Supporting Information for:

A Photoredox Coupling Reaction of Benzylboronic Esters and Carbonyl Compounds in Batch and Flow

Yiding Chen†, Oliver May†, David C. Blakemore‡ and Steven V. Ley†*

† Department of Chemistry, University of Cambridge, Lensfield Road, Cambridge CB2 1EW, U.K.

‡ Medicine Design, Pfizer Inc., Eastern Point Road, Groton, Connecticut 06340, United States

Content

General Information

All procedures below were conducted under inert nitrogen atmosphere unless stated otherwise. Reagents were purchased from Sigma-Aldrich, Alfa Aesar, Acros and Fluorochem and were used as supplied unless stated otherwise. Acetone was purchased from Sima-Aldrich and used as supplied. Methanol were distilled from CaO under inert gas prior to use. Work-up solvents were employed directly from commercial sources, i.e. Sigma-Aldrich unless stated otherwise. Petroleum ether refers to the fractions of petrol collected between 40-60 °C b.p.

Reactions were monitored *via* thin layer chromatography (TLC) on pre-coated glass backed plates (Merck Kieselgel 60 F_{254}). Products were visualized by UV light (254 nm) and/or with $KMnO_4$ stain. Flash column chromatography was conducted using a Biotage SPX system with single use disposable silica columns of the appropriate size (SiliaSep Flash Cartridges 4 or 12 g 40-60 μm ISO04/012).

^{1}H NMR, ^{13}C NMR were obtained from a 600 MHz Bruker DRX-600 Spectrometer or a 400 MHz Bruker Avance DPX-400 Spectrometer. ^{19}F NMR data were obtained from a 400 MHz Bruker Avance DPX-400 Spectrometer. ^{1}H NMR were generally obtained with 32 scans at 298 K with a sweep width of 10776 Hz. ^{13}C NMR were generally obtained with 256 scans at 298 K with a sweep width of 40650 Hz. ^{19}F NMR were generally obtained with 32 scans at 298 K with a sweep width of 131579 Hz. Chemical shifts (δ) are referenced to the residual solvent as $CDCl_3$ in the unit of parts per million (ppm). Coupling constants *J* are quoted in the unit of hertz (Hz). Proton and carbon multiplicity are recorded as singlet (s), doublet (d), triplet (t), quartet (q), multiplet (m) and broad (br), or combinations thereof. All compounds examined were dried *in vacuo* to remove residual solvents. Spectra are assigned as fully as possible, using ^{1}H-TCOSY, DEPT-135, HSQC and ^{1}H NOESY where appropriate to facilitate structural determination. Multiple signals arising from (pseudo)axial/equatorial positions are distinguished using suffix as for example Ha and H_b. ^{1}H NMR signals are reported to two decimal places and ^{13}C signals to one decimal place.

Low resolution mass spectra (LRMS) were recorded on an Advion Expression CMS spectrometer. High resolution mass spectrometry (HRMS) was performed on either a Waters Micromass LCT Premier spectrometer or performed by the Mass Spectrometry Service for the Department of

Chemistry at the University of Cambridge. Infra-red spectra were recorded neat on a Perkin-Elmer Spectrum One FTIR spectrometer with a universal ATR sampling accessory, selected peaks are reported.

The UV/Vis experiments were operated on a Shimadzu RF-6000 Spectro Fluorophotometer

Melting points were recorded on a Stanford Research Systems OptiMelt Automated Melting Point System.

All compounds listed in the paper are >98% purity. Some products appear to be very hydroscopic therefore contain 0.2 – 0.5 mol equivalents of water (2 – 5 wt%) present in the ^{1}H NMR spectra as shown below. Inseparable impurities are noted.

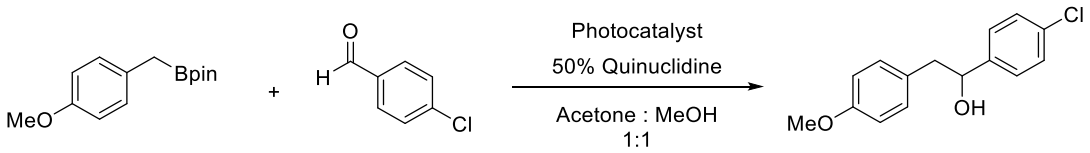
Photochemical experiments were performed magnetically stirred in 5 mL glass test-tubes, sealed with a rubber septum. The tubes were irradiated with blue light (450 nm) using a coiled commercial LED strip (1 m, from LEDXON, PN: 9009083) with a total power output of 14.4 W. To maintain a constant reaction temperature of 35°C, the setup was cooled by a constant air flow from a clip fan (Figure S1).

Figure S1: General set-up of the batch reaction

Screening of various conditions

For a detailed procedure, see General Procedure A.

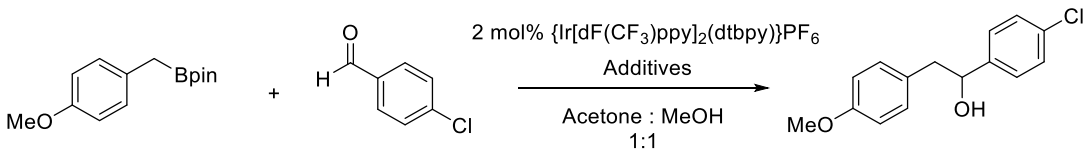
Screening of photocatalysts



Entry	Photocatalyst (2 mol%)	Yield
1	**{Ir[dF(CF$_3$)ppy]$_2$(dtbpy)}PF$_6$**	**40%**
2	[Ir(dtbbpy)(ppy)$_2$]PF$_6$	36%
3	9-Mesityl-10-methylacridinium tetrafluoroborate	22%
4	9-Mesityl-10-methylacridinium perchlorate	4%
5	[Ru(bpy)$_3$]Cl$_2$	0%
6	N/A	0%

Reaction conditions: 0.1 mmol 4-methoxybenzylboronic acid pinacol ester, 0.15 mmol 4-chlorobenzaldehyde, 0.05 mmol quinuclidine, 0.5 mL acetone and 0.5 mL methanol, 35 °C, 8 h. NMR yields measured with 1,3,5-trimethoxybenzene as internal standard

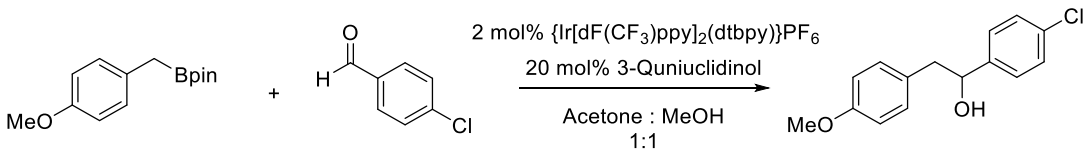
Screen of bases



Entry	Additives	Yield
1	50 mol % 3-Quinuclidinol	57%
2	**20 mol% 3-Quinuclidinol**	**54%**
3	50 mol% 3-Quinuclidinol + 20 mol% $Sc(OTf)_3$	46%
4	50 mol% Lutidine	0%
5	50 mol% DMAP	31%
6	20 mol% DIPEA	45%
7	20 mol% DBN	20%
8	20 mol% TMEDA	38%
9	100 mol% K_2CO_3	10%

Reaction conditions: 0.1 mmol 4-methoxybenzylboronic acid pinacol ester, 0.15 mmol 4-chlorobenzaldehyde, 2 mol% $\{Ir[dF(CF_3)ppy]_2(dtbpy)\}PF_6$, 0.5 mL acetone, 0.5 mL methanol, 35 °C, 8 h. NMR yields measured with 1,3,5-trimethoxybenzene as internal standard

Screening of solvents and concentration



Entry	Solvent(s) (Concentration)*	Yield
1	**Acetone and Methanol 1:1 (0.05 M)**	**86% (84%)****
2	Acetone and Methanol 1:1 (0.2 M)	37%
3	Methanol (0.1 M)	28%
4	Acetone (0.1M)	24%
5	Acetonitrile (0.1 M)	19%
6	Dichloromethane (0.1 M)	46%
7	Acetone and *t*BuOH 1:1 (0.1 M)	55%
8	Acetone and isopropanol 1:1 (0.1 M)	44%
9	Acetone and methanol 5:1 (0.1 M)	48%
10	Dimethylacetamide (0.1 M)	44%
11	Acetone and toluene (0.05 M)	32%
12	Acetone and HFIP (0.05 M)***	20%

Reaction conditions: 0.1 mmol 4-methoxybenzylboronic acid pinacol ester, 0.15 mmol 4-chlorobenzaldehyde, 2 mol% {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6, 20 mol% 3-quniuclidinol, 35 °C, 8 h. NMR yield measured with 1,3,5-trimethoxybenzene as internal standard

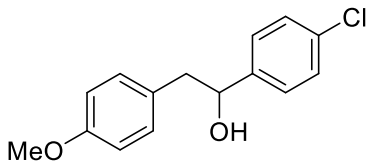
* Concentration measured against boronic ester

** Isolated yield

***HFIP: Hexafluoro-2-propanol

Cross-coupling products of benzylboronic esters with aldehydes and imines

Flow adaptation: Vapourtec UV-150 photoreactor

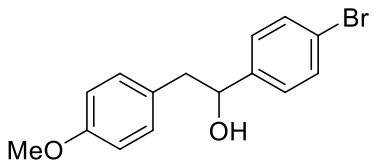


1-(4-Bromophenyl)-2-(4-methoxyphenyl)ethan-1-ol 3a

In a 10 mL test tube was charged with 4-methoxybenzylboronic acid pinacol ester (50 mg, 0.2 mmol, 1.0 eq.), 4-chlorobenzaldehyde (42 mg, 0.3 mmol, 1.5 eq.), 3-quinuclidinol (5.1 mg, 0.04 mmol, 20 mol%) and $\{Ir[dF(CF_3)ppy]_2(dtbpy)\}PF_6$ (4.4 mg, 0.004 mmol, 2 mol%). The tube was vacuumed and backfilled with nitrogen three time, and the reagents were then dissolved in 1:1 mixture of methanol and acetone (4 mL) before purged with dry nitrogen gas for 10 min.

The clear yellow solution was then pumped through a Vapourtec UV-150™ reactor (10 mL, FEP tubing) while irradiate by a 420 nm blue LED lamp (output power: 17W) at a flow rate of 0.1 mL/min. The reactor temperature was held at 35 °C with air cooling. Once the reaction mixture has fully be taken up by the reactor, the input was switched to a 1:1 mixture of methanol and acetone, to push the remaining reaction mixture through the reactor. The reaction mixture was collected over the period of reaction, and solvent was removed under vacuum. The resulting residue was purified with flash column chromatography (0 – 10% EtOAc in petroleum ether) to give the titled product as a pale-yellow solid (36 mg, 70%). Analytical data obtained were the same as the batch reaction.

Flow adaptation and Large-scale synthesis: Uniqsis PhotoSyn reactor



1-(4-Bromophenyl)-2-(4-methoxyphenyl)ethan-1-ol 3ak

In a 500 mL pear-shaped flask was charged with 4-methoxybenzylboronic acid pinacol ester (2.48 g, 10.0 mmol, 1.0 eq.), 4-bromobenzaldehyde (2.77 g, 15.0 mmol, 1.5 eq.), 3-quinuclidinol (254 mg, 2.0 mmol, 20 mol%) and $\{Ir[dF(CF_3)ppy]_2(dtbpy)\}PF_6$ (224 mg, 0.2 mmol, 2 mol%). The flask was vacuumed and backfilled with nitrogen three time, and the reagents were then dissolved in 1:1 mixture of methanol and acetone (200 mL) before purged with dry nitrogen gas for 15 min.

The flow system was controlled by LabVIEW v. 2018. The front panel and block diagram are shown below (Figure S2 and Figure S3).

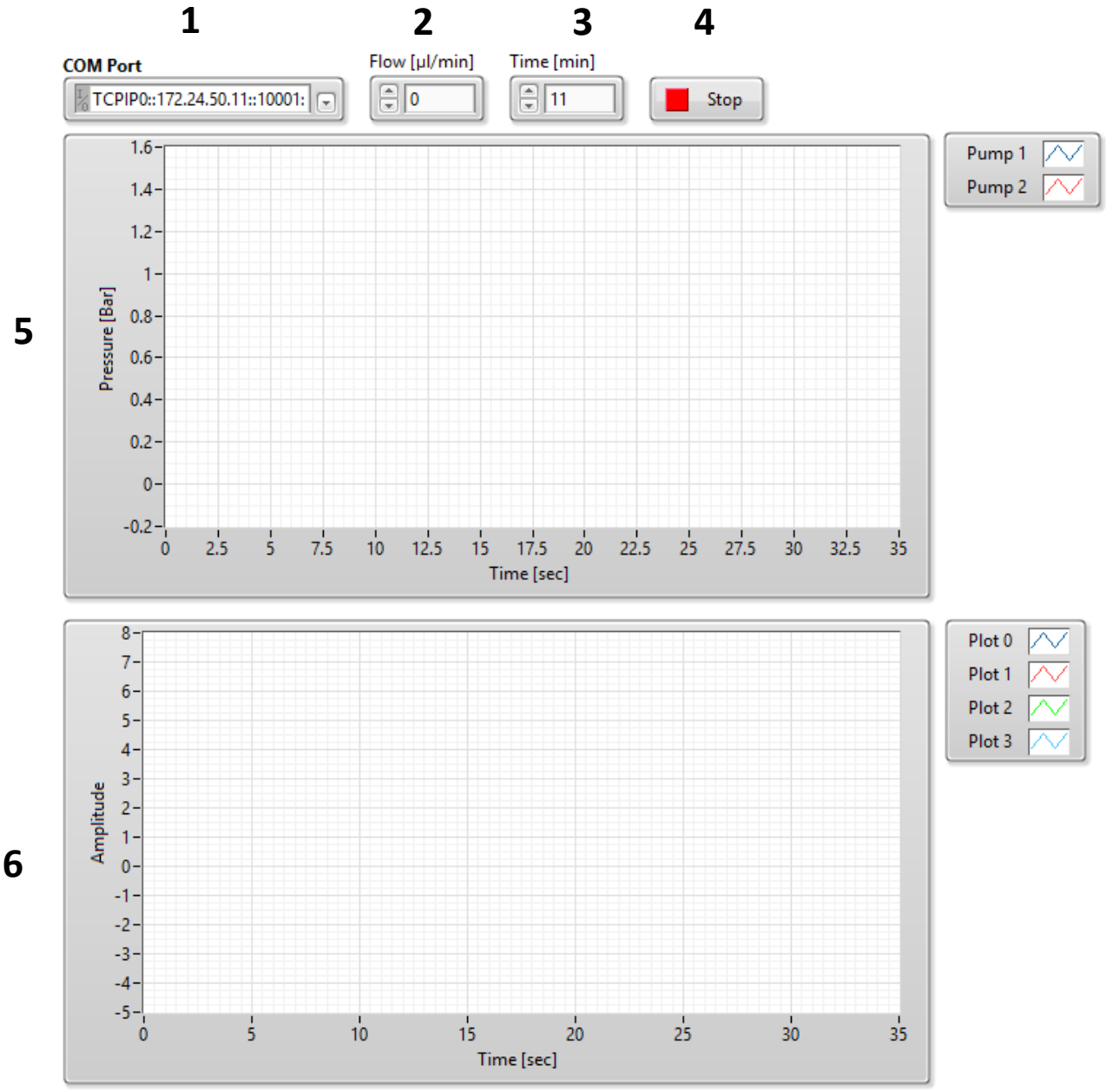


Figure S2: LabVIEW Front Panel. **1.** Pump connection address using either TCP/IP or COM port; **2.** Flow rate input; **3.** Reaction time (minutes); **4.** Emergency stop; **5.** Pump pressure (bar); **6.** UV-vis display of selected wavelengths.

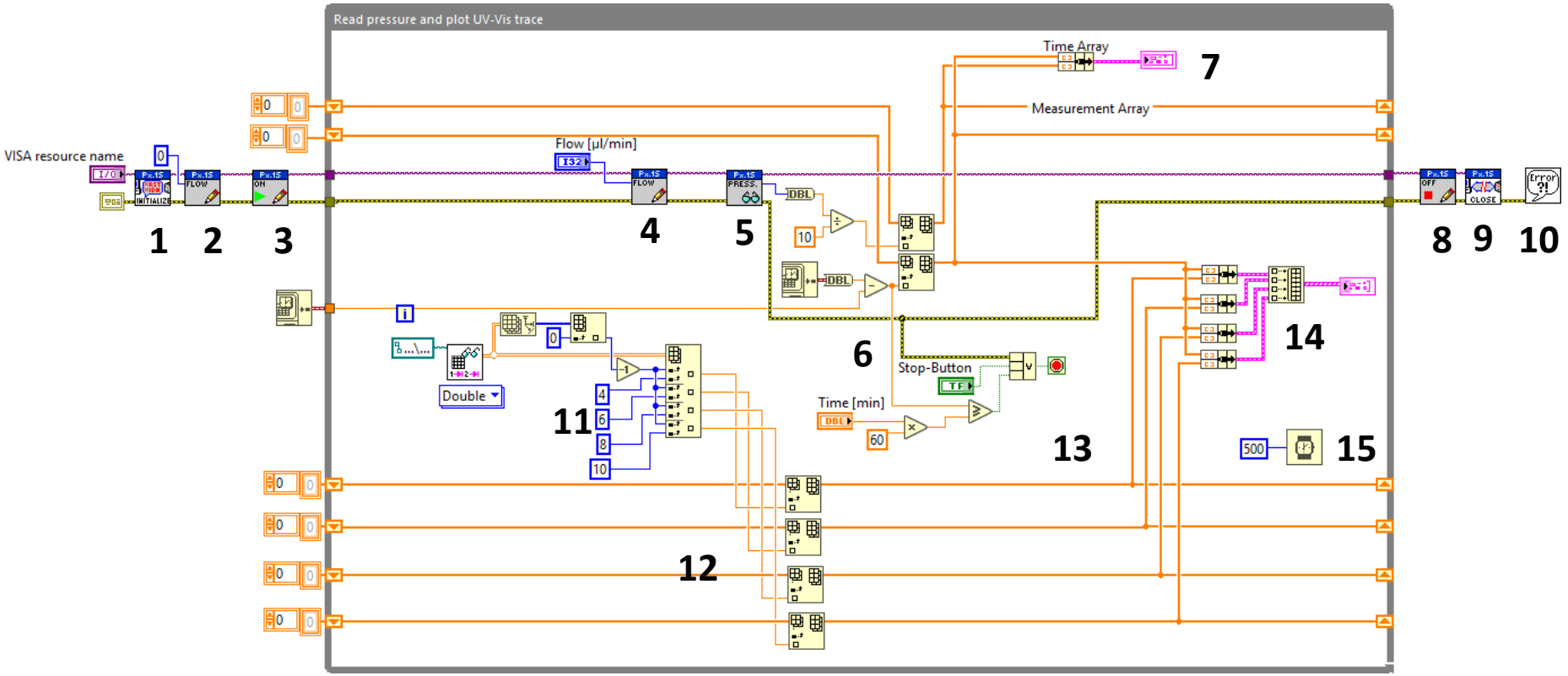
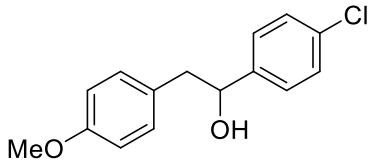


Figure S3: LabVIEW Block diagram. **1.** Initialise Knauer pump using user defined COM port; **2.** Set initial flow rate to 0; **3.** Start pump; **4.** Manually select a flow rate ; **5.** Get pump pressure value as an integer, convert to double and divide by 10 to get the reading in Bar; **6.** Get current time and subtract from start time to give current time in seconds; **7.** Create an array of time in seconds and pressure and plot to an XY graph; **8.** Stop pumps; **9.** Close serial connection; **10.** Display any error codes; **11.** Read delimited spreadsheet, convert to an array and select columns 4, 6, 8 and 10; **12.** Create a new array containing selected wavelengths; **13**. Set reaction run time in minutes to stop reaction after time has elapse or stop using stop button; **14.** Combine arrays of time and UV wavelength and plot to an XY graph. **15.** Update values every 500 ms.

The clear yellow solution was then pumped through a Uniqsis Photosyn™ reactor (PFA, 20 mL, 1/16" OD tubing) at a flow rate of 0.33 mL/min. The reactor temperature was held at 25 °C with water cooling and was detected by an infrared thermometer. The output stream was monitored by a Uniqsis Flow-UV™ in-line UV-Vis detector. Once the reaction mixture has fully be taken up by the reactor, the input was switched to a 1:1 mixture of methanol and acetone, to push the remaining reaction mixture through the reactor. The reaction mixture was collected over the period of reaction, and solvent was removed under vacuum. The resulting residue was purified with flash column chromatography (0 – 10% EtOAc in petroleum ether) to give the titled product as a pale-yellow solid (1.69 g, 55%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.45 (d, *J* = 8.4 Hz, 2H, H_{Ar}), 7.18 (d, *J* = 8.4 Hz, 2H, H_{Ar}), 7.06 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 6.83 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 4.78 (dd, *J* = 8.2, 5.2 Hz, 1H, C*H*OH), 3.78 (s, 3H, OCH_3), 2.93 (dd, *J* = 13.8, 5.2 Hz, 1H, CH_aCHOH), 2.88 (dd, *J* = 13.8, 8.2 Hz, 1H, CH_bCHOH), 2.20 (br s, 1H, O*H*); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 158.5, 142.9, 131.5 (C_{Ar}H), 130.6 (C_{Ar}H), 129.5, 127.8 (C_{Ar}H), 121.3, 114.1 (C_{Ar}H), 74.8 (*C*HOH), 55.3 (O*C*H_3), 45.2 (*C*H_2CHOH). **LRMS** (ESI, m/z) 307.2 ($[M+H]^+$, 100%); **HRMS** (ESI) calcd for $C_{15}H_{14}{}^{79}BrO^+$ $[M-OH]^+$ 289.0223, found 289.0222. **IR** ν max (film): 3433, 2933, 2835, 1683, 1610, 1585, 1510, 1486, 1439, 1382, 1328, 1300, 1244, 1176, 1069, 1034, 1008, 823 cm^{-1}. **M.p**.: 78 – 80 °C.

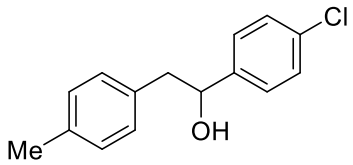
General Procedure A for the cross-coupling reaction



1-(4-Chlorophenyl)-2-(4-methoxyphenyl)ethan-1-ol 3a

In a 5 mL glass test tube was charged with 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 4-chlorobenzaldehyde (21 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and $\{Ir[dF(CF_3)ppy]_2(dtbpy)\}PF_6$ (2.2 mg, 0.002 mmol, 2 mol%). The reagents were dissolved in 1:1 mixture of methanol and acetone (2 mL) before purged with dry nitrogen gas for 10 min. The resulting solution was then irradiated with a commercial blue LED strip (14.4 W, 450 nm) for 8 hours with stirring, the reaction temperature was maintained at 30 – 35 °C using a clip fan. Upon completion the mixture was concentrated and purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a white solid (22 mg, 84%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35 – 7.27 (m, 4H, H_{Ar}), 7.10 (d, J = 8.6 Hz, 2H, H_{Ar}), 6.87 (d, J = 8.4 Hz, 1H, H_{Ar}), 4.86 (td, J = 5.2, 2.8 Hz, 1H, C*H*OH), 3.82 (s, 3H, OCH_3), 2.98 (dd, J = 13.8, 5.2 Hz, 1H, CH_aCHOH), 2.91 (dd, J = 13.8, 8.4 Hz, 1H, CH_bCHOH), 1.99 (d, J = 2.8 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.6, 142.4, 133.3, 130.6 (C_{Ar}H), 129.5, 128.6 (C_{Ar}H), 127.5 (C_{Ar}H), 114.2 (C_{Ar}H), 74.9 (*C*HOH), 55.4 (O*C*H_3), 45.4 (*C*H_2CHOH). **LRMS** (ESI, m/z) 285.1 ($[M+Na]^+$, 100%); **HRMS** (ESI) calcd for $C_{15}H_{15}O_2{}^{35}ClNa^+$ $[M+Na]^+$ 285.0653, found 285.0651. **IR** ν max (film): 3377, 2934, 1612, 1512, 1491, 1464, 1301, 1246, 1178, 1090, 1035, 1013, 829 cm^{-1}. **M.p**.: 81 – 83 °C (lit. 83 – 85 °C).[1]

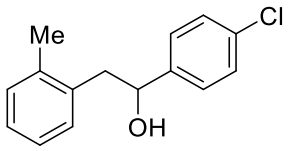


1-(4-Chlorophenyl)-2-(*p*-tolyl)ethan-1-ol 3b

General Procedure A was followed using 4-methylbenzylboronic acid pinacol ester (23 mg, 0.1 mmol, 1.0 eq.), 4-chlorobenzaldehyde (21 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02

mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a white solid (19 mg, 77%).

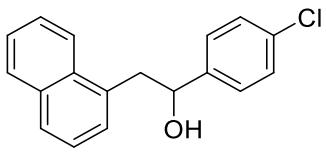
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.34 – 7.27 (m, 4H, H_{Ar}), 7.15 – 7.04 (m, 4H, H_{Ar}), 4.85 (ddd, *J* = 8.3, 4.9, 2.9 Hz, 1H, C*H*OH), 2.98 (dd, *J* = 13.7, 4.9 Hz, 1H, CH_aCHOH), 2.90 (dd, *J* = 13.7, 8.3 Hz, 1H, CH_bCHOH), 2.33 (s, 3H, CH_3), 1.95 (d, *J* = 2.9 Hz, 1H, CHO*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 142.4, 136.5, 134.5, 133.3, 129.5 (C_{Ar}H), 129.5 (C_{Ar}H), 128.6 (C_{Ar}H), 127.4 (C_{Ar}H), 74.8 (*C*HOH), 45.9 (CH_2CHOH), 21.2 (*C*H_3). **LRMS** (ESI, m/z) 247.2 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{15}H_{15}O^{35}ClNa^+$ [M+Na]$^+$ 269.0704, found 269.0703. **IR** ν max (film): 3411, 2916, 1596, 1515, 1491, 1408, 1090, 1042, 1013, 827, 794, 778 cm^{-1}. **M.p**.: 47 – 49 °C. The data presented are consistent with literature precedent.[2]



1-(4-Chlorophenyl)-2-(*o*-tolyl)ethan-1-ol 3c

General Procedure A was followed using 2-methylbenzylboronic acid pinacol ester (23 mg, 0.1 mmol, 1.0 eq.), 4-chlorobenzaldehyde (21 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a white solid (16 mg, 65%).

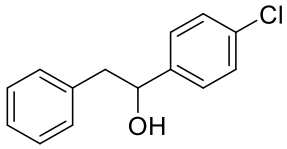
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35 – 7.27 (m, 4H, H_{Ar}), 7.19 – 7.10 (m, 4H, H_{Ar}), 4.88 (ddd, *J* = 8.1, 5.5, 2.6 Hz, 1H, C*H*OH), 3.05 – 2.93 (m, 2H, CH_2CHOH), 2.29 (s, 3H, CH_3), 1.95 (d, *J* = 2.8 Hz, 1H, CHO*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 13C NMR (100 MHz, CDCl3) δ 142.6, 136.9, 136.0, 133.4, 130.7 (C_{Ar}H), 130.4 (C_{Ar}H), 128.7 (C_{Ar}H), 127.3 (C_{Ar}H), 127.1 (C_{Ar}H), 126.3 (C_{Ar}H), 73.9 (*C*HOH), 43.5 (*C*H_2CHOH), 19.7 (*C*H_3). **LRMS** (ESI, m/z) 269.1 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{15}H_{15}O^{35}ClNa^+$ [M+Na]$^+$ 269.0704, found 269.0705. **IR** ν max (film): 3468, 3196, 1603, 1511, 1101, 1037, 798 cm^{-1}. **M.p**.: 76 – 79 °C.



1-(4-Chlorophenyl)-2-(naphthalen-1-yl)ethan-1-ol 3d

General Procedure A was followed using (1-naphthylmethyl)boronic acid pinacol ester (26 mg, 0.1 mmol, 1.0 eq.), 4-chlorobenzaldehyde (21 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 10% EtOAc in petroleum ether) to give the titled product as a white solid (17 mg, 60%).

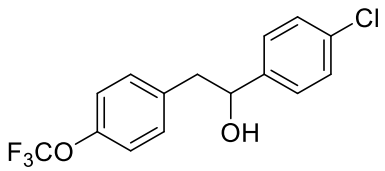
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.09 (dd, *J* = 8.5, 1.2 Hz, 1H, H_{Naphth}), 7.92 – 7.87 (m, 1H, H_{Naphth}), 7.79 (d, *J* = 8.2 Hz, 1H, H_{Naphth}), 7.56 (ddd, *J* = 8.5, 6.8, 1.5 Hz, 1H, H_{Naphth}), 7.52 (ddd, *J* = 8.0, 6.8, 1.3 Hz, 1H, H_{Naphth}), 7.40 (dd, *J* = 8.2, 7.0 Hz, 1H, H_{Naphth}), 7.37 – 7.31 (m, 4H, H_{Ar}), 7.30 – 7.28 (m, 1H, H_{Naphth}), 5.05 (ddd, *J* = 8.9, 4.6, 2.5 Hz, 1H, C*H*OH), 3.50 (dd, *J* = 14.0, 4.6 Hz, 1H, CH_aCHOH), 3.37 (dd, *J* = 14.0, 8.9 Hz, 1H, CH_bCHOH), 1.95 (d, *J* = 2.5 Hz, 1H, CHO*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 13C NMR (151 MHz, CDCl3) δ 142.6, 134.2, 133.8, 133.5, 132.2, 129.1 (C_{Naphth}H), 128.7(C_{Ar}H), 128.1 (C_{Naphth}H), 127.9 (C_{Naphth}H), 127.4 (C_{Ar}H), 126.4 (C_{Naphth}H), 125.9 (C_{Naphth}H), 125.6 (C_{Naphth}H), 123.7 (C_{Naphth}H), 73.9 (*C*HOH), 43.5 (*C*H_2CHOH). **HRMS** (ESI) calcd for $C_{18}H_{14}{}^{35}Cl^+$ [M-OH]$^+$ 265.0779, found 265.0783. **IR** ν max (film): 3748, 3432, 3047, 2338, 2202, 1611, 1597, 1503, 1491, 1397, 1088, 1013, 775 cm^{-1}.



1-(4-Chlorophenyl)-2-phenylethan-1-ol 3e

General Procedure A was followed using benzylboronic acid pinacol ester (22 mg, 0.1 mmol, 1.0 eq.), 4-chlorobenzaldehyde (21 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a white solid (11 mg, 47%).

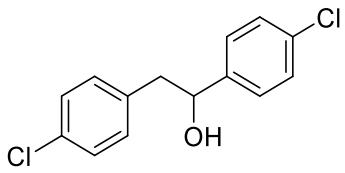
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36 – 7.28 (m, 5H, H_{Ar}), 7.27 – 7.22 (m, 2H, H_{Ar}), 7.20 – 7.14 (m, 2H, H_{Ar}), 4.89 (ddd, *J* = 8.2, 5.1, 2.9 Hz, 1H, C*H*OH), 3.02 (dd, *J* = 13.6, 5.1 Hz, 1H, CH_aCHOH), 2.96 (dd, *J* = 13.6, 8.2 Hz, 1H, CH_bCHOH), 1.95 (d, *J* = 2.9 Hz, 1H, CHO*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 142.4, 137.7, 133.4, 129.7 (C_{Ar}H), 128.8 (C_{Ar}H), 128.7 (C_{Ar}H), 127.4 (C_{Ar}H), 126.9 (C_{Ar}H), 74.8 (*C*HOH), 46.3 (*C*H_2CHOH). **LRMS** (ESI, m/z) 255.2 ([M+Na]$^+$, 100%); **HRMS** (ESI) calcd for $C_{14}H_{13}O^{35}ClNa^+$ [M+Na]$^+$ 255.0547, found 255.0545. **IR** ν max (film): 3400, 3338, 3026, 2923, 1493, 1454, 1090, 1013, 829, 747, 700 cm^{-1}. The data presented are consistent with literature precedent.[3]



1-(4-Chlorophenyl)-2-[4-(trifluoromethoxy)phenyl]ethan-1-ol 3f

General Procedure A was followed using 4-(trifluoromethoxy)benzylboronic acid pinacol ester (30 mg, 0.1 mmol, 1.0 eq.), 4-chlorobenzaldehyde (21 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a white solid (15 mg, 46%).

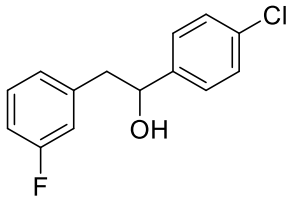
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32 (d, *J* = 8.2 Hz, 2H, H_{Ar}), 7.25 (d, *J* = 8.2 Hz, 2H, H_{Ar}), 7.18 (d, *J* = 8.4 Hz, 2H, H_{Ar}), 7.14 (d, *J* = 8.4 Hz, 2H, H_{Ar}), 4.87 (td, *J* = 6.6, 2.8 Hz, 1H, C*H*OH), 2.98 (d, *J* = 6.6 Hz, 2H, CH_2CHOH), 1.95 (d, *J* = 2.8 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 148.2, 142.1, 136.5, 133.6, 131.0 (C_{Ar}H), 128.8 (C_{Ar}H), 127.4 (C_{Ar}H), 121.1 (C_{Ar}H), 120.6 (q, $^{1}J_{C\text{-}F}$ = 256.9 Hz, $C_{Ar\text{-}F}$), 74.7 (*C*HOH), 45.3 (*C*H_2CHOH); **^{19}F NMR** (376 MHz, $CDCl_3$) δ -57.9. **LRMS** (ESI, m/z) 317.2 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{15}H_{11}OClF_3^+$ [M-OH]$^+$ 299.0445, found 299.0450. **IR** ν max (film): 3462, 3311, 2334, 1509, 1262, 1223, 1162, 1093, 1014, 830 cm^{-1}. **M.p**.: 58 – 60 °C.



1,2-Bis(4-chlorophenyl)ethan-1-ol 3g

General Procedure A was followed using 4-chlorobenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 4-chlorobenzaldehyde (21 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a white solid (11 mg, 42%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.34 (d, *J* = 8.5 Hz, 2H, H_{Ar}), 7.30 – 7.24 (m, 4H, H_{Ar}), 7.10 (d, *J* = 8.4 Hz, 2H, H_{Ar}), 4.88 (t, *J* = 6.6 Hz, 1H, C*H*OH), 2.99 (d, *J* = 6.6 Hz, 2H, CH_2CHOH), 1.93 (d, *J* = 3.0 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 142.1, 136.1, 133.6, 132.8, 131.0 (C_{Ar}H), 128.8 (C_{Ar}H), 128.8 (C_{Ar}H), 127.4 (C_{Ar}H), 74.7 (*C*HOH), 45.3 (*C*H_2CHOH). **LRMS** (ESI, m/z) 267.3 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{14}H_{11}O^{35}Cl_2^-$ [M-H]$^-$ 265.1087, found 265.1082. The data presented are consistent with literature precedent.[2]

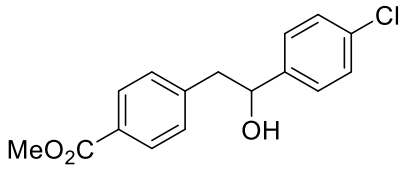


1-(4-Chlorophenyl)-2-(3-fluorophenyl)ethan-1-ol 3h

General Procedure A was followed using 3-fluorobenzylboronic acid pinacol ester (24 mg, 0.1 mmol, 1.0 eq.), 4-chlorobenzaldehyde (21 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 30% EtOAc in petroleum ether) to give the titled product as a colourless oil (5 mg, 20%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.41 – 7.19 (m, 5H, H_{Ar}), 7.02 – 6.80 (m, 3H, H_{Ar}), 4.89 (td, *J* = 6.7, 2.8 Hz, 1H, C*H*OH), 2.98 (d, *J* = 6.7 Hz, 2H, CH_2CHOH), 1.93 (d, *J* = 2.8 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 166.2 (d, $^1J_{C\text{-}F}$ = 187.6 Hz, $C_{Ar\text{-}F}$)142.1, 140.3 (d, $^3J_{C\text{-}F}$ = 7.2 Hz, $C_{Ar\text{-}F}$), 133.6, 130.1 (d, $^3J_{C\text{-}F}$ = 8.6 Hz, $C_{Ar\text{-}F}$H), 128.8 (C_{Ar}H), 127.4 (C_{Ar}H), 125.3 (d, $^4J_{C\text{-}F}$ = 2.7 Hz, $C_{Ar\text{-}F}$H),

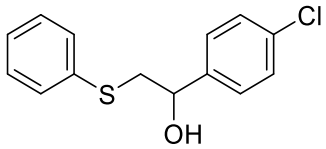
116.5 (d, $^{2}J_{C\text{-}F}$ = 21.1 Hz, $C_{Ar\text{-}F}H$), 113.83 (d, $^{2}J_{C\text{-}F}$ = 20.8 Hz, $C_{Ar\text{-}F}H$), 74.5 (*C*HOH), 45.8 (*C*H_2CHOH); **^{19}F NMR** (376 MHz, $CDCl_3$) δ -113.2. **LRMS** (ESI, m/z) 251.3 ($[M+H]^+$, 100%); **HRMS** (ESI) calcd for $C_{14}H_{11}OFCl^-$ $[M-H]^-$ 249.0482, found 249.0479. **IR** ν max (film): 3423, 3358, 2925, 1617, 1589, 1490, 1448, 1252, 1141, 1091, 1013, 829, 779, 751, 694 cm^{-1}.



Methyl 4-[2-(4-chlorophenyl)-2-hydroxyethyl]benzoate 3i

General Procedure A was followed using methyl 4-[(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)methyl]benzoate (28 mg, 0.1 mmol, 1.0 eq.), 4-chlorobenzaldehyde (21 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a white solid (10 mg, 34%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.96 (d, *J* = 8.5 Hz, 2H, H_{Ar}), 7.30 (d, *J* = 8.5 Hz, 2H, H_{Ar}), 7.24 (d, *J* = 8.3 Hz, 2H, H_{Ar}), 7.22 (d, *J* = 8.3 Hz, 2H, H_{Ar}), 4.92 (ddd, *J* = 7.8, 5.6, 3.0 Hz, 1H, C*H*OH), 3.91 (s, 3H, CH_3), 3.07 (dd, *J* = 13.7, 7.8 Hz, 1H, CH_aCHOH), 3.03 (dd, *J* = 13.7, 5.6 Hz, 1H, CH_bCHOH), 1.93 (d, *J* = 3.0 Hz, 1H, O*H*); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 167.1 (*C*OOCH_3), 143.1, 142.0, 133.6, 129.9 ($C_{Ar}H$), 129.7 ($C_{Ar}H$), 128.8, 128.8 ($C_{Ar}H$), 127.4 ($C_{Ar}H$), 74.6 (*C*HOH), 52.2 (COO*C*H_3), 46.0 (*C*H_2CHOH). **LRMS** (ESI, m/z) 291.3 ($[M+H]^+$, 100%); **HRMS** (ESI) calcd for $C_{16}H_{14}O_2{}^{35}Cl^+$ $[M-OH]^+$ 273.0682, found 273.0685. **IR** ν max (film): 3493, 3001, 2360, 1695, 1593, 1423, 1295, 668 cm^{-1}. **M.p**.: 118 – 120 °C.

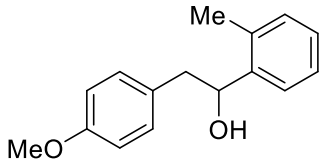


1-(4-Chlorophenyl)-2-(phenylthio)ethan-1-ol 3j

General Procedure A was followed using 4,4,5,5,-tetramethyl-2-phenylsulfanylmethyl-1,3,2-dioxaborolane (25 mg, 0.1 mmol, 1.0 eq.), 4-chlorobenzaldehyde (21 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002

mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a colourless oil (4 mg, 16%).

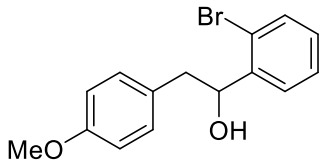
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.42 (d, *J* = 7.6 Hz, 2H, H_{Ar}), 7.36 – 7.23 (m, 7H, H_{Ar}), 4.69 (dt, *J* = 9.4, 3.0 Hz, 1H, C*H*OH), 3.29 (dd, *J* = 13.8, 3.6 Hz, 1H, CH_aCHOH), 3.04 (dd, *J* = 13.9, 9.4 Hz, 1H, CH_bCHOH), 2.86 (d, *J* = 2.5 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 140.7, 134.6, 133.82, 130.7 (C_{Ar}H), 129.4 (C_{Ar}H), 128.9 (C_{Ar}H), 127.4 (C_{Ar}H), 127.2 (C_{Ar}H), 71.1 (*C*HOH), 44.4 (*C*H_2CHOH). **LRMS** (ESI, m/z) 265.3 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{14}H_{13}O^{35}ClSNa^+$ [M+Na]$^+$ 287.0268, found 287.0266. **IR** ν max (film): 3515, 3438, 3250, 1512, 1090, 1008, 739, 691 cm^{-1}. The data presented are consistent with literature precedent.[4]



2-(4-Methoxyphenyl)-1-(*o*-tolyl)ethan-1-ol 3k

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), *o*-tolualdehyde (18 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a white solid (19 mg, 78%).

