Electronic Supplementary Material (ESI) for ChemComm.

Supporting Information

Consecutive Photochemical Reactions Enabled by a Dual Flow Reactor Coil Strategy

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1. Materials and Methods

Unless otherwise stated, all solvents were purchased from Fisher Scientific and Merck, and used without further purification. Substrates and reagents were purchased from Fluorochem or Sigma Aldrich and used as received.

^{1}H-NMR spectra were recorded on 400 MHz and 500 MHz instruments and are reported relative to residual solvent: $CHCl_3$ (δ 7.26 ppm). ^{13}C-NMR spectra were recorded on the same instruments (100 and 125 MHz) and are reported relative to $CHCl_3$ (δ 77.16 ppm). Data for ^{1}H-NMR are reported as follows: chemical shift (δ/ ppm) (multiplicity, coupling constant (Hz), integration). Multiplicities are reported as follows: s = singlet, d = doublet, t = triplet, q = quartet, p = pentet, m = multiplet, br. s = broad singlet, app = apparent. Data for 13C{1H} NMR are reported in terms of chemical shift (δ/ ppm) and multiplicity (C, CH, CH_2 or CH_3). COSY, HSQC, HMBC and NOESY experiments were used in the structural assignment. IR spectra were obtained by use of a Bruker Platinum spectrometer (neat, ATR sampling) with the intensities of the characteristic signals being reported as weak (w, <20% of tallest signal), medium (m, 21-70% of tallest signal) or strong (s, >71% of tallest signal).

High-resolution mass spectrometry was performed using the indicated techniques on a micromass LCT orthogonal time-of-flight mass spectrometer with leucine-enkephalin (Tyr-Gly-Phe-Leu) as an internal lock mass.

For UV-Vis measurements a Shimadzu UV-1800 UV spectrophotometer was used. Melting points were recorded on a Stuart SMP10 melting point apparatus and are uncorrected.

Single-Crystal X-Ray experiments were performed on a Bruker 3-circle D8 Venture diffractometer with a PHOTON III C14 MM CPAD area detector, using Mo-Ka radiation (λ=0.71073 Å) from an Incoatec IμS 3.0 microsource with focusing mirrors. Crystals were cooled using a Cryostream (Oxford Cryosystems) open-flow N_2 gas cryostat. The data were processed using APEX3 v.2017.3-0, reflection intensities integrated using SAINT v8.40A software (Bruker AXS, 2019) and scaled using SADABS-2016/2 program.[SI1] The structures were solved by dual-space intrinsic phasing method using SHELXT 2018/2 program[SI2] and refined by full-matrix least squares using SHELXL 2018/3 software[SI3] on OLEX2 platform.[SI4]

Continuous flow experiments were performed on a Vapourtec E-series system with the UV150 photoreactor that is equipped with a high-power LED array (50-100 W tuneable, λ_{max} 365 nm, Figure on page 14)

[SI1] Krause, L.; Herbst-Irmer, R.; Sheldrick G. M.; Stalke D. *J. Appl. Crystallogr.* **2015**, *48*, 3-10.

[SI2] Sheldrick, G. M. *Acta Crystallogr.* **2015**, A71, 3-8.

[SI3] Sheldrick, G. M. *Acta Crystallogr.* **2015**, C71, 3-8.

[SI4] Dolomanov, O. V.; Bourhis, L. J.; Gildea, R .J; Howard, J. A. K.; Puschmann, H., *J. Appl. Crystallogr.* **2009**, *42*, 339-341.

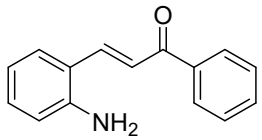
2. Experimental Procedures and Spectroscopic Data of all Compounds

Synthesis of Amino-enones (1a-g).

Following a previously published procedure [SI5] the aldol product (1 equiv.) and iron powder (10 equiv.) were suspended in EtOH/H_2O 9:1 (0.5M). Concentrated HCl (10 mol %) was then added dropwise and the resulting mixture was heated at reflux (ca. 70 °C) until TLC analysis indicated completion (approximately 1 h). The resulting mixture was cooled and diluted with EtOAc (30 mL) before filtering over a pad of silica (15 cm) to give a solution of the crude product. The crude material was purified by SiO_2 column chromatography using EtOAc/c-Hex (10-20%).

[SI5] - M. Di Filippo and M. Baumann, *Eur. J. Org. Chem.*, **2020**, *39*, 6199.

(*E*)-3-(2-Aminophenyl)-1-phenylprop-2-en-1-one (1a):

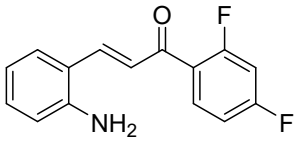


Chemical Formula: $C_{15}H_{13}NO$
Exact Mass: 223.10

Yield: 56% (28.7 mg, 0.13 mmol)
Appearance: Yellow solid.
Melting point: 121-123 °C.

^{1}H-NMR (400 MHz, $CDCl_3$) δ/ppm 8.03-7.96 (m, 3H), 7.59-7.46 (m, 5H), 7.19 (ddd, *J* = 8.9, 7.3, 1.5 Hz, 1H), 6.78 (t, *J* = 7.3 Hz, 1H), 6.72 (dd, *J* = 8.1, 1.3 Hz, 1H), 4.06 (s, 2H). **^{13}C-NMR (100 MHz, $CDCl_3$)** δ/ppm 190.3 (C), 146.2 (C), 140.1 (CH), 138.2 (C), 132.7 (CH), 131.6 (CH), 128.6 (2CH), 128.4 (2CH), 128.1 (CH), 121.8 (CH), 120.3 (C), 118.9 (CH), 116.8 (CH). **IR (neat)** ν/cm^{-1}: 3333 (br), 3031 (w), 1650 (m), 1569 (s), 1485 (m), 1341 (s), 1211 (s), 1155 (m), 1039 (s), 728 (s), 684 (s). **HR-MS (TOF ES+)** calcd for $C_{15}H_{14}NO$ 224.1075 found 224.1076 ($M+H^+$).

(*E*)-3-(2-Aminophenyl)-1-(2,4-difluorophenyl)prop-2-en-1-one (1b):

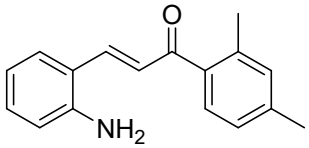


Chemical Formula: $C_{15}H_{11}F_2NO$
Exact Mass: 259.08

Yield: 61% (366 mg, 1.41 mmol)
Appearance: Orange solid.
Melting point: 115-117 °C.

^{1}H-NMR (400 MHz, $CDCl_3$) δ/ppm 7.96-7.86 (m, 2H), 7.49 (dd, *J* = 7.8, 1.0 Hz, 1H), 7.33 (dd, *J* = 15.4, 3.2 Hz, 1H), 7.21 (ddd, *J* = 8.1, 7.2, 1.6 Hz, 1H), 7.00-6.95 (m, 1H), 6.91 (ddd, *J* = 10.8, 8.7, 2.4 Hz, 1H), 6.79 (t, *J* = 7.4 Hz, 1H), 6.72 (dd, *J* = 8.0, 1.3 Hz, 1H), 4.04 (s, 2H). **^{13}C-NMR (100 MHz, $CDCl_3$)** δ/ppm 187.2 (d, *J* = 4.0 Hz, C), 165.5 (dd, *J* = 257.0, 12.0 Hz, CF), 161.9 (dd, *J* = 257.0, 12.0 Hz, CF), 146.4 (C), 140.3 (CH), 132.9 (dd, *J* = 11.0, 4.0 Hz, CH), 131.9 (CH), 128.4 (CH), 124.7 (d, *J* = 8.0 Hz, CH), 123.7 (dd, J = 13.0, 4.0 Hz, C), 119.9 (C), 118.9 (CH), 116.8 (CH), 112.2 (dd, *J* = 21.0, 3.0 Hz, CH), 104.7 (dd, *J* = 28.0, 26.0 Hz, CH). **^{19}F-NMR (282 MHz, $CDCl_3$)** δ/ppm -102.8 (m, 1F), -105.7 (m, 1F). **IR (neat)** ν/cm^{-1}: 3403 (w), 1655 (w), 1590 (s), 1487 (m), 1340 (m), 1229 (m), 1097 (s), 970 (m), 851 (s), 730 (s). **HR-MS (TOF ES+)** calcd for $C_{15}H_{12}F_2NO$ 260.0881, found 260.0882 ($M+H^+$)

(*E*)-3-(2-Aminophenyl)-1-(2,4-dimethylphenyl)prop-2-en-1-one (1c):

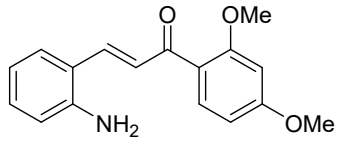


Chemical Formula: $C_{17}H_{17}NO$
Exact Mass: 251.13

Yield: 61% (306 mg, 1.22 mmol)
Appearance: Orange oil.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 7.74 (d, *J* = 15.7, 1H), 7.49 (d, *J* = 7.8, 1H), 7.46 (dd, *J* = 7.8, 1.7 Hz, 1H), 7.20 (td, *J* = 7.2, 1.5 Hz, 1H), 7.15 (d, *J* = 15.7 Hz, 1H), 7.10-7.06 (m, 2H), 6.79 (t, *J* = 9.0 Hz, 1H), 6.71 (d, *J* = 8.1 Hz, 1H), 4.02 (s, 2H), 2.47 (s, 3H), 2.37 (s, 3H). **^{13}C-NMR (125 MHz, $CDCl_3$)** δ/ppm 195.3 (C), 146.1 (C), 141.0 (C), 140.2 (CH), 137.6 (C), 136.3 (C), 132.3 (CH), 131.6 (CH), 128.7 (CH), 128.1 (CH), 126.1 (2CH), 120.1 (C), 118.9 (CH), 116.8 (CH), 21.3 (CH_3), 20.5 (CH_3). **IR (neat)** ν/cm^{-1}: 3365 (br), 2921 (w), 2356 (w), 1656 (m), 1609 (m), 1583 (m), 1488 (m), 1458 (m), 1331 (m), 1275 (m), 1261 (m), 1211 (m), 1159 (m), 1440 (w), 1014 (w), 817 (w), 750 (s), 590 (w), 461 (w). **HR- MS (TOF ES+):** calcd for $C_{17}H_{18}NO$ 252.1383, found 252.1385 (M + H$^+$).

(*E*)-1-(2,4-Dimethoxyphenyl)-3-phenylprop-2-en-1-one (1d):

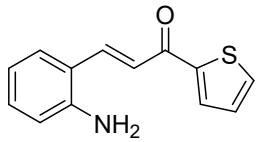


Chemical Formula: $C_{17}H_{17}NO_3$
Exact Mass: 283.12

Yield: 77% (719 mg, 2.54 mmol)
Appearance: Yellow oil.

^{1}H-NMR (400 MHz, $CDCl_3$) δ/ppm 7.83 (d, *J* = 15.6 Hz, 1H), 7.76 (d, *J* = 8.7 Hz, 1H), 7.44 (dd, *J* = 7.8, 1.6 Hz, 1H), 7.43 (d, *J* = 15.4 Hz, 1H), 7.14 (ddd, *J* = 8.4, 7.4, 1.5 Hz, 1H), 6.75 (td, *J* = 7.6, 7.2, 1.3 Hz, 1H), 6.68 (dd, *J* = 8.0, 1.2 Hz, 1H), 6.54 (dd, *J* = 8.6, 2.3 Hz, 1H), 6.47 (d, *J* = 2.2 Hz, 1H), 4.06 (s, 2H), 3.87 (s, 3H), 3.84 (s, 3H). **^{13}C-NMR (100 MHz, $CDCl_3$)** δ/ppm 190.2 (C), 164.1 (C), 160.4 (C), 145.9 (C), 137.4 (CH), 132.9 (CH), 130.9 (CH), 128.3 (CH), 127.3 (CH), 122.3 (C), 120.8 (C), 118.7 (CH), 116.5 (CH), 105.2 (CH), 98.6 (CH), 55.7 (CH_3), 55.5 (CH_3). **IR (neat)** ν/cm^{-1}: 3446 (m), 3357 (m), 3243 (w), 2940 (w), 1644 (m), 1597 (s), 1572 (s), 1456 (m), 1329 (s), 1288 (s), 1248 (s), 1206 (s), 1159 (s), 1124 (s), 1020 (s), 748 (s), 730 (s). **HR- MS (TOF ES+):** calcd for $C_{17}H_{18}NO_3$ 284.1281, found 284.1285 (M+H$^+$).

(*E*)-3-(2-Aminophenyl)-1-(thiophen-2-yl)prop-2-en-1-one (1e):

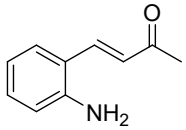


Chemical Formula: $C_{13}H_{11}NOS$
Exact Mass: 229,0561

Yield: 65% (447 mg, 1.95 mmol)
Appearance: Orange powder.
Melting point: 138-140 °C.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 8.02 (d, *J* = 15.3 Hz, 1H), 7.87 (dd, *J* = 3.8, 1.0 Hz, 1H), 7.69 (dd, *J* = 4.9, 1.0 Hz, 1H), 7.53 (dd, *J* = 7.8, 1.2 Hz, 1H), 7.38 (d, *J* = 15.3 Hz, 1H), 7.24 – 7.19 (m, 2H), 6.81 (t, *J* = 7.5 Hz, 1H), 6.74 (d, *J* = 8.1 Hz, 1H), 4.08 (s, 2H). **^{13}C-NMR (126 MHz, $CDCl_3$)** δ/ppm 182.0 (C), 146.3 (C), 145.7 (C), 139.3 (CH), 133.7 (CH), 131.7 (CH) 131.6 (CH), 128.2 (CH), 128.1 (CH), 121.5 (CH), 120.1 (C), 118.9 (CH), 116.8 (CH). **IR (neat)** ν/cm^{-1}: 3331 (w), 1647 (m), 1574 (s), 1458 (m), 1413 (m), 1218 (m), 977 (m), 857 (w), 746 (m), 696 (s), 593 (w). **HR-MS (TOF ES+)** calculated for $C_{13}H_{12}NOS$ 230.0634, found 230.0633 (M+H$^+$).

(*E*)-4-(2-Aminophenyl)but-3-en-2-one (1f):

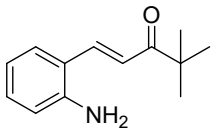


Chemical Formula: $C_{10}H_{11}NO$
Exact Mass: 161.08

Yield: 93% (115 mg, 0.77 mmol)
Appearance: Orange oil.

^{1}H-NMR (400 MHz, $CDCl_3$) δ/ppm 7.68 (d, *J* = 15.9 Hz, 1H), 7.40 (dd, *J* = 7.8, 1.5 Hz, 1H), 7.19 (ddd, *J* = 8.2,7.3, 1.5 H z, 1H), 6.78 (t, *J* = 7.2 Hz, 1H), 6.71 (dd, *J* = 8.1, 0.9 Hz, 1H), 6.67 (d, *J* = 15.9 Hz, 1H), 3.97 (s, 2H), 2.37 (s, 3H). **^{13}C-NMR (100 MHz, $CDCl_3$)** δ/ppm 198.1 (C), 145.8 (C), 138.6 (CH), 131.6 (CH), 128.2 (CH), 126.8 (CH), 119.9 (C), 119.1 (CH), 116.9 (CH), 28.0 (CH_3). **IR (neat)** ν/cm^{-1}: 3438 (m), 3243 (w), 1664 (s), 1636 (s), 1590 (s), 1488 (s), 1316 (m), 1248 (s), 1159 (m), 974 (m), 751 (m). **HR-MS (TOF ES+)**: calculated for $C_{10}H_{12}NO$ 162.0913, found 162.0916 ($M+H^+$).

(*E*)-1-(2-Aminophenyl)-4,4-dimethylpent-1-en-3-one (1g):



Chemical Formula: $C_{13}H_{17}NO$
Exact Mass: 203.13

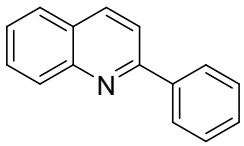
Yield: 88% (627 mg, 3.1 mmol)
Appearance: Red oil.

^{1}H-NMR (400 MHz, $CDCl_3$) δ/ppm 7.81 (d, *J* = 15.4 Hz, 1H), 7.41 (dd, *J* = 7.8, 1.5 Hz, 1H), 7.15 (ddd, *J* = 8.2, 7.4, 1.5 Hz, 1H), 7.03 (d, *J* = 15.3 Hz, 1H), 6.75 (t, *J* = 7.2 Hz, 1H), 6.68 (dd, *J* = 8.1, 0.9 Hz, 1H), 3.98 (s, 2H), 1.21 (s, 9H). **^{13}C-NMR (100 MHz, $CDCl_3$)** δ/ppm 204.3 (C), 146.0 (C), 138.1 (CH), 131.2 (CH), 127.9 (CH), 120.9 (CH), 120.3 (C), 118.7 (CH), 116.6 (CH), 43.1 (C), 26.4 ($3CH_3$). **IR (neat)** ν/cm^{-1}: 3367 (w), 2965 (m), 1672 (m), 1586 (s), 1459 (m), 1330 (s), 1262 (w), 1158 (m), 1077 (s), 1007 (m), 748 (s), 577 (w), 460 (w). **HR-MS (TOF ES+)**: calculated for $C_{13}H_{18}NO$ 204.1383, found 204.1386 ($M+H^+$).

Synthesis of substituted Quinolines (2a-g).

A solution of amine (**1**) in MeCN (100 mM) was prepared and passed through the UV-150 Vapourtec photoreactor unit equipped with LED lamp (10 min residence time, approx. 40° C, 70 W input power). The reaction mixture was collected, and the solvent was evaporated in *vacuo* to give the desired crude material. Silica column chromatography (10% c-Hex/ EtOAc) was performed giving the desired quinoline products in pure form.

2-Phenylquinoline (2a):

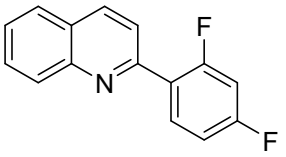


Chemical Formula: $C_{15}H_{11}N$
Exact Mass: 205.09

Yield: 79% (900 mg, 4.39 mmol)
Appearance: Off-white solid.
Melting point: 85-87 °C.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 8.25 (d, *J* = 8.7 Hz, 1H), 8.22–8.16 (m, 3H), 7.91 (d, *J* = 8.6 Hz, 1H), 7.85 (dd, *J* = 8.1, 1.0 Hz, 1H), 7.75 (ddd, *J* = 8.4, 6.9, 1.4 Hz, 1H), 7.60–7.46 (m, 4H). **^{13}C-NMR (125 MHz, $CDCl_3$)** δ/ppm 157.4 (C), 148.3 (C), 139.7 (C), 136.8 (CH), 129.8 (CH), 129.6 (CH), 129.3 (CH), 128.8 (2CH), 127.6 (CH), 127.5 (CH), 127.2 (C), 126.3 (2CH), 119.0 (CH). **IR (neat)** ν/cm^{-1}: 2957 (m), 1619 (m), 1600 (s), 1502 (s), 1363 (m), 1138 (s), 1102 (w), 829 (s), 756 (s), 478 (w). **HR-MS (TOF ES+):** calcd for $C_{15}H_{12}N$ 206.0970, found 206.0962 ($M+H^+$).

2-(2,4-Difluorophenyl)quinoline (2b):

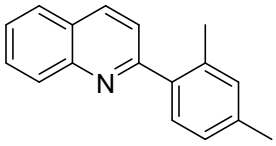


Chemical Formula: $C_{15}H_9F_2N$
Exact Mass: 241.07

Yield: 55% (270 mg, 1.12 mmol)
Appearance: White solid.
Melting point: 94-95°C.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 8.23 (d, *J* = 7.7 Hz, 1H), 8.19-8.14 (m, 2H), 7.87-7.85 (m, 2H), 7.78 (ddd, *J* = 8.4, 6.9, 1.4 Hz, 1H), 7.59 (ddd, *J* = 8.2, 6.9, 1.0 Hz, 1H), 7.09 (dddd, *J* = 8.7, 7.9, 2.5, 1.0 Hz, 1H), 7.00 (ddd, *J* = 11.0, 8.8, 2.0 Hz, 1H). **^{13}C-NMR (125 MHz, $CDCl_3$)** δ/ppm 164.5 (dd, *J* = 250.0, 12.0 Hz, CF), 159.9 (dd, *J* = 251.0, 12.0 Hz, CF), 153.0 (d, *J* = 2.0 Hz, C), 148.3 (C), 136.3 (CH), 132.7 (dd, *J* = 12.0, 4.0 Hz, C), 129.7 (CH), 129.6 (CH), 127.5 (CH), 127.2 (C), 126.7 (CH), 124.3 (dd, *J* = 10.0, 5.0 Hz, CH), 122.1 (d, *J* = 9.0 Hz, CH), 112.2 (dd, *J* = 21.0, 4.0 Hz, CH), 104.6 (dd, *J* = 28.0, 26.0 Hz, CH). **^{19}F-NMR** (376 MHz, $CDCl_3$) δ/ppm -108.7 (m, 1F), -112.8 (m, 1F). **IR (neat)** ν/cm^{-1}: 2921 (w), 1595 (m), 1496 (m), 1416 (m), 1263 (m), 1133 (m), 1095 (m), 968 (m), 833 (s), 755 (s), 468 (m). **HR-MS (TOF ES+):** calcd for $C_{15}H_{10}F_2N$ 242.0776, found 242.0781 ($M+H^+$).

2-(2,4-Dimethylphenyl)quinoline (2c):

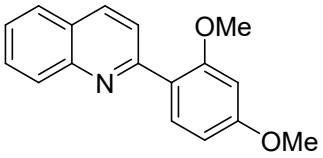


Chemical Formula: $C_{17}H_{15}N$
Exact Mass: 233.12

Yield: 77% (115 mg, 0.50 mmol)
Appearance: Yellow oil.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 8.21-8.19 (m, 2H), 7.87 (dd, *J* = 8.2, 1.6 Hz, 1H), 7.75 (td, *J* = 8.9, 7, 1.4 Hz, 1H), 7.57 – 7.52 (m, 2H), 7.42 (d, *J* = 7.5 Hz, 1H), 7.15 – 7.13 (m, 2H), 2.40 (s, 3H), 2.39 (s, 3H). **^{13}C-NMR (100 MHz, $CDCl_3$)** 160.4 (C), 148.0 (C), 138.3 (C), 138.0 (C), 136.0 (CH), 135.9 (C), 131.7 (CH), 129.8 (CH), 129.7 (CH), 129.6 (CH), 127.5 (CH), 126.8 (CH), 126.7 (C), 126.3 (CH), 122.5 (CH) 21.2 (CH_3), 20.3 (CH_3). **IR (neat)** ν/cm^{-1}: 3365 (w), 2921 (w), 2356 (w), 1656 (m), 1609 (m), 1583 (m), 1488 (w), 1458 (w), 1311 (m), 1275 (m), 1261 (m), 1211 (m), 1159 (w), 1140 (w), 871 (w), 750 (s), 590 (w), 461 (w). **HR-MS (TOF ES+):** calcd for $C_{17}H_{15}NNa$ 256.1097, found 256.1095 ($M + Na^+$).

2-(2,4-Dimethoxyphenyl)-quinoline (2d):

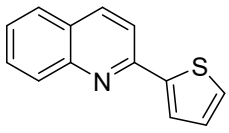


Chemical Formula: $C_{17}H_{15}NO_2$
Exact Mass: 265.11

Yield: 80% (446 mg, 1.68 mmol)
Appearance: White solid.
Melting point: 126°C - 130°C.

^{1}H-NMR (400 MHz, $CDCl_3$) δ/ppm 8.13-8.12 (m, 2H), 7.91 (dd, *J* = 8.6 Hz, 1H), 7.88 (dd, *J* = 8.5 Hz, 1H), 7.82 (dd, *J* = 8.5, 1.6, 1H), 7.68 (td, *J* = 10.0, 6.8, 1.5 Hz, 1H), 7.50 (t, *J* = 7.0 Hz, 1H), 6.68 (dd, *J* = 8.5, 2.3 Hz, 1H), 6.59 (s, 1H), 3.88 (s, 3H), 3.86 (s, 3H). **^{13}C-NMR (100 MHz, $CDCl_3$)** δ/ppm 161.7 (C), 158.4 (C), 156.8 (C), 148.3 (C), 134.9 (CH), 132.4 (CH), 129.4 (CH), 129.0 (CH), 127.3 (CH), 126.8 (C), 125.8 (CH), 123.3 (CH), 122.6 (C), 105.3 (CH), 98.9 (CH), 55.6 (CH_3), 55.5 (CH_3). **IR (neat)** ν/cm^{-1}: 2937 (w), 2835 (w), 1606 (s), 1497 (s), 1456 (s), 1427 (m), 1299 (s), 1277 (s), 1207 (s), 1160 (s), 1060 (m), 1030 (s), 834 (m), 759 (m). **HR-MS (TOF ES+):** calcd for $C_{17}H_{16}NO_2$ 266.1097, found 266.1088 ($M+H^+$).

2-(Thiophen-2-yl)-quinoline (2e):



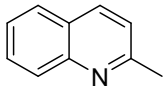
Chemical Formula: $C_{13}H_9NS$
Exact Mass: 211.05

Yield: 51% (81.1 mg, 0.39 mmol)
Appearance: White solid.
Melting point: 133-135 °C.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 8.15 (d, *J* = 8.6, 1.0 Hz, 1H), 8.11 (d, *J* = 8.4 Hz, 1H), 7.82 (d, *J* = 8.7 Hz, 1H), 7.78 (dd, *J* = 8.1, 1.2 Hz, 1H), 7.75

(d, *J* = 3.6 Hz, 1H) 7.72 (ddd, *J* = 8.4, 6.9, 1.4 Hz, 1H), 7.51-7.48 (m, 2H), 7.18 (dd, *J* = 5.0, 3.6 Hz, 1H). **^{13}C-NMR (125 MHz, $CDCl_3$)** δ/ppm 171.1 (C), 152.3 (CH), 148.1 (C), 145.4 (C), 136.6 (CH), 129.8 (CH), 129.9 (CH), 128.5 (CH), 128.0 (CH), 127.4 (CH), 127.1 (C), 126.0 (CH), 125.8 (CH). **IR (neat)** ν/cm^{-1}: 2916 (w), 1592 (m), 1497 (m), 1424 (m), 1315 (m), 1057 (w), 821 (s), 756 (s), 707 (s), 618 (m), 470 (m). **HR-MS (TOF ES+):** calcd for $C_{13}H_{10}NS$ 212.0528, found 212.0533 ($M+H^+$).

2-Methylquinoline (2f):

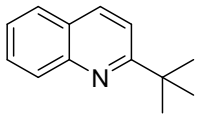


Chemical Formula: $C_{10}H_9N$
Exact Mass: 143.07

Yield: 91% (2.7 g, 18.9 mmol)
Appearance: Redish oil.

^{1}H-NMR (400 MHz, $CDCl_3$) δ/ppm 8.03 (m, 2H), 7.77 (dd, *J* = 8.1, 1.2 Hz, 1H), 7.68 (ddd, *J* = 8.4, 6.9, 1.4 Hz, 1H), 7.48 (ddd, *J* = 8.0, 7.0, 1.1 Hz, 1H), 7.28 (d, *J* = 8.4 Hz, 1H), 2.75 (s, 3H). **^{13}C-NMR (100 MHz, $CDCl_3$)** δ/ppm 159.0 (C), 147.8 (C), 136.2 (CH), 129.4 (CH), 128.5 (CH), 127.5 (CH), 126.5 (C), 125.7 (CH), 122.0 (CH), 25.3 (CH_3). **IR (neat) ν/cm^{-1}:** 3055 (w), 1600 (m), 1504 (m), 1423 (m), 1311 (m), 1220 (m), 1117 (m), 950 (w), 817 (s), 745 (s), 619 (m), 474 (m). **HR-MS (TOF ES+):** calculated for $C_{10}H_{10}N$ 144.0808, found 144.0809 ($M+H^+$).

2-(*tert*-Butyl)quinoline (2g):



Chemical Formula: $C_{13}H_{15}N$
Exact Mass: 185.12

Yield: 85% (66 mg, 0.36 mmol)
Appearance: Pale yellow oil.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 8.07 (d, *J* = 8.3 Hz, 1H), 8.06 (d, *J* = 8.0 Hz, 1H), 7.76 (dd, *J* = 8.1, 1.3 Hz, 1H), 7.66 (ddd, *J* = 8.4, 6.9, 1.5 Hz, 1H), 7.52 (d, *J* = 8.7 Hz, 1H), 7.47 (ddd, *J* = 8.1, 6.9, 1.2 Hz, 1H), 1.47 (s, 9H). **^{13}C-NMR (125 MHz, $CDCl_3$)** δ/ppm 169.2 (C), 147.4 (C), 135.8 (CH), 129.4 (CH), 128.9 (CH), 127.2 (CH), 126.4 (C), 125.6 (CH), 118.2 (CH), 38.1 (C), 30.1 ($3CH_3$). **IR (neat)** ν/cm^{-1}: 2957 (m), 1619 (m), 1600 (s), 1502 (s), 1363 (m), 1138 (s), 1102 (w), 829 (s), 756 (s), 478 (w). HR-MS (TOF ES): calculated for $C_{13}H_{16}N$ 186.1277, found 186.1280 ($M+H^+$).

Procedure for Minisci reaction using H_2O_2 (3a)

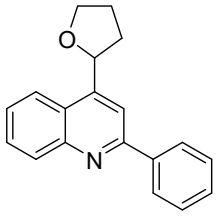
A solution of 2-phenylquinoline in THF (**2a**, 1 equiv., 0.3 M), H_2O_2 (2 equiv.), and concentrated HCl (2 equiv.) was prepared in a sample vial. A few drops of water were added to help the dissolution of the ammonium salt formed. The solution was then pumped through the UV LED unit at a flow rate of 667 mLmin^{-1} (15 min residence time, 40 °C, 1 bar, 70 W input power). The colourless product solution was collected in a sample and neutralised with NaOH (1 M). The organic phase was then separated with

EtOAc (2x20 mL) and washed with water (20 mL) and brine (20 mL). The organic phase was dried over anhydrous Na_2SO_4. The solvent was evaporated *in vacuo* to afford the crude product which was purified by SiO_2 column chromatography using EtOAc/c-Hex (10-20%) as the eluent.

Procedure of Minisci reaction using diacetyl (3a-g)

A solution of substituted quinoline (**2**) (1 equiv.), TFA (2 equiv.), TBHP (2 equiv.), diacetyl (2 equiv.) in THF (0.3 M) was pumped through the UV LED unit at a flow rate of 667 $mLmin^{-1}$ (15 min residence time, 40 °C, 1 bar, 70 W input power). The reaction product was collected in a flask. The organic phase was washed with $NaHCO_3$ and extracted with EtOAc (2 x 5 mL). The organic phase was dried over anhydrous Na_2SO_4. The solvent was evaporated *in vacuo* to afford the crude product which was purified by SiO_2 column chromatography using EtOAc/c-Hex (10-20%) as the eluent.

2-Phenyl-4-(tetrahydrofuran-2-yl)quinoline (3a):

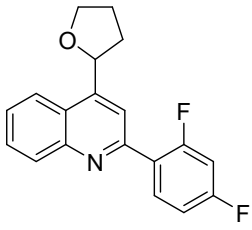


Chemical Formula: $C_{19}H_{17}NO$
Exact Mass: 275.13

Yield: 56% (83 mg, 0.30 mmol)
Appearance: Colourless oil.

^{1}H-NMR (400 MHz, $CDCl_3$) δ/ppm 8.23-8.20 (m, 3H), 8.06 (s, 1H), 7.90 (d, *J* = 8.4, 1H), 7.72 (t, *J* = 8.4 Hz, 1H), 7.55-7.52 (m, 3H), 7.48-7.45 (m, 1H), 5.66 (t, *J* = 7.0 Hz, 1H), 4.31-4.25 (m, 1H), 4.11-4.05 (m, 1H), 2.70-2.61 (m, 1H), 2.15-1.98 (m, 2H), 1.94-1.86 (m, 1H). **^{13}C-NMR (100 MHz, $CDCl_3$)** δ/ppm 157.4 (C), 149.9 (C), 148.3 (C), 139.9 (C), 130.5 (CH), 129.2 (CH), 129.1 (CH), 128.7 (2CH), 127.6 (2CH), 126.0 (CH), 124.5 (C), 123.0 (CH), 114.3 (CH), 77.0 (CH), 69.0 (CH_2), 33.9 (CH_2), 25.9 (CH_2). **IR (neat)** ν/cm^{-1}: 2974 (w), 1551 (s), 1494 (s), 1444 (s), 1532 (m), 1181 (s), 1067 (m), 1018 (m),767(s), 694 (m), 642 (s), 544 (s), 502 (s) 1596. **HR-MS (QTOF):** calcd for $C_{19}H_{17}NONa$ 298.1310, found 298.1202 ($M+Na^+$).

2-(2,4-Difluorophenyl)-4-(tetrahydrofuran-2-yl)quinoline (3b):

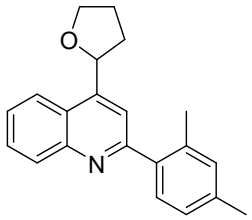


Chemical Formula: $C_{19}H_{15}F_2NO$
Exact Mass: 311.11

Yield: 26% (82 mg, 0.26 mmol)
Appearance: Colourless oil.

