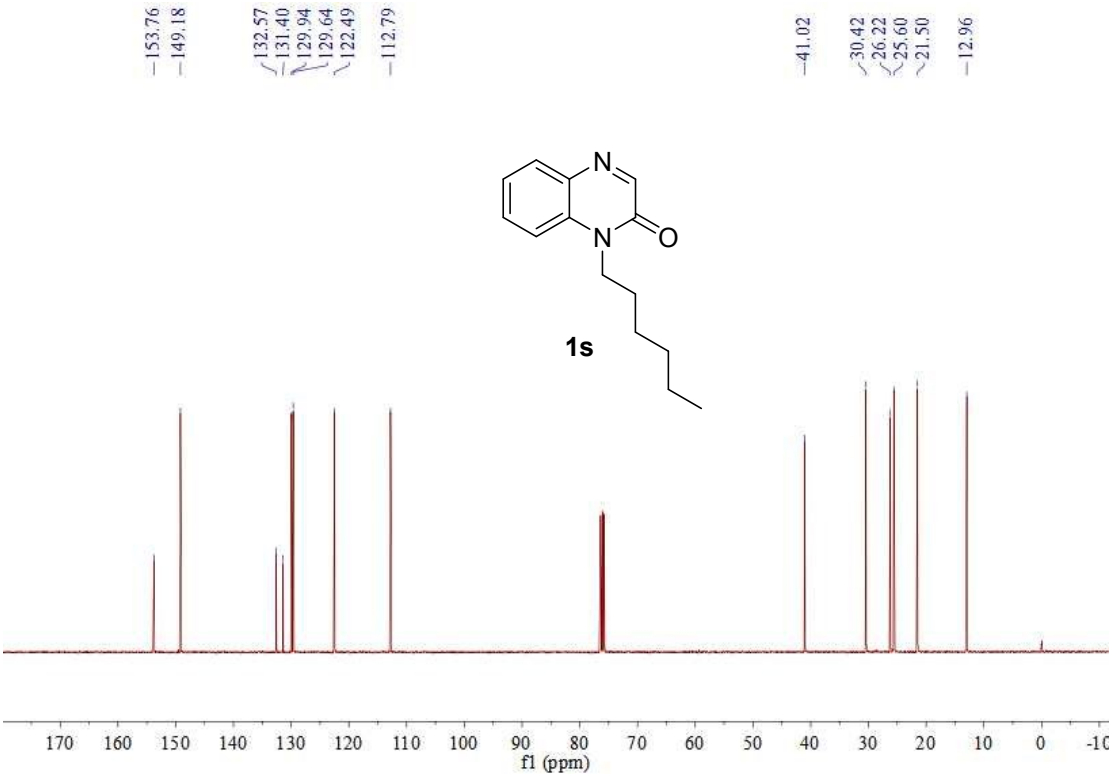
(4) S. Jin, H. Yao, S. Lin, X. You, Y. Yang and Z. Yan, *Org. Biomol. Chem.*, 2020, **18**, 205.

## 9. Copies of $^{1}H$, $^{19}F$, and $^{13}C$ NMR Spectra for the Products

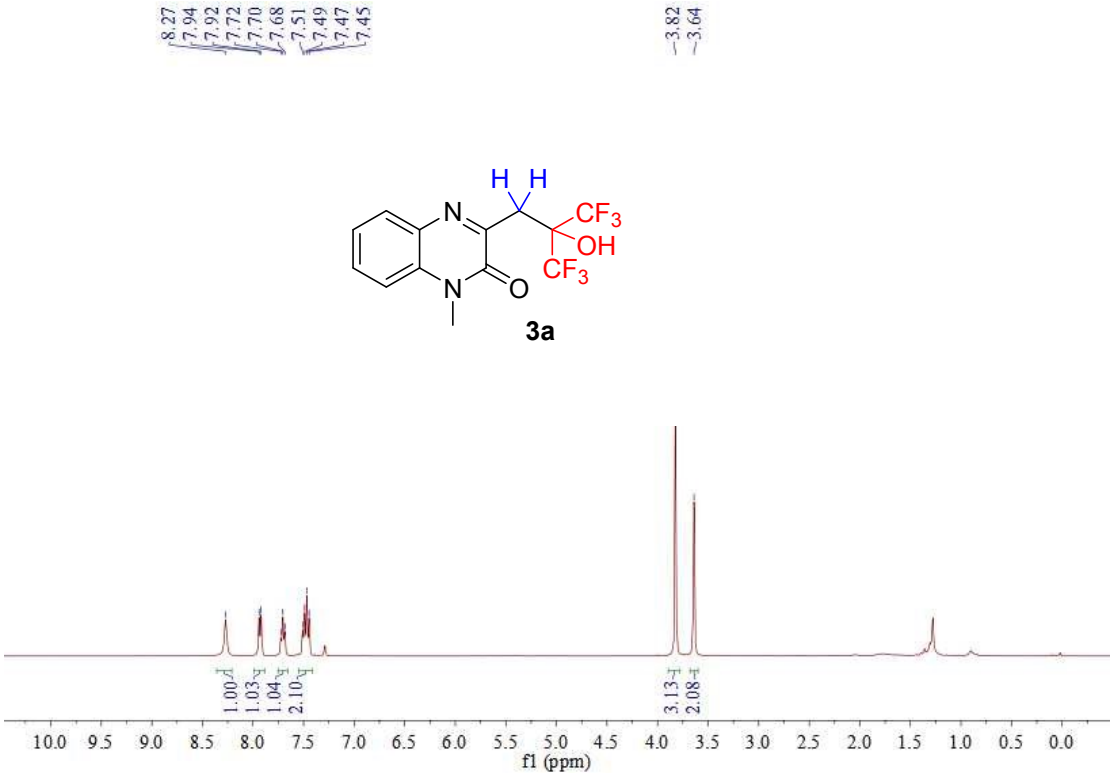
*$^{1}H$ NMR (400 MHz, $CDCl_3$)*



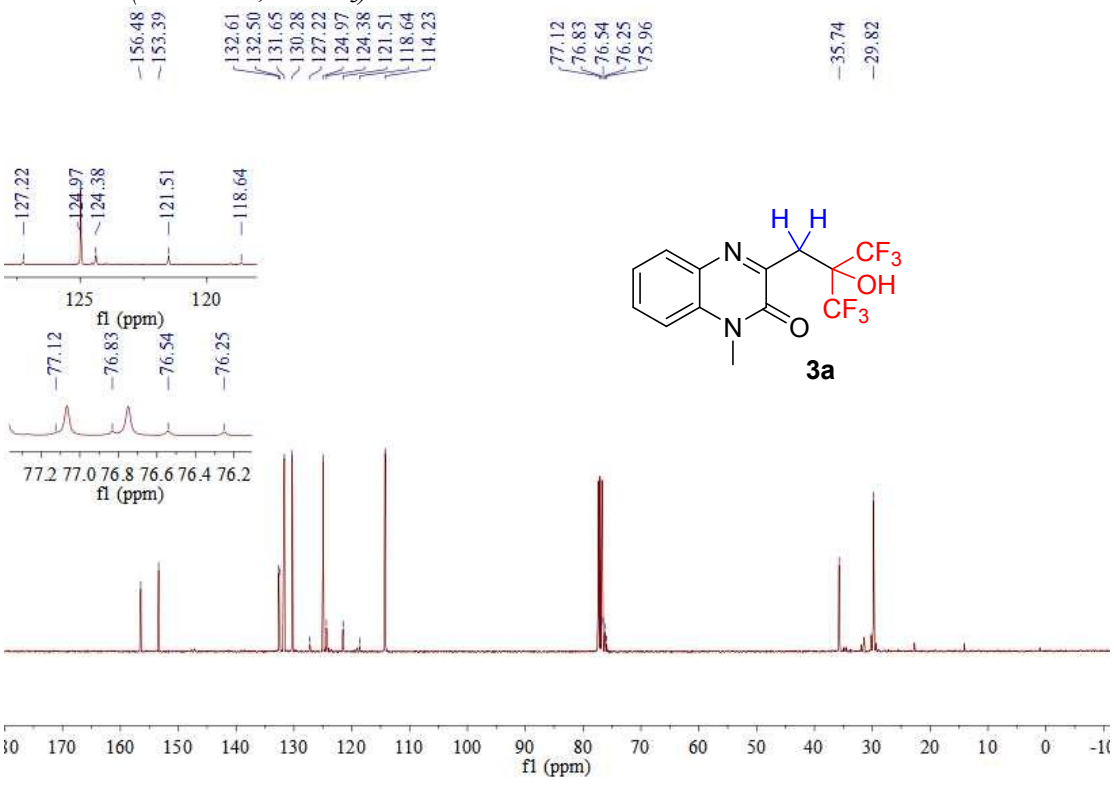

*$^{13}C$ NMR (101 MHz, $CDCl_3$)*



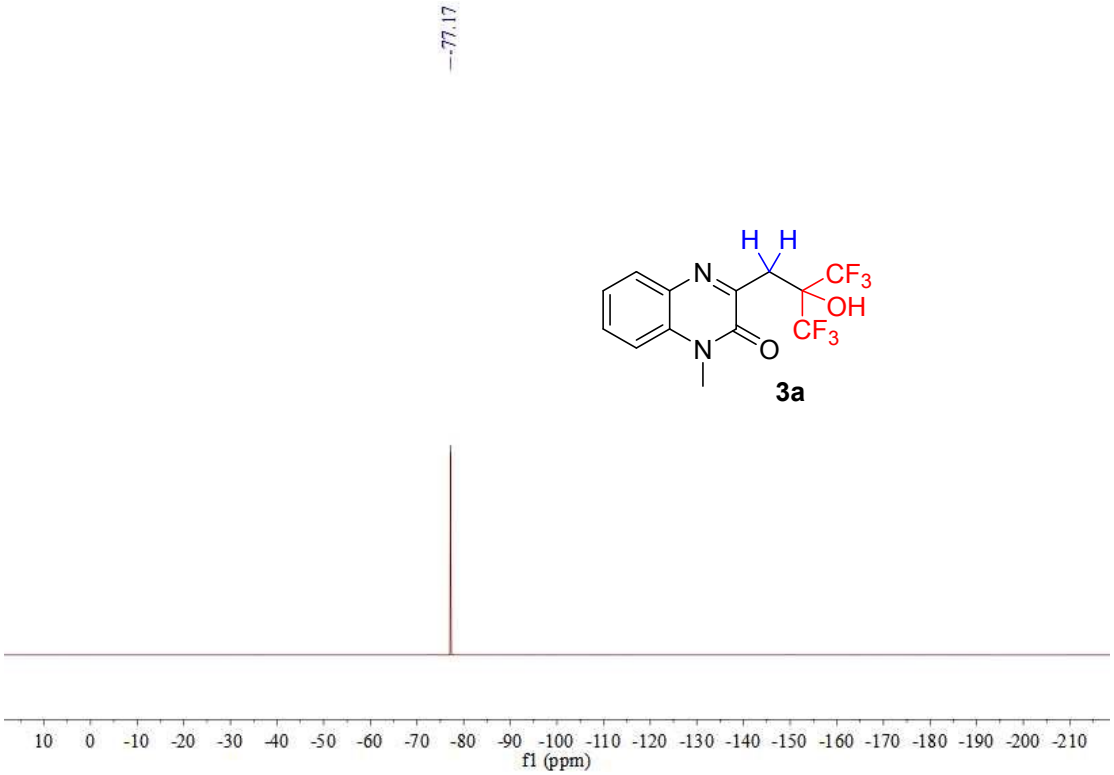
*$^{1}H$ NMR (400 MHz, $CDCl_3$)*



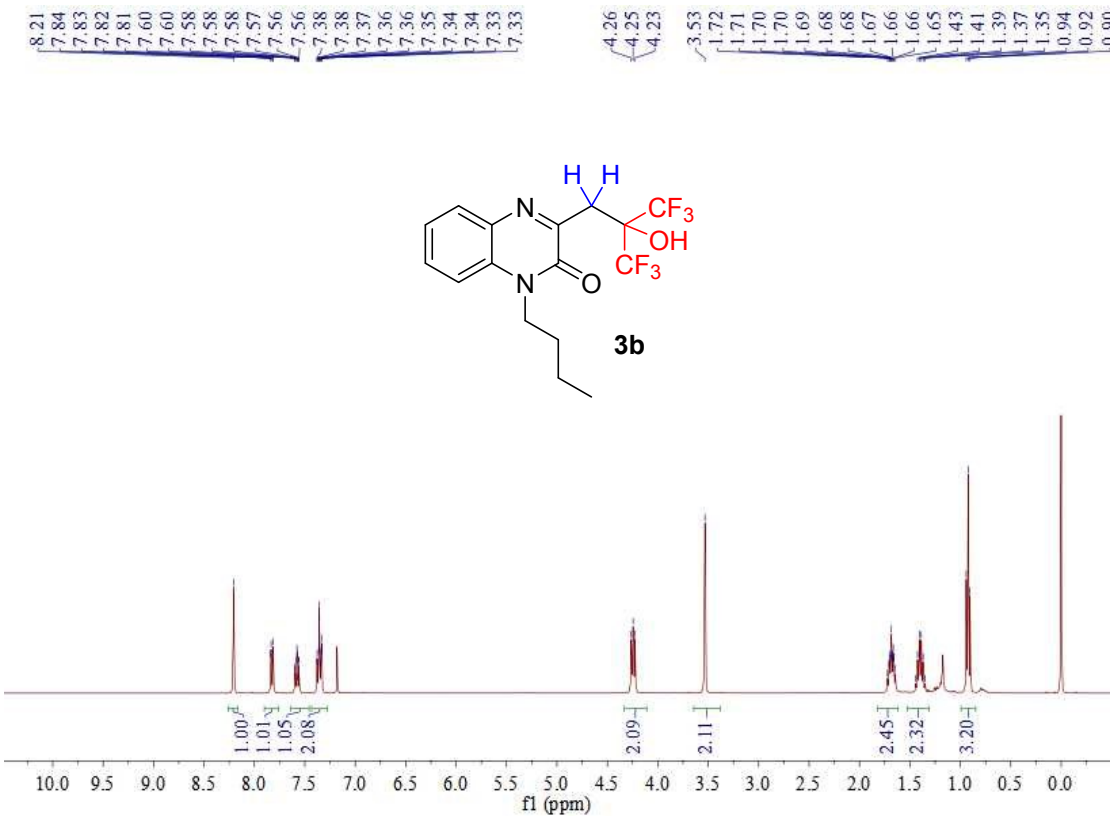

*$^{13}C$ NMR (101 MHz, $CDCl_3$)*



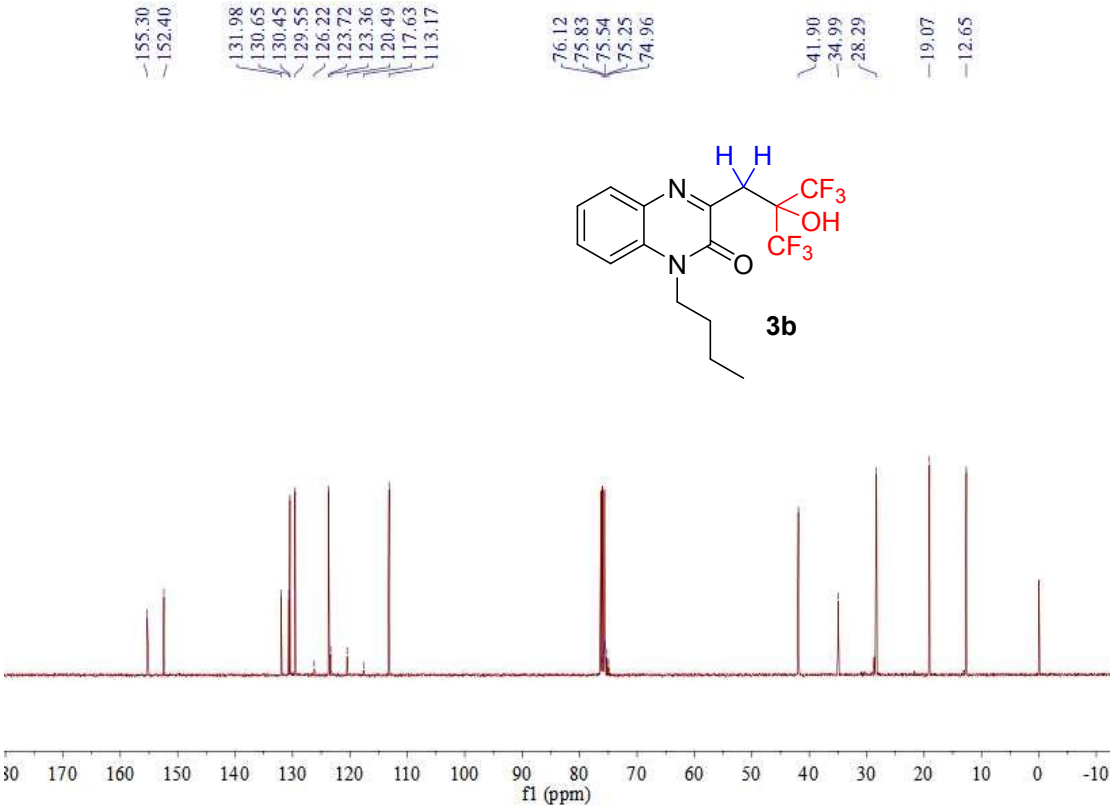
*$^{19}F$ NMR (376 MHz, $CDCl_3$)*



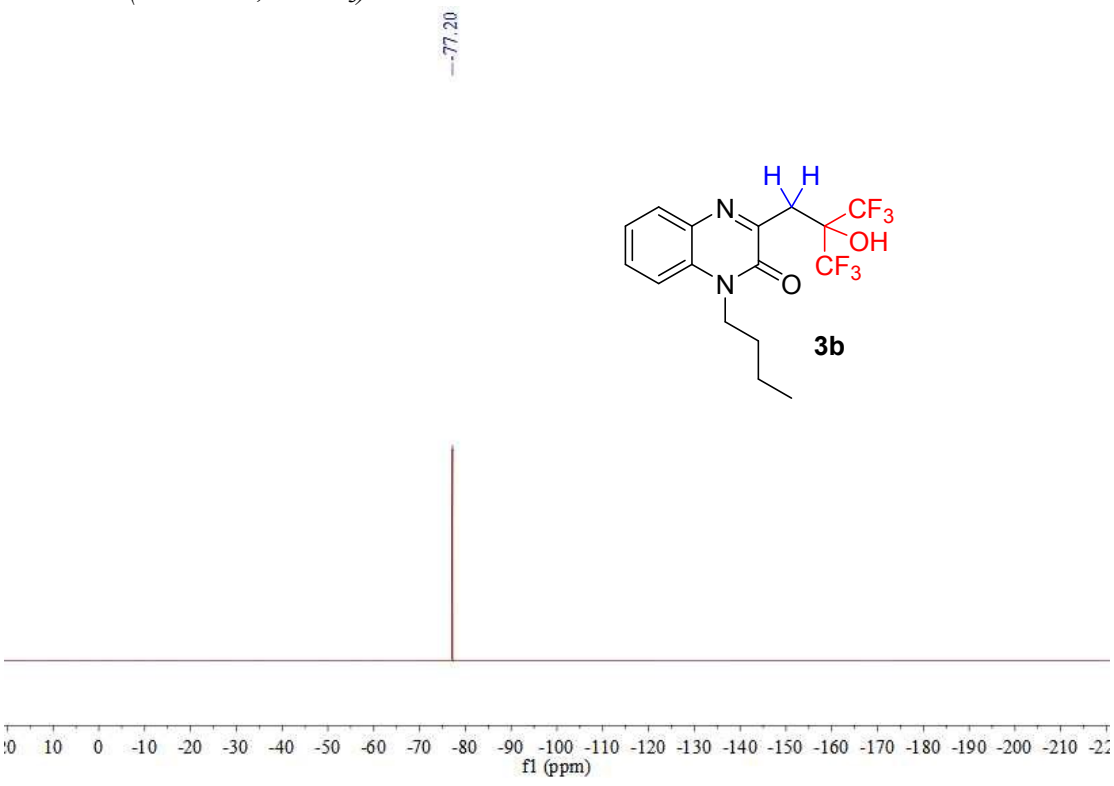

*$^{1}H$ NMR (400 MHz, $CDCl_3$)*



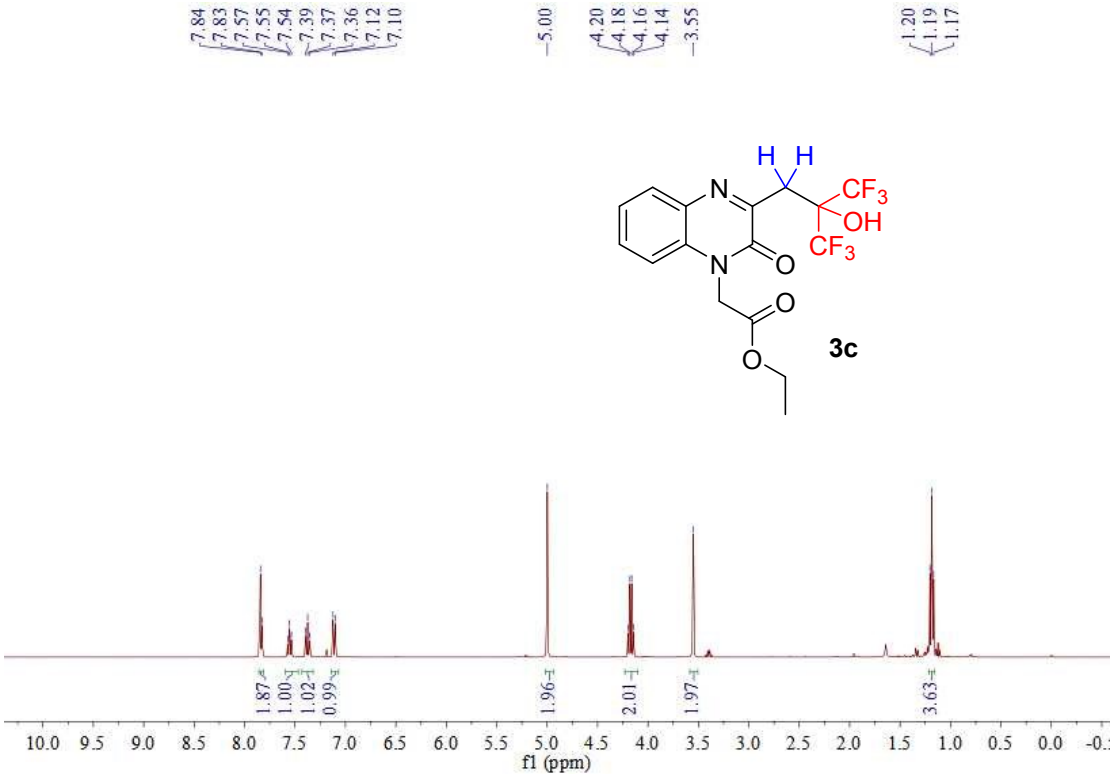
*$^{13}C$ NMR (101 MHz, $CDCl_3$)*



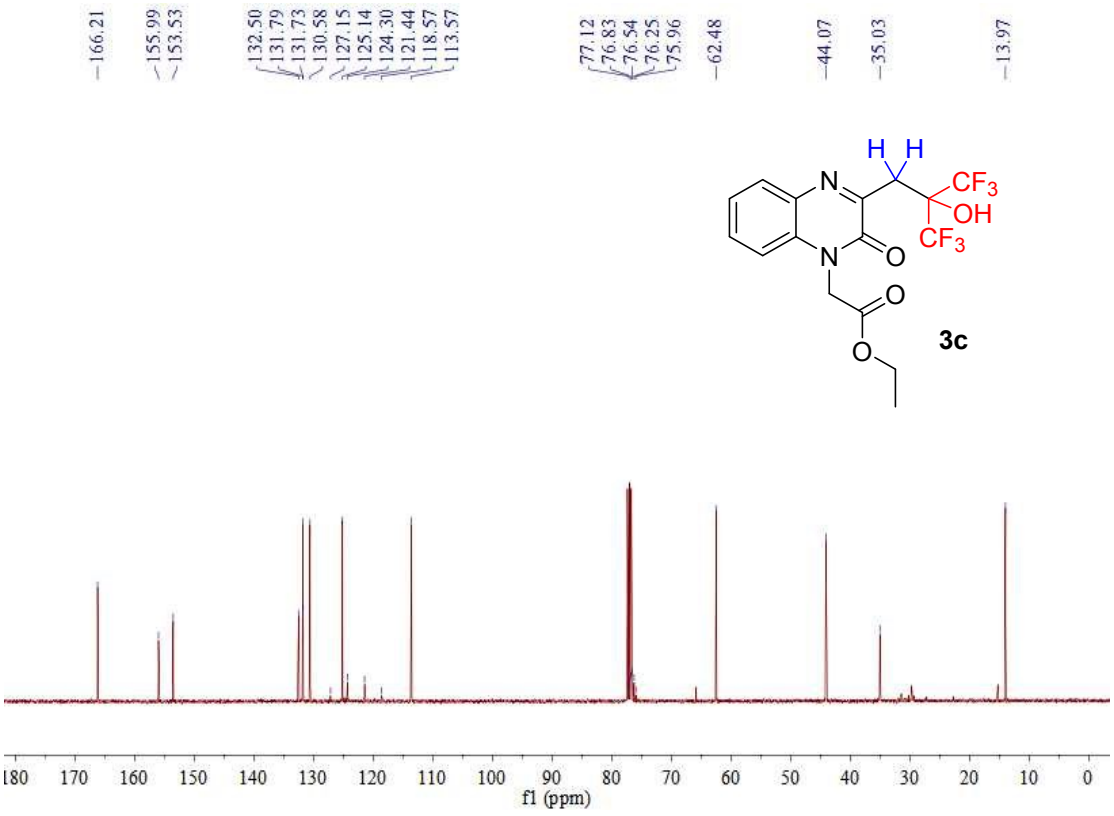

*$^{19}F$ NMR (377 MHz, $CDCl_3$)*



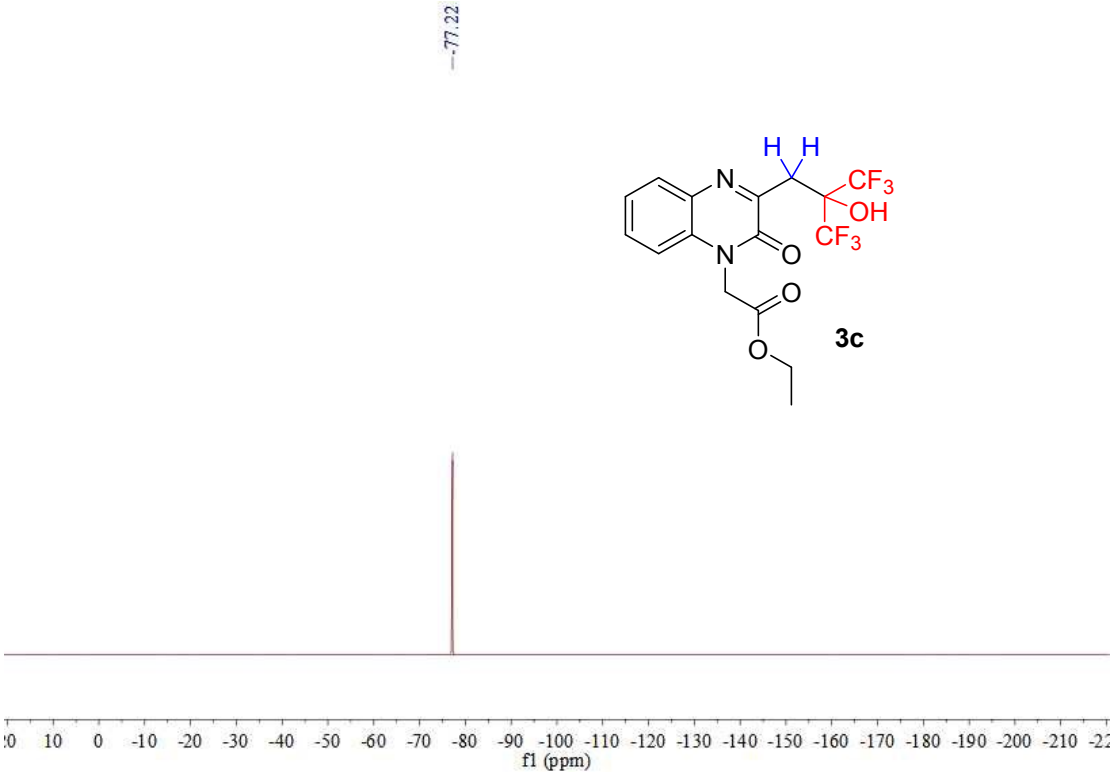
*$^{1}H$ NMR (400 MHz, $CDCl_3$)*




*$^{13}C$ NMR (101 MHz, $CDCl_3$)*



*$^{19}F$ NMR (376 MHz, $CDCl_3$)*

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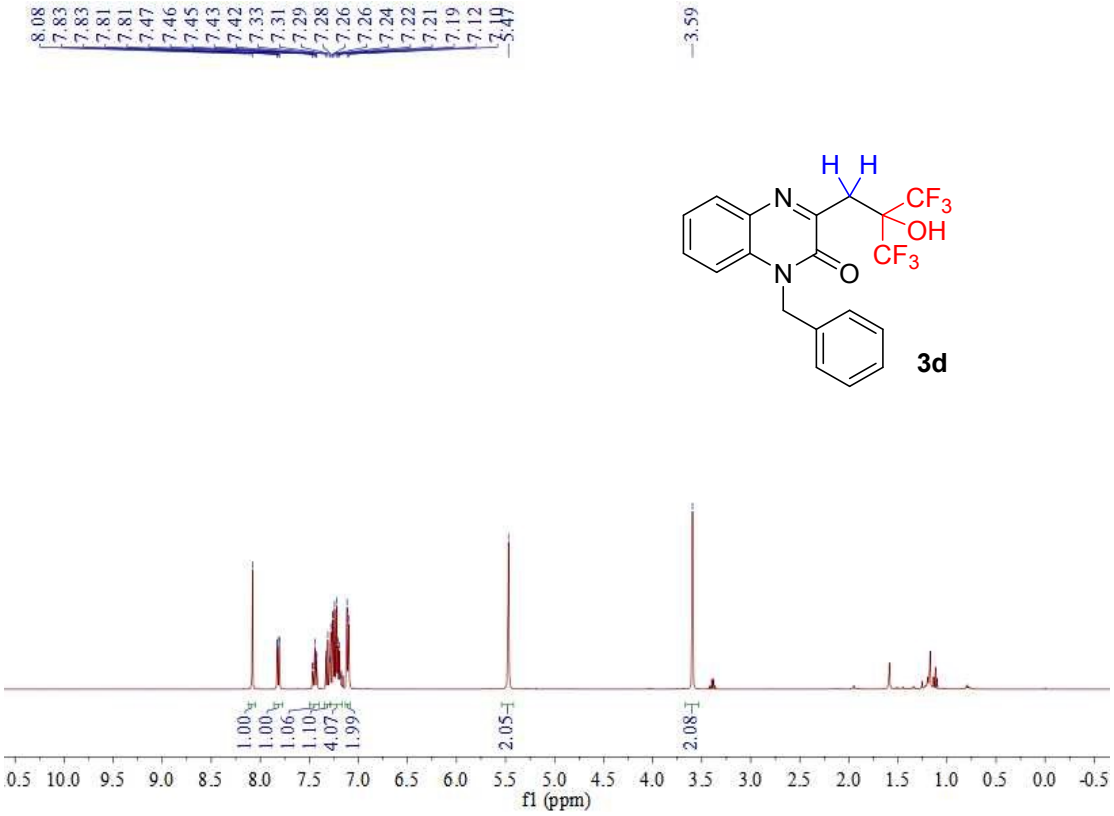