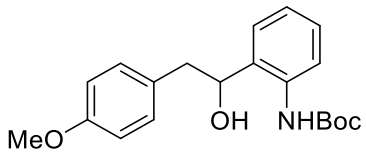
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.54 (dd, *J* = 7.6, 1.5 Hz, 1H, H_{Ar}), 7.28 – 7.23 (m, 1H, H_{Ar}), 7.19 (td, *J* = 7.4, 1.5 Hz, 1H, H_{Ar}), 7.16 – 7.09 (m, 3H, H_{Ar}), 6.85 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 5.08 (ddd, *J* = 8.7, 4.3, 2.8 Hz, 1H, C*H*OH), 3.80 (s, 3H, OCH_3), 2.96 (dd, *J* = 13.9, 4.3 Hz, 1H, CH_aCHOH), 2.86 (dd, *J* = 13.8, 8.7 Hz, 1H, CH_bCHOH), 2.29 (s, 3H, CCH_3), 1.87 (d, *J* = 2.8 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.6, 142.2, 134.5, 130.6 (C_{Ar}H), 130.4, 130.4 (C_{Ar}H), 127.4 (C_{Ar}H), 126.5 (C_{Ar}H), 125.4 (C_{Ar}H), 114.1 (C_{Ar}H), 72.0 (*C*HOH), 55.4 (O*C*H_3), 44.24 (*C*H_2CHOH), 19.2 (C*C*H_3). **LRMS** (ESI, m/z) 243.2 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{16}H_{18}O_2Na^+$ [M+Na]$^+$ 265.1199, found 265.1196. **IR** ν max (film): 338, 2915, 1611, 1583, 1512, 1463, 1441, 1300, 1246, 1177, 1112, 1036, 821, 758 cm^{-1}. **M.p**.: 71 – 73 °C.



1-(2-Bromophenyl)-2-(4-methoxyphenyl)ethan-1-ol 3l

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), *o*-bromobenzaldehyde (28 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a colourless oil (24 mg, 78%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.59 (dd, *J* = 7.8, 1.8 Hz, 1H, H_{Ar}), 7.54 (dd, *J* = 7.8, 1.2 Hz, 1H, H_{Ar}), 7.35 (td, *J* = 7.5, 1.2 Hz, 1H, H_{Ar}), 7.22 (d, *J* = 8.5 Hz, 2H, H_{Ar}), 7.15 (td, *J* = 7.8, 1.8 Hz, 1H, H_{Ar}), 6.88 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 5.21 (dt, *J* = 9.2, 3.2 Hz, 1H, C*H*OH), 3.81 (s, 3H, OCH_3), 3.15 (dd, J = 14.0, 3.2 Hz, 1H, CH_aCHOH), 2.68 (dd, J = 14.0, 9.2 Hz, 1H, CH_bCHOH), 2.02 (d, J = 3.2 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.7, 143.0, 132.7 (C_{Ar}H), 130.6 (C_{Ar}H), 130.2, 129.0 (C_{Ar}H), 127.9 (C_{Ar}H), 127.4 (C_{Ar}H), 121.9, 114.2 (C_{Ar}H), 74.3 (*C*HOH), 55.4 (O*C*H$_3$), 43.6 (*C*H$_2$CHOH). **LRMS** (ESI, m/z) 307.2 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{15}H_{14}{}^{79}BrO^+$ [M-OH]$^+$ 289.0223, found 289.0221. **IR** ν max (film): 3329, 2948, 1512, 1459, 1403, 1112, 1020, 880 cm^{-1}.

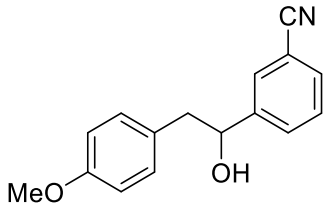


***tert*-Butyl {2-[1-hydroxy-2-(4-methoxyphenyl)ethyl]phenyl}carbamate 3m**

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), *tert*-butyl (2-formylphenyl)carbamate (34 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 40% EtOAc in petroleum ether) to give the titled product as a colourless oil (26 mg, 76%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.06 – 7.82 (m, 2H, H_{Ar}), 7.32 – 7.21 (m, 1H, H_{Ar}), 7.11 (d, *J* = 8.5 Hz, 3H, H_{Ar}), 7.00 (td, *J* = 7.5, 1.2 Hz, 1H, H_{Ar}), 6.86 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 4.88 (ddd, *J* = 8.8,

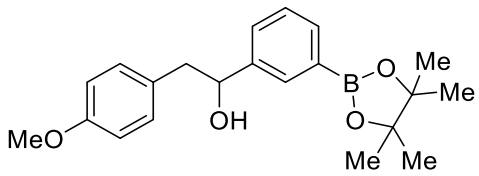
5.3, 2.8 Hz, 1H, C*H*OH), 3.80 (s, 3H, OCH_3), 3.11 (dd, *J* = 13.7, 8.8 Hz, 1H, CH_aCHOH), 3.04 (dd, *J* = 13.8, 5.3 Hz, 1H, CH_bCHOH), 2.27 (d, *J* = 2.8 Hz, 1H, O*H*), 1.53 (s, 9H, C(CH_3)$_3$); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.7, 153.5, 137.3, 130.6 (C_{Ar}H), 129.6, 128.7 (C_{Ar}H), 127.5 (C_{Ar}H), 123.2 (C_{Ar}H), 122.0, 114.3 (C_{Ar}H), 80.2 (*C*(CH$_3$)$_3$), 75.8 (*C*HOH), 55.4 (O*C*H$_3$), 42.1 (*C*H$_2$CHOH), 28.6 (C(*C*H$_3$)$_3$). **LRMS** (ESI, m/z) 366.3 ([M+Na]$^+$, 100%); **HRMS** (ESI) calcd for $C_{20}H_{25}NO_4Na^+$ [M+Na]$^+$ 366.1681, found 366.1677. **IR** ν max (film): 3320, 2934, 1967, 1726, 1590, 1513, 1448, 1367, 1302, 1246, 1159, 1037, 755 cm^{-1}.



3-(1-Hydroxy-2-(4-methoxyphenyl)ethyl)benzonitrile 3n

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 3-formylbenzonitrile (20 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF$_3$)ppy]$_2$(dtbpy)}PF$_6$ (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a colourless oil (21 mg, 82%).

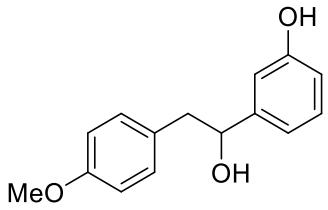
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65 (s, 1H, H_{Ar}), 7.56 (dt, *J* = 8.0, 1.8 Hz, 2H, H_{Ar}), 7.44 (t, *J* = 7.7 Hz, 1H, H_{Ar}), 7.07 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 6.85 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 4.89 (dd, *J* = 8.5, 4.8 Hz, 1H, C*H*OH), 3.80 (s, 3H, OCH_3), 2.98 (dd, *J* = 13.8, 4.8 Hz, 1H, CH_aCHOH), 2.88 (dd, *J* = 13.8, 8.5 Hz, 1H, CH_bCHOH), 2.08 (d, *J* = 2.9 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.8, 145.3, 131.3 (C_{Ar}H), 130.6 (C_{Ar}H), 130.5 (C_{Ar}H), 129.8 (C_{Ar}H), 129.2 (C_{Ar}H), 128.9, 119.0, 114.3 (C_{Ar}H), 112.6, 74.5 (*C*HOH), 55.4 (O*C*H$_3$), 45.4 (*C*H$_2$CHOH). **LRMS** (ESI, m/z) 254.2 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{16}H_{15}O_2NNa^+$ [M+Na]$^+$ 276.0995, found 276.0991. **IR** ν max (film): 3426, 2910, 2232, 1612, 1584, 1513, 1440, 1301, 1246, 1178, 1108, 1035, 817, 692 cm^{-1}.



2-(4-Methoxyphenyl)-1-[3-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)phenyl]ethan-1-ol 3o

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 3-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)benzaldehyde (35 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 30% EtOAc in petroleum ether) to give the titled product as a colourless oil (22 mg, 63%).

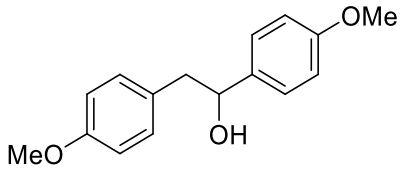
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82 (s, 1H, H_{Ar}), 7.74 (d, J = 7.2 Hz, 1H, H_{Ar}), 7.47 (d, J = 7.7 Hz, 1H, H_{Ar}), 7.36 (t, J = 7.4 Hz, 1H, H_{Ar}), 7.14 (d, J = 8.5 Hz, 2H, H_{Ar}), 6.85 (d, J = 8.6 Hz, 2H, H_{Ar}), 4.94 – 4.83 (m, 1H, C*H*OH), 3.80 (s, 3H, OCH_3), 3.01 (dd, J = 13.8, 4.3 Hz, 1H, CH_aCHOH), 2.91 (dd, J = 13.8, 8.9 Hz, 1H, CH_bCHOH), 1.92 (d, J = 3.0 Hz, 1H, O*H*), 1.36 (s, 12H, C(CH_3)$_2$); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.5, 143.3, 134.2 (C_{Ar}H), 132.3 (C_{Ar}H), 130.6 (C_{Ar}H), 130.3, 129.0 (C_{Ar}H), 128.0 (C_{Ar}H), 126.1, 114.1 (C_{Ar}H), 84.0 (C(CH$_3$)$_2$), 75.6 (*C*HOH), 55.4 (O*C*H$_3$), 45.3 (*C*H$_2$CHOH), 25.0 (C(*C*H$_3$)$_2$). **LRMS** (ESI, m/z) 377.3 ([M+Na]$^+$, 100%); **HRMS** (ESI) calcd for $C_{21}H_{27}O_4BNa^+$ [M+Na]$^+$ 377.1895, found 377.1891. **IR** ν max (film): 3439, 2976, 1609, 1512, 1429, 1358, 1317, 1246, 1143, 1109, 1036, 964, 857, 710 cm^{-1}.



3-[1-Hydroxy-2-(4-methoxyphenyl)ethyl]phenol 3p

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 3-hydroxybenzaldehyde (18 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 60% EtOAc in petroleum ether) to give the titled product as a colourless oil (18 mg, 73%).

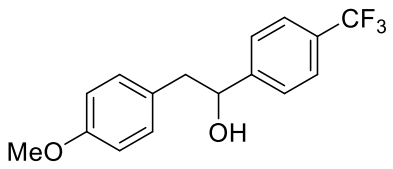
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.20 (t, *J* = 7.9 Hz, 1H, H_{Ar}), 7.10 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 6.88 (d, *J* = 7.7 Hz, 1H, H_{Ar}), 6.86 – 6.80 (m, 3H, H_{Ar}), 6.74 (dd, *J* = 7.9, 2.6 Hz, 1H, H_{Ar}), 5.25 (br s, 1H, ArO*H*), 4.80 (dd, *J* = 8.5, 4.8 Hz, 1H, C*H*OH), 3.79 (s, 3H, OCH_3), 2.98 (dd, *J* = 13.8, 4.8 Hz, 1H, CH_aCHOH), 2.89 (dd, *J* = 13.8, 8.5 Hz, 1H, CH_bCHOH), 2.09 (br s, 1H, CHO*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.5, 155.9, 145.8, 130.6 (C_{Ar}H), 129.9, 129.8 (C_{Ar}H), 118.5 (C_{Ar}H), 114.7 (C_{Ar}H), 114.1 (C_{Ar}H), 112.9 (C_{Ar}H), 75.3 (*C*HOH), 55.4 (O*C*H_3), 45.1 (*C*H_2CHOH). **LRMS** (ESI, m/z) 245.2 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{15}H_{15}O_2^+$ [M-OH]$^+$ 227.1067, found 227.1065. **IR** ν max (film): 3348, 2936, 2836, 1610, 1591, 1512, 1457, 1301, 1245, 1178, 1153, 110, 1033, 819, 789, 698 cm^{-1}.



1,2-Bis(4-methoxyphenyl)ethan-1-ol 3q

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 4-anisaldehyde (20 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a white solid (11 mg, 44%).

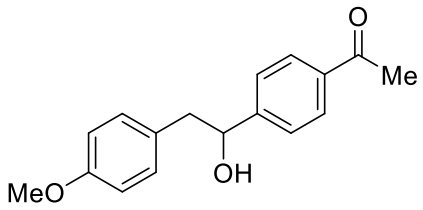
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.29 – 7.23 (m, 2H, H_{Ar}), 7.09 (d, *J* = 8.5 Hz, 2H, H_{Ar}), 6.88 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 6.83 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 4.81 (ddd, *J* = 7.9, 5.5, 2.6 Hz, 1H, C*H*OH), 3.81 (s, 3H, OCH_3), 3.79 (s, 3H, OCH_3), 2.97 (dd, *J* = 13.7, 5.5 Hz, 1H, CH_aCHOH), 2.94 (dd, *J* = 13.7, 7.9 Hz, 1H, CH_bCHOH), 1.89 (d, *J* = 2.6 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 159.2, 158.5, 136.2, 130.6 (C_{Ar}H), 130.2, 127.3 (C_{Ar}H), 114.1 (C_{Ar}H), 113.9 (C_{Ar}H), 75.2 (*C*HOH), 55.4 (O*C*H_3), 55.4 (O*C*H_3), 45.3 (*C*H_2CHOH). **LRMS** (ESI, m/z) 281.1 ([M+Na]$^+$, 100%); **HRMS** (ESI) calcd for $C_{16}H_{18}O_3Na^+$ [M+Na]$^+$ 281.1148, found 281.1143. **IR** ν max (film): 3389, 2938, 2836, 1612, 1585, 1512, 1464, 1301, 1245, 1176, 1105, 1034, 830 cm^{-1}. **M.p**.: 111– 113 °C (lit.: 113). The data presented are consistent with literature precedent.[5]



2-(4-Methoxyphenyl)-1-[4-(trifluoromethyl)phenyl]ethan-1-ol 3r

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 4-(trifluoromethyl)benzaldehyde (26 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 30% EtOAc in petroleum ether) to give the titled product as a white solid (23 mg, 79%).

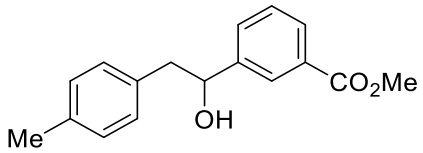
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.60 (d, *J* = 8.1 Hz, 2H, H_{Ar}), 7.46 (d, *J* = 8.1 Hz, 2H, H_{Ar}), 7.09 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 6.85 (d, *J* = 8.8 Hz, 2H, H_{Ar}), 4.92 (q, *J* = 3.9 Hz, 1H, C*H*OH), 3.80 (s, 3H, OCH_3), 3.00 (dd, *J* = 13.8, 4.7 Hz, 1H, CH_aCHOH), 2.89 (dd, *J* = 13.8, 8.5 Hz, 1H, CH_bCHOH), 2.04 (d, *J* = 2.9 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.7, 147.8, 130.6 (C_{Ar}H), 129.8 (q, $^2J_{C\text{-}F}$ = 32.4 Hz, $C_{Ar\text{-}F}$), 129.26, 126.3 ($C_{Ar\text{-}F}$H), 125.5 (q, $^3J_{C\text{-}F}$ = 3.8 Hz, $C_{Ar\text{-}F}$), 124.3 (q, $^1J_{C\text{-}F}$ = 271.8 Hz, $C_{Ar\text{-}F}$), 114.2 (C_{Ar}H), 74.9 (*C*HOH), 55.4 (O*C*H$_3$), 45.4 (*C*H$_2$CHOH); **^{19}F NMR** (376 MHz, $CDCl_3$) δ -63.4. **HRMS** (ESI) calcd for $C_{16}H_{15}O_2F_3Na^+$ $[M+Na]^+$ 319.0916, found 319.0916. **IR** ν max (film): 3254, 2963, 2844, 1611, 1514, 1467, 1421, 1329, 1250, 1159, 1121, 1069, 1034, 840, 814 cm^{-1}. **M.p**.: 97 – 99 °C. The data presented are consistent with literature precedent.[6]



1-{4-[1-Hydroxy-2-(4-methoxyphenyl)ethyl]phenyl}ethan-1-one 3s

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 4-acetylbenzaldehyde (23 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 40% EtOAc in petroleum ether) to give the titled product as a white solid (13 mg, 49%).

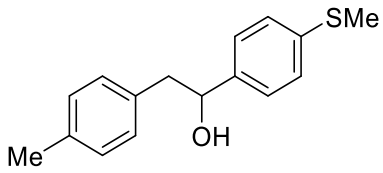
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.94 (d, *J* = 8.4 Hz, 2H, H_{Ar}), 7.43 (d, *J* = 8.3 Hz, 2H, H_{Ar}), 7.09 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 6.84 (d, *J* = 8.5 Hz, 2H, H_{Ar}), 4.92 (dd, *J* = 8.4, 4.7 Hz, 1H, C*H*OH), 3.80 (s, 3H, OCH_3), 3.01 (dd, *J* = 13.8, 4.7 Hz, 1H, CH_aCHOH), 2.91 (dd, *J* = 13.8, 8.4 Hz, 1H, CH_bCHOH), 2.61 (s, 3H, COCH_3), 2.02 (d, *J* = 3.0 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 259.1 (*C*OCH_3), 158.7, 149.2, 136.5, 130.7 (C_{Ar}H), 129.3, 128.6 (C_{Ar}H), 126.2 (C_{Ar}H), 114.2 (C_{Ar}H), 75.0 (*C*HOH), 55.4 (O*C*H_3), 45.3 (*C*H_2CHOH), 26.8 (CO*C*H_3). **LRMS** (ESI, m/z) 271.2 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{17}H_{18}O_3Na^+$ [M+Na]$^+$ 293.1148, found 293.1144. **IR** ν max (film): 3509, 3333, 2915, 1667, 1606, 1511, 1413, 1360, 1272, 1242, 1178, 1057, 1030, 834 cm^{-1}. **M.p**.: 128 – 130 °C.



Methyl 3-[1-hydroxy-2-(*p*-tolyl)ethyl]benzoate 3t

General Procedure A was followed using 4-methylbenzylboronic acid pinacol ester (23 mg, 0.1 mmol, 1.0 eq.), methyl 3-formylbenzoate (24 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 30% EtOAc in petroleum ether) to give the titled product as a colourless oil (16 mg, 59%).

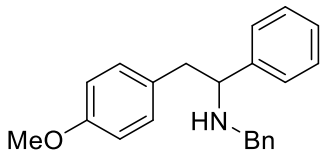
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.07 (s, 1H, H_{Ar}), 7.96 (dt, *J* = 7.8, 1.5 Hz, 1H, H_{Ar}), 7.56 (dt, *J* = 7.6, 1.6 Hz, 1H, H_{Ar}), 7.42 (t, *J* = 7.7 Hz, 1H, H_{Ar}), 7.16 – 7.07 (m, 4H, H_{Ar}), 4.93 (dt, *J* = 9.0, 3.7 Hz, 1H, C*H*OH), 3.93 (s, 3H, COOCH_3), 3.04 (dd, *J* = 13.7, 4.4 Hz, 1H, CH_aCHOH), 2.92 (dd, *J* = 13.7, 9.0 Hz, 1H, CH_bCHOH), 2.33 (s, 3H, CCH_3), 2.02 (d, *J* = 3.0 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 167.2 (*C*$OOCH_3$), 144.4, 136.6, 134.6, 130.7 (C_{Ar}H), 130.4, 129.5 (C_{Ar}H), 129.5 (C_{Ar}H), 128.9 (C_{Ar}H), 128.6 (C_{Ar}H), 127.2 (C_{Ar}H), 75.0 (*C*HOH), 52.3 (COO*C*H_3), 45.9 (*C*H_2CHOH), 21.2 (C*C*H_3). **LRMS** (ESI, m/z) 271.2 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{17}H_{17}O_3^-$ [M-H]$^-$ 269.1178, found 269.1176. **IR** ν max (film): 3455, 2947, 1722, 1515, 1433, 1286, 1201, 1108, 1055, 794, 759, 696 cm^{-1}.



1-[4-(Methylthio)phenyl]-2-(*p*-tolyl)ethan-1-ol 3u

General Procedure A was followed using 4-methylbenzylboronic acid pinacol ester (23 mg, 0.1 mmol, 1.0 eq.), 4-(methylthio)benzaldehyde (23 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a white solid (18 mg, 71%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.34 – 7.20 (m, 4H, H_{Ar}), 7.14 – 7.04 (m, 4H, H_{Ar}), 4.84 (ddd, J = 8.3, 4.8, 2.8 Hz, 1H, C*H*OH), 2.99 (dd, J = 13.7, 4.8 Hz, 1H), 2.92 (dd, J = 13.7, 8.3 Hz, 1H, CH_bCHOH), 2.49 (s, 3H, SCH_3), 2.33 (s, 3H, CCH_3), 1.91 (d, J = 2.8 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 141.0, 137.7, 136.4, 134.9, 129.5 (C_{Ar}H) 129.4 (C_{Ar}H), 126.8 (C_{Ar}H), 126.6 (C_{Ar}H), 75.1 (*C*HOH), 45.8 (*C*H_2CHOH), 21.2 (S*C*H_3), 16.1 (C*C*H_3). **HRMS** (ESI) calcd for $C_{16}H_{17}S^+$ [M-OH]$^+$ 241.1045, found 241.1047. **IR** ν max (film): 3438, 2917, 2835, 1515, 1489, 1423, 1107, 1040, 817 cm^{-1}. **M.p**.: 90 – 92 °C.

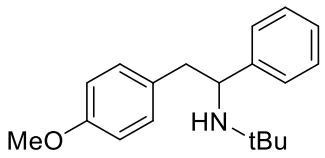


***N*-Benzyl-2-(4-methoxyphenyl)-1-phenylethan-1-amine 3v**

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), *N*-benzylidenebenzylamine (29 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 40% EtOAc in petroleum ether) to give the titled product as a colourless oil (22 mg, 70%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39 – 7.31 (m, 4H, H_{Ar}), 7.29 – 7.25 (m, 3H, H_{Ar}), 7.21 (t, J = 7.2 Hz, 1H, H_{Ar}), 7.15 – 7.11 (m, 2H, H_{Ar}), 7.02 (d, J = 8.4 Hz, 2H, H_{Ar}), 6.80 (d, J = 8.6 Hz, 2H, H_{Ar}), 3.85 (dd, J = 8.7, 5.5 Hz, 1H, C*H*NH), 3.80 (s, 3H, OCH_3), 3.66 (d, J = 13.6 Hz, 1H, CH_aNH), 3.47 (d, J = 13.6 Hz, 1H, CH_aNH), 2.91 (dd, J = 13.7, 5.5 Hz, 1H, CH_aCHOH), 2.84 (dd, J = 13.7, 8.7

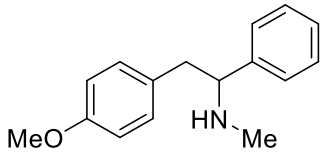
Hz, 1H, CH_bCHOH), 1.66 (br s, 1H, N*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.3, 144.0, 140.7, 131.0, 130.4 (C_{Ar}H), 128.5 (C_{Ar}H), 128.4 (C_{Ar}H), 128.1 (C_{Ar}H), 127.6 (C_{Ar}H), 127.2 (C_{Ar}H), 126.9 (C_{Ar}H), 113.9 (C_{Ar}H), 63.9 (*C*HNH), 55.4 (O*C*H$_3$), 51.5 (*C*H$_2$NH), 44.6 (*C*H$_2$CHNH). **LRMS** (ESI, m/z) 318.3 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{22}H_{24}NO^+$ [M+H]$^+$ 318.1858, found 318.1855. **IR** ν max (film): 3590, 3026, 2917, 2356, 1611, 1511, 1453, 1247, 1177, 1035, 699 cm^{-1}.



***N*-[2-(4-Methoxyphenyl)-1-phenylethyl]-2-methylpropan-2-amine 3w**

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), *N*-benzylidene-*tert*-butylamine (24 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF$_3$)ppy]$_2$(dtbpy)}PF$_6$ (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 30% EtOAc in petroleum ether) to give the titled product as a colourless oil (16 mg, 56%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.43 – 7.35 (m, 2H, H_{Ar}), 7.30 – 7.24 (m, 2H, H_{Ar}), 7.21 – 7.16 (m, 1H, H_{Ar}), 7.05 (d, *J* = 8.5 Hz, 2H, H_{Ar}), 6.80 (d, *J* = 8.5 Hz, 2H, H_{Ar}), 3.94 (dd, *J* = 9.0, 5.5 Hz, 1H, C*H*NH), 3.79 (s, 3H, OCH_3), 2.86 (dd, *J* = 13.6, 5.5 Hz, 1H, CH_aNH), 2.64 (dd, *J* = 13.6, 9.0 Hz, 1H, CH_bNH), 1.39 (br s, 1H, N*H*), 0.84 (s, 9H, C(CH_3)$_3$); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.3, 147.8, 131.5, 130.4 (C_{Ar}H), 128.2 (C_{Ar}H), 127.3 (C_{Ar}H), 126.5 (C_{Ar}H), 113.8 (C_{Ar}H), 59.4 (*C*HNH), 55.4 (O*C*H$_3$), 51.3 (*C*(CH$_3$)$_3$), 46.4 (*C*H$_2$CHNH), 30.1 (C(*C*H$_3$)$_3$). **LRMS** (ESI, m/z) 284.3 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{19}H_{26}NO^+$ [M+H]$^+$ 284.2014, found 284.2012. **IR** ν max (film): 3786, 2957, 2345, 1611, 1512, 1453, 1388, 1364, 1301, 1246, 1177, 1036, 823, 758, 700 cm^{-1}.

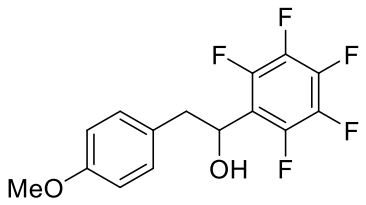


2-(4-Methoxyphenyl)-*N*-methyl-1-phenylethan-1-amine 3x

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), *N*-benzylidenemethylamine (18 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg,

0.02 mmol, 20 mol%) and {Ir[dF(CF$_3$)ppy]$_2$(dtbpy)}PF$_6$ (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 40% EtOAc in petroleum ether) to give the titled product as a colourless oil (19 mg, 80%).

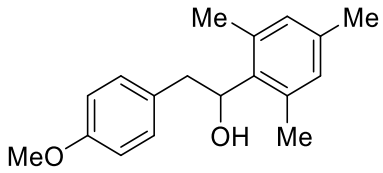
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 – 7.23 (m, 5H, H_{Ar}), 7.05 (d, J = 8.6 Hz, 2H, H_{Ar}), 6.81 (d, J = 8.6 Hz, 2H, H_{Ar}), 3.79 (s, 3H, OCH_3), 3.68 (dd, J = 8.4, 5.6 Hz, 1H, CHNH), 2.90 (dd, J = 13.7, 5.6 Hz, 1H, CH_aNH), 2.82 (dd, J = 13.6, 8.4 Hz, 1H, CH_bNH), 2.21 (s, 3H, NCH_3), 1.70 (br s, 1H, NH); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.3, 143.6, 131.0, 130.4 (C_{Ar}H), 128.5 (C_{Ar}H), 127.5 (C_{Ar}H), 127.2 (C_{Ar}H), 114.0 (C_{Ar}H), 67.2 (*C*HNH), 55.4 (O*C*H$_3$), 44.4 (*C*H$_2$CHNH), 34.8 (N*C*H$_3$). **LRMS** (ESI, m/z) 242.2 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{16}H_{20}NO^+$ [M+H]$^+$ 242.1545, found 242.1547. **IR** ν max (film): 3297, 2172, 1632, 1512, 1248, 1038, 798, 700 cm^{-1}.



2-(4-Methoxyphenyl)-1-(perfluorophenyl)ethan-1-ol 3y

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 2,3,4,5,6-pentafluorobenzaldehyde (29 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF$_3$)ppy]$_2$(dtbpy)}PF$_6$ (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 40% EtOAc in petroleum ether) to give the titled product as a white solid (13 mg, 42%).

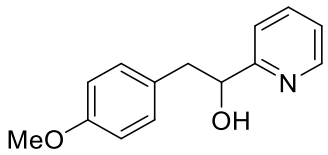
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.08 (d, J = 8.6 Hz, 2H, H_{Ar}), 6.83 (d, J = 8.6 Hz, 2H, H_{Ar}), 5.24 (q, J = 7.1 Hz, 1H, CHOH), 3.79 (s, 3H, OCH_3), 3.25 (dd, J = 13.7, 8.0 Hz, 1H, CH_aCHOH), 3.05 (dd, J = 13.7, 6.5 Hz, 1H, CH_bCHOH), 2.24 (d, J = 6.9 Hz, 1H, OH); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.9, 146.2, 139.5, 138.8, 131.1, 130.3 (C_{Ar}H), 128.3, 116.2, 114.4 (C_{Ar}H), 113.3, 67.7 (*C*HOH), 55.4 (O*C*H$_3$), 42.4 (*C*H$_2$CHOH); **^{19}F NMR** (376 MHz, $CDCl_3$) δ -144.2 – -144.5 (m), -155.9 (t, J = 21.0 Hz), -162.6 – -163.3 (m). **LRMS** (ESI, m/z) 341.3 ([M+Na]$^+$, 100%); **HRMS** (ESI) calcd for $C_{15}H_{11}O_2F_5Na^+$ [M+Na]$^+$ 341.0571, found 341.0566. **IR** ν max (film): 3422, 2938, 2837, 1653, 1612, 1503, 1466, 1420, 1302, 1248, 1178, 1121, 1035, 997, 953, 882, 821 cm^{-1}. **M.p**.: 78 – 80 °C.



1-Mesityl-2-(4-methoxyphenyl)ethan-1-ol 3z

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), mesitaldehyde (22 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a colourless oil (14 mg, 50%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.14 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 6.85 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 6.83 (s, 2H, H_{Ar}), 5.25 (ddd, *J* = 9.1, 5.1, 2.6 Hz, 1H, C*H*OH), 3.80 (s, 3H, OCH_3), 3.15 (dd, *J* = 13.8, 9.1 Hz, 1H, CH_aCHOH), 2.94 (dd, *J* = 13.8, 5.1 Hz, 1H, CH_bCHOH), 2.39 (s, 6H, CH_3), 2.26 (s, 3H, CH_3), 1.75 (d, *J* = 2.6 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.5, 136.8, 136.2, 136.1, 131.0, 130.5 (C_{Ar}H), 130.3 (C_{Ar}H), 114.1 (C_{Ar}H), 73.0 (*C*HOH), 55.4 (O*C*H$_3$), 41.5 (*C*H$_2$CHOH), 20.9 (*C*H$_3$), 20.9 (2 × *C*H$_3$). **HRMS** (ESI) calcd for $C_{18}H_{21}O_2^-$ [M-H]$^-$ 269.1542, found 269.1541. **IR** ν max (film): 3331, 2946, 2835, 1512, 1449, 1412, 1113, 1040, 970, 835 cm^{-1}.

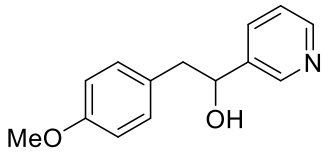


2-(4-methoxyphenyl)-1-(pyridin-2-yl)ethan-1-ol 3aa

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 2-pyridinecarboxaldehyde (16 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 60% EtOAc in petroleum ether) to give the titled product as a white solid (18 mg, 80%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.57 (dt, *J* = 4.9, 1.2 Hz, 1H, $H_{Pyridine}$), 7.65 (td, *J* = 7.6, 1.8 Hz, 1H, $H_{Pyridine}$), 7.21 (ddd, *J* = 7.5, 4.9, 1.2 Hz, 1H, $H_{Pyridine}$), 7.14 (d, *J* = 7.9 Hz, 1H, $H_{Pyridine}$), 7.09 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 6.83 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 4.95 (s, 1H, C*H*OH), 3.91 (d, *J* = 5.3 Hz, 1H, O*H*), 3.81 (s, 3H, OCH_3), 3.08 (dd, *J* = 13.7, 5.4 Hz, 1H, CH_aCHOH), 2.99 (dd, *J* = 13.7, 7.4 Hz, 1H,

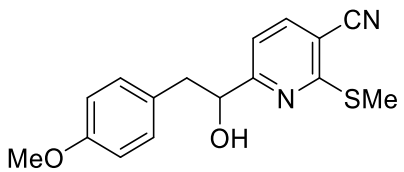
CH_bCHOH); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 161.5, 158.4, 148.5 ($C_{Pyridine}H$), 136.5 ($C_{Pyridine}H$), 130.7 ($C_{Ar}H$), 129.8, 122.5 ($C_{Pyridine}H$), 120.9 ($C_{Pyridine}H$), 113.9 ($C_{Ar}H$), 74.3 (*C*HOH), 55.4 (O*C*H$_3$), 44.4 (*C*H$_2$CHOH). **LRMS** (ESI, m/z) 230.4 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{14}H_{16}O_2N^+$ [M+H]$^+$ 230.1176, found 230.1173. **IR** ν max (film): 3120, 2907, 2833, 1713, 1598, 1510, 1465, 1435, 1336, 1302, 1242, 1177, 1111, 1035, 1006, 828, 805, 755 cm^{-1}. **M.p**.: 113 – 115 °C.



2-(4-Methoxyphenyl)-1-(pyridin-3-yl)ethan-1-ol 3ab

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 3-pyridinecarboxaldehyde (16 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF$_3$)ppy]$_2$(dtbpy)}PF$_6$ (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 60% EtOAc in petroleum ether) to give the titled product as a white solid (21 mg, 92%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 8.51 (d, *J* = 2.4 Hz, 1H, $H_{Pyridine}$), 8.49 (dd, *J* = 5.0, 1.8 Hz, 1H, $H_{Pyridine}$), 7.67 (dt, *J* = 7.9, 1.8 Hz, 1H, $H_{Pyridine}$), 7.26 (td, *J* = 5.0, 2.4 Hz, 1H, $H_{Pyridine}$), 7.08 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 6.84 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 4.89 (dd, *J* = 8.2, 5.2 Hz, 1H, C*H*OH), 3.79 (s, 3H, OC*H*$_3$), 2.99 (dd, *J* = 13.7, 5.2 Hz, 1H, CH_aCHOH), 2.93 (dd, *J* = 13.7, 8.2 Hz, 1H, CH_bCHOH), 2.39 (br s, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.7, 149.0 ($C_{Pyridine}H$), 148.0 ($C_{Pyridine}H$), 139.2, 133.8 ($C_{Pyridine}H$), 130.7 ($C_{Ar}H$), 129.2, 123.5 ($C_{Pyridine}H$), 114.2 ($C_{Ar}H$), 73.3 (*C*HOH), 55.4 (O*C*H$_3$), 45.3 (*C*H$_2$CHOH). **LRMS** (ESI, m/z) 230.2 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{14}H_{16}O_2N^+$ [M+H]$^+$ 230.1176, found 230.1174. **IR** ν max (film): 3332, 3194, 2907, 1611, 1583, 1512, 1464, 1428, 130, 1246, 1178, 1108, 1032, 814, 714 cm^{-1}. **M.p**.: 117 – 119 °C.

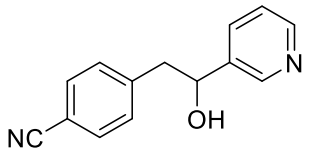


6-[1-Hydroxy-2-(4-methoxyphenyl)ethyl]-2-(methylthio)nicotinonitrile 3ac

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1

mmol, 1.0 eq.), 6-formyl-2-(methylthio)nicotinonitrile (27 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 30% EtOAc in petroleum ether) to give the titled product as a white solid (26 mg, 86%).

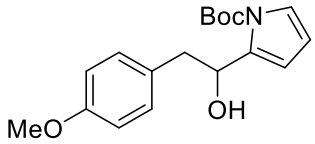
^{1}H NMR (600 MHz, $CDCl_3$) δ 7.73 (d, *J* = 7.9 Hz, 1H, $H_{Pyridine}$), 7.01 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 6.95 (d, *J* = 7.9 Hz, 1H, $H_{Pyridine}$), 6.82 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 5.02 – 4.86 (m, 1H, C*H*OH), 3.79 (s, 3H, OCH_3), 3.25 (d, *J* = 6.0 Hz, 1H, O*H*), 3.11 (dd, *J* = 13.8, 5.3 Hz, 1H, CH_aCHOH), 2.97 (dd, *J* = 13.8, 7.2 Hz, 1H, CH_bCHOH), 2.58 (s, 3H, SCH_3); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 165.3, 162.8, 158.7, 141.0 ($C_{Pyridine}$H), 130.7 (C_{Ar}H), 128.7, 115.7 (*C*N), 115.5 ($C_{Pyridine}$H), 114.1 (C_{Ar}H), 105.9, 74.5 (*C*HOH), 55.4 (O*C*H_3), 43.7 (*C*H_2CHOH), 13.3 (S*C*H_3). **LRMS** (ESI, m/z) 301.3 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{16}H_{17}N_2O_2S^+$ [M+H]$^+$ 301.1011, found 301.1005. **IR** ν max (film): 3477, 2929, 2834, 2224, 1611, 1572, 1511, 1425, 1358, 1301, 1245, 1177, 1071, 1033, 907, 834, 788 cm^{-1}. **M.p**.: 112 – 115 °C.



2-(4-Isocyanophenyl)-1-(pyridin-3-yl)ethan-1-ol 3ad

General Procedure A was followed using 4-isocyanobenzylboronic acid pinacol ester (24 mg, 0.1 mmol, 1.0 eq.), 3-pyridinecarboxaldehyde (16 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a white solid (7 mg, 33%).

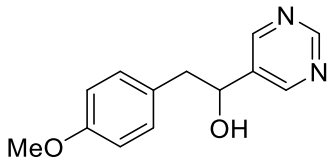
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.58 – 8.52 (m, 2H, $H_{Pyridine}$), 7.65 (d, *J* = 7.9 Hz, 1H, $H_{Pyridine}$), 7.59 (d, *J* = 7.8 Hz, 2H, H_{Ar}), 7.29 (dd, *J* = 7.9, 4.7 Hz, 3H, $H_{Pyridine}$ + H_{Ar}), 4.99 (dd, *J* = 7.8, 5.3 Hz, 1H, C*H*OH), 3.15 – 3.04 (m, 2H, CH_2CHOH); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 165.6, 149.6 ($C_{Pyridine}$H), 147.9 ($C_{Pyridine}$H), 143.0, 138.6, 133.7 ($C_{Pyridine}$H), 132.4 (C_{Ar}H), 130.6 (C_{Ar}H), 123.7 ($C_{Pyridine}$H), 111.0, 72.8 (*C*HOH), 45.8 (*C*H_2CHOH). **LRMS** (ESI, m/z) 225.1 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{14}H_{13}ON_2^+$ [M+H]$^+$ 225.1028, found 225.1026. **IR** ν max (film): 3399, 3334, 2925, 1607, 1512, 1432, 1095, 1004, 814 cm^{-1}. **M.p**.: 118 – 120 °C.



***tert*-Butyl 2-[1-hydroxy-2-(4-methoxyphenyl)ethyl]-1*H*-pyrrole-1-carboxylate 3ae**

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), *N*-Boc-pyrrole-2-carboxaldehyde (29 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and $\{Ir[dF(CF_3)ppy]_2(dtbpy)\}PF_6$ (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 50% EtOAc in petroleum ether) to give the titled product as a pale-yellow oil (19 mg, 61%). The product is not stable under air.

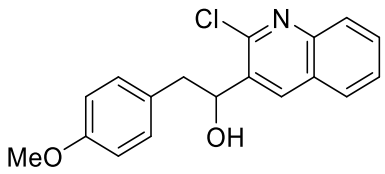
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.21 – 7.13 (m, 3H, $H_{Pyrrole}$ + H_{Ar}), 6.83 (d, J = 8.6 Hz, 2H), 6.22 – 6.17 (m, 1H, $H_{Pyrrole}$), 6.09 (t, J = 3.4 Hz, 1H, $H_{Pyrrole}$), 5.10 (dt, J = 8.5, 5.6 Hz, 1H, C*H*OH), 3.90 (d, J = 5.6 Hz, 1H, O*H*), 3.79 (s, 3H, OCH_3), 3.15 (dd, J = 13.8, 5.5 Hz, 1H, CH_aCHOH), 3.08 (dd, J = 13.8, 8.5 Hz, 1H, CH_bCHOH), 1.60 (s, 9H, C(CH_3)$_3$); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.3, 144.2, 137.8, 131.2, 130.5 (C_{Ar}H), 122.1 ($C_{Pyrrole}$H), 113.8 (C_{Ar}H), 112.0 ($C_{Pyrrole}$H), 110.5 ($C_{Pyrrole}$H), 84.7 (C(CH$_3$)$_3$), 68.2 (*C*HOH), 55.4 (O*C*H$_3$), 40.8 (*C*H$_2$CHOH), 28.1 (C(*C*H$_3$)$_3$). **LRMS** (ESI, m/z) 340.4 ($[M+Na]^+$, 100%); **HRMS** (ESI) calcd for $C_{18}H_{23}O_4NNa^+$ $[M+Na]^+$ 340.1519, found 340.1517. **IR** ν max (film): 2977, 2341, 1737, 1605, 1511, 1467, 1393, 1369, 1325, 1249, 1173, 1121, 1066, 1034, 961, 847, 727 cm^{-1}.