^{1}H-NMR (400 MHz, $CDCl_3$) δ/ppm 8.18 (dd, *J* = 9.9, 1.1 Hz, 1H), 8.10 (td, *J* = 8.7, 6.6 Hz, 1H), 7.96 (dd, *J* = 2.9, 1.3 Hz, 1H), 7.91 (d, *J* = 8.3 Hz, 1H), 7.72 (t, *J* = 8.2 Hz, 1H), 7.55 (t, *J* = 7.6 Hz, 1H), 7.05 (m, 1H), 6.96 (dddd, *J* = 11.2, 8.7, 2.5 Hz, 1H), 5.65 (t, *J* = 7.0 Hz, 1H), 4.25 (m, 1H), 4.07 (m, 1H), 2.65 (m, 1H), 2.11-1.97 (m, 2H), 1.93 (m, 1H). **^{13}C-NMR (100 MHz, $CDCl_3$)** δ/ppm 163.4 (dd, *J* =249.7, 11.9 Hz, CF), 160.9 (dd, *J* = 243.0, 11.9 Hz, CF), 153.2 (d, *J* = 2.3 Hz, C), 149.6 (C), 148.3 (C), 132.7 (dd, *J* = 9.6, 4.6 Hz, CH), 130.4 (CH), 129.1 (CH), 126.4 (CH), 124.6 (dd, *J* = 12.2, 4.6 Hz, C), 124.5 (C), 123.0 (CH), 117.5 (d, *J* = 8.1 Hz, CH), 112.0 (dd, *J* = 21.0, 3.6 Hz, CH), 104.6 (dd, *J* = 26.5, 25.3 Hz, CH), 76.8 (CH), 69.0 (CH_2), 34.0 (CH_2), 25.8 (CH_2). **^{19}F-NMR (376 MHz, $CDCl_3$)** δ/ppm -108.9 (m, 1F), -112.3 (m, 1F). **IR (neat)** ν/cm^{-1}: 2979 (w), 1595 (s), 1503 (s), 1429 (m), 1355 (w), 1292 (w), 1266 (w), 1135 (m), 1104 (s), 1069 (s), 964 (s0, 853 (s), 732 (w), 587 (w). **HR-MS (QTOF):** calcd for $C_{19}H_{15}NOF_2$ 312.1194, found 312.1199 ($M+H^+$).

2-(2,4-dimethylphenyl)-4-(tetrahydrofuran-2-yl)quinoline (3c):

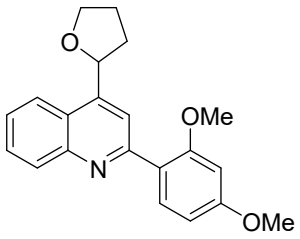


Chemical Formula: $C_{21}H_{21}NO$
Exact Mass: 303.16

Yield: 25% (25 mg, 0.08 mmol)
Appearance: Colourless oil.

^{1}H-NMR (400 MHz, $CDCl_3$) δ/ppm 8.18 (d, *J* = 8.4 Hz, 1H), 7.93 (d, *J* = 8.3 Hz, 1H), 7.73-7.69 (m, 2H), 7.54 (t, *J* = 6.9 Hz, 1H), 7.43 (d, *J* = 8.0 Hz, 1H), 7.14-7.11 (m, 2H), 5.05 (t, *J* = 7.4 Hz, 1H), 4.22-4.17 (m, 1H), 4.07-4.01 (m, 1H), 2.68-2.60 (m, 1H), 2.41 (s, 3H), 2.39 (s, 3H), 2.12-2.07 (m, 1H), 2.04-1.89 (m, 2H). **^{13}C-NMR (100 MHz, $CDCl_3$)** δ/ppm 160.3 (C), 149.1 (C), 147.9 (C), 138.1 (C), 135.8 (C), 131.5 (CH), 130.3 (CH), 129.7 (CH), 128.9 (CH), 126.6 (CH), 126.5 (C), 126.0 (CH), 124.0 (C), 123.0 (CH), 117.8 (CH), 76.8 (CH), 68.9 (CH_2), 33.8 (CH_2), 25.9 (CH_2), 21.2 (CH_3), 20.3 (CH_3). **IR (neat)** ν/cm^{-1} 2921 (b), 1597 (s), 1551 (m), 1501 (m), 1446 (m), 1351 (w), 1201 (w), 920 (m), 763 (s). **HR-MS (QTOF):** calcd for $C_{21}H_{22}NO$ calculated for 304.1696, found 304.1698 ($M+H^+$).

2-(2,4-Dimethoxyphenyl)-4-(tetrahydrofuran-2-yl) quinoline (3d):

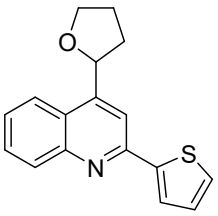


Chemical Formula: $C_{21}H_{21}NO_3$
Exact Mass: 335.15

Yield: 54% (68 mg, 0.20 mmol)
Appearance: Colourless oil.

^{1}H-NMR (400 MHz, $CDCl_3$) δ/ppm 8.16 (dd, *J* = 8.5, 0.7 Hz, 1H), 7.98 (s, 1H), 7.90 (d, *J* = 7.7 Hz, 1H), 7.82 (d, *J* = 8.4 Hz, 1H), 7.67 (ddd, *J* = 8.3, 6.8, 1.3 Hz, 1H), 7.50 (ddd, *J* = 8.2, 6.9, 1.4, 1H), 6.66 (dd, *J* = 8.5, 2.4 Hz, 1H), 6.59 (d, *J* = 2.1 Hz, 1H), 5.66 (t, *J* = 6.4 Hz, 1H), 4.24-4.19 (m, 1H), 4.08-4.02 (m, 1H), 3.87 (s, 3H), 3.85 (s, 3H), 2.64-2.57 (m, 1H), 2.11-1.91 (m, 3H). **^{13}C-NMR (100 MHz, $CDCl_3$)** δ/ppm 161.0 (C), 158.4 (C), 156.9 (C), 156.9 (C), 148.4 (C), 147.9 (C), 132.3 (CH), 130.3 (CH), 128.6 (CH), 125.6 (CH), 124.3 (CH), 123.1 (C), 123.0 (CH), 106.3 (CH), 100.0 (CH), 77.0 (CH), 55.7 (CH_3), 55.5 (CH_3), 33.7 (CH_2), 25.8 (CH_2), 69.0 (CH_2). **IR (neat)** ν/cm^{-1}: 2935 (b), 1719 (s), 1595 (s), 1548 (m), 1503 (s), 1454 (s), 1421 (s), 1349 (s), 1299 (s), 1281 (s), 1251 (s), 1207 (s), 1159 (s), 1072 (s), 1032 (s), 831 (m), 762 (m), 735 (m), 637 (w), 581 (w). **HR-MS (QTOF):** calcd for $C_{21}H_{22}NO_3$ 336.1594, found 336.1598 ($M+H^+$).

4-(Tetrahydrofuran-2-yl)-2-(thiophen-2-yl)quinoline (3e):



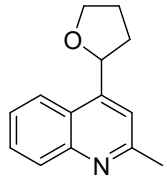
Chemical Formula: $C_{17}H_{15}NOS$
Exact Mass: 281.09

Yield: 56% (38.6 mg, 0.14 mmol)
Appearance: Colourless oil.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 8.12 (d, *J* = 8.8 Hz, 1H), 7.96 (s, 1H), 7.85 (d, *J* = 8.3 Hz, 1H), 7.80-7.78 (m, 1H), 7.69-7.65 (m, 1H), 7.50-7.45 (m, 2H), 7.16 (dd, *J* = 5.1, 3.6 Hz, 1H), 5.61 (t, *J* = 8.0 Hz, 1H), 4.30-4.26 (m, 1H), 4.10-4.06 (m, 1H) 2.68-2.61 (m, 1H), 2.14-1.99 (m, 2H), 1.91-1.84 (m, 1H). **^{13}C-NMR (125 MHz, $CDCl_3$)** δ/ppm 152.3 (C), 149.8 (C), 148.2 (C), 145.7 (C), 136.6 (C), 130.1 (CH), 129.2 (CH), 128.4 (CH), 128.0 (CH), 126.0 (CH), 125.8 (CH), 123.0 (CH), 112.9 (CH), 76.8

(CH), 69.0 (CH_2), 33.9 (CH_2), 26.0 (CH_2). **IR (neat)** v/cm^{-1}: 3068 (s), 2924 (b), 1692 (s), 1595 (s), 1552 (m), 1552 (s), 1502 (s), 1427 (s), 1237 (m), 1063 (s), 825 (s), 758 (s), 704 (s), 642 (s), 575 (s), 491 (s), 470 (s), 432 (s). **HR-MS (QTOF):** calcd for $C_{17}H_{16}NOS$ 282.0947, found 282.0947 ($M+H^+$).

2-Methyl-4-(tetrahydrofuran-2-yl)quinoline (3f):

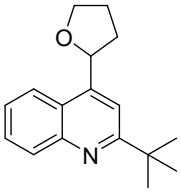


Chemical Formula: $C_{14}H_{15}NO$
Exact Mass: 213.12

Yield: 55% (83 mg, 0.39 mmol)
Appearance: Colourless oil.

^{1}H-NMR (400 MHz, $CDCl_3$) δ/ppm 8.01 (dd, *J* = 8.7, 1.3 Hz, 1H), 7.81 (dd, *J* = 8.2, 1.4 Hz, 1H), 7.63 (ddd, *J* = 8.4, 6.8, 1.5 Hz, 1H), 7.44 (ddd, *J* = 8.3, 6.8, 1.4 Hz, 1H), 7.41 (s, 1H), 5.54 (t, *J* = 7.1 Hz, 1H), 4.20 (td, *J* = 7.6, 5.5 Hz, 1H), 4.01 (dt, *J* = 8.7, 7.2 Hz, 1H), 2.71 (s, 3H), 2.62 – 2.52 (m, 1H), 2.10 – 1.91 (m, 3H), 1.81 (ddt, *J* = 13.1, 8.2, 6.7 Hz, 1H). **^{13}C-NMR (100 MHz, $CDCl_3$)** δ/ppm δ 159.1 (C), 149.2 (C), 147.9 (C), 129.4 (CH), 128.9 (CH), 125.4 (CH), 123.8 (C), 123.0 (CH), 117.1 (CH), 76.7 (CH), 68.9 (CH_2), 33.8 (CH_2), 25.9 (CH_2), 25.5 (CH_3). **IR (neat)**: v/cm^{-1}: 2357 (w), 2110 (w), 1600 (m), 1561 (w), 1509 (w), 1378 (w), 1078 (m), 878 (w), 761 (s), 614 (m). **HR-MS (QTOF):** calcd for $C_{14}H_{16}NO$ 214.1181 found 214.1182 ($M+H^+$)

2-(*tert*-Butyl)-4-(tetrahydrofuran-2-yl)quinoline (3g):

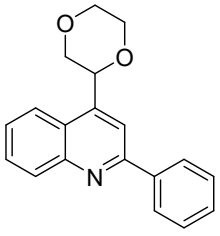


Chemical Formula: $C_{17}H_{21}NO$
Exact Mass: 255.16

Yield: 50% (128 mg, 0.50 mmol)
Appearance: Colourless oil.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 8.12 (dd, *J* = 9.2, 1.5 Hz, 1H), 7.86 (dd, *J* = 8.5, 1.9 Hz, 1H), 7.69 (s, 1H), 7.66 (ddd, *J* = 8.5, 6.9, 1.5 Hz, 1H), 7.48 (ddd, *J* = 8.3, 6.9, 1.4 Hz, 1H), 5.59 (t, *J* = 7.7 Hz, 1H), 4.25 (m, 1H), 4.07 (q, *J* = 7.1 Hz, 1H), 2.61 (m, 1H), 2.10-1.98 (m, 2H), 1.87 (m, 1H), 1.50 (s, 9H). **^{13}C-NMR (125 MHz, $CDCl_3$)** δ/ppm 169.2 (C), 148.6 (C), 147.5 (C), 130.2 (CH), 128.4 (CH), 127.2 (C), 125.4 (CH), 122.8 (CH), 113.2 (CH), 77.1 (CH), 68.9 (CH_2), 38.2 (C), 33.8 (CH_2), 30.16 ($3CH_3$), 25.9 (CH_2). **IR (neat)**: v/cm^{-1}: 2954 (s), 1693 (w), 1597 (s), 1557 (m), 1505 (m), 1457 (s), 1080 (s), 761 (s). **HR-MS** (QTOF): calcd for $C_{17}H_{21}NO$ 256.1696 found 256.1695.

4-(1,4-Dioxan-2-yl)-2-phenylquinoline (3h):



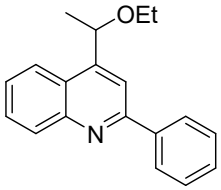
Chemical Formula: $C_{19}H_{17}NO_2$
Exact Mass: 291.13

Yield: 70% (45 mg, 0.15 mmol)
Appearance: Colourless crystals.

^{1}H-NMR (400 MHz, $CDCl_3$) δ/ppm 8.23-8.19 (m, 3H), 8.10 (s, 1H), 7.98 (d, *J* = 8.5 Hz, 1H), 7.73 (ddd, *J* = 8.4, 6.9, 1.4 Hz, 1H), 7.56 – 7.50 (m, 3H), 7.48-7.46 (m, 1H), 5.43 (dd, *J* = 9.9, 2.7 Hz, 1H), 4.19 (dd, *J* = 11.8, 2.7 Hz, 1H), 4.11 – 4.06 (m, 2H), 3.92 – 3.79 (m, 2H), 3.49 (dd, *J* = 11.8, 9.9 Hz, 1H). **^{13}C-NMR (100 MHz, $CDCl_3$)** δ/ppm 157.4 (C), 148.4 (C), 144.2 (C), 139.7 (C), 130.8 (CH), 129.5 (CH), 129.4 (CH), 128.8 (2CH), 127.7 (2CH), 126.6 (CH), 124.3 (C), 122.4 (CH), 116.2 (CH), 74.52 (CH), 72.2 (CH_2), 67.4 (CH_2), 66.7 (CH_2). **IR (neat)** v/cm^{-1}: 3061 (b),

1597 (s), 1552 (w), 1502 (m), 1429 (w), 1354 (w), 1115 (s), 1071 (w), 969 (w), 761 (s). **HR-MS (QTOF):** calcd for $C_{19}H_{18}NO_2$ 292.1332, found 292.1334 ($M+H^+$). **Crystal data** (CCDC-2212117): P1 (2); a = 10.26560(10), b = 10.37350(10), c = 15.2757(2); α = 102.5580 (10), β = 101.4380(10), γ = 104.3690(10).

4-(1-Ethoxyethyl)-2-phenylquinoline (3i):

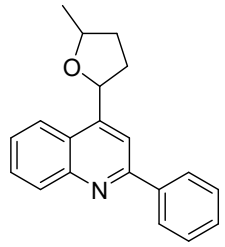


Chemical Formula: $C_{19}H_{19}NO$
Exact Mass: 277.15

Yield: 36% (46 mg, 0.17 mmol)
Appearance: Colourless oil.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 8.23 (m, 3H), 8.12 (d, *J* = 8.3 Hz, 1H), 8.01 (s, 1H), 7.75 (ddd, *J* = 8.5, 7, 1.6 Hz, 1H), 7.53 (m, 3H), 7.48 (m, 1H), 5.21 (q, *J* = 6.5 Hz, 1H), 3.52 (m, 2H), 1.66 (d, *J* = 6.6 Hz, 3H), 1.26 (t, *J* = 7 Hz, 3H). **^{13}C-NMR (125 MHz, $CDCl_3$)** δ/ppm 157.3 (C), 150.3 (C), 148.6 (C), 139.8 (C), 130.6 (CH), 129.3 (CH), 129.4 (CH), 128.2 (2CH), 127.5 (2CH), 126.1 (CH), 125.0 (C), 122.8 (CH), 115.3. (CH), 74.6 (CH), 64.7 (CH_2), 23.6 (CH_3), 15.5 (CH_3). **IR (neat)**: ν/cm^{-1}: 2975 (w), 1671 (s), 1582 (m), 1491 (s), 1447 (s), 1420 (m), 1281 (m), 1243 (m), 1194 (w), 1153 (m), 1116 (m), 772 (s), 701 (s). **HR-MS** (QTOF): calcd for $C_{19}H_{20}NO$ 278.1539, found 278.1540 ($M+H^+$).

4-(5-Methyltetrahydrofuran-2-yl)-2-phenylquinoline (3j): - Ratio of diastereoisomers 4:1

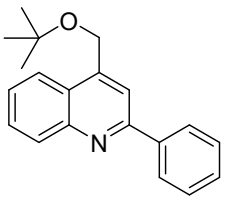


Chemical Formula: $C_{20}H_{19}NO$
Exact Mass: 289.15

Yield: 22% (23 mg, 0.08 mmol)
Appearance: Colourless oil.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 8.21 (m, 3H), 8.07 (s, 1H), 7.92 (m, 1H), 7.72 (ddd, *J* = 8.5, 6.9, 1.5 Hz, 1H), 7.54 (m, 3H), 7.47 (tt, *J* = 7.5, 1.5 Hz, 1H), 5.82 (t, *J* = 7.4, 1H, major), 5.67 (t, *J* = 7.7, 1H, minor), 4.55 (m, major, 1H), 4.34 (m, 1H, minor), 2.77 (m, 1H, major), 2.67 (m, 1H, minor), 2.18 (m, 1H), 1.95 (m, 1H), 1.77 (m, 1H, major), 1.62 (m, 1H, minor), 1.54 (d, *J* = 6.1 Hz, 3H, minor), 1.45 (d, *J* = 6.1 Hz, 3H, major). **^{13}C-NMR (125 MHz, $CDCl_3$)** δ/ppm 157.4 (C, major), 157.3 (C, minor), 150.4 (C, major), 150.1 (C, minor), 148.4 (C, major), 148.3 (C, minor), 140.0 (C), 130.5 (CH, major), 130.5 (CH, minor), 130.2 (CH, minor), 129.2 (CH, major), 129.1 (CH, major), 129.0 (CH, minor), 128.8 (2CH, minor), 128.7 (2CH, major), 127.6 (2CH, major), 127.6 (2CH, minor), 126.0 (CH, minor), 125.9 (CH, major), 124.5 (C), 123.0 (CH, major), 122.9 (CH, minor), 114.6 (CH, minor), 114.08 (CH, major), 77.0 (CH, minor), 76.7 (CH, major), 76.5 (CH, minor), 76.2 (CH, major), 34.7 (CH_2, major), 34.1 (CH_2, minor), 33.8 (CH_2, major), 33.01 (CH_2, minor), 21.4 (CH_3, major), 21.0 (CH_3, minor). **IR (neat)**: ν/cm^{-1}: 2967 (w), 1687 (w), 1597 (s), 1151 (m), 1494 (m), 1457 (w), 1349 (m), 1079 (s), 769 (s), 695 (s). **HR-MS** (QTOF): calcd for $C_{20}H_{19}NONa$ 312.1359, found 312.1347 ($M+Na^+$).

4-(*tert*-Butoxymethyl)-2-phenylquinoline (3k):

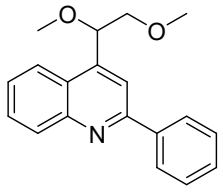


Chemical Formula: $C_{20}H_{21}NO$
Exact Mass: 291.16

Yield: 27% (79 mg, 0.27 mmol)
Appearance: Colourless oil.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 8.21-8.16 (m, 3H), 8.05 (s, 1H), 7.90-7.86 (m, 1H), 7.72 (t, *J* = 10.7 Hz, 1H), 7.55-7.43 (m, 4H), 4.99 (s, 2H), 1.41 (s, 9H). **^{13}C-NMR (125 MHz, $CDCl_3$)** δ/ppm 157.4 (C), 148.2 (C), 145.7 (C), 140.0 (C), 130.4 (CH), 129.2 (2CH), 128.8 (2CH), 127.6 (2CH), 126.1 (CH), 125.3 (C), 122.8 (CH), 117.1 (CH), 74.2 (C), 60.9 (CH_2), 27.7 ($3CH_3$). **IR (neat)** ν/cm^{-1}: 2973 (m), 1601 (s), 1552 (m), 1364 (m), 1192 (s), 1078 (m), 890 (m), 789 (s), 694 (s). **HR-MS (QTOF):** calcd for $C_{20}H_{22}NO$ 292.1696, found 292.1726 ($M+H^+$).

4-(1,2-Dimethoxyethyl)-2-phenylquinoline (3l):

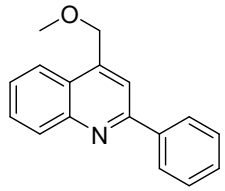


Chemical Formula: $C_{19}H_{19}NO_2$
Exact Mass: 293.14

Yield: 27% (79 mg, 0.27 mmol)
Appearance: Colourless oil.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 8.23 (dd, *J* = 8.2, 0.8 Hz, 1H), 8.21-8.19 (m, 2H), 8.10 (d, *J* = 8.1 Hz, 1H), 8.01 (s, 1H), 7.74 (ddd, *J* = 8.4, 6.8, 1.4 Hz, 1H), 7.58-7.52 (m, 3H), 7.49-7.46 (m, 1H), 5.22 (dd, *J* = 7.8, 2.8 Hz, 1H), 3.74 (dd, *J* = 11.0, 8.1 Hz, 1H), 3.67 (dd, *J* = 10.8, 2.9 Hz, 1H), 3.44 (s, 6H). **^{13}C-NMR (125 MHz, $CDCl_3$)** δ/ppm 157.2 (C), 148.7 (C), 144.7 (C), 139.5 (C), 130.8 (CH), 129.5 (CH), 129.4 (CH), 128.8 (2CH), 127.5 (2CH), 126.5 (CH), 125.4 (C), 122.6 (CH), 116.6 (CH), 80.1 (CH), 76.5 (CH_2), 59.4 (CH_3), 57.7 (CH_3). **IR (neat)** ν/cm^{-1}: **IR (neat)**: ν/cm^{-1}: 2925 (w), 2825 (w), 1596 (m), 1550 (w), 1445 (w), 1235 (w), 1050 (s), 1029 (w), 937 (w), 892 (w), 770 (s), 694 (s). **HR-MS (QTOF):** calcd for $C_{19}H_{20}NO_2$ 294.1489, found 294.1490 ($M+H^+$).

4-(Methoxymethyl)-2-phenylquinoline (3l'):

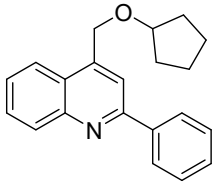


Chemical Formula: $C_{17}H_{15}NO$
Exact Mass: 249.12

Yield: 38% (94 mg, 0.38 mmol)
Appearance: Waxy oil.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 8.22-8.16 (m, 3H), 7.98-7.96 (m, 2H), 7.74-7.71 (m, 1H), 7.56-7.45 (m, 4H), 4.99 (s, 2H), 3.56 (s, 3H). **^{13}C-NMR (125 MHz, $CDCl_3$)** δ/ppm 157.2 (C), 148.3 (C), 144.0 (C), 139.7 (C), 130.4 (CH), 129.4 (CH), 129.3 (CH), 128.8 (2CH), 127.6 (2CH), 126.3 (CH), 125.2 (C), 122.9 (CH), 117.2 (CH), 71.6 (CH_2), 58.9 (CH_3). **IR (neat)** ν/cm^{-1}: 2927 (w), 1600 (s), 1553 (m), 1446 (m), 1204 (m), 1151 (s), 1104 (m), 1067 (m), 769 (s), 694 (s). **HR-MS (QTOF):** calcd for $C_{19}H_{15}NONa$ 272.1046, found 272.1048 ($M+Na^+$).

4-((Cyclopentyloxy)methyl)-2-phenylquinoline (3m):



Chemical Formula: $C_{21}H_{21}NO$
Exact Mass: 303.16

Yield: 26% (39 mg, 0.13 mmol)
Appearance: Colourless oil.

^{1}H-NMR (500 MHz, $CDCl_3$) δ/ppm 8.21 (m, 3H), 7.99 (m, 2H), 7.73 (ddd, *J* = 8.4, 6.9, 1.5 Hz, 1H), 7.55 (m, 3H), 7.48 (tt, *J* = 7.5, 1.4 Hz, 1H), 5.01 (d, *J* = 1 Hz, 2H), 4.18 (p, *J* = 5.2, 1H), 1.85-1.63 (m, 8H). **^{13}C-NMR (125 MHz, $CDCl_3$)** δ/ppm 157.2 (C), 148.2 (C), 144.8 (C), 139.8 (C), 130.4 (CH), 129.3 (CH), 129.2 (CH), 128.8 (2CH), 127.6 (2CH), 126.2 (CH), 125.3 (C), 123.0 (CH), 117.3 (CH), 82.0 (CH), 67.7 (CH_2), 32.4 ($2CH_2$), 23,6 ($2CH_2$). **IR (neat)**: ν/cm^{-1}: 2952 (m), 2325 (w), 2080 (w), 1600 (m), 1473

(m), 1159 (m), 1052 (m), 768 (s), 693 (s). **HR-MS** (QTOF): calcd for $C_{21}H_{22}NO$ 304.1696 found 304.1695.

3. Double photochemical reactor setup and emission spectra of LEDs

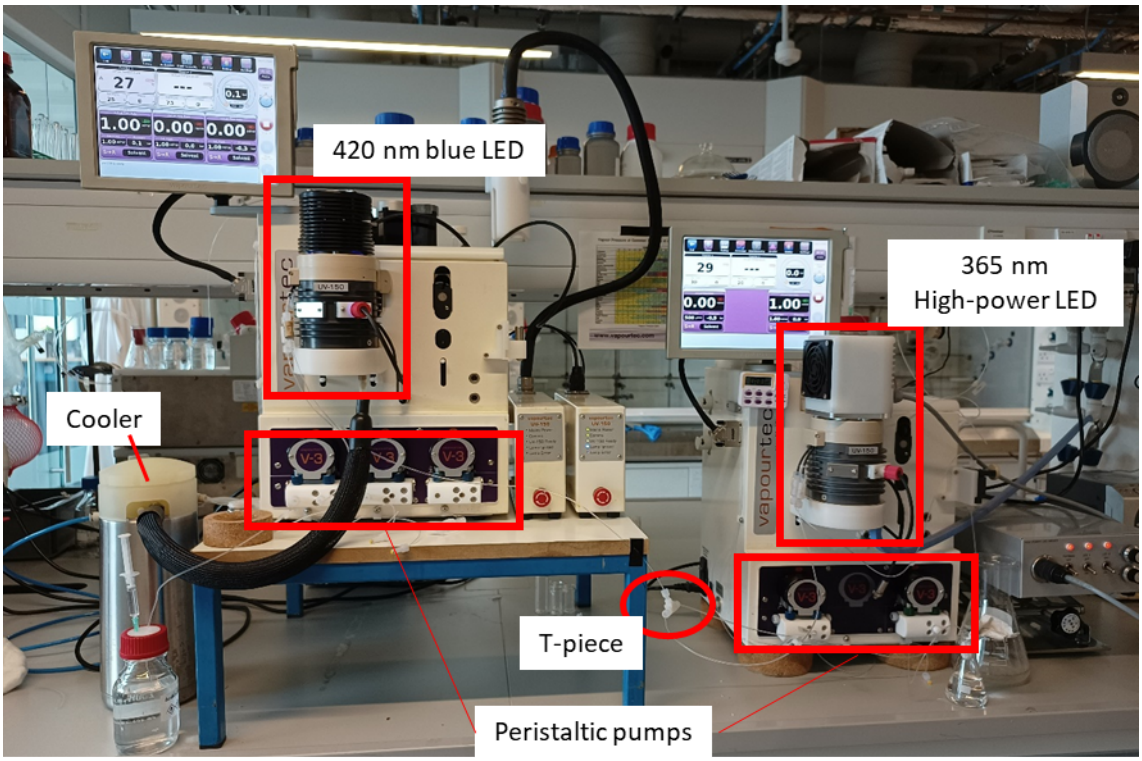
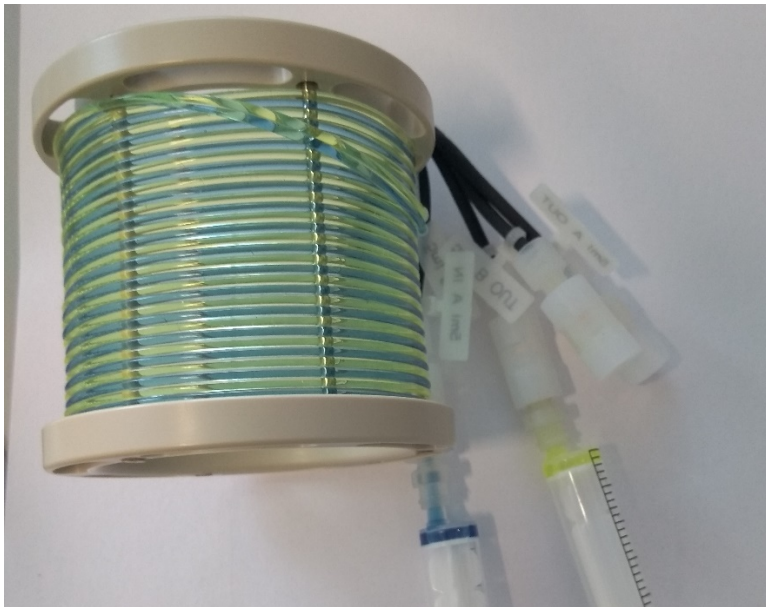
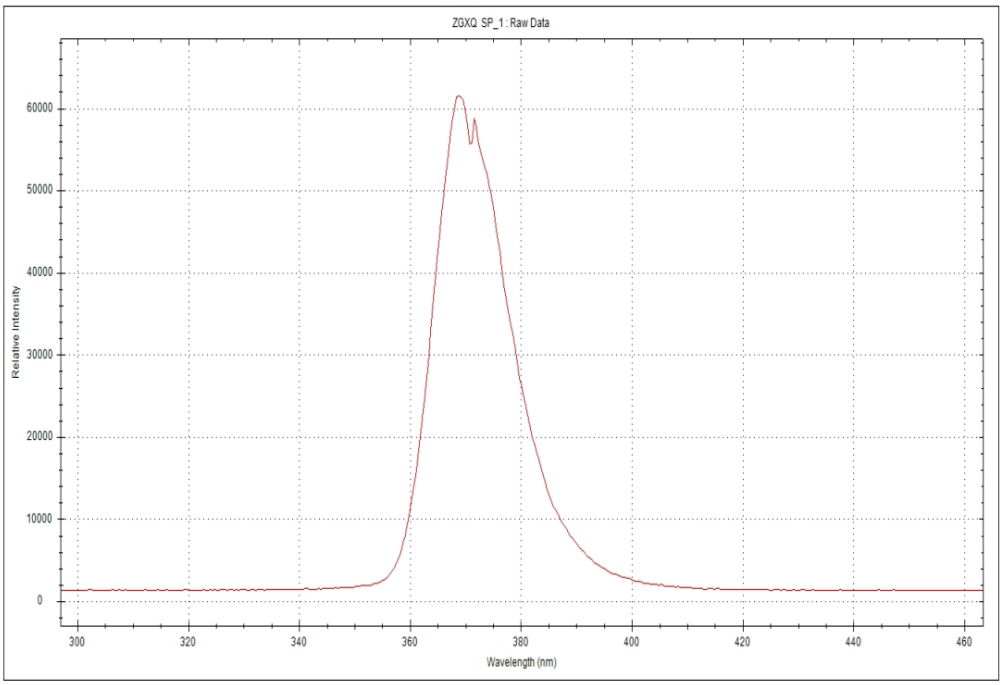


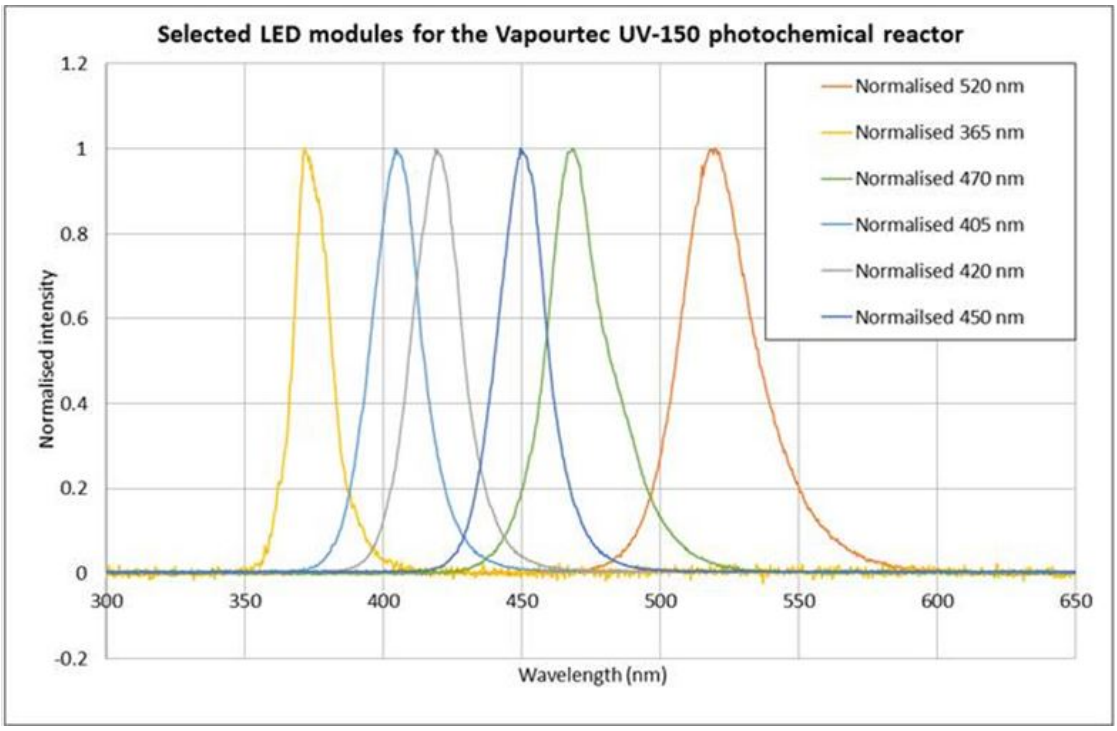
Image of dual flow coil (2 x 5 mL volume, PFA; filled with coloured solutions):