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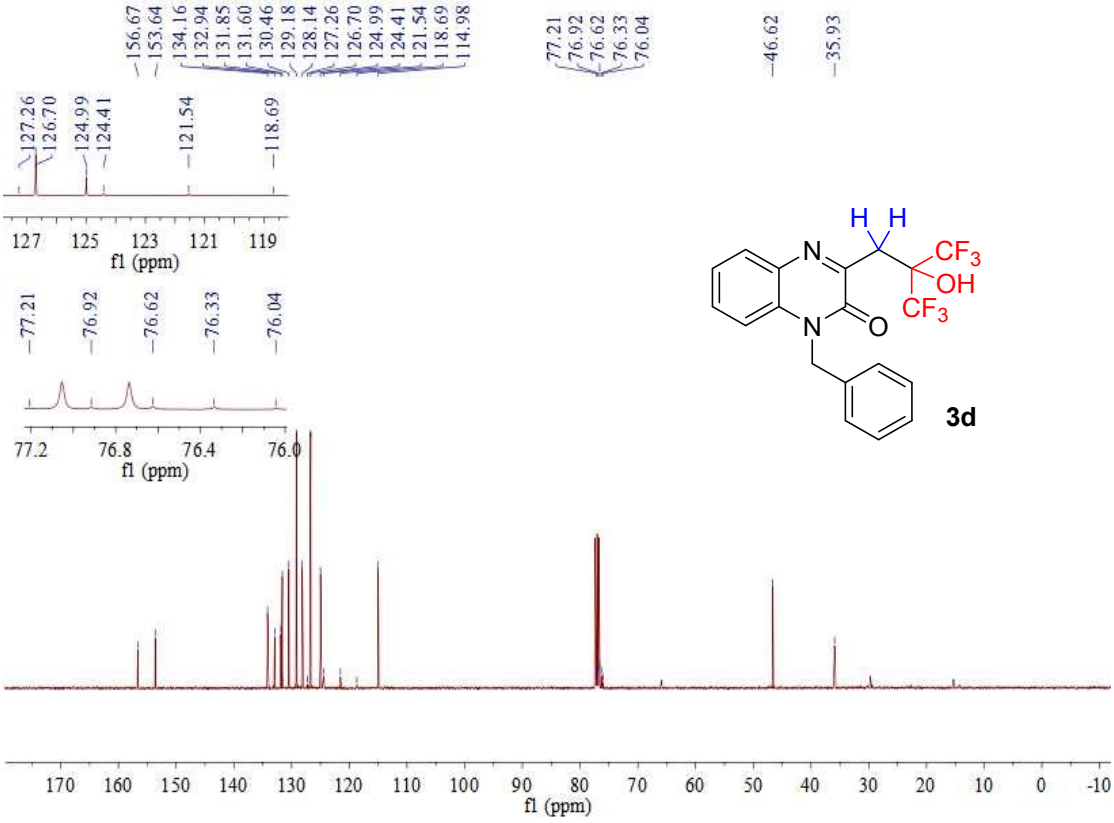


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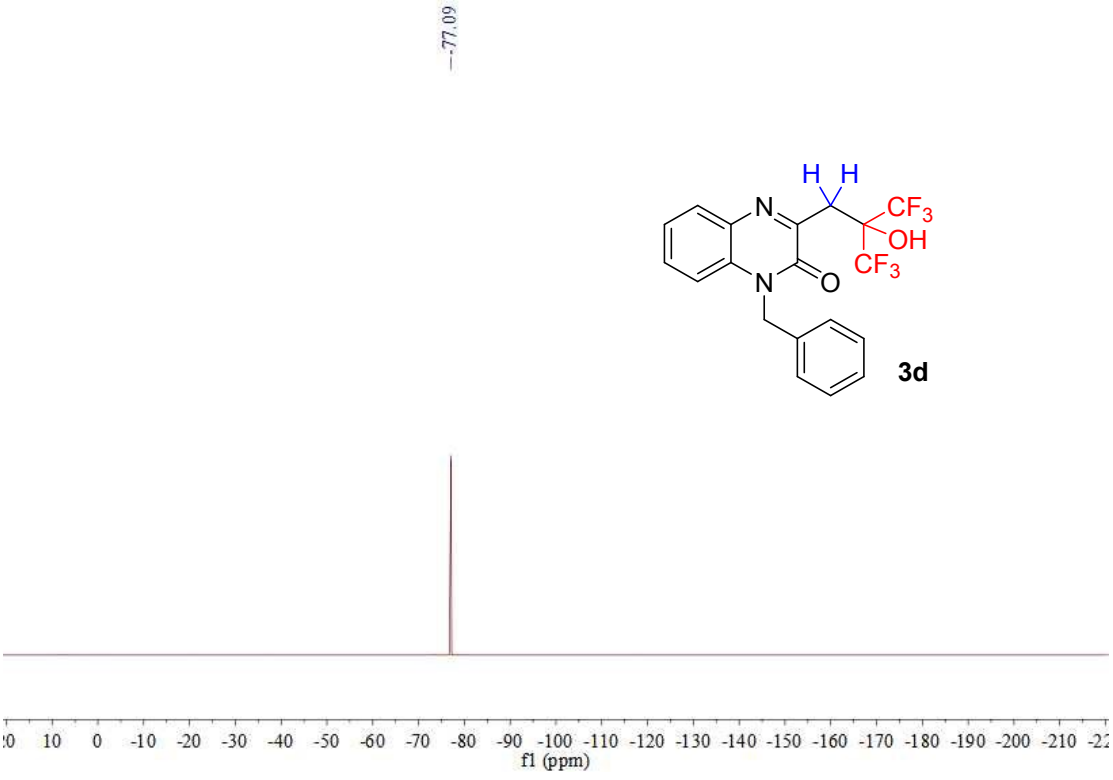

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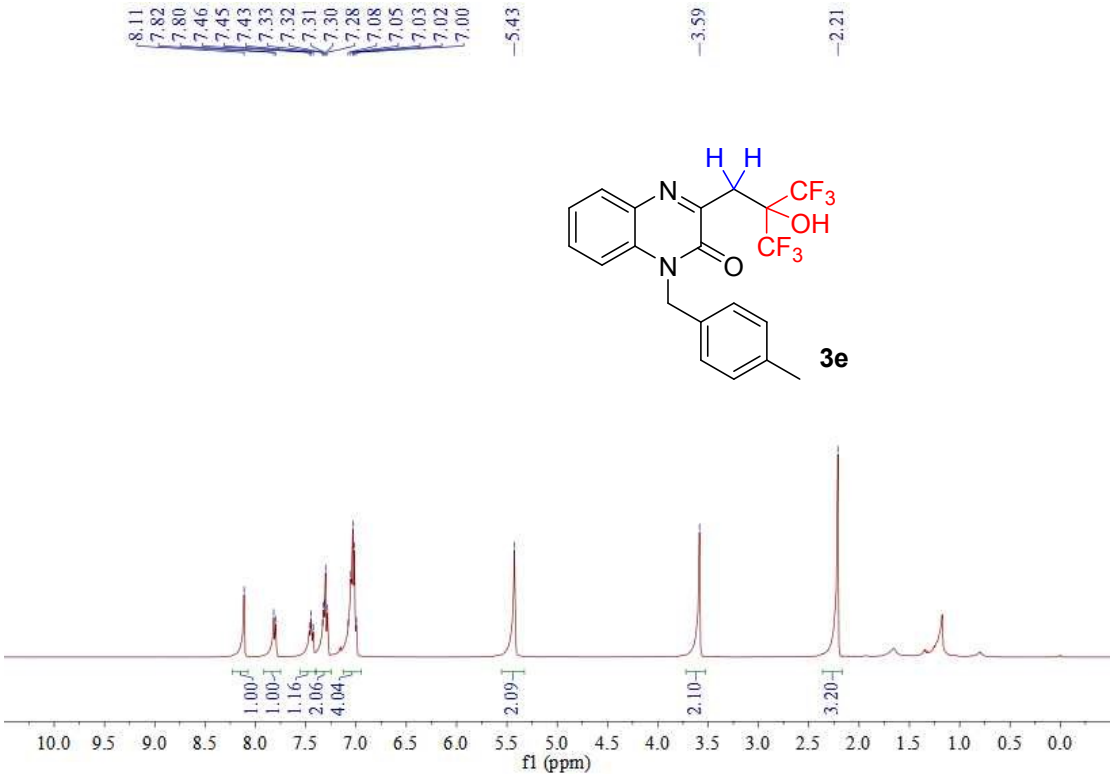
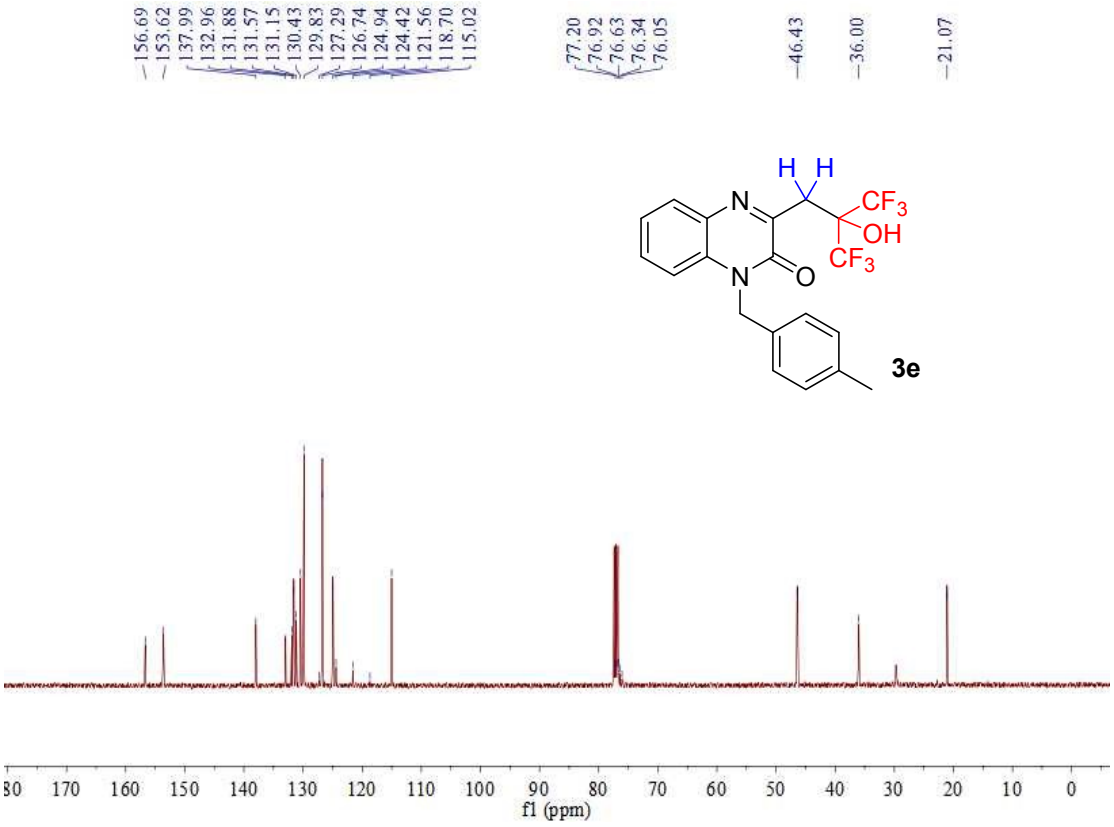
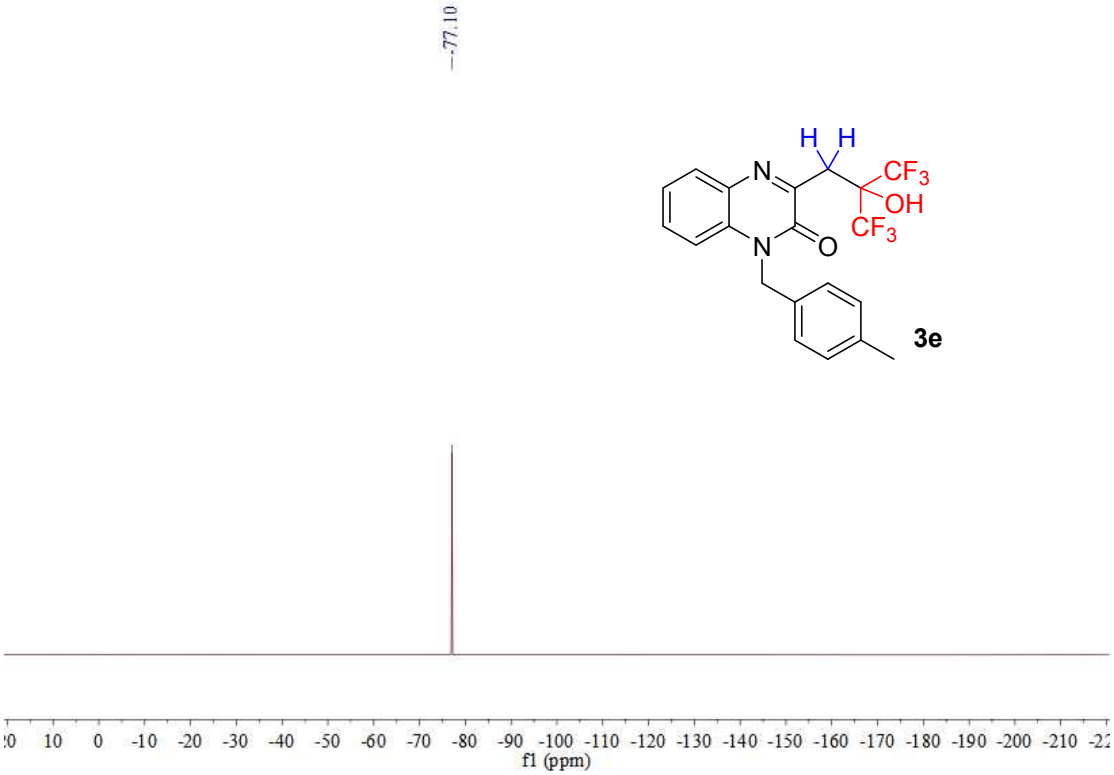



*$^{13}C$ NMR (101 MHz, $CDCl_3$)*



*$^{19}F$ NMR (376 MHz, $CDCl_3$)*

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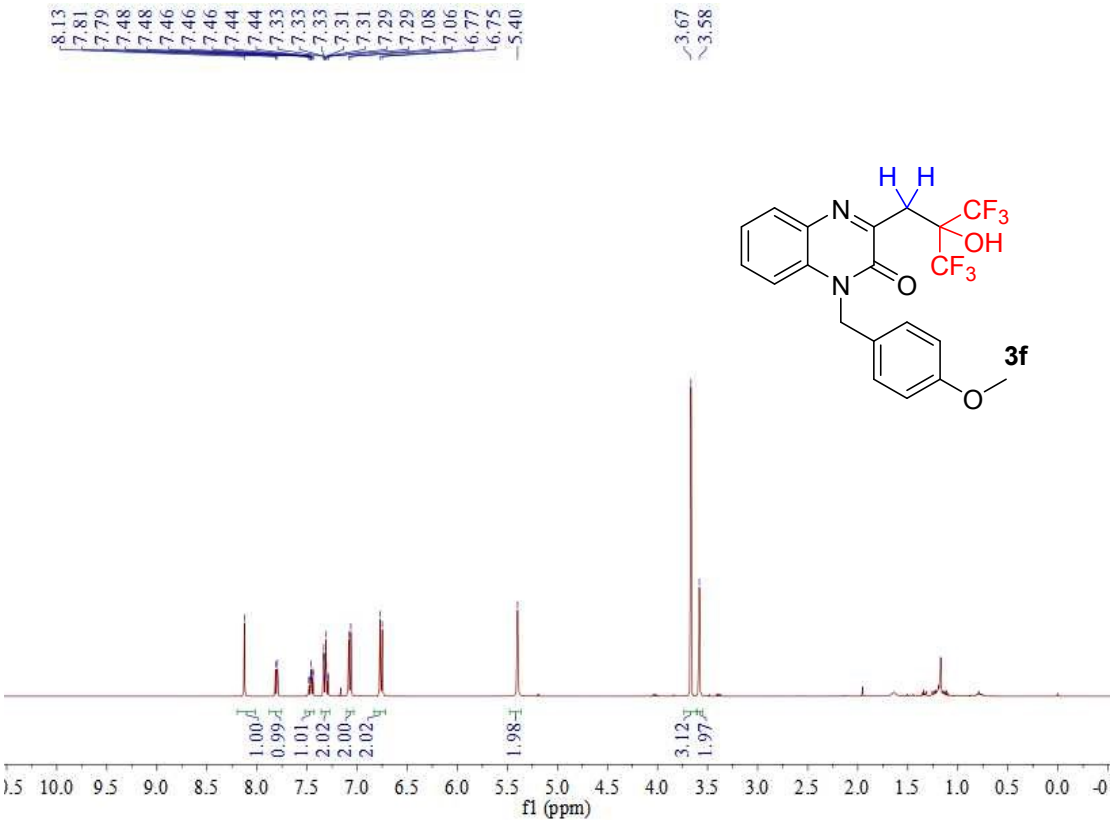
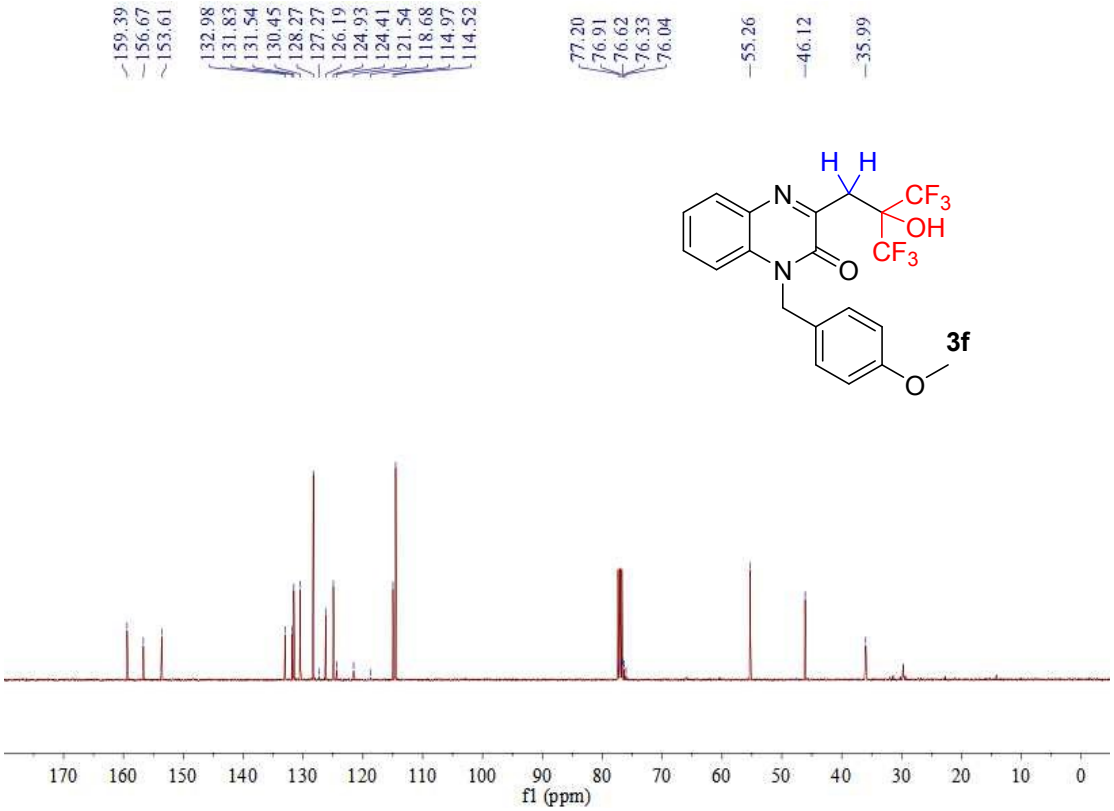
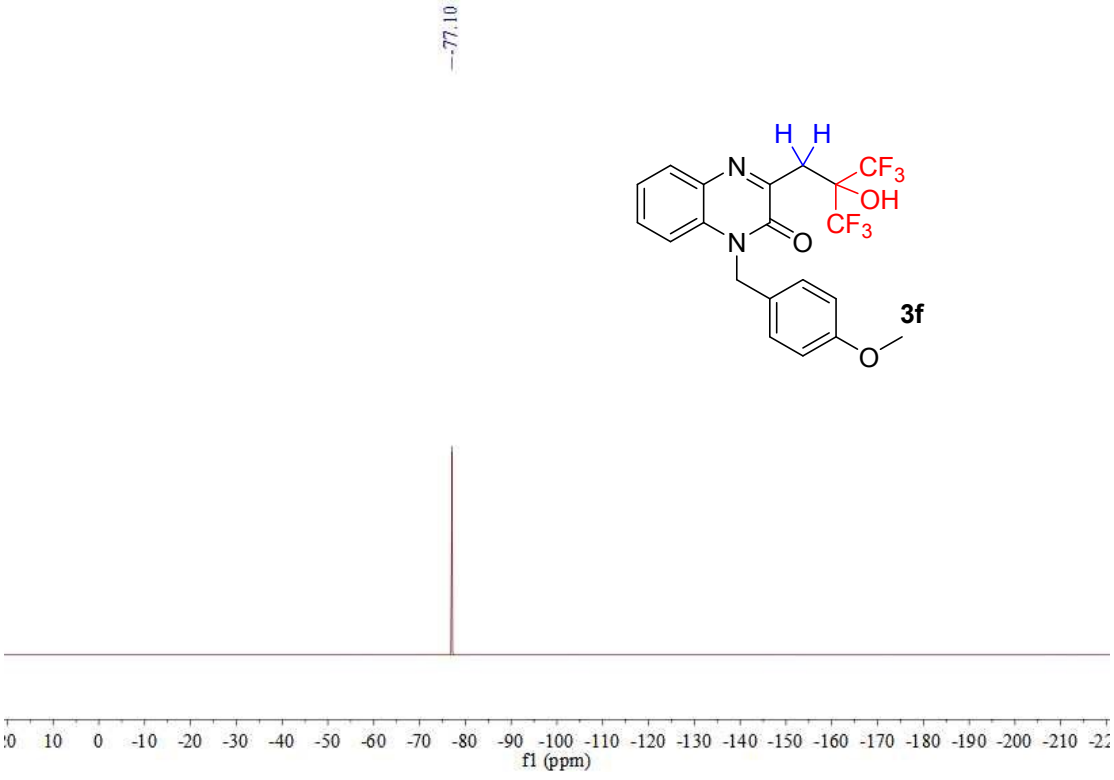


*$^{13}C$ NMR (101 MHz, $CDCl_3$)*




*$^{19}F$ NMR (376 MHz, $CDCl_3$)*



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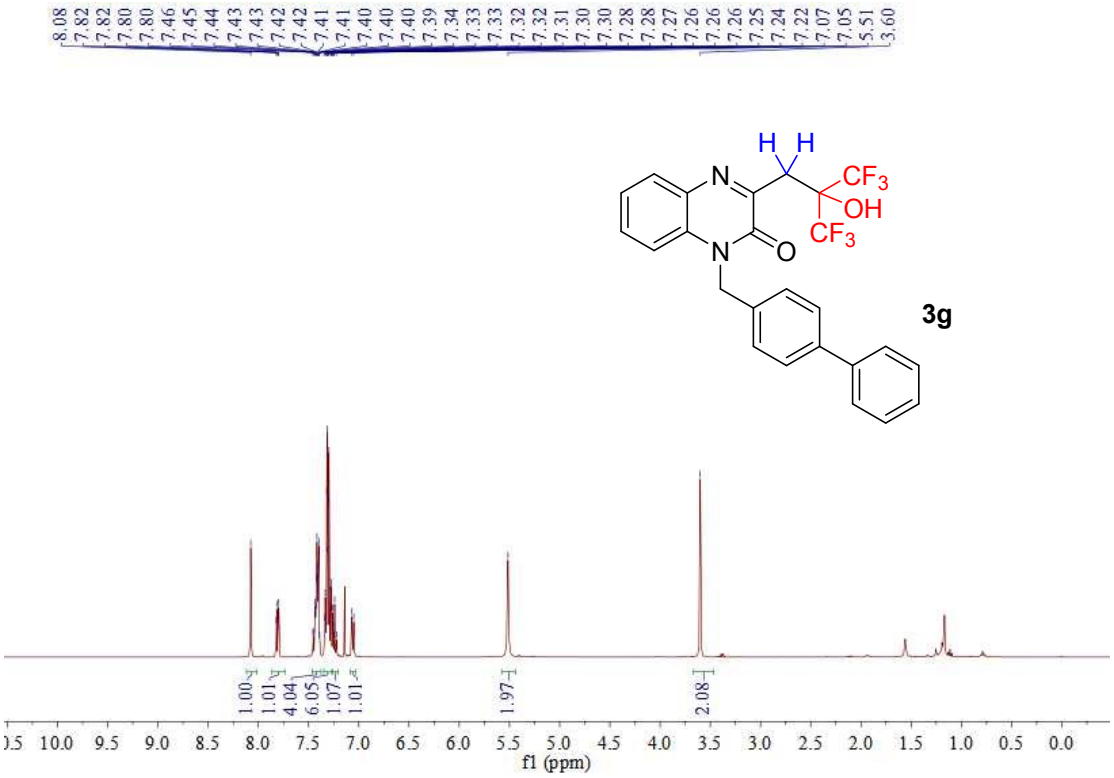
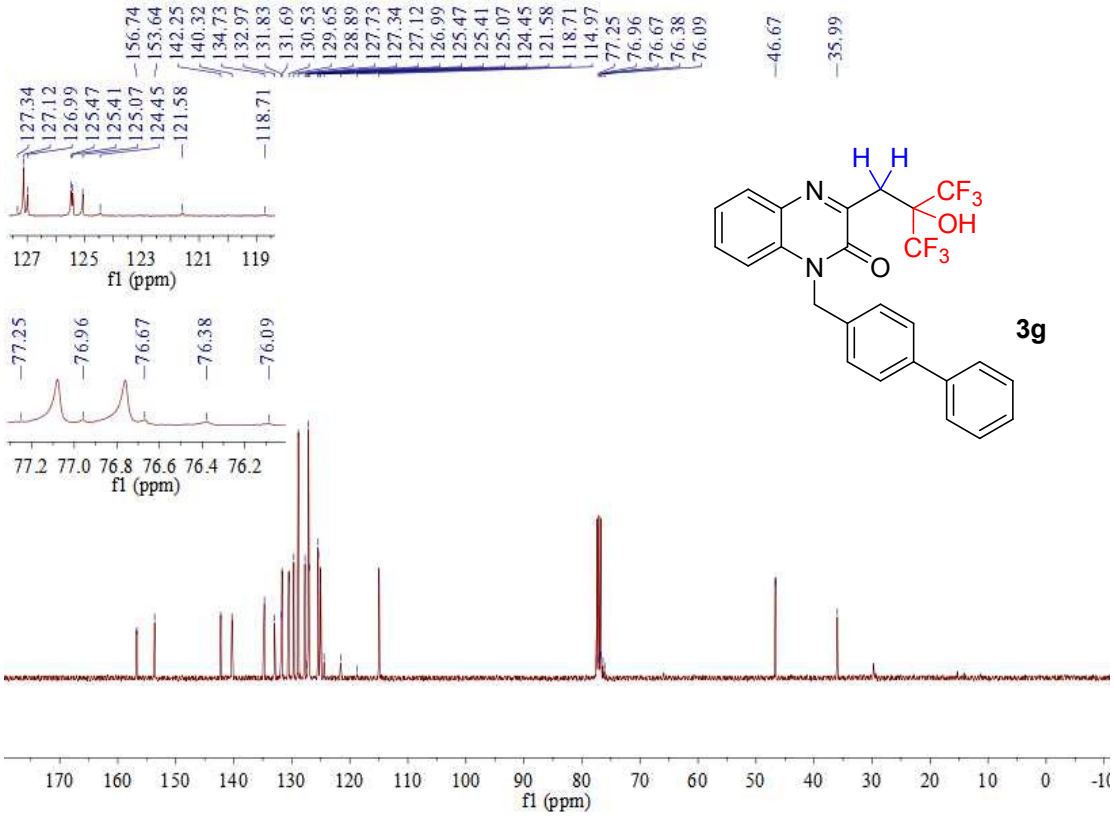



