Electronic Supplementary Material (ESI) for Green Chemistry.

Supporting Information

Visible-Light-Induced Cascade Radical Ring-Closure and Pyridylation for the Synthesis of Tetrahydrofurans

*Yechan Kim, Kangjae Lee, Gangadhar Rao Mathi, Inwon Kim, Sungwoo Hong**

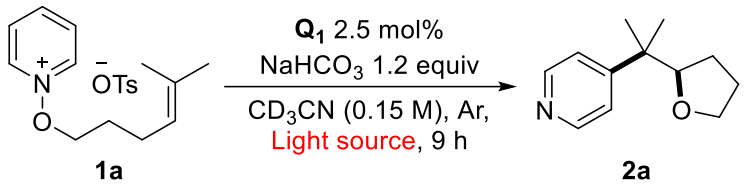
Department of Chemistry, Korea Advance Institute of Science and Technology (KAIST), and Center for Catalytic Hydrocarbon Functionalization Institute for Basic Science (IBS), Daejeon, 34141, Korea

I. General Methods and Materials.

Unless stated otherwise, reactions were performed in flame-dried glassware. Analytical thin layer chromatography (TLC) was performed on precoated silica gel 60 F^{254} plates and visualization on TLC was achieved by UV light (254 and 365 nm). Flash column chromatography was undertaken on silica gel (400-630 mesh) or a Combi*Flash*® R_f^+ system with Redi*Sep*® R_f silica columns (230-400 mesh) using a proper eluent. ^{1}H NMR was recorded on Brucker Avance 400 MHz or Agilent Technologies DD2 600 MHz, and chemical shifts were quoted in parts per million (ppm) referenced to the appropriate solvent peak or 0.0 ppm for tetramethylsilane. The following abbreviations were used to describe peak splitting patterns when appropriate: br = broad, s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet, dd = doublet of doublet, td = triplet of doublet, ddd = doublet of doublet of doublet. Coupling constants, *J*, were reported in hertz unit (Hz). ^{13}C NMR was recorded on Brucker Avance 100 MHz or Agilent Technologies DD2 150 MHz and was fully decoupled by broad band proton decoupling. Chemical shifts were reported in ppm referenced to the centerline of a triplet at 77.0 ppm of $CDCl_3$. ^{19}F NMR was recorded on Agilent Technologies DD2 (564 MHz). High-resolution mass spectra were obtained by using EI or FAB method from Korea Basic Science Institute (Daegu) or ESI from KAIST Research Analysis Center (Daejeon). Commercial grade reagents and solvents were used without further purification except as indicated below.

II. Control Experiments

Scheme S1. Light source screening



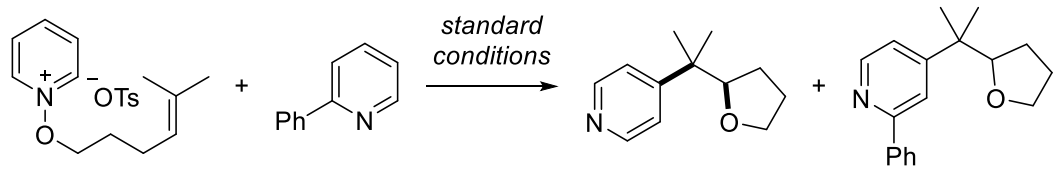
1a **2a**

Entry	Light source	Result (NMR yield)
1	Green LED	No reaction, SM fully remained
2	Red LED	No reaction, SM fully remained
3	Blue LED	77%

Reactions were conducted in cap test tube (12 mL) sealed by assembled screw cap with hole and PTFE/silicone septa. 1-((5-methylhex-4-en-1-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (**1a**) (36.3 mg, 0.10 mmol), 3-(diphenylphosphoryl)-6-methoxy-1-methylquinolin-2(1H)-one ($\mathbf{Q_1}$) (1.0 mg, 0.0025 mmol), and $NaHCO_3$ (10.1 mg, 0.12 mmol) were combined in CH_3CN (0.67 mL) under argon atmosphere. The mixture was placed in the irradiation apparatus equipped with a blue LED. The resulting mixture was stirred at room temperature. After 9 hours, the reaction mixture was diluted and

filtered through a nylon syringe filter (pore size: 0.2 μm) with CH_2Cl_2 (10 mL). The yield of product was deteremined by ^1H NMR analysis using caffeine as an internal standard.

Scheme S2. Reaction with pyridine



1a **2a**, 45% **2d**, trace

Reaction was conducted in cap test tube (12 mL) sealed by assembled screw cap with hole and PTFE/silicone septa. 1-((5-methylhex-4-en-1-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (**1a**) (36.3 mg, 0.10 mmol), 3-(diphenylphosphoryl)-6-methoxy-1-methylquinolin-2(1H)-one (**Q_1**) (1.0 mg, 0.0025 mmol), $NaHCO_3$ (10.1 mg, 0.12 mmol), and 2-phenylpyridine (15.5 mg, 0.10 mmol) were combined in CD_3CN (0.67 mL) under argon atmosphere. The mixture was placed in the irradiation apparatus equipped with a blue LED. The resulting mixture was stirred at room temperature. The reaction mixture was monitored by TLC using (CH_2Cl_2/MeOH = 15:1) as the mobile phase. After 72 h, the reaction mixture was diluted and filtered through a nylon syringe filter (pore size: 0.2 μm) with CH_2Cl_2 (10 mL). The yield of product was deteremined by ^1H NMR analysis using caffeine as an internal standard. The yield of **2a** was determined to be 45% (0.045 mmol of **2a**).

Quantum yield measurements

Blue LED (λ_{max} = 415 nm) was used for measurement of quantum yield.

Determination of the light intensity at 415 nm

According to the procedure of Yoon,[S2] the photon flux of the LED (λ_{max} = 415 nm) was determined by standard ferrioxalate actinometry. A 0.15 M solution of ferrioxalate was prepared by dissolving potassium ferrioxalate hydrate (0.737 g) in H_2SO_4 (10 mL of a 0.05 M solution). A buffered solution of 1,10-phenanthroline was prepared by dissolving 1,10-phenanthroline (5.0 mg) and sodium acetate (1.13 g) in H_2SO_4 (5.0 mL of a 0.5 M solution). Both solutions were stored in the dark. To determine the photon flux of the LED, the ferrioxalate solution (2.0 mL) was placed in a cuvette and irradiated for 45 seconds at λ_{max} = 415 nm. After irradiation, the phenanthroline solution (0.35 mL) was added to the cuvette and the mixture was allowed to stir in the dark for 1 h to allow the ferrous ions to completely coordinate to the phenanthroline. The absorbance of the solution was measured at 510 nm. A non-irradiated sample was also prepared and the absorbance at 510 nm was measured. Conversion was

calculated using eq 1.

$$\text{mol of } Fe^{2+} = \frac{V \cdot \Delta A_{510\ nm}}{l \cdot \epsilon} = \frac{(0.00235\ L) \cdot (2.24)}{(1.00\ cm) \cdot (11{,}100\ \frac{L}{mol} \cdot cm)} = 4.74 \times 10^{-7}\ mol \quad (1)$$

V is the total volume (0.00235 L) of the solution after addition of phenanthroline, ΔA is the difference in absorbance at 510 nm between the irradiated and non-irradiated solutions, l is the path length (1.00 cm), and ε is the molar absorptivity of the ferrioxalate actinometer at 510 nm (11,100 $Lmol^{-1}cm^{-1}$).[S3] The photon flux can be calculated using eq 2.

$$\text{Photon flux} = \frac{mol\ of\ Fe^{2+}}{\emptyset \cdot t \cdot f} = \frac{4.74 \times 10^{-7}\ mol}{(1.12) \cdot (45\ s) \cdot (0.999)} = 9.41 \times 10^{-9}\ einstein/s \quad (2)$$

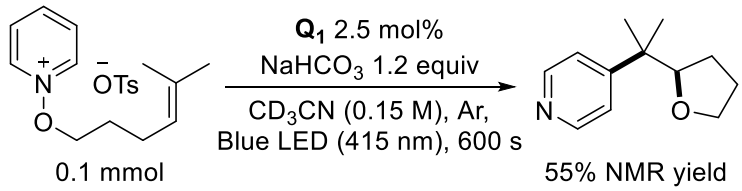
Where Φ is the quantum yield for the ferrioxalate actinometer (1.12 at λ = 415 nm),[S4] t is the irradiation time (45 s), and f is the fraction of light absorbed at 415 nm by the ferrioxalate actinometer. This value is calculated using eq 3 where $A_{415z\ nm}$ is the absorbance of the ferrioxalate solution at 415 nm. An absorption spectrum gave an $A_{415\ nm}$ value of > 3, indicating that the fraction of absorbed light (f) is > 0.999.

$$f = 1 - 10^{-A_{415\ nm}} \quad (3)$$

The photon flux was thus calculated (average of three experiments) to be 9.41 × 10^{-9} einstein s^{-1}

Determination of the reaction quantum yield.

Scheme S3.



The reaction mixture was stirred and irradiated by blue LED (λ_{max} = 415 nm) for 600 s. After irradiation, the reaction mixture was passed through a celite plug. The yield of product was determined by ^{1}H NMR analysis using caffeine as an internal standard. The yield of **3a** was determined to be 55% (55 × 10^{-6} mol of **3a**). The reaction quantum yield (Φ) was determined using eq 4 where the photon flux is 5.09 × 10^{-9} einsteins s^{-1} (determined by actinometry as described above), t is the reaction time (600 s) and f is the fraction of incident light absorbed by the catalyst, determined using eq 3. An absorption spectrum of the catalyst gave an absorbance value of 2.28 at 415 nm, indicating that the fraction of light absorbed by the photocatalyst (f) is 0.995.

$$\Phi = \frac{mol\ of\ product}{flux \cdot t \cdot f} \quad (4)$$

$$\Phi = \frac{55 \times 10^{-6}\ mol}{9.41 \times 10^{-9}\ einstein\ s^{-1} \cdot 600\ s \cdot 0.995} = 9.8$$

The reaction quantum yield (Φ) was calculated to be 9.8.

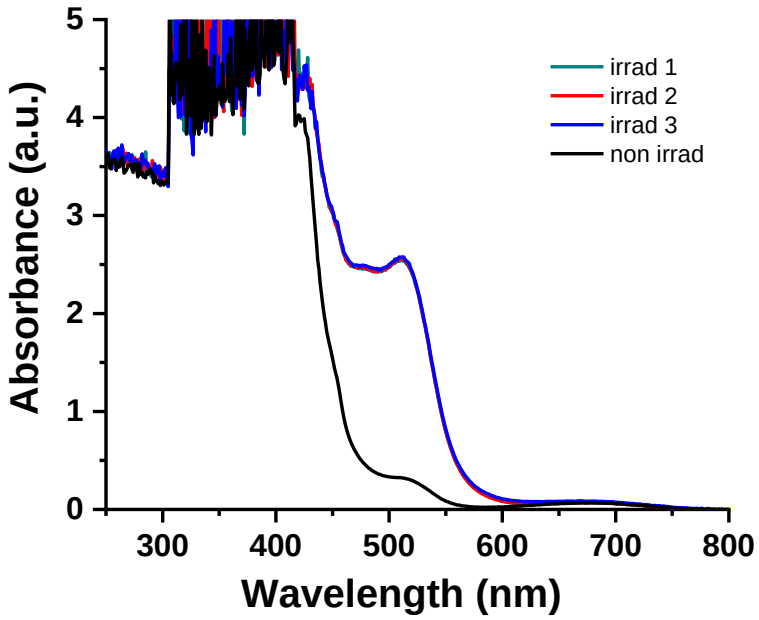


Figure S1. Three irradiation experiments and non-irradiation experiment absorption spectra

III. Absorption spectra

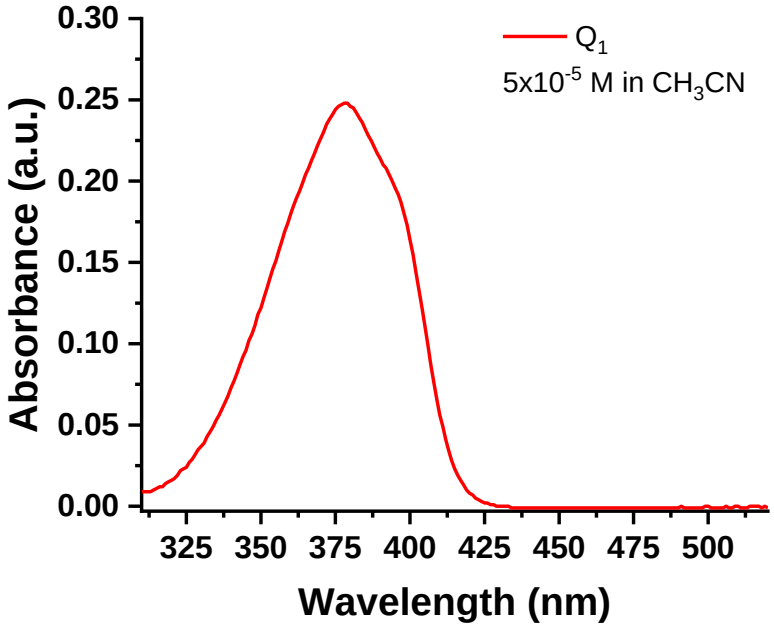


Figure S2. Absorption spectra of $\mathbf{Q_1}$. (5×10^{-5} M in acetonitrile). The wavelength of maximum absorbance is 378 nm. The tail wavelength was considered about 437 nm.

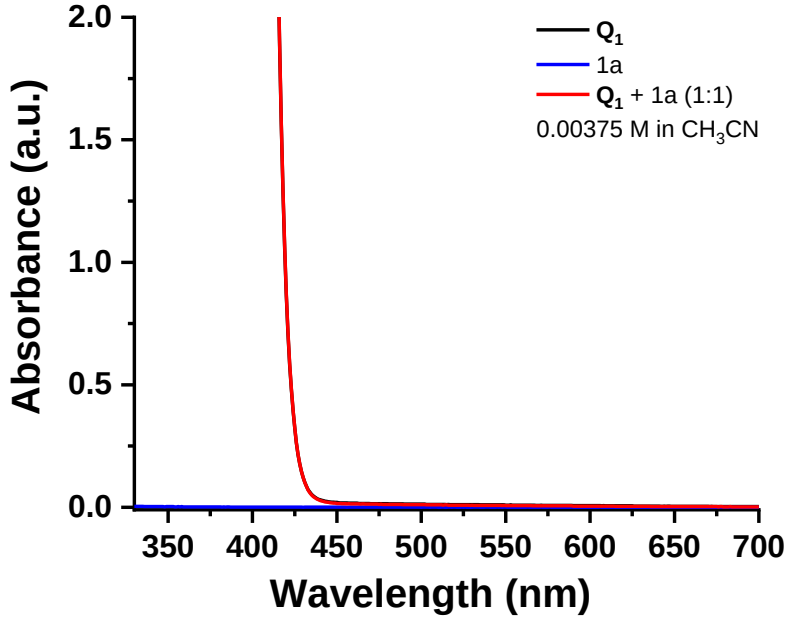


Figure S3. Absorption spectra of $\mathbf{Q_1}$, **1a**, and mixture of $\mathbf{Q_1}$ and **1a** (0.00375 M in acetonitrile).

IV. Stern–Volmer quenching experiment

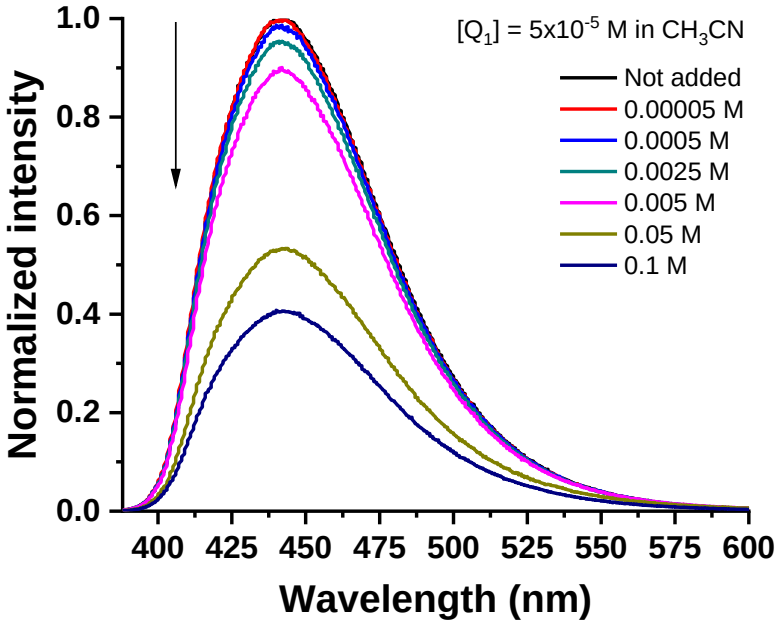


Figure S4. Quenching of the photoredox catalyst $\mathbf{Q_1}$ emission (5×10^{-5} M in acetonitrile) in the presence of increasing amounts of pyridinium salt (**1a**). Excitation wavelength : 378 nm, Bandwidth : Ex 3.0 nm, Em 3.0 nm

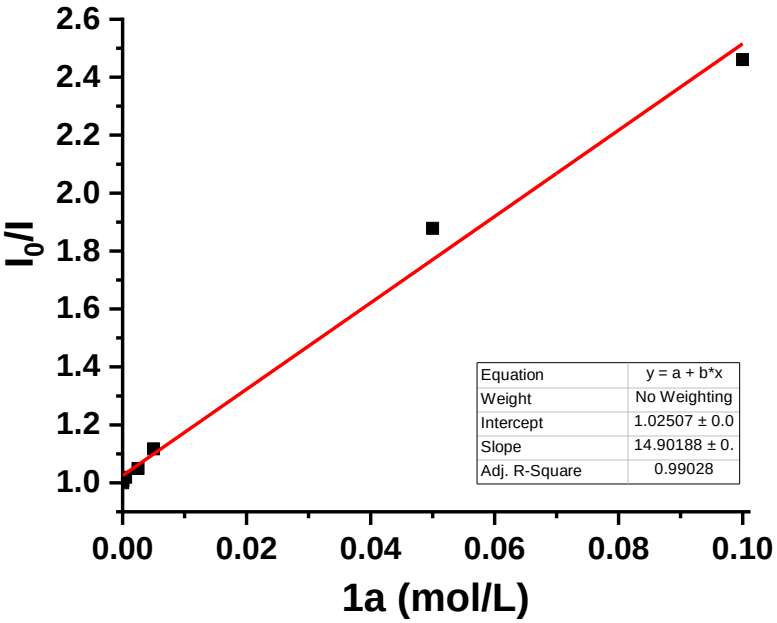


Figure S5. Stern-Volmer quenching plot.

V. Cyclic Voltammetry

Cyclic voltammetry was measured by a potentiostat (CH instrument, 600E) with conventional three electrode system (Reference electrode: Ag/Ag^{+}, working electrode: Glassy carbon, counter electrode: Pt wire, Supporting electrolyte: 0.1 M NBu_4PF_6 CH_3CN) at 50 mV/sec of scan rate.

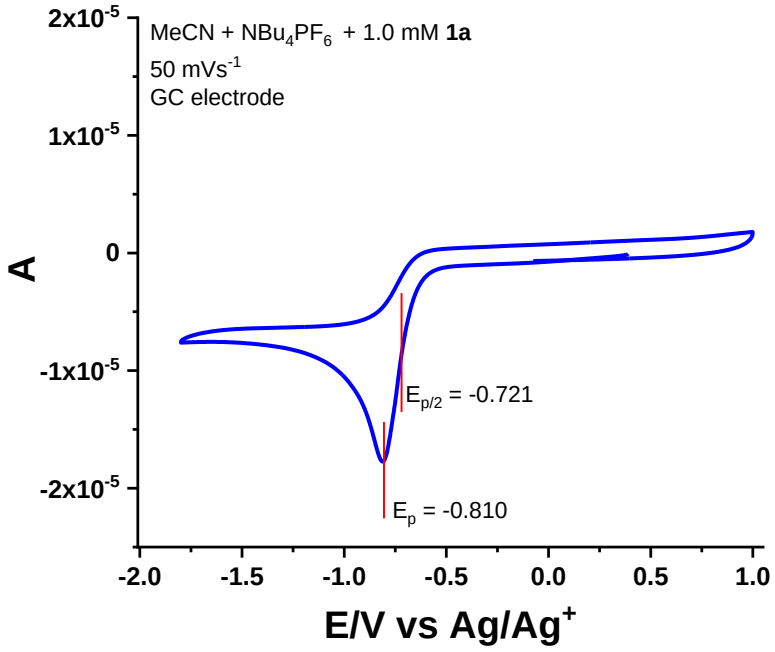


Figure S6. CV of **1a** (1 mM in CH_3CN)

References

[S1] I. Kim, M. Min, D. Kang, K. Kim, S. Hong, *Org. Lett.* **2017**, *19*, 1394.

[S2] M. A. Cismesia, T. P. Yoon, *Chem. Sci.* **2015**, *6*, 5426.

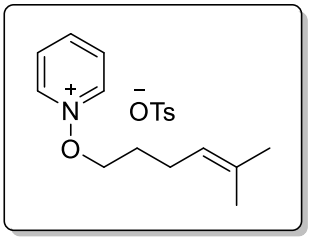
[S3] H. J. Kuhn, S. E. Braslavsky, R. Schmidt, *Pure Appl. Chem.* **2004**, *76*, 2105.

[S4] E. E. Wegner, A. W. Adamson, *J. Am. Chem. Soc.* **1966**, *88*, 394.

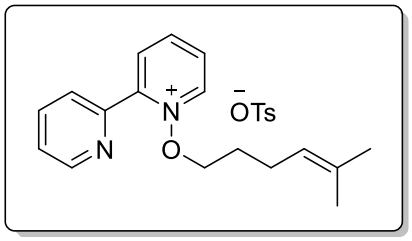
VI. Experimental Procedure and Compound Characterizations

General Procedure for *N*-alkenyloxypyridinium Salts (GP1)

Pyridine *N*-oxide (1 mmol) and appropriate alkyl tosylate (1.1 mmol) were stirred in CH_3CN (1.4 mL) for overnight at 80 °C. The reaction solvent was evaporated under reduced pressure. The product was recrystallized from CH_2Cl_2 (1 mL) and diethyl ether (100 mL) solution at 0 °C. A white solid product was obtained.

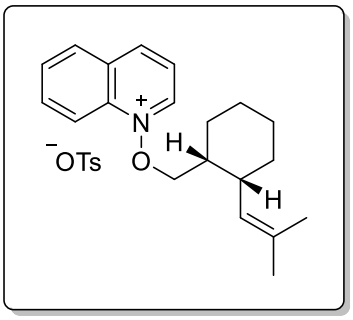


1-((5-methylhex-4-en-1-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (1a). Prepared according to **GP1**. **1a** (265.3 mg; 73%) was obtained. White solid. ^{1}H NMR (600 MHz, Methylene Chloride-d_2) δ 9.41 (d, J = 6.3 Hz, 2H), 8.46 (t, J = 7.8 Hz, 1H), 8.18 (t, J = 7.1 Hz, 2H), 7.66 (d, J = 7.7 Hz, 2H), 7.11 (d, J = 7.7 Hz, 2H), 5.05 (t, J = 7.4 Hz, 1H), 4.58 (t, J = 6.6 Hz, 2H), 2.30 (s, 3H), 2.07 (q, J = 7.5 Hz, 2H), 1.75 (p, J = 7.1 Hz, 2H), 1.66 (s, 3H), 1.57 (s, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 145.2, 145.0, 141.9, 139.5, 133.5, 130.3, 128.9, 126.1, 122.7, 83.7, 28.0, 25.7, 24.0, 21.3, 17.8. HRMS (FAB) m/z calcd. For $C_{12}H_{18}NO^+$ $[M\text{-}OTs^-]^+$: 192.1383, found : 192.1389.

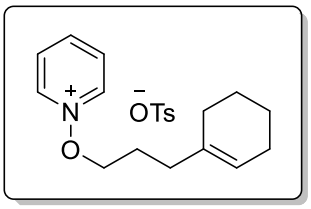


1-((5-methylhex-4-en-1-yl)oxy)-[2,2'-bipyridin]-1-ium 4-methylbenzenesulfonate (1h). Prepared according to **GP1**. **1h** (158.6 mg; 36%) was obtained. Yellow gum. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 9.89 (dd, J = 6.6, 1.3 Hz, 1H), 8.86 (ddd, J = 4.8, 1.8, 1.0 Hz, 1H), 8.57 (td, J = 7.8, 1.3 Hz, 1H), 8.43 (ddd, J = 7.7, 6.6, 2.0 Hz, 1H), 8.31 (dd, J = 7.9, 2.0 Hz, 1H), 8.06 (dt, J = 8.0, 1.1 Hz, 1H), 7.99 (td, J = 7.8, 1.7 Hz, 1H), 7.69 – 7.66 (m, 2H), 7.60 (ddd, J = 7.6, 4.8, 1.3 Hz, 1H), 7.16 – 7.12 (m, 2H), 4.92 (ddt, J = 7.1, 5.7, 1.5 Hz, 1H), 4.55 (t, J = 6.5 Hz, 2H), 2.34 (s, 3H), 1.90 (d, J = 7.5 Hz,

2H), 1.69 (dt, *J* = 8.5, 6.5 Hz, 2H), 1.64 (d, *J* = 1.4 Hz, 3H), 1.51 (s, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 151.3, 150.5, 147.0, 145.6, 145.4, 144.3, 139.5, 138.0, 133.8, 131.3, 130.8, 129.0, 126.9, 126.4, 122.7, 84.8, 28.2, 25.9, 24.2, 21.5, 18.0. HRMS (FAB) m/z calcd. For $C_{17}H_{21}N_2O^+$ [M-OTs$^-$]$^+$: 269.1648, found : 269.1651.

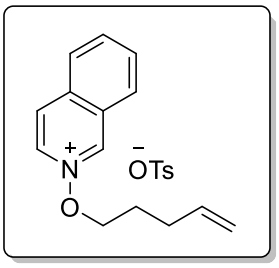


1-(((1*R*,2*R*)-2-(2-methylprop-1-en-1-yl)cyclohexyl)methoxy)quinolin-1-ium 4-methylbenzenesulfonate (1o). Prepared according to **GP1**. **1o** (140.3 mg; 30%) was obtained. Pale yellow solid. ^{1}H NMR (600 MHz, Methylene Chloride-d_2) δ 10.21 (d, *J* = 5.1 Hz, 1H), 9.14 – 9.07 (m, 1H), 8.39 (d, *J* = 8.2 Hz, 1H), 8.36 – 8.28 (m, 2H), 8.17 (ddd, *J* = 8.7, 7.0, 1.2 Hz, 1H), 7.99 (t, *J* = 7.6 Hz, 1H), 7.69 (d, *J* = 7.9 Hz, 2H), 7.11 (d, *J* = 7.7 Hz, 2H), 5.45 (d, *J* = 9.8 Hz, 1H), 4.52 (dd, *J* = 7.1, 2.2 Hz, 2H), 2.90 (dq, *J* = 8.6, 4.1 Hz, 1H), 2.40 – 2.32 (m, 1H), 2.32 (s, 3H), 1.79 (dt, *J* = 12.7, 3.8 Hz, 1H), 1.75 (s, 3H), 1.72 (dt, *J* = 13.1, 3.8 Hz, 1H), 1.68 (s, 3H), 1.64 – 1.44 (m, 5H), 1.40 (qt, *J* = 12.2, 9.5 Hz, 1H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 146.6, 146.3, 145.4, 139.4, 136.8, 136.6, 134.4, 131.4, 131.4, 131.0, 128.9, 126.4, 124.0, 123.6, 116.4, 87.1, 39.8, 34.5, 32.3, 26.5, 25.7, 24.8, 22.0, 21.5, 18.3. HRMS (FAB) m/z calcd. For $C_{20}H_{26}NO^+$ [M-OTs$^-$]$^+$: 296.2009, found : 296.2011.

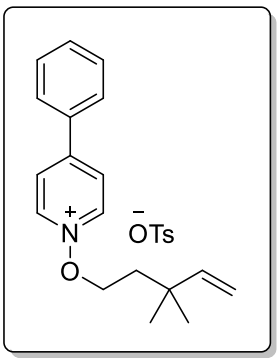


1-(3-(cyclohex-1-en-1-yl)propoxy)pyridin-1-ium 4-methylbenzenesulfonate (1u). Prepared according to **GP1**. **1u** (253.2 mg; 65%) was obtained. White solid. ^{1}H NMR (600 MHz, Methylene Chloride-d_2) δ 9.38 (d, *J* = 6.3 Hz, 2H), 8.47 (t, *J* = 7.7 Hz, 1H), 8.21 (t, *J* = 7.1 Hz, 2H), 7.67 (d, *J* = 7.9 Hz, 2H), 7.13 (d, *J* = 7.8 Hz, 2H), 5.43 (s, 1H), 4.65 (t, *J* = 6.4 Hz, 2H), 2.33 (s, 3H), 2.06 (t, *J* = 7.8 Hz, 2H), 1.97 (ddq, *J* = 6.2, 4.2, 2.1 Hz, 2H), 1.91 – 1.85 (m, 4H), 1.64 – 1.58 (m, 2H), 1.56 – 1.51 (m, 2H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 145.3, 145.2, 142.0, 139.6, 136.4, 130.5, 129.1,

126.3, 122.8, 84.3, 34.0, 28.6, 26.1, 25.7, 23.4, 23.0, 21.5. HRMS (FAB) m/z calcd. For $C_{14}H_{20}NO^+$ [M-OTs^-]$^+$: 218.1539, found : 218.1543.

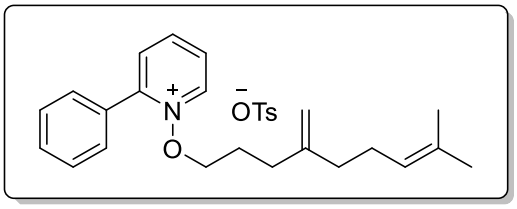


2-(pent-4-en-1-yloxy)isoquinolin-2-ium 4-methylbenzenesulfonate (1aa). Prepared according to **GP1**. **1aa** (273.7 mg; 71%) was obtained. White solid. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 10.98 (d, J = 2.2 Hz, 1H), 8.87 (dq, J = 8.5, 1.0 Hz, 1H), 8.55 (dd, J = 7.2, 2.2 Hz, 1H), 8.34 (dt, J = 7.2, 0.6 Hz, 1H), 8.19 – 8.14 (m, 2H), 8.02 (dt, J = 8.3, 4.1 Hz, 1H), 7.74 – 7.67 (m, 2H), 7.16 – 7.11 (m, 2H), 5.85 (ddt, J = 16.9, 10.2, 6.6 Hz, 1H), 5.11 (dq, J = 17.1, 1.7 Hz, 1H), 5.04 (ddt, J = 10.2, 2.0, 1.3 Hz, 1H), 4.86 (t, J = 6.4 Hz, 2H), 2.34 (s, 3H), 2.28 (dtt, J = 7.8, 6.4, 1.4 Hz, 2H), 1.98 (dq, J = 8.8, 6.5 Hz, 2H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 146.5, 145.4, 139.6, 137.6, 137.5, 137.1, 132.3, 132.1, 132.0, 129.0, 128.8, 128.4, 127.9, 126.3, 116.1, 83.6, 29.9, 27.3, 21.5. HRMS (FAB) m/z calcd. For $C_{14}H_{16}NO^+$ [M-OTs^-]$^+$: 214.1226, found : 214.1235.

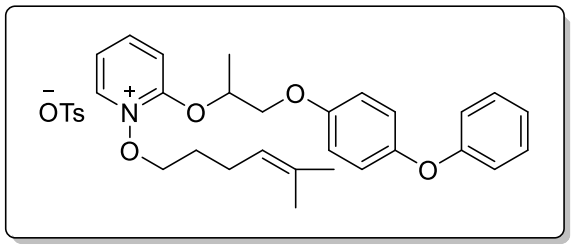


1-((3,3-dimethylpent-4-en-1-yl)oxy)-4-phenylpyridin-1-ium 4-methylbenzenesulfonate (1ac). Prepared according to **GP1**. **1ac** (356.0 mg; 81%) was obtained. White solid. ^{1}H NMR (600 MHz, Methylene Chloride-d_2) δ 9.34 – 9.30 (m, 2H), 8.34 (d, J = 7.0 Hz, 2H), 7.81 – 7.77 (m, 2H), 7.73 – 7.69 (m, 2H), 7.61 – 7.56 (m, 1H), 7.53 (td, J = 8.0, 2.7 Hz, 2H), 7.12 (d, J = 7.8 Hz, 2H), 5.80 (ddd, J = 17.8, 10.4, 1.7 Hz, 1H), 5.00 (d, J = 1.7 Hz, 1H), 4.97 (dt, J = 5.5, 1.2 Hz, 1H), 4.63 (td, J = 7.0, 2.8 Hz, 2H), 2.30 (s, 3H), 1.83 (td, J = 7.1, 2.2 Hz, 2H), 1.05 (d, J = 1.8 Hz, 6H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 156.3, 147.1, 145.4, 141.8, 139.6, 133.9, 132.9, 130.3, 129.1, 128.6, 126.9,

126.4, 112.2, 82.1, 39.5, 36.1, 27.3, 21.5. HRMS (FAB) m/z calcd. For $C_{18}H_{22}NO^+$ $[M\text{-}OTs^-]^+$: 268.1696, found : 268.1698.

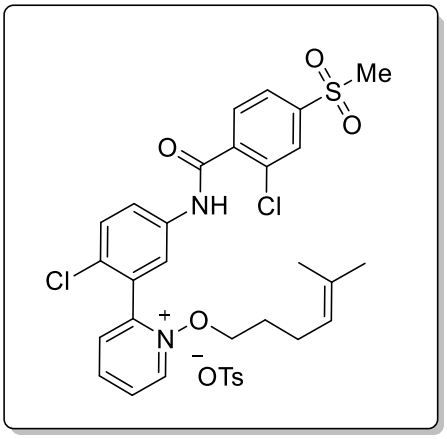


1-((8-methyl-4-methylenenon-7-en-1-yl)oxy)-2-phenylpyridin-1-ium 4-methylbenzenesulfonate (3c). Prepared according to **GP1**. **3c** (444.3 mg; 90%) was obtained. White solid. ^{1}H NMR (600 MHz, Methylene Chloride-d_2) δ 9.74 – 9.68 (m, 1H), 8.62 (t, J = 7.1 Hz, 1H), 8.21 – 8.16 (m, 1H), 8.10 (d, J = 7.6 Hz, 1H), 7.74 (d, J = 6.8 Hz, 2H), 7.66 (dd, J = 8.0, 2.7 Hz, 2H), 7.64 – 7.61 (m, 1H), 7.60 – 7.55 (m, 2H), 7.10 (d, J = 7.0 Hz, 2H), 5.11 – 4.99 (m, 1H), 4.64 (s, 1H), 4.46 (s, 1H), 4.26 – 4.20 (m, 2H), 2.30 (s, 3H), 2.02 – 1.95 (m, 2H), 1.86 – 1.81 (m, 2H), 1.76 – 1.71 (m, 2H), 1.67 (s, 3H), 1.65 – 1.55 (m, 5H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 152.0, 148.0, 146.1, 145.2, 143.7, 139.2, 132.4, 131.9, 131.3, 130.4, 129.5, 129.3, 128.8, 128.4, 126.2, 124.2, 109.6, 83.2, 36.1, 31.7, 26.6, 25.8, 25.7, 21.3, 17.8. HRMS (FAB) m/z calcd. For $C_{22}H_{28}NO^+$ $[M\text{-}OTs^-]^+$: 322.2165, found : 322.2169.



1-((5-methylhex-4-en-1-yl)oxy)-2-((1-phenoxypropan-2-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (3e). Prepared according to **GP1**. **3e** (121.1 mg; 20%) was obtained. Colorless gum. ^{1}H NMR (400 MHz, Methanol-d_4) δ 8.81 (dd, J = 6.8, 1.7 Hz, 1H), 8.41 (ddd, J = 9.1, 7.5, 1.8 Hz, 1H), 7.98 (dd, J = 9.0, 1.5 Hz, 1H), 7.76 – 7.69 (m, 4H), 7.56 – 7.47 (m, 1H), 7.32 – 7.23 (m, 2H), 7.22 – 7.16 (m, 4H), 7.07 – 6.99 (m, 1H), 6.90 (d, J = 1.8 Hz, 3H), 6.90 – 6.85 (m, 2H), 6.75 – 6.66 (m, 1H), 5.58 (pd, J = 6.5, 2.8 Hz, 1H), 5.09 (tp, J = 7.2, 1.4 Hz, 1H), 4.43 (t, J = 6.5 Hz, 2H), 4.35 (dd, J = 11.2, 2.5 Hz, 1H), 4.24 (dd, J = 11.1, 7.2 Hz, 1H), 2.32 (s, 6H), 2.11 (q, J = 7.0 Hz, 2H), 1.79 (p, J = 7.1 Hz, 2H), 1.65 (s, 3H), 1.64 (d, J = 6.4 Hz, 3H), 1.56 (s, 3H). ^{13}C NMR (100 MHz, Methanol-d_4) δ 159.5, 159.1, 155.6, 152.3, 148.0, 143.6, 141.5, 141.4, 133.8, 130.7 (d, J = 1.4 Hz), 129.8, 126.9, 123.9, 123.8, 121.7, 120.3, 118.7, 116.7, 115.4, 82.7, 81.7, 71.7, 29.0, 25.9, 24.9, 21.3,

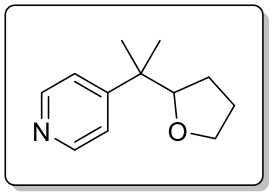
17.9, 16.2. HRMS (FAB) m/z calcd. For $C_{27}H_{32}NO_4^+$ $[M\text{-}OTs^-]^+$: 434.2326, found : 434.2334.



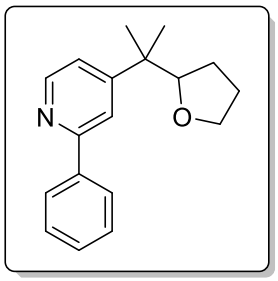
2-(2-chloro-5-(2-chloro-4-(methylsulfonyl)benzamido)phenyl)-1-((5-methylhex-4-en-1-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (3f). Prepared according to **GP1**. **3f** (416.3 mg; 59%) was obtained. White solid. ^{1}H NMR (400 MHz, Acetone-d_6) δ 10.96 (s, 1H), 9.69 (dd, J = 6.5, 1.3 Hz, 1H), 8.86 (td, J = 7.8, 1.3 Hz, 1H), 8.50 – 8.36 (m, 3H), 8.27 (dd, J = 8.9, 2.6 Hz, 1H), 8.00 (d, J = 1.7 Hz, 1H), 7.93 (dd, J = 8.0, 1.7 Hz, 1H), 7.85 (d, J = 8.0 Hz, 1H), 7.73 (d, J = 8.9 Hz, 1H), 7.54 (d, J = 8.2 Hz, 2H), 7.11 (d, J = 7.9 Hz, 2H), 5.00 – 4.86 (m, 1H), 4.72 – 4.41 (m, 2H), 3.20 (s, 3H), 2.31 (s, 3H), 1.76 (h, J = 7.4 Hz, 2H), 1.68 – 1.55 (m, 5H), 1.50 (s, 3H). ^{13}C NMR (100 MHz, Acetone-d_6) δ 165.19, 150.64, 146.71, 145.68, 144.51, 143.71, 141.41, 139.52, 139.43, 133.28, 132.81, 132.70, 131.20, 131.02, 130.79, 129.47, 129.11, 129.06, 128.31, 127.01, 126.71, 125.08, 123.62, 123.44, 84.44, 44.06, 28.64, 25.79, 24.34, 21.22, 17.80. HRMS (FAB) m/z calcd. For $C_{26}H_{27}Cl_2N_2O_4S^+$ $[M\text{-}OTs^-]^+$: 533.1063, found : 533.1072.

General Procedure for Visible-Light Induced Pyridylation (GP2)

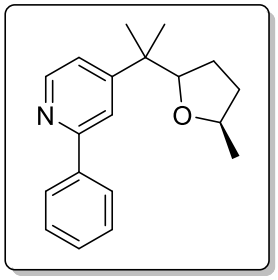
Reactions were conducted in cap test tube (12 mL) sealed by assembled screw cap with hole and PTFE/silicone septa. 1-((5-methylhex-4-en-1-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (**1a**) (54.5 mg, 0.15 mmol), 3-(diphenylphosphoryl)-6-methoxy-1-methylquinolin-2(1H)-one (**Q_1**) (1.5 mg, 0.00375 mmol), and $NaHCO_3$ (15.1 mg, 0.18 mmol) were combined in CH_3CN (1.0 mL) under argon atmosphere. The mixture was placed in the irradiation apparatus equipped with a blue LED. The resulting mixture was stirred at room temperature. The reaction mixture was monitored by TLC using (CH_2Cl_2/MeOH = 15:1) as the mobile phase. After disappearance of starting material, the reaction mixture was diluted and filtered through a nylon syringe filter (pore size: 0.2 μm) with CH_2Cl_2 (10 mL). After removal of solvent, the residue was purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:2) to give the desired product compound **3a** (20.1 mg, 70%) as a pale yellow oil.



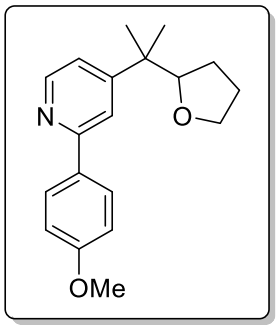
4-(2-(tetrahydrofuran-2-yl)propan-2-yl)pyridine (2a). Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:2). Prepared according to **GP2**. From 1-((5-methylhex-4-en-1-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (54.5 mg, 0.15 mmol), compound **2a** (21.2 mg, 74%) was obtained. Pale yellow oil. ^{1}H NMR (600 MHz, Methylene Chloride-d_2) δ 8.46 (dd, J = 4.7, 1.5 Hz, 2H), 7.32 (dd, J = 4.7, 1.7 Hz, 2H), 3.90 (dd, J = 8.4, 6.5 Hz, 1H), 3.72 – 3.63 (m, 2H), 1.80 – 1.69 (m, 2H), 1.67 – 1.60 (m, 1H), 1.44 – 1.36 (m, 1H), 1.31 (s, 3H), 1.30 (s, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 156.8, 149.9, 122.9, 86.9, 69.0, 41.7, 27.6, 26.6, 24.9, 24.2. HRMS (EI) m/z calcd. For $C_{12}H_{17}NO$ $[M]^+$: 191.1310, found : 191.1311.



2-phenyl-4-(2-(tetrahydrofuran-2-yl)propan-2-yl)pyridine (2b). Purified by flash chromatography on silica gel (Et_2O/*n*-hexane = 1:1.5). Prepared according to **GP2**. From 1-((5-methylhex-4-en-1-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (65.9 mg, 0.15 mmol), compound **2b** (29.3 mg, 73%) was obtained. Colorless oil. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.55 (dd, J = 5.3, 0.8 Hz, 1H), 8.03 – 7.98 (m, 2H), 7.81 (dd, J = 1.9, 0.8 Hz, 1H), 7.50 – 7.44 (m, 2H), 7.43 – 7.38 (m, 1H), 7.29 (dd, J = 5.3, 1.8 Hz, 1H), 3.95 (dd, J = 8.6, 6.4 Hz, 1H), 3.74 – 3.68 (m, 2H), 1.80 – 1.72 (m, 2H), 1.69 – 1.62 (m, 1H), 1.48 – 1.40 (m, 1H), 1.37 (s, 3H), 1.36 (s, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 157.7, 157.3, 149.7, 140.5, 129.2, 127.5, 127.5, 121.6, 119.8, 87.0, 69.1, 42.0, 27.7, 26.7, 25.0, 24.4. HRMS (EI) m/z calcd. For $C_{18}H_{21}NO$ $[M]^+$: 267.1623, found : 267.1624.

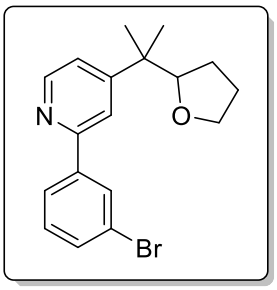


4-(2-((5*R*)-5-methyltetrahydrofuran-2-yl)propan-2-yl)-2-phenylpyridine (2c). d.r. 2.0:1. Purified by flash chromatography on silica gel (Et_2O/*n*-hexane = 1:2.5). Prepared according to **GP2**. From (*R*)-1-((6-methylhept-5-en-2-yl)oxy)-2-phenylpyridin-1-ium 4-methylbenzenesulfonate (68.0 mg, 0.15 mmol), compound **2c** (31.4 mg, 72%) was obtained. Colorless oil. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.56 (dd, *J* = 5.3, 0.8 Hz, 1H), 8.04 – 7.98 (m, 2H), 7.84 – 7.80 (m, 1H), 7.50 – 7.44 (m, 2H), 7.44 – 7.38 (m, 1H), 7.30 (dd, *J* = 5.3, 1.8 Hz, 1H), 4.12 (dd, *J* = 9.0, 6.0 Hz, 0.65H – major isomer), 3.97 (t, *J* = 7.5 Hz, 0.35H – minor isomer), 3.93 – 3.85 (m, 1H), 1.90 – 1.69 (m, 2H), 1.55 – 1.38 (m, 2H), 1.38 – 1.34 (m, 6H), 1.17 (d, *J* = 6.1 Hz, 1.95H – major isomer), 1.14 (d, *J* = 6.0 Hz, 1.05H – minor isomer). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 157.6, 157.3, 157.2, 149.7, 149.6, 140.6, 140.6, 129.2, 129.2, 129.1, 127.4, 127.4, 121.7, 121.7, 119.8, 119.8, 86.8, 86.6, 76.6, 75.9, 42.3, 41.7, 34.8, 33.5, 28.8, 27.5, 25.0, 24.5, 24.5, 21.5, 21.2. HRMS (EI) m/z calcd. For $C_{19}H_{23}NO$ $[M]^+$: 281.1780, found : 281.1781.

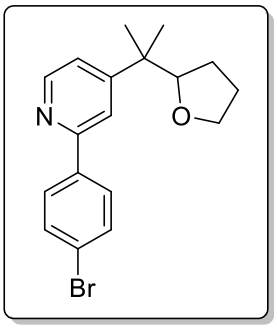


2-(4-methoxyphenyl)-4-(2-(tetrahydrofuran-2-yl)propan-2-yl)pyridine (2d). Purified by flash chromatography on silica gel (Et_2O/*n*-hexane = 1:1.5). Prepared according to **GP2**. From 2-(4-methoxyphenyl)-1-((5-methylhex-4-en-1-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (70.4 mg, 0.15 mmol), compound **2d** (32.6 mg, 73%) was obtained. Pale yellow oil. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.50 (dd, *J* = 5.3, 0.8 Hz, 1H), 7.96 (d, *J* = 8.9 Hz, 2H), 7.74 (dd, *J* = 1.8, 0.8 Hz, 1H), 7.23 (dd, *J* = 5.3, 1.8 Hz, 1H), 6.99 (d, *J* = 8.9 Hz, 2H), 3.98 – 3.92 (m, 1H), 3.85 (s, 3H), 3.73 – 3.68 (m, 2H), 1.81 – 1.72 (m, 2H), 1.69 – 1.63 (m, 1H), 1.47 – 1.40 (m, 1H), 1.36 (s, 3H), 1.35 (s, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 160.9, 157.5, 157.0, 149.6, 133.1, 128.7, 120.9,

118.9, 114.5, 87.0, 69.1, 55.9, 41.9, 27.7, 26.7, 24.9, 24.5. HRMS (EI) m/z calcd. For $C_{19}H_{23}NO_2$ $[M]^+$: 297.1729, found : 297.1729.

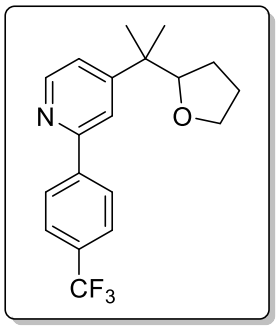


2-(3-bromophenyl)-4-(2-(tetrahydrofuran-2-yl)propan-2-yl)pyridine (2e). Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:4). Prepared according to **GP2**. From 2-(3-bromophenyl)-1-((5-methylhex-4-en-1-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (77.8 mg, 0.15 mmol), compound **2e** (45.7 mg, 88%) was obtained. Colorless gum. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.56 (dd, *J* = 5.2, 0.8 Hz, 1H), 8.19 (t, *J* = 1.8 Hz, 1H), 7.95 (ddd, *J* = 7.8, 1.7, 1.1 Hz, 1H), 7.78 (dd, *J* = 1.8, 0.8 Hz, 1H), 7.54 (ddd, *J* = 7.9, 2.0, 1.1 Hz, 1H), 7.35 (t, *J* = 7.9 Hz, 1H), 7.32 (dd, *J* = 5.2, 1.8 Hz, 1H), 3.98 – 3.91 (m, 1H), 3.73 – 3.67 (m, 2H), 1.85 – 1.72 (m, 2H), 1.71 – 1.60 (m, 1H), 1.47 – 1.39 (m, 1H), 1.37 (s, 3H), 1.36 (s, 3H). ^{13}C NMR (151 MHz, Methylene Chloride-d_2) δ 157.9, 155.7, 149.8, 142.7, 132.1, 130.7, 130.5, 126.1, 123.3, 122.2, 119.8, 86.9, 69.1, 42.0, 27.8, 26.7, 25.2, 24.3. HRMS (EI) m/z calcd. For $C_{18}H_{20}BrNO$ $[M]^+$: 345.0728, found : 345.0729.

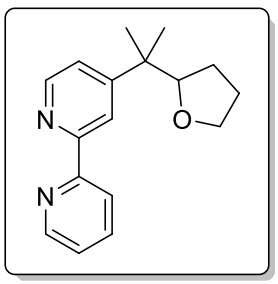


2-(4-bromophenyl)-4-(2-(tetrahydrofuran-2-yl)propan-2-yl)pyridine (2f). Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:4). Prepared according to **GP2**. From 2-(4-bromophenyl)-1-((5-methylhex-4-en-1-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (77.8 mg, 0.15 mmol), compound **2f** (43.1 mg, 83%) was obtained. Colorless gum. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.55 (dd, *J* = 5.3, 0.8 Hz, 1H), 7.95 – 7.88 (m, 2H), 7.79 (dd, *J* = 1.8, 0.8 Hz, 1H), 7.64 – 7.56 (m, 2H), 7.31 (dd, *J* = 5.3, 1.8 Hz, 1H), 3.98 – 3.90 (m, 1H), 3.74 – 3.66 (m, 2H), 1.85 – 1.71 (m, 2H), 1.71 – 1.61 (m, 1H), 1.47 – 1.38 (m, 1H), 1.37 (s, 3H), 1.35 (s, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 157.9, 156.1, 149.8, 139.5, 132.2, 129.1, 123.5, 121.9, 119.5, 87.0,

69.1, 42.0, 27.8, 26.7, 25.2, 24.3. HRMS (EI) m/z calcd. For $C_{18}H_{20}BrNO$ $[M]^+$: 345.0728, found : 345.0726.

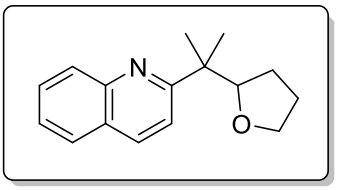


4-(2-(tetrahydrofuran-2-yl)propan-2-yl)-2-(4-(trifluoromethyl)phenyl)pyridine (2g). Purified by flash chromatography on silica gel (Et_2O/*n*-hexane = 1:2). Prepared according to **GP2**. From 1-((5-methylhex-4-en-1-yl)oxy)-2-(4-(trifluoromethyl)phenyl)pyridin-1-ium 4-methylbenzenesulfonate (76.1 mg, 0.15 mmol), compound **2g** (36.7 mg, 73%) was obtained. Colorless oil. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.59 (dd, *J* = 5.3, 0.8 Hz, 1H), 8.15 (d, *J* = 8.0 Hz, 2H), 7.86 (dd, *J* = 1.8, 0.8 Hz, 1H), 7.73 (d, *J* = 8.2 Hz, 2H), 7.36 (dd, *J* = 5.2, 1.8 Hz, 1H), 3.98 – 3.92 (m, 1H), 3.74 – 3.67 (m, 2H), 1.84 – 1.73 (m, 2H), 1.70 – 1.61 (m, 1H), 1.48 – 1.40 (m, 1H), 1.38 (s, 3H), 1.37 (s, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 158.1, 155.8, 150.0, 144.1, 130.8 (q, $J_{C\text{-}F}$ = 32.3 Hz), 127.8, 126.1 (q, $J_{C\text{-}F}$ = 3.9 Hz), 125.0 (q, $J_{C\text{-}F}$ = 272.1 Hz), 122.5, 120.2, 87.0, 69.1, 42.0, 27.8, 26.7, 25.3, 24.2. HRMS (EI) m/z calcd. For $C_{19}H_{20}F_3NO$ $[M]^+$: 335.1497, found : 335.1498.

