Supporting Information

Copper-Catalyzed Transfer Methylenation *via* C(sp^3)-C(sp^3) Bond Cleavage of Alcohols

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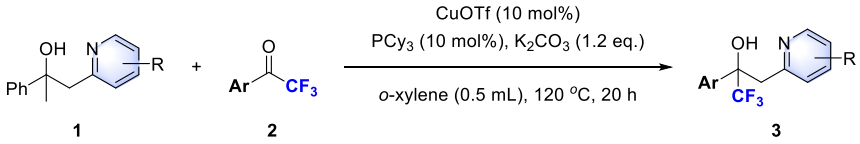
Contents:

I. General information

^{1}H and **^{13}C NMR** spectra were recorded on a Bruker Avance 600 MHZ and 400 MHZ instruments. Chemical shifts were reported in parts per million (ppm), and the residual solvent peak was used as an internal reference: proton (chloroform δ 7.26), carbon (chloroform δ 77.0) or tetramethylsilane (TMS δ 0.00) was used as a reference. Multiplicity was indicated as follows: s (singlet), d (doublet), t (triplet), q (quartet), m (multiplet), dd (doublet of doublet), bs (broad singlet). Coupling constants were reported in Hertz (Hz). All high resolution mass spectra (**HRMS**) were obtained on a Bruker Apex-2. For thin layer chromatography (**TLC**), Qingdao Haiyang Chemical were used, and compounds were visualized with a UV light at 254 nm. Further visualization was achieved by staining with iodine, or potassium permanganate solution followed by heating using a heat gun. Flash chromatography separations were performed on Qingdao Haiyang Chemical 300-400 mesh silica gel. All reactions were carried out under a nitrogen atmosphere. All commercially available reagents were used as received for the reactions without any purification. All solvents were dried on alumina columns using a solvent dispensing system. And CuOTf comes from the vendor bidepharm. Alcohols[1], trifluoromethyl ketones[2,3] and aldehydes[4] are commercially available or synthesized via the known procedures.

II. General procedure

Method A (preparation of product 3):

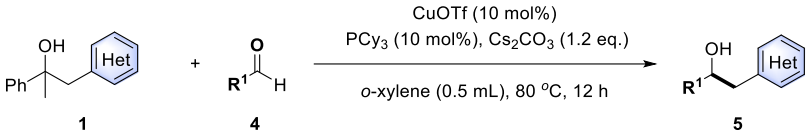


1 **2** **3**

To a vial equipped with a dried stir bar was added alcohols **1** (0.1 mmol), ketones **2** (0.1 mmol), CuOTf (10 mol%), PCy_3 (10 mol%), K_2CO_3 (0.12 mmol), *o*-xylene (0.5 mL) in the glovebox. The reaction mixture was taken outside the glovebox and allowed to stir at corresponding temperature for 20 hours. The reaction mixture was added to water (10 mL), extracted with EtOAc (3 × 5 mL). The organic layer was washed with aqueous

$NaHCO_3$ and brine and dried over Na_2SO_4. And the residue was purified by column chromatography with silica gel to give pure products.

Method B (preparation of product 5):

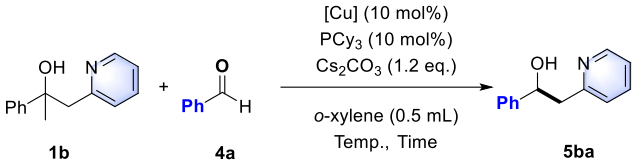


1 **4** **5**

To a vial equipped with a dried stir bar was added alcohols **1** (0.1 mmol), aldehydes **4** (0.1 mmol), CuOTf (10 mol%), PCy_3 (10 mol%), Cs_2CO_3 (0.12 mmol), *o*-xylene (0.5 mL) in the glovebox. The reaction mixture was taken outside the glovebox and allowed to stir at corresponding temperature for 12 hours. The reaction mixture was added to water (10 mL), extracted with EtOAc (3 × 5 mL). The organic layer was washed with aqueous $NaHCO_3$ and brine and dried over Na_2SO_4. And the residue was purified by column chromatography with silica gel to give pure products.

III. Optimization of reaction conditions

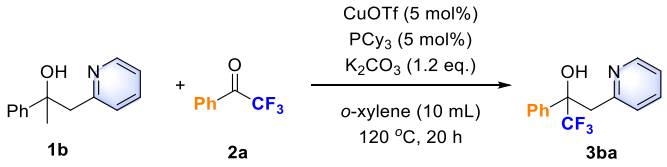
Table S1: Optimization of reaction conditions for preparation of secondary alcohol (**5ba**)



Entry[a]	[Cu]	Temp.	Time	Yield (%)[b]
1	CuOTf	120 ^{o}C	20 h	43
2	$Cu(OTf)_2$	120 ^{o}C	20 h	32
3	CuCl	120 ^{o}C	20 h	30
4	$Cu(OAc)_2$	120 ^{o}C	20 h	31
5	CuOTf	100 ^{o}C	20 h	47
6	CuOTf	80 ^{o}C	20 h	55
7	CuOTf	60 ^{o}C	20 h	45
8	CuOTf	80 ^{o}C	24 h	44
9	**CuOTf**	**80 ^{o}C**	**12 h**	**69**
10[c]	-	80 ^{o}C	12 h	0
11[c]	CuOTf	80 ^{o}C	12 h	0
12[d]	CuOTf	80 ^{o}C	12 h	0

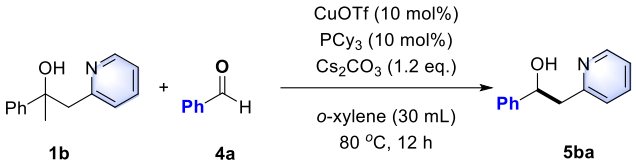
[a]The reaction was carried out with 0.1 mmol of **1b**, 0.1 mmol of **4a**, 0.01 mmol [Cu], 0.01 mmol PCy_3, 1.2 equivalent Cs_2CO_3 in 0.5 mL of *o*-xylene under N_2 at corresponding temperature and time. [b]Isolated yields. [c]Without PCy_3. [d]Without Cs_2CO_3.

IV. Gram scale reaction



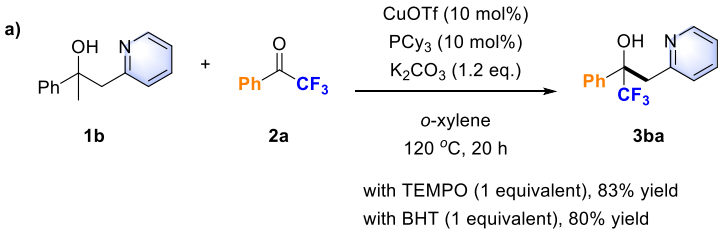
To a vial equipped with a dried stir bar was added 2-phenyl -1-(pyridin-2-yl)propan-2-ol **1b** (6 mmol), 2,2,2-trifluoro-1-phenylethan-1-one **2a** (6 mmol), CuOTf (5 mol%), PCy_3 (5 mol%), K_2CO_3 (7.2 mmol), *o*-xylene (10 mL) in the glovebox. The reaction mixture was taken outside the glovebox and allowed to stir at corresponding temperature for 20 hours. The reaction mixture was added to water (30 mL), extracted with EtOAc (3 × 25 mL). The organic layer was washed with aqueous $NaHCO_3$ and brine and dried over Na_2SO_4. And the residue was purified by column

chromatography with silica gel to give 1.36 g of product **3ba** with 85% isolated yield.

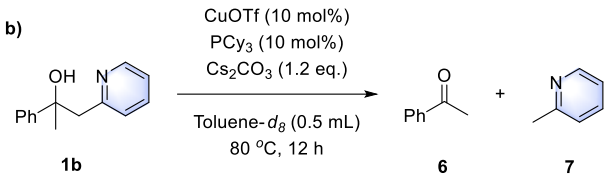


To a vial equipped with a dried stir bar was added 2-phenyl-1-(pyridin-2-yl)propan-2-ol **1b** (6 mmol), benzaldehyde **4a** (6 mmol), CuOTf (10 mol%), PCy_3 (10 mol%), Cs_2CO_3 (7.2 mmol), *o*-xylene (30 mL) in the glovebox. The reaction mixture was taken outside the glovebox and allowed to stir at corresponding temperature for 12 hours. The reaction mixture was added to water (30 mL), extracted with EtOAc (3 × 25 mL). The organic layer was washed with aqueous $NaHCO_3$ and brine and dried over Na_2SO_4. And the residue was purified by column chromatography with silica gel to give 0.54 g of product **5ba** with 46% isolated yield.

V. Mechanism studies

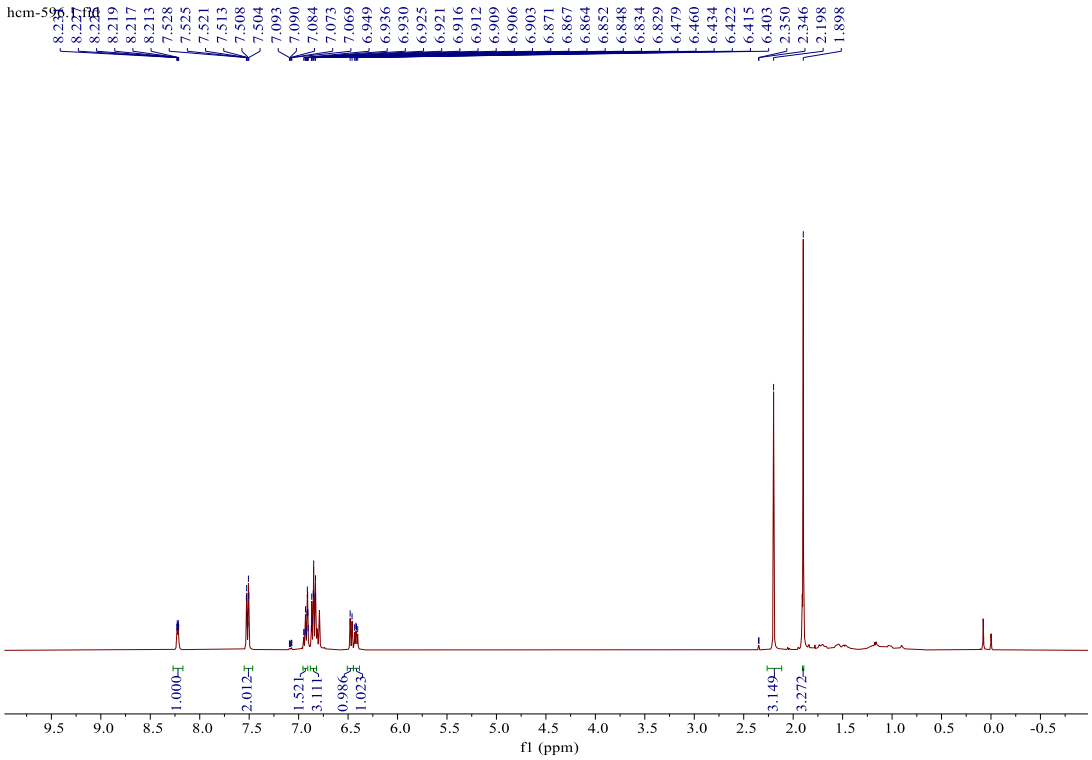


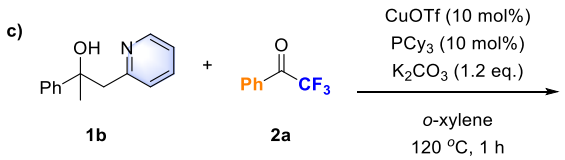
a) To a vial equipped with a dried stir bar was added 2-phenyl -1-(pyridin-2-yl)propan-2-ol **1b** (0.1 mmol), 2,2,2-trifluoro-1-phenylethan-1-one **2a** (0.1 mmol), CuOTf (10 mol%), PCy_3 (10 mol%), K_2CO_3 (0.12 mmol), TEMPO (0.1 mmol) or BHT (0.1 mmol), *o*-xylene (0.5 mL) in the glovebox. The reaction mixture was taken outside the glovebox and allowed to stir at corresponding temperature for 20 hours. The reaction mixture was added to water (10 mL), extracted with EtOAc (3 × 5 mL). The organic layer was washed with aqueous $NaHCO_3$ and brine and dried over Na_2SO_4. And the residue was purified by column chromatography with silica gel to give product **3ba** with 83% isolated yield (with TEMPO) and 80% isolated yield (with BHT), which could rule out the free radical mechanistic pathways.



b) To a vial equipped with a dried stir bar was added 2-phenyl-1-(pyridin-2-yl)propan-2-ol **1b** (0.1 mmol), CuOTf (10 mol%), PCy_3 (10 mol%), Cs_2CO_3 (0.12 mmol), toluene-d_8 (0.5 mL) in the glovebox. The reaction mixture was taken outside the glovebox and allowed to stir at corresponding temperature for 12 hours. The reaction mixture was detected by TLC, we found the starting substrate (compound **1b**) was decomposed with 100% conversion, and the decomposed products acetophenone **6** and 2-methylpyridine **7** were observed with >95% ^{1}HNMR yields. The ^{1}HNMR of the reaction mixture was also tested. The NMR shows that under the copper catalyst, 2-phenyl-1-(pyridin-2-yl)propan-2-ol **1b** could cleavage C(sp^3)-C(sp^3) bond, and led to 2-methylpyridine (ppm: 2.20, 8.24-8.20), acetophenone (ppm: 1.90) as it shown below. All these results support the cleavage C(sp^3)-C(sp^3) bond.

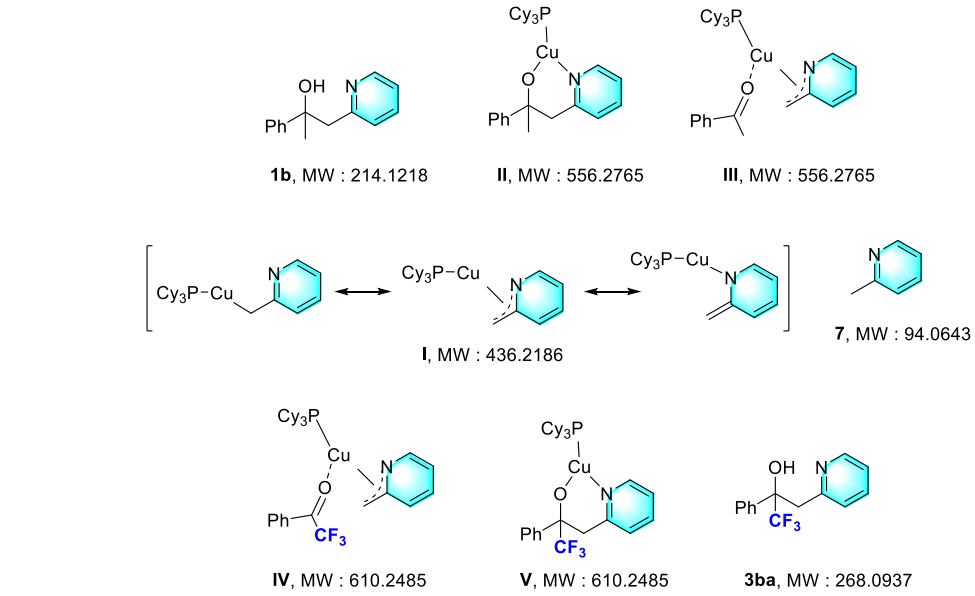
The ^{1}H NMR of the reaction mixture of experiment b

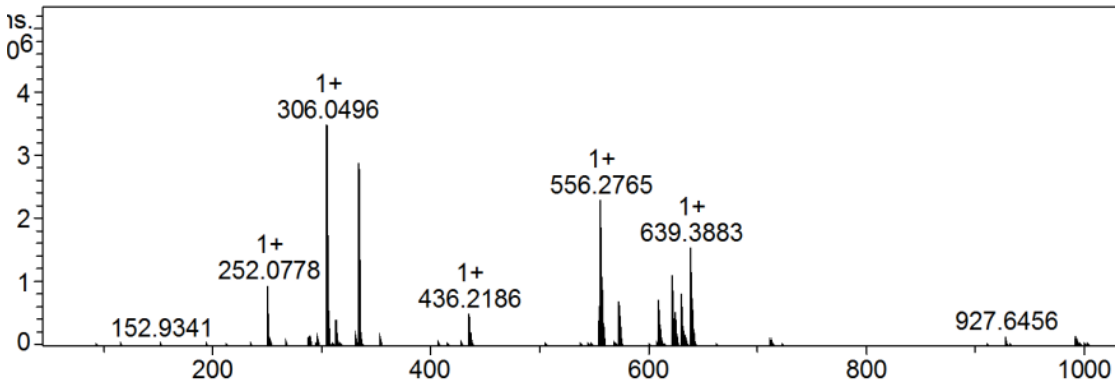


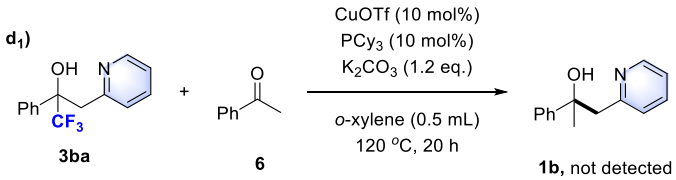


c) To a vial equipped with a dried stir bar was added 2-phenyl -1-(pyridin-2-yl)propan-2-ol **1b** (0.1 mmol), 2,2,2-trifluoro-1-phenylethan-1-one **2a** (0.1 mmol), CuOTf (10 mol%), PCy_3 (10 mol%), K_2CO_3 (0.12 mmol), *o*-xylene (0.5 mL) in the glovebox. The reaction mixture was taken outside the glovebox and allowed to stir at corresponding temperature for 1 hour. The crude reaction mixture was given HRMS. As it shown below (for more details see part IX), we found the fragment of starting materials **1b**, some intermediates e.g. **I-V** and **7**, and product **3ba**. All these results could prove the formation of Cu-C(2-pyridine methyl) bond.

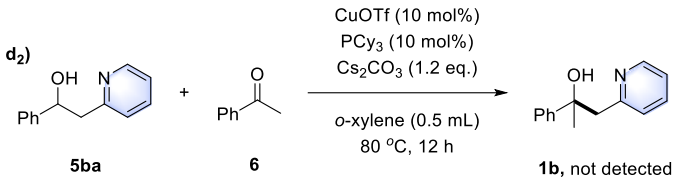
The HRMS for the mixture of experiment c







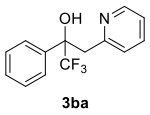
d_1) Method A: To a vial equipped with a dried stir bar was added 1,1,1-trifluoro-2-phenyl-3-(pyridin-2-yl)propan-2-ol **3ba** (0.1 mmol), acetophenone **6** (0.1 mmol), CuOTf (10 mol%), PCy_3 (10 mol%), K_2CO_3 (0.12 mmol), *o*-xylene (0.5 mL) in the glovebox. The reaction mixture was taken outside the glovebox and allowed to stir at corresponding temperature for 20 hours. The reaction mixture was detected by TLC, all the starting materials were recovered.



d2) Method B: To a vial equipped with a dried stir bar was added 1-phenyl-2-(pyridin-2-yl)ethan-1-ol **5ba** (0.1 mmol), acetophenone **6** (0.1 mmol), CuOTf (10 mol%), PCy_3 (10 mol%), Cs_2CO_3 (0.12 mmol), *o*-xylene (0.5 mL) in the glovebox. The reaction mixture was taken outside the glovebox and allowed to stir at corresponding temperature for 12 hours. The reaction mixture was detected by TLC, most of the starting materials were recovered and trace amounts of by-products such as 2-styrylpyridine, 1-phenyl-2-(pyridin-2-yl)ethan-1-one and 2-methylpyridine were obtained with low conversion.

VI. The analytical and spectral characterization data

1,1,1-trifluoro-2-phenyl-3-(pyridin-2-yl)propan-2-ol (3ba)[5]



3ba

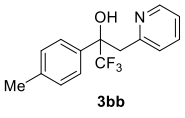
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.60 in hexane:ethyl acetate = 10:1) resulting in 22.1 mg of yellow solid in 83% yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.40-8.36 (m, 1H), 8.05 (s, 1H), 7.67-7.61 (m, 2H), 7.56 (td, *J* = 8.0 Hz, 2.0 Hz, 1H), 7.34-7.27 (m, 2H), 7.27-7.21 (m, 1H), 7.13-7.08 (m, 2H), 3.60 (d, *J* = 14.8 Hz, 1H), 3.47 (d, *J* = 14.8 Hz, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 157.15, 148.10, 138.58, 137.53, 128.26, 128.16, 126.86, 125.41 (q, *J* = 286.6 Hz), 124.72, 122.28, 77.42 (q, *J* = 28.4 Hz), 40.09.

^{19}F NMR (376 MHz, $CDCl_3$) δ -79.16.

1,1,1-trifluoro-3-(pyridin-2-yl)-2-(*p*-tolyl)propan-2-ol (3bb)



3bb

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.43 in hexane:ethyl acetate = 10:1)

resulting in 19.7 mg of yellow solid in 70% yield, melting point 74-76 ^{o}C.

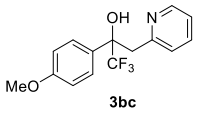
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.39 (d, *J* = 5.4 Hz, 1H), 7.98 (s, 1H), 7.59-7.54 (m, 1H), 7.50 (d, *J* = 7.8 Hz, 2H), 7.14-7.07 (m, 4H), 3.58 (d, *J* = 14.4 Hz, 1H), 3.45 (d, *J* = 15.0 Hz, 1H), 2.29 (s, 3H).

^{13}C NMR (151 MHz, $CDCl_3$) δ 157.30, 148.12, 137.98, 137.49, 135.62, 128.91, 126.77, 125.46 (q, *J* = 285.8 Hz), 124.73, 122.24, 77.34 (q, *J* = 28.4 Hz), 40.10, 21.12.

^{19}F NMR (376 MHz, $CDCl_3$) δ -79.37.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{15}H_{15}F_3NO$ 282.1100, found 282.1100.

1,1,1-trifluoro-2-(4-methoxyphenyl)-3-(pyridin-2-yl)propan-2-ol (3bc)



3bc

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.30 in hexane:ethyl acetate = 10:1) resulting in 25.2 mg of yellow solid in 85% yield, melting point 77-79 ^{o}C.

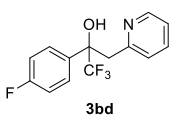
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.39 (d, *J* = 5.4 Hz, 1H), 7.98 (s, 1H), 7.60-7.55 (m, 1H), 7.53 (d, *J* = 8.4 Hz, 2H), 7.14-7.08 (m, 2H), 6.88-6.79 (m, 2H), 3.76 (s, 3H), 3.57 (d, *J* = 14.4 Hz, 1H), 3.45 (d, *J* = 15.0 Hz, 1H).

^{13}C NMR (151 MHz, $CDCl_3$) δ 159.52, 157.29, 148.12, 137.50, 130.60, 128.17, 125.46 (q, *J* = 285.8 Hz), 124.75, 122.23, 113.55, 77.17 (q, *J* = 28.4 Hz), 55.29, 40.07.

^{19}F NMR (376 MHz, $CDCl_3$) δ -79.63.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{15}H_{15}F_3NO_2$ 298.1049, found 298.1051.

1,1,1-trifluoro-2-(4-fluorophenyl)-3-(pyridin-2-yl)propan-2-ol (3bd)



3bd

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.43 in hexane:ethyl acetate = 10:1) resulting in 21.1 mg of yellow solid in 74% yield, melting point 79-81 ^{o}C.

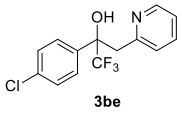
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.39 (d, *J* = 4.8 Hz, 1H), 8.12 (s, 1H), 7.63-7.59 (m, 3H), 7.16-7.12 (m, 1H), 7.11 (d, *J* = 7.8 Hz, 1H), 6.97 (t, *J* = 9.0 Hz, 2H), 3.59 (d, *J* = 15.0 Hz, 1H), 3.44 (d, *J* = 15.0 Hz, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 162.72 (d, *J* = 248.0 Hz), 156.91, 148.12, 137.65, 134.37 (d, *J* = 3.2 Hz), 128.81 (d, *J* = 8.3 Hz), 125.26 (q, *J* = 286.3 Hz), 124.72, 122.41, 115.08 (d, *J* = 21.6 Hz), 77.17 (q, *J* = 28.7 Hz), 39.99.

^{19}F NMR (376 MHz, $CDCl_3$) δ -79.52, -114.44.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{14}H_{12}F_4NO$ 286.0850, found 286.0849.

2-(4-chlorophenyl)-1,1,1-trifluoro-3-(pyridin-2-yl)propan-2-ol (3be)



3be

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.43 in hexane:ethyl acetate = 10:1) resulting in 24.1 mg of yellow oil in 80% yield.

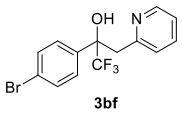
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.39 (d, *J* = 5.4 Hz, 1H), 8.13 (s, 1H), 7.61-7.57 (m, 1H), 7.56 (d, *J* = 8.4 Hz, 2H), 7.32-7.21 (m, 2H), 7.16-7.12 (m, 1H), 7.10 (d, *J* = 7.8 Hz, 1H), 3.58 (d, *J* = 15.0 Hz, 1H), 3.43 (d, *J* = 15.0 Hz, 1H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 156.34, 148.55, 137.43, 136.83, 133.51, 129.45, 128.33, 125.78 (q, *J* = 287.9 Hz), 125.40, 122.65, 76.84 (q, *J* = 27.8 Hz), 40.18.

^{19}F NMR (376 MHz, $CDCl_3$) δ -79.44.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{14}H_{12}ClF_3NO$ 302.0554, found 302.0550.

2-(4-bromophenyl)-1,1,1-trifluoro-3-(pyridin-2-yl)propan-2-ol (3bf)



3bf

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.43 in hexane:ethyl acetate = 10:1) resulting in 19.7 mg of yellow solid in 57% yield, melting point 84-86 ^{o}C.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.40-8.36 (m, 1H), 7.59 (td, *J* = 7.6 Hz, 1.6 Hz, 1H),

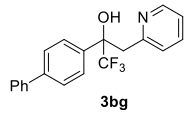
7.51-7.47 (m, 2H), 7.44-7.42 (m, 1H), 7.42-7.39 (m, 1H), 7.17-7.12 (m, 1H), 7.10 (d, *J* = 7.6 Hz, 1H), 3.58 (d, *J* = 15.2 Hz, 1H), 3.42 (d, *J* = 15.2 Hz, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 156.77, 148.16, 137.75, 137.70, 131.37, 130.08 (q, *J* = 286.7 Hz), 128.77, 124.71, 122.69, 122.47, 77.28 (q, *J* = 28.4 Hz), 39.75.

^{19}F NMR (376 MHz, $CDCl_3$) δ -79.39.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{14}H_{12}BrF_3NO$ 346.0049, found 346.0047.

2-([1,1'-biphenyl]-4-yl)-1,1,1-trifluoro-3-(pyridin-2-yl)propan-2-ol (3bg)



3bg

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.52 in hexane:ethyl acetate = 10:1) resulting in 30.8 mg of yellow solid in 90% yield, melting point 79-81 ^{o}C.

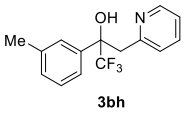
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.41 (d, *J* = 4.8 Hz, 1H), 7.70 (d, *J* = 8.0 Hz, 2H), 7.64-7.57 (m, 1H), 7.59-7.50 (m, 4H), 7.46-7.37 (m, 2H), 7.36-7.29 (m, 1H), 7.17-7.10 (m, 2H), 3.64 (d, *J* = 15.2 Hz, 1H), 3.51 (d, *J* = 15.2 Hz, 1H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 156.72, 148.52, 140.26, 139.81, 137.49, 137.10, 129.38, 128.08, 127.11, 126.56, 126.00 (q, *J* = 287.9 Hz), 125.43, 122.64, 77.21 (q, *J* = 28.3 Hz), 40.18.

^{19}F NMR (376 MHz, $CDCl_3$) δ -79.09.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{20}H_{17}F_3NO$ 344.1257, found 344.1255.

1,1,1-trifluoro-3-(pyridin-2-yl)-2-(*m*-tolyl)propan-2-ol (3bh)



3bh

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.48 in hexane:ethyl acetate = 10:1) resulting in 23.0 mg of white oil in 82% yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.48-8.33 (m, 1H), 8.04 (s, 1H), 7.59 (td, *J* = 8.0 Hz, 2.0 Hz, 1H), 7.46 (s, 1H), 7.40 (d, *J* = 8.0 Hz, 1H), 7.19 (t, *J* = 7.6 Hz, 1H), 7.15-7.09 (m,

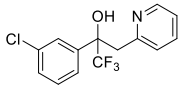
2H), 7.09-7.04 (m, 1H), 3.59 (d, *J* = 14.8 Hz, 1H), 3.45 (d, *J* = 14.8 Hz, 1H), 2.33 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 157.21, 148.04, 138.51, 137.78, 137.57, 129.03, 128.01, 127.55, 125.47 (q, *J* = 286.8 Hz), 124.72, 123.82, 122.28, 77.37 (q, *J* = 28.3 Hz), 40.19, 21.67.

^{19}F NMR (376 MHz, $CDCl_3$) δ -78.98.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{15}H_{15}F_3NO$ 282.1100, found 282.1100.

2-(3-chlorophenyl)-1,1,1-trifluoro-3-(pyridin-2-yl)propan-2-ol (3bi)



3bi

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.45 in hexane:ethyl acetate = 10:1) resulting in 28.0 mg of yellow oil in 93% yield.

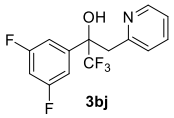
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.45-8.36 (m, 1H), 8.20 (s, 1H), 7.65 (s, 1H), 7.63-7.57 (m, 1H), 7.53-7.45 (m, 1H), 7.25-7.21 (m, 2H), 7.18-7.08 (m, 2H), 3.59 (d, *J* = 15.2 Hz, 1H), 3.42 (d, *J* = 14.8 Hz, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 156.69, 148.14, 140.80, 137.73, 134.41, 129.44, 128.55, 127.37, 125.12 (q, *J* = 286.8 Hz), 125.03, 124.70, 122.49, 77.20 (q, *J* = 29.3 Hz), 39.86.

^{19}F NMR (376 MHz, $CDCl_3$) δ -79.15.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{14}H_{12}ClF_3NO$ 302.0554, found 302.0553.

2-(3,5-difluorophenyl)-1,1,1-trifluoro-3-(pyridin-2-yl)propan-2-ol (3bj)



3bj

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.45 in hexane:ethyl acetate = 10:1) resulting in 24.2 mg of white solid in 80% yield, melting point 73-75 ^{o}C.

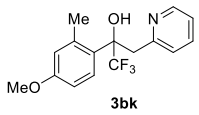
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.42-8.39 (m, 1H), 8.36-8.22 (m, 1H), 7.62 (td, *J* = 7.6 Hz, 1.6 Hz, 1H), 7.22-7.09 (m, 4H), 6.70 (tt, *J* = 8.8 Hz, 2.0 Hz, 1H), 3.57 (d, *J* = 14.8 Hz, 1H), 3.38 (d, *J* = 15.2 Hz, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 163.00 (d, *J* = 249.1 Hz), 162.88 (d, *J* = 249.1 Hz), 156.38, 148.19, 142.87 (t, *J* = 8.6 Hz), 137.85, 124.88 (q, *J* = 286.8 Hz), 124.69, 122.63, 110.34 (d, *J* = 19.6 Hz), 110.27 (d, *J* = 19.4 Hz), 103.88 (t, *J* = 25.5 Hz), 77.23 (q, *J* = 28.5 Hz), 39.77.

^{19}F NMR (376 MHz, $CDCl_3$) δ -79.20, -109.50.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{14}H_{11}F_5NO$ 304.0755, found 304.0753.

1,1,1-trifluoro-2-(4-methoxy-2-methylphenyl)-3-(pyridin-2-yl)propan-2-ol (3bk)



3bk

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.21 in hexane:ethyl acetate = 10:1) resulting in 15.2 mg of yellow oil in 49% yield.

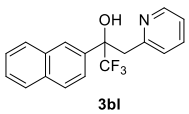
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.41-8.34 (m, 1H), 7.61 (td, *J* = 8.0 Hz, 2.0 Hz, 1H), 7.43-7.31 (m, 1H), 7.19 (d, *J* = 8.0 Hz, 1H), 7.15-7.08 (m, 1H), 6.64-6.58 (m, 2H), 3.73 (s, 3H), 3.66 (d, *J* = 15.2 Hz, 1H), 3.59 (d, *J* = 15.2 Hz, 1H), 2.60 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 159.02, 157.76, 148.05, 140.76, 137.50, 129.90, 127.93, 125.94 (q, *J* = 287.5 Hz), 124.78, 122.19, 118.51, 110.51, 79.74 (q, *J* = 28.6 Hz), 55.14, 40.43, 23.47.

^{19}F NMR (376 MHz, $CDCl_3$) δ -79.03.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{16}H_{17}F_3NO_2$ 312.1206, found 312.1204.

1,1,1-trifluoro-2-(naphthalen-2-yl)-3-(pyridin-2-yl)propan-2-ol (3bl)



3bl

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.55 in hexane:ethyl acetate = 10:1) resulting in 28.5 mg of yellow solid in 90% yield, melting point

75-77^{o}C.

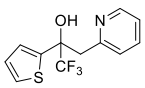
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.40-8.36 (m, 1H), 8.17-8.14 (m, 1H), 7.85-7.82 (m, 1H), 7.81-7.76 (m, 2H), 7.75-7.70 (m, 1H), 7.54 (td, *J* = 7.6 Hz, 1.6 Hz, 1H), 7.47 (dt, *J* = 9.6 Hz, 3.6 Hz, 2H), 7.14 (d, *J* = 7.6 Hz, 1H), 7.10-7.06 (m, 1H), 3.71 (d, *J* = 14.8 Hz, 1H), 3.60 (d, *J* = 15.2 Hz, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 157.02, 148.05, 137.62, 135.97, 133.09, 133.04, 128.61, 127.84, 127.56, 126.85, 126.52, 126.23, 125.48 (q, *J* = 286.8 Hz), 124.74, 124.26, 122.33, 77.64 (q, *J* = 28.4 Hz), 40.04.

^{19}F NMR (376 MHz, $CDCl_3$) δ -78.96.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{18}H_{15}F_3NO$ 318.1100, found 318.1100.

1,1,1-trifluoro-3-(pyridin-2-yl)-2-(thiophen-2-yl)propan-2-ol (3bm)[5]



3bm

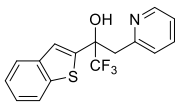
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.67 in hexane:ethyl acetate = 10:1) resulting in 23.2 mg of yellow solid in 85% yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.52 (s, 1H), 8.46-8.37 (m, 1H), 7.60 (td, *J* = 8.0 Hz, 2.0 Hz, 1H), 7.21 (dd, *J* = 5.2 Hz, 1.6 Hz, 1H), 7.18-7.13 (m, 1H), 7.11 (d, *J* = 7.6 Hz, 1H), 7.08 (d, *J* = 4.0 Hz, 1H), 6.92 (dd, *J* = 4.8 Hz, 3.6 Hz, 1H), 3.58 (d, *J* = 14.8 Hz, 1H), 3.42 (d, *J* = 14.8 Hz, 1H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 156.35, 148.49, 142.54, 137.49, 127.47, 127.00, 126.41, 125.45, 125.36 (q, *J* = 287.0 Hz), 122.73, 76.56 (q, *J* = 29.2 Hz), 41.30.

^{19}F NMR (376 MHz, $CDCl_3$) δ -80.58.

2-(benzo[*b*]thiophen-2-yl)-1,1,1-trifluoro-3-(pyridin-2-yl)propan-2-ol (3bn)



3bn

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.41 in hexane:ethyl acetate = 10:1) resulting in 29.7 mg of yellow solid in 92% yield, melting point 79-81

^{o}C.

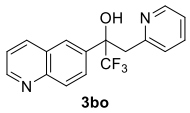
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.74 (s, 1H), 8.44-8.32 (m, 1H), 7.75 (d, *J* = 7.8 Hz, 1H), 7.69 (d, *J* = 7.8 Hz, 1H), 7.57 (td, *J* = 7.8 Hz, 1.8 Hz, 1H), 7.35 (s, 1H), 7.31-7.23 (m, 2H), 7.18-7.10 (m, 2H), 3.63 (d, *J* = 15.0 Hz, 1H), 3.49 (d, *J* = 15.0 Hz, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 156.55, 148.01, 144.11, 140.08, 139.72, 137.79, 124.87, 124.72 (q, *J* = 286.4 Hz), 124.48, 124.31, 123.86, 122.66, 122.55, 122.26, 77.16 (q, *J* = 30.1 Hz), 40.50.

^{19}F NMR (376 MHz, $CDCl_3$) δ -80.13.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{16}H_{13}F_3NOS$ 324.0664, found 324.0664.

1,1,1-trifluoro-3-(pyridin-2-yl)-2-(quinolin-6-yl)propan-2-ol (3bo)



3bo

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.15 in hexane:ethyl acetate = 10:1) resulting in 20.7 mg of yellow oil in 65% yield.

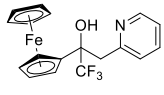
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.89 (s, 1H), 8.42-8.33 (m, 1H), 8.28 (s, 1H), 8.19-8.12 (m, 2H), 8.05 (d, *J* = 8.8 Hz, 1H), 7.97-7.90 (m, 1H), 7.56 (td, *J* = 7.6 Hz, 2.0 Hz, 1H), 7.39 (dd, *J* = 8.4 Hz, 4.4 Hz, 1H), 7.19-7.07 (m, 2H), 3.71 (d, *J* = 15.2 Hz, 1H), 3.59 (d, *J* = 14.8 Hz, 1H).

^{13}C NMR (101 MHz, DMSO-d_6) δ 156.42, 151.62, 148.55, 147.64, 137.40, 136.90, 136.02, 128.81, 128.57, 127.52, 127.48, 126.00 (q, *J* = 288.5 Hz), 125.41, 122.62, 122.21, 77.20 (q, *J* = 27.7 Hz), 40.38.

^{19}F NMR (376 MHz, $CDCl_3$) δ -78.94.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{17}H_{14}F_3N_2O$ 319.1053, found 319.1049.

2-ferrocenyl-1,1,1-trifluoro-3-(pyridin-2-yl)propan-2-ol (3bp)



3bp

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.55 in hexane:ethyl acetate =

10:1) resulting in 18.0 mg of yellow solid in 48% yield, melting point 104-106 ^{o}C.

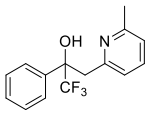
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.55-8.50 (m, 1H), 7.89 (s, 1H), 7.69 (td, *J* = 7.6 Hz, 2.0 Hz, 1H), 7.25-7.22 (m, 1H), 7.18 (d, *J* = 8.0 Hz, 1H), 4.56-4.43 (m, 1H), 4.25-4.19 (m, 6H), 4.17-4.13 (m, 2H), 3.60 (d, *J* = 14.8 Hz, 1H), 3.40 (d, *J* = 14.8 Hz, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 157.89, 148.18, 137.64, 125.60 (q, *J* = 289.8 Hz), 124.38, 122.29, 90.23, 75.37 (q, *J* = 27.9 Hz), 69.19, 68.13, 67.75, 67.41, 66.74, 41.18.

^{19}F NMR (376 MHz, $CDCl_3$) δ -78.08.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{18}H_{17}F_3FeNO$ 376.0606, found 376.0601.

1,1,1-trifluoro-3-(6-methylpyridin-2-yl)-2-phenylpropan-2-ol (3ca)[6]



3ca

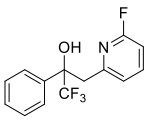
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.80 in hexane:ethyl acetate = 10:1) resulting in 16.9 mg of yellow solid in 60% yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.47 (s, 1H), 7.71-7.58 (m, 2H), 7.45 (t, *J* = 7.6 Hz, 1H), 7.34-7.28 (m, 2H), 7.27-7.22 (m, 1H), 6.96 (d, *J* = 7.6 Hz, 1H), 6.91 (d, *J* = 7.6 Hz, 1H), 3.55 (d, *J* = 14.8 Hz, 1H), 3.41 (d, *J* = 14.8 Hz, 1H), 2.46 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 157.21, 156.36, 138.78, 137.74, 128.20, 128.14, 126.88, 125.46 (q, *J* = 286.7 Hz), 121.89, 121.60, 77.36 (q, *J* = 28.2 Hz), 39.90, 24.17.

^{19}F NMR (376 MHz, $CDCl_3$) δ -79.12.

1,1,1-trifluoro-3-(6-fluoropyridin-2-yl)-2-phenylpropan-2-ol (3da)



3da

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.70 in hexane:ethyl acetate = 10:1) resulting in 16.5 mg of yellow solid in 58% yield, melting point 84-86 ^{o}C.

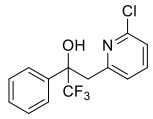
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.69-7.62 (m, 1H), 7.62-7.58 (m, 2H), 7.36-7.24 (m, 3H), 6.98 (dd, *J* = 7.2 Hz, 2.0 Hz, 1H), 6.76 (dd, *J* = 8.0 Hz, 2.4 Hz, 1H), 6.50 (s, 1H), 3.56 (d, *J* = 15.2 Hz, 1H), 3.48 (d, *J* = 15.2 Hz, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 162.38 (d, *J* = 245.23 Hz), 155.57 (d, *J* = 11.6 Hz), 142.28 (d, *J* = 8.1 Hz), 137.80, 128.49, 128.30, 126.78, 125.21 (q, *J* = 286.7 Hz), 121.95 (d, *J* = 4.2 Hz), 108.22 (d, *J* = 35.0 Hz), 77.38 (q, *J* = 28.8 Hz), 40.35.

^{19}F NMR (376 MHz, $CDCl_3$) δ -67.27, -79.18.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{14}H_{12}F_4NO$ 286.0850, found 286.0849.

3-(6-chloropyridin-2-yl)-1,1,1-trifluoro-2-phenylpropan-2-ol (3ea)



3ea

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.67 in hexane:ethyl acetate = 10:1) resulting in 16.8 mg of white solid in 56% yield, melting point 95-97 ^{o}C.

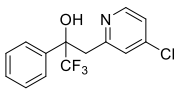
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.64-7.57 (m, 2H), 7.52 (t, *J* = 7.6 Hz, 1H), 7.35-7.24 (m, 3H), 7.15 (d, *J* = 8.0 Hz, 1H), 7.01 (d, *J* = 7.6 Hz, 1H), 6.74 (s, 1H), 3.57 (d, *J* = 14.8 Hz, 1H), 3.47 (d, *J* = 15.2 Hz, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 157.59, 150.31, 139.85, 137.85, 128.48, 128.31, 126.74, 125.24 (q, *J* = 286.7 Hz), 123.16, 123.01, 77.58 (q, *J* = 28.7 Hz), 40.51.

^{19}F NMR (376 MHz, $CDCl_3$) δ -79.10.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{14}H_{12}ClF_3NO$ 302.0554, found 302.0553.

3-(4-chloropyridin-2-yl)-1,1,1-trifluoro-2-phenylpropan-2-ol (3fa)



3fa

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (30:1) (R*f* = 0.65 in hexane:ethyl acetate = 10:1) resulting in 17.0 mg of yellow oil in 56% yield.

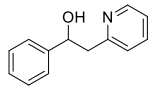
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.30 (d, *J* = 5.4 Hz, 1H), 7.66-7.58 (m, 3H), 7.33 (t, *J* = 7.8 Hz, 2H), 7.28 (d, *J* = 7.2 Hz, 1H), 7.16 (s, 1H), 3.59 (d, *J* = 15.0 Hz, 1H), 3.46 (d, *J* = 15.0 Hz, 1H).

^{13}C NMR (151 MHz, $CDCl_3$) δ 158.71, 149.06, 145.59, 138.19, 128.48, 128.32, 126.78, 125.28 (q, *J* = 286.0 Hz), 125.03, 122.86, 77.36 (q, *J* = 28.5 Hz),40.24.

^{19}F NMR (565 MHz, $CDCl_3$) δ -79.13.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{14}H_{12}ClF_3NO$ 302.0554, found 302.0552.

1-phenyl-2-(pyridin-2-yl)ethan-1-ol (5ba)[7]



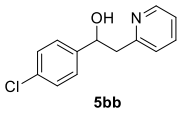
5ba

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.31 in hexane:ethyl acetate = 3:1) resulting in 13.7 mg of colorless solid in 69% yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.53 (d, *J* = 4.0 Hz, 1H), 7.61 (td, *J* = 7.6 Hz, 2.0 Hz, 1H), 7.46-7.39 (m, 2H), 7.34 (t, *J* = 7.6 Hz, 2H), 7.28-7.22 (m, 1H), 7.20-7.15 (m, 1H), 7.10 (d, *J* = 7.6 Hz, 1H), 5.66 (s, 1H), 5.17 (dd, *J* = 8.0 Hz, 4.0 Hz, 1H), 3.21-3.02 (m, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 159.94, 148.74, 144.24, 136.96, 128.44, 127.40, 125.98, 123.94, 121.83, 73.48, 45.88.

1-(4-chlorophenyl)-2-(pyridin-2-yl)ethan-1-ol (5bb)[7]



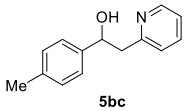
5bb

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.20 in hexane:ethyl acetate = 3:1) resulting in 9.6 mg of white solid in 41% yield.

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.57-8.46 (m, 1H), 7.65-7.58 (m, 1H), 7.40-7.28 (m, 4H), 7.21-7.17 (m, 1H), 7.09 (d, *J* = 7.8 Hz, 1H), 5.92 (s, 1H), 5.15 (t, *J* = 6.0 Hz, 1H), 3.09 (d, *J* = 6.0 Hz, 2H).

^{13}C NMR (151 MHz, $CDCl_3$) δ 159.57, 148.70, 142.77, 137.08, 133.00, 128.56, 127.37, 123.95, 121.97, 72.81, 45.58.

2-(pyridin-2-yl)-1-(*p*-tolyl)ethan-1-ol (5bc)[7]



5bc

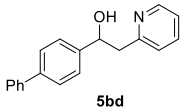
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.25 in hexane:ethyl

acetate = 3:1) resulting in 13.6 mg of white solid in 64% yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.56-8.47 (m, 1H), 7.61 (td, *J* = 7.6 Hz, 2.0 Hz, 1H), 7.38-7.28 (m, 2H). 7.21-7.12 (m, 3H), 7.11 (d, *J* = 7.6 Hz, 1H), 5.54 (s, 1H), 5.14 (dd, *J* = 8.8 Hz, 3.6 Hz, 1H), 3.36-2.51 (m, 2H), 2.35 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 160.01, 148.73, 141.31, 136.96, 136.91, 129.11, 125.91, 123.94, 121.77, 73.32, 45.96, 21.22.

1-([1,1'-biphenyl]-4-yl)-2-(pyridin-2-yl)ethan-1-ol (5bd)



5bd

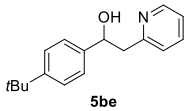
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.28 in hexane:ethyl acetate = 3:1) resulting in 12.4 mg of white solid in 45% yield, melting point 129-131 ^{o}C.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.57-8.53 (m, 1H), 7.64 (dd, *J* = 7.6 Hz, 2.0 Hz, 1H), 7.62-7.56 (m, 4H), 7.51-7.48 (m, 2H), 7.45-7.40 (m, 2H), 7.37-7.30 (m, 1H), 7.21-7.17 (m, 1H), 7.13 (d, *J* = 7.6 Hz, 1H), 5.73 (s, 1H), 5.22 (dd, *J* = 8.0 Hz, 4.0 Hz, 1H), 3.29-3.02 (m, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 159.93, 148.77, 143.31, 141.18, 140.37, 137.03, 128.87, 127.31, 127.24, 126.44, 123.99, 121.90, 73.27, 45.78.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{19}H_{18}NO$ 276.1383, found 276.1382.

1-(4-(*tert*-butyl)phenyl)-2-(pyridin-2-yl)ethan-1-ol (5be)



5be

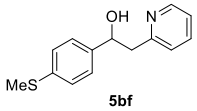
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.38 in hexane:ethyl acetate = 3:1) resulting in 8.4 mg of yellow solid in 33% yield, melting point 67-69 ^{o}C.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.59-8.49 (m, 1H), 7.62 (td, *J* = 7.6 Hz, 2.0 Hz, 1H), 7.41-7.36 (m, 4H), 7.20-7.16 (m, 1H), 7.15-7.11 (m, 1H), 5.14 (dd, *J* = 9.2 Hz, 3.2 Hz, 1H), 3.26-2.89 (m, 2H), 1.33 (s, 9H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 160.13, 150.36, 148.77, 141.20, 136.93, 125.74, 125.38, 123.95, 121.79, 73.30, 45.87, 34.63, 31.53.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{17}H_{22}NO$ 256.1696, found 256.1696.

1-(4-(methylthio)phenyl)-2-(pyridin-2-yl)ethan-1-ol (5bf)



5bf

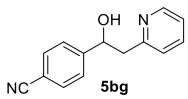
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.29 in hexane:ethyl acetate = 3:1) resulting in 13.7 mg of yellow solid in 56% yield, melting point 114-116 ^{o}C.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.56-8.49 (m, 1H), 7.61 (td, *J* = 7.6 Hz, 2.0 Hz, 1H), 7.38-7.30 (m, 2H), 7.25-7.22 (m, 2H), 7.20-7.15 (m, 1H), 7.10 (d, *J* = 7.6 Hz, 1H), 5.70 (s, 1H), 5.13 (dd, *J* = 7.6 Hz, 4.0 Hz, 1H), 3.12-3.06 (m, 2H), 2.47 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 159.82, 148.73, 141.36, 137.25, 137.01, 127.00, 126.55, 123.96, 121.88, 73.08, 45.71, 16.26.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{14}H_{16}NOS$ 246.0947, found 246.0947.

4-(1-hydroxy-2-(pyridin-2-yl)ethyl)benzonitrile (5bg)[7]



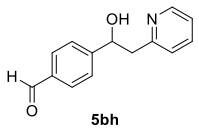
5bg

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.28 in hexane:ethyl acetate = 3:1) resulting in 10.0 mg of white solid in 45% yield.

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.53 (d, *J* = 5.4 Hz, 1H), 7.66-7.60 (m, 3H), 7.53 (d, *J* = 7.8 Hz, 2H), 7.23-7.19 (m, 1H), 7.09 (d, *J* = 7.2 Hz, 1H), 5.25-5.19 (m, 1H), 3.18-2.96 (m, 2H).

^{13}C NMR (151 MHz, $CDCl_3$) δ 159.20, 149.66, 148.76, 137.26, 132.34, 126.72, 123.94, 122.19, 119.06, 111.23, 72.81, 45.08.

4-(1-hydroxy-2-(pyridin-2-yl)ethyl)benzaldehyde (5bh)



5bh

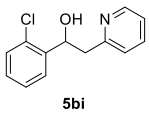
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.28 in hexane:ethyl acetate = 3:1) resulting in 8.0 mg of white oil in 35% yield.

^{1}H NMR (600 MHz, $CDCl_3$) δ 10.00 (s, 1H), 8.54 (d, *J* = 4.8, 1H), 7.86 (d, *J* = 7.2Hz, 2H), 7.66-57 (m, 3H), 7.21 (t, *J* = 6.0 Hz, 1H), 7.10 (d, *J* = 7.8 Hz, 1H), 5.26 (dd, *J* = 9.0 Hz, 3.6 Hz, 1H), 3.20-3.17 (m, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 192.20, 159.34, 151.20, 148.69, 137.24, 135.72, 130.04, 126.57, 123.96, 122.14, 73.07, 45.16.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{14}H_{14}NO_2$ 228.1019, found 228.1017.

1-(2-chlorophenyl)-2-(pyridin-2-yl)ethan-1-ol (5bi)



5bi

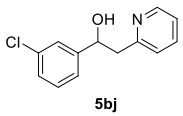
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.42 in hexane:ethyl acetate = 3:1) resulting in 18.4 mg of yellow oil in 79% yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.55-8.51 (m, 1H), 7.66 (dd, *J* = 7.6 Hz, 1.6 Hz, 1H), 7.62 (td, *J* = 7.6 Hz, 1.6 Hz, 1H), 7.33 (dd, *J* = 7.6 Hz, 1.2 Hz, 1H), 7.29-7.24 (m, 1H), 7.21-7.16 (m, 2H), 7.12 (d, *J* = 8.0 Hz, 1H), 5.50 (dd, *J* = 8.8 Hz, 2.4 Hz, 1H), 3.25 (dd, *J* = 15.2 Hz, 2.4 Hz, 1H), 3.00 (dd, *J* = 14.8 Hz, 8.8 Hz, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 159.83, 148.63, 141.49, 137.12, 131.54, 129.30, 128.34, 127.63, 127.13, 123.89, 121.96, 70.23, 43.53.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{13}H_{13}ClNO$ 234.0680, found 234.0679.

1-(3-chlorophenyl)-2-(pyridin-2-yl)ethan-1-ol (5bj)



5bj

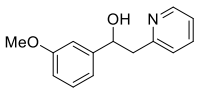
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.50 in hexane:ethyl acetate = 3:1) resulting in 13.7 mg of yellow solid in 59% yield, melting point 95-97 ^{o}C.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.55-8.49 (m, 1H), 7.65-7.59 (m, 1H), 7.45-7.42 (m, 1H), 7.32-7.15 (m, 4H), 7.10 (d, *J* = 8.0 Hz, 1H), 5.93 (s, 1H), 5.14 (t, *J* = 6.4 Hz, 1H), 3.10 (d, *J* = 6.0 Hz, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 159.58, 148.73, 146.38, 137.12, 134.41, 129.72, 127.50, 126.27, 124.14, 123.94, 122.01, 72.85, 45.47.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{13}H_{13}ClNO$ 234.0680, found 234.0680.

1-(3-methoxyphenyl)-2-(pyridin-2-yl)ethan-1-ol (5bk)



5bk

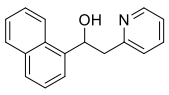
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.11 in hexane:ethyl acetate = 3:1) resulting in 14.9 mg of yellow solid in 65% yield, melting point 58-60 ^{o}C.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.56-8.51 (m, 1H), 7.62 (td, *J* = 7.6 Hz, 1.6 Hz, 1H), 7.28-7.23 (m, 1H), 7.20-7.15 (m, 1H), 7.11 (d, *J* = 7.6 Hz, 1H), 7.04-6.96 (m, 2H), 6.82-6.78 (m, 1H), 5.65 (s, 1H), 5.15 (dd, *J* = 7.2 Hz, 4.8 Hz, 1H), 3.81 (s, 3H), 3.25-2.99 (m, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 159.94, 159.91, 148.75, 145.99, 137.00, 129.45, 123.98, 121.87, 118.34, 113.18, 111.40, 73.41, 55.38, 45.83.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{14}H_{16}NO_2$ 230.1176, found 230.1177.

1-(naphthalen-1-yl)-2-(pyridin-2-yl)ethan-1-ol (5bl)[8]



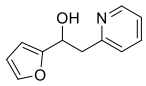
5bl

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.40 in hexane:ethyl acetate = 3:1) resulting in 19.4 mg of yellow solid in 78% yield, melting point 110-112 ^{o}C.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.66-8.57 (m, 1H), 8.18-8.09 (m, 1H), 7.91-7.85 (m, 1H), 7.82-7.73 (m, 2H), 7.65-7.59 (m, 1H), 7.55-7.44 (m, 3H), 7.22 (dd, *J* = 7.6 Hz, 4.8 Hz, 1H), 7.11 (d, *J* = 8.0 Hz, 1H), 5.99-5.94 (m, 1H), 5.87 (s, 1H), 3.53-2.83 (m, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 160.15, 148.88, 139.64, 137.03, 133.95, 130.40, 129.11, 127.84, 126.07, 125.76, 125.45, 123.89, 123.36, 123.14, 121.94, 70.21, 45.04.