2-(4-Methoxyphenyl)-1-(pyrimidin-5-yl)ethan-1-ol 3af

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), pyrimidine-5-carboxaldehyde (16 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and $\{Ir[dF(CF_3)ppy]_2(dtbpy)\}PF_6$ (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 45% EtOAc in petroleum ether) to give the titled product as a white solid (18 mg, 76%).

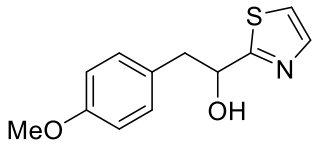
^{1}H NMR (400 MHz, $CDCl_3$) δ 9.12 (s, 1H, $H_{Pyrimidine}$), 8.67 (s, 2H, $H_{Pyrimidine}$), 7.08 (d, J = 8.6 Hz, 2H, H_{Ar}), 6.85 (d, J = 8.6 Hz, 2H, H_{Ar}), 4.92 (ddd, J = 8.2, 5.2, 3.0 Hz, 1H, C*H*OH), 3.79 (s, 3H, OCH_3), 3.02 (dd, J = 13.8, 5.2 Hz, 1H, CH_aCHOH), 2.96 (dd, J = 13.8, 8.2 Hz, 1H, CH_bCHOH), 2.41 (d, J = 3.0 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 159.0, 158.1 ($C_{Pyrimidine}$H), 155.0 ($C_{Thiophene}$H), 136.6, 130.7 (C_{Ar}H), 128.2, 114.5 (C_{Ar}H), 71.4 (*C*HOH), 55.4 (O*C*H_3), 45.1 (*C*H_2CHOH). **LRMS** (ESI, m/z) 253.2 ([M+Na]$^+$, 100%); **HRMS** (ESI) calcd for $C_{13}H_{14}O_2N_2Na^+$ [M+Na]$^+$ 253.0947, found 253.0945. **IR** ν max (film): 3303, 2936, 2835, 1611, 1567, 1512, 1439, 1408, 1301, 1247, 1178, 1110, 1064, 1034, 821, 727 cm^{-1}. **M.p**.: 105 – 107 °C.



1-(2-Chloroquinolin-3-yl)-2-(4-methoxyphenyl)ethan-1-ol 3ag

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 2-chloroquinoline-3-carbaldehyde (29 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 50% EtOAc in petroleum ether) to give the titled product as a white solid (18 mg, 59%).

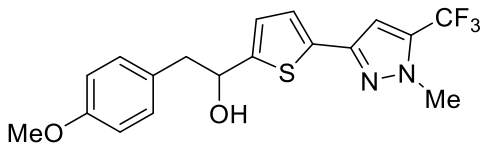
^{1}H NMR (400 MHz, $CDCl_3$) δ 8.36 (s, 1H, $H_{Quinoline}$), 8.02 (d, J = 8.5 Hz, 1H, $H_{Quinoline}$), 7.83 (dd, J = 8.2, 1.4 Hz, 1H, $H_{Quinoline}$), 7.72 (ddd, J = 8.5, 6.9, 1.4 Hz, 1H, $H_{Quinoline}$), 7.56 (ddd, J = 8.2, 6.9, 1.2 Hz, 1H, $H_{Quinoline}$), 7.23 (d, J = 8.5 Hz, 2H, H_{Ar}), 6.88 (d, J = 8.6 Hz, 2H, H_{Ar}), 5.32 (dd, J = 8.8, 2.8 Hz, 1H, C*H*OH), 3.80 (s, 4H, OCH_3), 3.32 (dd, J = 14.0, 3.0 Hz, 1H, CH_aCHOH), 2.72 (dd, J = 14.0, 9.1 Hz, 1H, CH_bCHOH), 2.37 (s, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.8, 148.7, 147.1, 135.9 ($C_{Quinoline}$H), 135.7, 130.7 (C_{Ar}H), 130.4 ($C_{Quinoline}$H), 129.6, 128.3 ($C_{Quinoline}$H), 127.8 ($C_{Quinoline}$H), 127.6, 127.3 ($C_{Quinoline}$H), 114.3 (C_{Ar}H), 71.8 (*C*HOH), 55.4 (O*C*H_3), 43.7 (*C*H_2CHOH). **LRMS** (ESI, m/z) 314.1 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{18}H_{17}O_2N^{35}Cl^+$ [M+H]$^+$ 314.0948, found 314.0945. **IR** ν max (film): 3376, 2922, 2835, 2359, 1612, 1511, 1491, 1398, 1327, 1246, 1177, 1138, 1037, 818, 782, 754 cm^{-1}. **M.p**.: 111 – 113 °C.



2-(4-Methoxyphenyl)-1-(thiazol-2-yl)ethan-1-ol 3ah

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 2-thiazolecarboxaldehyde (17 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 40% EtOAc in petroleum ether) to give the titled product as a white solid (16 mg, 68%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.75 (d, *J* = 3.2 Hz, 1H, $H_{Thiazole}$), 7.29 (d, *J* = 3.2 Hz, 1H, $H_{Thiazole}$), 7.14 (d, *J* = 8.5 Hz, 2H, H_{Ar}), 6.85 (d, *J* = 8.5 Hz, 2H, H_{Ar}), 5.18 (dt, *J* = 8.5, 4.3 Hz, 1H, C*H*OH), 3.79 (s, 3H, OCH_3), 3.30 (dd, *J* = 13.9, 4.3 Hz, 1H, CH_aCHOH), 3.04 (dd, *J* = 13.9, 8.5 Hz, 1H, CH_bCHOH), 2.86 (d, *J* = 4.7 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 174.2, 158.8, 142.5 ($C_{Thiazole}$H), 130.8 (C_{Ar}H), 128.7, 119.1 ($C_{Thiazole}$H), 114.2 (C_{Ar}H), 73.1 (*C*HOH), 55.4 (O*C*H$_3$), 43.8 (*C*H$_2$CHOH). **LRMS** (ESI, m/z) 236.2 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{12}H_{14}O_2NS^+$ [M+H]$^+$ 236.0745, found 236.0745. **IR** ν max (film): 3397, 3245, 2358, 1611, 1513, 1247, 1178, 1035, 787, 669 cm^{-1}. **M.p**.: 98 – 100 °C.

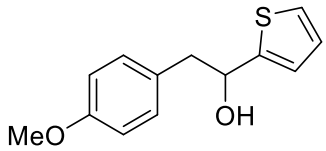


2-(4-Methoxyphenyl)-1-{5-[1-methyl-5-(trifluoromethyl)-1*H*-pyrazol-3-yl]thiophen-2-yl}ethan-1-ol 3ai

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 5-[1-methyl-5-(trifluoromethyl)-1*H*-pyrazol-3-yl]thiophene-2-carbaldehyde (39 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 30% EtOAc in petroleum ether) to give the titled product as a white solid (21 mg, 54%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.16 – 7.10 (m, 3H, H_{Ar}), 6.87 – 6.83 (m, 3H, H_{Ar}), 6.77 (s, 1H, H_{Ar}), 5.08 (dd, *J* = 8.0, 5.3 Hz, 1H, C*H*OH), 4.00 (s, 3H, NCH_3), 3.79 (s, 3H, OCH_3), 3.11 (dd, *J* = 13.8,

5.3 Hz, 1H, CH_aCHOH), 3.06 (dd, J = 13.8, 8.0 Hz, 1H, CH_bCHOH), 2.13 (br s, 1H, O*H*); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 158.7, 147.7, 145.9, 134.3, 133.3 (q, $^2J_{C\text{-}F}$ = 39.1 Hz, $C_{Ar\text{-}F}$), 130.6 (C_{Ar}H), 129.4, 124.6 (C_{Ar}H), 123.9 (C_{Ar}H), 120.0 (q, $^1J_{C\text{-}F}$ = 268.9 Hz, $C_{Ar\text{-}F}$), 114.2 (C_{Ar}H), 104.4 (d, $^3J_{C\text{-}F}$ = 2.3 Hz, $C_{Ar\text{-}F}$H), 71.6 (*C*HOH), 55.4 (O*C*H$_3$), 45.2 (*C*H$_2$CHOH), 38.2 (d, $^3J_{C\text{-}F}$ = 2.1 Hz, N$C_{Ar\text{-}F}H_3$); **^{19}F NMR** (376 MHz, $CDCl_3$) δ -60.6. **LRMS** (ESI, m/z) 383.1 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{18}H_{18}N_2O_2F_3S^+$ [M+H]$^+$ 383.1041, found 383.1032. **IR** ν max (film):3363, 2923, 2316, 1611, 1545, 1513, 1421, 1273, 1247, 1196, 1180, 1158, 1128, 1035, 804, 711 cm^{-1}. **M.p**.: 104 – 106 °C.

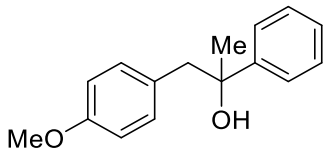


2-(4-Methoxyphenyl)-1-(thiophen-2-yl)ethan-1-ol 3aj

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 2-thiophenecarboxaldehyde (17 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 30% EtOAc in petroleum ether) to give the titled product as a colourless oil (11 mg, 48%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.29 – 7.23 (m, 1H, $H_{Thiophene}$), 7.14 (d, *J* = 8.3 Hz, 2H, H_{Ar}), 6.99 – 6.92 (m, 2H, $H_{Thiophene}$), 6.85 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 5.11 (t, *J* = 7.3 Hz, 1H, C*H*OH), 3.79 (s, 3H, OCH_3), 3.11 (dd, *J* = 13.8, 5.1 Hz, 1H, CH_aCHOH), 3.04 (dd, *J* = 13.8, 8.2 Hz, 1H, CH_bCHOH), 2.09 (d, *J* = 3.4 Hz, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.7, 147.8, 130.6 (C_{Ar}H), 129.6, 126.8 ($C_{Thiophene}$H), 124.7 ($C_{Thiophene}$H), 124.0 ($C_{Thiophene}$H), 114.1 (C_{Ar}H), 71.5 (*C*HOH), 55.4 (O*C*H$_3$), 45.4 (*C*H$_2$CHOH). **LRMS** (ESI, m/z) 257.3 ([M+Na]$^+$, 100%); **HRMS** (ESI) calcd for $C_{13}H_{14}O_2SNa^+$ [M+Na]$^+$ 257.0607, found 257.0604. **IR** ν max (film): 3749, 3400, 2918, 1611, 1512, 1463, 1301, 1246, 1178, 1033, 831, 701 cm^{-1}.

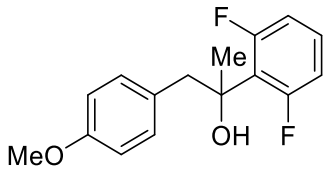
Cross-coupling products of benzylboronic esters with ketones



1-(4-Methoxyphenyl)-2-phenylpropan-2-ol 5a

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), acetophenone (18 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 20% EtOAc in petroleum ether) to give the titled product as a colourless oil (13 mg, 54%).

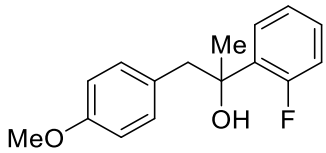
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.42 – 7.37 (m, 2H, H_{Ar}), 7.35 – 7.30 (m, 2H, H_{Ar}), 7.26 – 7.20 (m, 1H, H_{Ar}), 6.90 (d, J = 8.6 Hz, 2H, H_{Ar}), 6.75 (d, J = 8.7 Hz, 2H, H_{Ar}), 3.77 (s, 3H, OCH_3), 3.08 (d, J = 13.5 Hz, 1H, CH_aCCH$_3$), 2.96 (d, J = 13.5 Hz, 1H, CH_bCCH$_3$), 1.84 (br s, 1H, OH), 1.56 (s, 3H, CH_3); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.6, 147.8, 131.7 (C_{Ar}H), 128.8, 128.2 (C_{Ar}H), 126.8 (C_{Ar}H), 125.2 (C_{Ar}H), 113.7 (C_{Ar}H), 74.6 (CH$_2$$CCH_3$), 55.3 (O$CH_3$), 49.7 ($CH_2CCH_3$), 29.5 (C$CH_3$). **LRMS** (ESI, m/z) 243.2 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{16}H_{17}O_2^-$ [M-H]$^-$ 241.1234, found 241.1229. **IR** ν max (film): 3519, 3410, 2934, 1611, 1512, 1445, 1247, 1179, 1035, 819, 700 cm^{-1}. The data presented are consistent with literature precedent.[7]



2-(2,6-Difluorophenyl)-1-(4-methoxyphenyl)propan-2-ol 5b

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 2',6'-difluoroacetophenone (24 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 10% EtOAc in petroleum ether) to give the titled product as a colourless oil (9 mg, 32%).

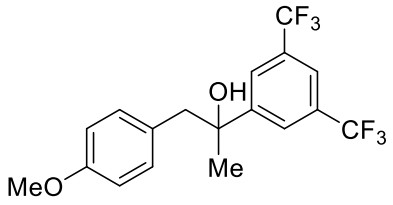
^{1}H NMR (600 MHz, $CDCl_3$) δ 7.21 – 7.12 (m, 1H, H_{Ar}), 6.87 (d, J = 8.8 Hz, 2H, H_{Ar}), 6.84 – 6.76 (m, 2H, H_{Ar}), 6.73 (d, J = 8.8 Hz, 2H, H_{Ar}), 3.76 (s, 3H, OCH_3), 3.20 (d, J = 13.5 Hz, 1H, CH_aCOH), 3.13 – 3.07 (m, 1H, OH), 3.02 (d, J = 13.5 Hz, 1H, CH_bCOH), 1.75 (t, J = 1.1 Hz, 3H, CCH_3); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 160.7 (dd, $^{1}J_{C\text{-}F}$ = 246.8, 8.9 Hz, $C_{Ar\text{-}F}$), 158.6, 131.3 (C_{Ar}H), 128.7, 128.6, 122.0, 113.7 (C_{Ar}H), 112.6 (d, $^{2}J_{C\text{-}F}$ = 29.7 Hz, $C_{Ar\text{-}F}$), 76.1 (CH_2COH), 55.3 (OCH$_3$), 48.6 (CH$_2$COH), 28.6 (CCH$_3$); **^{19}F NMR** (376 MHz, $CDCl_3$) δ -110.5. **HRMS** (ESI) calcd for $C_{16}H_{15}F_2O^-$ [M-OH]$^+$ 261.1091, found 261.1096. **IR** ν max (film): 3373, 2343, 2183, 1513, 1464, 1250, 987, 787 cm^{-1}.



2-(2-Fluorophenyl)-1-(4-methoxyphenyl)propan-2-ol 5c

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 2'-fluoroacetophenone (21 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF$_3$)ppy]$_2$(dtbpy)}PF$_6$ (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 10% EtOAc in petroleum ether) to give the titled product as a colourless oil (12 mg, 44%).

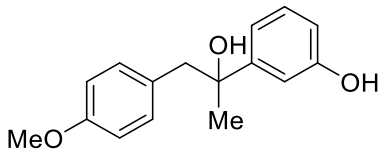
^{1}H NMR (600 MHz, $CDCl_3$) δ 7.32 (td, J = 8.1, 1.7 Hz, 1H, H_{Ar}), 7.25 – 7.19 (m, 1H, H_{Ar}), 7.09 – 6.99 (m, 2H, H_{Ar}), 6.90 (d, J = 8.6 Hz, 2H, H_{Ar}), 6.74 (d, J = 8.6 Hz, 2H, H_{Ar}), 3.75 (s, 3H, OCH_3), 3.29 (d, J = 13.7 Hz, 1H, CH_aCOH), 3.04 (d, J = 13.7 Hz, 1H, CH_bCOH), 2.08 (d, J = 1.8 Hz, 1H, OH), 1.63 (s, 3H, CCH_3); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 158.8, 158.6, 134.1, 131.5 (C_{Ar}H), 128.8, 128.7 (d, $^{2}J_{C\text{-}F}$ = 17.8 Hz, $C_{Ar\text{-}F}$), 127.6 (d, $^{3}J_{C\text{-}F}$ = 4.5 Hz, $C_{Ar\text{-}F}$), 124.1 (d, $^{3}J_{C\text{-}F}$ = 3.2 Hz, $C_{Ar\text{-}F}$), 116.0 (d, $^{1}J_{C\text{-}F}$ = 23.9 Hz, $C_{Ar\text{-}F}$), 113.8 (C_{Ar}H), 73.7 (CH_2COH), 55.3 (OCH$_3$), 47.2 (d, $^{4}J_{C\text{-}F}$ = 4.0 Hz, CH$_2$COH), 28.3 (d, $^{4}J_{C\text{-}F}$ = 3.9 Hz, CCH$_3$); **^{19}F NMR** (376 MHz, $CDCl_3$) δ -112.8. **HRMS** (ESI) calcd for $C_{16}H_{18}FO_2^+$ [M+H]$^+$ 261.1291, found 261.1285. **IR** ν max (film): 3492, 2915, 2341, 1612, 1512, 1485, 1447, 1247, 1178, 1036, 811, 758 cm^{-1}.



2-[3,5-Bis(trifluoromethyl)phenyl]-1-(4-methoxyphenyl)propan-2-ol 5d

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 3',5'-bis(trifluoromethyl)acetophenone (38 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 30% EtOAc in petroleum ether) to give the titled product as a colourless oil (24 mg, 64%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.84 (d, J = 1.7 Hz, 2H, H_{Ar}), 7.77 (s, 1H, H_{Ar}), 6.91 (d, J = 8.6 Hz, 2H, H_{Ar}), 6.80 (d, J = 8.6 Hz, 2H, H_{Ar}), 3.78 (s, 3H, OCH_3), 3.03 (d, J = 13.6 Hz, 1H, CH_aCOH), 2.98 (d, J = 13.6 Hz, 1H, CH_bCOH), 1.98 (s, 1H, OH), 1.59 (s, 3H, CCH_3); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 159.0, 150.5, 131.6 (C_{ArH}), 131.4 (m, C_{ArH-F}), 127.5, 125.7, 123.6 (q, J_{C-F} = 272.3 Hz, C_{C-F}), 120.8 (m, C_{ArH-F}), 114.1 (C_{ArH}), 74.3 (CH_2COH), 55.4 (OCH_3), 49.6 (CH_2COH), 29.4 (CCH_3). **^{19}F NMR** (376 MHz, $CDCl_3$) δ -62.7. **HRMS** (ESI) calcd for $C_{18}H_{15}O_2F_6^-$ [M-H]$^-$ 377.0976, found 377.0978. **IR** ν max (film): 3564, 3491, 2945, 2339, 1612, 1513, 1468, 1376, 1278, 1170, 1130, 1037, 899, 844, 708, 682 cm^{-1}.

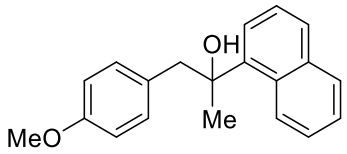


3-[2-Hydroxy-1-(4-methoxyphenyl)propan-2-yl]phenol 5e

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 3-hydroxyacetophenone (20 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 10% EtOAc in petroleum ether) to give the titled product as a colourless oil (9 mg, 35%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.20 (t, J = 7.9 Hz, 1H, H_{Ar}), 6.96 – 6.87 (m, 4H, H_{Ar}), 6.76 (d, J = 8.6 Hz, 2H, H_{Ar}), 6.71 (ddd, J = 8.0, 2.5, 0.9 Hz, 1H, H_{Ar}), 4.92 (br s, 1H, ArOH), 3.77 (s, 3H, OCH_3), 3.07 (d, J = 13.6 Hz, 1H, CH_aCOH), 2.94 (d, J = 13.6 Hz, 1H, CH_aCOH), 1.87 (s, 1H, COH),

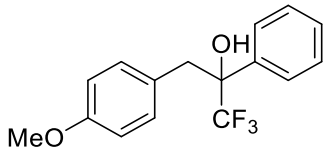
1.53 (s, 3H, CCH_3); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 158.6, 155.6, 149.9, 131.7 ($C_{Ar}H$), 129.5 ($C_{Ar}H$), 128.6, 117.7 ($C_{Ar}H$), 113.7 ($C_{Ar}H$), 113.6 ($C_{Ar}H$), 112.4 ($C_{Ar}H$), 74.6 (CH_2COH), 55.3 (OCH_3), 49.5 (CH_2COH), 29.6 (CCH_3). **LRMS** (ESI, m/z) 259.1 ($[M+H]^+$, 100%); **HRMS** (ESI) calcd for $C_{16}H_{19}O_3^+$ $[M+H]^+$ 259.1334, found 259.1323. **IR** ν max (film): 3306, 2150, 1609, 1512, 1448, 1248, 1178, 1003, 704 cm^{-1}.



1-(4-Methoxyphenyl)-2-(naphthalen-1-yl)propan-2-ol 5f

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 1-acetonaphthone (26 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 10% EtOAc in petroleum ether) to give the titled product as a colourless oil (11 mg, 36%).

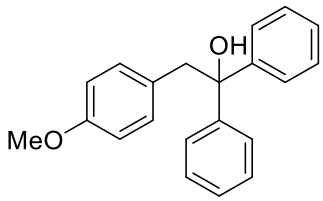
^{1}H NMR (600 MHz, $CDCl_3$) δ 8.88 (d, J = 8.6 Hz, 1H, H_{Naphth}), 7.90 (d, J = 8.6 Hz, 1H, H_{Naphth}), 7.78 (d, J = 8.0 Hz, 1H, H_{Naphth}), 7.56 (ddd, J = 8.6, 6.7, 1.5 Hz, 1H, H_{Naphth}), 7.50 (ddd, J = 8.0, 6.7, 1.2 Hz, 1H, H_{Naphth}), 7.43 (dd, J = 7.3, 1.2 Hz, 1H, H_{Naphth}), 7.35 (t, J = 7.7 Hz, 1H, H_{Naphth}), 6.85 (d, J = 8.5 Hz, 2H, H_{Ar}), 6.72 (d, J = 8.6 Hz, 2H, H_{Ar}), 3.75 (s, 3H, OCH_3), 3.55 (d, J = 13.6 Hz, 1H, CH_aCOH), 3.32 (d, J = 13.6 Hz, 1H, CH_bCOH), 2.09 (s, 1H, O*H*), 1.79 (s, 3H, CCH_3); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 158.5, 142.3, 135.0, 131.7 ($C_{Ar}H$), 131.0, 129.5 ($C_{Naphth}H$), 129.3, 128.8 ($C_{Naphth}H$), 127.1 ($C_{Naphth}H$), 125.6 ($C_{Naphth}H$), 125.3 ($C_{Naphth}H$), 125.0 ($C_{Naphth}H$), 124.2 ($C_{Naphth}H$), 113.6 ($C_{Ar}H$), 76.3 (CH_2COH), 55.3 (OCH_3), 47.8 (CH_2COH), 29.6 (CCH_3). **HRMS** (ESI) calcd for $C_{20}H_{19}O^+$ $[M-OH]^+$ 275.1430, found 275.1434. **IR** ν max (film): 3650, 3466, 2331, 2167, 1996, 1611, 1511, 1298, 1247, 779 cm^{-1}. The data presented are consistent with literature precedent.[8]



1,1,1-Trifluoro-3-(4-methoxyphenyl)-2-phenylpropan-2-ol 5g

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 2,2,2-trifluoroacetophenone (26 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 10% EtOAc in petroleum ether) to give the titled product as a colourless oil (15 mg, 49%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.57 – 7.49 (m, 2H, H_{Ar}), 7.42 – 7.32 (m, 3H, H_{Ar}), 6.89 (d, J = 8.7 Hz, 2H, H_{Ar}), 6.73 (d, J = 8.7 Hz, 2H, H_{Ar}), 3.74 (s, 3H, OCH_3), 3.47 – 3.27 (m, 2H, CH_2COH), 2.41 (s, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 159.2, 137.4, 131.9 (C_{Ar}H), 128.6 (C_{Ar}H), 128.4 (C_{Ar}H), 126.6 (q, $^4J_{C\text{-}F}$ = 1.5 Hz, $C_{Ar\text{-}F}$H), 124.9, 125.7 (q, $^1J_{C\text{-}F}$ = 285.7 Hz, $C_{Ar\text{-}F}$), 114.0 (C_{Ar}H), 55.3 (OCH$_3$), 41.1 (CH$_2$COH). One carbon is not detectable due to peak overlapping. **^{19}F NMR** (376 MHz, $CDCl_3$) δ -78.2. **HRMS** (ESI) calcd for $C_{16}H_{14}OF_3^+$ [M-OH]$^+$ 279.0997, found 279.0996. **IR** ν max (film): 3454, 2932, 1974, 1612, 1514, 1449, 1249, 1156, 1073, 1034, 962, 831, 759, 701 cm^{-1}. The data presented are consistent with literature precedent.[9]

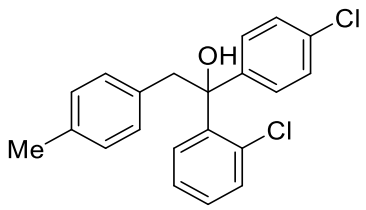


2-(4-Methoxyphenyl)-1,1-diphenylethan-1-ol 5h

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), benzophenone (27 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF_3)ppy]$_2$(dtbpy)}PF_6 (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 10% EtOAc in petroleum ether) to give the titled product as a white solid (18 mg, 59%).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.49 – 7.40 (m, 4H, H_{Ar}), 7.31 (t, J = 7.5 Hz, 4H, H_{Ar}), 7.23 (t, J = 7.3 Hz, 2H, H_{Ar}), 6.81 (d, J = 8.7 Hz, 2H, H_{Ar}), 6.70 (d, J = 8.7 Hz, 2H, H_{Ar}), 3.74 (s, 3H, OCH_3), 3.60 (s, 2H, CH_2COH), 2.32 (s, 1H, O*H*); **^{13}C NMR** (100 MHz, $CDCl_3$) δ 158.7, 146.8, 132.0 (C_{Ar}H), 128.2 (C_{Ar}H), 127.7, 127.0 (C_{Ar}H), 126.3 (C_{Ar}H), 113.7 (C_{Ar}H), 77.9 (CH$_2$*C*OH), 55.3 (OCH$_3$), 47.2 (CH$_2$COH). **HRMS** (ESI) calcd for $C_{21}H_{19}O^+$ [M-OH]$^+$ 287.1436, found 287.1430. **IR** ν max (film): 3560, 3030, 2932, 1610, 1582, 1511, 1493, 1446, 1346, 1302, 1247, 1178, 1110, 1033, 827, 776,

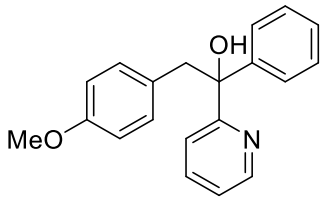
699 cm^{-1}. **M.p**.: 135 – 138 °C (lit.: 138 °C). The data presented are consistent with literature precedent.[10]



1-(2-Chlorophenyl)-1-(4-chlorophenyl)-2-(*p*-tolyl)ethan-1-ol 5i

General Procedure A was followed using 4-methylbenzylboronic acid pinacol ester (23 mg, 0.1 mmol, 1.0 eq.), 2,4'-dichlorobenzophenone (38 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and $\{Ir[dF(CF_3)ppy]_2(dtbpy)\}PF_6$ (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 10% EtOAc in petroleum ether) to give the titled product as a colourless oil (24 mg, 66%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.70 – 7.52 (m, 1H, H_{Ar}), 7.40 – 7.30 (m, 1H, H_{Ar}), 7.25 – 7.21 (m, 4H, H_{Ar}), 7.15 (d, J = 8.6 Hz, 2H, H_{Ar}), 6.94 (d, J = 7.8 Hz, 2H, H_{Ar}), 6.74 (d, J = 7.8 Hz, 2H, H_{Ar}), 3.99 (d, J = 13.1 Hz, 1H, CH_aCOH), 3.45 (d, J = 13.1 Hz, 1H, CH_bCOH), 2.95 (s, 1H, O*H*), 2.27 (s, 3H, CH_3); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 144.1, 142.7, 136.4, 133.1, 132.6, 132.4, 131.5 (C_{Ar}H), 130.9 (C_{Ar}H), 129.1 (C_{Ar}H), 128.7 (C_{Ar}H), 128.6 (C_{Ar}H), 128.2 (C_{Ar}H), 128.1 (C_{Ar}H), 126.8 (C_{Ar}H), 77.9 (CH_2*C*OH), 44.8 (*C*H_2COH), 21.2 (*C*H_3). **HRMS** (ESI) calcd for $C_{21}H_{17}Cl_2^+$ $[M\text{-}OH]^+$ 339.0702, found 339.0706. **IR** ν max (film): 3547, 2927, 2148, 1514, 1489, 1435, 1238, 1093, 1014, 828, 780, 747 cm^{-1}. **M.p**.: 106 – 109 °C.

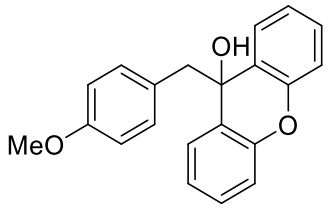


2-(4-Methoxyphenyl)-1-phenyl-1-(pyridin-2-yl)ethan-1-ol 5j

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 2-benzoylpyridine (28 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and $\{Ir[dF(CF_3)ppy]_2(dtbpy)\}PF_6$ (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was

purified *via* flash column chromatography (0 – 30% EtOAc in petroleum ether) to give the titled product as a white solid (26 mg, 85%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 8.41 (ddd, *J* = 4.9, 1.7, 1.0 Hz, 1H, $H_{Pyridine}$), 7.64 (td, *J* = 7.8, 1.7 Hz, 1H, $H_{Pyridine}$), 7.66 – 7.54 (m, 2H, H_{Ar}), 7.44 (d, *J* = 7.8 Hz, 1H, $H_{Pyridine}$), 7.33 (t, *J* = 7.7 Hz, 2H, H_{Ar}), 7.24 (t, *J* = 7.3 Hz, 1H, H_{Ar}), 7.12 (ddd, *J* = 7.4, 4.9, 1.1 Hz, 1H, $H_{Pyridine}$), 6.88 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 6.66 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 5.38 (s, 1H, O*H*), 3.73 (s, 3H, OCH_3), 3.65 (d, *J* = 13.6 Hz, 1H, CH_aCOH), 3.55 (d, *J* = 13.6 Hz, 1H, CH_bCOH); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 163.2, 158.2, 147.3 (C_{Ar}H), 146.4, 136.8 (C_{Ar}H), 131.8 (C_{Ar}H), 128.6, 128.3 (C_{Ar}H), 127.1 (C_{Ar}H), 126.3 (C_{Ar}H), 122.0 (C_{Ar}H), 121.1 (C_{Ar}H), 113.3 (C_{Ar}H), 77.6 (CH$_2$*C*OH), 55.2 (O*C*H$_3$), 46.5 (*C*H$_2$COH). **LRMS** (ESI, m/z) 306.3 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{20}H_{20}NO_2^+$ [M+H]$^+$ 306.1494, found 306.1489. **IR** ν max (film): 3381, 3030, 2929, 1611, 1590, 1512, 1446, 1395, 1301, 1246, 1178, 1115, 1034, 828, 756, 700 cm^{-1}. **M.p.**: 140 – 143 °C.

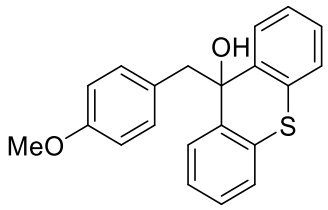


9-(4-Methoxybenzyl)-9*H*-xanthen-9-ol 5k

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 9-xanthone (29 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF$_3$)ppy]$_2$(dtbpy)}PF$_6$ (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 10% EtOAc in petroleum ether) to give the titled product as a white solid (17 mg, 55%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.64 (dd, *J* = 7.8, 1.7 Hz, 2H, H_{Ar}), 7.27 (ddd, *J* = 8.2, 7.2, 1.7 Hz, 2H, H_{Ar}), 7.16 (ddd, *J* = 7.8, 7.2, 1.2 Hz, 2H, H_{Ar}), 6.96 (dd, *J* = 8.2, 1.2 Hz, 2H, H_{Ar}), 6.52 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 6.34 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 3.69 (s, 3H, OCH_3), 3.11 (s, 2H, CH_2COH), 2.50 (s, 1H, O*H*); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 158.4, 150.6, 131.5 (C_{Ar}H), 128.9 (C_{Ar}H), 127.7, 126.7 (C_{Ar}H), 126.7, 123.2 (C_{Ar}H), 116.0 (C_{Ar}H), 113.0 (C_{Ar}H), 70.4 (CH$_2$*C*OH), 55.2 (O*C*H$_3$), 52.3 (*C*H$_2$COH). **LRMS** (ESI, m/z) 319.2 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{21}H_{19}O_3^+$ [M+H]$^+$

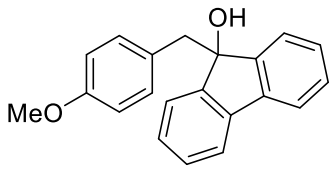
319.1334, found 319.1326. **IR** ν max (film): 3363, 2927, 1655, 1605, 1509, 1479, 1452, 1301, 1277, 1250, 1176, 1101, 1034, 824, 761 cm^{-1}. **M.p**.: 57 – 60 °C.



9-(4-Methoxybenzyl)-9*H*-thioxanthen-9-ol 5l

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 9-thioxanthenone (32 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and $\{Ir[dF(CF_3)ppy]_2(dtbpy)\}PF_6$ (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 10% EtOAc in petroleum ether) to give the titled product as a white solid (25 mg, 75%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.54 – 7.50 (m, 2H, H_{Ar}), 7.44 (dd, J = 7.6, 1.4 Hz, 2H, H_{Ar}), 7.24 (td, J = 7.4, 1.7 Hz, 2H, H_{Ar}), 7.21 (td, J = 7.4, 1.4 Hz, 2H, H_{Ar}), 6.66 (d, J = 8.6 Hz, 2H, H_{Ar}), 6.58 (d, J = 8.6 Hz, 2H, H_{Ar}), 3.75 (s, 3H, OCH_3), 3.02 (s, 2H, CH_2COH), 2.56 (s, 1H, OH); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 158.6, 139.8, 131.8 (C_{Ar}H), 130.3, 127.6, 127.2 (C_{Ar}H), 126.5 (C_{Ar}H), 126.3 (C_{Ar}H), 125.7 (C_{Ar}H), 113.3 (C_{Ar}H), 75.5 (CH$_2$*C*OH), 55.3 (O*C*H$_3$), 42.9 (*C*H$_2$COH). **LRMS** (ESI, m/z) 335.1 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{21}H_{19}O_2S$ [M+H]$^+$ 335.1106, found 335.1103. **IR** ν max (film): 3450, 2834, 2361, 1611, 1584, 1511, 1459, 1439, 1302, 1247, 1178, 1110, 1036, 827, 752, 736 cm^{-1}. **M.p**.: 115 – 117 °C.

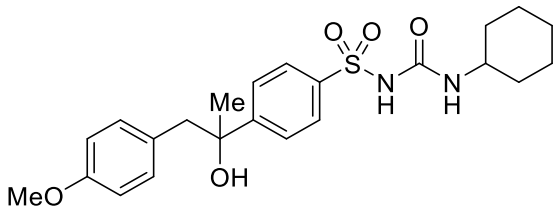


9-(4-Methoxybenzyl)-9*H*-fluoren-9-ol 5m

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), 9-fluorenone (27 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and $\{Ir[dF(CF_3)ppy]_2(dtbpy)\}PF_6$ (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was

purified *via* flash column chromatography (0 – 5% EtOAc in petroleum ether) to give the titled product as a white solid (27 mg, 90%).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.46 (dd, *J* = 7.4, 1.0 Hz, 2H, H_{Ar}), 7.27 – 7.23 (m, 2H, H_{Ar}), 7.22 – 7.20 (m, 2H, H_{Ar}), 7.18 – 7.15 (m, 2H, H_{Ar}), 6.82 (d, *J* = 8.5 Hz, 2H, H_{Ar}), 6.60 (d, *J* = 8.5 Hz, 2H, H_{Ar}), 3.66 (s, 3H, OCH_3), 3.15 (s, 2H, CH_2COH), 2.08 (s, 1H, O*H*); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 158.4, 148.5, 139.5, 131.8 (C_{Ar}H), 129.0 (C_{Ar}H), 128.6, 127.7 (C_{Ar}H), 124.4 (C_{Ar}H), 120.1 (C_{Ar}H), 113.1 (C_{Ar}H), 82.5 (CH$_2$*C*OH), 55.3 (O*C*H$_3$), 45.1 (*C*H$_2$COH). **LRMS** (ESI, m/z) 303.2 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{21}H_{19}O_2^+$ [M+H]$^+$ 303.1385, found 303.1389. **IR** ν max (film): 3417, 2920, 1610, 1512, 1449, 1301, 1248, 1179, 1037, 824, 759, 737 cm^{-1}. **M.p**.: 87 – 89 °C (lit.: 110 – 111 °C). The data presented are consistent with literature precedent except melting point.[11]



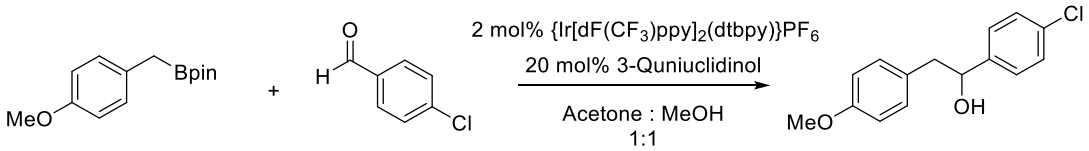
***N*-(cyclohexylcarbamoyl)-4-(2-hydroxy-1-(4-methoxyphenyl)propan-2-yl)benzenesulfonamide 5n**

General Procedure A was followed using 4-methoxybenzylboronic acid pinacol ester (25 mg, 0.1 mmol, 1.0 eq.), acetohexamide (49 mg, 0.15 mmol, 1.5 eq.), 3-quinuclidinol (2.5 mg, 0.02 mmol, 20 mol%) and {Ir[dF(CF$_3$)ppy]$_2$(dtbpy)}PF$_6$ (2.2 mg, 0.002 mmol, 2 mol%). The crude mixture was purified *via* flash column chromatography (0 – 30% EtOAc in petroleum ether) to give the titled product as a white solid (26 mg, 59%). The yield was adjusted to account for 10% acetohexamide that we were not able to separate from the product.