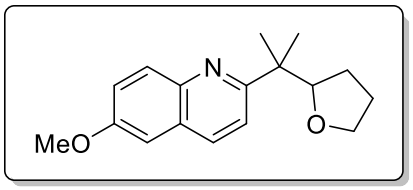


4-(2-(tetrahydrofuran-2-yl)propan-2-yl)-2,2'-bipyridine (2h). Purified by flash chromatography on alumina basic (EtOAc/*n*-hexane = 1:4). Prepared according to **GP2**. From 1-((5-methylhex-4-en-1-yl)oxy)-[2,2'-bipyridin]-1-ium 4-methylbenzenesulfonate (66.1 mg, 0.15 mmol), compound **2h** (22.9 mg, 57%) was obtained. Colorless gum. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.66 (ddd, *J* = 4.8, 1.8, 0.9 Hz, 1H), 8.55 (dd, *J* = 5.2, 0.8 Hz, 1H), 8.48 (dd, *J* = 2.0, 0.8 Hz, 1H), 8.42 (dt, *J* = 8.0, 1.1 Hz, 1H), 7.81 (ddd, *J* = 8.0, 7.5, 1.8 Hz, 1H), 7.38 (dd, *J* = 5.2, 2.0 Hz, 1H), 7.30 (ddd, *J* = 7.5, 4.8, 1.2 Hz, 1H), 4.03 – 3.95 (m, 1H), 3.77 – 3.65 (m, 2H), 1.83 – 1.72 (m, 2H), 1.72 – 1.64 (m, 1H), 1.51 – 1.42 (m, 1H), 1.38 (s, 3H), 1.38 (s, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 158.0, 157.1,

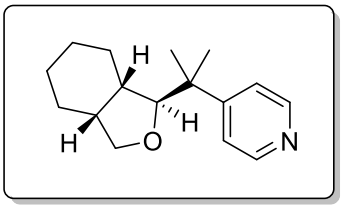
156.2, 149.6, 149.3, 137.3, 124.1, 123.1, 121.5, 119.8, 86.9, 69.1, 42.1, 27.7, 26.7, 24.9, 24.3. HRMS (EI) m/z calcd. For $C_{17}H_{20}N_2O$ $[M]^+$: 268.1576, found : 268.1578.



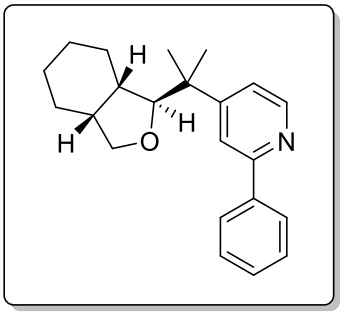
2-(2-(tetrahydrofuran-2-yl)propan-2-yl)quinolone (2i). Purified by flash chromatography on silica gel (Et_2O/*n*-hexane = 1:2). Prepared according to **GP2**. From 1-((5-methylhex-4-en-1-yl)oxy)quinolin-1-ium 4-methylbenzenesulfonate (62.0 mg, 0.15 mmol), compound **2i** (18.4 mg, 51%) was obtained. Pale yellow oil. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.08 (dd, J = 8.7, 0.8 Hz, 1H), 8.00 (dd, J = 8.6, 1.1 Hz, 1H), 7.79 (dd, J = 8.1, 1.5 Hz, 1H), 7.67 (ddd, J = 8.5, 6.9, 1.5 Hz, 1H), 7.61 (d, J = 8.7 Hz, 1H), 7.49 (ddd, J = 8.1, 6.9, 1.2 Hz, 1H), 4.25 – 4.19 (m, 1H), 3.73 – 3.63 (m, 2H), 1.82 – 1.73 (m, 2H), 1.67 – 1.57 (m, 2H), 1.47 (s, 3H), 1.44 (s, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 167.4, 147.9, 135.8, 129.8, 129.4, 127.9, 127.2, 126.2, 120.6, 87. 0, 69.0, 45.2, 27.5, 26.7, 24.3, 24.1. HRMS (EI) m/z calcd. For $C_{16}H_{19}NO$ $[M]^+$: 241.1467, found : 241.1465.



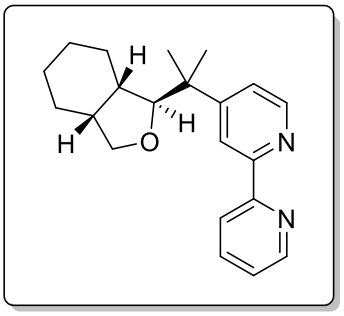
6-methoxy-2-(2-(tetrahydrofuran-2-yl)propan-2-yl)quinolone (2j). Purified by flash chromatography on silica gel (Et_2O/*n*-hexane = 1:1). Prepared according to **GP2**. From 6-methoxy-1-((5-methylhex-4-en-1-yl)oxy)quinolin-1-ium 4-methylbenzenesulfonate (66.5 mg, 0.15 mmol), compound **2j** (24.4 mg, 60%) was obtained. Pale yellow gum. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 7.98 (dd, J = 8.7, 0.8 Hz, 1H), 7.88 (d, J = 9.2 Hz, 1H), 7.55 (d, J = 8.7 Hz, 1H), 7.30 (dd, J = 9.2, 2.8 Hz, 1H), 7.08 (d, J = 2.8 Hz, 1H), 4.22 – 4.16 (m, 1H), 3.91 (s, 3H), 3.73 – 3.62 (m, 2H), 1.82 – 1.71 (m, 2H), 1.67 – 1.56 (m, 2H), 1.45 (s, 3H), 1.41 (s, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 164.8, 157.9, 143.9, 134.7, 131.2, 128.0, 121.9, 120.8, 105.5, 87.0, 68.9, 56.1, 44.9, 27.5, 26.7, 24.3, 24.1. HRMS (EI) m/z calcd. For $C_{17}H_{21}NO_2$ $[M]^+$: 271.1572, found : 241.1575.



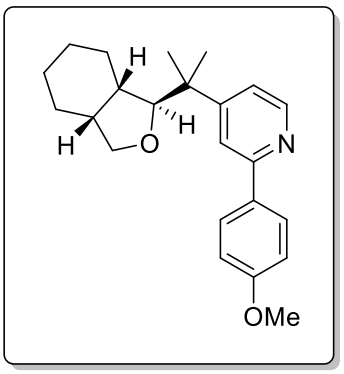
***rel*-4-(2-((1*S*,3a*R*,7a*S*)-octahydroisobenzofuran-1-yl)propan-2-yl)pyridine (2k).** Purified by flash chromatography on silica gel (Et_2O/*n*-hexane = 2:1). Prepared according to **GP2**. From 1-(((1*R*,2*R*)-2-(2-methylprop-1-en-1-yl)cyclohexyl)methoxy)pyridin-1-ium 4-methylbenzenesulfonate (62.6 mg, 0.15 mmol), compound **2k** (22.8 mg, 62%) was obtained. Colorless oil. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.46 (d, *J* = 6.3 Hz, 2H), 7.31 (d, *J* = 6.3 Hz, 2H), 3.76 (d, *J* = 5.3 Hz, 1H), 3.60 (dd, *J* = 7.9, 6.0 Hz, 1H), 3.52 (dd, *J* = 7.9, 6.6 Hz, 1H), 1.90 – 1.82 (m, 1H), 1.82 – 1.75 (m, 1H), 1.52 – 1.33 (m, 5H), 1.31 (s, 6H), 1.29 – 1.11 (m, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 156.6, 149.8, 122.9, 90.7, 72.3, 42.5, 39.4, 39.0, 28.8, 25.5, 25.0, 24.3, 23.6, 23.6. HRMS (EI) m/z calcd. For $C_{16}H_{23}NO$ $[M]^+$: 245.1780, found : 245.1776.



***rel*-4-(2-((1*S*,3a*R*,7a*S*)-octahydroisobenzofuran-1-yl)propan-2-yl)-2-phenylpyridine (2l).** Purified by flash chromatography on silica gel (Et_2O/*n*-hexane = 1:2). Prepared according to **GP2**. From 1-(((1*R*,2*R*)-2-(2-methylprop-1-en-1-yl)cyclohexyl)methoxy)-2-phenylpyridin-1-ium 4-methylbenzenesulfonate (74.0 mg, 0.15 mmol), compound **2l** (41.0 mg, 85%) was obtained. Colorless gum. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.56 (dd, *J* = 5.3, 0.8 Hz, 1H), 8.05 – 7.97 (m, 2H), 7.80 (dd, *J* = 1.8, 0.8 Hz, 1H), 7.52 – 7.43 (m, 2H), 7.46 – 7.36 (m, 1H), 7.29 (dd, *J* = 5.3, 1.8 Hz, 1H), 3.84 (d, *J* = 5.4 Hz, 1H), 3.64 (dd, *J* = 7.9, 6.0 Hz, 1H), 3.56 (dd, *J* = 7.9, 6.7 Hz, 1H), 1.86 (dq, *J* = 24.7, 6.0 Hz, 2H), 1.57 – 1.37 (m, 5H), 1.38 (s, 6H), 1.33 – 1.18 (m, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 157.5, 157.3, 149.7, 140.6, 129.2, 129.1, 127.5, 121.6, 119.7, 90.9, 72.4, 42.7, 39.5, 39.1, 28.9, 25.6, 25.2, 24.4, 23.7, 23.6. HRMS (EI) m/z calcd. For $C_{22}H_{27}NO$ $[M]^+$: 321.2093, found : 321.2094.

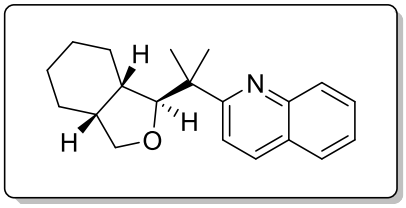


***rel*-4-(2-((1*S*,3a*R*,7a*S*)-octahydroisobenzofuran-1-yl)propan-2-yl)-2,2'-bipyridine (2m).** Purified by flash chromatography on alumina basic (EtOAc/*n*-hexane = 1:4). Prepared according to **GP2**. From 1-(((1*R*,2*R*)-2-(2-methylprop-1-en-1-yl)cyclohexyl)methoxy)-[2,2'-bipyridin]-1-ium 4-methylbenzenesulfonate (74.2 mg, 0.15 mmol), compound **2m** (28.0 mg, 58%) was obtained. Colorless gum. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.66 (ddd, *J* = 4.8, 1.9, 1.0 Hz, 1H), 8.54 (dd, *J* = 5.3, 0.8 Hz, 1H), 8.48 (dd, *J* = 2.0, 0.7 Hz, 1H), 8.42 (dt, *J* = 7.9, 1.1 Hz, 1H), 7.81 (td, *J* = 7.7, 1.8 Hz, 1H), 7.37 (dd, *J* = 5.2, 2.0 Hz, 1H), 7.30 (ddd, *J* = 7.5, 4.8, 1.2 Hz, 1H), 3.85 (d, *J* = 5.3 Hz, 1H), 3.64 (dd, *J* = 7.9, 6.0 Hz, 1H), 3.55 (dd, *J* = 7.9, 6.8 Hz, 1H), 1.96 – 1.89 (m, 1H), 1.88 – 1.79 (m, 1H), 1.52 – 1.41 (m, 4H), 1.41 – 1.35 (m, 7H), 1.33 – 1.25 (m, 1H), 1.24 – 1.18 (m, 2H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 157.8, 157.1, 156.2, 149.6, 149.2, 137.3, 124.1, 123.2, 121.5, 119.7, 90.9, 72.3, 42.8, 39.5, 39.1, 28.9, 25.5, 25.1, 24.4, 23.7, 23.6. HRMS (EI) m/z calcd. For $C_{21}H_{26}N_2O$ $[M]^+$: 322.2045, found : 322.2044.

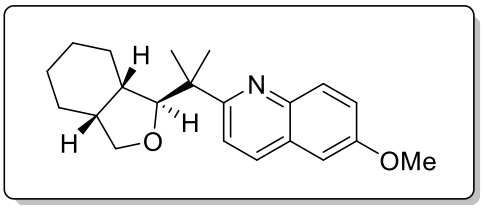


***rel*-2-(4-methoxyphenyl)-4-(2-((1S,3aR,7aS)-octahydroisobenzofuran-1-yl)propan-2-yl)pyridine (2n).** Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:4). Prepared according to **GP2**. From 2-(4-methoxyphenyl)-1-(((1*R*,2*R*)-2-(2-methylprop-1-en-1-yl)cyclohexyl)methoxy)pyridin-1-ium 4-methylbenzenesulfonate (78.6 mg, 0.15 mmol), compound **2n** (35.3 mg, 67%) was obtained. Colorless oil. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.50 (dd, *J* = 5.3, 0.8 Hz, 1H), 8.00 – 7.92 (m, 2H), 7.72 (dd, *J* = 1.8, 0.8 Hz, 1H), 7.22 (dd, *J* = 5.3, 1.8 Hz, 1H), 7.04 – 6.95 (m, 2H), 3.85 (s, 3H), 3.82 (d, *J* = 5.3 Hz, 1H), 3.63 (dd, *J* = 7.9, 6.0 Hz, 1H), 3.55 (dd, *J* = 7.9, 6.6 Hz, 1H), 1.94 – 1.75 (m, 2H), 1.52 – 1.37 (m, 5H), 1.36 (s, 6H), 1.33 – 1.25 (m, 1H), 1.24 –

1.15 (m, 2H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 161.0, 157.3, 157.0, 149.6, 133.1, 128.7, 120.9, 118.8, 114.5, 90.9, 72.4, 55.9, 42.7, 39.5, 39.1, 28.9, 25.6, 25.3, 24.3, 23.7, 23.6. HRMS (ESI) m/z calcd. For $C_{23}H_{29}NO_2$ $[M+H]^+$: 352.2271, found : 352.2273.

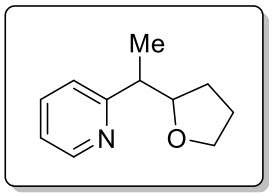


***rel*-2-(2-((1*S*,3a*R*,7a*S*)-octahydroisobenzofuran-1-yl)propan-2-yl)quinolone (2o).** Purified by flash chromatography on silica gel (acetone/*n*-hexane = 1:3). Prepared according to **GP2**. From 1-(((1*R*,2*R*)-2-(2-methylprop-1-en-1-yl)cyclohexyl)methoxy)quinolin-1-ium 4-methylbenzenesulfonate (70.1 mg, 0.15 mmol), compound **2o** (28.4 mg, 64%) was obtained. Pale yellow gum. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.07 (dd, *J* = 8.7, 0.8 Hz, 1H), 8.01 (d, *J* = 8.5 Hz, 1H), 7.79 (dd, *J* = 8.1, 1.5 Hz, 1H), 7.67 (ddd, *J* = 8.5, 6.8, 1.5 Hz, 1H), 7.59 (d, *J* = 8.7 Hz, 1H), 7.49 (ddd, *J* = 8.1, 6.9, 1.2 Hz, 1H), 4.11 (d, *J* = 5.7 Hz, 1H), 3.62 (dd, *J* = 7.9, 6.1 Hz, 1H), 3.54 (dd, *J* = 7.8, 6.6 Hz, 1H), 2.11 – 2.03 (m, 1H), 1.89 – 1.79 (m, 1H), 1.48 (s, 3H), 1.45 (s, 3H), 1.43 – 1.35 (m, 4H), 1.30 – 1.04 (m, 4H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 167.2, 147.9, 135.7, 129.9, 129.4, 127.9, 127.2, 126.3, 120.6, 90.7, 72.3, 46.0, 39.2, 39.2, 28.5, 25.7, 25.2, 23.8, 23.7, 23.7. HRMS (EI) m/z calcd. For $C_{20}H_{25}NO$ $[M]^+$: 295.1936, found : 295.1936.

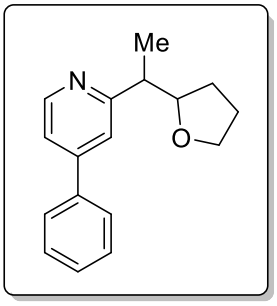


***rel*-6-methoxy-2-(2-((1*S*,3a*R*,7a*S*)-octahydroisobenzofuran-1-yl)propan-2-yl)quinolone (2p).** Purified by flash chromatography on silica gel (acetone/*n*-hexane = 1:4). Prepared according to **GP2**. From 6-methoxy-1-(((1*R*,2*R*)-2-(2-methylprop-1-en-1-yl)cyclohexyl)methoxy)quinolin-1-ium 4-methylbenzenesulfonate (74.6 mg, 0.15 mmol), compound **2p** (32.7 mg, 67%) was obtained. Pale yellow gum. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 7.97 (dd, *J* = 8.7, 0.7 Hz, 1H), 7.90 (d, *J* = 9.2 Hz, 1H), 7.53 (d, *J* = 8.7 Hz, 1H), 7.31 (dd, *J* = 9.2, 2.8 Hz, 1H), 7.08 (d, *J* = 2.8 Hz, 1H), 4.08 (d, *J* = 5.6 Hz, 1H), 3.91 (s, 3H), 3.61 (dd, *J* = 7.8, 6.0 Hz, 1H), 3.53 (dd, *J* = 7.8, 6.5 Hz, 1H), 2.10 – 2.02 (m, 1H), 1.88 – 1.79 (m, 1H), 1.46 (s, 3H), 1.43 (s, 3H), 1.42 – 1.35 (m, 4H), 1.30 – 1.00 (m, 4H). ^{13}C NMR (151 MHz, Methylene Chloride-d_2) δ 164.6, 157.9, 143.9, 134.6, 131.2, 128.0, 121.9, 120.8, 105.5,

90.6, 72.3, 56.0, 45.6, 39.2, 39.1, 28.5, 25.7, 25.2, 23.8, 23.6, 23.6. HRMS (EI) m/z calcd. For $C_{21}H_{27}NO_2$ $[M]^+$: 325.2042, found : 325.2042.

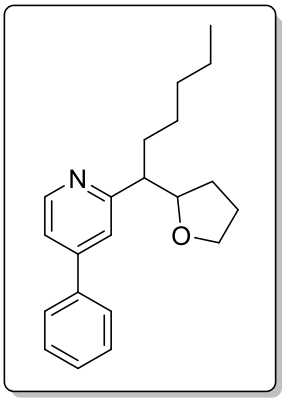


2-(1-(tetrahydrofuran-2-yl)ethyl)pyridine (2q). d.r. 2.7:1. Purified by flash chromatography on silica gel (acetone/*n*-hexane = 1:3). Prepared according to **GP2**. From (*E*)-1-(hex-4-en-1-yloxy)pyridin-1-ium 4-methylbenzenesulfonate (52.4 mg, 0.15 mmol), compound **2q** (18.3 mg, 69%) was obtained. Pale yellow oil. (major diastereomer). Pale yellow oil (minor diastereomer). ^{1}H NMR (400 MHz, Methylene Chloride-d_2, major diastereomer) δ 8.50 (ddd, *J* = 4.8, 1.9, 1.0 Hz, 1H), 7.59 (td, *J* = 7.7, 1.9 Hz, 1H), 7.18 (dt, *J* = 7.9, 1.1 Hz, 1H), 7.10 (ddd, *J* = 7.5, 4.8, 1.2 Hz, 1H), 4.05 (td, *J* = 8.4, 6.3 Hz, 1H), 3.75 (dtd, *J* = 8.3, 6.9, 0.5 Hz, 1H), 3.62 (dt, *J* = 8.2, 6.9 Hz, 1H), 2.88 (dq, *J* = 8.4, 7.0 Hz, 1H), 2.08 – 1.99 (m, 1H), 1.90 – 1.80 (m, 2H), 1.67 – 1.56 (m, 1H), 1.23 (d, *J* = 7.1 Hz, 3H). ^{1}H NMR (400 MHz, Methylene Chloride-d_2, minor diastereomer) δ 8.49 (ddd, *J* = 5.0, 1.9, 1.0 Hz, 1H), 7.60 (td, *J* = 7.7, 1.8 Hz, 1H), 7.17 (dt, *J* = 7.8, 1.1 Hz, 1H), 7.15 – 7.07 (m, 1H), 4.08 – 3.98 (m, 1H), 3.79 (dt, *J* = 8.3, 6.7 Hz, 1H), 3.70 (dt, *J* = 8.3, 6.8 Hz, 1H), 2.89 (p, *J* = 7.1 Hz, 1H), 1.82 – 1.63 (m, 3H), 1.54 – 1.43 (m, 1H), 1.34 (d, *J* = 6.9 Hz, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2, major diastereomer) δ 165.0, 149.5, 136.5, 123.2, 121.8, 83.6, 68.4, 47.9, 30.4, 26.3, 17.6. ^{13}C NMR (150 MHz, Methylene Chloride-d_2, minor diastereomer) δ 164.6, 149.6, 136.6, 123.2, 121.8, 83.6, 68.4, 47.6, 30.1, 26.4, 17.7. HRMS (EI, major diastereomer) m/z calcd. For $C_{11}H_{15}NO$ $[M]^+$: 177.1154, found : 177.1152. HRMS (EI, minor diastereomer) m/z calcd. For $C_{11}H_{15}NO$ $[M]^+$: 177.1154, found : 177.1151.



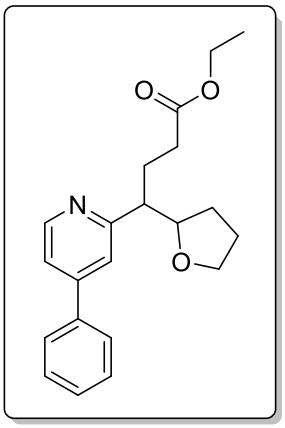
4-phenyl-2-(1-(tetrahydrofuran-2-yl)ethyl)pyridine (2r). d.r. 2.4:1. Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:2). Prepared according to **GP2**. From (*E*)-1-(hex-4-en-1-yloxy)-4-phenylpyridin-1-ium 4-methylbenzenesulfonate (63.8 mg, 0.15 mmol), compound **2r** (28.9 mg, 76%) was obtained. White solid (major diastereomer). Colorless oil (minor diastereomer). ^{1}H NMR (400 MHz, Methylene Chloride-d_2, major diastereomer) δ 8.55 (dd, *J* = 5.2, 0.8 Hz, 1H), 7.71 –

7.63 (m, 2H), 7.52 – 7.40 (m, 4H), 7.35 (dd, *J* = 5.1, 1.8 Hz, 1H), 4.12 (td, *J* = 8.3, 6.3 Hz, 1H), 3.77 (dt, *J* = 8.2, 6.9 Hz, 1H), 3.64 (dt, *J* = 8.2, 6.8 Hz, 1H), 2.97 (dq, *J* = 8.3, 7.1 Hz, 1H), 2.11 – 2.02 (m, 1H), 1.91 – 1.82 (m, 2H), 1.70 – 1.60 (m, 1H), 1.29 (d, *J* = 7.0 Hz, 3H). ^{1}H NMR (400 MHz, Methylene Chloride-d_2, minor diastereomer) δ 8.55 (dd, *J* = 5.2, 0.8 Hz, 1H), 7.69 – 7.64 (m, 2H), 7.52 – 7.40 (m, 4H), 7.36 (dd, *J* = 5.2, 1.8 Hz, 1H), 4.10 (td, *J* = 7.6, 6.3 Hz, 1H), 3.81 (dt, *J* = 8.4, 6.6 Hz, 1H), 3.76 – 3.69 (m, 1H), 3.02 – 2.93 (m, 1H), 1.84 – 1.70 (m, 3H), 1.58 – 1.50 (m, 1H), 1.40 (d, *J* = 6.9 Hz, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2, major diastereomer) δ 165.6, 150.0, 148.8, 139.2, 129.5, 129.4, 127.6, 121.2, 119.9, 83.6, 68.4, 48.1, 30.4, 26.4, 17.7. ^{13}C NMR (150 MHz, Methylene Chloride-d_2, minor diastereomer) δ 165.2, 150.1, 148.9, 139.1, 129.6, 129.4, 127.6, 121.1, 119.9, 83.6, 68.5, 47.8, 30.1, 26.4, 17.8. HRMS (EI, major diastereomer) m/z calcd. For $C_{17}H_{19}NO$ $[M]^+$: 253.1467, found : 253.1466. HRMS (EI, minor diastereomer) m/z calcd. For $C_{17}H_{19}NO$ $[M]^+$: 253.1467, found : 253.1466.

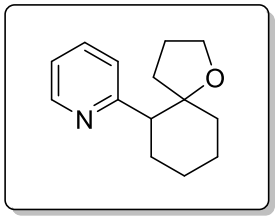


4-phenyl-2-(1-(tetrahydrofuran-2-yl)hexyl)pyridine (2s). d.r. 2.5:1. Purified by flash chromatography on silica gel (acetone/*n*-hexane = 1:5). Prepared according to **GP2**. From (*E*)-1-(dec-4-en-1-yloxy)-4-phenylpyridin-1-ium 4-methylbenzenesulfonate (72.2 mg, 0.15 mmol), compound **2s** (36.2 mg, 78%) was obtained. Yellow oil (major diastereomer). Yellow oil (minor diastereomer). ^{1}H NMR (400 MHz, Methylene Chloride-d_2, major diastereomer) δ 8.56 (dd, *J* = 5.1, 0.8 Hz, 1H), 7.69 – 7.65 (m, 2H), 7.51 – 7.40 (m, 3H), 7.39 (dd, *J* = 1.9, 0.8 Hz, 1H), 7.35 (dd, *J* = 5.2, 1.8 Hz, 1H), 4.12 (td, *J* = 8.2, 6.3 Hz, 1H), 3.73 (dt, *J* = 8.3, 6.9 Hz, 1H), 3.61 (ddd, *J* = 8.2, 7.3, 6.2 Hz, 1H), 2.81 (ddd, *J* = 10.9, 8.1, 3.9 Hz, 1H), 2.11 – 2.03 (m, 1H), 1.90 – 1.78 (m, 3H), 1.69 – 1.60 (m, 2H), 1.29 – 1.02 (m, 6H), 0.81 (t, *J* = 7.0 Hz, 3H). ^{1}H NMR (400 MHz, Methylene Chloride-d_2, minor diastereomer) δ 8.56 (dd, *J* = 4.7, 1.3 Hz, 1H), 7.69 – 7.64 (m, 2H), 7.52 – 7.41 (m, 3H), 7.38 – 7.33 (m, 2H), 4.12 – 4.04 (m, 1H), 3.79 (dt, *J* = 8.2, 6.8 Hz, 1H), 3.71 (dt, *J* = 8.2, 6.8 Hz, 1H), 2.80 (ddd, *J* = 10.6, 8.4, 3.8 Hz, 1H), 2.02 – 1.93 (m, 1H), 1.91 – 1.80 (m, 1H), 1.80 – 1.72 (m, 2H), 1.67 – 1.59 (m, 1H), 1.52 – 1.42 (m, 1H), 1.28 – 1.07 (m, 6H), 0.82 (t, *J* = 7.0 Hz, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2, major diastereomer) δ 164.4, 150.1, 148.4, 139.3, 129.5, 129.3, 127.6, 122.2, 119.8, 83.2, 68.2, 54.2, 32.5, 32.3, 30.7, 27.6, 26.3, 23.1, 14.4. ^{13}C NMR (150 MHz, Methylene Chloride-d_2, minor

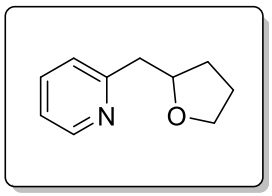
diastereomer) δ 163.9, 150.2, 148.6, 139.1, 129.6, 129.4, 127.6, 122.2, 119.8, 83.2, 68.3, 54.1, 32.7, 32.6, 30.3, 27.7, 26.2, 23.2, 14.4. HRMS (EI, major diastereomer) m/z calcd. For $C_{21}H_{27}NO$ $[M]^+$: 309.2093, found : 309.2091. HRMS (EI, minor diastereomer) m/z calcd. For $C_{21}H_{27}NO$ $[M]^+$: 309.2093, found : 309.2090.



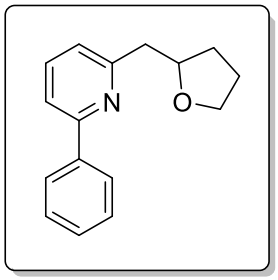
ethyl 4-(4-phenylpyridin-2-yl)-4-(tetrahydrofuran-2-yl)butanoate (2t). d.r. 2.5:1. Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:2). Prepared according to **GP2**. From (*E*)-1-((8-ethoxy-8-oxooct-4-en-1-yl)oxy)-4-phenylpyridin-1-ium 4-methylbenzenesulfonate (76.7 mg, 0.15 mmol), compound **2t** (35.6 mg, 70%) was obtained. Yellow oil (major diastereomer). Pale yellow oil (minor diastereomer). ^{1}H NMR (400 MHz, Methylene Chloride-d_2, major diastereomer) δ 8.58 (dd, *J* = 5.1, 0.9 Hz, 1H), 7.70 – 7.64 (m, 2H), 7.52 – 7.41 (m, 3H), 7.40 – 7.35 (m, 2H), 4.14 (td, *J* = 8.2, 6.4 Hz, 1H), 4.04 (q, *J* = 7.1 Hz, 2H), 3.78 – 3.71 (m, 1H), 3.65 – 3.58 (m, 1H), 2.89 – 2.81 (m, 1H), 2.17 – 1.99 (m, 5H), 1.89 – 1.80 (m, 2H), 1.72 – 1.64 (m, 1H), 1.18 (t, *J* = 7.1 Hz, 3H). ^{1}H NMR (400 MHz, Methylene Chloride-d_2, minor diastereomer) δ 8.57 (dd, *J* = 5.1, 0.9 Hz, 1H), 7.69 – 7.64 (m, 2H), 7.53 – 7.41 (m, 3H), 7.40 – 7.35 (m, 2H), 4.13 (ddd, *J* = 8.5, 7.5, 6.4 Hz, 1H), 4.03 (q, *J* = 7.1 Hz, 2H), 3.84 – 3.78 (m, 1H), 3.73 (dt, *J* = 8.2, 6.8 Hz, 1H), 2.84 (ddd, *J* = 10.0, 8.3, 4.0 Hz, 1H), 2.36 – 2.26 (m, 1H), 2.21 – 2.08 (m, 3H), 1.82 – 1.73 (m, 2H), 1.70 – 1.63 (m, 1H), 1.53 – 1.42 (m, 1H), 1.18 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2, major diastereomer) δ 173.7, 163.1, 150.3, 148.7, 139.0, 129. 6, 129.4, 127.6, 122.5, 120.1, 82.8, 68.3, 60.7, 53.2, 32.6, 30.5, 27.3, 26.3, 14.6. ^{13}C NMR (150 MHz, Methylene Chloride-d_2, minor diastereomer) δ 173.9, 162.7, 150.4, 148.9, 138.9, 129.6, 129.5, 127.6, 122.4, 120.1, 82.9, 68.4, 60.6, 53.1, 32.8, 30.3, 28.0, 26.2, 14.6. HRMS (EI, major diastereomer) m/z calcd. For $C_{21}H_{25}NO_3$ $[M]^+$: 339.1834, found : 339.1831. HRMS (EI, minor diastereomer) m/z calcd. For $C_{21}H_{25}NO_3$ $[M]^+$: 339.1834, found : 339.1833.



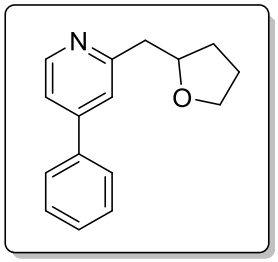
2-(1-oxaspiro[4.5]decan-6-yl)pyridine (2u). d.r. 2.0:1. Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:7). Prepared according to **GP2**. From 1-(3-(cyclohex-1-en-1-yl)propoxy)pyridin-1-ium 4-methylbenzenesulfonate (58.4 mg, 0.15 mmol), compound **2u** (13.9 mg, 43%) was obtained. Colorless oil (major diastereomer). Colorless oil (minor diastereomer). ^{1}H NMR (600 MHz, Methylene Chloride-d_2) δ 8.50 – 8.38 (m, 1H), 7.57 (td, *J* = 7.7, 1.9 Hz, 1H), 7.40 (dd, *J* = 8.1, 1.2 Hz, 1H), 7.10 (ddd, *J* = 7.4, 4.8, 1.2 Hz, 1H), 3.62 (td, *J* = 7.9, 6.6 Hz, 1H), 3.51 (td, *J* = 7.7, 4.9 Hz, 1H), 2.83 (dd, *J* = 13.0, 3.6 Hz, 1H), 2.02 (qd, *J* = 13.0, 3.7 Hz, 1H), 1.84 (ddd, *J* = 12.5, 8.6, 5.5 Hz, 1H), 1.82 – 1.75 (m, 2H), 1.72 (dt, *J* = 13.1, 3.8 Hz, 1H), 1.69 – 1.64 (m, 1H), 1.62 – 1.55 (m, 2H), 1.51 – 1.33 (m, 3H), 0.85 – 0.77 (m, 1H). ^{1}H NMR (600 MHz, Chloroform-*d*, minor diastereomer) δ 8.54 (d, *J* = 4.6 Hz, 1H), 7.56 – 7.52 (m, 1H), 7.29 (d, *J* = 7.8 Hz, 1H), 7.13 – 7.07 (m, 1H), 3.62 (q, *J* = 6.8 Hz, 1H), 3.12 (q, *J* = 6.8 Hz, 1H), 2.95 (dd, *J* = 12.5, 3.5 Hz, 1H), 2.14 – 2.07 (m, 1H), 1.99 (qd, *J* = 12.9, 3.5 Hz, 1H), 1.92 – 1.86 (m, 1H), 1.84 – 1.75 (m, 3H), 1.64 – 1.54 (m, 3H), 1.44 – 1.31 (m, 2H), 0.96 – 0.89 (m, 1H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2, major diastereomer) δ 164.3, 148.6, 136.0, 123.9, 121.7, 83.8, 68.3, 55.1, 39.1, 36.2, 30.0, 26.6, 26.1, 23.4. ^{13}C NMR (150 MHz, Chloroform-*d*, minor diastereomer) δ 162.2, 148.4, 135.0, 126.0, 121.1, 86.0, 67.3, 53.5, 40.2, 29.1, 29.1, 26.2, 25.7, 24.9. HRMS (EI, major diastereomer) m/z calcd. For $C_{14}H_{19}NO$ $[M]^+$: 217.1467, found : 217.1465. HRMS (EI, minor diastereomer) m/z calcd. For $C_{14}H_{19}NO$ $[M]^+$: 217.1467, found : 217.1464.



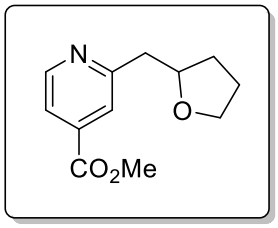
2-((tetrahydrofuran-2-yl)methyl)pyridine (2v). Purified by flash chromatography on silica gel (Acetone/*n*-hexane = 1:4). Prepared according to **GP2**. From 1-(pent-4-en-1-yloxy)pyridin-1-ium 4-methylbenzenesulfonate (50.3 mg, 0.15 mmol), compound **2v** (10.4 mg, 43%) was obtained. Colorless oil. ^{1}H NMR (600 MHz, Methylene Chloride-d_2) δ 8.5 (d, *J* = 4.9 Hz, 1H), 7.6 (tt, *J* = 7.7, 1.5 Hz, 1H), 7.2 (d, *J* = 7.7 Hz, 1H), 7.1 – 7.1 (m, 1H), 4.2 (p, *J* = 6.8 Hz, 1H), 3.8 (q, *J* = 7.3 Hz, 1H), 3.7 (q, *J* = 7.5 Hz, 1H), 2.9 (qd, *J* = 13.6, 6.5 Hz, 2H), 2.0 – 1.9 (m, 1H), 1.9 – 1.8 (m, 2H), 1.6 (dq, *J* = 12.1, 7.9 Hz, 1H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 160.1, 149.6, 136.5, 124.2, 121.7, 79.3, 68.2, 44.8, 31.7, 26.1. HRMS (ESI) m/z calcd. For $C_{10}H_{13}NO$ $[M+H]^+$: 164.1070, found : 164.1061.



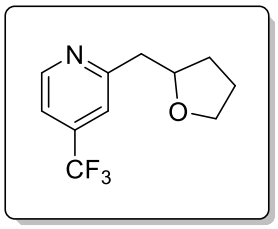
2-phenyl-6-((tetrahydrofuran-2-yl)methyl)pyridine (2w). Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:4). Prepared according to **GP2**. From 1-(pent-4-en-1-yloxy)-2-phenylpyridin-1-ium 4-methylbenzenesulfonate (61.7 mg, 0.15 mmol), compound **2w** (12.5 mg, 35%) was obtained. Colorless oil. ^{1}H NMR (600 MHz, Methylene Chloride-d_2) δ 8.06 – 8.00 (m, 2H), 7.68 (t, *J* = 7.7 Hz, 1H), 7.59 (dd, *J* = 7.9, 0.9 Hz, 1H), 7.46 (dd, *J* = 8.3, 6.8 Hz, 2H), 7.43 – 7.38 (m, 1H), 7.17 (dd, *J* = 7.6, 0.9 Hz, 1H), 4.32 (p, *J* = 6.8 Hz, 1H), 3.87 (td, *J* = 7.9, 6.2 Hz, 1H), 3.70 (td, *J* = 8.0, 6.3 Hz, 1H), 3.07 (dd, *J* = 13.6, 7.2 Hz, 1H), 3.00 (dd, *J* = 13.6, 5.9 Hz, 1H), 2.03 (dddd, *J* = 11.8, 8.5, 6.5, 5.0 Hz, 1H), 1.96 – 1.83 (m, 2H), 1.69 (ddt, *J* = 12.1, 8.9, 7.4 Hz, 1H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 159.9, 157.0, 140.2, 137.4, 129.3, 129.1, 127.4, 122.7, 118.3, 79.4, 68.3, 45.0, 31.8, 26.2. HRMS (EI) m/z calcd. For $C_{16}H_{17}NO$ $[M]^+$: 239.1310, found : 239.1311.



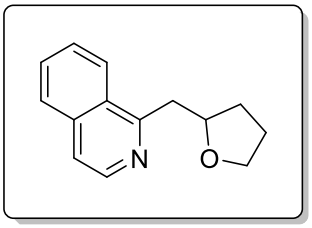
4-phenyl-2-((tetrahydrofuran-2-yl)methyl)pyridine (2x). Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 2:1). Prepared according to **GP2**. From 1-(pent-4-en-1-yloxy)-4-phenylpyridin-1-ium 4-methylbenzenesulfonate (61.7 mg, 0.15 mmol), compound **2x** (20.1 mg, 56%) was obtained. Pale yellow oil. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.54 (dd, *J* = 5.2, 0.8 Hz, 1H), 7.69 – 7.64 (m, 2H), 7.52 – 7.41 (m, 4H), 7.37 (dd, *J* = 5.2, 1.9 Hz, 1H), 4.32 – 4.23 (m, 1H), 3.90 – 3.82 (m, 1H), 3.73 – 3.66 (m, 1H), 3.05 (dd, *J* = 13.6, 7.3 Hz, 1H), 2.99 (dd, *J* = 13.6, 5.7 Hz, 1H), 2.05 – 1.96 (m, 1H), 1.94 – 1.83 (m, 2H), 1.69 – 1.61 (m, 1H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 160.7, 150.1, 148.9, 139.0, 129.6, 129.4, 127.6, 122.1, 119.8, 79.3, 68.3, 44.9, 31.7, 26.2. HRMS (EI) m/z calcd. For $C_{16}H_{17}NO$ $[M]^+$: 239.1310, found : 239.1307.



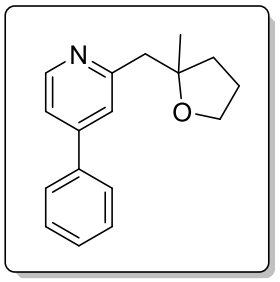
methyl 2-((tetrahydrofuran-2-yl)methyl)isonicotinate (2y). Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:1). Prepared according to **GP2**. From 4-(methoxycarbonyl)-1-(pent-4-en-1-yloxy)pyridin-1-ium 4-methylbenzenesulfonate (59.0 mg, 0.15 mmol), compound **2y** (20.6 mg, 62%) was obtained. Pale yellow oil. ^{1}H NMR (400 MHz, Chloroform-*d*) δ 8.7 (ddt, *J* = 3.9, 1.9, 1.0 Hz, 1H), 7.8 (tt, *J* = 2.2, 1.2 Hz, 1H), 7.7 (dq, *J* = 5.2, 1.7 Hz, 1H), 4.3 (dtd, *J* = 8.9, 7.3, 5.6 Hz, 1H), 3.9 (dd, *J* = 2.3, 1.5 Hz, 3H), 3.9 – 3.8 (m, 1H), 3.8 – 3.7 (m, 1H), 3.1 – 3.0 (m, 2H), 2.1 – 1.9 (m, 1H), 2.0 – 1.7 (m, 2H), 1.7 – 1.5 (m, 1H). ^{13}C NMR (100 MHz, Chloroform-*d*) δ 166.0, 160.7, 150.1, 137.7, 123.1, 120.6, 78.7, 68.1, 52.7, 44.3, 31.3, 25.7. HRMS (EI) m/z calcd. For $C_{12}H_{15}NO$ $[M]^+$: 221.1052, found : 221.1054.



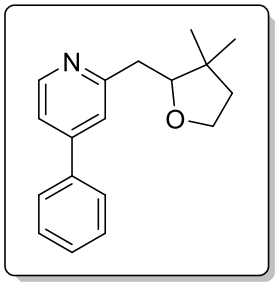
2-((tetrahydrofuran-2-yl)methyl)-4-(trifluoromethyl)pyridine (2z). Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:2). Prepared according to **GP2**. From 1-(pent-4-en-1-yloxy)-4-(trifluoromethyl)pyridin-1-ium 4-methylbenzenesulfonate (60.5 mg, 0.15 mmol), compound **2z** (22.5 mg, 65%) was obtained. Colorless oil. ^{1}H NMR (600 MHz, Methylene Chloride-d_2) δ 8.70 (d, *J* = 5.1 Hz, 1H), 7.47 (s, 1H), 7.35 (d, *J* = 5.1 Hz, 1H), 4.24 (p, *J* = 6.6 Hz, 1H), 3.84 (qd, *J* = 8.0, 7.3, 1.5 Hz, 1H), 3.69 (qd, *J* = 8.0, 7.2, 1.5 Hz, 1H), 3.04 (d, *J* = 6.4 Hz, 2H), 2.01 (dddd, *J* = 13.6, 8.2, 6.6, 3.5 Hz, 1H), 1.94 – 1.80 (m, 2H), 1.66 – 1.56 (m, 1H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 161.9, 150.7, 138.6 (q, *J* = 33.8 Hz), 123.7 (q, *J* = 273.0 Hz), 119.8 (q, *J* = 3.7 Hz), 117.3 (q, *J* = 3.6 Hz), 78.9, 68.4, 44.8, 31.8, 26.2. ^{19}F NMR (564 MHz, Methylene Chloride-d_2) δ -65.1. HRMS (EI) m/z calcd. For $C_{11}H_{12}F_3NO$ $[M]^+$: 231.0871, found : 231.0871.



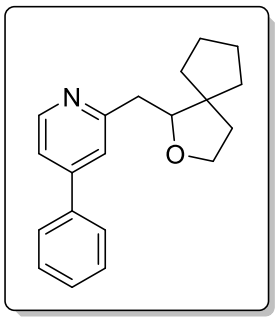
1-((tetrahydrofuran-2-yl)methyl)isoquinoline (2aa). Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:4). Prepared according to **GP2**. From 2-(pent-4-en-1-yloxy)isoquinolin-2-ium 4-methylbenzenesulfonate (57.8 mg, 0.15 mmol), compound **2aa** (23.0 mg, 72%) was obtained. Pale yellow oil. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.42 (d, *J* = 5.7 Hz, 1H), 8.23 (d, *J* = 8.4 Hz, 1H), 7.83 (d, *J* = 8.2 Hz, 1H), 7.68 (t, *J* = 7.5 Hz, 1H), 7.60 (t, *J* = 7.6 Hz, 1H), 7.53 (d, *J* = 5.7 Hz, 1H), 4.43 (p, *J* = 6.6 Hz, 1H), 3.88 (q, *J* = 7.2 Hz, 1H), 3.68 (q, *J* = 7.4 Hz, 1H), 3.61 (dd, *J* = 13.9, 6.7 Hz, 1H), 3.34 (dd, *J* = 13.9, 6.3 Hz, 1H), 2.02 (ddd, *J* = 14.1, 11.6, 5.5 Hz, 1H), 1.97 – 1.82 (m, 2H), 1.72 (dq, *J* = 11.5, 7.4 Hz, 1H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 160.0, 142.4, 136.7, 130.3, 128.1, 127.7, 127.5, 126.2, 119.8, 79.3, 68.3, 41.6, 31.9, 26.2. HRMS (EI) m/z calcd. For $C_{14}H_{15}NO$ $[M]^+$: 213.1154, found : 213.1156.



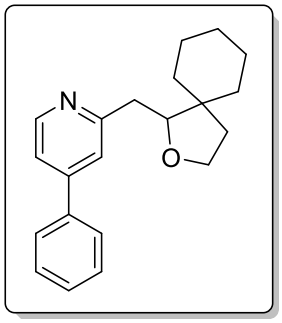
2-((2-methyltetrahydrofuran-2-yl)methyl)-4-phenylpyridine (2ab). Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:4). Prepared according to **GP2**. From 1-((4-methylpent-4-en-1-yl)oxy)-4-phenylpyridin-1-ium 4-methylbenzenesulfonate (63.8 mg, 0.15 mmol), compound **2ab** (17.8 mg, 47%) was obtained. Pale yellow oil. ^{1}H NMR (400 MHz, Acetonitrile-d_3) δ 8.5 (dd, *J* = 5.3, 0.8 Hz, 1H), 7.8 – 7.7 (m, 2H), 7.6 (dd, *J* = 1.8, 0.8 Hz, 1H), 7.6 – 7.4 (m, 4H), 3.9 – 3.6 (m, 2H), 3.0 (s, 2H), 2.1 (ddd, *J* = 12.1, 8.4, 6.2 Hz, 1H), 2.0 – 1.9 (m, 1H), 1.8 (dddt, *J* = 12.1, 8.3, 7.2, 6.3 Hz, 1H), 1.6 (ddd, *J* = 12.0, 8.3, 6.4 Hz, 1H), 1.2 (s, 3H). ^{13}C NMR (150 MHz, Acetonitrile-d_3) δ 160.8, 150.1, 148.7, 139.3, 130.1, 130.0, 127.9, 123.6, 120.1, 83.4, 67.9, 49.4, 37.1, 26.9, 26.7. HRMS (EI) m/z calcd. For $C_{17}H_{19}NO$ $[M]^+$: 253.1467, found : 253.1464.



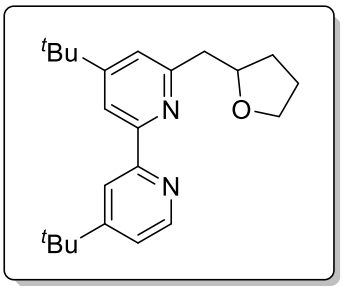
2-((3,3-dimethyltetrahydrofuran-2-yl)methyl)-4-phenylpyridine (2ac). Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:3). Prepared according to **GP2**. From 1-((3,3-dimethylpent-4-en-1-yl)oxy)-4-phenylpyridin-1-ium 4-methylbenzenesulfonate (65.9 mg, 0.15 mmol), compound **2ac** (29.7 mg, 74%) was obtained. Pale yellow oil. ^{1}H NMR (600 MHz, Methylene Chloride-d_2) δ 8.55 (d, *J* = 5.2 Hz, 1H), 7.69 – 7.65 (m, 2H), 7.51 – 7.47 (m, 3H), 7.46 – 7.42 (m, 1H), 7.36 (dd, *J* = 5.1, 1.8 Hz, 1H), 3.90 – 3.82 (m, 2H), 3.73 (td, *J* = 8.7, 4.4 Hz, 1H), 2.93 (dd, *J* = 13.9, 2.9 Hz, 1H), 2.84 (dd, *J* = 13.8, 9.9 Hz, 1H), 1.85 – 1.74 (m, 2H), 1.10 (s, 3H), 1.05 (s, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 161.5, 150.1, 148.8, 139.1, 129.5, 129.4, 127.6, 122.1, 119.7, 86.9, 65.8, 41.7, 41.1, 39.7, 25.6, 22.2. HRMS (EI) m/z calcd. For $C_{18}H_{21}NO$ $[M]^+$: 267.1623, found : 267.1623.



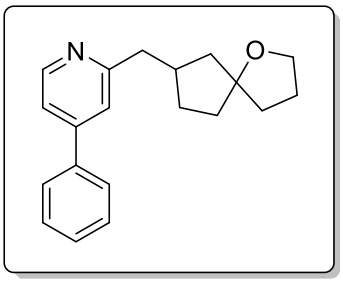
2-((2-oxaspiro[4.4]nonan-1-yl)methyl)-4-phenylpyridine (2ad). Purified by flash chromatography on silica gel (Et_2O/CH_2Cl_2 = 2:1). Prepared according to **GP2**. From 4-phenyl-1-(2-(1-vinylcyclopentyl)ethoxy)pyridin-1-ium 4-methylbenzenesulfonate (69.8 mg, 0.15 mmol), compound **2ad** (28.6 mg, 65%) was obtained. Pale yellow oil. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.54 (dd, *J* = 5.2, 0.8 Hz, 1H), 7.69 – 7.64 (m, 2H), 7.52 – 7.40 (m, 4H), 7.35 (dd, *J* = 5.2, 1.8 Hz, 1H), 4.08 (dd, *J* = 10.1, 2.9 Hz, 1H), 3.85 (ddd, *J* = 8.3, 7.7, 6.7 Hz, 1H), 3.74 (td, *J* = 8.2, 5.9 Hz, 1H), 2.96 (dd, *J* = 13.7, 2.8 Hz, 1H), 2.84 (dd, *J* = 13.7, 10.1 Hz, 1H), 1.92 – 1.79 (m, 2H), 1.78 – 1.57 (m, 8H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 161.5, 150.1, 148.8, 139.1, 129.5, 129.4, 127.6, 122.2, 119.7, 85.2, 66.4, 53.3, 40.8, 40.2, 36.8, 32.9, 25.4, 24.6. HRMS (EI) m/z calcd. For $C_{20}H_{23}NO$ $[M]^+$: 293.1780, found : 293.1778.



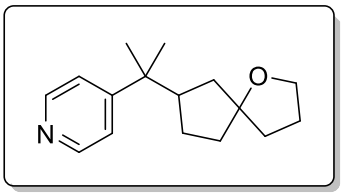
2-((2-oxaspiro[4.5]decan-1-yl)methyl)-4-phenylpyridine (2ae). Purified by flash chromatography on silica gel (Et_2O/CH_2Cl_2 = 2:1). Prepared according to **GP2**. From 4-phenyl-1-(2-(1-vinylcyclohexyl)ethoxy)pyridin-1-ium 4-methylbenzenesulfonate (71.9 mg, 0.15 mmol), compound **2ae** (29.1 mg, 63%) was obtained. Pale yellow oil. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.54 (dd, *J* = 5.2, 0.8 Hz, 1H), 7.69 – 7.64 (m, 2H), 7.52 – 7.40 (m, 4H), 7.35 (dd, *J* = 5.2, 1.8 Hz, 1H), 3.87 (td, *J* = 8.3, 6.6 Hz, 1H), 3.81 (dd, *J* = 10.3, 2.7 Hz, 1H), 3.70 (td, *J* = 8.6, 5.8 Hz, 1H), 2.94 (dd, *J* = 13.7, 2.8 Hz, 1H), 2.83 (dd, *J* = 13.8, 10.3 Hz, 1H), 2.06 – 1.97 (m, 1H), 1.71 – 1.36 (m, 11H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 161.7, 150.1, 148.8, 139.1, 129.5, 129.4, 127.6, 122.2, 119.7, 87.6, 66.0, 45.5, 39.6, 36.1, 35.8, 31.0, 27.1, 24.5, 23.6. HRMS (EI) m/z calcd. For $C_{21}H_{25}NO$ $[M]^+$: 307.1936, found : 307.1936.



4,4'-di-tert-butyl-6-((tetrahydrofuran-2-yl)methyl)-2,2'-bipyridine (2af). Purified by flash chromatography on alumina basic (EtOAc/*n*-hexane = 1:19). Prepared according to **GP2**. From 4,5'-di-tert-butyl-1-(pent-4-en-1-yloxy)-[2,2'-bipyridin]-1-ium 4-methylbenzenesulfonate (78.7 mg, 0.15 mmol), compound **2af** (24.8 mg, 47%) was obtained. Colorless gum. ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.5 (dd, *J* = 5.2, 0.8 Hz, 1H), 8.5 (dd, *J* = 2.0, 0.8 Hz, 1H), 8.3 (d, *J* = 1.8 Hz, 1H), 7.3 (dd, *J* = 5.2, 2.0 Hz, 1H), 7.2 (d, *J* = 1.8 Hz, 1H), 4.4 (p, *J* = 6.7 Hz, 1H), 3.9 (ddd, *J* = 8.3, 7.3, 6.1 Hz, 1H), 3.7 (td, *J* = 7.8, 6.4 Hz, 1H), 3.1 (dd, *J* = 13.6, 6.6 Hz, 1H), 3.0 (dd, *J* = 13.6, 6.4 Hz, 1H), 2.0 (dddd, *J* = 11.6, 8.4, 6.4, 5.1 Hz, 1H), 2.0 – 1.8 (m, 2H), 1.7 (ddt, *J* = 11.8, 8.8, 7.2 Hz, 1H), 1.4 (s, 9H), 1.4 (s, 9H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 161.5, 161.2, 159.2, 157.3, 156.3, 149.4, 121.1 (d, *J* = 2.9 Hz), 118.6, 116.2, 79.5, 68.3, 45.0, 35.4, 35.4, 31.7, 31.0, 30.9, 26.2. HRMS (EI) m/z calcd. For $C_{23}H_{32}N_2O$ $[M]^+$: 352.2515, found : 352.2512.