1-(furan-2-yl)-2-(pyridin-2-yl)ethan-1-ol (5bm)[7]



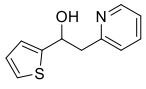
5bm

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.15 in hexane:ethyl acetate = 3:1) resulting in 12.7 mg of yellow oil in 67% yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.54-8.49 (m, 1H), 7.63 (td, *J* = 8.0 Hz, 2.0 Hz, 1H), 7.37 (dd, *J* = 2.0 Hz, 0.8 Hz, 1H), 7.21-7.12 (m, 2H), 6.31 (dd, *J* = 3.2 Hz, 1.6 Hz, 1H), 6.24-6.22 (m, 1H), 5.20 (dd, *J* = 8.4 Hz, 3.6 Hz, 1H), 3.39-3.16 (m, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 159.52, 156.48, 148.72, 141.86, 137.01, 123.97, 121.91, 110.26, 105.96, 67.47, 41.94.

2-(pyridin-2-yl)-1-(thiophen-2-yl)ethan-1-ol (5bn)



5bn

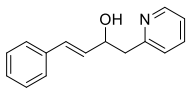
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.30 in hexane:ethyl acetate = 3:1) resulting in 16.0 mg of yellow solid in 78% yield, melting point 48-50 ^{o}C.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.53-8.49 (m, 1H), 7.63 (td, *J* = 7.6 Hz, 1.6 Hz, 1H), 7.21 (dd, *J* = 4.8 Hz, 1.2 Hz, 1H), 7.20-7.16 (m, 1H), 7.14 (d, *J* = 8.0 Hz, 1H), 7.00-6.89 (m, 2H), 5.97 (s, 1H), 5.44 (t, *J* = 5.6 Hz, 1H), 3.26 (d, *J* = 6.0 Hz, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 159.46, 148.71, 148.37, 137.04, 126.64, 124.32, 124.06, 123.26, 121.97, 69.76, 45.56.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{11}H_{12}NOS$ 206.0634, found 206.0633.

(*E*)-4-phenyl-1-(pyridin-2-yl)but-3-en-2-ol (5bo)[8]



5bo

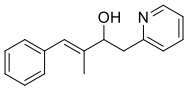
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed

using hexanes and ethyl acetate (10:1) (R*f* = 0.20 in hexane:ethyl acetate = 3:1) resulting in 17.8 mg of yellow solid in 79% yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.56-8.47 (m, 1H), 7.63 (td, *J* = 7.6 Hz, 1.6 Hz, 1H), 7.43-7.34 (m, 2H), 7.32-7.27 (m, 2H), 7.24-7.20 (m, 1H), 7.20-7.14 (m, 2H), 6.67 (dd, *J* = 16.0 Hz, 1.2 Hz, 1H), 6.30 (dd, *J* = 16.0 Hz, 6.0 Hz, 1H), 5.39 (s, 1H), 4.81-4.72 (m, 1H), 3.36-2.66 (m, 2H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 159.83, 148.78, 137.17, 136.95, 131.82, 130.12, 128.63, 127.58, 126.63, 123.98, 121.81, 71.90, 43.80.

(*E*)-3-methyl-4-phenyl-1-(pyridin-2-yl)but-3-en-2-ol (5bp)



5bp

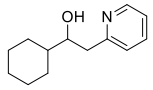
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.27 in hexane:ethyl acetate = 3:1) resulting in 12.2 mg of yellow oil in 51% yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.58-8.48 (m, 1H), 7.64 (t, *J* = 7.2 Hz, 1H), 7.31 (t, *J* = 7.6 Hz, 2H), 7.25 (d, *J* = 8.0 Hz, 2H), 7.22-7.14 (m, 3H), 6.59 (s, 1H), 4.61 (t, *J* = 6.0 Hz, 1H), 3.07 (d, *J* = 6.0 Hz, 2H), 1.94 (s, 3H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 160.11, 148.79, 139.58, 138.05, 137.00, 129.14, 128.17, 126.40, 125.55, 123.92, 121.81, 76.64, 42.41, 14.43.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{16}H_{18}NO$ 240.1383, found 240.1377.

1-cyclohexyl-2-(pyridin-2-yl)ethan-1-ol (5bq)[8]



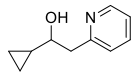
5bq

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.54 in hexane:ethyl acetate = 3:1) resulting in 10.9 mg of yellow solid in 53% yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.68-8.23 (m, 1H), 7.60 (td, *J* = 7.6 Hz, 2.0 Hz, 1H), 7.20-6.88 (m, 2H), 4.94 (s, 1H), 3.86-3.74 (m, 1H), 3.23-2.46 (m, 2H), 2.22-1.92 (m, 1H), 1.80-1.68 (m, 3H), 1.72-1.64 (m, 1H), 1.47-1.34 (m, 1H), 1.32-1.01 (m, 5H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 161.01, 148.70, 136.80, 123.86, 121.49, 75.36, 43.69, 40.58, 29.17, 28.63, 26.75, 26.48, 26.39.

1-cyclopropyl-2-(pyridin-2-yl)ethan-1-ol (5br)



5br

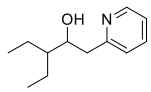
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.15 in hexane:ethyl acetate = 3:1) resulting in 10.9 mg of yellow oil in 67% yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.56-8.40 (m, 1H), 7.63 (td, *J* = 7.6 Hz, 1.6 Hz, 1H), 7.22-7.10 (m, 2H), 3.40-3.27 (m, 1H), 3.14-2.93 (m, 2H), 1.03-0.91 (m, 1H), 0.59-0.51 (m, 1H), 0.50-0.46 (m, 1H), 0.45-0.38 (m, 1H), 0.26-0.17 (m, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 160.37, 148.76, 136.82, 123.92, 121.61, 75.85, 43.70, 17.33, 3.27, 2.09.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{10}H_{14}NO$ 164.1070, found 164.1068.

3-ethyl-1-(pyridin-2-yl)pentan-2-ol (5bs)



5bs

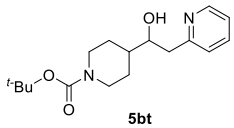
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.35 in hexane:ethyl acetate = 3:1) resulting in 11.6 mg of yellow oil in 60% yield.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.53-8.44 (m, 1H), 7.62 (t, *J* = 7.6 Hz, 1H), 7.19-7.10 (m, 2H), 4.11-3.99 (m, 1H), 2.95-2.77 (m, 2H), 1.65-1.56 (m, 1H), 1.54-1.45 (m, 2H), 1.38-1.28 (m, 2H), 0.94 (t, *J* = 7.2 Hz, 6H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 161.18, 148.75, 136.82, 123.83, 121.52, 72.53, 46.77, 40.52, 22.16, 21.70, 11.91.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{12}H_{20}NO$ 194.1539, found 194.1539.

***tert*-butyl 4-(1-hydroxy-2-(pyridin-2-yl)ethyl)piperidine-1-carboxylate (5bt)**



5bt

The title compound was prepared according to the general

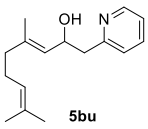
procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.28 in hexane:ethyl acetate = 3:1) resulting in 10.0 mg of white oil in 33% yield.

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.48 (d, *J* = 4.8 Hz, 1H), 7.62 (t, *J* = 7.8 Hz, 1H), 7.19-7.10 (m, 2H), 4.24-4.04 (m, 2H), 3.85-3.76 (m, 1H), 2.98-2.80 (m, 2H), 2.73-2.59 (m, 2H), 1.95-1.87 (m, 2H), 1.75-1.65 (m, 2H), 1.59-1.53 (m, 1H), 1.45 (s, 9H).

^{13}C NMR (151 MHz, $CDCl_3$) δ 160.50, 155.05, 148.72, 137.00, 123.91, 121.72, 79.40, 74.50, 42.12, 40.22, 28.64, 28.24.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{17}H_{27}N_2O_3$ 307.2016, found 307.2018.

(*E*)-4,8-dimethyl-1-(pyridin-2-yl)nona-3,7-dien-2-ol (5bu)



5bu

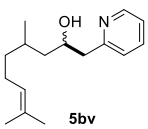
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.13 in hexane:ethyl acetate = 3:1) resulting in 8.7 mg of yellow oil in 36% yield.

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.51 (d, *J* = 5.4 Hz, 1H), 7.62 (t, *J* = 7.8 Hz, 1H), 7.18-7.11 (m, 2H), 5.29 (d, *J* = 8.4 Hz, 1H), 5.09 (t, *J* = 7.2 Hz, 1H), 4.87-4.79 (m, 1H), 3.02-2.86 (m, 2H), 2.13-2.05 (m, 2H), 2.01 (t, *J* = 7.2 Hz, 2H), 1.68 (s, 3H), 1.67 (s, 3H), 1.60 (s, 3H).

^{13}C NMR (151 MHz, $CDCl_3$) δ 160.25, 148.82, 138.24, 136.77, 131.71, 127.01, 124.22, 124.00, 121.64, 68.24, 44.15, 39.69, 26.59, 25.81, 17.83, 16.77.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{16}H_{24}NO$ 246.1852, found 246.1847.

4,8-dimethyl-1-(pyridin-2-yl)non-7-en-2-ol (5bv)



5bv

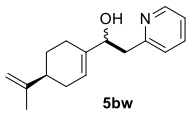
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.33 in hexane:ethyl acetate = 3:1) resulting in 6.0 mg of yellow oil in 24% yield, **5bv** was obtained as 1:1 diastereomixture. Trials to isolate each diastereomer resulted in failure.

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.53-8.47 (m, 1H), 7.62 (t, *J* = 7.2 Hz, 1H), 7.18-7.10 (m, 2H), 5.14-5.07 (m, 1H), 4.19-4.09 (m, 1H), 2.94-2.74 (m, 2H), 2.06-1.91 (m, 2H), 1.68 (s, 3H), 1.60 (s, 3H), 1.52-1.40 (m, 2H), 1.38-1.30 (m, 1H), 1.24-1.11 (m, 2H), 0.94 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (151 MHz, $CDCl_3$) δ 160.61, 148.76, 136.82, 131.22, 125.09, 123.89, 121.61, 69.27, 44.81, 44.31, 38.08, 29.45, 25.85, 25.67, 20.33, 17.80; (other isomer) 160.61, 148.76, 136.82, 131.22, 125.05, 123.89, 121.61, 68.82, 44.72, 43.63, 37.08, 29.01, 25.85, 25.57, 19.35, 17.79.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{16}H_{26}NO$ 248.2009, found 248.2006.

1-((*S*)-4-(prop-1-en-2-yl)cyclohex-1-en-1-yl)-2-(pyridin-2-yl)ethan-1-ol (5bw)



5bw

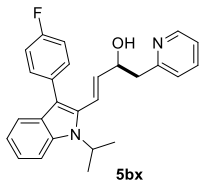
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.26 in hexane:ethyl acetate = 3:1) resulting in 11.9 mg of yellow oil in 49% yield, **5bw** was obtained as 1:1 diastereomixture. Trials to isolate each diastereomer resulted in failure.

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.50-8.46 (m, 1H), 7.61 (td, *J* = 7.6 Hz, 2.0 Hz, 1H), 7.17-7.11 (m, 2H), 5.78-5.72 (m, 1H), 4.84-4.62 (m, 2H), 4.51-4.22 (m, 1H), 3.04-2.86 (m, 2H), 2.37-2.25 (m, 1H), 2.24-2.04 (m, 3H), 2.01-1.93 (m, 1H), 1.90-1.81 (m, 1H), 1.73 (s, 3H), 1.57-1.42 (m, 1H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 160.48, 150.09, 148.76, 136.89, 126.54,123.89, 122.65, 121.67, 108.71, 75.07, 42.48, 41.46, 30.63, 27.75, 25.35, 20.95; (other isomer) 160.38, 150.09, 148.75, 136.86, 126.0, 123.85, 121.87,121.67, 108.67, 74.95, 42.45, 41.38, 30.57, 27.72, 24.71, 20.91.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{16}H_{22}NO$ 244.1696, found 244.1690.

(*S*,*E*)-4-(3-(4-fluorophenyl)-1-isopropyl-1*H*-indol-2-yl)-1-(pyridin-2-yl)but-3-en-2-ol (5bx)



5bx

The title compound was prepared according to the general procedure

as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.10 in hexane:ethyl acetate = 3:1) resulting in 17.7 mg of yellow oil in 44% yield.

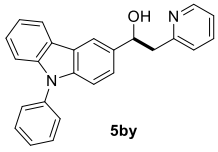
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.54-8.46 (m, 1H), 7.61 (td, *J* = 7.8 Hz, 1.8 Hz, 1H), 7.55-7.48 (m, 2H), 7.38-7.33 (m, 2H), 7.19-7.12 (m, 2H), 7.11-7.02 (m, 4H), 6.73 (dd, *J* = 16.2, 1.2 Hz, 1H), 5.79 (dd, *J* = 16.2, 5.4 Hz, 1H), 4.82-4.73 (m, 1H), 4.69-4.64 (m, 1H), 3.04-2.77 (m, 2H), 1.61 (d, *J* = 7.2 Hz, 6H).

^{13}C NMR (151 MHz, $CDCl_3$) δ161.49 (d, *J* = 224.5 Hz), 159.58, 148.59, 139.07, 137.03, 135.13, 134.09, 132.06 (d, *J* = 7.9 Hz), 131.90 (d, *J* = 3.2 Hz), 128.55, 124.01, 121.87, 121.71, 119.67, 119.47, 118.73, 115.31 (d, *J* = 21.1 Hz), 114.42, 111.75, 71.56, 47.77, 42.74, 21.85, 21.82.

^{19}F NMR (376 MHz, $CDCl_3$) δ -117.17.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{26}H_{26}FN_2O$ 401.2024, found 401.2017.

(*S*)-1-(9-phenyl-9*H*-carbazol-3-yl)-2-(pyridin-2-yl)ethan-1-ol (5by)



5by

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.11 in hexane:ethyl acetate = 3:1) resulting in 16.0 mg of yellow oil in 44% yield.

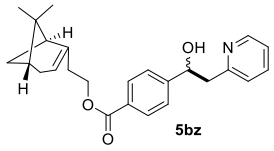
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.58 (d, *J* = 4.8 Hz, 1H), 8.23 (s, 1H), 8.14 (d, *J* = 7.8 Hz, 1H), 7.65-7.59 (m, 3H), 7.57 (d, *J* = 7.2 Hz, 2H), 7.49-7.43 (m, 2H), 7.42-7.36 (m, 3H), 7.30-7.26 (m, 1H), 7.22-7.17 (m, 1H), 7.15 (d, *J* = 7.8 Hz, 1H), 5.43-5.32 (m, 1H), 3.33-3.15 (m, 2H).

^{13}C NMR (151 MHz, $CDCl_3$) δ 160.11, 148.77, 141.37, 140.54, 137.95, 136.99, 136.11, 129.99, 127.52, 127.20, 126.02, 124.26, 124.02, 123.58, 123.49, 121.84, 120.50, 120.02, 117.81, 109.91, 109.73, 73.97, 46.55.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{25}H_{21}N_2O$ 365.1648, found 365.1640.

2-((1*S*,5*R*)-6,6-dimethylbicyclo[3.1.1]hept-2-en-2-yl)ethyl-4-((*S*)-1-hydroxy-2-(pyr

idin-2-yl)ethyl)benzoate (5bz)

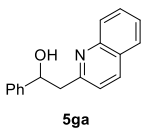


The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.23 in hexane:ethyl acetate = 3:1) resulting in 18.4 mg of yellow oil in 47% yield, **5bz** was obtained as 1:1 diastereomixture. Trials to isolate each diastereomer resulted in failure. ^{1}H NMR (600 MHz, $CDCl_3$) δ 8.54 (d, *J* = 5.4 Hz, 1H), 8.04-7.94 (m, 2H), 7.62 (td, *J* = 7.8, 1.8 Hz, 1H), 7.48 (d, *J* = 7.8 Hz, 2H), 7.23-7.17 (m, 1H), 7.09 (d, *J* = 7.8 Hz, 1H), 5.39-5.33 (m, 1H), 5.23 (dd, *J* = 8.4 Hz, 4.2 Hz, 1H), 4.37-4.25 (m, 2H), 3.26-2.97 (m, 2H), 2.45-2.40 (m, 2H), 2.38 (dt, *J* = 8.4 Hz, 6.0 Hz, 1H), 2.30-2.17 (m, 2H), 2.13 (td, *J* = 5.4 Hz, 1.8 Hz, 1H), 2.11-2.07 (m, 1H), 1.27 (s, 3H), 1.17 (d, *J* = 8.4 Hz, 1H), 0.84 (s, 3H); (other isomer) 8.54 (d, *J* = 5.4 Hz, 1H), 8.04-7.94 (m, 2H), 7.62 (td, *J* = 7.8, 1.8 Hz, 1H), 7.48 (d, *J* = 7.8 Hz, 2H), 7.23-7.17 (m, 1H), 7.09 (d, *J* = 7.8 Hz, 1H), 5.39-5.33 (m, 1H), 5.23 (dd, *J* = 8.4 Hz, 4.2 Hz, 1H), 4.37-4.25 (m, 2H), 3.26-2.97 (m, 2H), 2.45-2.40 (m, 2H), 2.38 (dt, *J* = 8.4 Hz, 6.0 Hz, 1H), 2.30-2.17 (m, 2H), 2.13 (td, *J* = 5.4 Hz, 1.8 Hz, 1H), 2.11-2.07 (m, 1H), 1.27 (s, 3H), 1.17 (d, *J* = 8.4 Hz, 1H), 0.83 (s, 3H).

^{13}C NMR (151 MHz, $CDCl_3$) δ 166.65, 159.52, 149.27, 148.69, 144.45, 137.15, 129.80, 129.54, 125.88, 123.96, 122.03, 119.05, 73.10, 63.41, 45.97, 45.34, 40.92, 38.17, 36.23, 31.84, 31.55, 26.42, 21.30.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{25}H_{30}NO_3$ 392.2220, found 392.2208

1-phenyl-2-(quinolin-2-yl)ethan-1-ol (5ga)[9]



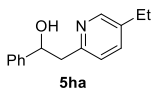
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.45 in hexane:ethyl acetate = 3:1) resulting in 16.0 mg of white solid in 64% yield.

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.10 (d, *J* = 8.4 Hz, 1H), 8.08 (d, *J* = 8.4 Hz, 1H), 7.81 (d, *J* = 8.4 Hz, 1H), 7.74-7.69 (m, 1H), 7.57-7.51 (m, 1H), 7.51-7.45 (m, 2H), 7.37 (t, *J* = 7.2 Hz, 2H), 7.31-7.27 (m, 1H), 7.23 (d, *J* = 8.4 Hz, 1H), 6.16 (s, 1H), 5.34 (dd, *J* = 9.0

Hz, 3.6 Hz, 1H), 3.60-2.98 (m, 2H).

^{13}C NMR (151 MHz, $CDCl_3$) δ 160.71, 147.23, 144.14, 136.96, 129.97, 128.90, 128.51, 127.74, 127.45, 127.03, 126.38, 126.04, 122.24, 73.12, 46.29.

2-(5-ethylpyridin-2-yl)-1-phenylethan-1-ol (5ha)



5ha

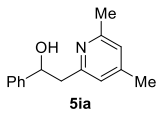
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.23 in hexane:ethyl acetate = 3:1) resulting in 12.3 mg of yellow oil in 54% yield.

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.39-8.37 (m, 1H), 7.45 (dd, *J* = 8.4 Hz, 2.4 Hz, 1H), 7.43 (d, *J* = 7.2 Hz, 2H), 7.34 (t, *J* = 7.2 Hz, 2H), 7.27-7.23 (m, 1H), 7.03 (d, *J* = 7.8 Hz, 1H), 5.14 (dd, *J* = 7.8 Hz, 3.6 Hz, 1H), 3.20-3.02 (m, 2H), 2.64 (q, *J* = 7.8 Hz, 2H), 1.25 (t, *J* = 7.2 Hz, 3H).

^{13}C NMR (151 MHz, $CDCl_3$) δ 157.18, 148.31, 144.35, 137.42, 136.46, 128.44, 127.38, 126.01, 123.50, 73.62, 45.37, 25.88, 15.44.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{15}H_{17}NO$ 228.1383, found 228.1376

2-(4,6-dimethylpyridin-2-yl)-1-phenylethan-1-ol (5ia)



5ia

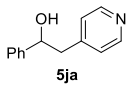
The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.27 in hexane:ethyl acetate = 3:1) resulting in 17.3 mg of yellow oil in 76% yield.

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.43 (d, *J* = 7.2 Hz, 2H), 7.35 (t, *J* = 7.8 Hz, 2H), 7.27-7.24 (m, 1H), 6.87 (s, 1H), 6.74 (s, 1H), 5.10 (dd, *J* = 9.0 Hz, 3.0 Hz, 1H), 3.07-2.96 (m, 2H), 2.51 (s, 3H), 2.27 (s, 3H).

^{13}C NMR (151 MHz, $CDCl_3$) δ 159.11, 157.24, 148.47, 144.52, 128.42, 127.30, 126.00, 122.38, 121.71, 73.57, 45.39, 24.28, 21.04.

HRMS (*m/z*): $[M+H]^+$ calcd for $C_{15}H_{17}NO$ 228.1383, found 228.1375

1-phenyl-2-(pyridin-4-yl)ethan-1-ol (5ja)[10]



5ja

The title compound was prepared according to the general procedure as described, silica gel flash column chromatography was performed using hexanes and ethyl acetate (10:1) (R*f* = 0.28 in hexane:ethyl acetate = 3:1) resulting in 5.0 mg of yellow oil in 25% yield.

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.46 (d, *J* = 4.8 Hz, 2H), 7.37-7.27 (m, 5H), 7.10 (d, *J* = 4.8 Hz, 2H), 4.94 (dd, *J* = 8.4 Hz, 5.4 Hz, 1H), 3.09-2.96 (m, 2H).

^{13}C NMR (151 MHz, $CDCl_3$) δ 149.68, 147.52, 143.66, 128.71, 128.08, 126.00, 125.07, 74.67, 45.25.

VII. References

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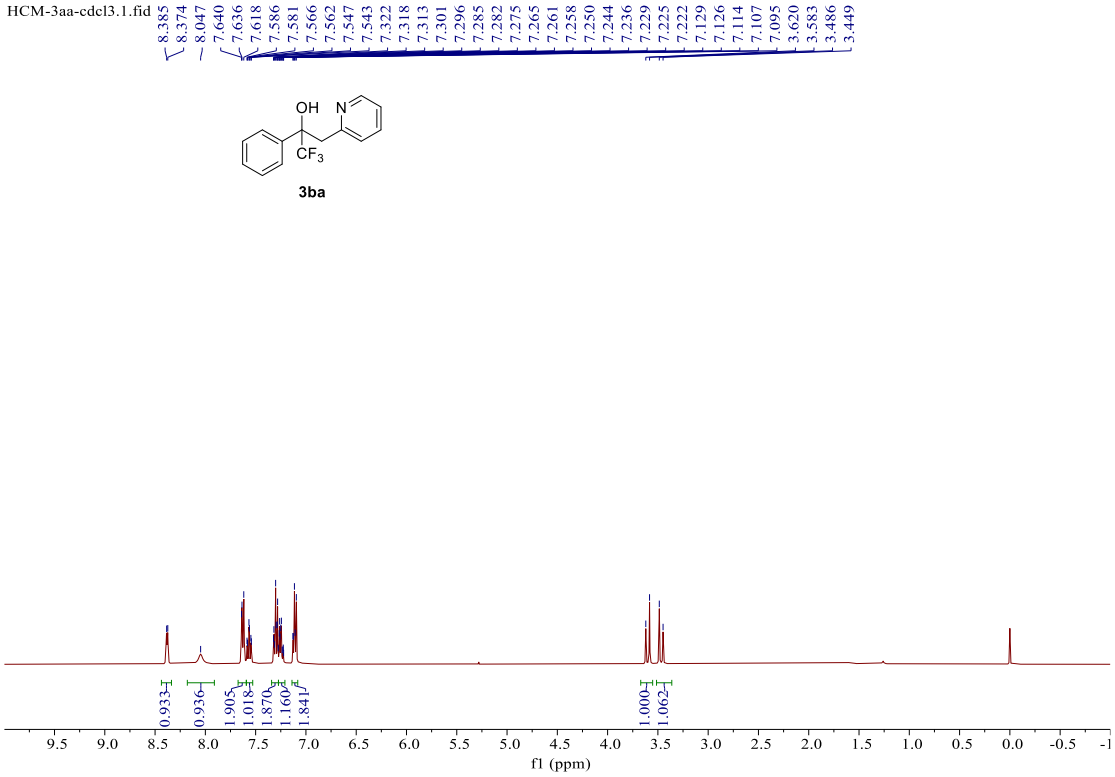
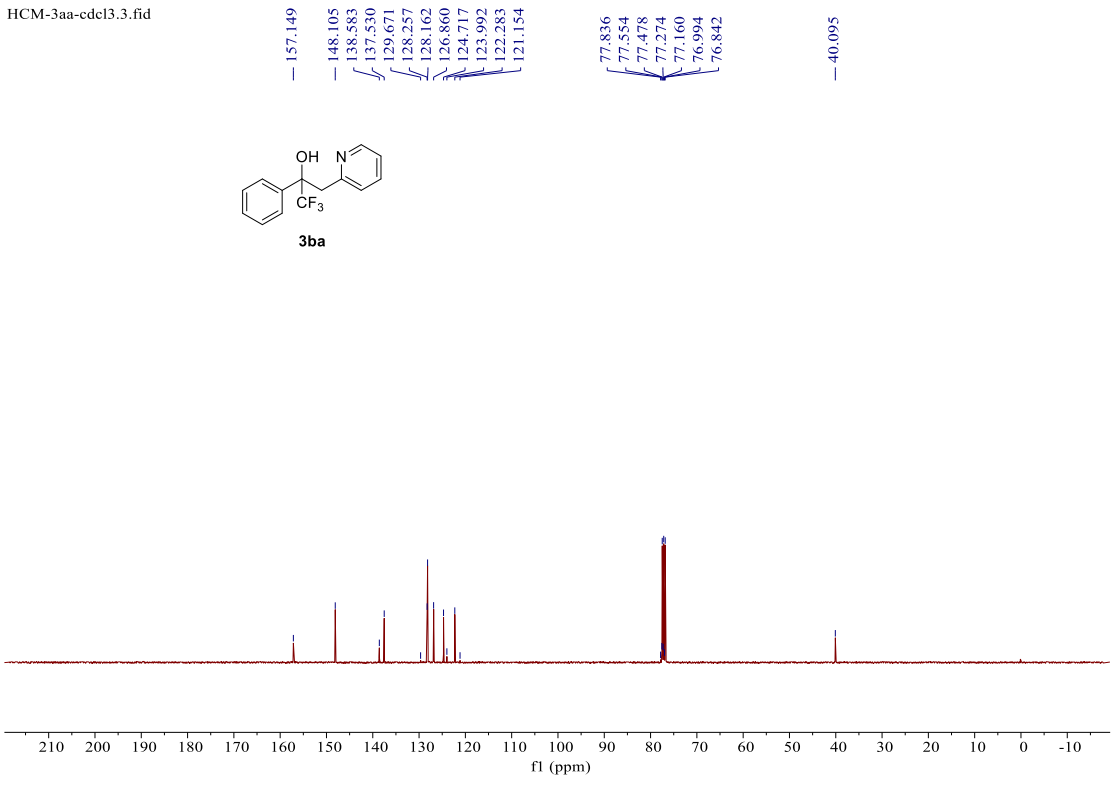
VIII. NMR spectra of the products