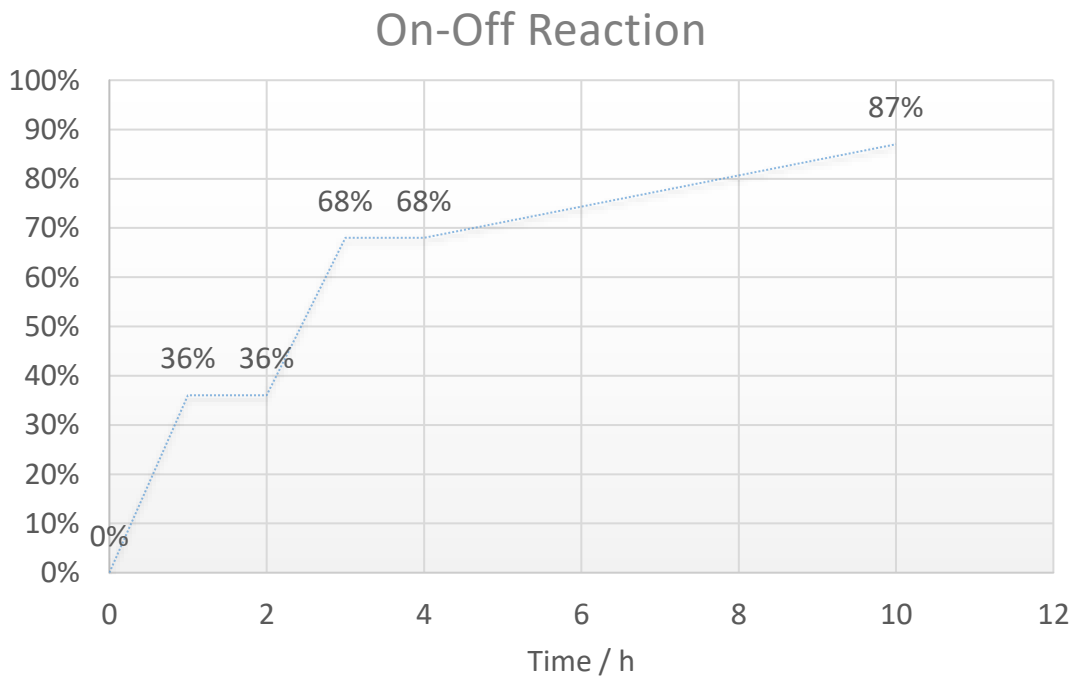
^{1}H NMR (600 MHz, $CDCl_3$) δ 7.82 (d, *J* = 8.5 Hz, 2H, H_{Ar}), 7.55 (d, *J* = 8.5 Hz, 2H, H_{Ar}), 6.87 (d, J = 8.6 Hz, 2H, H_{Ar}), 6.77 (d, *J* = 8.6 Hz, 2H, H_{Ar}), 6.50 (d, *J* = 8.0 Hz, 1H, N*H*), 3.77 (s, 3H, OCH_3), 3.62 (q, *J* = 9.4 Hz, 1H, NHC*H*), 3.05 (d, *J* = 13.7 Hz, 1H, CH_aCOH), 2.97 (d, *J* = 13.7 Hz, 1H, CH_bCOH), 2.01 (s, 1H, O*H*), 1.88 – 1.77 (m, 2H, NHCHCH_aCH$_2$), 1.71 – 1.65 (m, 2H, NHCHCH_bCH$_2$), 1.56 (s, 3H, CCH_3), 1.34 (m, 6H, NHCHCH$_2$CH_2 + NHCHCH$_2$CH$_2$CH_2); **^{13}C NMR** (151 MHz, $CDCl_3$) δ 158.9, 154.4, 150.5, 137.8, 131.6 (C_{Ar}H), 127.7, 126.9 (C_{Ar}H), 126.4 (C_{Ar}H), 114.0 (C_{Ar}H), 74.6 (CH$_2$*C*OH), 55.4 (O*C*H$_3$), 49.5 (*C*H$_2$COH), 49.4 (NH*C*H), 33.0

(NHCH*C*H_2), 29.5 (C*C*H_3), 25.51 (NHCHCH$_2$*C*H_2), 24.7 (NHCHCH$_2$CH$_2$*C*H_2). **LRMS** (ESI, m/z) 447.3 ([M+H]$^+$, 100%); **HRMS** (ESI) calcd for $C_{23}H_{31}O_5N_2S$ [M+H]$^+$ 447.1954, found 447.1937. **IR** ν max (film): 3372, 2927, 2354, 1676, 1611, 1513, 1459, 1332, 1250, 1163, 1036 cm^{-1}. **M.p**.: 70 – 73 °C.

On-Off Test

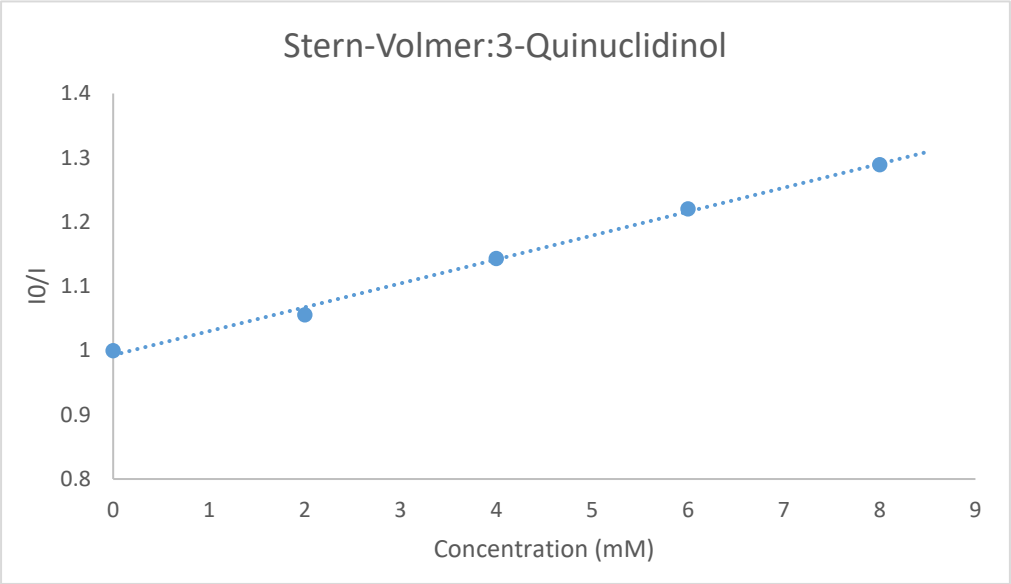


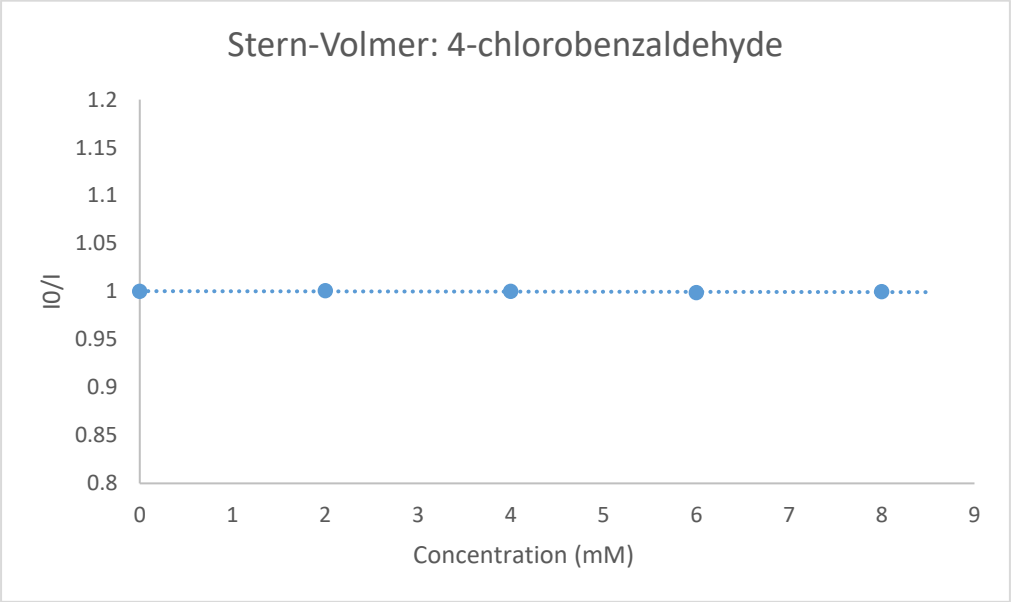
General Procedure A was followed with 4-methoxybenzylboronic acid pinacol ester (50 mg, 0.2 mmol, 1.0 eq.), 4-chlorobenzaldehyde (42 mg, 0.3 mmol, 1.5 eq.), 3-quinuclidinol (5.1 mg, 0.04 mmol, 20 mol%) and $\{Ir[dF(CF_3)ppy]_2(dtbpy)\}PF_6$ (4.4 mg, 0.004 mmol, 2 mol%). The LED light source was switched off at 1 and 3 h into the reaction, and subsequently switched back on at 2 and 4 h into the reaction respectively. Samples were taken at the beginning of the reaction as well as 1, 2, 3, 4 and 10 h time point. At 10 h point little starting material was detected therefore the reaction was quenched. The yields shown were NMR yields calculated with 1,3,5-trimethoxybenzene as internal standard.

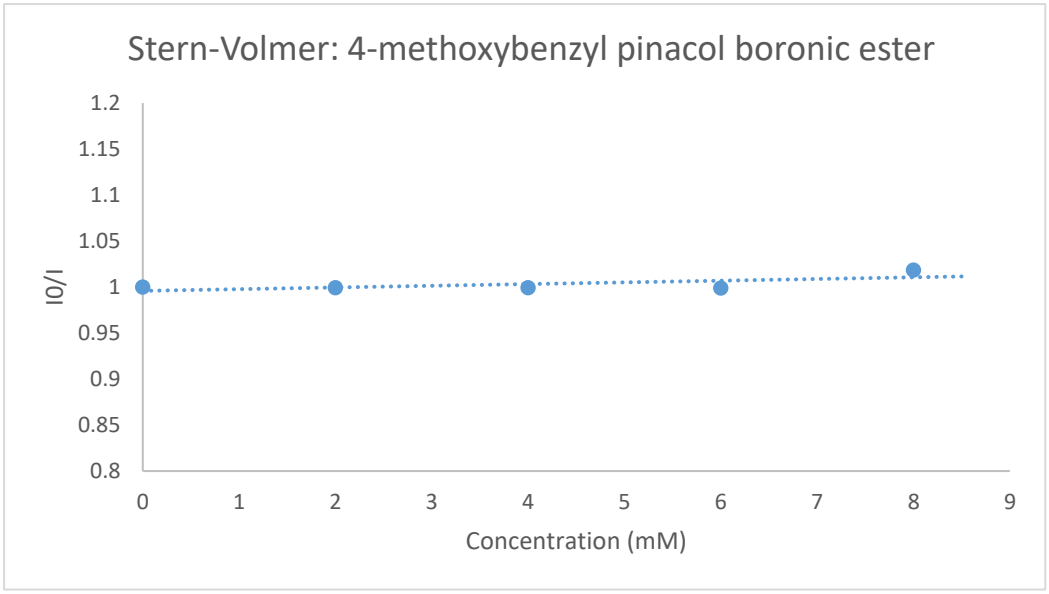


Stern-Volmer Experiments

Stock solutions (1:1 MeOH/acetone) of photocatalyst (0.02 mM), 3-quinuclidinol (16 mM), 4-chlorobenzaldehyde (16 mM) and 4-methoxybenzyl pinacol boronic ester (16 mM) were diluted and prepared into appropriate concentrations. The concentration of photocatalyst was kept at 0.01 mM. Samples were irradiated at 380 nm and emission was detected at 545 mM.






Stern-Volmer: 4-methoxybenzyl pinacol boronic ester
I0/I
1.2
1.15
1.1
1.05
1
0.95
0.9
0.85
0.8
0
1
2
3
4
5
6
7
8
9
Concentration (mM)

References

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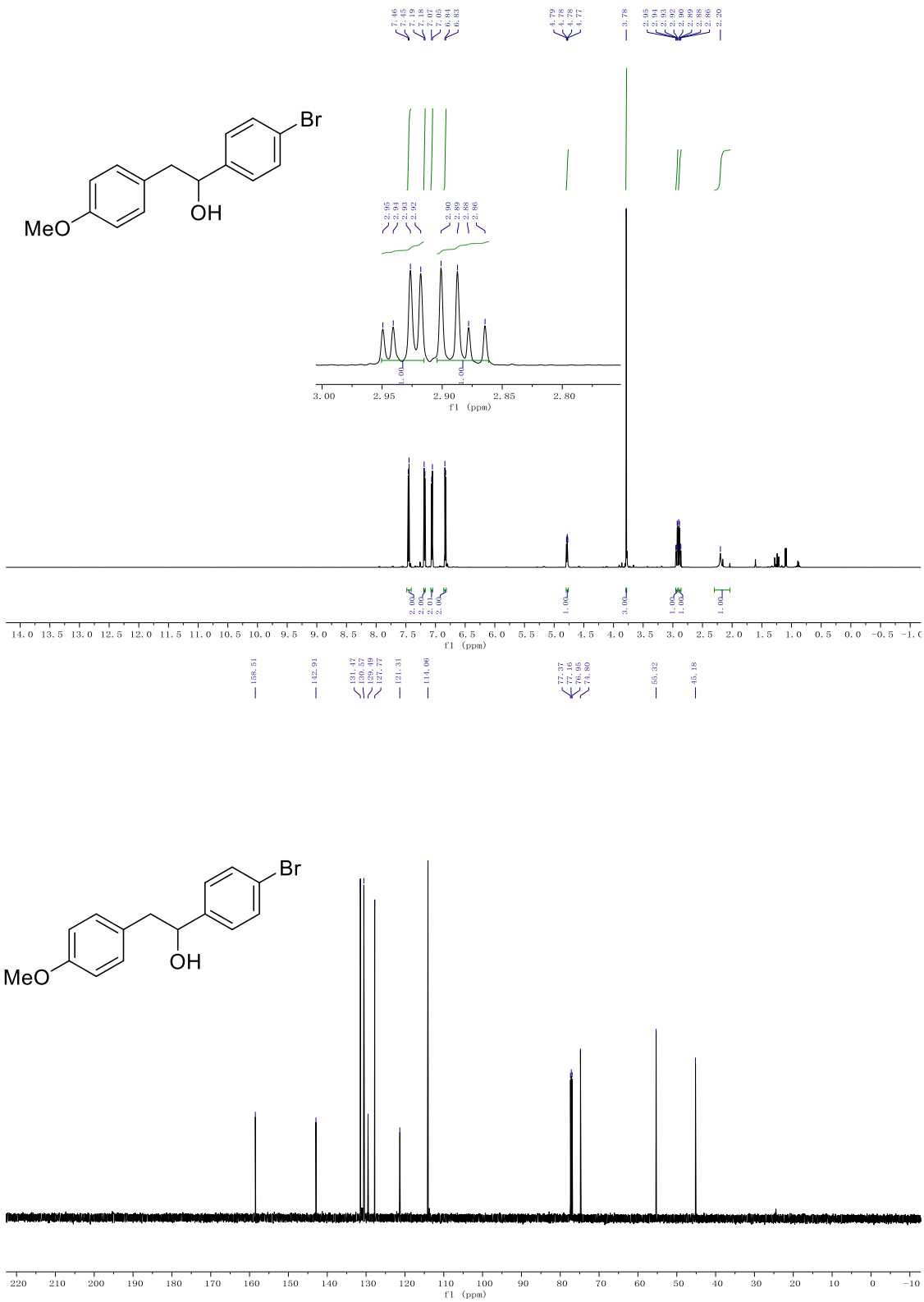
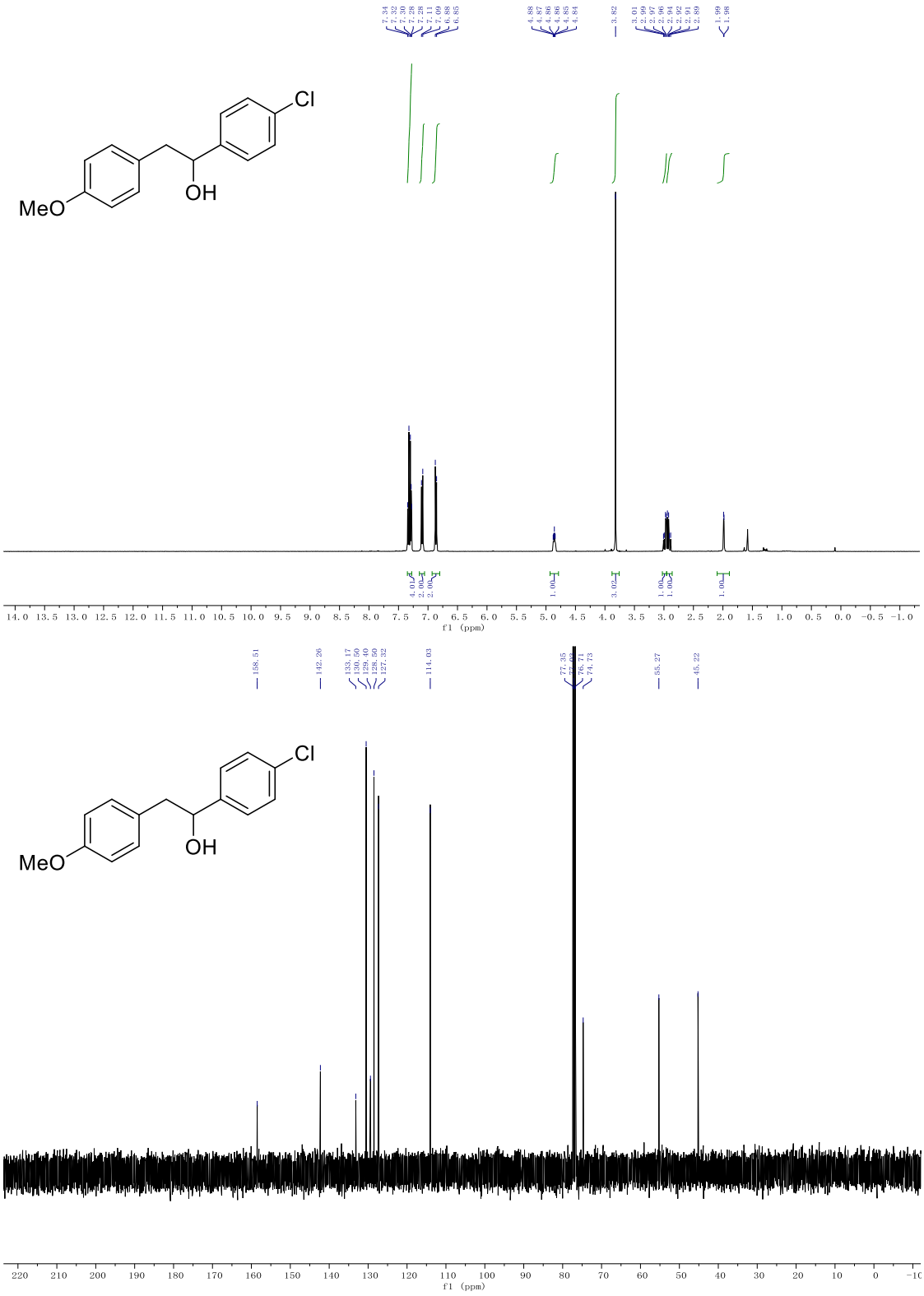
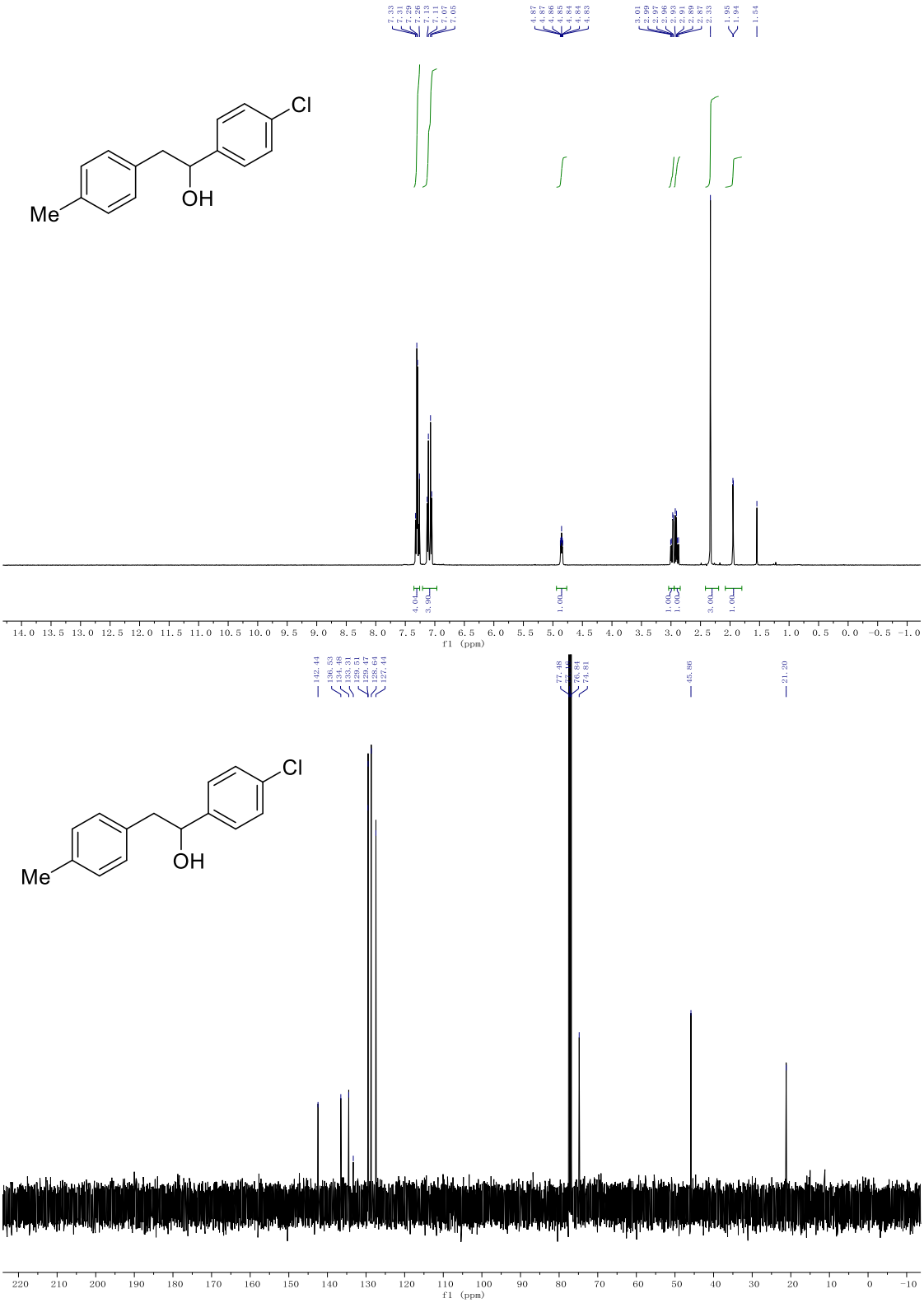
Spectroscopic data



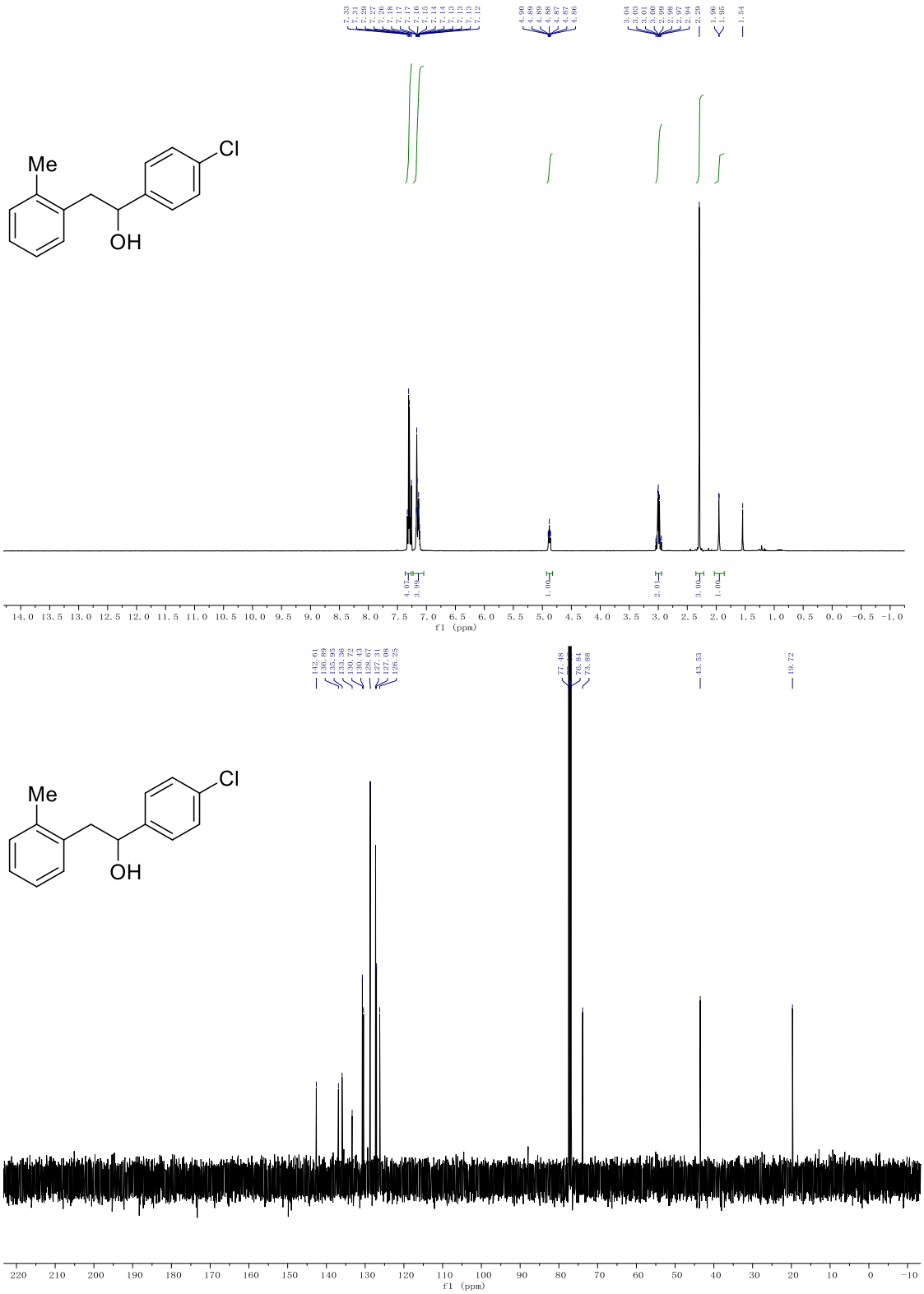
^{1}H and ^{13}C NMR spectrum of **1-(4-bromophenyl)-2-(4-methoxyphenyl)ethan-1-ol 3ak**



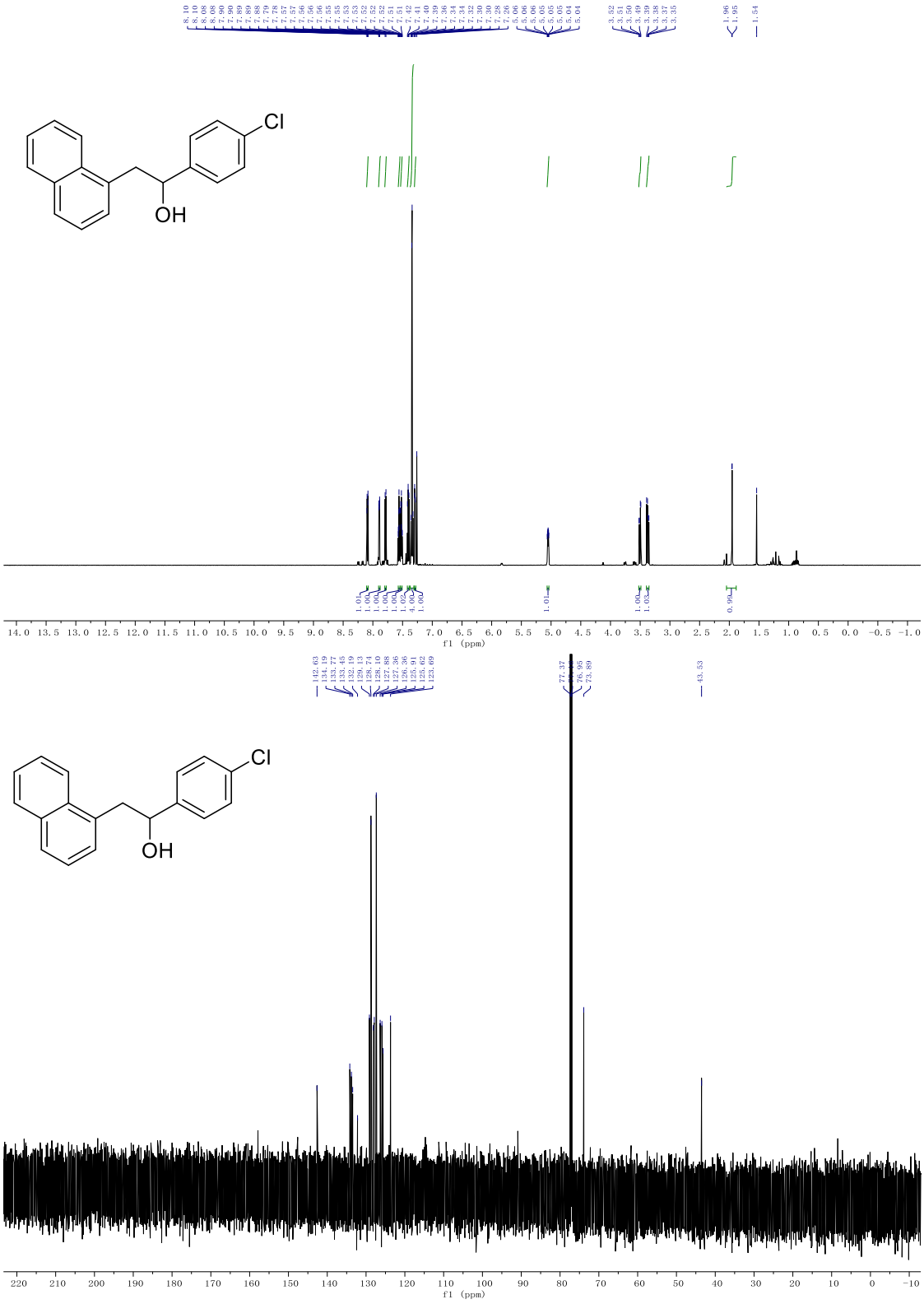
^{1}H and ^{13}C NMR spectrum of **1-(4-chlorophenyl)-2-(4-methoxyphenyl)ethan-1-ol 3a**



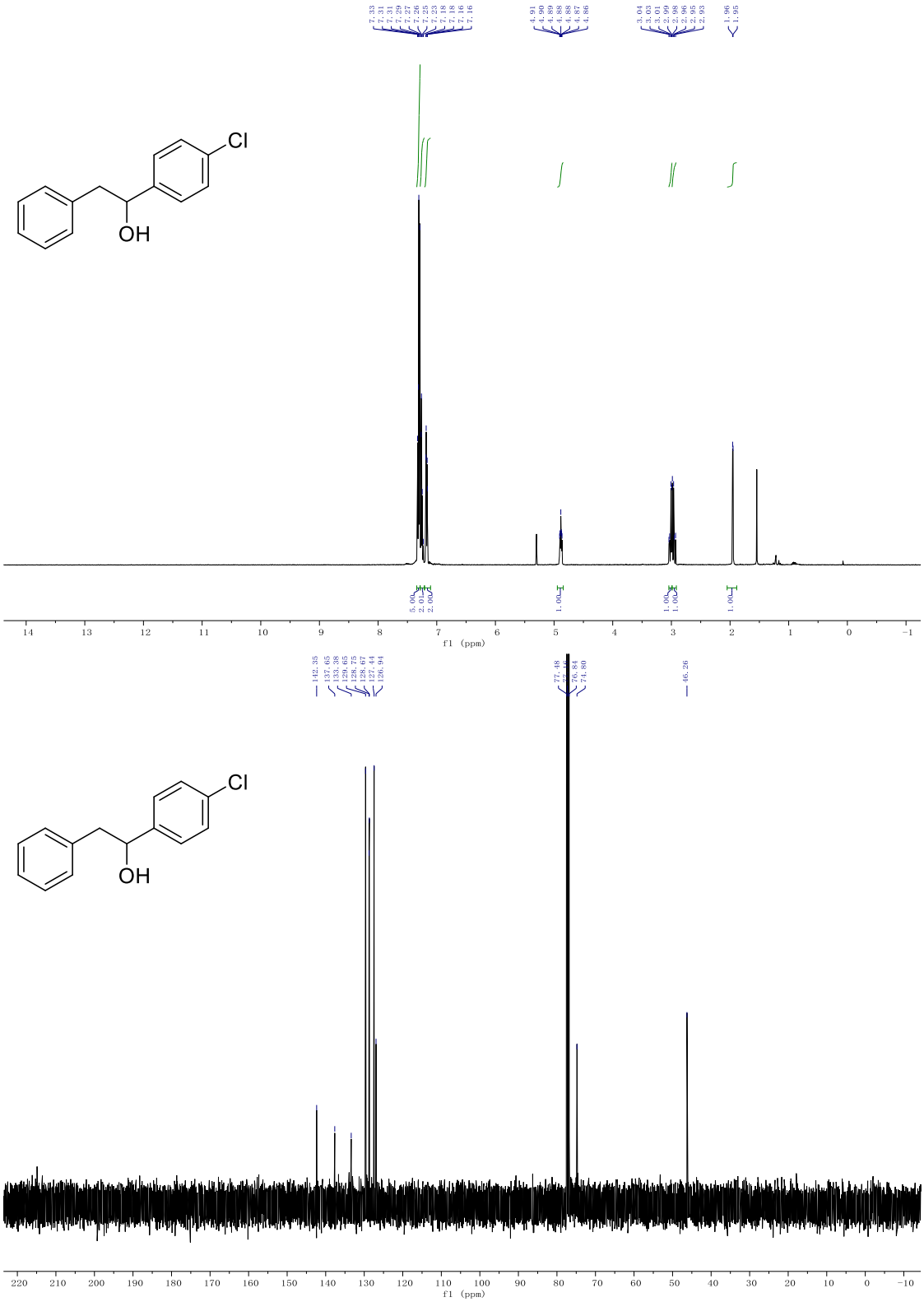
^{1}H and ^{13}C NMR spectrum of **1-(4-chlorophenyl)-2-(*p*-tolyl)ethan-1-ol 3b**



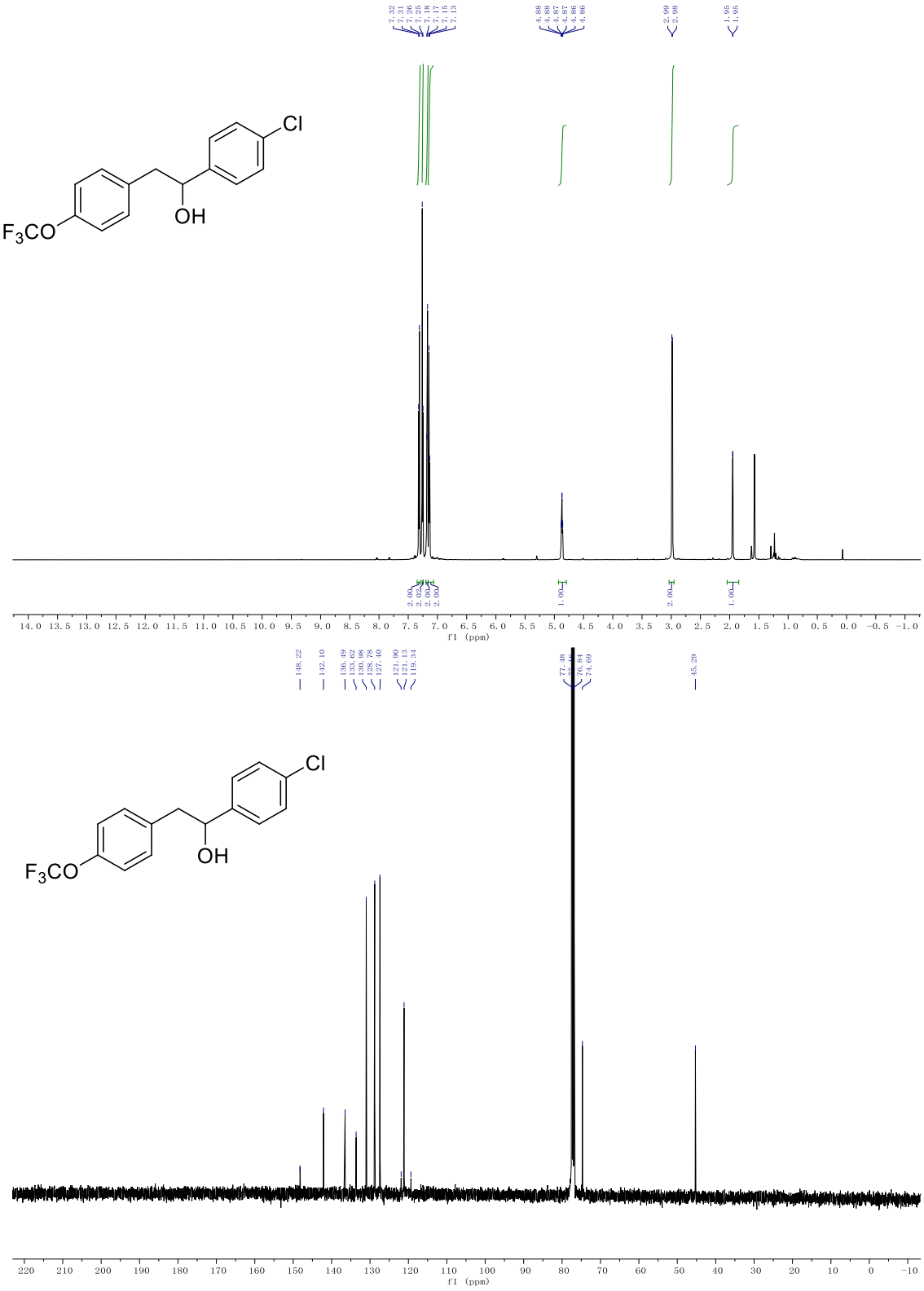
^{1}H and ^{13}C NMR spectrum of **1-(4-chlorophenyl)-2-(*o*-tolyl)ethan-1-ol 3c**



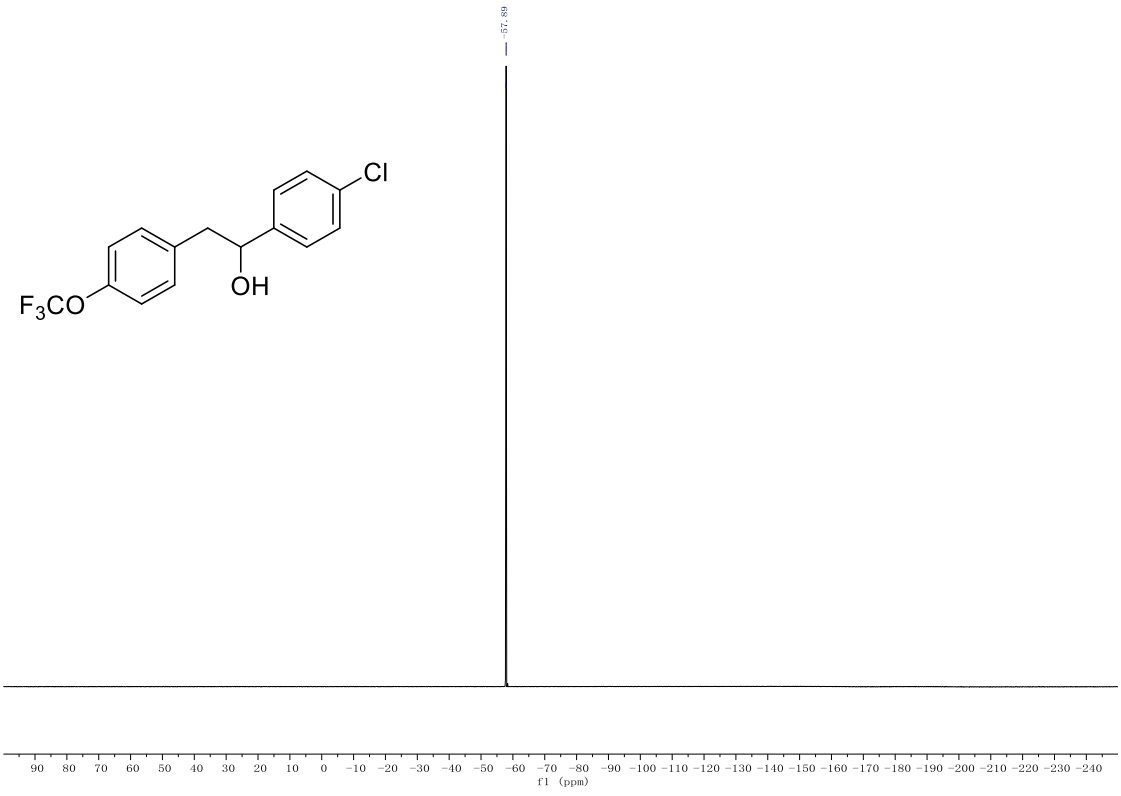
^{1}H and ^{13}C NMR spectrum of **1-(4-chlorophenyl)-2-(naphthalen-1-yl)ethan-1-ol 3d**