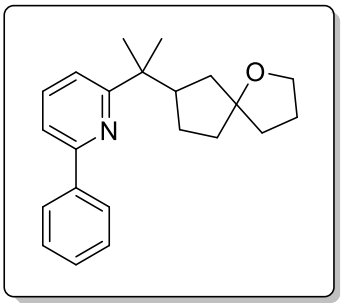


2-((1-oxaspiro[4.4]nonan-2-yl)methyl)-4-phenylpyridine (4a). d.r. 1:1. Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:5). Prepared according to **GP2**. From 1-((4-methyleneoct-7-en-1-yl)oxy)-4-phenylpyridin-1-ium 4-methylbenzenesulfonate (44.2 mg, 0.15 mmol), compound **4a** (21.2 mg, 48%) was obtained. Colorless oil (diastereomer A). Colorless oil (diastereomer B). ^{1}H NMR (400 MHz, Methylene Chloride-d_2) δ 8.53 (dd, *J* = 5.2, 0.8 Hz, 1H), 7.68 – 7.64 (m, 2H), 7.52 – 7.40 (m, 3H), 7.37 (dd, *J* = 1.8, 0.8 Hz, 1H), 7.33 (dd, *J* = 5.2, 1.9 Hz, 1H), 3.82 – 3.66 (m, 2H), 2.89 (d, *J* = 7.5 Hz, 2H), 2.42 (dddd, *J* = 15.6, 8.8, 7.6, 1.1 Hz, 1H), 1.91 – 1.71 (m, 7H), 1.61 – 1.46 (m, 3H). ^{1}H NMR (400 MHz, Methylene Chloride-d_2, diastereomer B) δ 8.52 (dd, *J* = 5.2, 0.9 Hz, 1H), 7.68 – 7.64 (m, 2H), 7.52 – 7.40 (m, 3H), 7.38 (dd, *J* = 1.9, 0.8 Hz, 1H), 7.34 (dd, *J* = 5.2, 1.8 Hz, 1H), 3.81 – 3.61 (m, 2H), 2.95 – 2.75 (m, 2H), 2.58 (ddt, *J* = 10.1, 8.6, 7.4 Hz, 1H), 1.92 – 1.78 (m, 6H), 1.76 – 1.71 (m, 2H), 1.41 – 1.28 (m, 2H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2, diastereomer A) δ 162.9, 150.2, 148.8, 139.1, 129.6, 129.4, 127.5, 121.5, 119.4, 90.9, 67.1, 45.4, 45.2, 39.5, 38.5, 37.7, 31.6, 26.3. ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 162.8, 150.1, 148.8, 139.2, 129.6, 129.4, 127.5, 121.3, 119.5, 91.1, 66.9, 45.4, 45.2, 39.7, 38.4, 37.1, 31.6, 26.5. HRMS (EI, diastereomer A) m/z calcd. For $C_{20}H_{23}NO$ $[M]^+$: 293.1780, found : 293.1779. HRMS (EI, diastereomer B) m/z calcd. For $C_{20}H_{23}NO$ $[M]^+$: 293.1780, found : 293.1781.

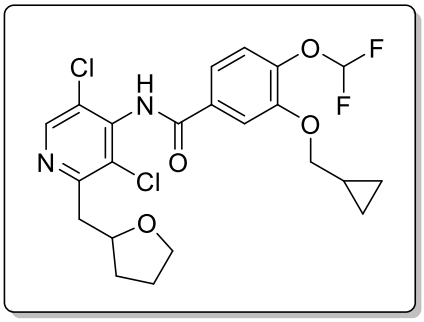


4-(2-(1-oxaspiro[4.4]nonan-7-yl)propan-2-yl)pyridine (4b). d.r. 1:1. Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:1). Prepared according to **GP2**. From 1-((8-methyl-4-methylenenon-7-en-1-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (37.0 mg, 0.15 mmol), compound **4b** (19.5 mg, 53%) was obtained. Colorless oil (diastereomer A). Colorless oil (diastereomer B). ^{1}H NMR (600 MHz, Methylene Chloride-d_2, diastereomer A) δ 8.47 (s, 2H), 7.28 (d, *J* = 5.0 Hz, 2H), 3.68 (h, *J* = 8.2 Hz, 2H), 2.17 (p, *J* = 8.8 Hz, 1H), 1.89 – 1.78 (m, 2H), 1.75 – 1.66 (m, 3H), 1.52 – 1.38 (m, 5H), 1.28 (s, 3H), 1.27 (s, 3H). ^{1}H NMR (600 MHz, Methylene Chloride-d_2, diastereomer B)

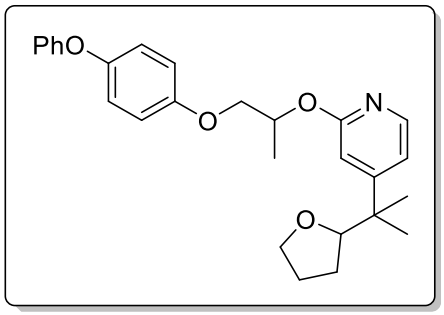
δ 8.46 (d, *J* = 5.1 Hz, 2H), 7.25 (d, *J* = 5.2 Hz, 2H), 3.68 (dq, *J* = 26.4, 7.6 Hz, 2H), 2.49 – 2.38 (m, 1H), 1.82 (p, *J* = 7.1 Hz, 2H), 1.74 – 1.64 (m, 3H), 1.61 – 1.52 (m, 3H), 1.34 – 1.24 (m, 8H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2, diastereomer A) δ 160.1, 149.4, 122.3, 90.2, 67.0, 49.9, 40.6, 40.0, 38.5, 37.6, 26.6, 26.3, 25.2, 24.8. ^{13}C NMR (150 MHz, Methylene Chloride-d_2, diastereomer B) δ 159.2, 150.0, 122.2, 90.8, 67.0, 49.8, 40.3, 39.7, 38.3, 36.5, 26.4, 25.2, 25.2. HRMS (EI, diastereomer A) m/z calcd. For $C_{16}H_{23}NO$ $[M]^+$: 245.1780, found : 245.1779. HRMS (EI, diastereomer B) m/z calcd. For $C_{16}H_{23}NO$ $[M]^+$: 245.1780, found : 245.1784.



2-(2-(1-oxaspiro[4.4]nonan-7-yl)propan-2-yl)-6-phenylpyridine (4c). d.r. 1:1. Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:7). Prepared according to **GP2**. From 1-((8-methyl-4-methylenenon-7-en-1-yl)oxy)-2-phenylpyridin-1-ium 4-methylbenzenesulfonate (48.4 mg, 0.15 mmol), compound **4c** (28.8 mg, 60%) was obtained. Colorless oil (diastereomer A). Colorless oil (diastereomer B). ^{1}H NMR (600 MHz, Methylene Chloride-d_2, diastereomer A) δ 8.55 (dd, *J* = 5.1, 2.3 Hz, 1H), 8.01 (d, *J* = 7.5 Hz, 2H), 7.71 (s, 1H), 7.50 – 7.45 (m, 2H), 7.41 (t, *J* = 7.5 Hz, 1H), 7.25 – 7.20 (m, 1H), 3.74 – 3.65 (m, 2H), 2.24 (p, *J* = 9.0 Hz, 1H), 1.84 (h, *J* = 6.3 Hz, 2H), 1.77 – 1.68 (m, 3H), 1.54 – 1.45 (m, 5H), 1.35 – 1.32 (m, 6H). ^{1}H NMR (600 MHz, Methylene Chloride-d_2, diastereomer B) δ 8.55 (dd, *J* = 5.4, 2.4 Hz, 1H), 8.00 (d, *J* = 7.6 Hz, 2H), 7.72 (s, 1H), 7.47 (t, *J* = 7.7 Hz, 2H), 7.41 (t, *J* = 7.4 Hz, 1H), 7.25 – 7.20 (m, 1H), 3.69 (dq, *J* = 23.7, 7.2 Hz, 2H), 2.51 (p, *J* = 8.8 Hz, 1H), 1.82 (p, *J* = 7.3 Hz, 2H), 1.76 – 1.66 (m, 3H), 1.65 – 1.53 (m, 3H), 1.37 – 1.24 (m, 8H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2, diastereomer A) δ 160.2, 157.5, 149.9, 140.6, 129.2, 127.5, 120.8, 118.8, 90.2, 67.0, 50.0, 40.6, 40.1, 38.5, 37.7, 26.6, 26.3, 25.3, 24.9. ^{13}C NMR (150 MHz, Methylene Chloride-d_2, diastereomer B) δ 160.1, 157.5, 149.8, 140.6, 129.2, 129.1, 127.5, 120.9, 118.9, 90.8, 67.0, 49.8, 40.4, 40.0, 38.3, 36.6, 26.5, 26.4, 25.3, 25.3. HRMS (EI, diastereomer A) m/z calcd. For $C_{22}H_{27}NO$ $[M]^+$: 321.2093, found : 321.2092. HRMS (EI, diastereomer B) m/z calcd. For $C_{22}H_{27}NO$ $[M]^+$: 321.2093, found : 321.2095.

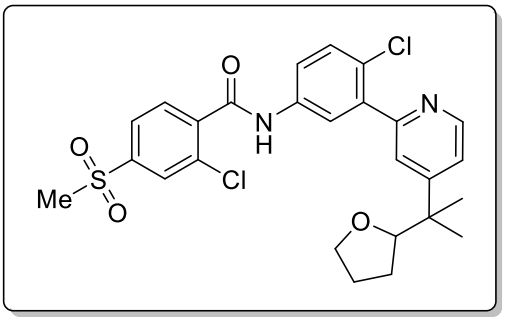


3-(cyclopropylmethoxy)-*N*-(3,5-dichloro-2-((tetrahydrofuran-2-yl)methyl)pyridin-4-yl)-4-(difluoromethoxy)benzamide (4d). Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:3). Prepared according to **GP2**. From 3,5-dichloro-4-(3-(cyclopropylmethoxy)-4-(difluoromethoxy)benzamido)-1-(pent-4-en-1-yloxy)pyridin-1-ium 4-methylbenzenesulfonate (98.9 mg, 0.15 mmol), compound **4d** (59.2 mg, 81%) was obtained. Pale yellow oil. ^{1}H NMR (600 MHz, Methylene Chloride-d_2) δ 8.47 (s, 1H), 8.13 (s, 1H), 7.56 (d, J = 2.9 Hz, 1H), 7.49 (dd, J = 8.0, 2.8 Hz, 1H), 7.25 (d, J = 8.2 Hz, 1H), 6.76 (t, J = 75.1 Hz, 1H), 4.40 (p, J = 7.0 Hz, 1H), 3.96 (d, J = 6.9 Hz, 2H), 3.80 (q, J = 7.5 Hz, 1H), 3.61 (q, J = 7.5 Hz, 1H), 3.22 (dd, J = 14.4, 7.9 Hz, 1H), 3.03 (dd, J = 14.3, 5.2 Hz, 1H), 2.08 – 1.98 (m, 1H), 1.95 – 1.89 (m, 1H), 1.85 (dt, J = 12.8, 7.3 Hz, 1H), 1.66 (dq, J = 15.5, 8.4, 7.9 Hz, 1H), 1.32 (dq, J = 12.6, 5.9 Hz, 1H), 0.67 (d, J = 7.7 Hz, 2H), 0.37 (d, J = 5.0 Hz, 2H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 164.62, 157.10, 151.26, 147.51, 144.18, 140.48, 131.95, 129.31, 127.80, 122.40, 120.79, 116.60 (t, J = 260.0 Hz), 114.61, 77.92, 74.78, 68.29, 41.93, 31.87, 26.12, 10.50, 3.56. ^{19}F NMR (564 MHz, Methylene Chloride-d_2) δ -82.31 (d, J = 75.1 Hz). HRMS (EI) m/z calcd. For $C_{22}H_{22}Cl_2F_2N_2O_4$ $[M]^+$: 486.0925, found : 486.0922.



2-((1-(4-phenoxyphenoxy)propan-2-yl)oxy)-4-(2-(tetrahydrofuran-2-yl)propan-2-yl)pyridine (4e). d.r. 1:1. Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 1:7). Prepared according to **GP2**. From 1-((5-methylhex-4-en-1-yl)oxy)-2-((1-(4-phenoxyphenoxy)propan-2-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (90.9 mg, 0.15 mmol), compound **4e** (28.6 mg, 44%) was obtained. Colorless oil. ^{1}H NMR (600 MHz, Methylene Chloride-d_2) δ 8.03 (d, J = 5.5 Hz, 1H), 7.30 (t, J = 7.7 Hz, 2H), 7.05 (t, J = 7.4 Hz, 1H), 6.98 – 6.92 (m, 7H), 6.75 (s, 1H), 5.56 (h, J = 6.1 Hz, 1H), 4.17 (dd,

J = 10.0, 5.4 Hz, 1H), 4.08 (dd, *J* = 10.0, 4.6 Hz, 1H), 3.90 (t, *J* = 7.3 Hz, 1H), 3.75 – 3.61 (m, 2H), 1.82 – 1.65 (m, 3H), 1.49 – 1.39 (m, 4H), 1.27 (d, *J* = 3.1 Hz, 6H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 164.01, 160.51, 159.10, 155.87, 150.87, 146.52, 130.18, 123.02, 121.28, 118.15, 116.63, 116.24, 110.12, 86.78, 71.73, 69.76, 69.03, 41.84, 27.65, 26.67, 24.55, 24.33, 17.32. HRMS (ESI) m/z calcd. For $C_{20}H_{25}NO$ $[M+H]^+$: 434.2326, found : 434.2327.



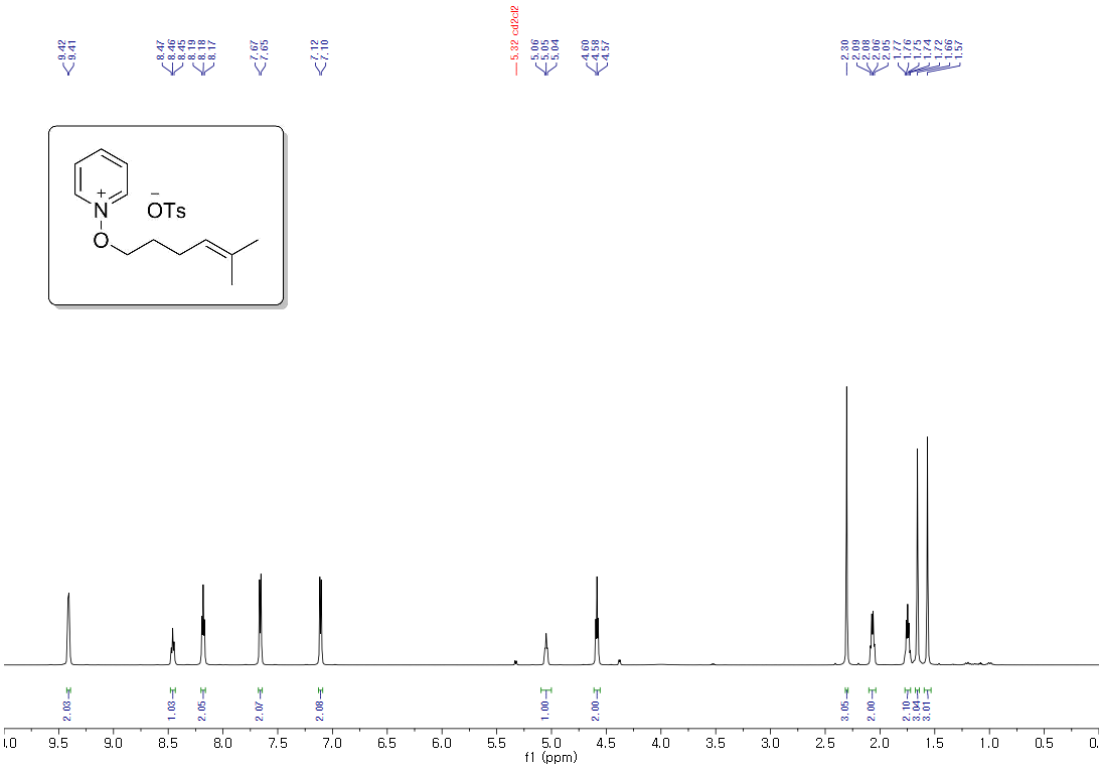
2-chloro-*N*-(4-chloro-3-(4-(2-(tetrahydrofuran-2-yl)propan-2-yl)pyridin-2-yl)phenyl)-4-(methylsulfonyl)benzamide (4f). Purified by flash chromatography on silica gel (EtOAc/*n*-hexane = 2:1). Prepared according to **GP2**. From 2-(2-chloro-5-(2-chloro-4-(methylsulfonyl)benzamido)phenyl)-1-((5-methylhex-4-en-1-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (105.8 mg, 0.15 mmol), compound **4f** (52.8 mg, 66%) was obtained. White Solid. ^{1}H NMR (600 MHz, Methylene Chloride-d_2) δ 10.55 (s, 1H), 8.16 (d, *J* = 5.4 Hz, 1H), 8.10 (dd, *J* = 8.8, 2.6 Hz, 1H), 7.83 (d, *J* = 1.7 Hz, 1H), 7.68 – 7.63 (m, 3H), 7.48 (d, *J* = 8.7 Hz, 1H), 7.46 (d, *J* = 8.0 Hz, 1H), 7.20 (dd, *J* = 5.4, 1.8 Hz, 1H), 3.85 (dd, *J* = 8.4, 6.2 Hz, 1H), 3.72 – 3.56 (m, 2H), 2.94 (s, 3H), 1.83 – 1.70 (m, 2H), 1.68 – 1.60 (m, 1H), 1.45 – 1.35 (m, 1H), 1.29 (s, 3H), 1.28 (s, 3H). ^{13}C NMR (150 MHz, Methylene Chloride-d_2) δ 164.6, 157.9, 155.7, 148.5, 143.1, 141.5, 139.6, 138.1, 132.6, 131.2, 130.2, 129.3, 127.5, 126.3, 124.9, 123.2, 122.0, 121.8, 86.6, 69.0, 44.8, 42.0, 27.7, 26.6, 25.0, 23.7. HRMS (EI) m/z calcd. For $C_{26}H_{26}Cl_2N_2O_4S$ $[M]^+$: 532.0990, found : 532.0986.

Appendix I

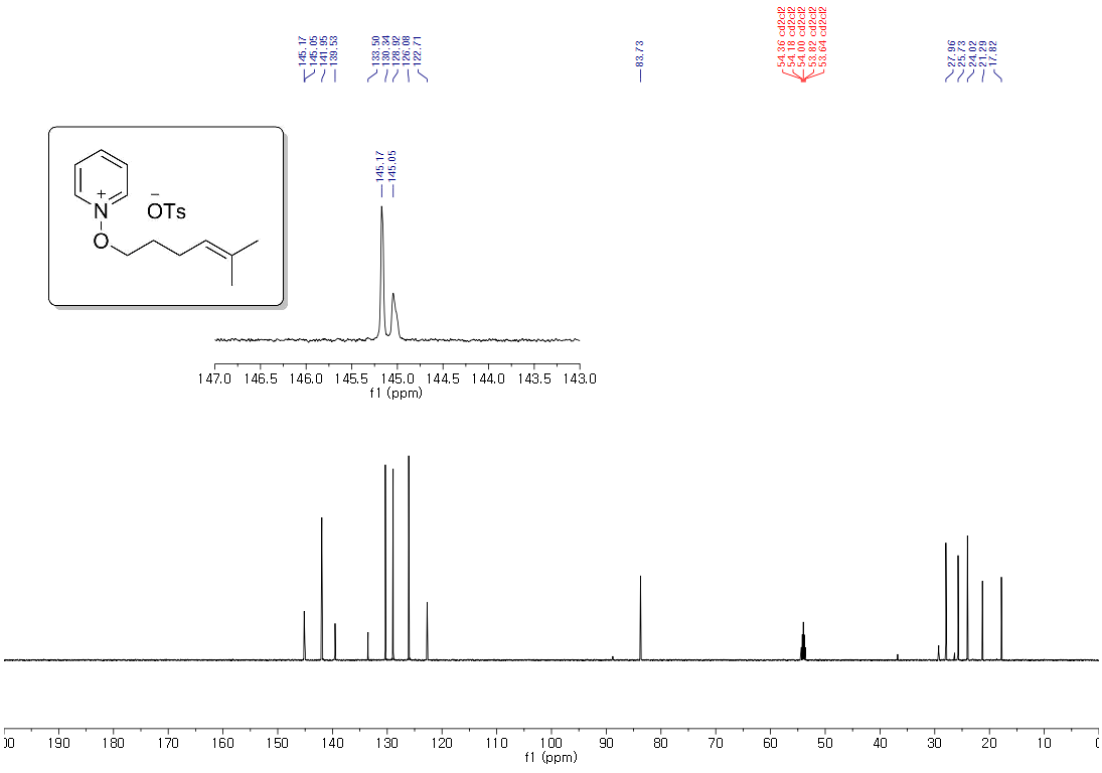
Spectral Copies of ^{1}H, ^{13}C and ^{19}F NMR Data Obtained in this Study

1-((5-methylhex-4-en-1-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (1a).

600 MHz, ^{1}H NMR in Methylene Chloride-d_2

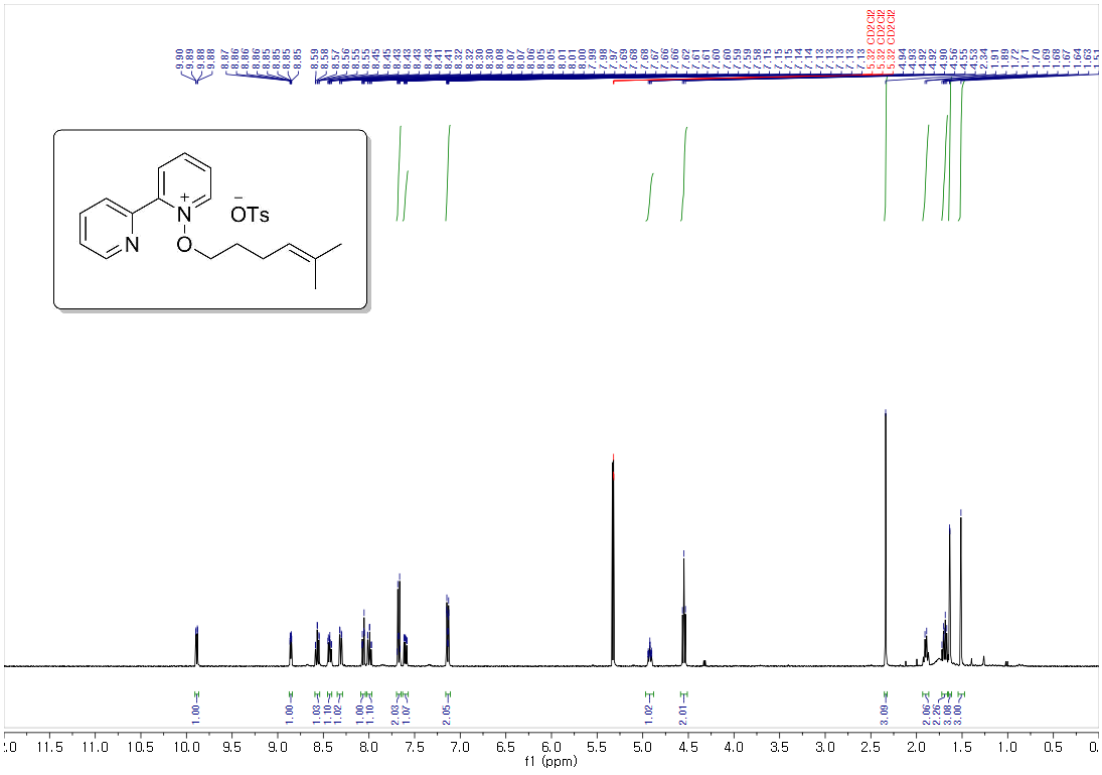


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

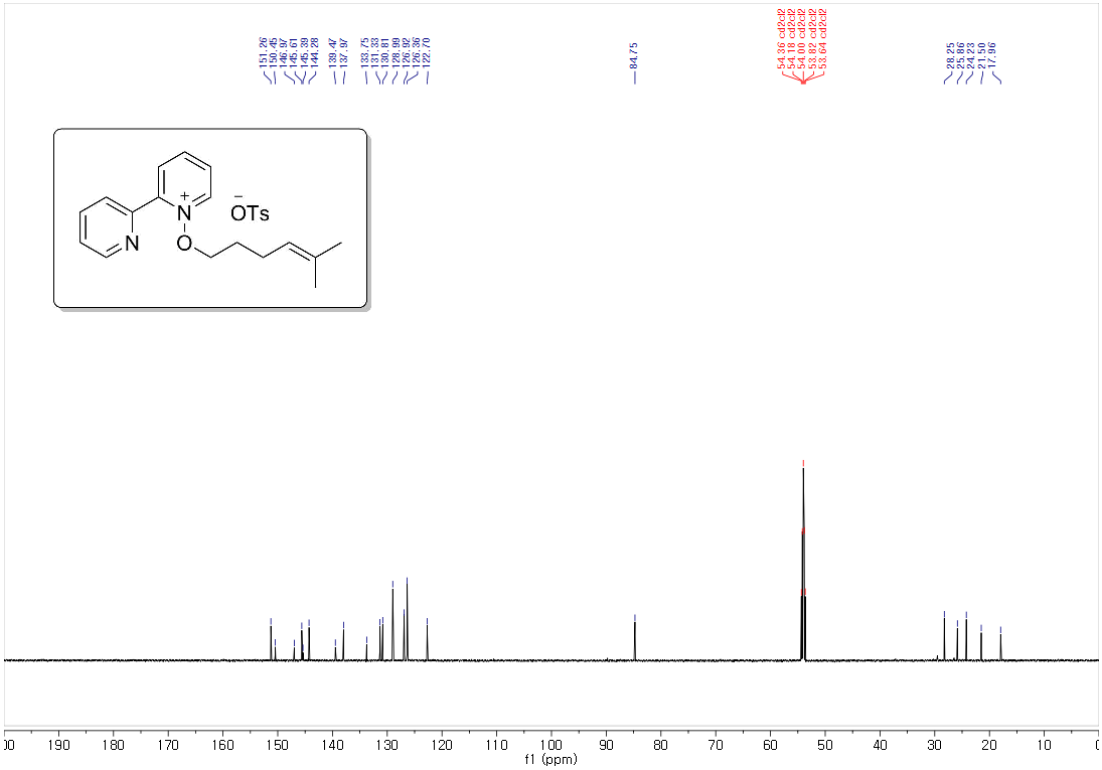


1-((5-methylhex-4-en-1-yl)oxy)-[2,2'-bipyridin]-1-ium 4-methylbenzenesulfonate (1h).

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

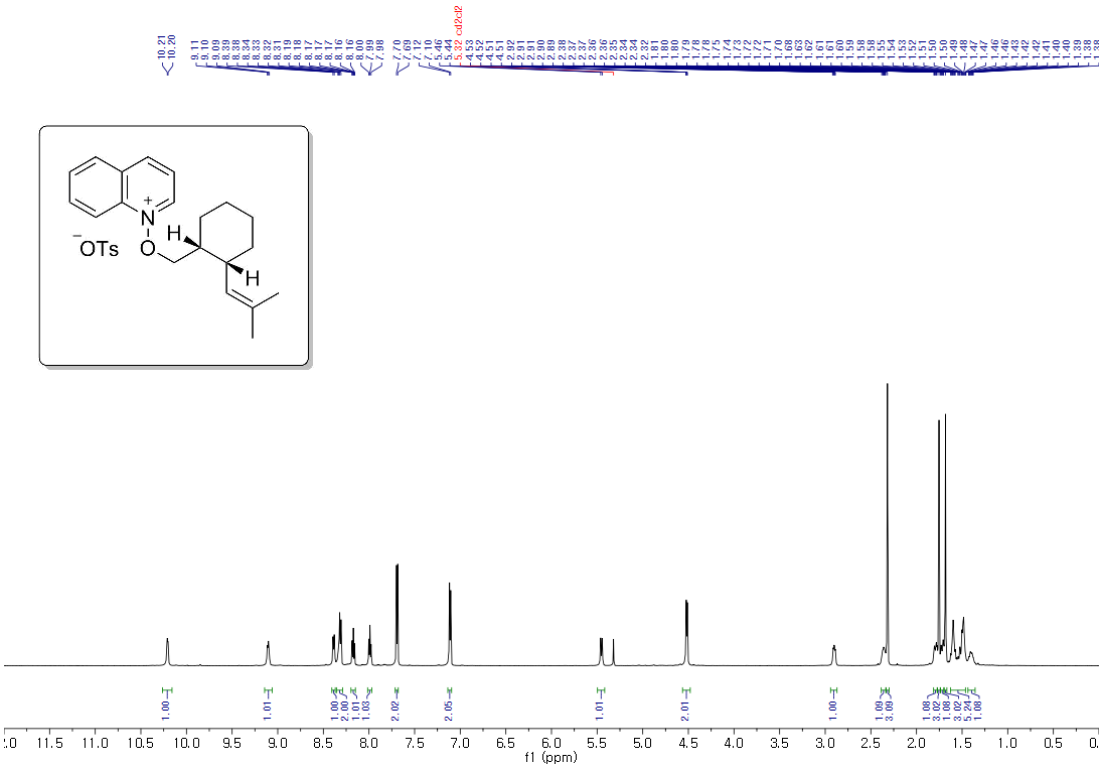


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

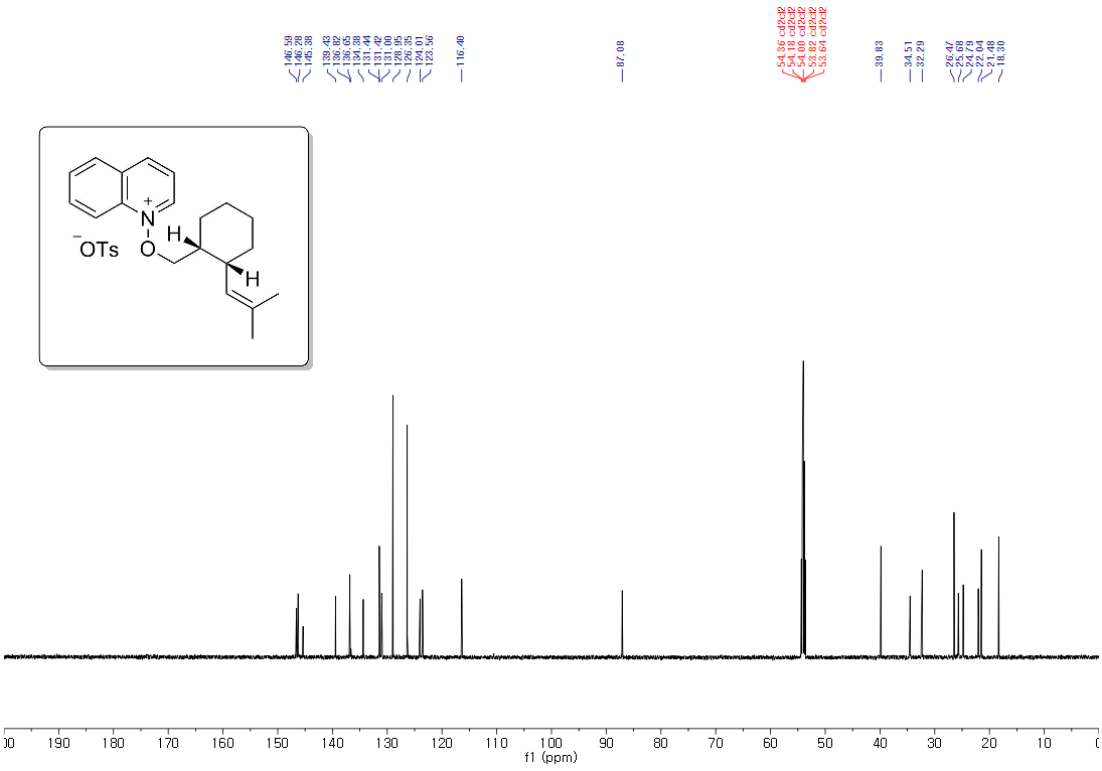


1-(((1*R*,2*R*)-2-(2-methylprop-1-en-1-yl)cyclohexyl)methoxy)quinolin-1-ium 4-methylbenzenesulfonate (1o).

600 MHz, ^{1}H NMR in Methylene Chloride-d_2

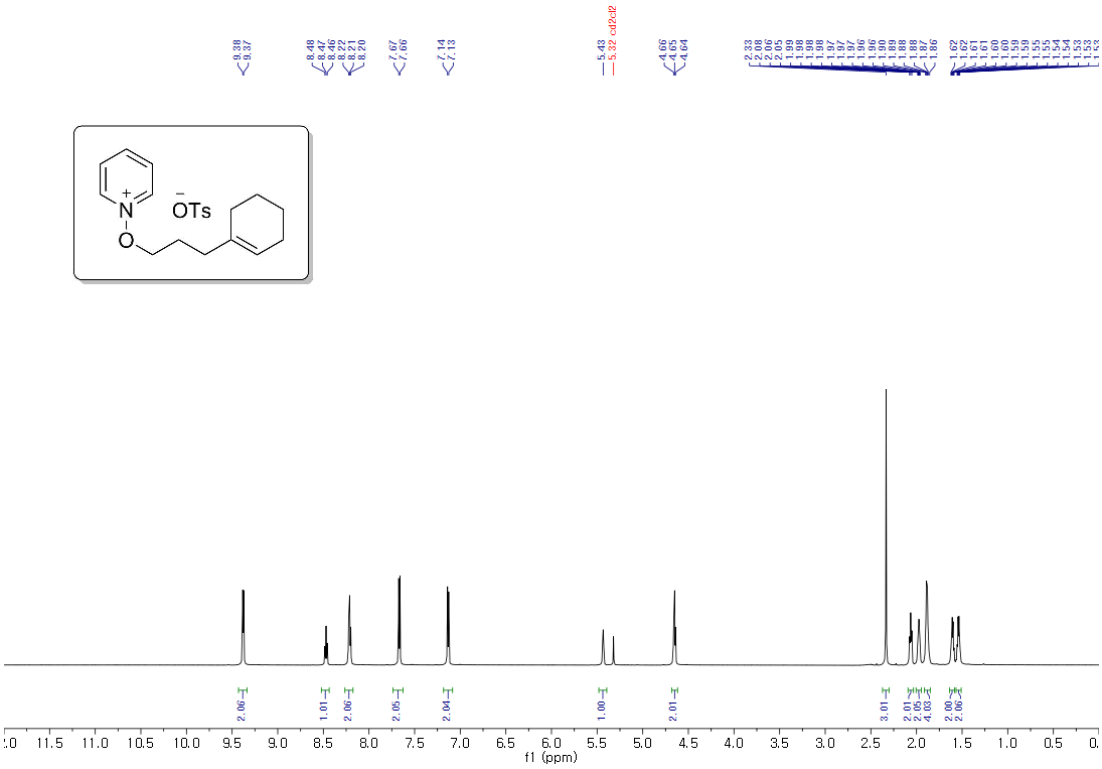


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

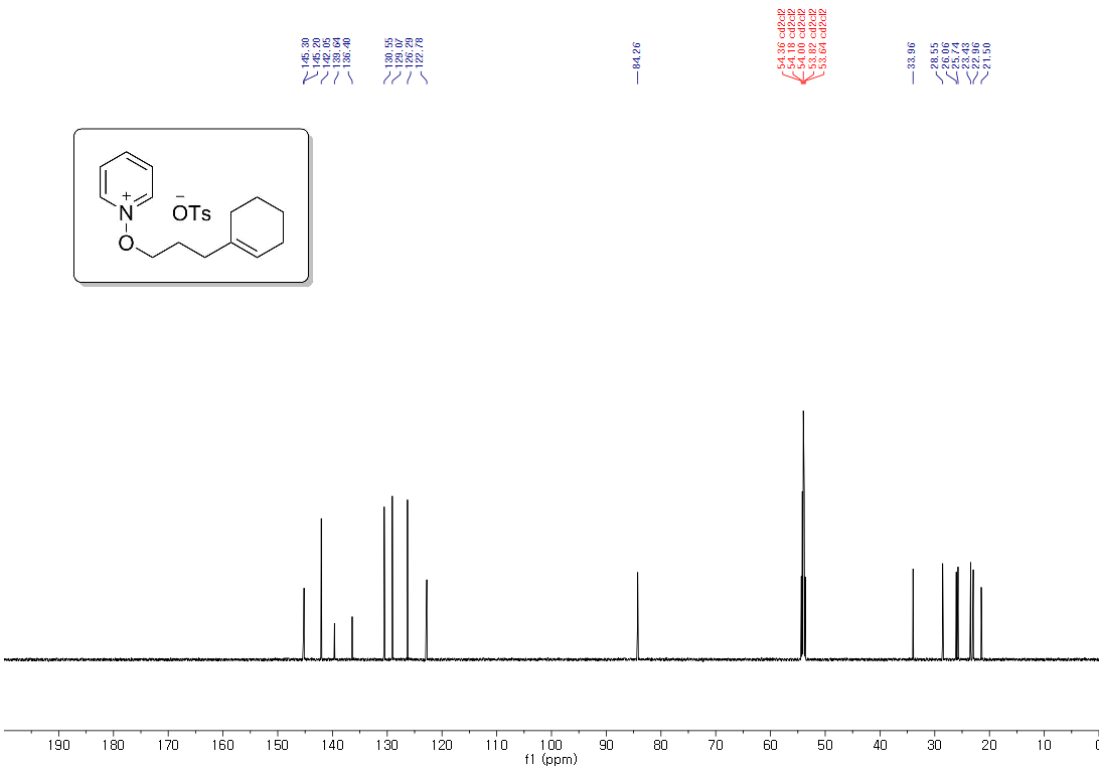


1-(3-(cyclohex-1-en-1-yl)propoxy)pyridin-1-ium 4-methylbenzenesulfonate (1u).

600 MHz, ^{1}H NMR in Methylene Chloride-d_2

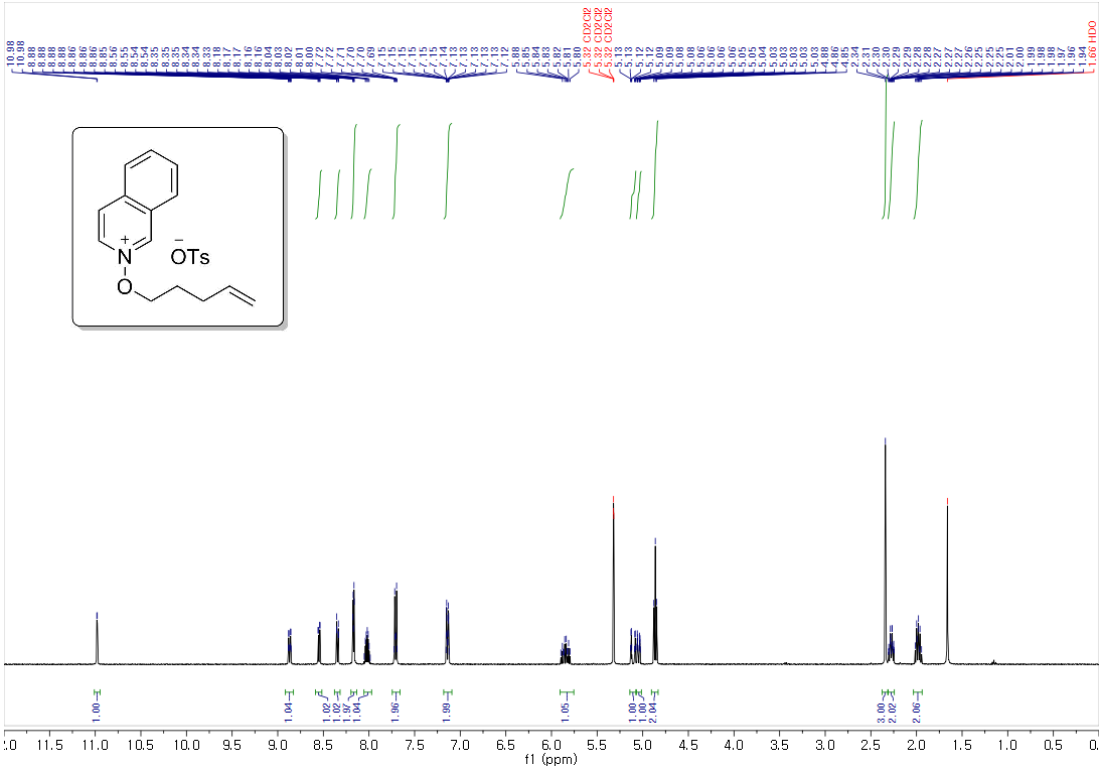


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

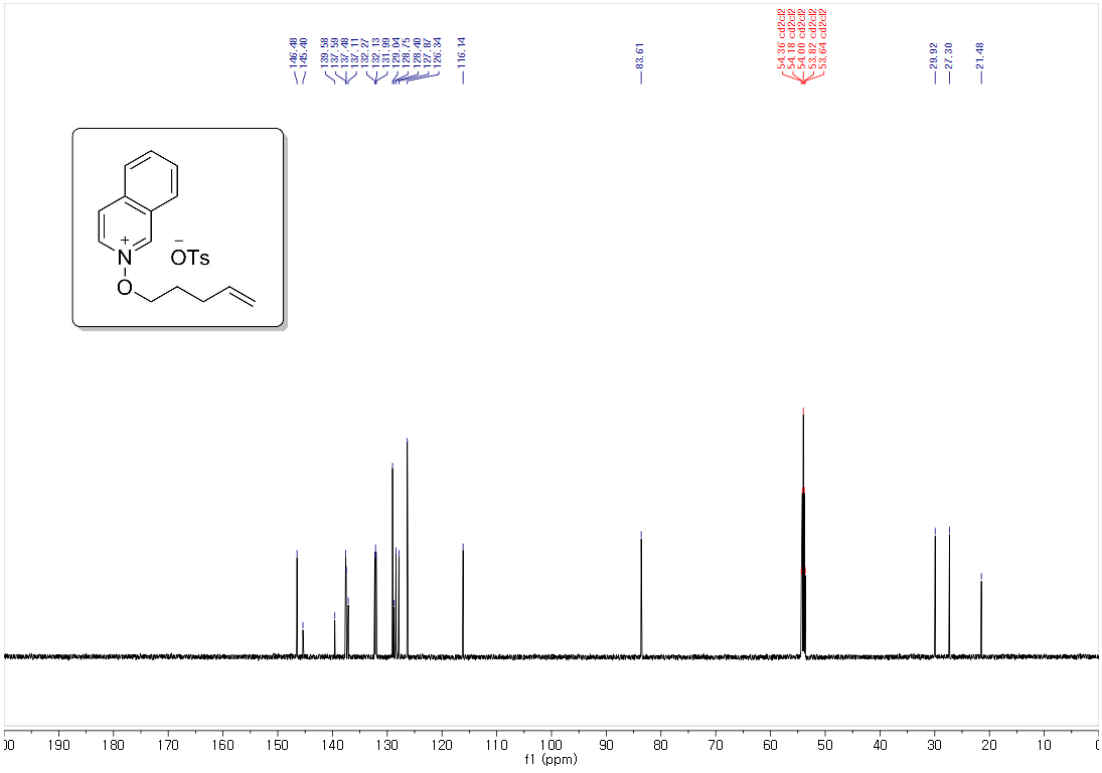


2-(pent-4-en-1-yloxy)isoquinolin-2-ium 4-methylbenzenesulfonate (1aa).

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

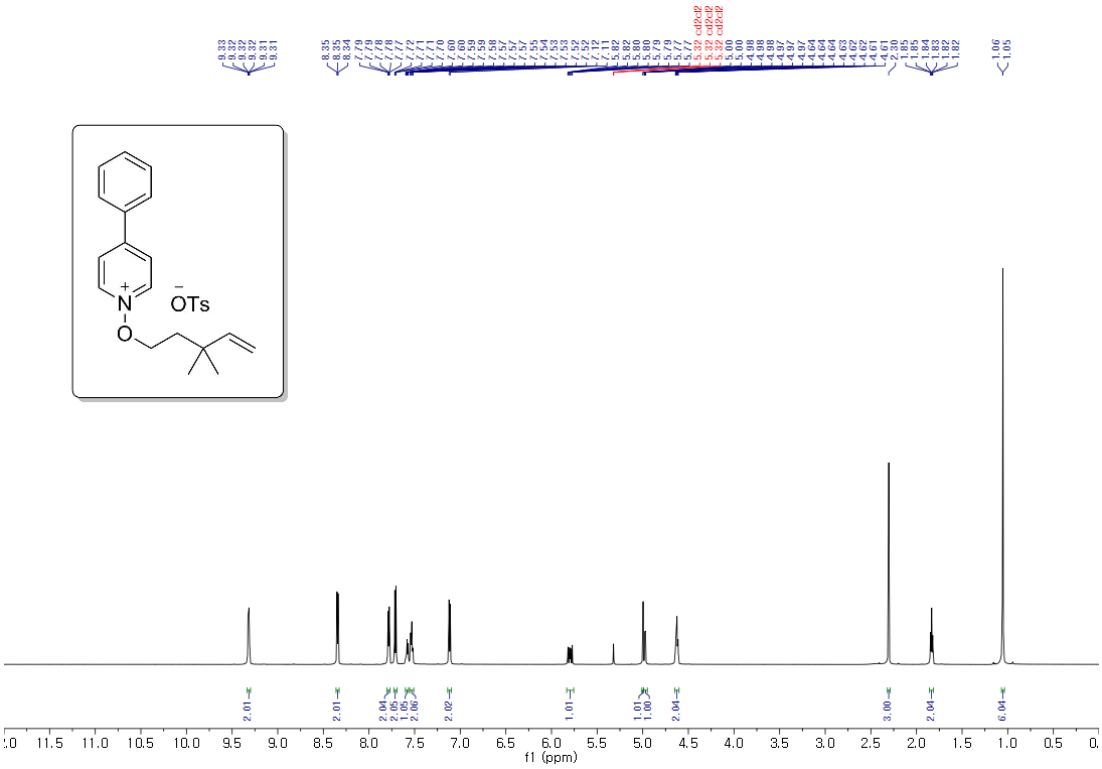


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

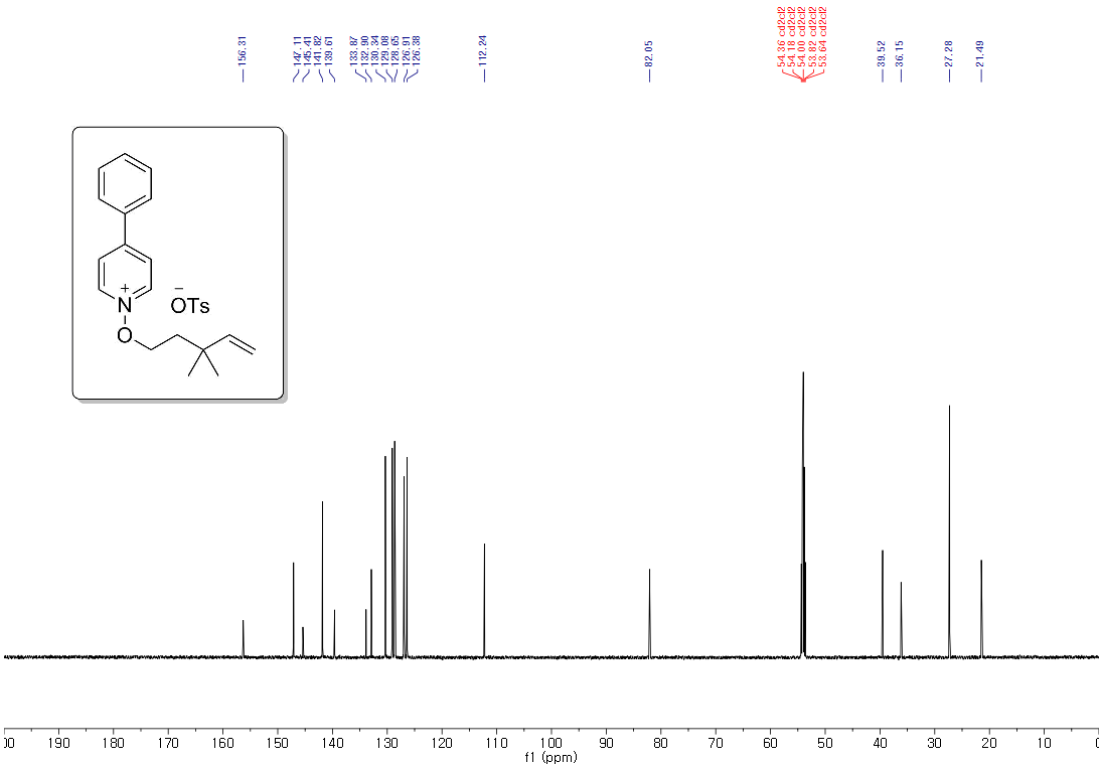


1-((3,3-dimethylpent-4-en-1-yl)oxy)-4-phenylpyridin-1-ium 4-methylbenzenesulfonate (1ac).

600 MHz, ^{1}H NMR in Methylene Chloride-d_2

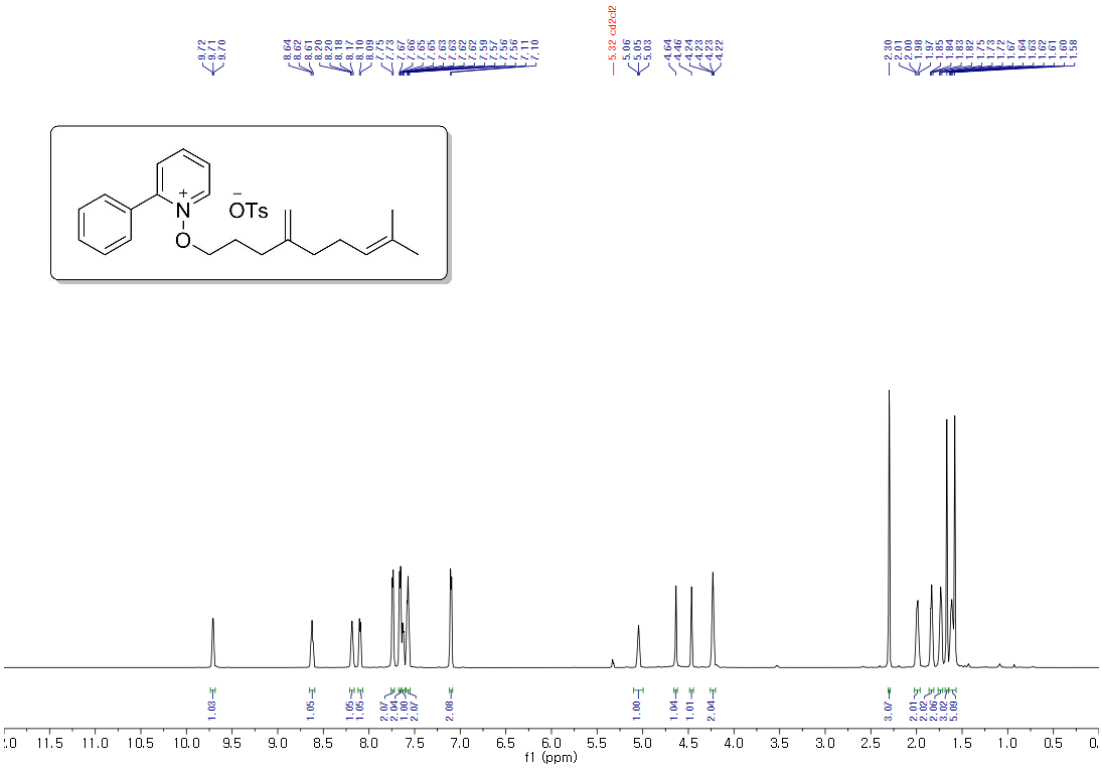


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

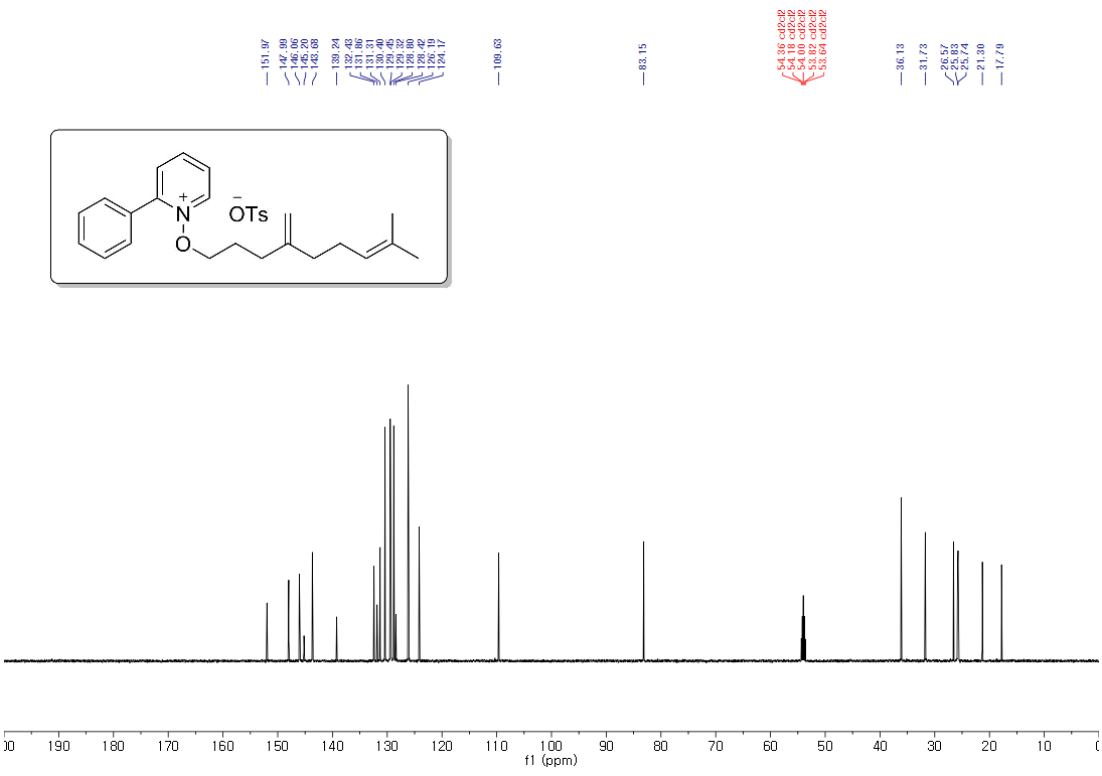


1-((8-methyl-4-methylenenon-7-en-1-yl)oxy)-2-phenylpyridin-1-ium 4-methylbenzenesulfonate (3c).