^{1}H NMR ($CDCl_3$) for **3ba**

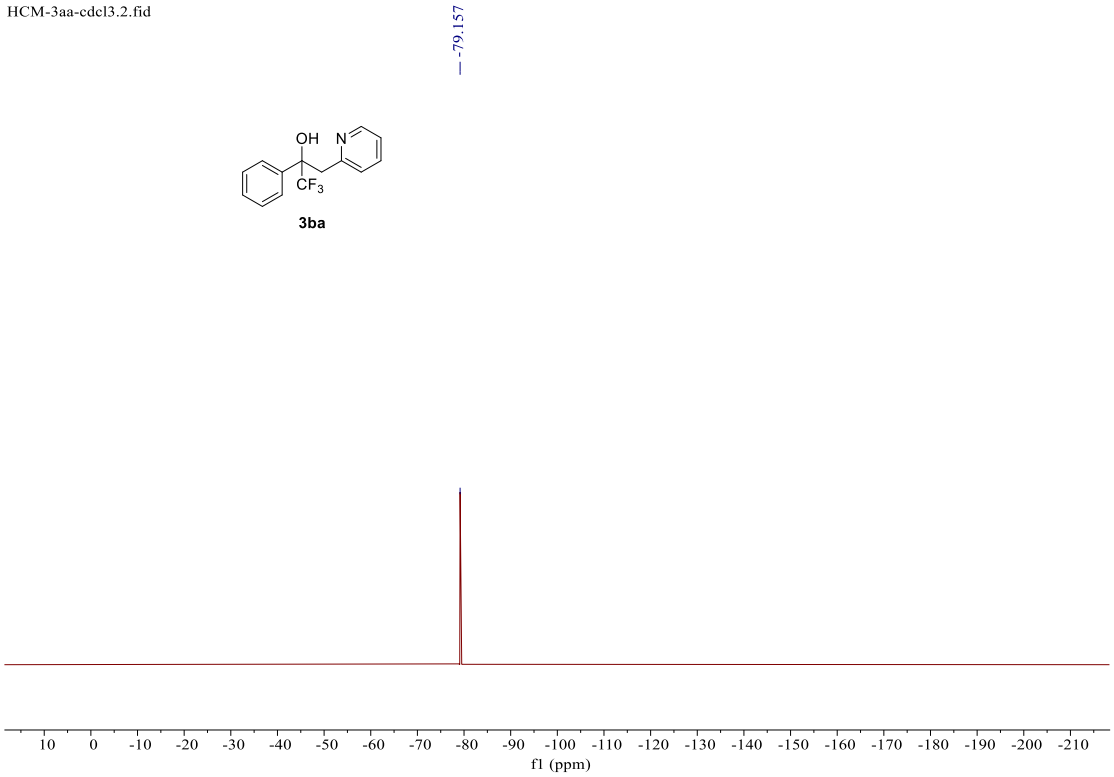


^{13}C NMR ($CDCl_3$) for **3ba**



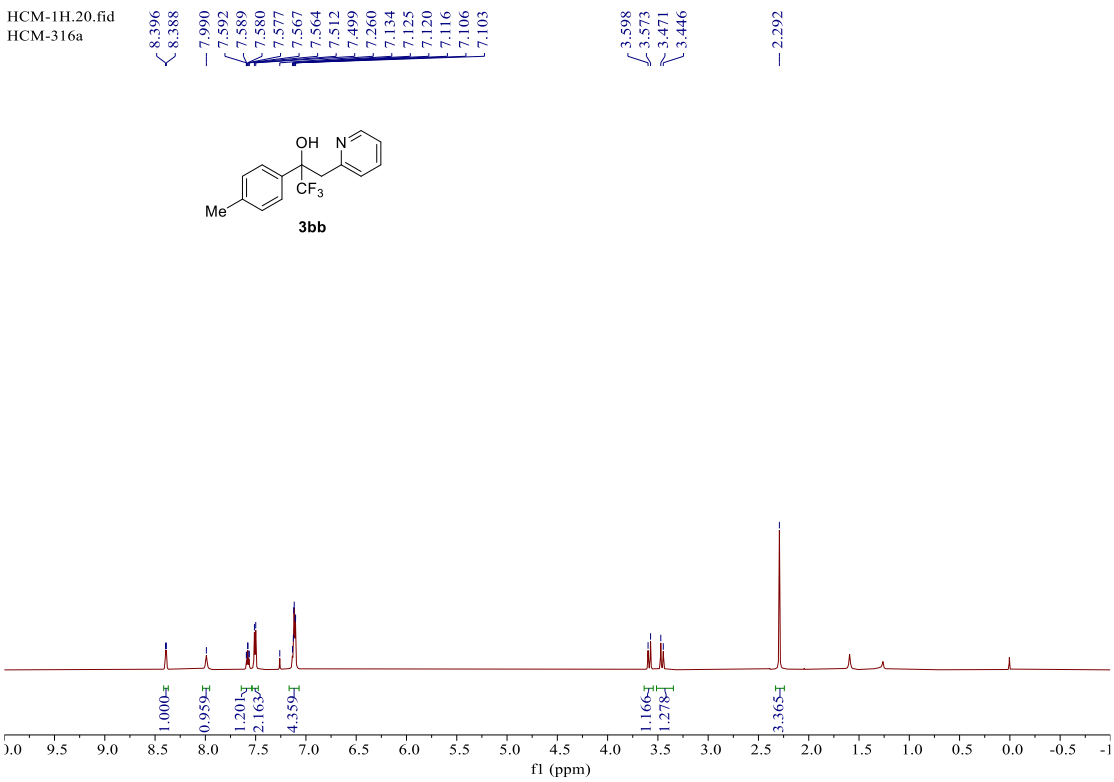
^{19}F NMR ($CDCl_3$) for **3ba**

HCM-3aa-cdcl3.2.fid

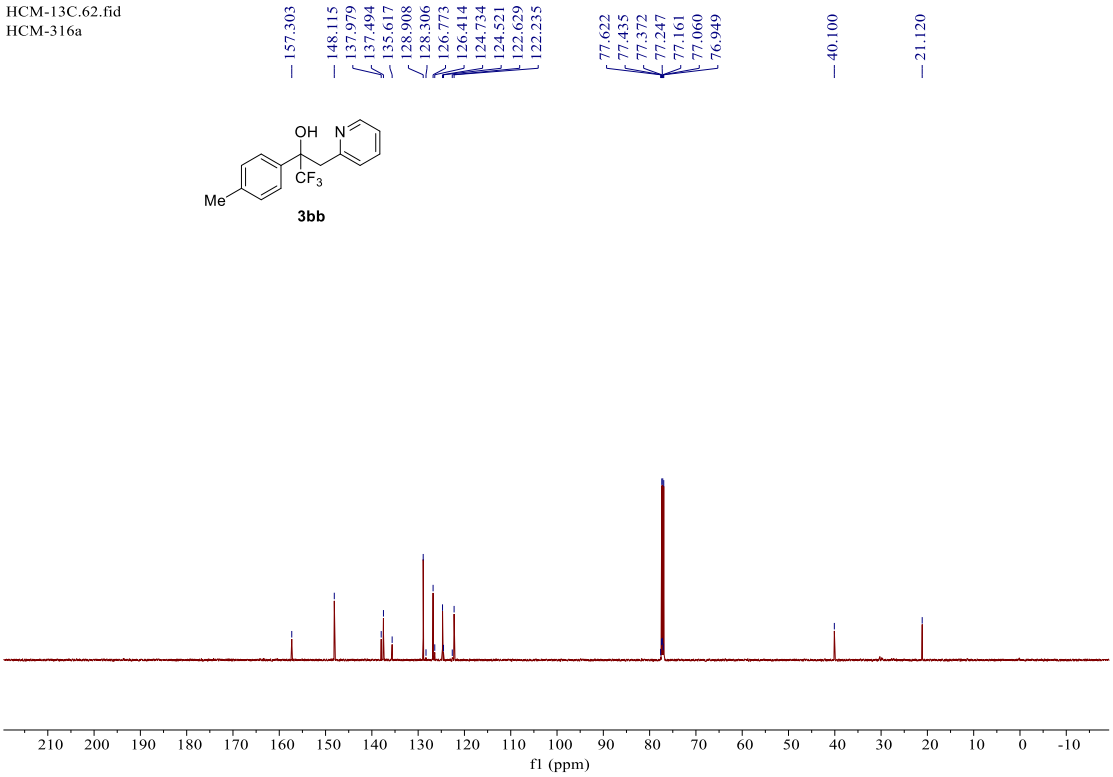


^{1}H NMR ($CDCl_3$) for **3bb**

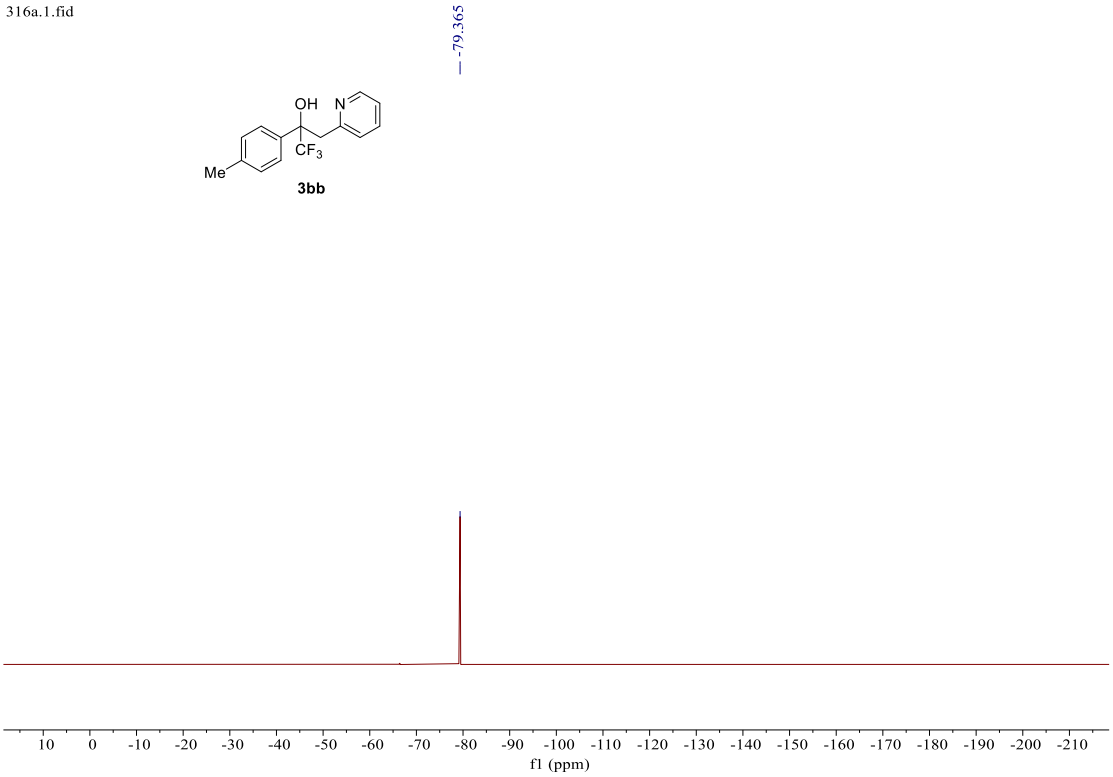
HCM-1H.20.fid
HCM-316a



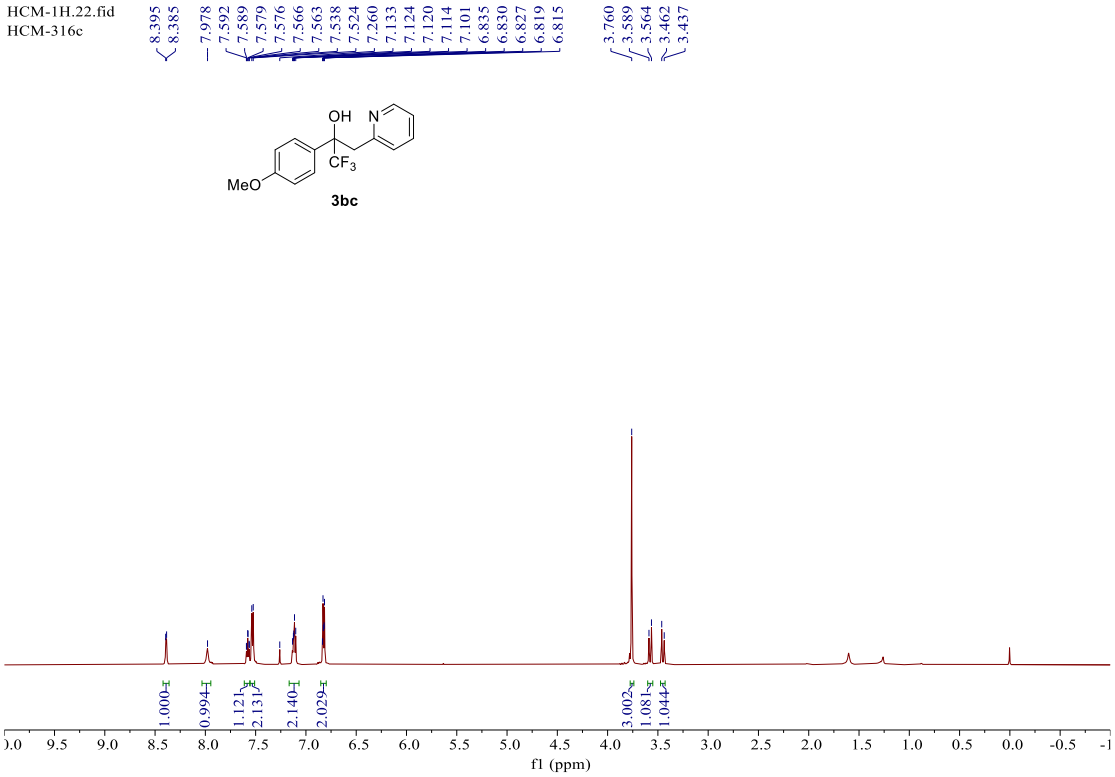
^{13}C NMR ($CDCl_3$) for **3bb**



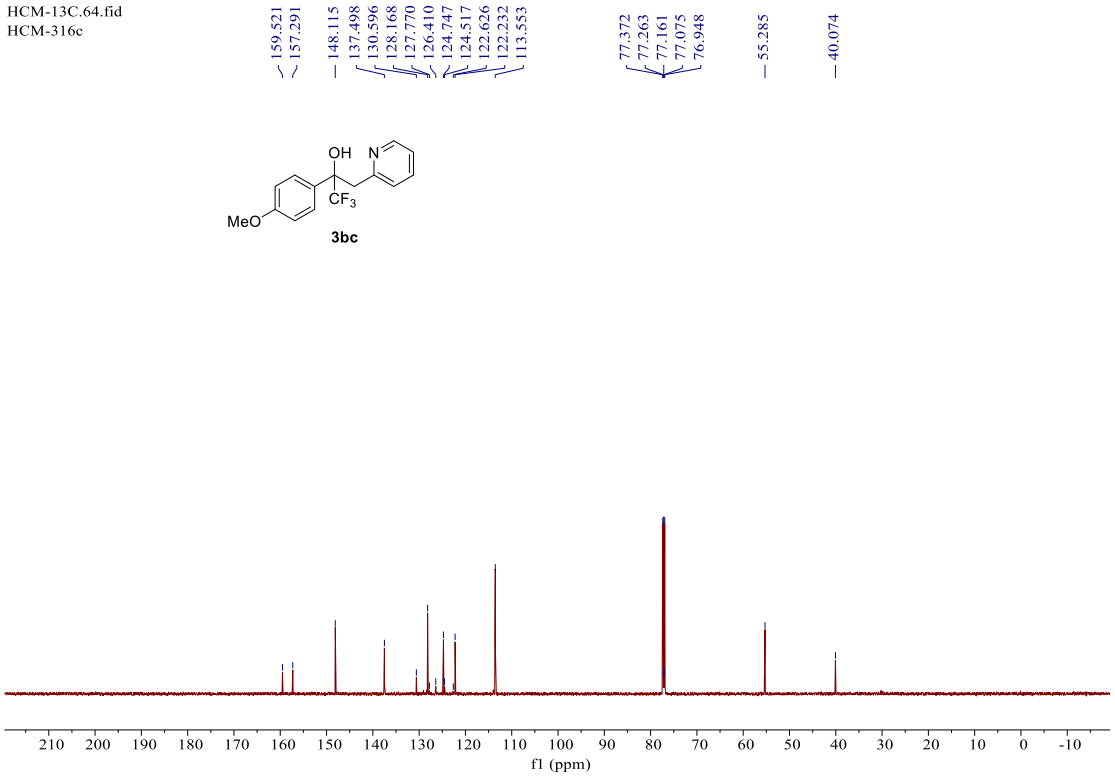
^{19}F NMR ($CDCl_3$) for **3bb**



^{1}H NMR ($CDCl_3$) for **3bc**

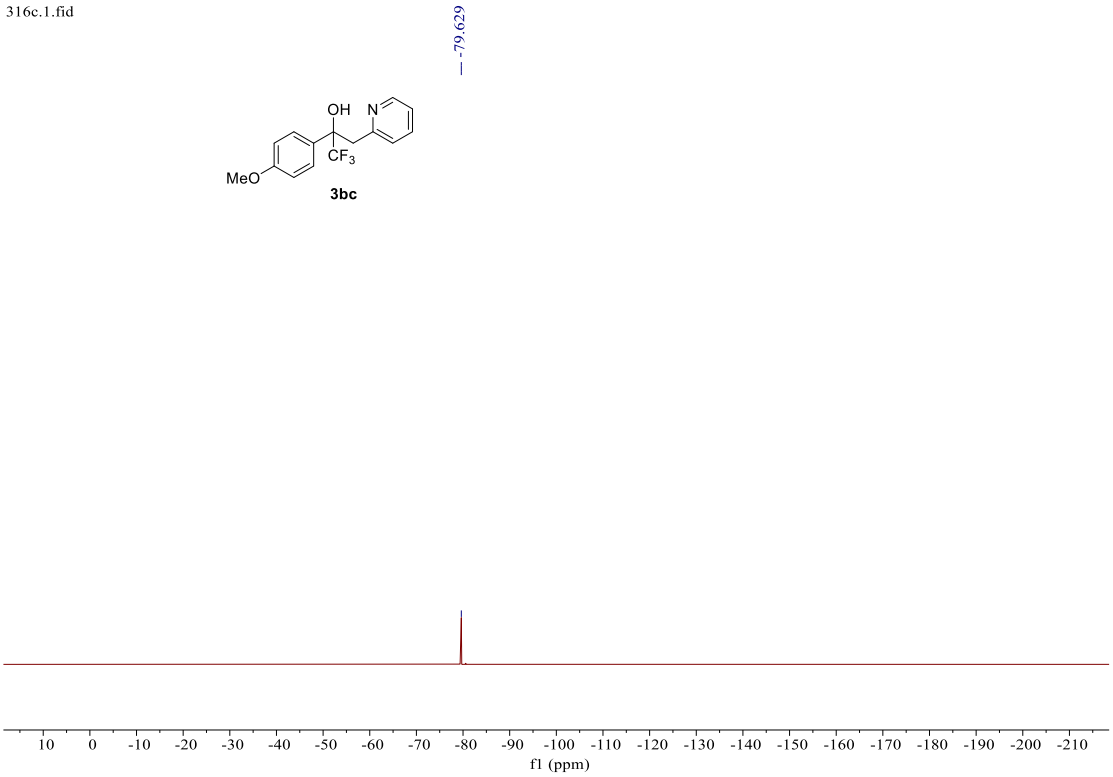


^{13}C NMR ($CDCl_3$) for **3bc**



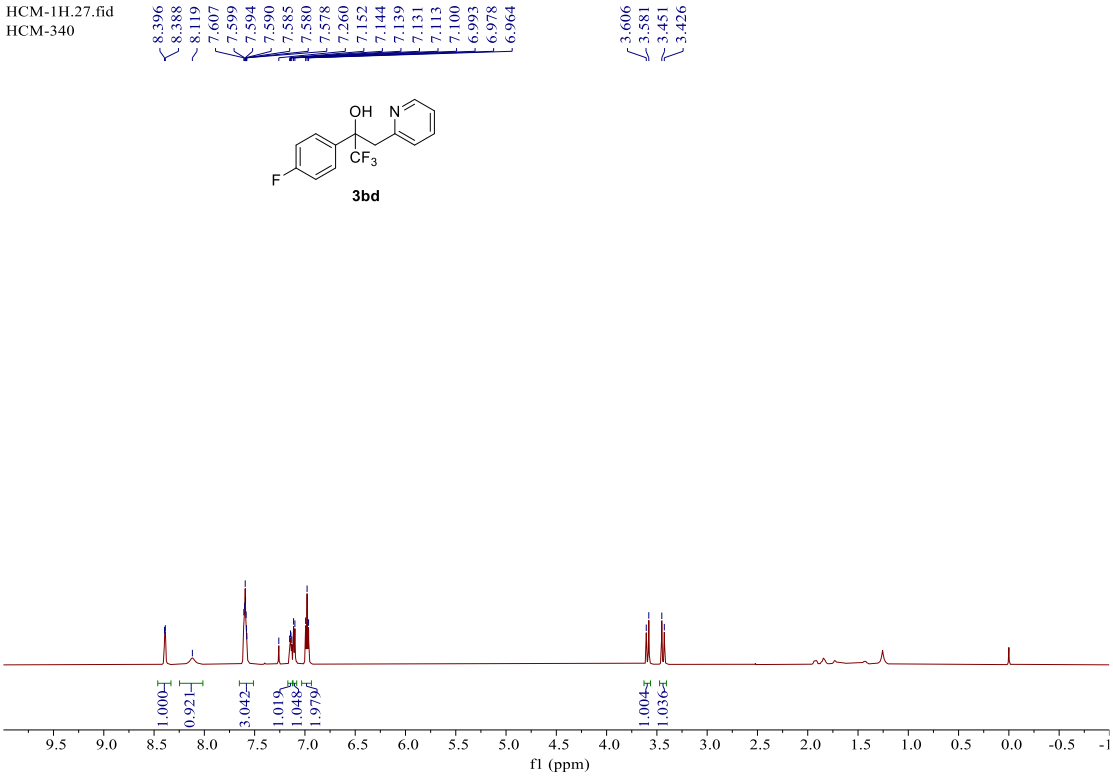
^{19}F NMR ($CDCl_3$) for **3bc**

316c.1.fid

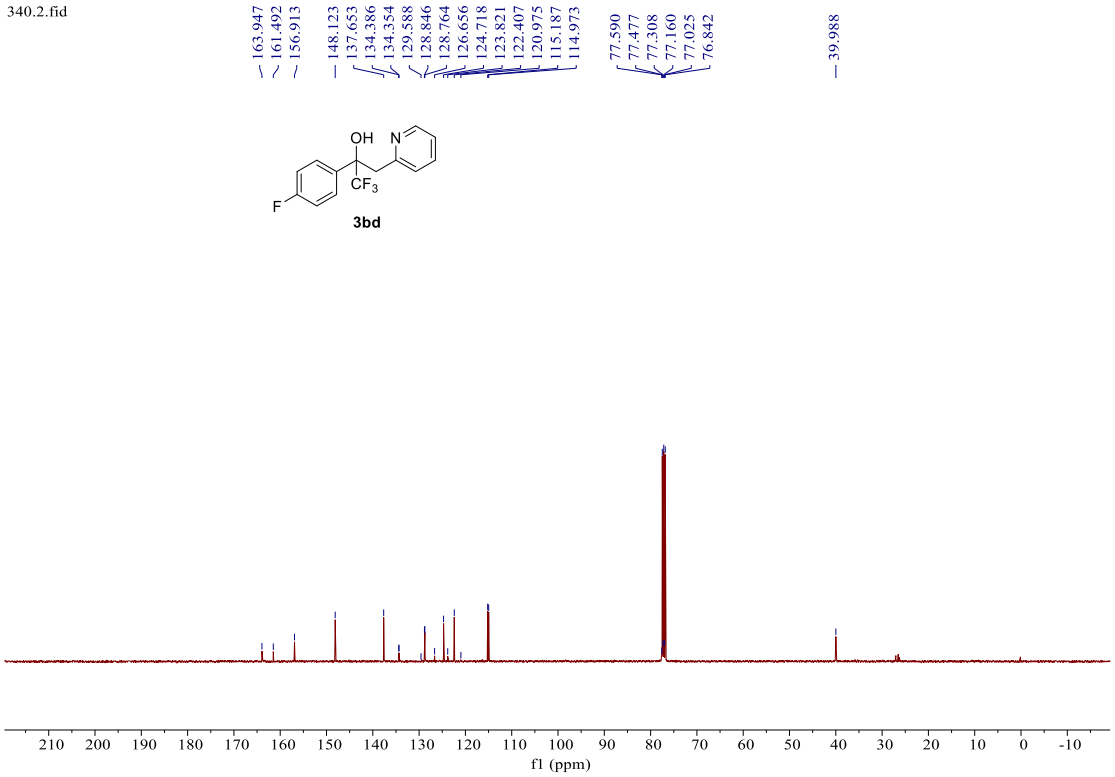


^{1}H NMR ($CDCl_3$) for **3bd**

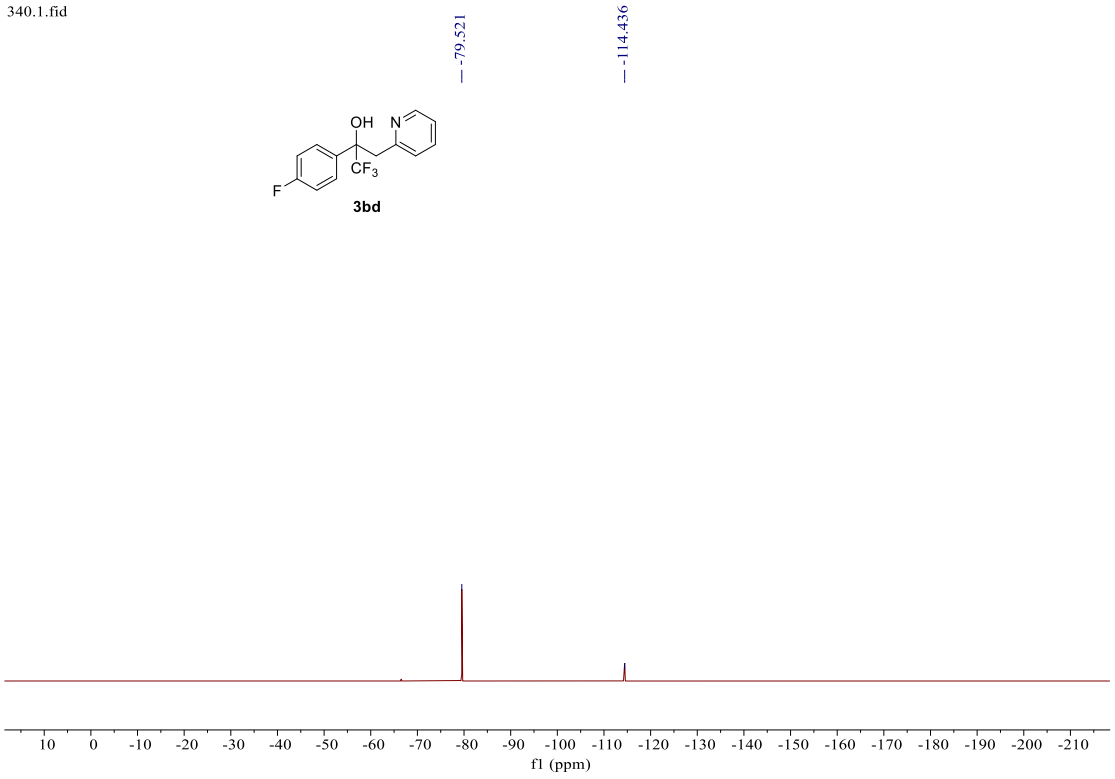
HCM-1H.27.fid
HCM-340



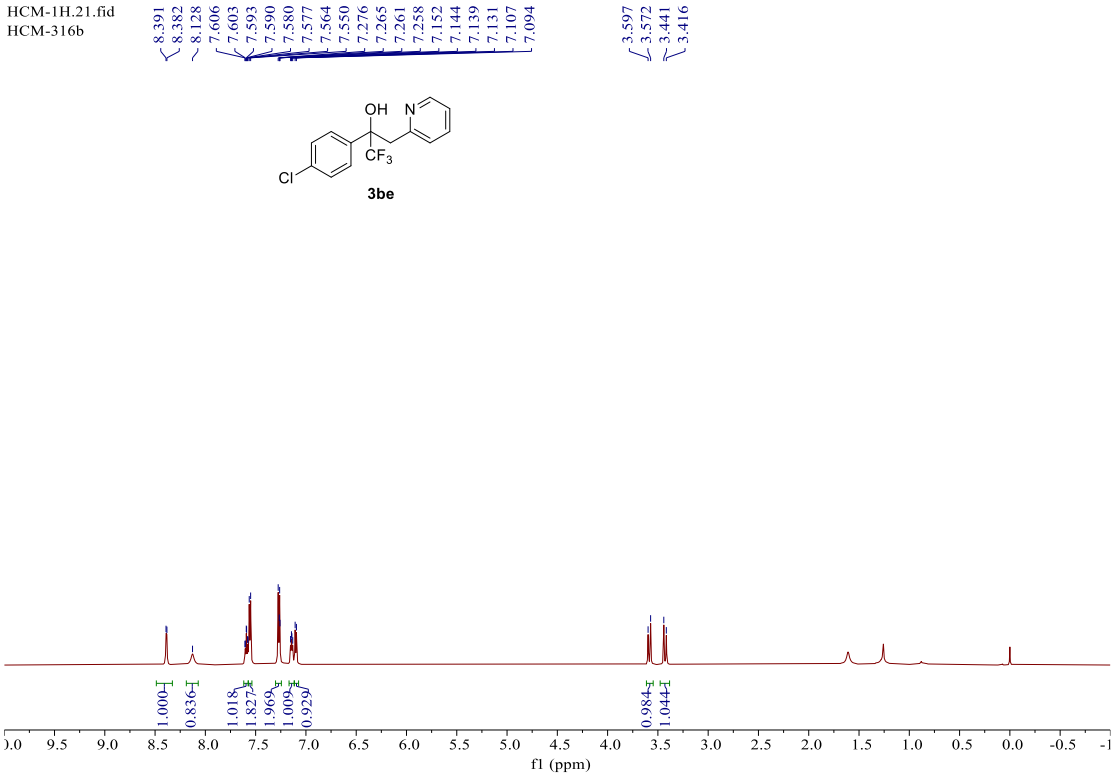
^{13}C NMR ($CDCl_3$) for **3bd**



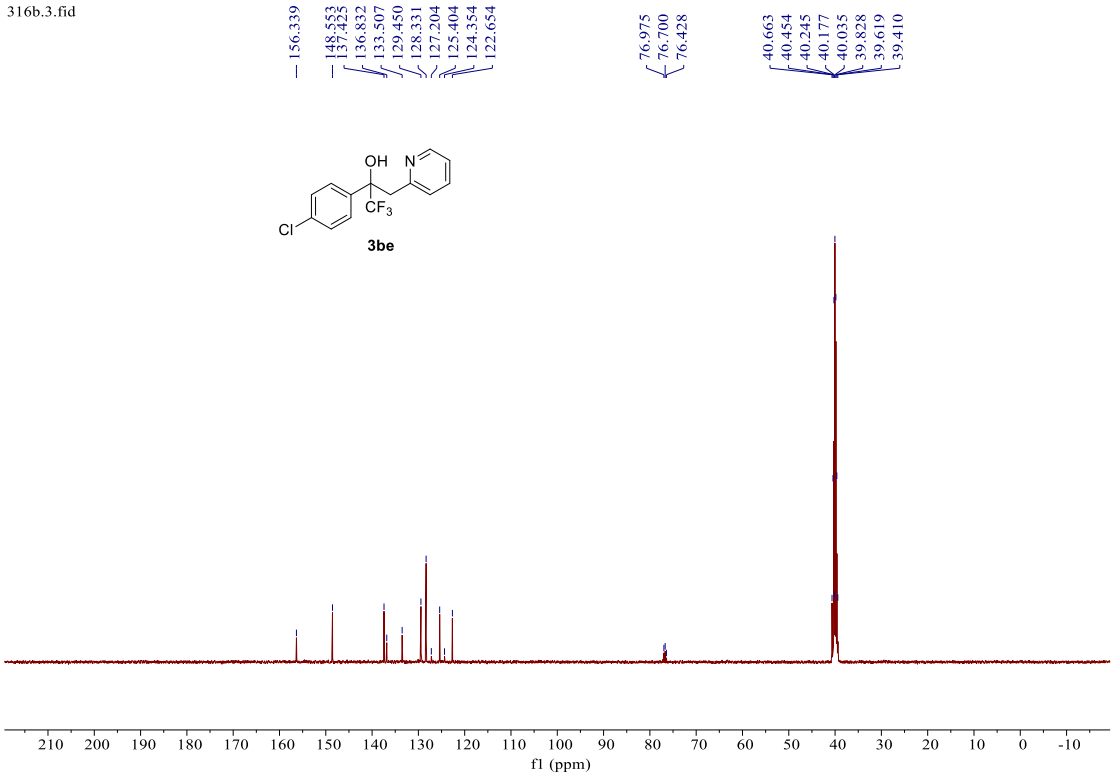
^{19}F NMR ($CDCl_3$) for **3bd**



^{1}H NMR ($CDCl_3$) for **3be**

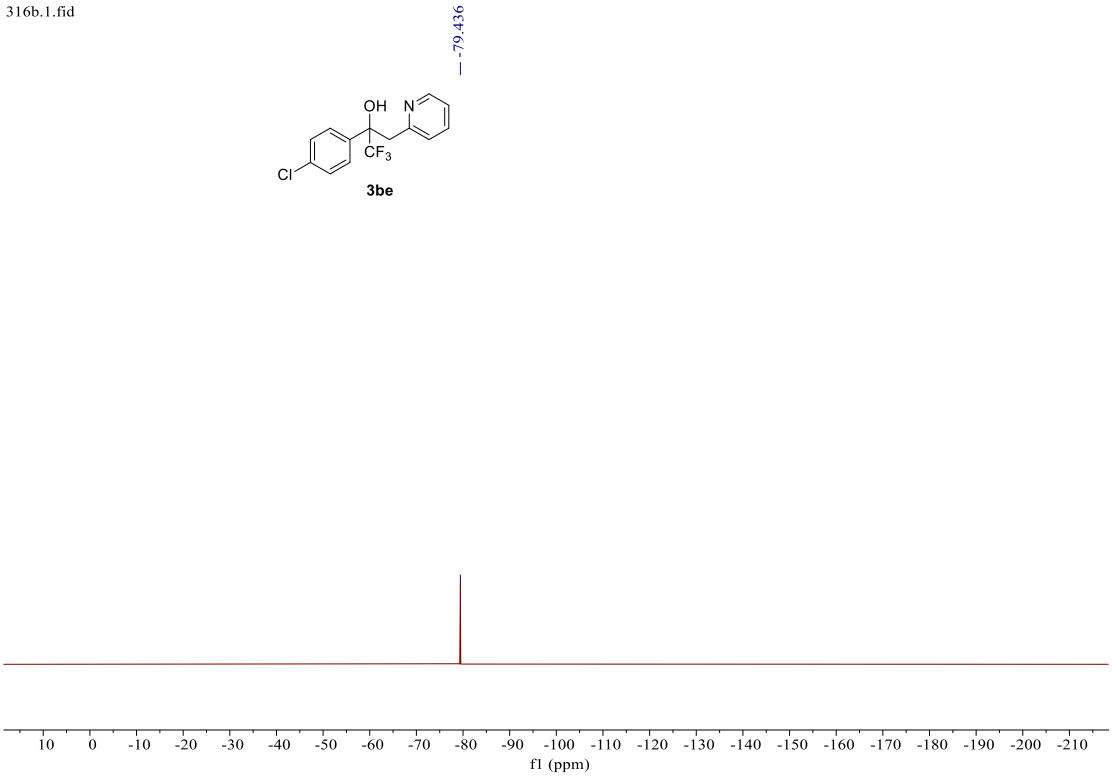


^{13}C NMR (DMSO-d_6) for **3be**

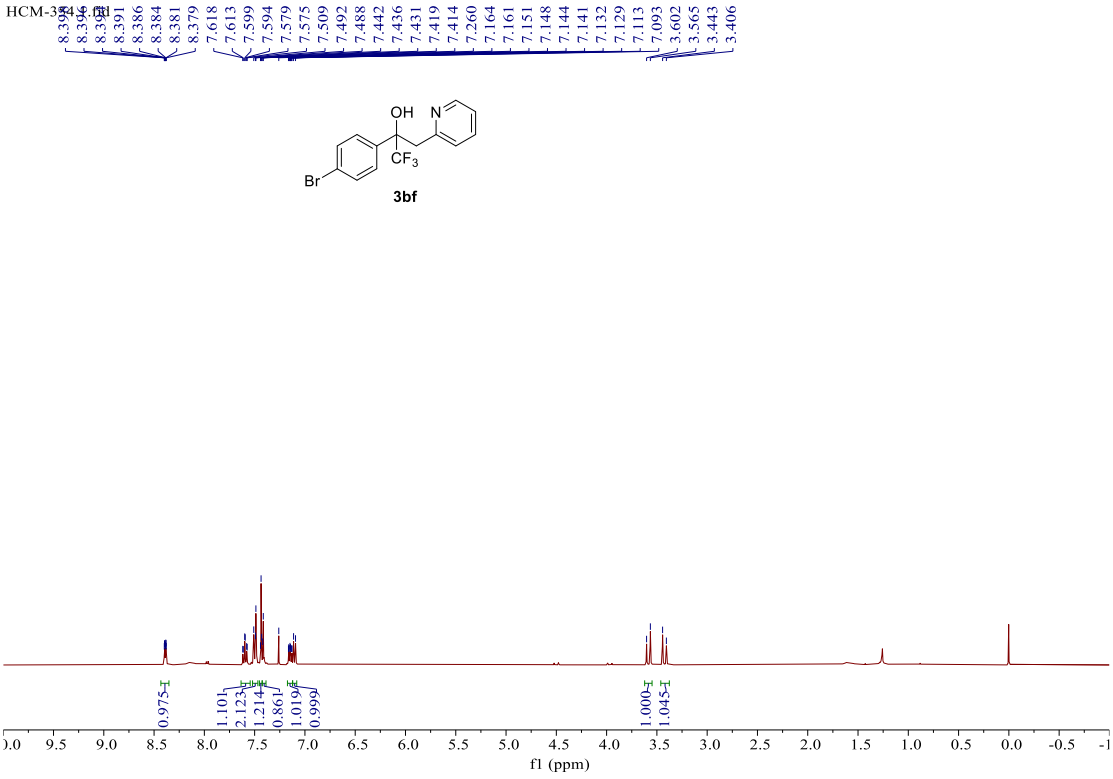


^{19}F NMR ($CDCl_3$) for **3be**

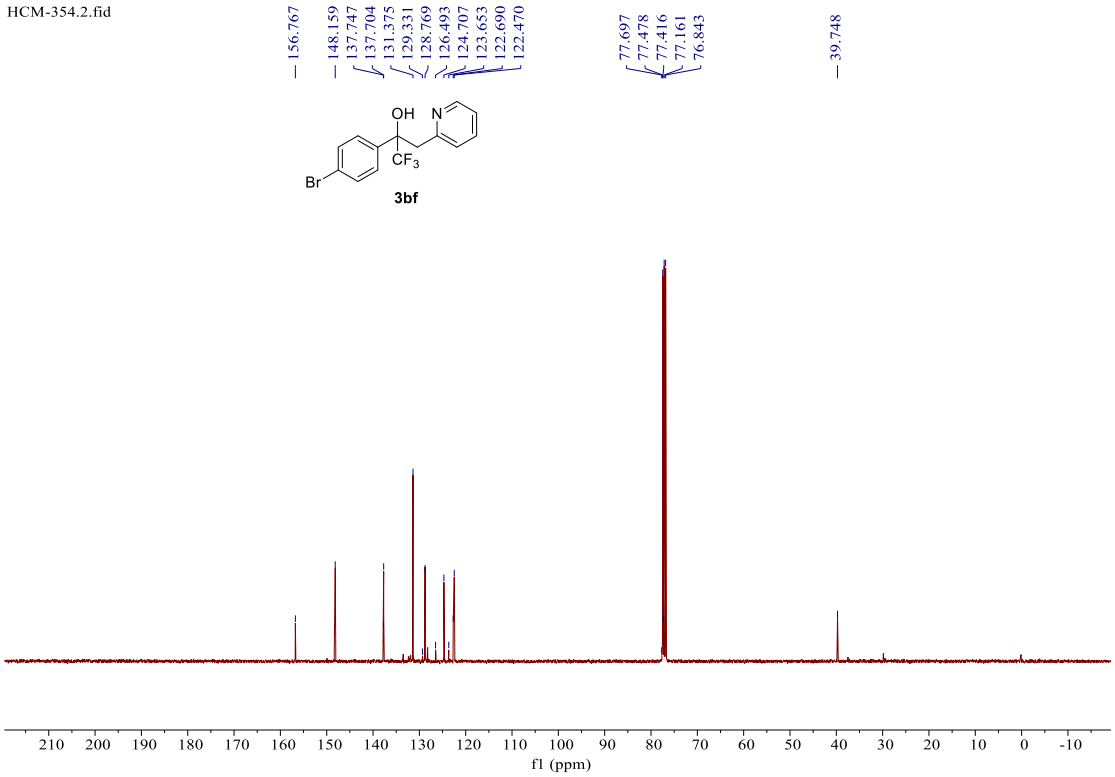
316b.1.fid



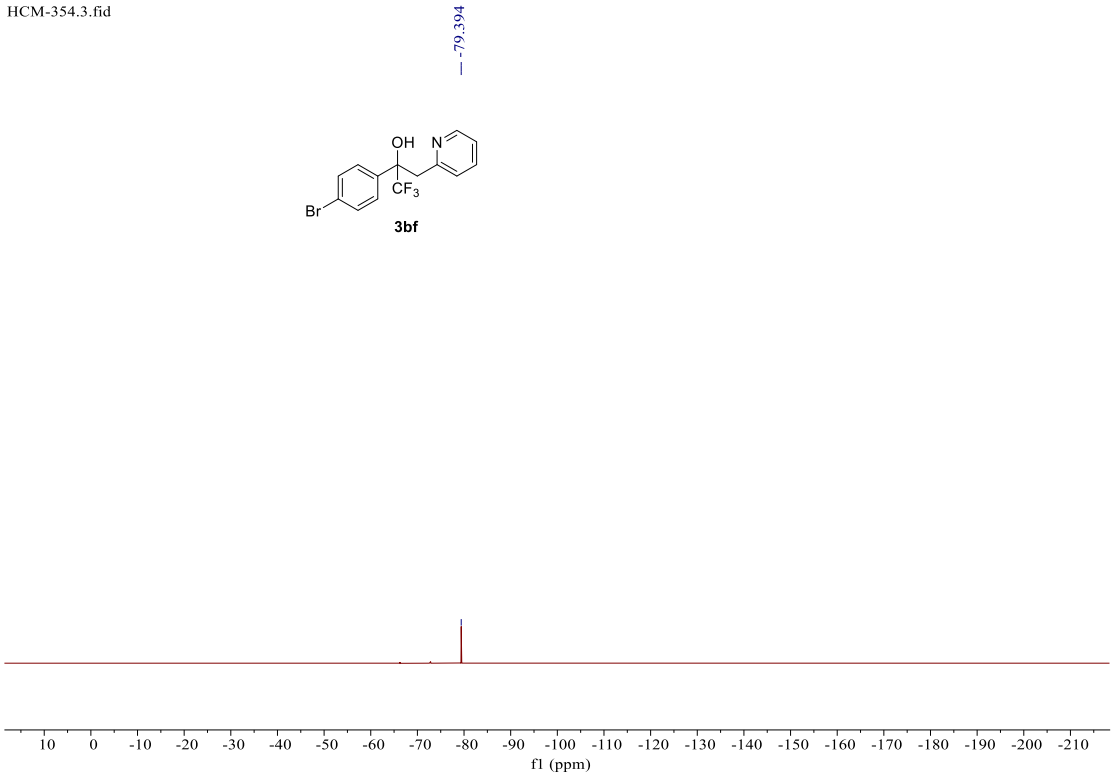
^{1}H NMR ($CDCl_3$) for **3bf**



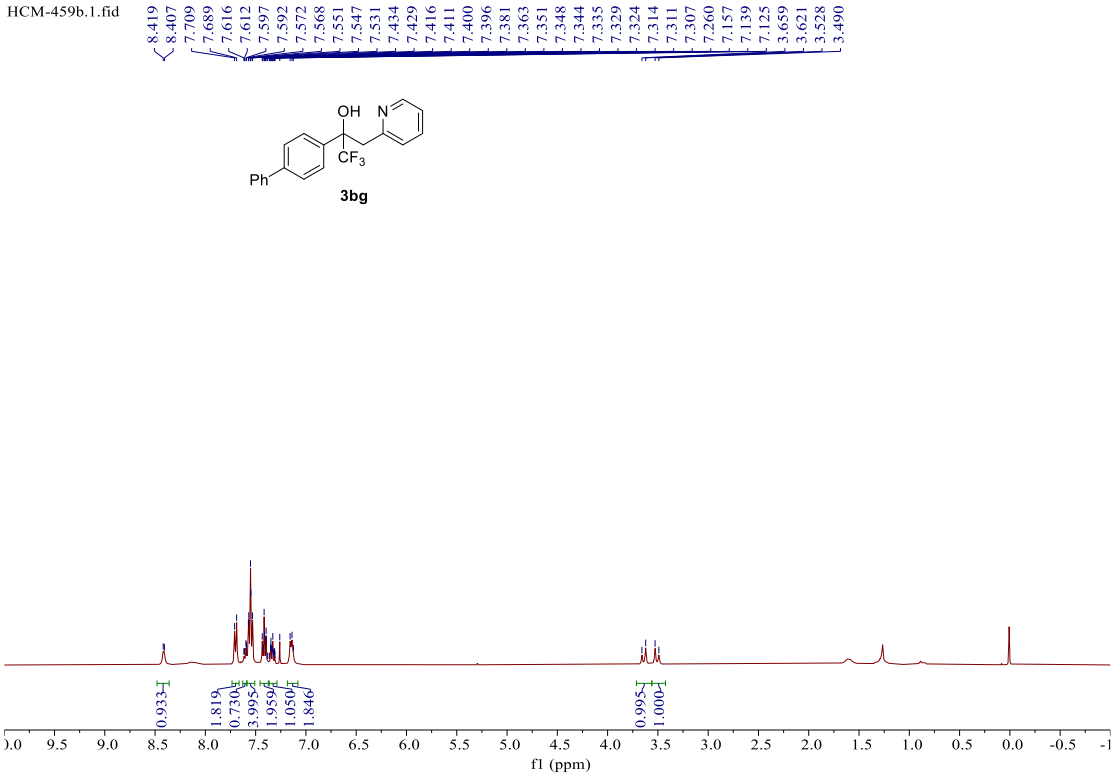
^{13}C NMR ($CDCl_3$) for **3bf**



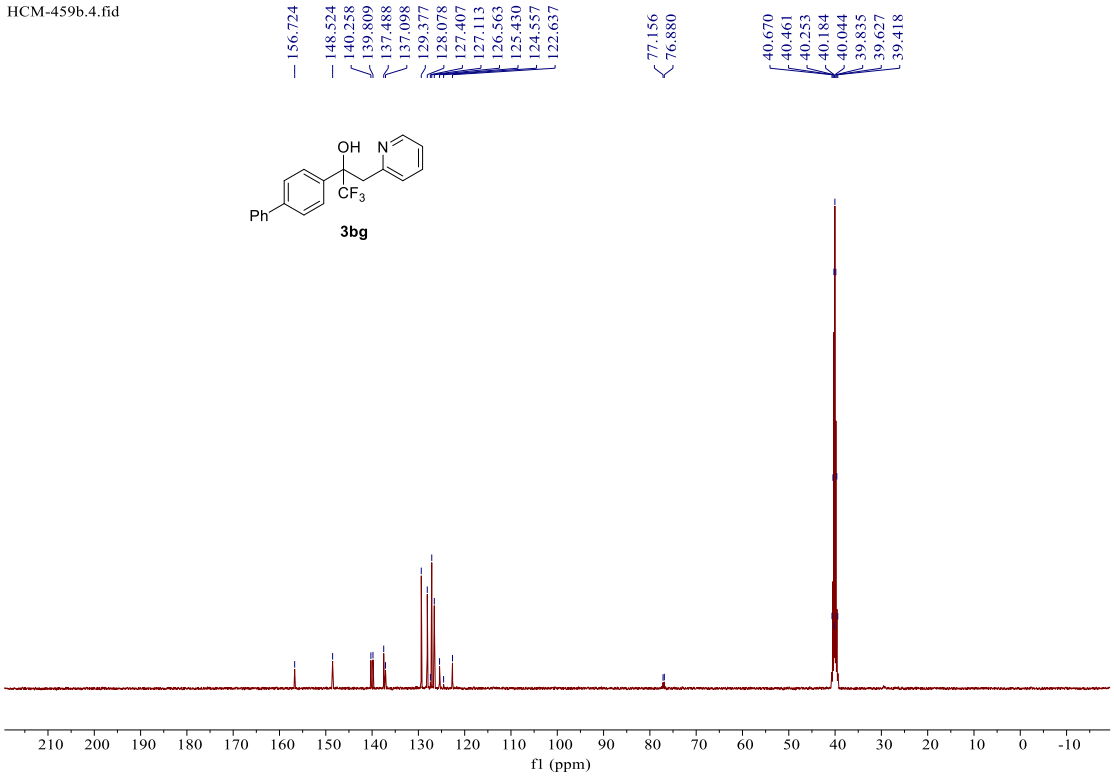
^{19}F NMR ($CDCl_3$) for **3bf**



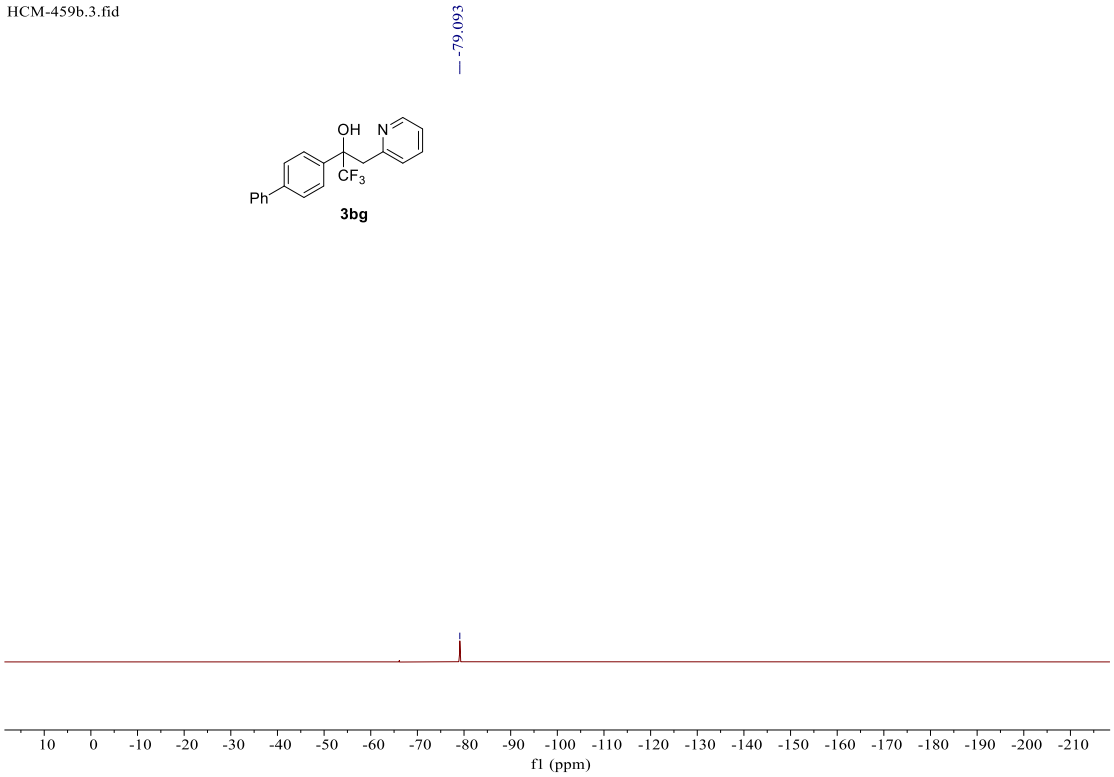
^{1}H NMR ($CDCl_3$) for **3bg**



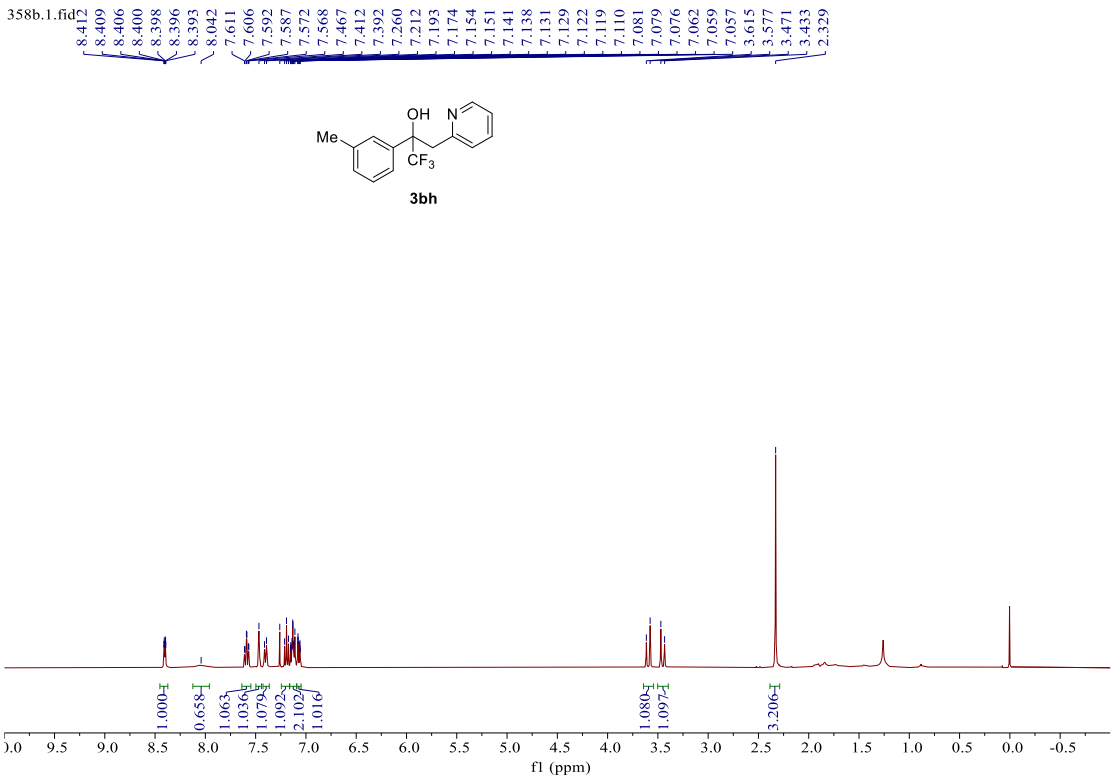
^{13}C NMR (DMSO-d_6) for **3bg**



^{19}F NMR ($CDCl_3$) for **3bg**

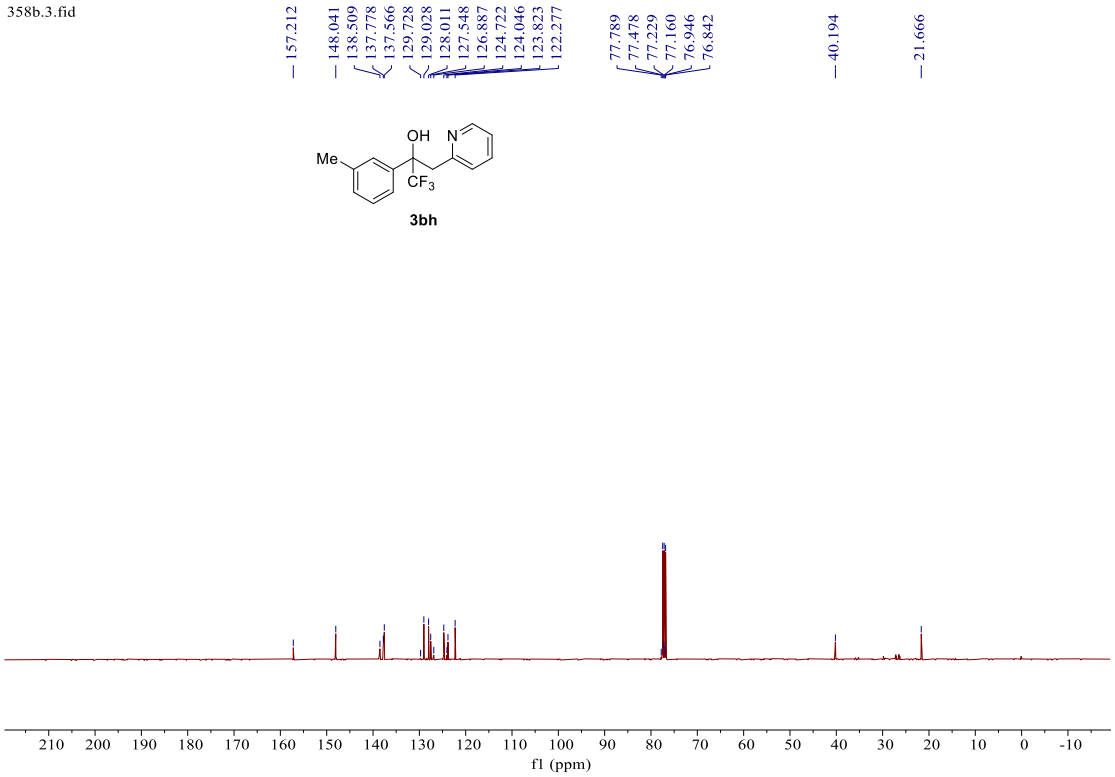


^{1}H NMR ($CDCl_3$) for **3bh**



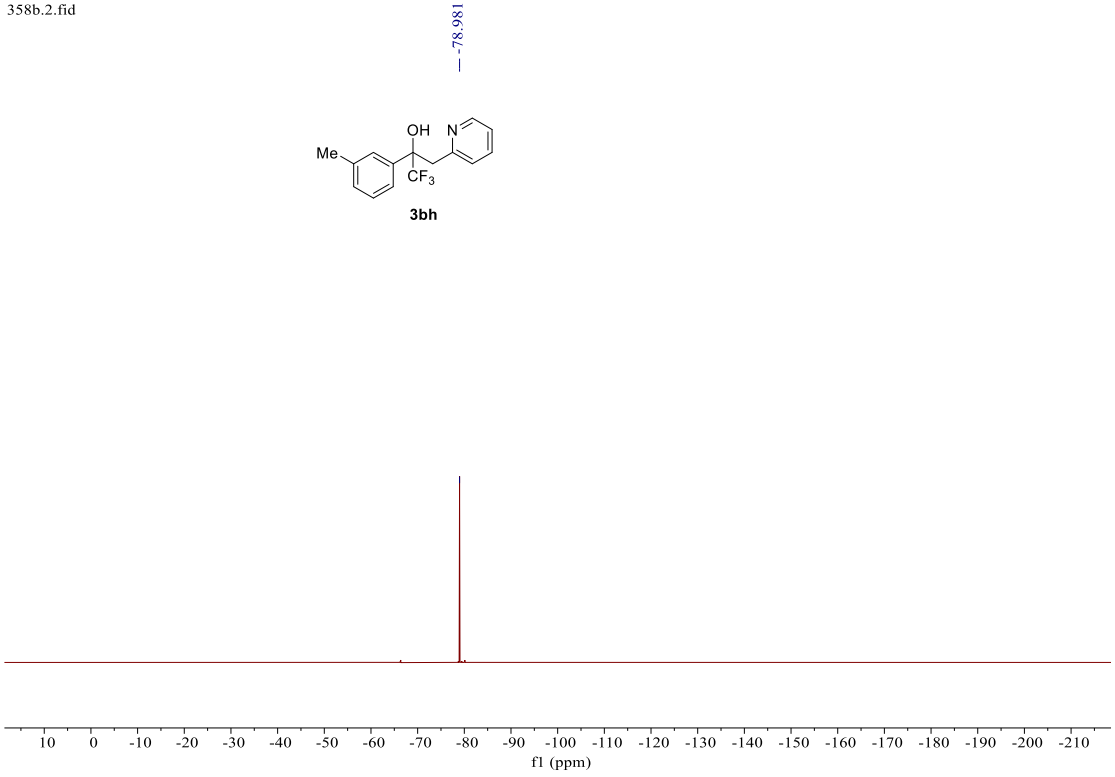
^{13}C NMR ($CDCl_3$) for **3bh**

358b.3.fid

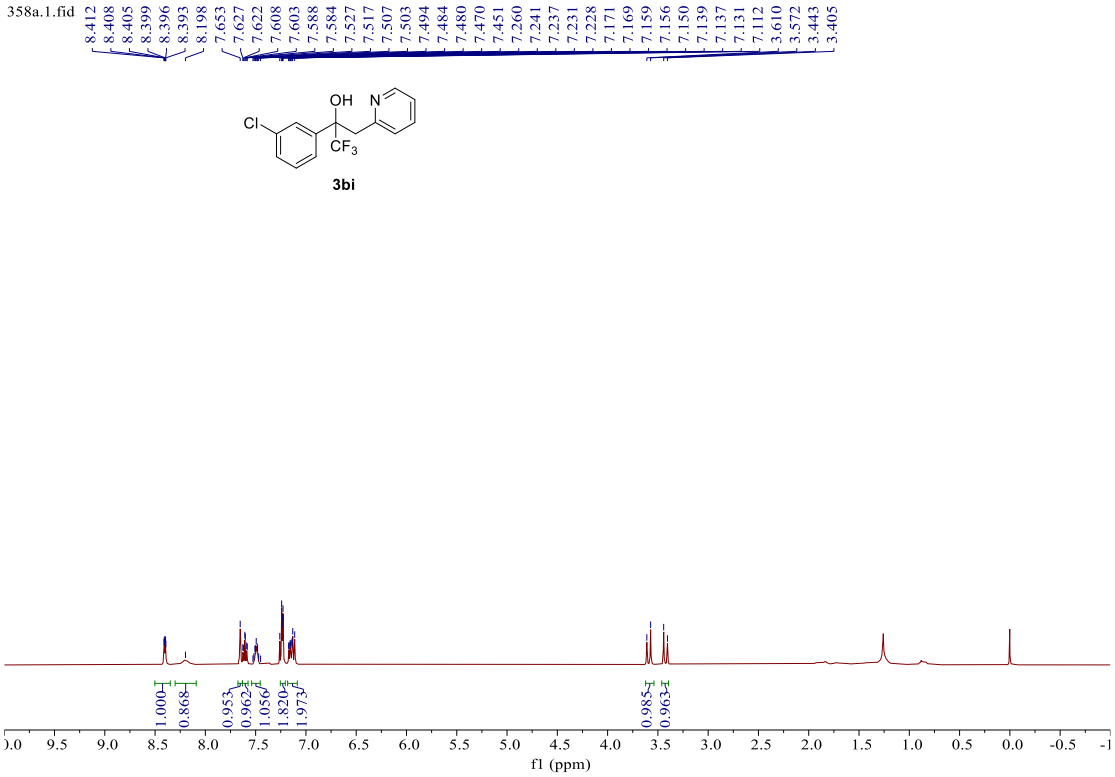