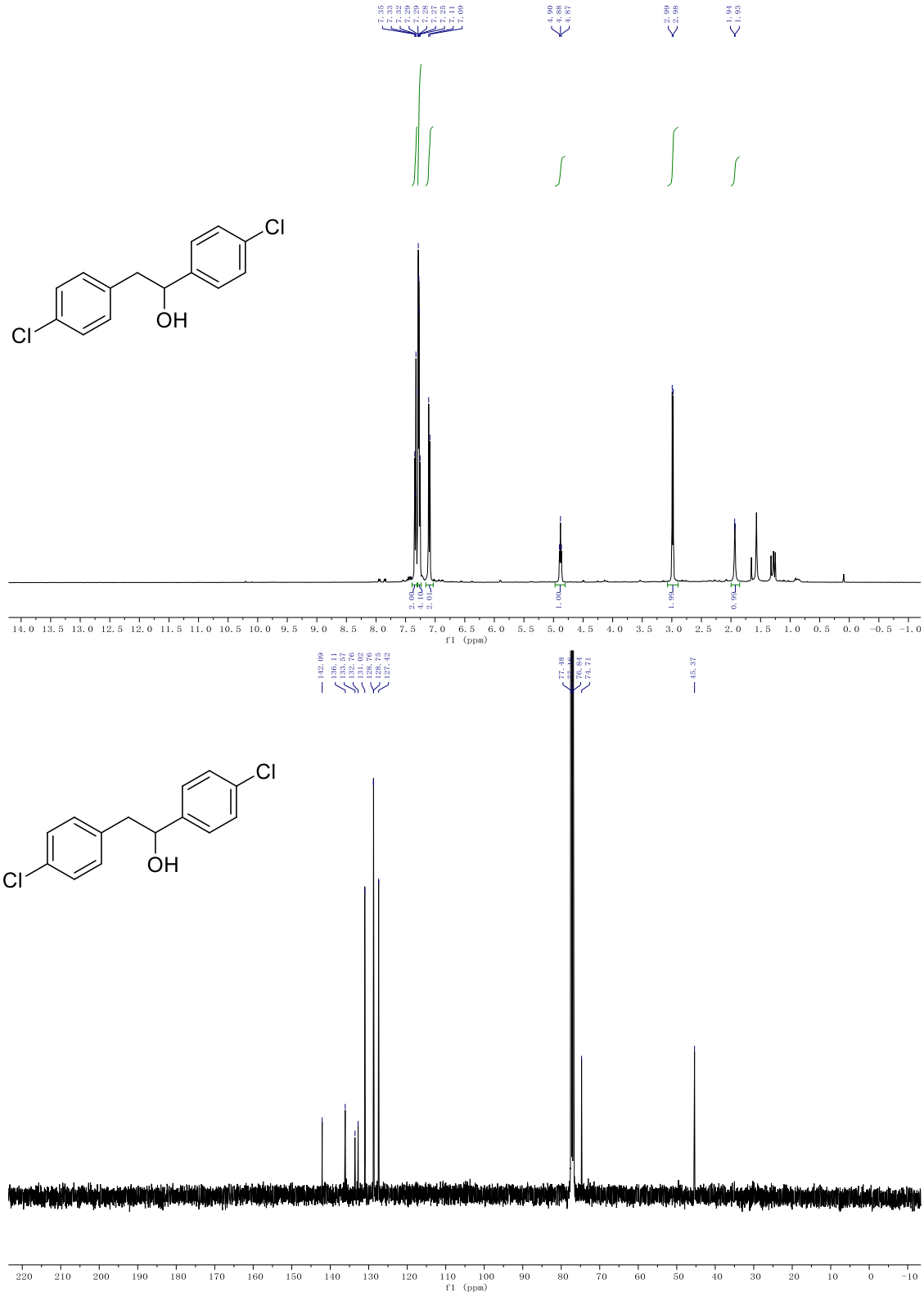
^{1}H and ^{13}C NMR spectrum of **1-(4-chlorophenyl)-2-phenylethan-1-ol 3e**



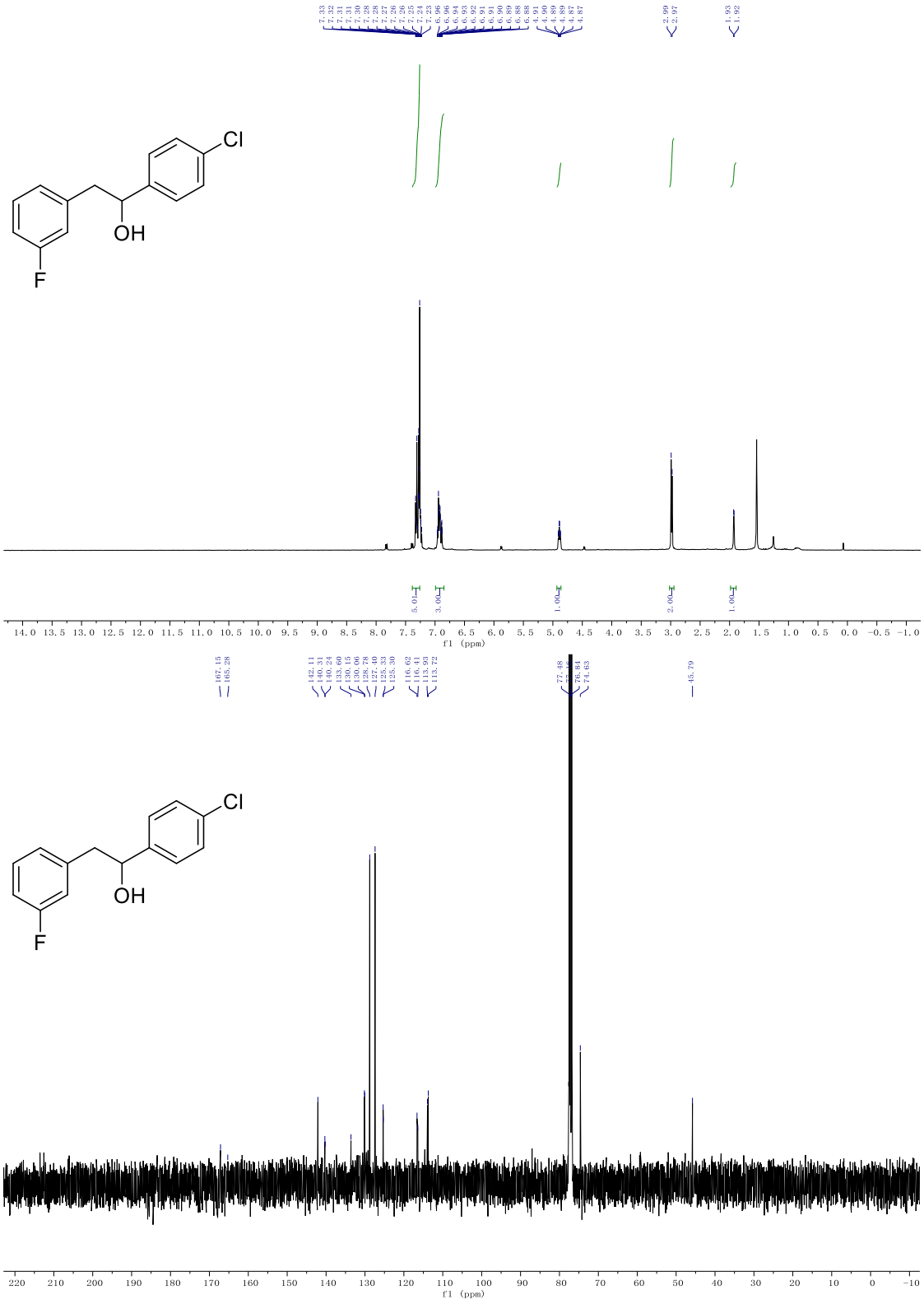
^{1}H and ^{13}C NMR spectrum of **1-(4-chlorophenyl)-2-[4-(trifluoromethoxy)phenyl]ethan-1-ol 3f**



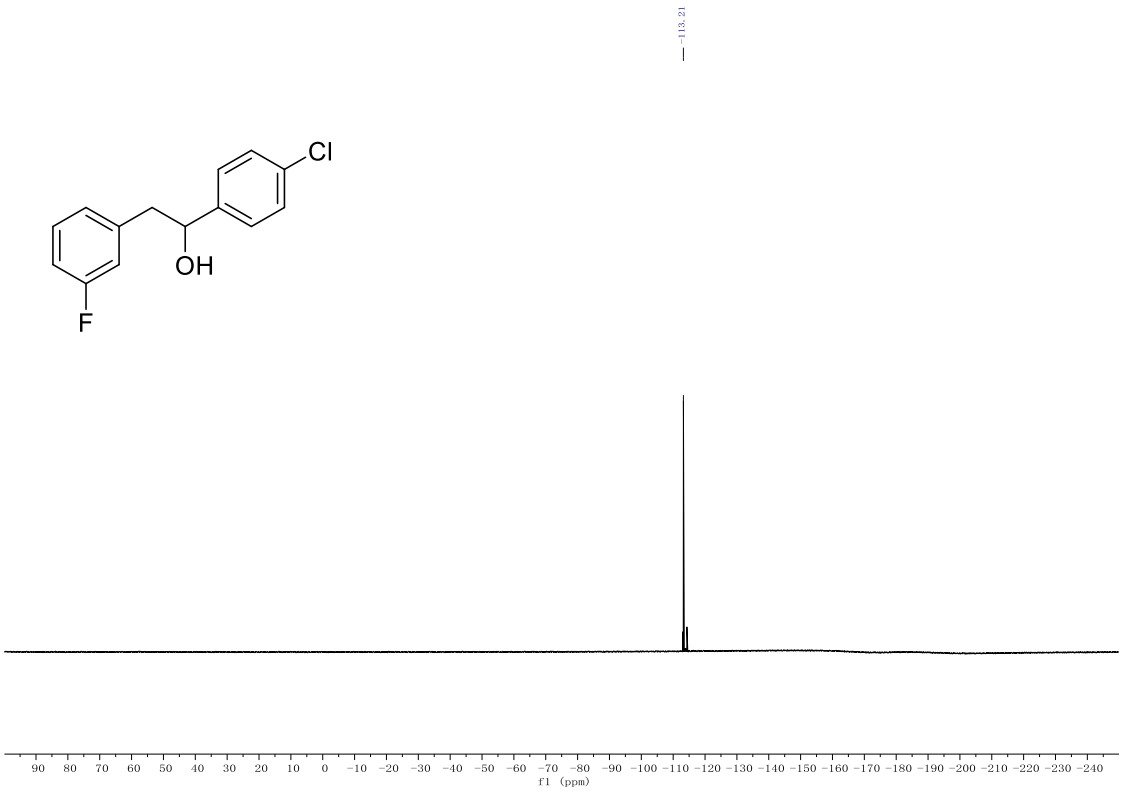
^{19}F NMR spectra of **1-(4-chlorophenyl)-2-[4-(trifluoromethoxy)phenyl]ethan-1-ol 3f**



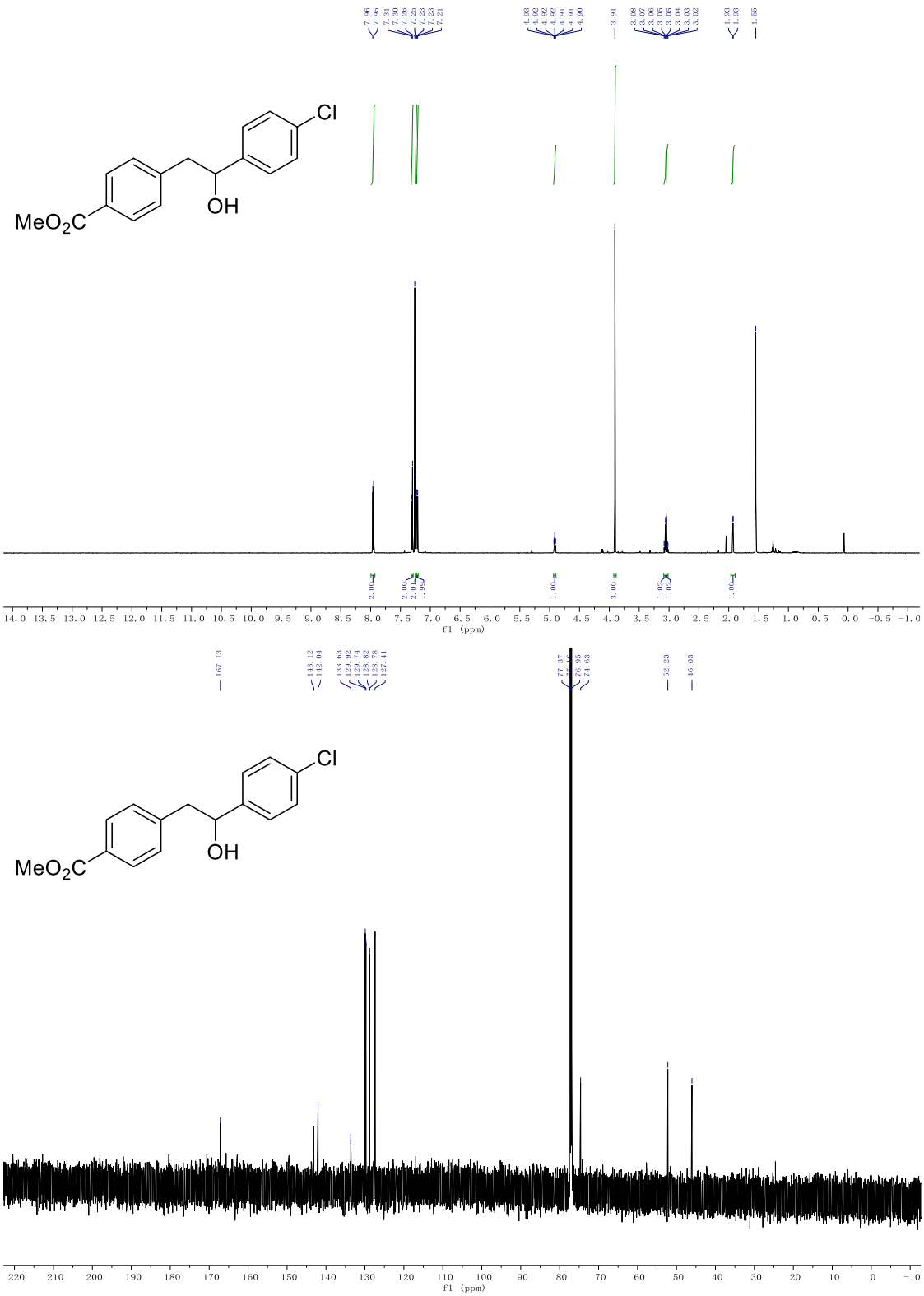
^{1}H and ^{13}C NMR spectrum of **1,2-bis(4-chlorophenyl)ethan-1-ol 3g**



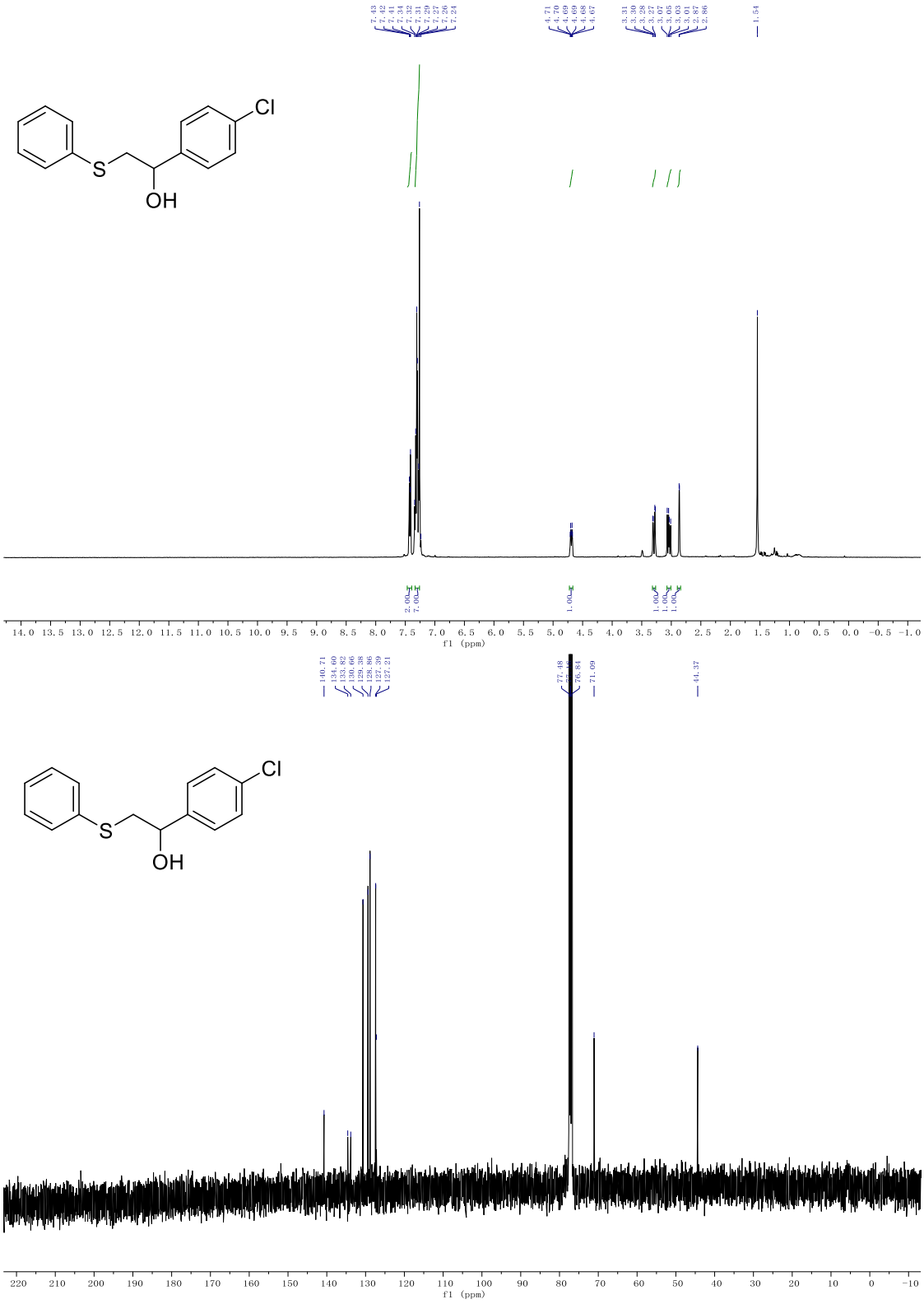
^{1}H and ^{13}C NMR spectrum of **1-(4-chlorophenyl)-2-(3-fluorophenyl)ethan-1-ol 3h**



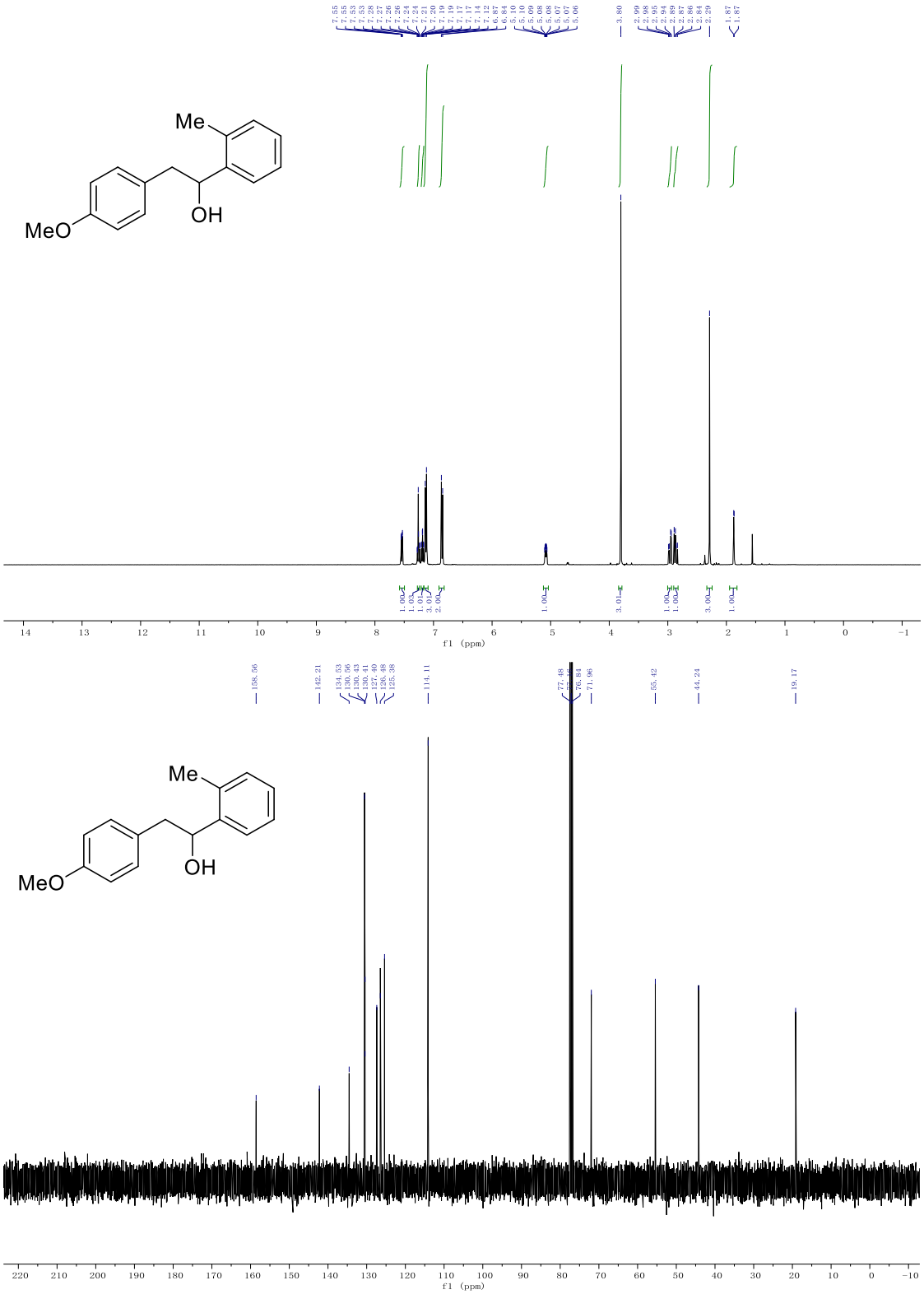
^{19}F NMR spectra of **1-(4-chlorophenyl)-2-(3-fluorophenyl)ethan-1-ol 3h**



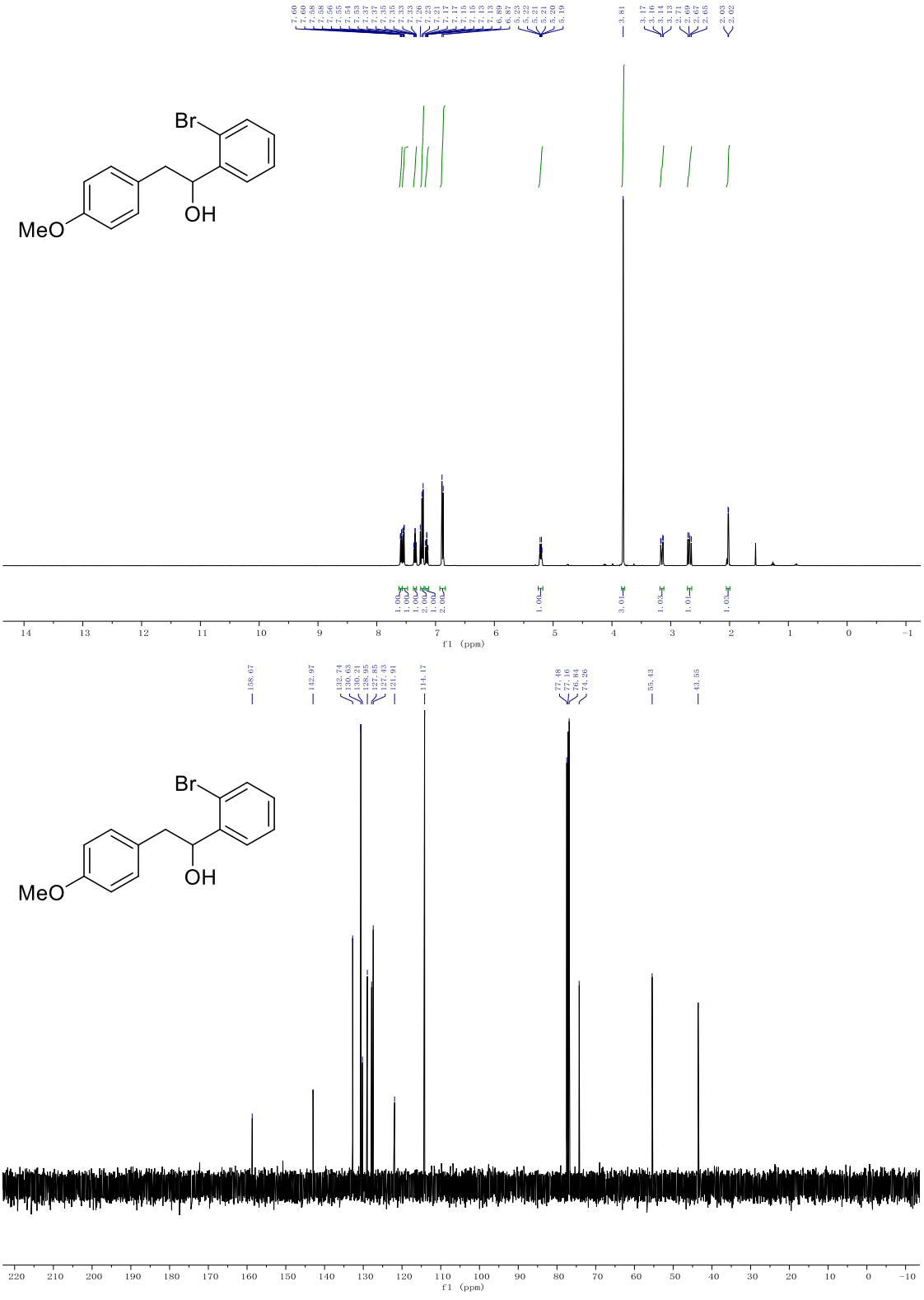
^{1}H and ^{13}C NMR spectrum of **methyl 4-[2-(4-chlorophenyl)-2-hydroxyethyl]benzoate 3i**



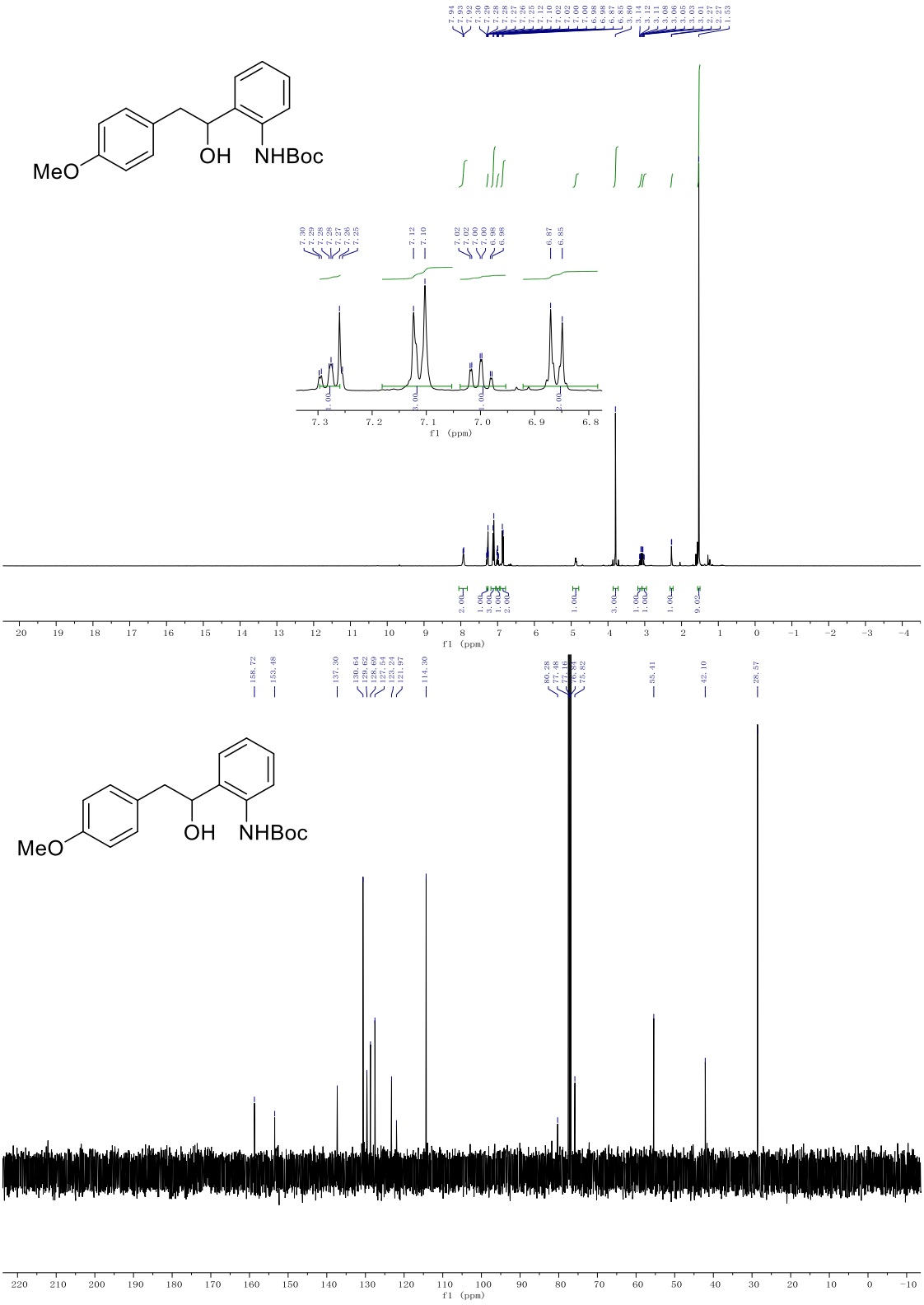
^{1}H and ^{13}C NMR spectrum of **1-(4-chlorophenyl)-2-(phenylthio)ethan-1-ol 3j**



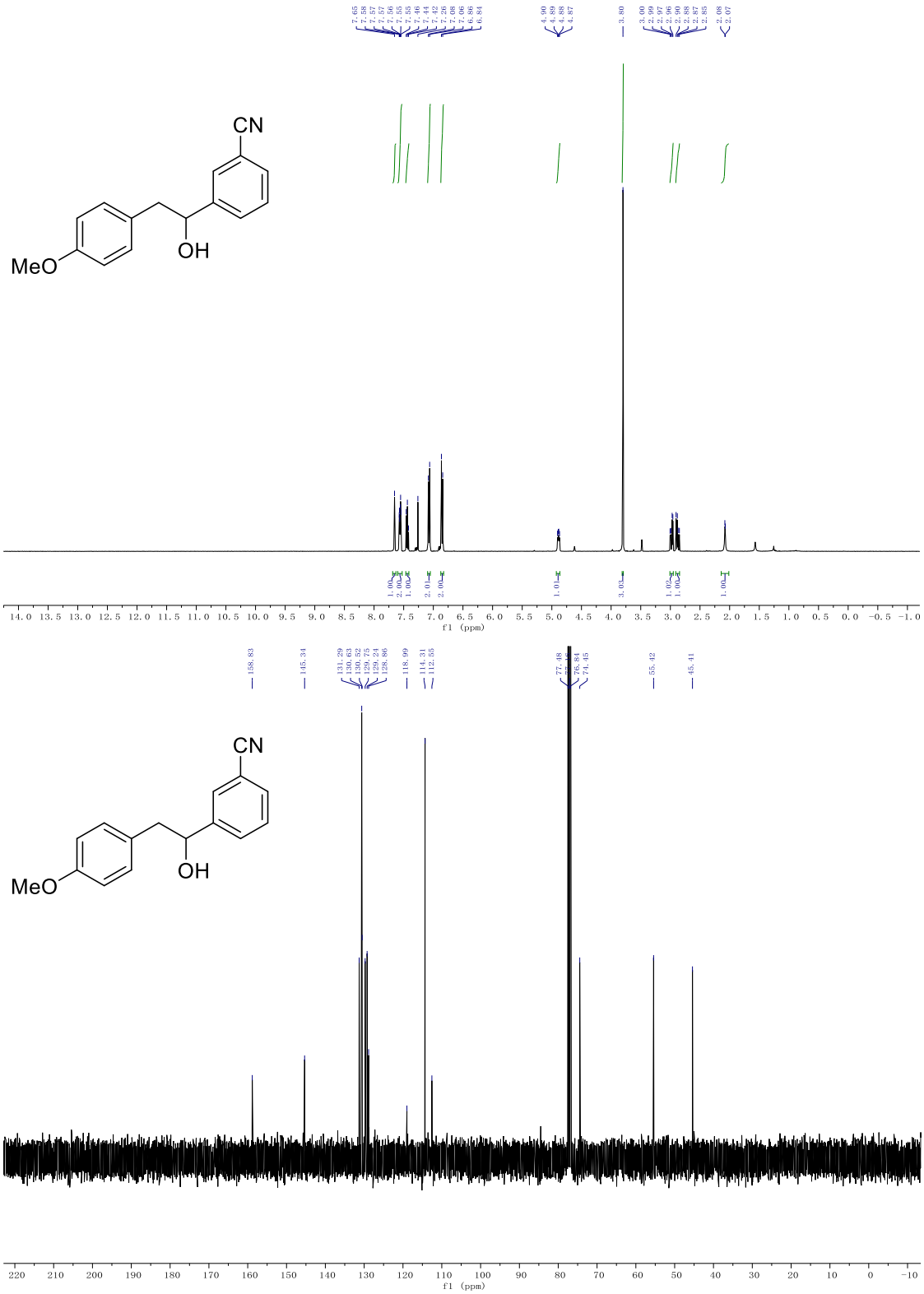
^{1}H and ^{13}C NMR spectrum of **2-(4-methoxyphenyl)-1-(*o*-tolyl)ethan-1-ol 3k**



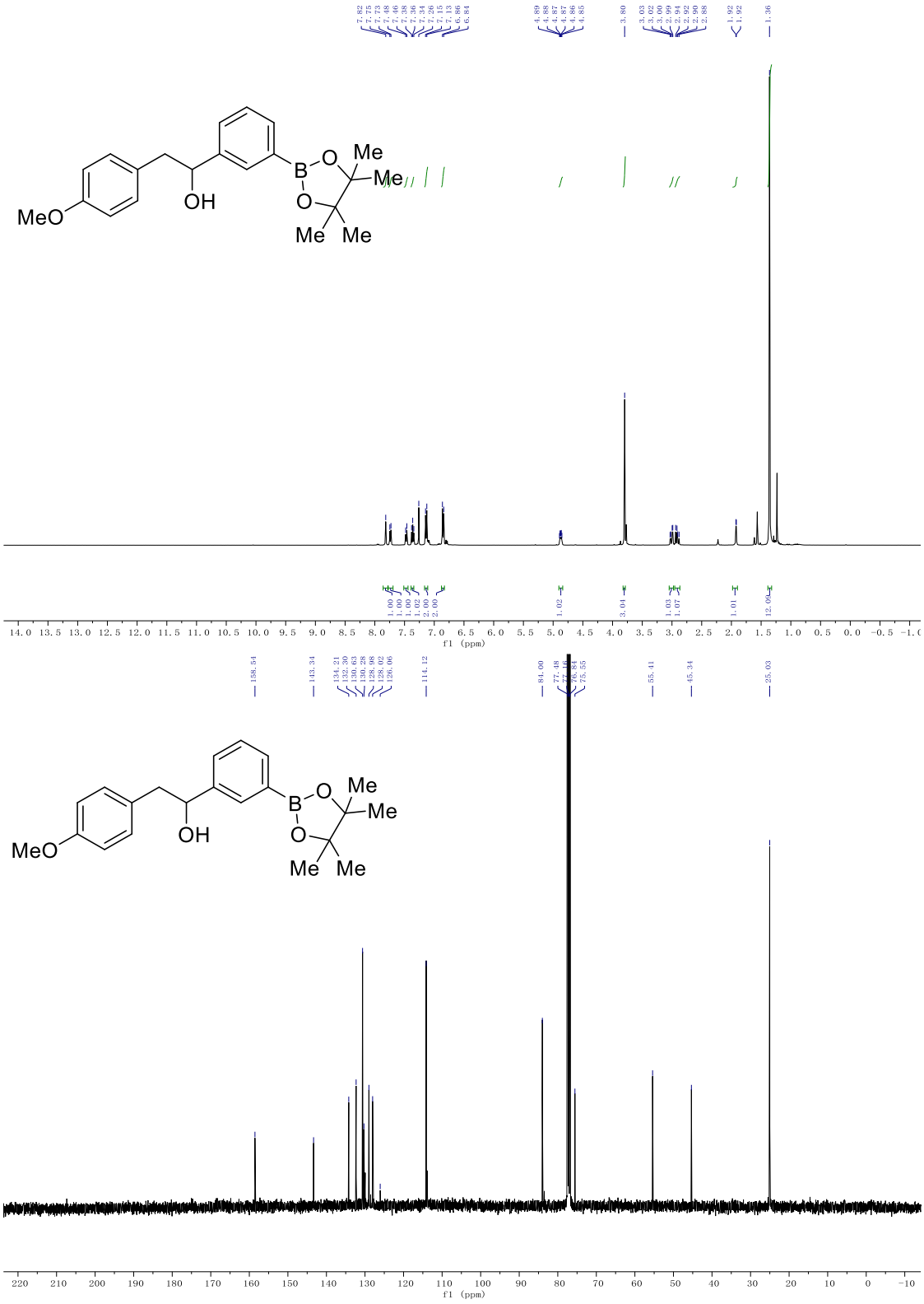
^{1}H and ^{13}C NMR spectrum of **1-(2-bromophenyl)-2-(4-methoxyphenyl)ethan-1-ol 3l**



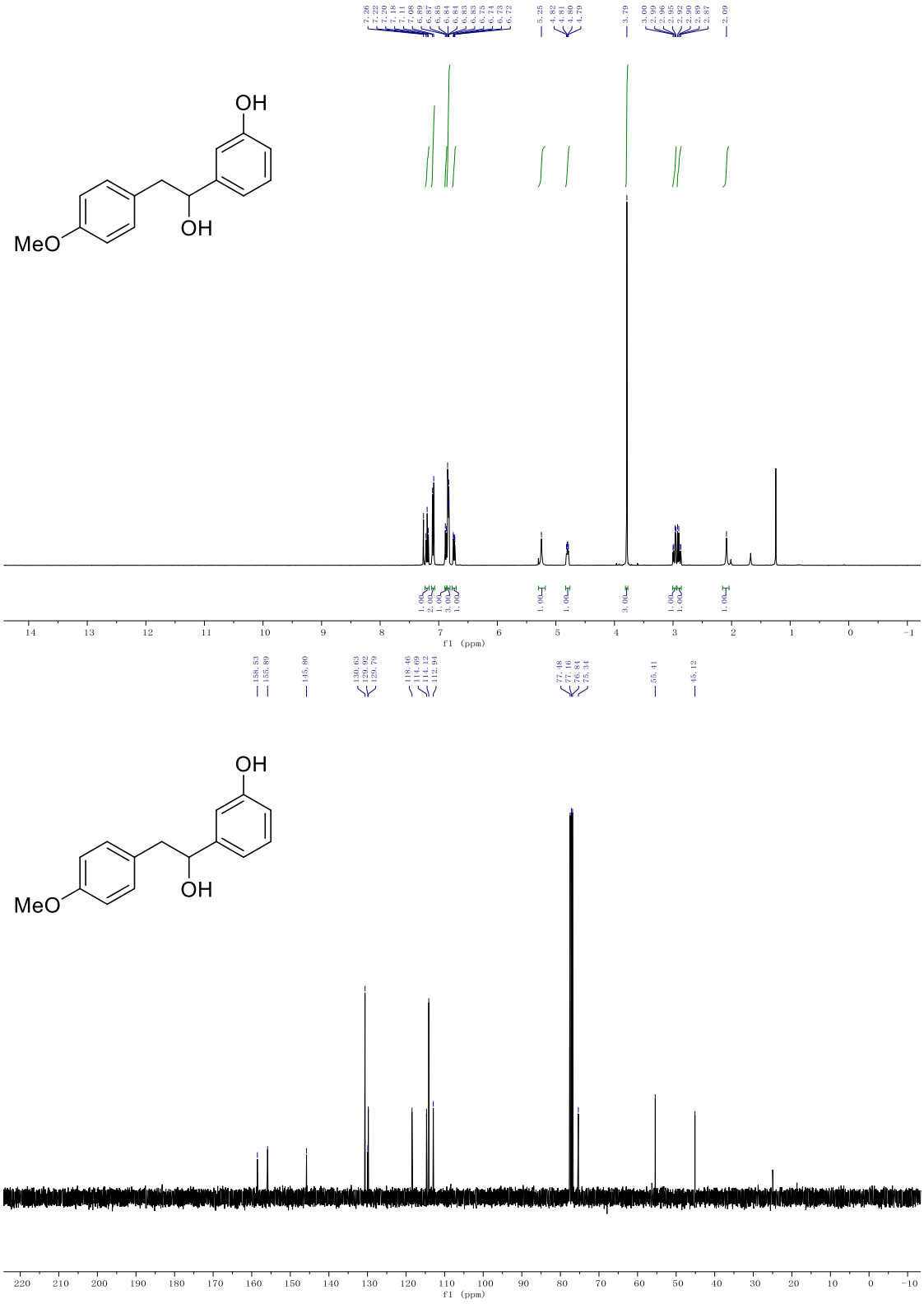
^{1}H and ^{13}C NMR spectrum of ***tert*-butyl {2-[1-hydroxy-2-(4-methoxyphenyl)ethyl]phenyl}carbamate 3m**