600 MHz, ^{1}H NMR in Methylene Chloride-d_2

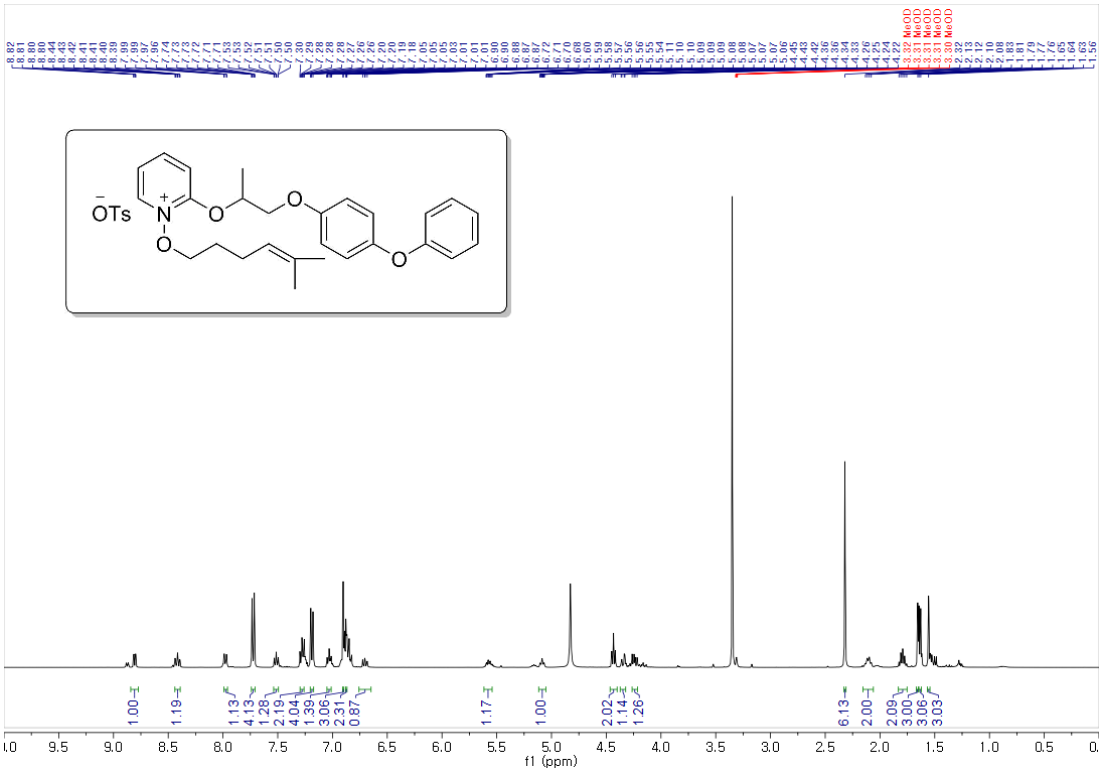


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

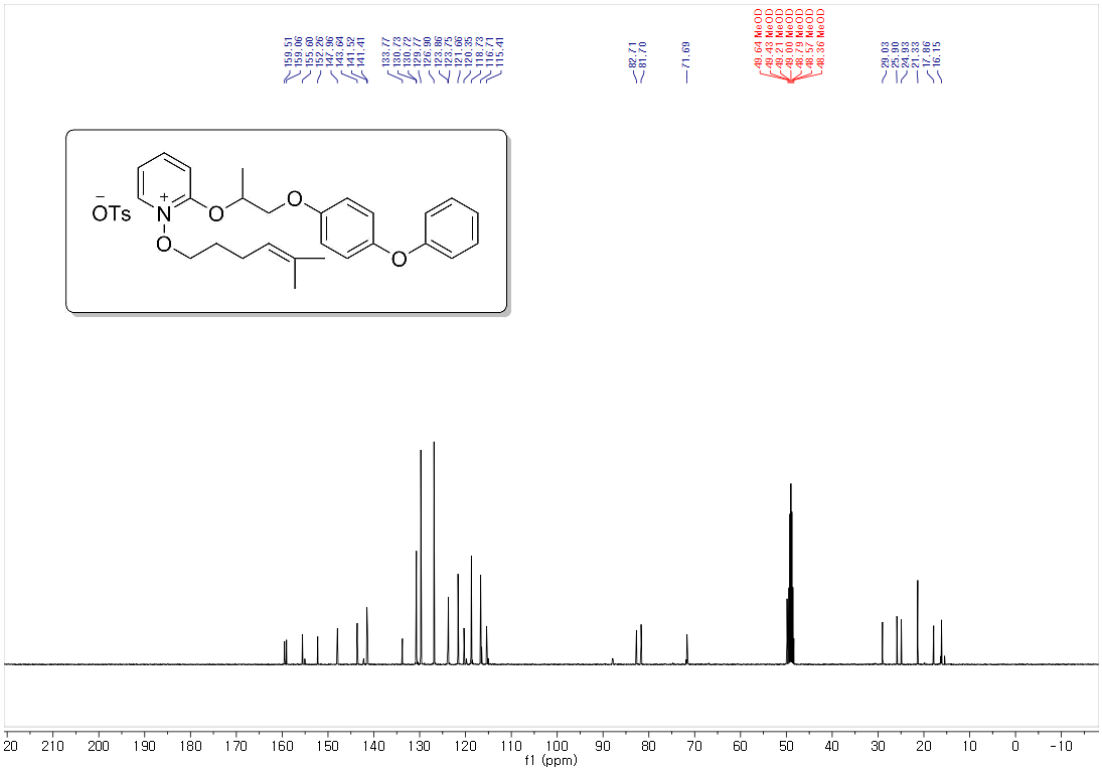


1-((5-methylhex-4-en-1-yl)oxy)-2-((1-phenoxypropan-2-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (3e).

400 MHz, ^{1}H NMR in Methanol-*d*$_4$

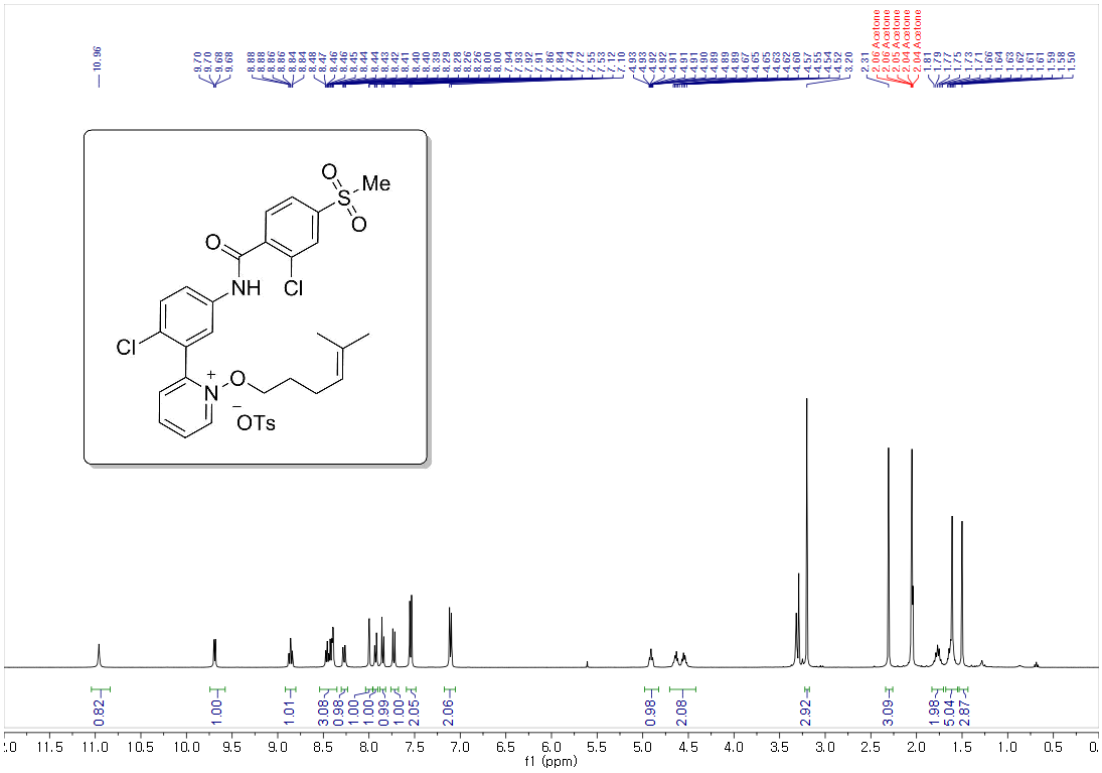


100 MHz, ^{13}C NMR in Methanol-*d*$_4$

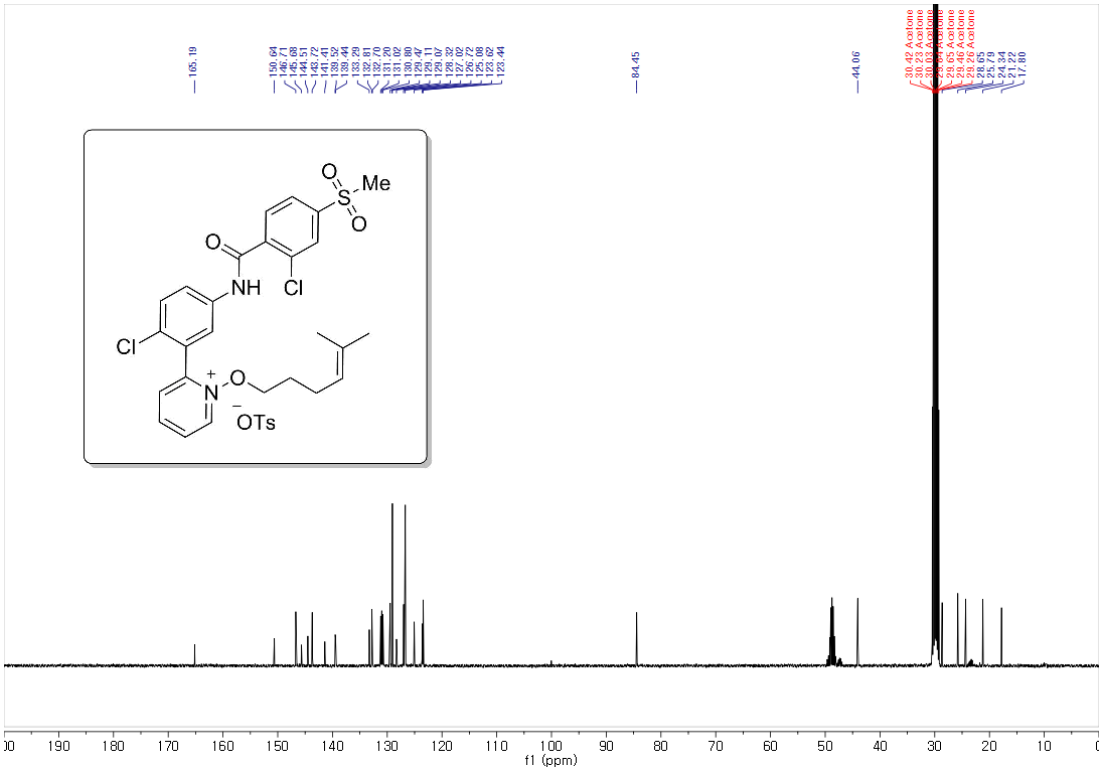


2-(2-chloro-5-(2-chloro-4-(methylsulfonyl)benzamido)phenyl)-1-((5-methylhex-4-en-1-yl)oxy)pyridin-1-ium 4-methylbenzenesulfonate (3f).

400 MHz, ^{1}H NMR in Acetone-d_6

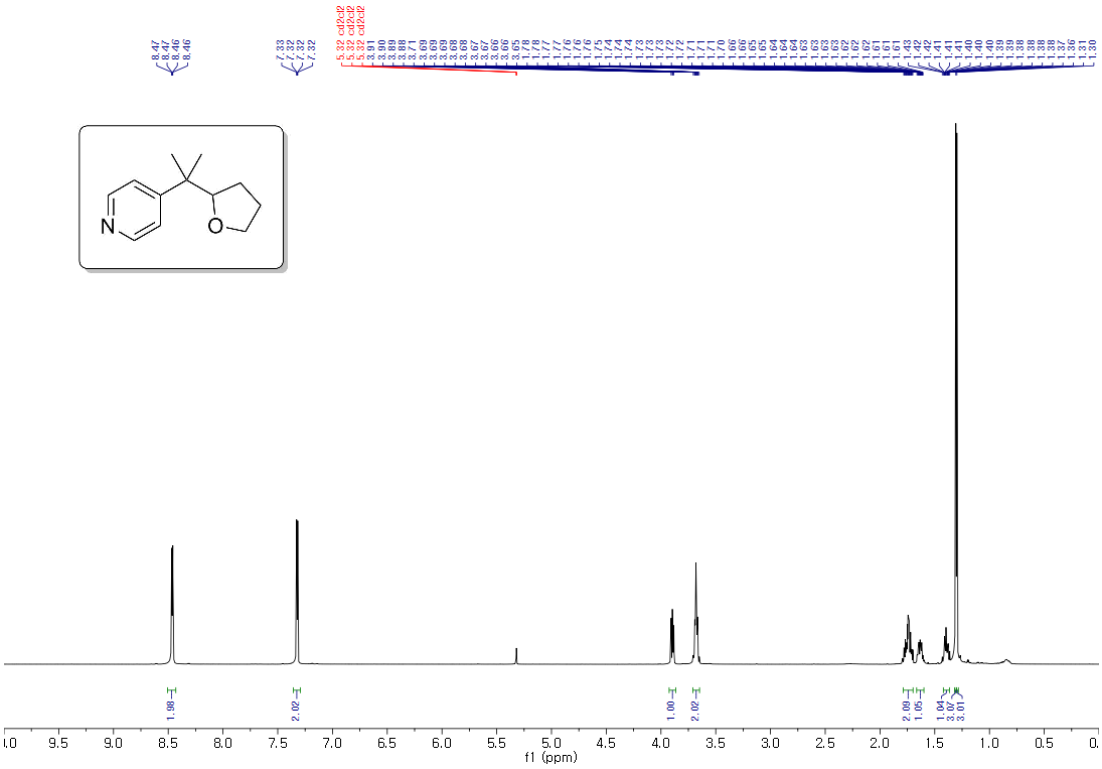


100 MHz, ^{13}C NMR in Acetone-d_6

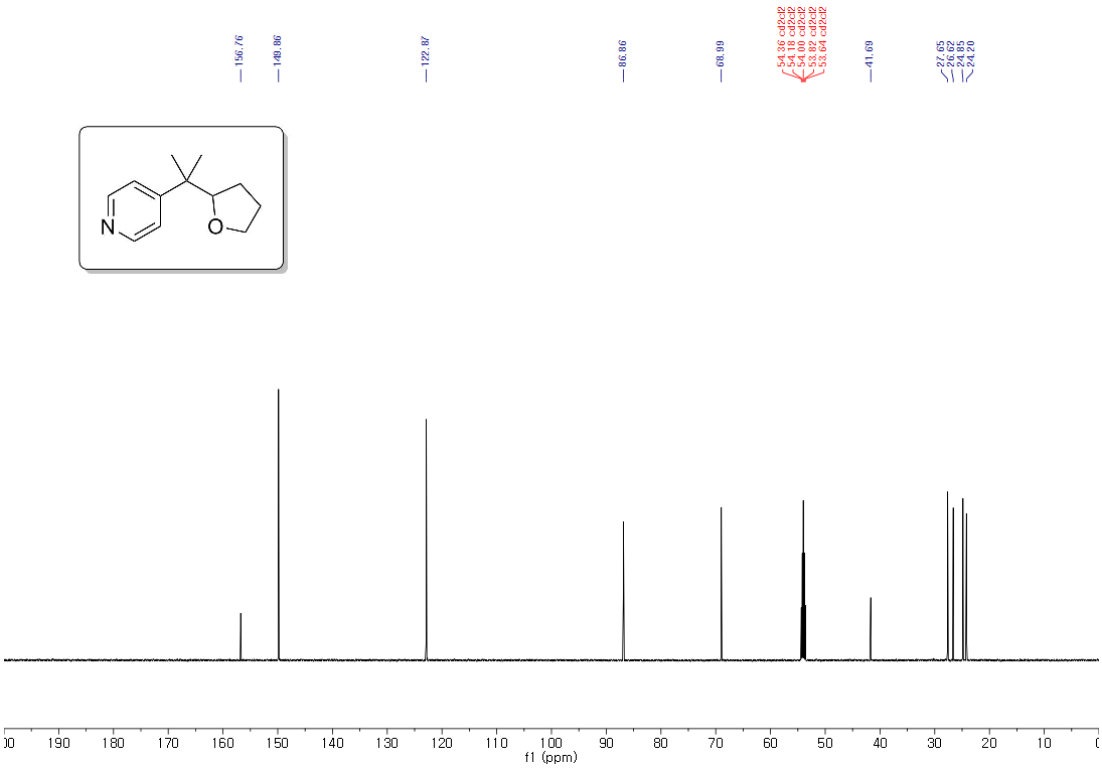


4-(2-(tetrahydrofuran-2-yl)propan-2-yl)pyridine (2a).

600 MHz, ^{1}H NMR in Methylene Chloride-d_2

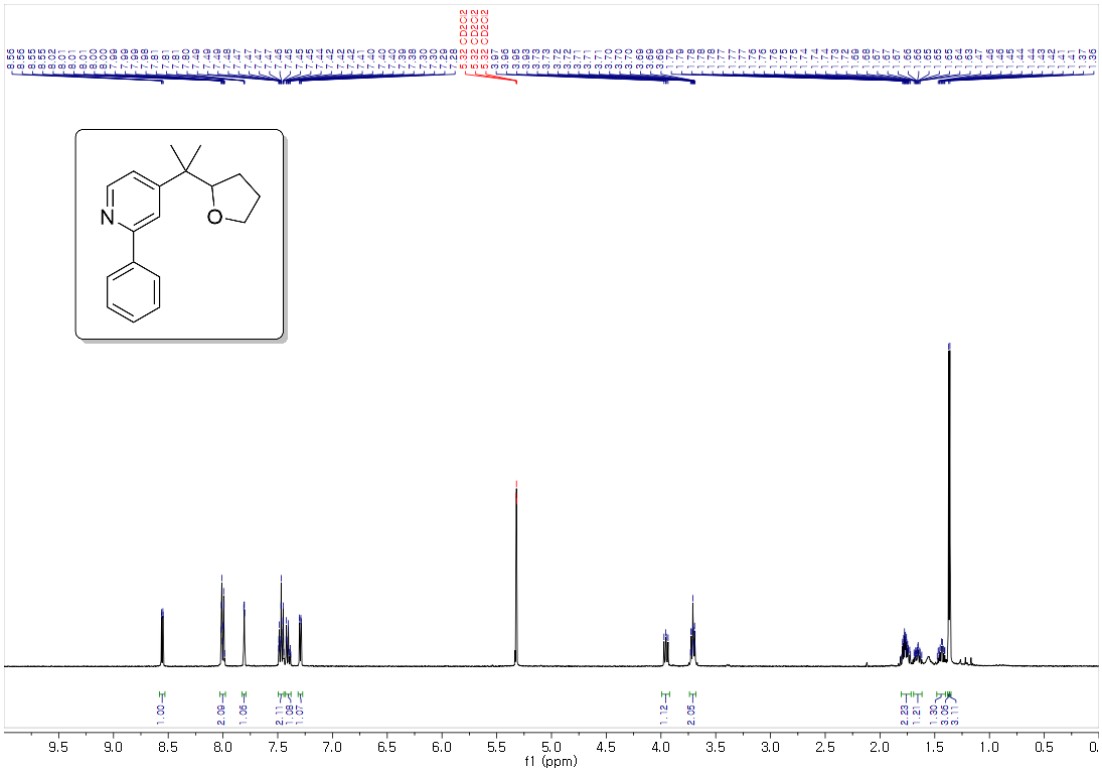


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

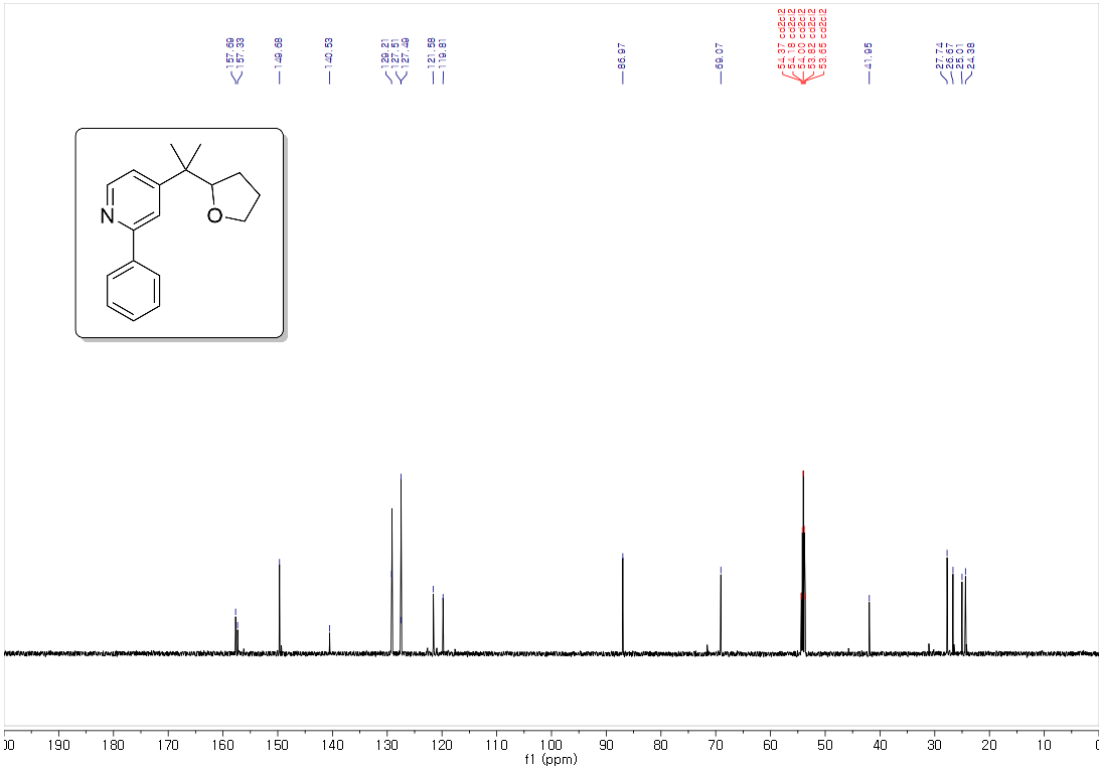


2-phenyl-4-(2-(tetrahydrofuran-2-yl)propan-2-yl)pyridine (2b).

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

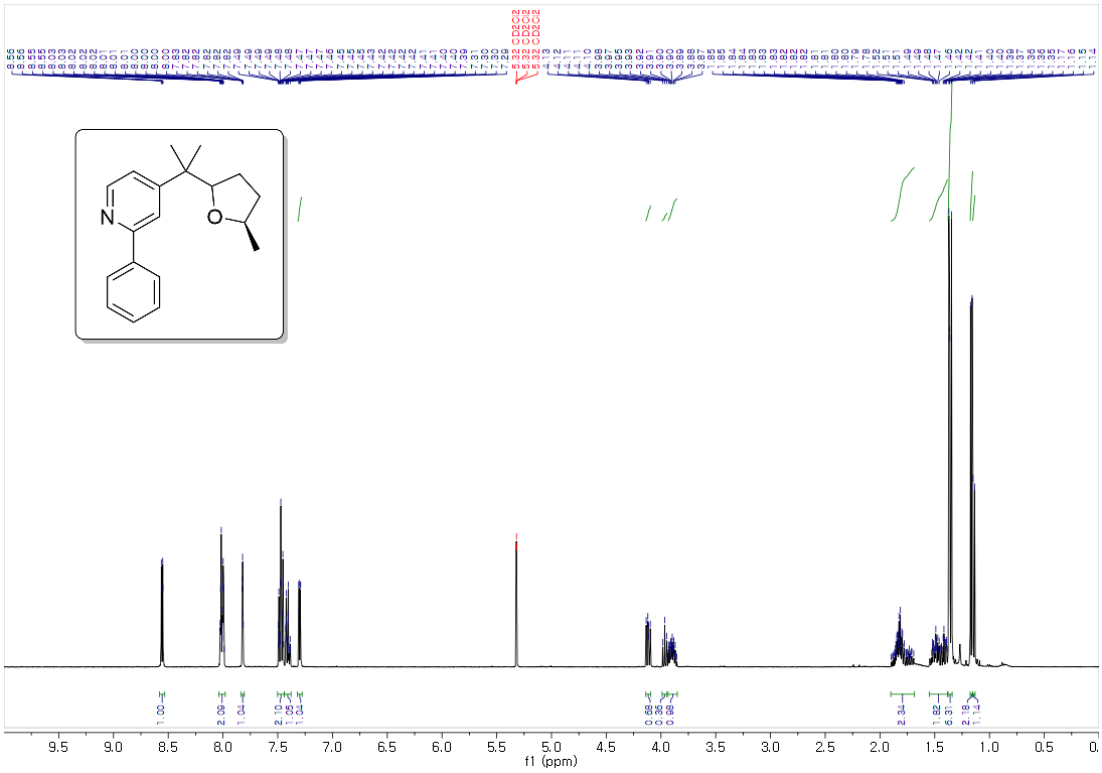


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

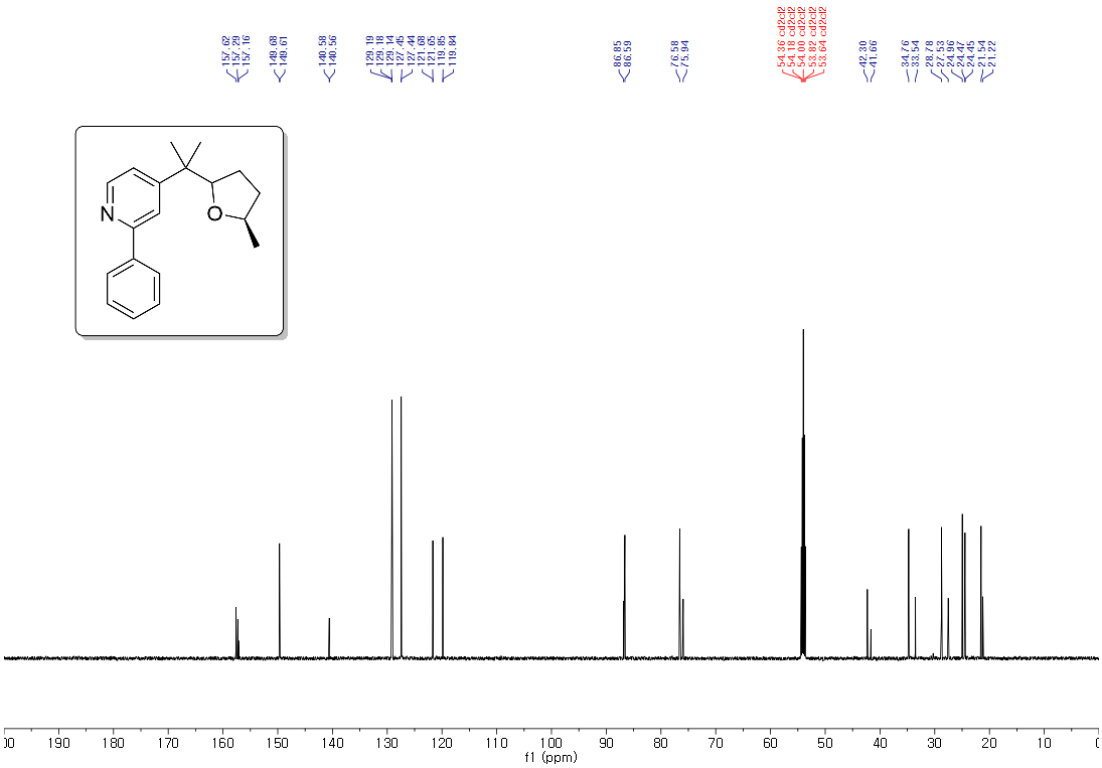


4-(2-((5*R*)-5-methyltetrahydrofuran-2-yl)propan-2-yl)-2-phenylpyridine (2c). d.r. 2.0:1.

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

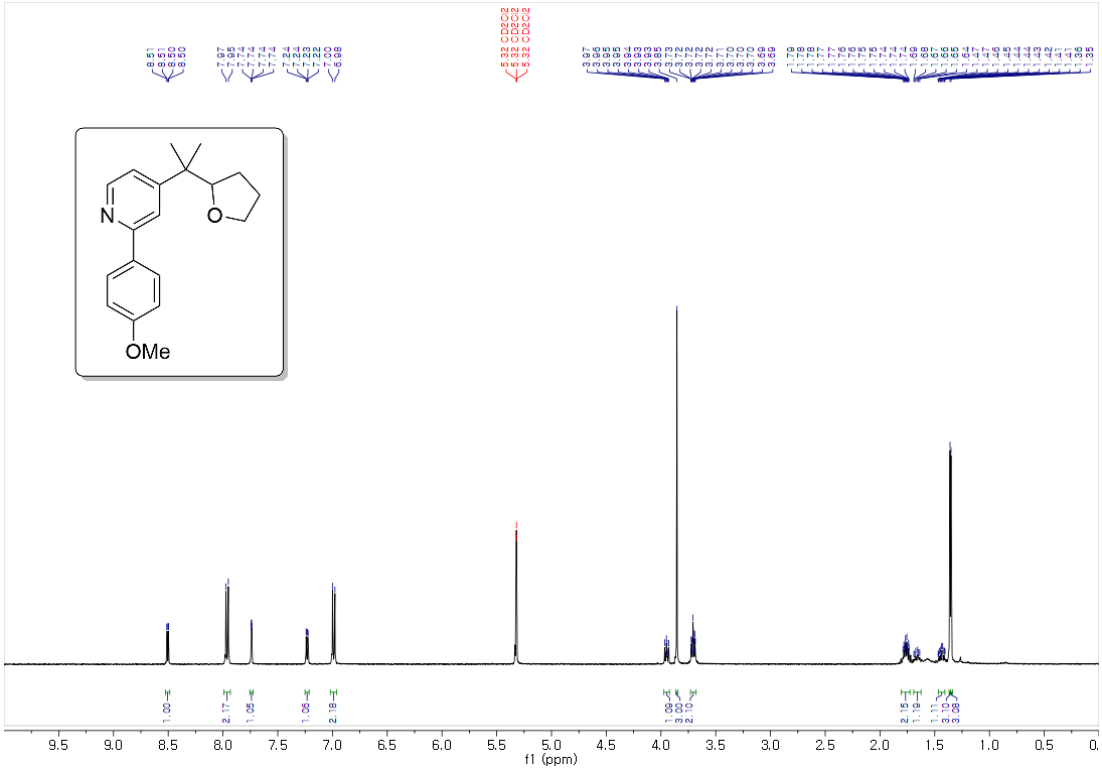


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

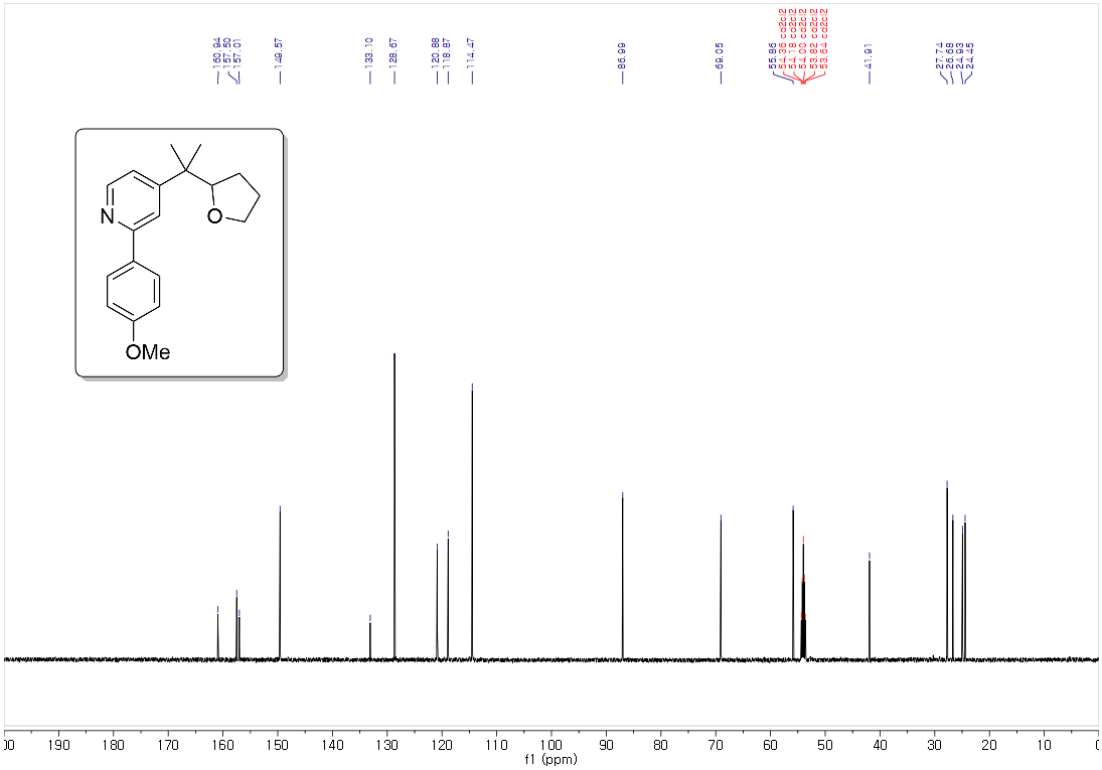


2-(4-methoxyphenyl)-4-(2-(tetrahydrofuran-2-yl)propan-2-yl)pyridine (2d).

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

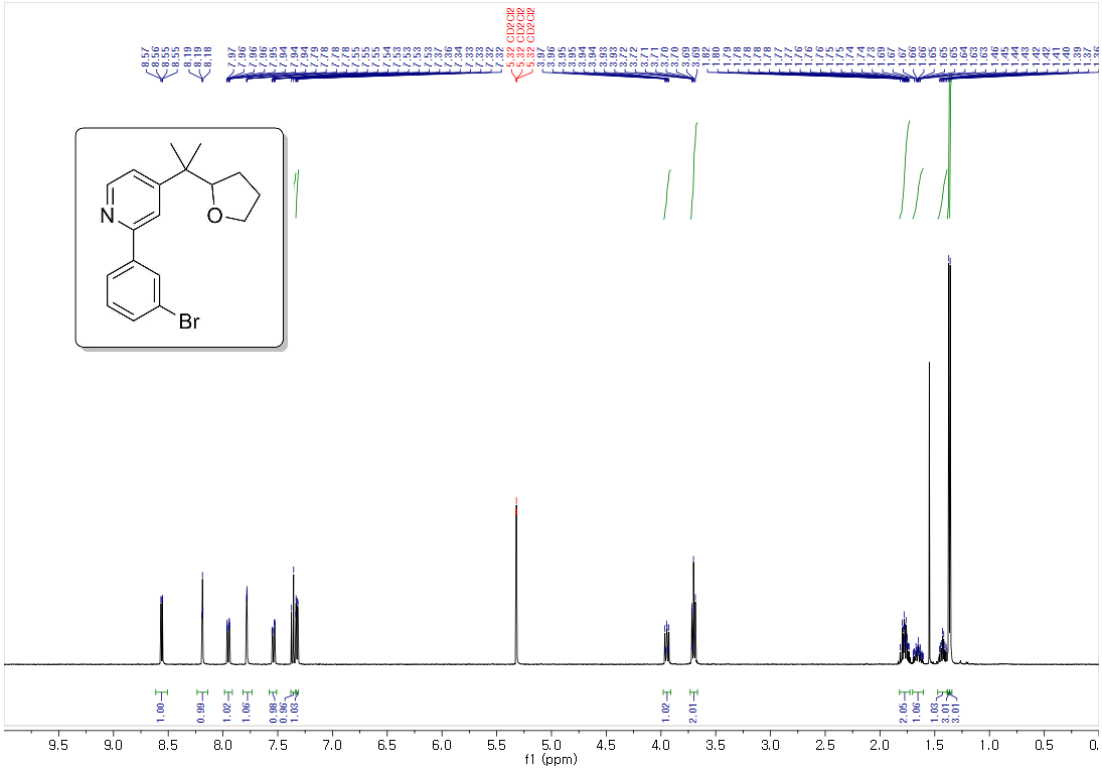


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

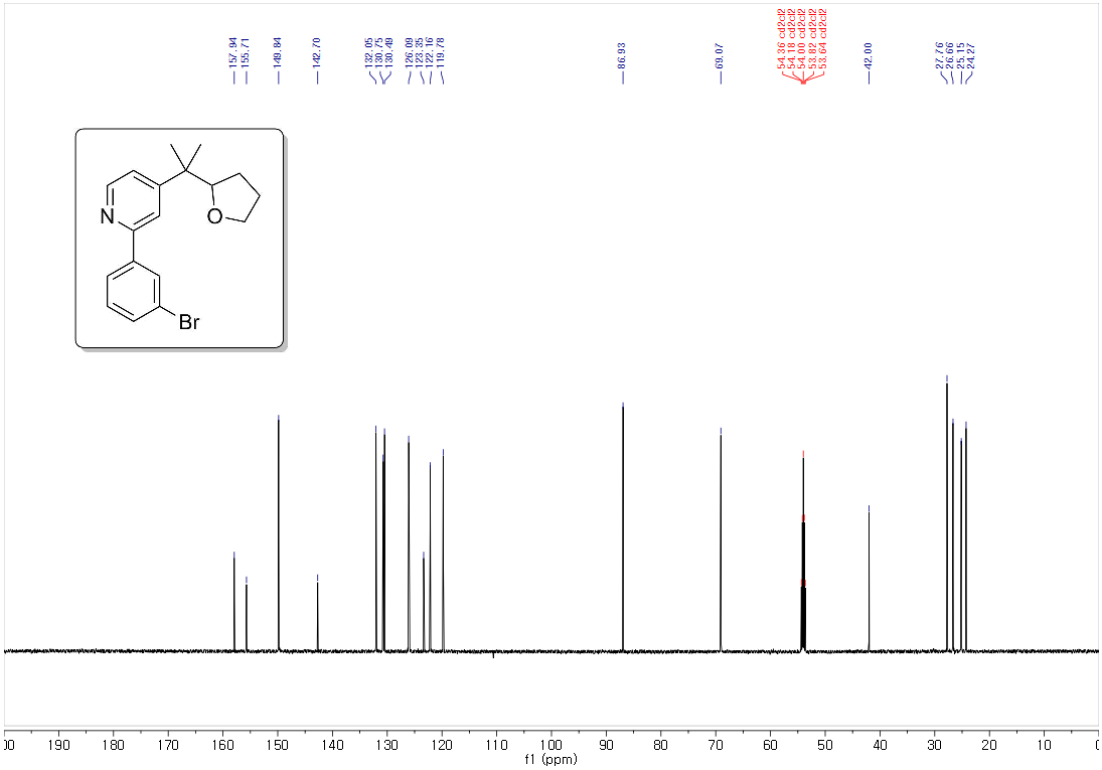


2-(3-bromophenyl)-4-(2-(tetrahydrofuran-2-yl)propan-2-yl)pyridine (2e).

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

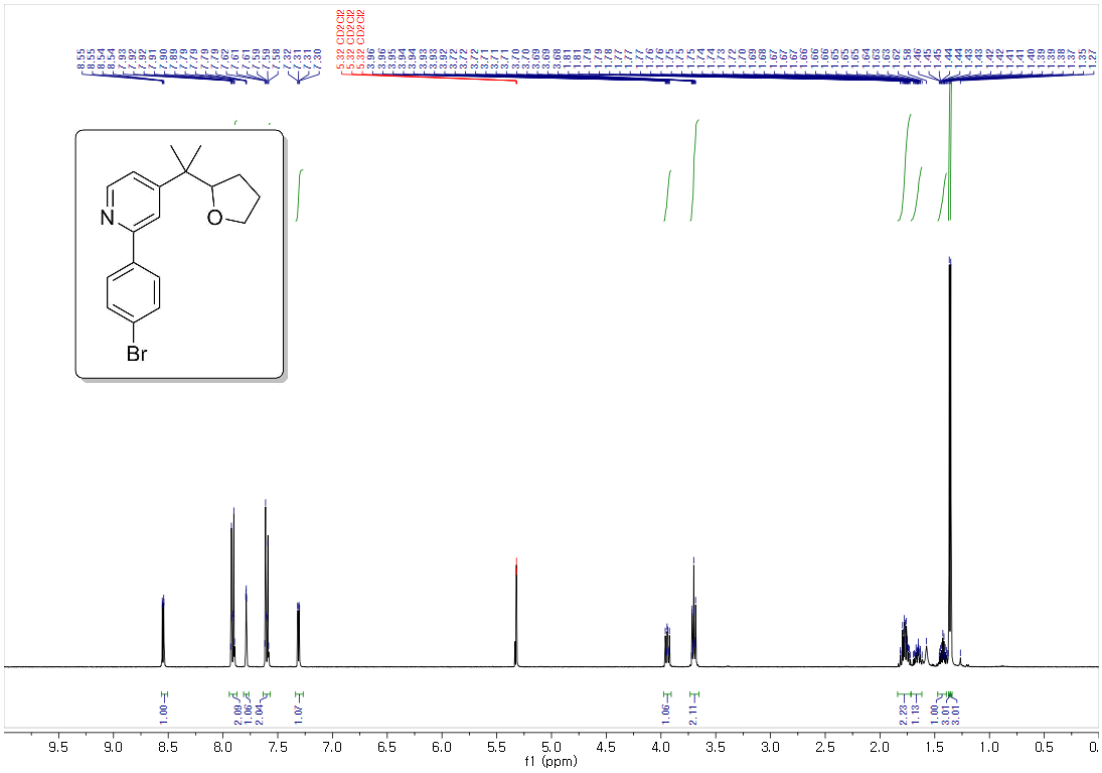


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

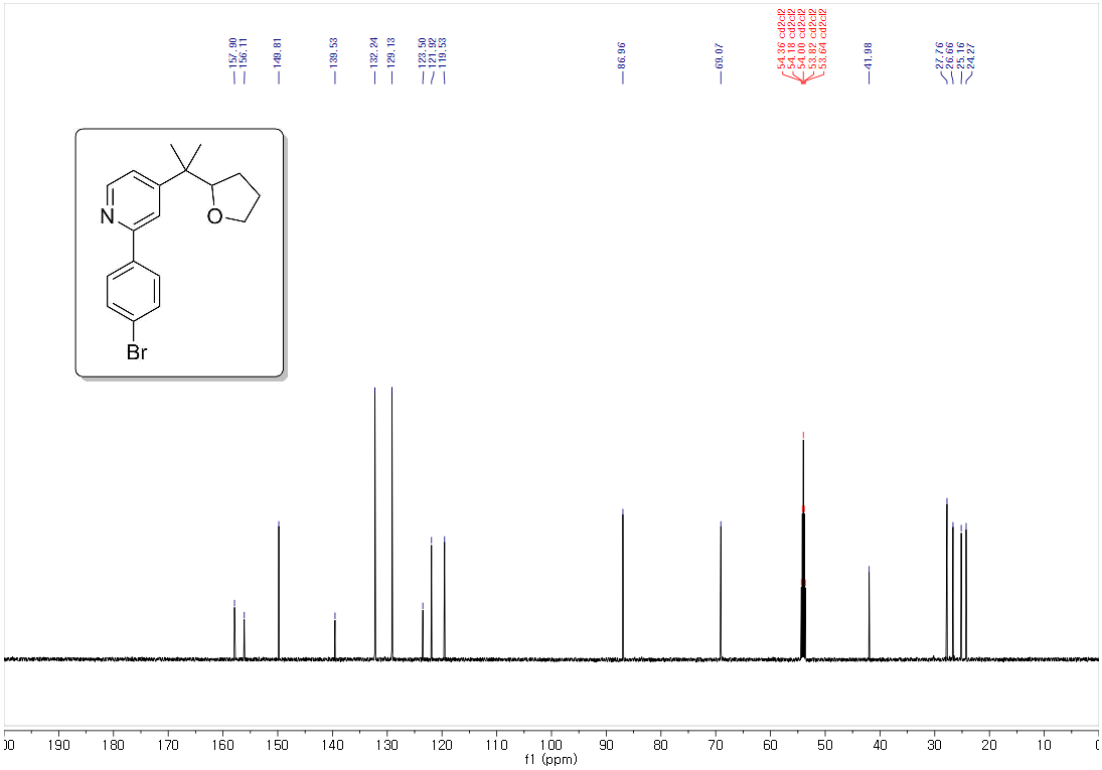


2-(4-bromophenyl)-4-(2-(tetrahydrofuran-2-yl)propan-2-yl)pyridine(2f).

^{1}H NMR (400 MHz, Methylene Chloride-d_2)

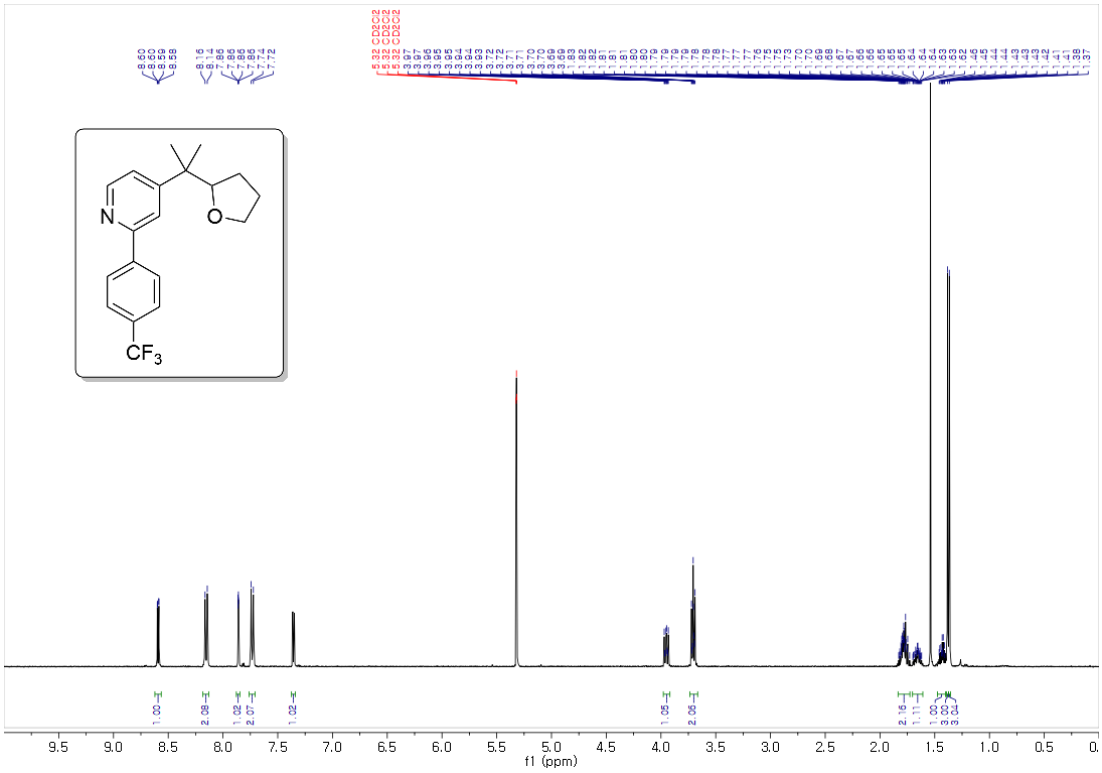


^{13}C NMR (150 MHz, Methylene Chloride-d_2)

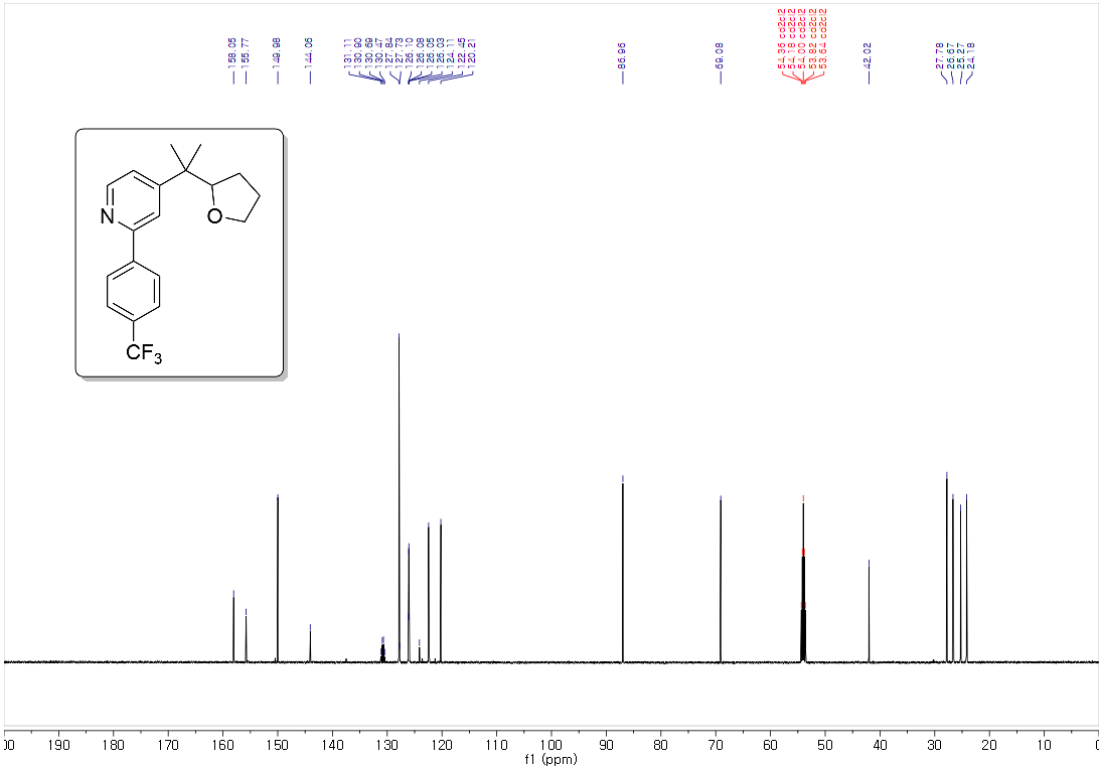


4-(2-(tetrahydrofuran-2-yl)propan-2-yl)-2-(4-(trifluoromethyl)phenyl)pyridine (2g).

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

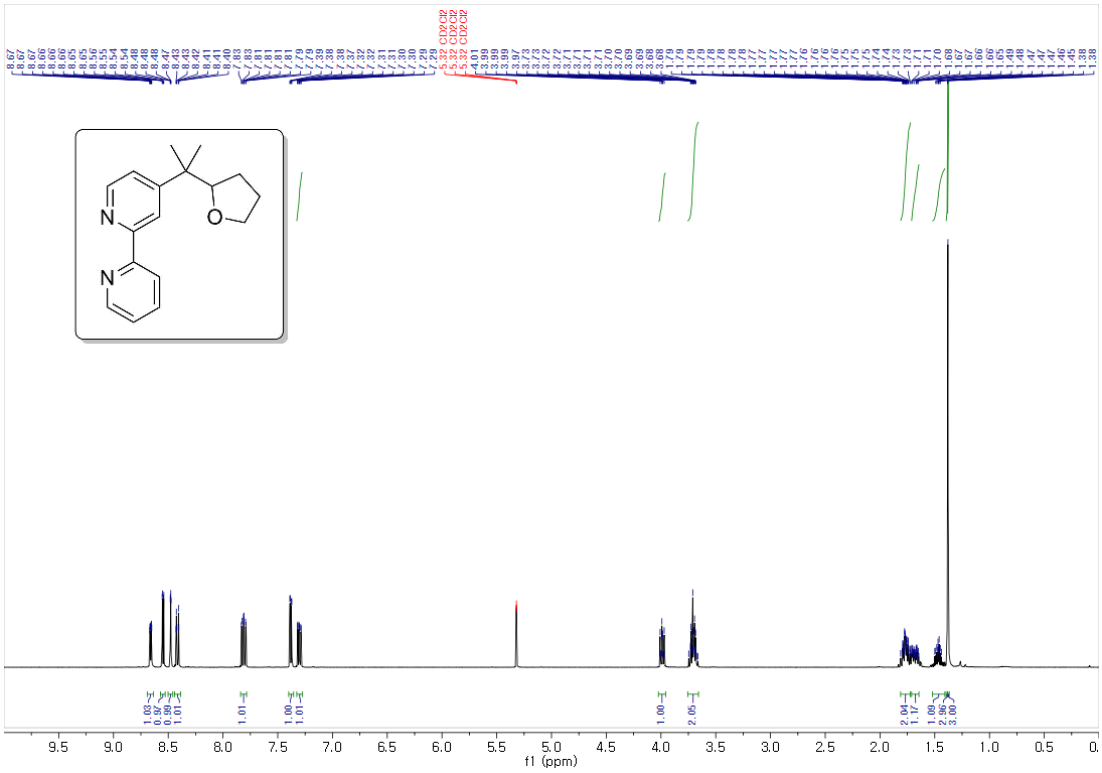


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

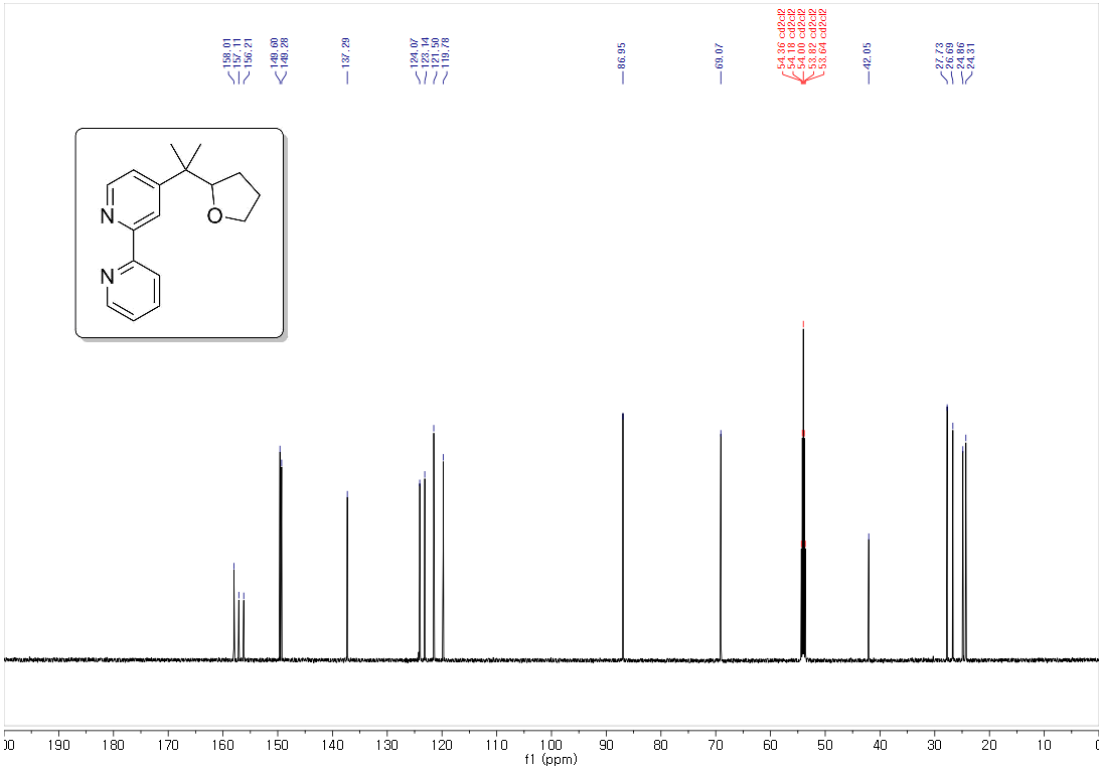


4-(2-(tetrahydrofuran-2-yl)propan-2-yl)-2,2'-bipyridine (2h).