^{19}F NMR ($CDCl_3$) for **3bh**

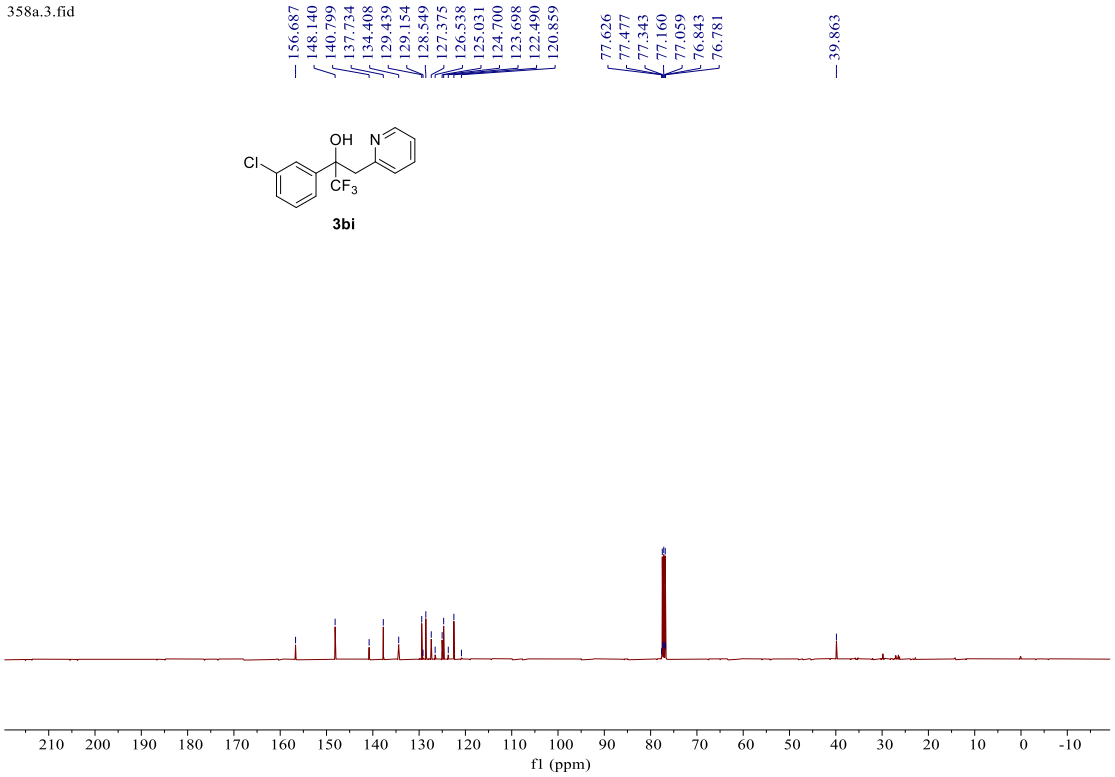
358b.2.fid



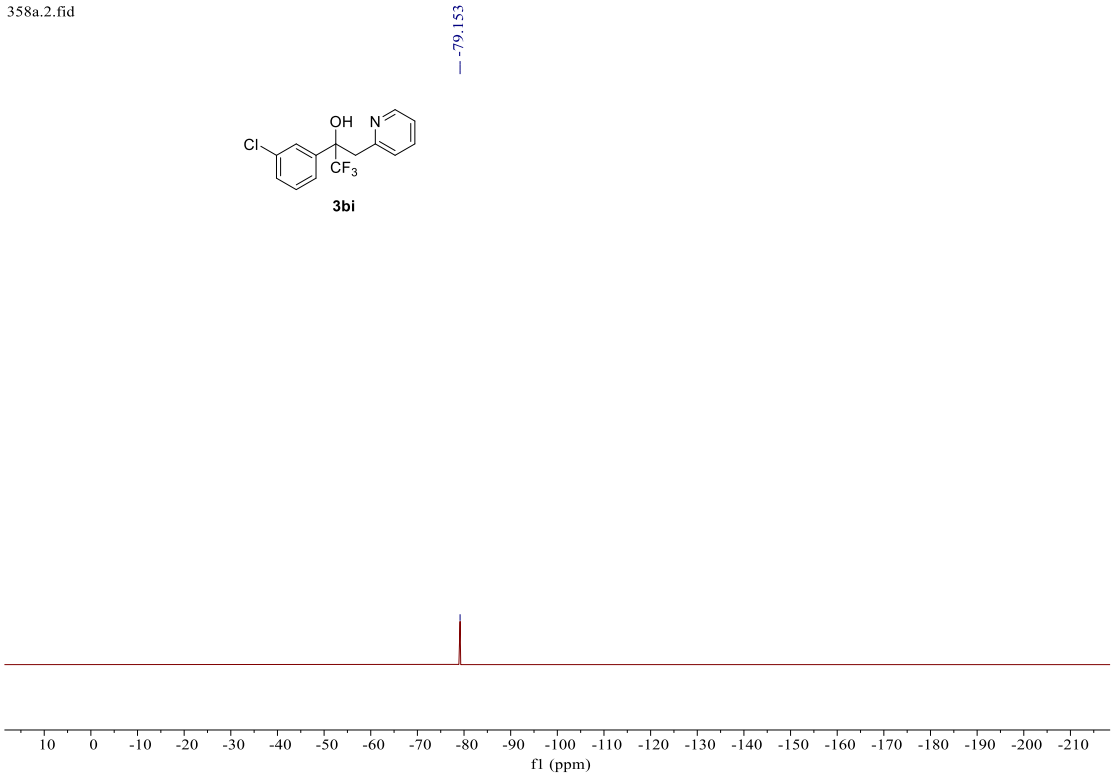
^{1}H NMR ($CDCl_3$) for **3bi**



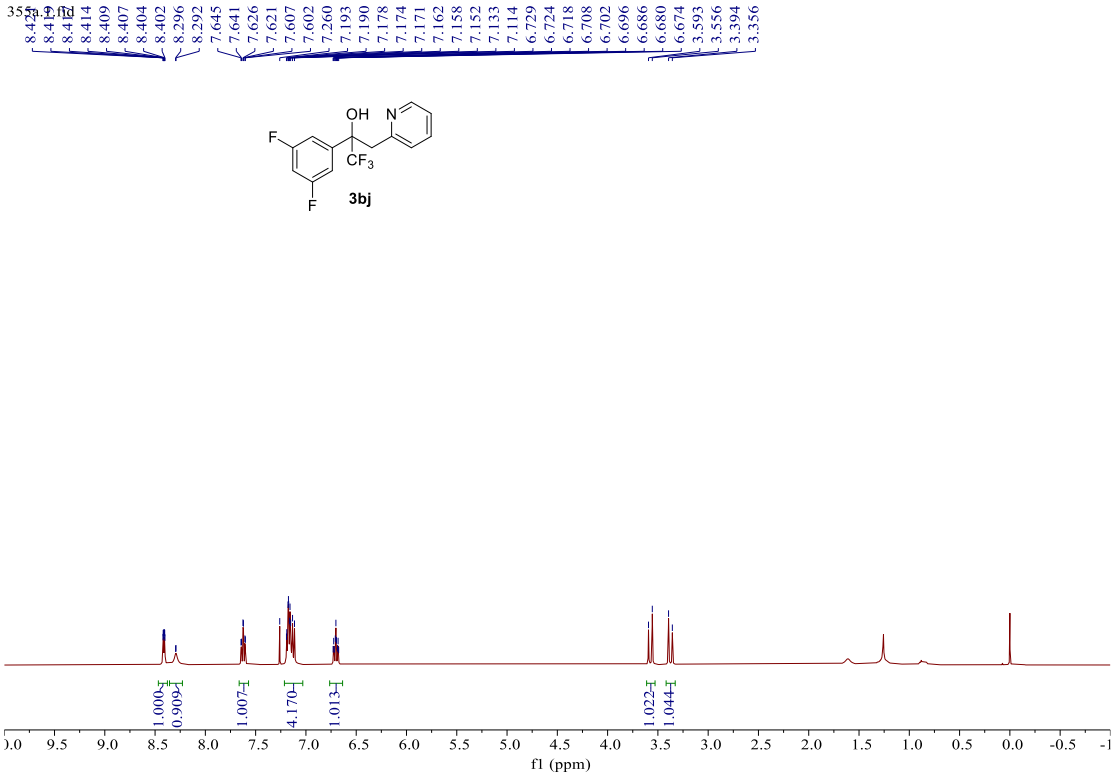
^{13}C NMR ($CDCl_3$) for **3bi**



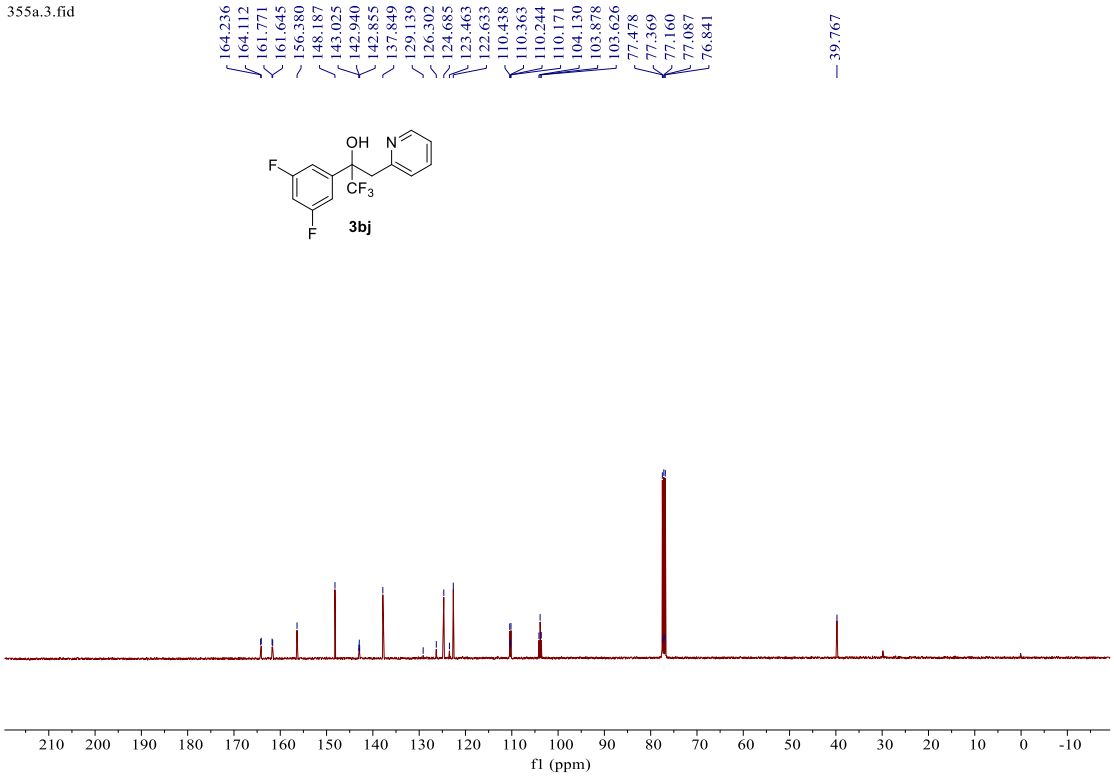
^{19}F NMR ($CDCl_3$) for **3bi**



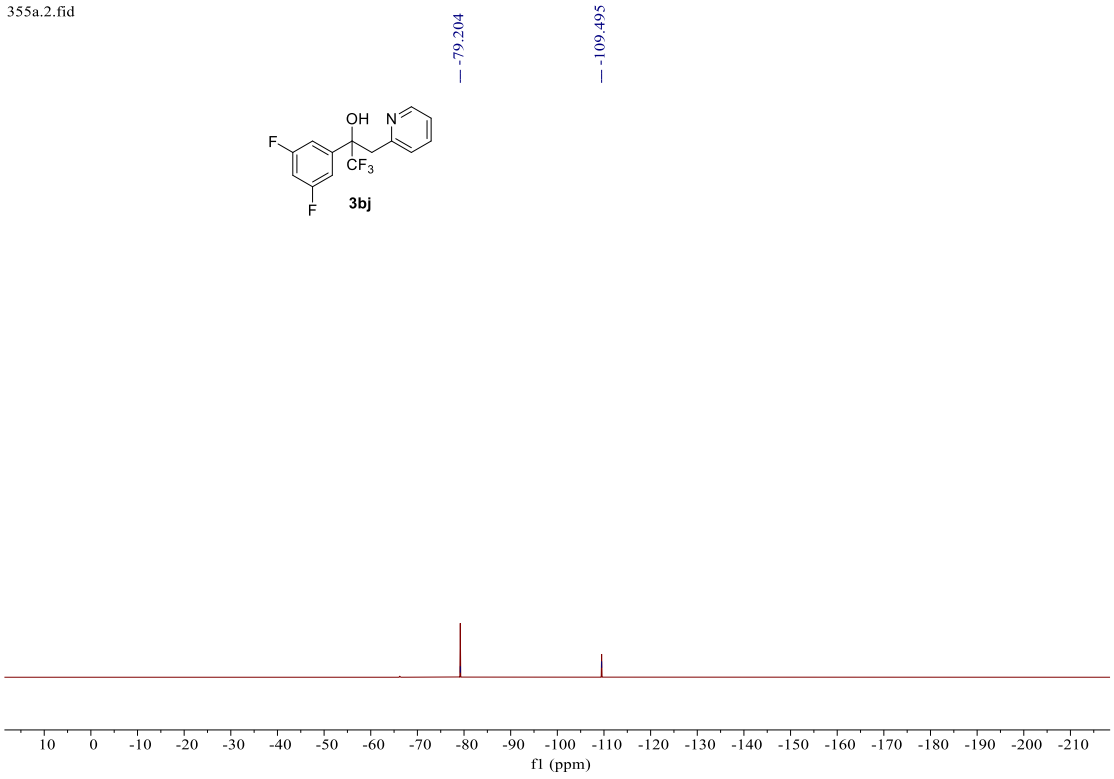
^{1}H NMR ($CDCl_3$) for **3bj**



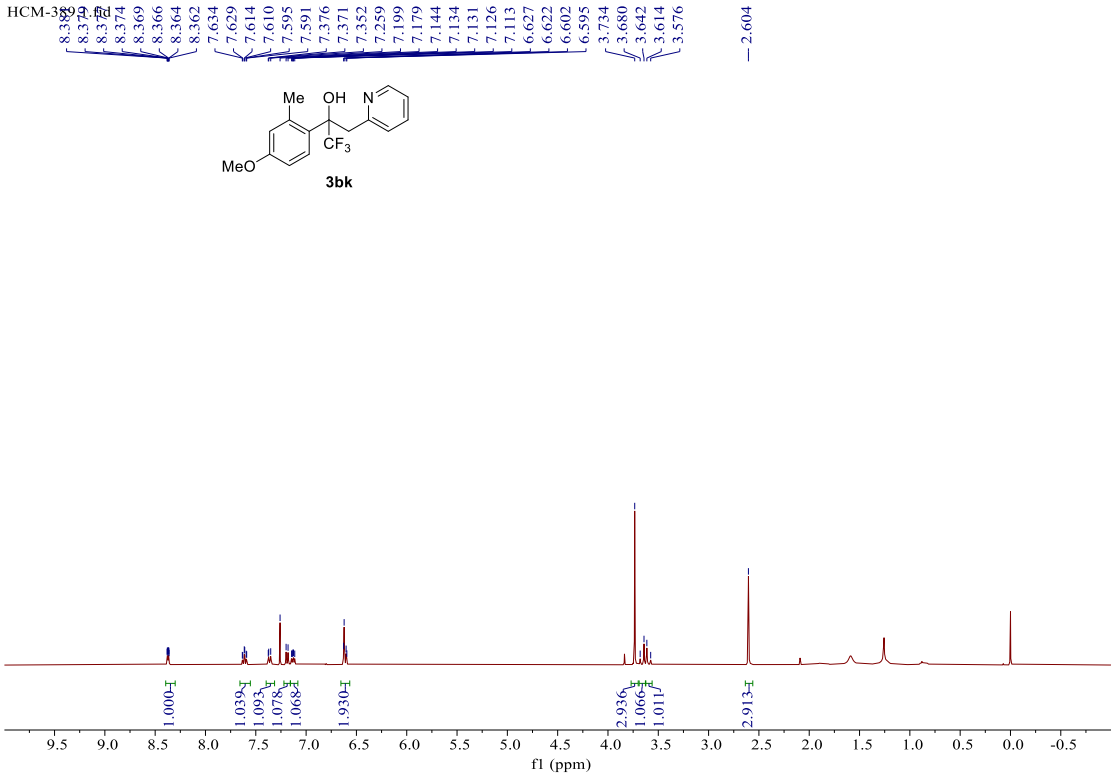
^{13}C NMR ($CDCl_3$) for **3bj**



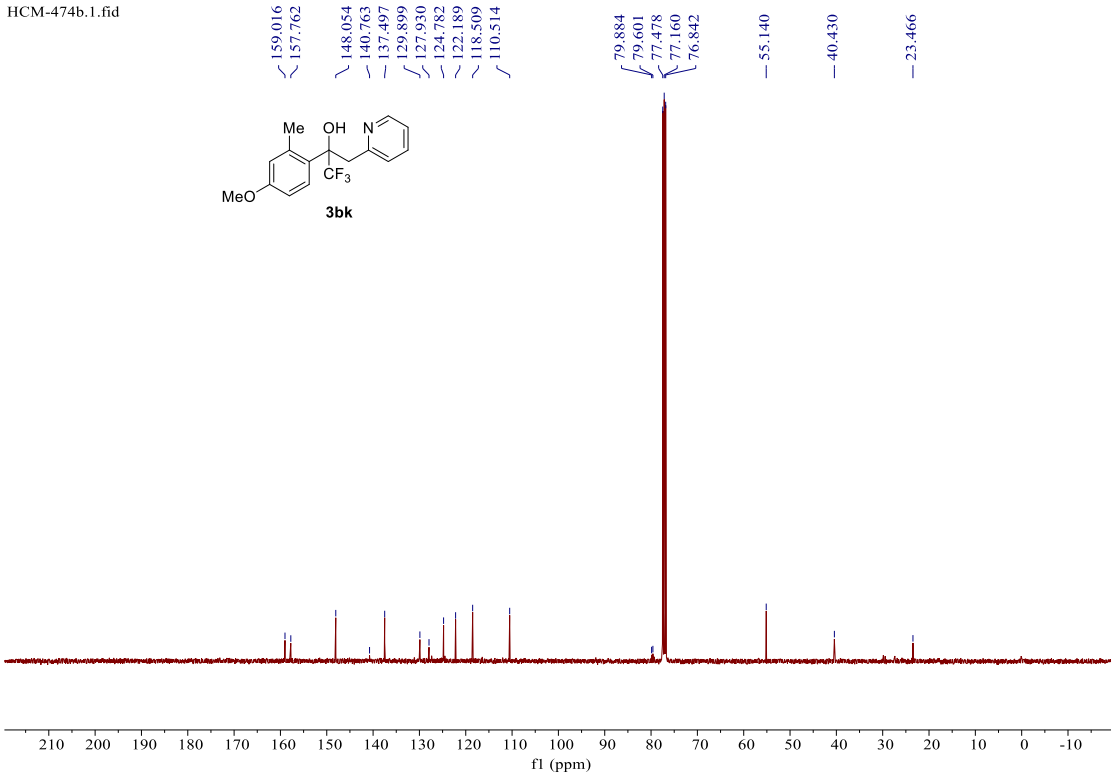
^{19}F NMR ($CDCl_3$) for **3bj**



^{1}H NMR ($CDCl_3$) for **3bk**

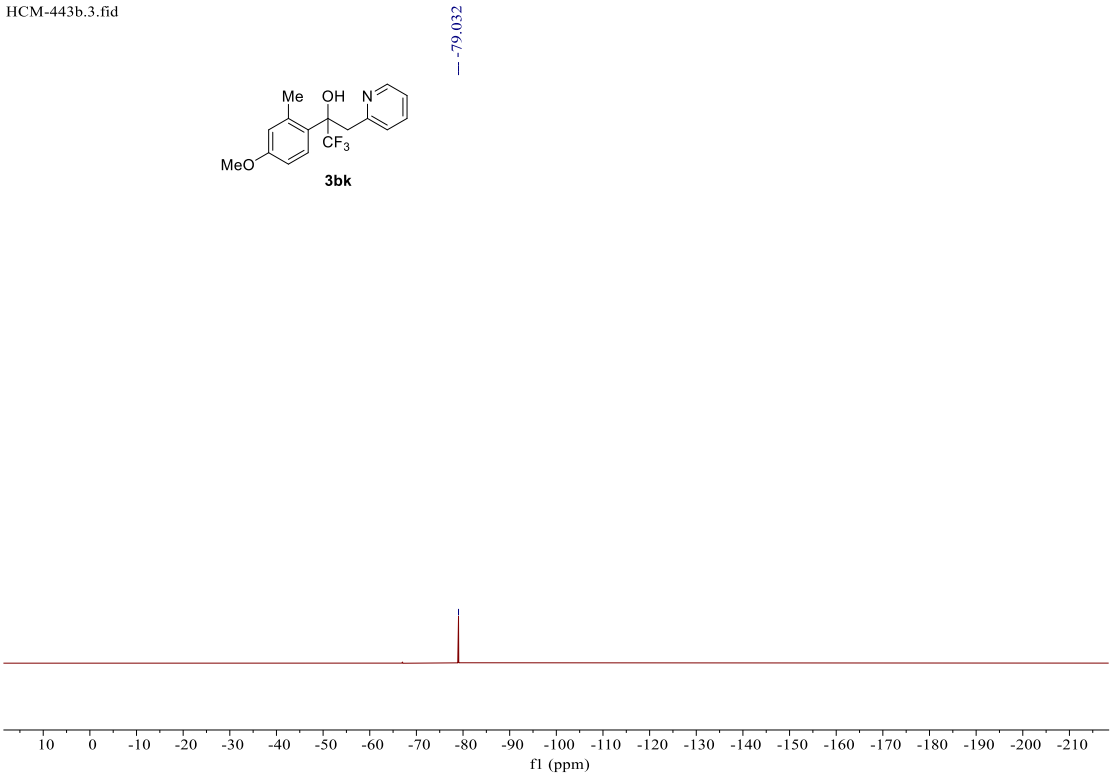


^{13}C NMR ($CDCl_3$) for **3bk**

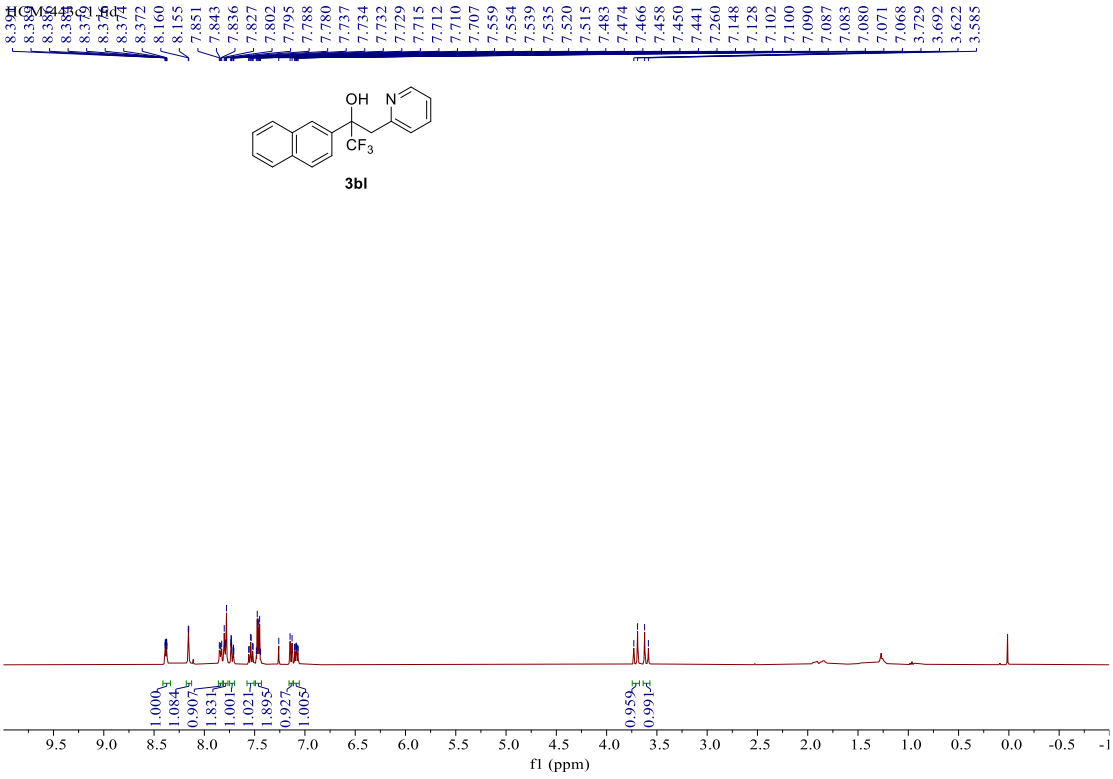


^{19}F NMR ($CDCl_3$) for **3bk**

HCM-443b.3.fid

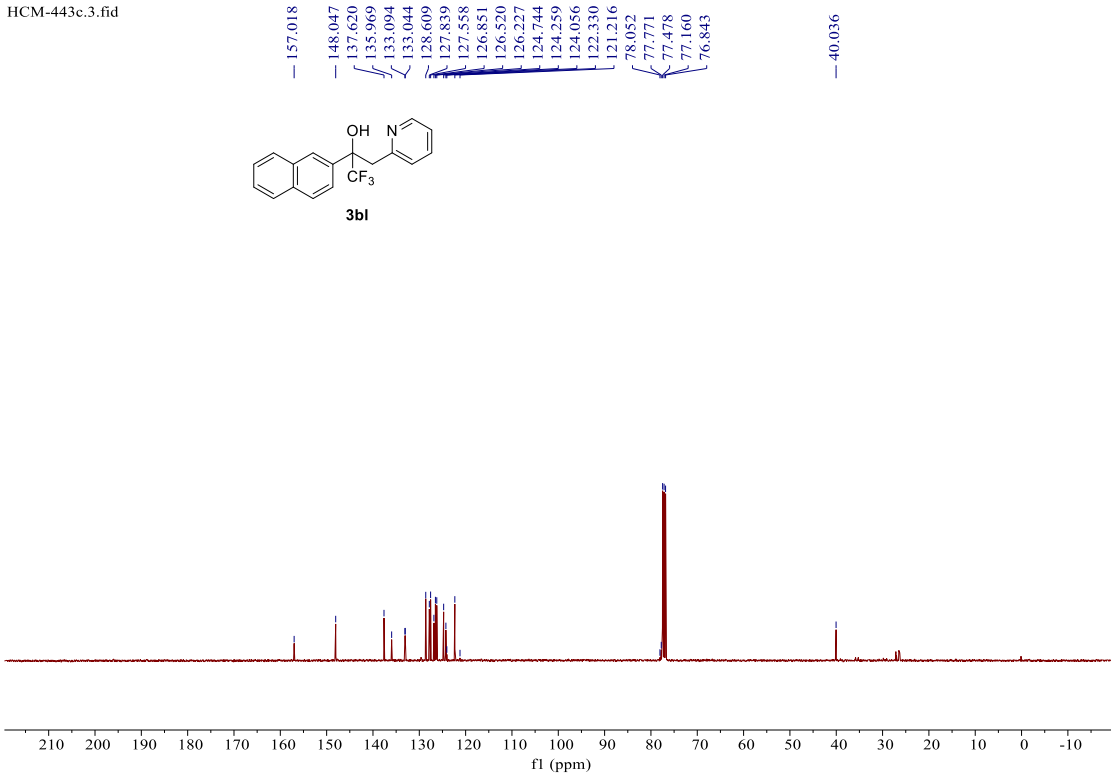


^{1}H NMR ($CDCl_3$) for **3bl**



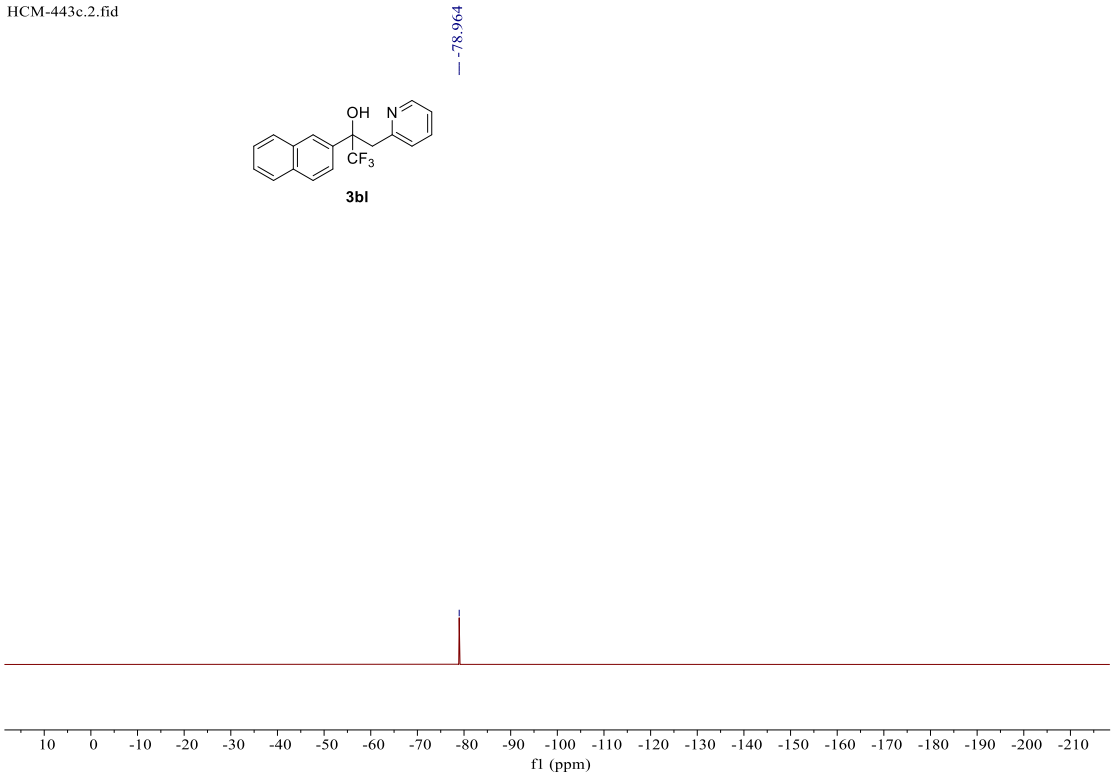
^{13}C NMR ($CDCl_3$) for **3bl**

HCM-443c.3.fid

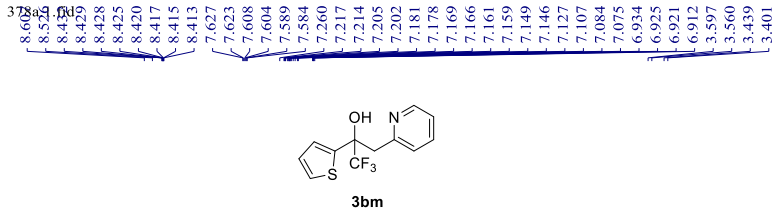


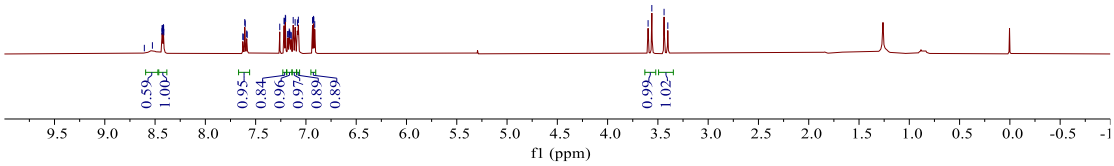
^{19}F NMR ($CDCl_3$) for **3bl**

HCM-443c.2.fid

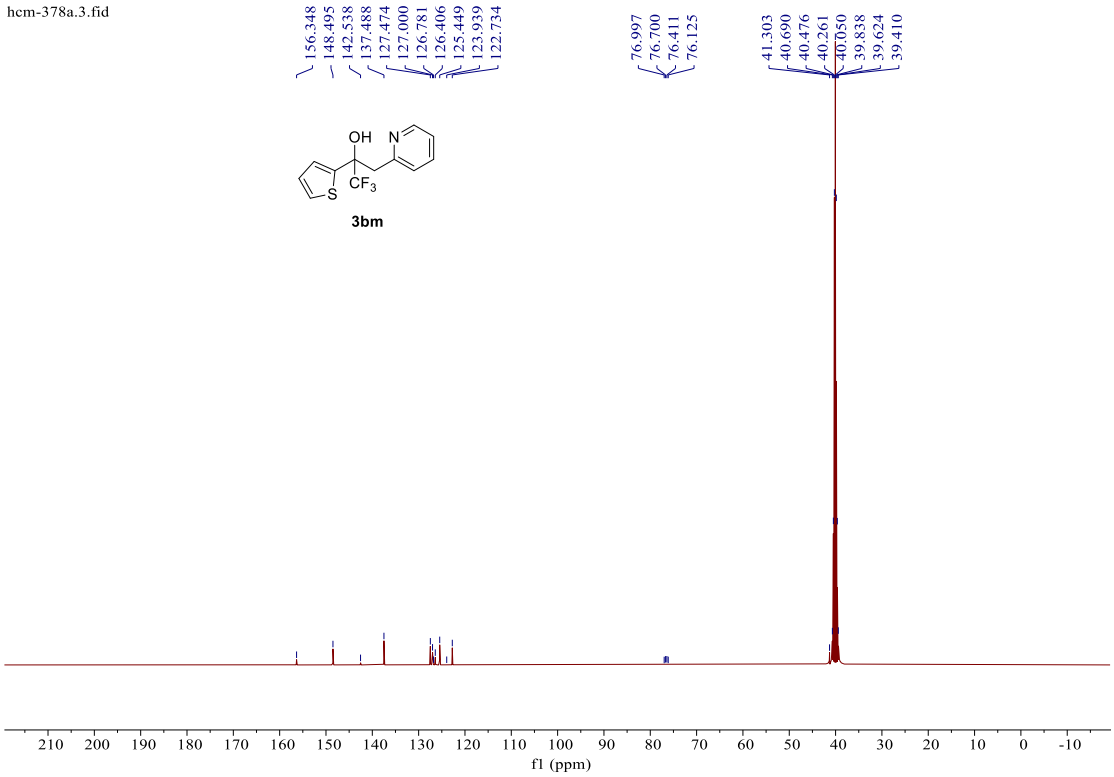


^{1}H NMR ($CDCl_3$) for **3bm**

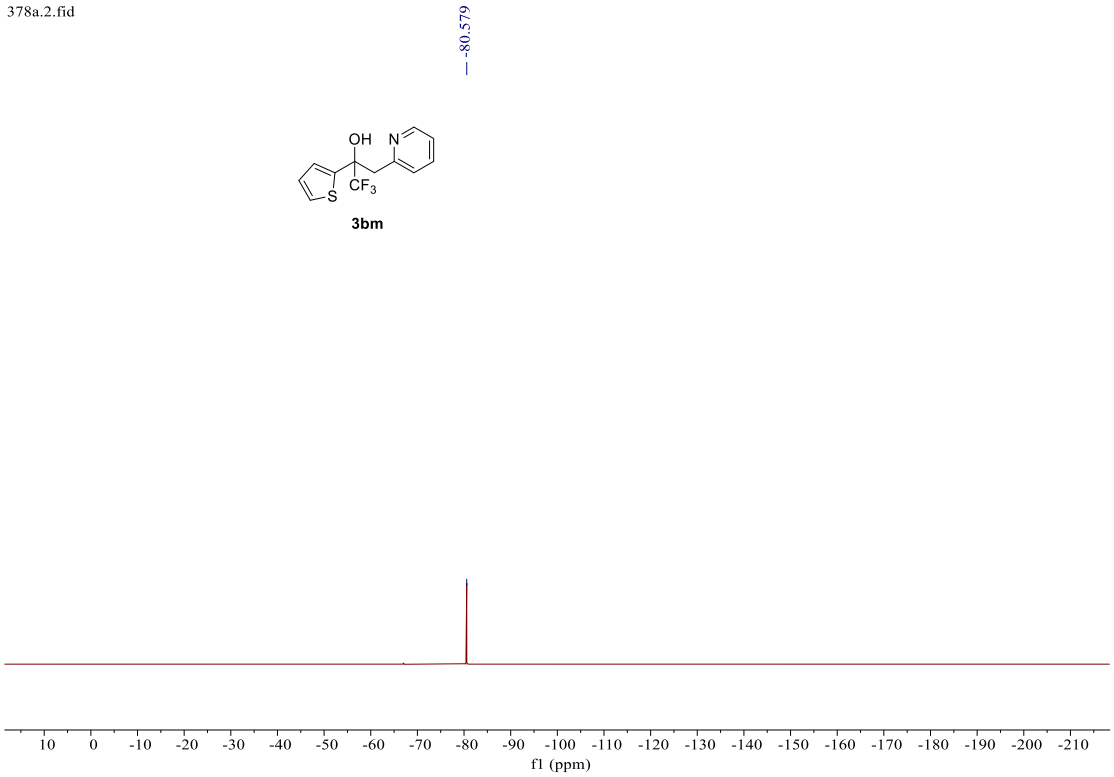




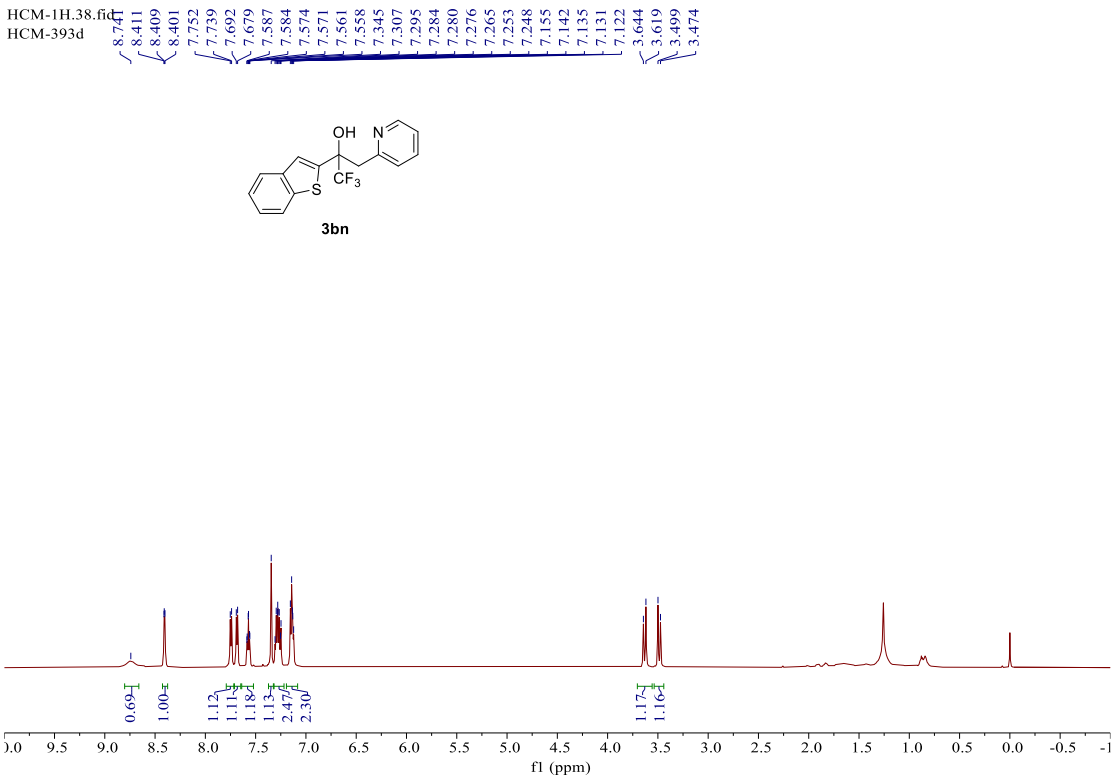
^{13}C NMR (DMSO-d_6) for **3bm**



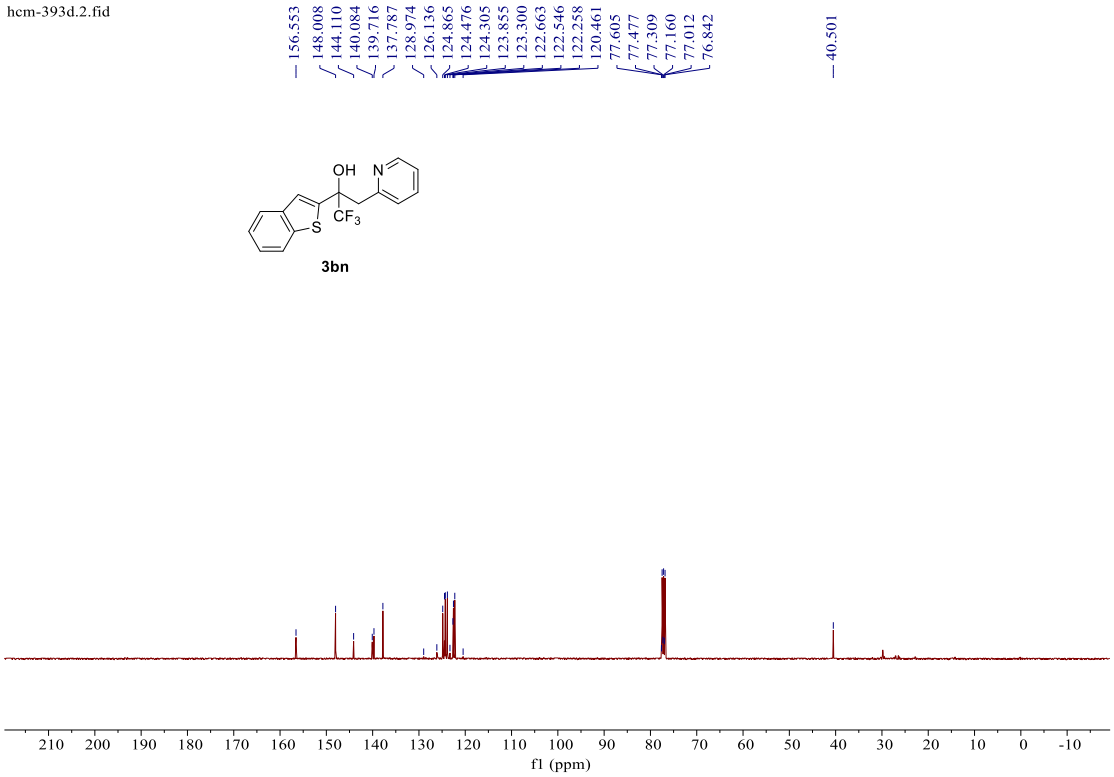
^{19}F NMR ($CDCl_3$) for **3bm**



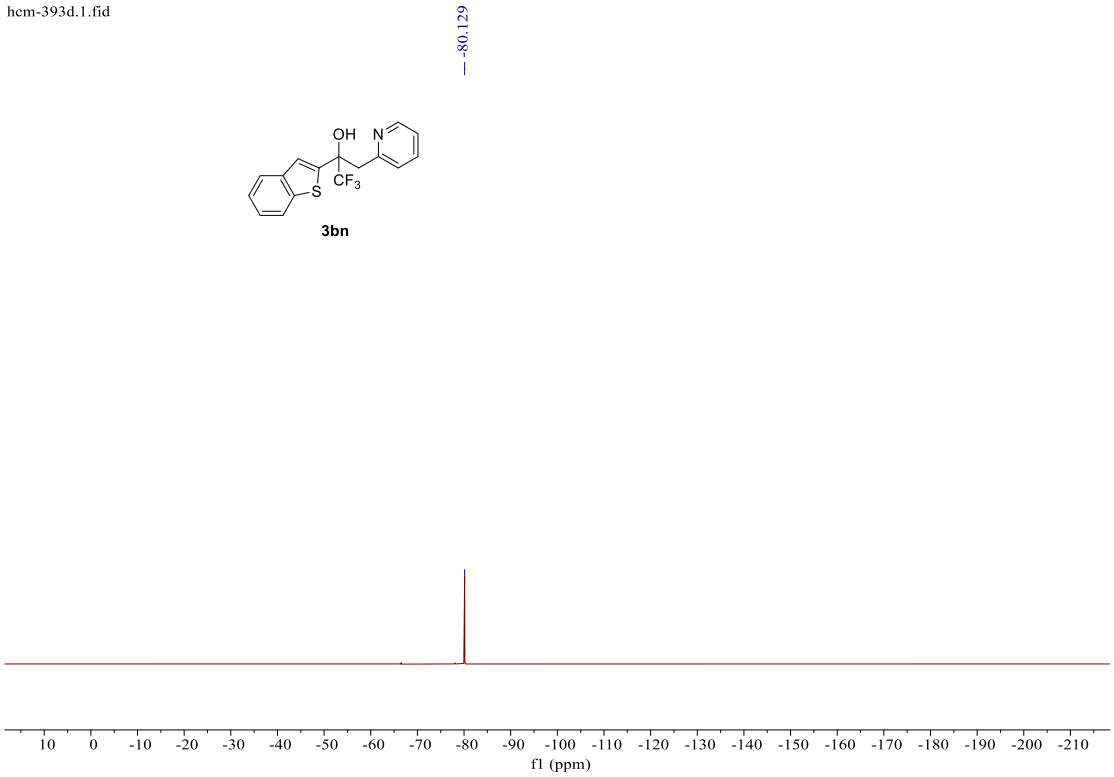
^{1}H NMR ($CDCl_3$) for **3bn**



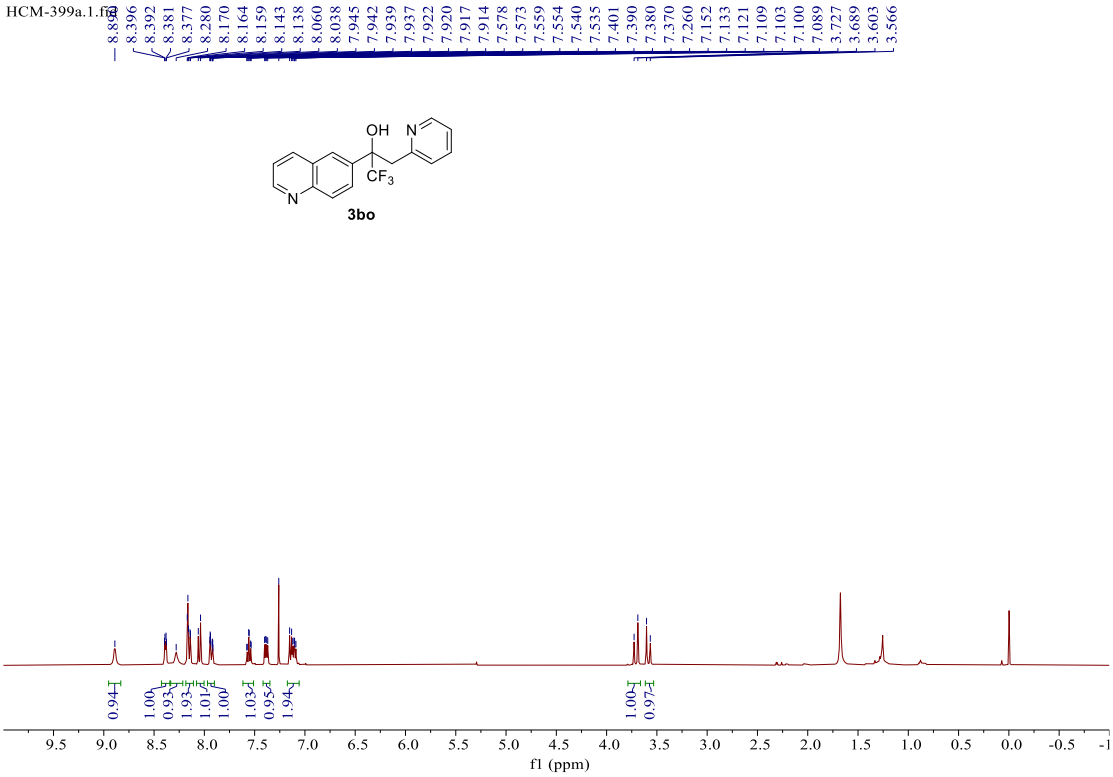
^{13}C NMR ($CDCl_3$) for **3bn**



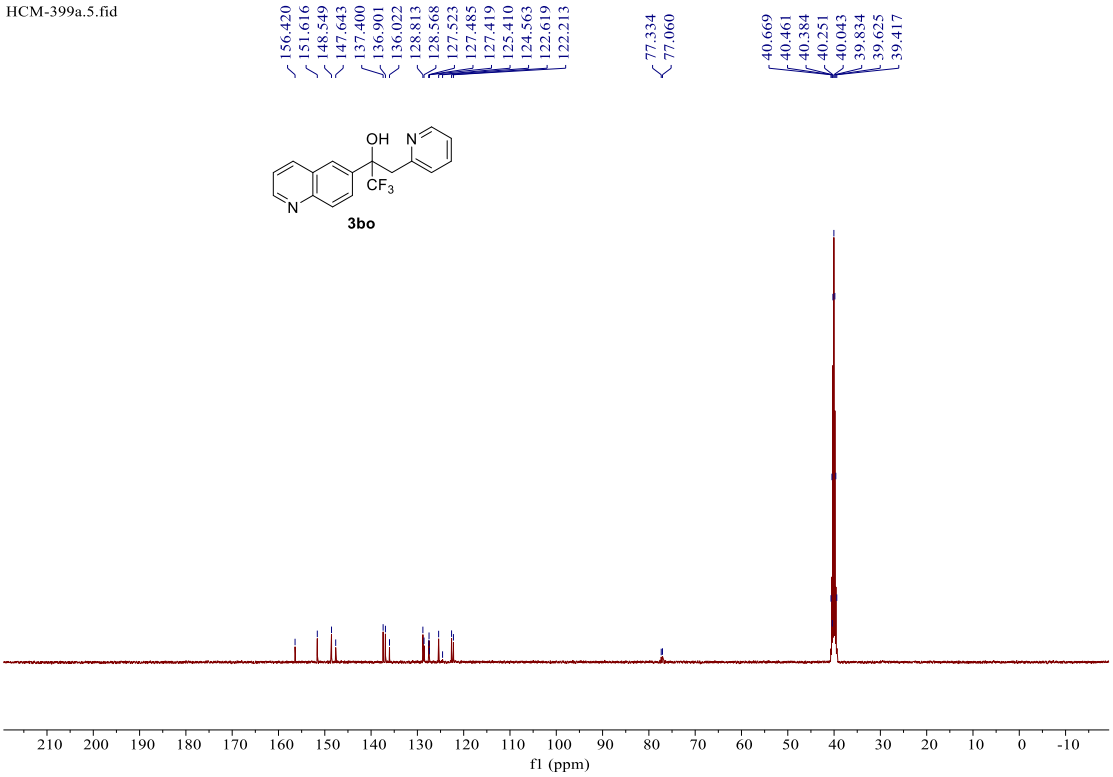
^{19}F NMR ($CDCl_3$) for **3bn**



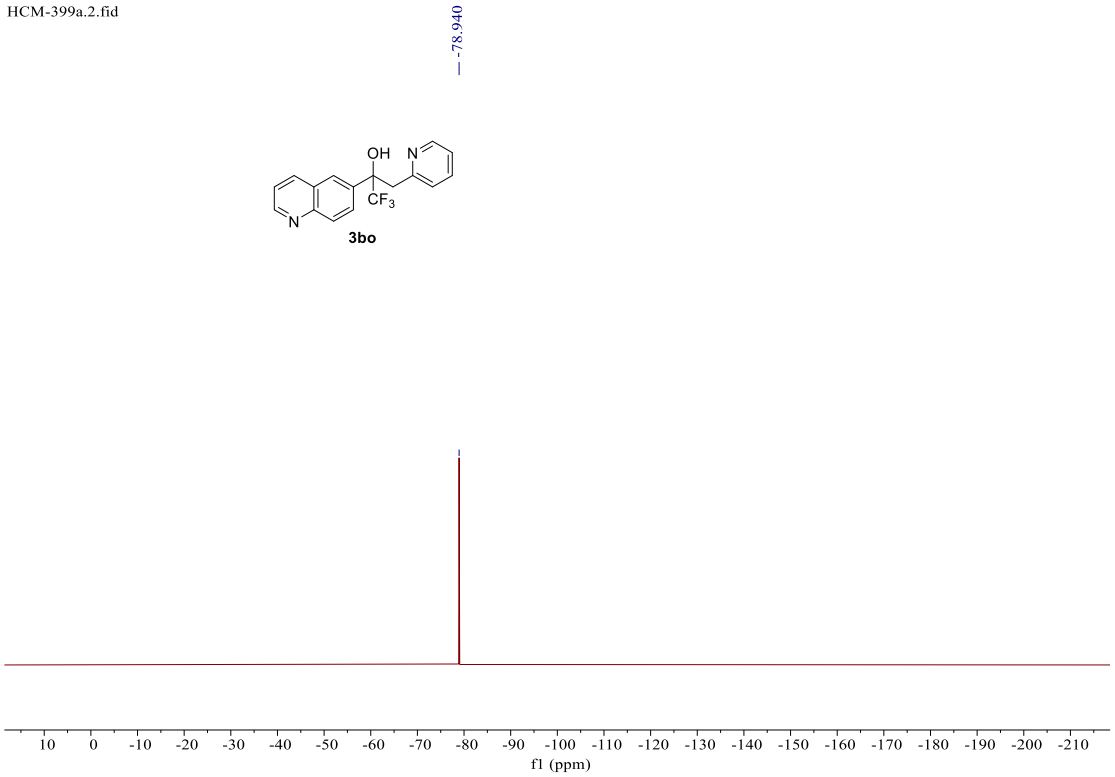
^{1}H NMR ($CDCl_3$) for **3bo**



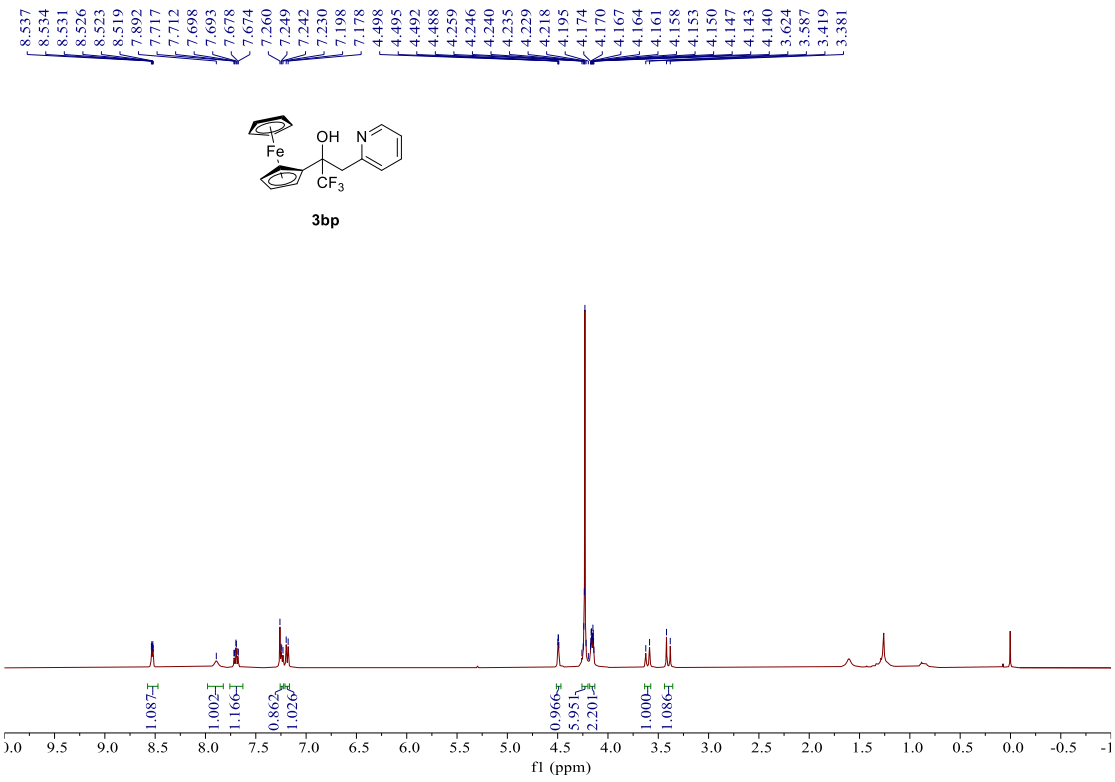
^{13}C NMR (DMSO-d_6) for **3bo**



^{19}F NMR ($CDCl_3$) for **3bo**

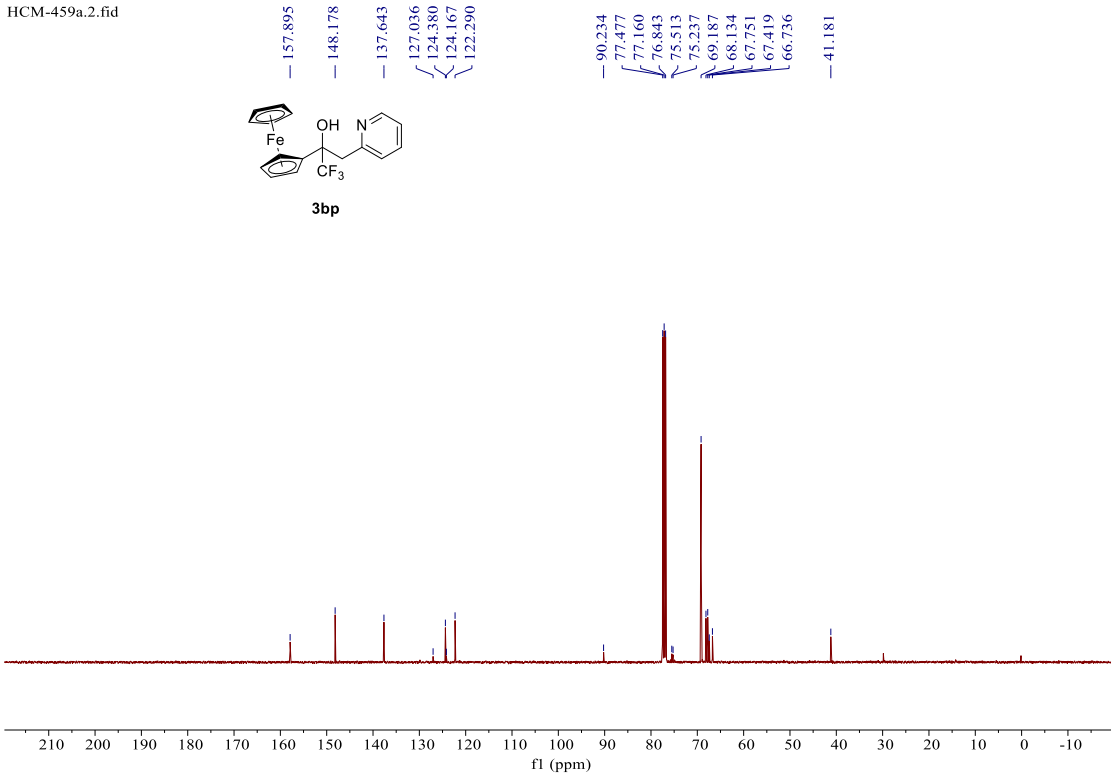


^{1}H NMR ($CDCl_3$) for **3bp**



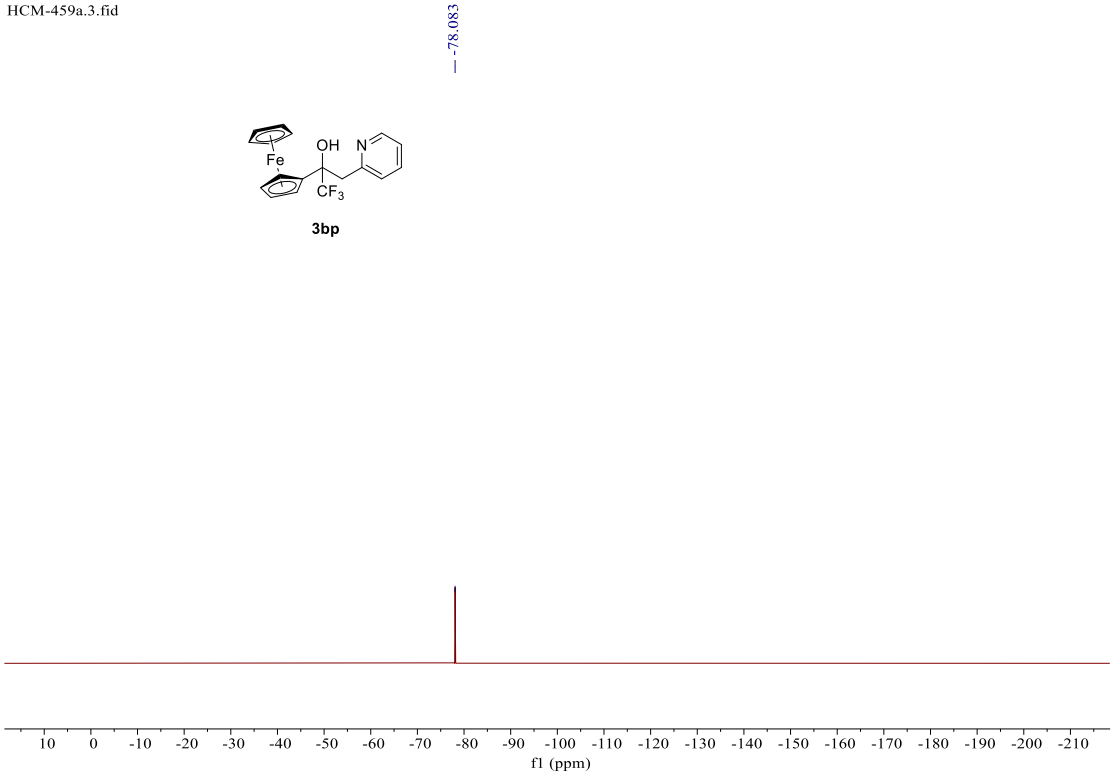