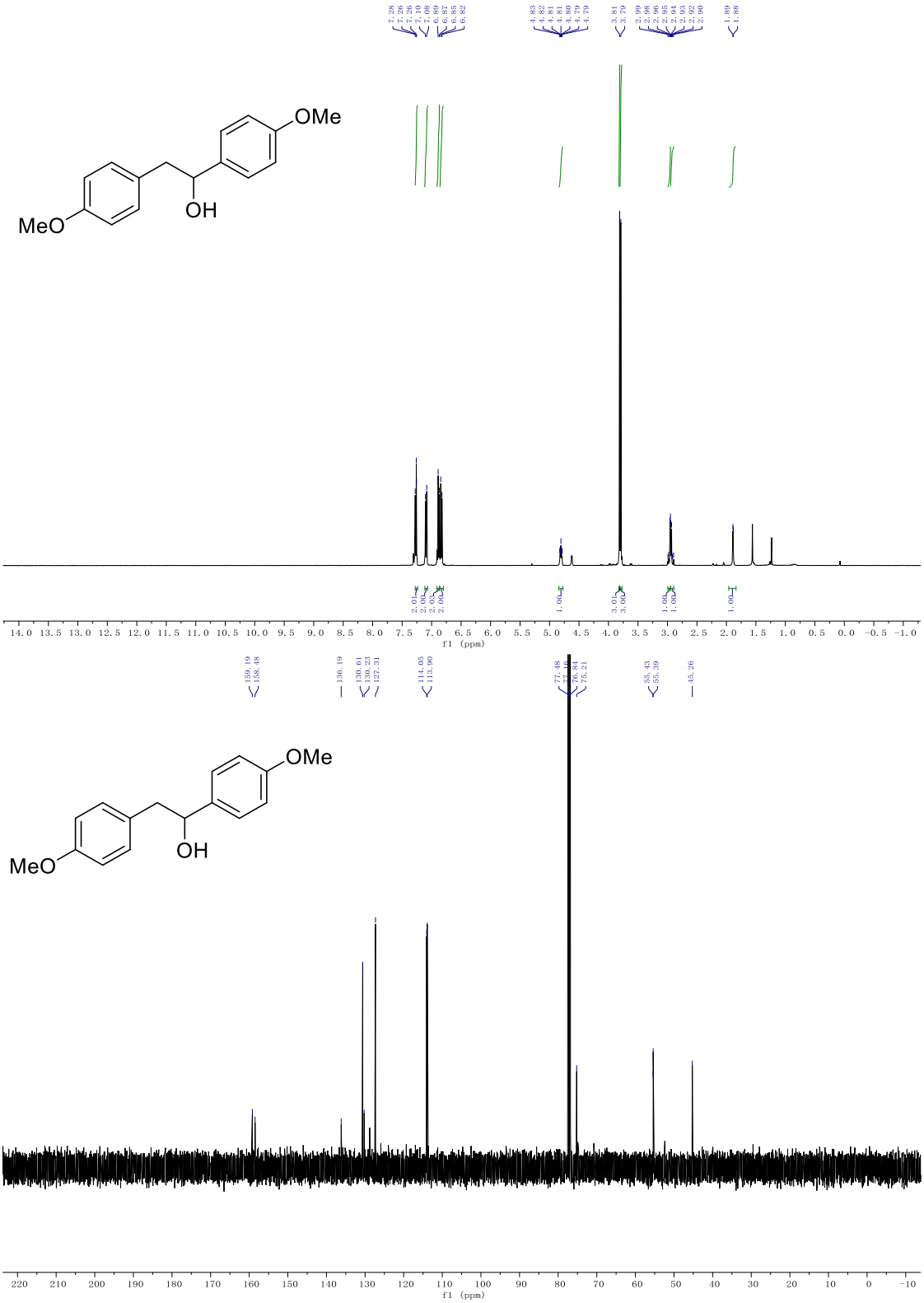
^{1}H and ^{13}C NMR spectrum of **3-(1-hydroxy-2-(4-methoxyphenyl)ethyl)benzonitrile 3n**



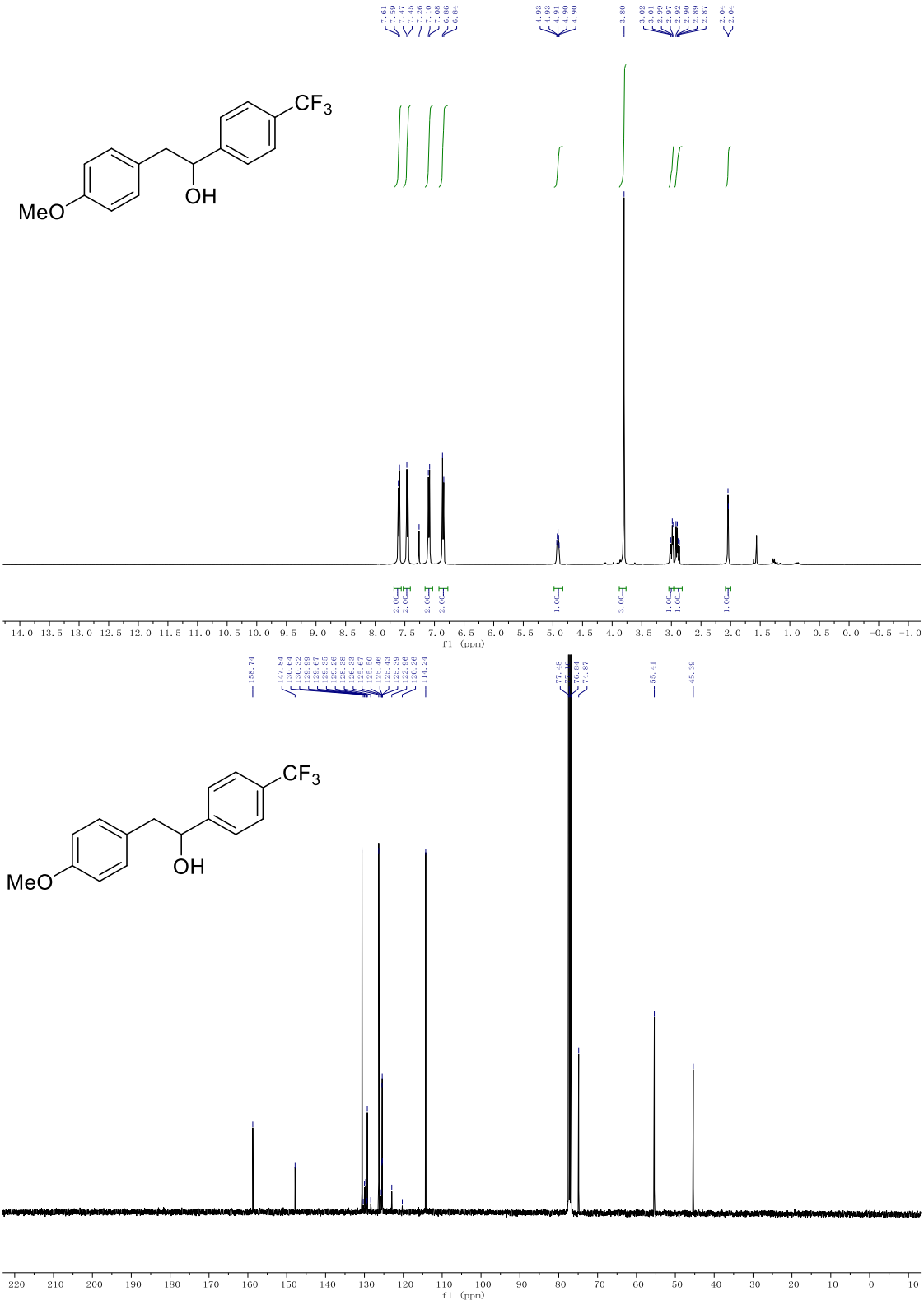
^{1}H and ^{13}C NMR spectrum of **2-(4-methoxyphenyl)-1-[3-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)phenyl]ethan-1-ol 3o**



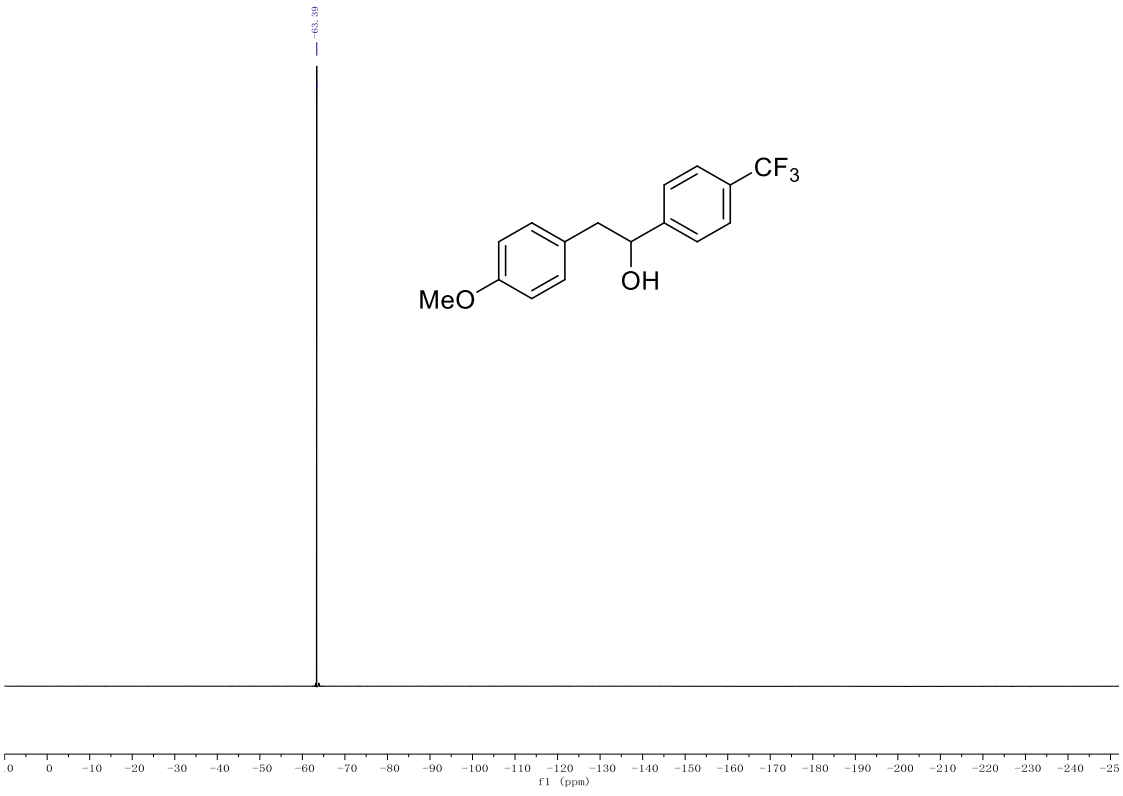
^{1}H and ^{13}C NMR spectrum of **3-(1-hydroxy-2-(4-methoxyphenyl)ethyl)phenol 3p**



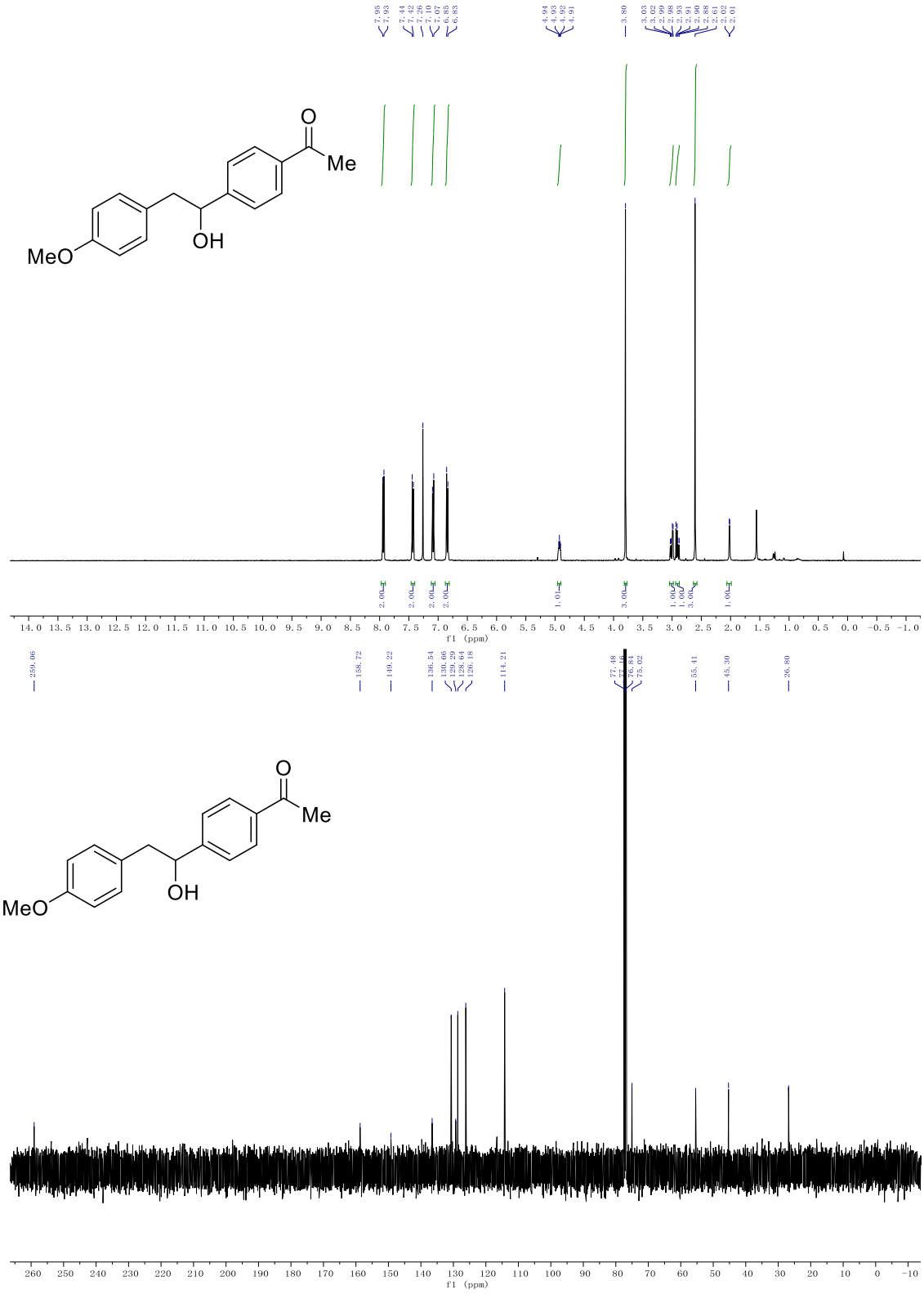
^{1}H and ^{13}C NMR spectrum of **1,2-bis(4-methoxyphenyl)ethan-1-ol 3q**



^{1}H and ^{13}C NMR spectrum of **2-(4-methoxyphenyl)-1-[4-(trifluoromethyl)phenyl]ethan-1-ol 3r**

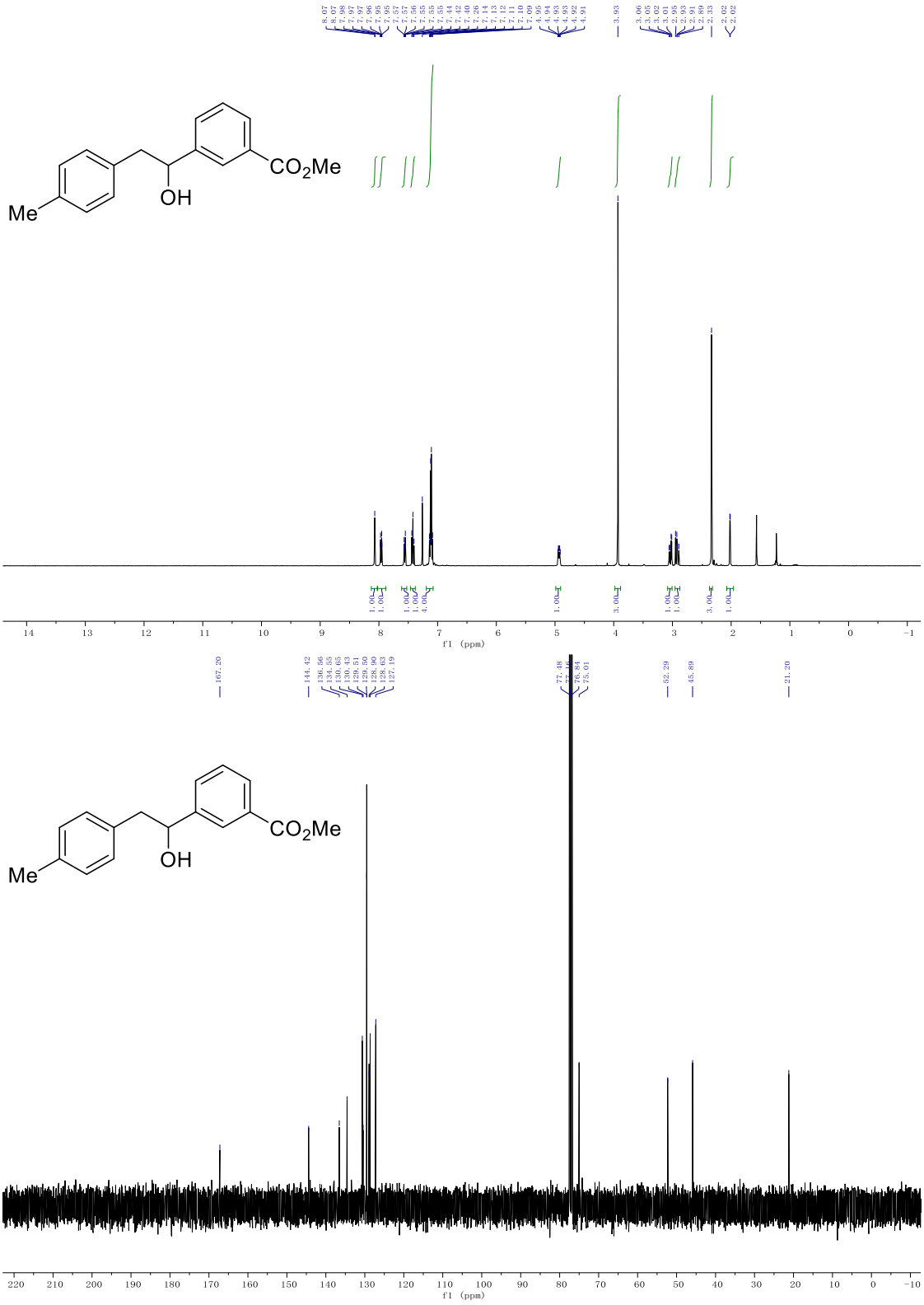


^{19}F NMR spectra of **2-(4-methoxyphenyl)-1-[4-(trifluoromethyl)phenyl]ethan-1-ol 3r**

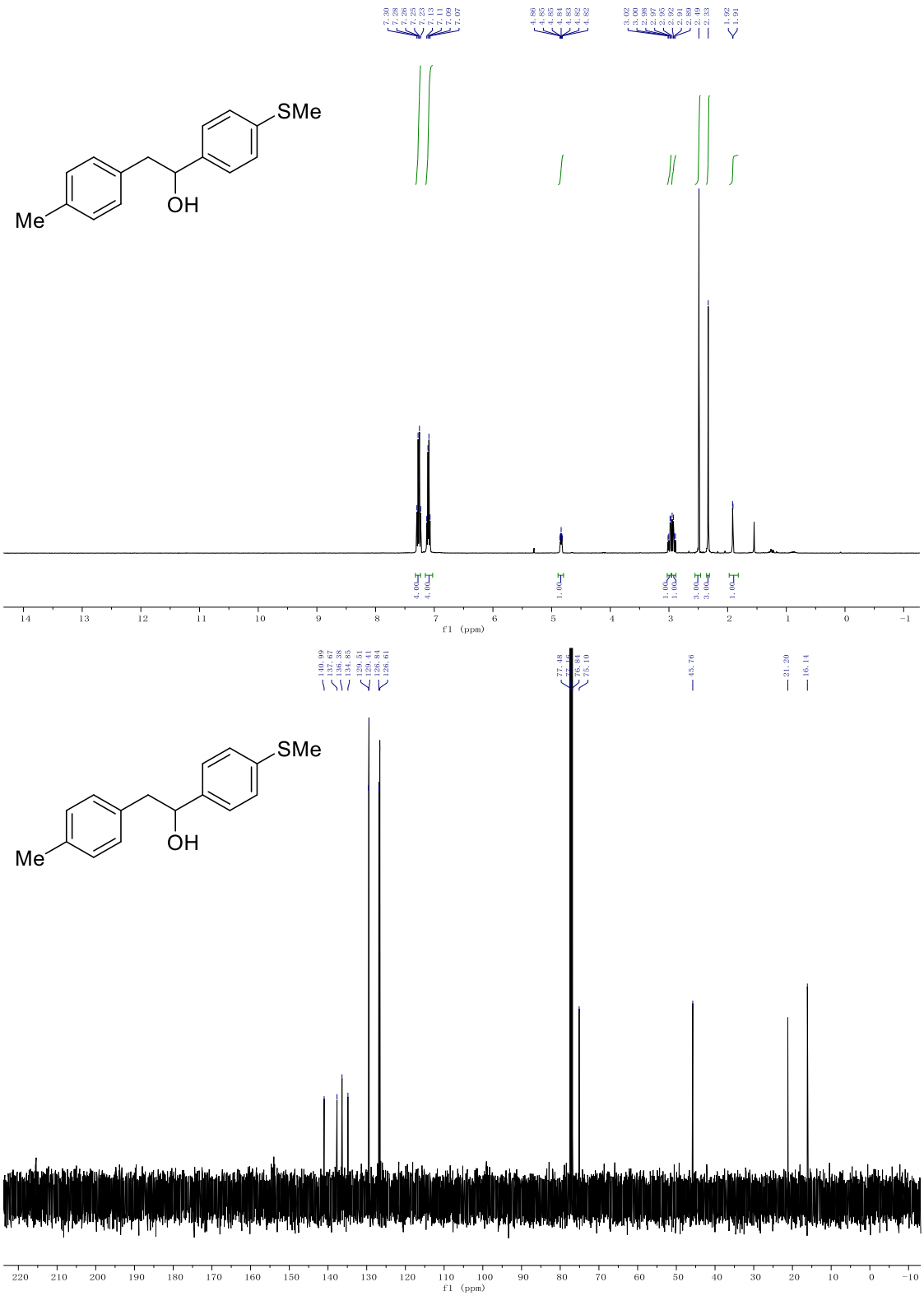


^{1}H and ^{13}C NMR spectrum of **1-{4-[1-hydroxy-2-(4-methoxyphenyl)ethyl]phenyl}ethan-1-one**

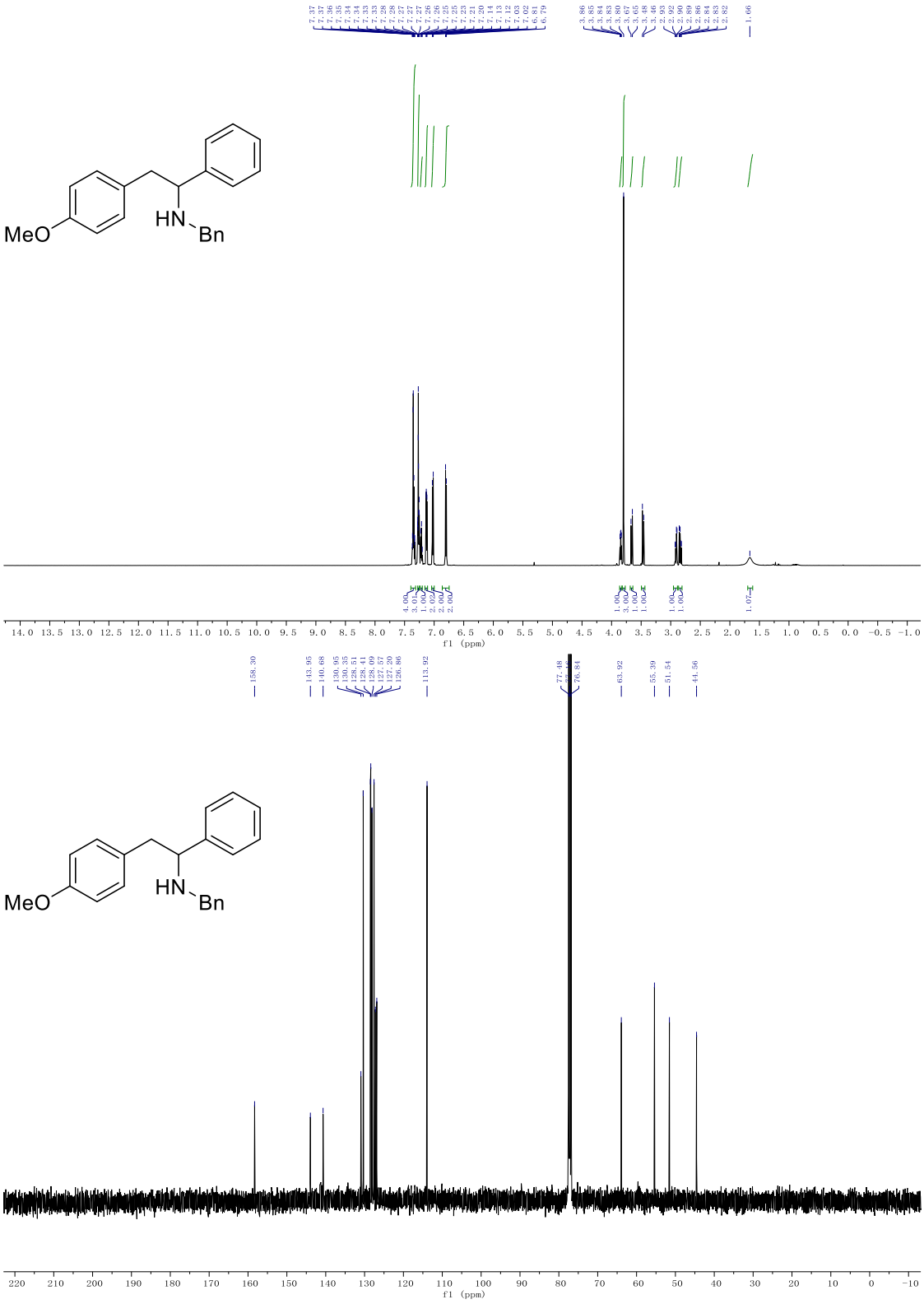
3s



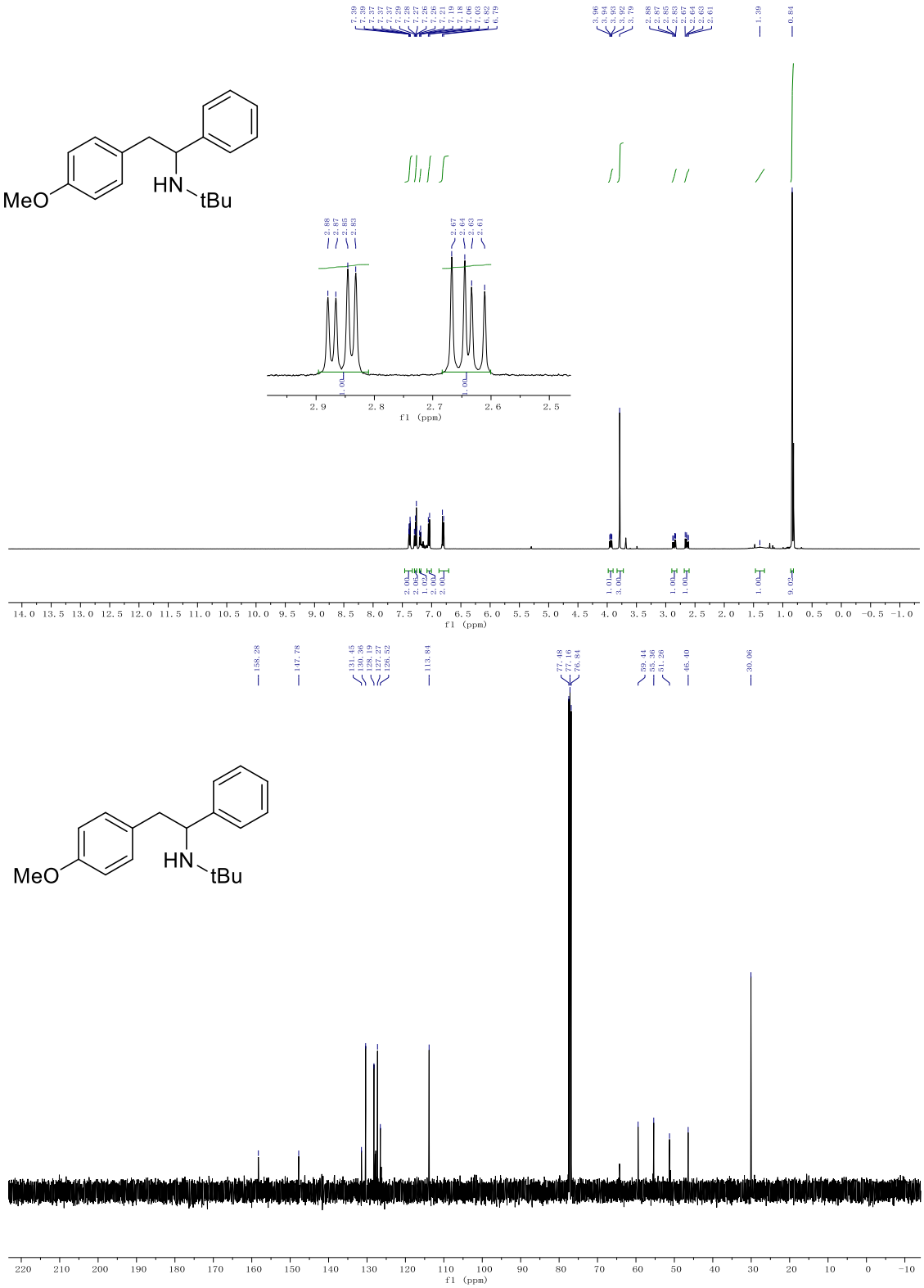
^{1}H and ^{13}C NMR spectrum of **methyl 3-[1-hydroxy-2-(*p*-tolyl)ethyl]benzoate 3t**



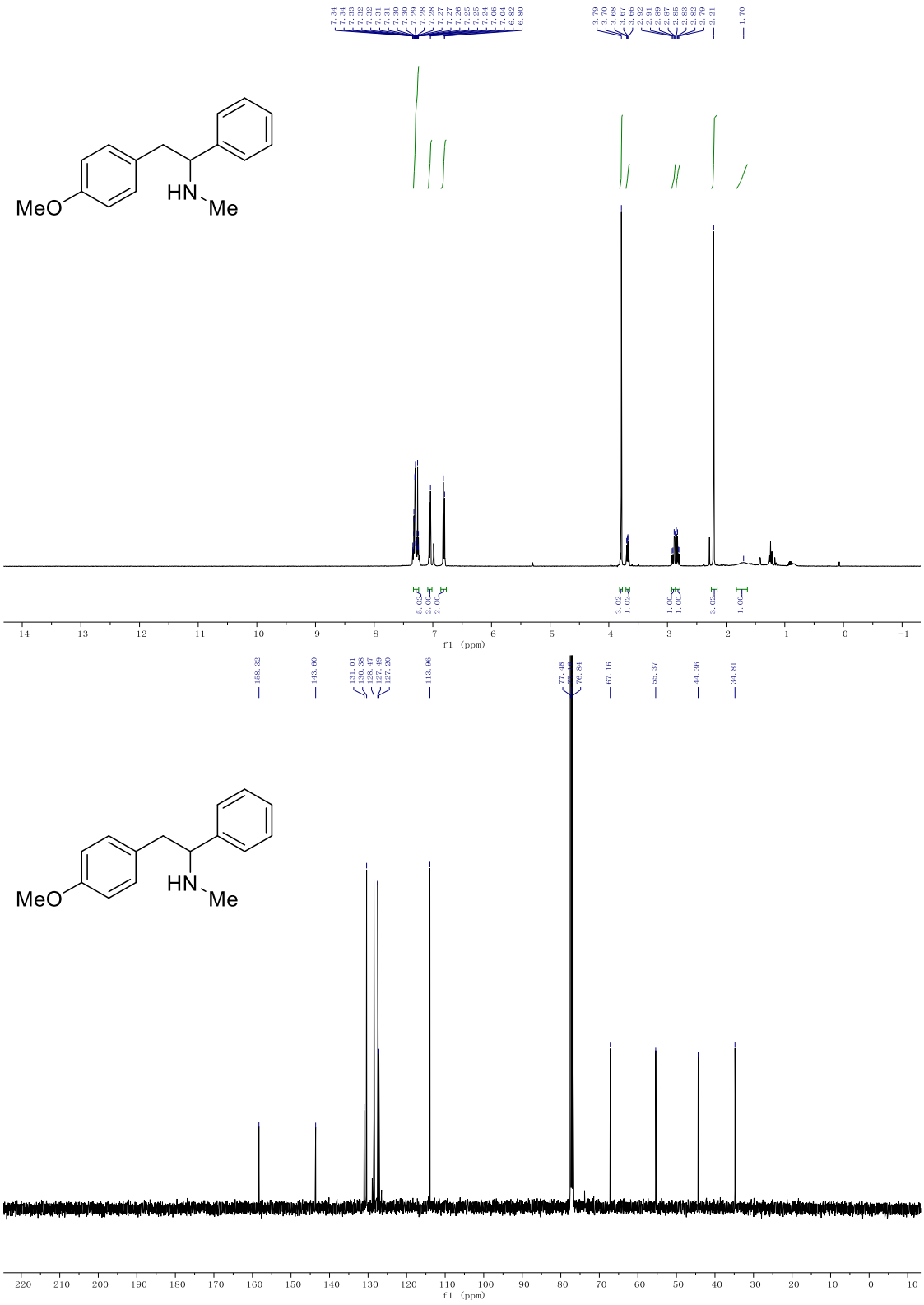
^{1}H and ^{13}C NMR spectrum of **1-[4-(methylthio)phenyl]-2-(*p*-tolyl)ethan-1-ol 3u**



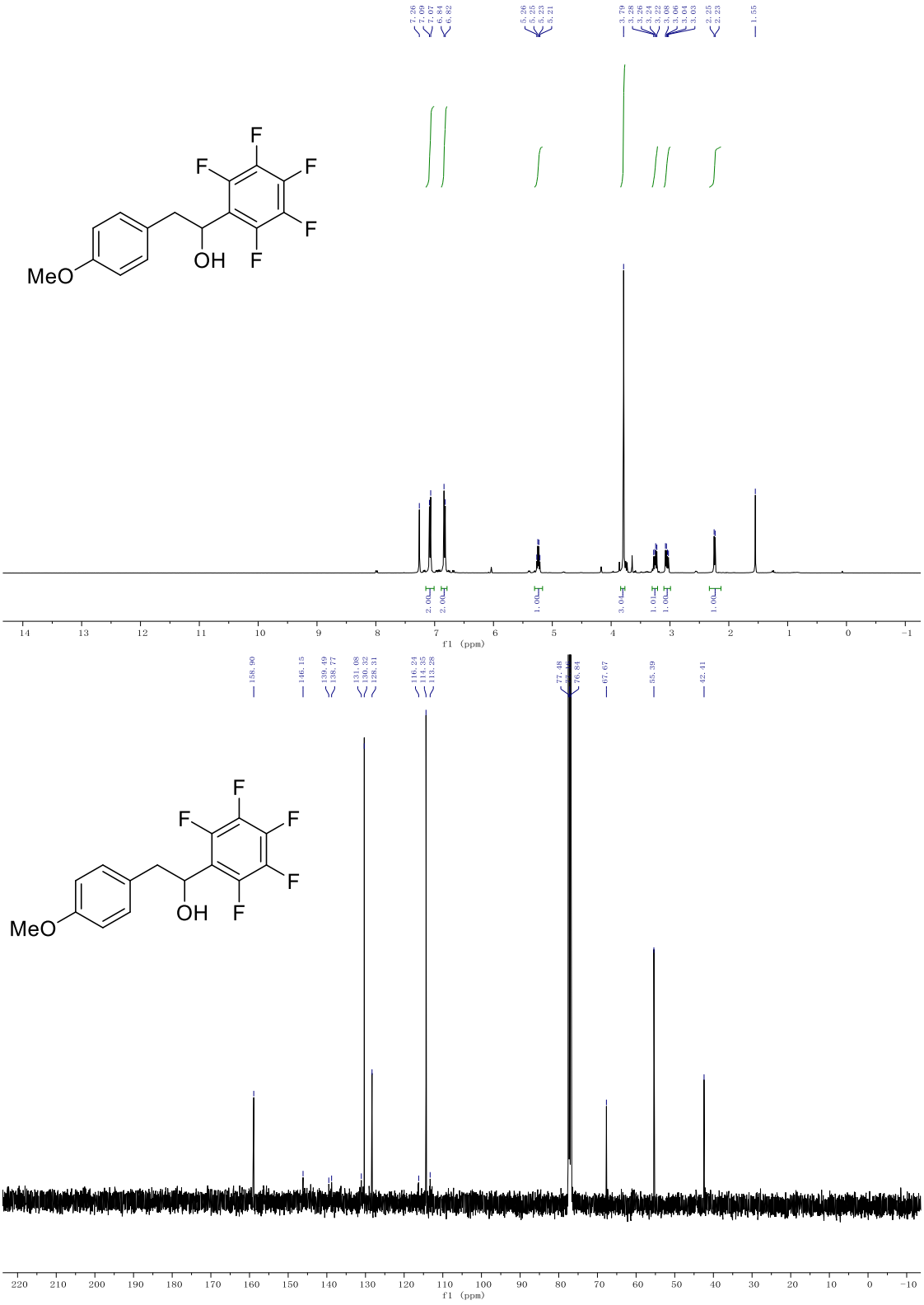
^{1}H and ^{13}C NMR spectrum of ***N*-benzyl-2-(4-methoxyphenyl)-1-phenylethan-1-amine 3v**



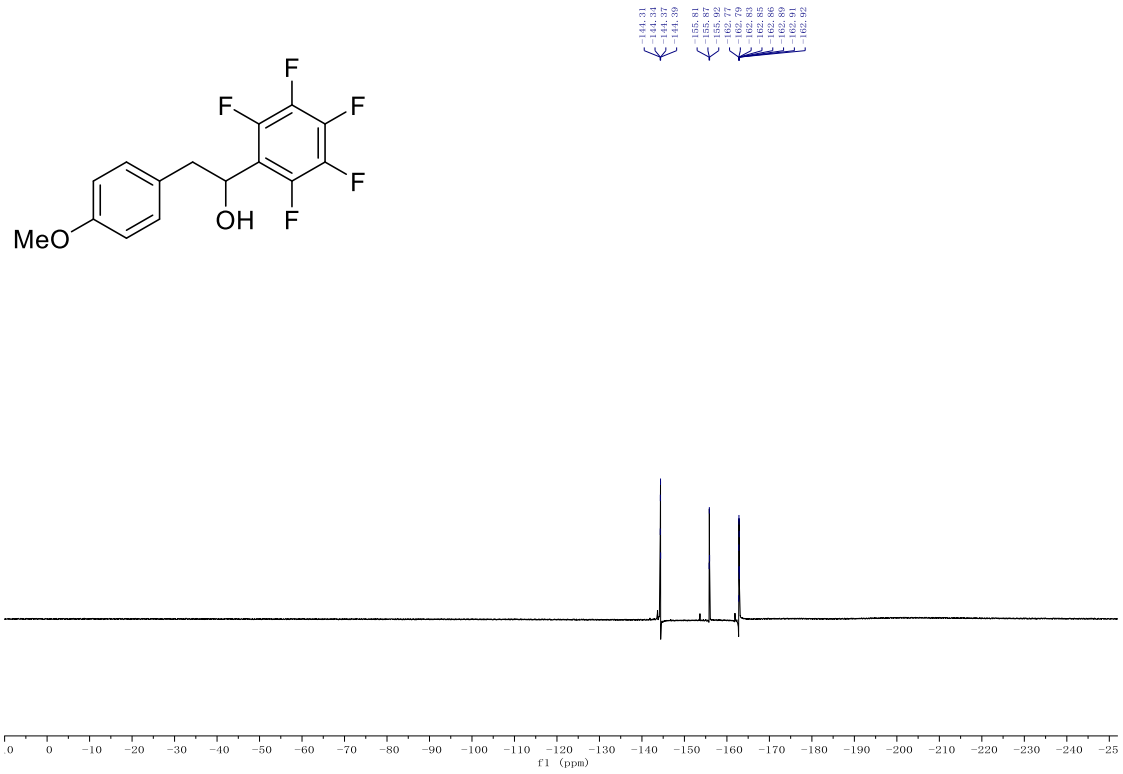
^{1}H and ^{13}C NMR spectrum of ***N*-[2-(4-methoxyphenyl)-1-phenylethyl]-2-methylpropan-2-amine 3w**