*$^{13}C$ NMR (101 MHz, $CDCl_3$)*



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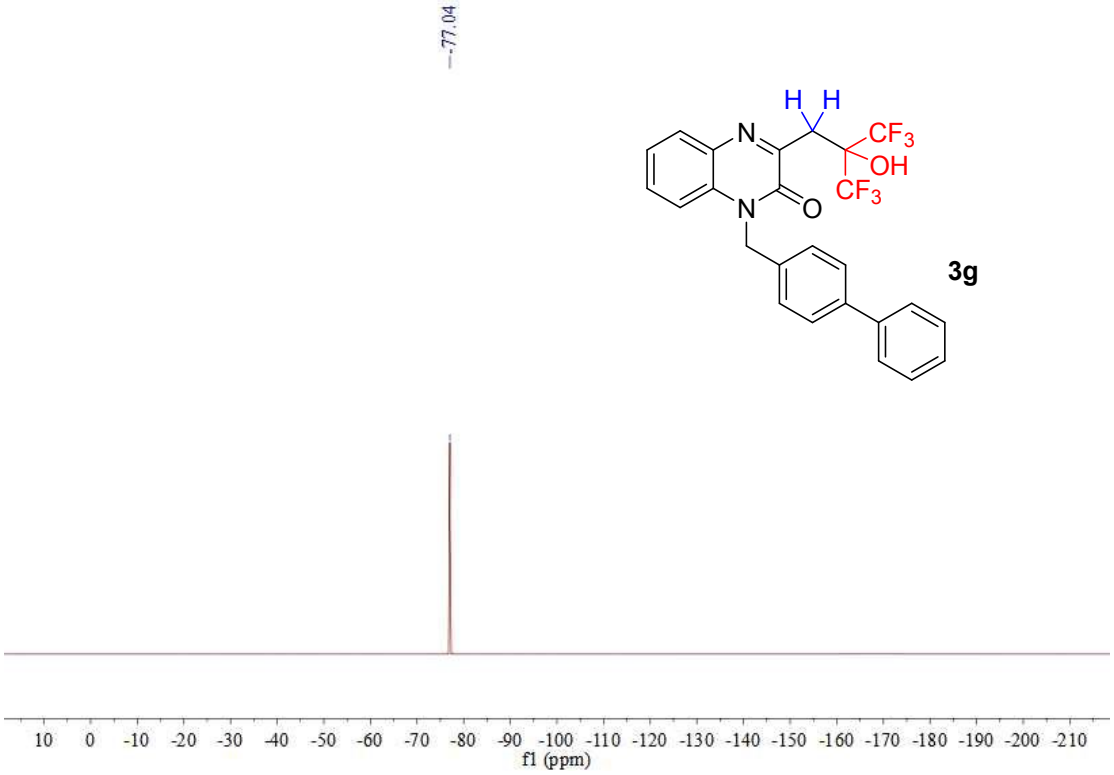
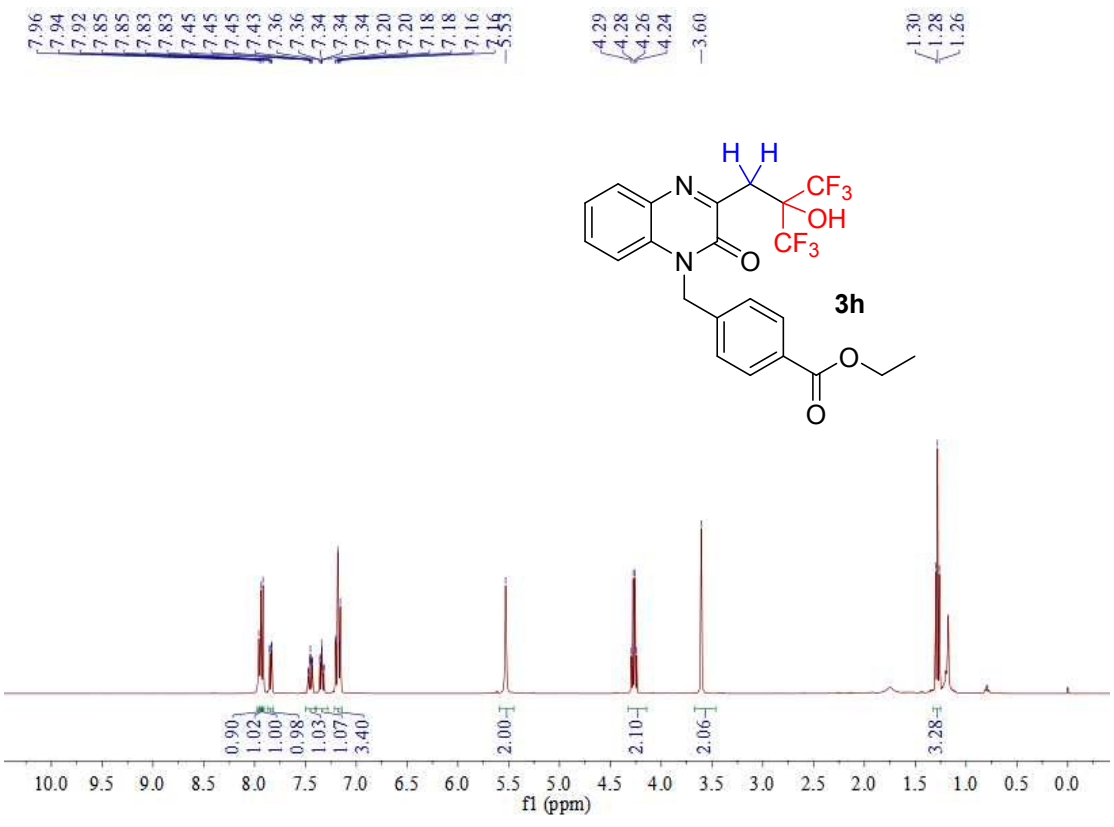
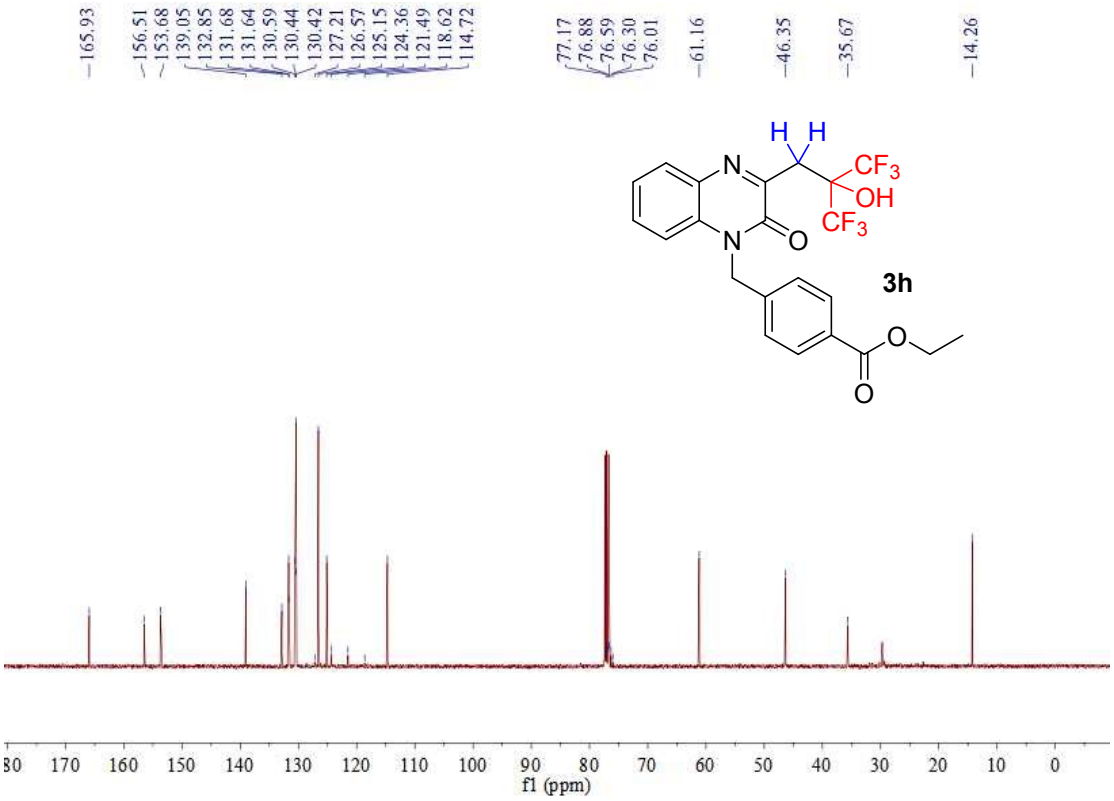


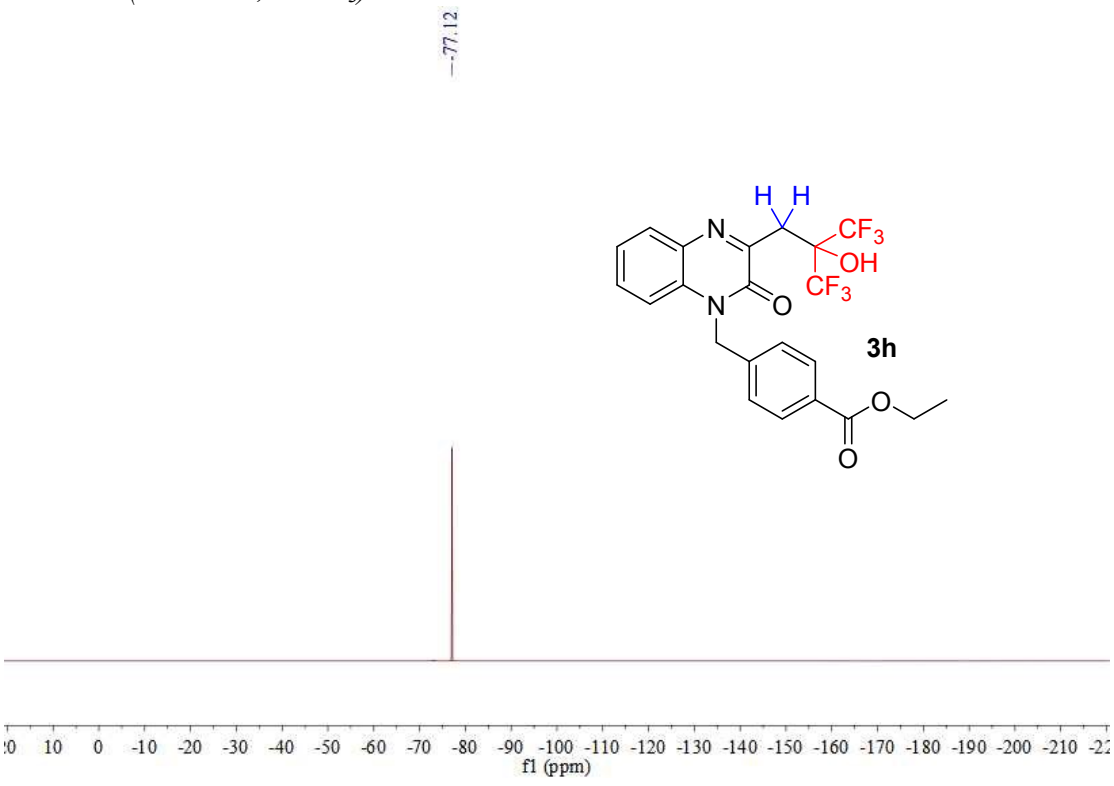

*$^{1}H$ NMR (400 MHz, $CDCl_3$)*



*$^{13}C$ NMR (101 MHz, $CDCl_3$)*




*$^{19}F$ NMR (376 MHz, $CDCl_3$)*



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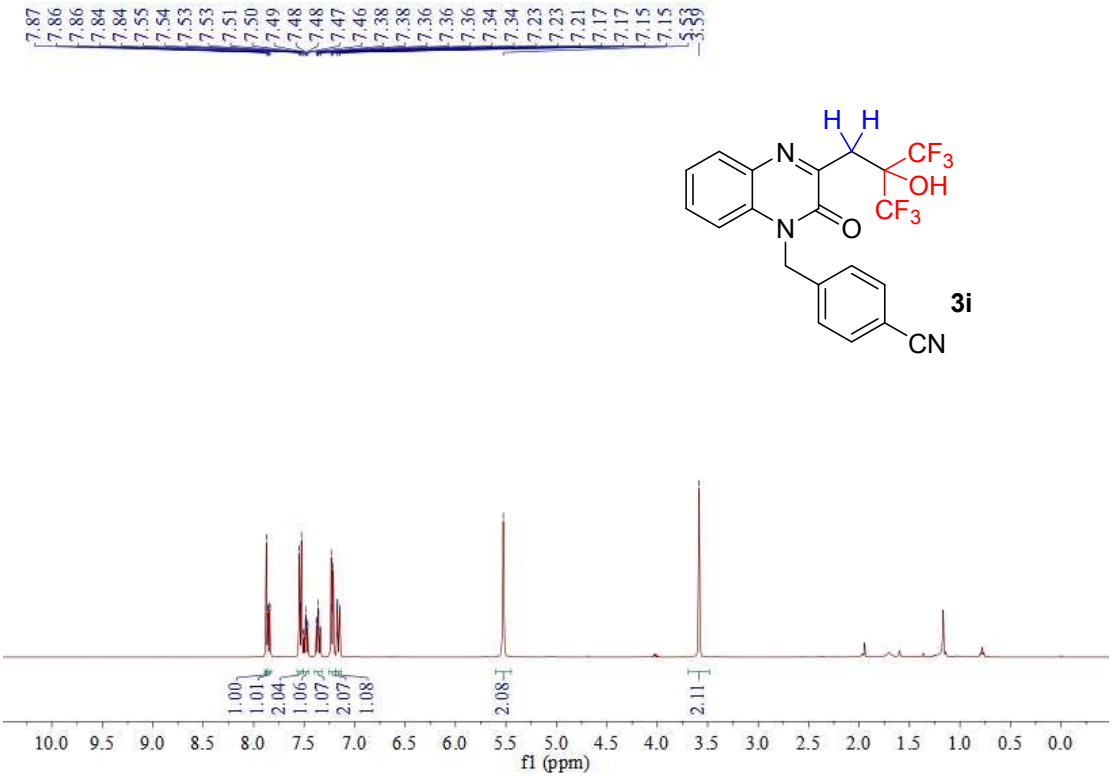


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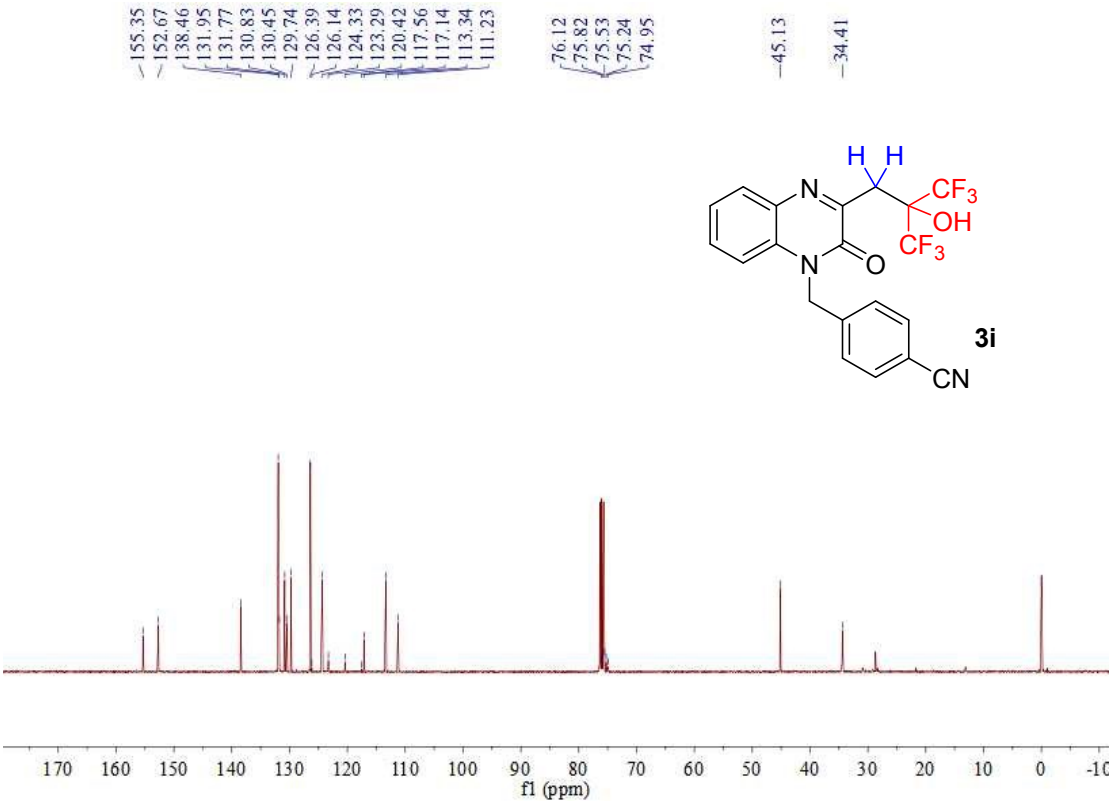

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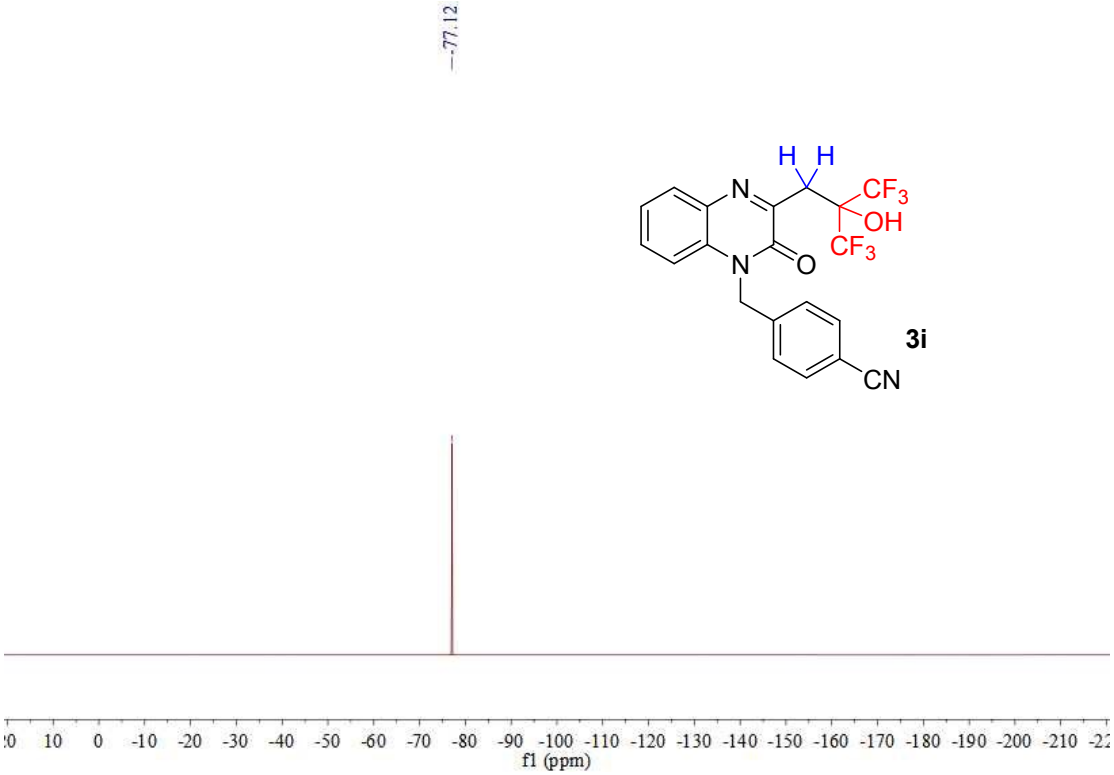


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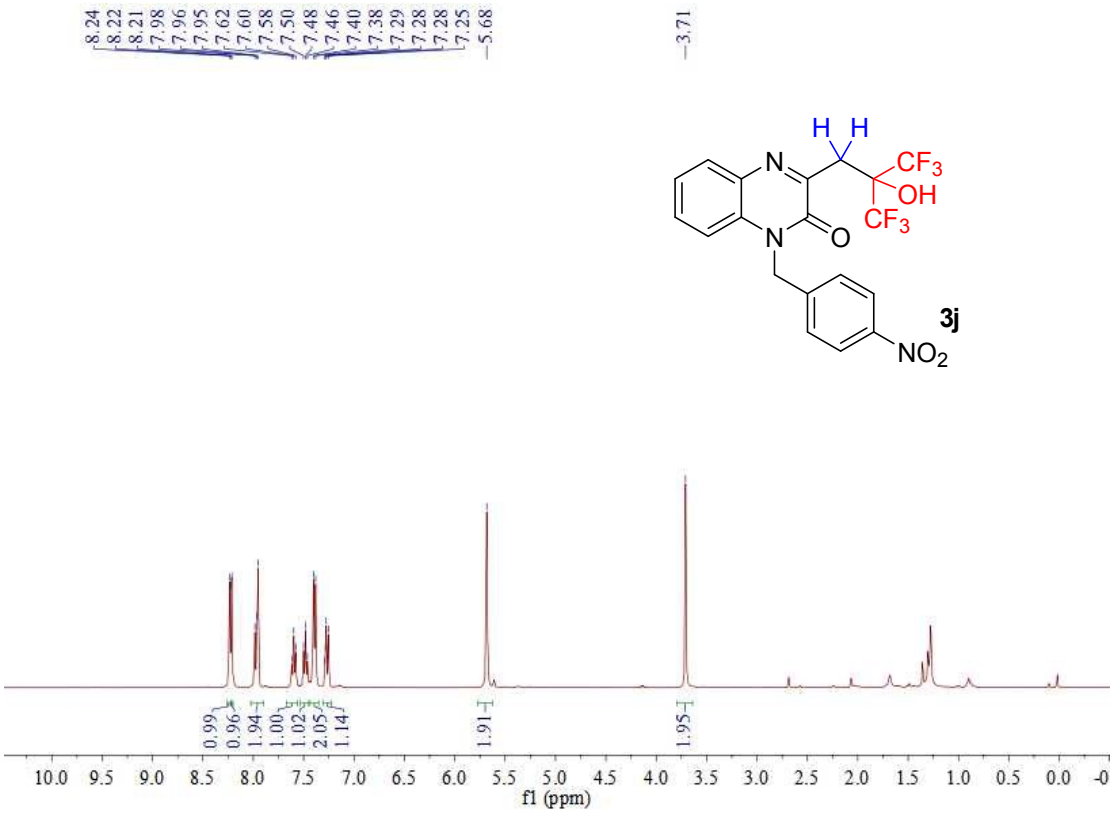

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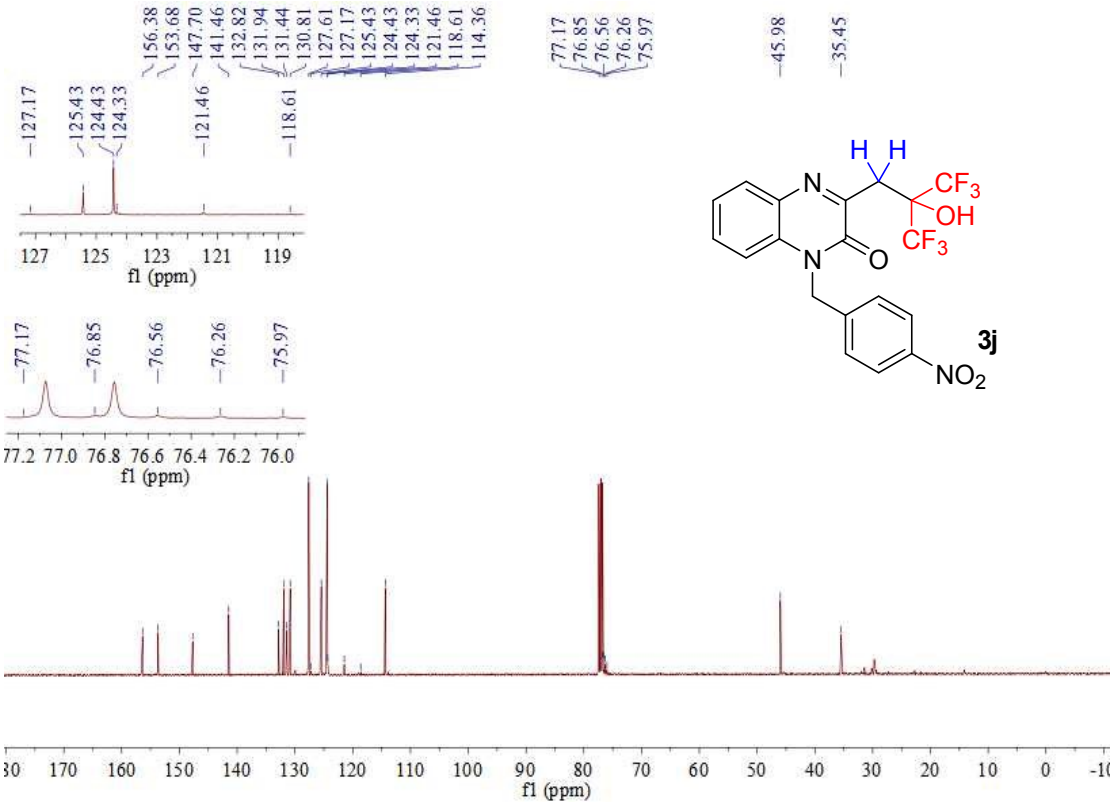


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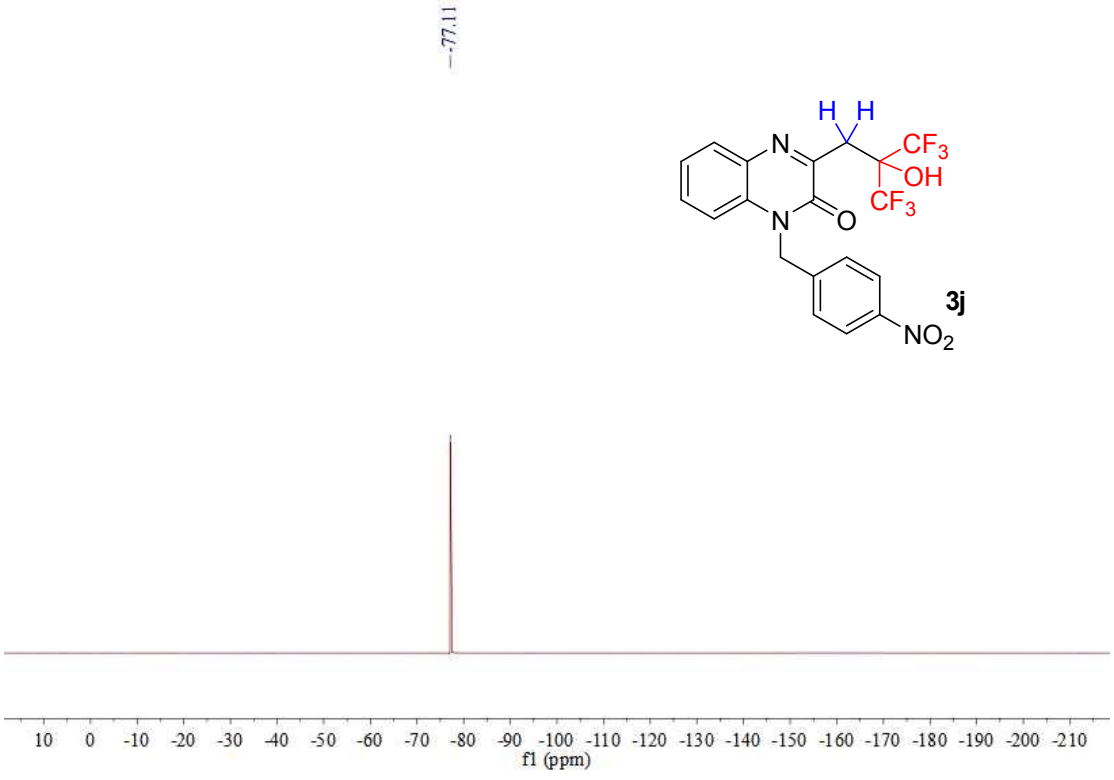

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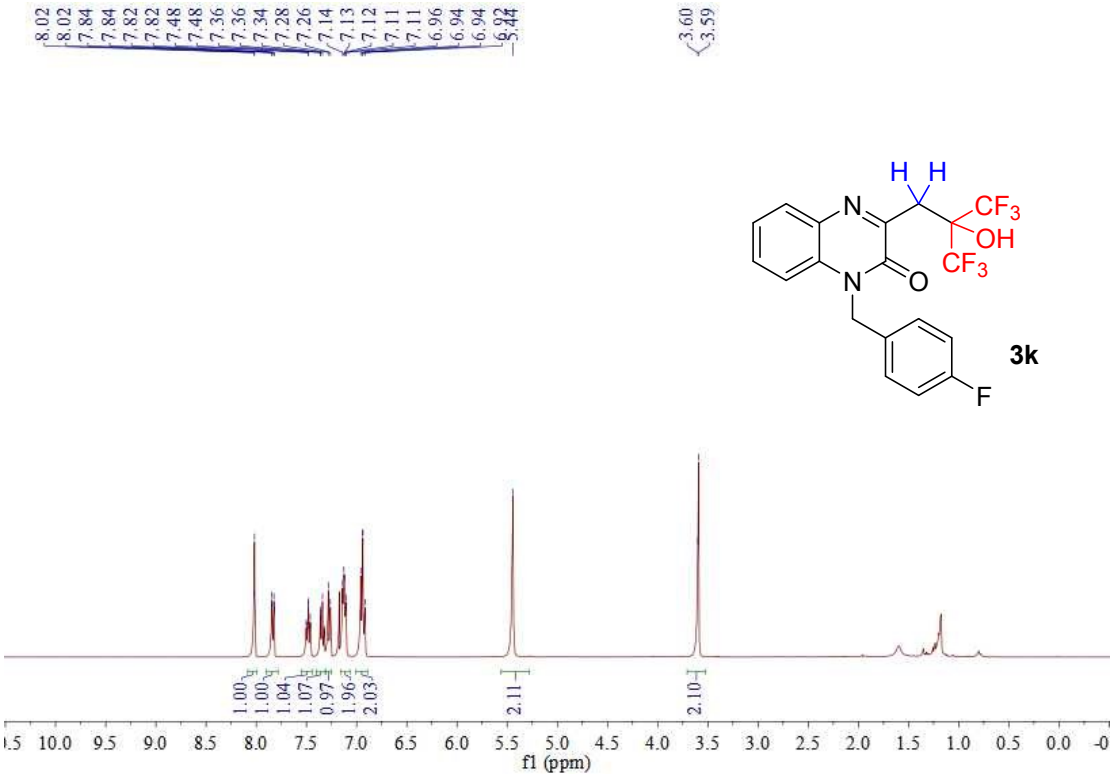