^{13}C NMR ($CDCl_3$) for **3bp**

HCM-459a.2.fid

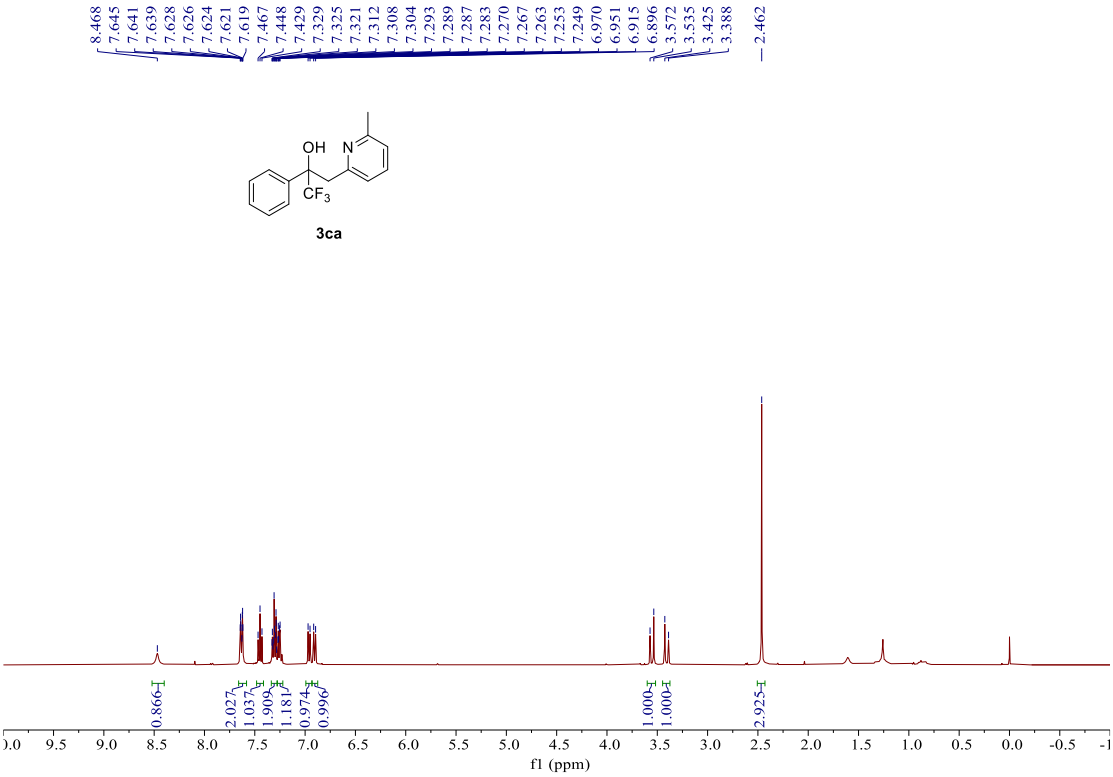


^{19}F NMR ($CDCl_3$) for **3bp**

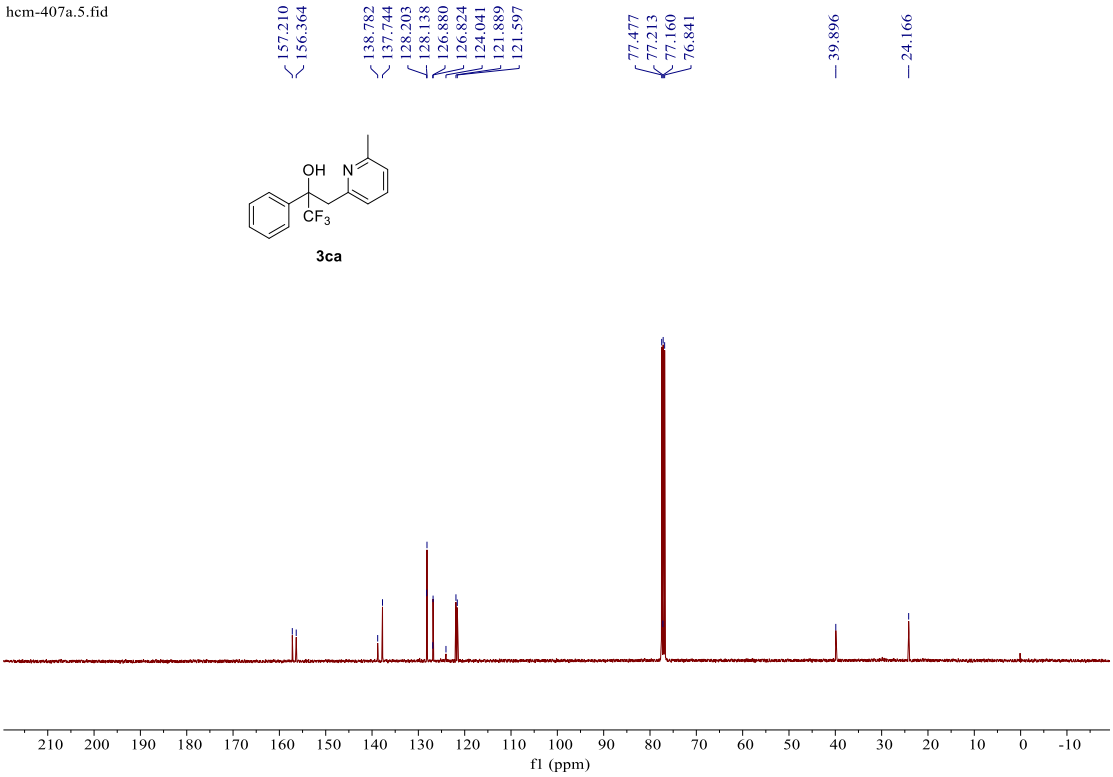
HCM-459a.3.fid



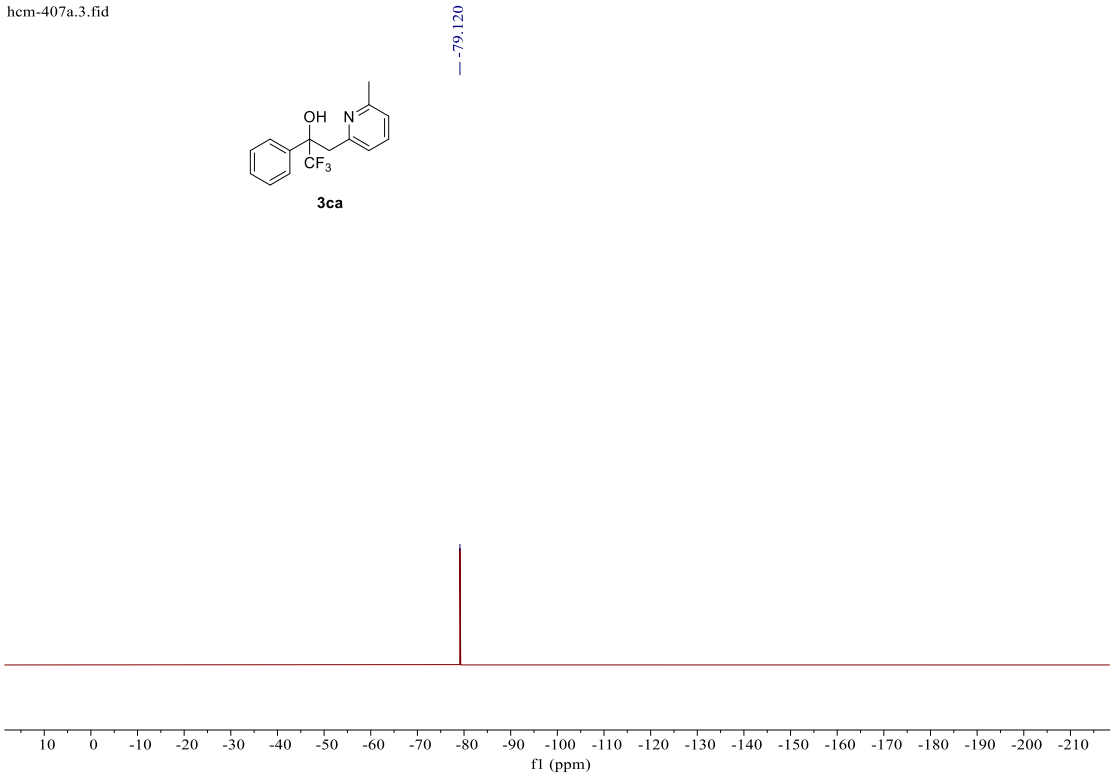
^{1}H NMR ($CDCl_3$) for **3ca**



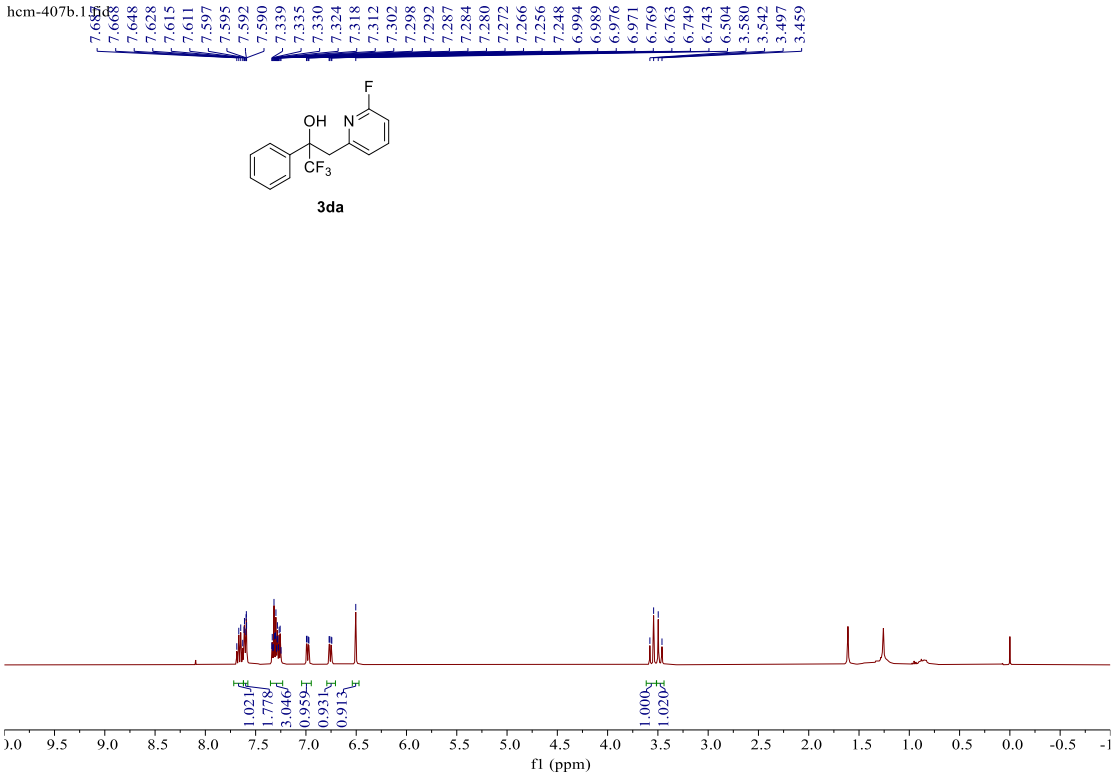
^{13}C NMR ($CDCl_3$) for **3ca**



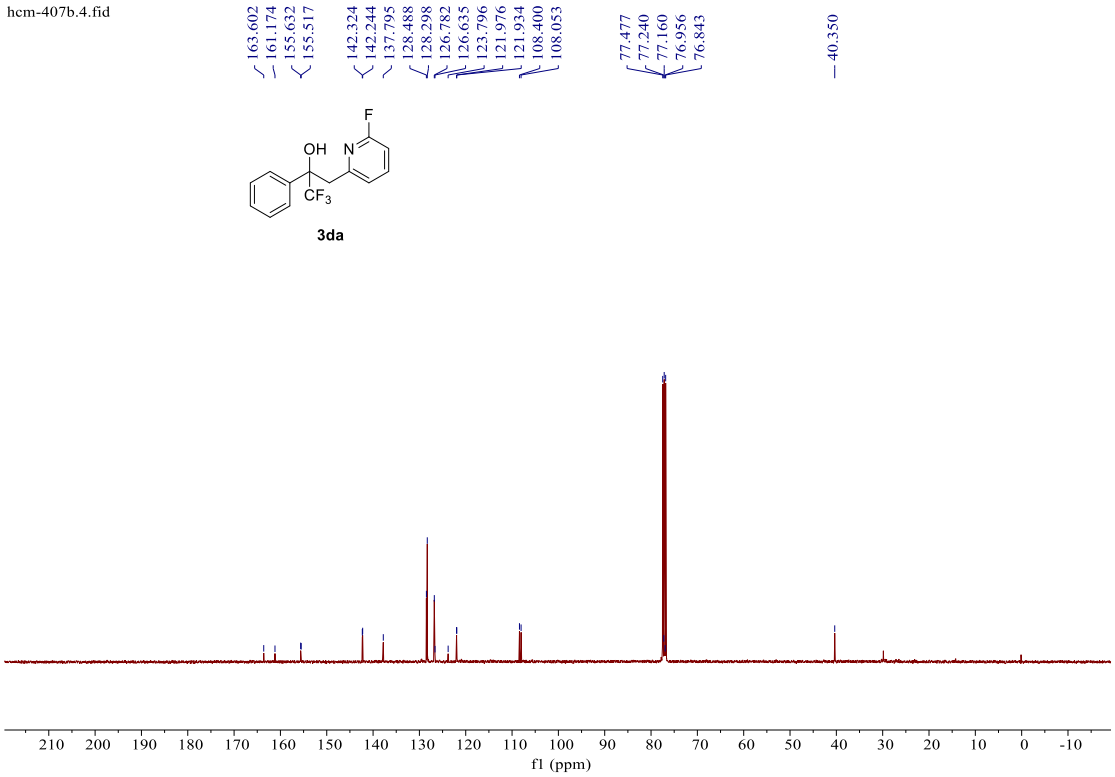
^{19}F NMR ($CDCl_3$) for **3ca**



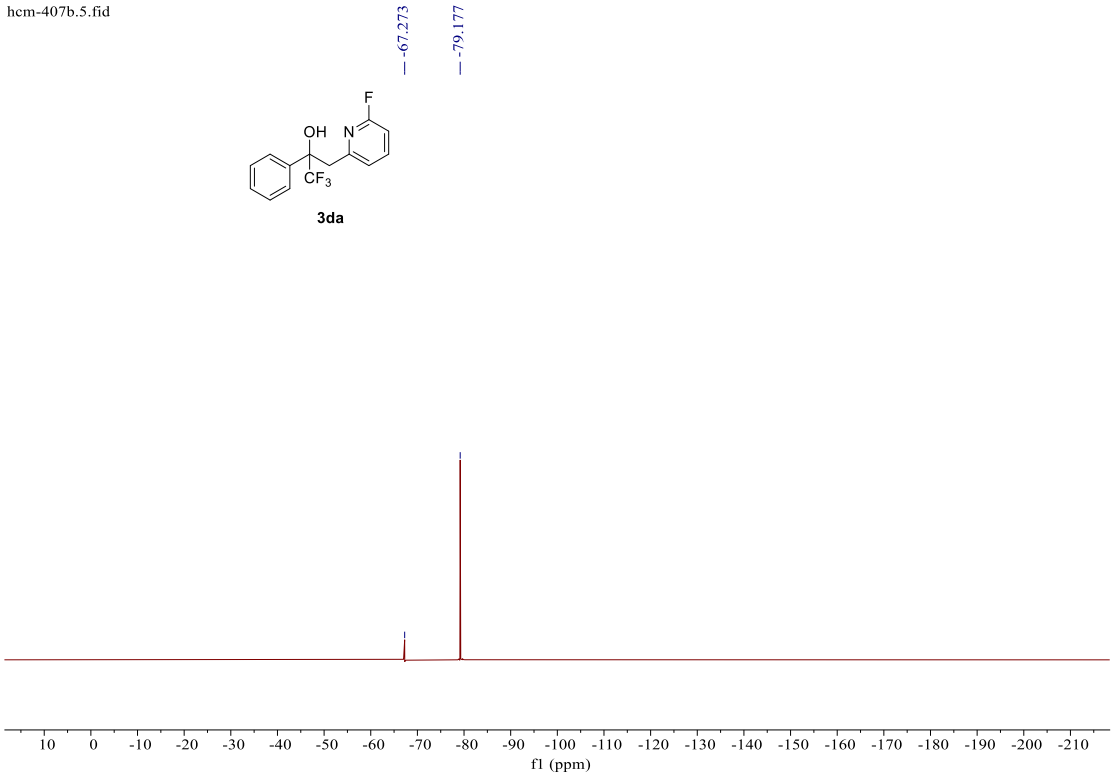
^{1}H NMR ($CDCl_3$) for **3da**



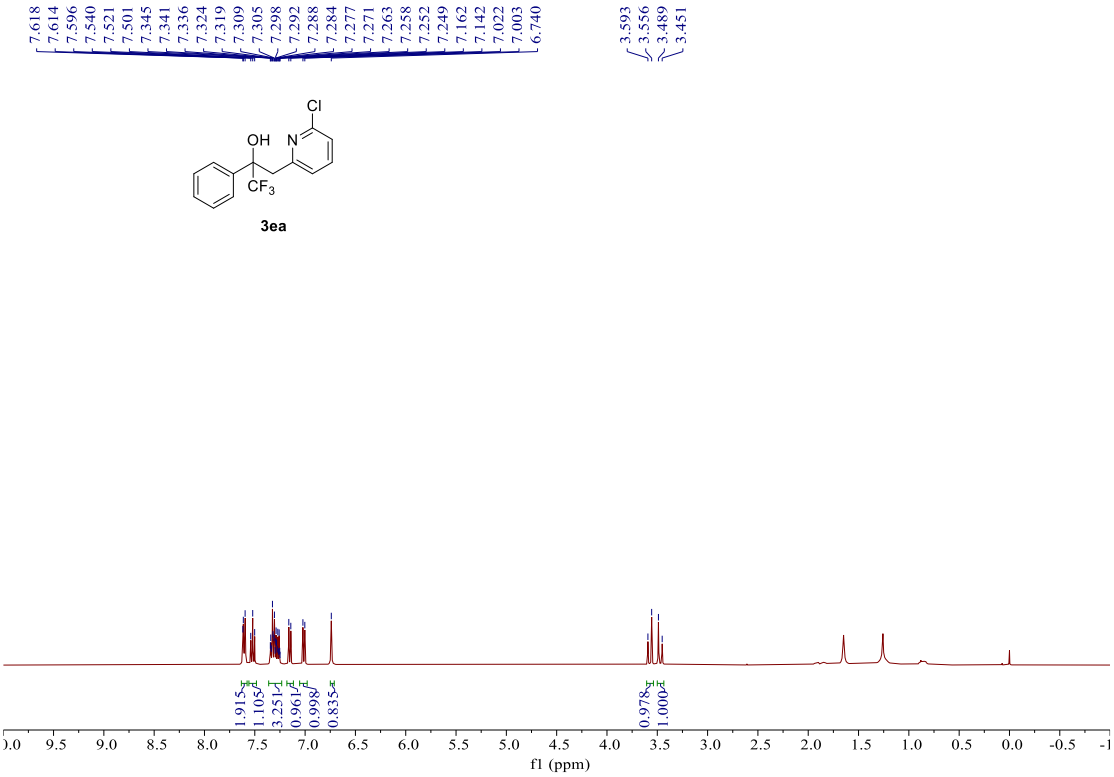
^{13}C NMR ($CDCl_3$) for **3da**



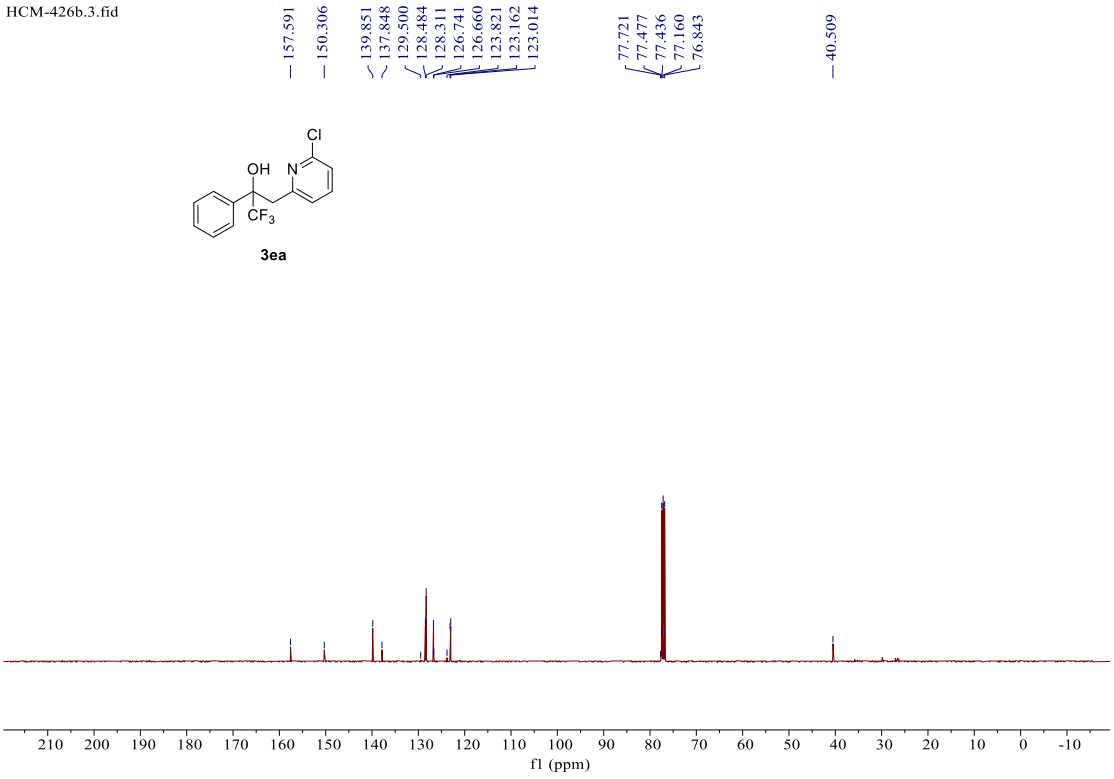
^{19}F NMR ($CDCl_3$) for **3da**



^{1}H NMR ($CDCl_3$) for **3ea**

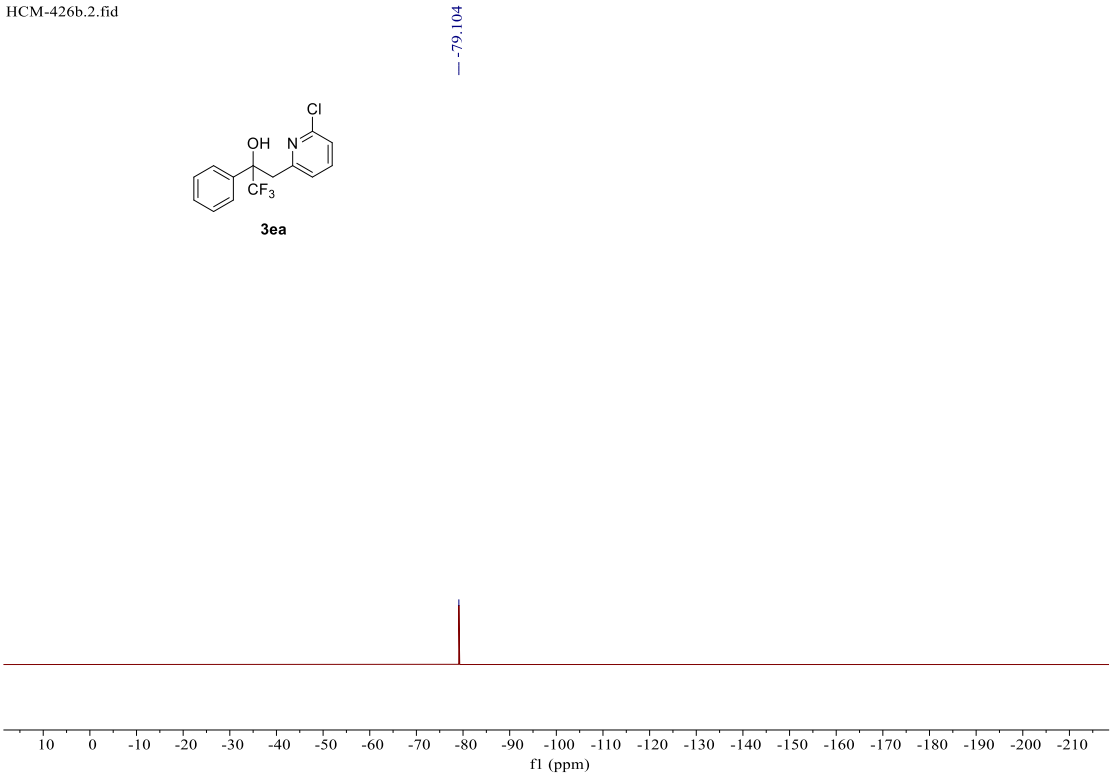


^{13}C NMR ($CDCl_3$) for **3ea**



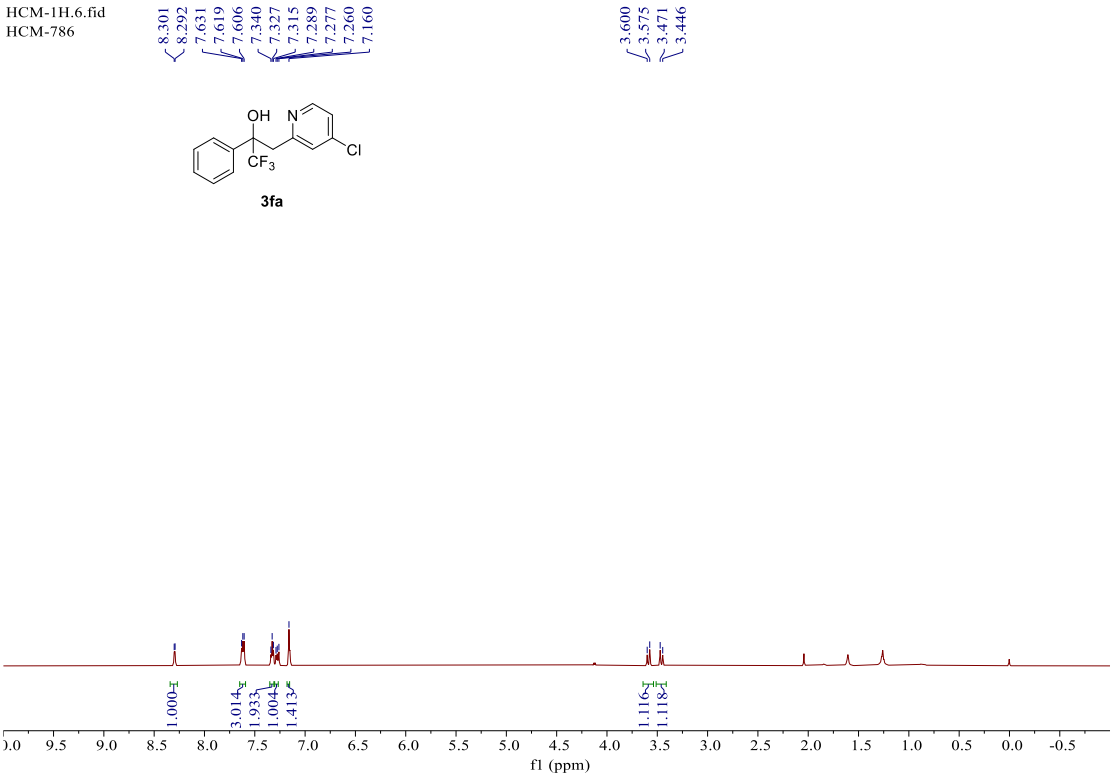
^{19}F NMR ($CDCl_3$) for **3ea**

HCM-426b.2.fid

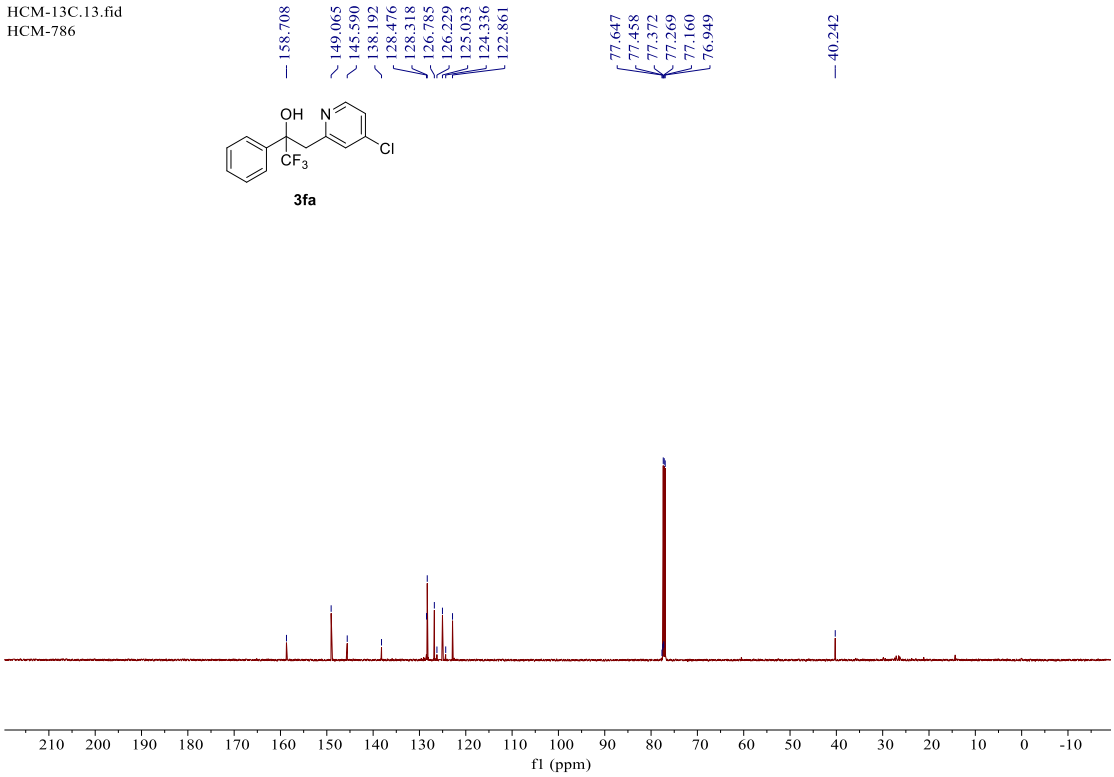


^{1}H NMR ($CDCl_3$) for **3fa**

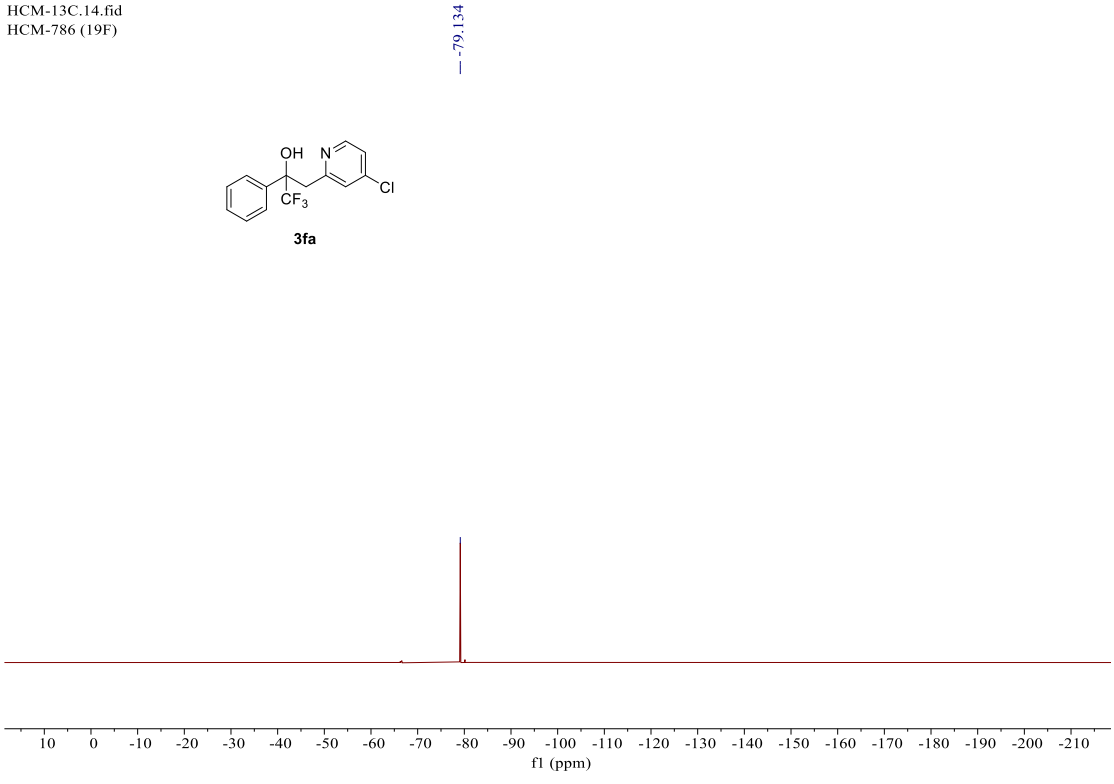
HCM-1H.6.fid
HCM-786



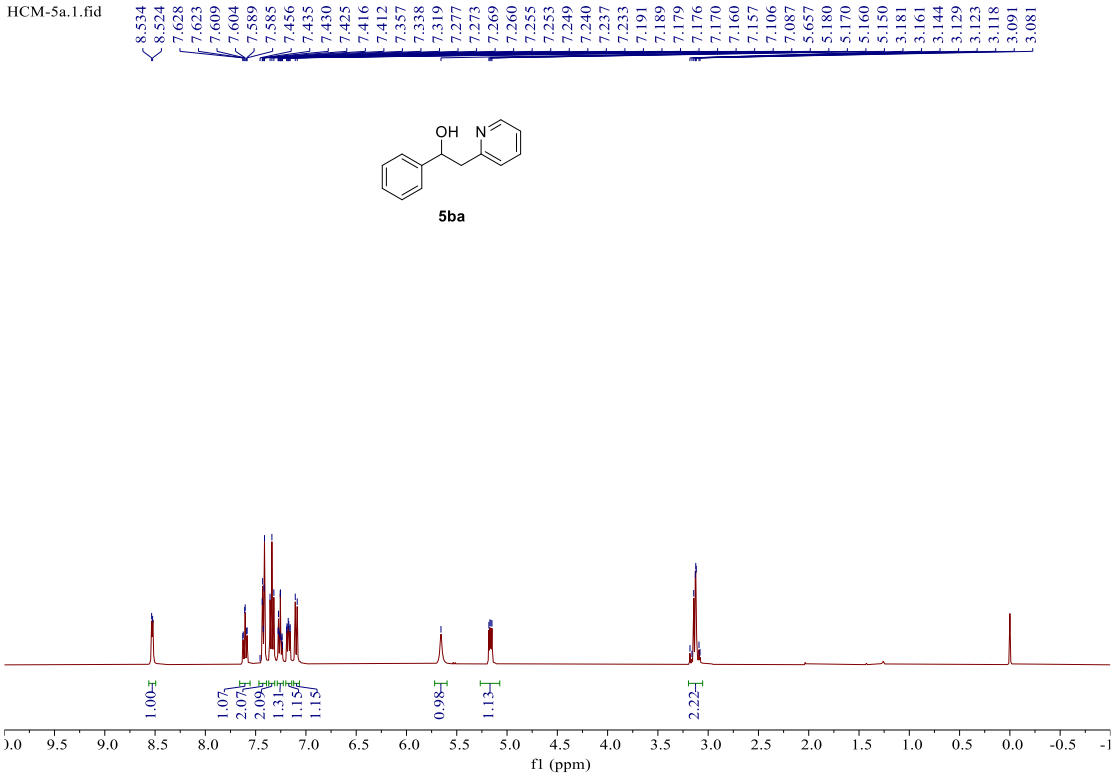
^{13}C NMR ($CDCl_3$) for **3fa**



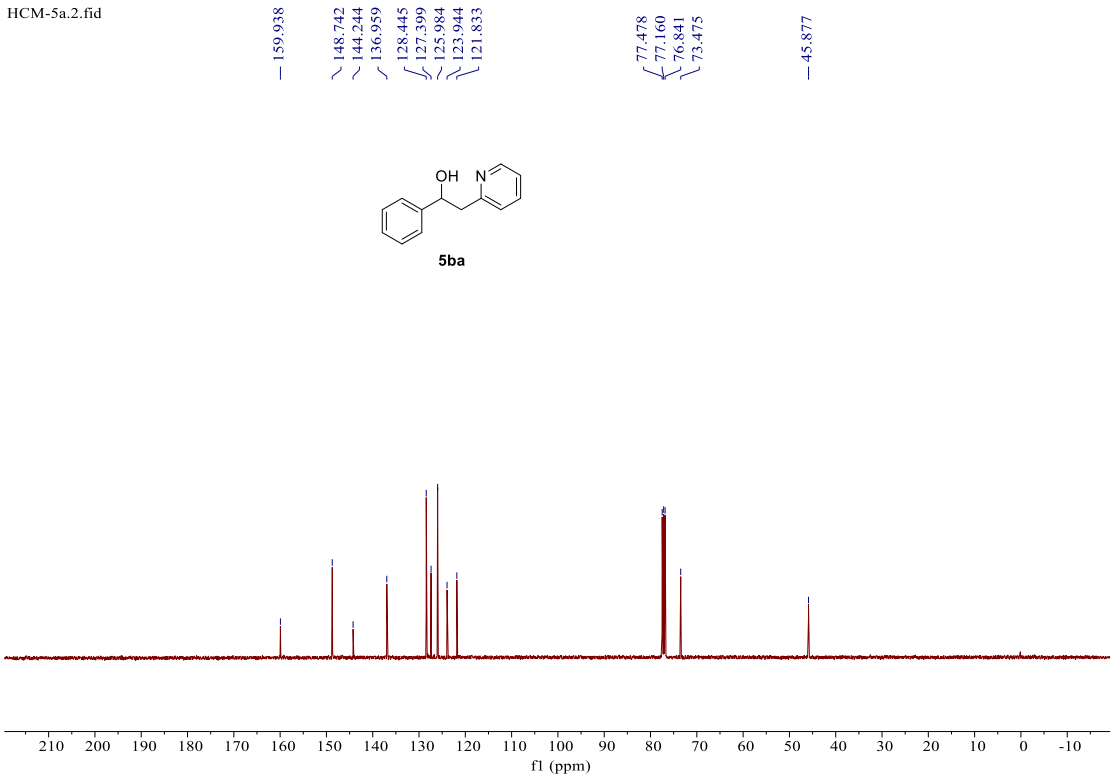
^{19}F NMR ($CDCl_3$) for **3fa**



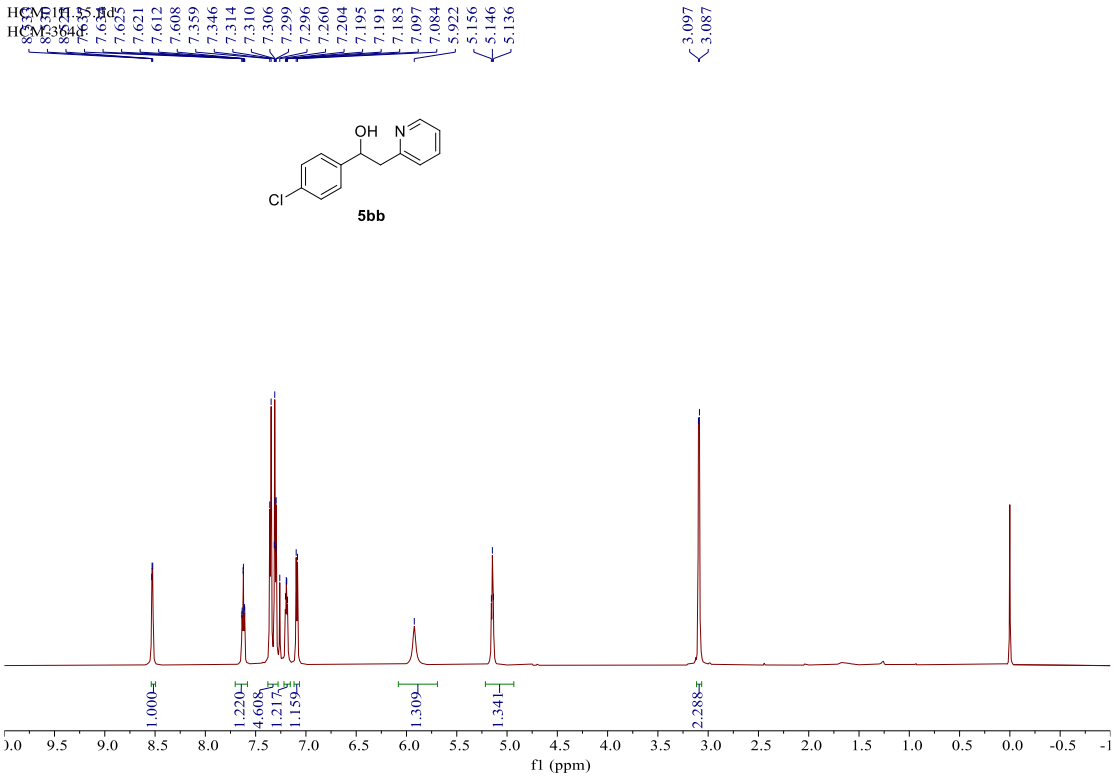
^{1}H NMR ($CDCl_3$) for **5ba**



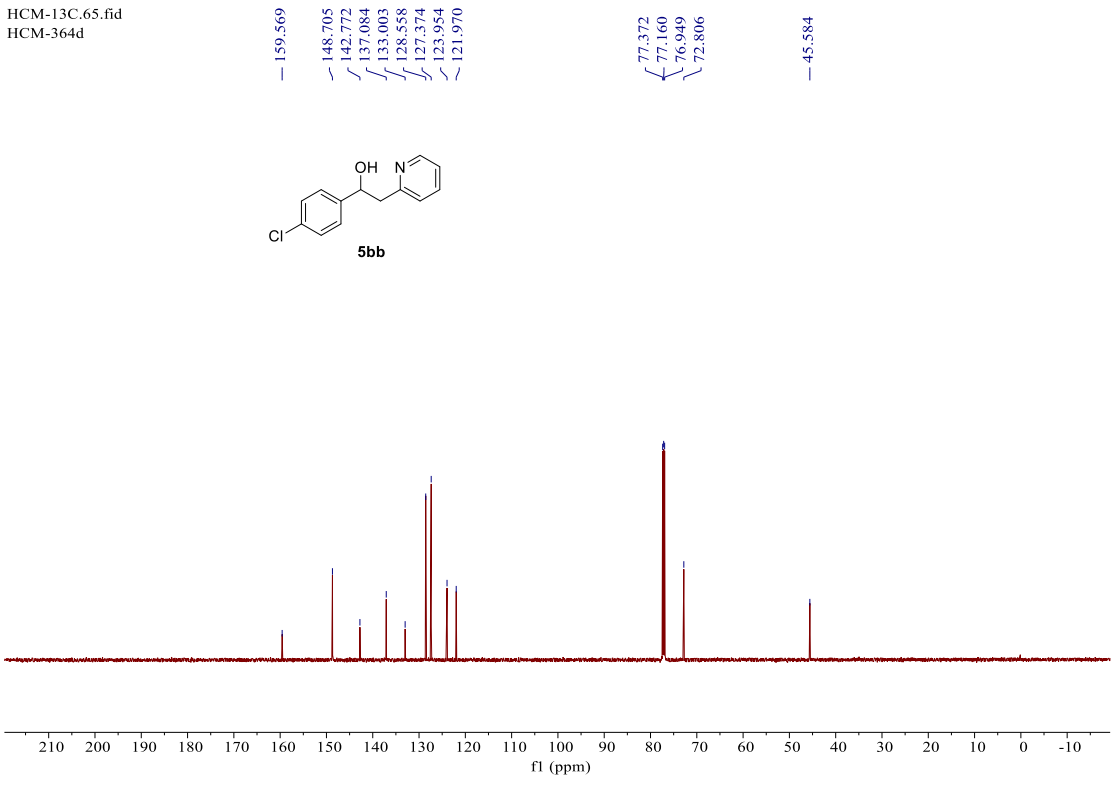
^{13}C NMR ($CDCl_3$) for **5ba**



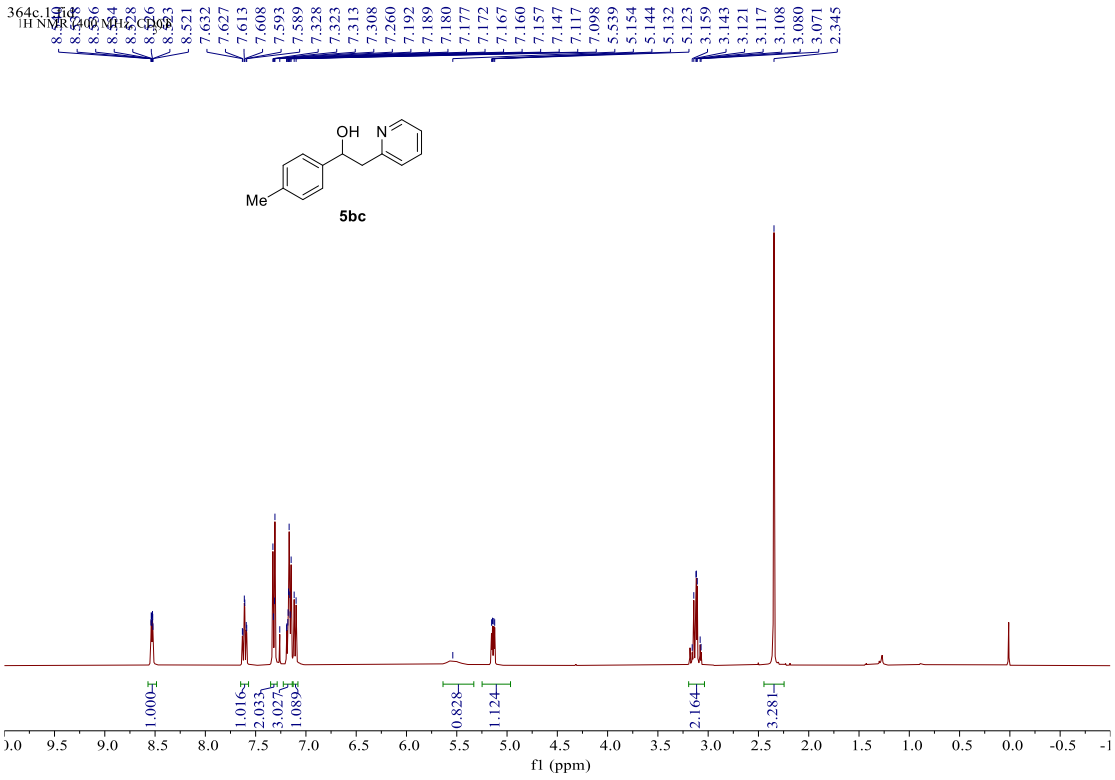
^{1}H NMR ($CDCl_3$) for **5bb**



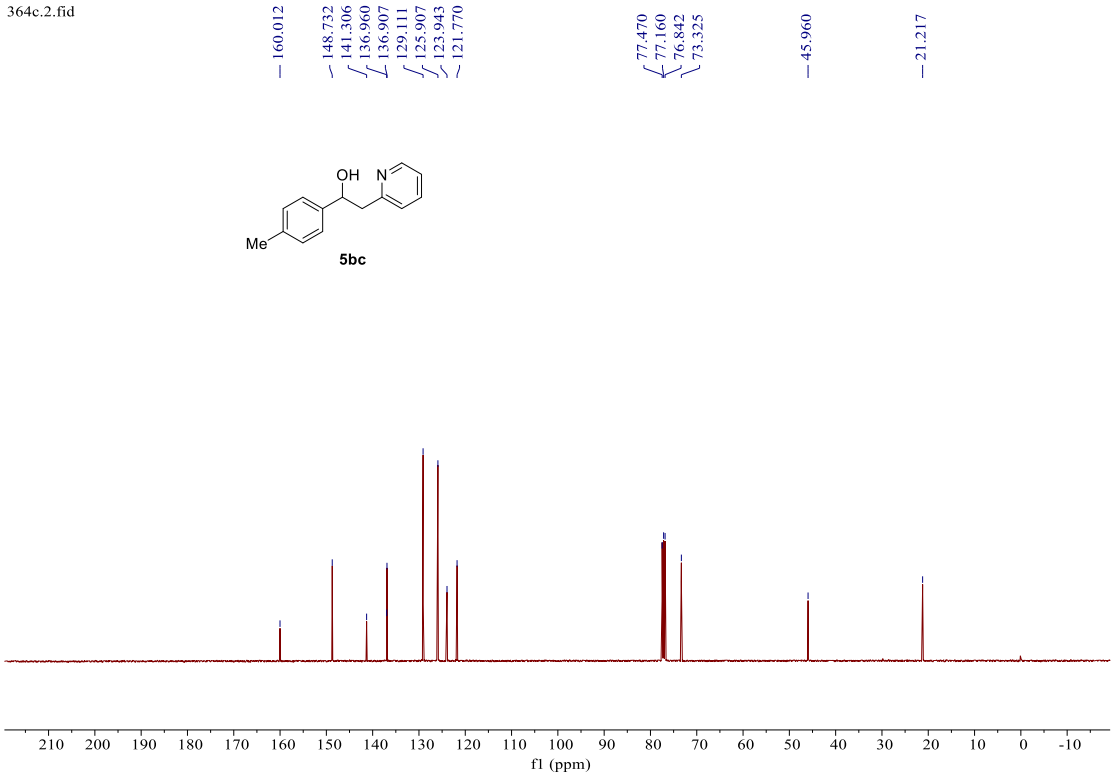
^{13}C NMR ($CDCl_3$) for **5bb**



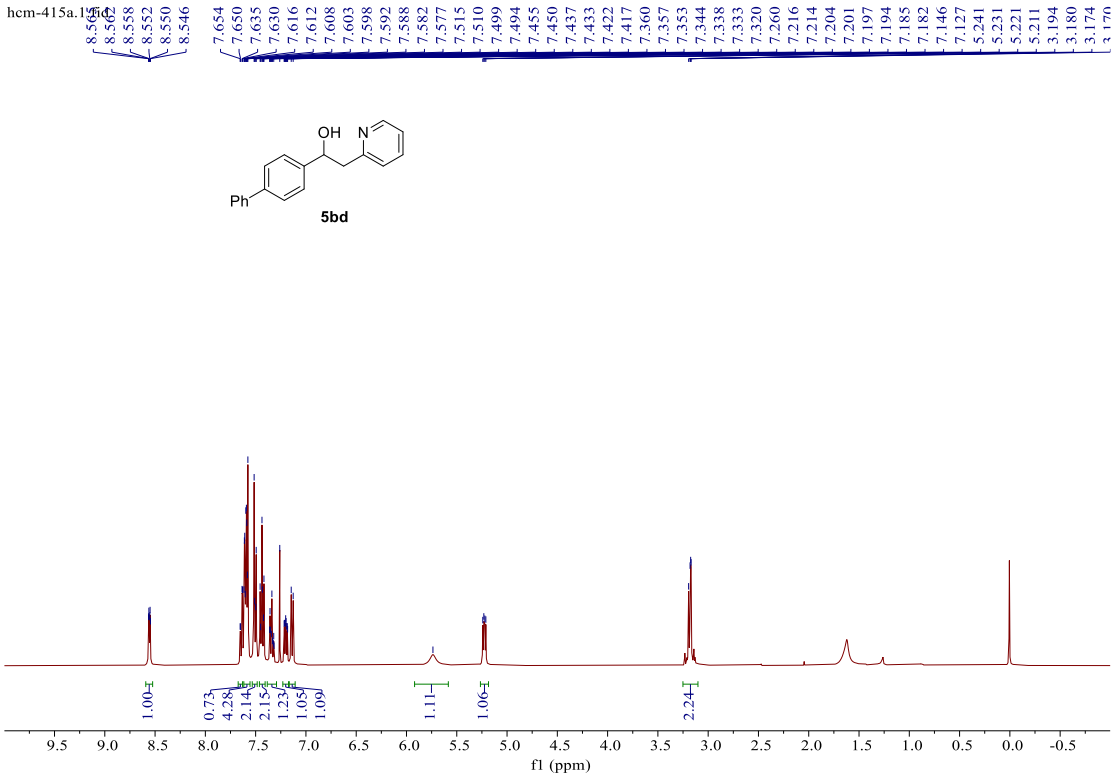
^{1}H NMR ($CDCl_3$) for **5bc**



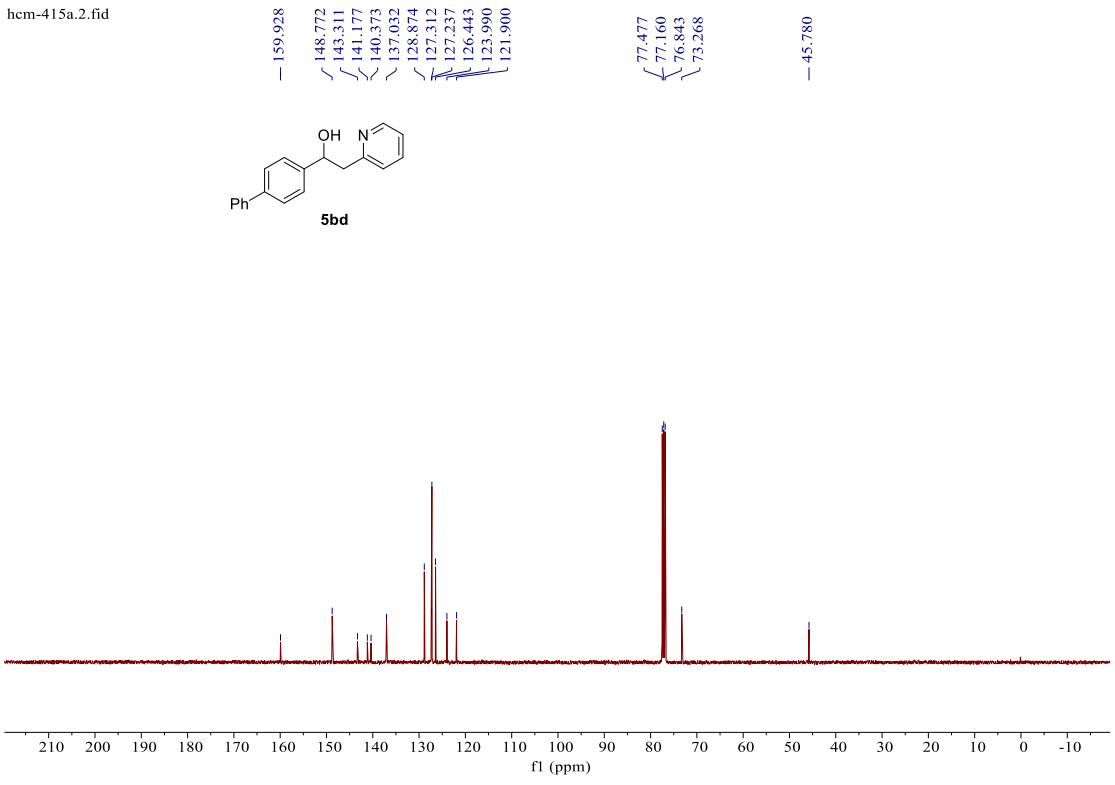
^{13}C NMR ($CDCl_3$) for **5bc**



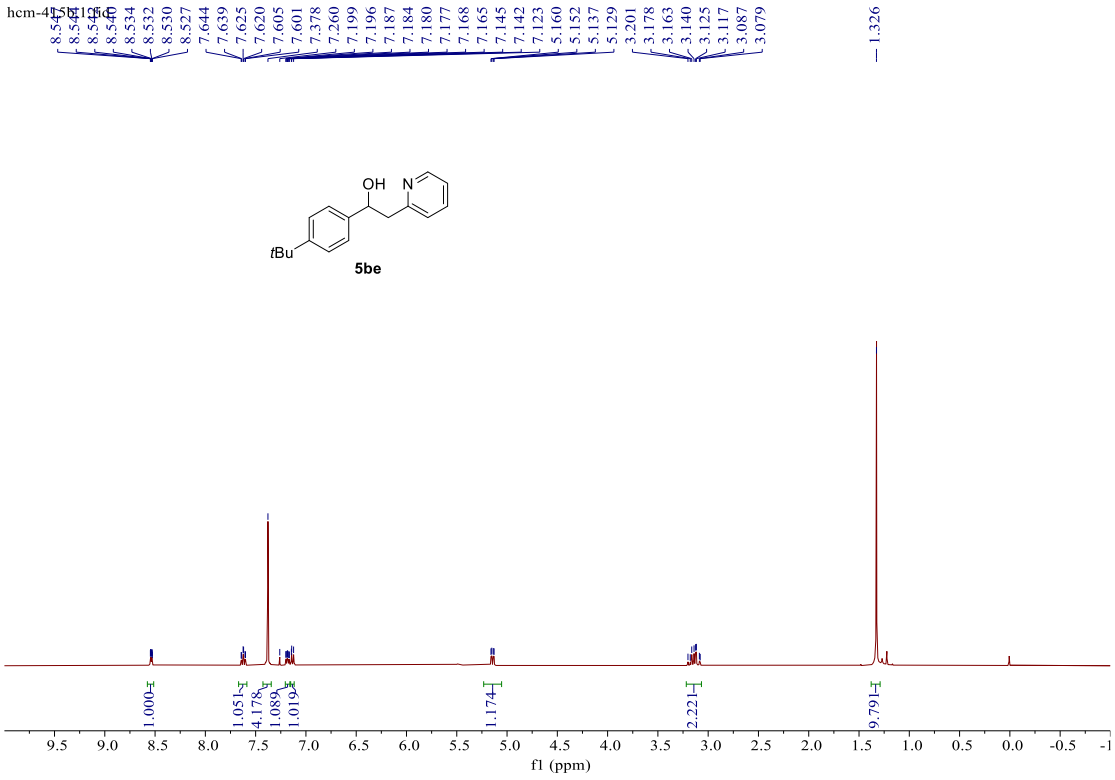
^{1}H NMR ($CDCl_3$) for **5bd**



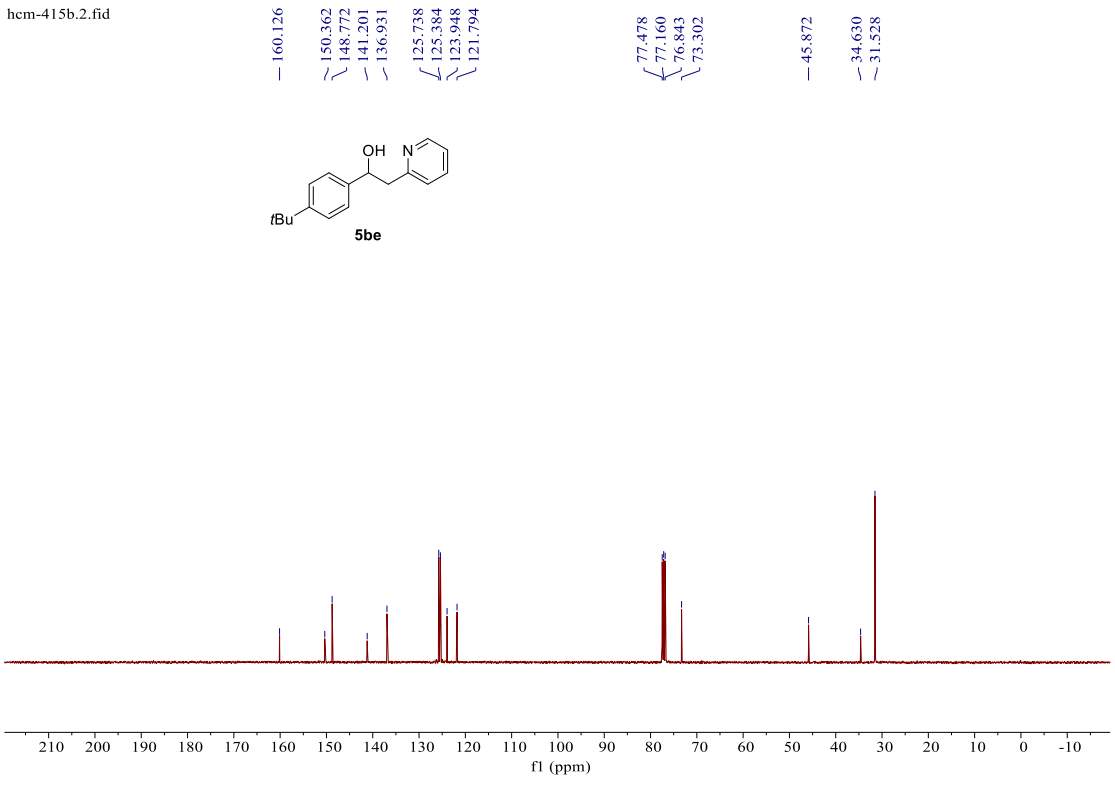
^{13}C NMR ($CDCl_3$) for **5bd**



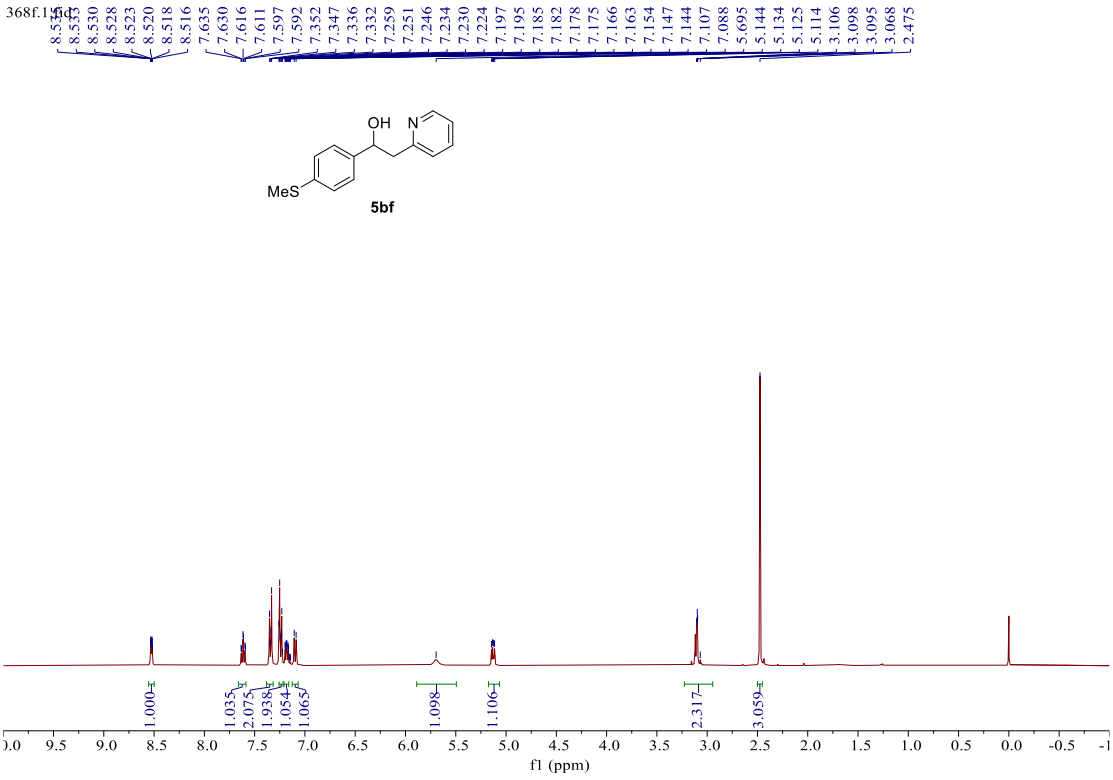
^{1}H NMR ($CDCl_3$) for **5be**