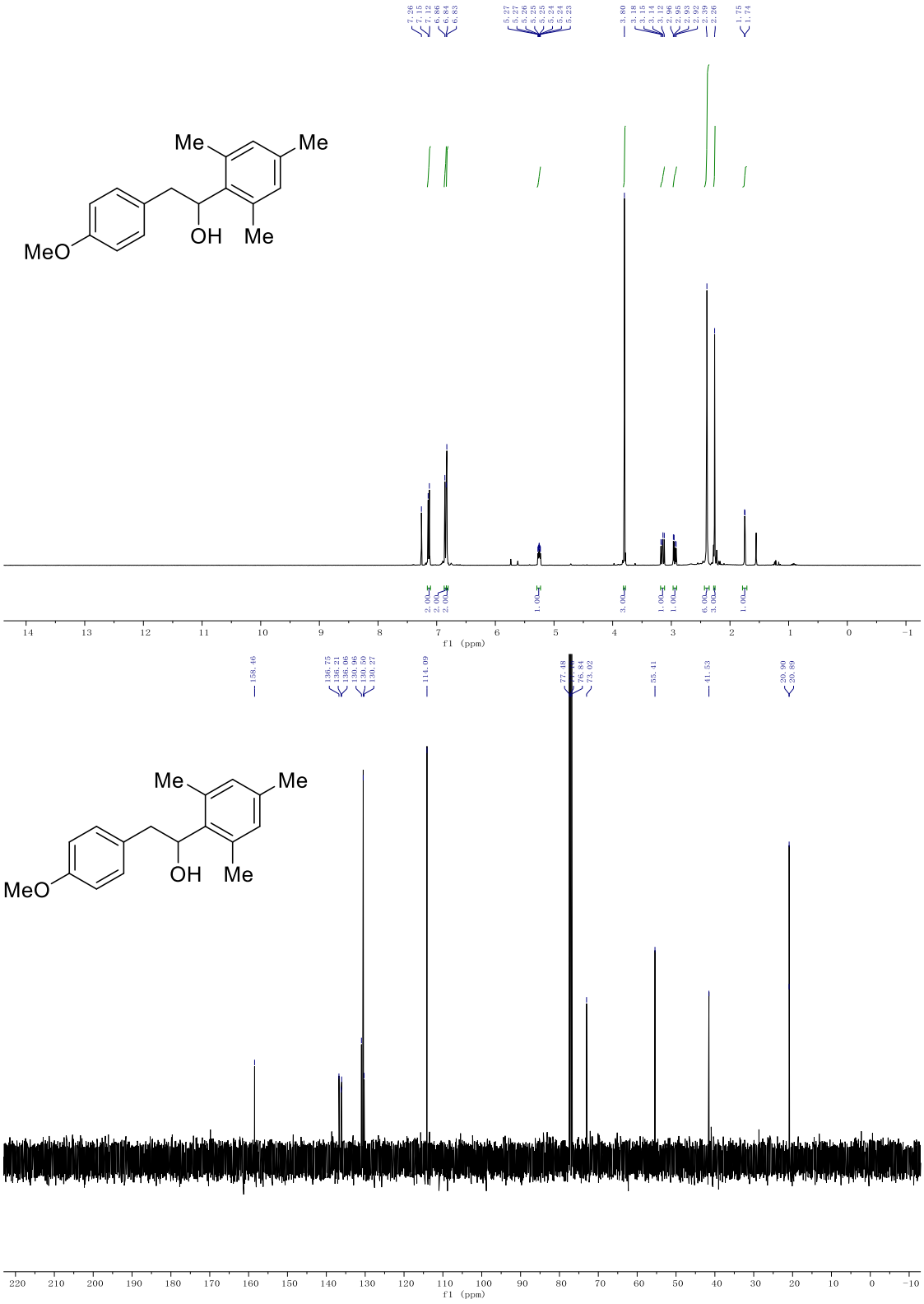
^{1}H and ^{13}C NMR spectrum of **2-(4-methoxyphenyl)-*N*-methyl-1-phenylethan-1-amine 3x**



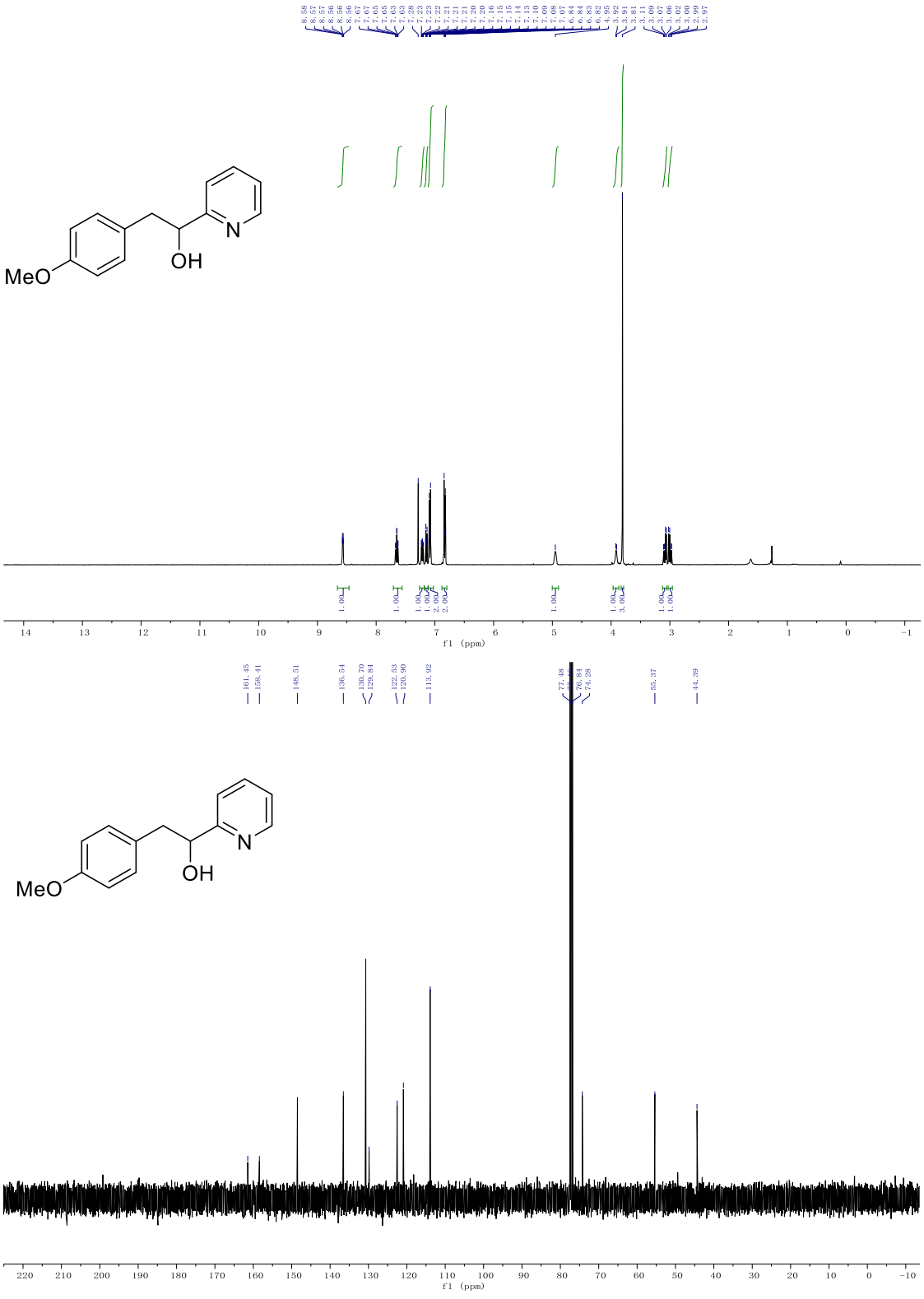
^{1}H and ^{13}C NMR spectrum of **2-(4-methoxyphenyl)-1-(perfluorophenyl)ethan-1-ol 3y**



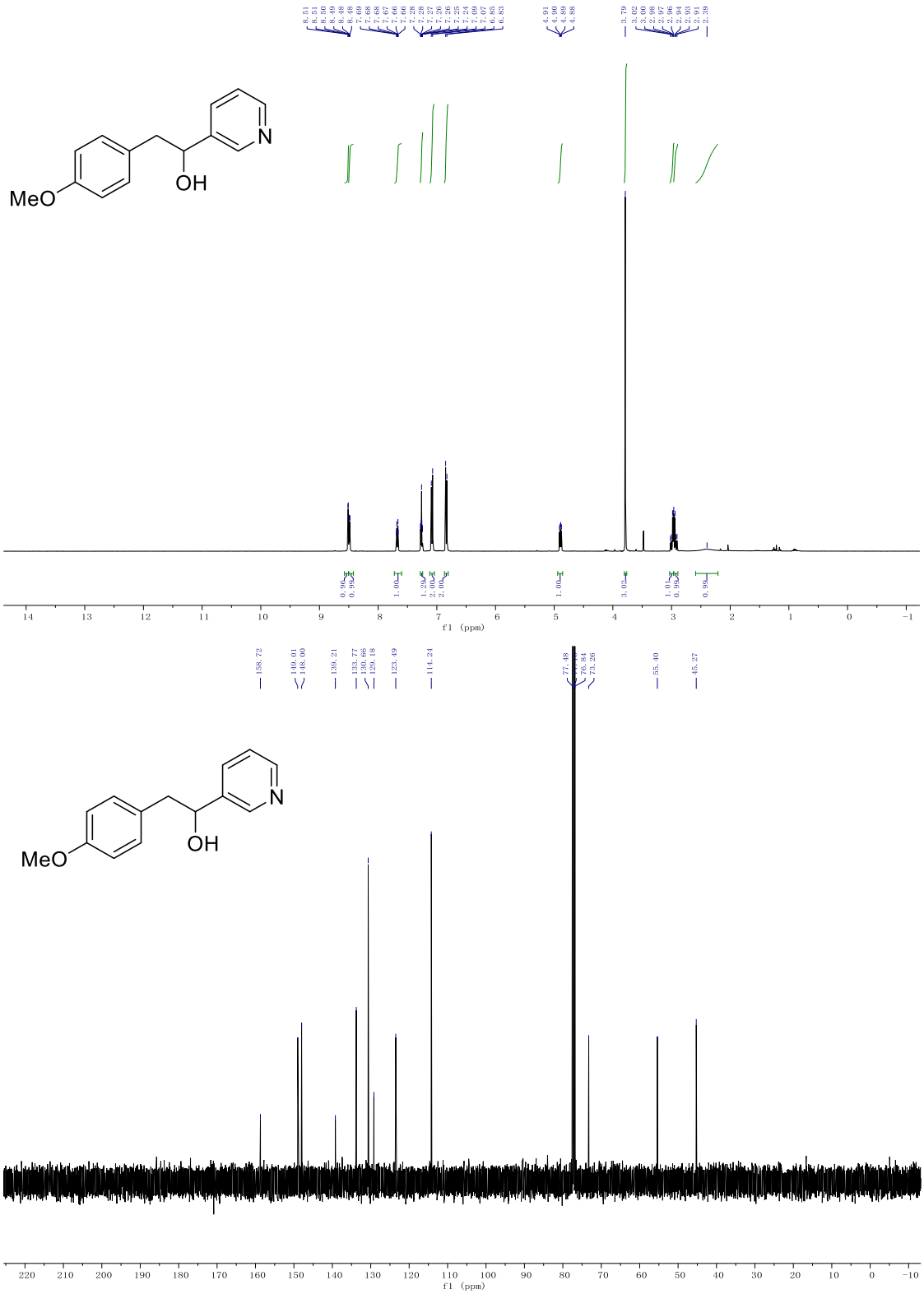
^{19}F NMR spectra of **2-(4-methoxyphenyl)-1-(perfluorophenyl)ethan-1-ol 3y**



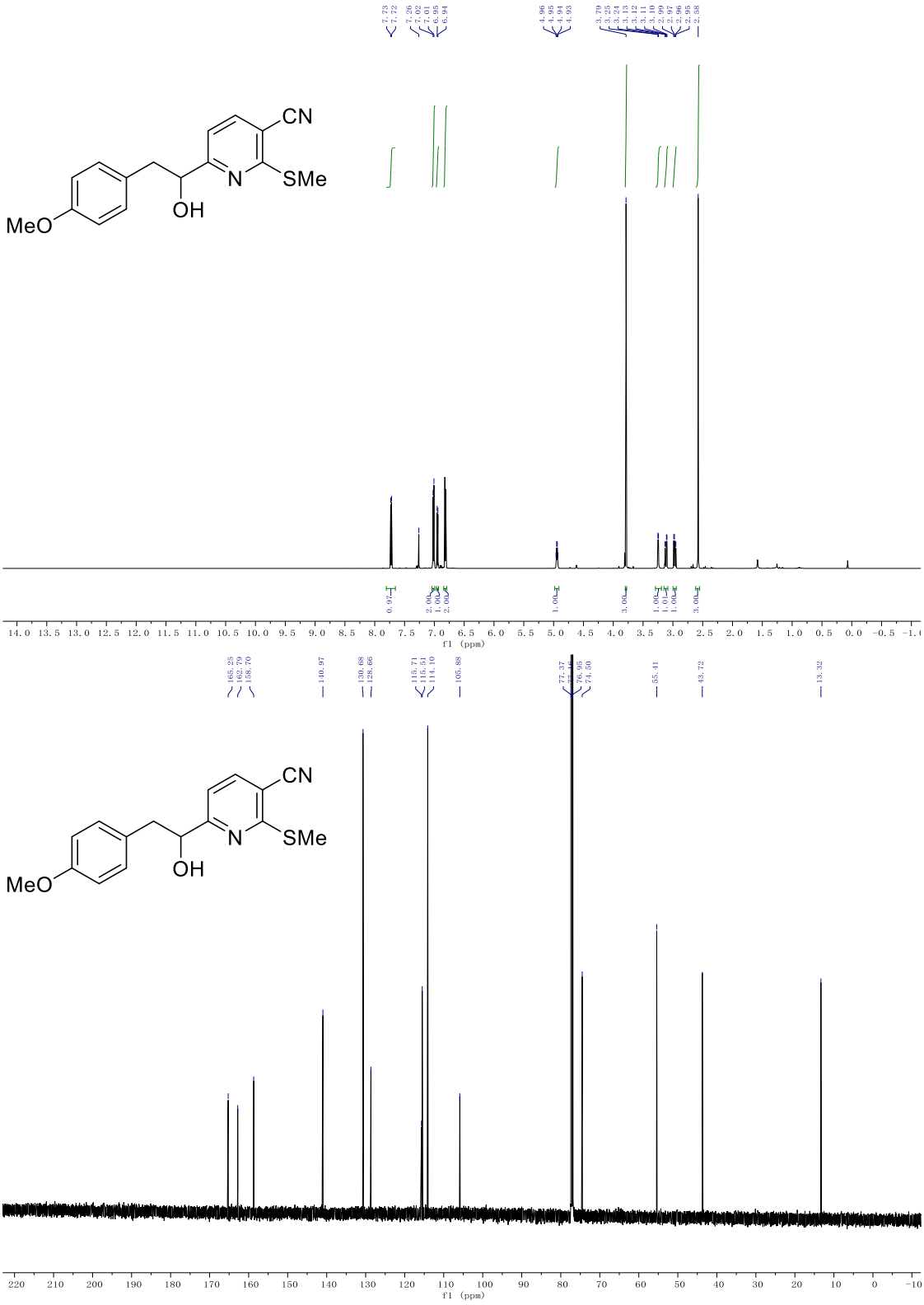
^{1}H and ^{13}C NMR spectrum of **1-mesityl-2-(4-methoxyphenyl)ethan-1-ol 3z**



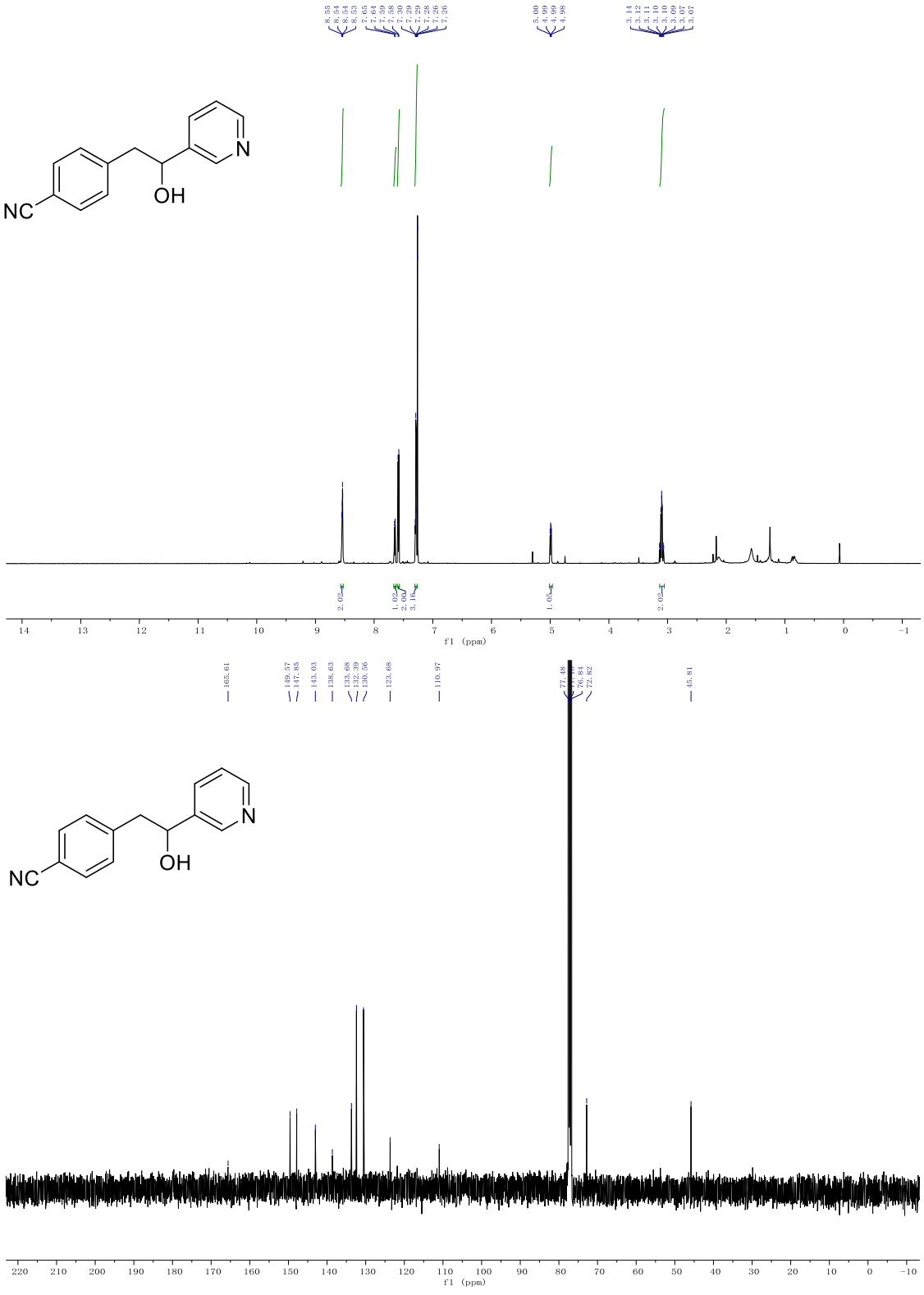
^{1}H and ^{13}C NMR spectrum of **2-(4-methoxyphenyl)-1-(pyridin-2-yl)ethan-1-ol 3aa**



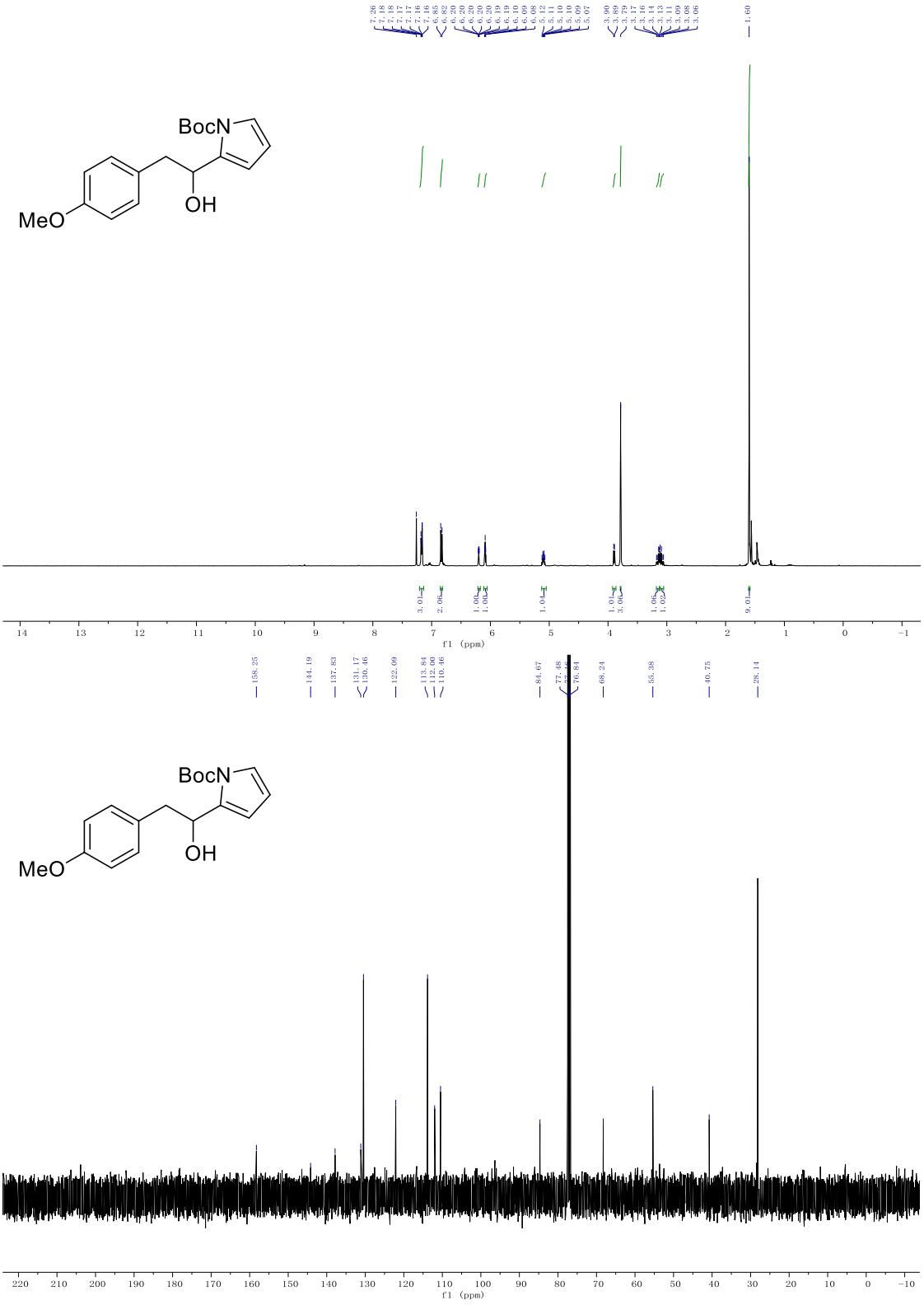
^{1}H and ^{13}C NMR spectrum of **2-(4-methoxyphenyl)-1-(pyridin-3-yl)ethan-1-ol 3ab**



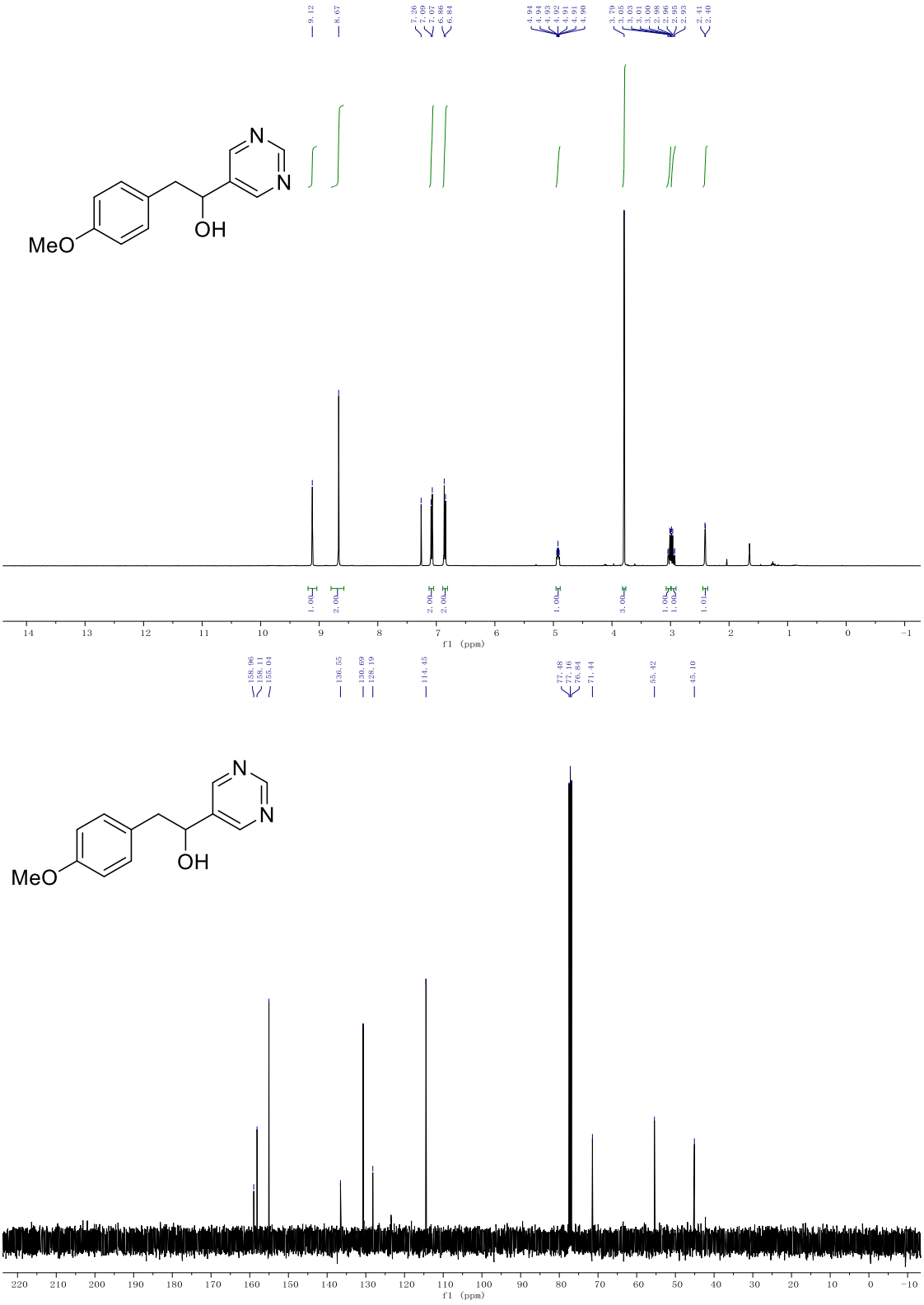
^{1}H and ^{13}C NMR spectrum of **6-[1-hydroxy-2-(4-methoxyphenyl)ethyl]-2-(methylthio)nicotinonitrile 3ac**



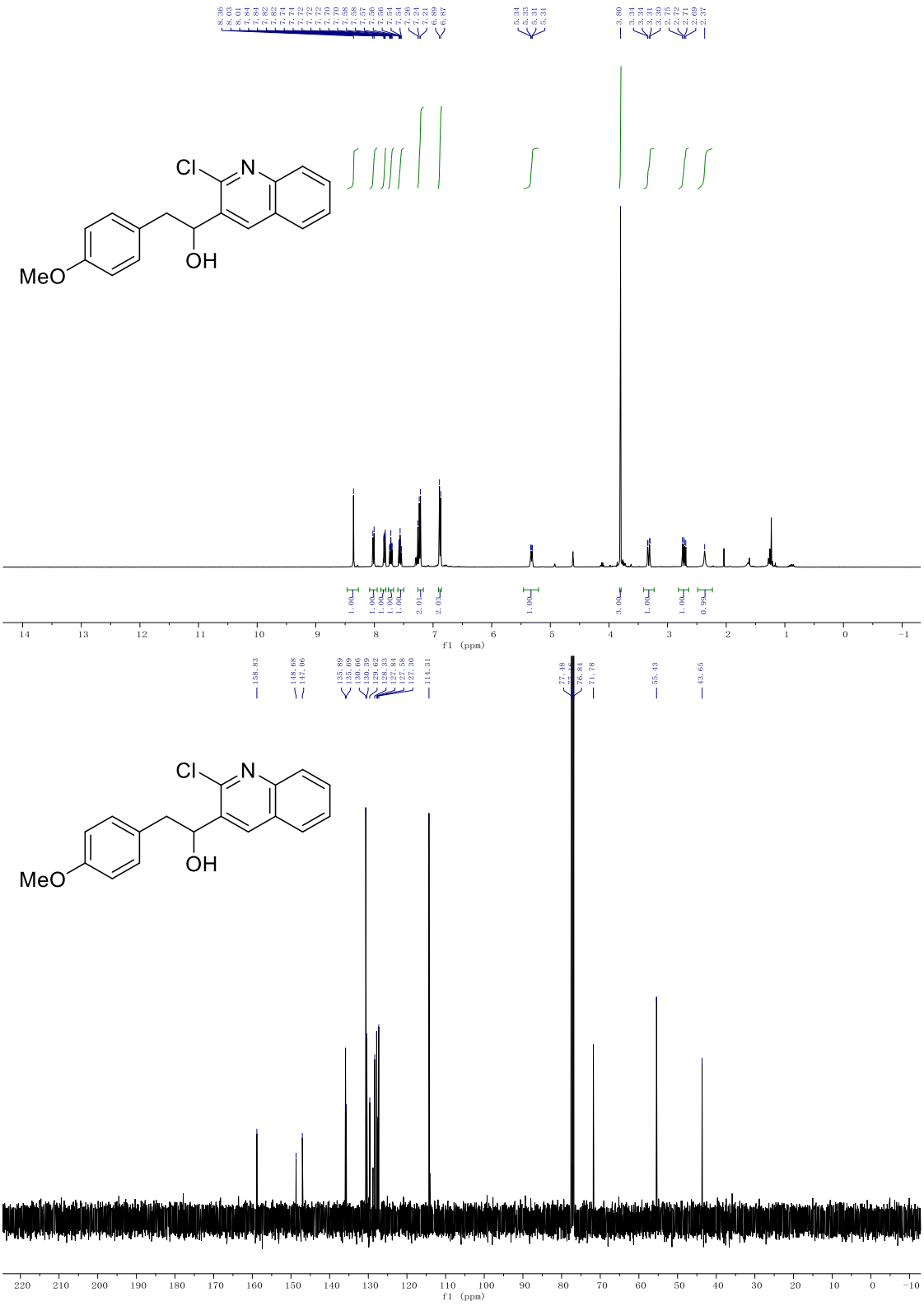
^{1}H and ^{13}C NMR spectrum of **2-(4-isocyanophenyl)-1-(pyridin-3-yl)ethan-1-ol 3ad**



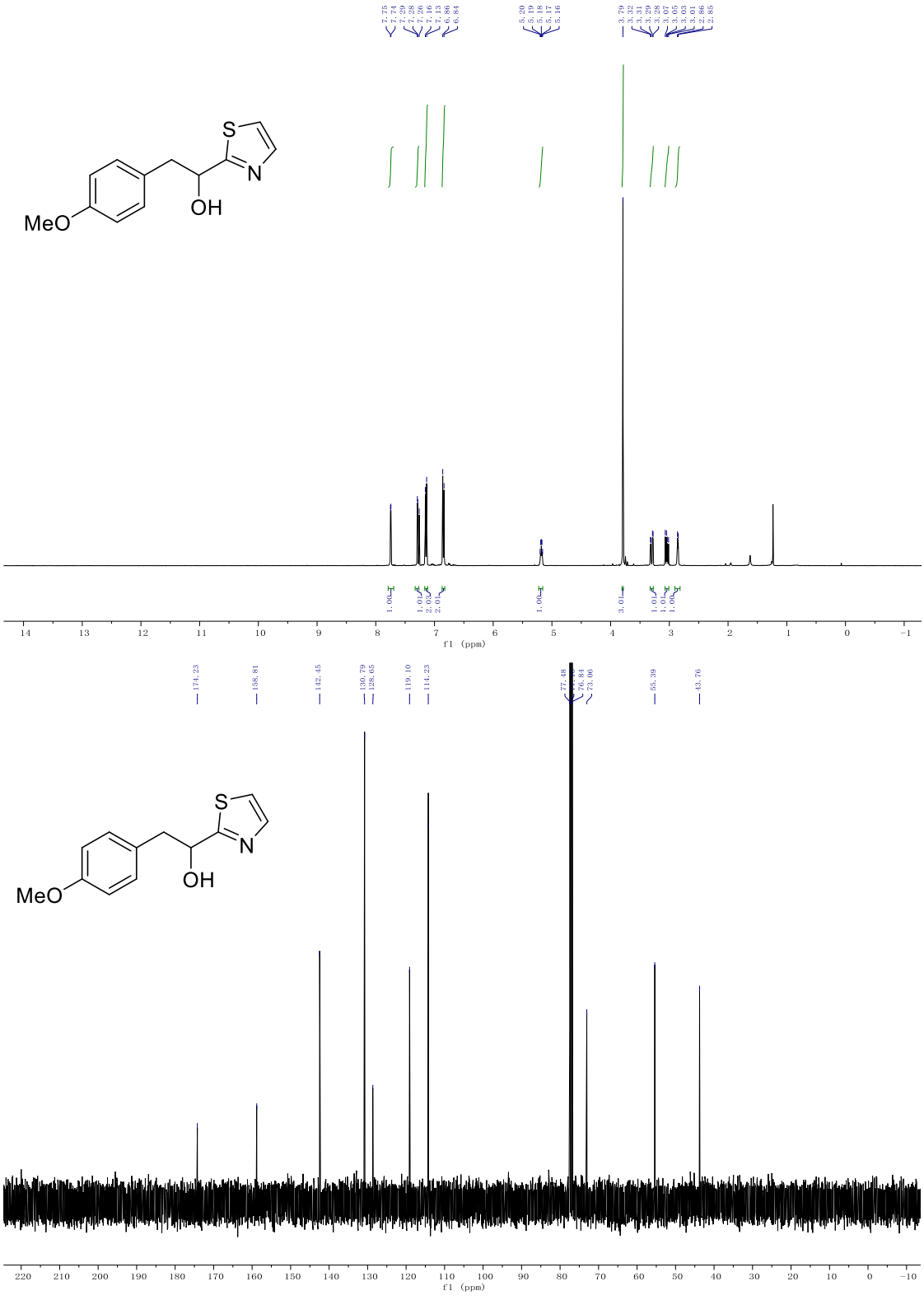
^{1}H and ^{13}C NMR spectrum of ***tert*-Butyl 2-[1-hydroxy-2-(4-methoxyphenyl)ethyl]-1*H*-pyrrole-1-carboxylate 3ae**



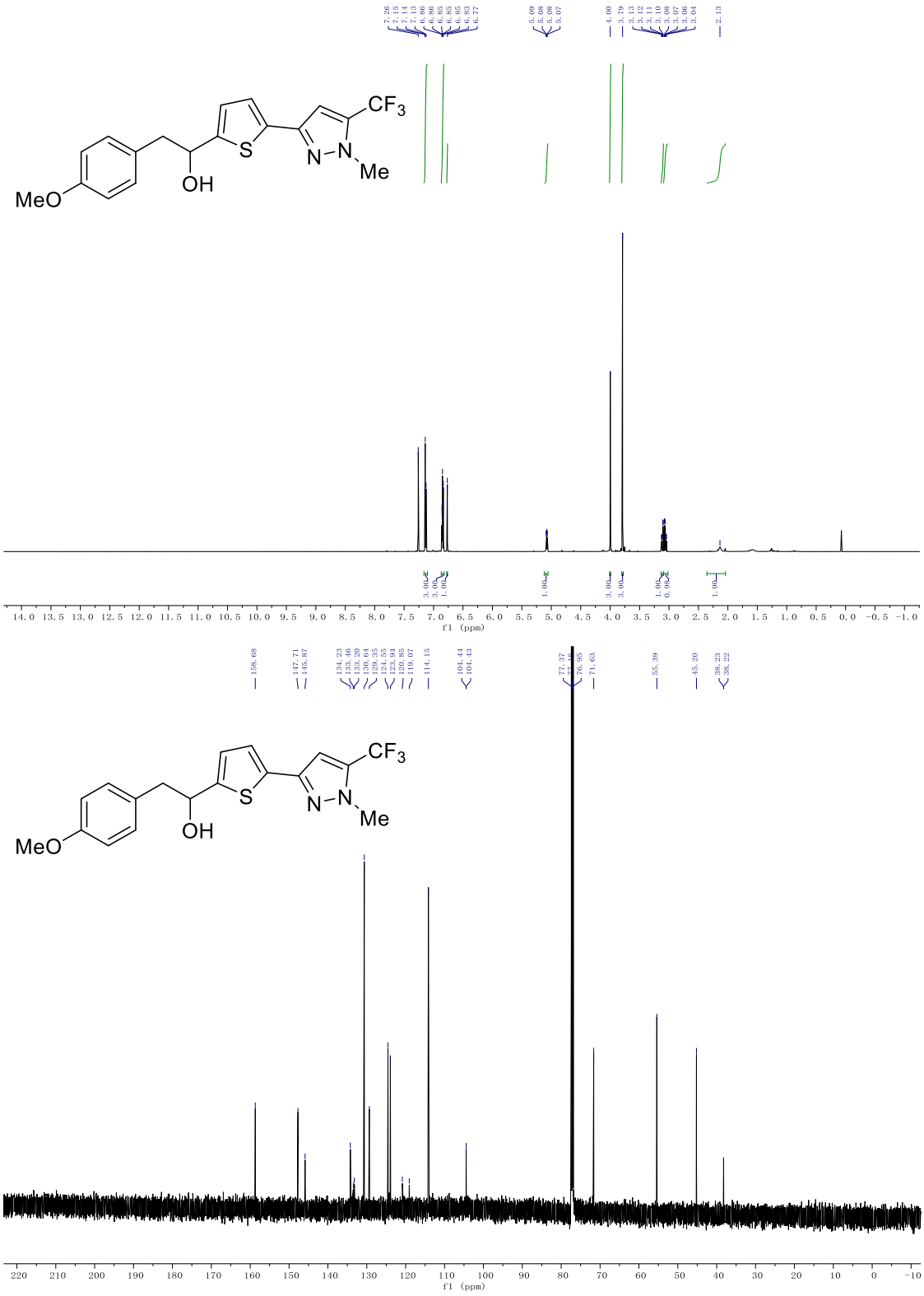
^{1}H and ^{13}C NMR spectrum of **2-(4-methoxyphenyl)-1-(pyrimidin-5-yl)ethan-1-ol 3af**



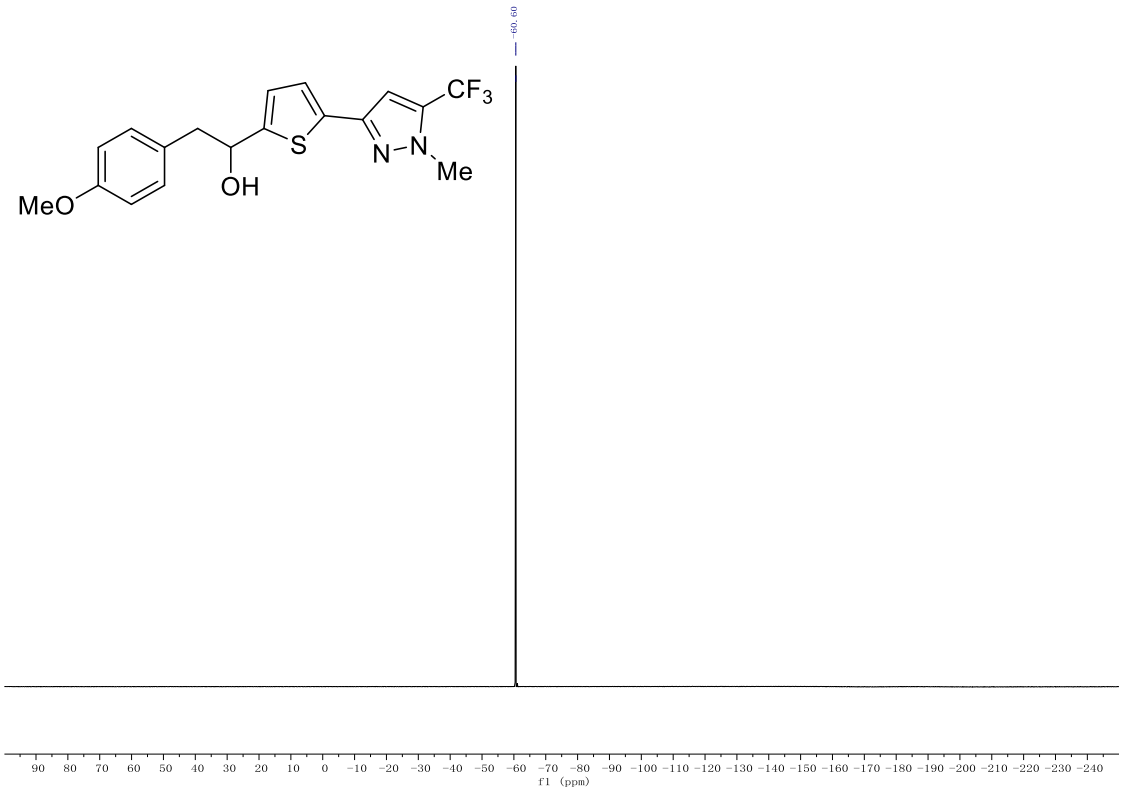
^{1}H and ^{13}C NMR spectrum of **1-(2-chloroquinolin-3-yl)-2-(4-methoxyphenyl)ethan-1-ol 3ag**