Images of LED emission spectra: LED-365 and visible range LEDs:

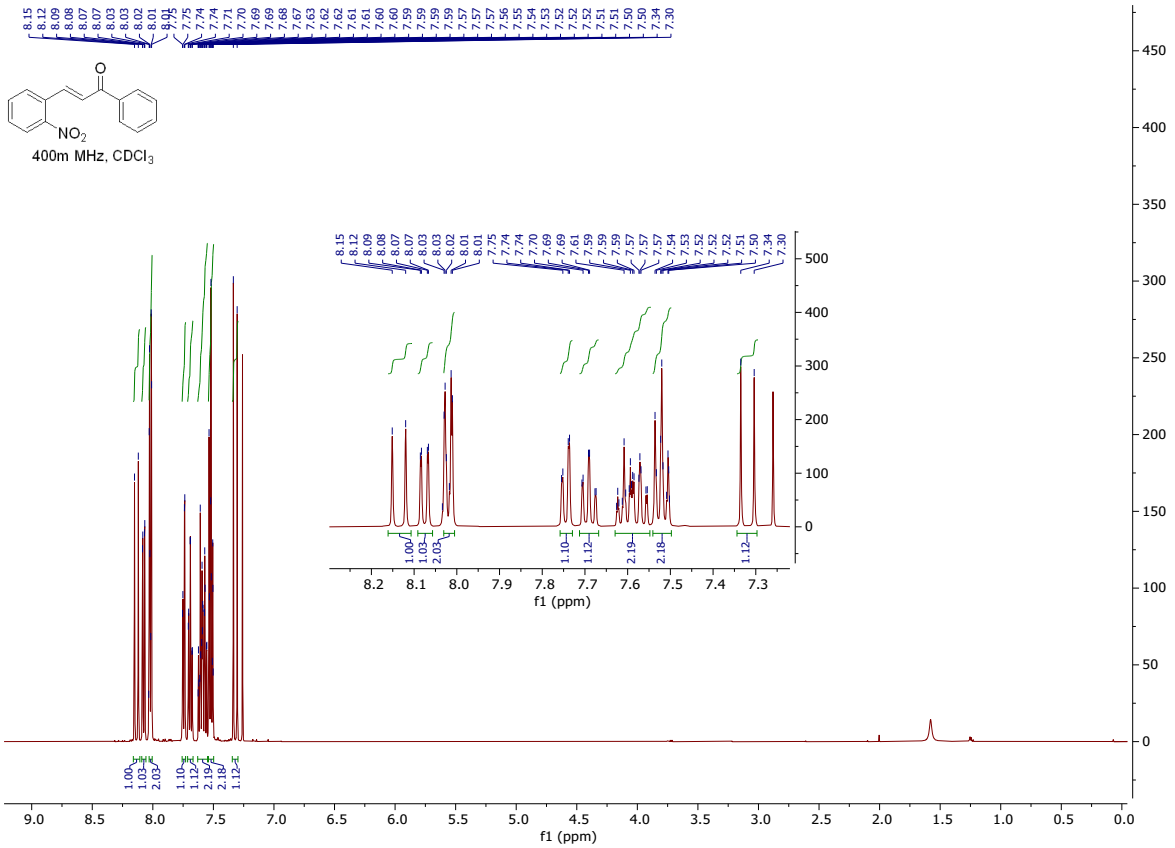
Spectrum Name: SP_1
System Model: BRC115P-U-ST1 C Code: ZGXQ Operator:
Exposure Time: 4 (ms) Laser Level: Date: 02/11/2021

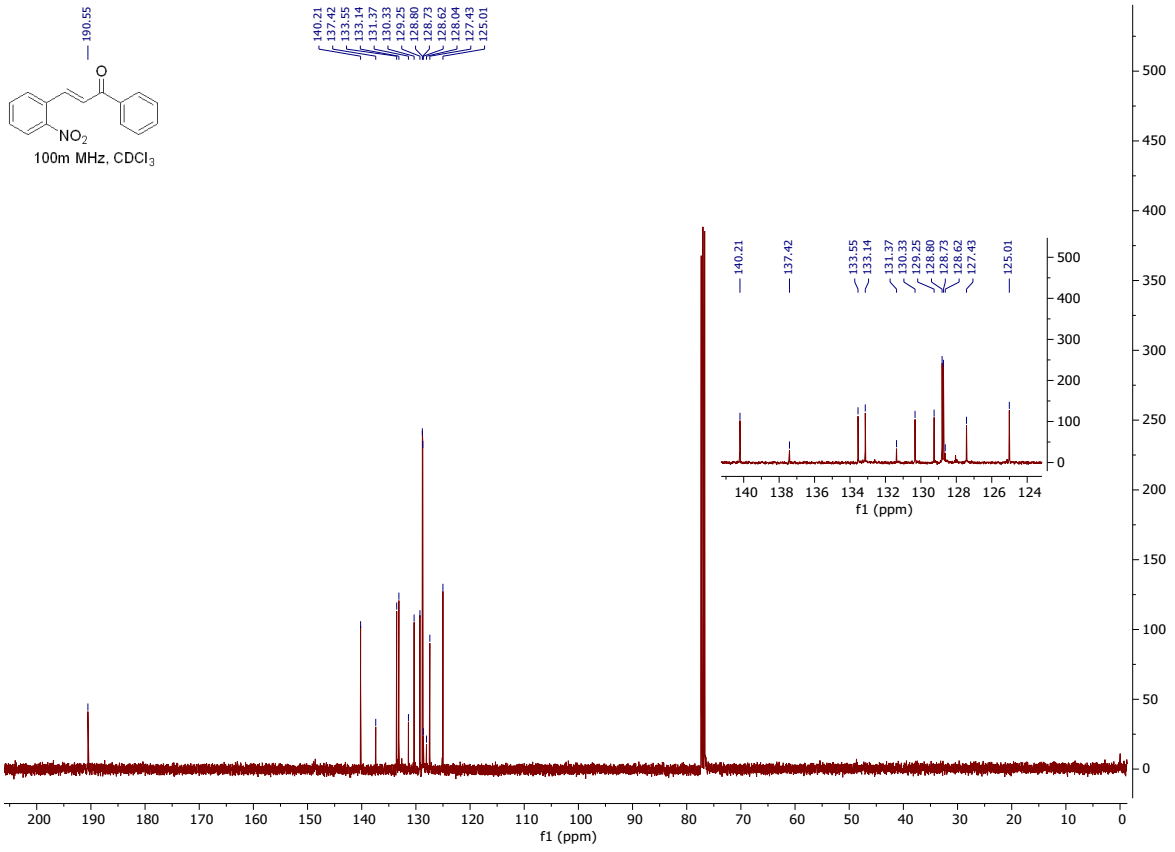




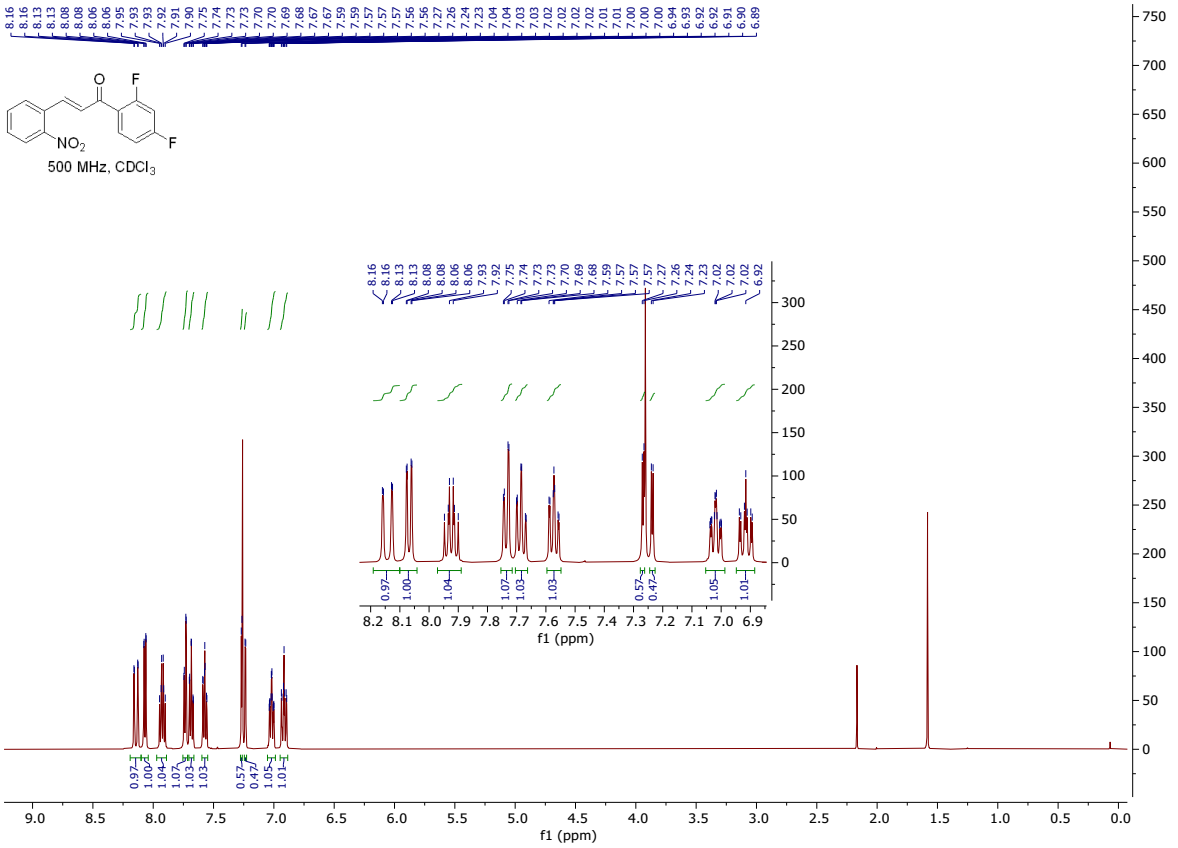
4. Copies of NMR Spectra of all Compounds

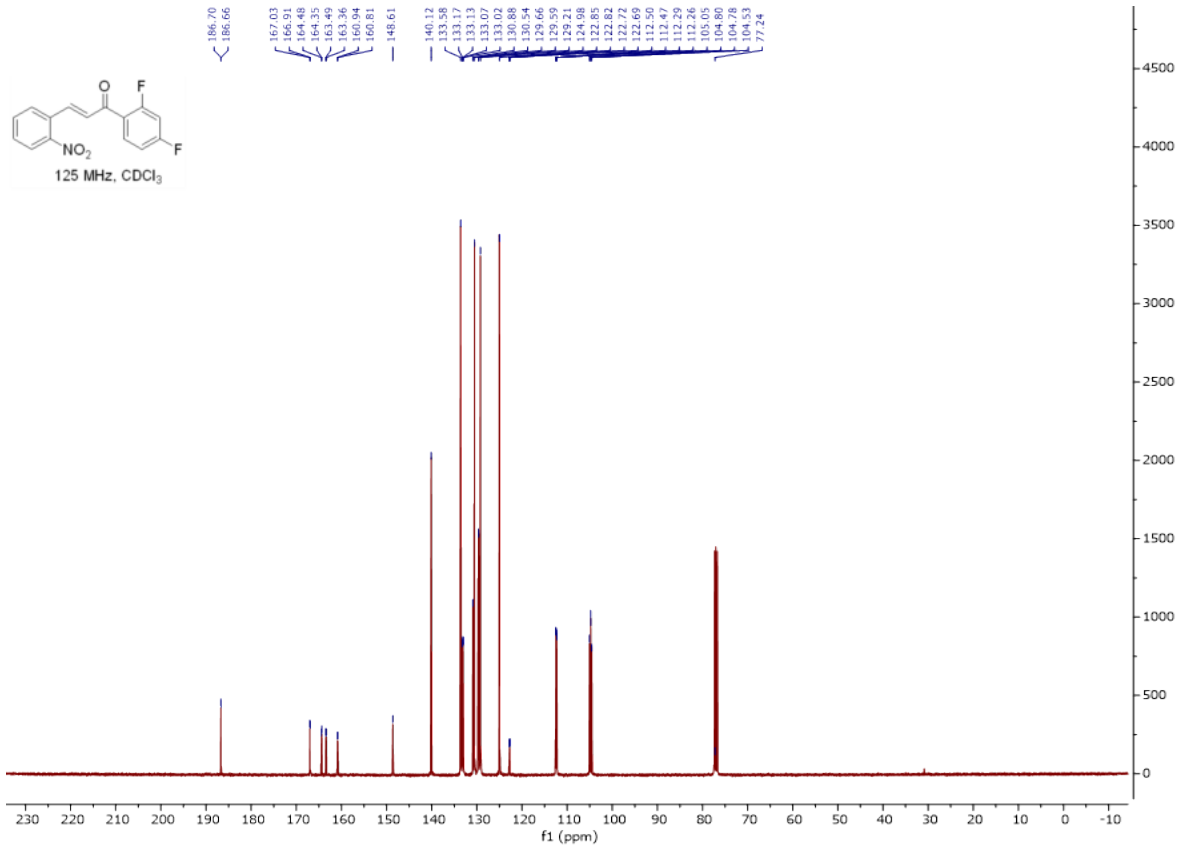
(*E*)-3-(2-Nitrophenyl)-1-phenylprop-2-en-1one:

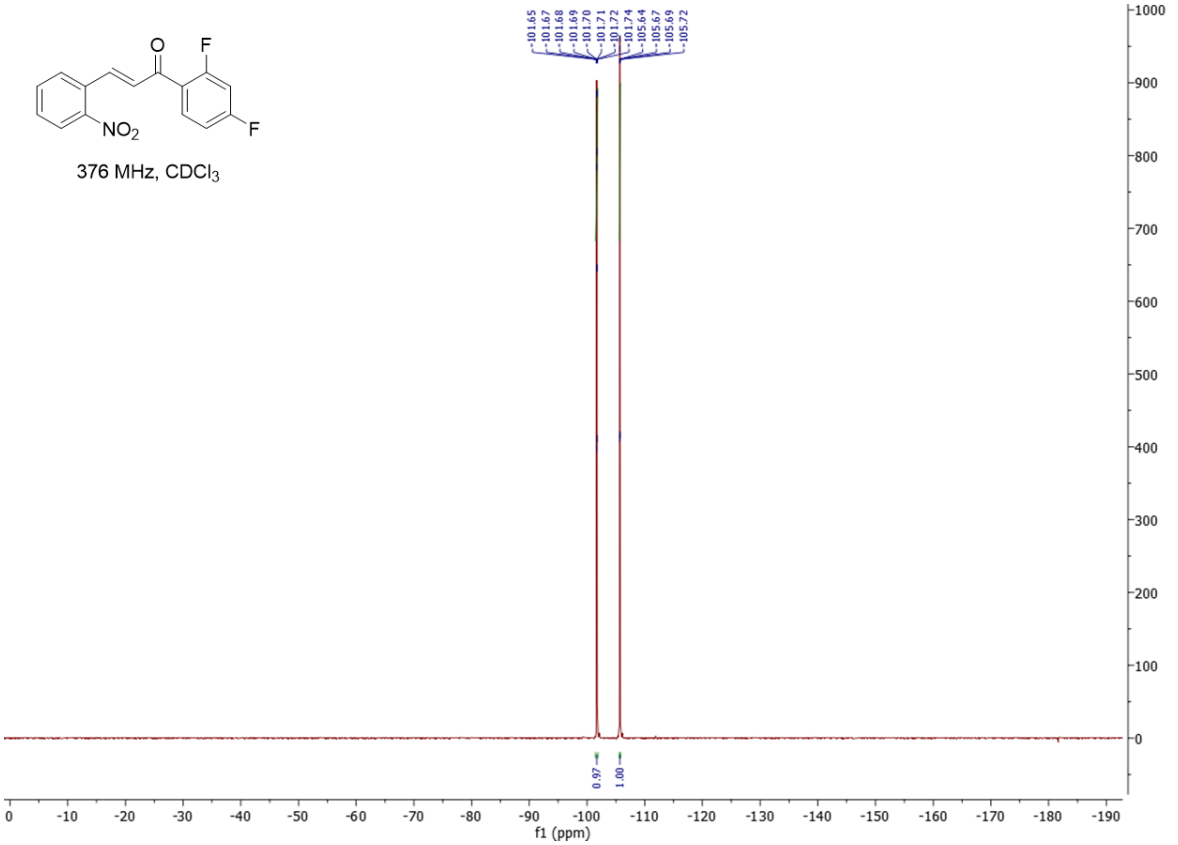




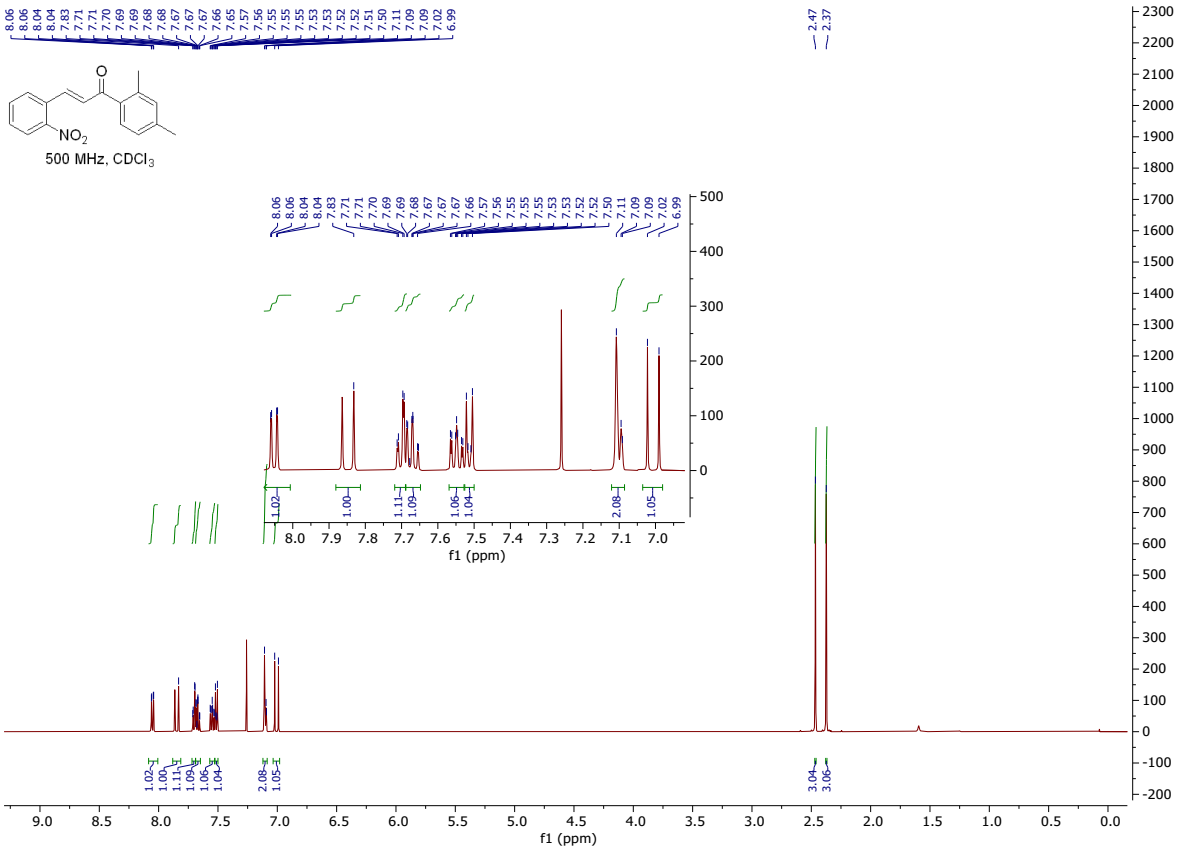
(*E*)-1-(3,4-Difluorophenyl)-3-(2-nitrophenyl)prop-2-en-1-one:

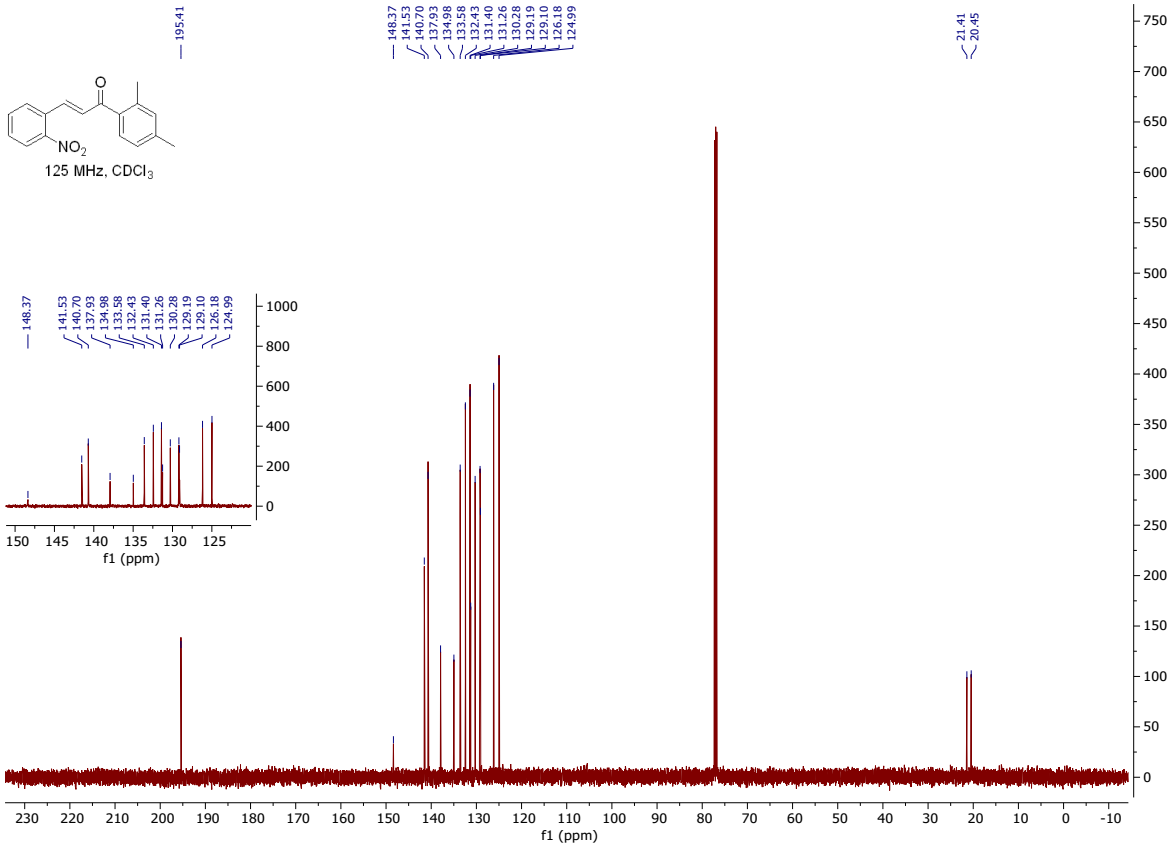




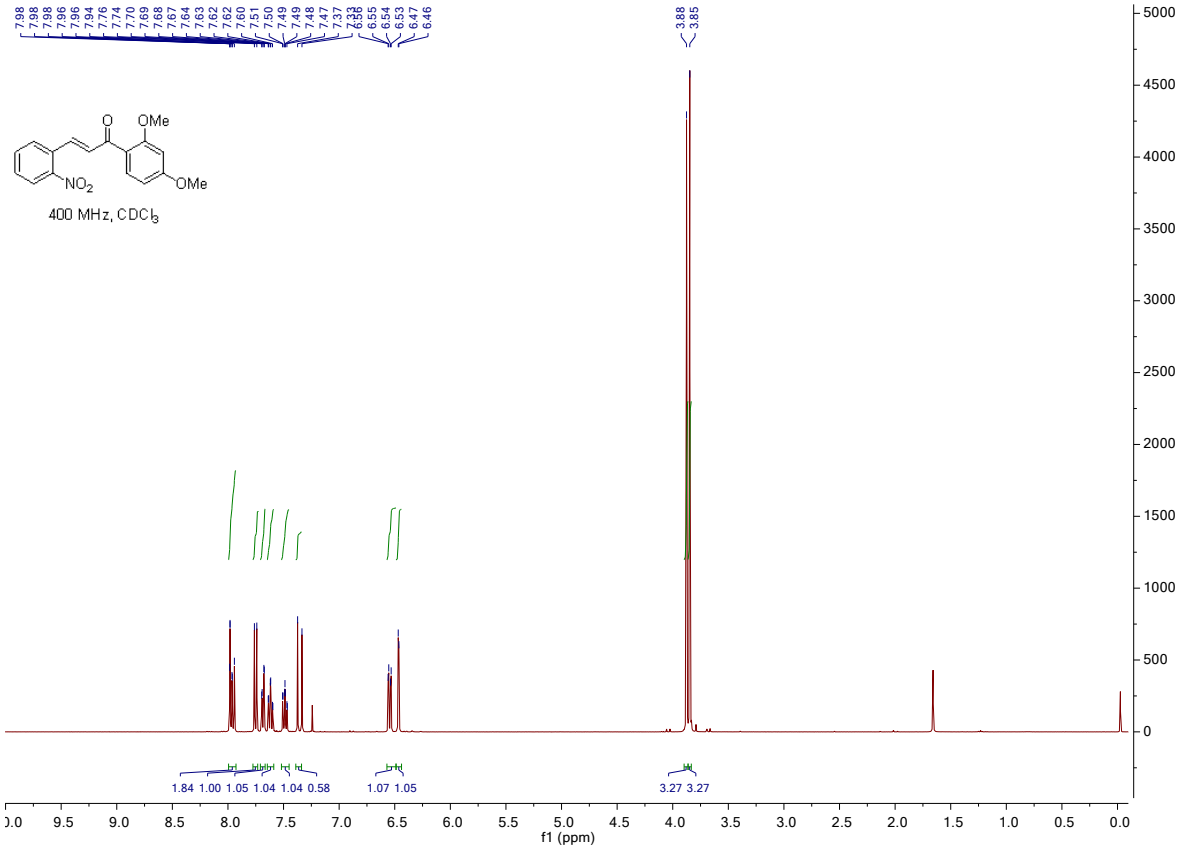


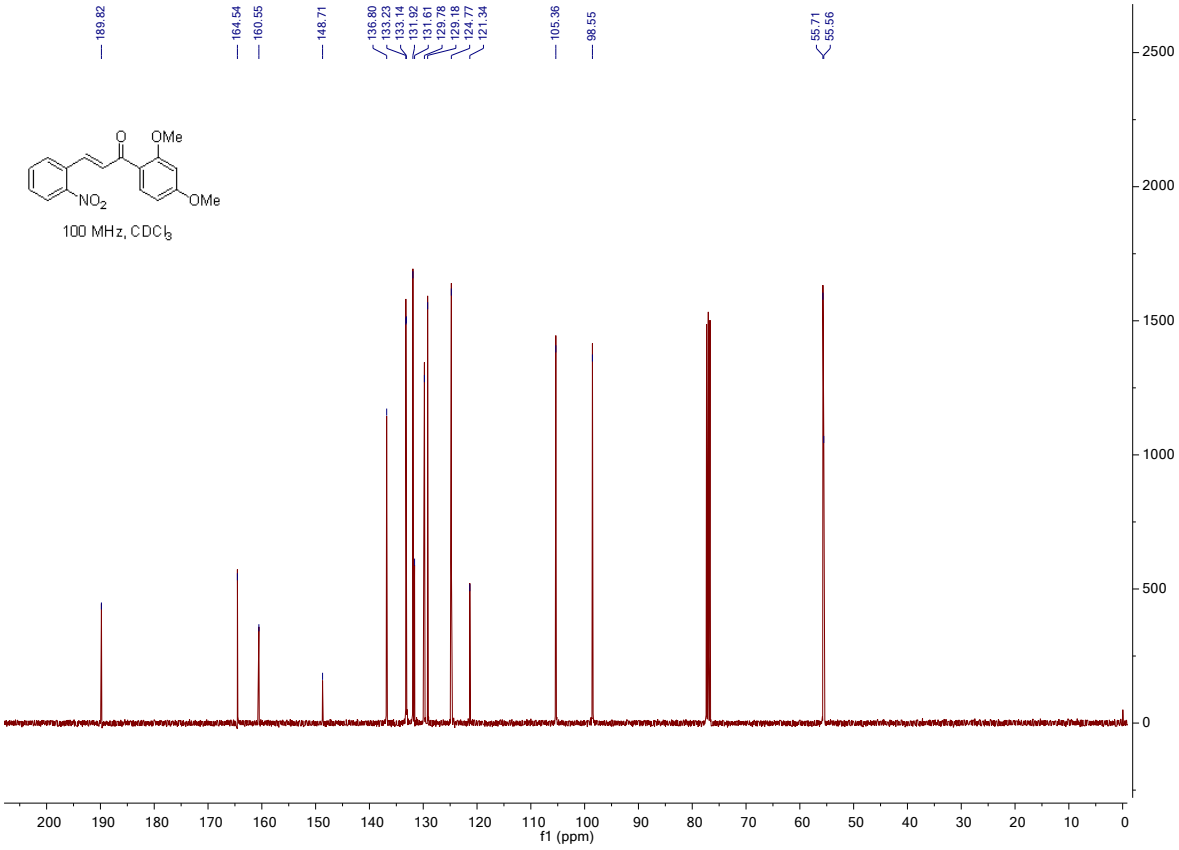
(*E*)-3-(2-Nitrophenyl)-1-phenylprop-2-en-1-one:



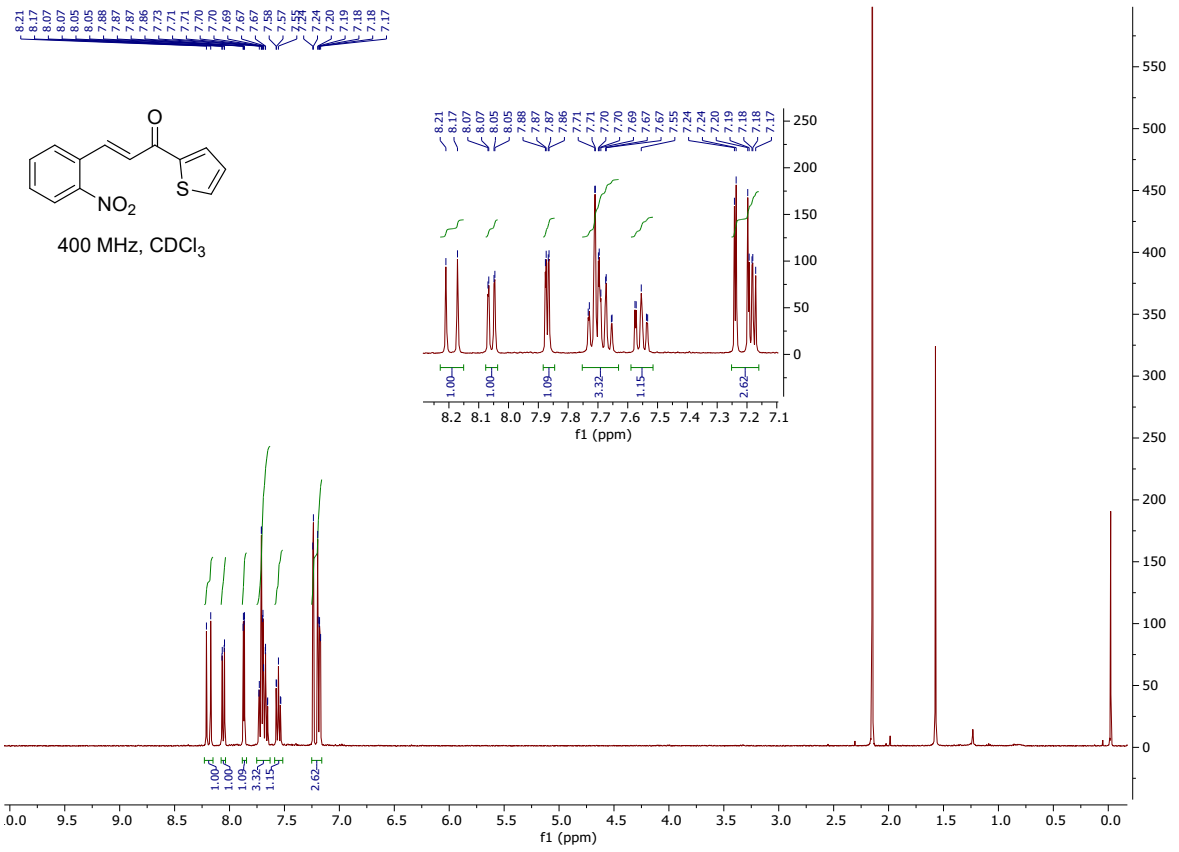


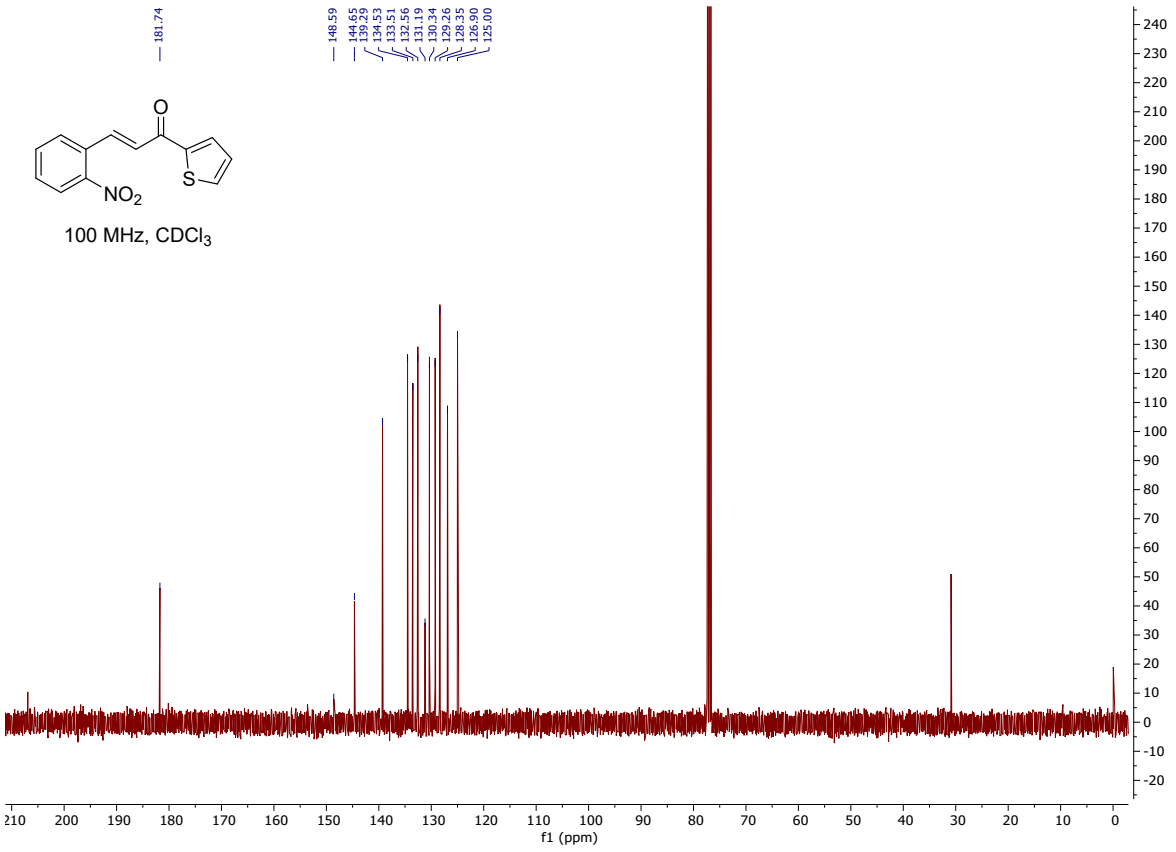
(*E*)-1-(2,4-Dimethoxyphenyl)-3-(2-nitrophenyl)prop-2-en-1-one:



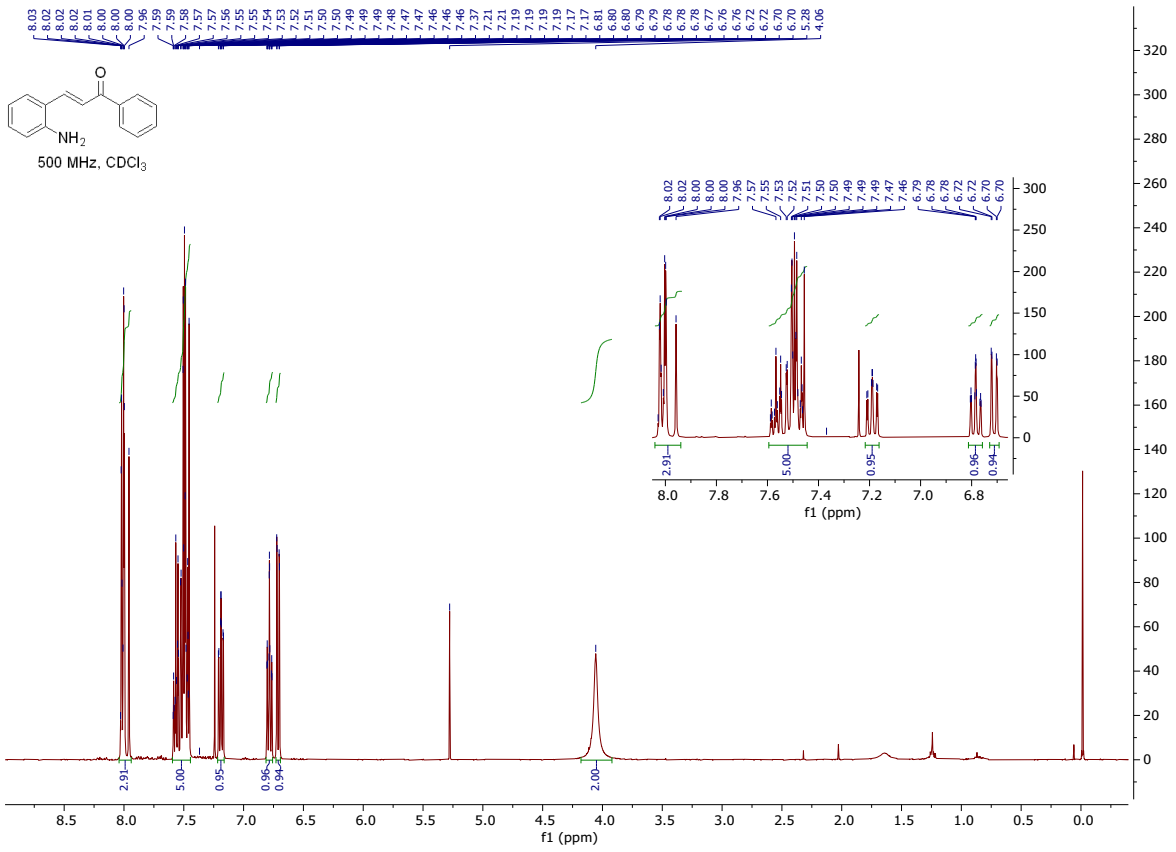


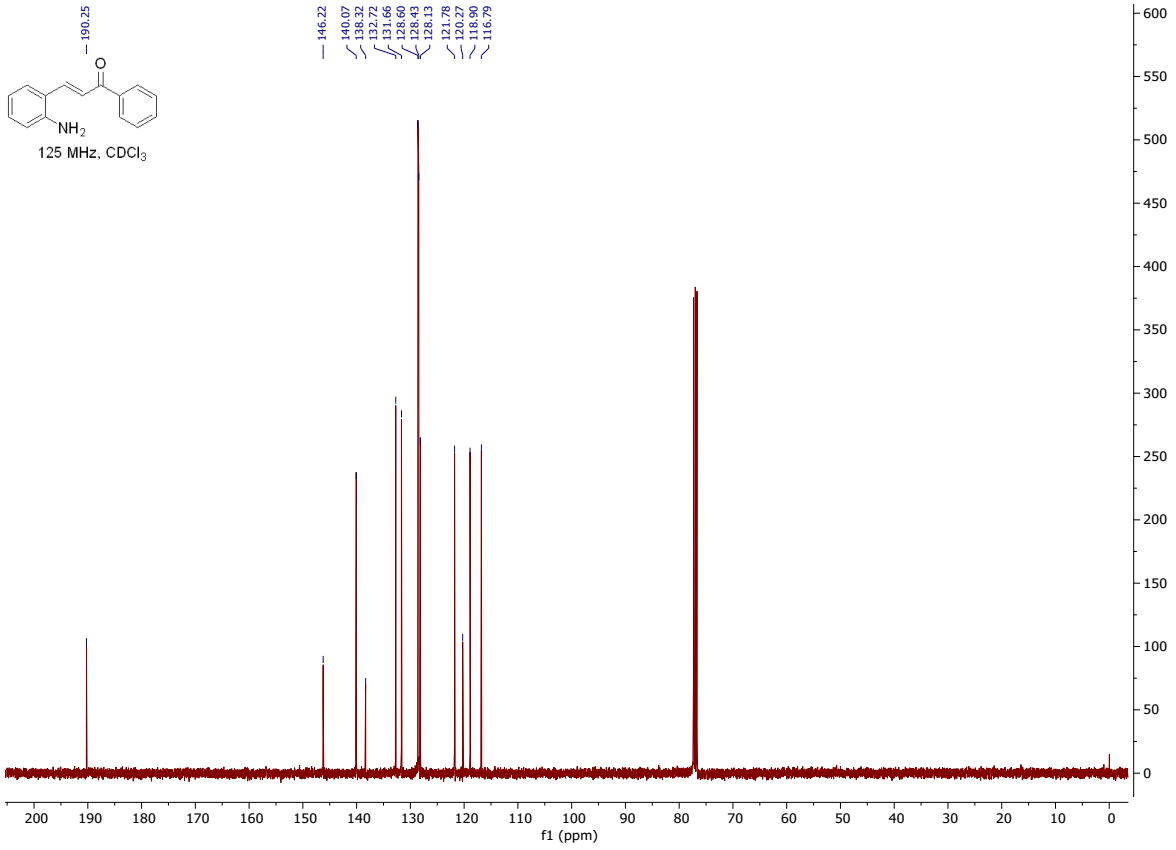
(*E*)-3-(2-Nitrophenyl)-1-(thiophen-2-yl)prop-2-en-1-one:



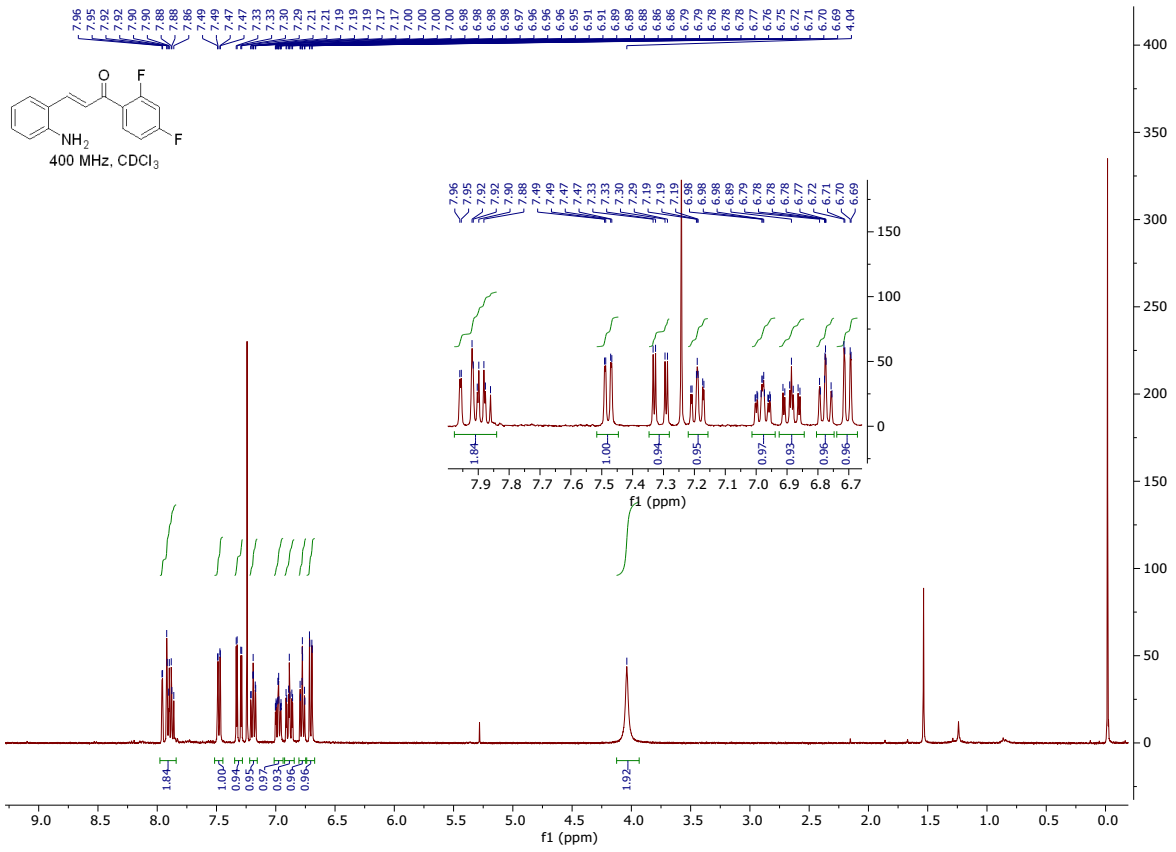


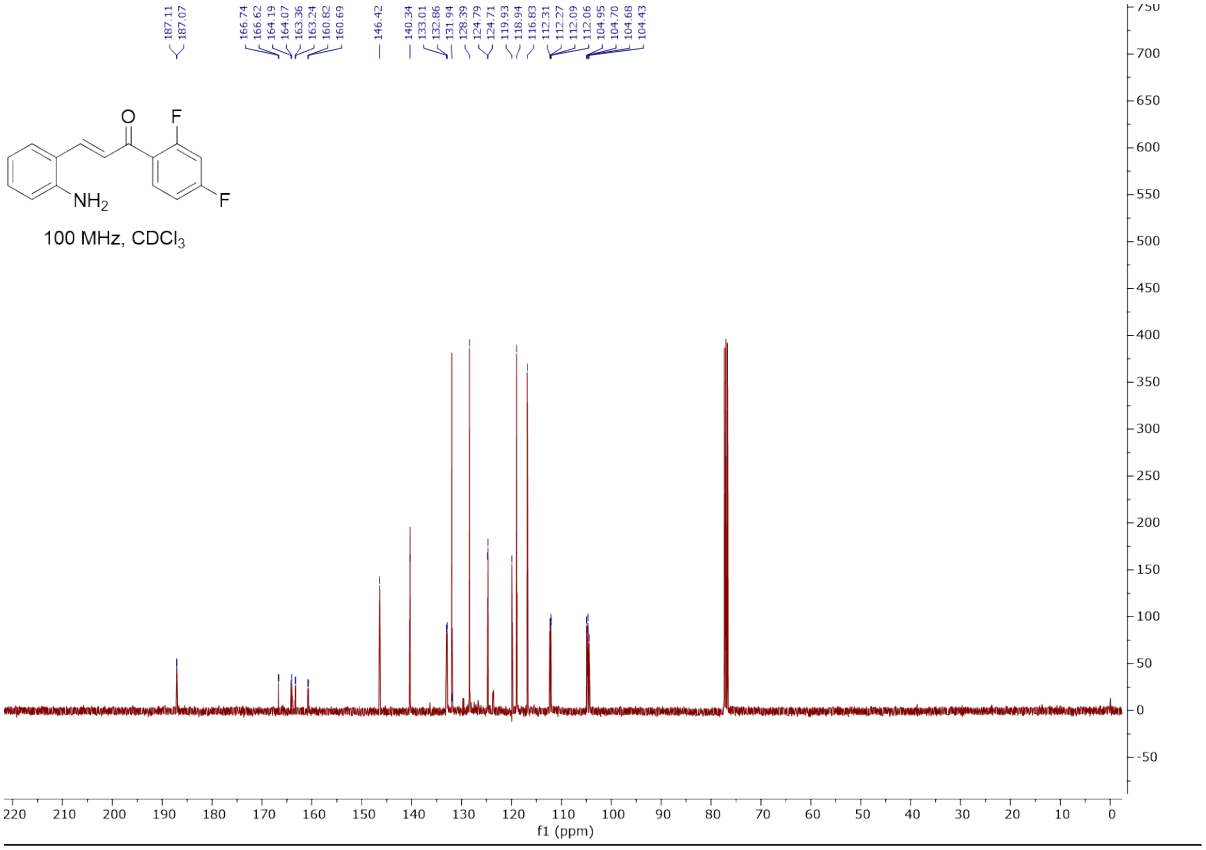
(*E*)-3-(2-Aminophenyl)-1-phenylprop-2-en-1-one 1a:





(*E*)-3-(2-Aminophenyl)-1-(2,4-difluorophenyl)prop-2-en-1-one 1b:




187.11
187.07
166.74
166.62
164.19
164.07
163.36
163.24
160.82
160.69
146.42
140.34
133.01
132.86
131.94
128.39
124.79
124.71
119.93
118.94
116.83
112.31
112.27
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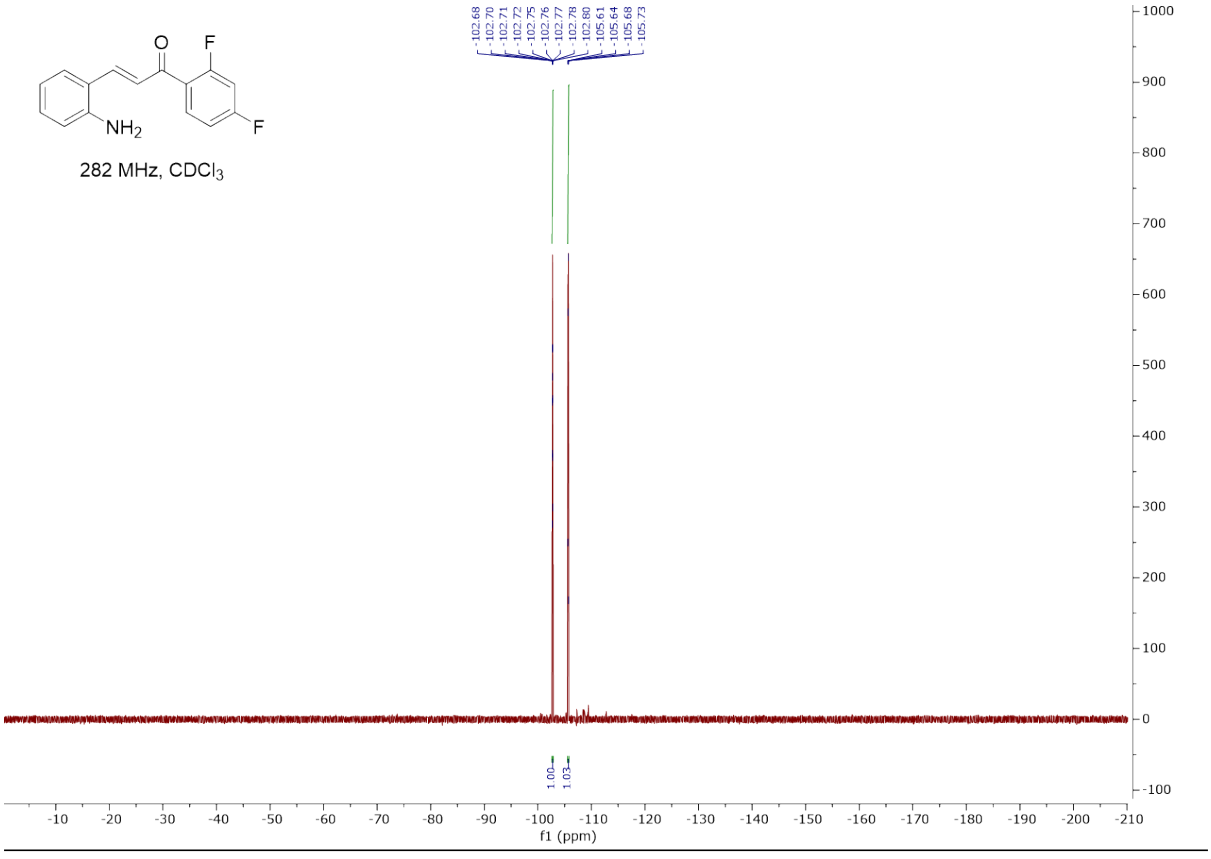
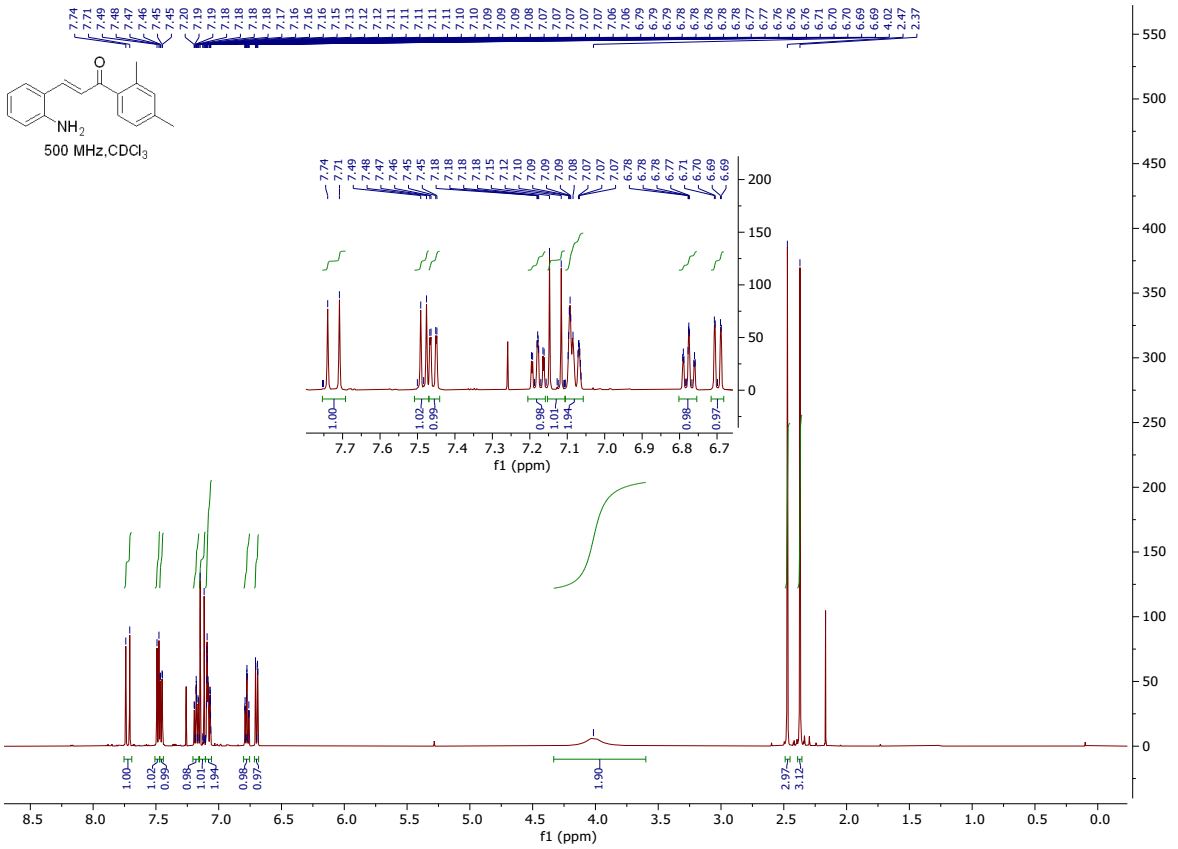
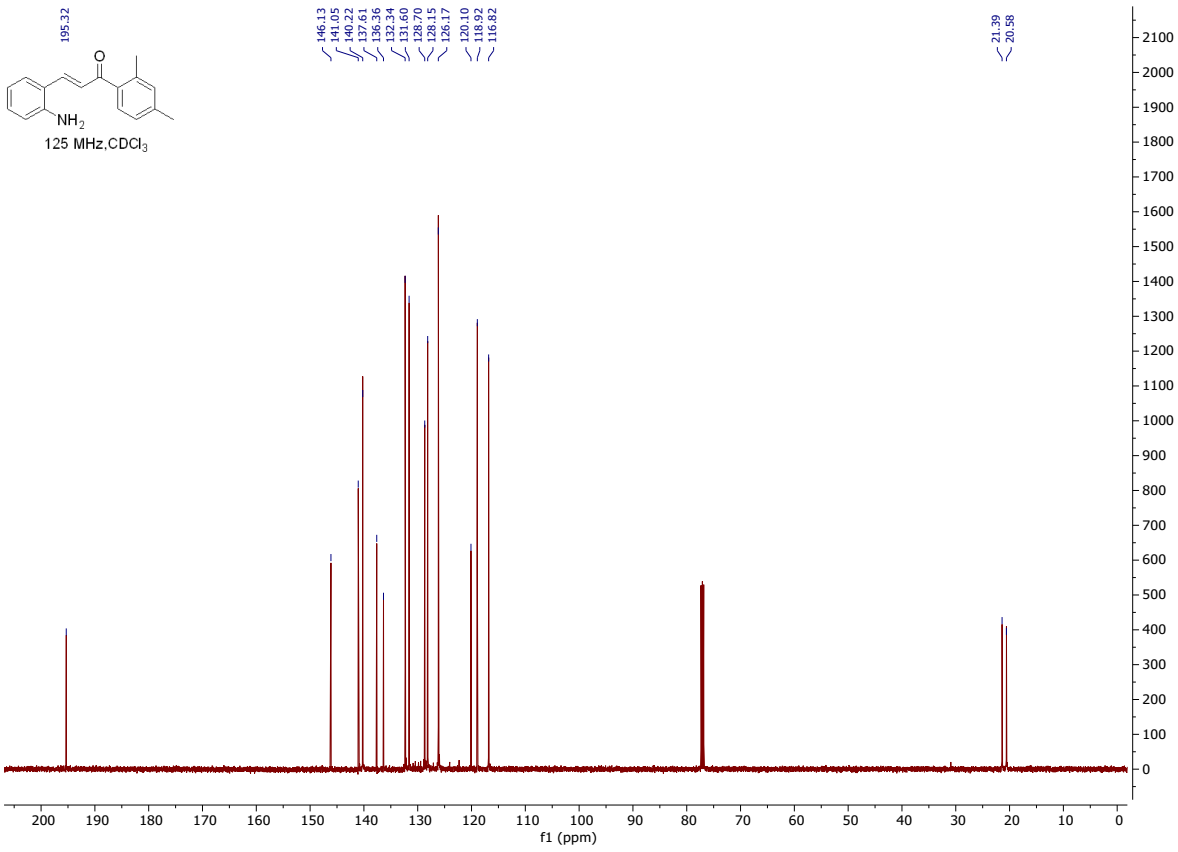
104.68
104.43
O
F
NH2
F
100 MHz, CDCl3
f1 (ppm)

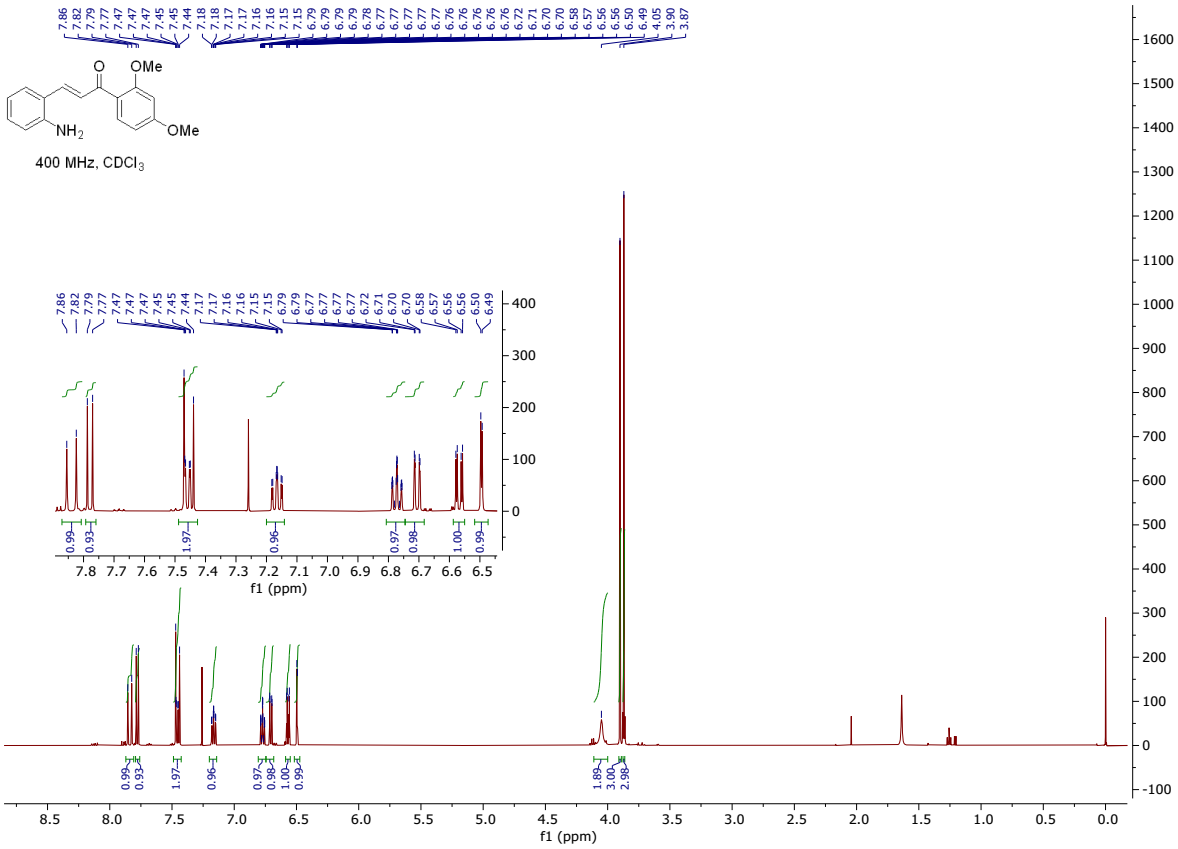

-102.68
-102.70
-102.71
-102.72
-102.75
-102.76
-102.77
-102.78
-102.80
-105.61
-105.64
-105.68
-105.73
1.00
1.03
O
F
NH2
F
282 MHz, CDCl3
f1 (ppm)

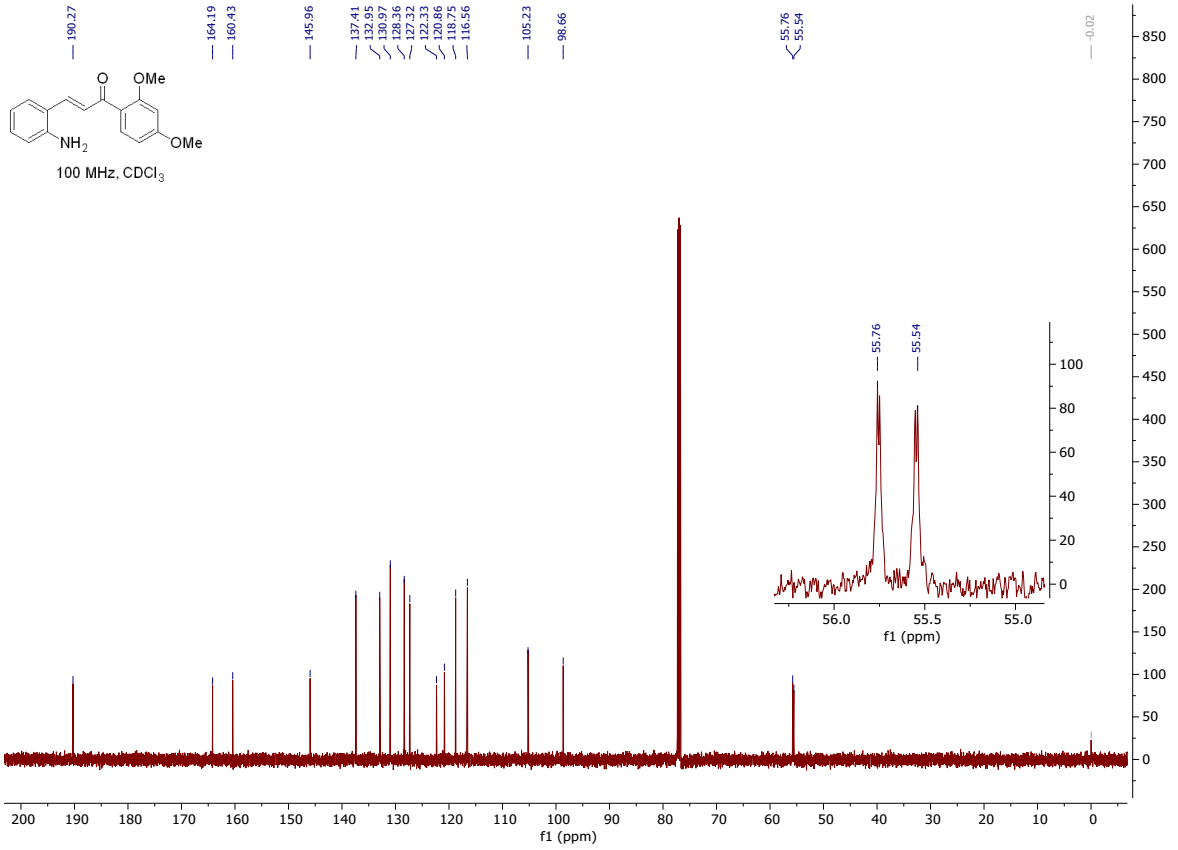
(*E*)-3-(2-Aminophenyl)-1-(2,4-dimethylphenyl)prop-2-en-1-one 1c:



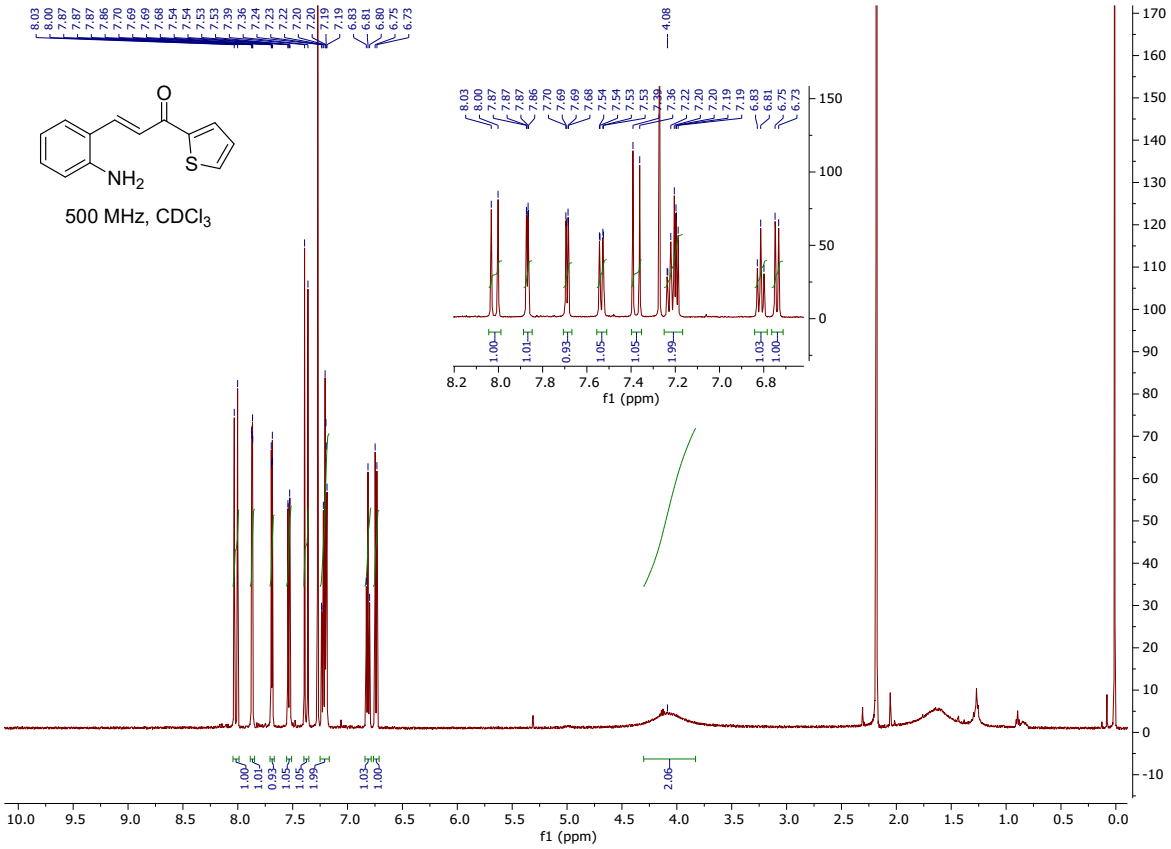


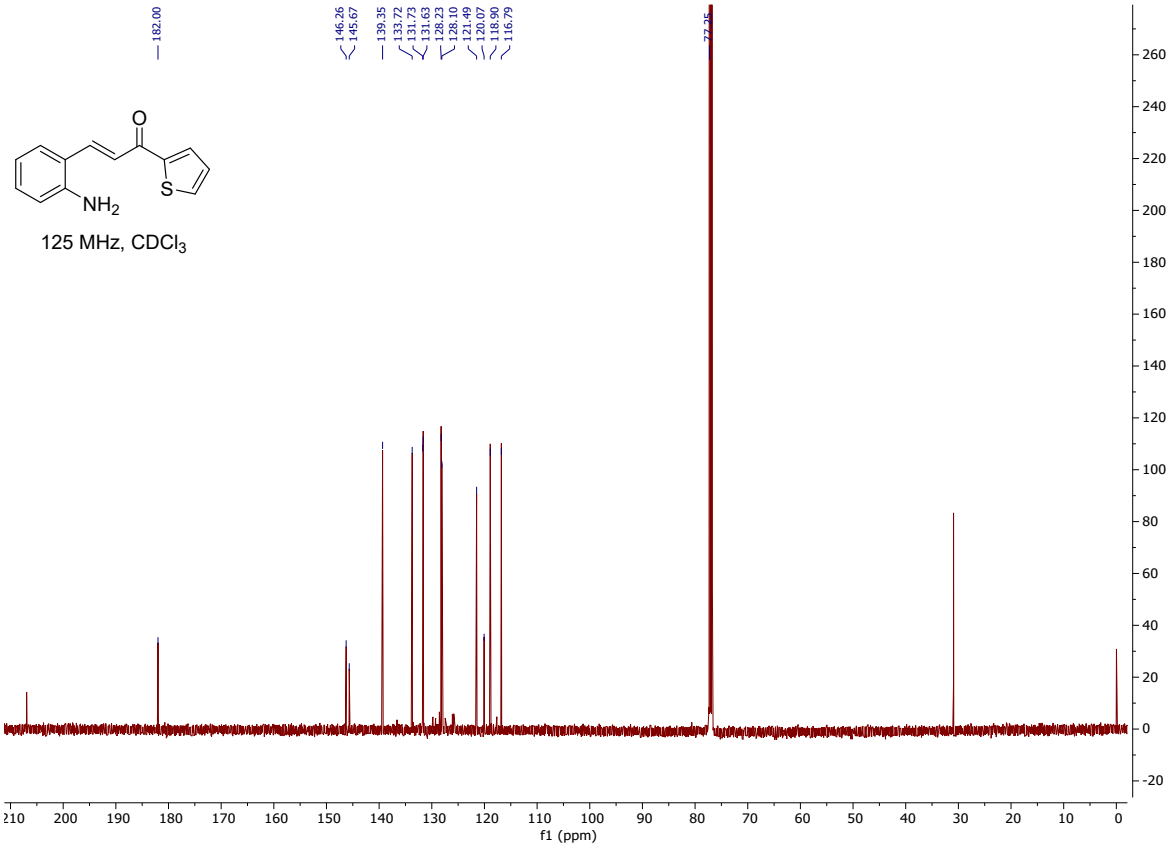
(*E*)-1-(2,4-Dimethoxyphenyl)-3-phenylprop-2-en-1-one 1d:



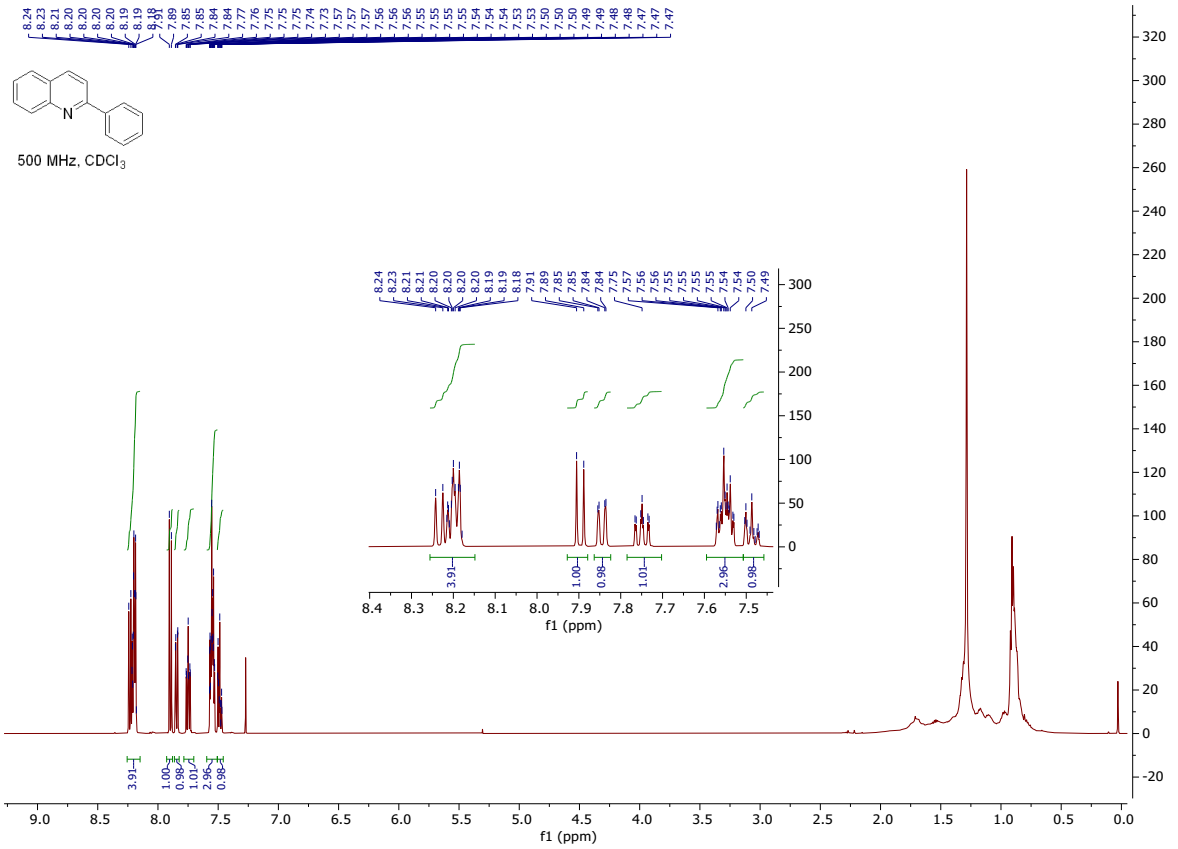


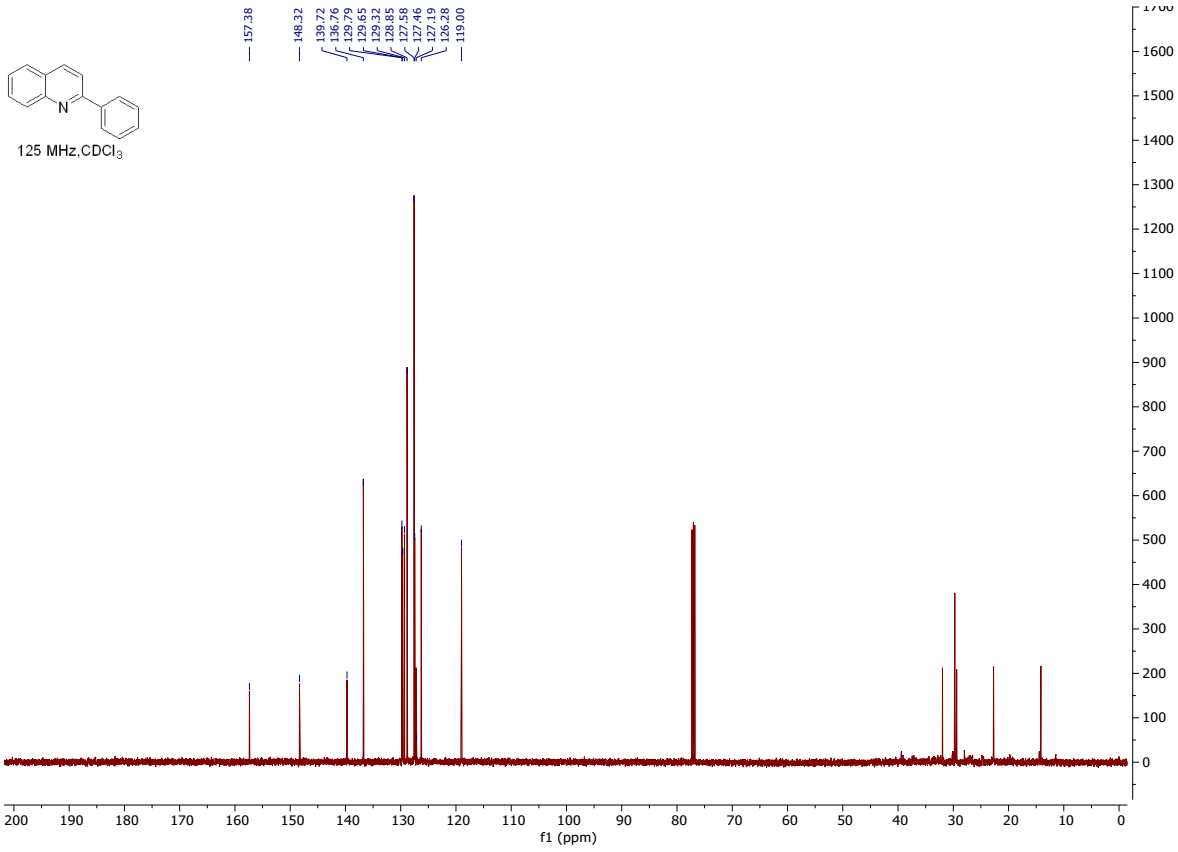
(*E*)-3-(2-Aminophenyl)-1-(thiophen-2-yl)prop-2-en-1-one 1e:



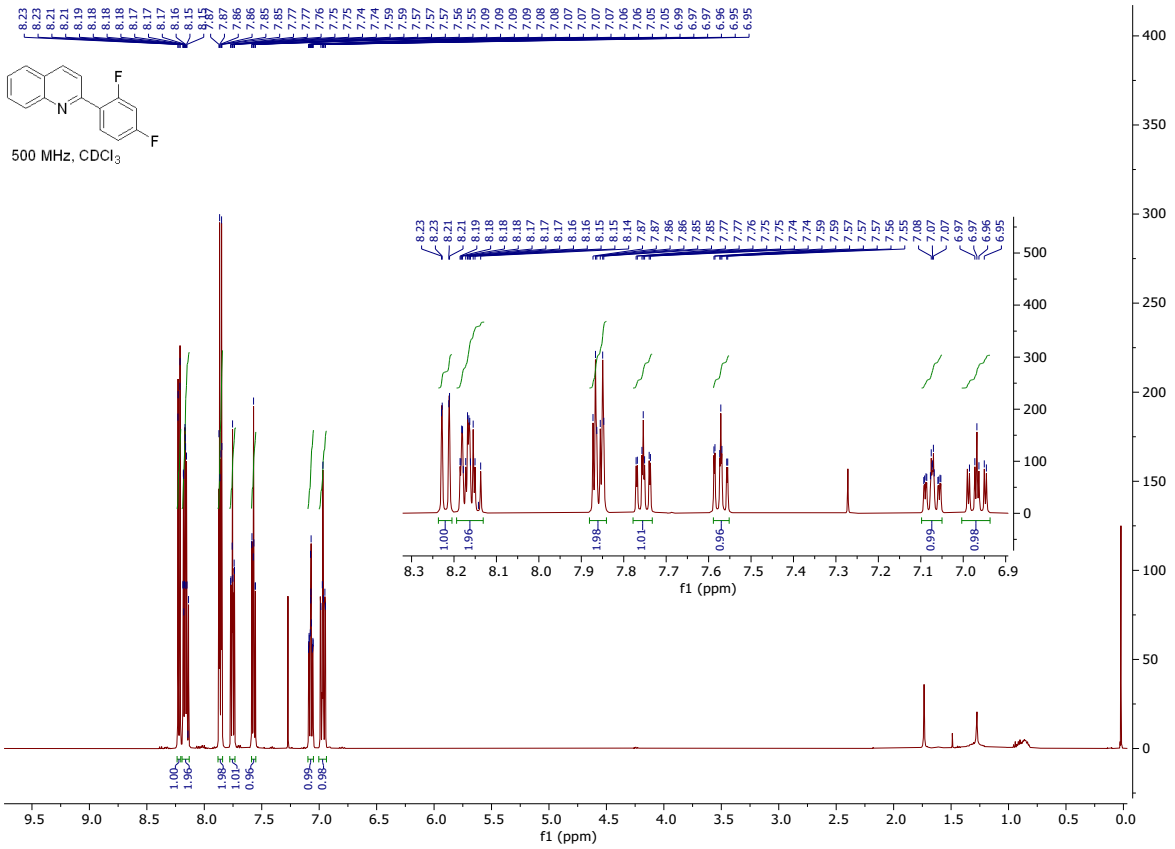


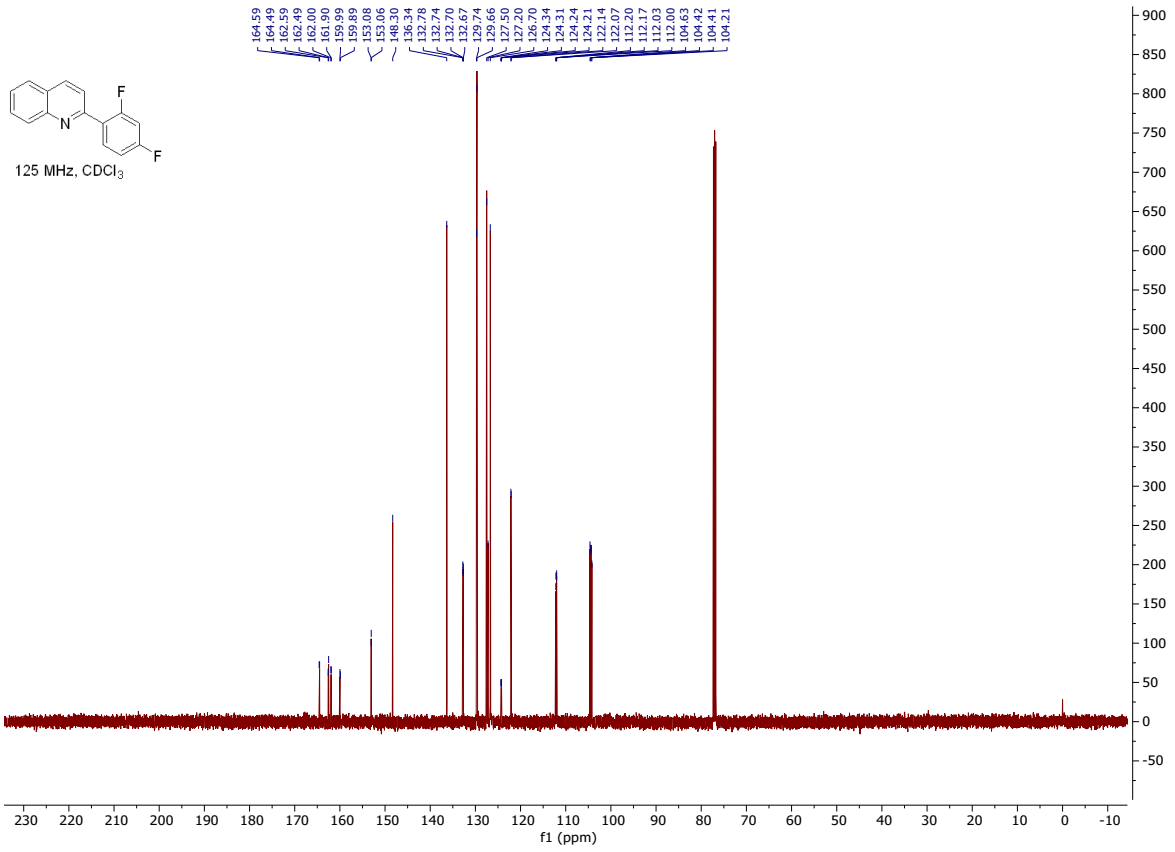
2-Phenylquinoline 2a:

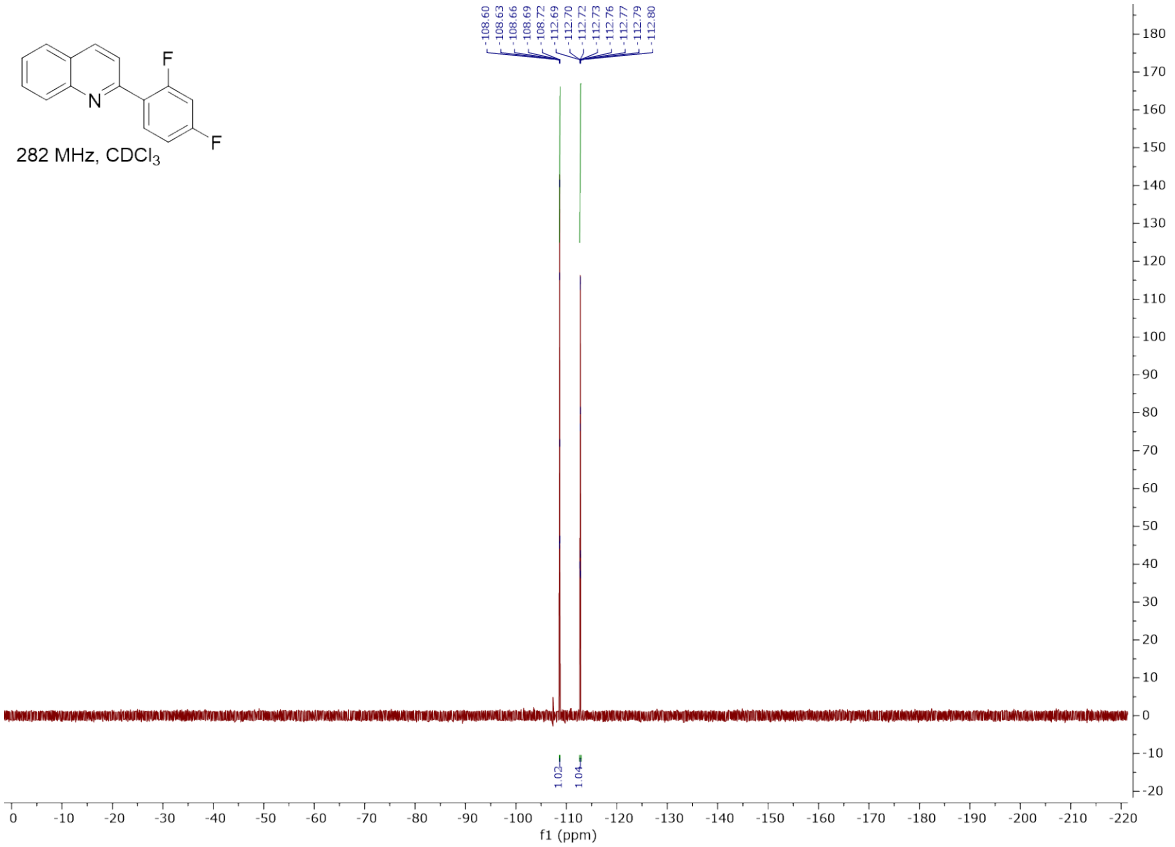




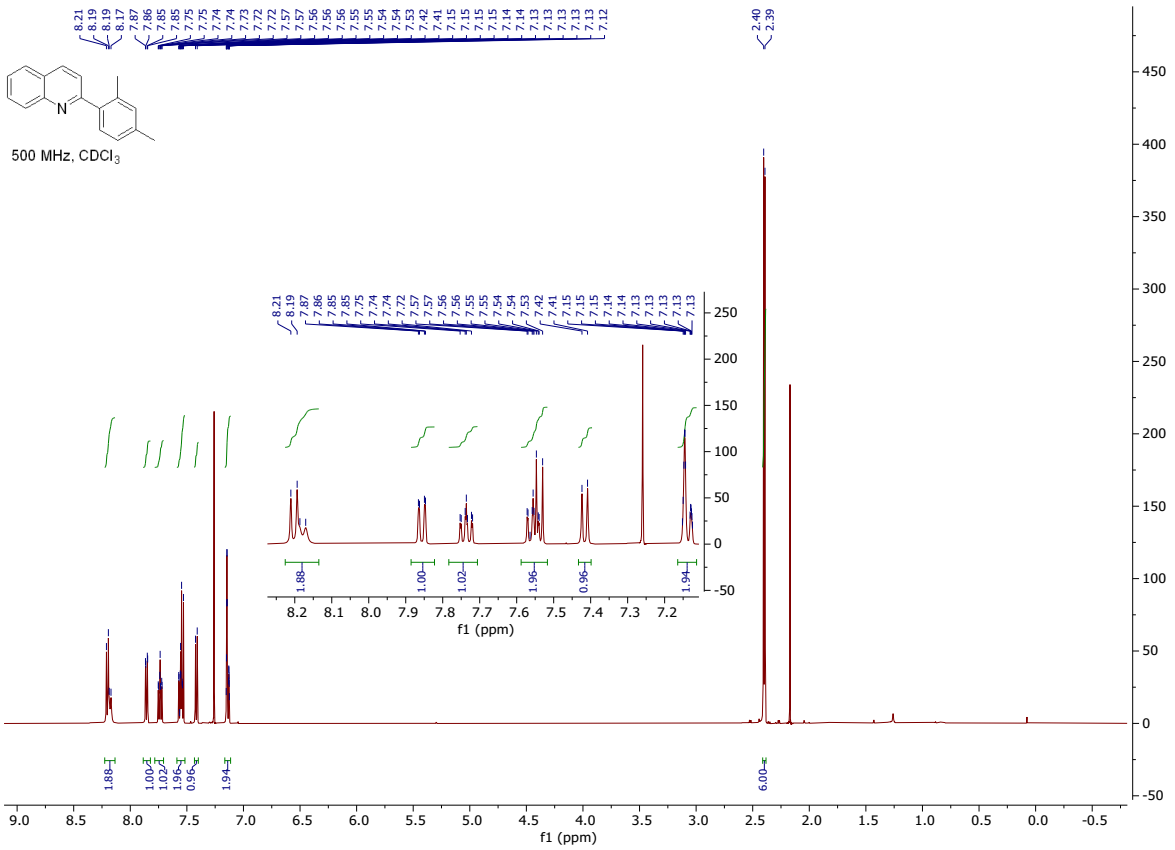
2-(2,4-Difluorophenyl)quinoline 2b:

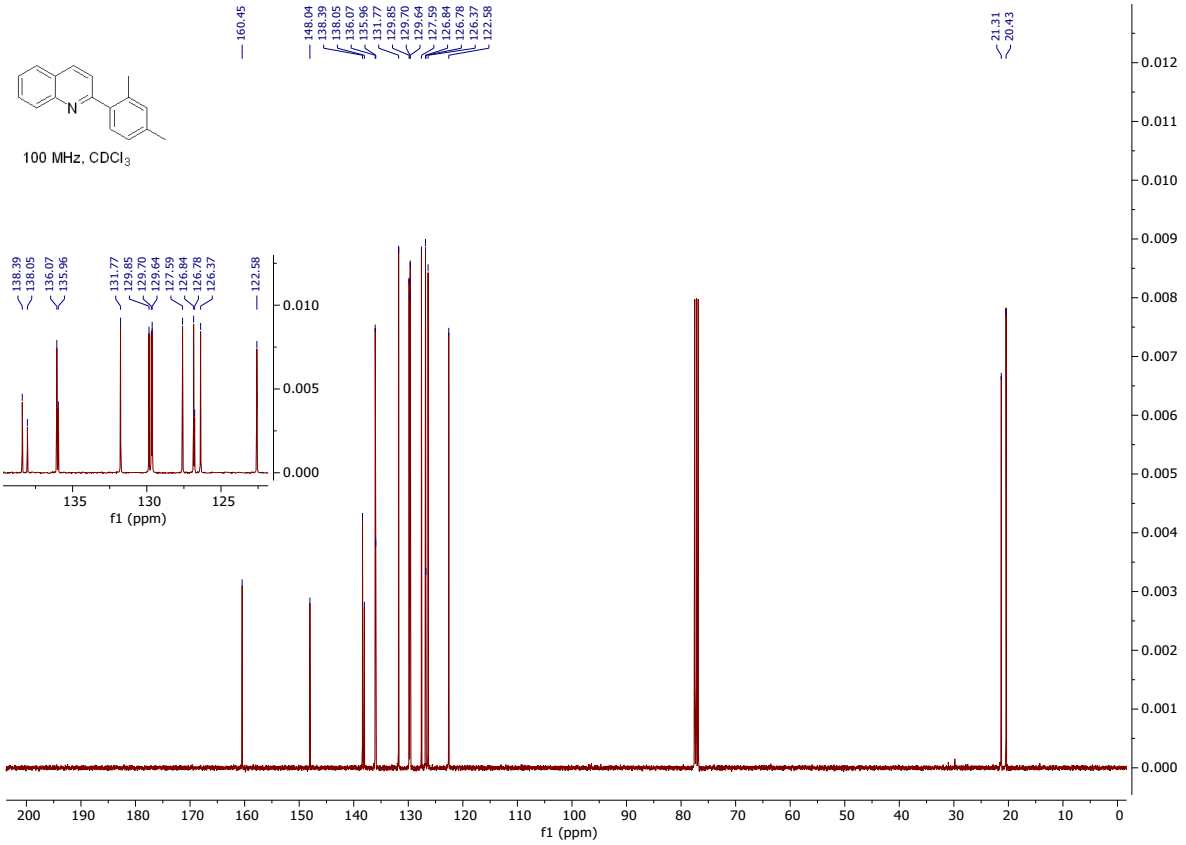




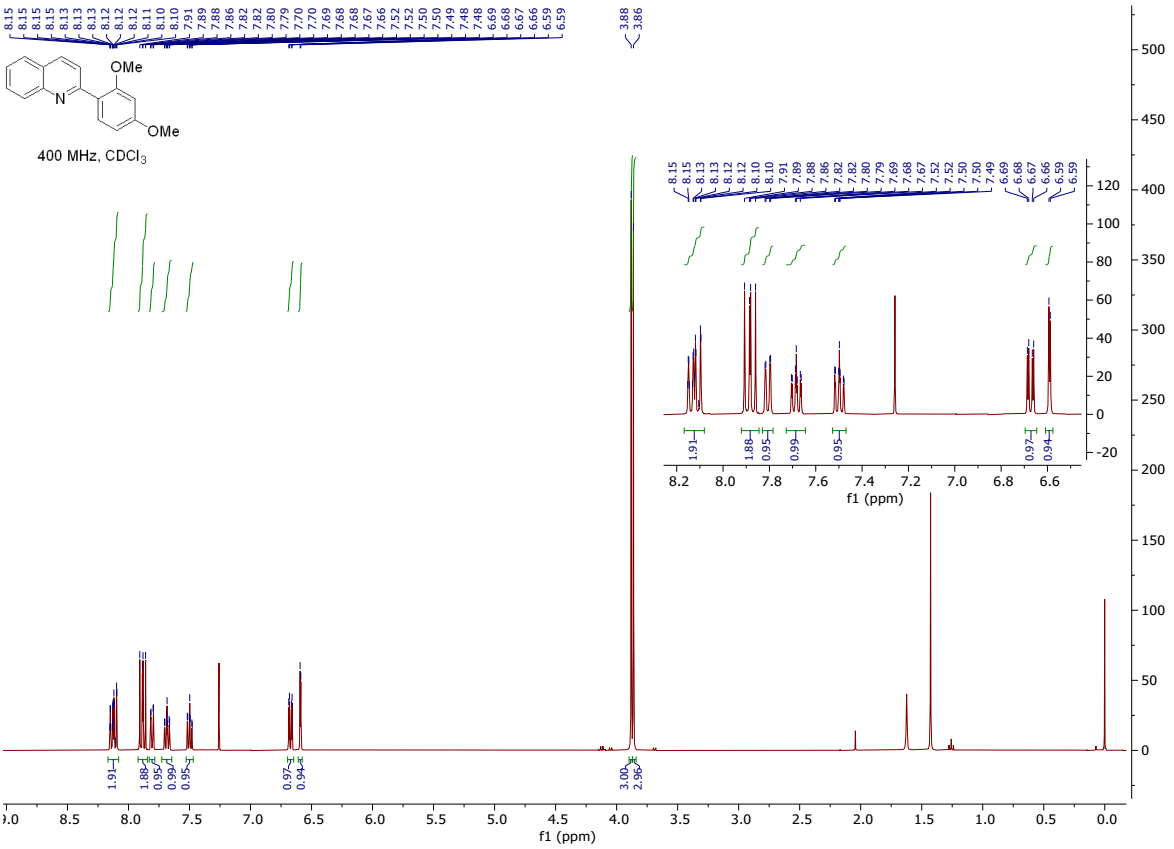


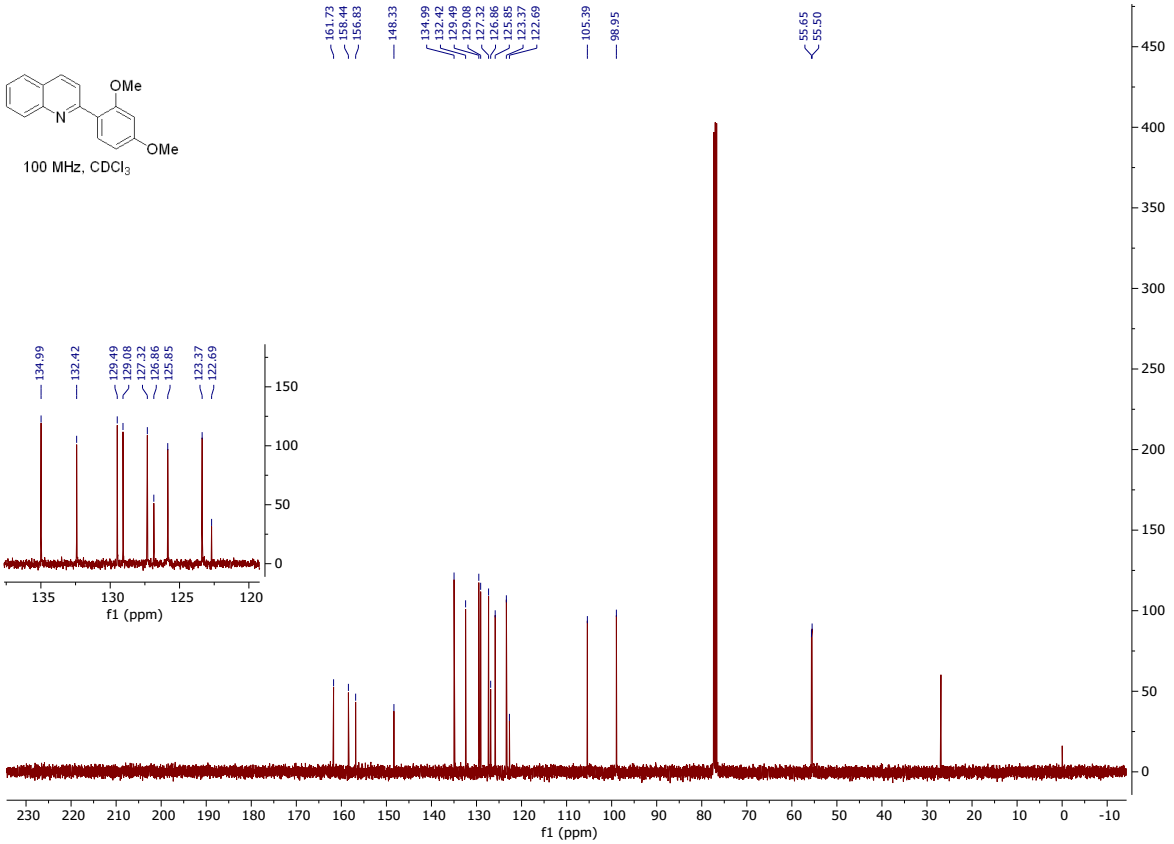
2-(2,4-Dimethylphenyl)quinoline 2c:



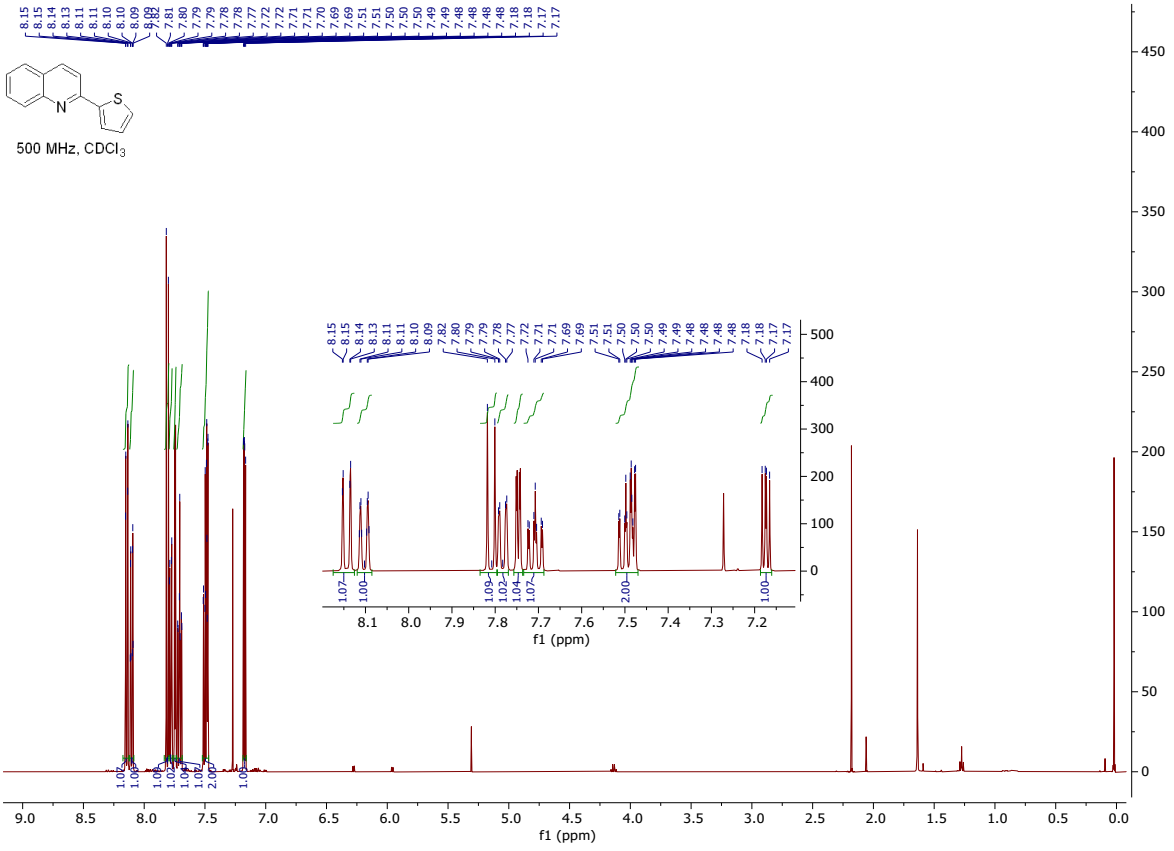


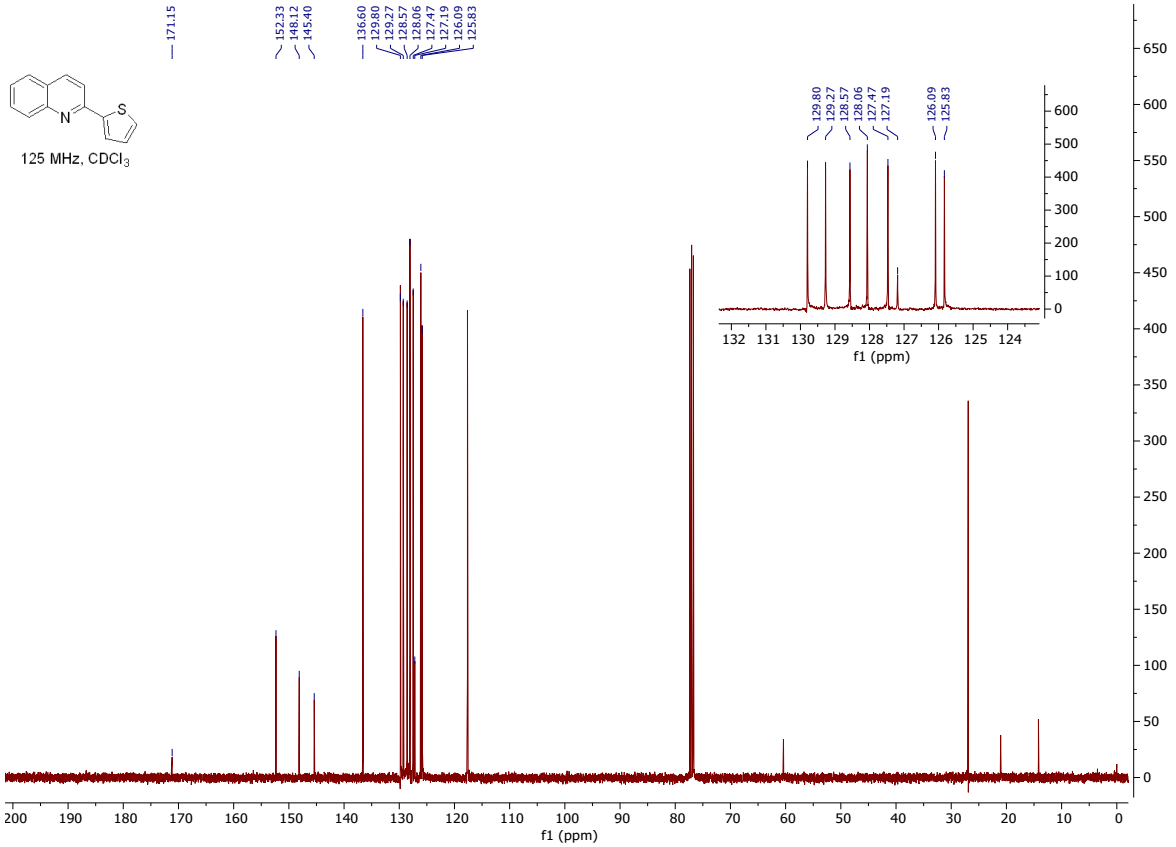
2-(2,4-Dimethoxyphenyl)-quinoline 2d:





2-(Thiophen-2-yl)-quinoline 2e:

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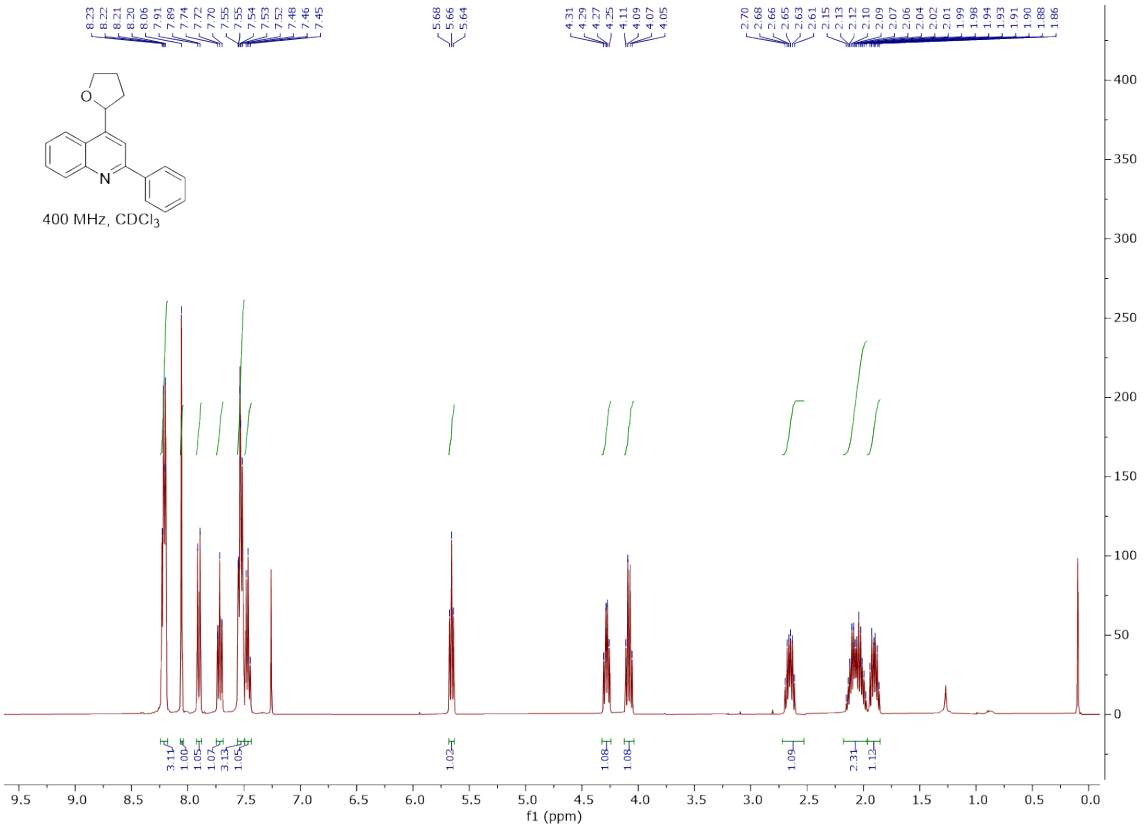
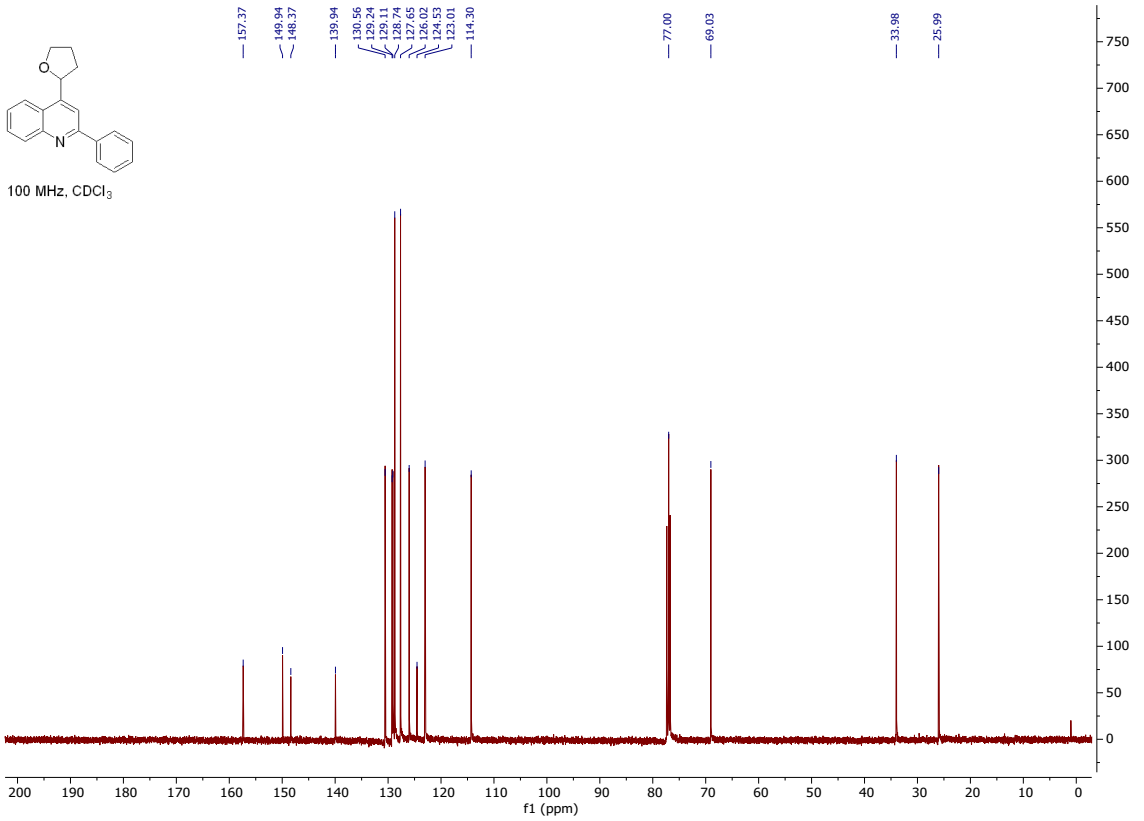
125 MHz, CDCl3
f1 (ppm)

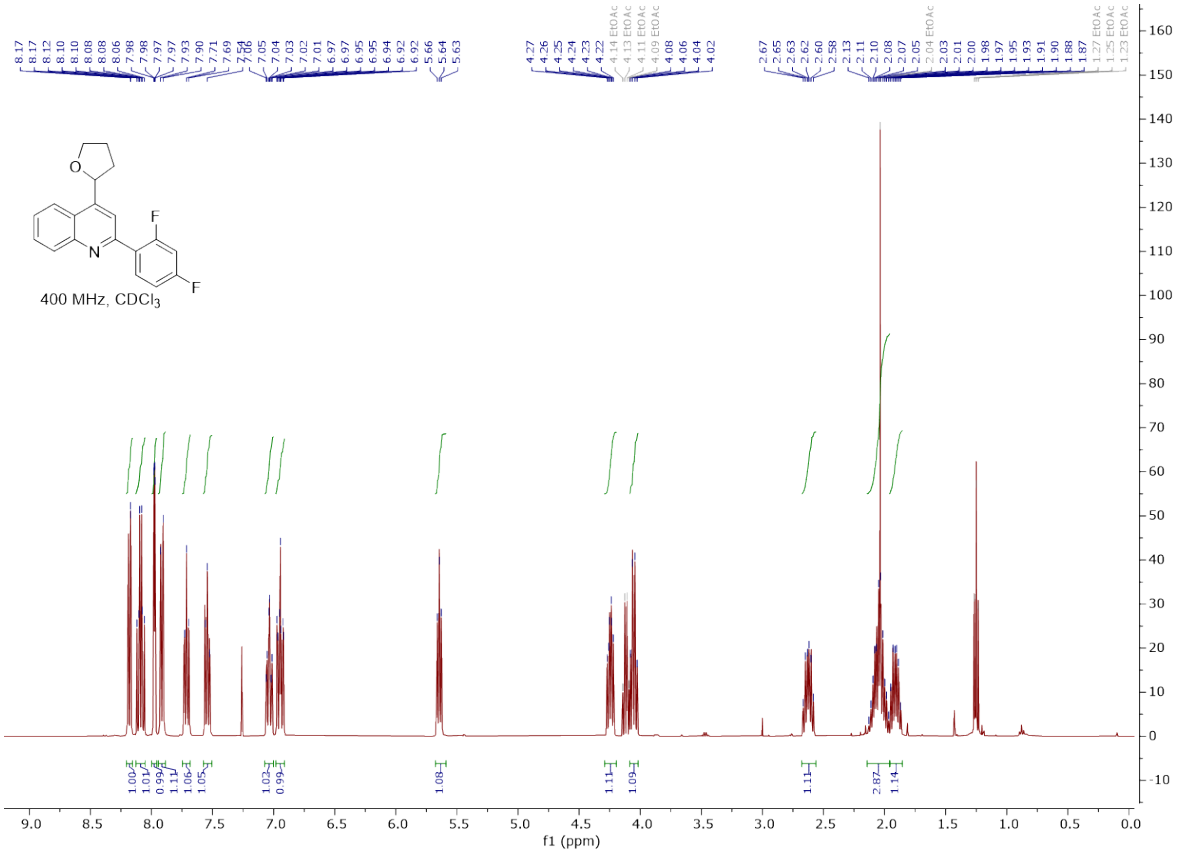
Minisci reaction products

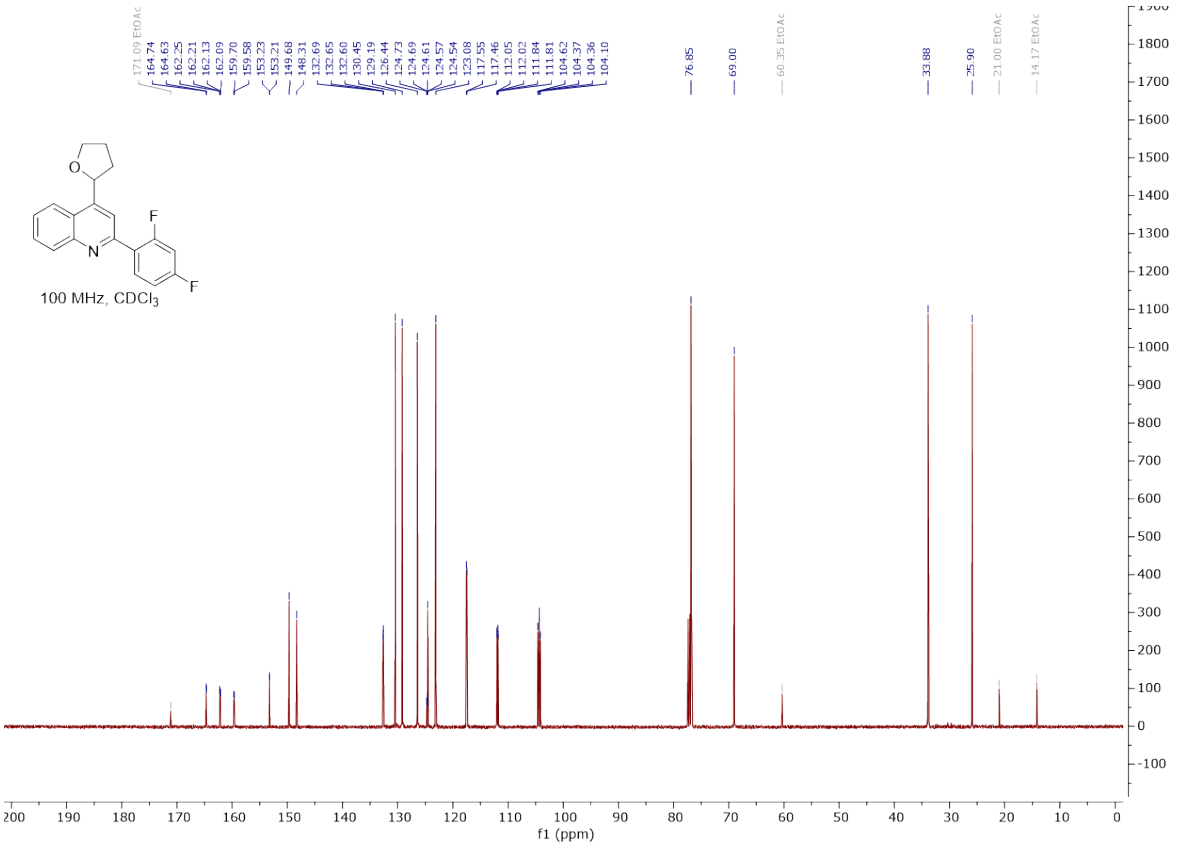
2-Phenyl-4-(tetrahydrofuran-2-yl)quinoline 3a:

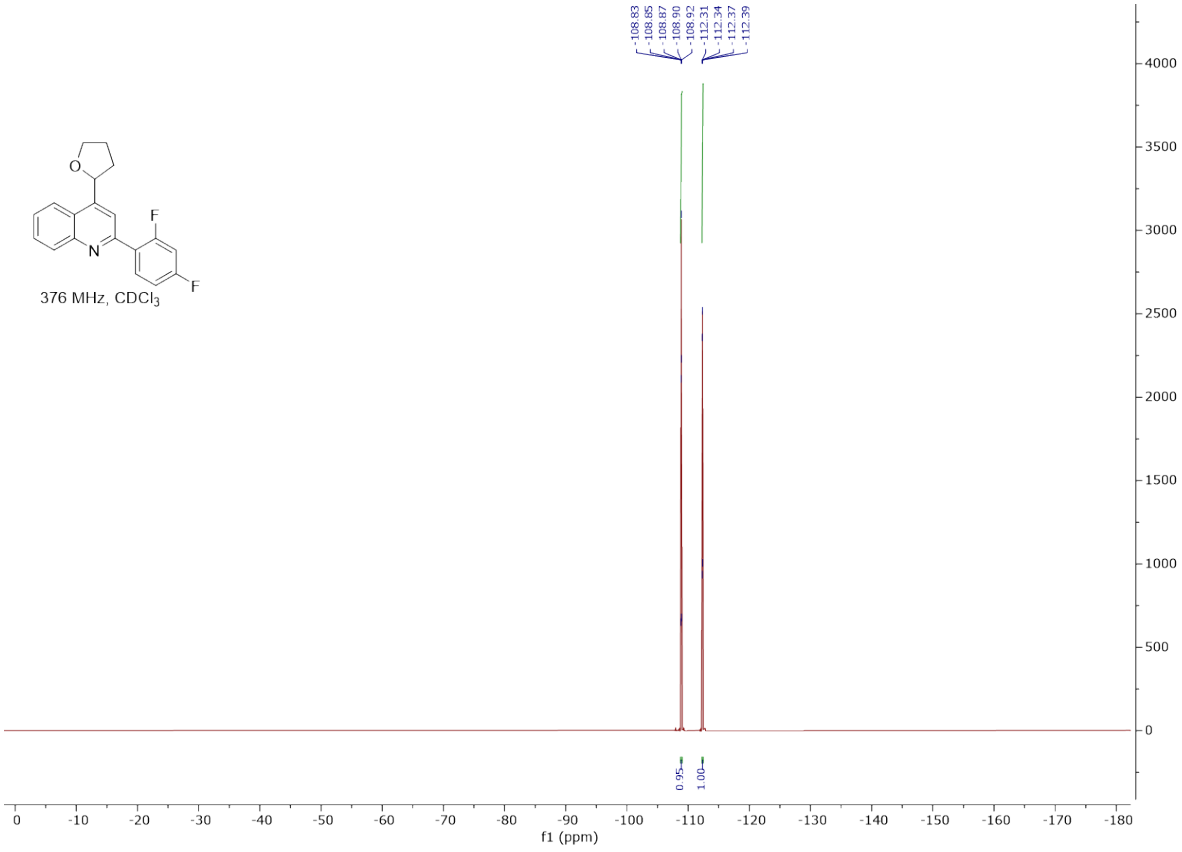




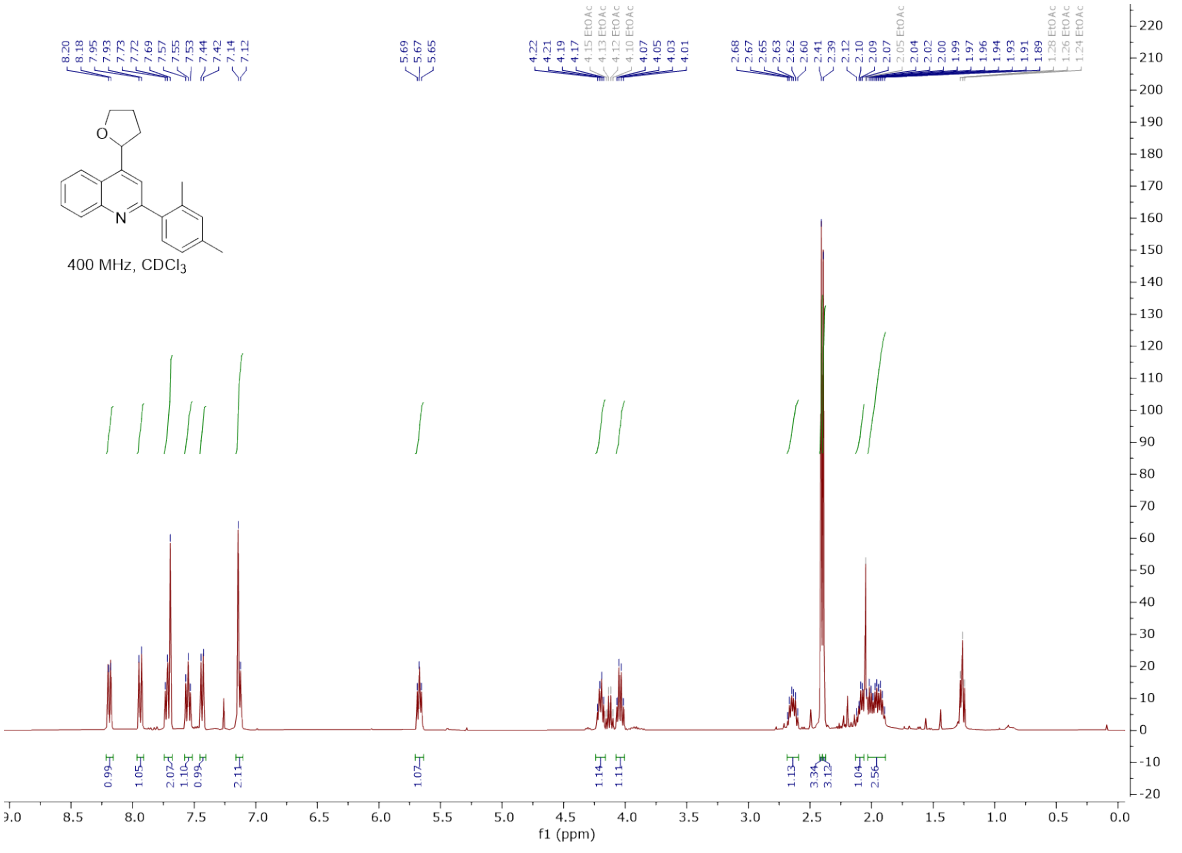
2-(2,4-Difluorophenyl)-4-(tetrahydrofuran-2-yl)quinoline 3b:

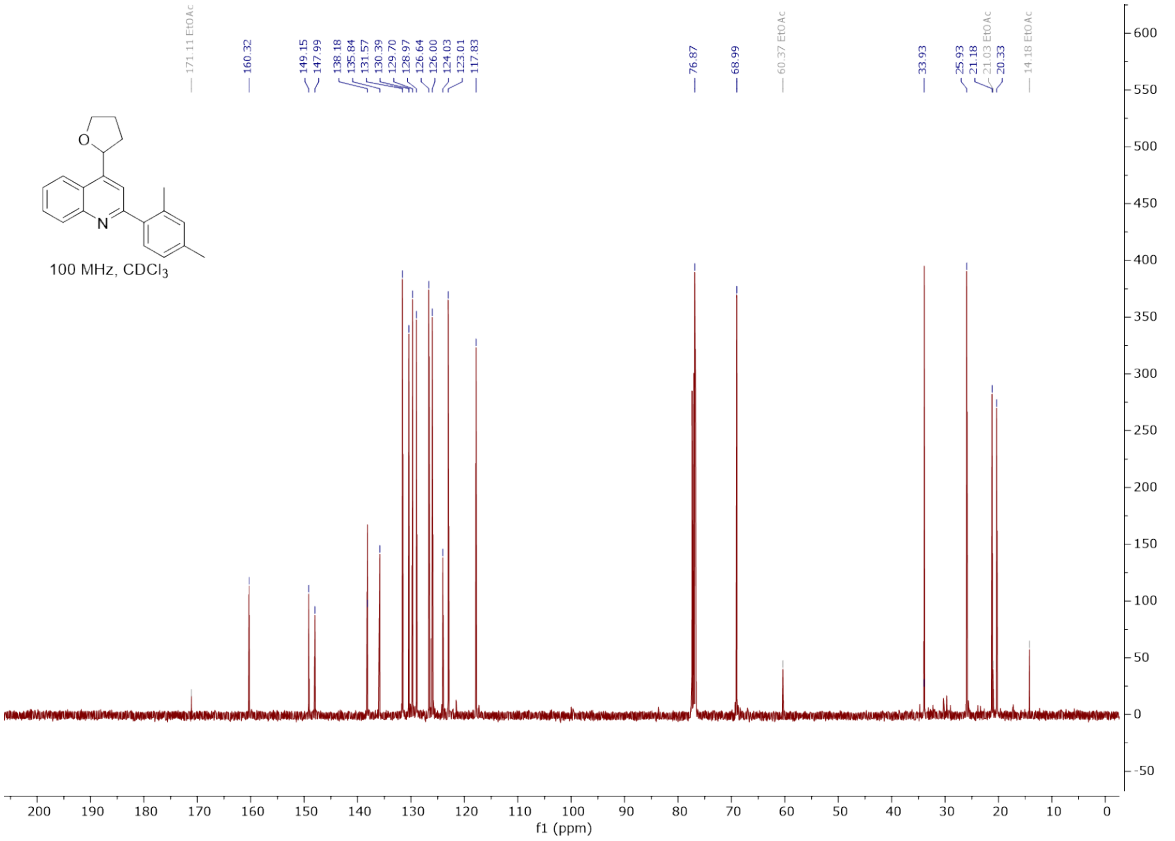




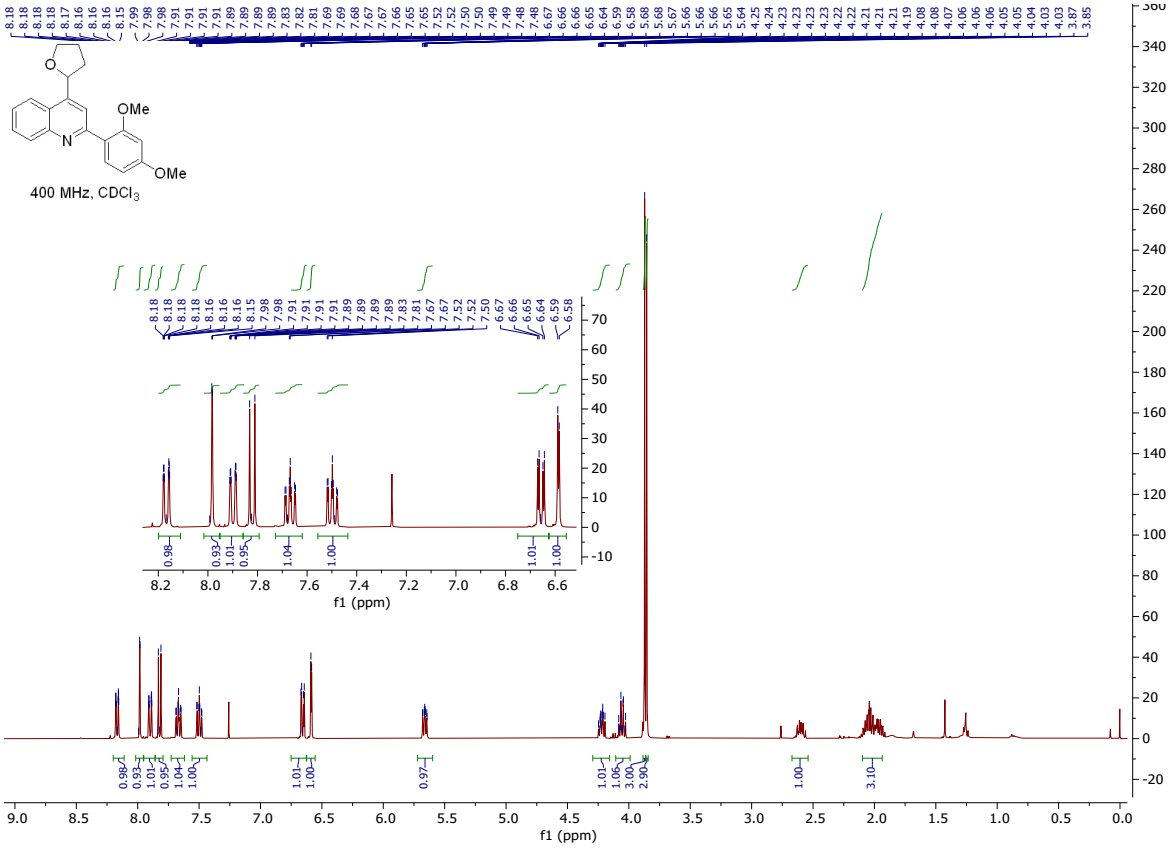


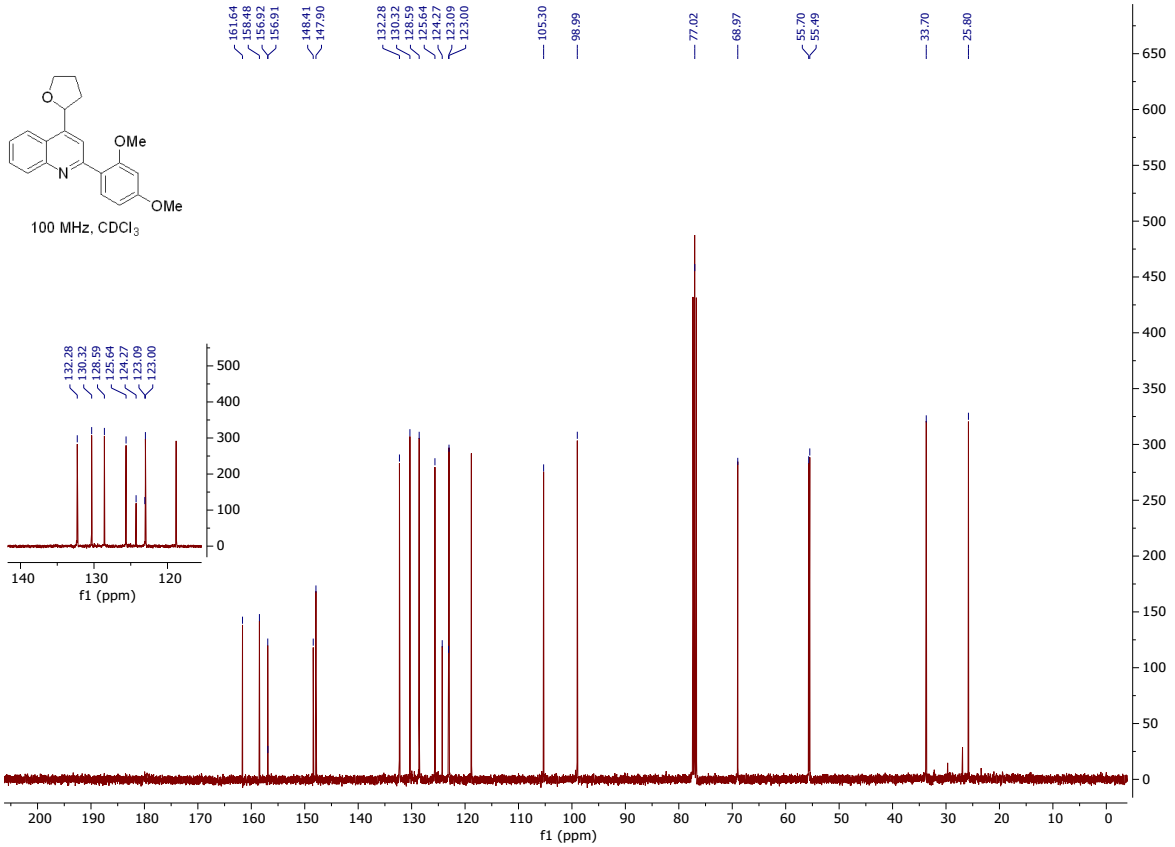
2-(2,4-Dimethylphenyl)-4-(tetrahydrofuran-2-yl)quinoline 3c:



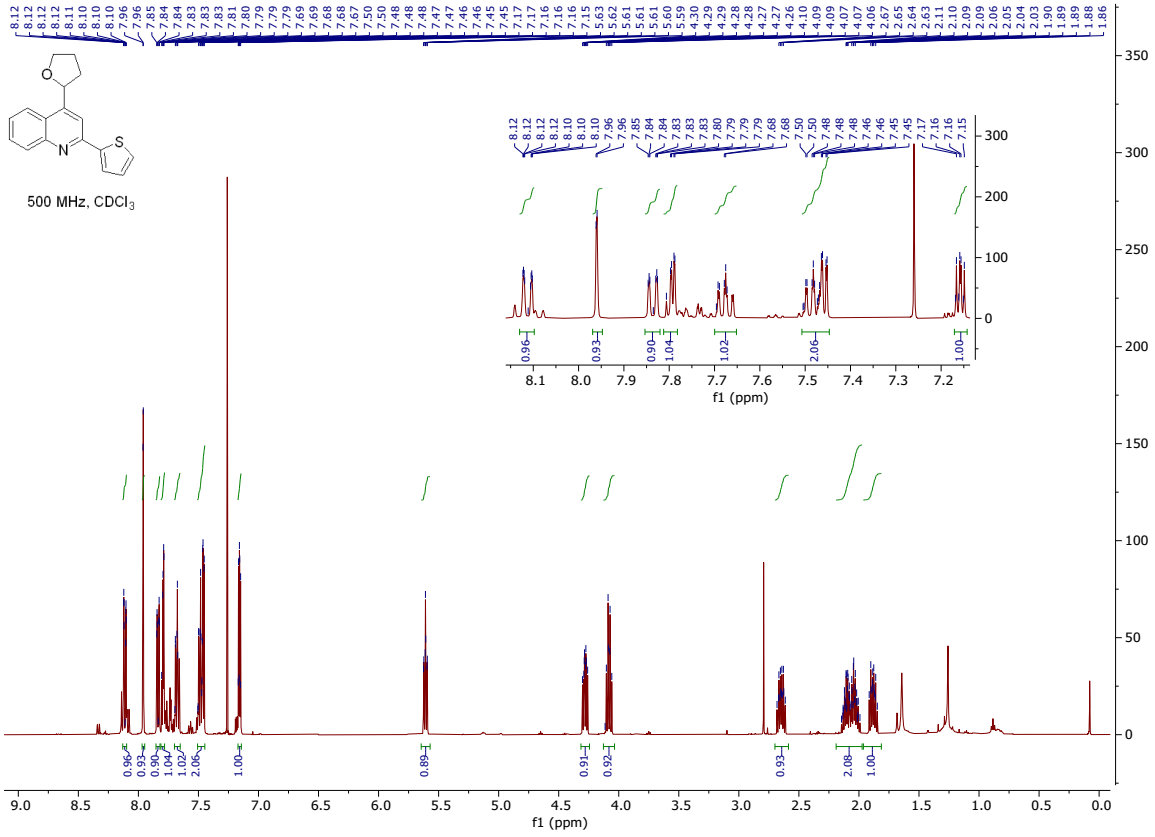


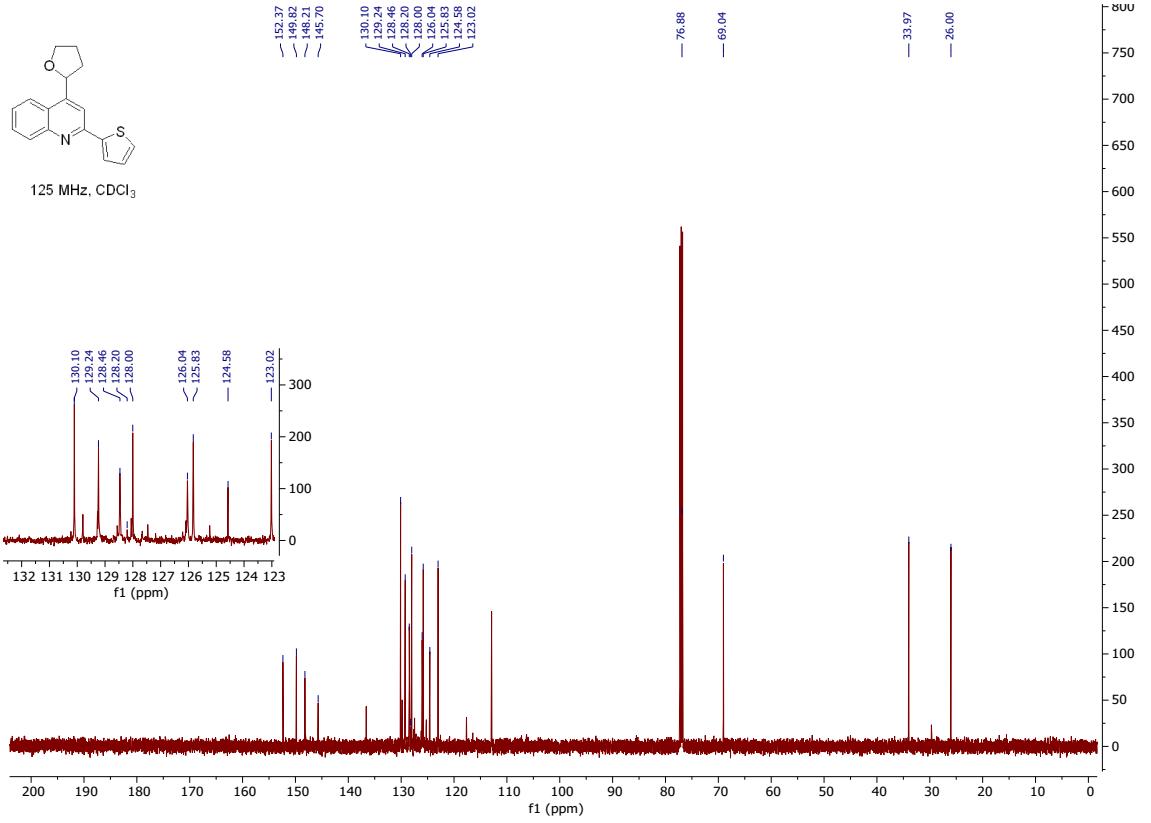
2-(2,4-Dimethoxyphenyl)-4-(tetrahydrofuran-2-yl) quinoline 3d:



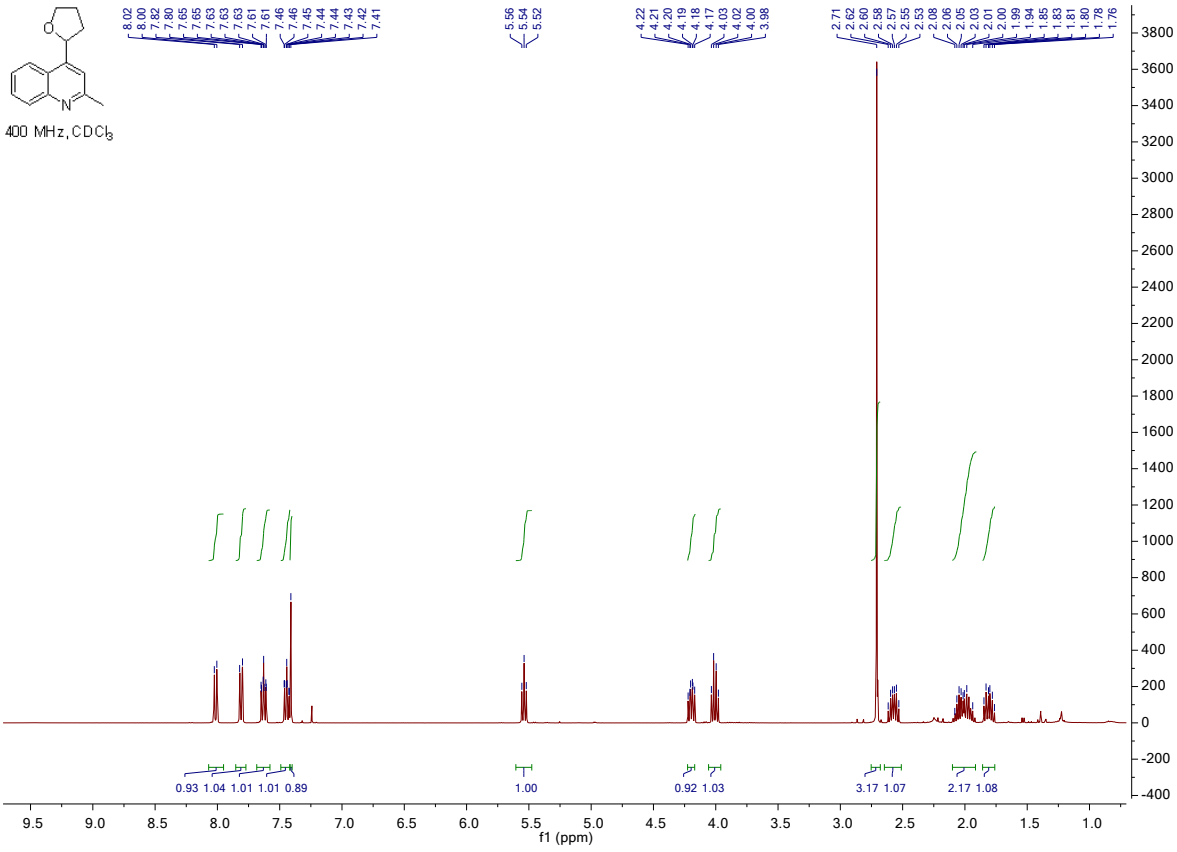


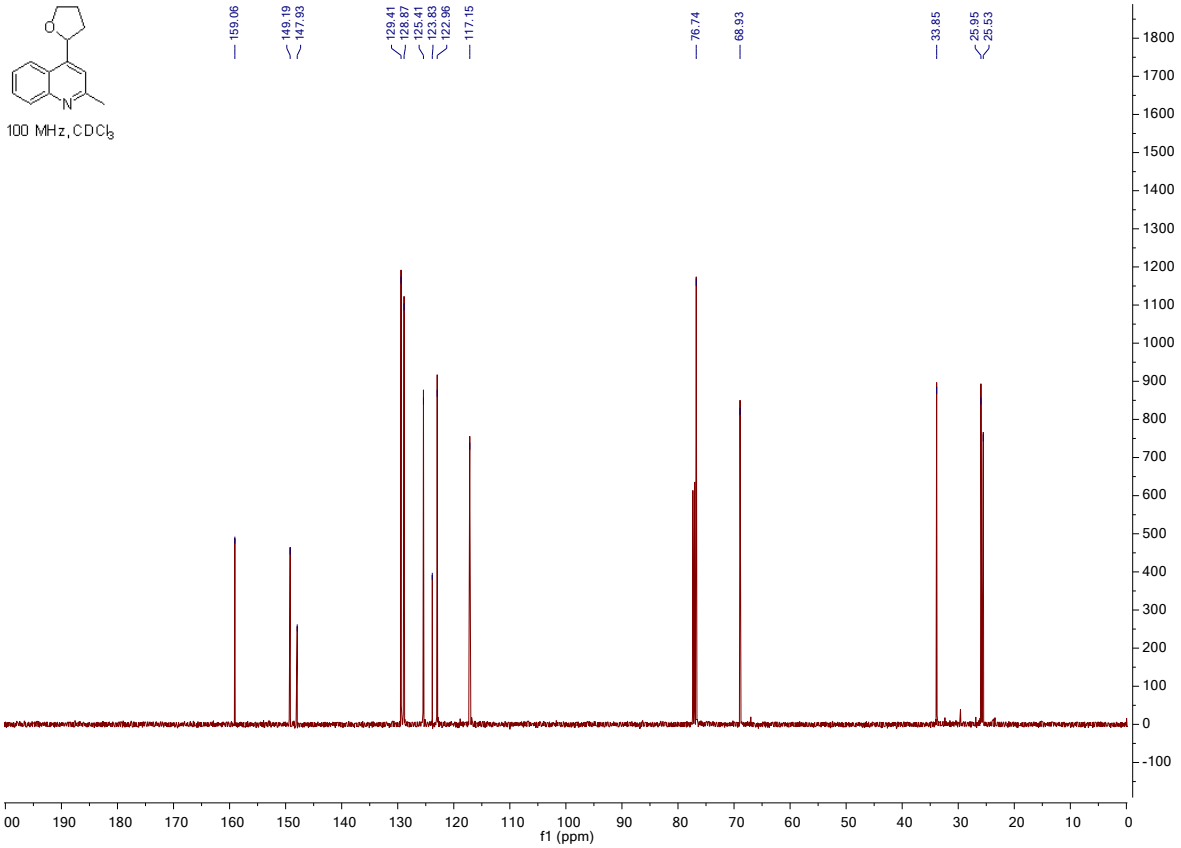
4-(Tetrahydrofuran-2-yl)-2-(thiophen-2-yl)quinoline 3e:



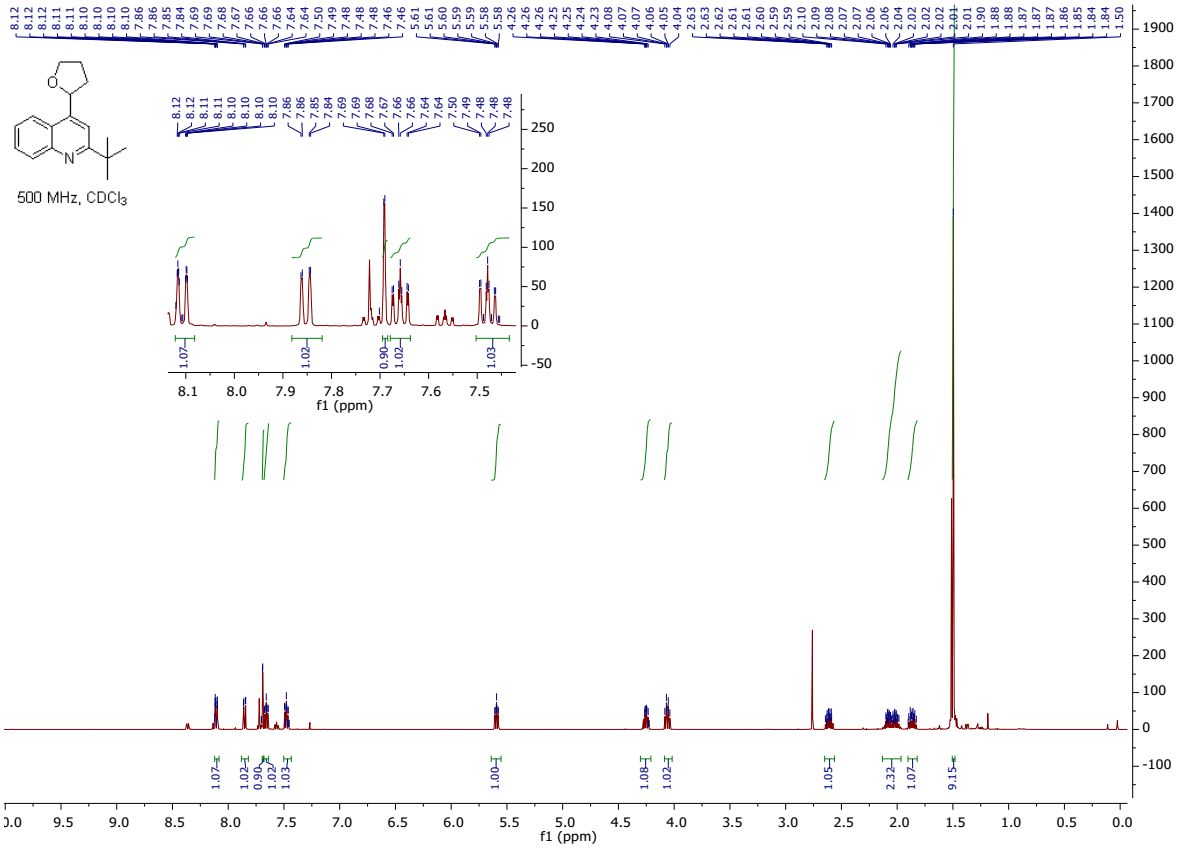


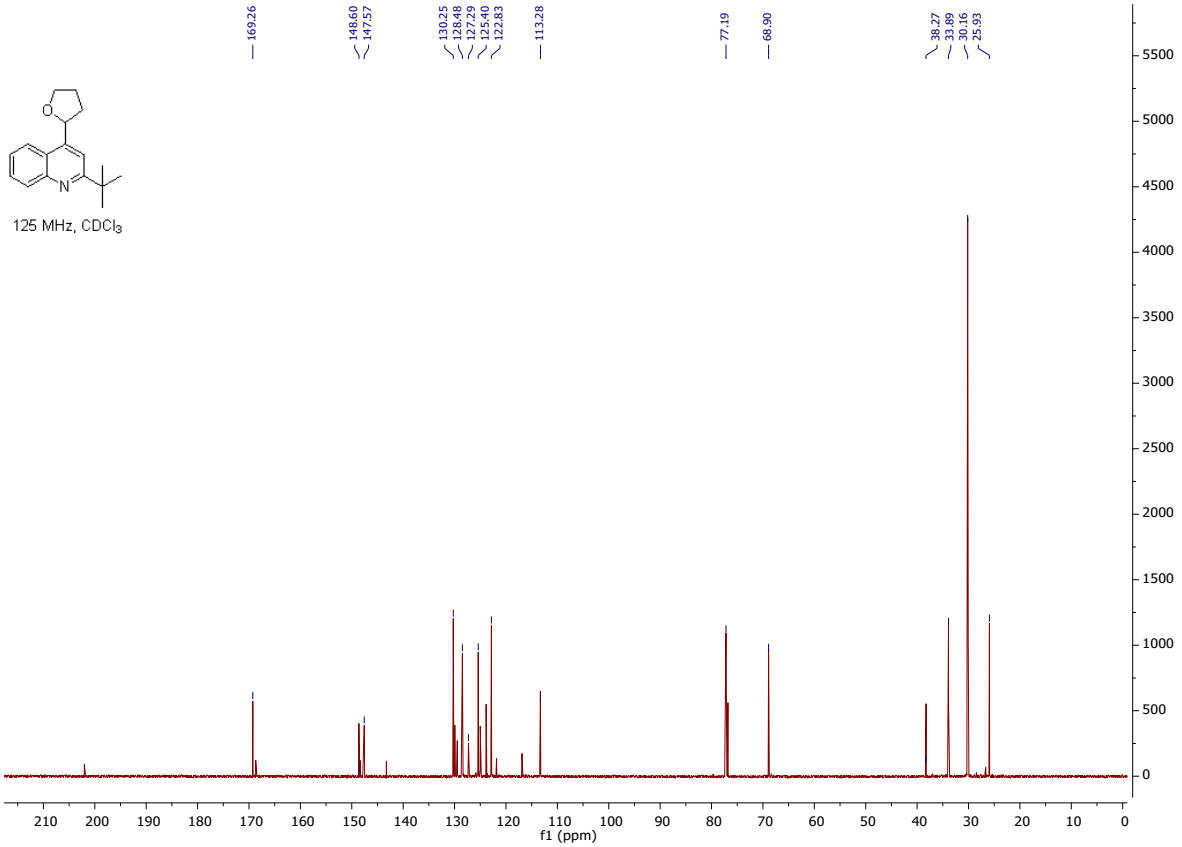
2-Methyl-4-(tetrahydrofuran-2-yl)quinoline 3f:



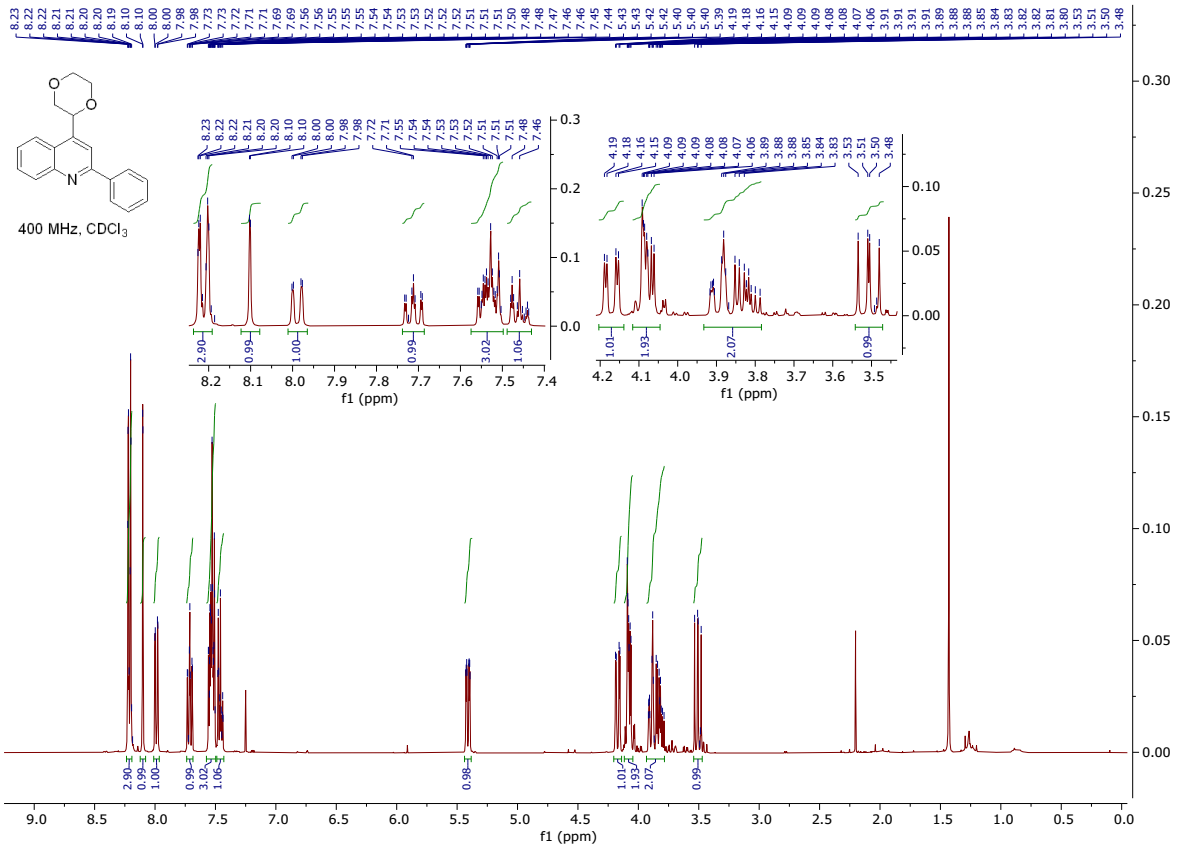


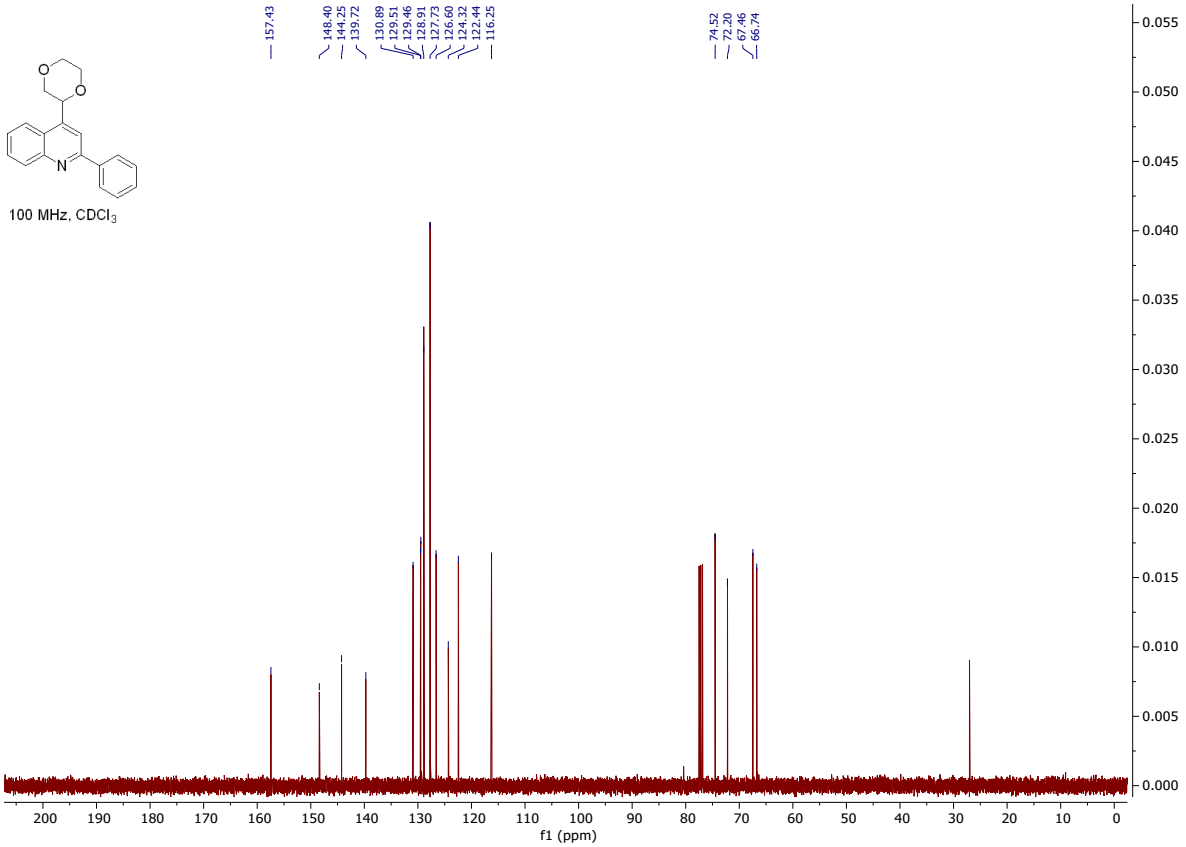
2-(*tert*-Butyl)-4-(tetrahydrofuran-2-yl)quinoline 3g:



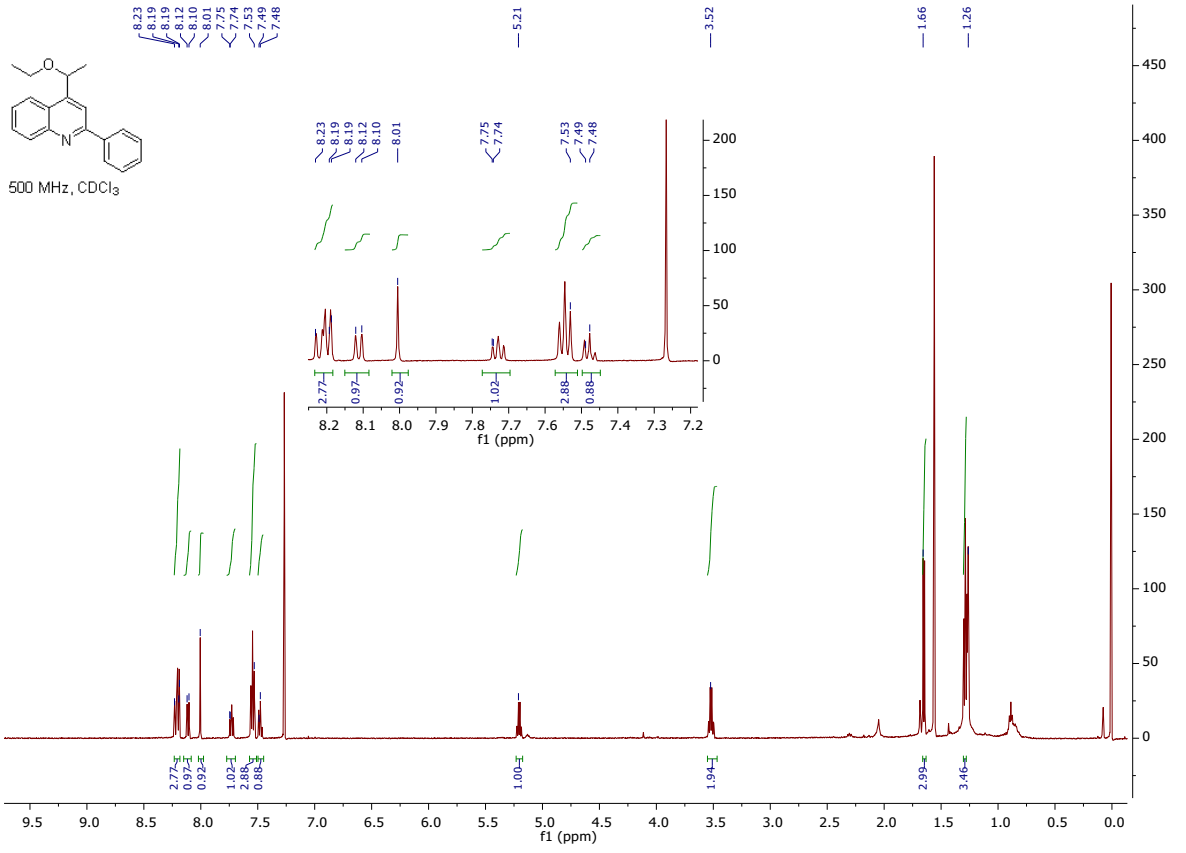


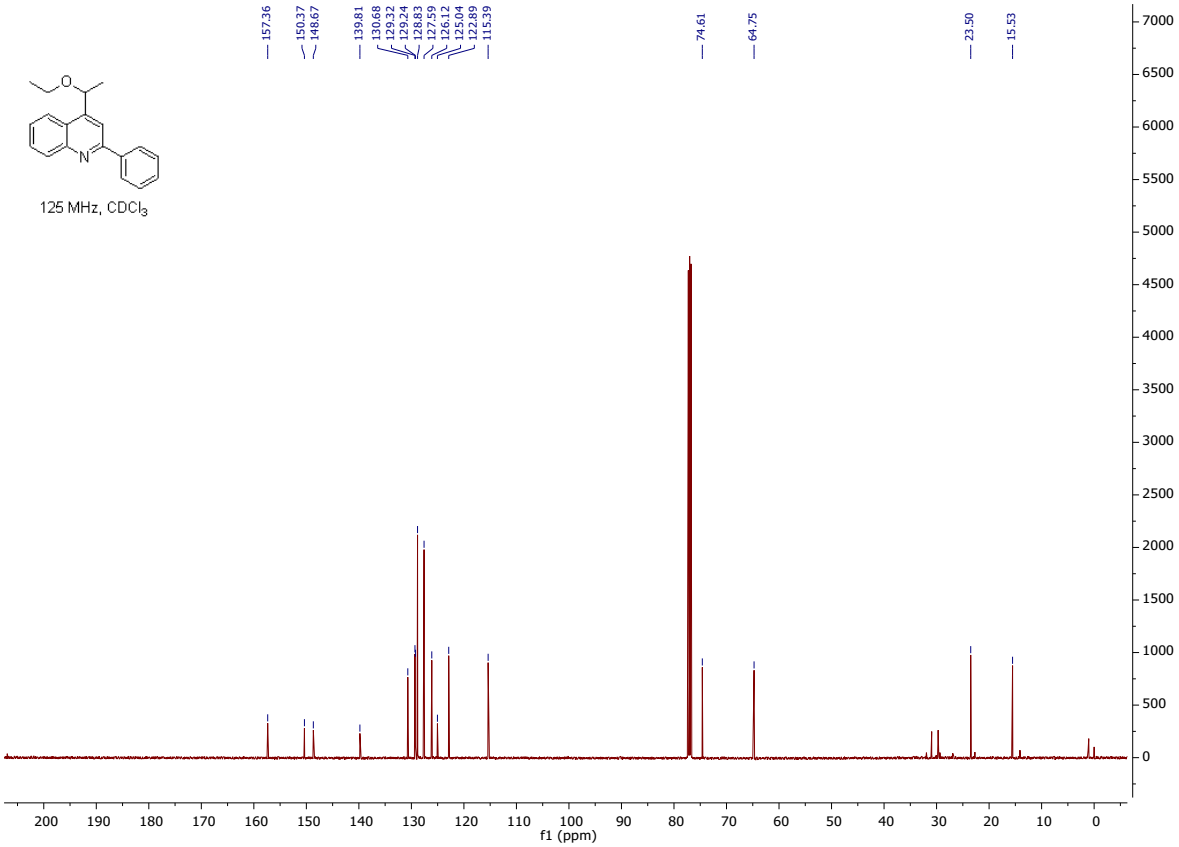
4-(1,4-Dioxan-2-yl)-2-phenylquinoline 3h:



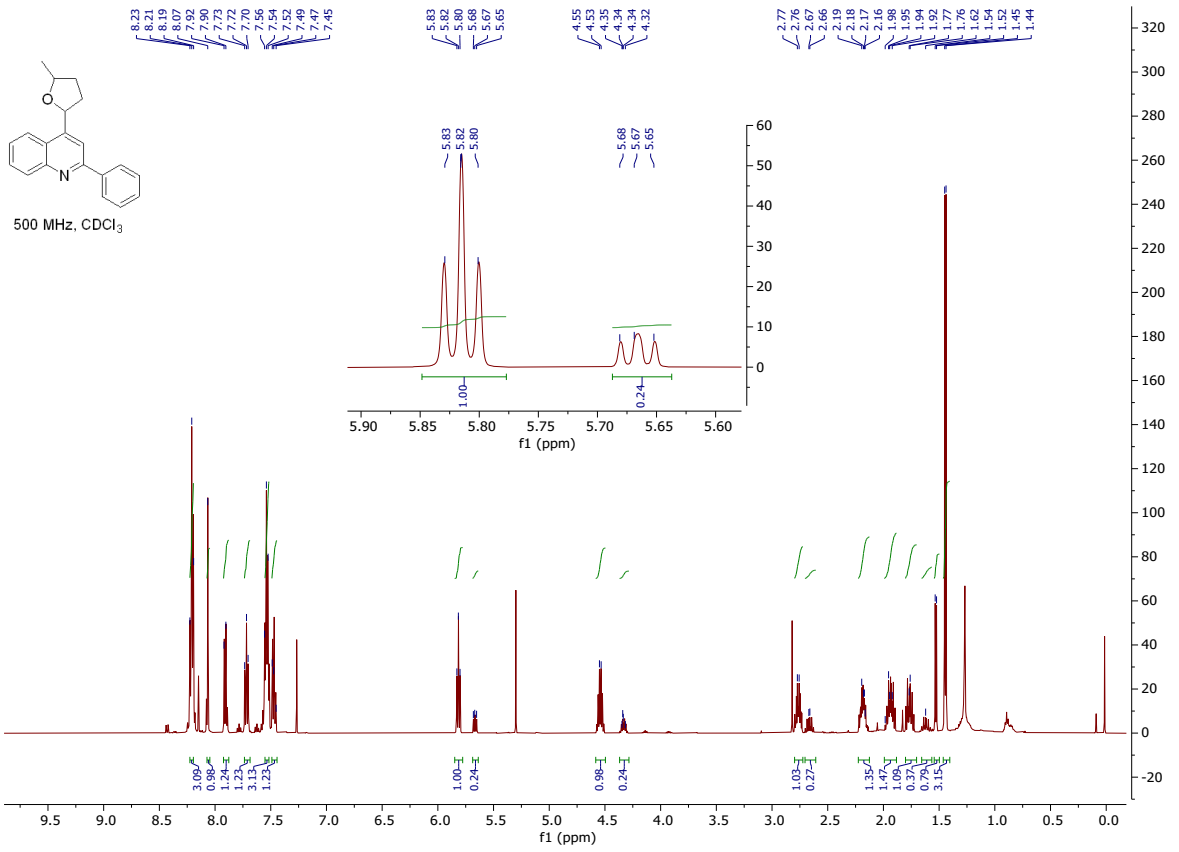


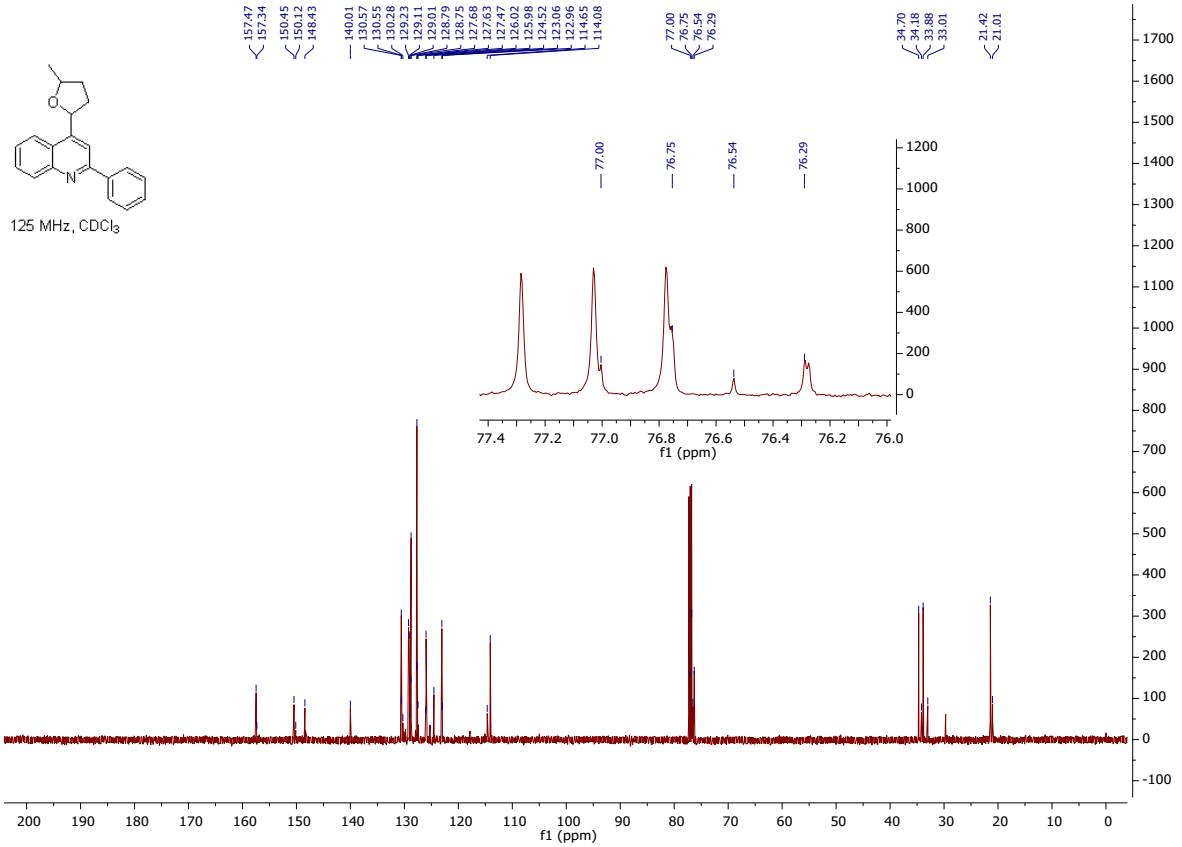
4-(1-Ethoxyethyl)-2-phenylquinoline 3i:



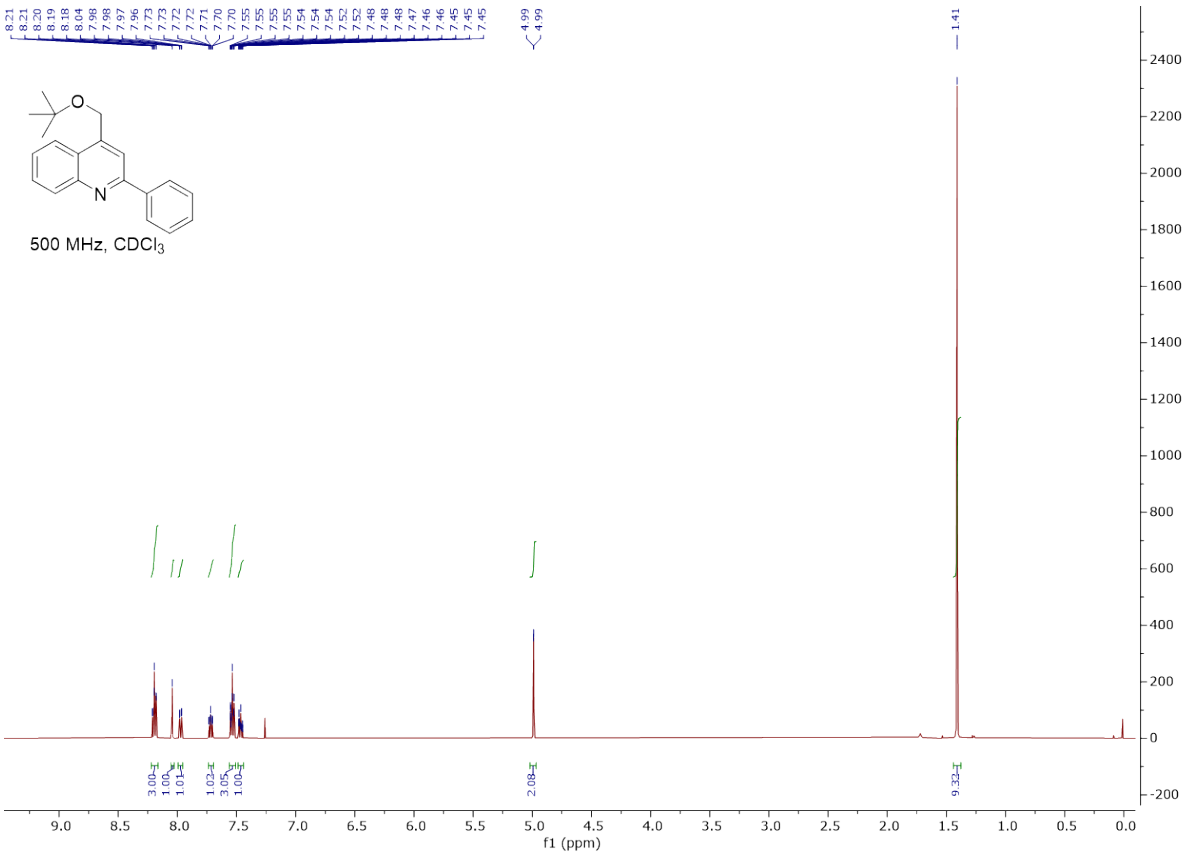


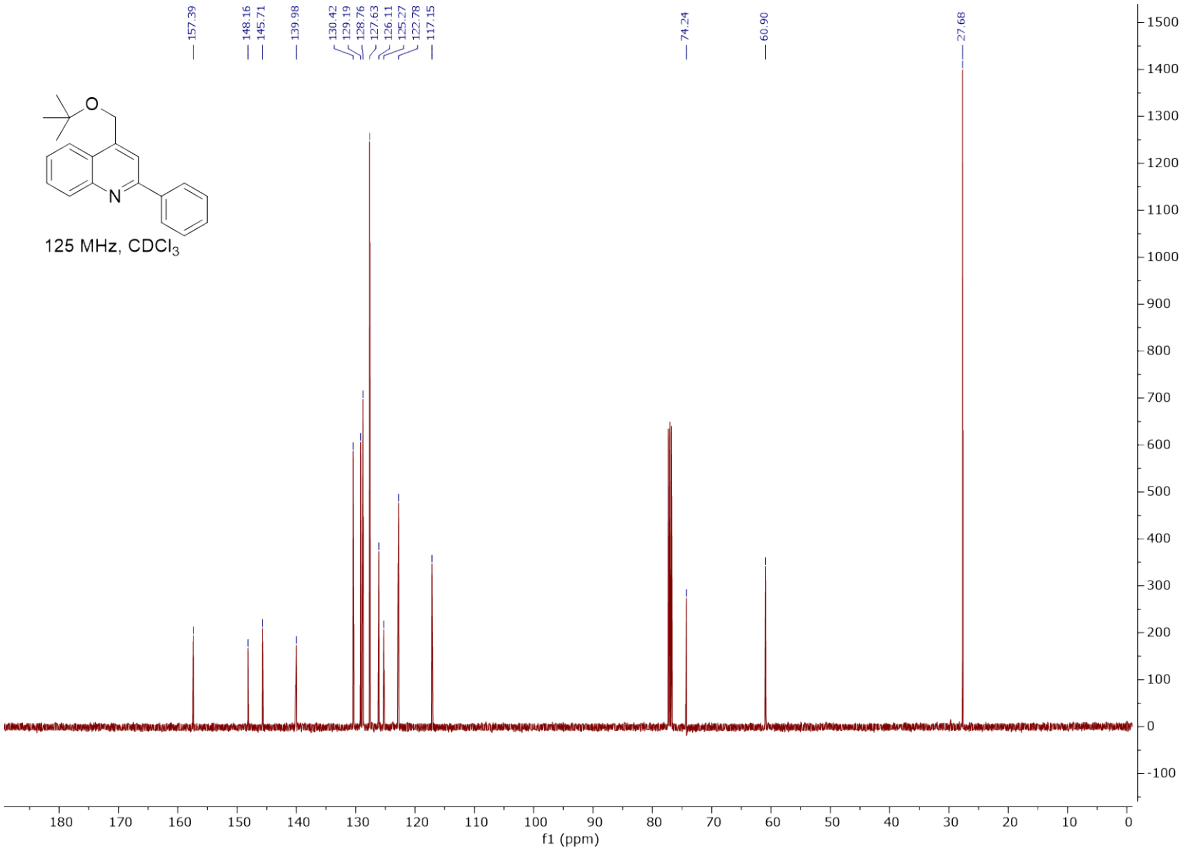
4-(5-Methyltetrahydrofuran-2-yl)-2-phenylquinoline 3j:



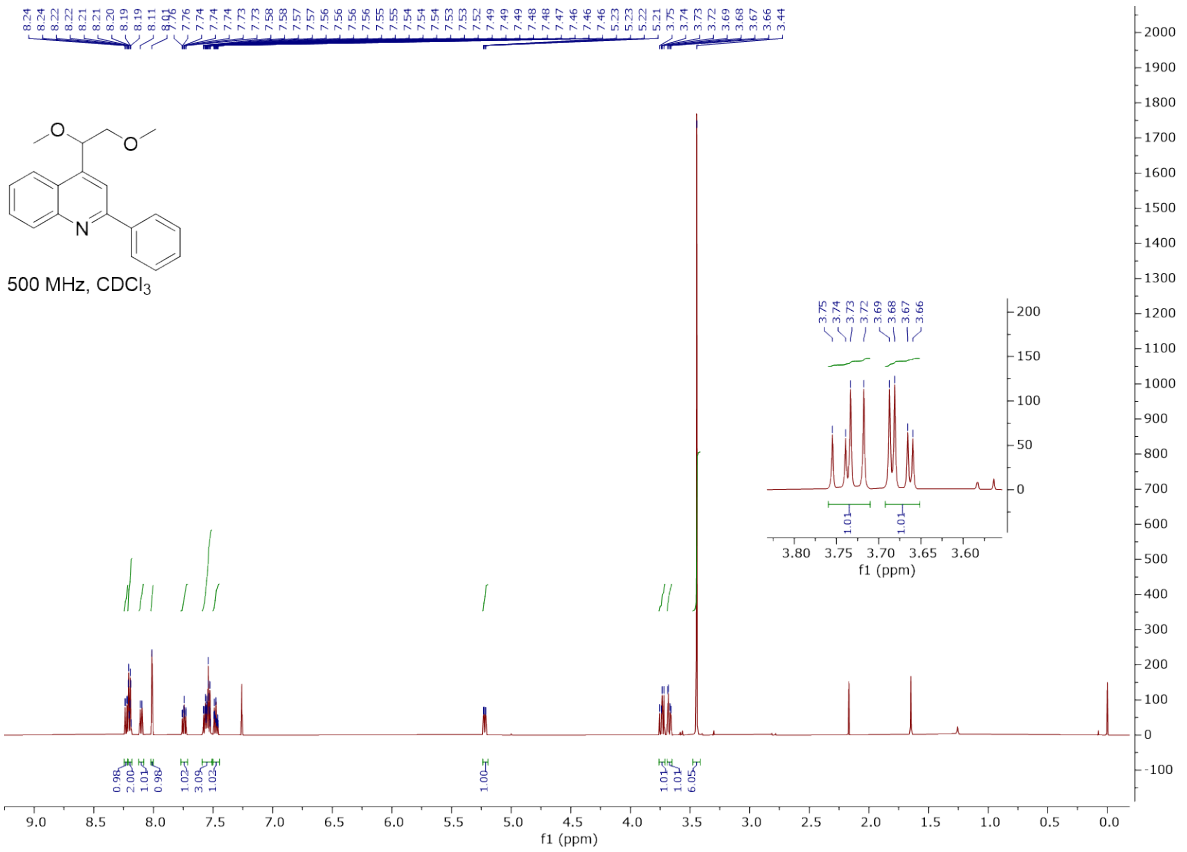


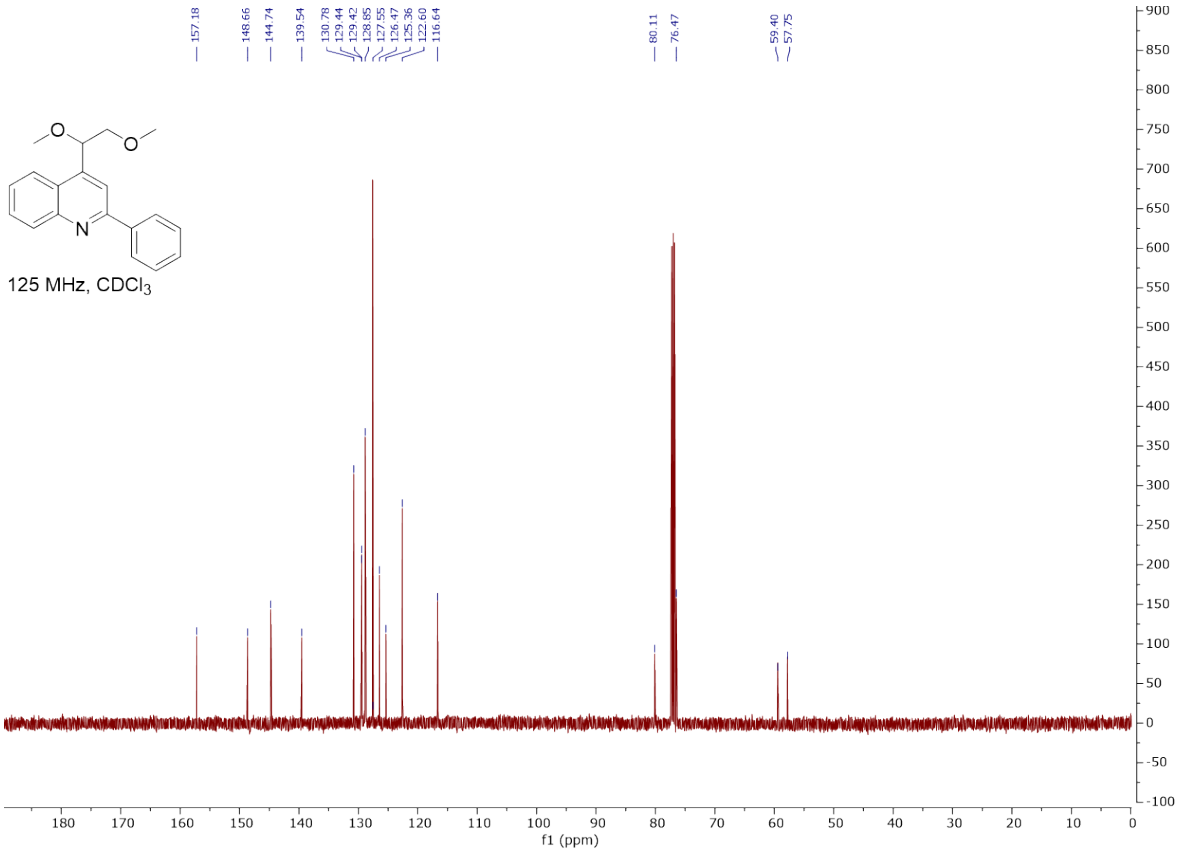
4-(*tert*-Butoxymethyl)-2-phenylquinoline 3k:



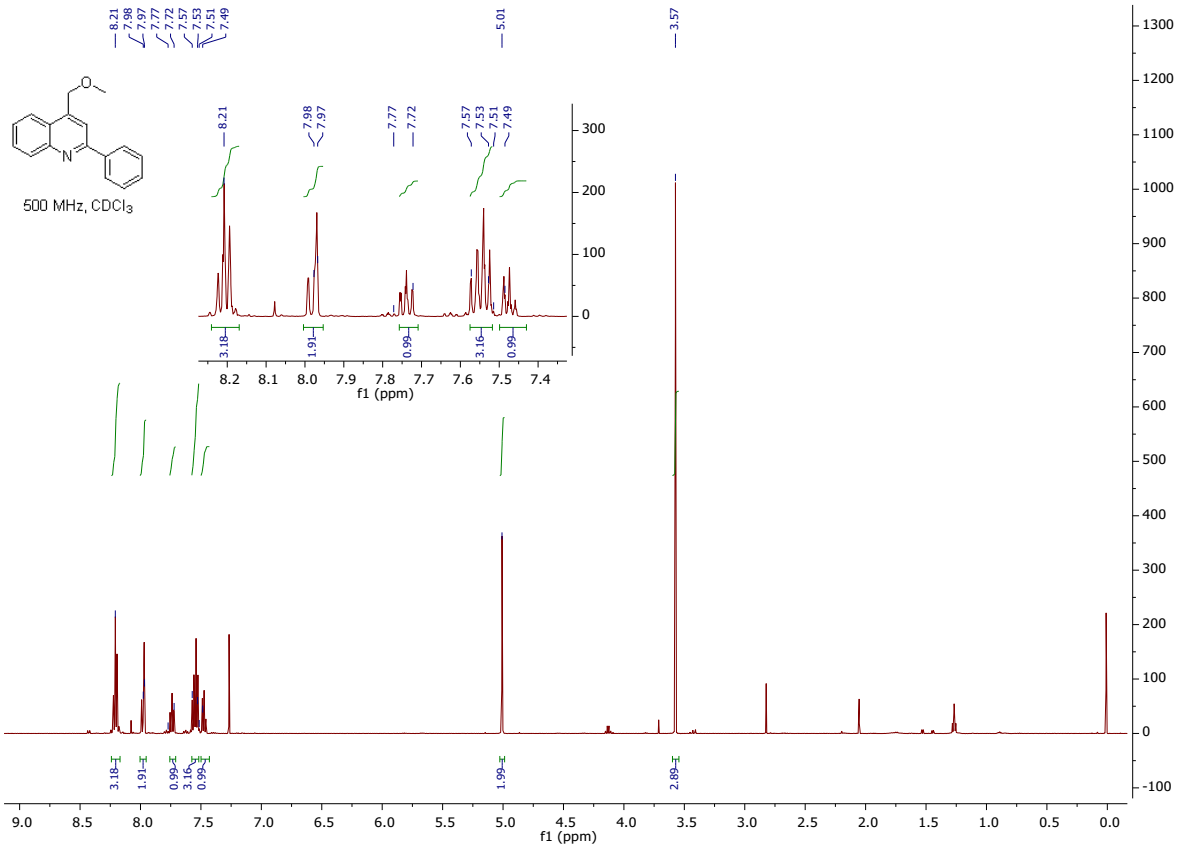


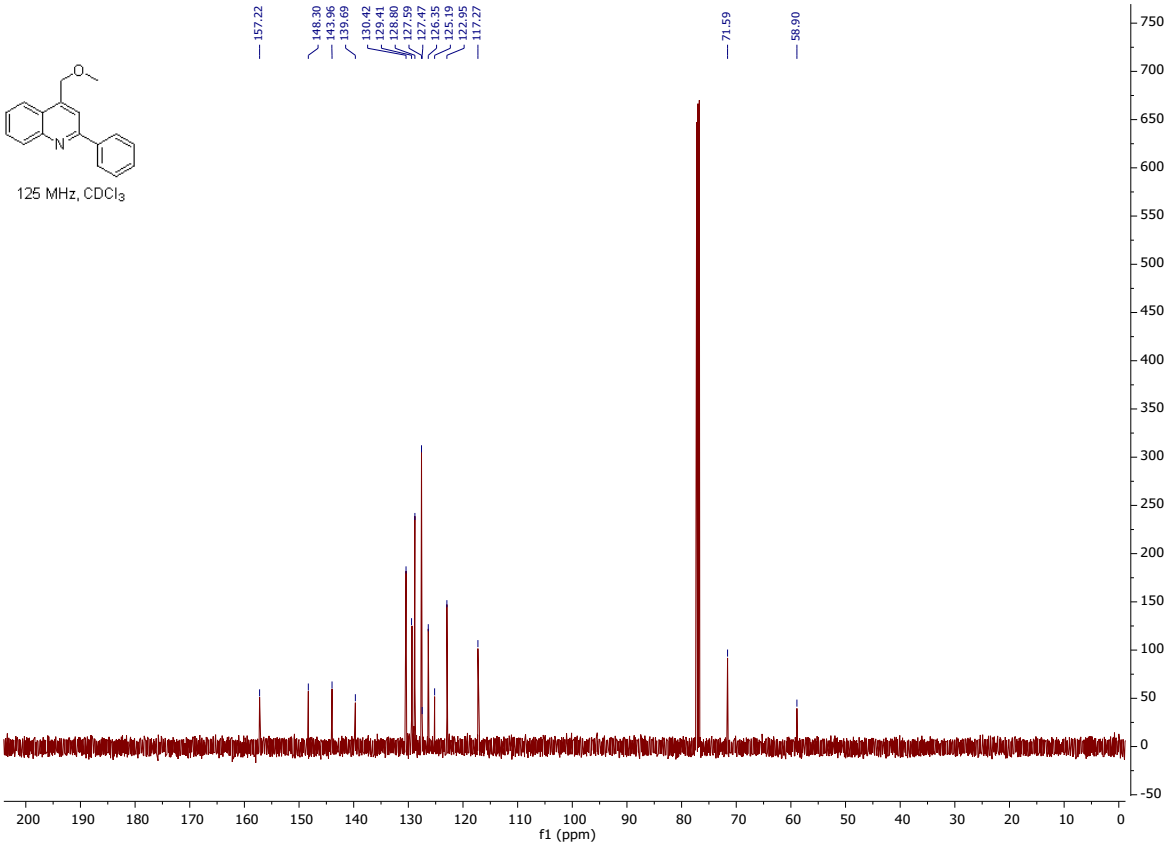
4-(1,2-Dimethoxyethyl)-2-phenylquinoline 3l:



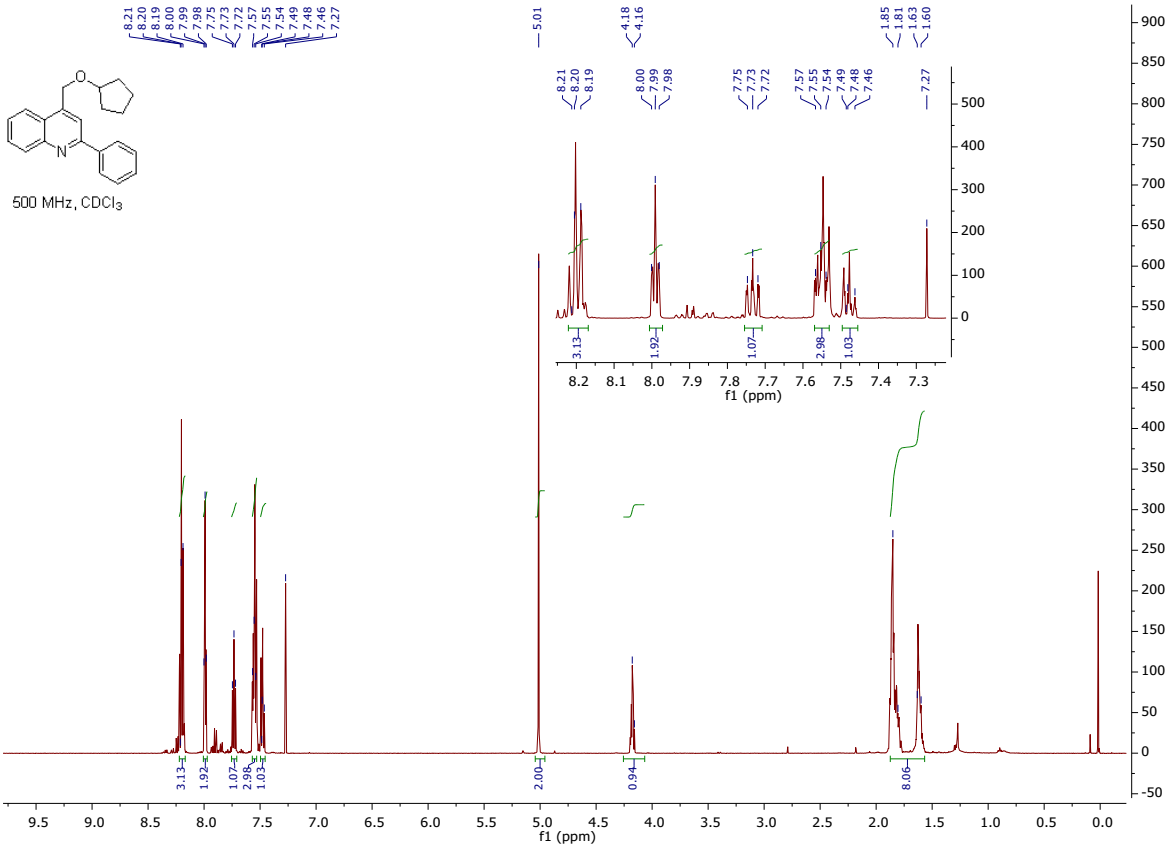


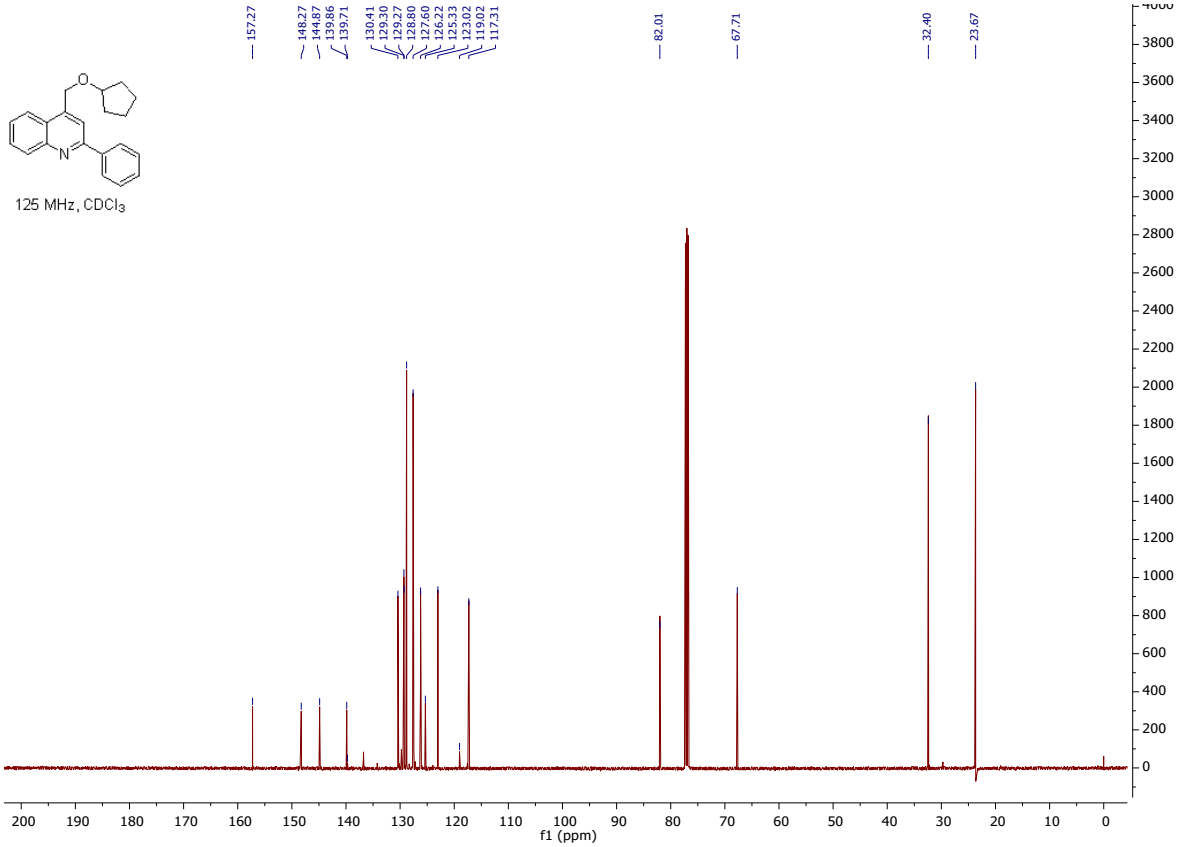
4-(Methoxymethyl)-2-phenylquinoline 3l':





4-((Cyclopentyloxy)methyl)-2-phenylquinoline 3m:

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32.40
23.67
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f1 (ppm)