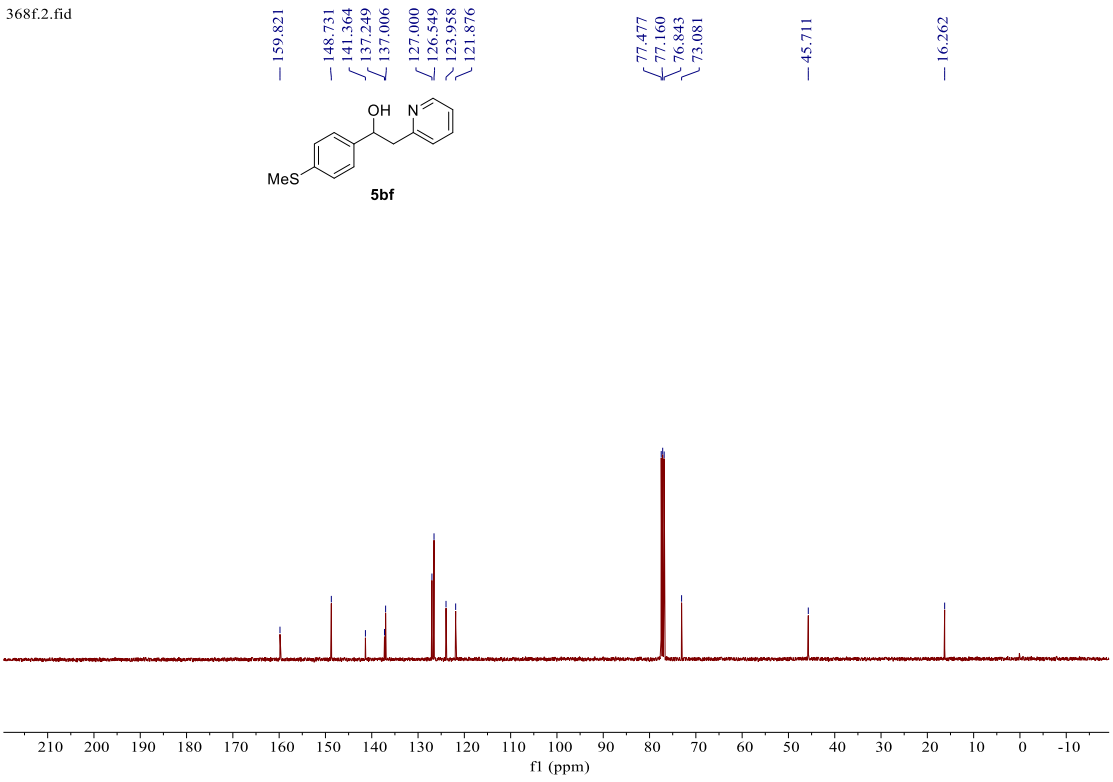
^{13}C NMR ($CDCl_3$) for **5be**



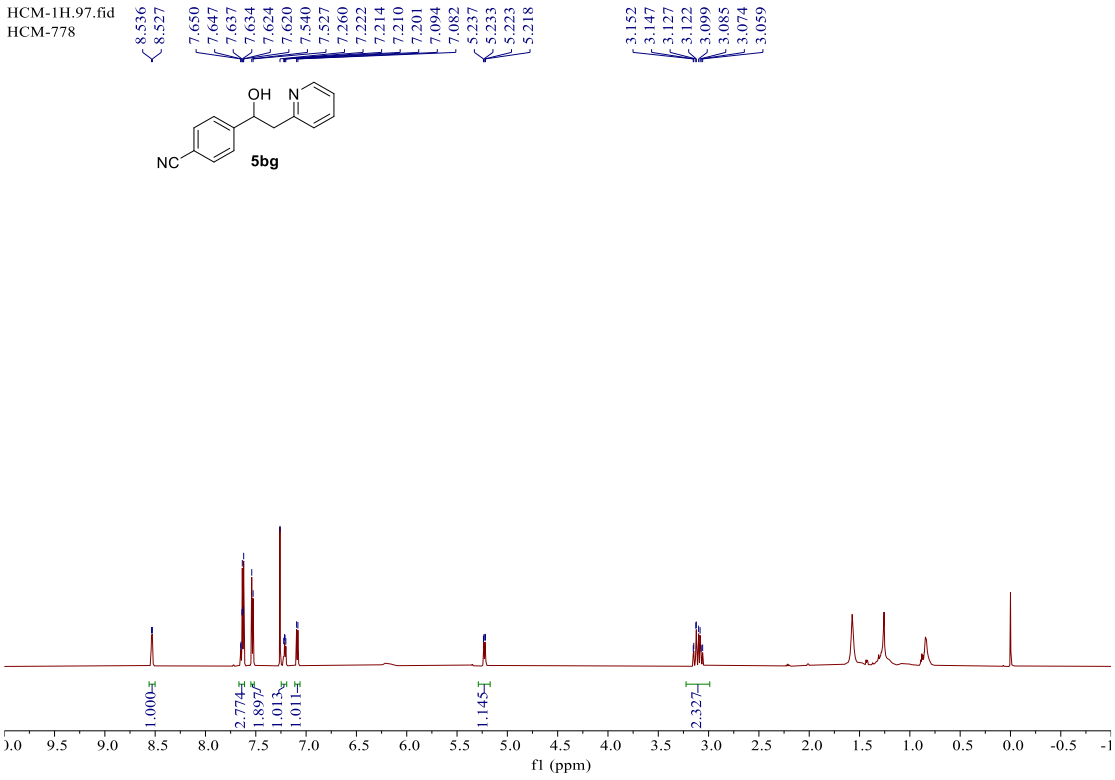
^{1}H NMR ($CDCl_3$) for **5bf**



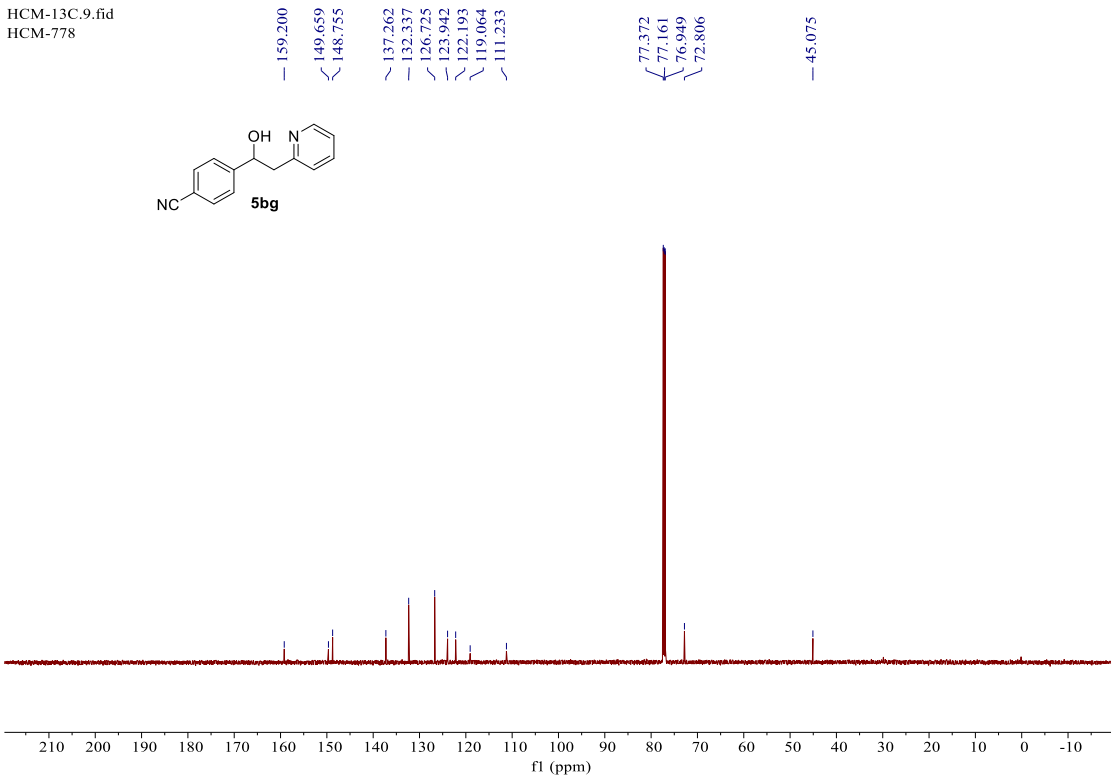
^{13}C NMR ($CDCl_3$) for **5bf**



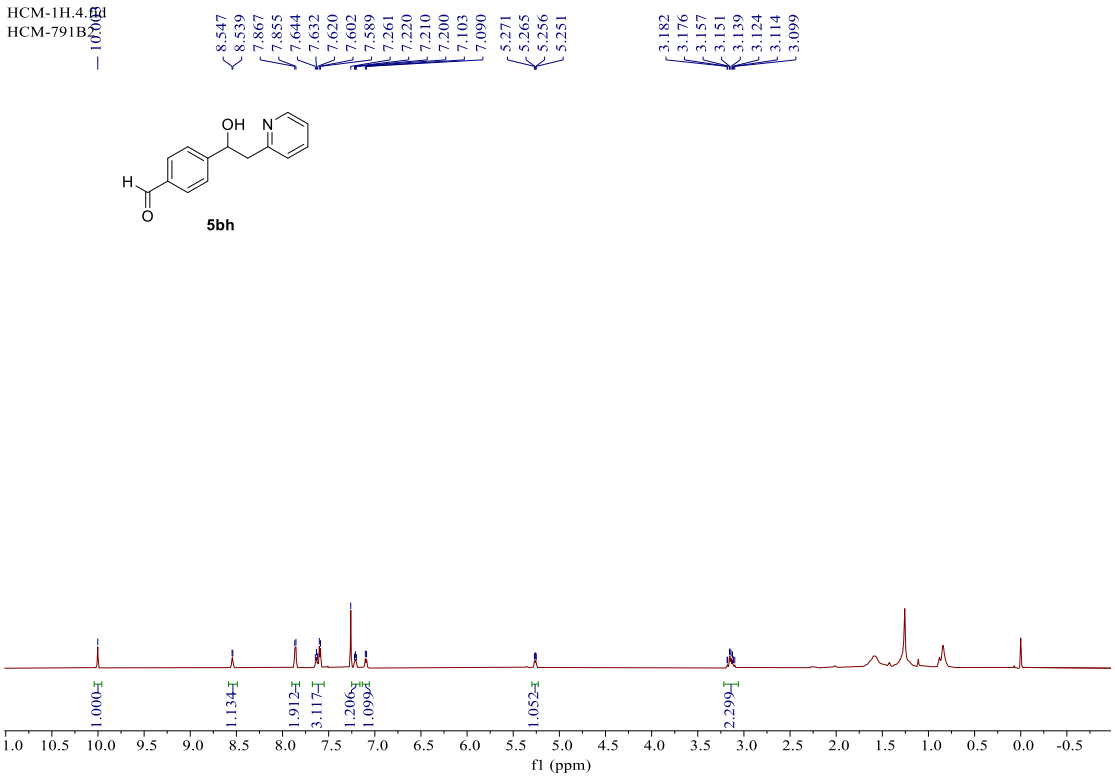
^{1}H NMR ($CDCl_3$) for **5bg**



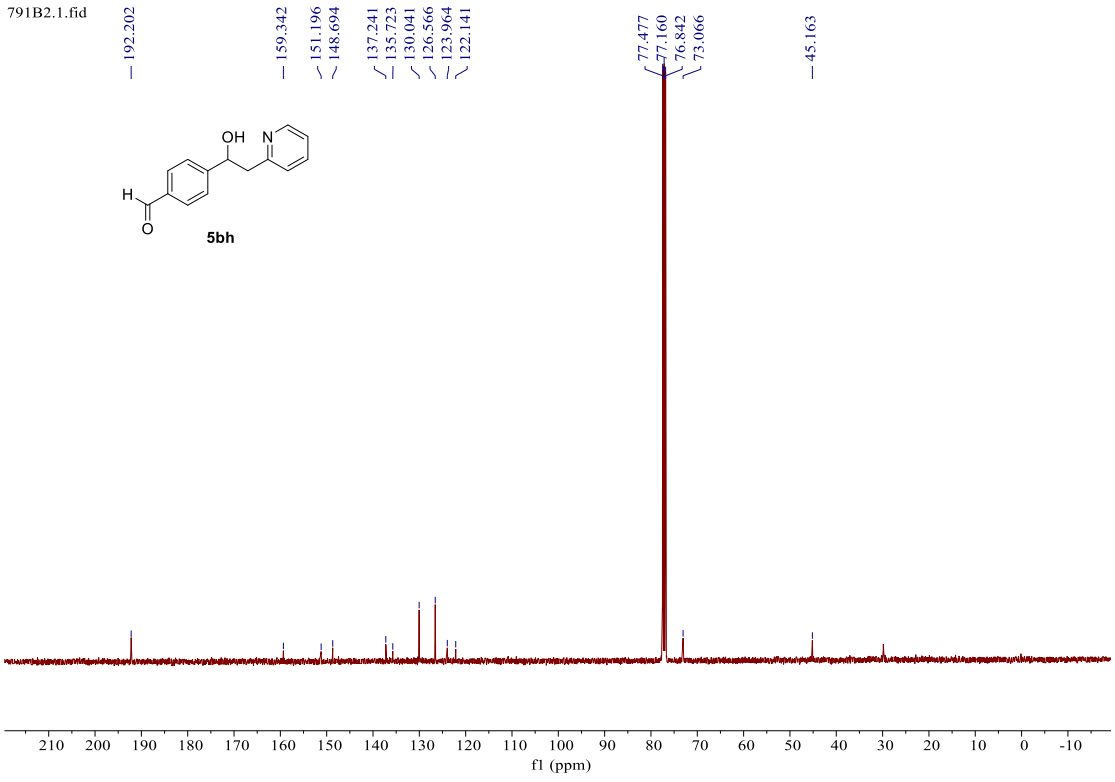
^{13}C NMR ($CDCl_3$) for **5bg**



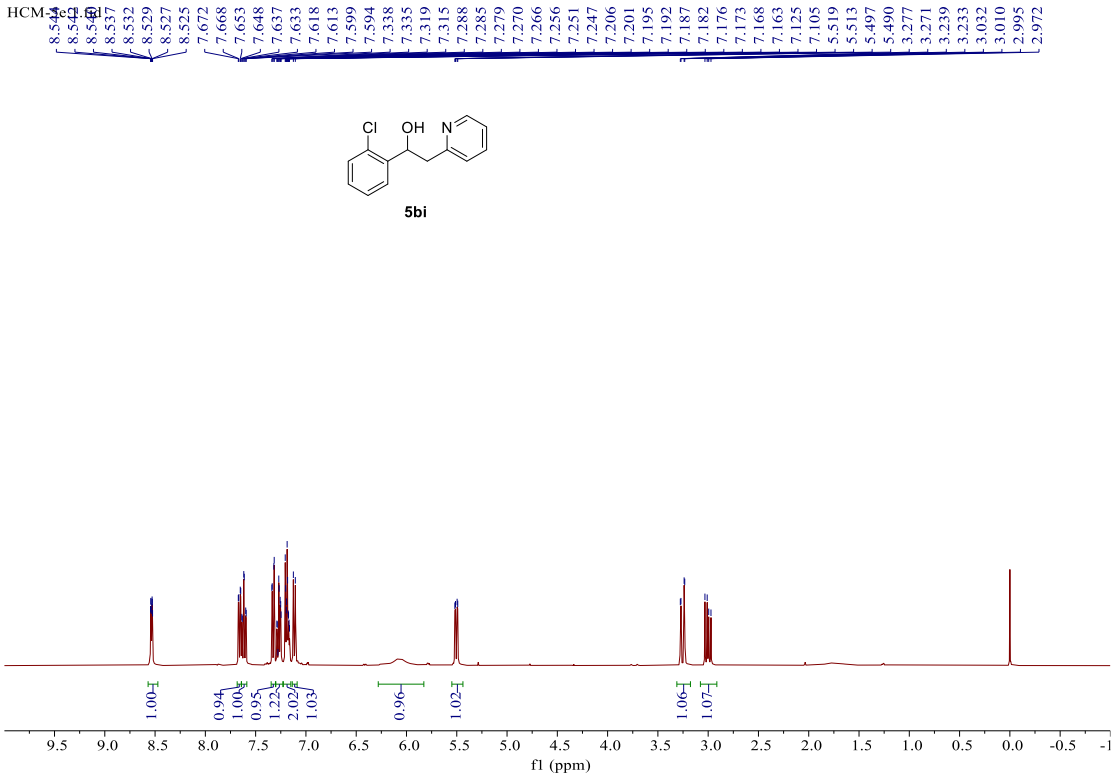
^{1}H NMR ($CDCl_3$) for **5bh**



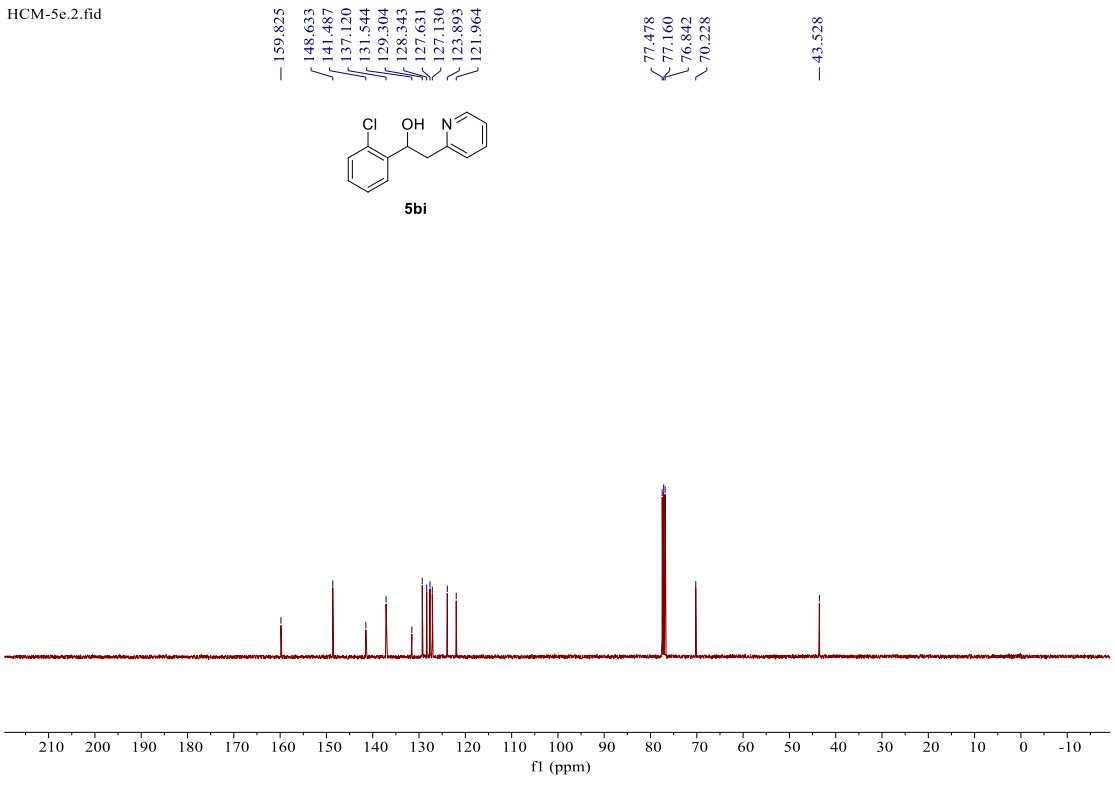
^{13}C NMR ($CDCl_3$) for **5bh**



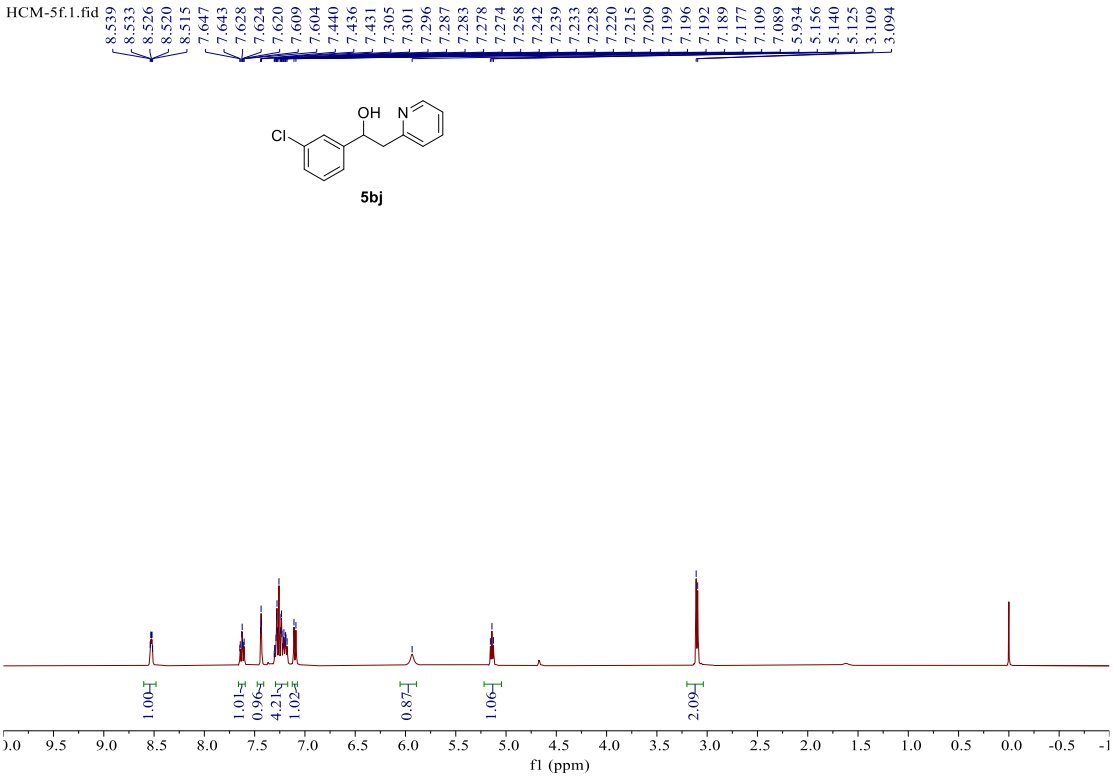
^{1}H NMR ($CDCl_3$) for **5bi**



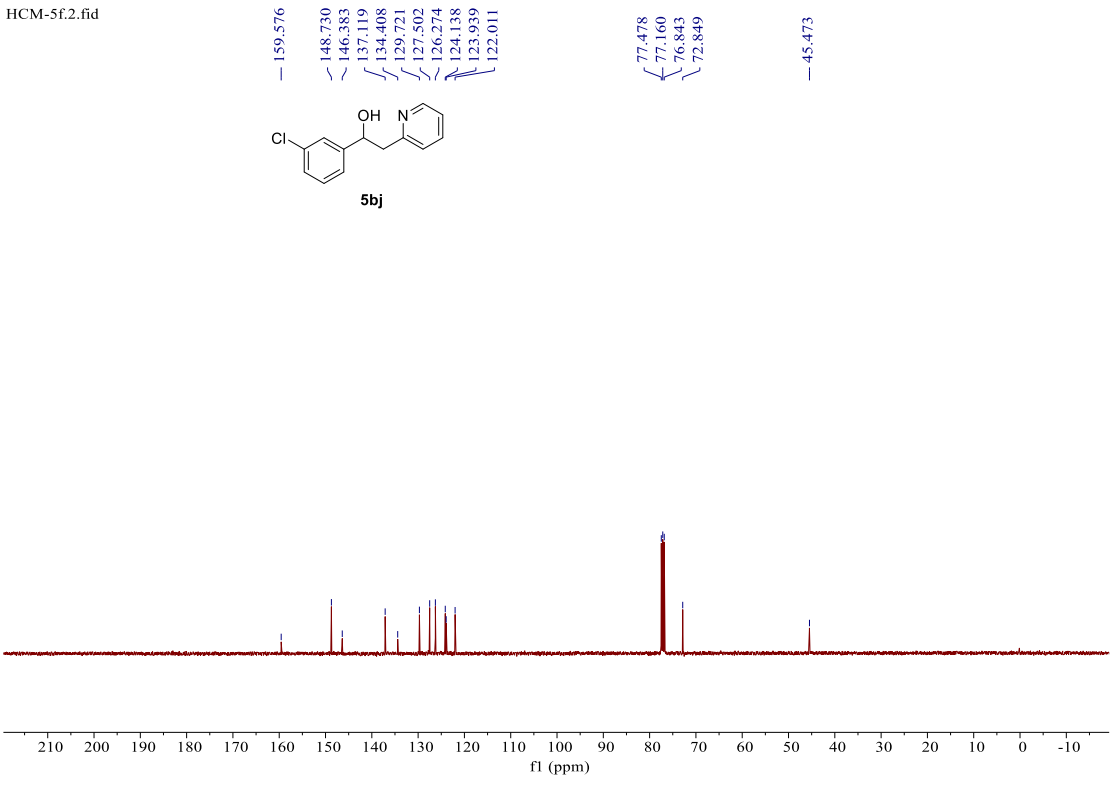
^{13}C NMR ($CDCl_3$) for **5bi**



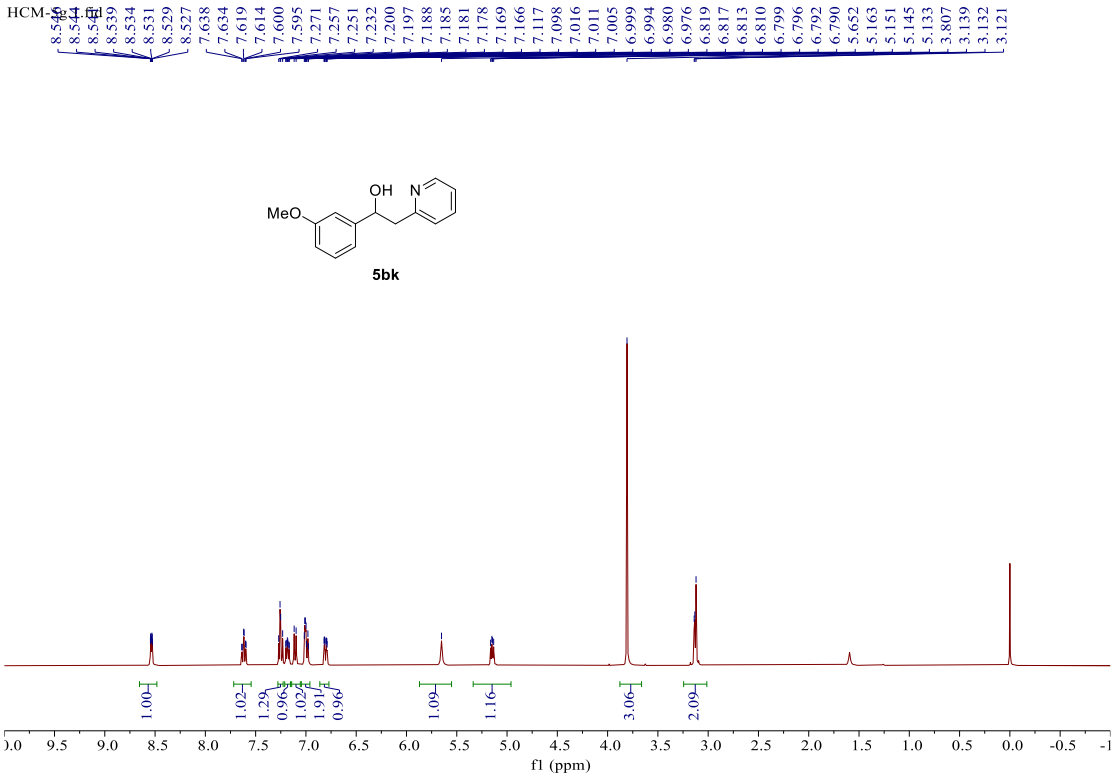
^{1}H NMR ($CDCl_3$) for **5bj**



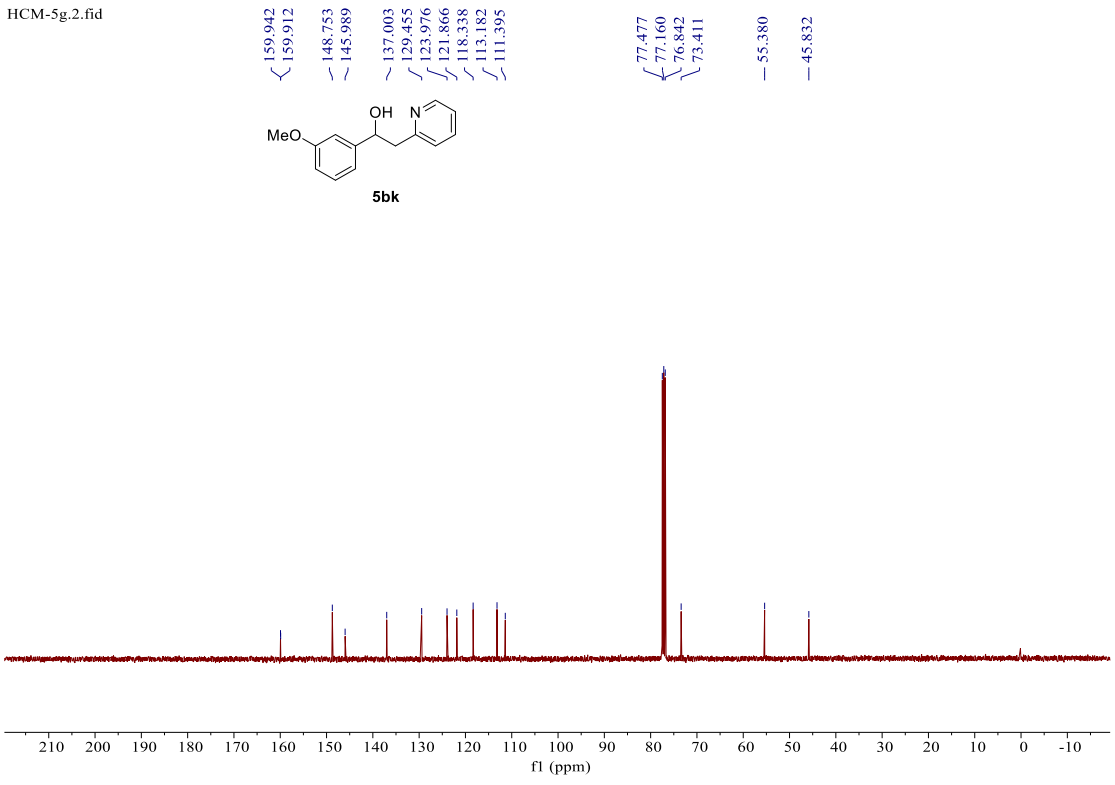
^{13}C NMR ($CDCl_3$) for **5bj**



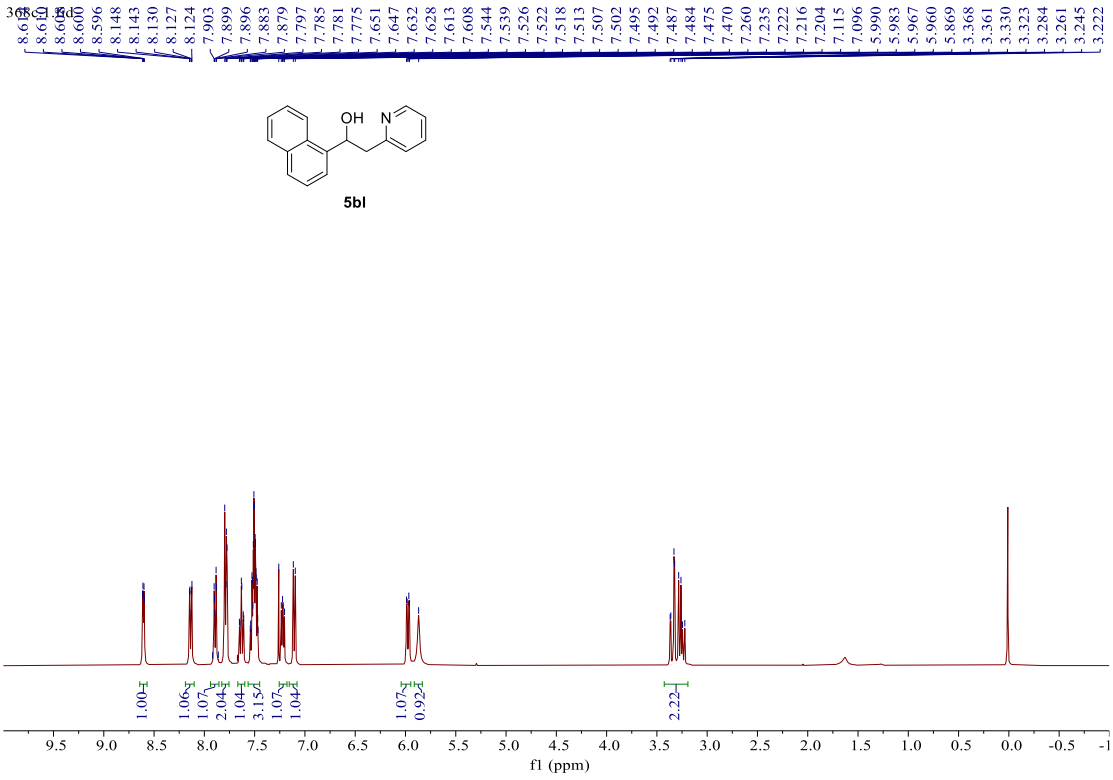
^{1}H NMR ($CDCl_3$) for **5bk**



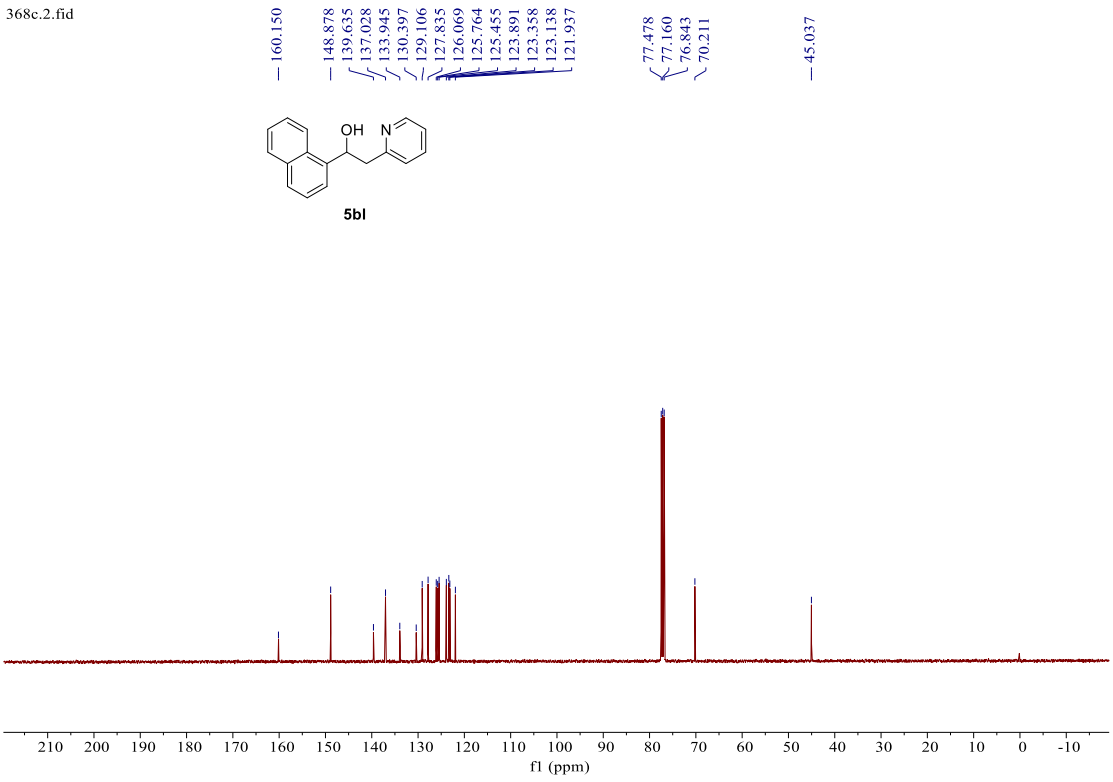
^{13}C NMR ($CDCl_3$) for **5bk**



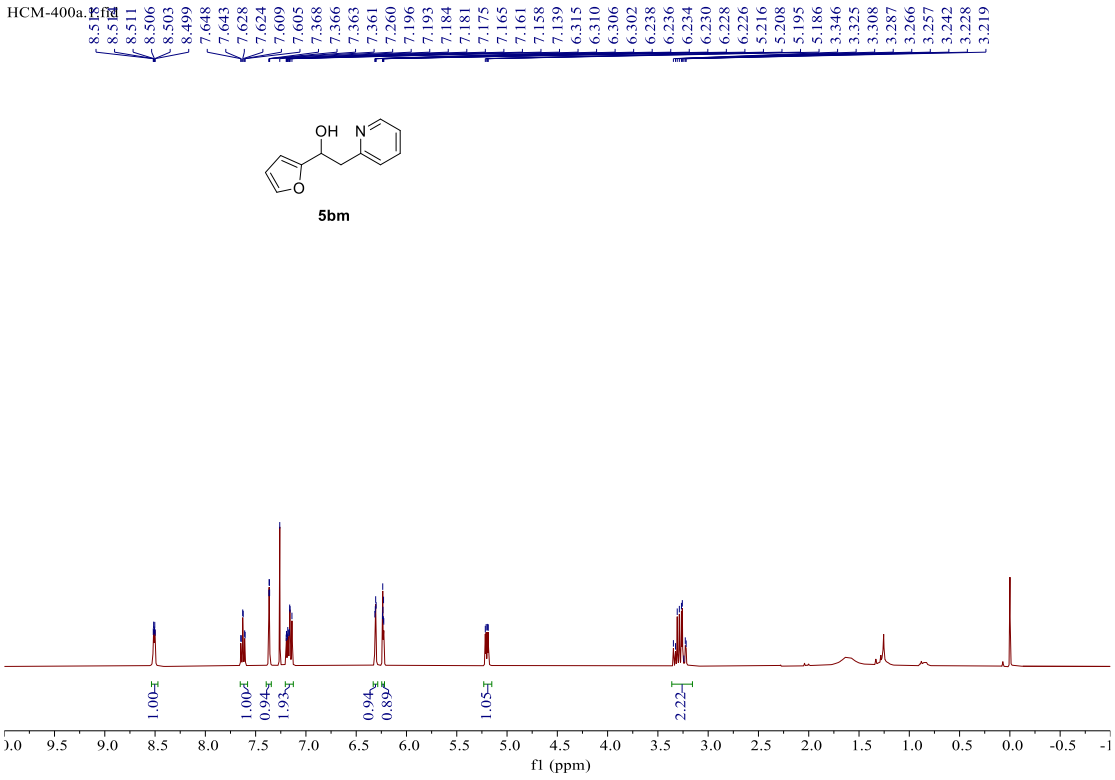
^{1}H NMR ($CDCl_3$) for **5bl**



^{13}C NMR ($CDCl_3$) for **5bl**



^{1}H NMR ($CDCl_3$) for **5bm**



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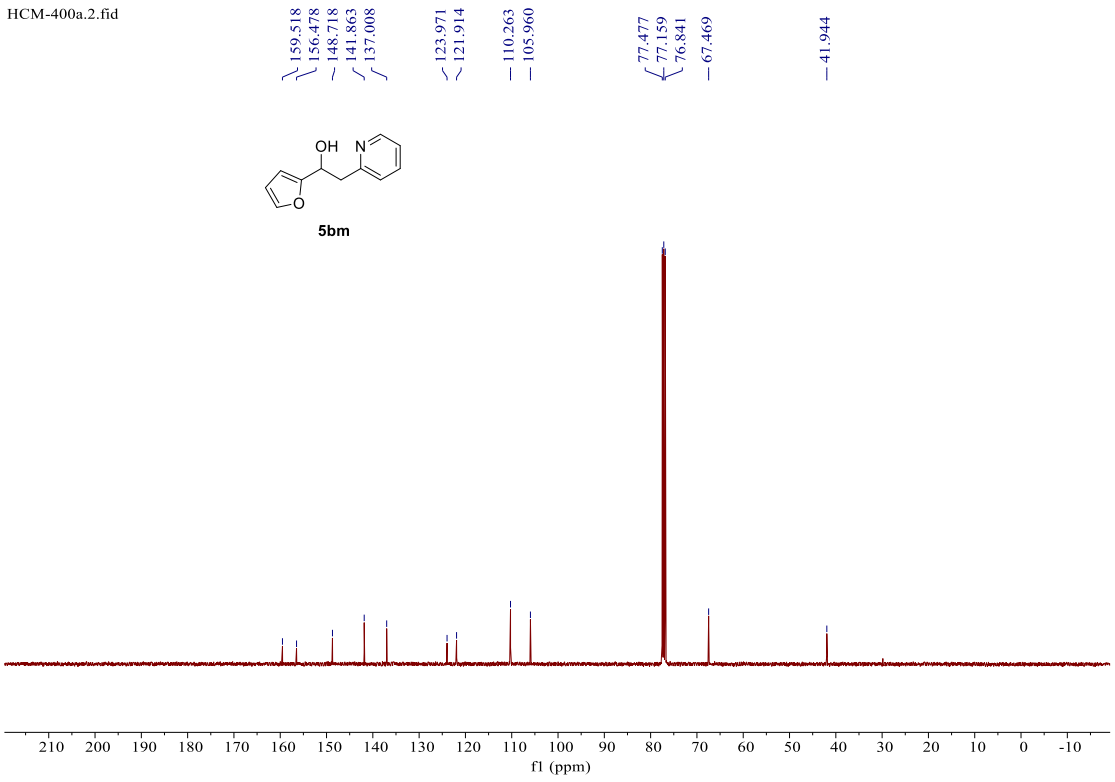
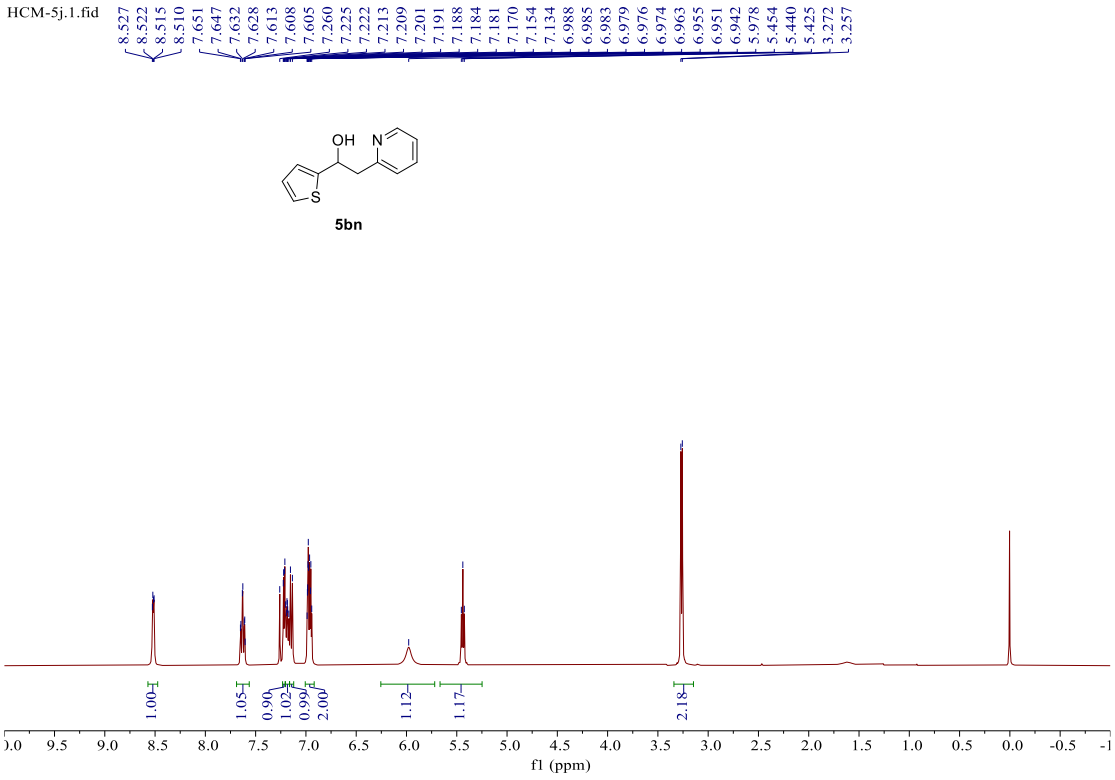
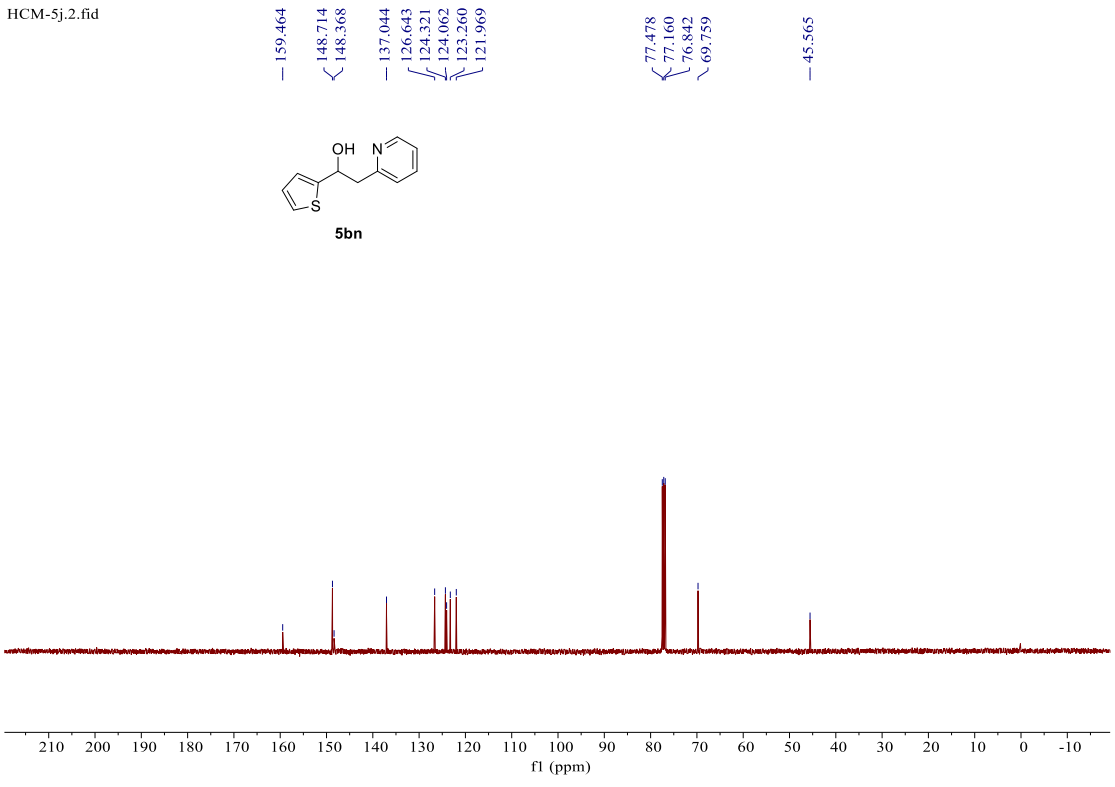


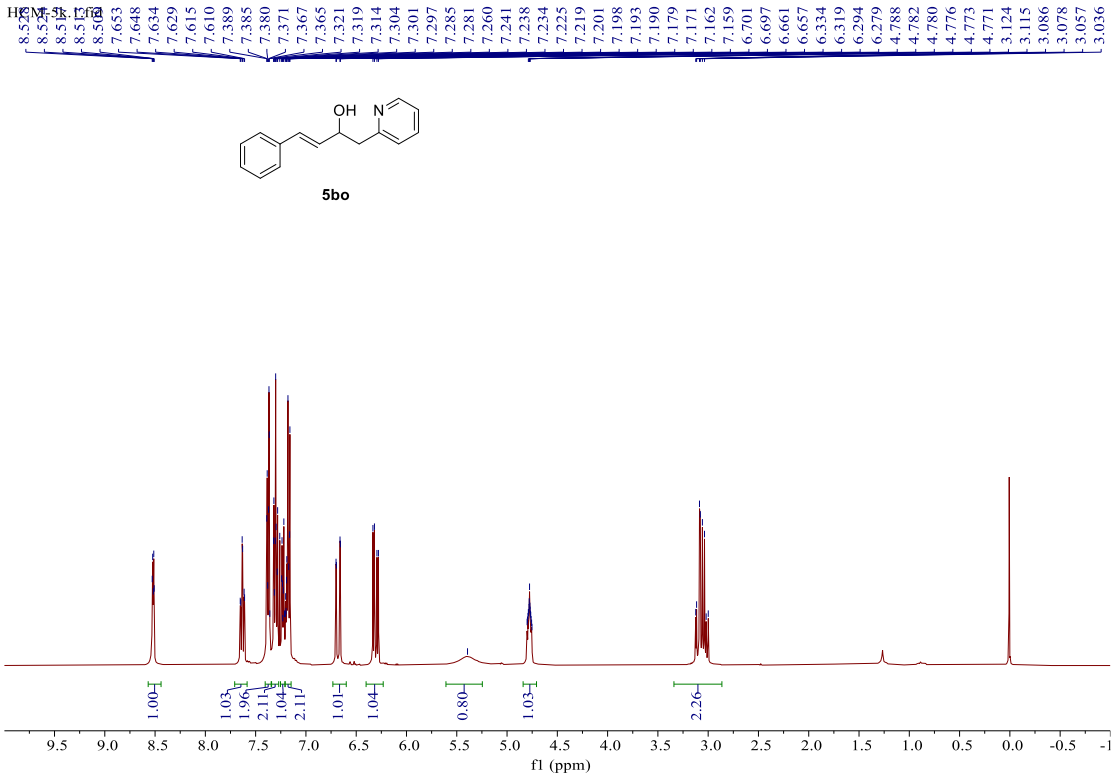
^{1}H NMR ($CDCl_3$) for **5bn**



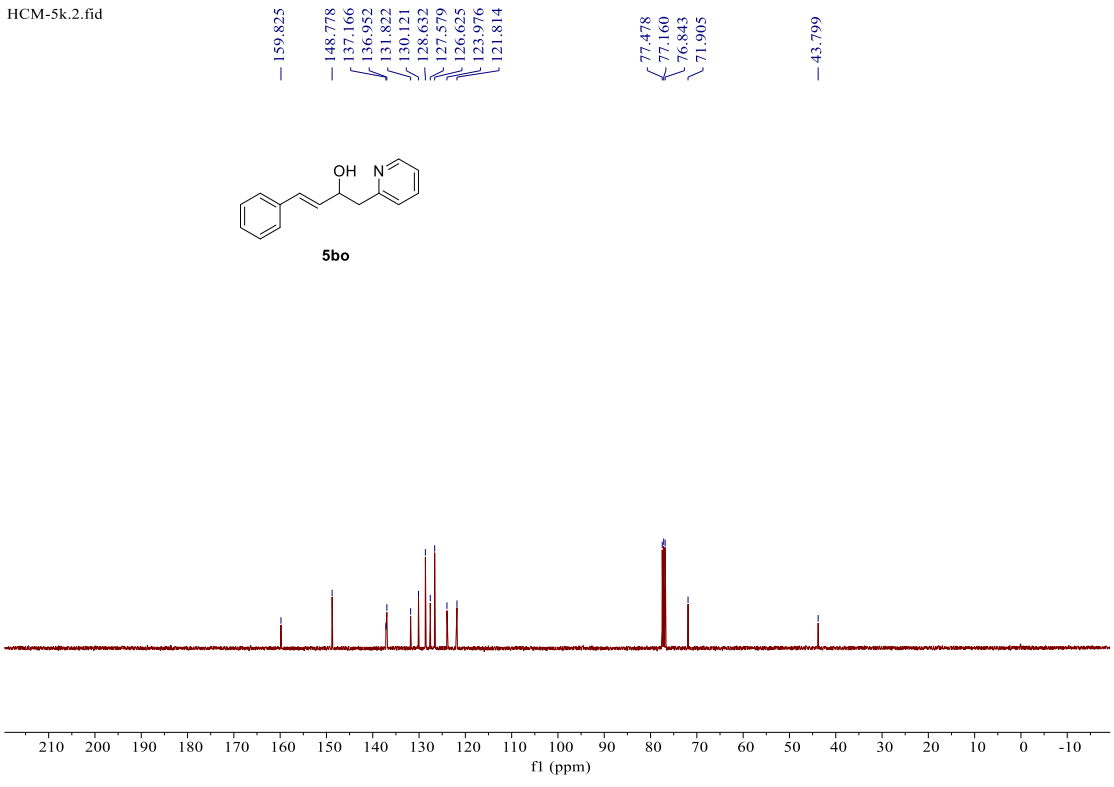
^{13}C NMR ($CDCl_3$) for **5bn**



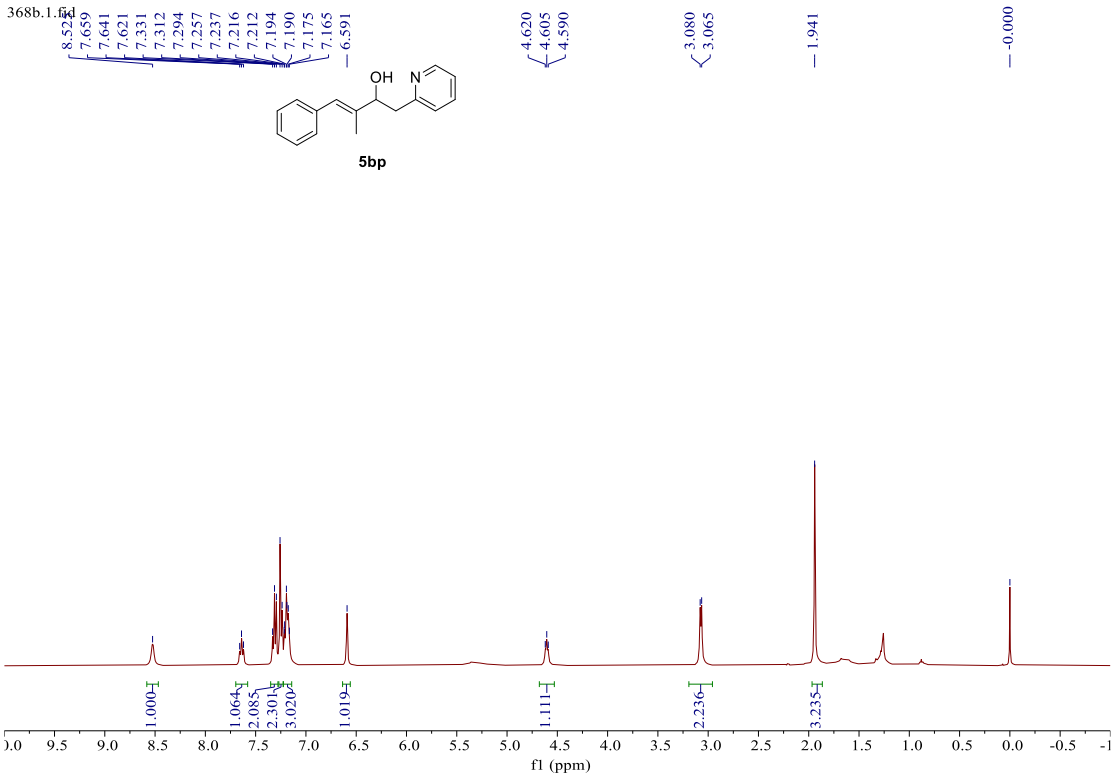
^{1}H NMR ($CDCl_3$) for **5bo**



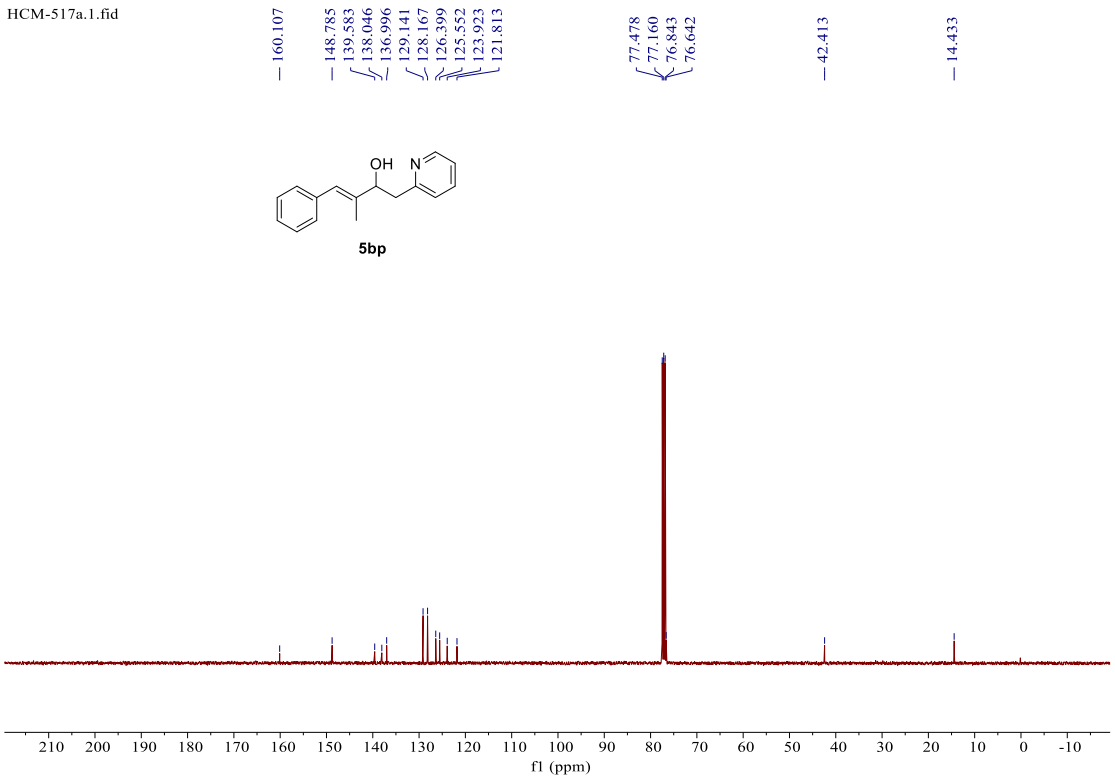
^{13}C NMR ($CDCl_3$) for **5bo**



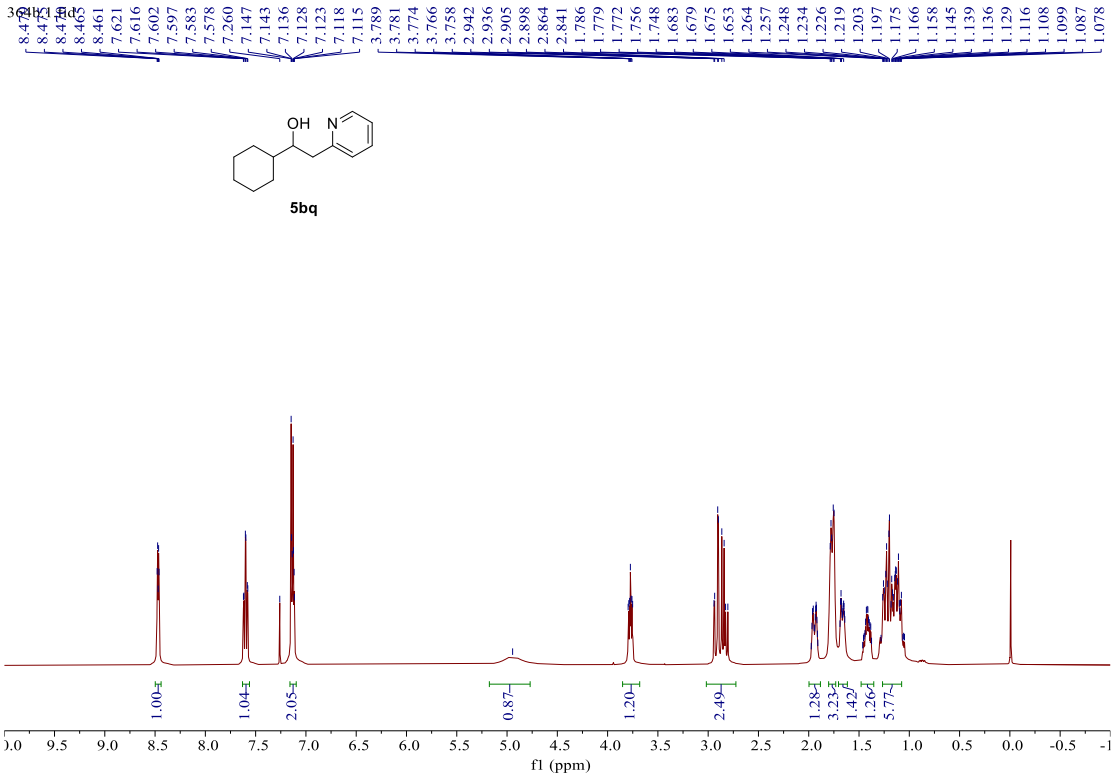
^{1}H NMR ($CDCl_3$) for **5bp**



^{13}C NMR ($CDCl_3$) for **5bp**



^{1}H NMR ($CDCl_3$) for **5q**



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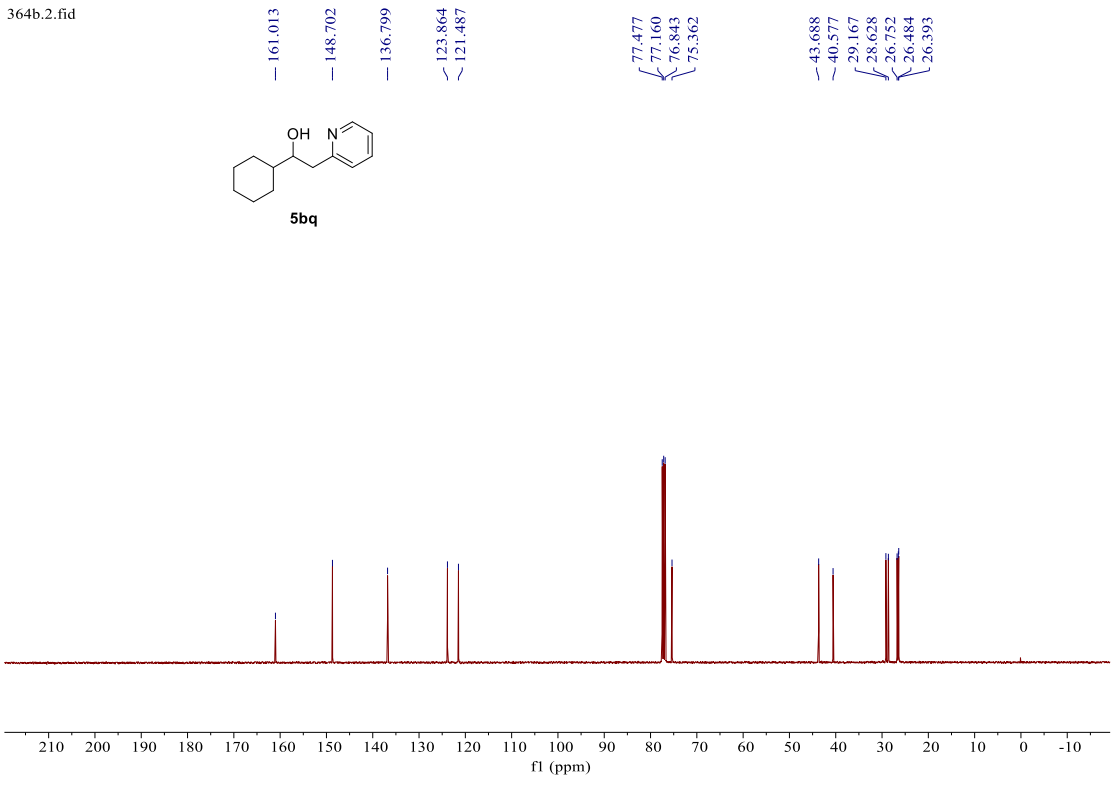