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

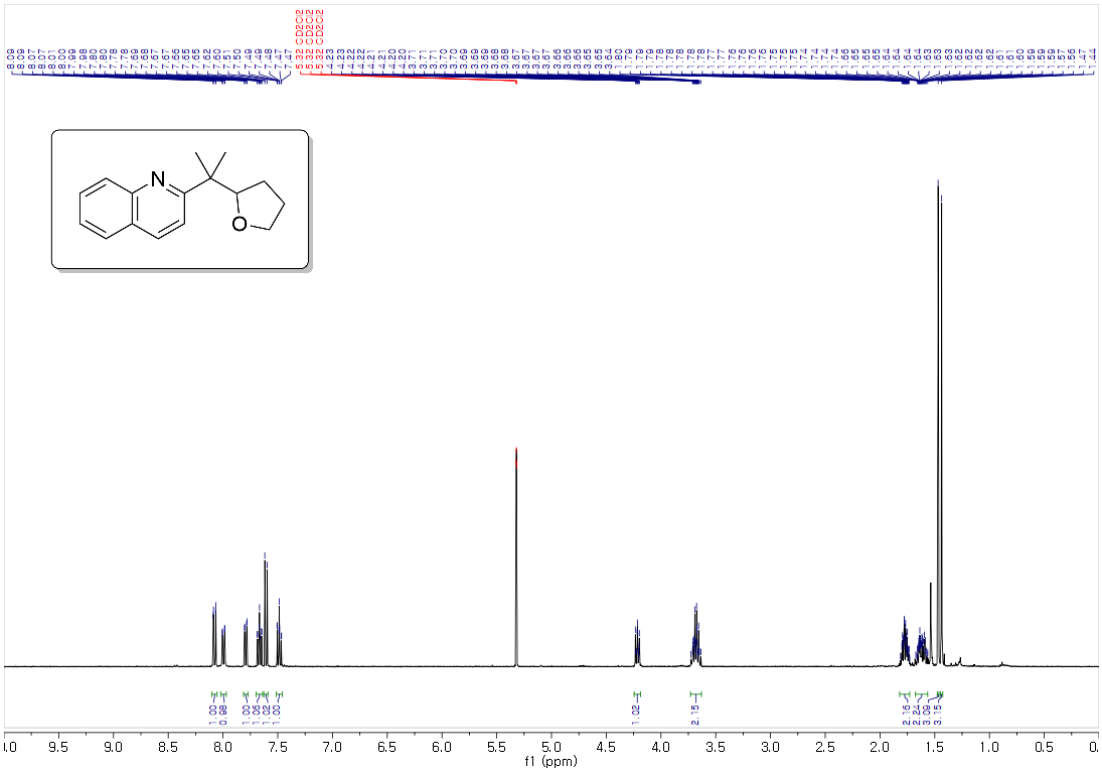


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

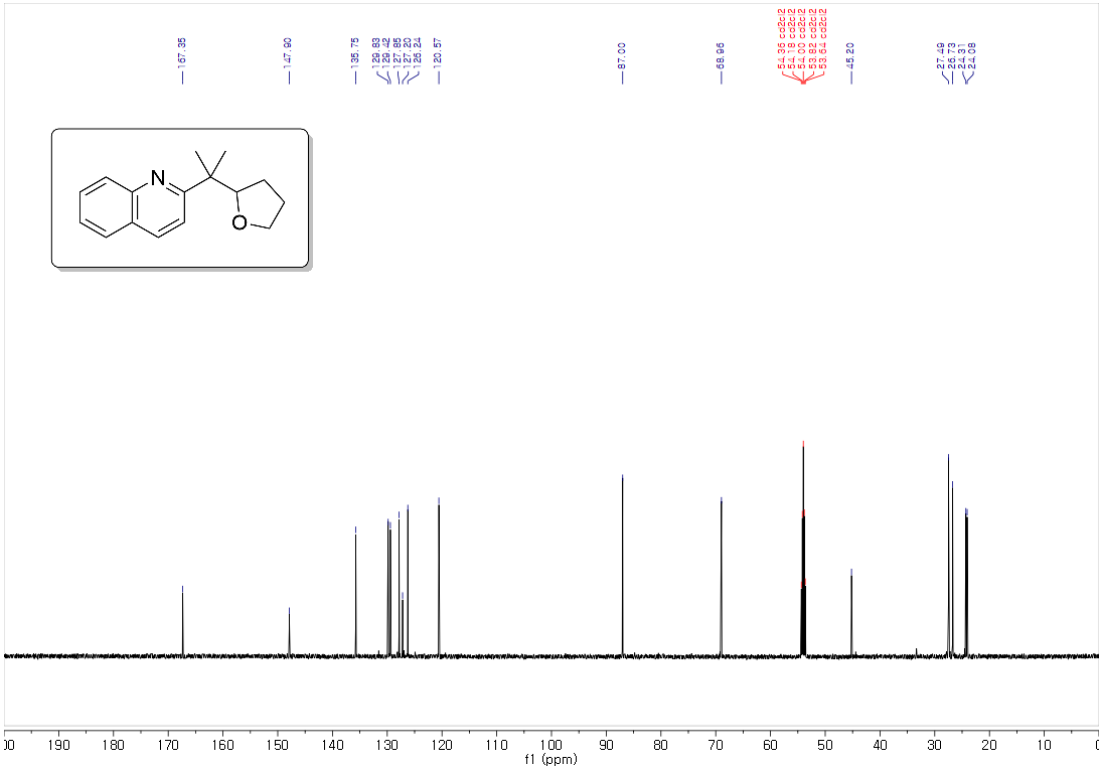


2-(2-(tetrahydrofuran-2-yl)propan-2-yl)quinolone (2i).

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

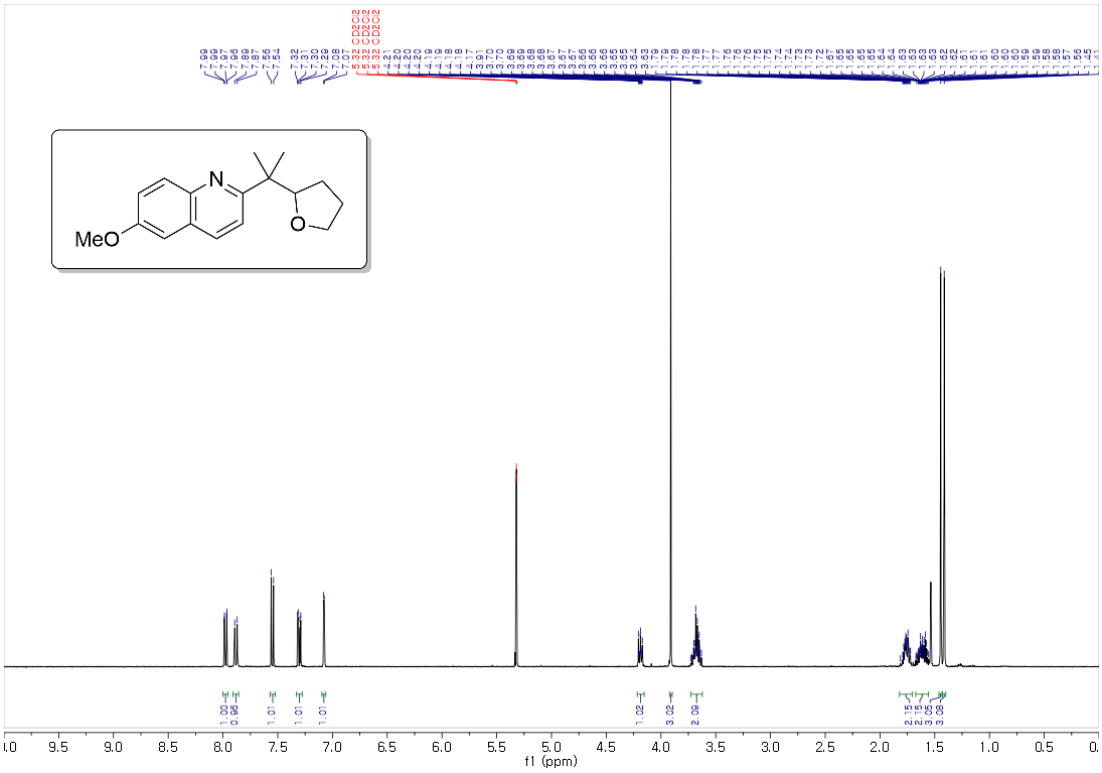


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

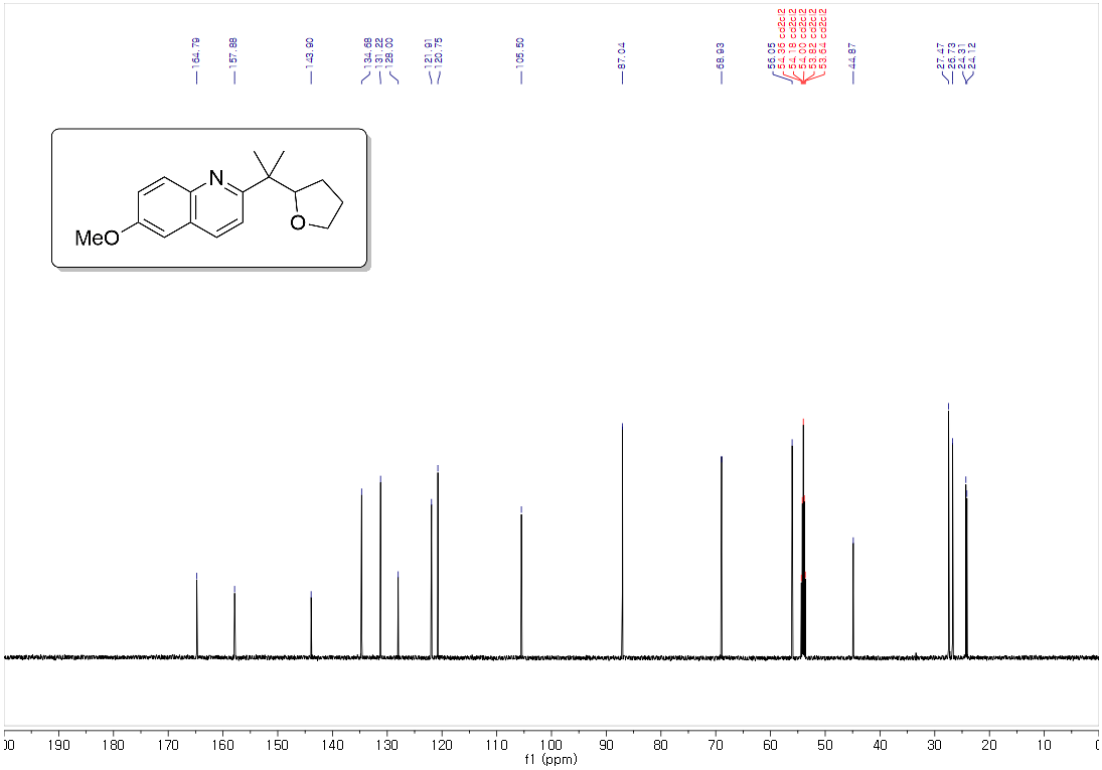


6-methoxy-2-(2-(tetrahydrofuran-2-yl)propan-2-yl)quinolone (2j).

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

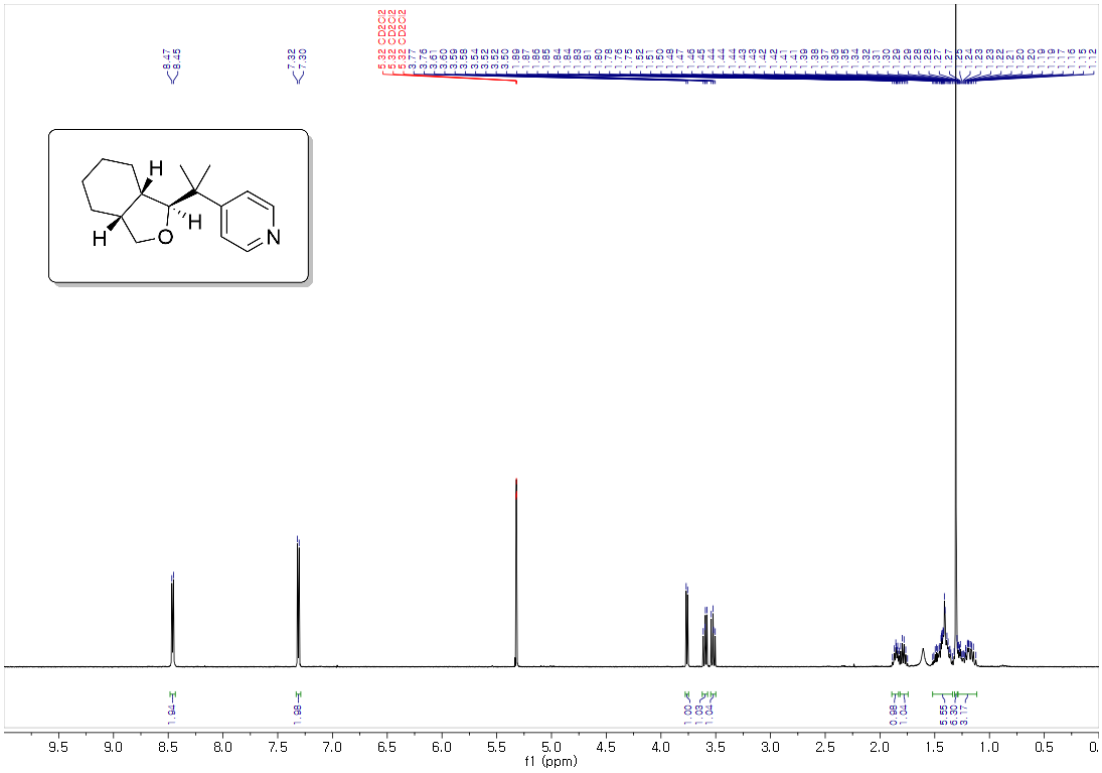


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

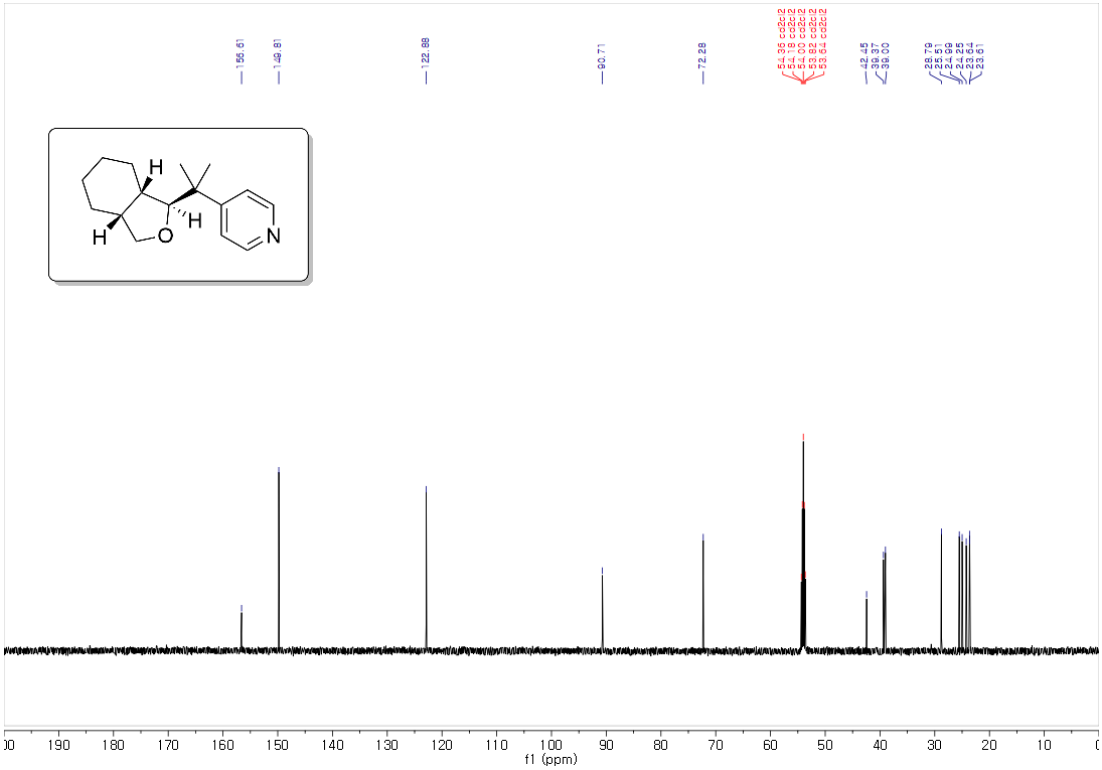


***rel*-4-(2-((1*S*,3a*R*,7a*S*)-octahydroisobenzofuran-1-yl)propan-2-yl)pyridine (2k).**

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

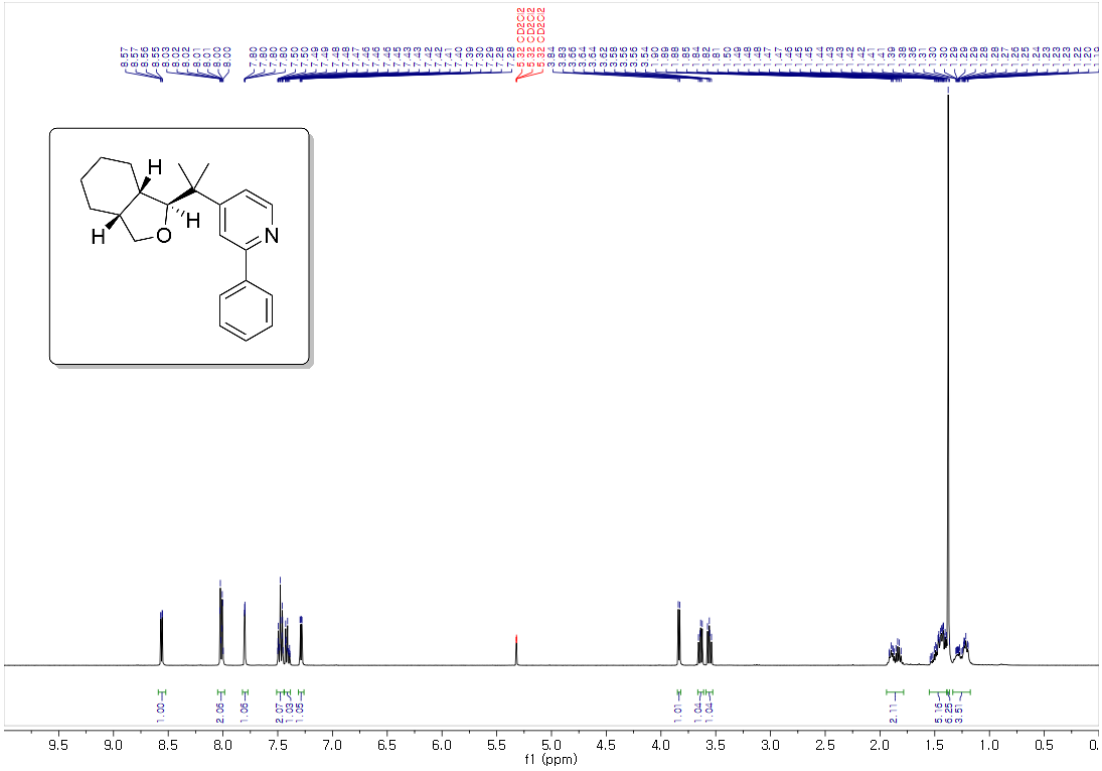


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

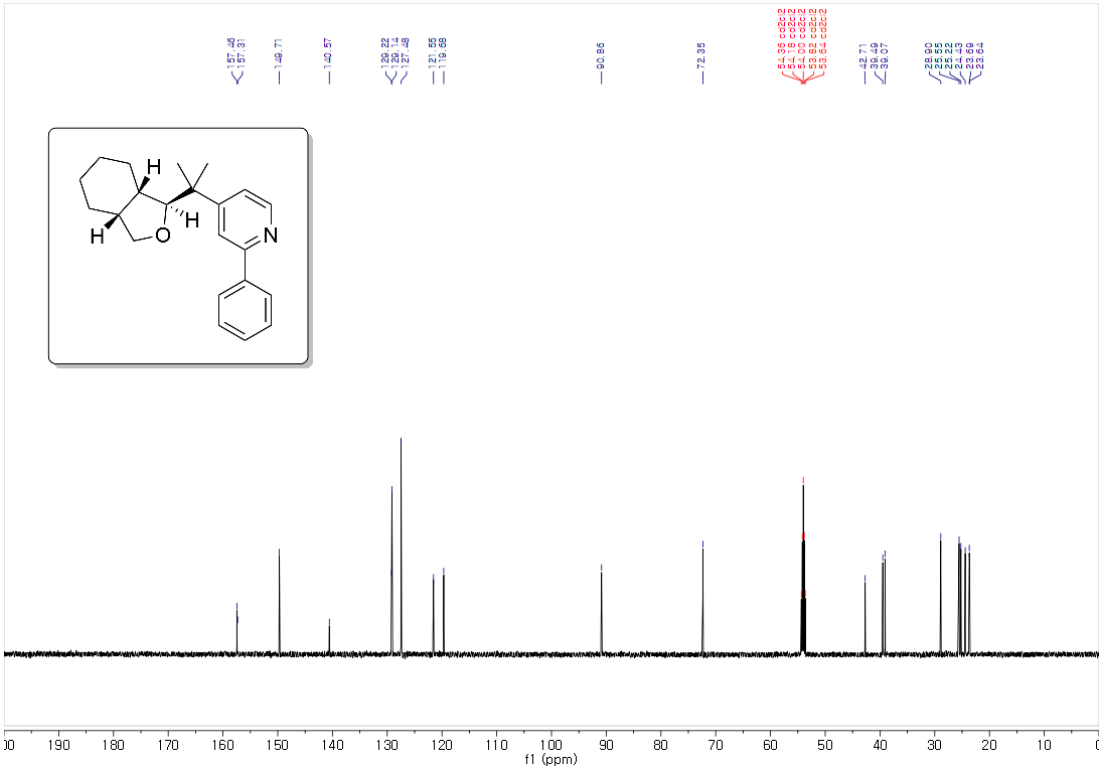


***rel*-4-(2-((1*S*,3a*R*,7a*S*)-octahydroisobenzofuran-1-yl)propan-2-yl)-2-phenylpyridine (2l).**

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

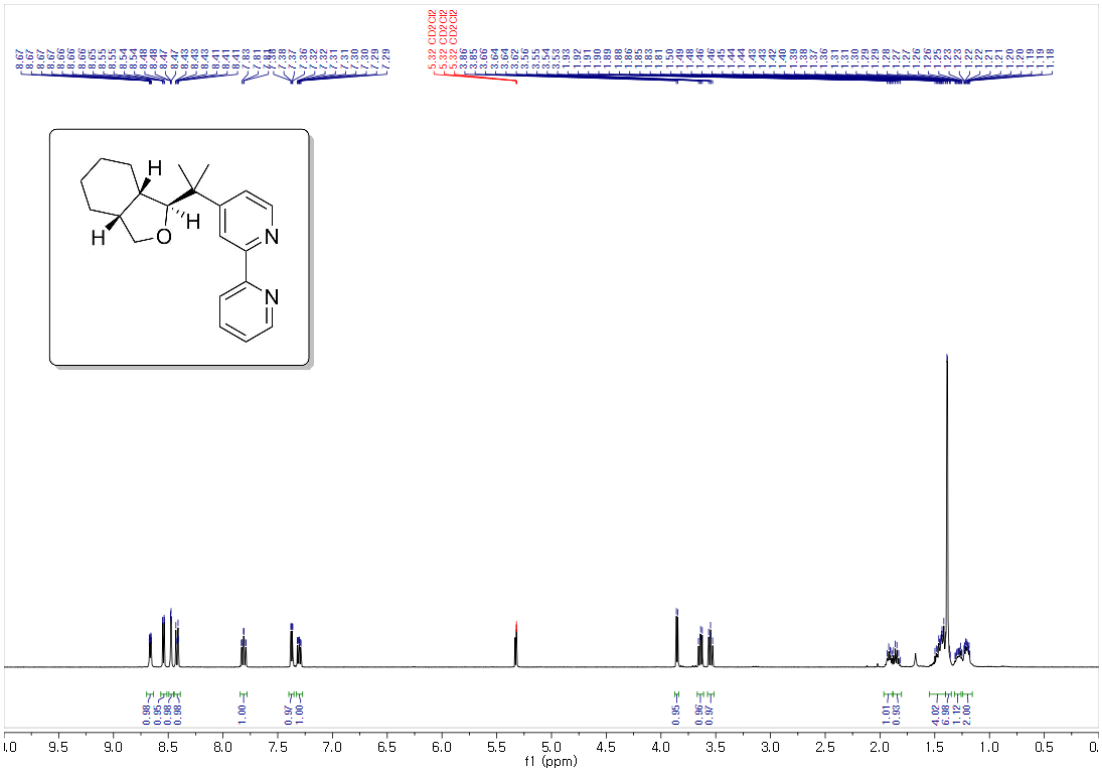


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

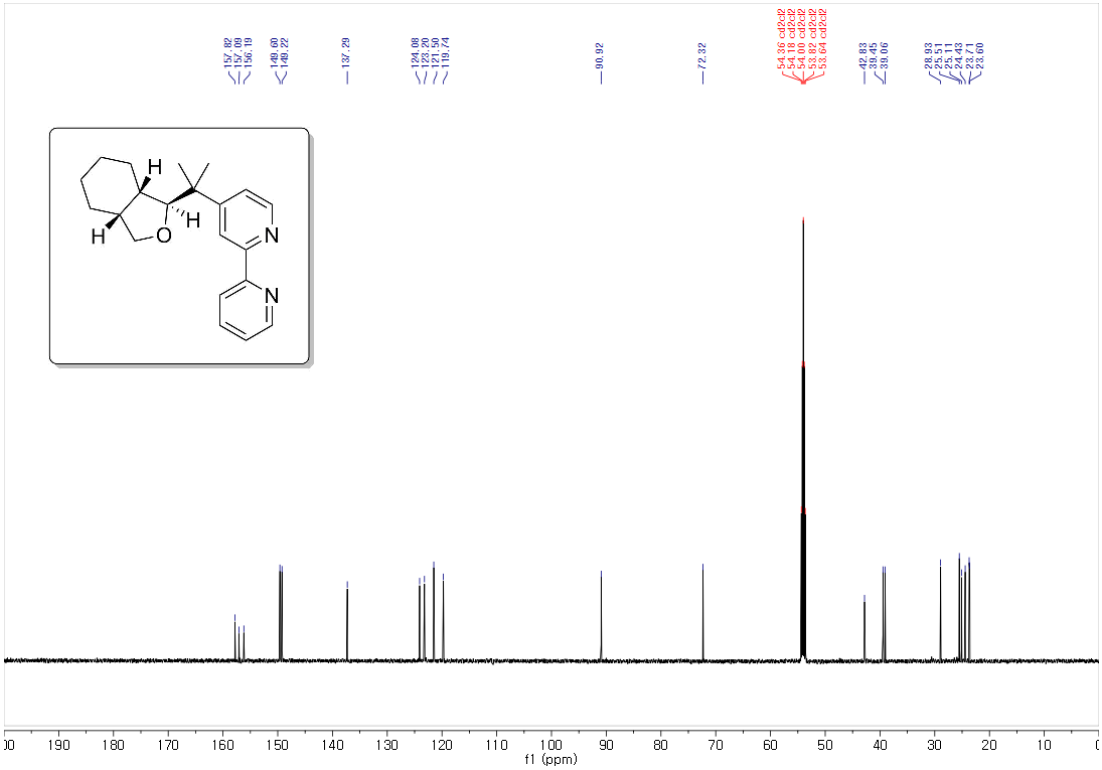


***rel*-4-(2-((1S,3aR,7aS)-octahydroisobenzofuran-1-yl)propan-2-yl)-2,2'-bipyridine (2m).**

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

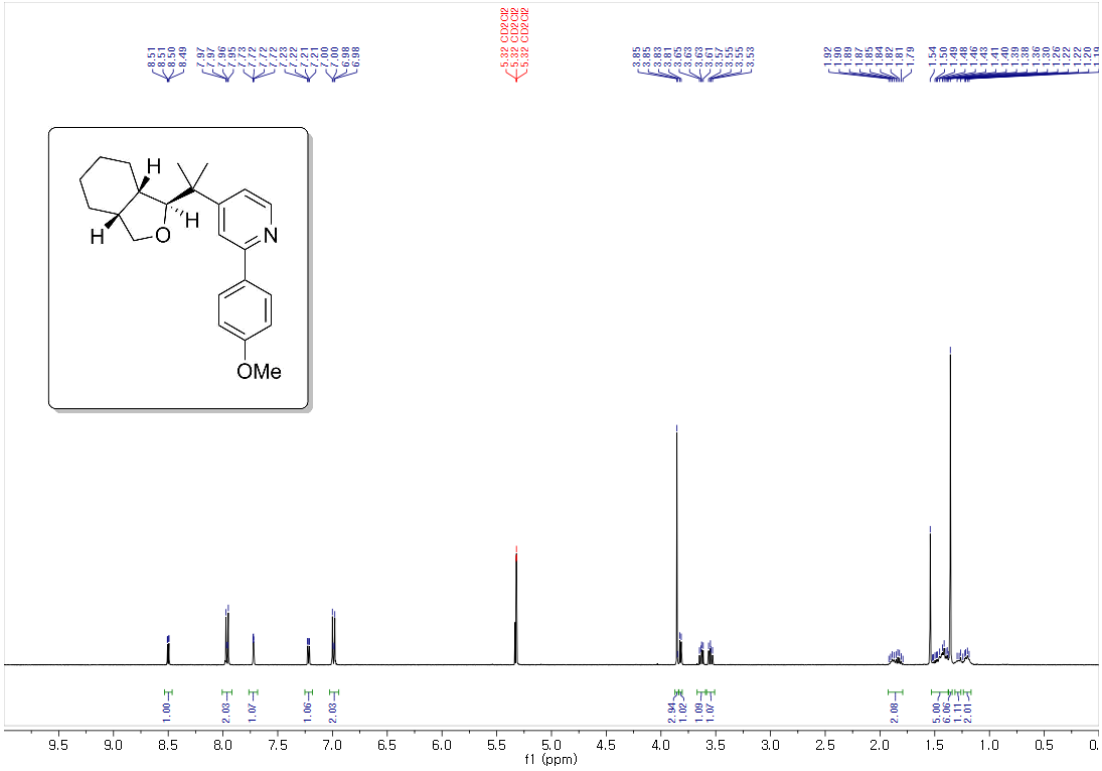


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

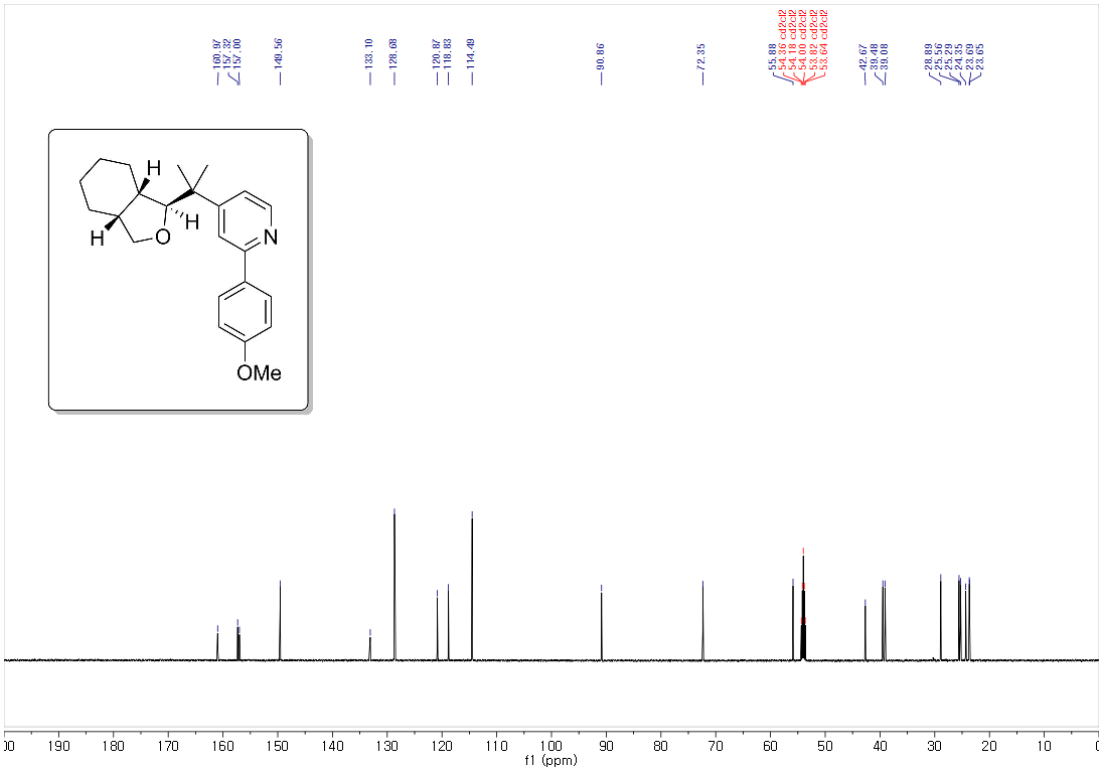


***rel*-2-(4-methoxyphenyl)-4-(2-((1S,3aR,7aS)-octahydroisobenzofuran-1-yl)propan-2-yl)pyridine (2n).**

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

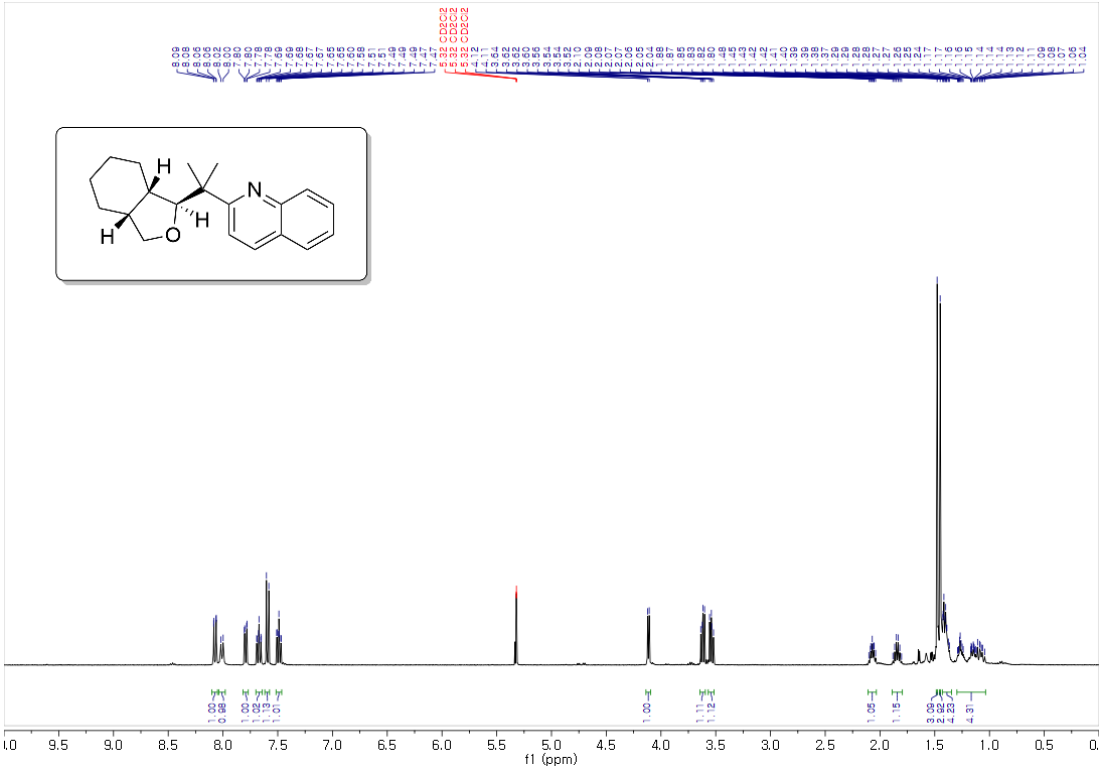


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

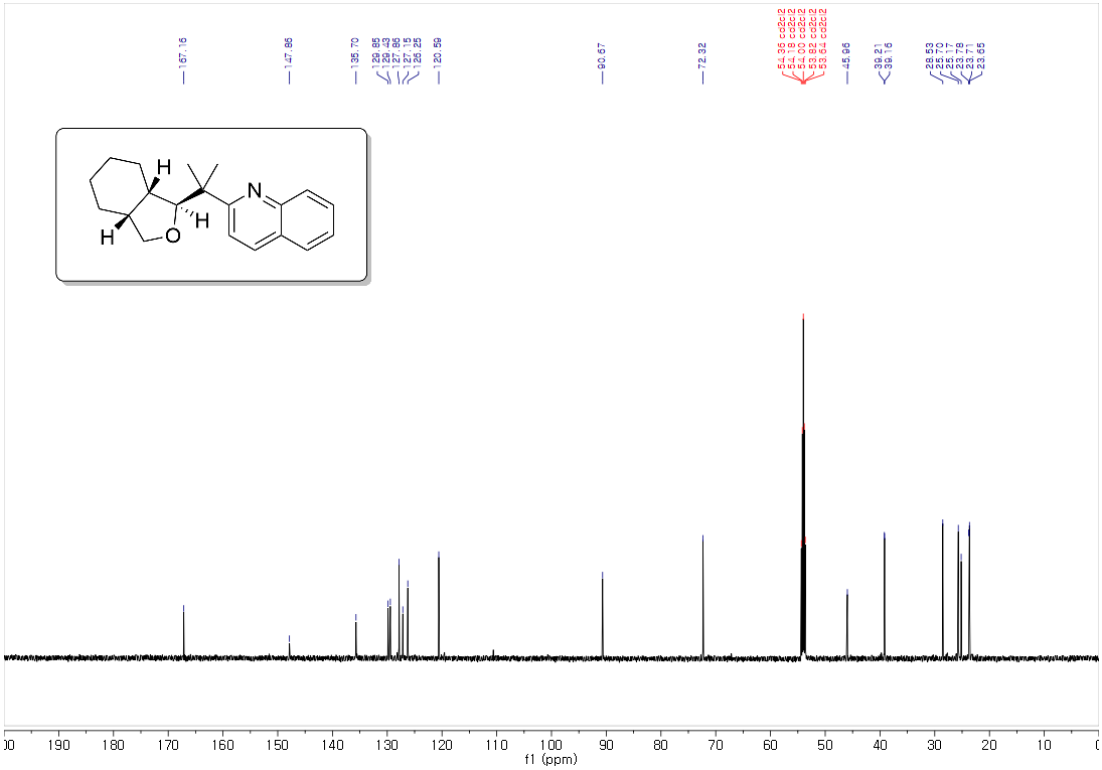


***rel*-2-(2-((1*S*,3a*R*,7a*S*)-octahydroisobenzofuran-1-yl)propan-2-yl)quinolone (2o).**

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

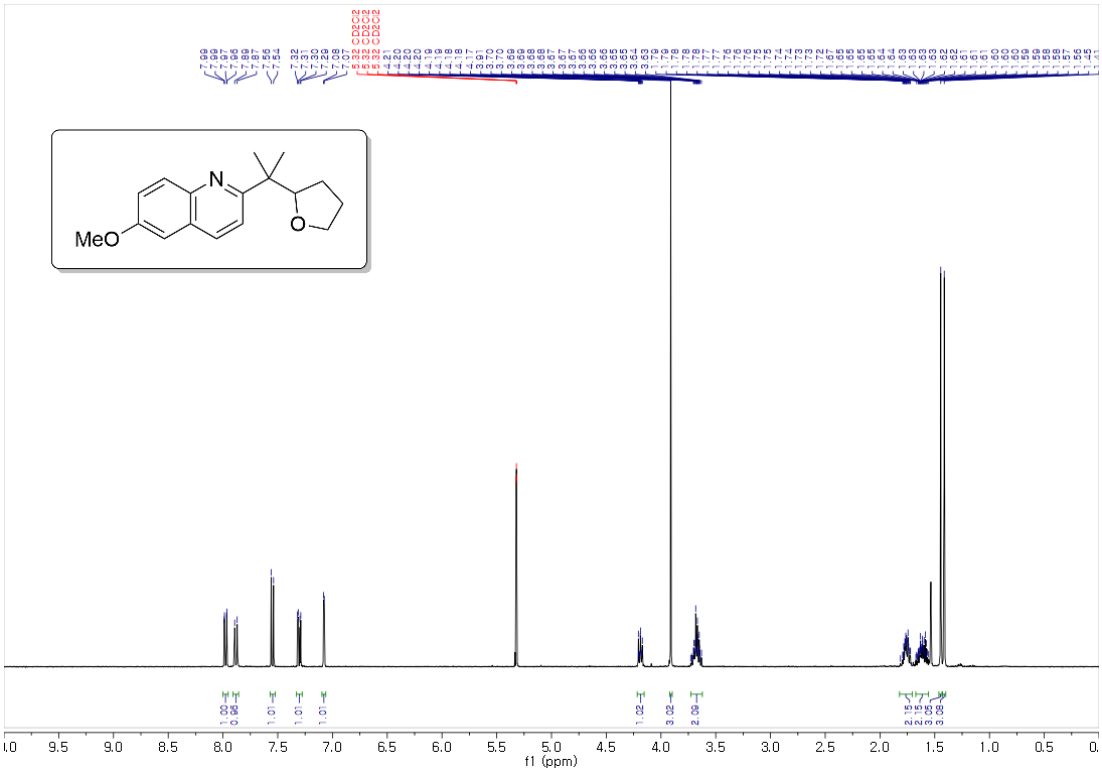


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

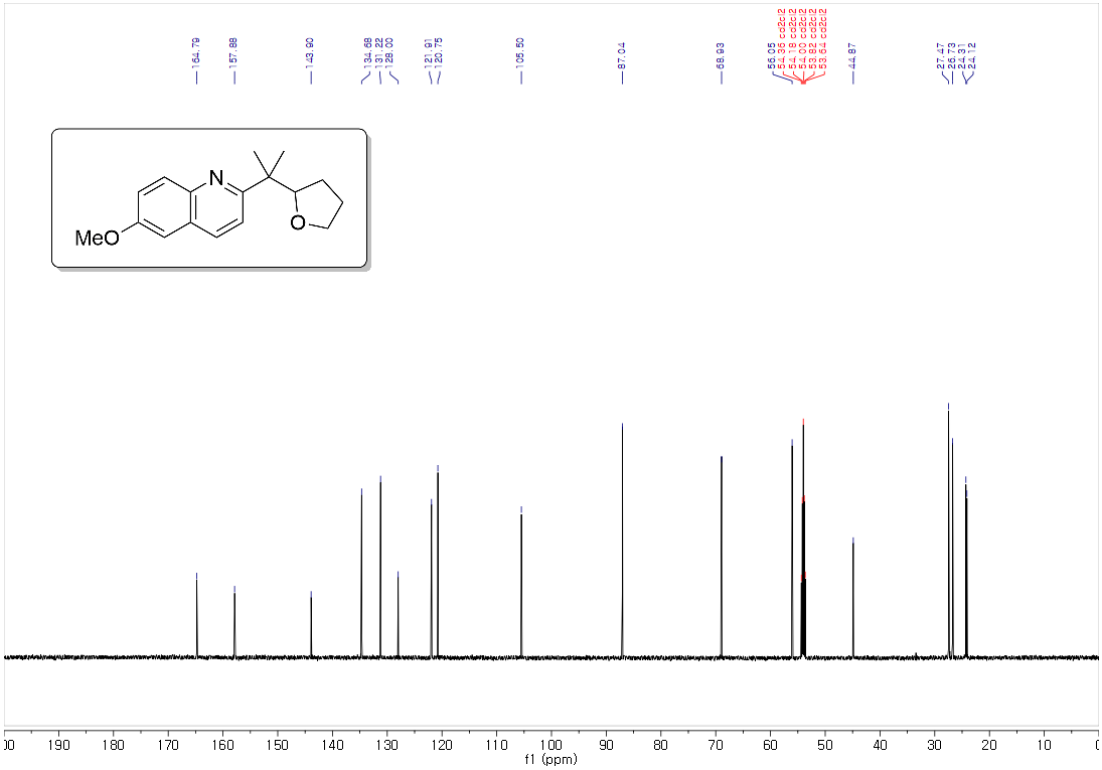


***rel*-6-methoxy-2-(2-((1*S*,3a*R*,7a*S*)-octahydroisobenzofuran-1-yl)propan-2-yl)quinolone (2p).**

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

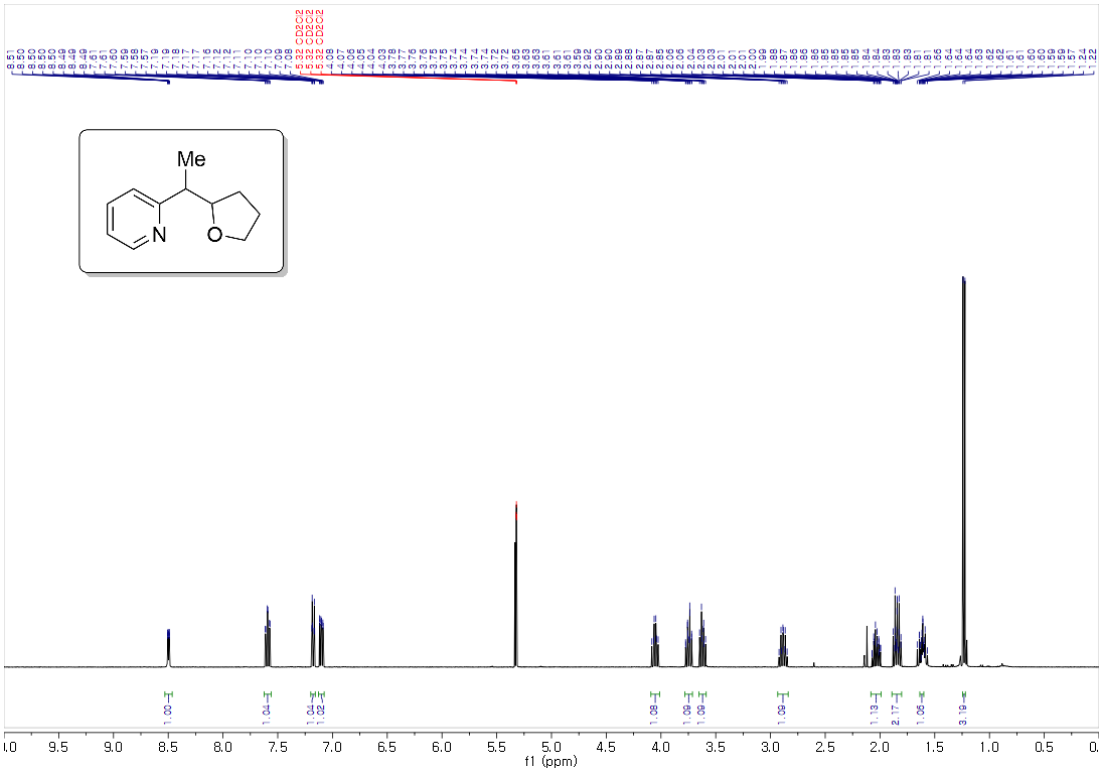


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

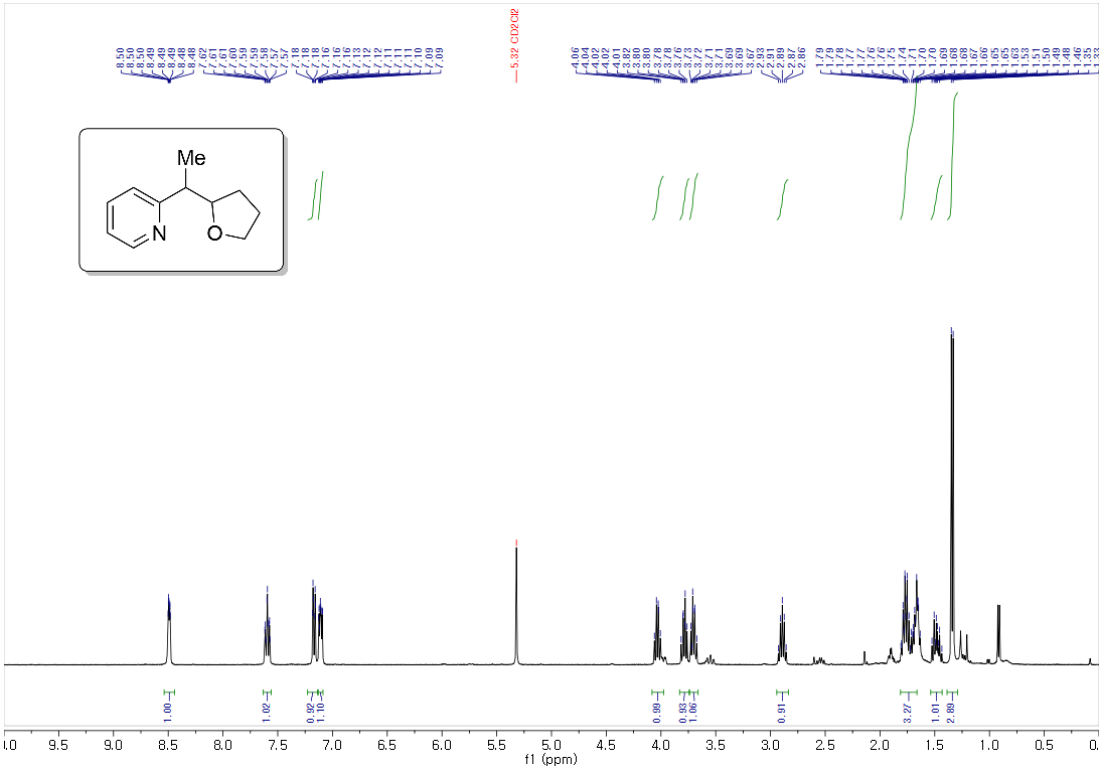


2-(1-(tetrahydrofuran-2-yl)ethyl)pyridine (2q).