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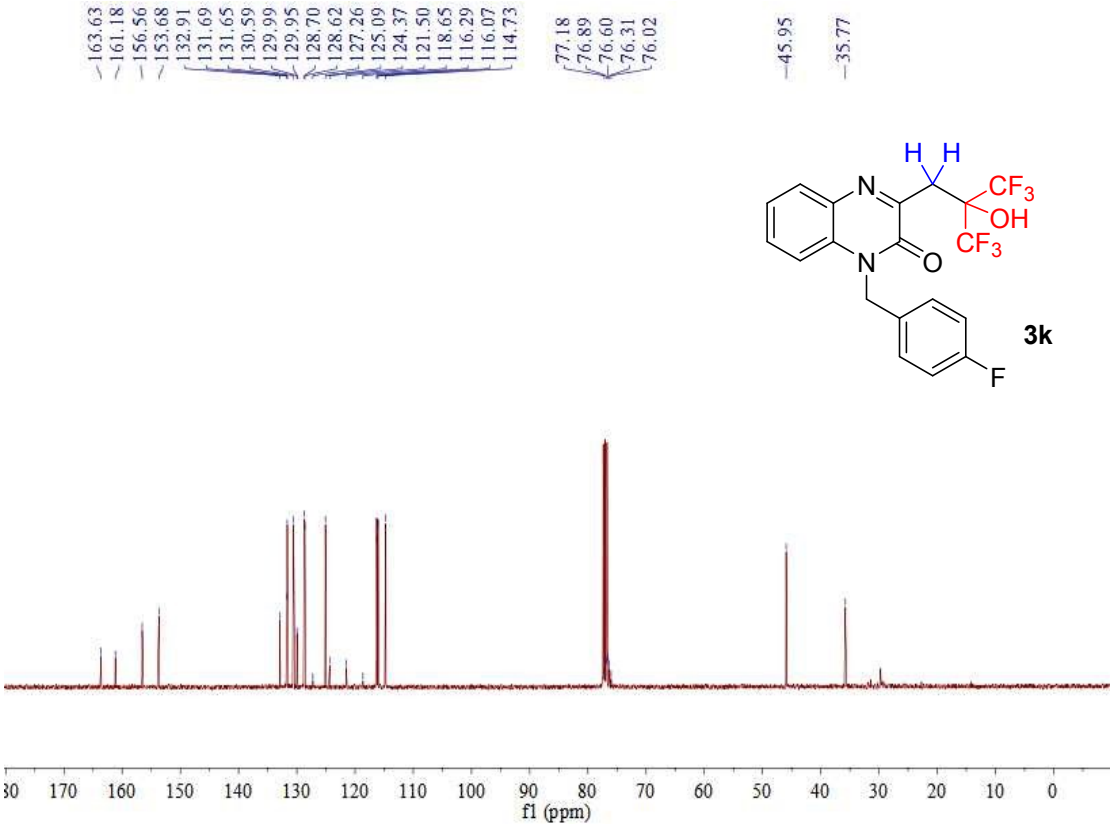

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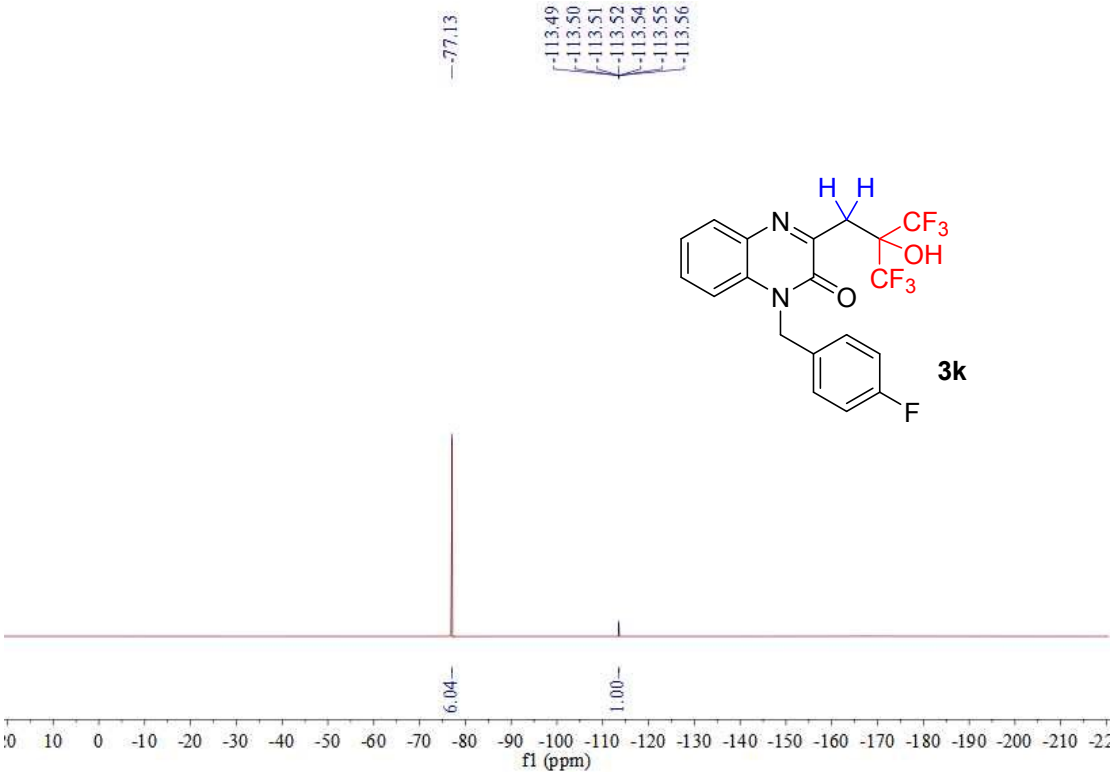


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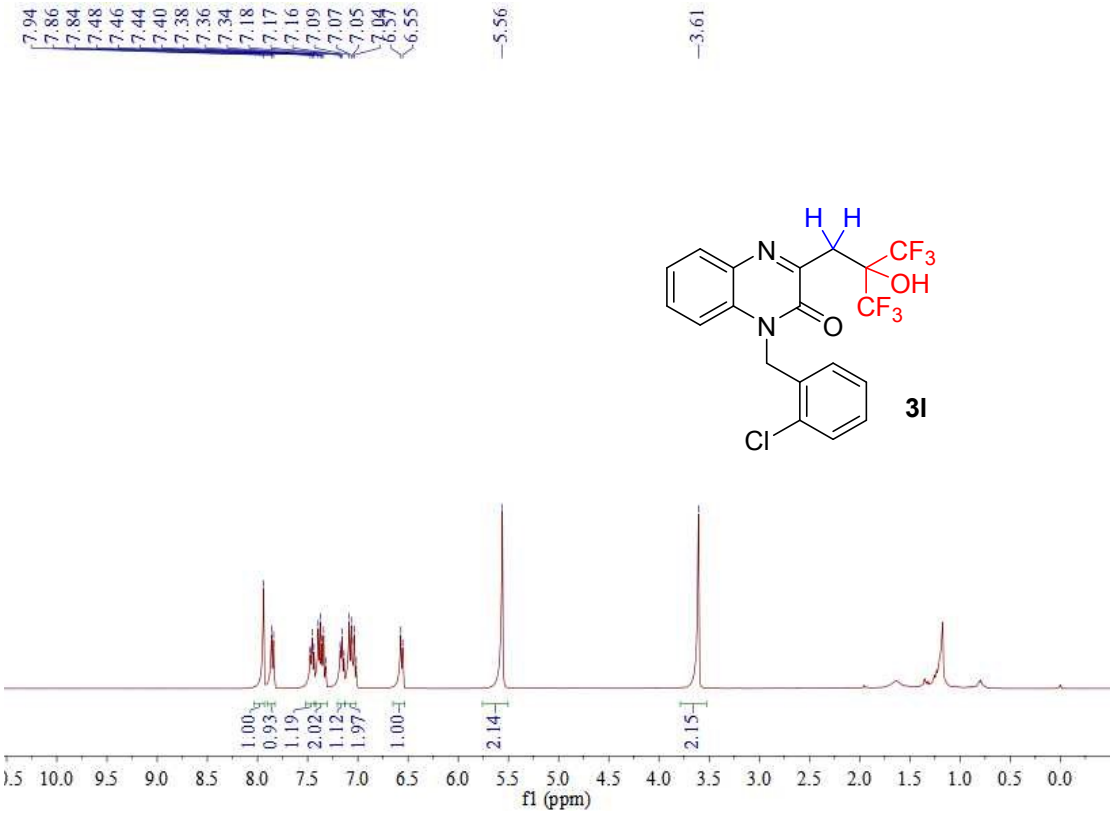

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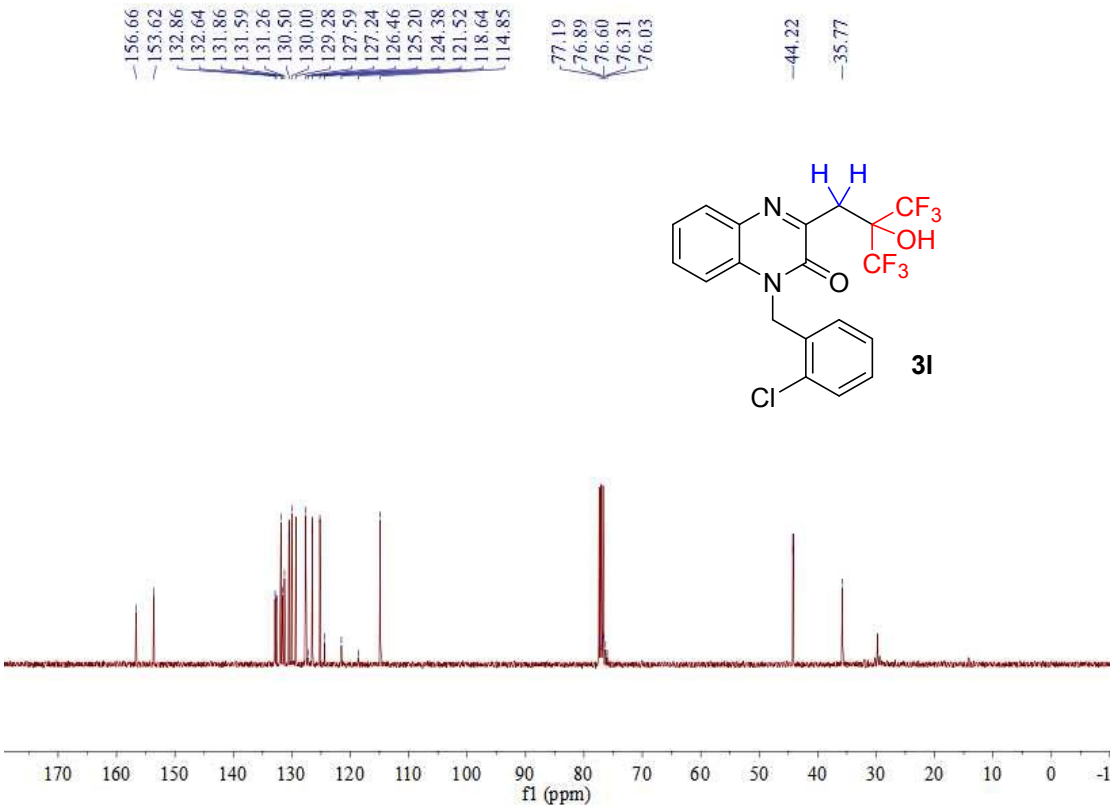
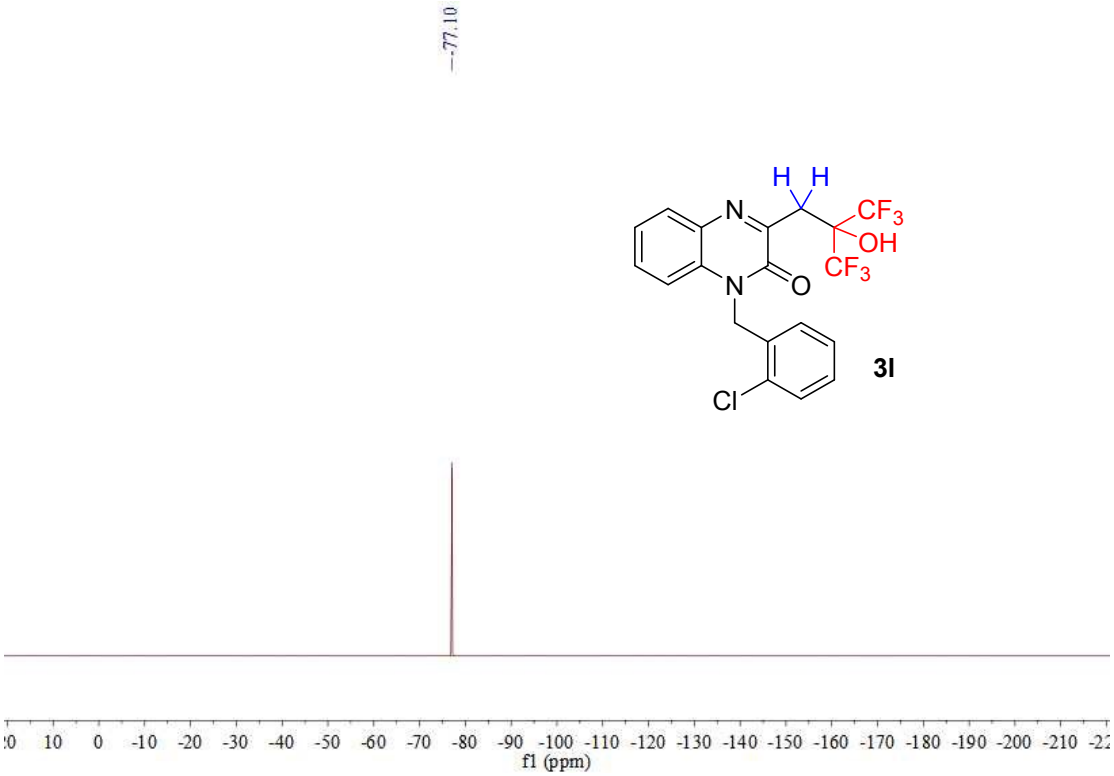



*$^{19}F$ NMR (376 MHz, $CDCl_3$)*



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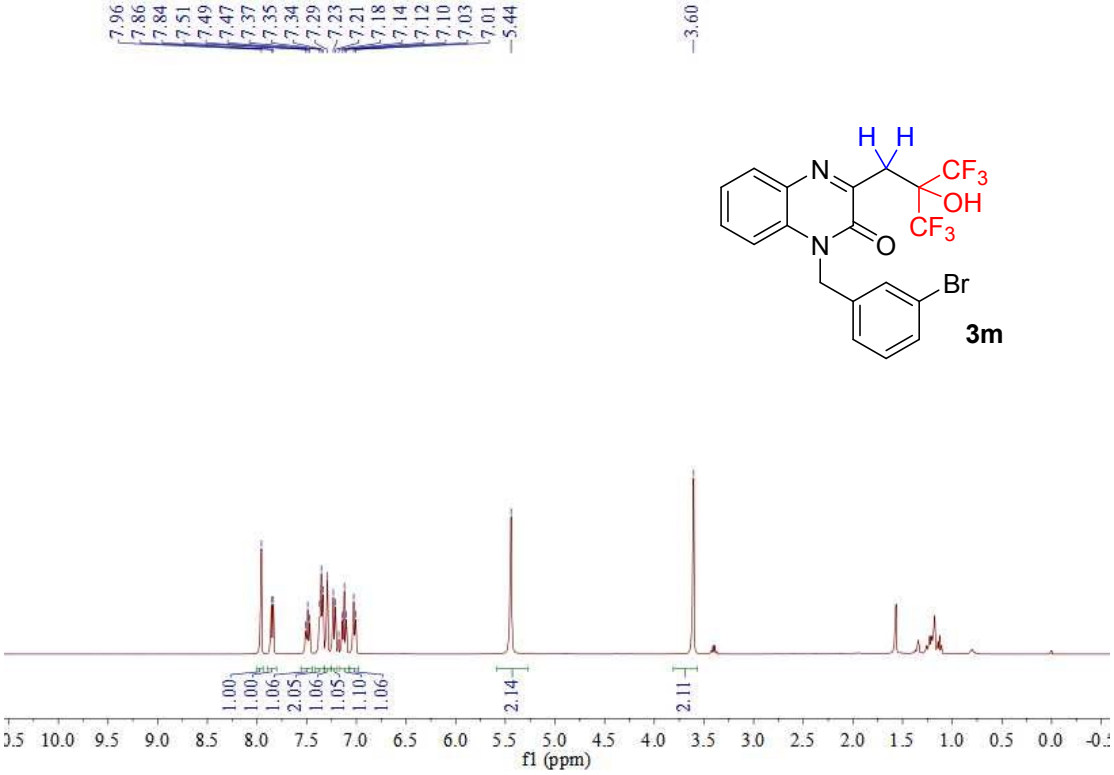
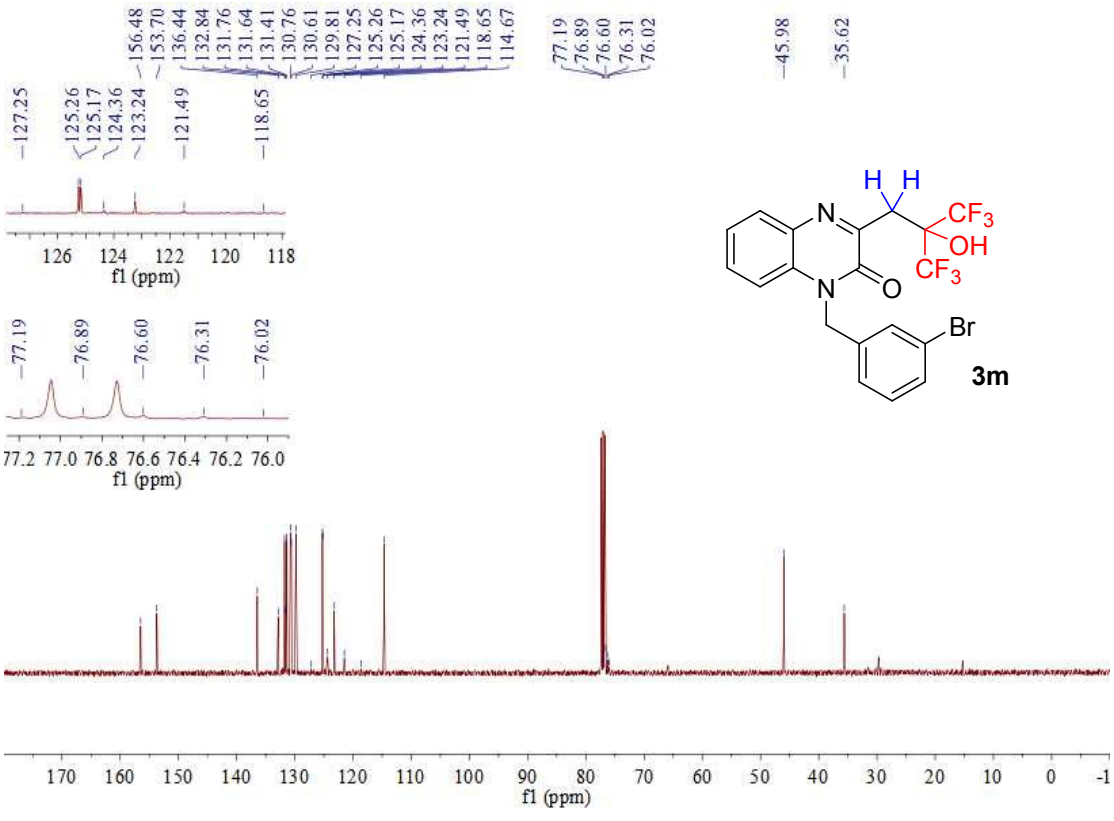
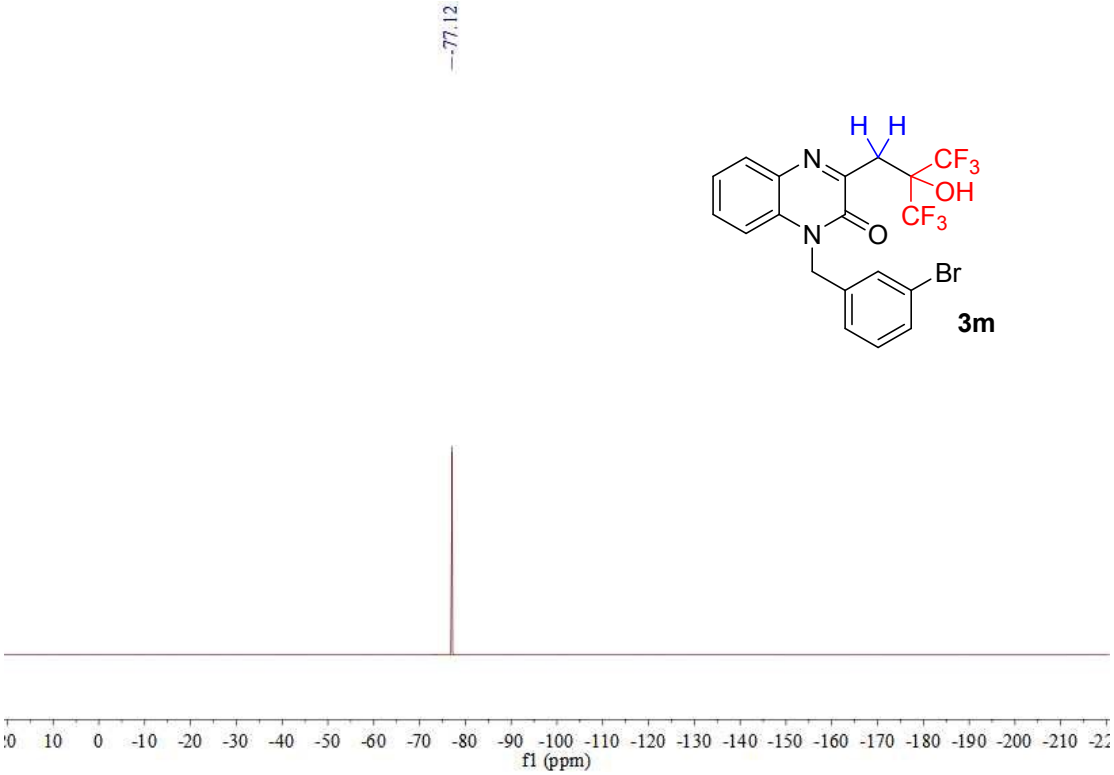



*$^{13}C$ NMR (101 MHz, $CDCl_3$)*



*$^{19}F$ NMR (376 MHz, $CDCl_3$)*

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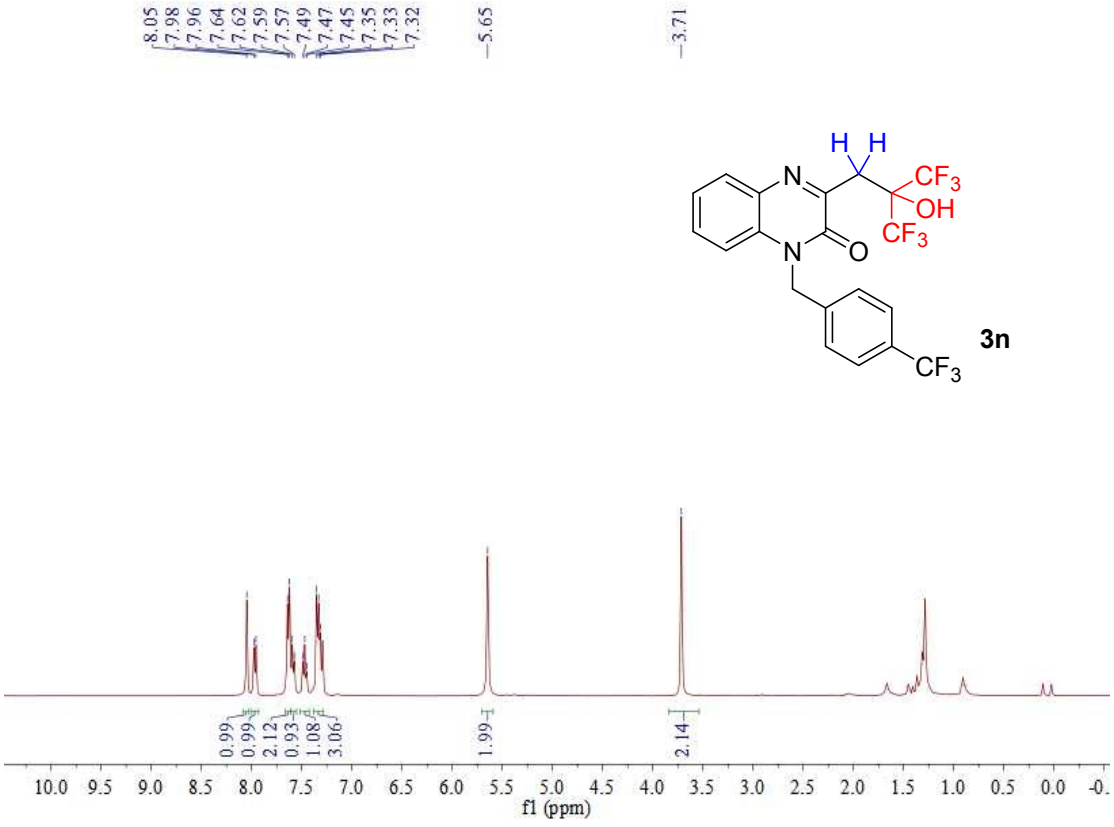

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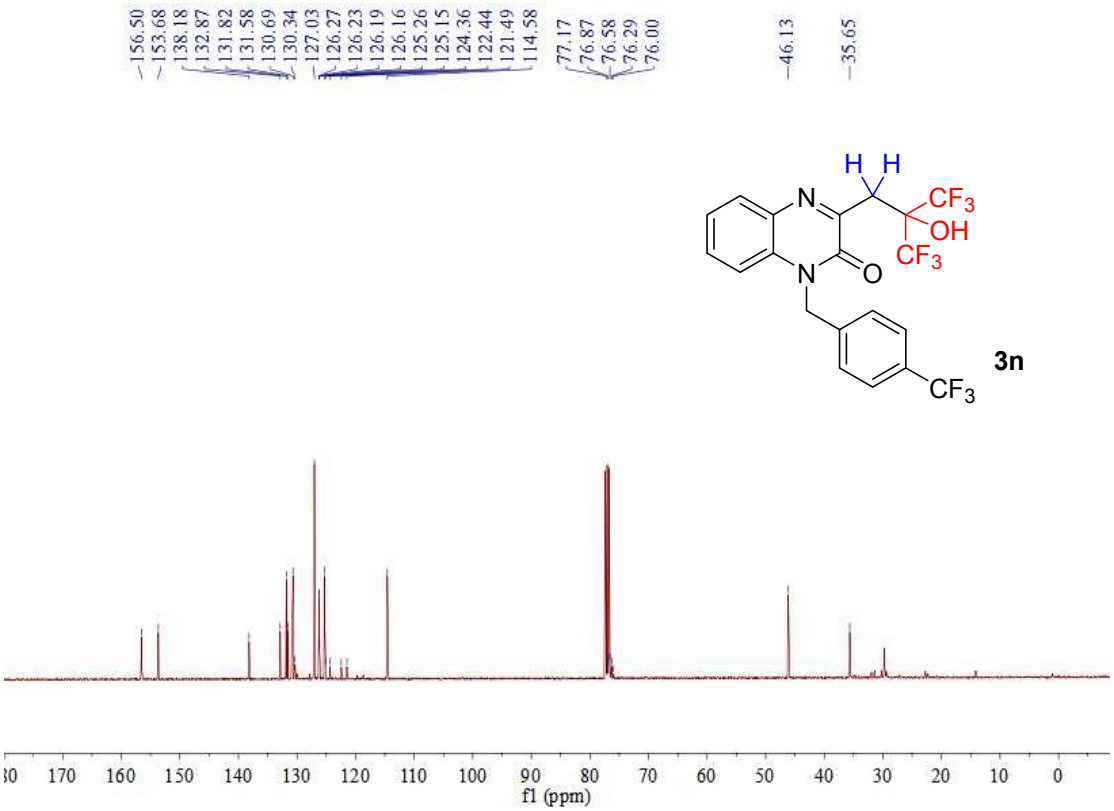