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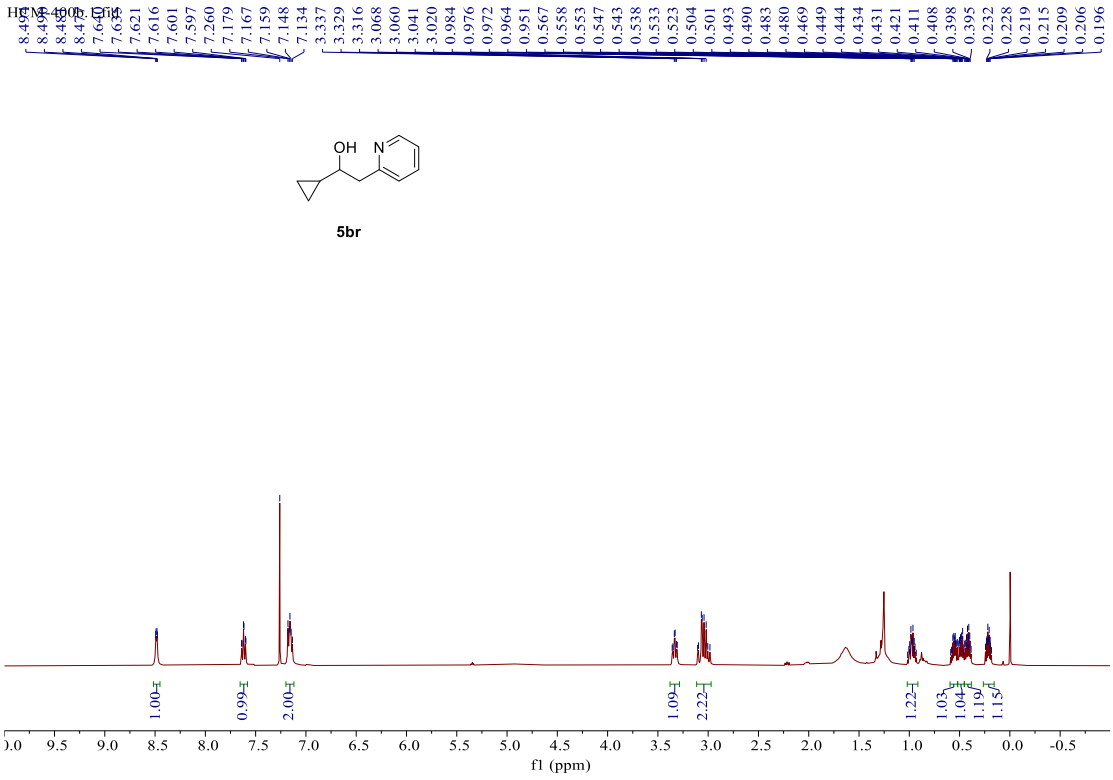

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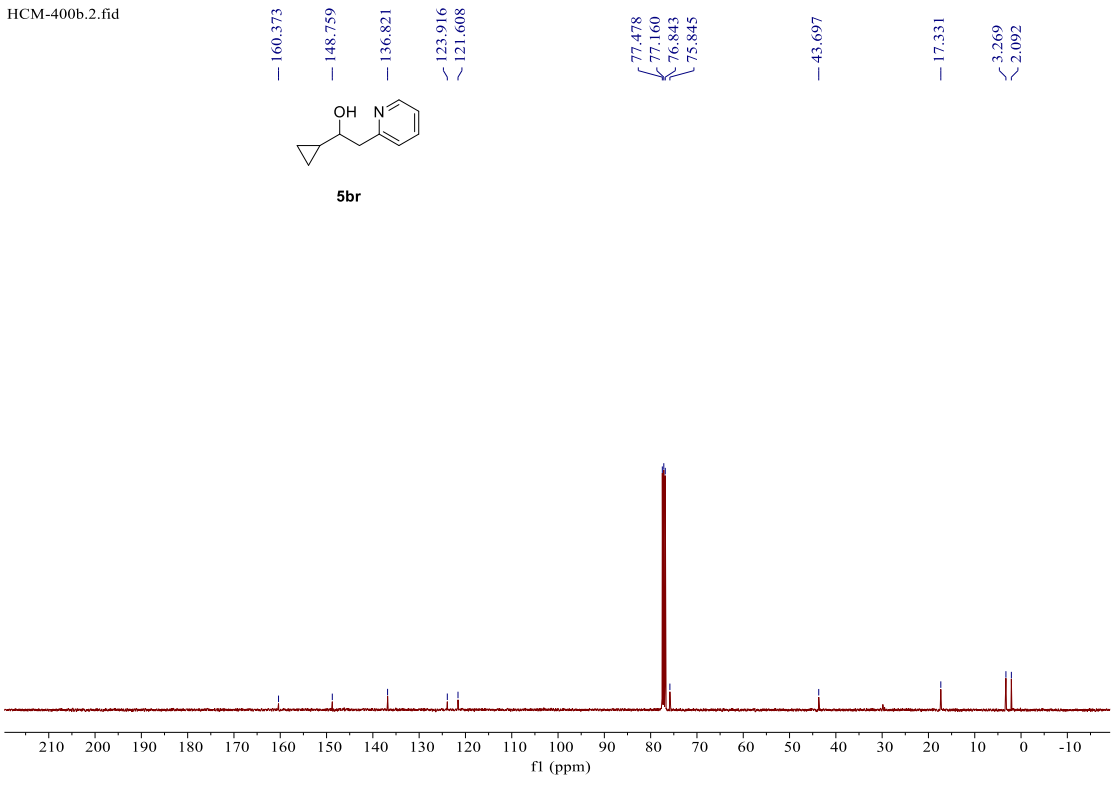

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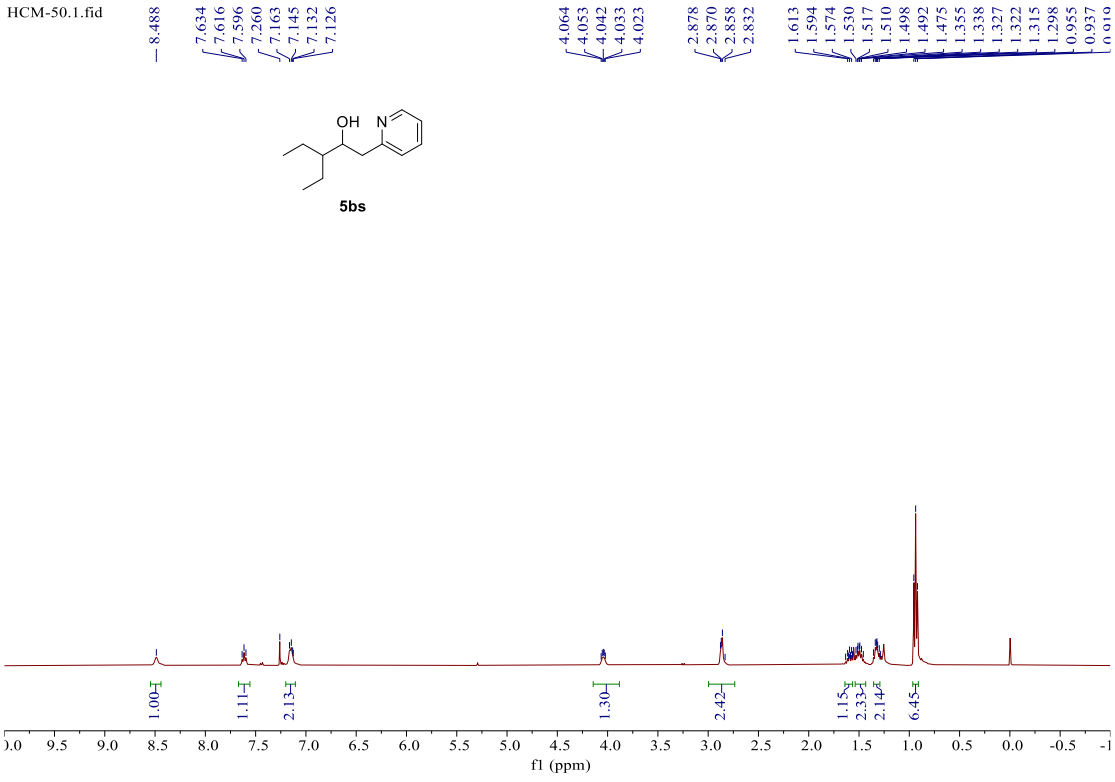
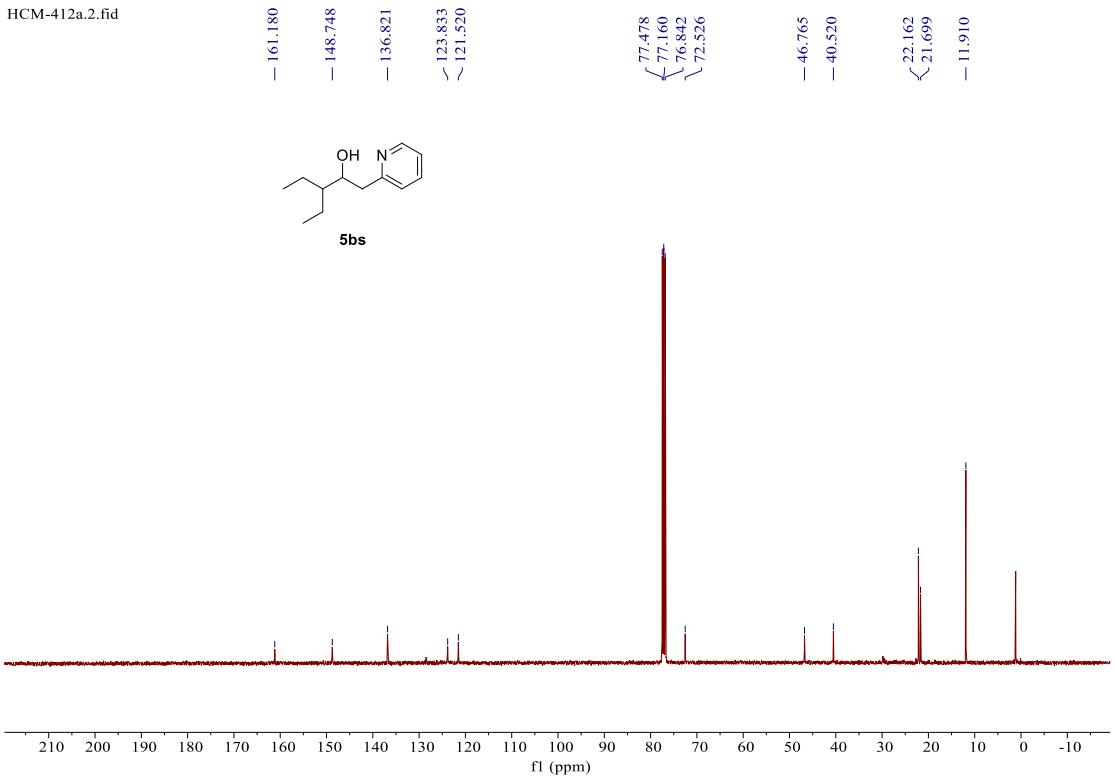
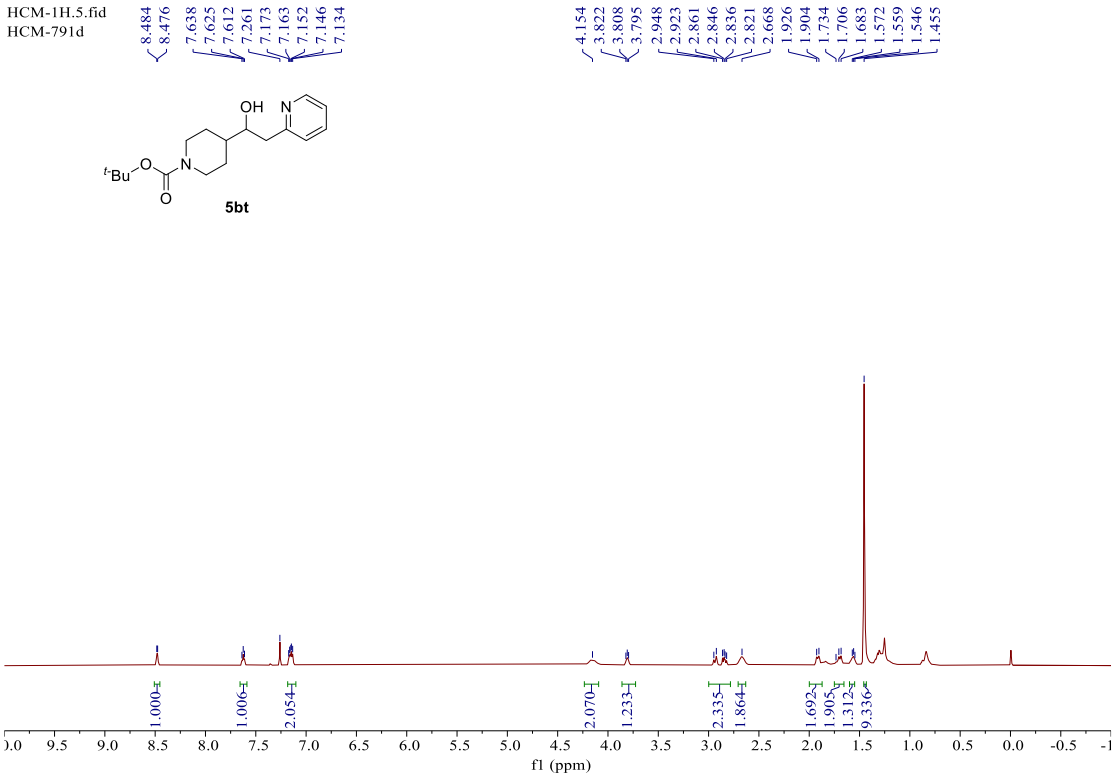


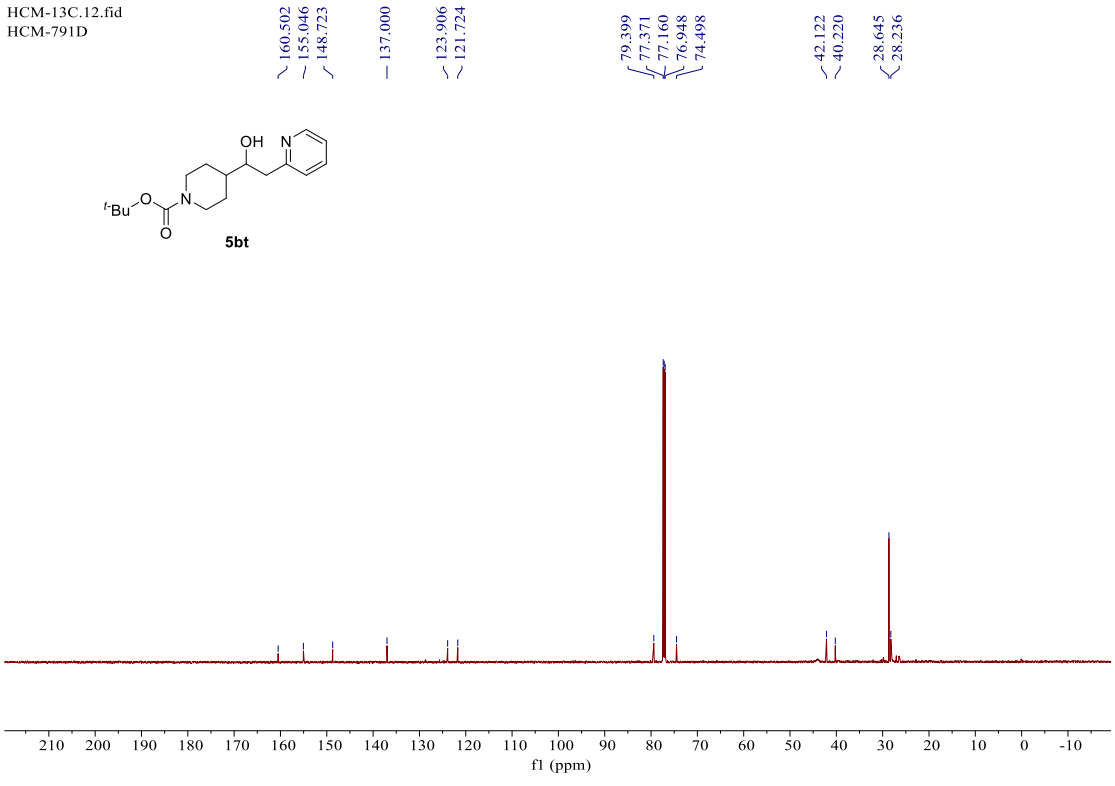
^{13}C NMR ($CDCl_3$) for **5bs**



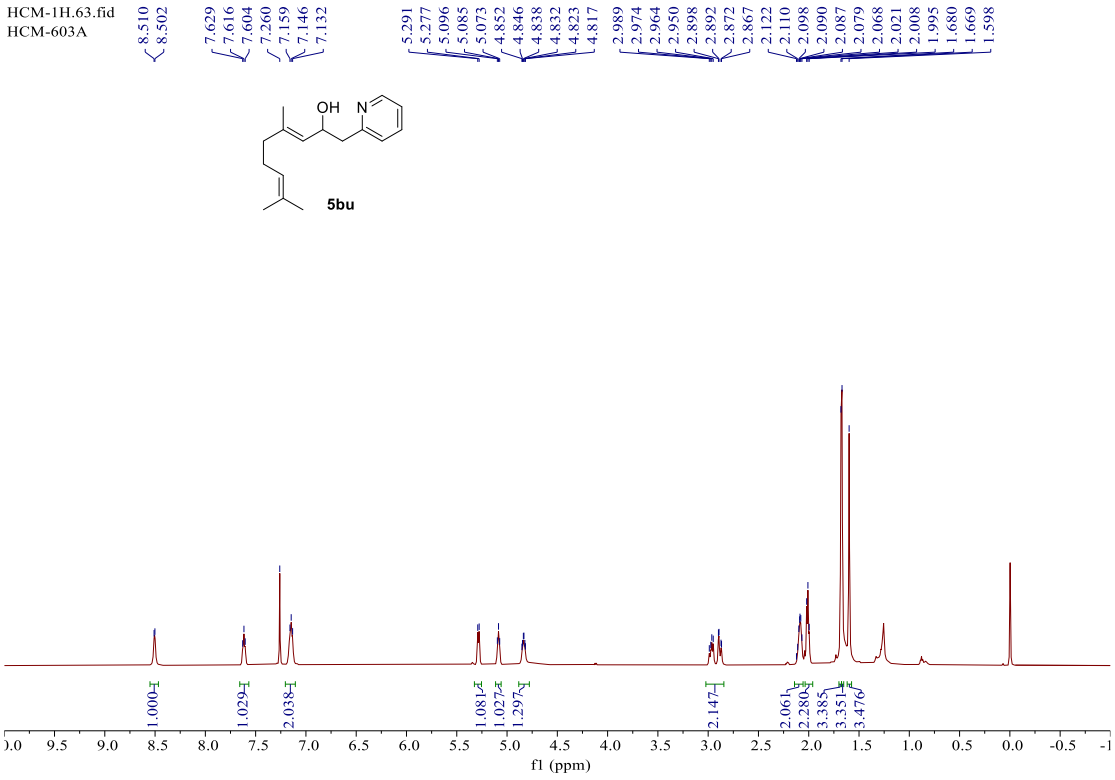
^{1}H NMR ($CDCl_3$) for **5bt**



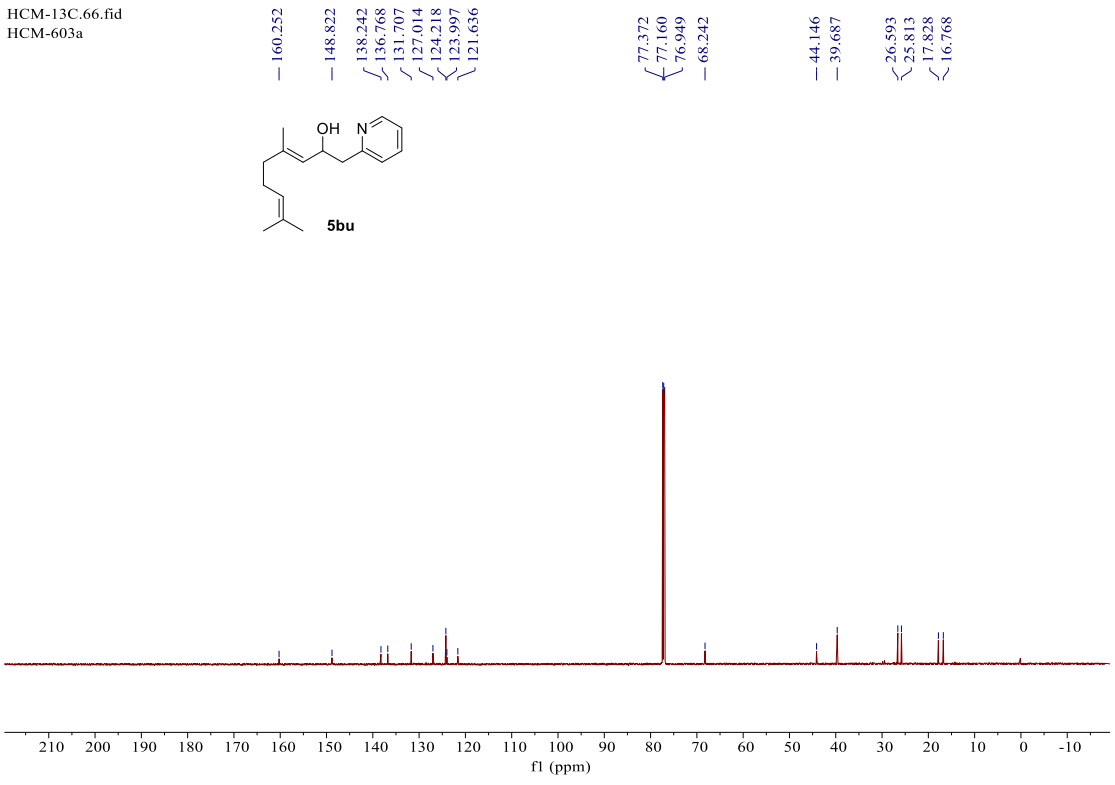
^{1}H NMR ($CDCl_3$) for **5bt**



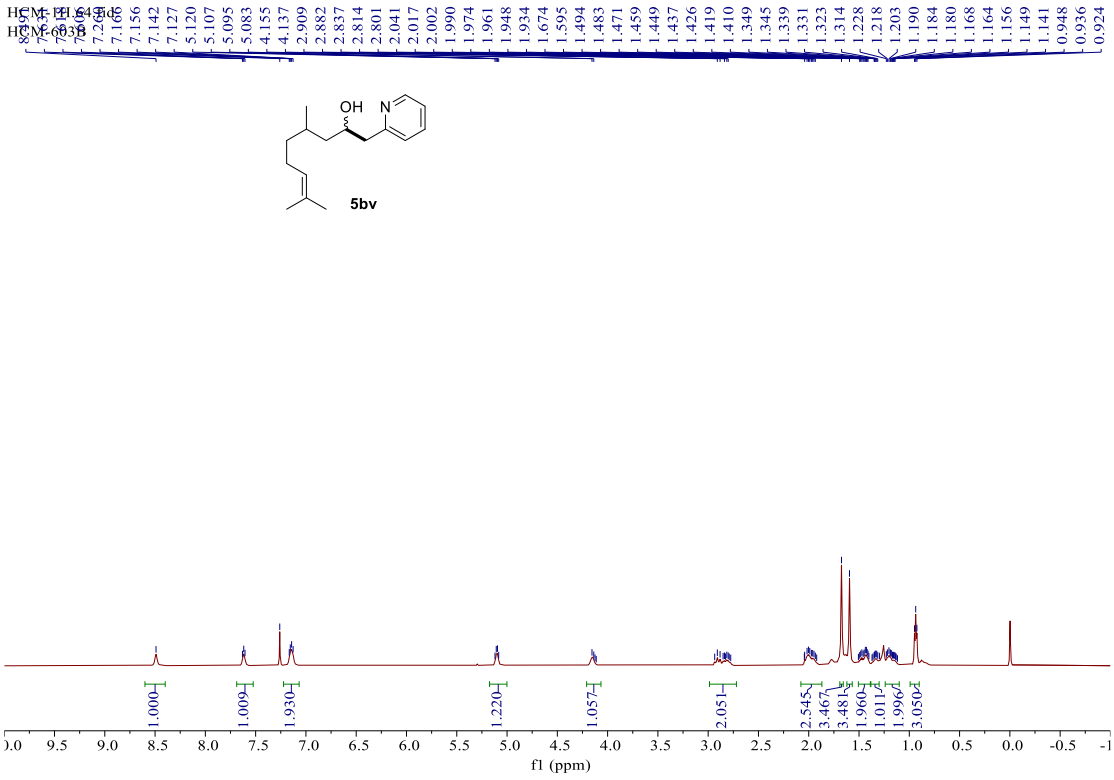
^{1}H NMR ($CDCl_3$) for **5bu**



^{13}C NMR ($CDCl_3$) for **5bu**



^{1}H NMR ($CDCl_3$) for **5bv**



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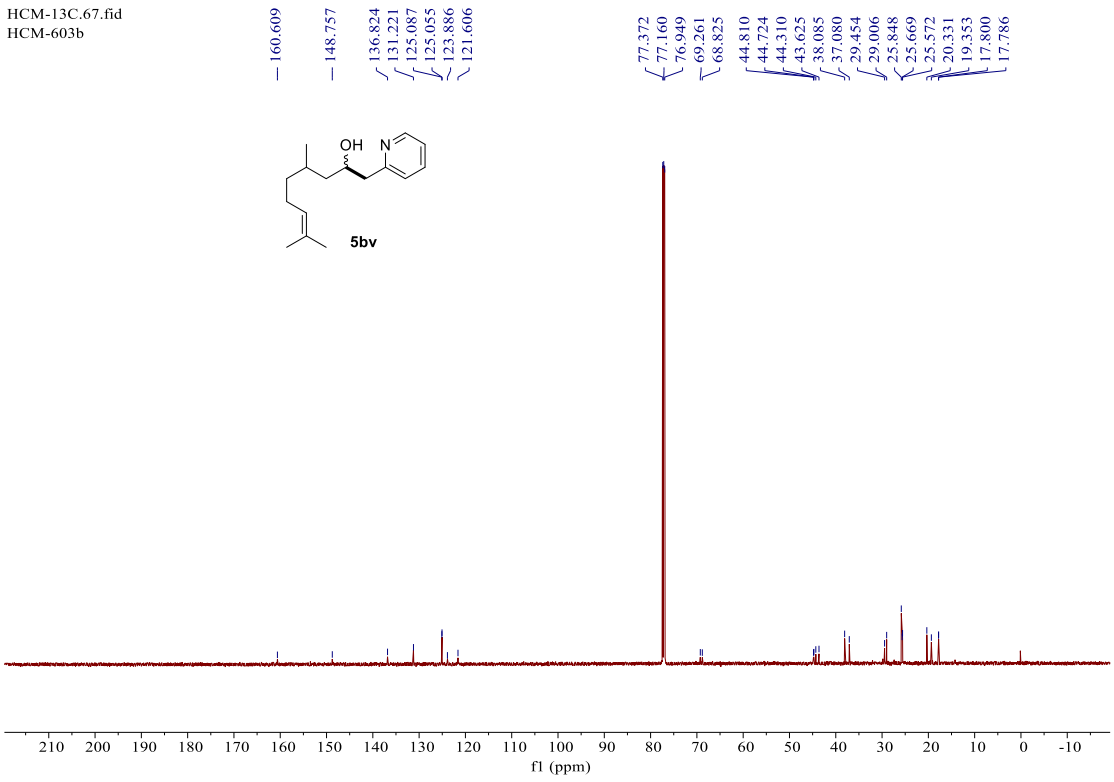
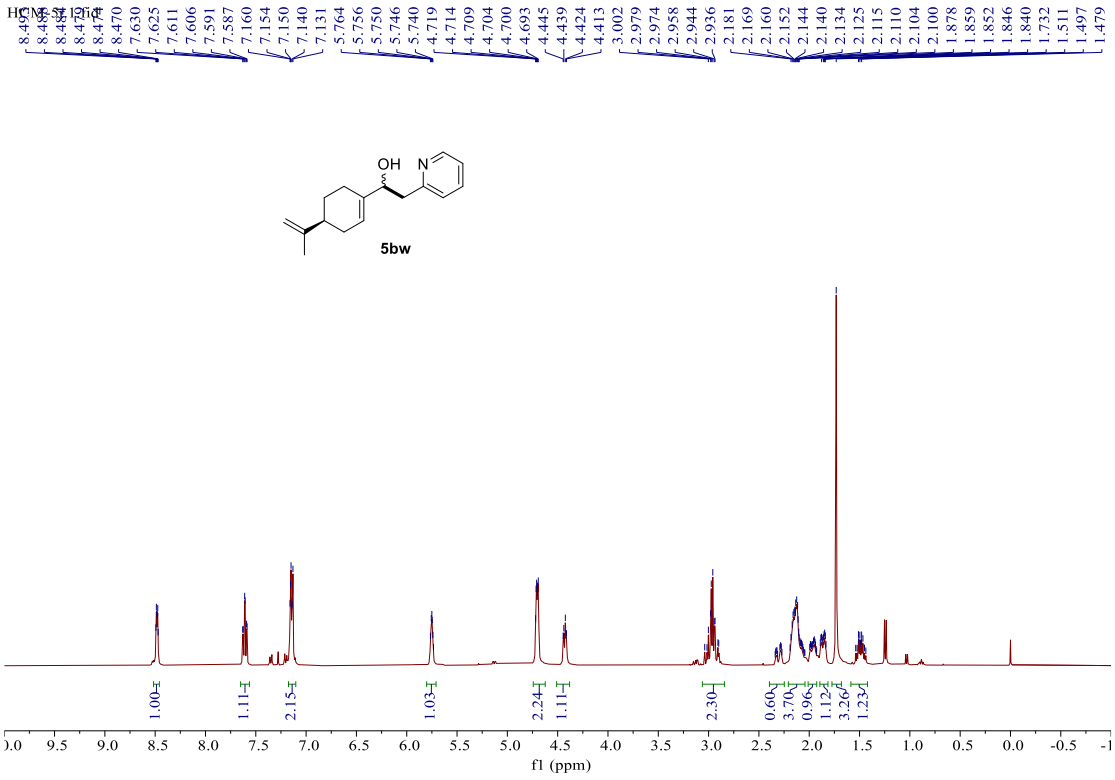
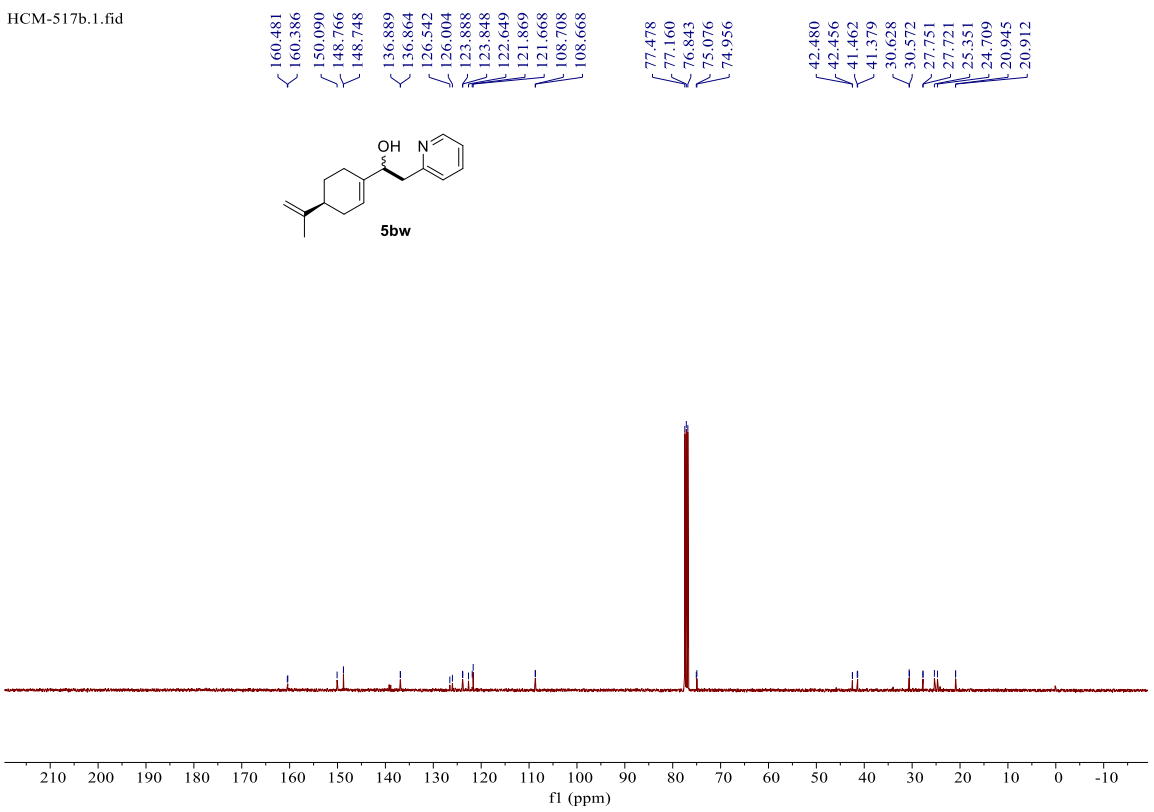


^{1}H NMR ($CDCl_3$) for **5bw**



^{13}C NMR ($CDCl_3$) for **5bw**



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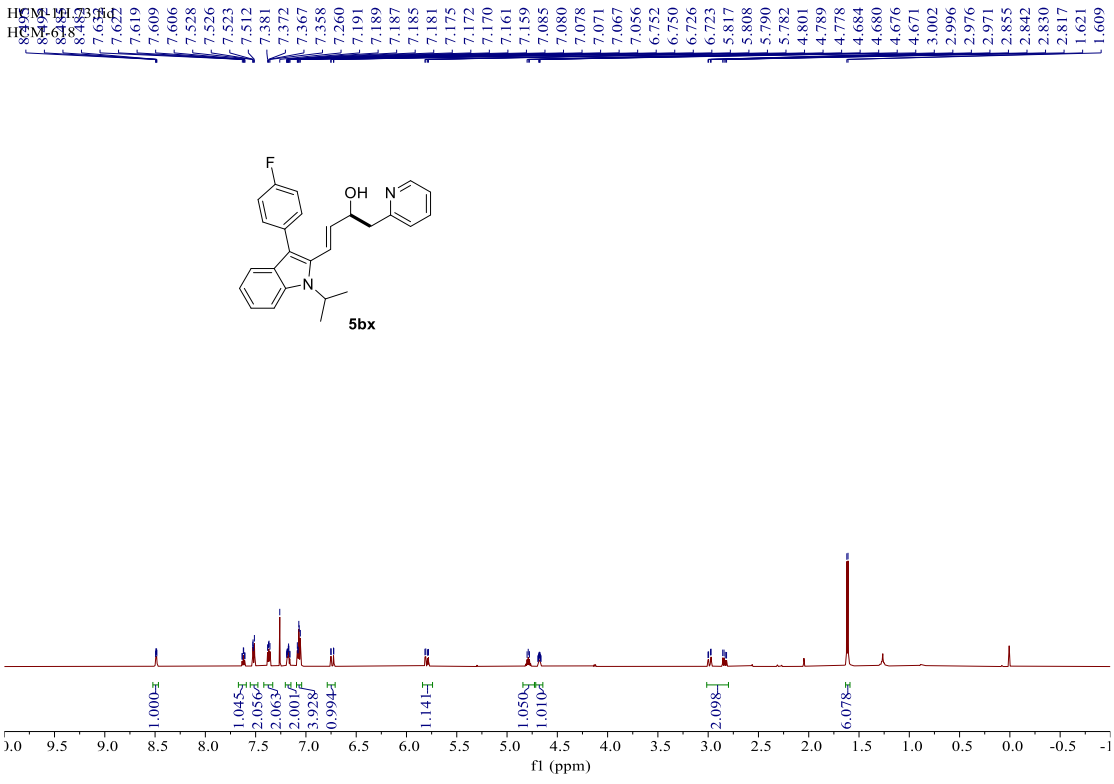
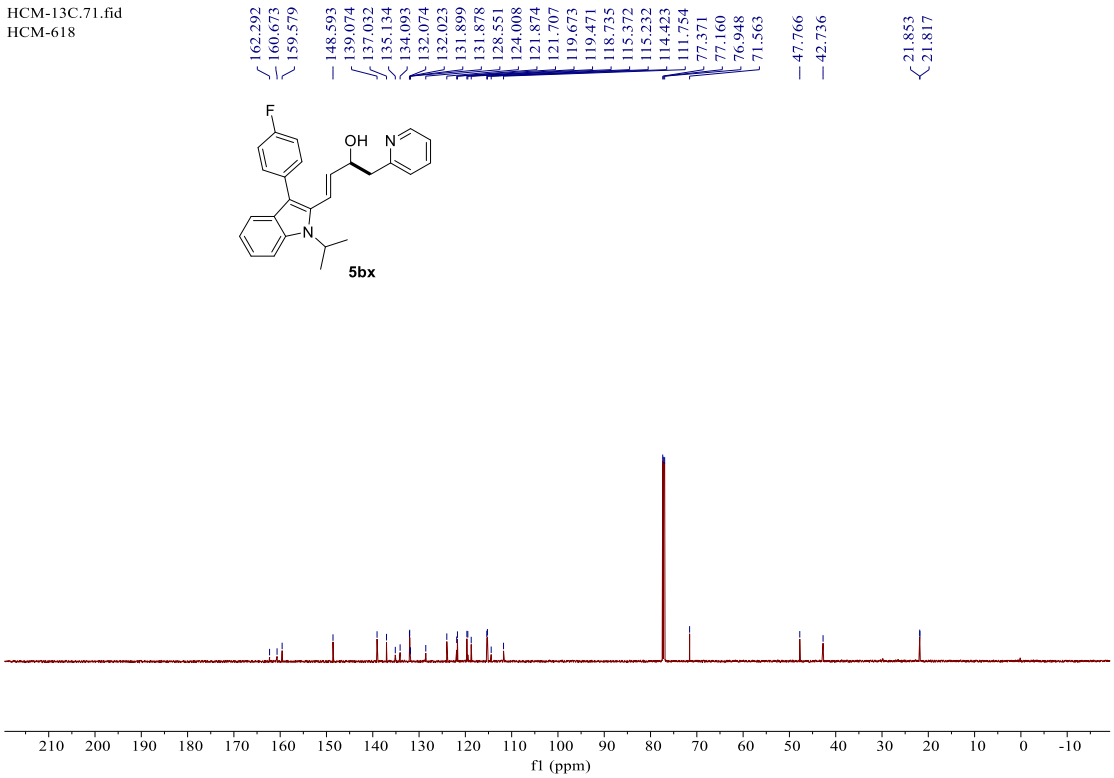