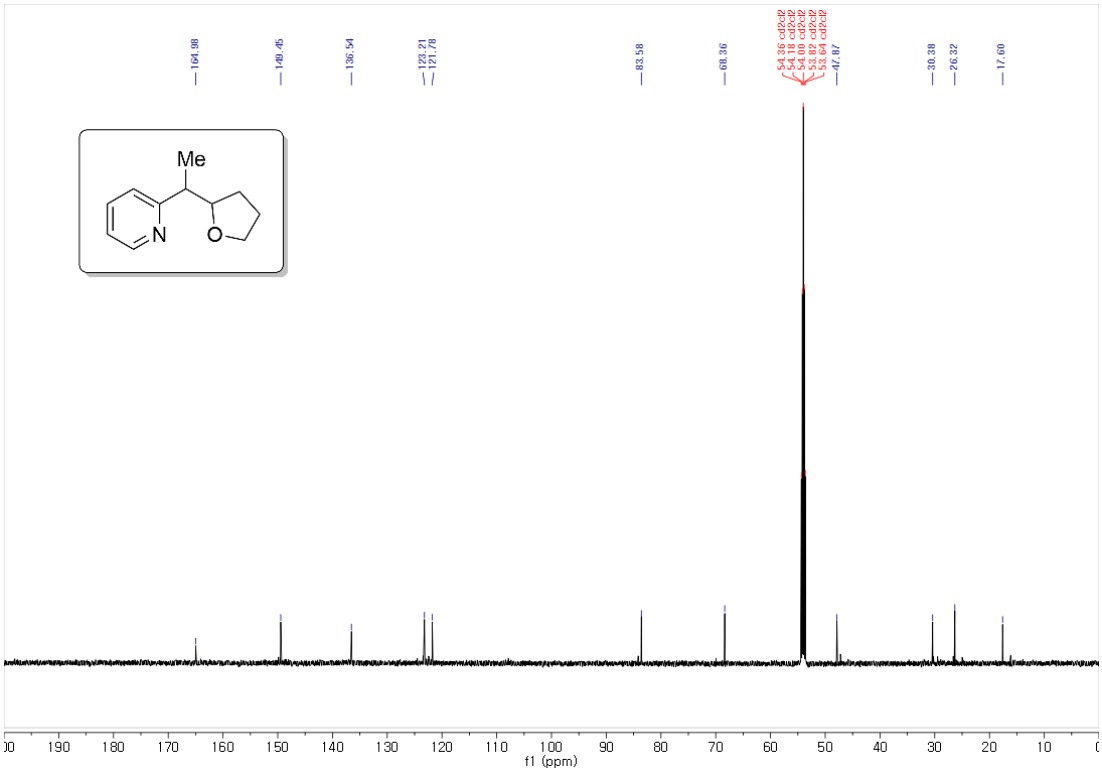
400 MHz, ^{1}H NMR in Methylene Chloride-d_2, major diastereomer



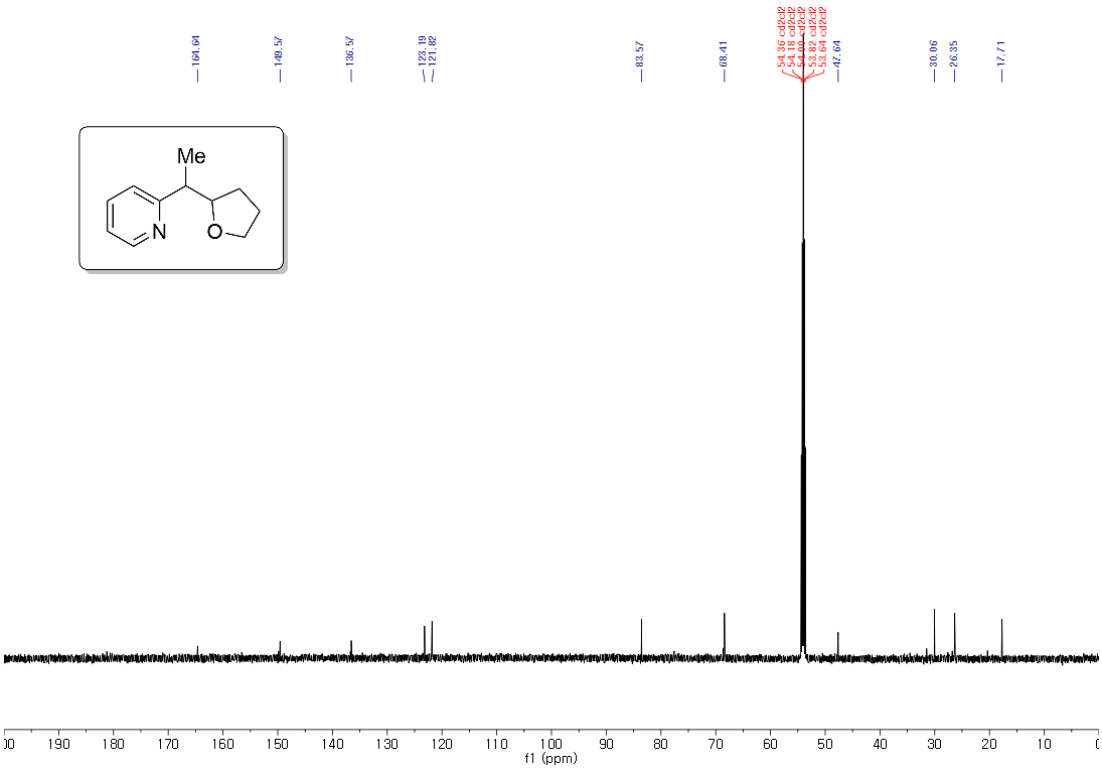
400 MHz, ^{1}H NMR in Methylene Chloride-d_2, minor diastereomer



150 MHz, ^{13}C NMR in Methylene Chloride-d_2, major diastereomer

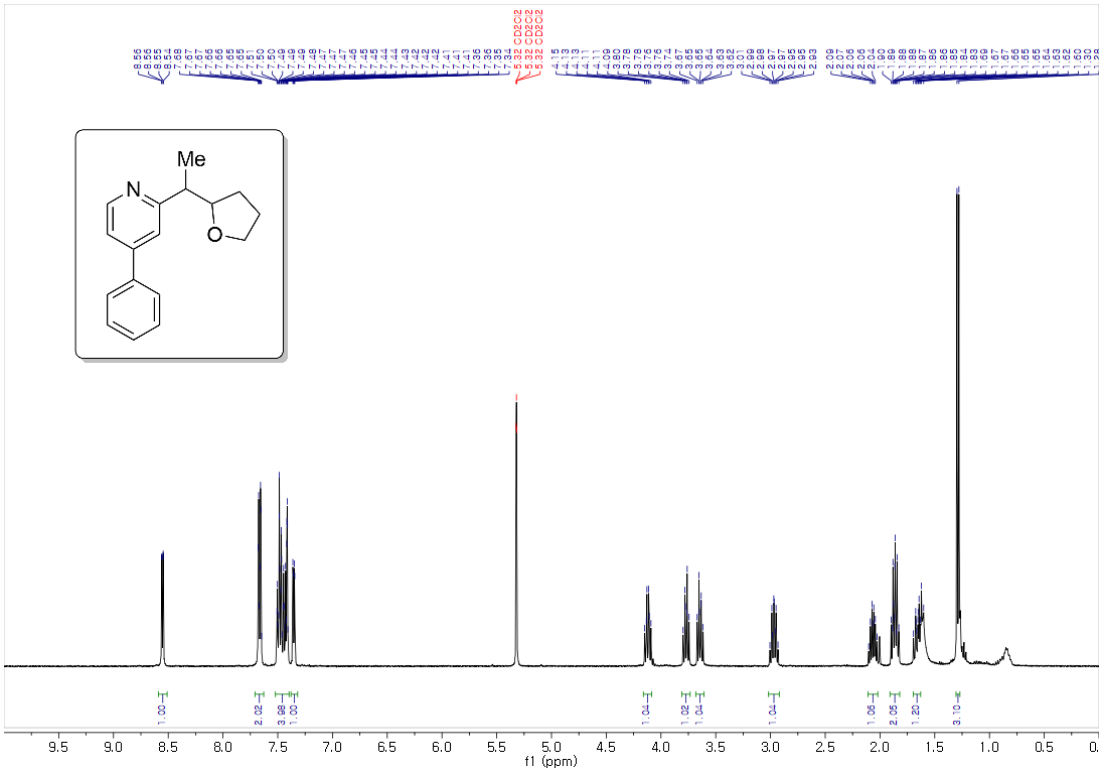


150 MHz, ^{13}C NMR in Methylene Chloride-d_2, minor diastereomer

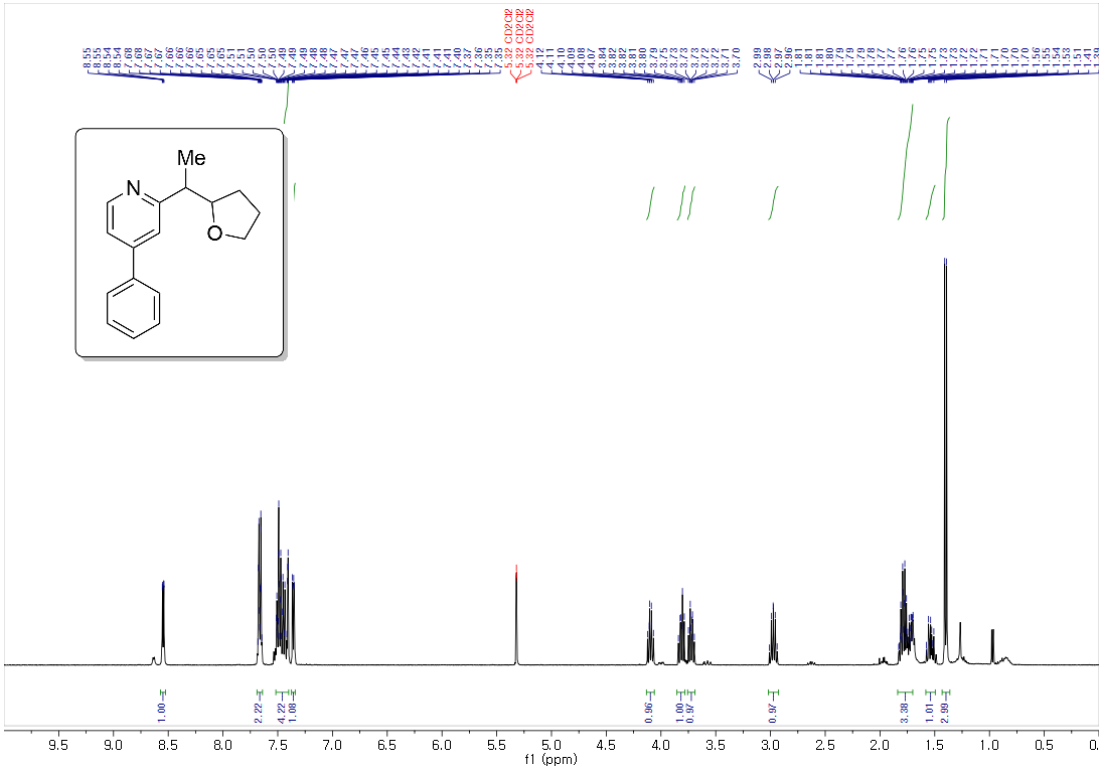


4-phenyl-2-(1-(tetrahydrofuran-2-yl)ethyl)pyridine (2r).

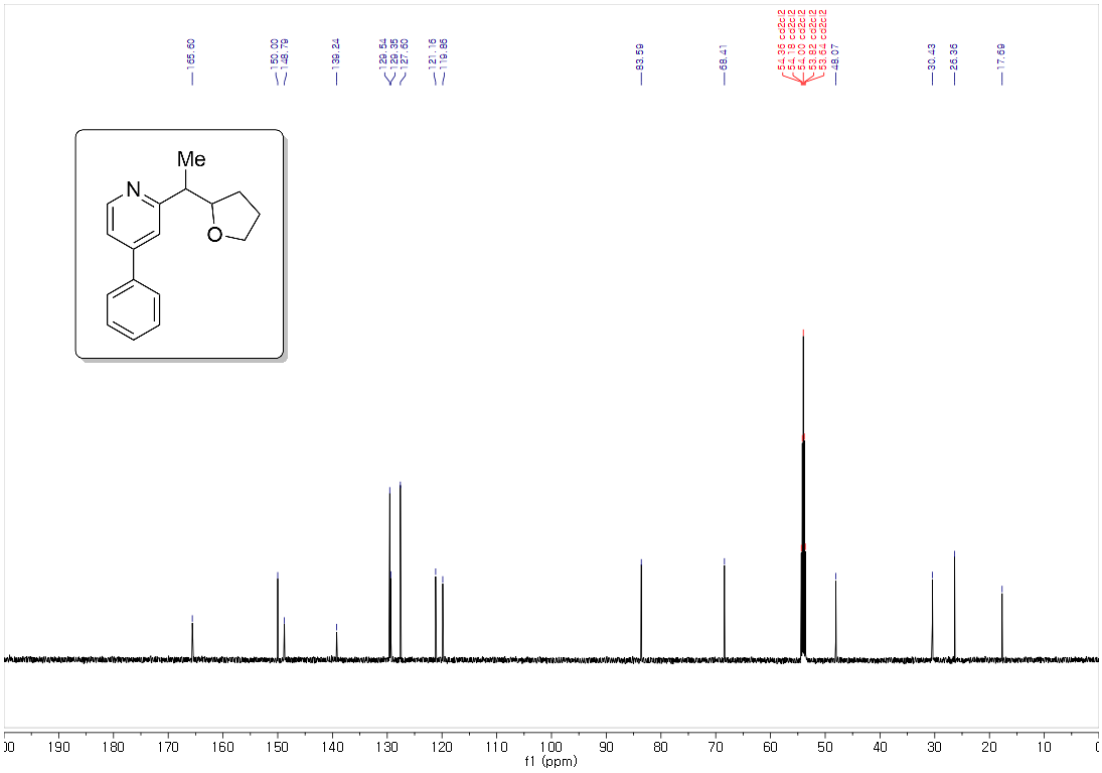
400 MHz, ^{1}H NMR in Methylene Chloride-d_2, major diastereomer



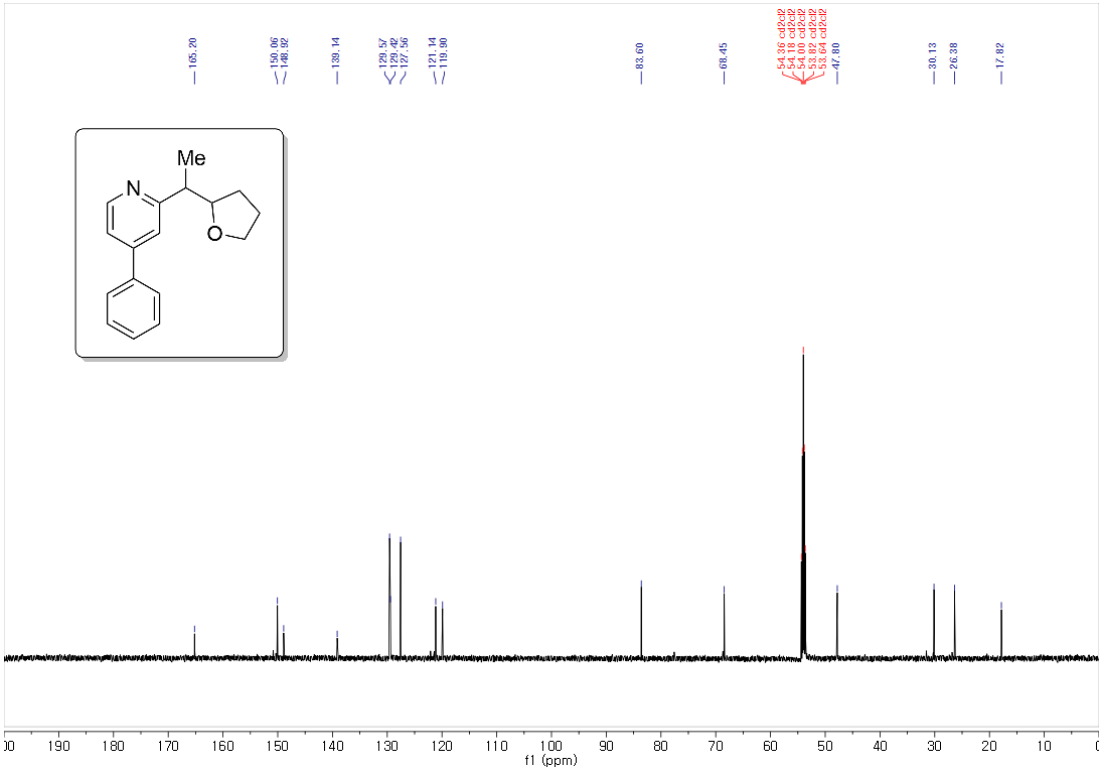
400 MHz, ^{1}H NMR in Methylene Chloride-d_2, minor diastereomer



150 MHz, ^{13}C NMR in Methylene Chloride-d_2, major diastereomer

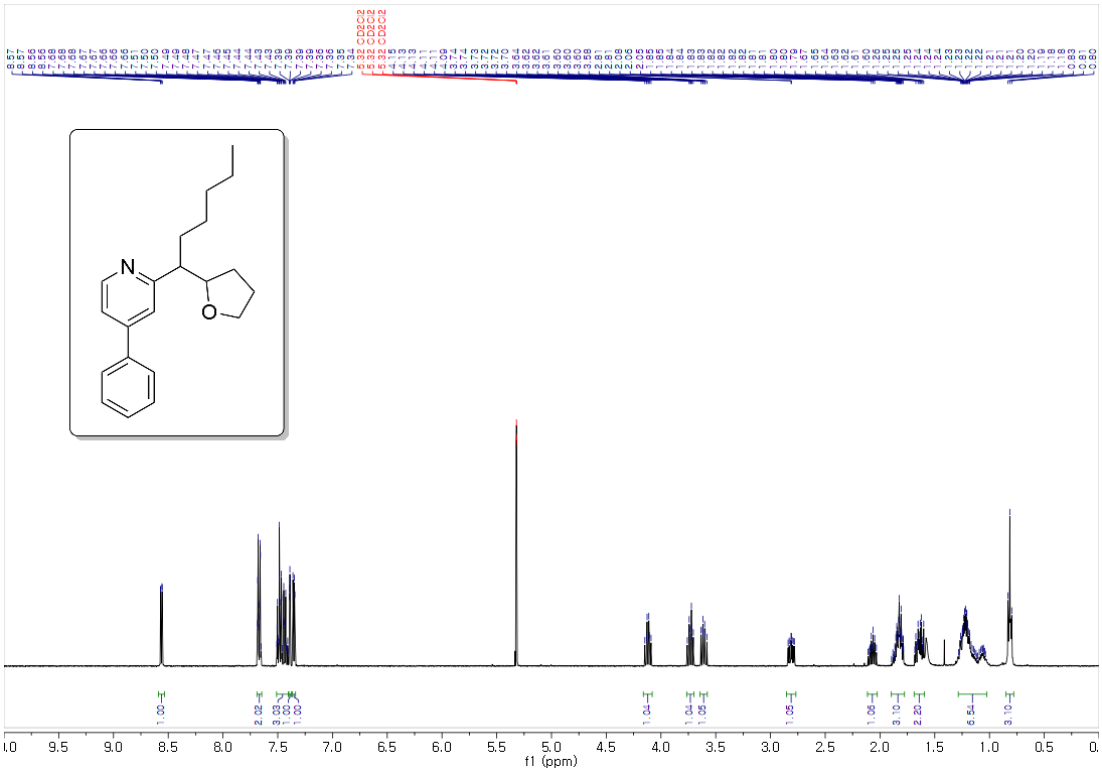


150 MHz, ^{13}C NMR in Methylene Chloride-d_2, minor diastereomer

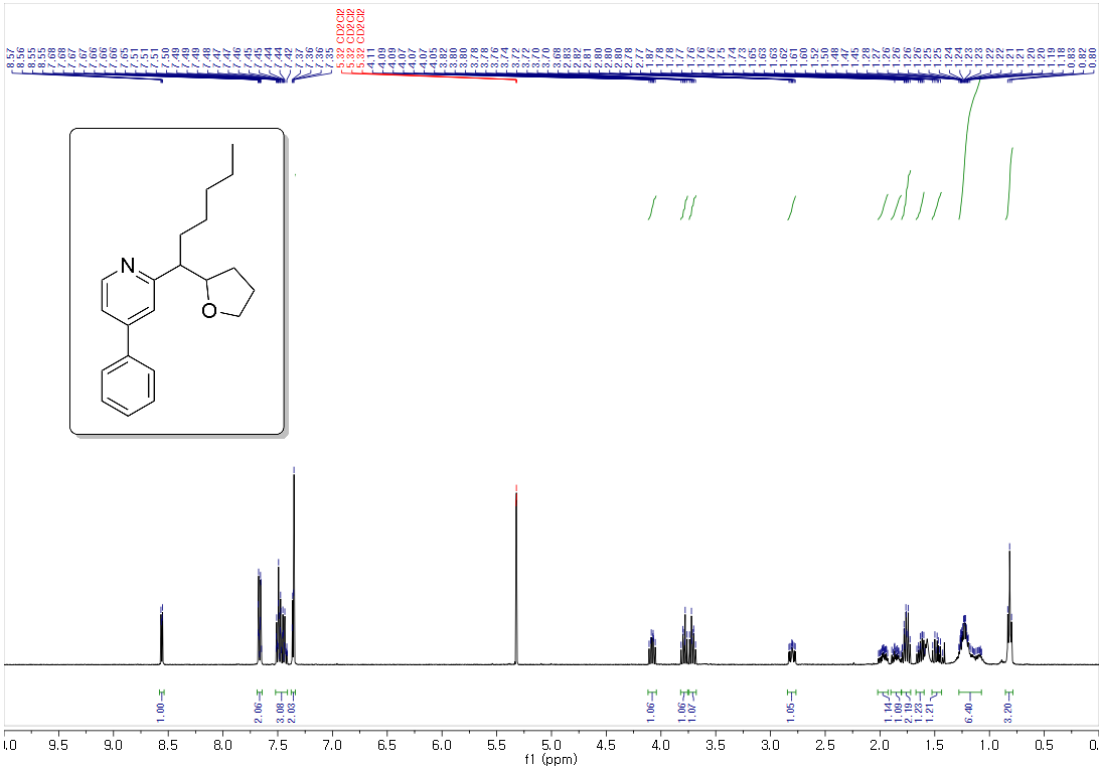


4-phenyl-2-(1-(tetrahydrofuran-2-yl)hexyl)pyridine (2s).

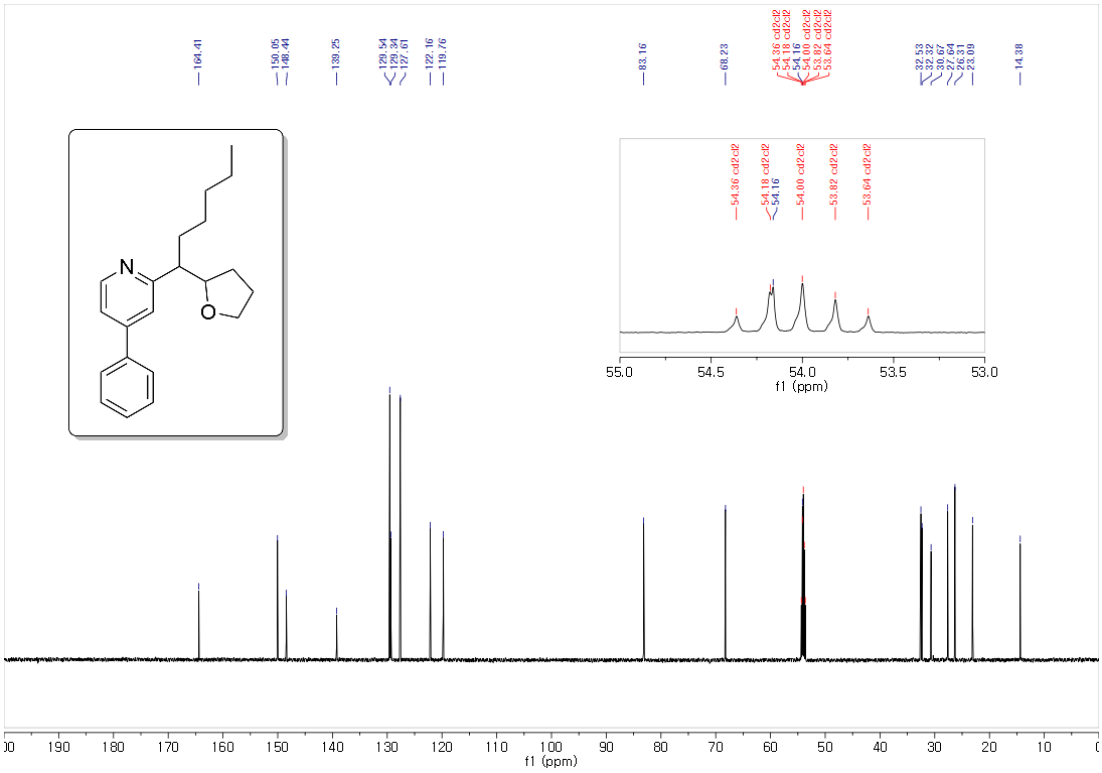
400 MHz, ^{1}H NMR in Methylene Chloride-d_2, major diastereomer



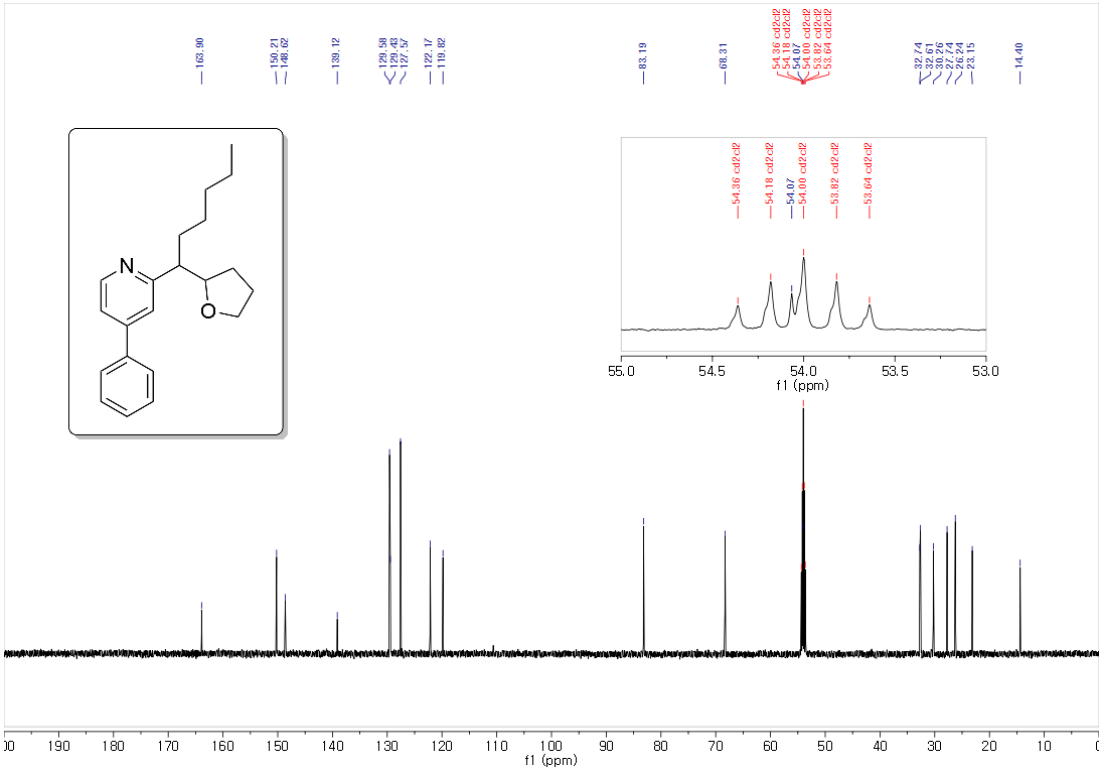
400 MHz, ^{1}H NMR in Methylene Chloride-d_2, minor diastereomer



150 MHz, ^{13}C NMR in Methylene Chloride-d_2, major diastereomer

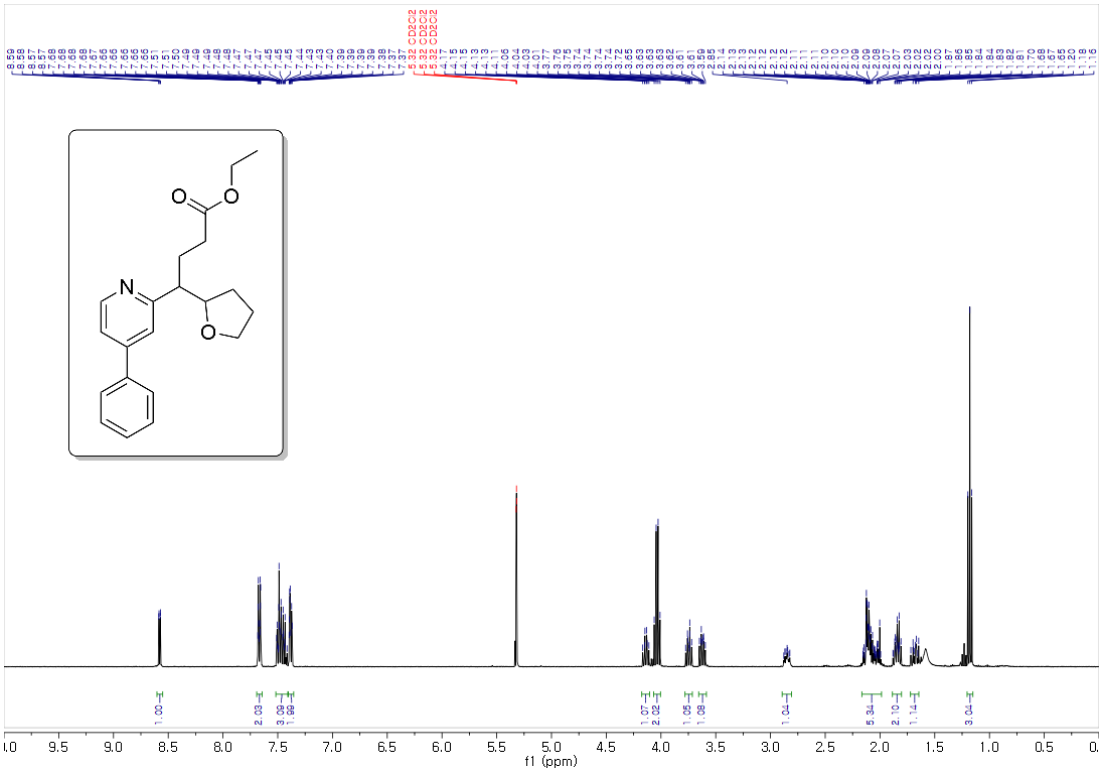


150 MHz, ^{13}C NMR in Methylene Chloride-d_2, minor diastereomer

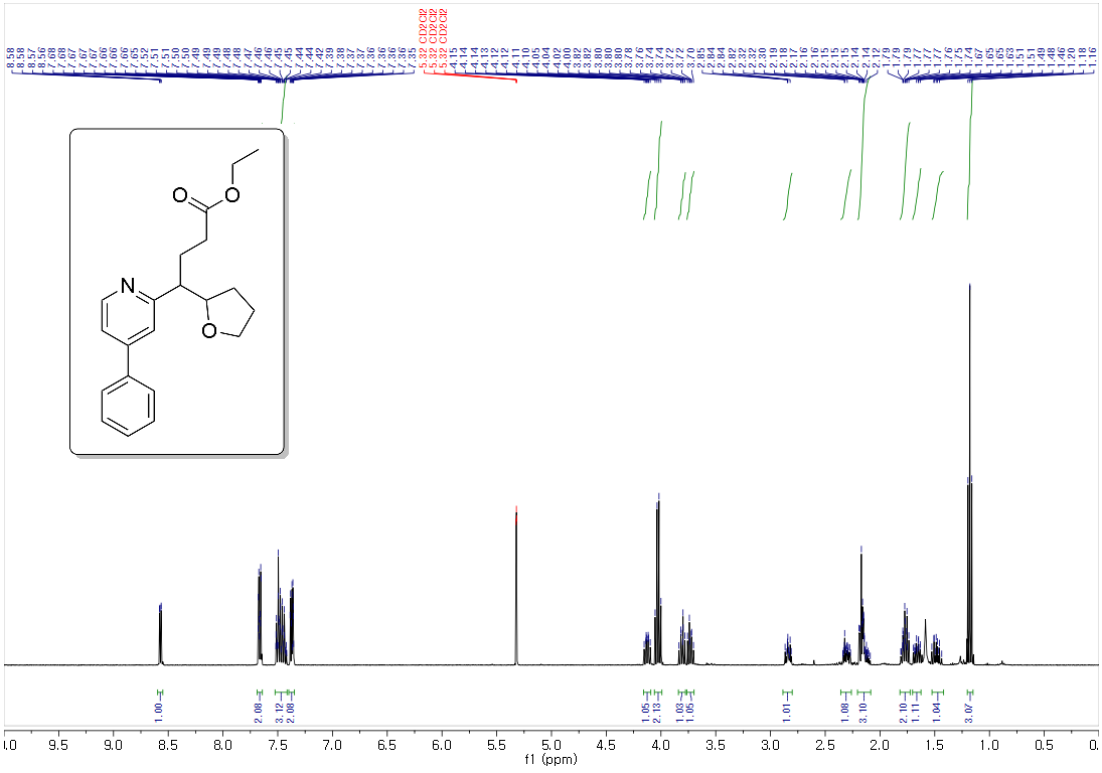


ethyl 4-(4-phenylpyridin-2-yl)-4-(tetrahydrofuran-2-yl)butanoate (2t).

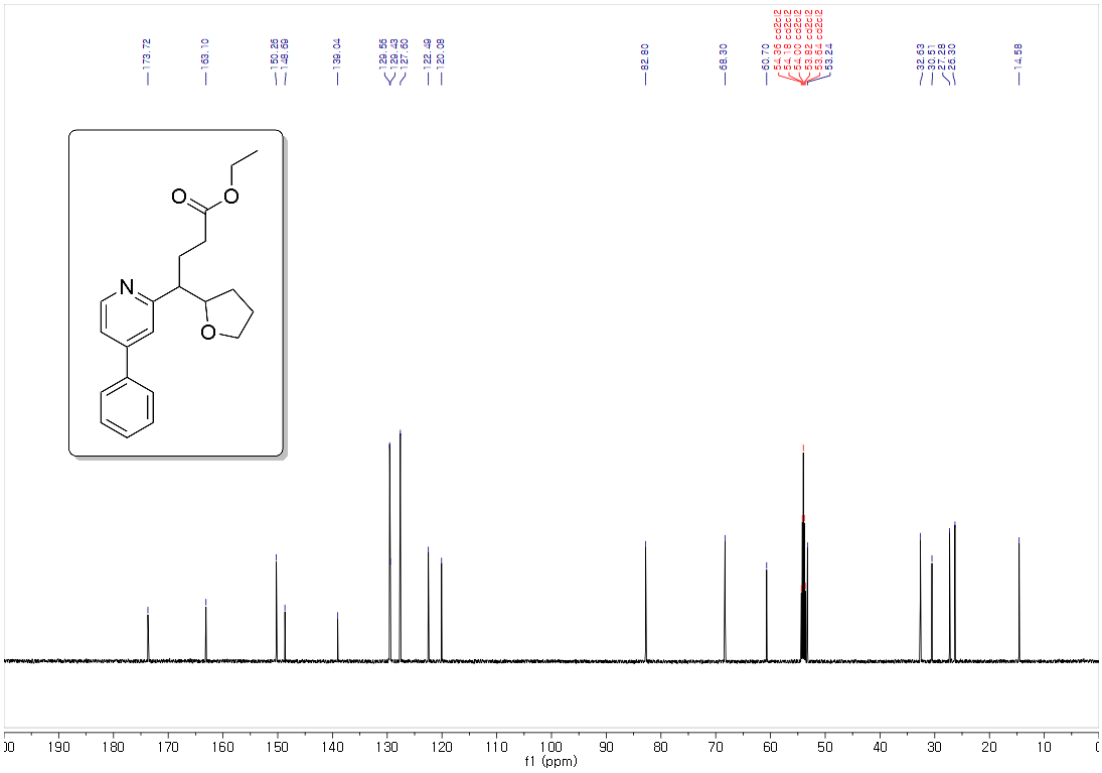
400 MHz, ^{1}H NMR in Methylene Chloride-d_2, major diastereomer



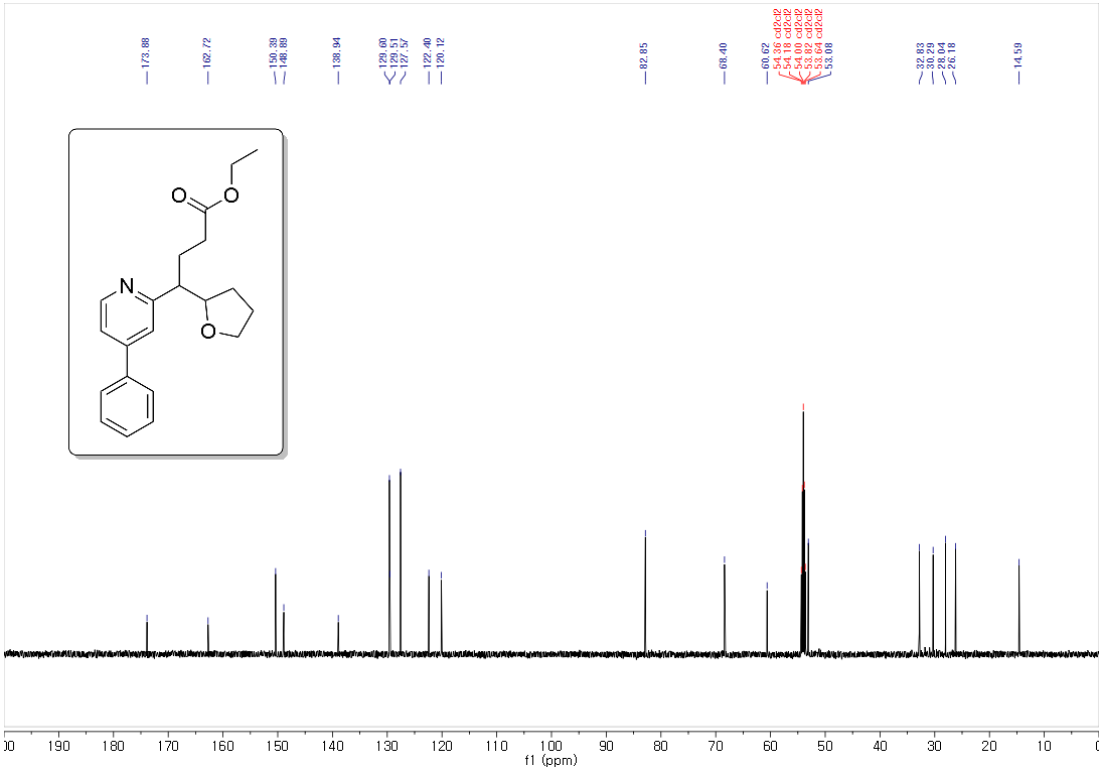
400 MHz, ^{1}H NMR in Methylene Chloride-d_2, minor diastereomer



150 MHz, ^{13}C NMR in Methylene Chloride-d_2, major diastereomer

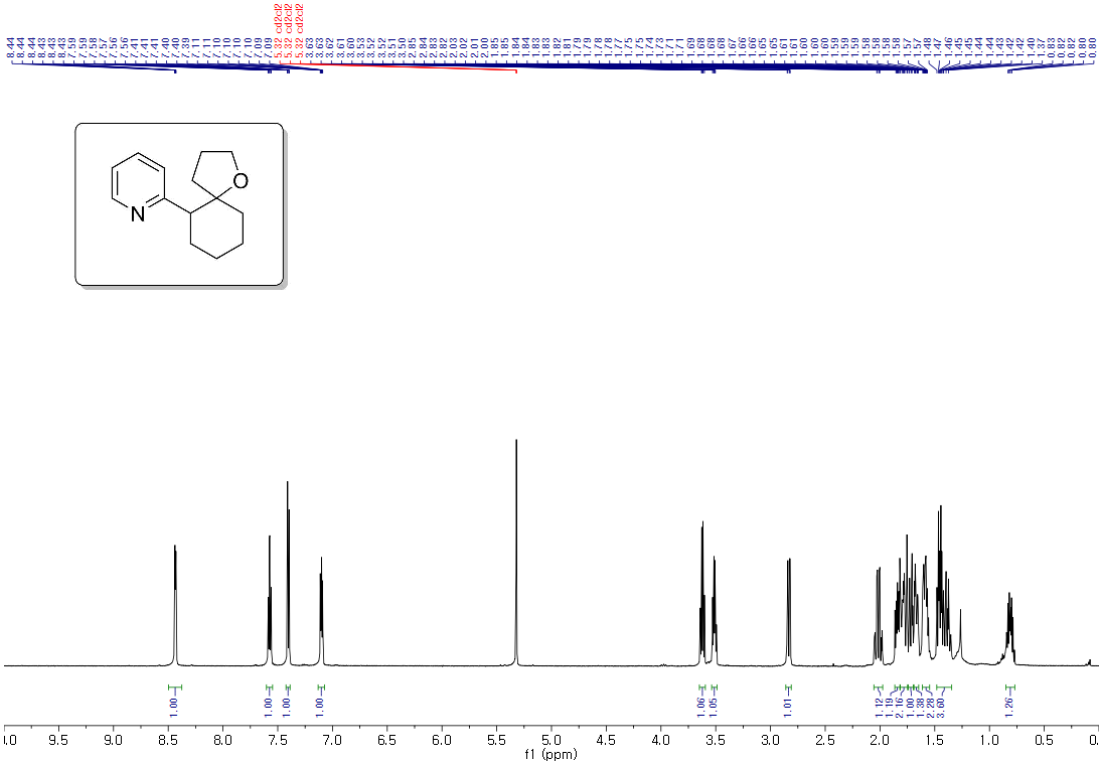


150 MHz, ^{13}C NMR in Methylene Chloride-d_2, minor diastereomer

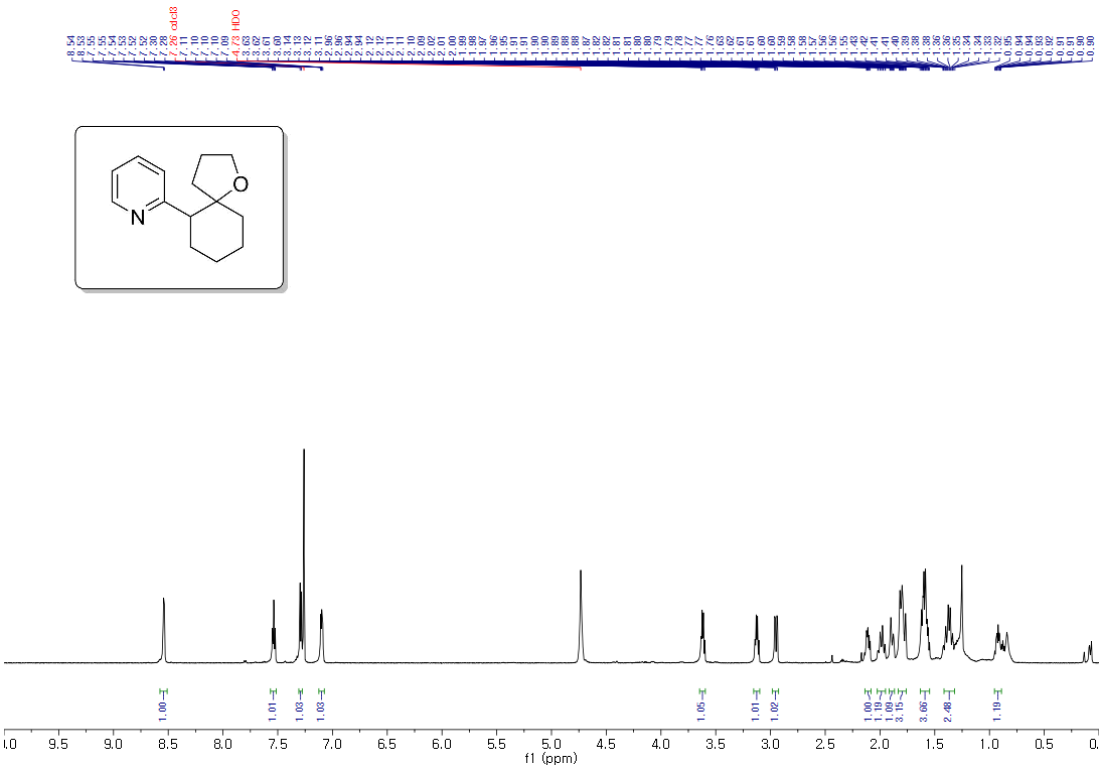


2-(1-oxaspiro[4.5]decan-6-yl)pyridine (2u).

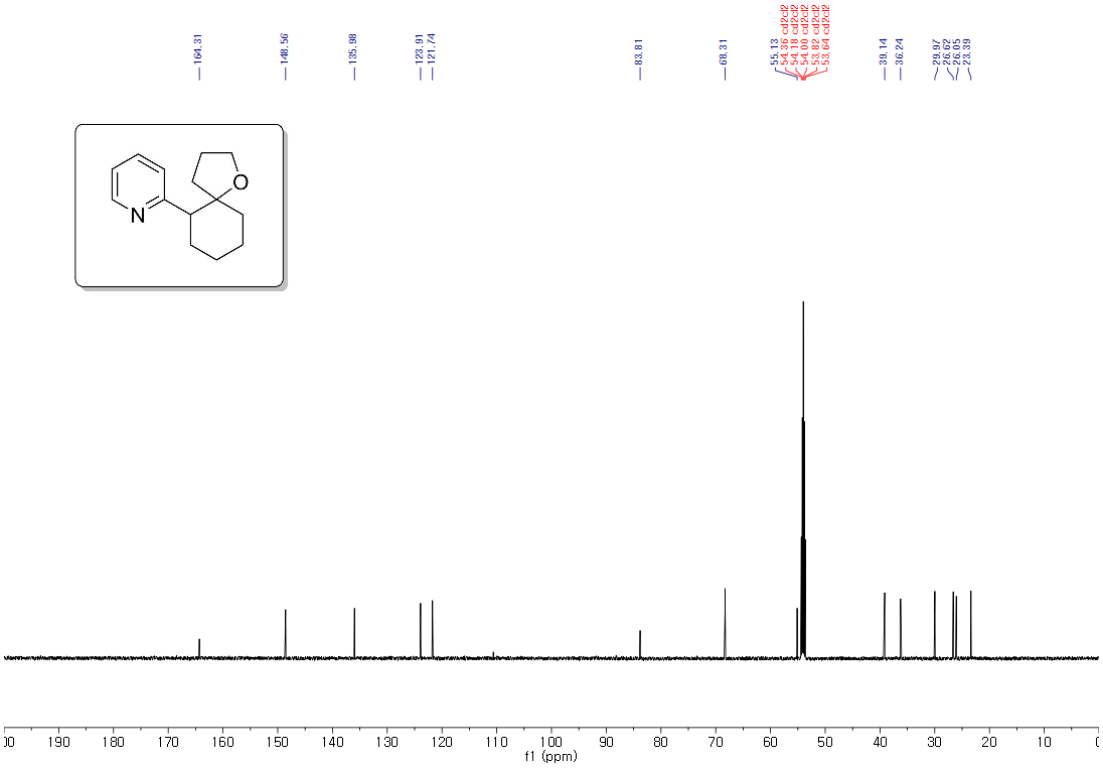
600 MHz, ^{1}H NMR in Methylene Chloride-d_2, major diastereomer



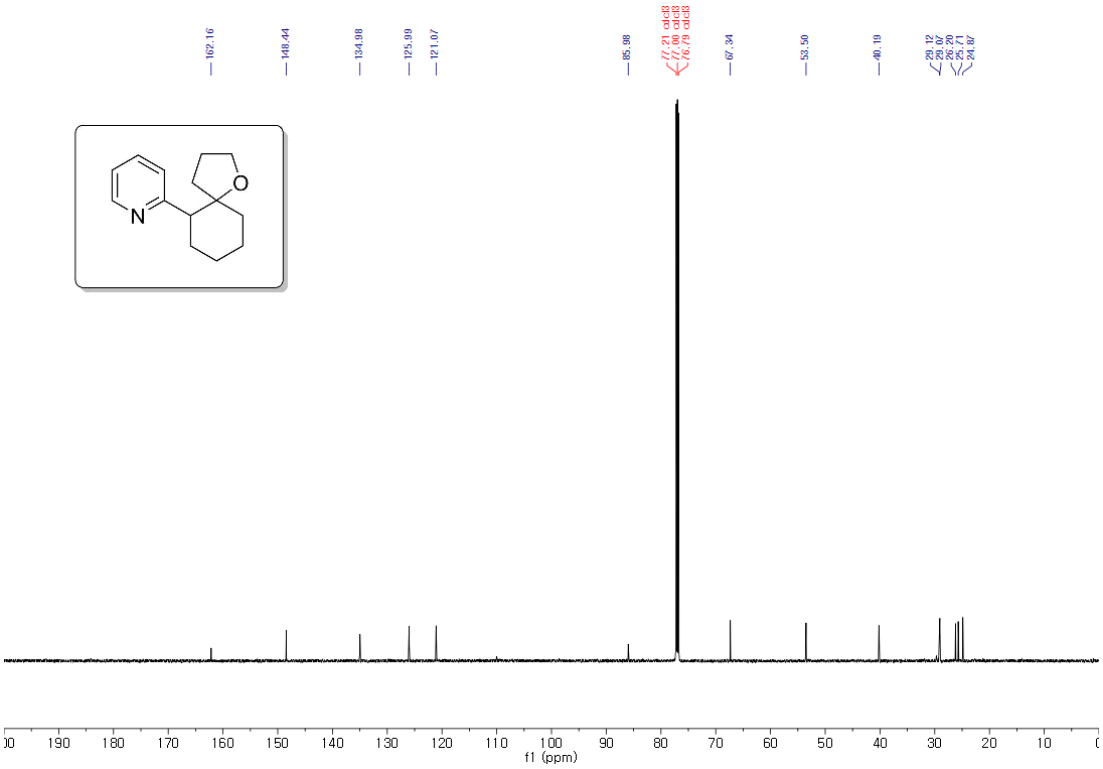
600 MHz, ^{1}H NMR in Chloroform-d, minor diastereomer



150 MHz, ^{13}C NMR in Methylene Chloride-d_2, major diastereomer

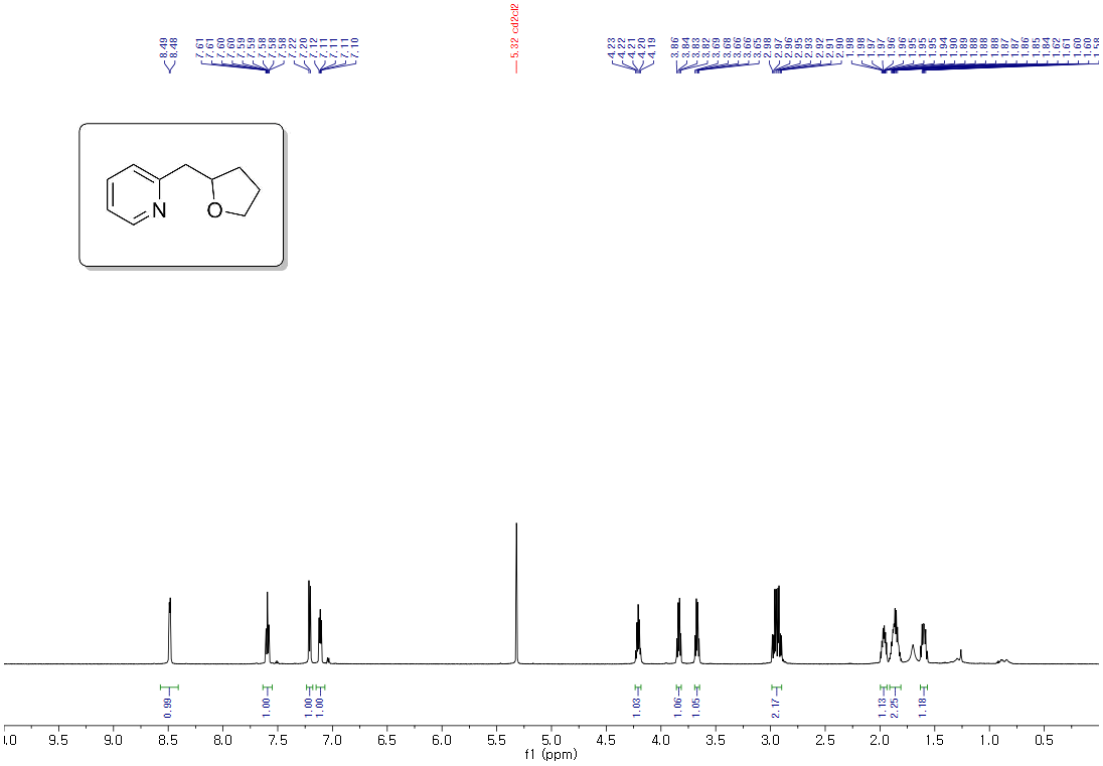


150 MHz, ^{13}C NMR in Chloroform-*d*, minor diastereomer

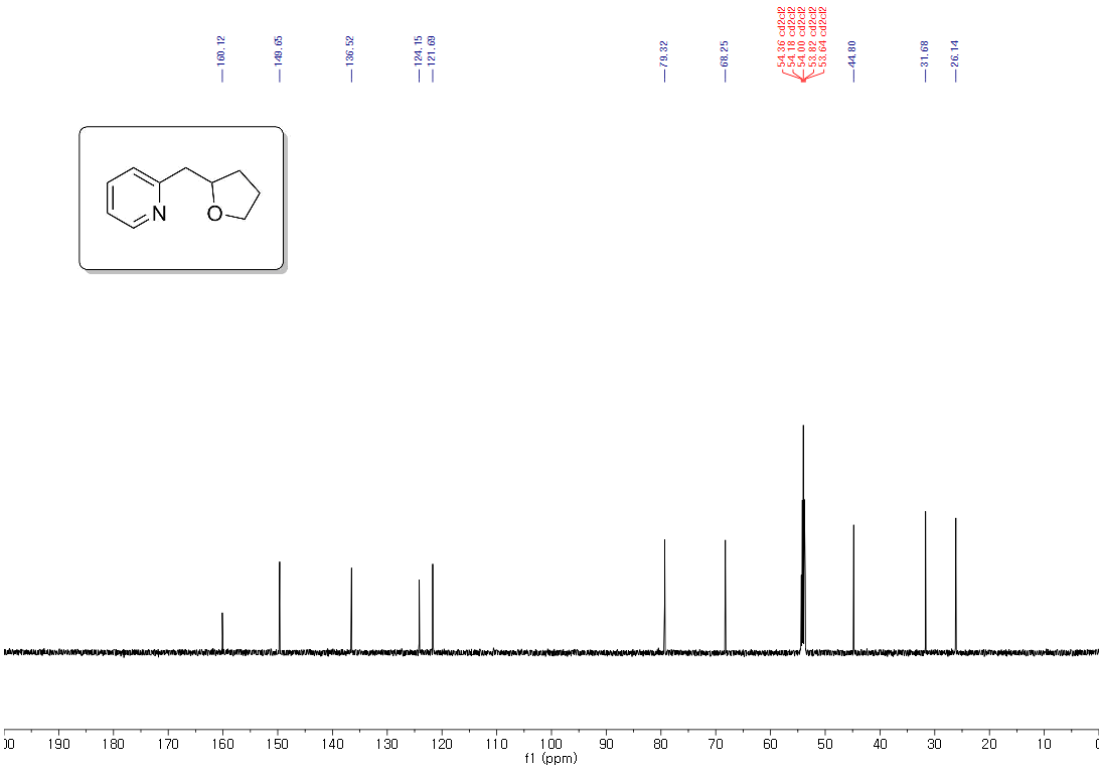


2-((tetrahydrofuran-2-yl)methyl)pyridine (2v).