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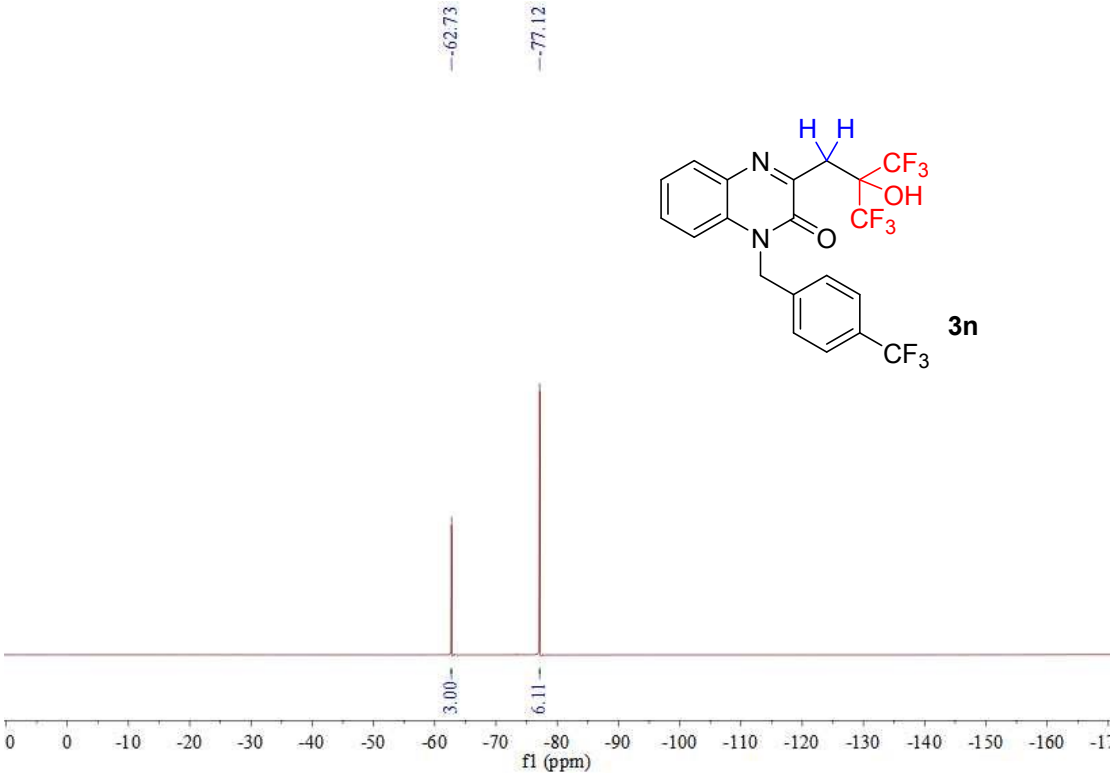

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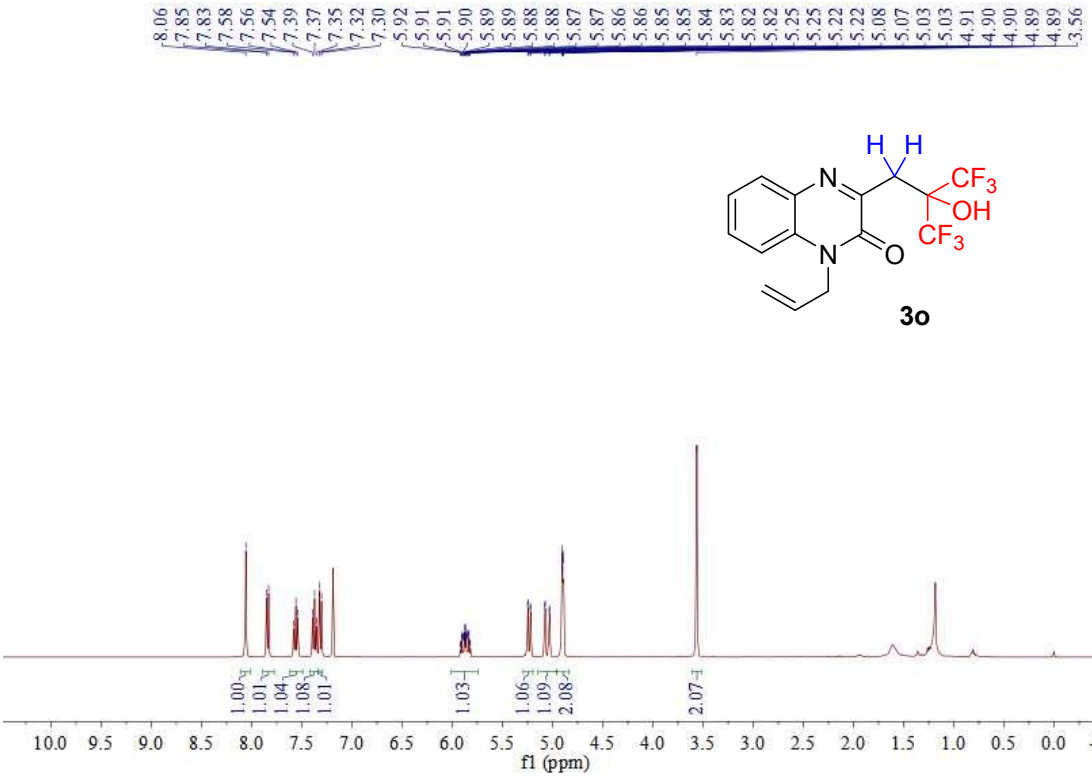


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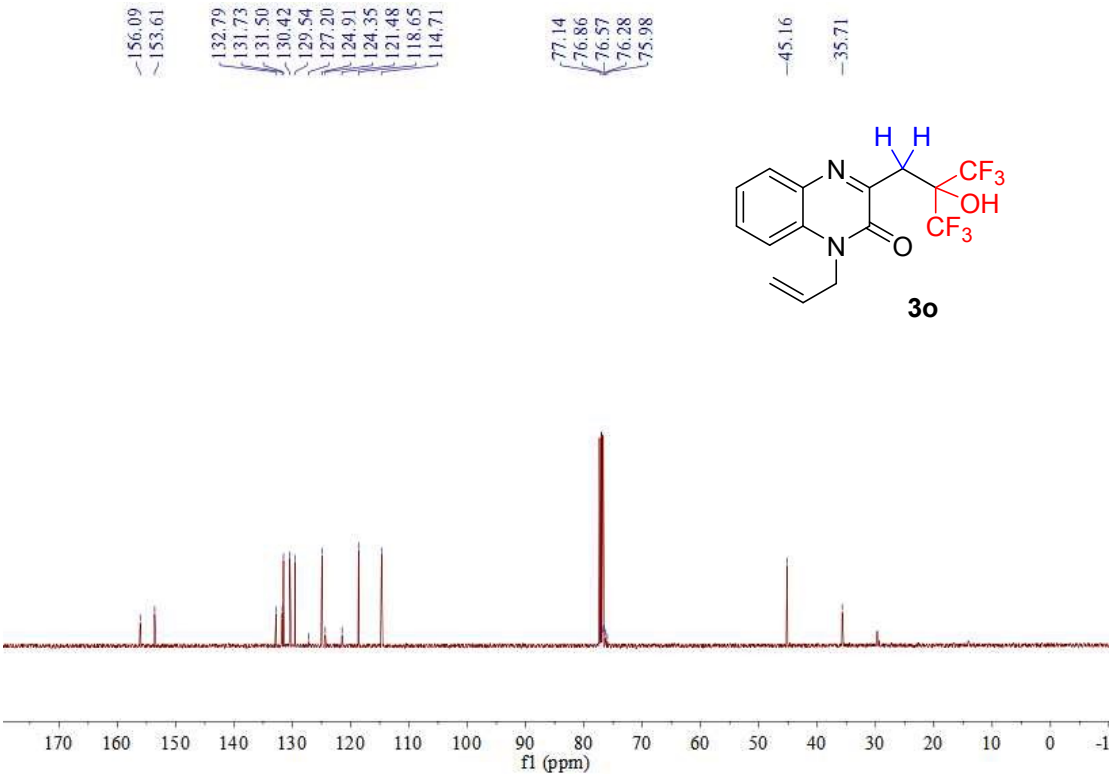
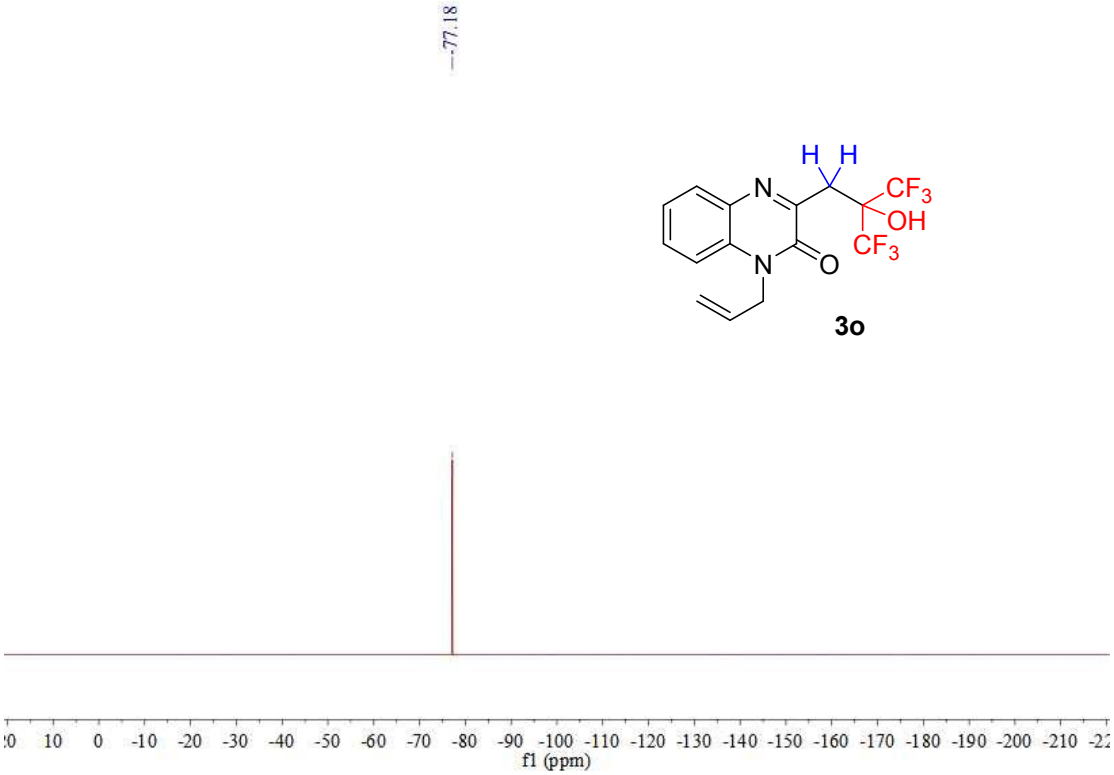


*$^{19}F$ NMR (376 MHz, $CDCl_3$)*

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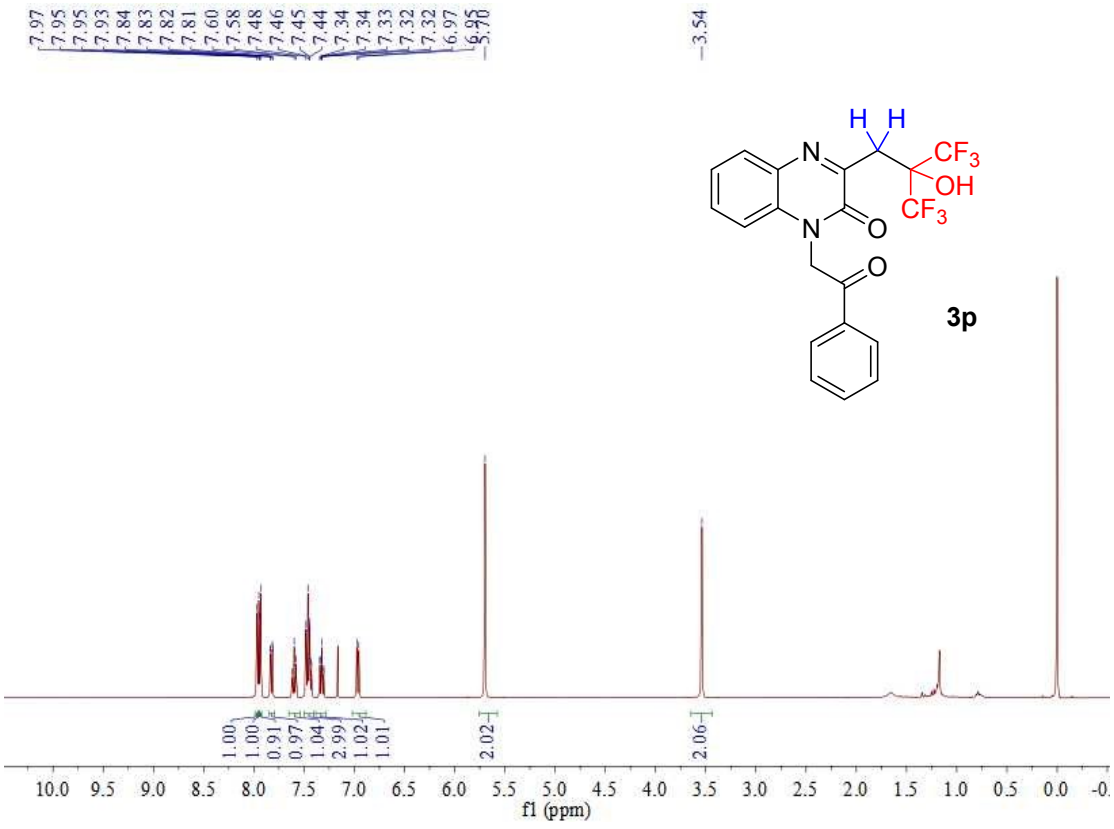

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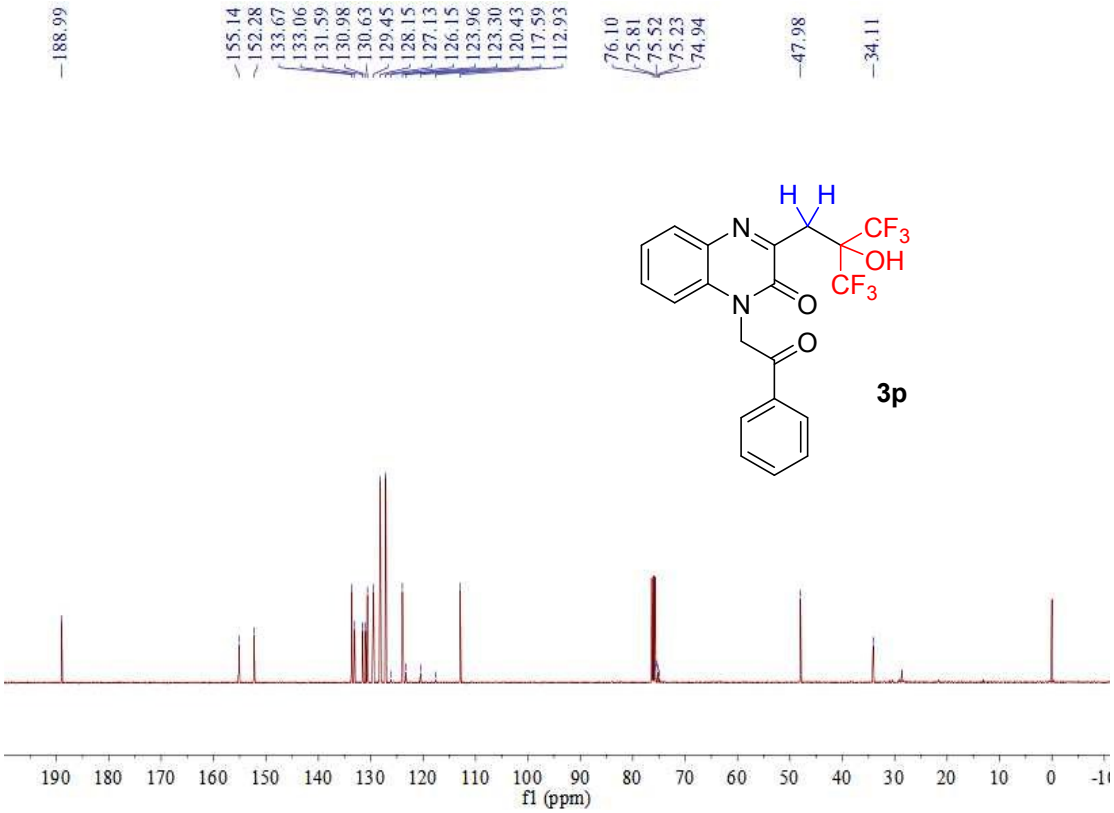
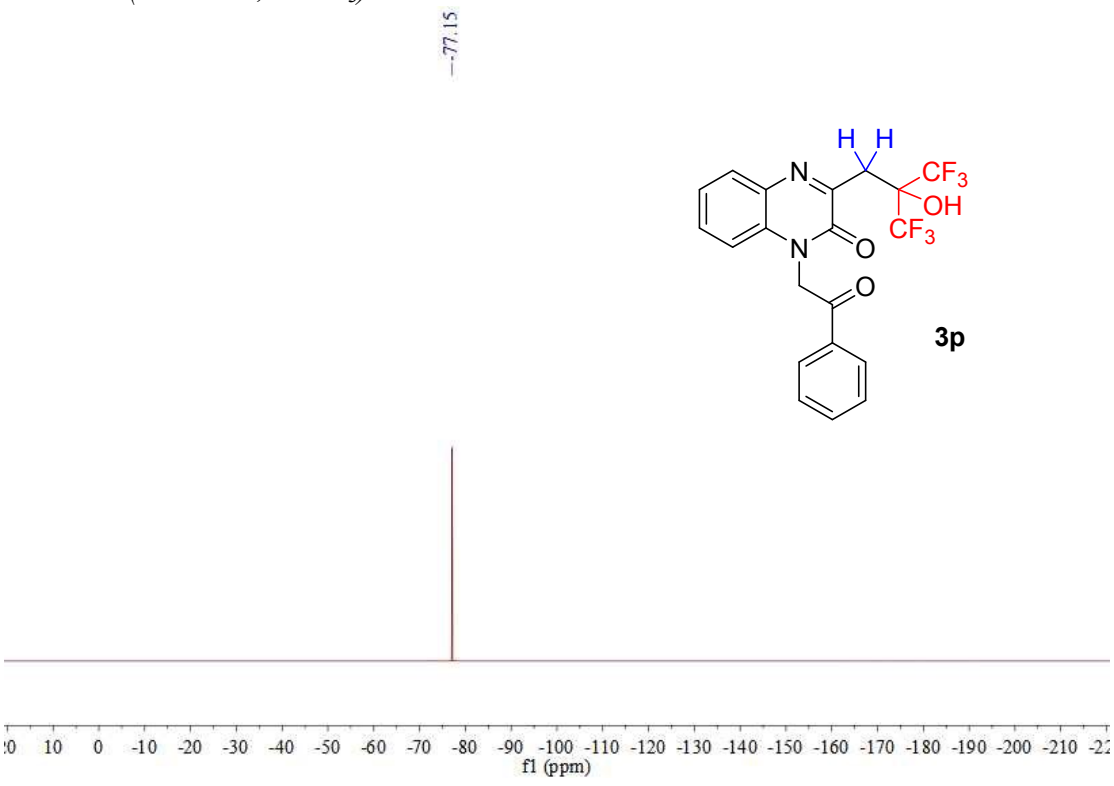



*$^{19}F$ NMR (376 MHz, $CDCl_3$)*



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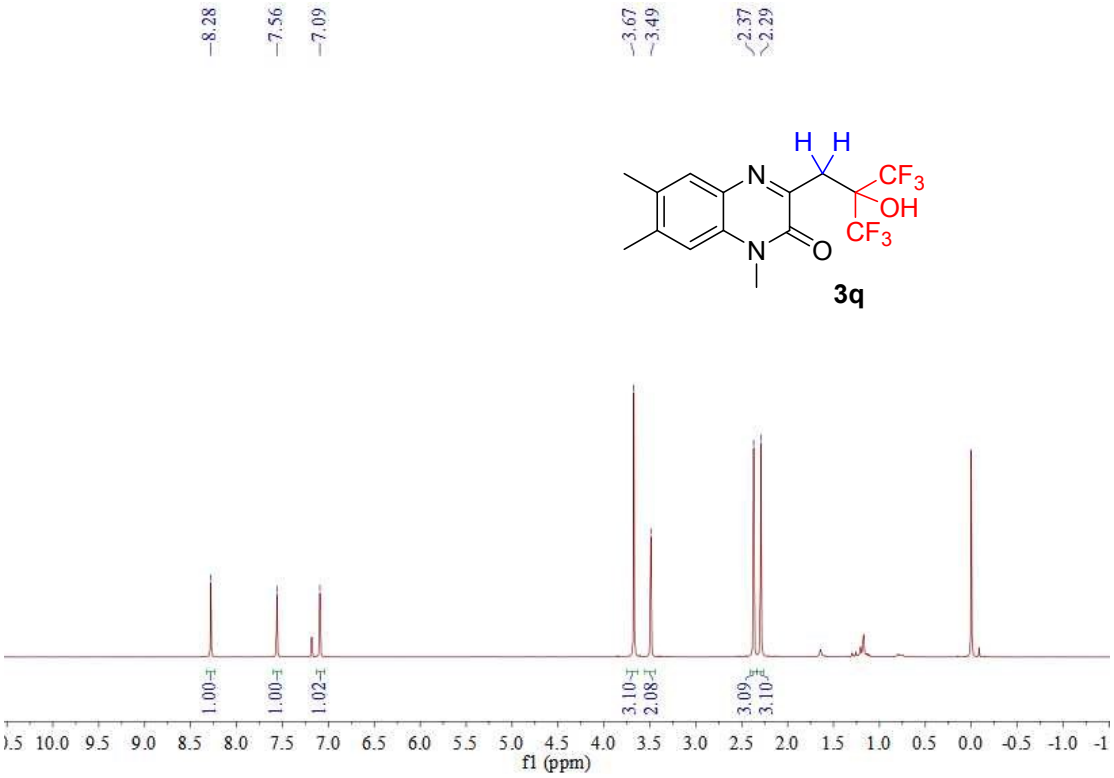


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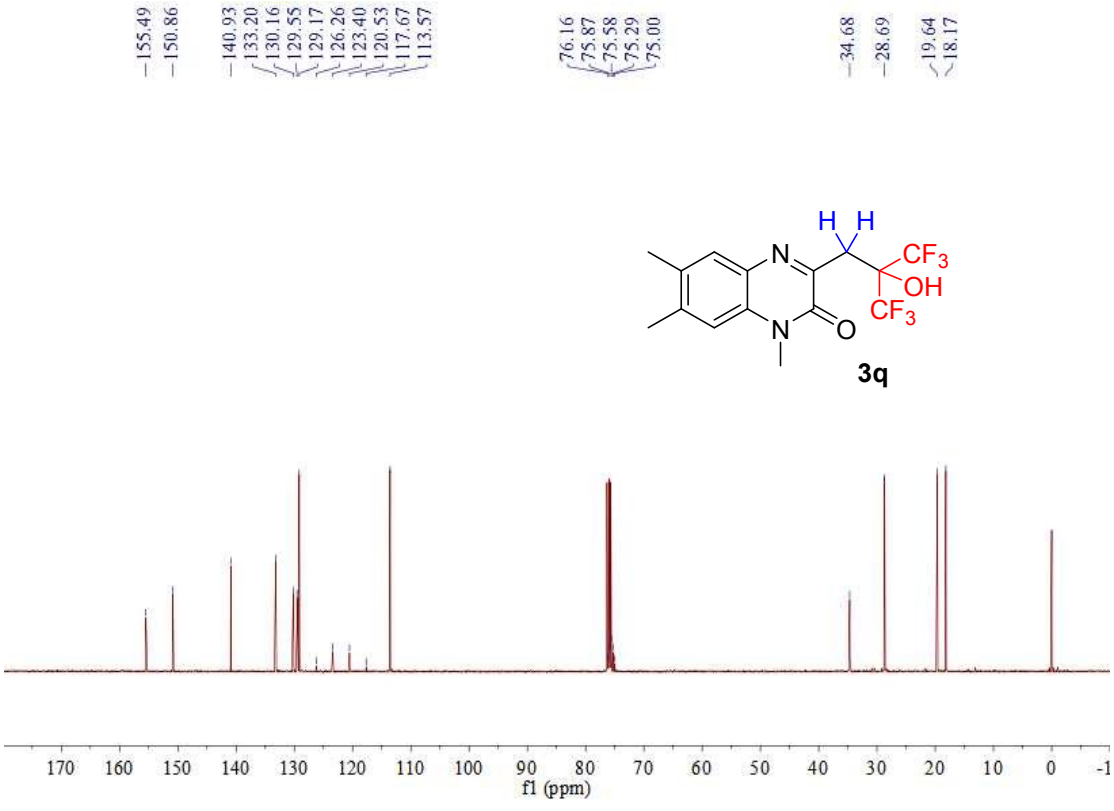
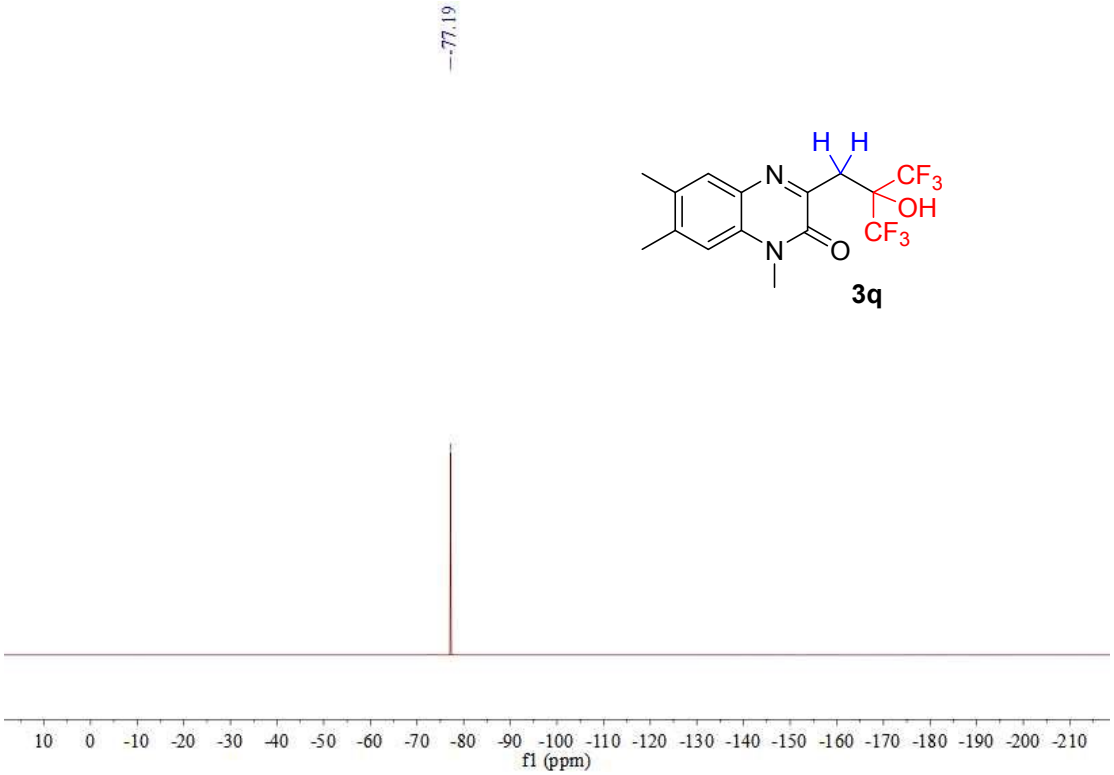
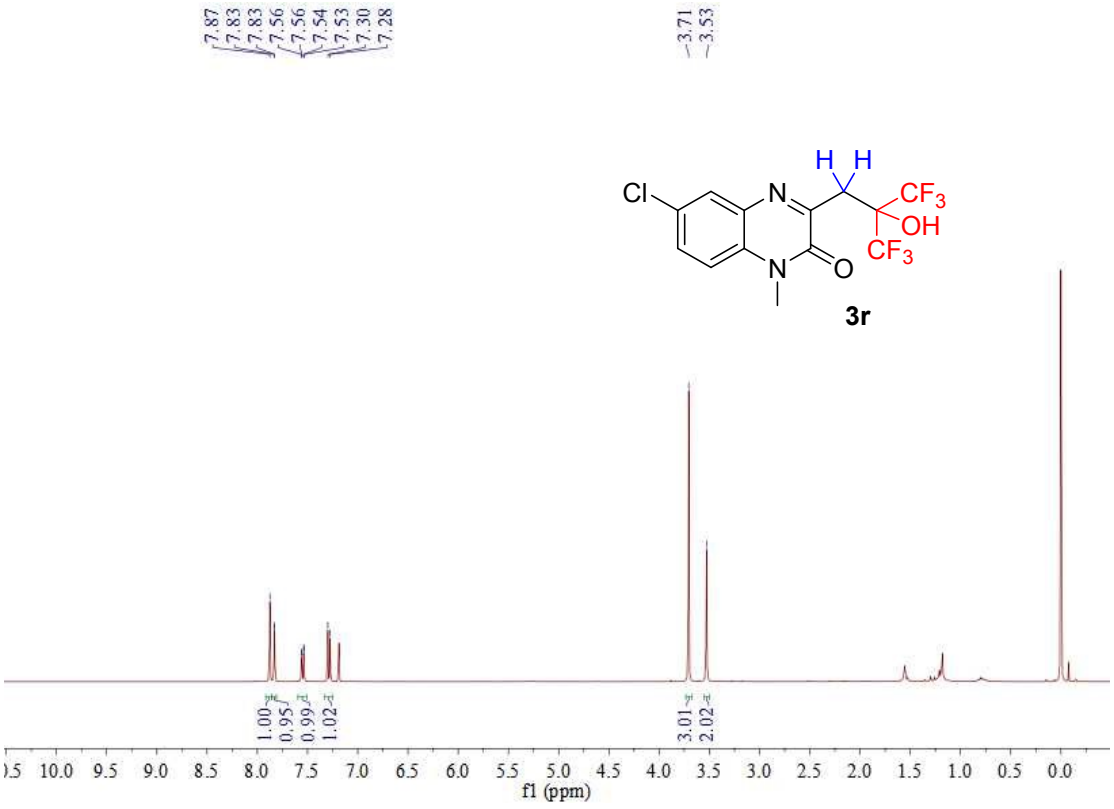