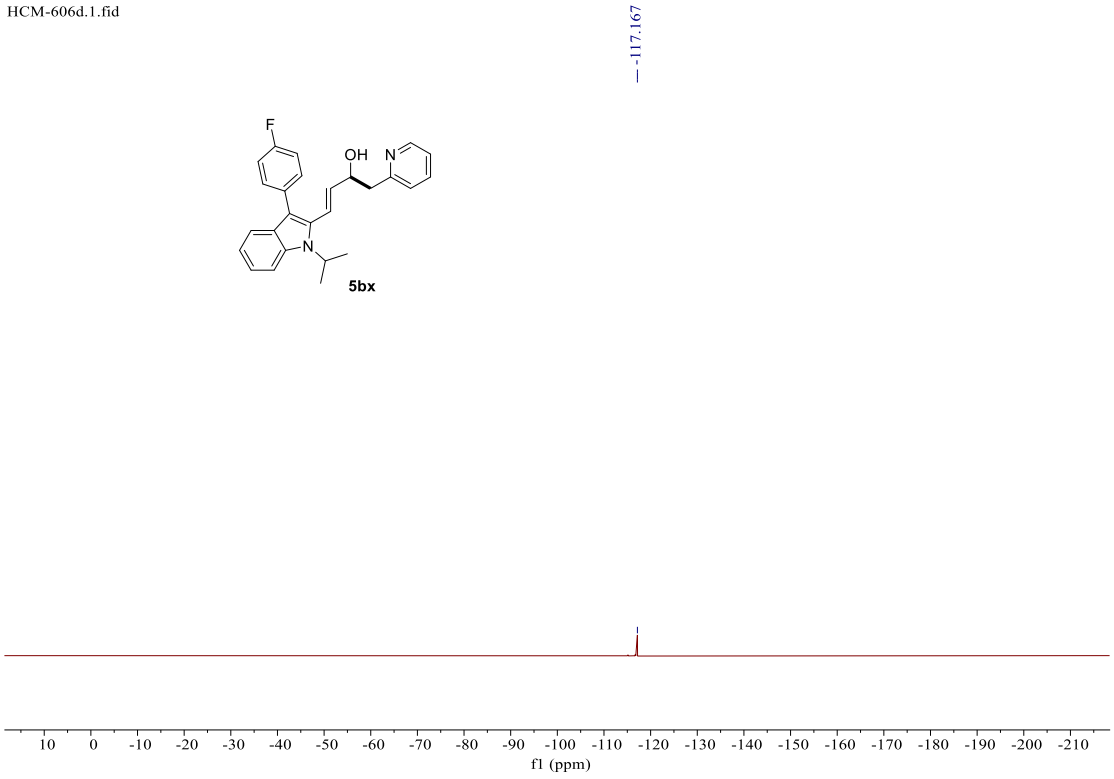
^{13}C NMR ($CDCl_3$) for **5bx**

HCM-13C.71.fid
HCM-618

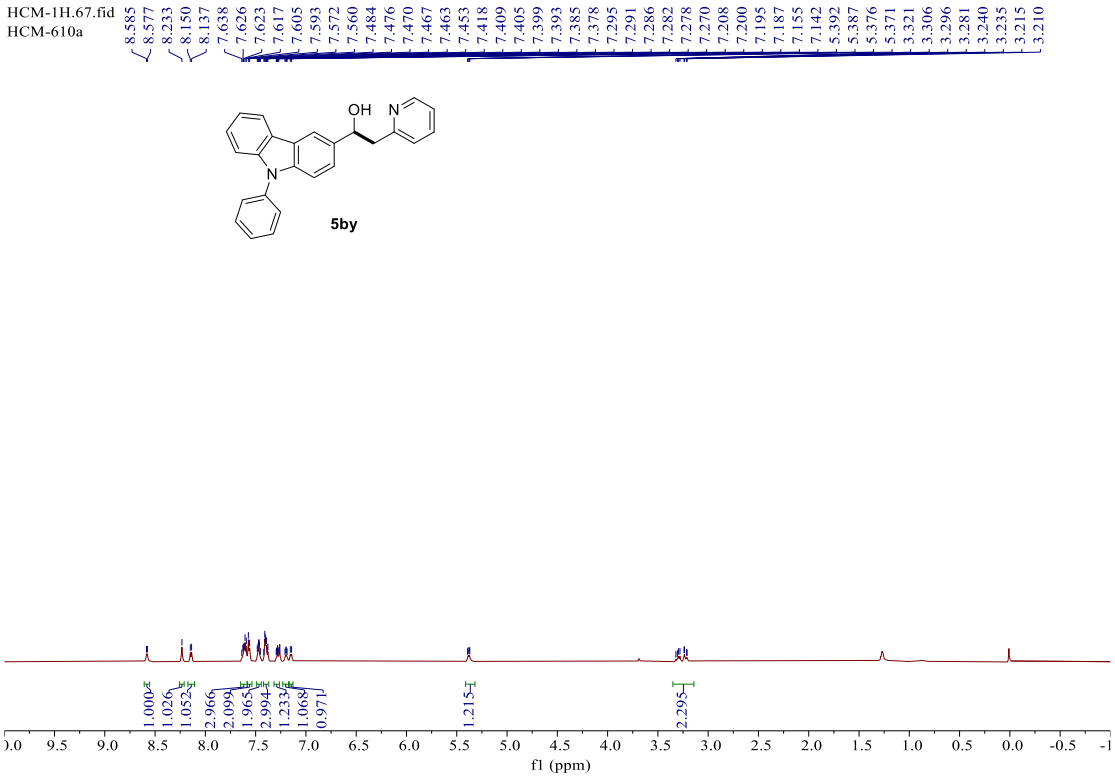


^{19}F NMR ($CDCl_3$) for **5bx**

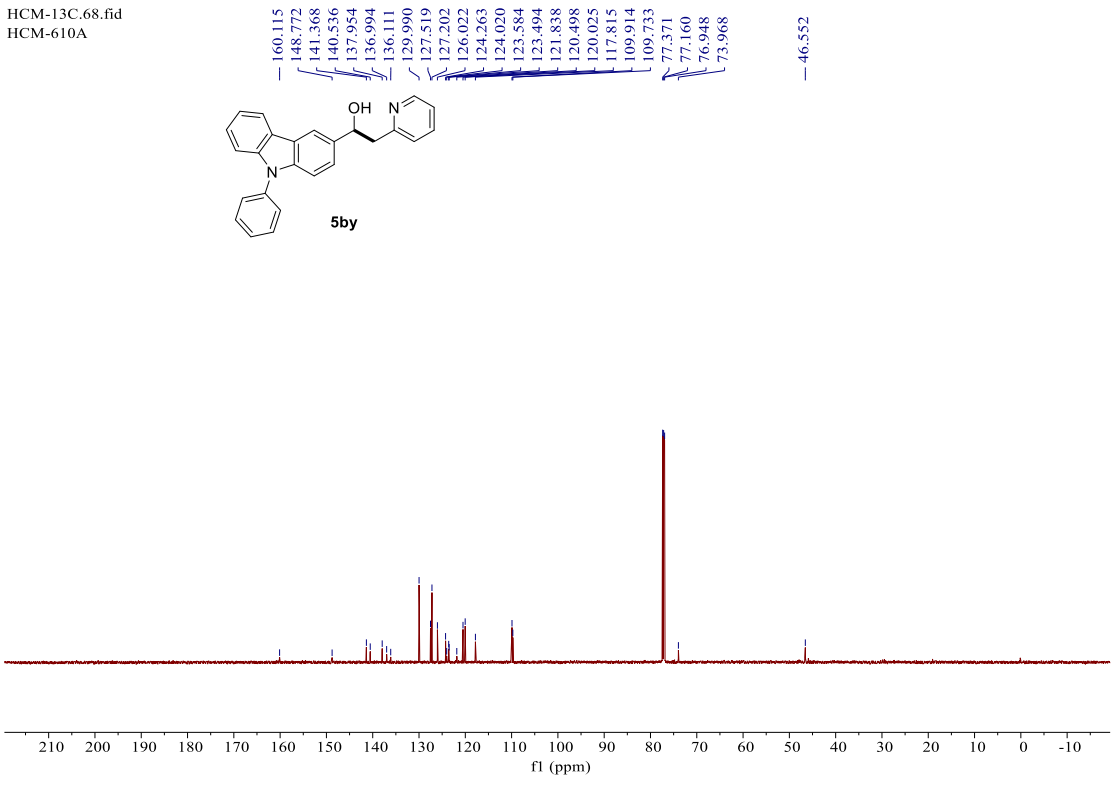
HCM-606d.1.fid



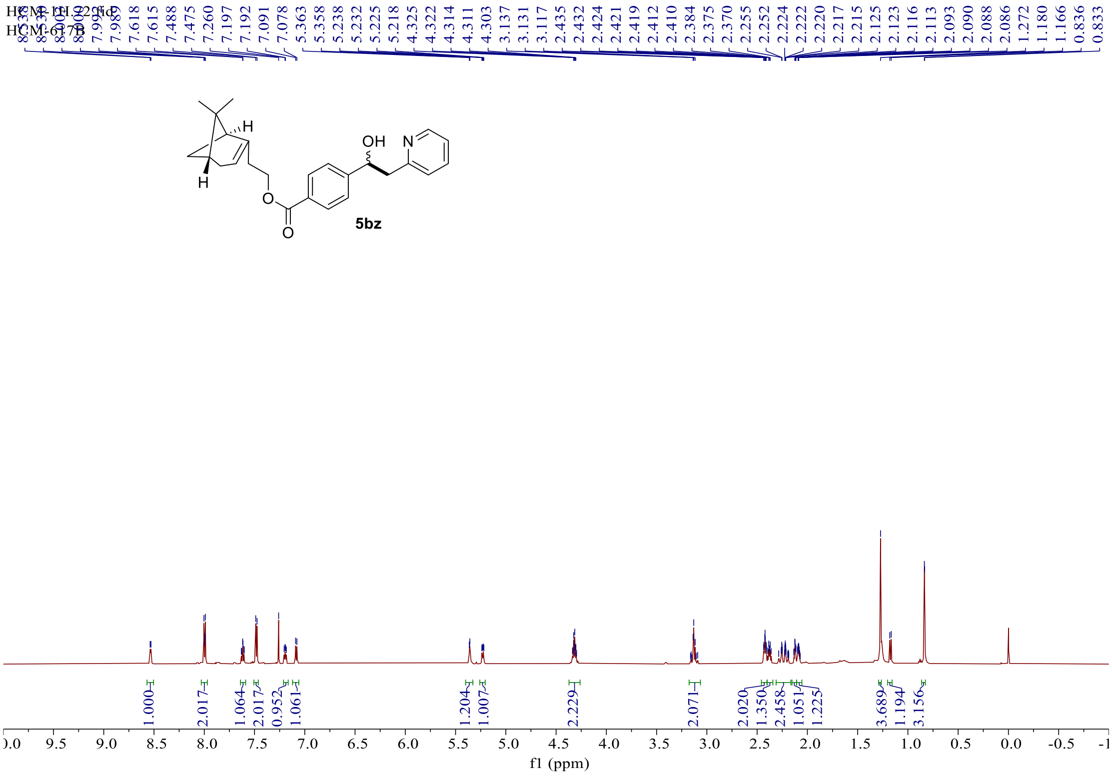
^{1}H NMR ($CDCl_3$) for **5by**



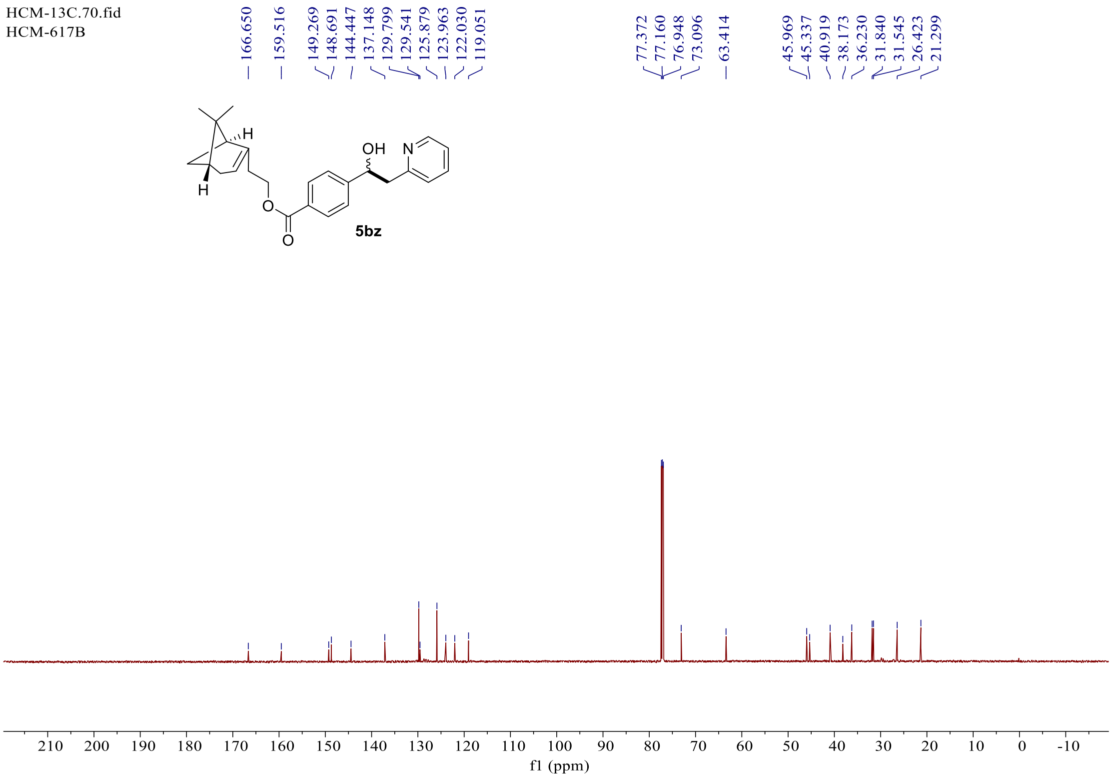
^{13}C NMR ($CDCl_3$) for **5by**



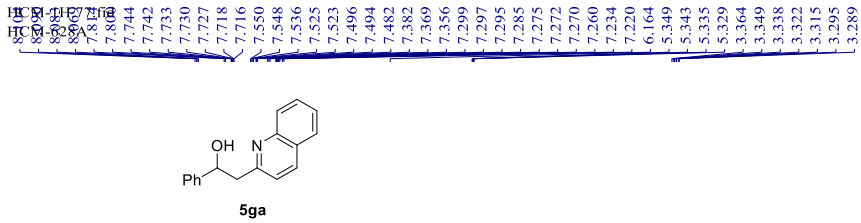
^{1}H NMR ($CDCl_3$) for **5bz**



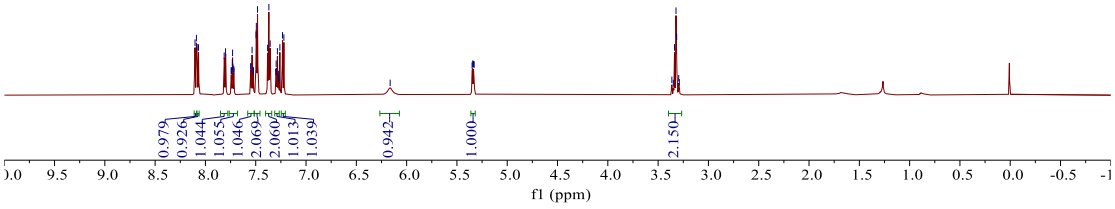
^{13}C NMR ($CDCl_3$) for **5bz**



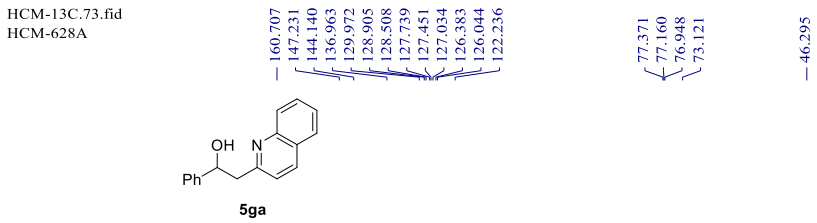
^{1}H NMR ($CDCl_3$) for **5ga**



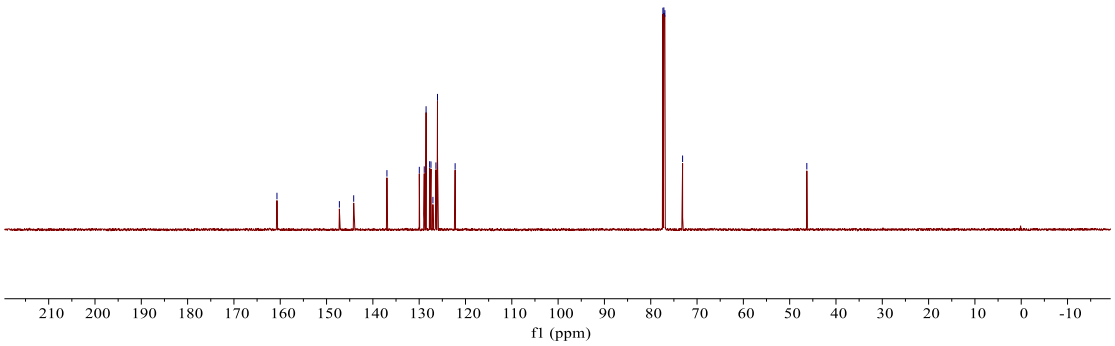
5ga



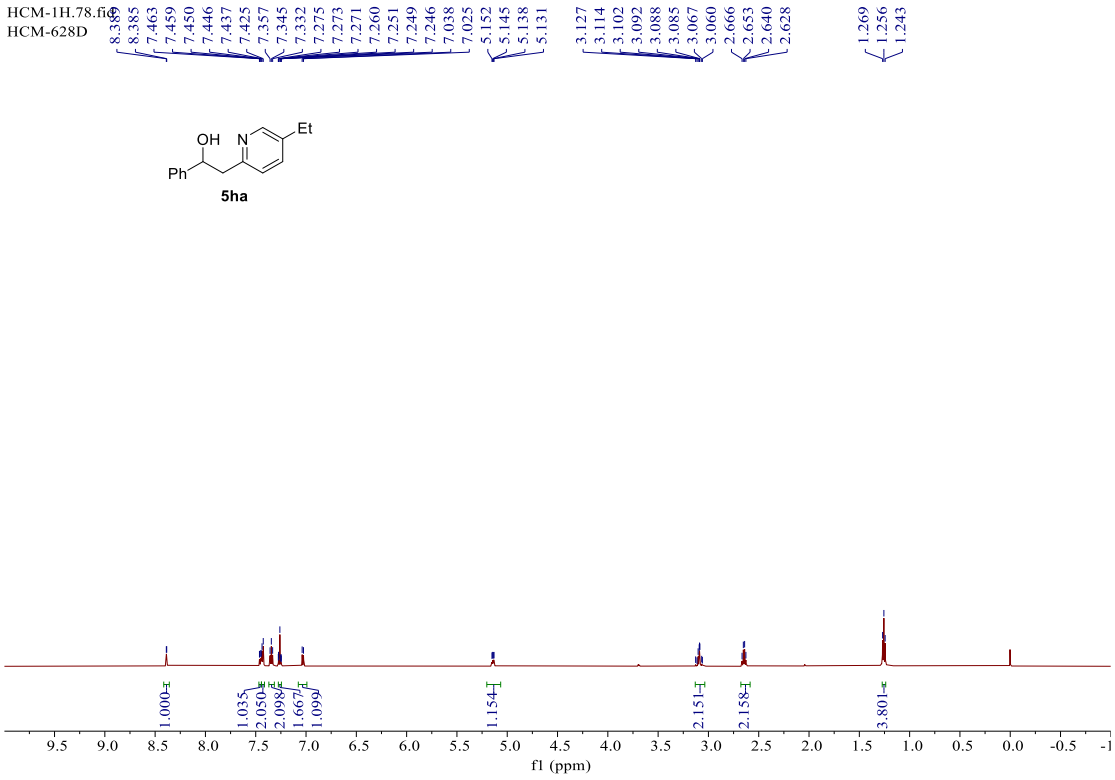
^{13}C NMR ($CDCl_3$) for **5ga**



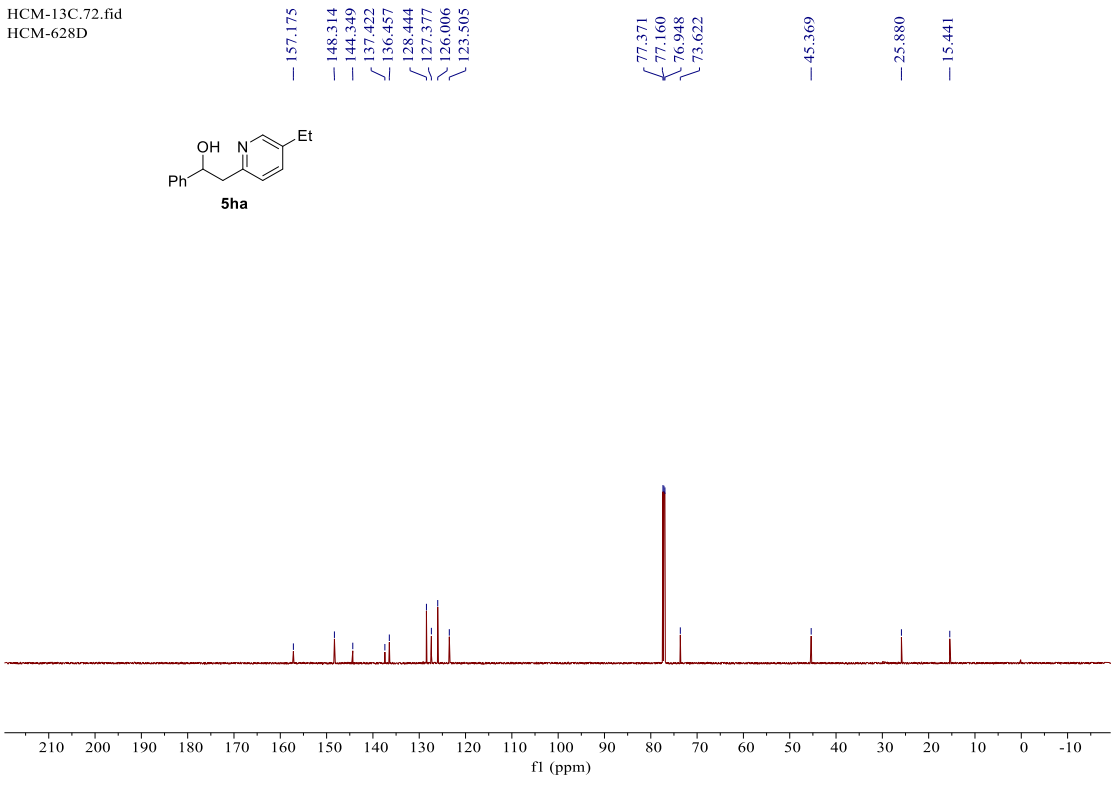
5ga



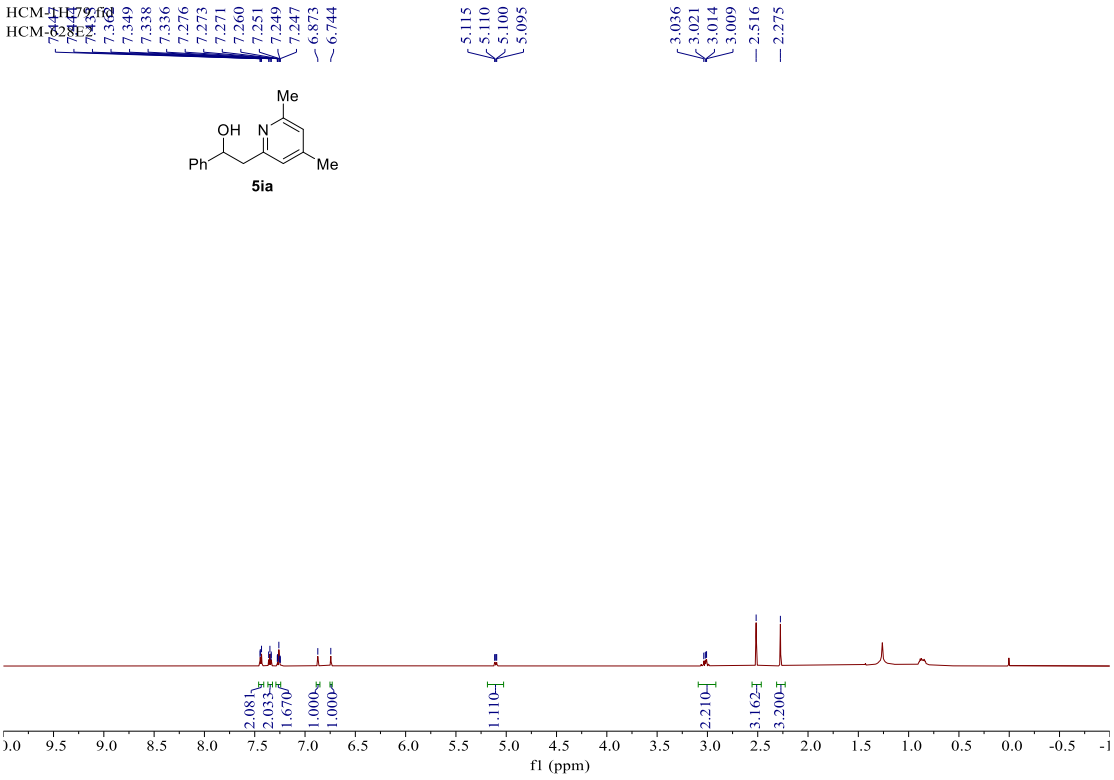
^{1}H NMR ($CDCl_3$) for **5ha**



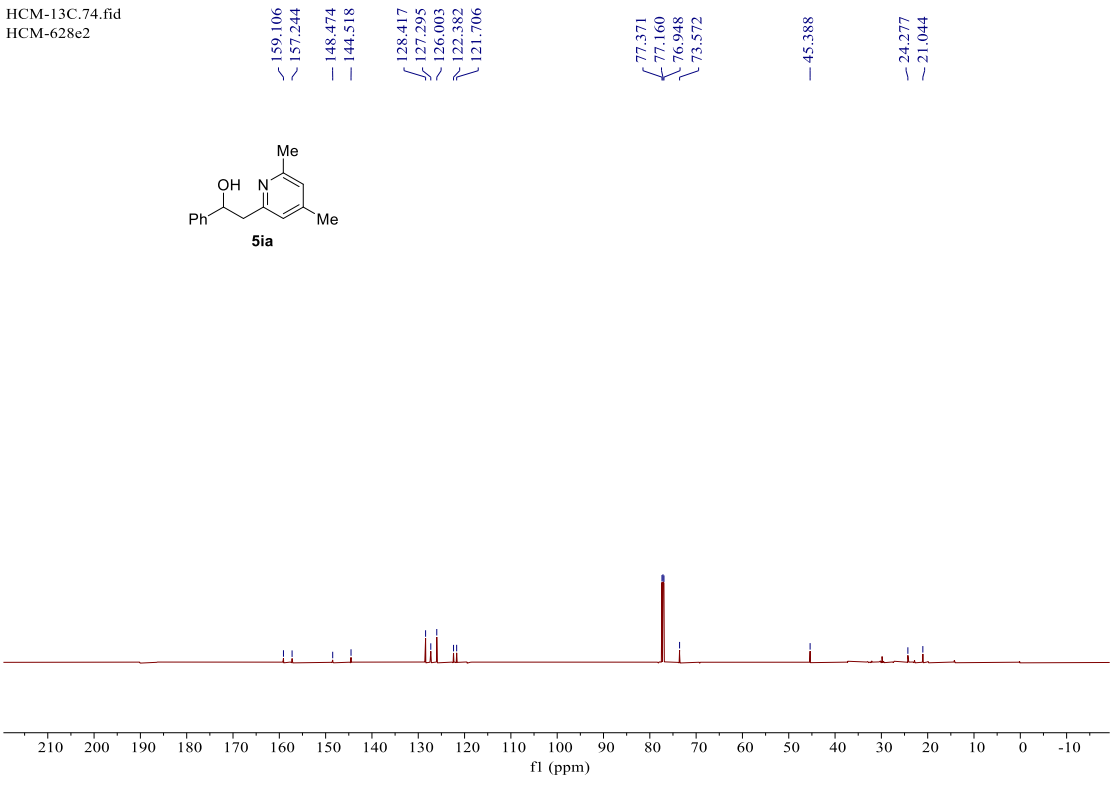
^{13}C NMR ($CDCl_3$) for **5ha**



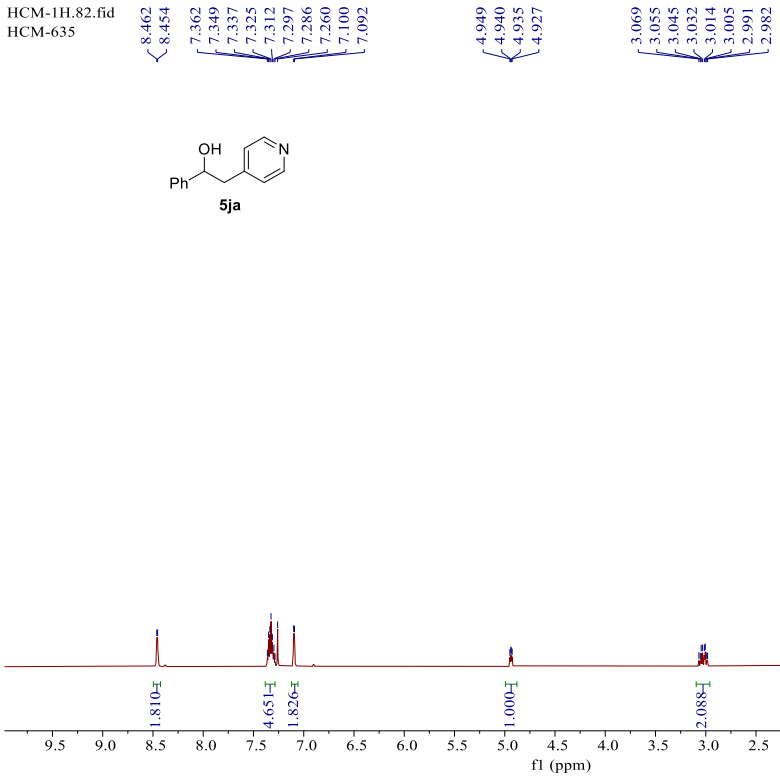
^{1}H NMR ($CDCl_3$) for **5ia**



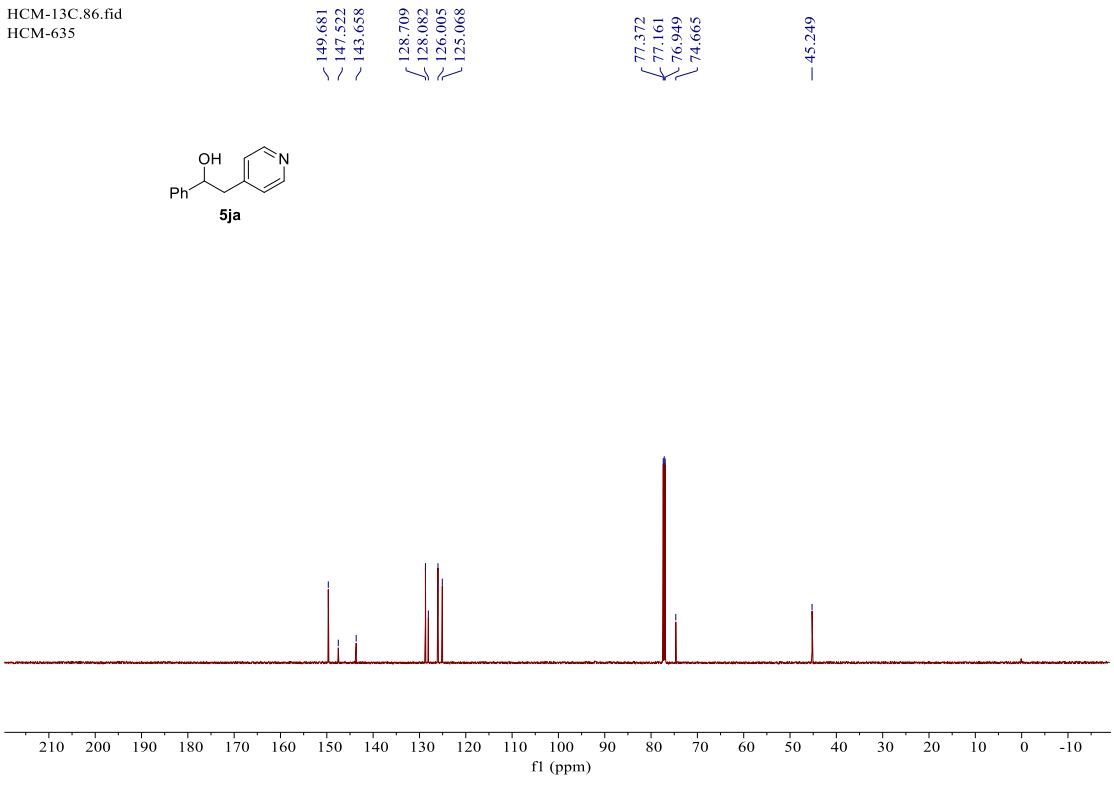
^{13}C NMR ($CDCl_3$) for **5ia**



^{1}H NMR ($CDCl_3$) for **5ja**



^{13}C NMR ($CDCl_3$) for **5ja**



IX. The HRMS for the mixture of mechanism studies (experiment c)

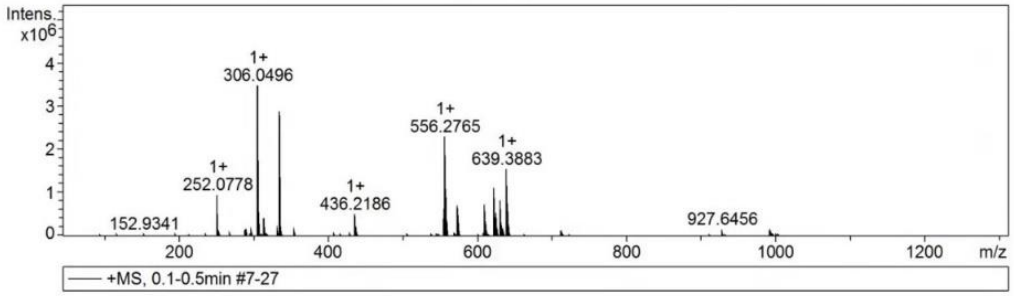
Mass Spectrum List Report

Analysis Info

Analysis Name	D:\Data\2021\guanzhi\20211118\D212.d	Acquisition Date	11/18/2021 10:16:41 AM
Method	DirectInfusion - MS - positive.m	Operator	Demo User
Sample Name		Instrument	impact II 1825265.10221
Comment			

Acquisition Parameter

Source Type	ESI	Ion Polarity	Positive	Set Nebulizer	0.4 Bar
Focus	Not active	Set Capillary	4500 V	Set Dry Heater	180 °C
Scan Begin	50 m/z	Set End Plate Offset	-500 V	Set Dry Gas	4.0 l/min
Scan End	1300 m/z	Set Charging Voltage	2000 V	Set Divert Valve	Source
		Set Corona	0 nA	Set APCI Heater	0 °C



#	m/z	Res.	S/N	I	I %	FWHM
1	94.0643	17759	2004.0	15582	0.4	0.0053
2	94.9287	17428	6127.8	47774	1.4	0.0054
3	96.9264	16691	1113.9	8749	0.3	0.0058
4	104.9624	19350	241.4	1928	0.1	0.0054
5	108.9443	19537	798.5	6467	0.2	0.0056
6	112.0150	19409	262.6	2143	0.1	0.0058
7	112.8947	19839	537.3	4394	0.1	0.0057
8	114.8921	19318	242.0	1990	0.1	0.0059
9	116.9762	19304	6419.0	53132	1.5	0.0061
10	118.9740	14961	748.7	6233	0.2	0.0080
11	132.9038	22159	221.9	1954	0.1	0.0060
12	136.9602	20588	808.3	7262	0.2	0.0067
13	136.9885	20134	370.0	3325	0.1	0.0068
14	138.9184	20396	415.3	3766	0.1	0.0068
15	143.0457	20408	364.4	3406	0.1	0.0070
16	150.1269	21694	307.0	2990	0.1	0.0069
17	150.8950	22602	591.7	5775	0.2	0.0067
18	152.9341	21780	5855.0	57512	1.7	0.0070
19	154.9323	20392	820.9	8181	0.2	0.0076
20	159.0197	21777	236.3	2450	0.1	0.0073
21	171.0408	23084	204.1	2298	0.1	0.0074
22	176.8744	22243	790.2	9446	0.3	0.0080
23	178.8724	21722	169.9	2071	0.1	0.0082
24	196.1112	23502	3717.6	50808	1.5	0.0083
25	197.1145	22761	569.0	7801	0.2	0.0087
26	206.8616	24010	124.5	1884	0.1	0.0086
27	208.9006	23843	755.8	11938	0.3	0.0088
28	210.8984	19834	212.4	3439	0.1	0.0106
29	212.8416	22813	122.5	2011	0.1	0.0093
30	214.1218	23305	1697.6	28032	0.8	0.0092
31	215.1251	23561	271.4	4503	0.1	0.0091
32	221.0355	24802	150.8	2683	0.1	0.0089
33	226.8778	24482	460.3	9328	0.3	0.0093

Mass Spectrum List Report

#	m/z	Res.	S/N	I	I %	FWHM
34	228.8749	20105	86.0	1810	0.1	0.0114
35	234.0672	24095	198.6	4470	0.1	0.0097
36	236.1038	24142	2825.1	64834	1.9	0.0098
37	237.1071	23923	420.2	9760	0.3	0.0099
38	238.0291	24360	338.5	7887	0.2	0.0098
39	242.2835	24726	824.8	19718	0.6	0.0098
40	243.2868	23689	146.0	3530	0.1	0.0103
41	248.8932	25089	76.6	1915	0.1	0.0099
42	250.9322	25174	111.5	2808	0.1	0.0100
43	252.0778	23413	37852.8	955643	27.5	0.0108
44	252.8905	20075	83.8	2113	0.1	0.0126
45	253.0811	23212	5797.0	146236	4.2	0.0109
46	254.0766	21400	2883.1	72692	2.1	0.0119
47	254.1128	13945	128.2	3232	0.1	0.0182
48	255.0794	23283	444.6	11210	0.3	0.0110
49	263.0574	25446	159.6	4218	0.1	0.0103
50	264.8672	25361	253.6	6895	0.2	0.0104
51	265.0729	23941	176.4	4823	0.1	0.0111
52	266.8648	22027	93.4	2645	0.1	0.0121
53	266.9062	25561	323.2	9157	0.3	0.0104
54	268.0937	25402	2536.9	73304	2.1	0.0106
55	268.9046	23605	71.6	2087	0.1	0.0114
56	269.0969	25208	386.4	11265	0.3	0.0107
57	279.1715	25205	166.2	5076	0.1	0.0111
58	281.2385	25437	76.1	2368	0.1	0.0111
59	282.8408	16544	60.6	1930	0.1	0.0171
60	290.0757	24868	4229.4	148394	4.3	0.0117
61	291.0789	24292	660.3	23241	0.7	0.0120
62	292.0805	20265	68.2	2414	0.1	0.0144
63	295.2542	25044	85.0	3123	0.1	0.0118
64	296.2496	25929	810.2	30111	0.9	0.0114
65	297.2335	24924	2650.0	98992	2.8	0.0119
66	298.2370	25111	521.9	19582	0.6	0.0119
67	299.0648	26174	497.7	18729	0.5	0.0114
68	299.2401	24884	52.2	1963	0.1	0.0120
69	300.0681	27316	96.3	3639	0.1	0.0110
70	305.8647	27673	75.9	3096	0.1	0.0111
71	305.9921	8951	122.0	4980	0.1	0.0342
72	306.0496	23978	85214.6	3481012	100.0	0.0128
73	306.1086	15072	401.7	16415	0.5	0.0203
74	306.1279	10067	315.3	12883	0.4	0.0304
75	306.1742	27687	165.4	6756	0.2	0.0111
76	306.1968	25152	1395.7	57027	1.6	0.0122
77	306.8989	18858	98.7	4066	0.1	0.0163
78	307.0530	24349	13433.0	553977	15.9	0.0126
79	307.1652	9794	61.9	2555	0.1	0.0314
80	307.1934	10552	53.8	2221	0.1	0.0291
81	308.0486	21806	6451.8	267929	7.7	0.0141
82	308.0851	20416	661.6	27475	0.8	0.0151
83	308.1398	16896	119.8	4976	0.1	0.0182
84	309.0513	24098	975.0	40581	1.2	0.0128
85	309.0887	19847	119.2	4963	0.1	0.0156
86	310.0540	23820	83.1	3463	0.1	0.0130
87	311.2492	26645	1018.3	42918	1.2	0.0117
88	312.2524	25230	211.3	8999	0.3	0.0124
89	315.0388	25024	9775.6	419497	12.1	0.0126
90	316.0421	26075	1697.7	72965	2.1	0.0121
91	317.0379	21824	752.3	32379	0.9	0.0145
92	317.0748	24673	191.4	8239	0.2	0.0129
93	317.1141	22104	61.5	2648	0.1	0.0143
94	318.0407	24865	132.2	5690	0.2	0.0128
95	319.1664	25275	49.7	2148	0.1	0.0126

Mass Spectrum List Report

#	m/z	Res.	S/N	I	I %	FWHM
96	319.2156	26827	719.6	31099	0.9	0.0119
97	320.2190	25613	135.6	5894	0.2	0.0125
98	322.8727	26805	318.9	14117	0.4	0.0120
99	323.2349	22172	41.1	1827	0.1	0.0146
100	324.0600	25987	64.3	2874	0.1	0.0125
101	324.8714	22792	110.8	4969	0.1	0.0143
102	332.0653	26487	271.8	12827	0.4	0.0125
103	333.0494	26295	2621.5	124719	3.6	0.0127
104	333.1459	20797	84.0	3999	0.1	0.0160
105	333.1737	25265	210.1	10002	0.3	0.0132
106	334.0529	26388	468.2	22450	0.6	0.0127
107	334.1773	24501	45.0	2158	0.1	0.0136
108	334.8724	19304	42.0	2018	0.1	0.0173
109	334.8963	15515	48.6	2337	0.1	0.0216
110	335.0487	16815	272.1	13090	0.4	0.0199
111	335.0839	19310	91.2	4389	0.1	0.0174
112	335.1259	12730	107.1	5151	0.1	0.0263
113	335.1896	24626	60000.8	2886149	82.9	0.0136
114	335.2492	8665	333.6	16049	0.5	0.0387
115	335.2703	10535	264.9	12742	0.4	0.0318
116	335.3441	20125	642.2	30896	0.9	0.0167
117	336.0514	11243	61.8	2981	0.1	0.0299
118	336.1332	15436	41.7	2012	0.1	0.0218
119	336.1930	25278	11984.4	578383	16.6	0.0133
120	336.3440	12217	50.4	2430	0.1	0.0275
121	337.1890	20893	4616.6	222868	6.4	0.0161
122	338.1914	24482	869.1	41981	1.2	0.0138
123	338.2268	16321	71.8	3467	0.1	0.0207
124	339.1944	23736	89.8	4333	0.1	0.0143
125	340.8487	20573	63.1	3040	0.1	0.0166
126	349.1688	26476	207.4	10240	0.3	0.0132
127	350.1721	26612	41.2	2039	0.1	0.0132
128	351.1677	17675	70.1	3478	0.1	0.0199
129	351.1837	24216	149.1	7398	0.2	0.0145
130	355.2868	26850	1973.4	99135	2.8	0.0132
131	356.2900	26132	427.5	21502	0.6	0.0136
132	357.2931	25280	50.0	2517	0.1	0.0141
133	361.1711	27507	126.1	6401	0.2	0.0131
134	363.1694	26253	58.6	2986	0.1	0.0138
135	364.0917	24791	51.0	2603	0.1	0.0147
136	364.9044	28060	44.4	2264	0.1	0.0130
137	366.8626	26642	40.8	2092	0.1	0.0138
138	372.0500	27554	53.9	2805	0.1	0.0135
139	375.1862	26188	339.6	17869	0.5	0.0143
140	376.1896	26138	70.9	3735	0.1	0.0144
141	377.1850	25741	143.2	7548	0.2	0.0147
142	378.8393	25994	52.0	2751	0.1	0.0146
143	380.8377	21648	38.8	2066	0.1	0.0176
144	380.8783	28059	150.0	7982	0.2	0.0136
145	381.1250	24650	67.3	3582	0.1	0.0155
146	381.1950	26426	94.3	5019	0.1	0.0144
147	382.8771	25501	43.9	2363	0.1	0.0150
148	383.2859	26906	39.1	2115	0.1	0.0142
149	384.1870	26731	220.5	11980	0.3	0.0144
150	385.1898	23667	52.4	2863	0.1	0.0163
151	385.3014	26476	57.2	3127	0.1	0.0146
152	386.0818	26305	233.9	12833	0.4	0.0147
153	386.1855	25845	106.3	5831	0.2	0.0149
154	386.2981	22843	65.5	3592	0.1	0.0169
155	387.0852	25135	49.2	2715	0.1	0.0154
156	390.2914	26346	43.4	2437	0.1	0.0148
157	391.1560	26936	95.7	5395	0.2	0.0145

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#	m/z	Res.	S/N	I	I %	FWHM
158	396.3385	28023	46.7	2712	0.1	0.0141
159	396.8146	19956	53.6	3110	0.1	0.0199
160	404.8189	26039	29.5	1745	0.1	0.0155
161	407.1355	27369	42.0	2531	0.1	0.0149
162	408.0968	26700	970.5	58889	1.7	0.0153
163	409.1000	27138	239.5	14626	0.4	0.0151
164	410.0970	21249	86.8	5327	0.2	0.0193
165	410.1248	19702	34.4	2112	0.1	0.0208
166	413.1432	24684	16.9	1055	0.0	0.0167
167	413.2032	24086	10.5	654	0.0	0.0172
168	413.2662	25378	10.3	645	0.0	0.0163
169	417.0930	26785	415.7	26299	0.8	0.0156
170	418.0965	26922	81.4	5180	0.1	0.0155
171	419.0911	28065	356.5	22808	0.7	0.0149
172	420.0944	27126	67.5	4347	0.1	0.0155
173	420.8709	27239	31.2	2018	0.1	0.0155
174	421.0889	25947	84.5	5461	0.2	0.0162
175	424.1225	28003	91.3	6002	0.2	0.0151
176	426.1105	16455	91.5	6091	0.2	0.0259
177	429.2399	27654	855.1	57680	1.7	0.0155
178	430.2432	26677	220.2	14908	0.4	0.0161
179	431.2409	21601	78.8	5362	0.2	0.0200
180	433.1877	27455	55.0	3751	0.1	0.0158
181	436.2186	25916	7327.3	506520	14.6	0.0168
182	436.8449	28499	117.5	8174	0.2	0.0153
183	437.2219	26884	1946.9	135378	3.9	0.0163
184	438.2172	25564	3366.4	235506	6.8	0.0171
185	438.8434	24532	55.0	3864	0.1	0.0179
186	439.2202	26362	852.2	60037	1.7	0.0167
187	440.2234	26810	111.3	7869	0.2	0.0164
188	449.1618	28263	226.8	16394	0.5	0.0159
189	449.2203	20542	40.5	2929	0.1	0.0219
190	449.2358	19516	39.4	2849	0.1	0.0230
191	450.1651	28352	51.0	3709	0.1	0.0159
192	451.1612	24561	35.7	2615	0.1	0.0184
193	454.8208	23008	36.3	2693	0.1	0.0198
194	463.2183	25115	27.5	2075	0.1	0.0184
195	465.2098	19531	40.1	3035	0.1	0.0238
196	466.9205	28986	26.9	2042	0.1	0.0161
197	468.2635	26640	28.3	2157	0.1	0.0176
198	474.3281	27619	85.6	6582	0.2	0.0172
199	475.3313	27429	30.6	2357	0.1	0.0173
200	489.1547	25949	22.0	1748	0.1	0.0189
201	492.2814	27749	55.5	4445	0.1	0.0177
202	494.2800	27802	27.9	2248	0.1	0.0178
203	494.8504	28234	47.7	3845	0.1	0.0175
204	495.3228	25870	21.7	1751	0.1	0.0191
205	499.2245	28179	28.0	2325	0.1	0.0177
206	503.1914	27547	47.7	4128	0.1	0.0183
207	505.1281	27992	41.4	3658	0.1	0.0180
208	506.2195	27781	339.3	30239	0.9	0.0182
209	507.2224	26980	102.5	9244	0.3	0.0188
210	508.2198	21825	35.7	3228	0.1	0.0233
211	510.3495	27835	93.5	8560	0.2	0.0183
212	510.7863	22179	23.2	2127	0.1	0.0230
213	511.3529	27922	33.9	3136	0.1	0.0183
214	519.1653	27531	48.5	4731	0.1	0.0189
215	520.0179	27966	44.5	4373	0.1	0.0186
216	522.0165	27148	24.4	2427	0.1	0.0192
217	523.1041	24027	22.5	2243	0.1	0.0218
218	532.3314	29292	192.7	19706	0.6	0.0182
219	533.3349	27935	67.7	6943	0.2	0.0191

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#	m/z	Res.	S/N	I	I %	FWHM
220	534.8429	29111	17.4	1795	0.1	0.0184
221	535.1287	27003	19.0	1953	0.1	0.0198
222	538.2658	28860	340.7	35332	1.0	0.0187
223	539.2690	28212	118.1	12263	0.4	0.0191
224	540.2647	27529	164.8	17165	0.5	0.0196
225	541.2675	27916	56.5	5895	0.2	0.0194
226	542.1235	27872	27.0	2822	0.1	0.0195
227	542.2676	20740	16.6	1743	0.1	0.0261
228	546.3107	27764	261.1	27596	0.8	0.0197
229	547.3141	28255	94.3	9981	0.3	0.0194
230	548.3058	27222	309.4	32854	0.9	0.0201
231	549.3089	28881	111.0	11815	0.3	0.0190
232	550.3077	23352	36.6	3904	0.1	0.0236
233	550.8172	29114	36.0	3841	0.1	0.0189
234	552.8157	26214	23.1	2480	0.1	0.0211
235	554.2607	27166	42.3	4562	0.1	0.0204
236	555.2603	22369	28.5	3075	0.1	0.0248
237	555.8169	20293	17.6	1898	0.1	0.0274
238	555.8989	24871	19.0	2049	0.1	0.0224
239	556.0099	20254	25.3	2733	0.1	0.0275
240	556.1684	19069	38.6	4174	0.1	0.0292
241	556.2765	27371	21236.2	2295032	65.9	0.0203
242	556.3809	13572	206.9	22360	0.6	0.0410
243	556.4751	20043	237.9	25706	0.7	0.0278
244	556.9334	19143	16.5	1783	0.1	0.0291
245	557.0517	24897	17.3	1874	0.1	0.0224
246	557.0807	24898	17.5	1894	0.1	0.0224
247	557.1047	24898	16.7	1814	0.1	0.0224
248	557.1635	25250	133.7	14495	0.4	0.0221
249	557.2799	27448	7462.4	808855	23.2	0.0203
250	557.4769	8790	35.9	3890	0.1	0.0634
251	557.6104	13587	17.7	1914	0.1	0.0410
252	557.6447	24910	17.8	1924	0.1	0.0224
253	557.6914	24911	17.1	1852	0.1	0.0224
254	557.7379	18685	18.8	2041	0.1	0.0298
255	557.7610	13082	16.9	1830	0.1	0.0426
256	557.8138	26276	19.7	2135	0.1	0.0212
257	557.8551	24915	19.1	2067	0.1	0.0224
258	557.9233	12458	20.6	2233	0.1	0.0448
259	557.9618	25354	21.5	2327	0.1	0.0220
260	558.0625	24919	23.4	2536	0.1	0.0224
261	558.0931	37380	23.5	2549	0.1	0.0149
262	558.1170	14952	22.4	2431	0.1	0.0373
263	558.1670	17156	60.8	6586	0.2	0.0325
264	558.2756	25866	10166.1	1101827	31.7	0.0216
265	558.4718	18697	53.8	5825	0.2	0.0299
266	559.1690	15585	20.4	2204	0.1	0.0359
267	559.2783	27264	3364.5	363741	10.4	0.0205
268	560.2813	28285	571.6	61691	1.8	0.0198
269	561.2851	24891	70.9	7654	0.2	0.0225
270	563.1340	27798	36.0	3891	0.1	0.0203
271	563.3175	26226	18.4	1984	0.1	0.0215
272	564.3216	26520	19.9	2152	0.1	0.0213
273	566.1523	25737	16.9	1830	0.1	0.0220
274	568.7930	24074	19.9	2177	0.1	0.0236
275	569.2716	29279	598.1	65313	1.9	0.0194
276	569.4329	24512	17.5	1909	0.1	0.0232
277	570.2749	28673	212.8	23368	0.7	0.0199
278	571.2706	26787	286.5	31639	0.9	0.0213
279	572.2733	27320	104.2	11591	0.3	0.0209
280	572.4509	26991	22.9	2545	0.1	0.0212
281	573.1373	28992	376.7	42004	1.2	0.0198

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#	m/z	Res.	S/N	I	I %	FWHM
282	573.2759	20297	24.4	2718	0.1	0.0282
283	574.1407	28869	129.5	14416	0.4	0.0199
284	574.4667	27556	6421.2	714721	20.5	0.0208
285	575.1389	22375	48.4	5386	0.2	0.0257
286	575.4700	28213	2543.5	282484	8.1	0.0204
287	576.1401	18240	15.8	1755	0.1	0.0316
288	576.4734	28950	477.2	52909	1.5	0.0199
289	577.4766	29487	63.9	7082	0.2	0.0196
290	582.1266	28568	61.6	6941	0.2	0.0204
291	583.1296	27465	21.9	2488	0.1	0.0212
292	583.3237	30251	21.9	2487	0.1	0.0193
293	586.3035	29522	116.7	13523	0.4	0.0199
294	587.3066	28445	42.9	4997	0.1	0.0206
295	589.1008	28082	30.0	3517	0.1	0.0210
296	591.0571	25567	30.6	3614	0.1	0.0231
297	591.1019	22382	15.3	1807	0.1	0.0264
298	592.4771	29016	18.8	2225	0.1	0.0204
299	593.0558	23734	16.7	1983	0.1	0.0250
300	593.4617	25856	57.5	6840	0.2	0.0230
301	594.4648	27546	22.7	2714	0.1	0.0216
302	596.0954	29068	19.7	2365	0.1	0.0205
303	602.2775	29451	219.7	26940	0.8	0.0205
304	603.2808	28436	78.5	9636	0.3	0.0212
305	604.2799	23756	27.9	3428	0.1	0.0254
306	608.8226	28342	24.9	3118	0.1	0.0215
307	609.2659	29415	458.8	57379	1.6	0.0207
308	610.2485	27340	5793.8	724334	20.8	0.0223
309	610.5149	12918	14.8	1855	0.1	0.0473
310	610.8216	18430	15.3	1911	0.1	0.0331
311	611.2526	25947	2110.3	263731	7.6	0.0236
312	612.2477	26379	2834.8	353828	10.2	0.0232
313	613.2503	28205	931.1	116273	3.3	0.0217
314	614.2533	27682	156.3	19512	0.6	0.0222
315	614.3371	13393	15.6	1952	0.1	0.0459
316	615.2563	26436	20.3	2534	0.1	0.0233
317	615.4434	29756	213.3	26677	0.8	0.0207
318	616.4467	30090	84.7	10600	0.3	0.0205
319	617.4500	28369	18.4	2304	0.1	0.0218
320	618.0776	29035	20.9	2617	0.1	0.0213
321	618.2413	26659	17.7	2213	0.1	0.0232
322	620.1917	28486	18.7	2357	0.1	0.0218
323	621.3775	28817	33.3	4203	0.1	0.0216
324	622.3812	26611	13.8	1745	0.1	0.0234
325	623.1961	27430	14.8	1884	0.1	0.0227
326	623.2443	29022	17.5	2222	0.1	0.0215
327	623.2696	10794	15.9	2022	0.1	0.0577
328	623.3934	27716	8794.9	1117308	32.1	0.0225
329	623.6019	19570	48.3	6143	0.2	0.0319
330	623.6676	13600	21.7	2760	0.1	0.0459
331	624.3968	28056	3477.3	440889	12.7	0.0223
332	624.7584	13033	18.4	2331	0.1	0.0479
333	625.2363	13417	17.6	2232	0.1	0.0466
334	625.3927	26101	4301.5	544613	15.6	0.0240
335	625.6666	9784	14.0	1769	0.1	0.0639
336	626.3953	28099	1587.1	200630	5.8	0.0223
337	627.3984	29436	295.1	37256	1.1	0.0213
338	628.4016	27021	37.1	4678	0.1	0.0233
339	629.4018	26622	44.4	5610	0.2	0.0236
340	630.2092	27481	13.9	1754	0.1	0.0229
341	630.4048	26195	18.3	2308	0.1	0.0241
342	631.4173	27655	6642.8	838854	24.1	0.0228
343	631.6941	11385	15.8	1996	0.1	0.0555

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#	m/z	Res.	S/N	I	I %	FWHM
344	632.0280	18991	17.7	2228	0.1	0.0333
345	632.2092	13211	15.7	1980	0.1	0.0479
346	632.4208	28122	2643.2	333469	9.6	0.0225
347	633.4203	25061	884.0	111298	3.2	0.0253
348	634.0515	29057	1491.6	187770	5.4	0.0218
349	634.4210	25698	236.0	29671	0.9	0.0247
350	635.0547	29379	452.3	56848	1.6	0.0216
351	635.4233	25377	44.2	5554	0.2	0.0250
352	636.0503	27632	789.6	99116	2.8	0.0230
353	636.2634	22754	18.6	2334	0.1	0.0280
354	637.0532	28481	240.1	30126	0.9	0.0224
355	637.3724	28304	60.5	7593	0.2	0.0225
356	638.0518	24759	78.1	9802	0.3	0.0258
357	638.3757	25368	25.3	3175	0.1	0.0252
358	638.5196	23060	19.1	2396	0.1	0.0277
359	639.0541	16767	31.4	3939	0.1	0.0381
360	639.1930	13335	19.7	2465	0.1	0.0479
361	639.2640	19992	25.0	3132	0.1	0.0320
362	639.3883	27786	12353.3	1548990	44.5	0.0230
363	639.5997	15881	83.1	10418	0.3	0.0403
364	639.6705	10159	28.3	3548	0.1	0.0630
365	640.2668	26692	14.0	1758	0.1	0.0240
366	640.3917	28078	4861.1	609410	17.5	0.0228
367	640.6728	20025	18.7	2339	0.1	0.0320
368	641.0701	26709	14.2	1781	0.1	0.0240
369	641.0991	26709	14.3	1797	0.1	0.0240
370	641.1465	26710	15.0	1880	0.1	0.0240
371	641.2638	20361	17.7	2215	0.1	0.0315
372	641.3877	26395	6119.9	767544	22.0	0.0243
373	641.6730	8607	19.4	2438	0.1	0.0746
374	642.3903	27816	2181.6	273637	7.9	0.0231
375	643.3934	29963	418.5	52462	1.5	0.0215
376	644.3965	26977	53.9	6751	0.2	0.0239
377	645.3968	28491	40.6	5090	0.1	0.0227
378	646.4005	23411	14.6	1830	0.1	0.0276
379	647.4106	25401	27.7	3476	0.1	0.0255
380	648.2045	28813	97.4	12221	0.4	0.0225
381	649.2076	30451	38.1	4777	0.1	0.0213
382	650.2033	27798	53.3	6678	0.2	0.0234
383	651.2065	27953	18.4	2299	0.1	0.0233
384	651.5146	30540	170.6	21352	0.6	0.0213
385	652.5178	29050	71.1	8890	0.3	0.0225
386	653.5209	28065	15.6	1953	0.1	0.0233
387	655.3682	19324	103.2	12914	0.4	0.0339
388	656.3713	18080	40.8	5114	0.1	0.0363
389	657.3673	18646	55.4	6948	0.2	0.0353
390	658.0751	30008	19.6	2454	0.1	0.0219
391	658.3695	20892	21.2	2665	0.1	0.0315
392	663.3995	29203	350.6	44167	1.3	0.0227
393	664.4029	30281	149.5	18814	0.5	0.0219
394	665.3989	26732	186.0	23397	0.7	0.0249
395	666.4016	27944	71.4	8973	0.3	0.0238
396	666.7877	25200	15.7	1970	0.1	0.0265
397	667.3701	26939	30.7	3857	0.1	0.0248
398	667.4002	18717	26.8	3363	0.1	0.0357
399	669.3694	25674	28.0	3505	0.1	0.0261
400	677.4226	28759	17.9	2246	0.1	0.0236
401	682.7636	24098	17.6	2181	0.1	0.0283
402	697.3265	28125	21.5	2595	0.1	0.0248
403	699.3247	26399	18.3	2212	0.1	0.0265
404	704.3246	30565	73.9	8850	0.3	0.0230
405	705.3277	28403	34.4	4116	0.1	0.0248

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406	708.7790	28645	16.4	1956	0.1	0.0247
407	712.3261	28898	678.4	80848	2.3	0.0246
408	713.3285	27828	310.5	36974	1.1	0.0256
409	714.3250	28310	664.2	79012	2.3	0.0252
410	715.3270	27243	268.9	31948	0.9	0.0263
411	716.3247	26407	176.1	20915	0.6	0.0271
412	717.3357	20075	102.4	12138	0.3	0.0357
413	718.3424	22292	33.5	3966	0.1	0.0322
414	719.3401	28435	63.9	7568	0.2	0.0253
415	720.3451	27282	31.3	3700	0.1	0.0264
416	721.2921	29063	188.5	22307	0.6	0.0248
417	722.2956	29527	76.4	9038	0.3	0.0245
418	722.3362	19160	21.8	2583	0.1	0.0377
419	722.7948	30108	31.5	3730	0.1	0.0240
420	723.2903	28836	244.7	28960	0.8	0.0251
421	724.2935	29314	94.5	11175	0.3	0.0247
422	724.7936	27714	17.5	2069	0.1	0.0262
423	725.2892	27580	103.2	12196	0.4	0.0263
424	725.4676	29720	105.8	12506	0.4	0.0244
425	726.2918	27978	37.1	4381	0.1	0.0260
426	726.4711	29111	47.2	5572	0.2	0.0250
427	727.2887	24990	18.9	2226	0.1	0.0291
428	727.4713	26080	18.2	2146	0.1	0.0279
429	728.3208	27118	25.6	3020	0.1	0.0269
430	730.3184	23896	27.9	3288	0.1	0.0306
431	745.3897	27255	15.7	1824	0.1	0.0273
432	746.4805	27237	19.0	2207	0.1	0.0274
433	748.0238	29731	27.1	3155	0.1	0.0252
434	750.0225	28739	17.4	2024	0.1	0.0261
435	761.3317	28671	22.6	2564	0.1	0.0266
436	763.3308	27736	20.7	2350	0.1	0.0275
437	796.7374	27509	24.1	2510	0.1	0.0290
438	802.4476	29719	112.6	11451	0.3	0.0270
439	803.4504	28436	58.7	5955	0.2	0.0283
440	804.4505	24586	22.7	2300	0.1	0.0327
441	810.4184	29424	121.8	12221	0.4	0.0275
442	811.4217	29072	61.1	6126	0.2	0.0279
443	812.4183	27537	67.6	6763	0.2	0.0295
444	813.4201	27776	30.1	3007	0.1	0.0293
445	842.5673	29348	21.6	2040	0.1	0.0287
446	850.5382	30368	129.8	11996	0.3	0.0280
447	851.5414	30993	72.1	6656	0.2	0.0275
448	852.5382	28363	75.6	6966	0.2	0.0301
449	853.5407	28274	33.7	3097	0.1	0.0302
450	898.4316	30258	177.8	14641	0.4	0.0297
451	899.4346	30332	97.2	7985	0.2	0.0297
452	900.4308	29295	186.8	15333	0.4	0.0307
453	901.4334	30118	92.6	7598	0.2	0.0299
454	902.4316	27187	55.9	4582	0.1	0.0332
455	903.4327	27817	24.7	2019	0.1	0.0325
456	911.6715	31037	509.1	40668	1.2	0.0294
457	912.6749	29070	289.3	23099	0.7	0.0314
458	913.6784	30075	91.2	7267	0.2	0.0304
459	915.4619	26657	45.9	3644	0.1	0.0343
460	916.4664	26067	29.6	2351	0.1	0.0352
461	917.4606	24387	40.2	3189	0.1	0.0376
462	918.4626	27895	24.2	1915	0.1	0.0329
463	927.6456	29800	2041.8	159312	4.6	0.0311
464	928.6490	30222	1206.5	94097	2.7	0.0307
465	929.6501	28431	468.0	36470	1.0	0.0327
466	930.2796	30265	560.2	43648	1.3	0.0307
467	930.6510	27026	147.0	11451	0.3	0.0344

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468	931.2828	29784	281.0	21880	0.6	0.0313
469	931.6528	25746	36.9	2872	0.1	0.0362
470	932.2797	28749	340.8	26522	0.8	0.0324
471	933.2818	29381	153.3	11921	0.3	0.0318
472	934.2825	27480	53.1	4124	0.1	0.0340
473	943.6329	30009	239.0	18156	0.5	0.0314
474	944.4324	29254	25.5	1932	0.1	0.0323
475	944.6362	30308	152.4	11549	0.3	0.0312
476	945.6336	28057	142.7	10786	0.3	0.0337
477	946.6353	28303	75.9	5726	0.2	0.0334
478	947.6382	28016	23.2	1747	0.1	0.0338
479	952.4034	30990	166.0	12294	0.4	0.0307
480	953.4068	29893	85.5	6313	0.2	0.0319
481	954.4029	29194	158.5	11658	0.3	0.0327
482	955.4054	30531	85.2	6251	0.2	0.0313
483	956.4035	27330	53.5	3915	0.1	0.0350
484	992.5596	30707	1156.5	78540	2.3	0.0323
485	993.5628	30682	701.7	47641	1.4	0.0324
486	994.5592	29355	1214.5	82433	2.4	0.0339
487	995.5615	29716	634.5	43032	1.2	0.0335
488	996.5600	28049	376.6	25514	0.7	0.0355
489	997.5614	27750	164.6	11134	0.3	0.0359
490	998.5645	26019	48.8	3293	0.1	0.0384
491	1001.5253	31290	404.7	27157	0.8	0.0320
492	1002.5285	30827	235.3	15764	0.5	0.0325
493	1003.5243	29886	546.5	36535	1.0	0.0336
494	1004.5269	31163	299.7	20016	0.6	0.0322
495	1005.5240	27930	255.6	17049	0.5	0.0360
496	1006.5253	28722	122.7	8171	0.2	0.0350
497	1007.5248	26934	54.7	3629	0.1	0.0374
498	1008.5536	27823	96.8	6420	0.2	0.0362
499	1009.5562	28151	64.8	4286	0.1	0.0359
500	1010.5542	28473	97.4	6441	0.2	0.0355
501	1011.5554	29390	61.9	4086	0.1	0.0344
502	1012.5528	28042	55.2	3635	0.1	0.0361
503	1013.5544	26991	29.2	1923	0.1	0.0376
504	1041.5647	30618	134.9	8559	0.2	0.0340
505	1042.5681	29478	79.3	5027	0.1	0.0354
506	1043.5643	29603	140.4	8883	0.3	0.0353
507	1044.4814	29694	42.4	2679	0.1	0.0352
508	1044.5667	28960	81.8	5169	0.1	0.0361
509	1045.4839	27347	31.3	1975	0.1	0.0382
510	1045.5652	27235	51.1	3228	0.1	0.0384
511	1046.4813	28938	49.7	3135	0.1	0.0362
512	1047.4817	27317	36.9	2328	0.1	0.0383
513	1098.6758	30493	70.2	4038	0.1	0.0360
514	1099.6784	28493	47.8	2744	0.1	0.0386
515	1116.5970	29115	36.2	2012	0.1	0.0384
516	1272.7932	32100	201.0	9918	0.3	0.0397
517	1273.7967	30076	156.7	7725	0.2	0.0424
518	1274.7935	30222	240.3	11837	0.3	0.0422
519	1275.7957	31120	155.3	7648	0.2	0.0410
520	1276.7954	29451	93.7	4614	0.1	0.0434
521	1277.7957	28707	47.4	2333	0.1	0.0445
522	1288.7875	30629	46.9	2297	0.1	0.0421
523	1289.7919	29180	39.2	1918	0.1	0.0442
524	1290.7886	28281	53.1	2599	0.1	0.0456
525	1291.7905	28082	39.4	1934	0.1	0.0460