600 MHz, ^{1}H NMR in Methylene Chloride-d_2

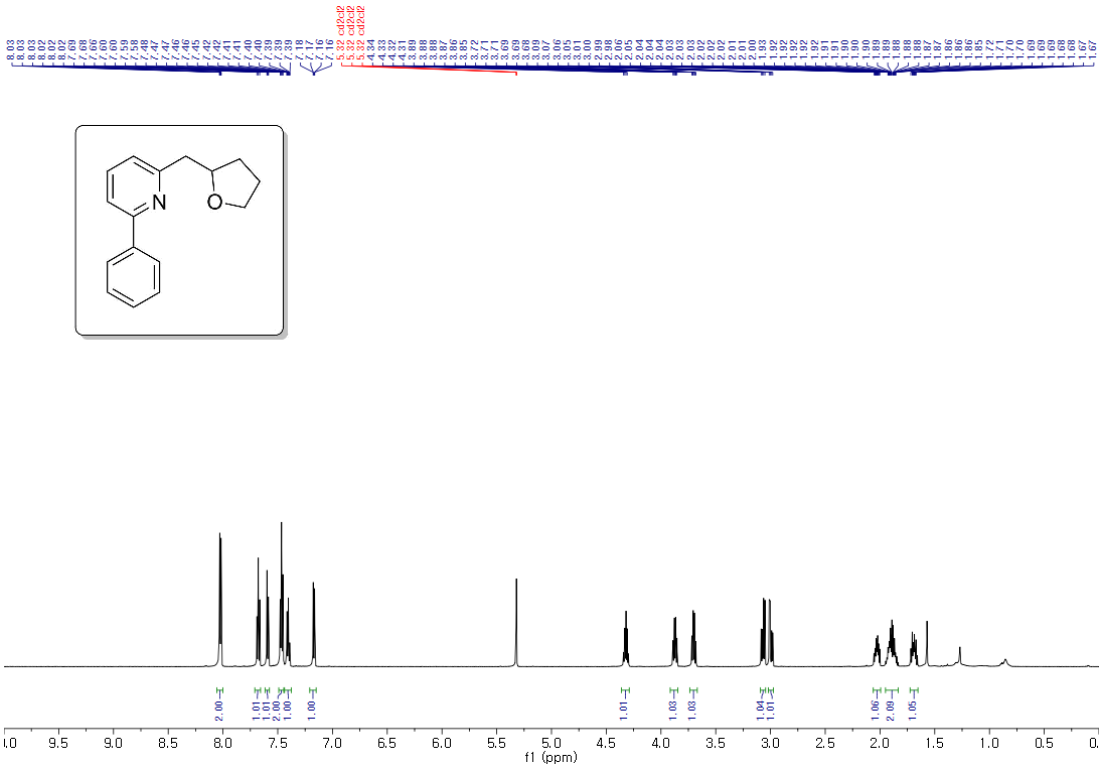


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

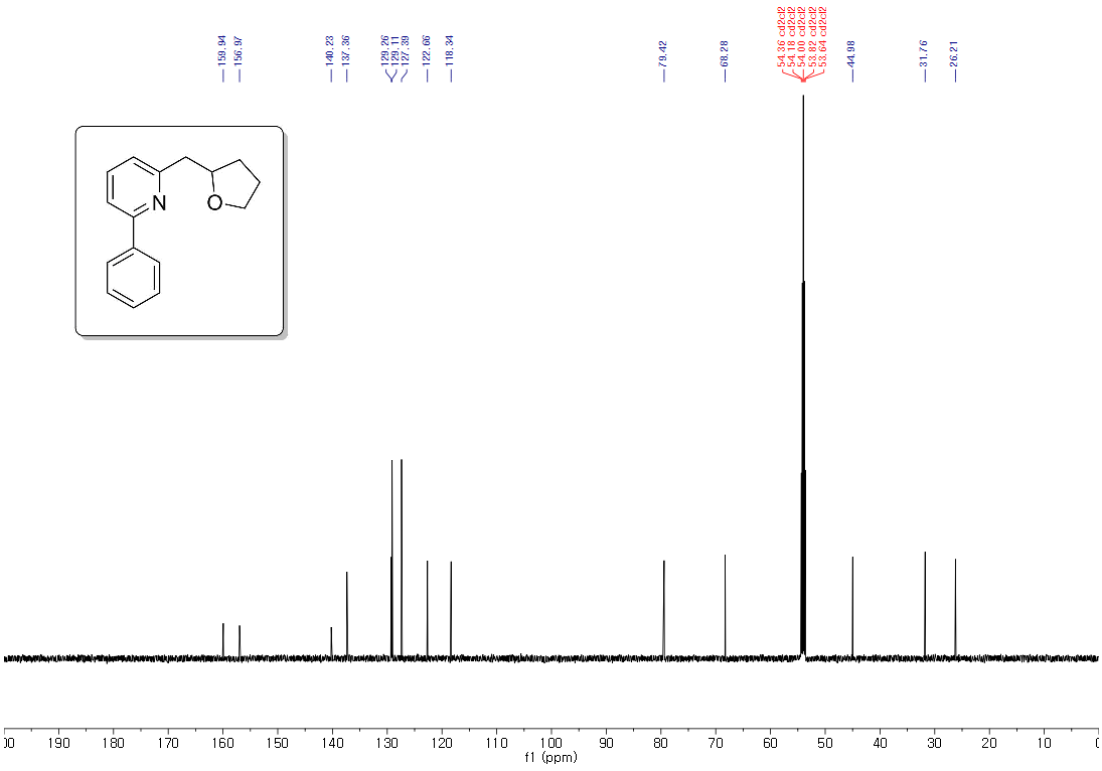


2-phenyl-6-((tetrahydrofuran-2-yl)methyl)pyridine (2w).

600 MHz, ^{1}H NMR in Methylene Chloride-d_2

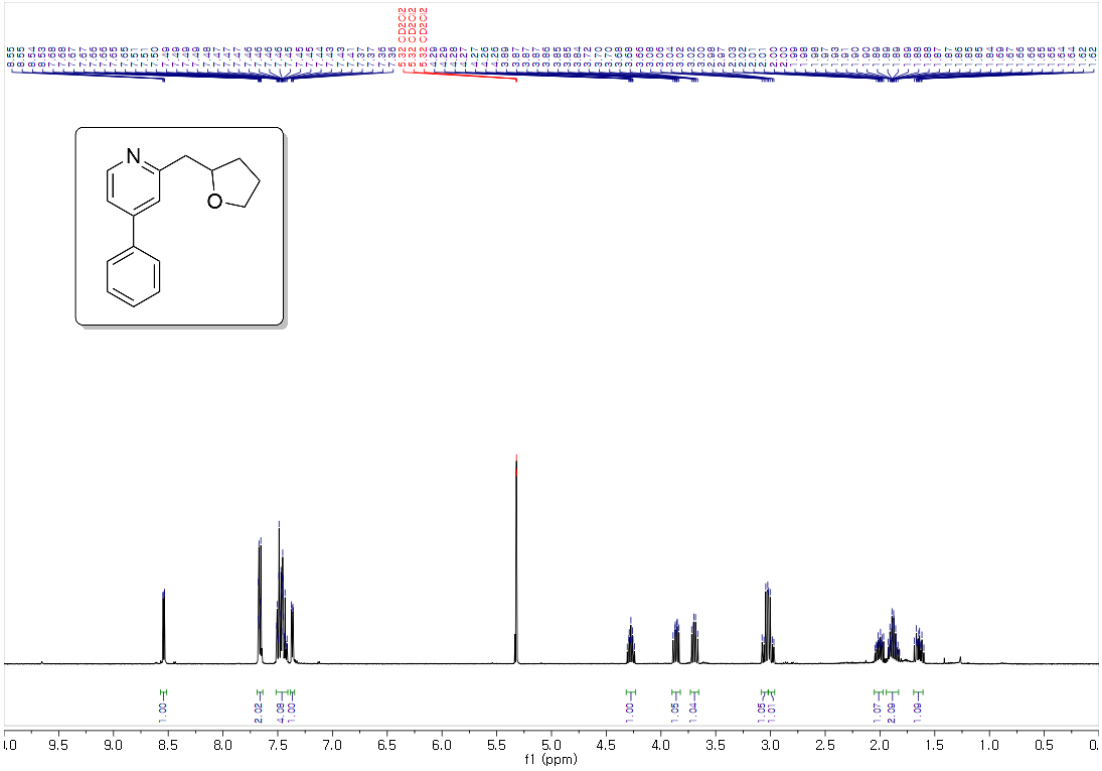


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

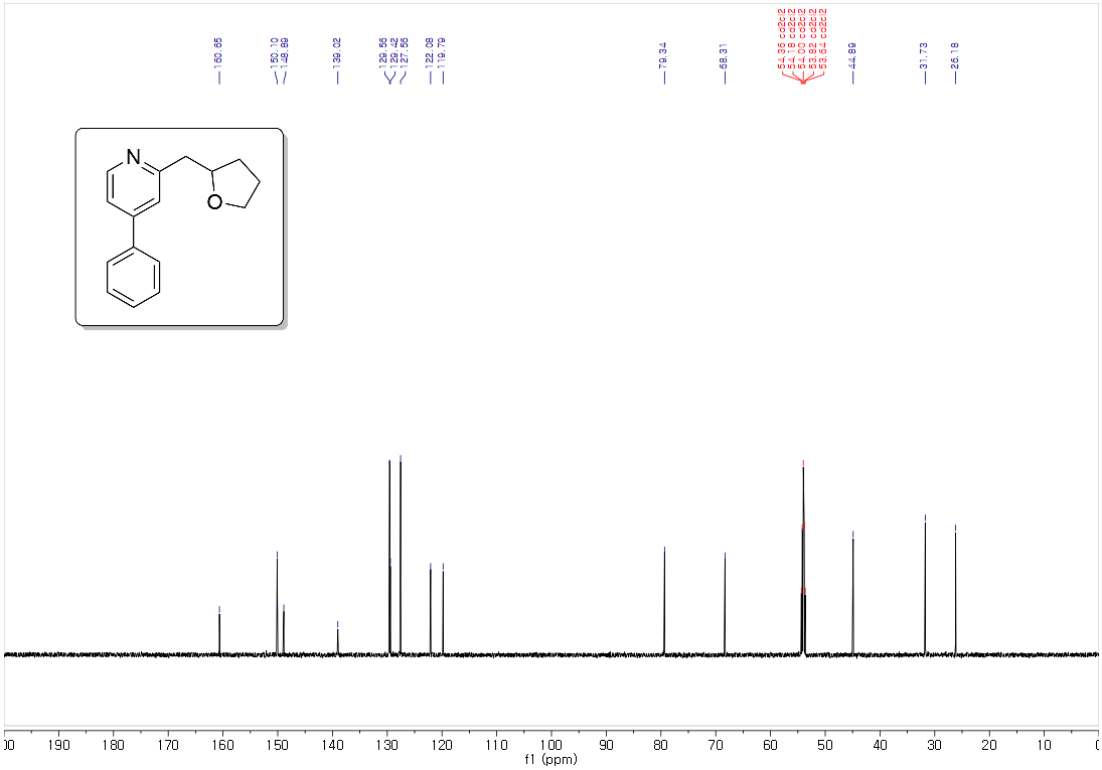


4-phenyl-2-((tetrahydrofuran-2-yl)methyl)pyridine (2x).

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

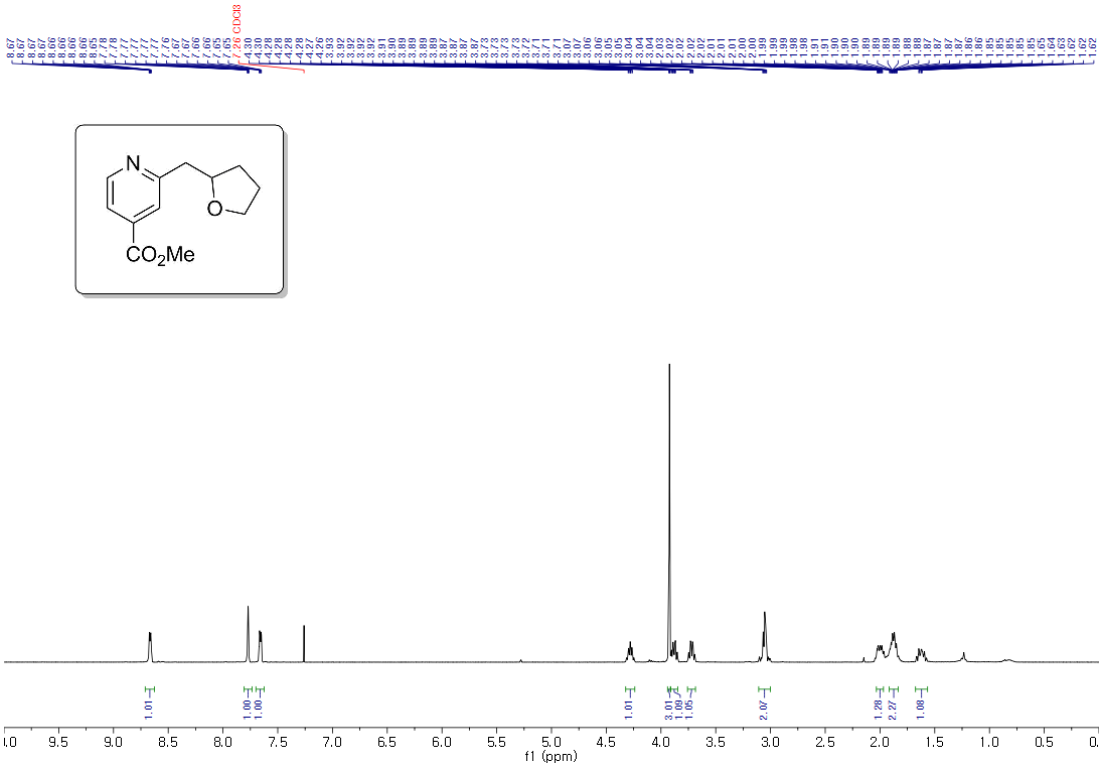


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

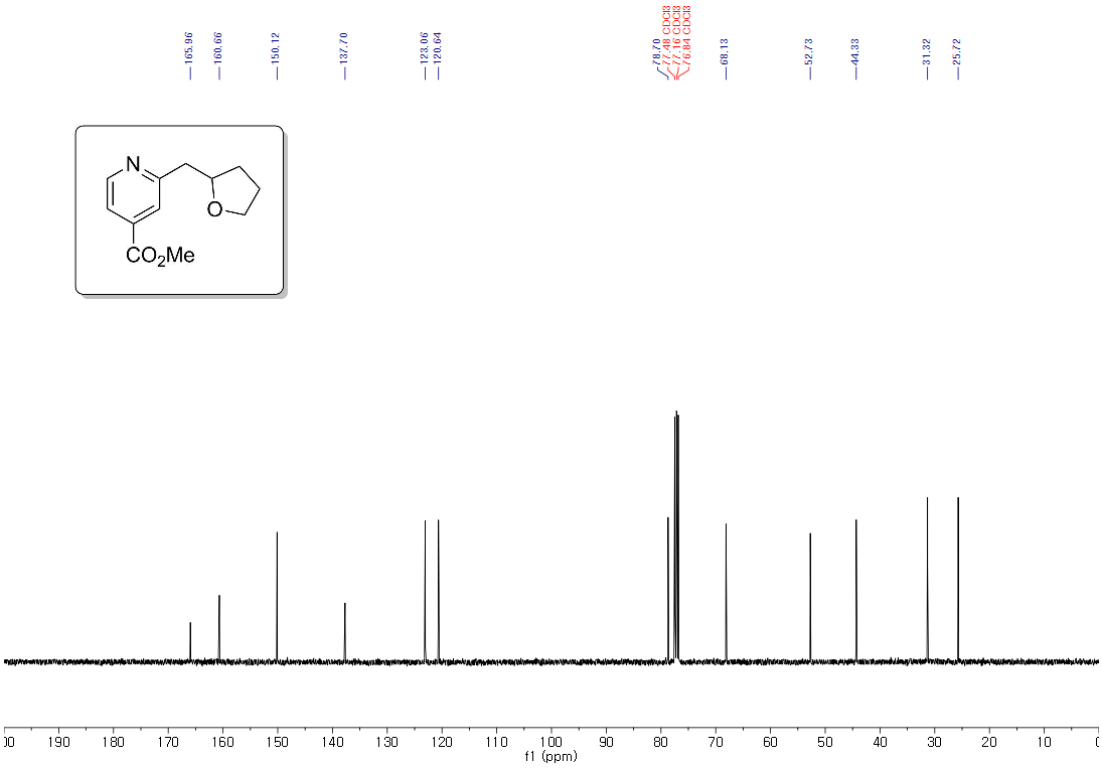


methyl 2-((tetrahydrofuran-2-yl)methyl)isonicotinate (2y).

400 MHz, ^{1}H NMR in Chloroform-*d*

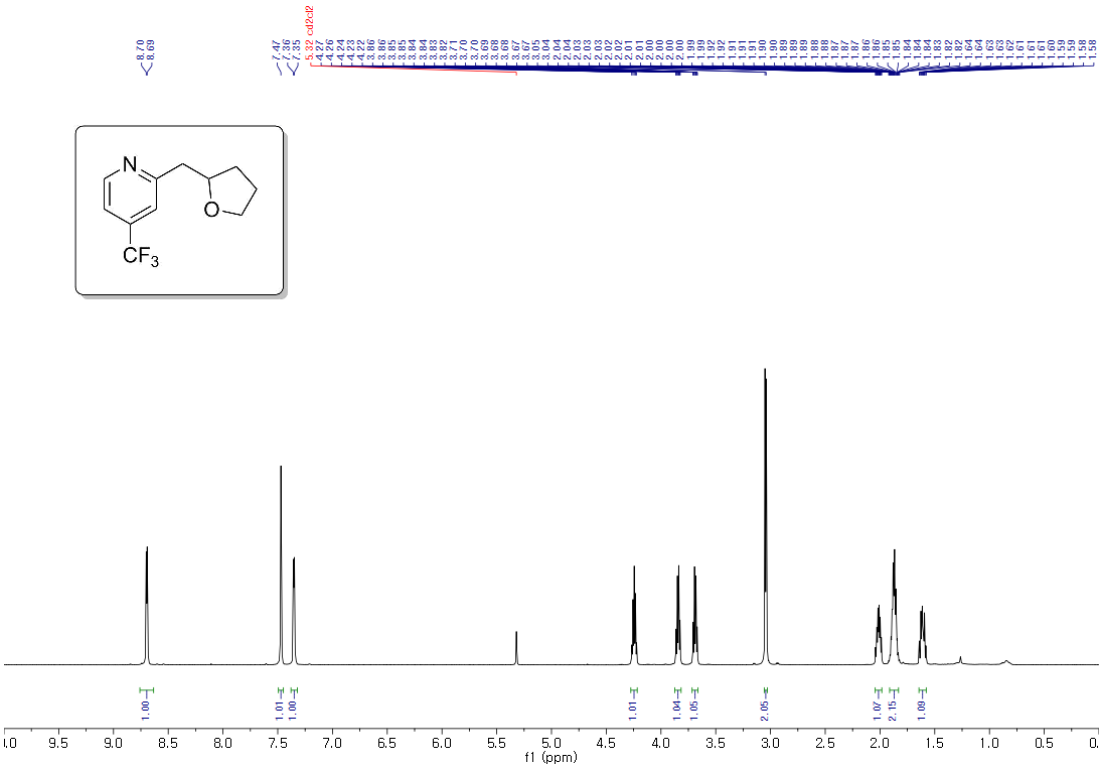


100 MHz, ^{13}C NMR in Chloroform-*d*

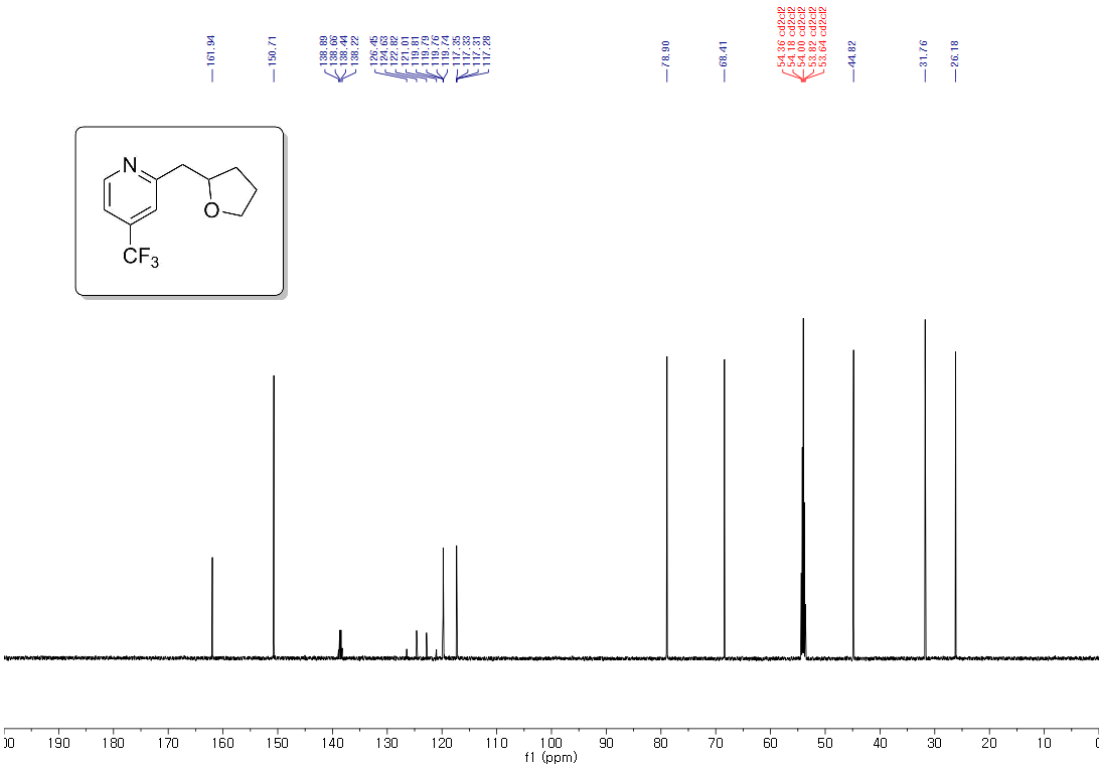


2-((tetrahydrofuran-2-yl)methyl)-4-(trifluoromethyl)pyridine (2z).

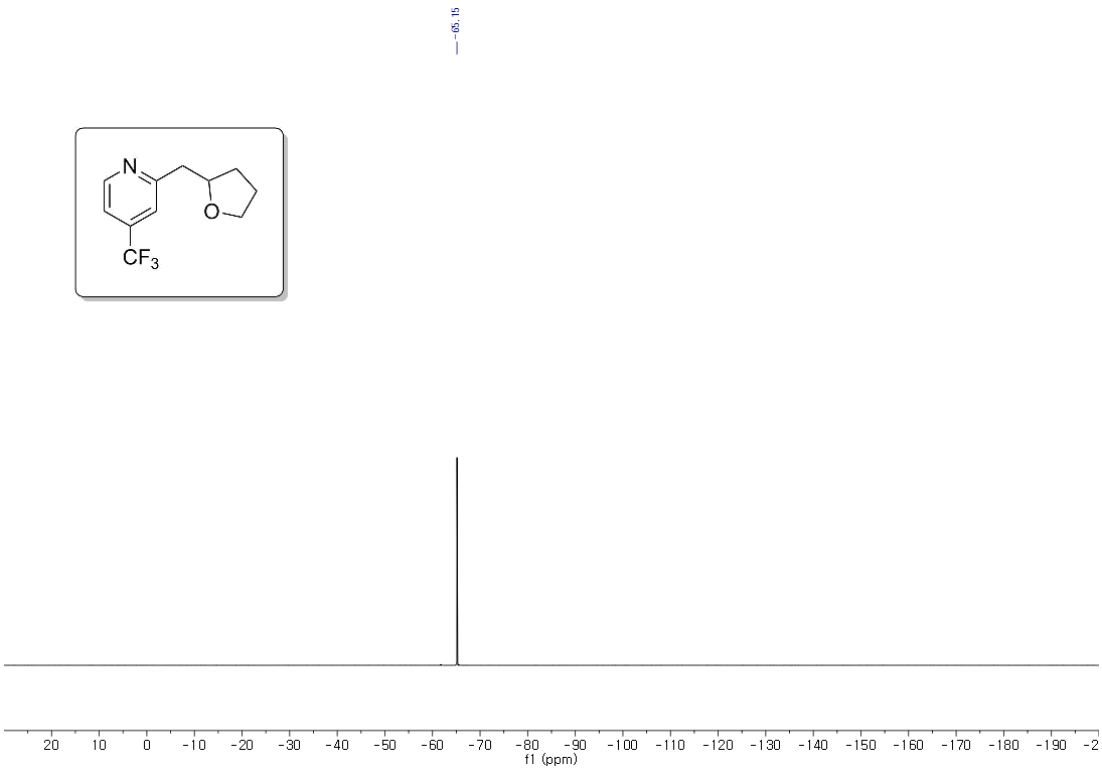
^{1}H NMR (600 MHz, Methylene Chloride-d_2)



^{13}C NMR (150 MHz, Methylene Chloride-d_2)

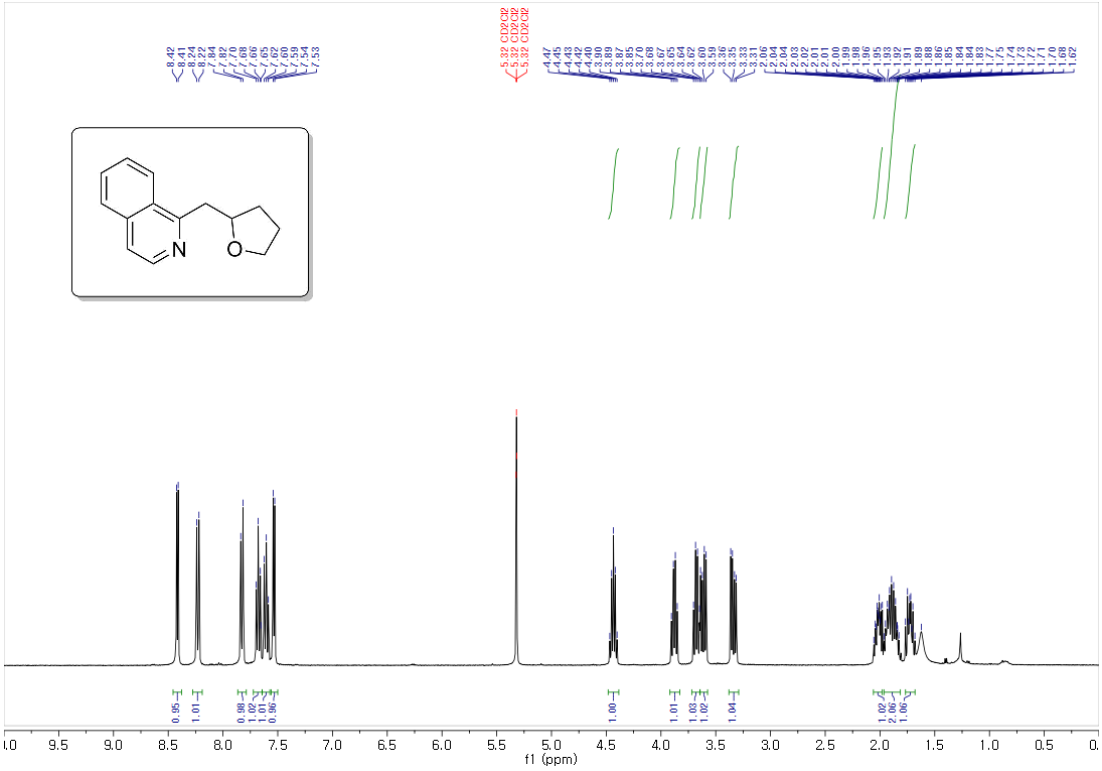


^{19}F NMR (564 MHz, Methylene Chloride-d_2)

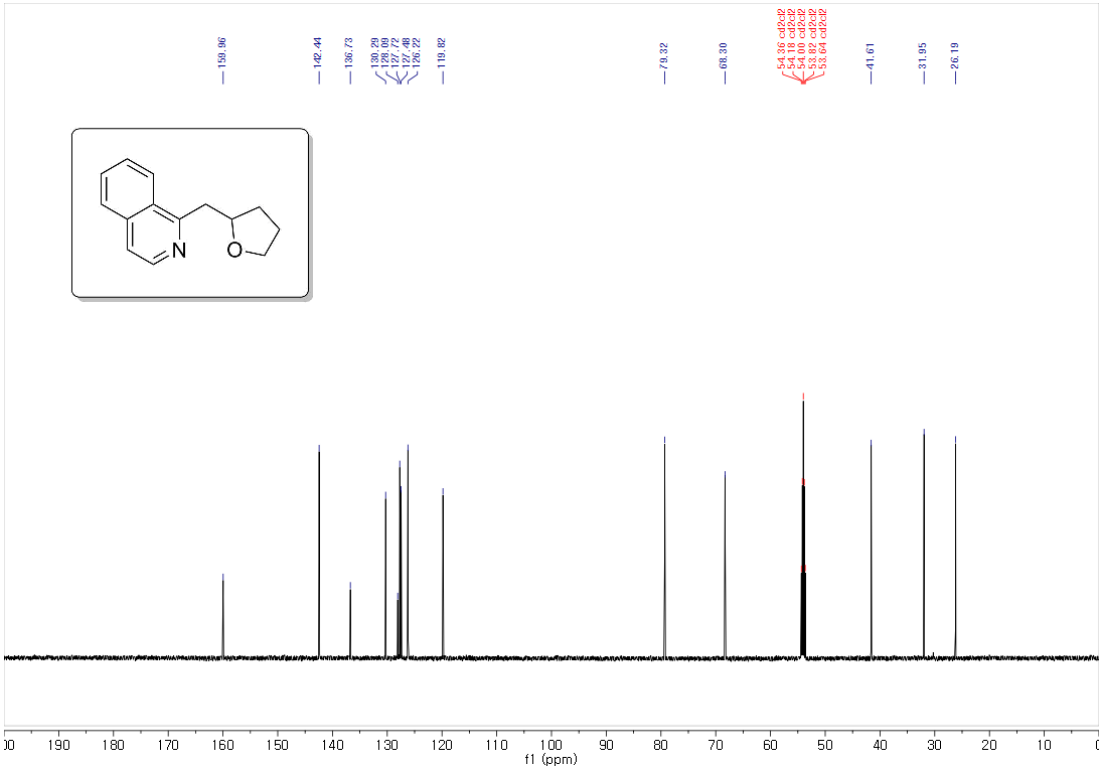


1-((tetrahydrofuran-2-yl)methyl)isoquinoline (2aa).

400 MHz, ^{1}H NMR in Methylene Chloride-d_2

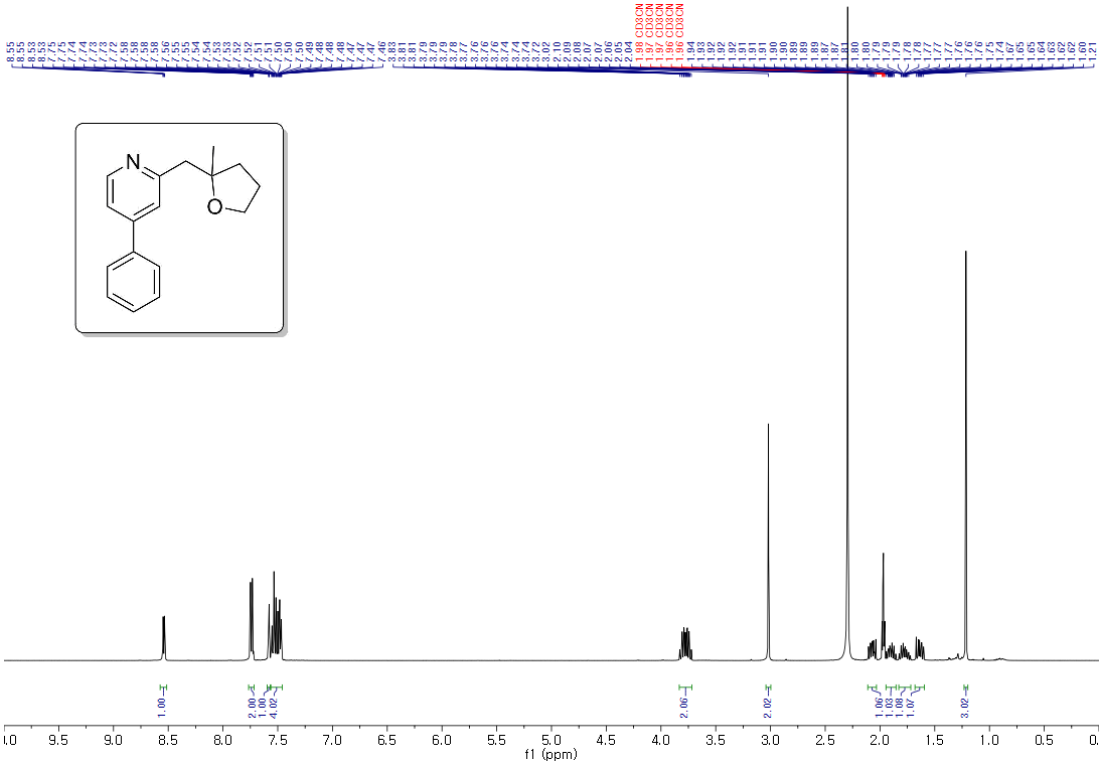


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

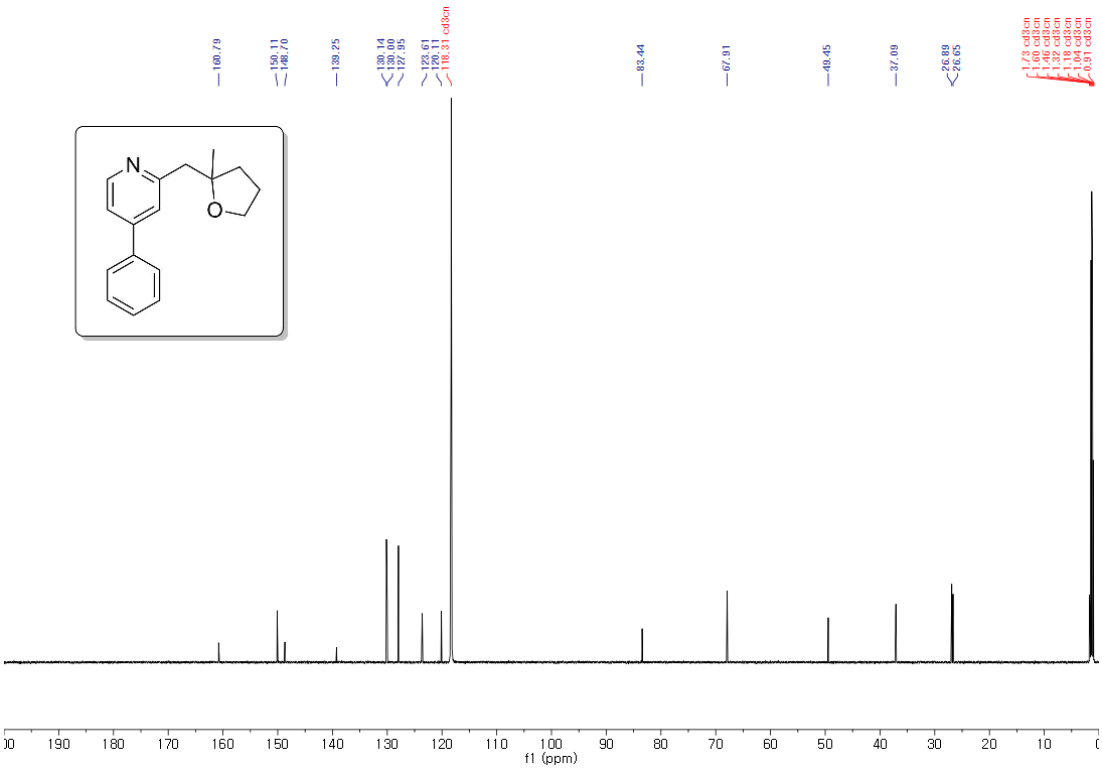


2-((2-methyltetrahydrofuran-2-yl)methyl)-4-phenylpyridine (2ab).

400 MHz, ^{1}H NMR in Acetonitrile-d_3

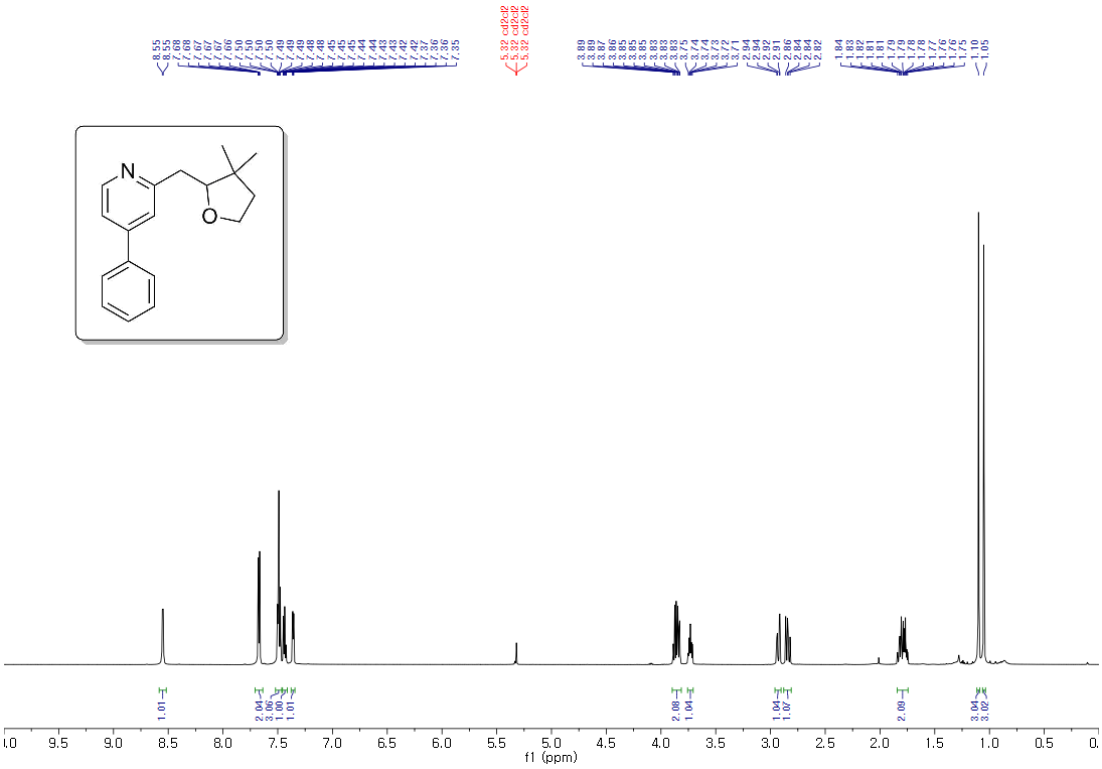


150 MHz, ^{13}C NMR in Acetonitrile-d_3

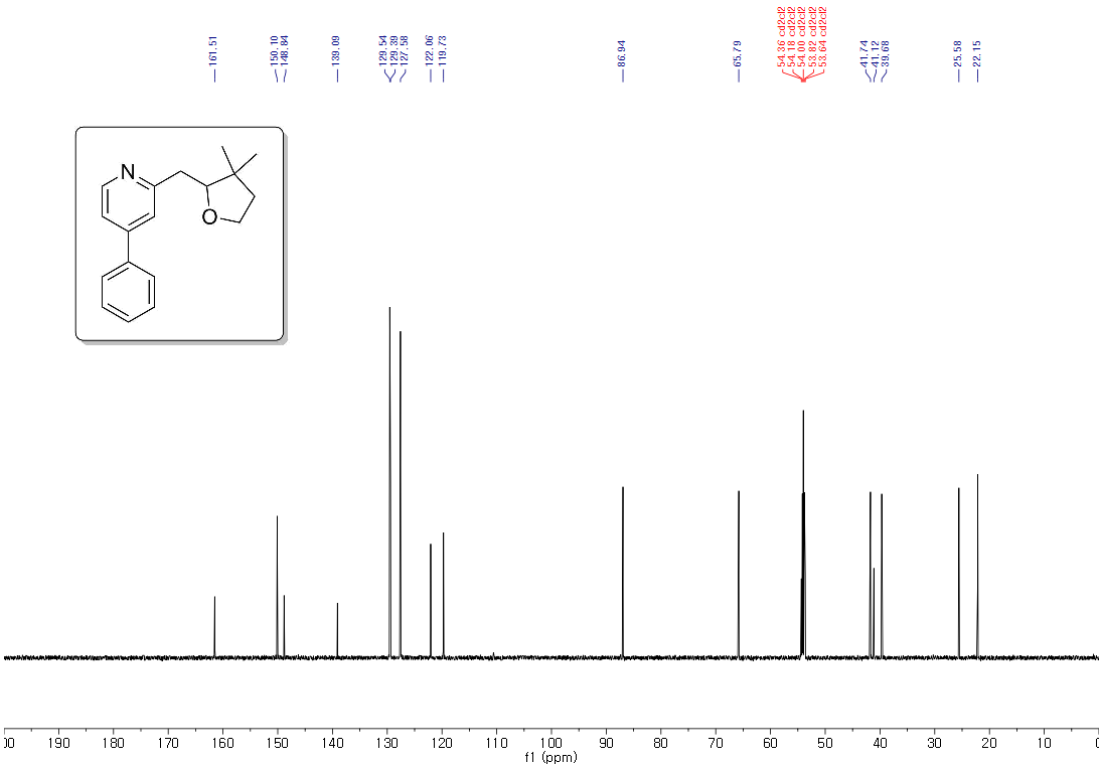


2-((3,3-dimethyltetrahydrofuran-2-yl)methyl)-4-phenylpyridine (2ac).

600 MHz, ^{1}H NMR in Methylene Chloride-d_2

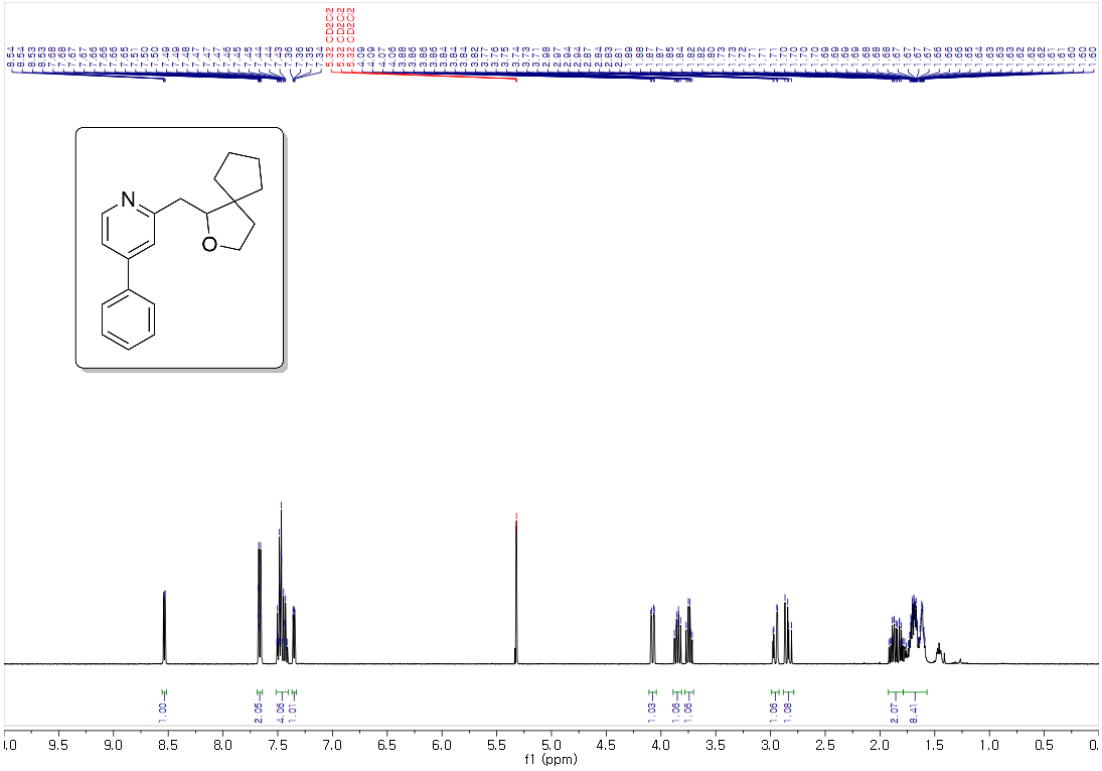


150 MHz, ^{13}C NMR in Methylene Chloride-d_2

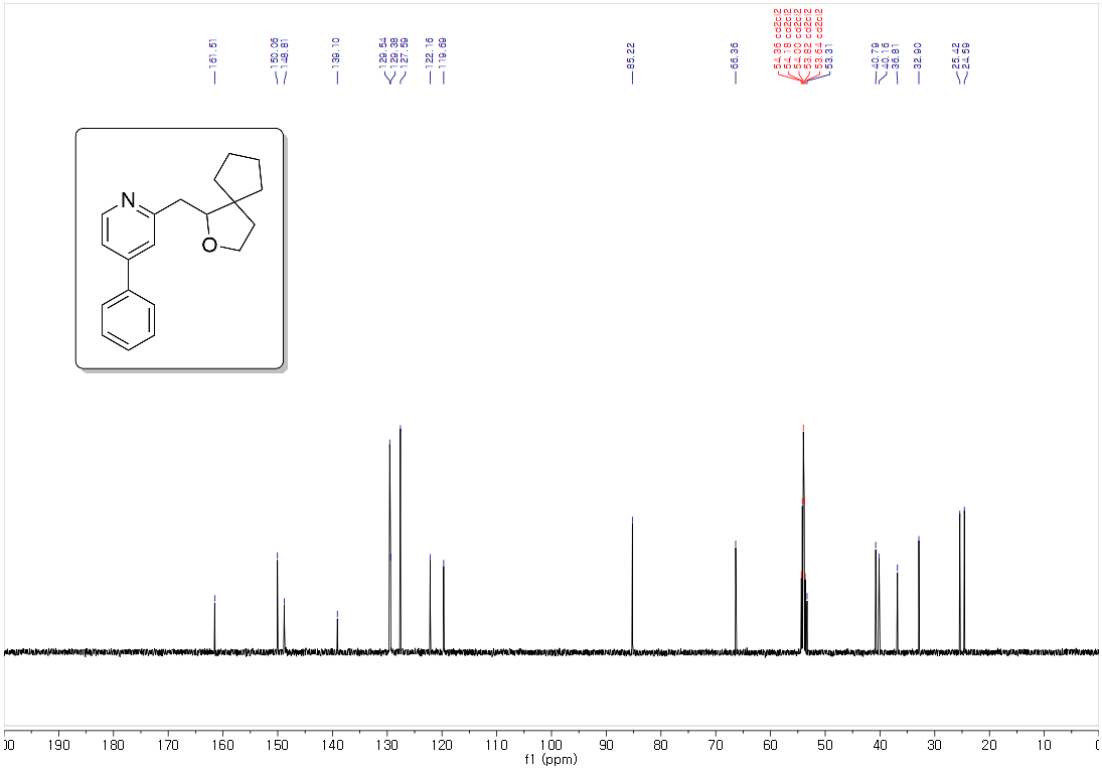


2-((2-oxaspiro[4.4]nonan-1-yl)methyl)-4-phenylpyridine (2ad).

400 MHz, ^{1}H NMR in Methylene Chloride-d_2



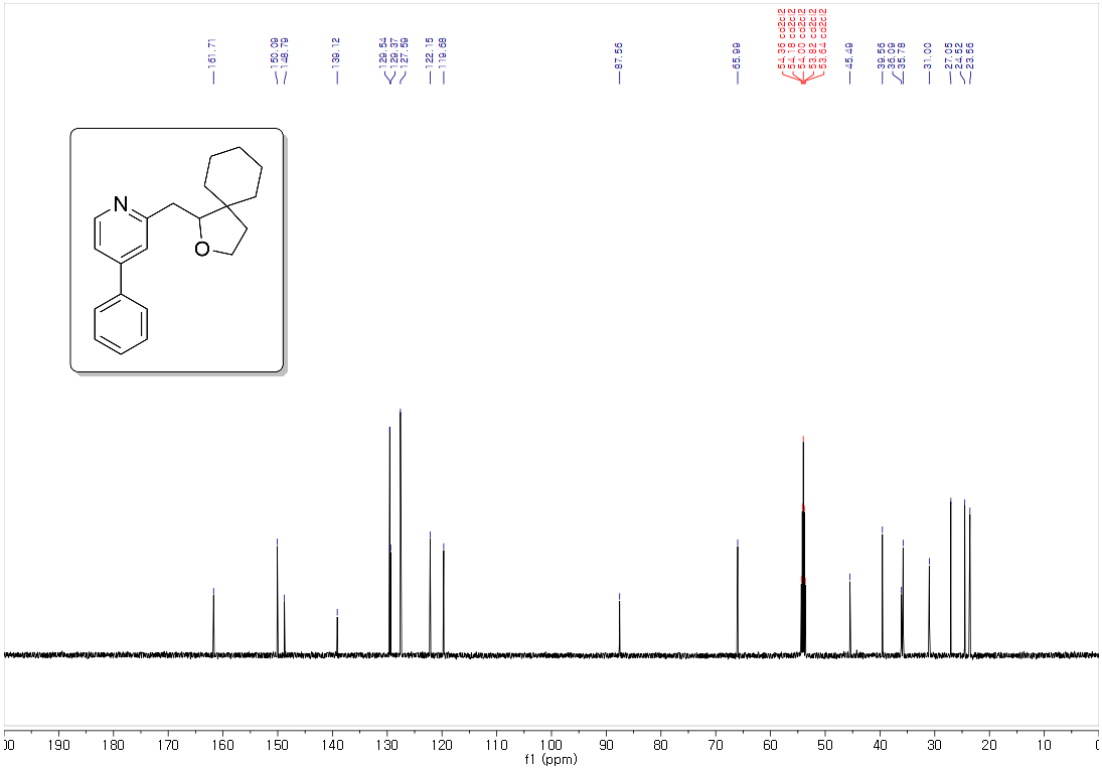
150 MHz, ^{13}C NMR in Methylene Chloride-d_2



2-((2-oxaspiro[4.5]decan-1-yl)methyl)-4-phenylpyridine (2ae).

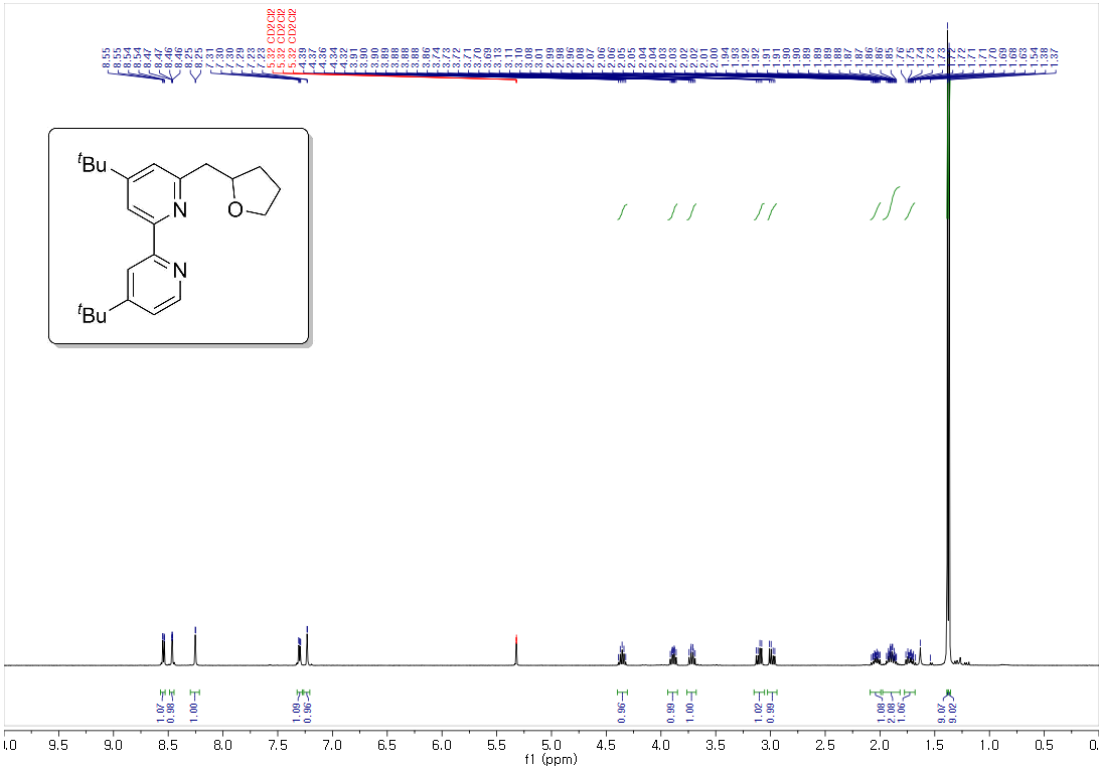
400 MHz, ^{1}H NMR in Methylene Chloride-d_2

150 MHz, ^{13}C NMR in Methylene Chloride-d_2

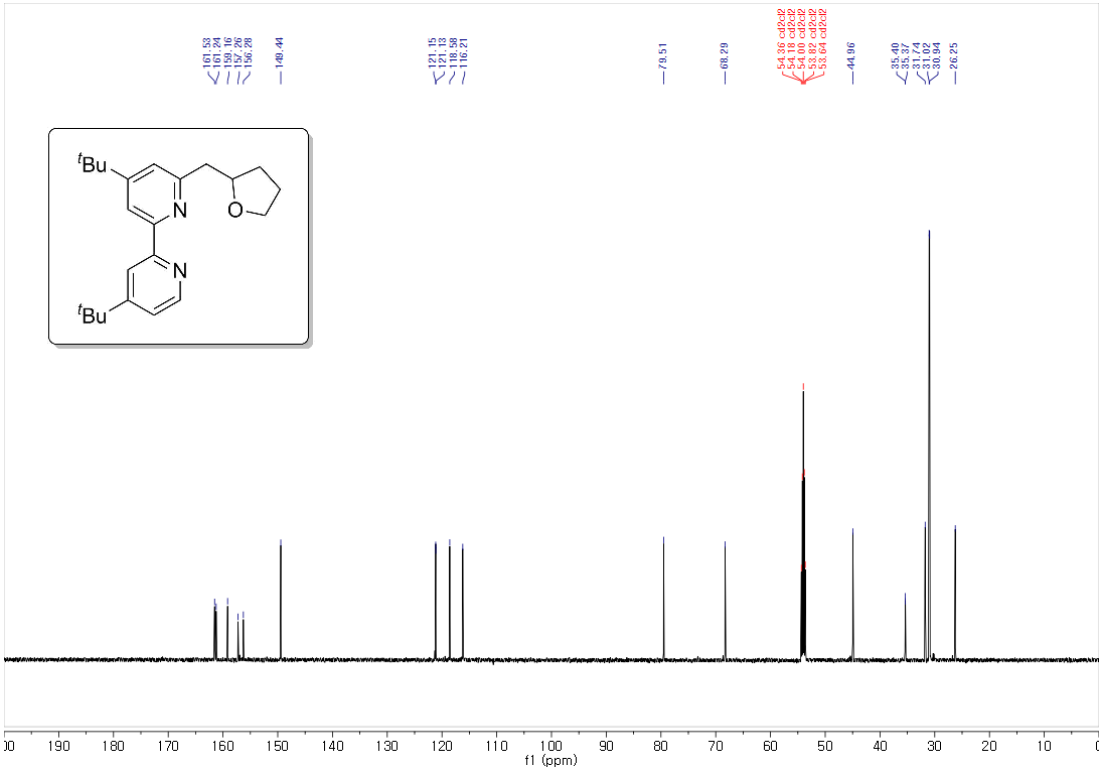


4,4'-di-tert-butyl-6-((tetrahydrofuran-2-yl)methyl)-2,2'-bipyridine (2af).