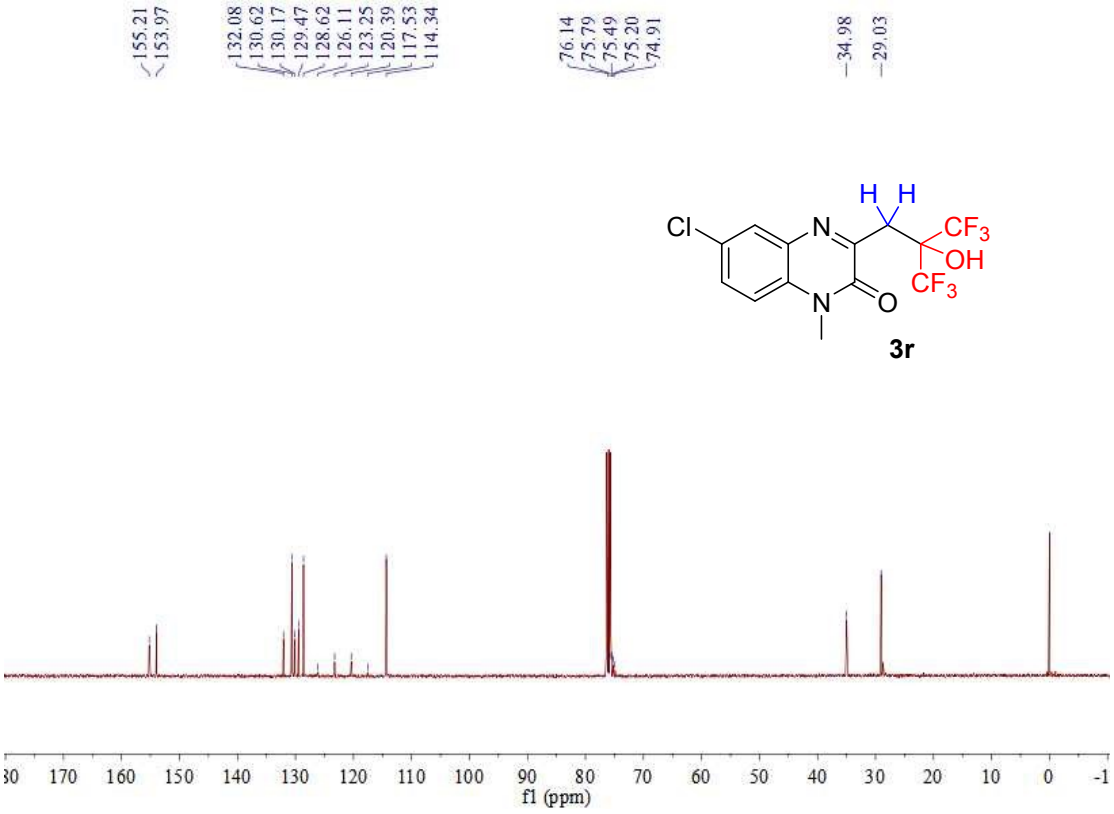
*$^{19}F$ NMR (377 MHz, $CDCl_3$)*



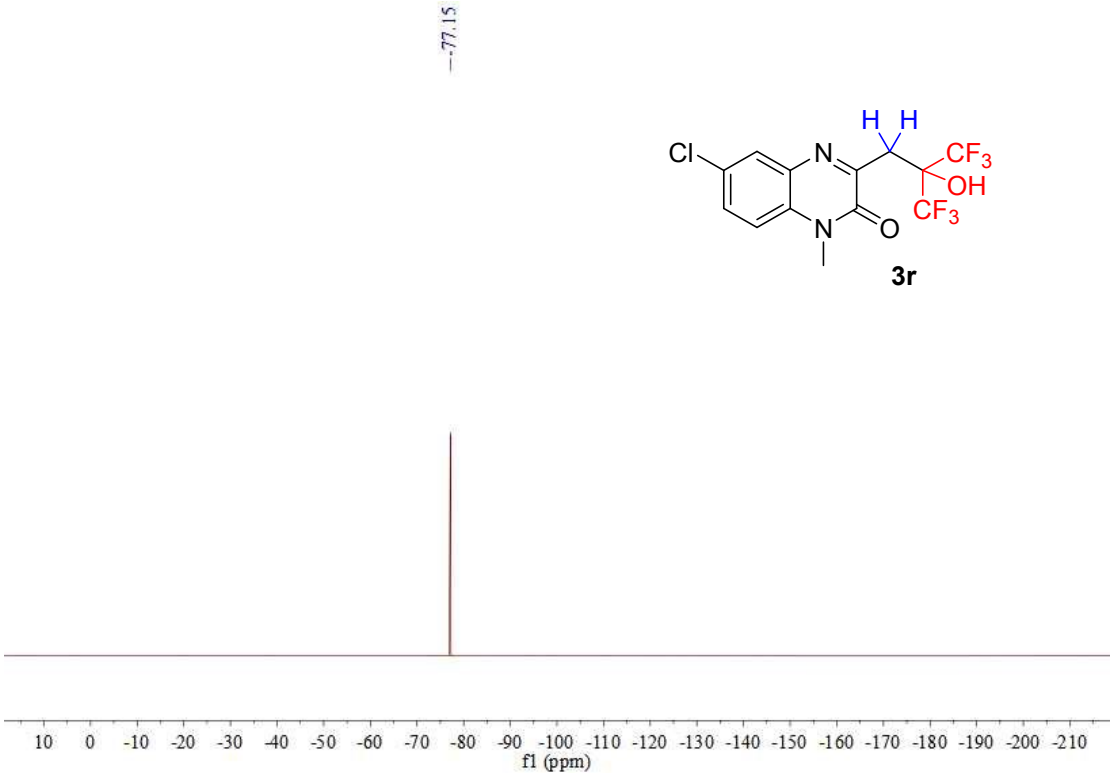

*$^{1}H$ NMR (400 MHz, $CDCl_3$)*



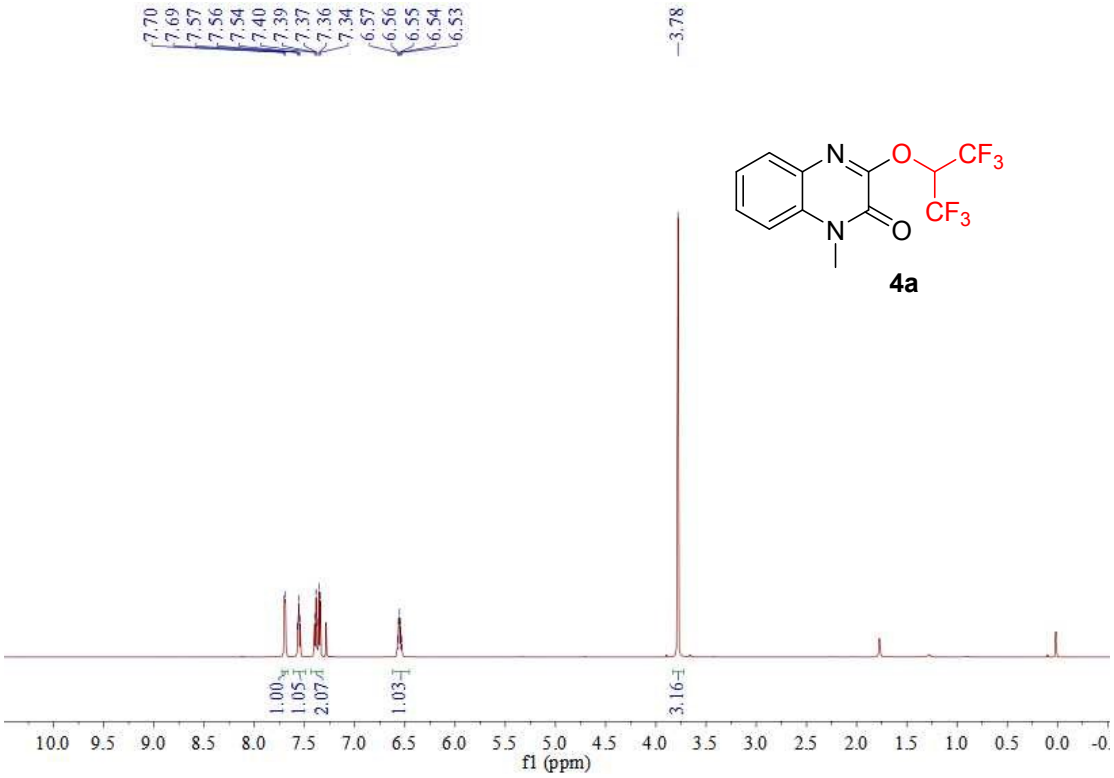
*$^{13}C$ NMR (101 MHz, $CDCl_3$)*




*$^{19}F$ NMR (377 MHz, $CDCl_3$)*



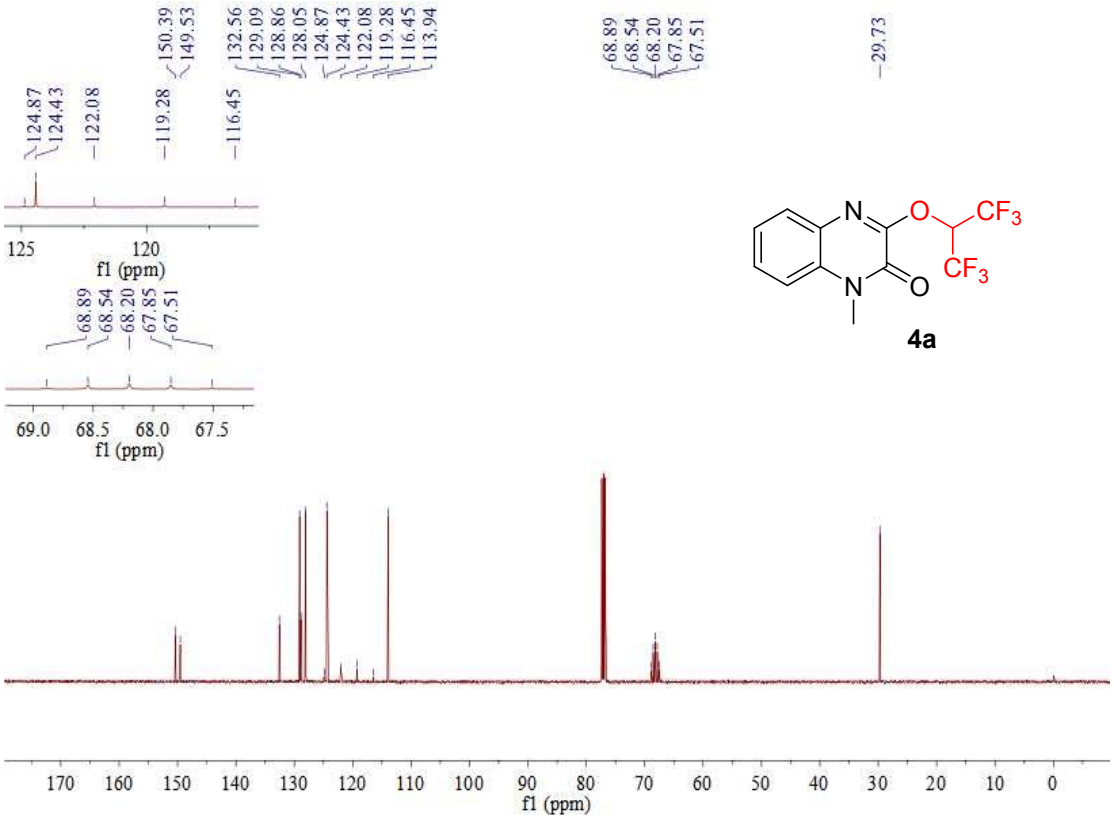
*$^{1}H$ NMR (600 MHz, $CDCl_3$)*






**4a**

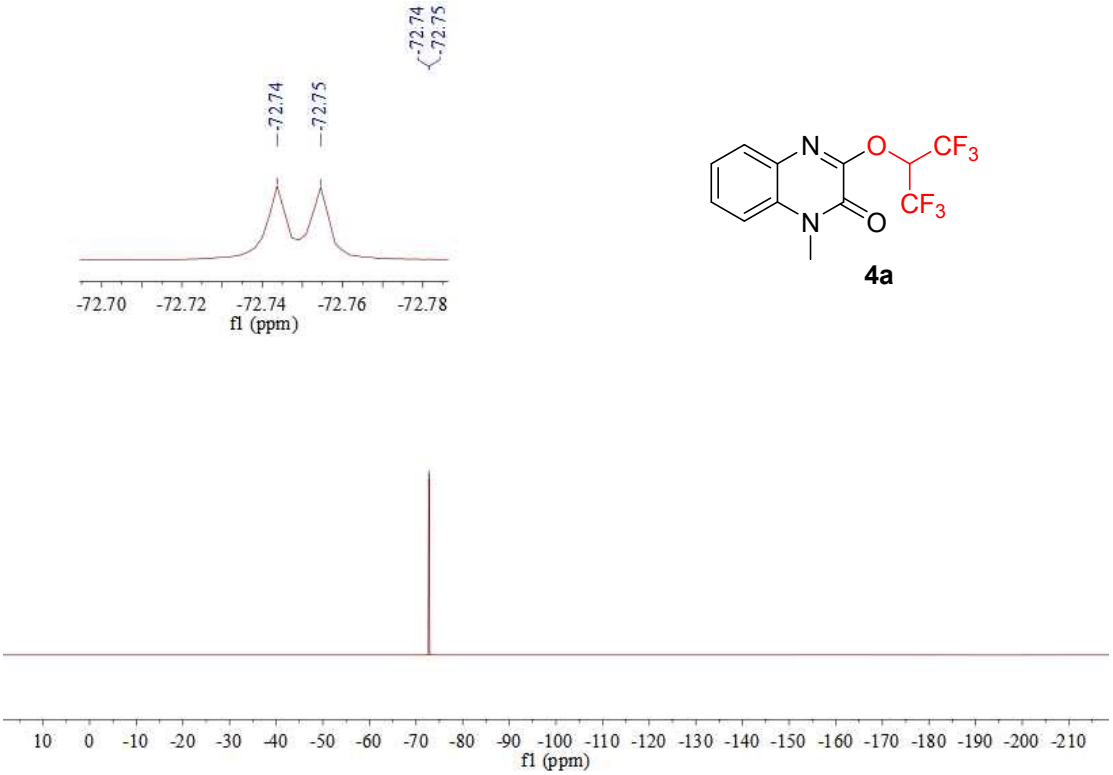
*$^{13}C$ NMR (101 MHz, $CDCl_3$)*






**4a**

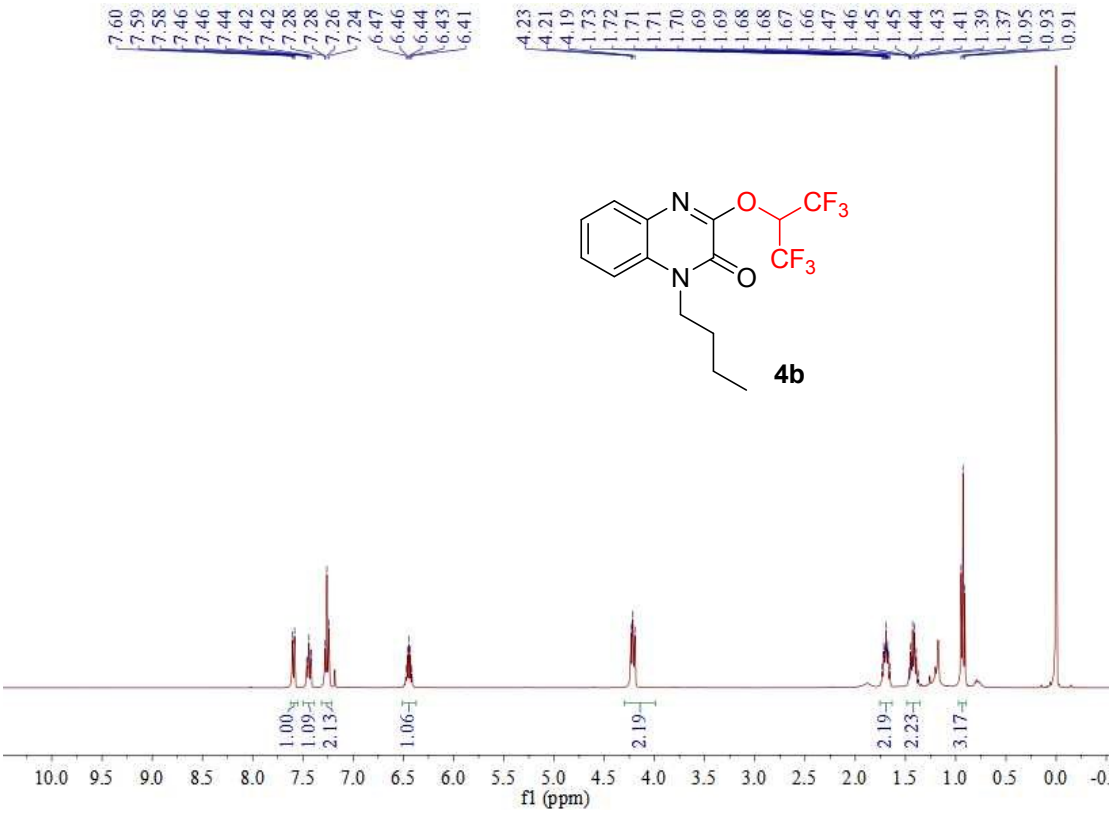
*$^{19}F$ NMR (565 MHz, $CDCl_3$)*






**4a**

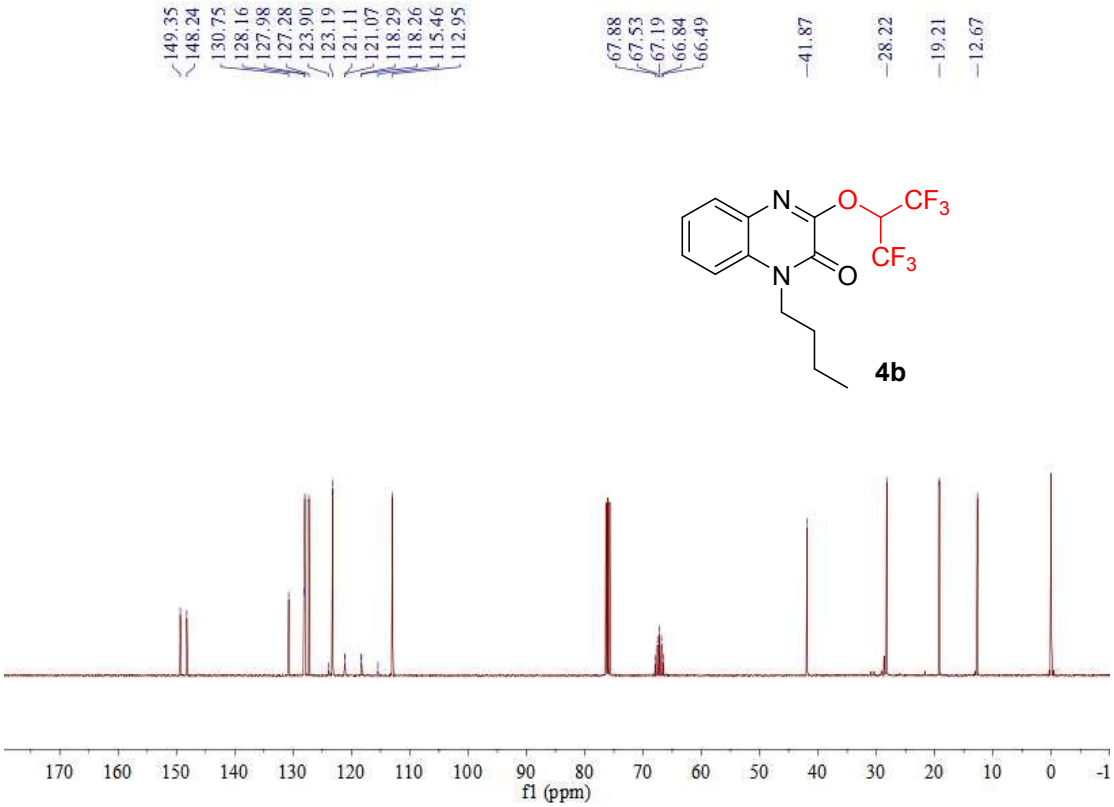
*$^{1}H$ NMR (400 MHz, $CDCl_3$)*



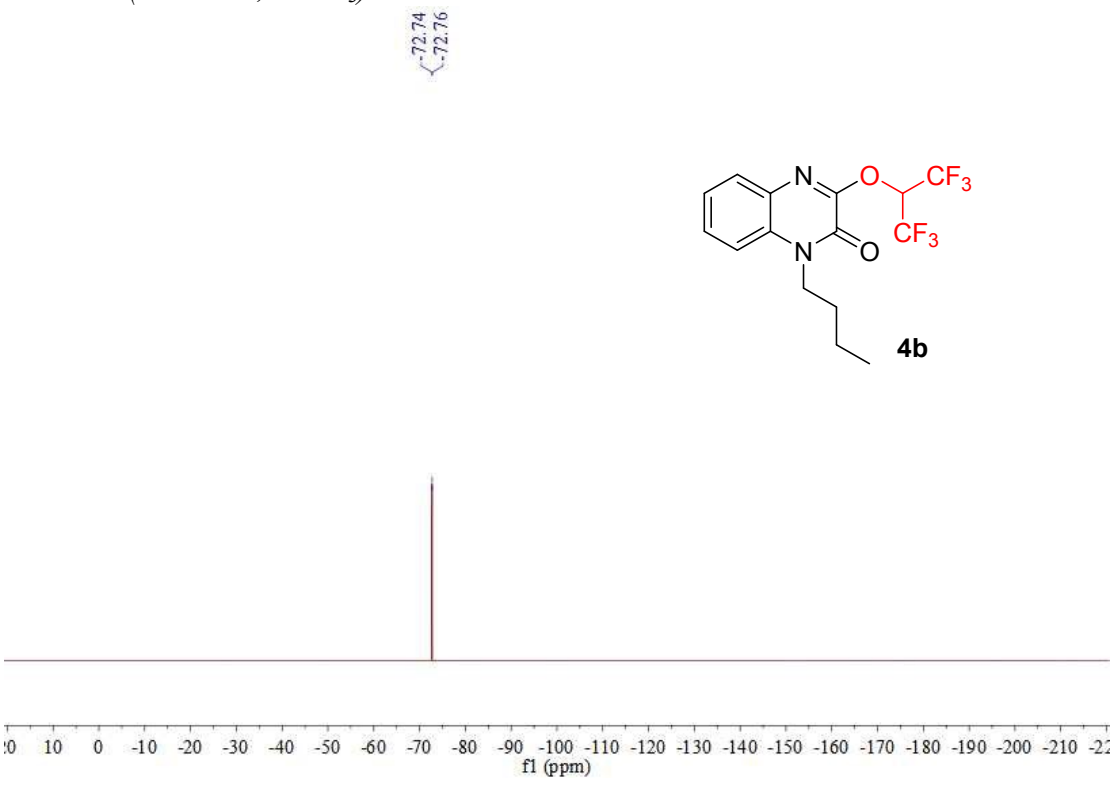



**4b**

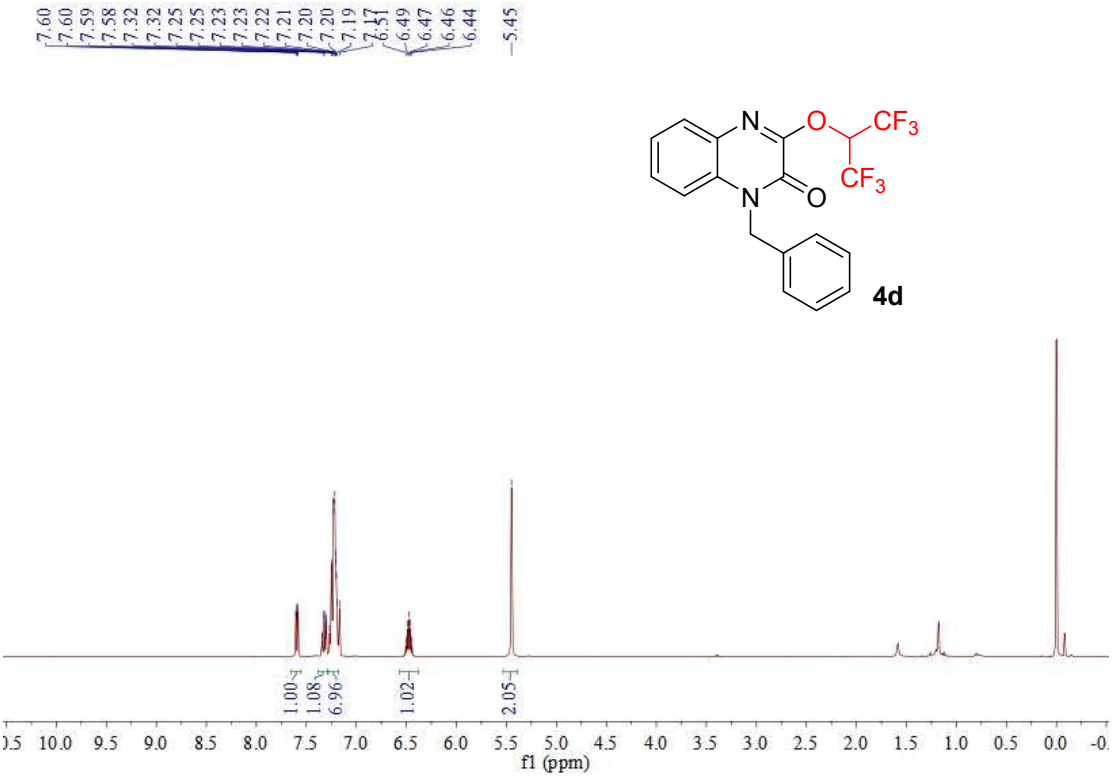
*$^{13}C$ NMR (101 MHz, $CDCl_3$)*



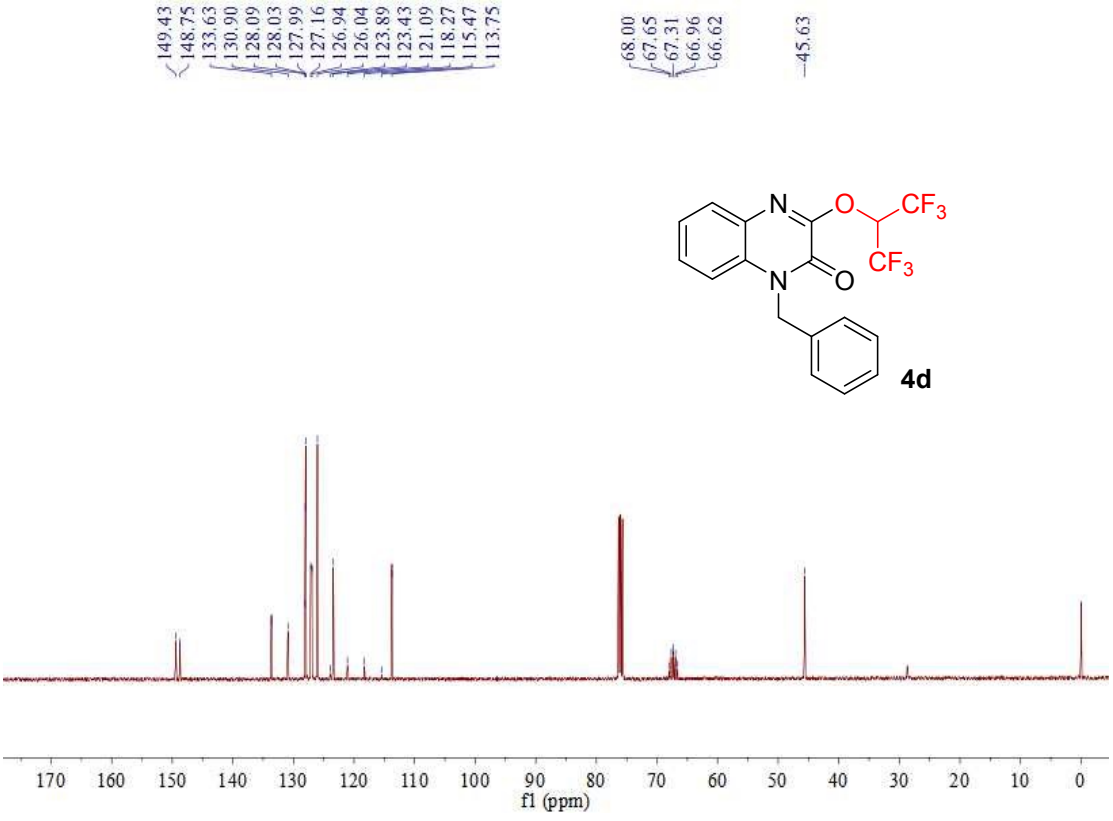

*$^{19}F$ NMR (376 MHz, $CDCl_3$)*



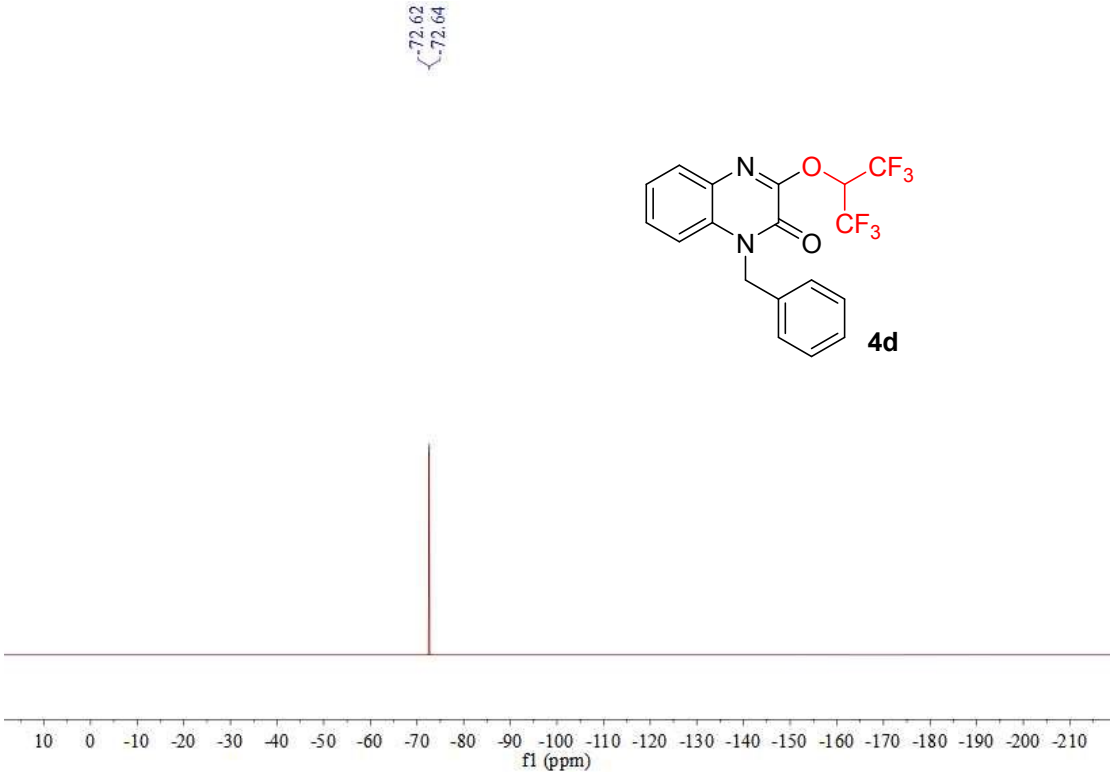
*[1]H NMR (400 MHz, $CDCl_3$)*



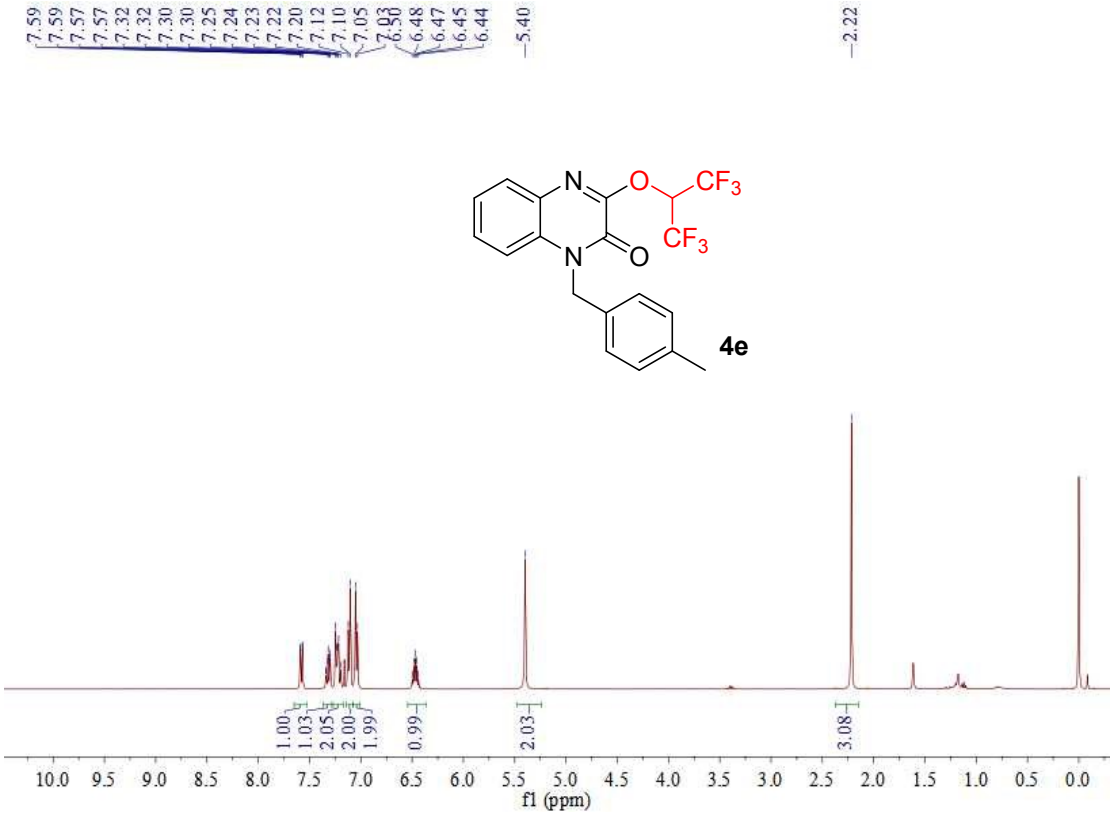

*[13]C NMR (101 MHz, $CDCl_3$)*



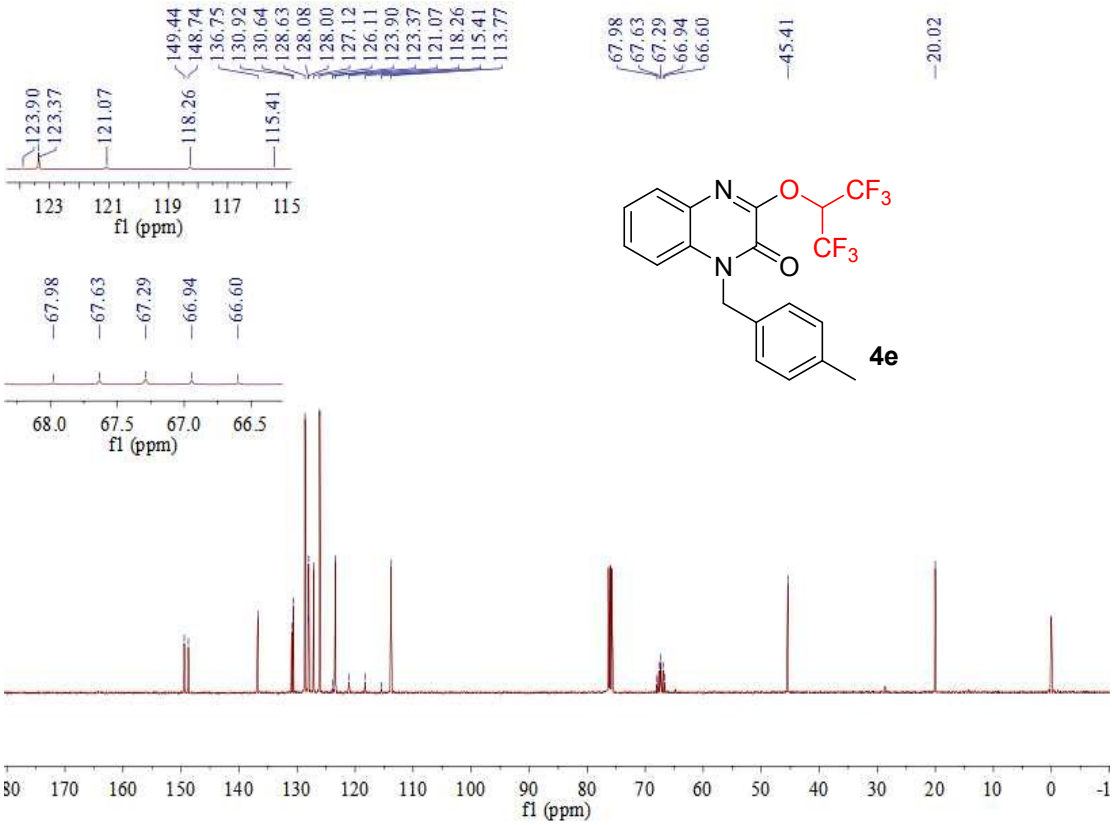
*$^{19}F$ NMR (377 MHz, $CDCl_3$)*