400 MHz, ^{1}H NMR in Methylene Chloride-*d*$_2$

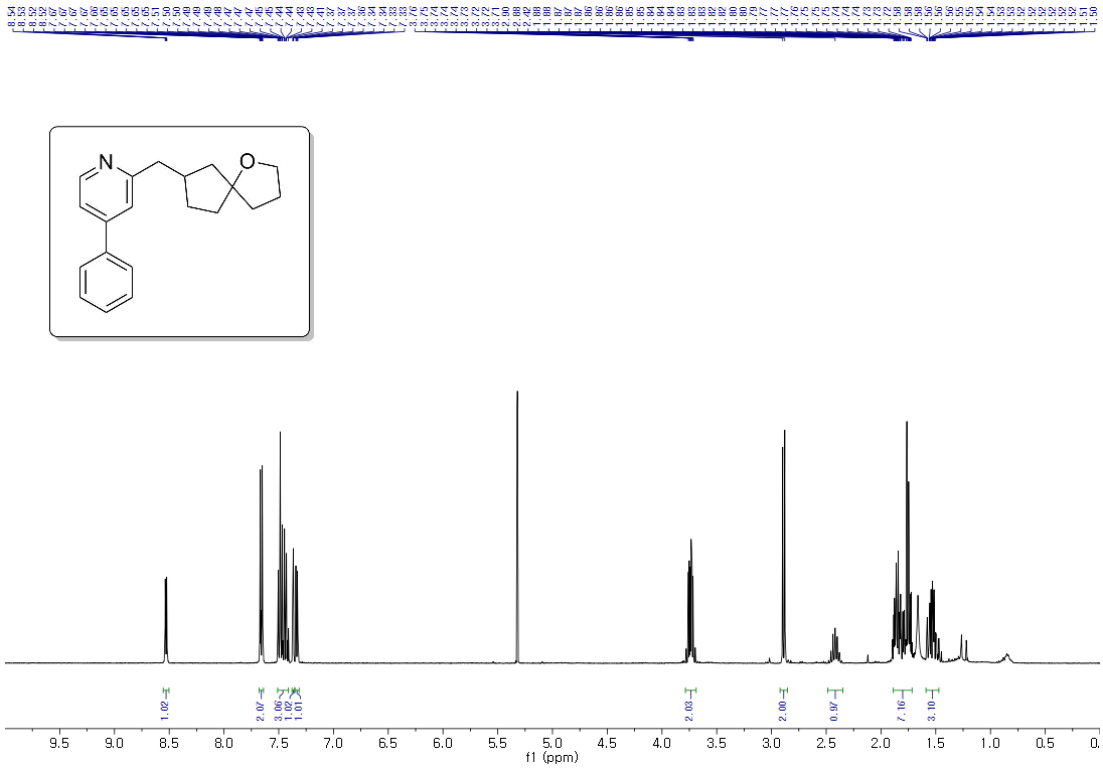


150 MHz, ^{13}C NMR in Methylene Chloride-*d*$_2$

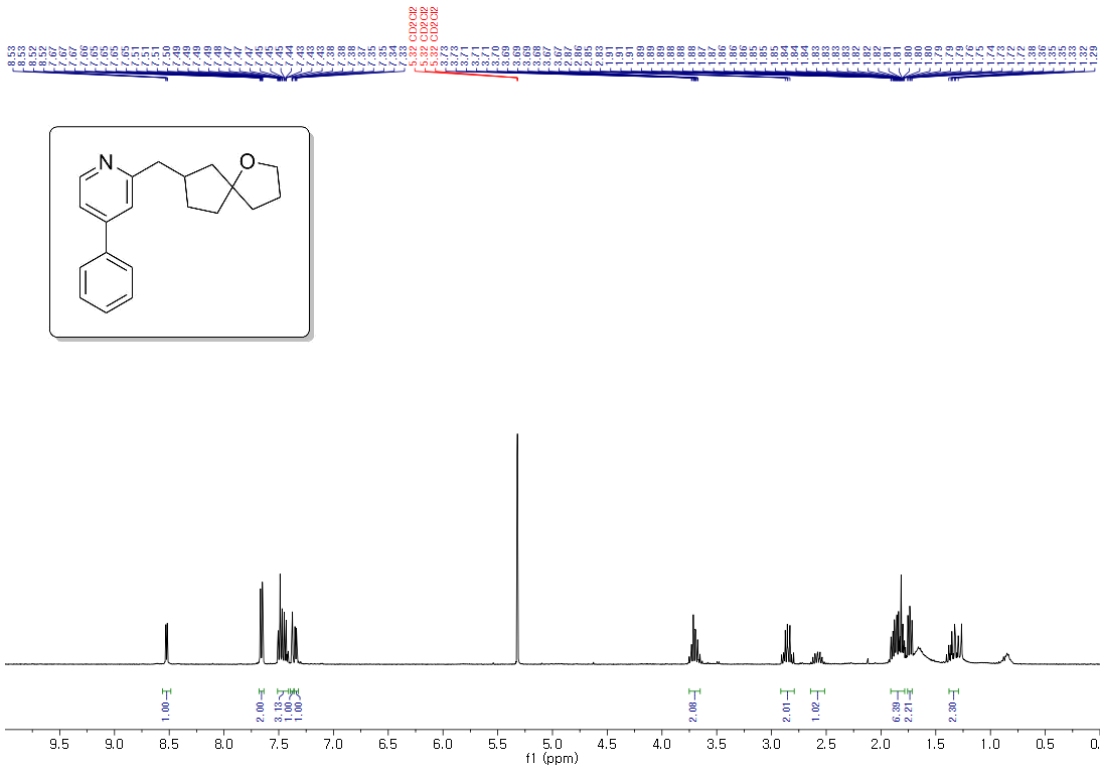


2-((1-oxaspiro[4.4]nonan-2-yl)methyl)-4-phenylpyridine (4a).

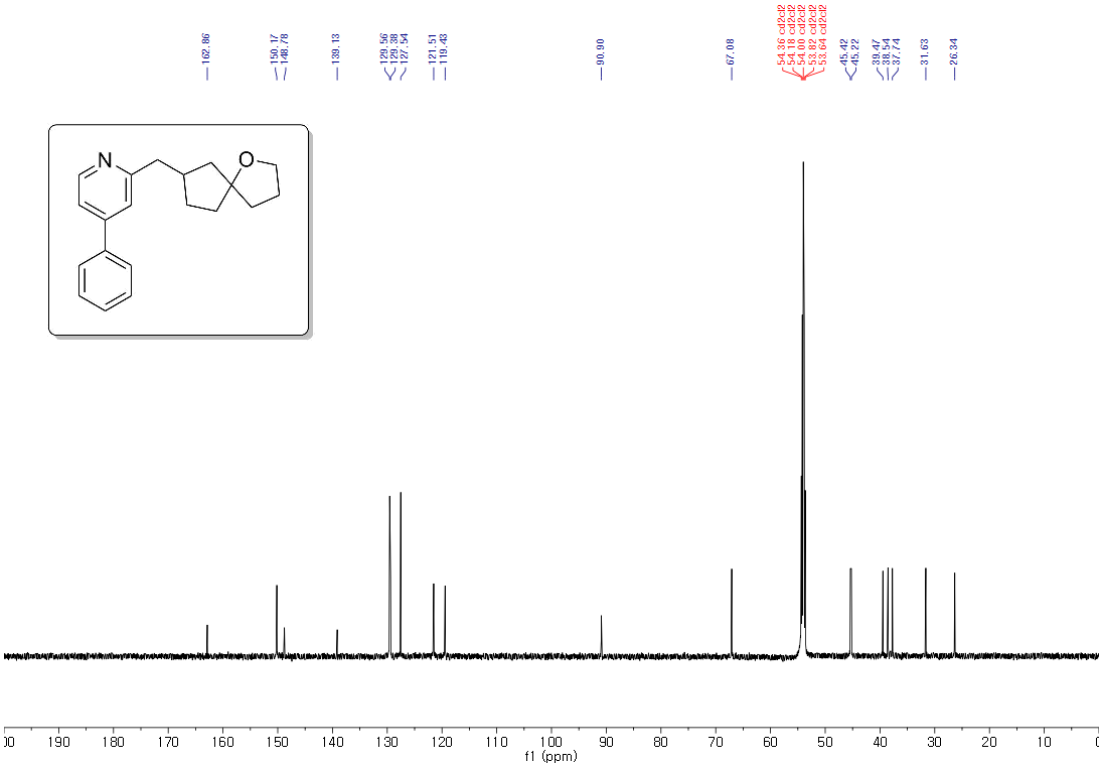
400 MHz, ^{1}H NMR in Methylene Chloride-d_2, diastereomer A



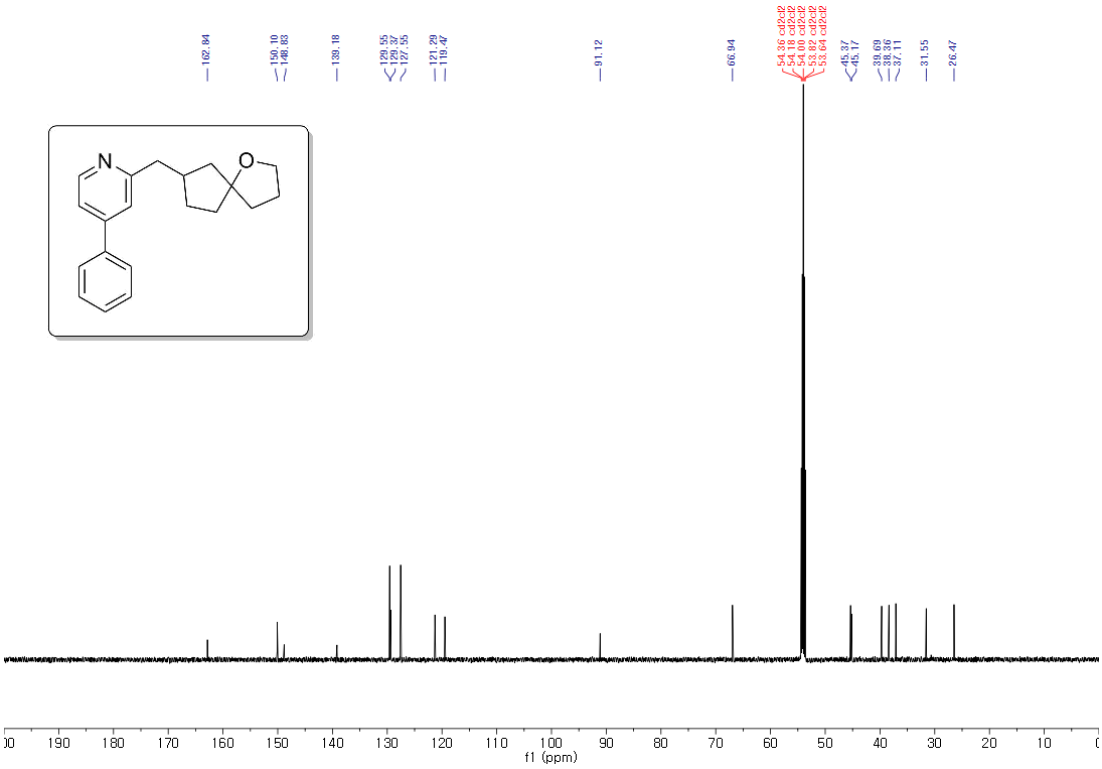
400 MHz, ^{1}H NMR in Methylene Chloride-d_2, diastereomer B



150 MHz, ^{13}C NMR in Methylene Chloride-d_2, diastereomer A

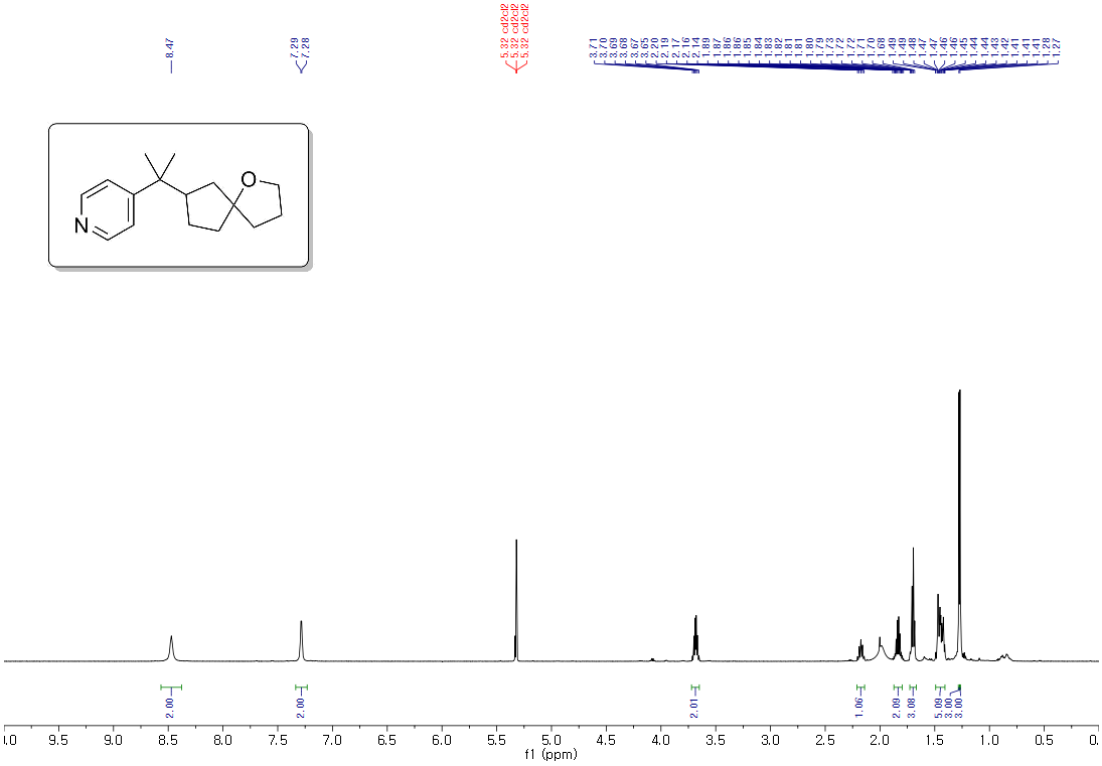


150 MHz, ^{13}C NMR in Methylene Chloride-d_2, diastereomer B

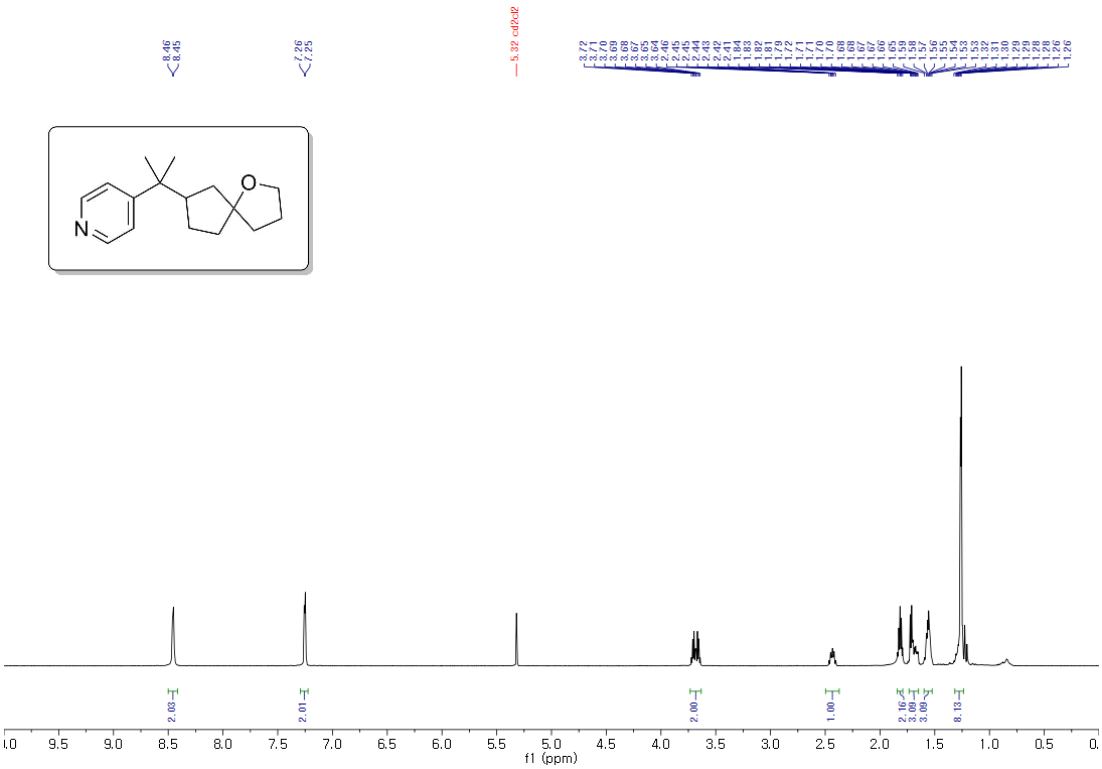


4-(2-(1-oxaspiro[4.4]nonan-7-yl)propan-2-yl)pyridine (4b).

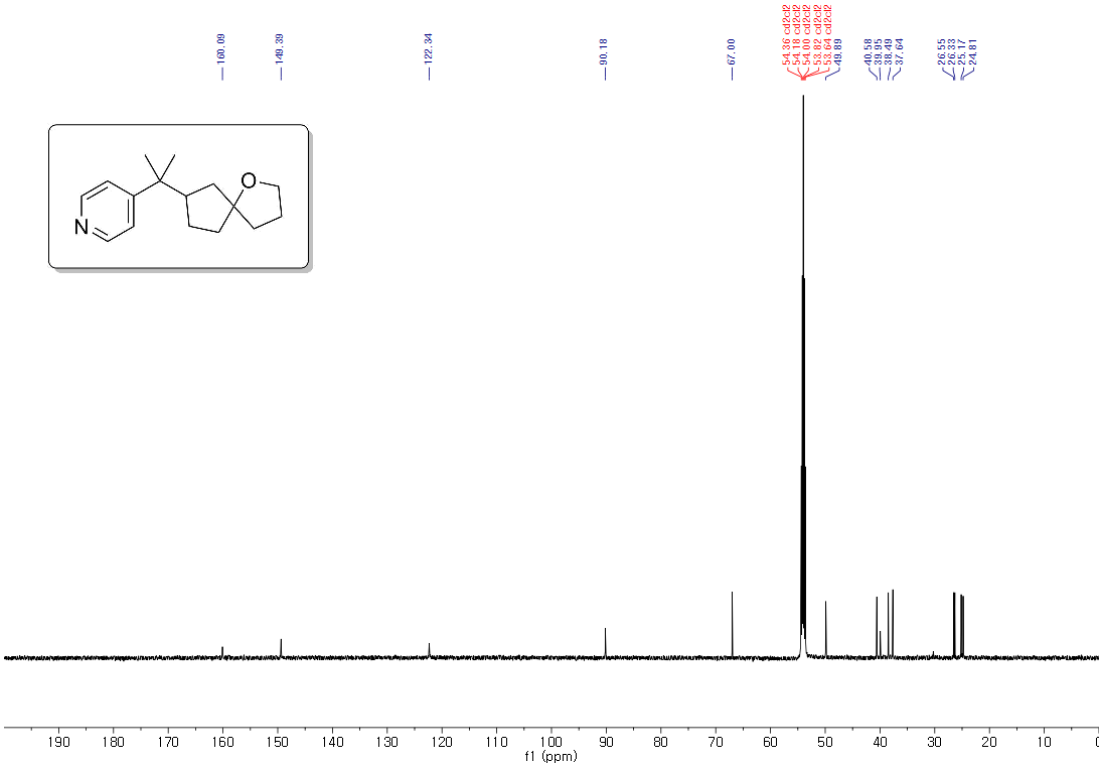
600 MHz, ^{1}H NMR in Methylene Chloride-d_2, diastereomer A



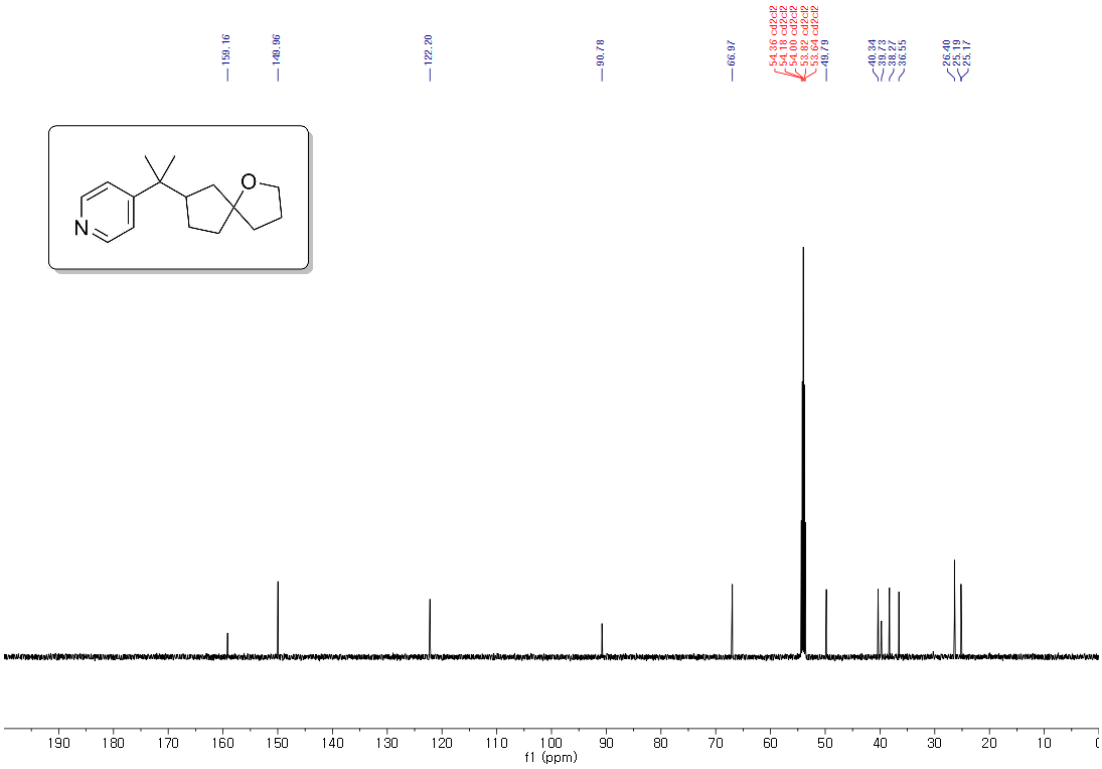
600 MHz, ^{1}H NMR in Methylene Chloride-d_2, diastereomer B



150 MHz, ^{13}C NMR in Methylene Chloride-d_2, diastereomer A

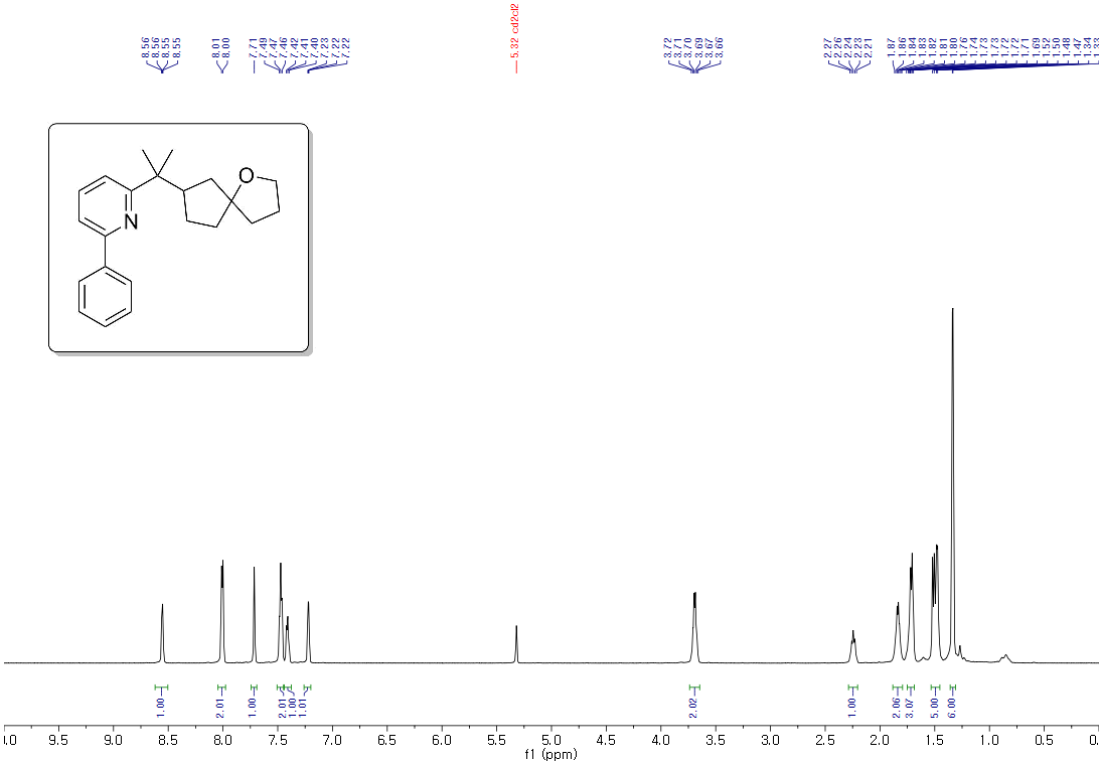


150 MHz, ^{13}C NMR in Methylene Chloride-d_2, diastereomer B

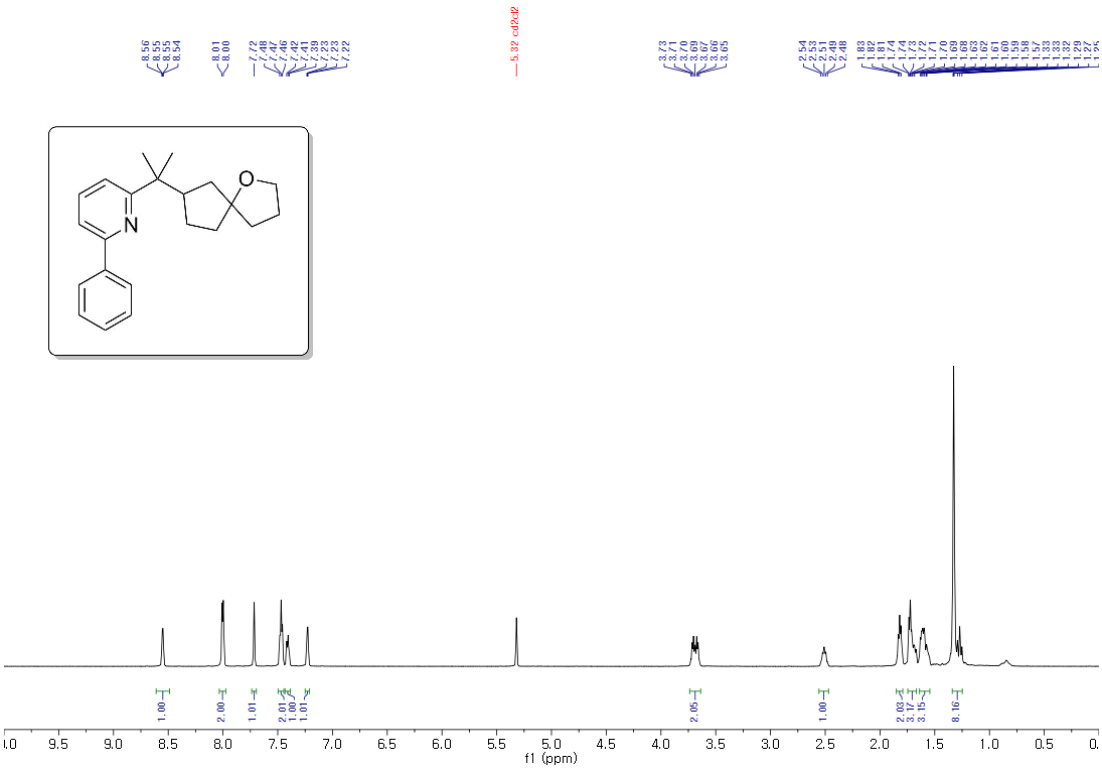


2-(2-(1-oxaspiro[4.4]nonan-7-yl)propan-2-yl)-6-phenylpyridine (4c).

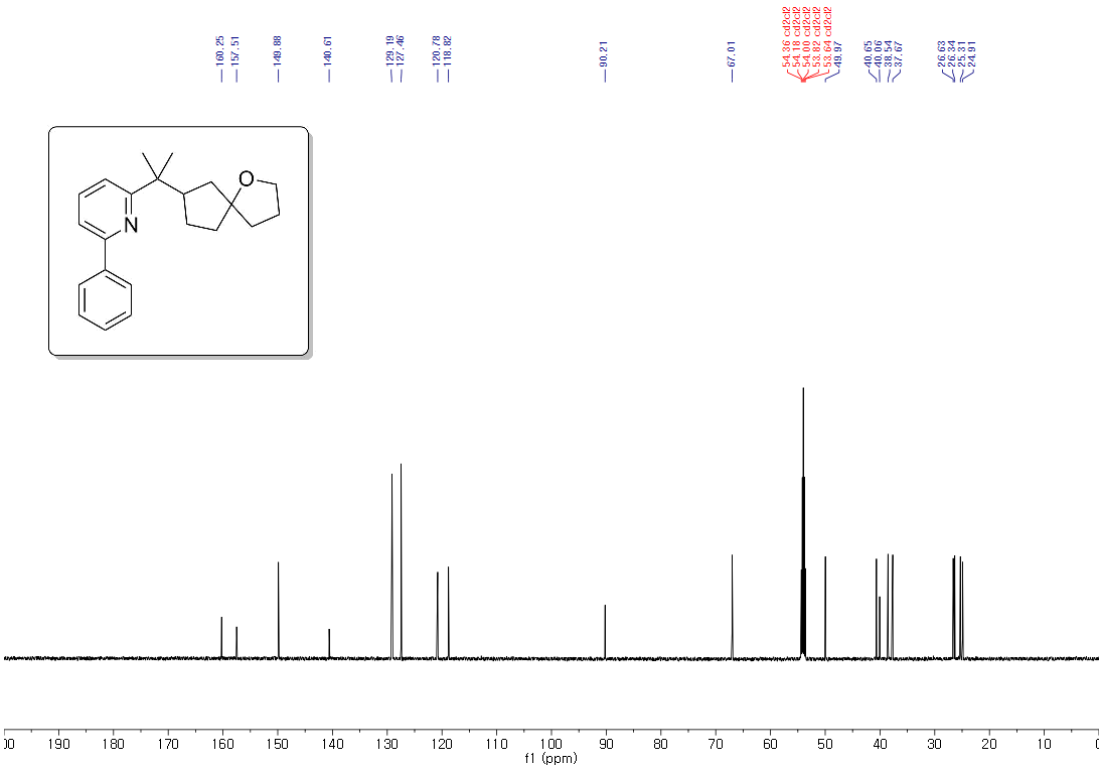
600 MHz, ^{1}H NMR in Methylene Chloride-d_2, diastereomer A



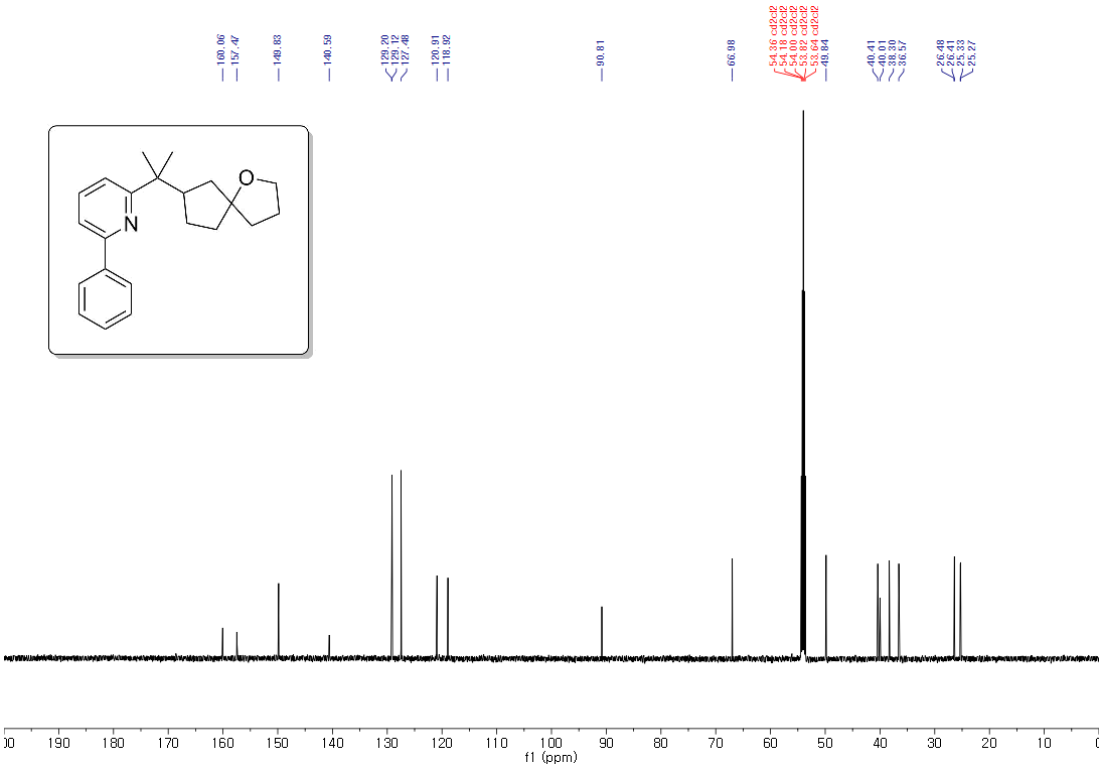
600 MHz, ^{1}H NMR in Methylene Chloride-d_2, diastereomer B



600 MHz, ^{13}C NMR in Methylene Chloride-d_2, diastereomer A

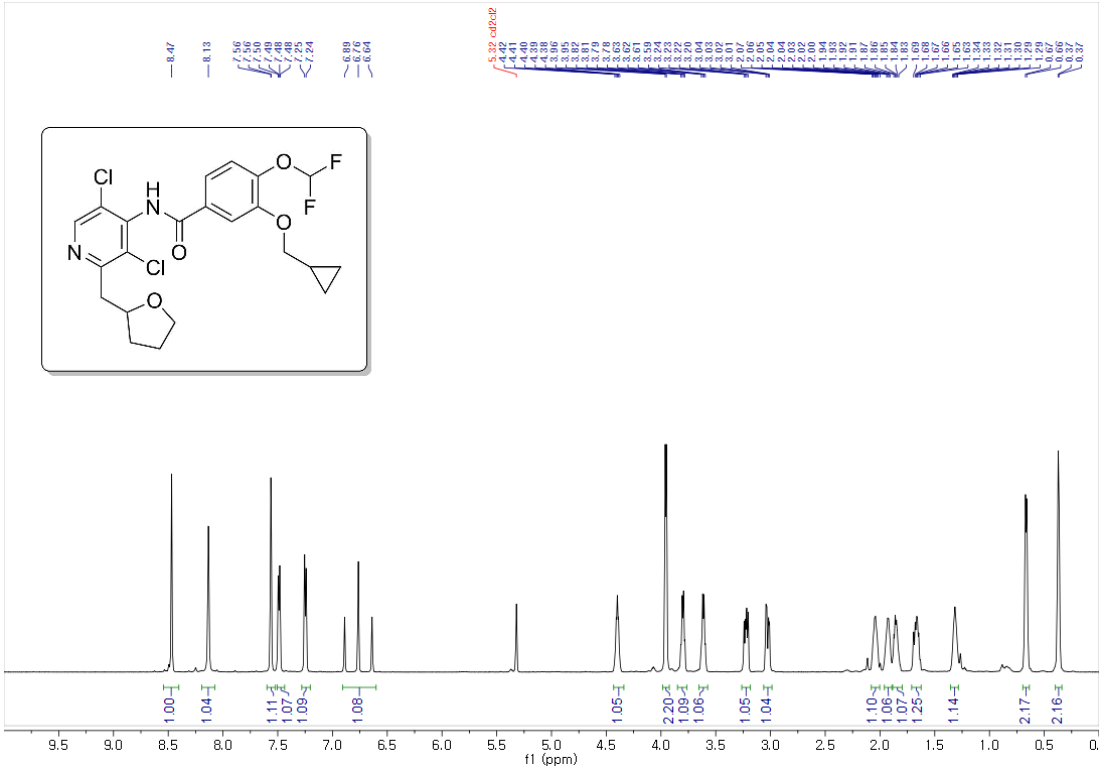


600 MHz, ^{13}C NMR in Methylene Chloride-d_2, diastereomer B

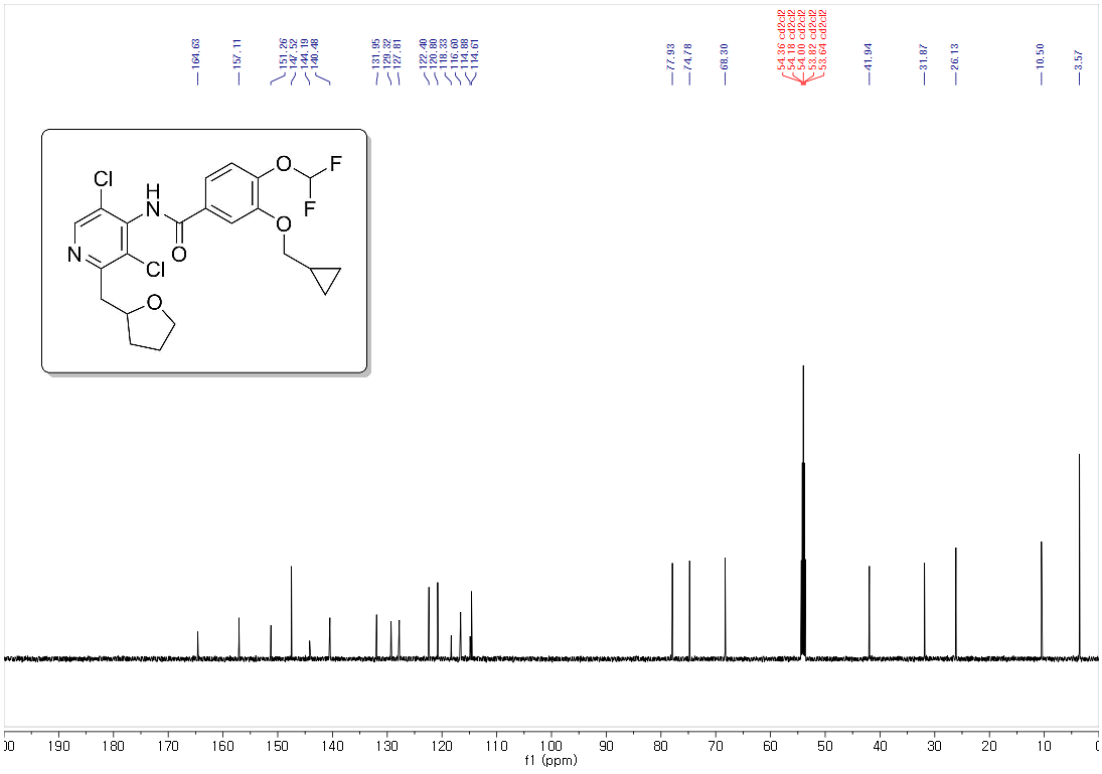


3-(cyclopropylmethoxy)-N-(3,5-dichloro-2-((tetrahydrofuran-2-yl)methyl)pyridin-4-yl)-4-(difluoromethoxy)benzamide (4d).

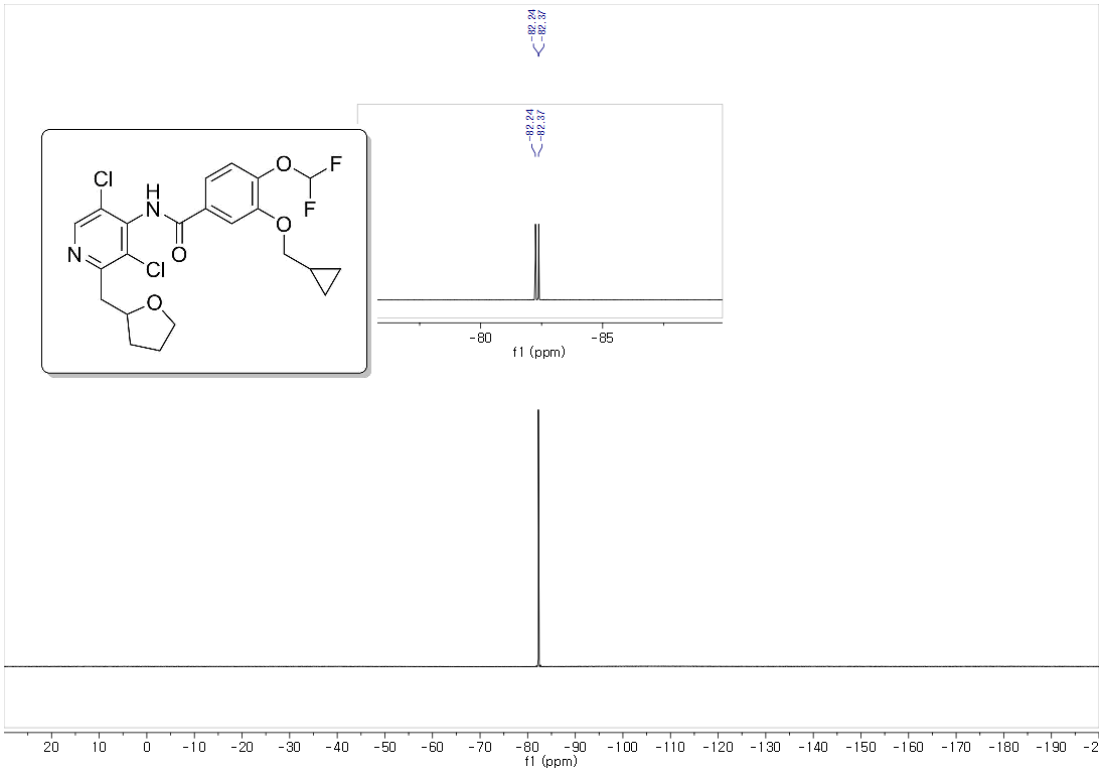
600 MHz, ^{1}H NMR in Methylene Chloride-d_2



150 MHz, ^{13}C NMR in Methylene Chloride-d_2

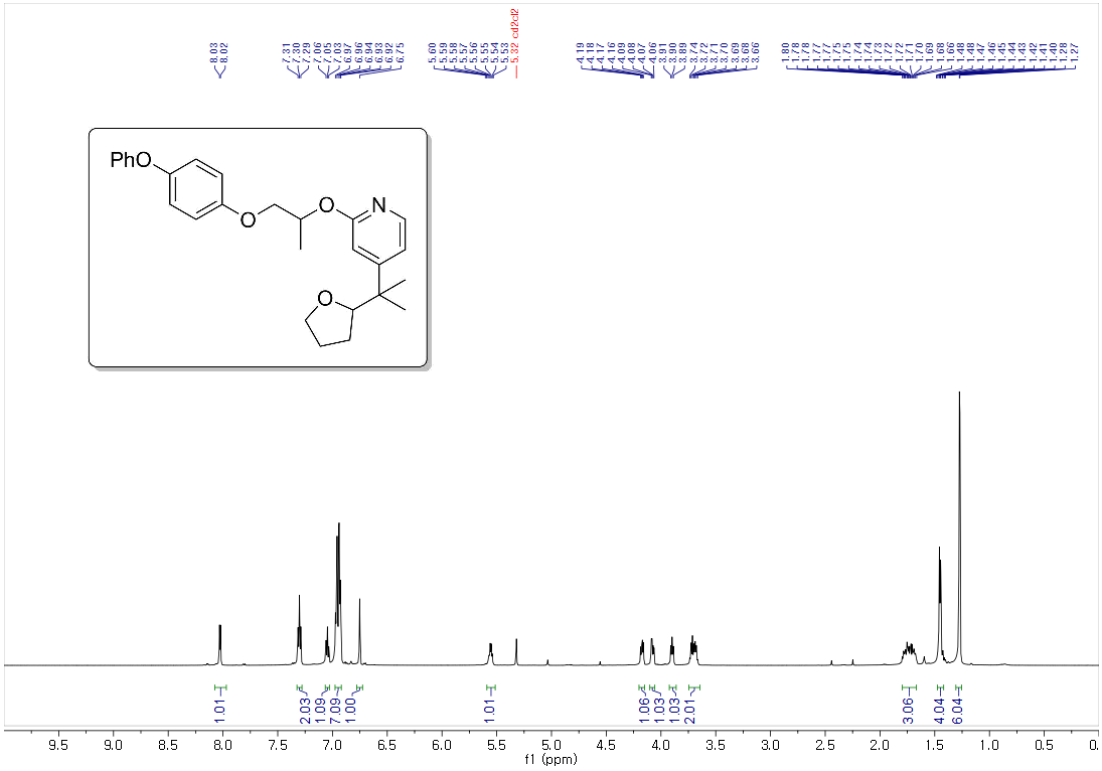


564 MHz, ^{19}F NMR in Methylene Chloride-d_2

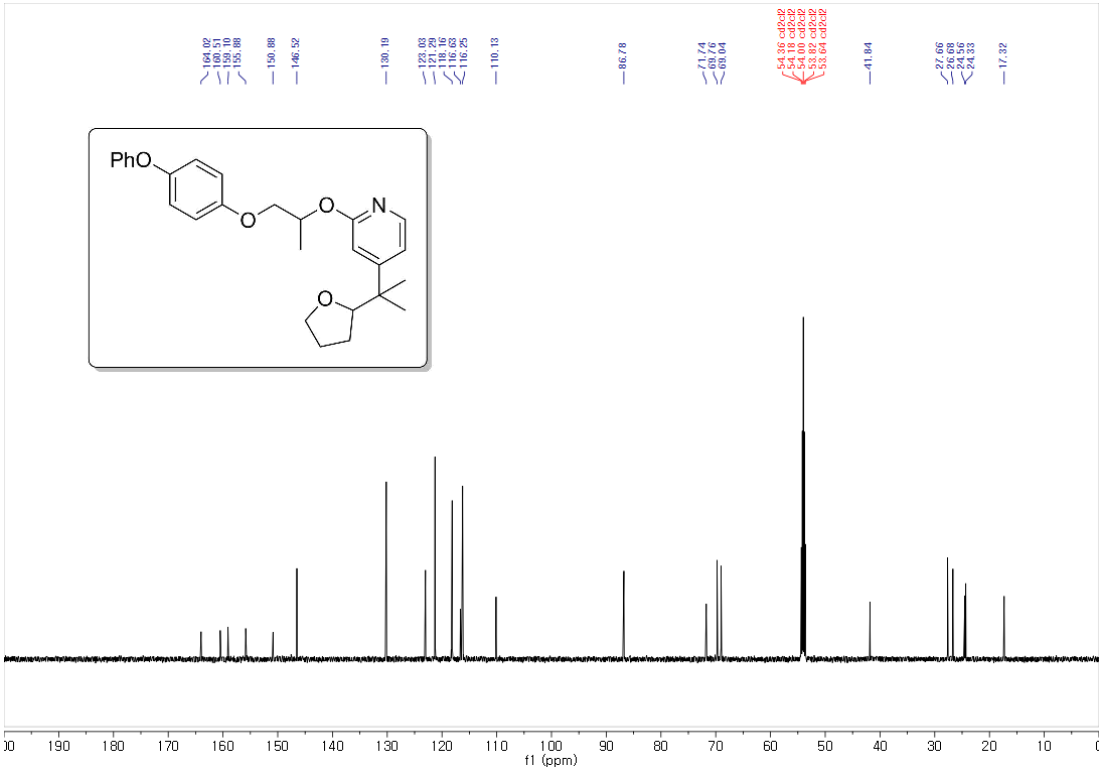


2-((1-(4-phenoxyphenoxy)propan-2-yl)oxy)-4-(2-(tetrahydrofuran-2-yl)propan-2-yl)pyridine (4e).

600 MHz, ^{1}H NMR in Methylene Chloride-d_2

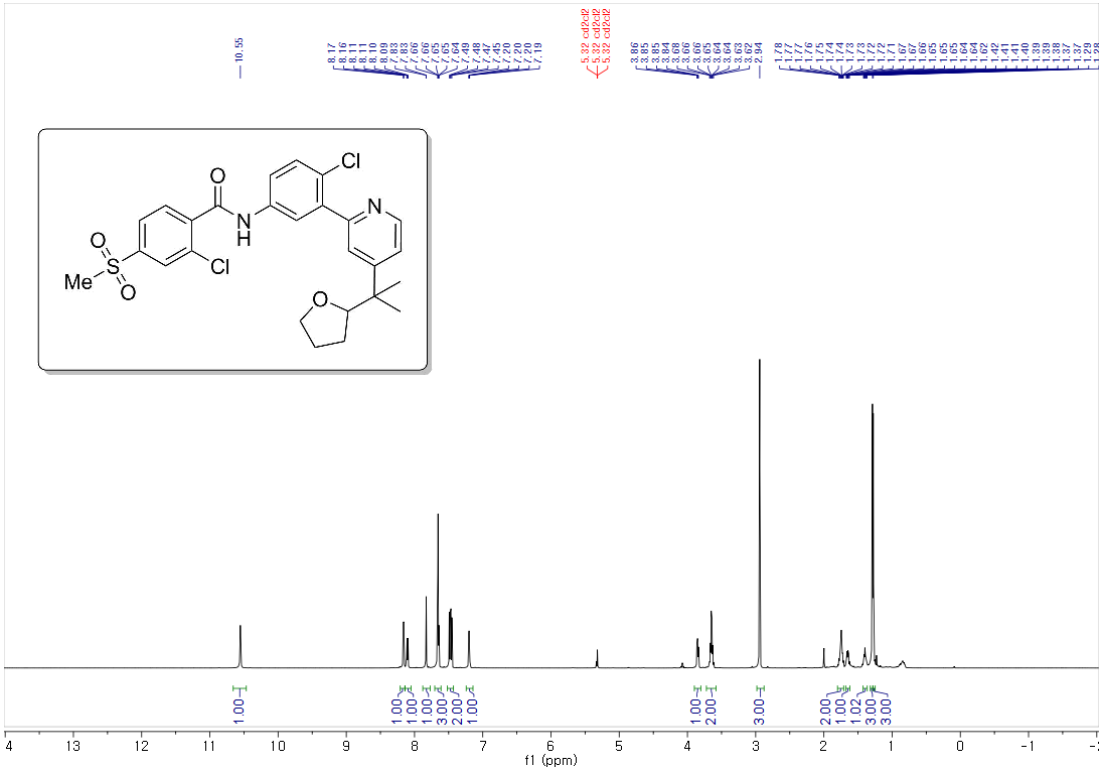


150 MHz, ^{13}C NMR in Methylene Chloride-d_2



2-chloro-N-(4-chloro-3-(4-(2-(tetrahydrofuran-2-yl)propan-2-yl)pyridin-2-yl)phenyl)-4-(methylsulfonyl)benzamide (4f).

600 MHz, ^{1}H NMR in Methylene Chloride-d_2



150 MHz, ^{13}C NMR in Methylene Chloride-d_2