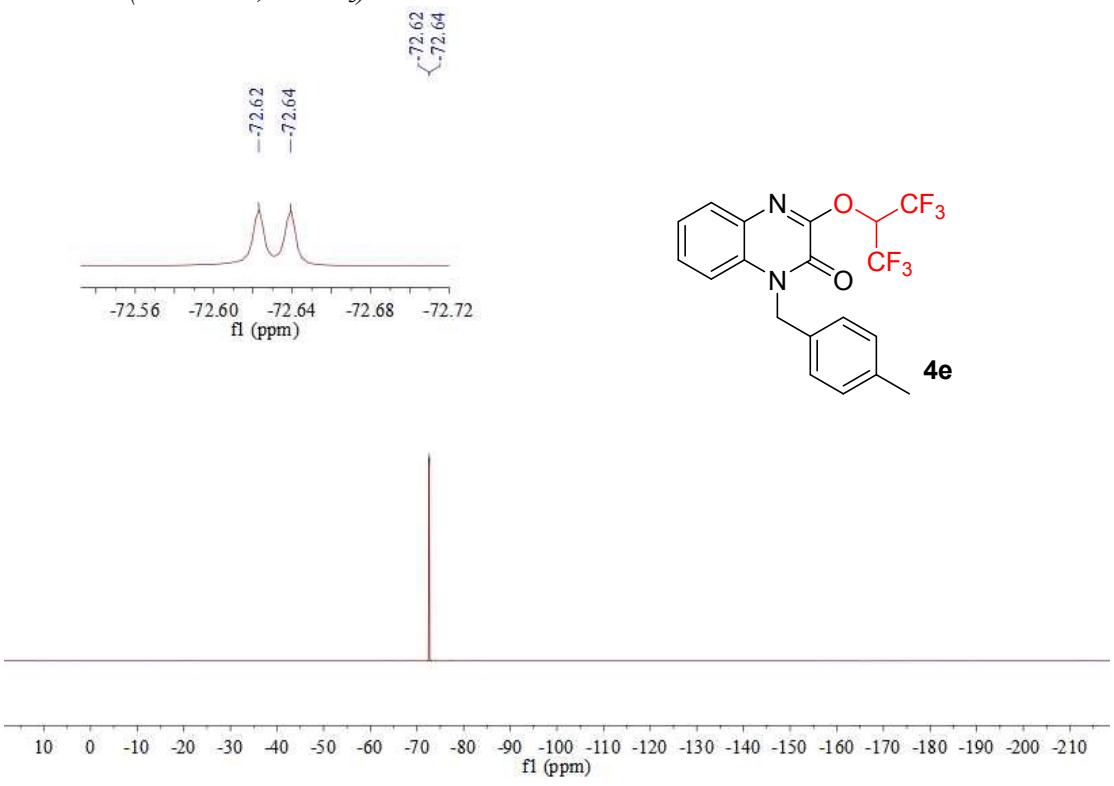

*$^{1}H$ NMR (400 MHz, $CDCl_3$)*



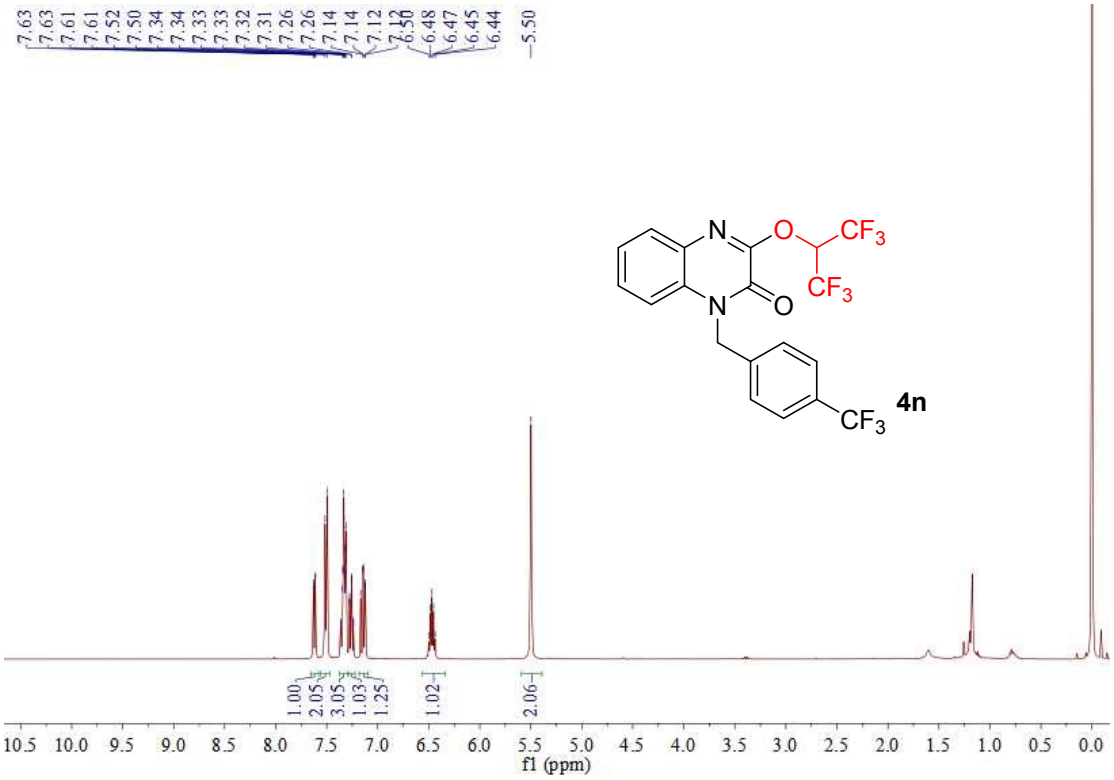
*$^{13}C$ NMR (101 MHz, $CDCl_3$)*



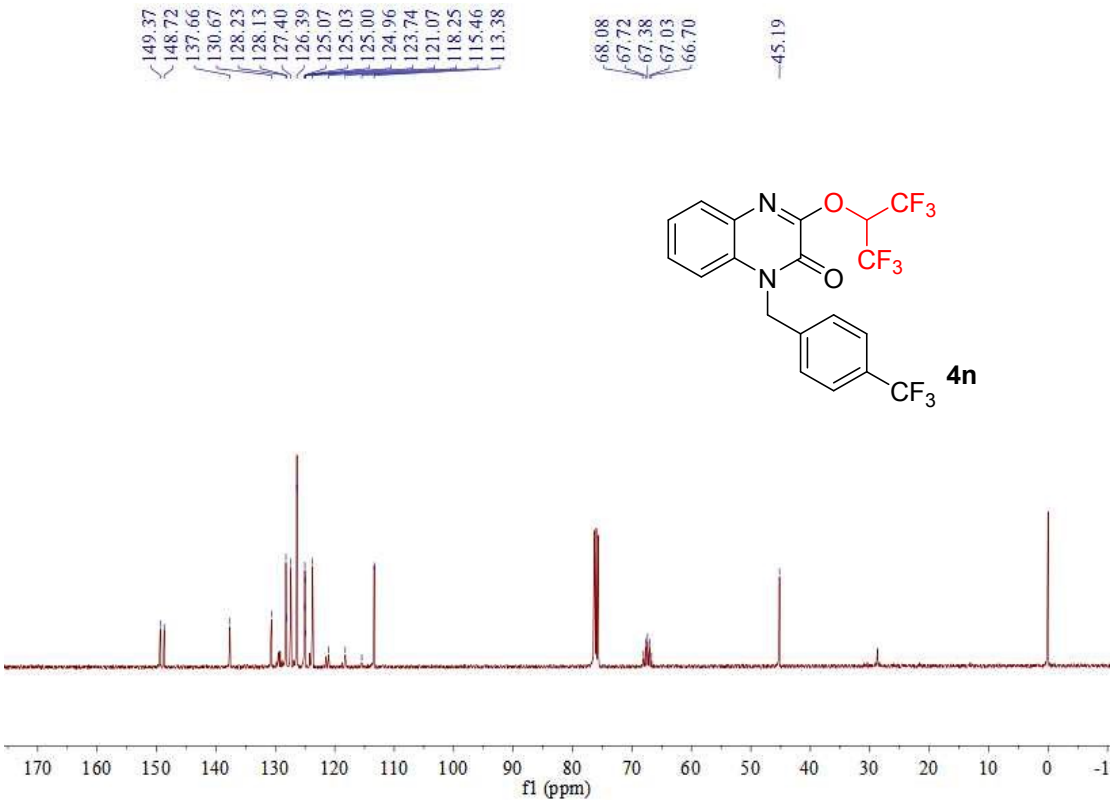

*$^{19}F$ NMR (377 MHz, $CDCl_3$)*



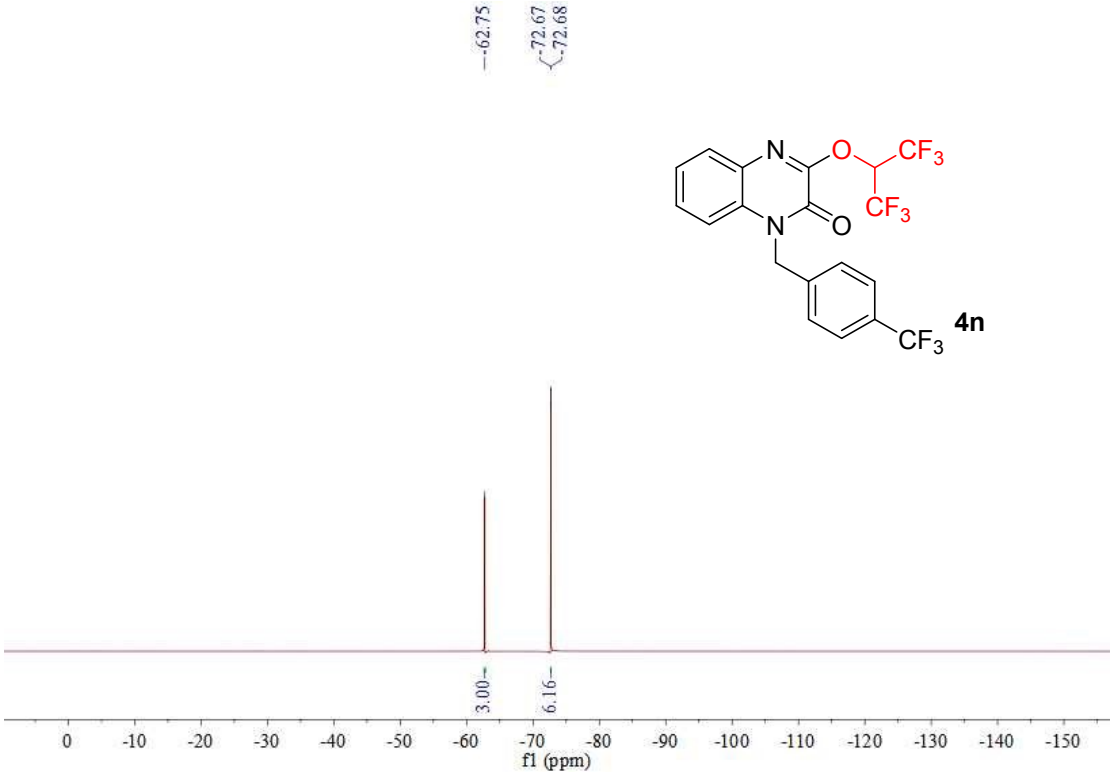
*$^{1}H$ NMR (400 MHz, $CDCl_3$)*



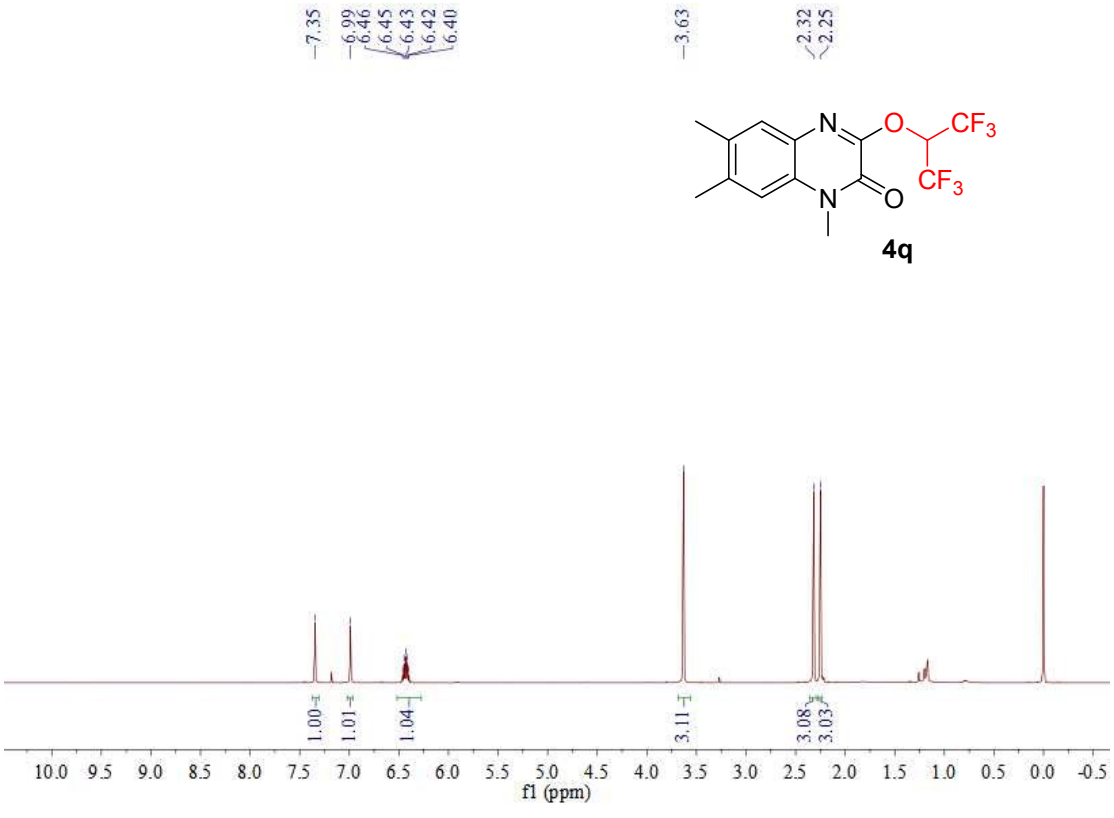

*$^{13}C$ NMR (101 MHz, $CDCl_3$)*



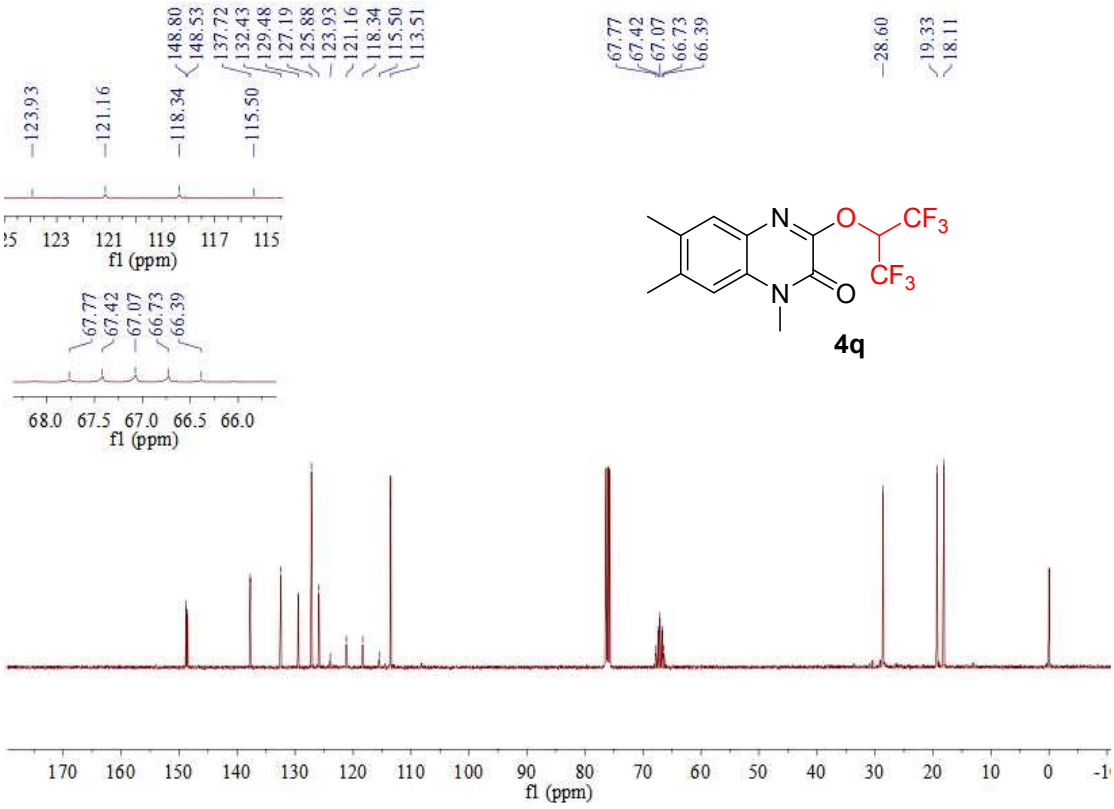
*$^{19}F$ NMR (377 MHz, $CDCl_3$)*



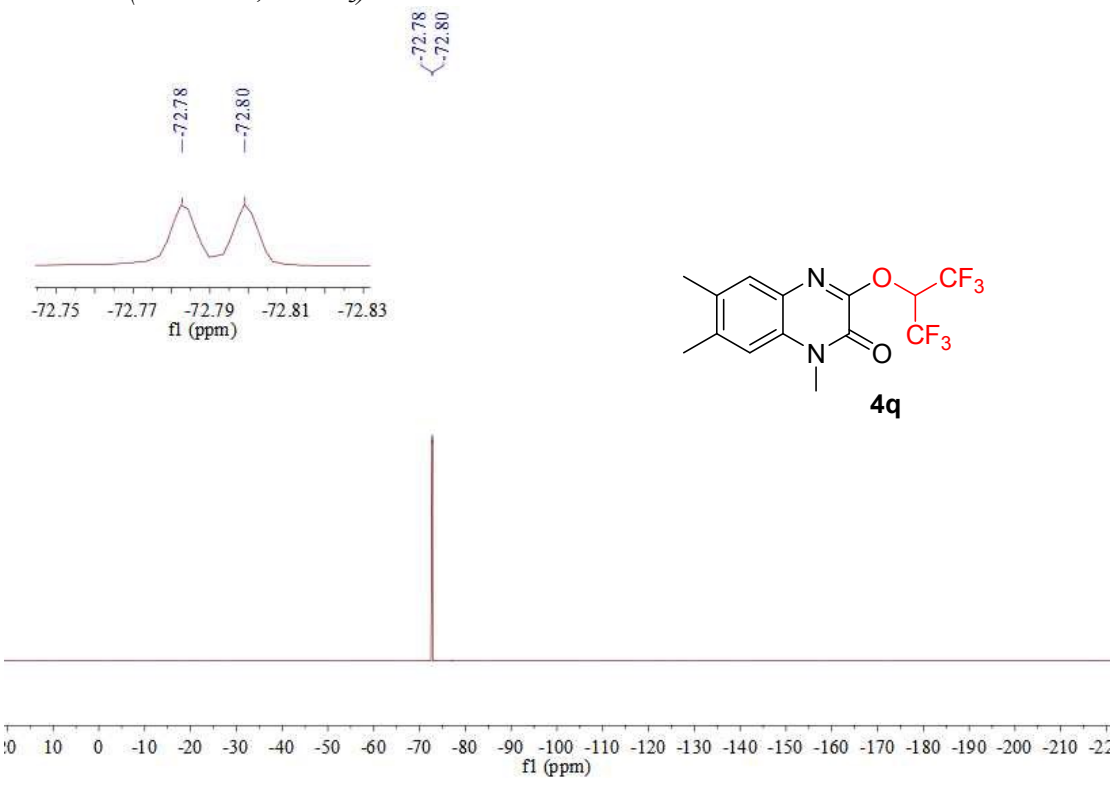

*$^{1}H$ NMR (400 MHz, $CDCl_3$)*



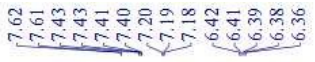
*$^{13}C$ NMR (101 MHz, $CDCl_3$)*



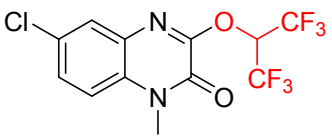

*$^{19}F$ NMR (376 MHz, $CDCl_3$)*



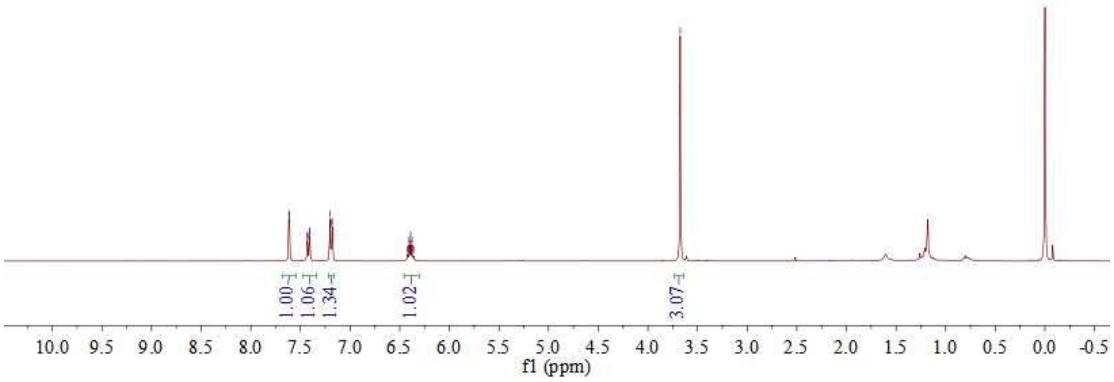
*$^{1}H$ NMR (400 MHz, $CDCl_3$)*





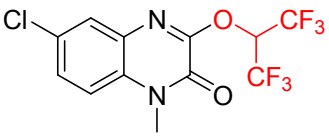



**4r**

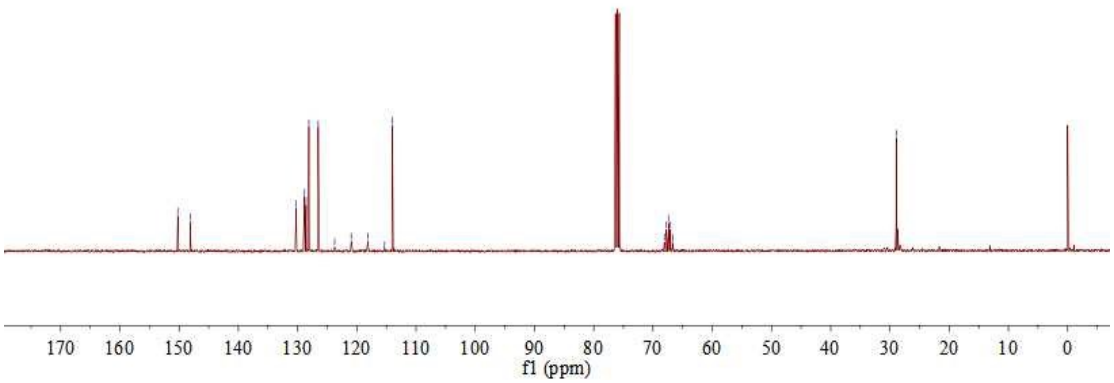



*$^{13}C$ NMR (101 MHz, $CDCl_3$)*

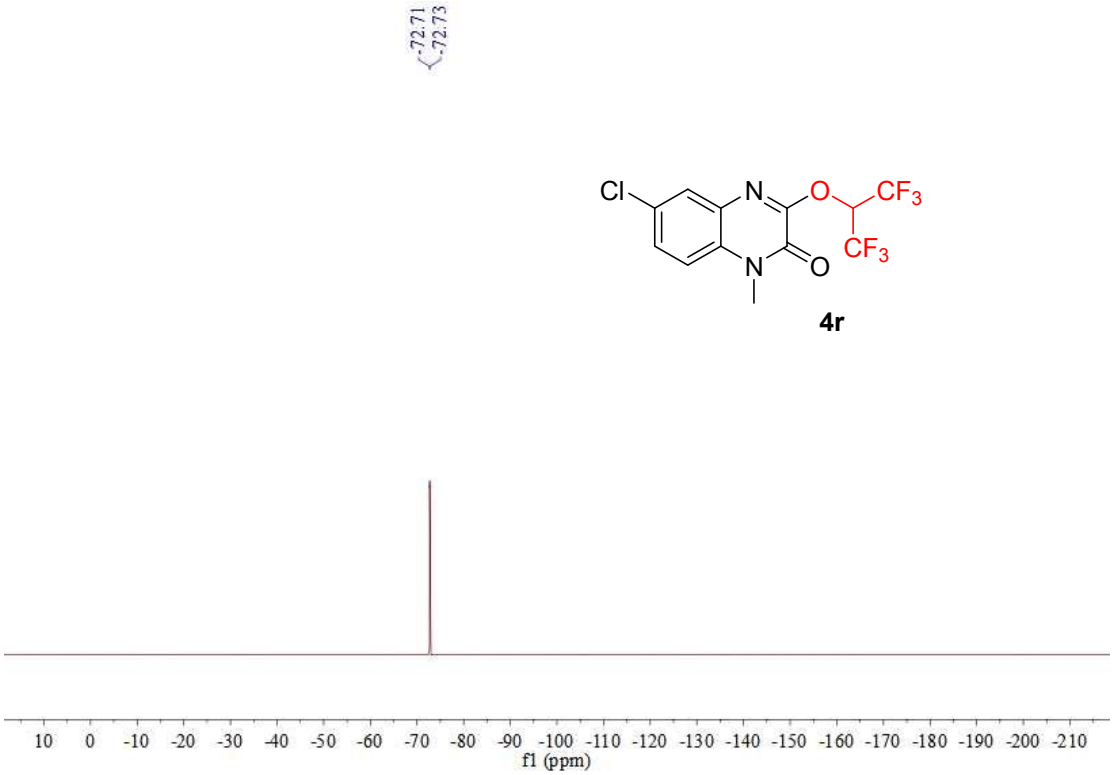


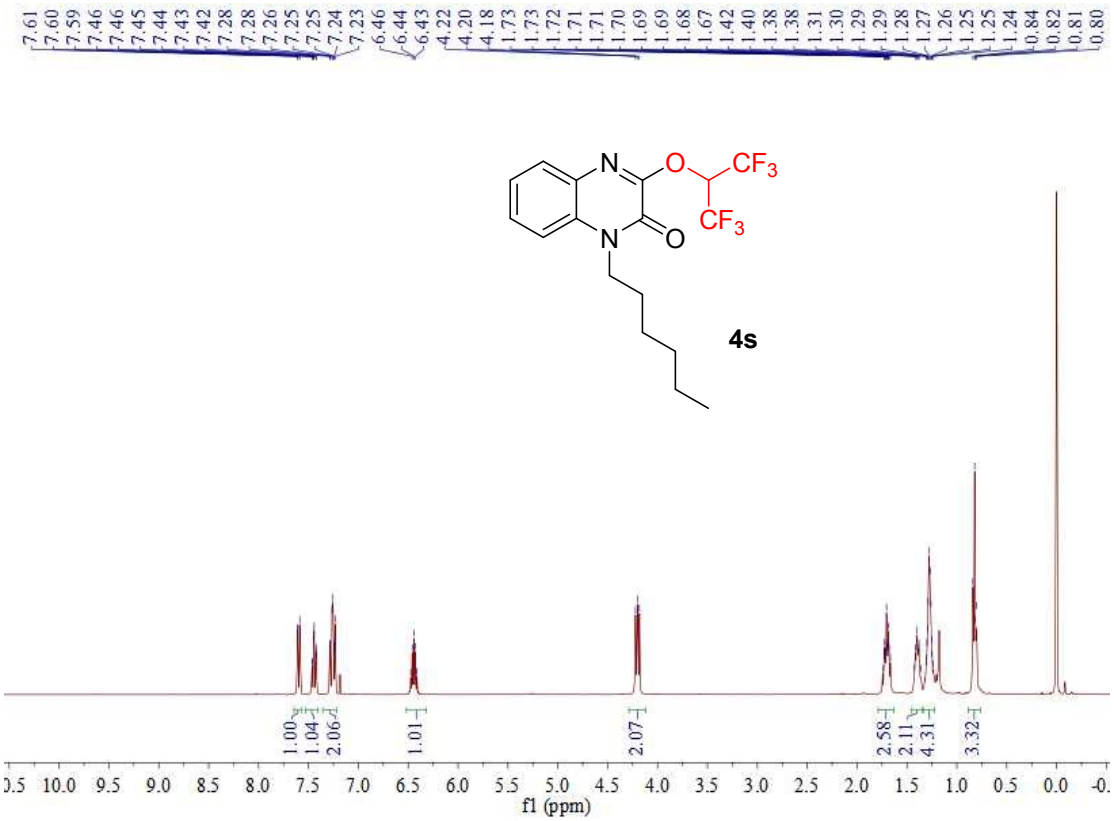

**4r**



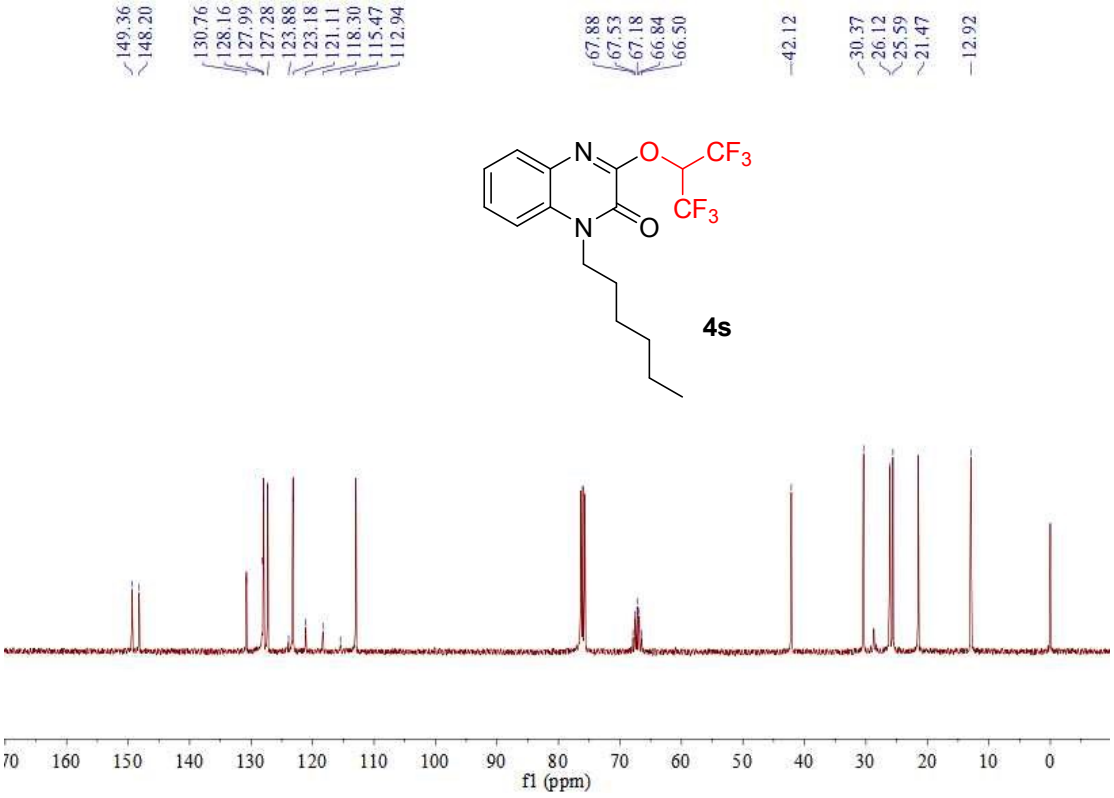
*$^{19}F$ NMR (377 MHz, $CDCl_3$)*



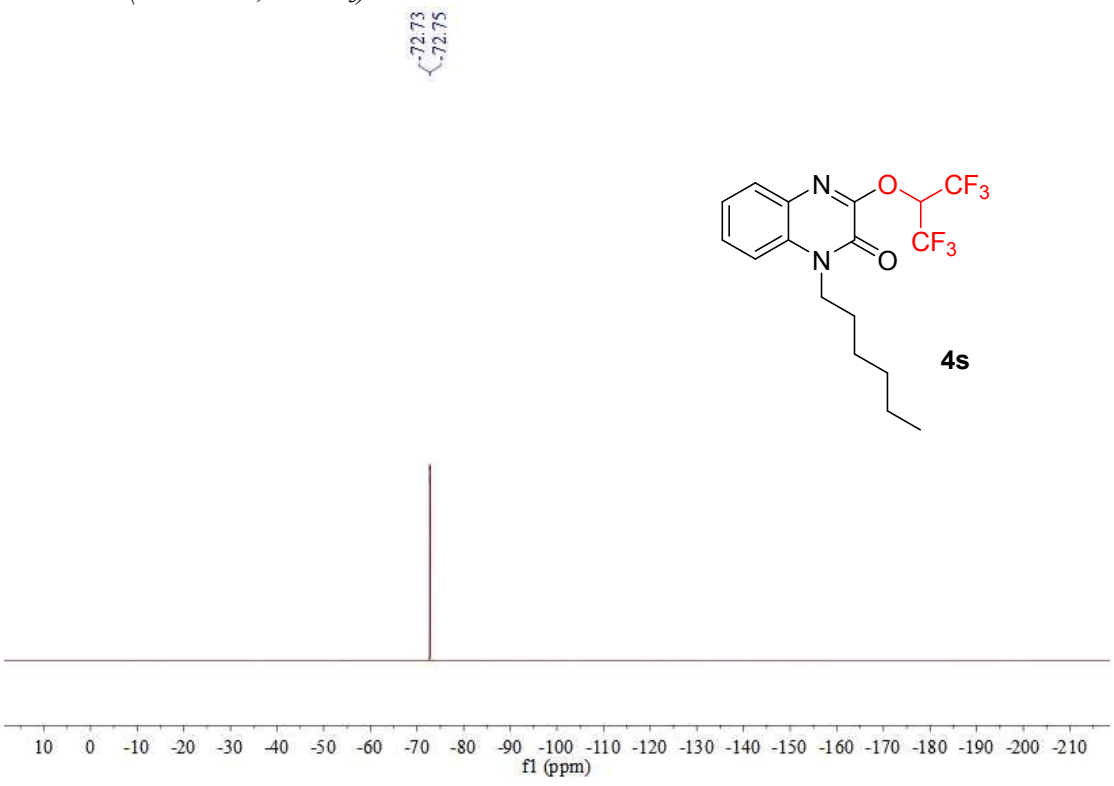

*$^{1}H$ NMR (400 MHz, $CDCl_3$)*



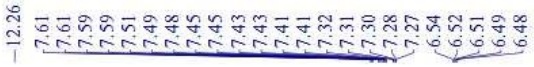
*$^{13}C$ NMR (101 MHz, $CDCl_3$)*

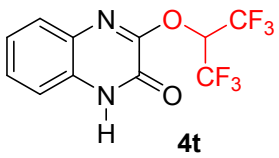



*$^{19}F$ NMR (377 MHz, $CDCl_3$)*

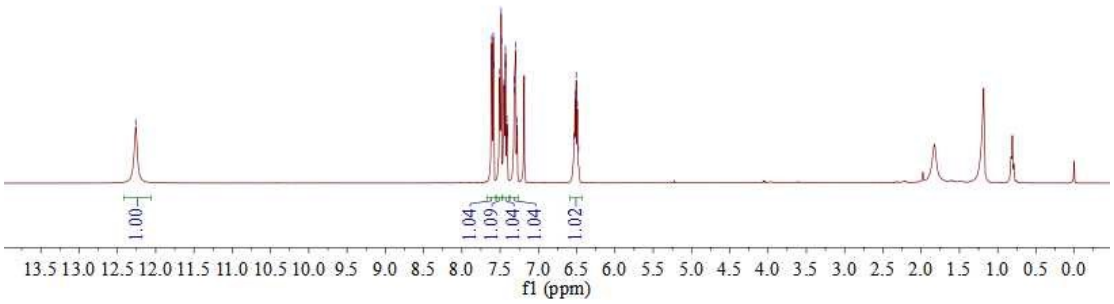


*[1]H NMR (400 MHz, $CDCl_3$)*

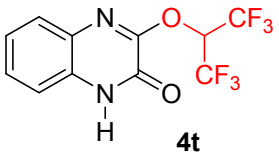


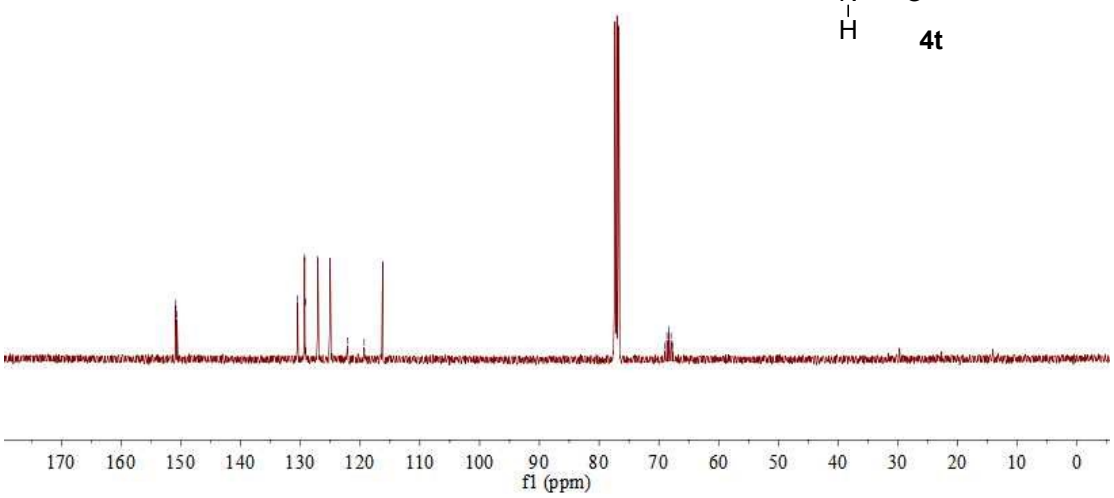

**4t**



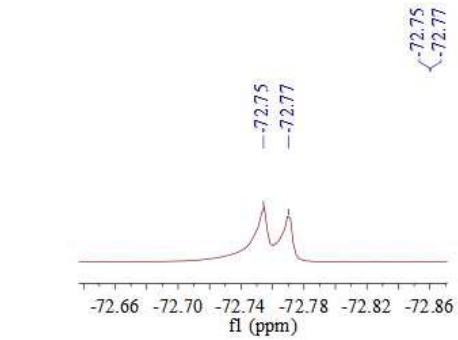

*[13]C NMR (101 MHz, $CDCl_3$)*

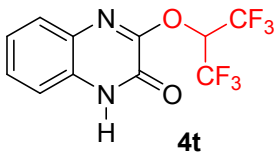




**4t**

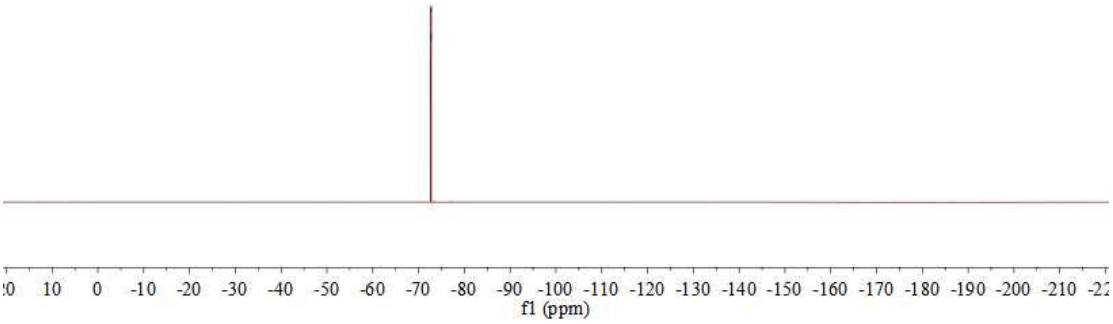


*$^{19}F$ NMR (376 MHz, $CDCl_3$)*

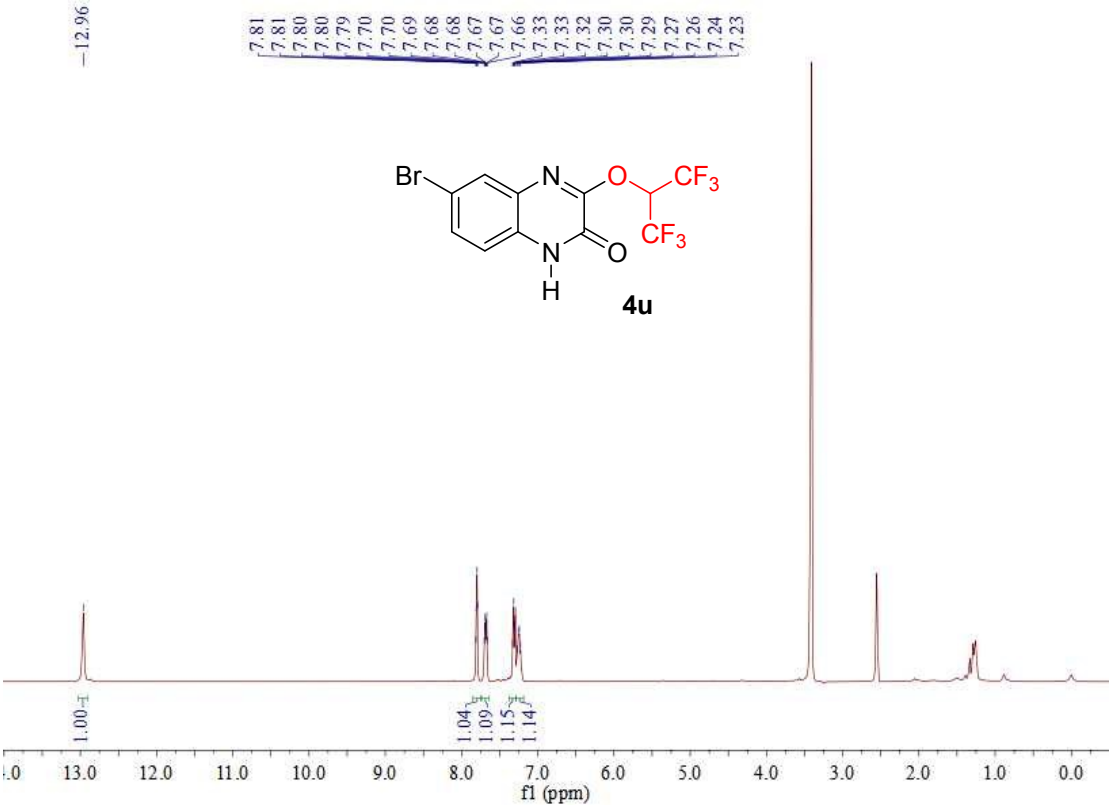



**4t**

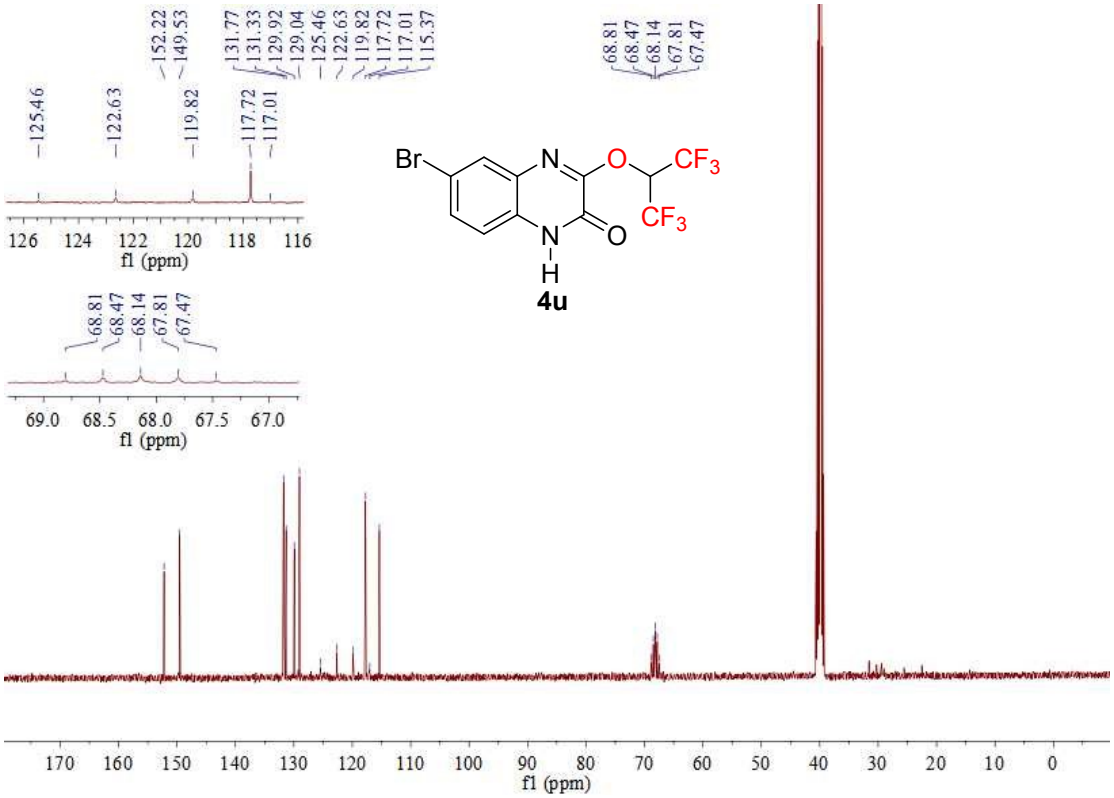



*$^{1}H$ NMR (400 MHz, DMSO-$d_6$)*

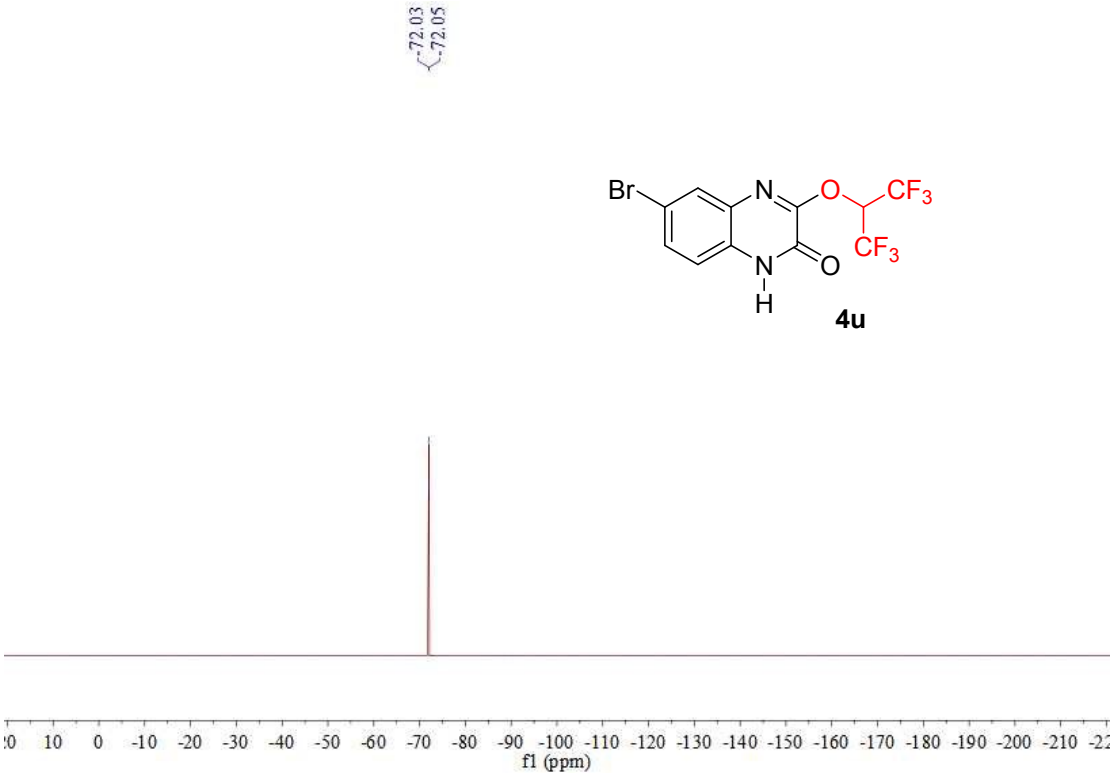



**4u**

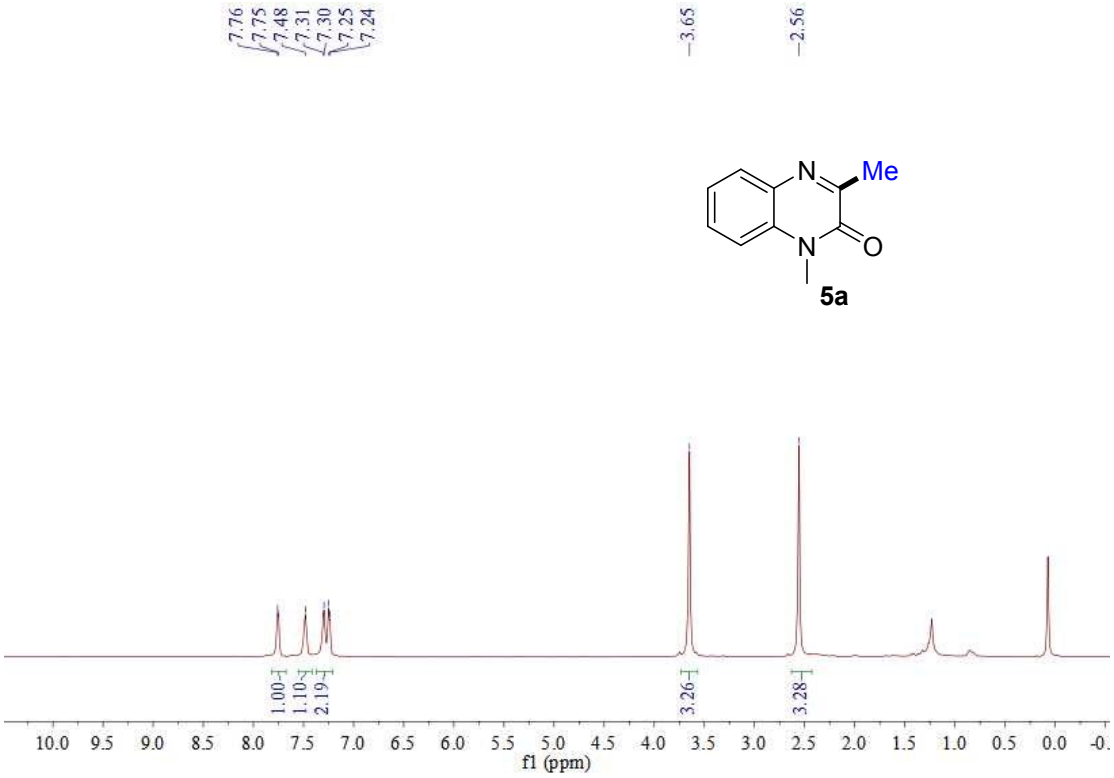
*$^{13}$C NMR (101 MHz, DMSO-$d_6$)*




*$^{19}$F NMR (376 MHz, DMSO-$d_6$)*



*$^{1}H$ NMR (600 MHz, $CDCl_3$)*




*$^{13}C$ NMR (151 MHz, $CDCl_3$)*