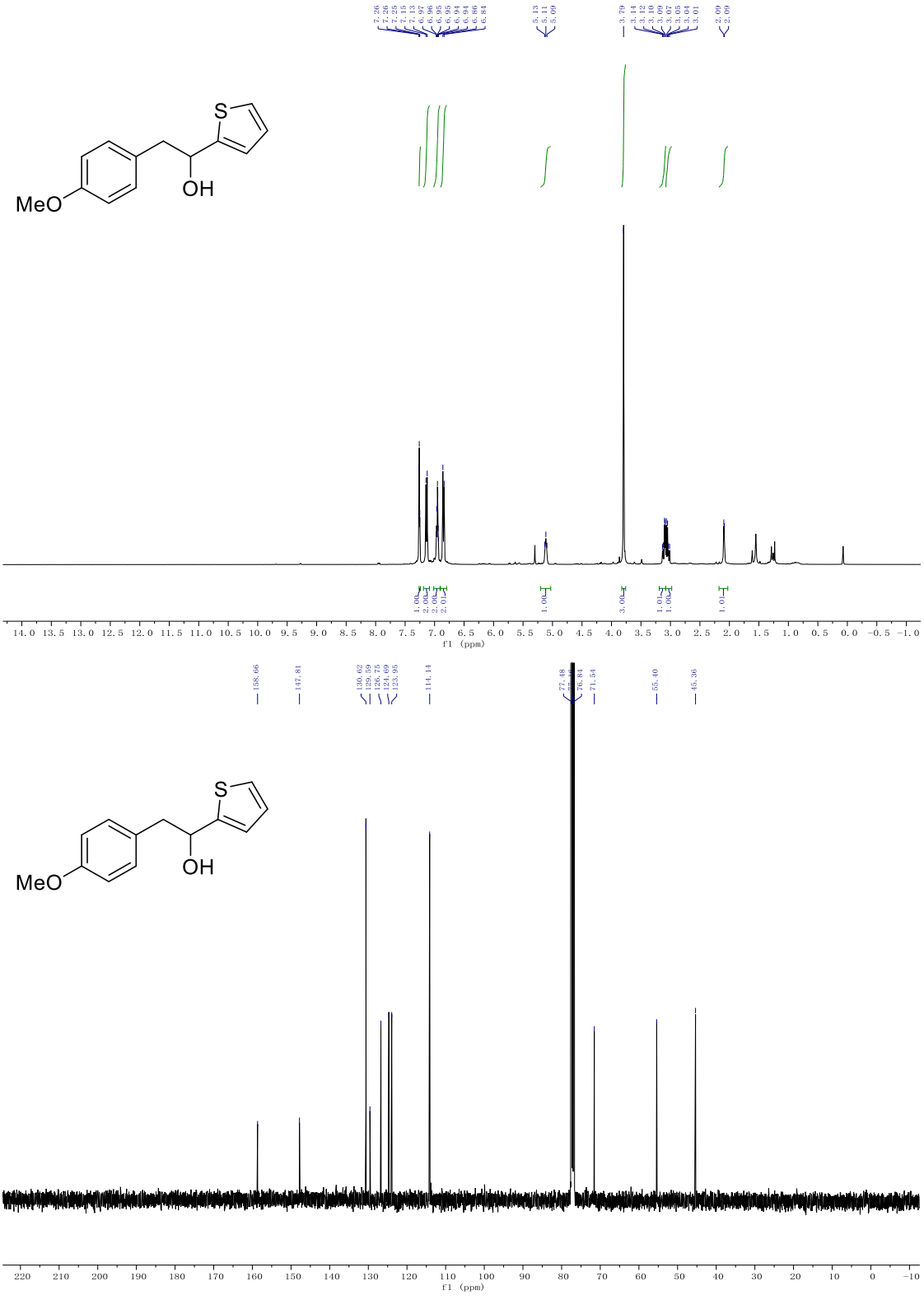
^{1}H and ^{13}C NMR spectrum of **2-(4-methoxyphenyl)-1-(thiazol-2-yl)ethan-1-ol 3ah**



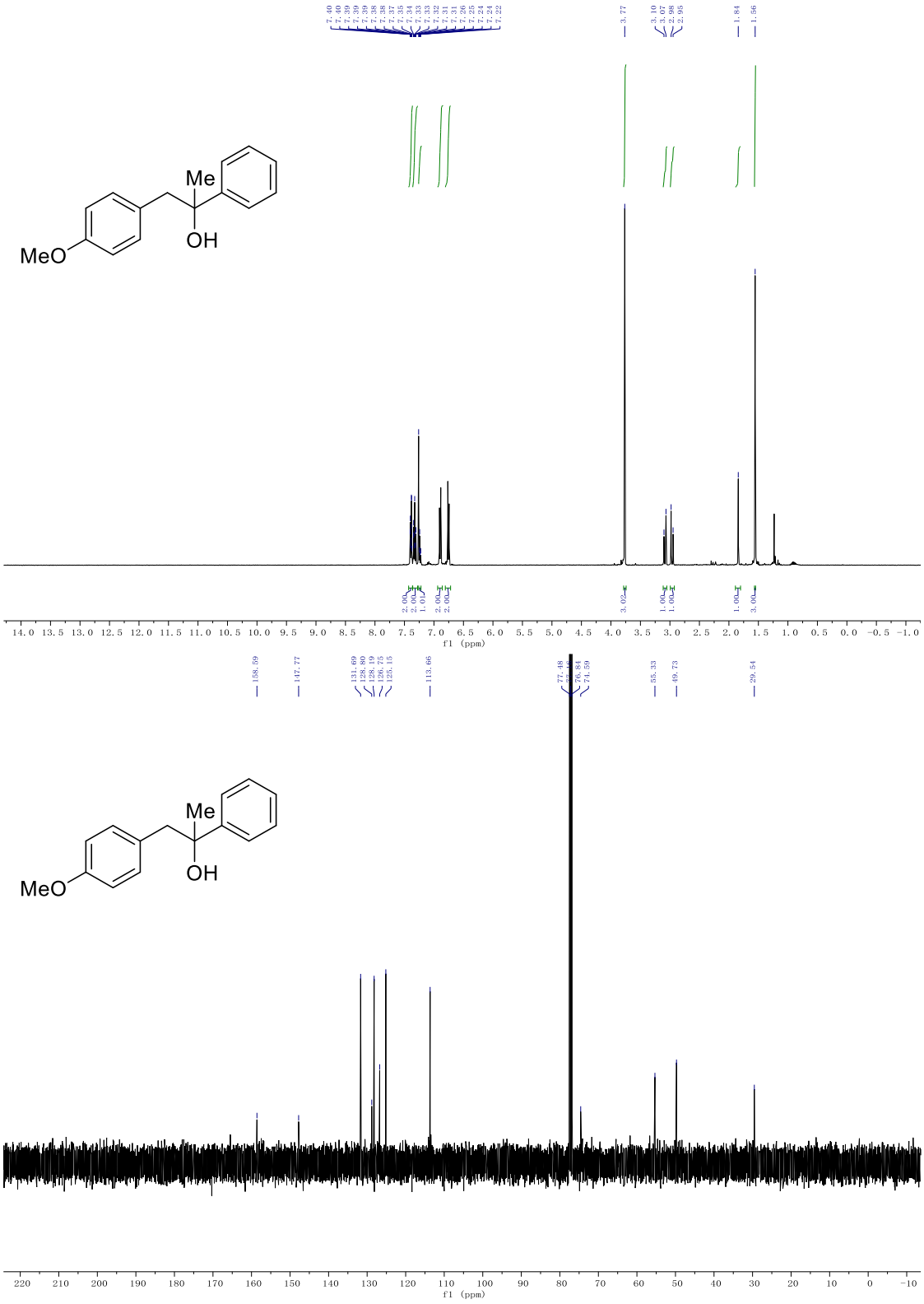
^{1}H and ^{13}C NMR spectrum of **2-(4-methoxyphenyl)-1-{5-[1-methyl-5-(trifluoromethyl)-1*H*-pyrazol-3-yl]thiophen-2-yl}ethan-1-ol 3ai**



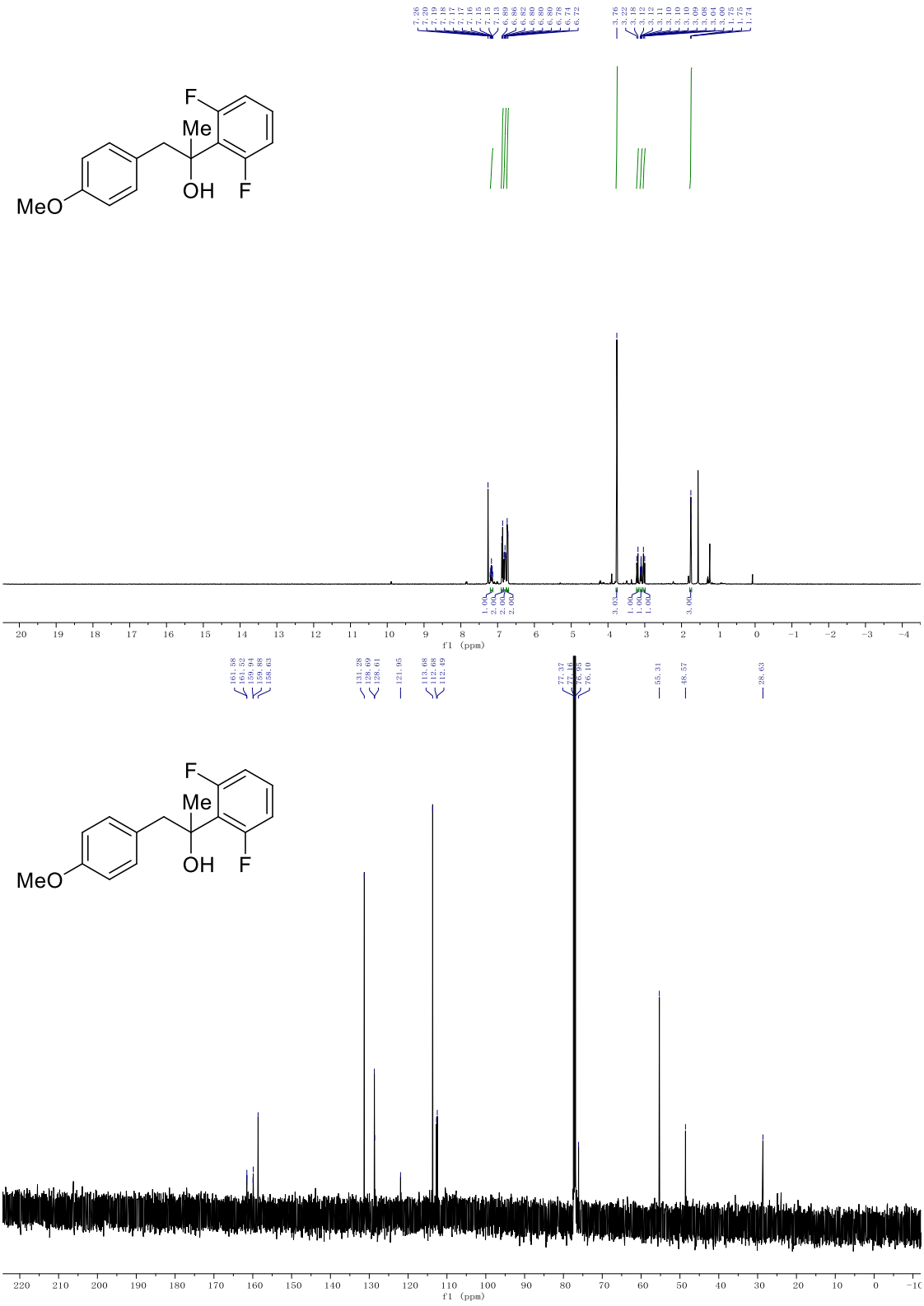
^{19}F NMR spectra of **2-(4-methoxyphenyl)-1-{5-[1-methyl-5-(trifluoromethyl)-1*H*-pyrazol-3-yl]thiophen-2-yl}ethan-1-ol 3ai**



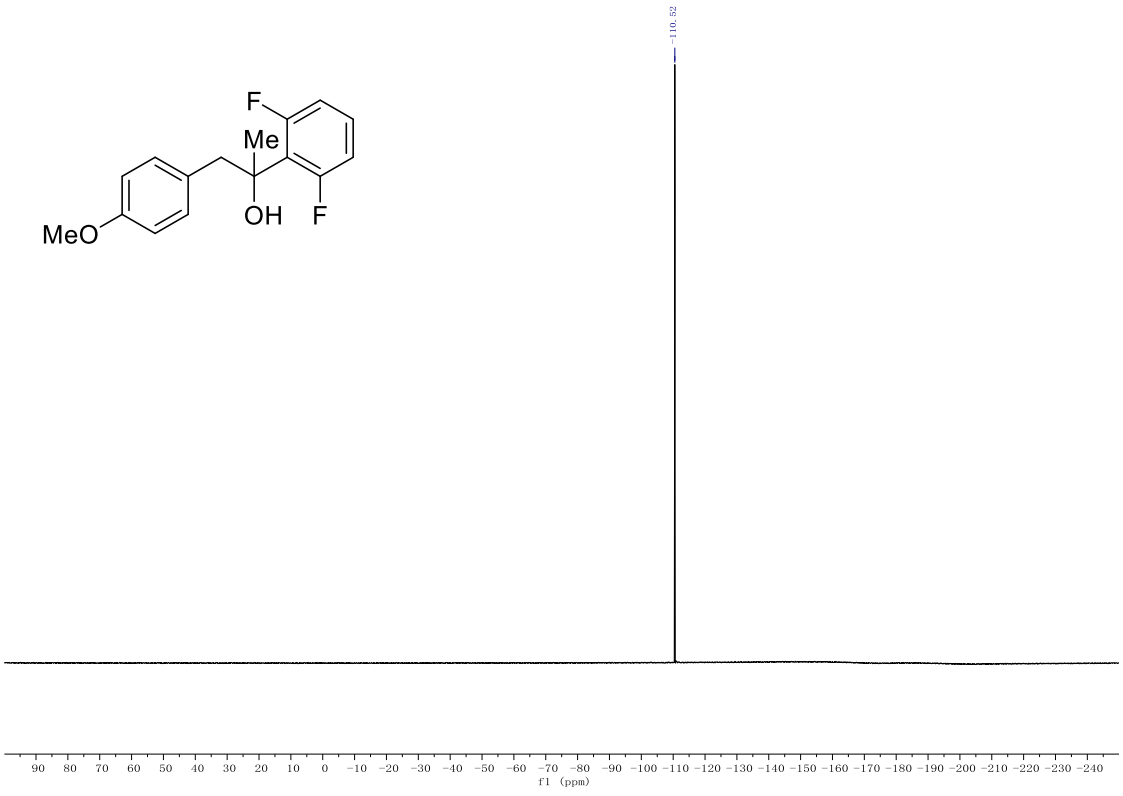
^{1}H and ^{13}C NMR spectrum of **2-(4-methoxyphenyl)-1-(thiophen-2-yl)ethan-1-ol 3aj**



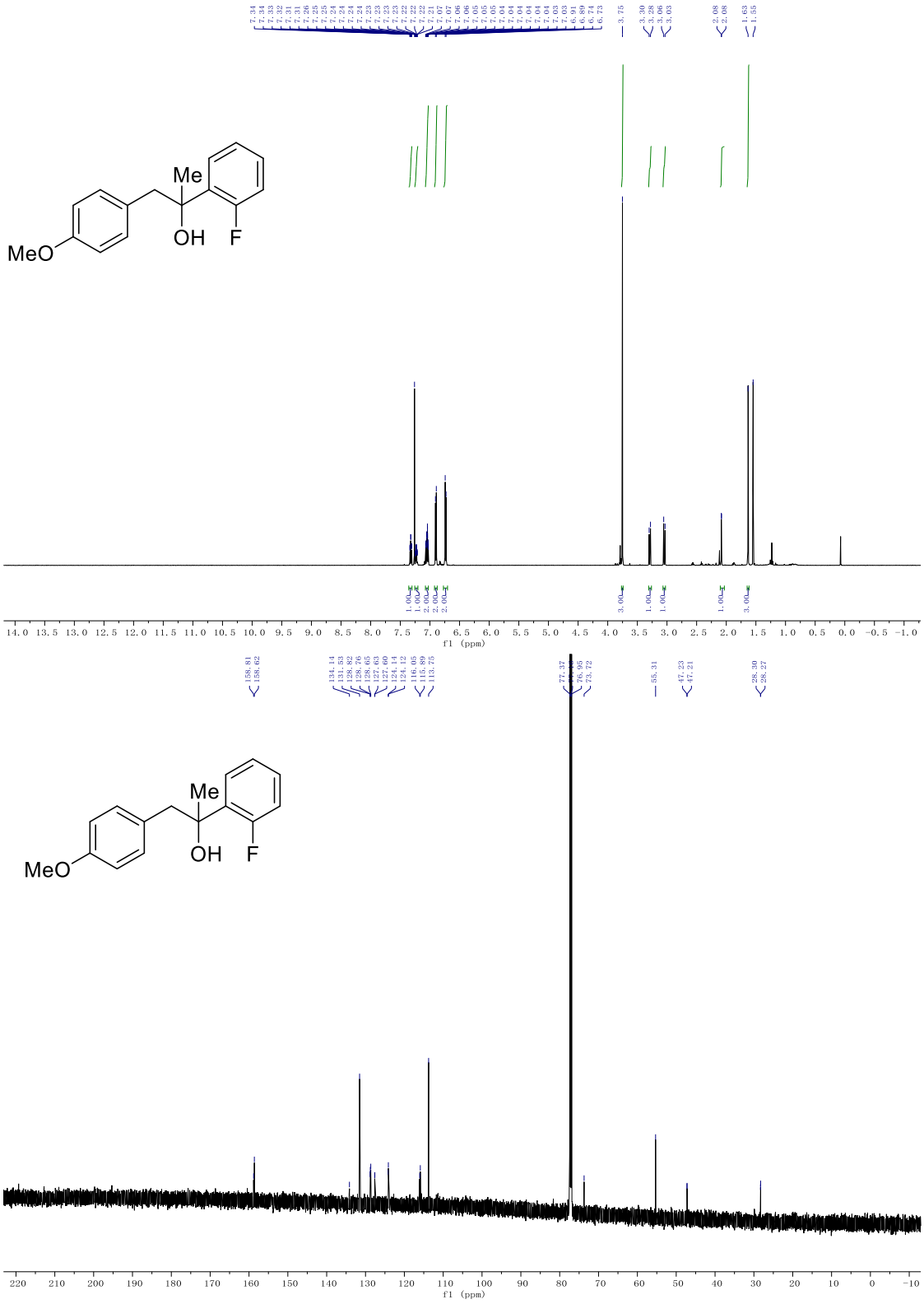
^{1}H and ^{13}C NMR spectrum of **1-(4-methoxyphenyl)-2-phenylpropan-2-ol 5a**



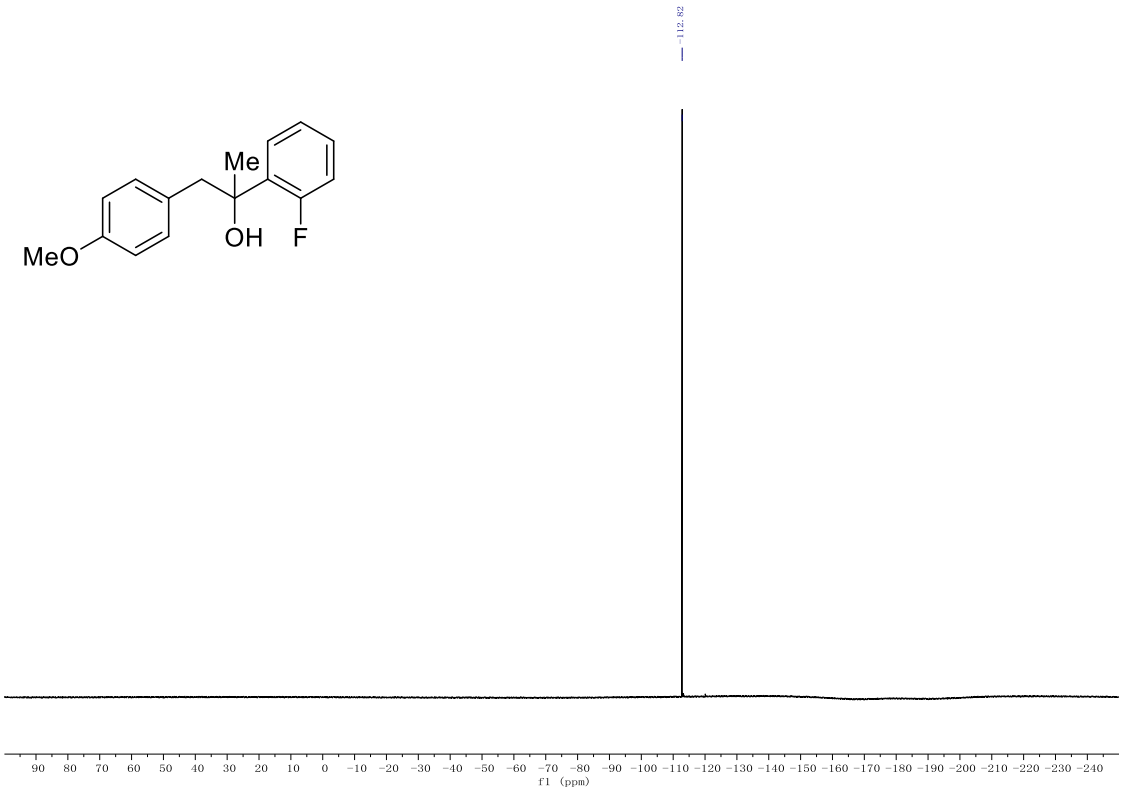
^{1}H and ^{13}C NMR spectrum of **2-(2,6-difluorophenyl)-1-(4-methoxyphenyl)propan-2-ol 5b**



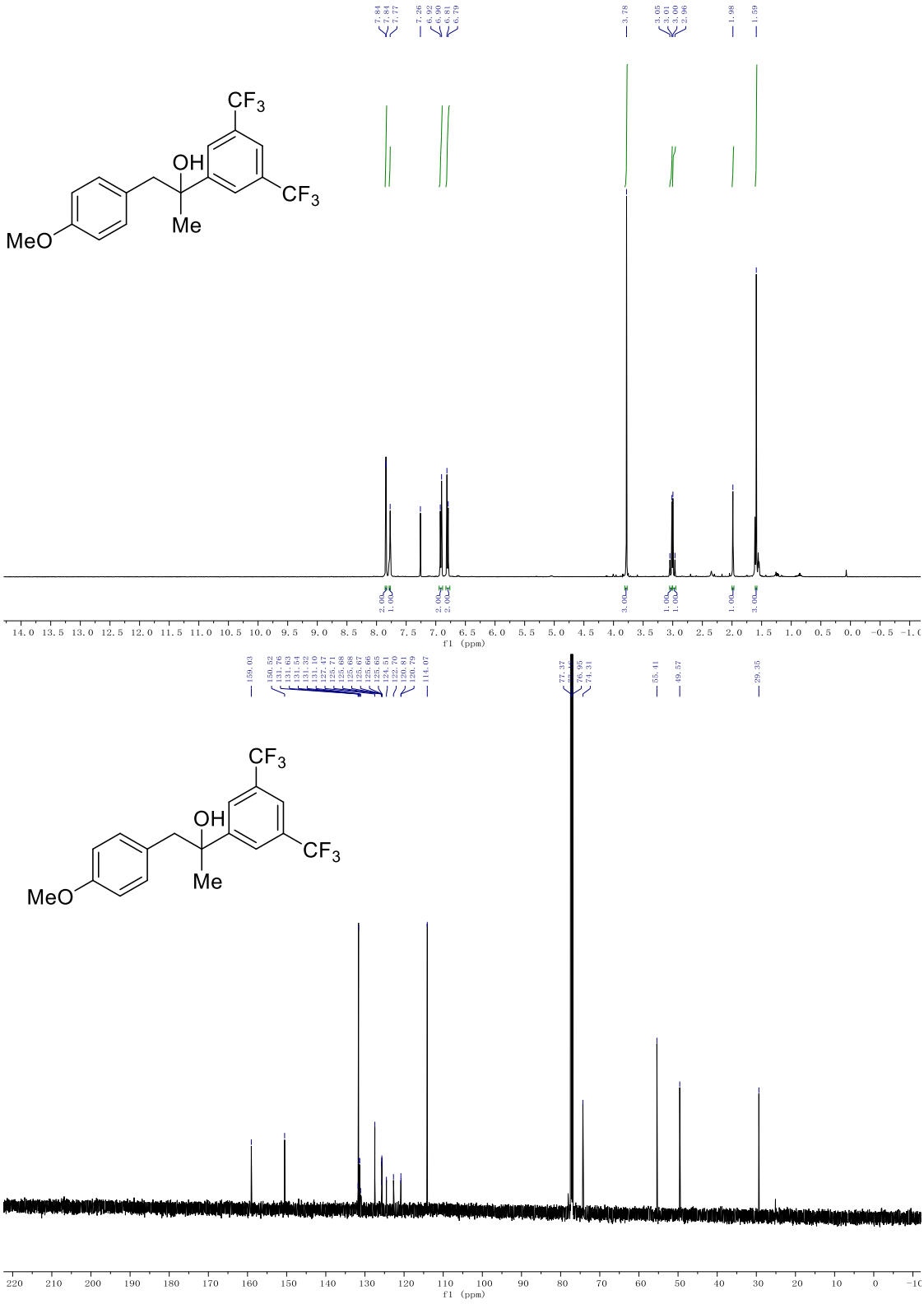
^{19}F NMR spectra of **2-(2,6-difluorophenyl)-1-(4-methoxyphenyl)propan-2-ol 5b**



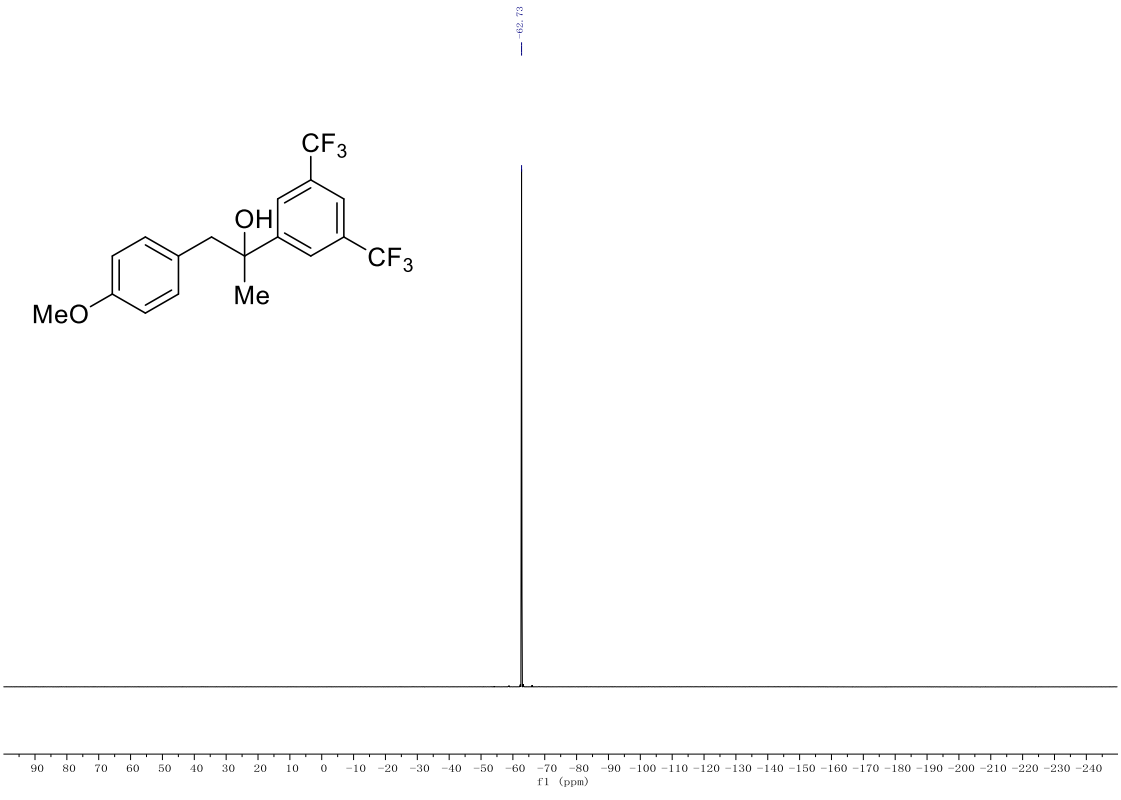
^{1}H and ^{13}C NMR spectrum of **2-(2-fluorophenyl)-1-(4-methoxyphenyl)propan-2-ol 5c**



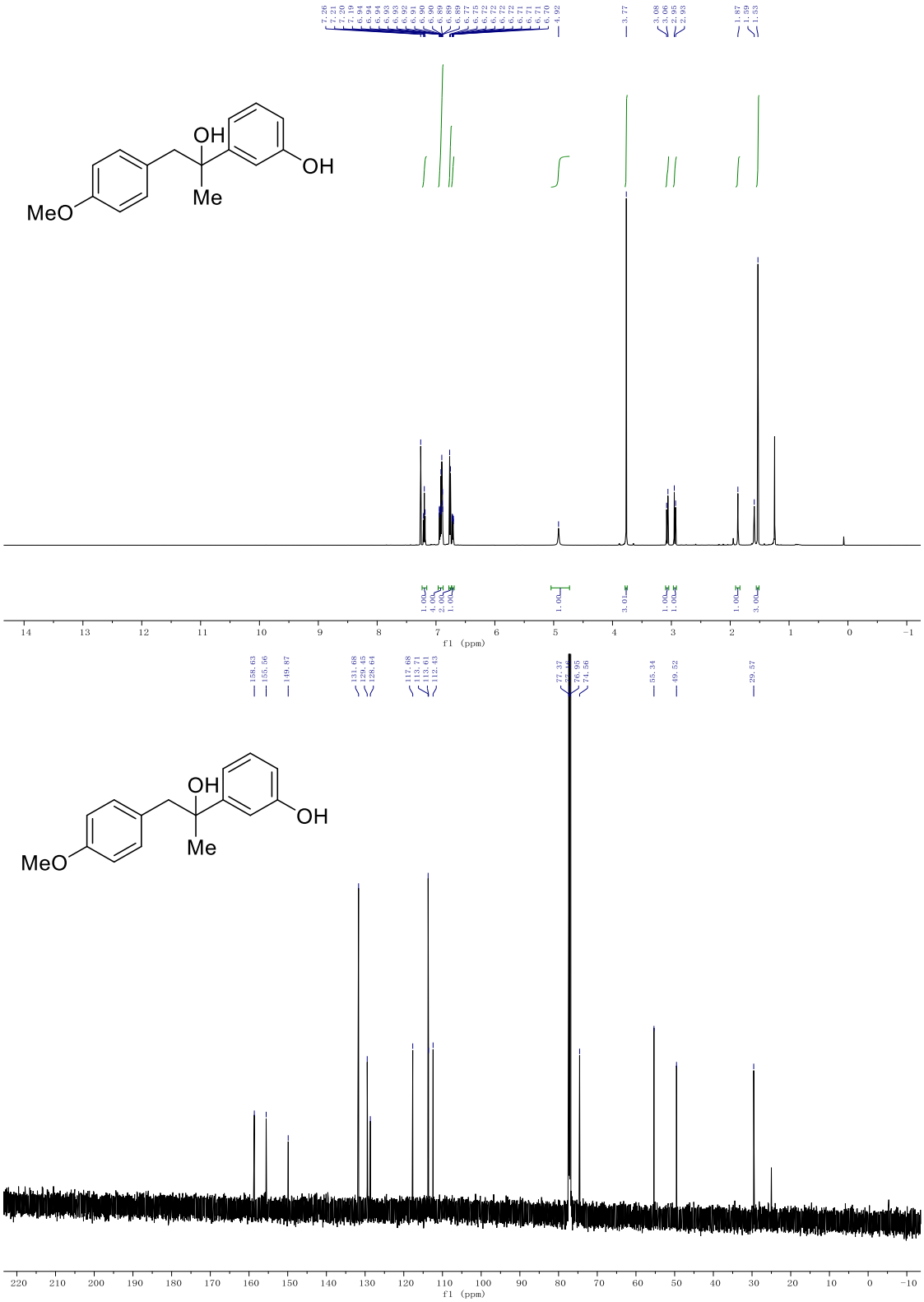
^{19}F NMR spectra of **2-(2-fluorophenyl)-1-(4-methoxyphenyl)propan-2-ol 5c**



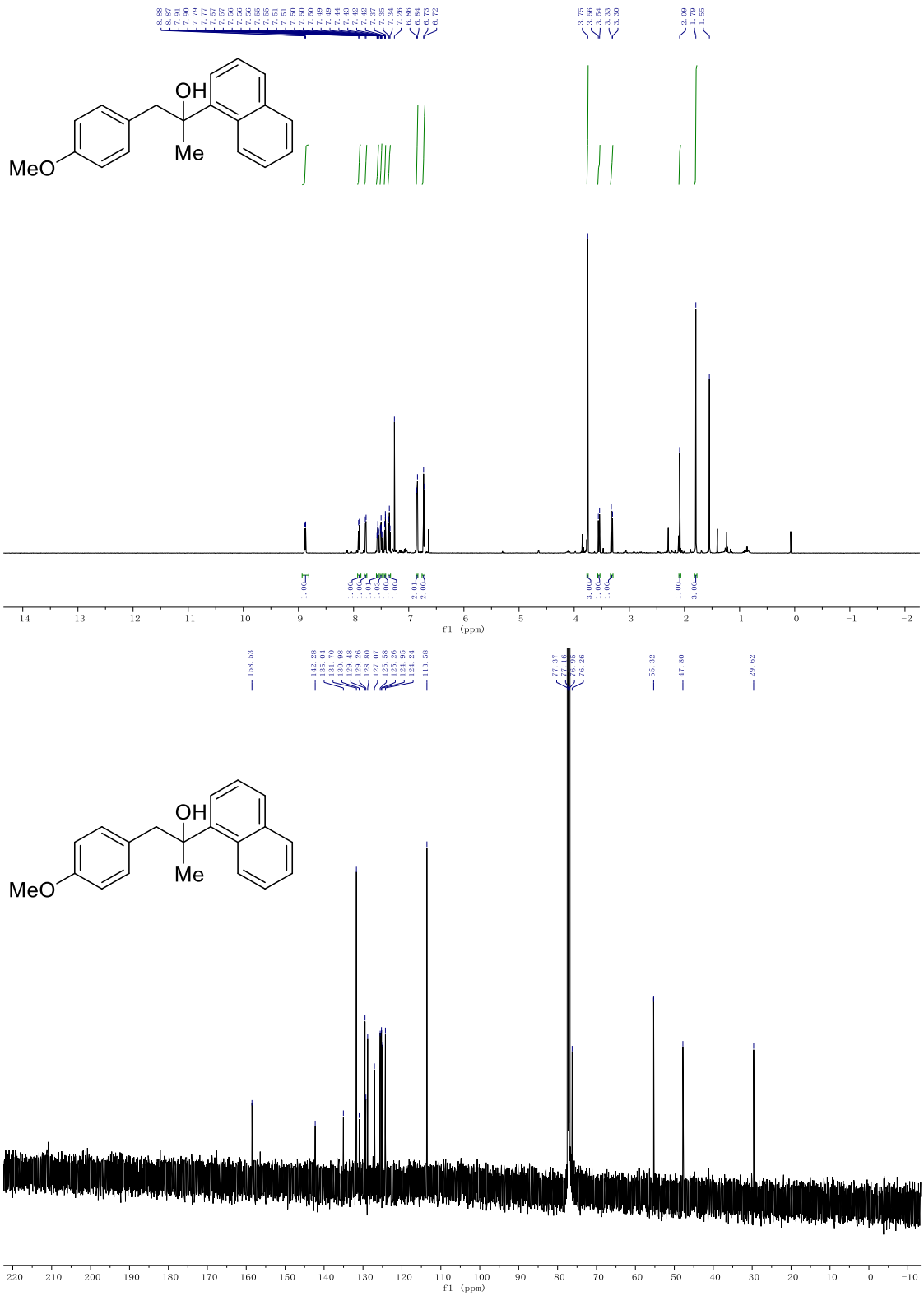
^{1}H and ^{13}C NMR spectrum of **2-[3,5-bis(trifluoromethyl)phenyl]-1-(4-methoxyphenyl)propan-2-ol 5d**



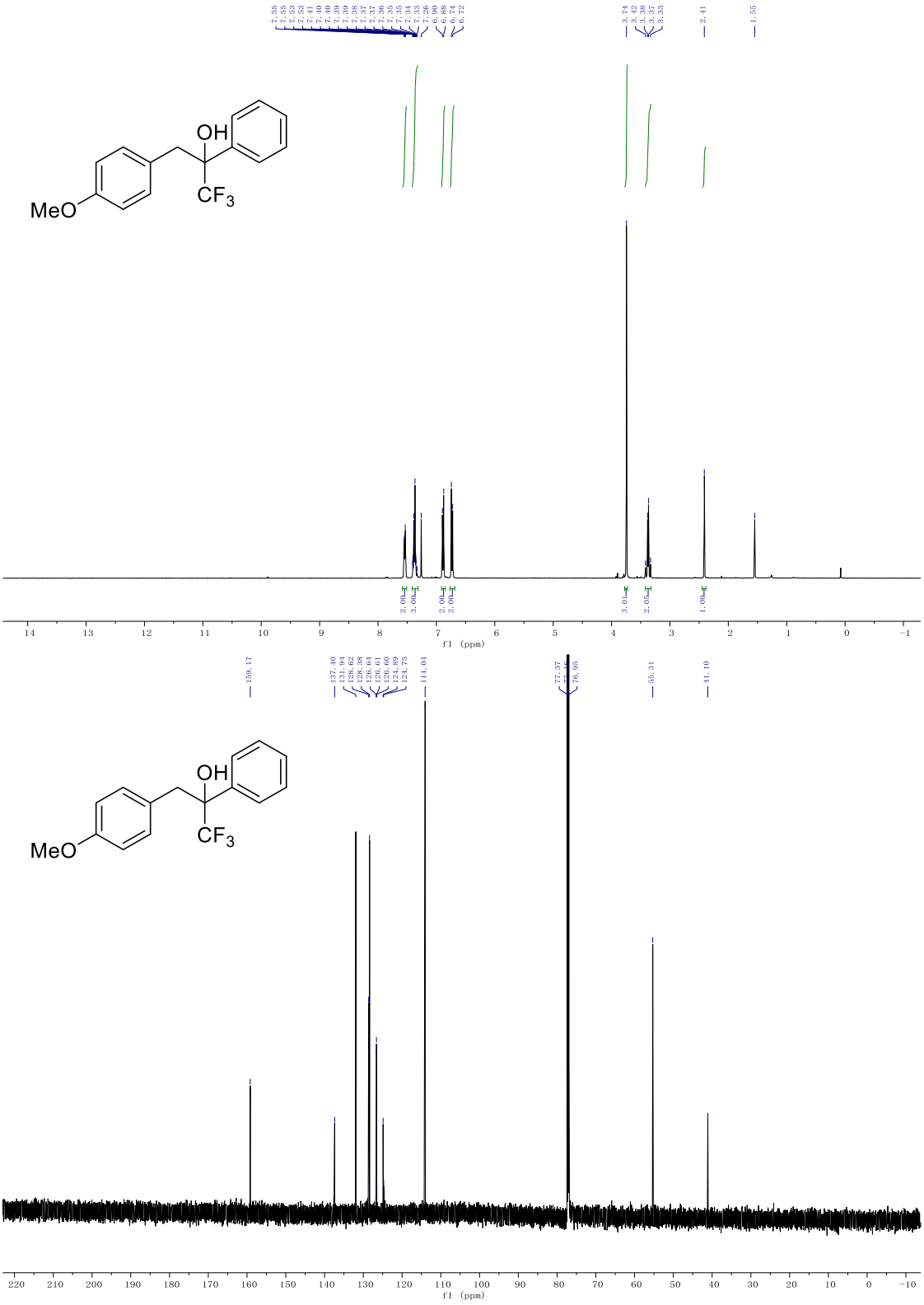
^{19}F NMR spectra of **2-[3,5-bis(trifluoromethyl)phenyl]-1-(4-methoxyphenyl)propan-2-ol 5d**



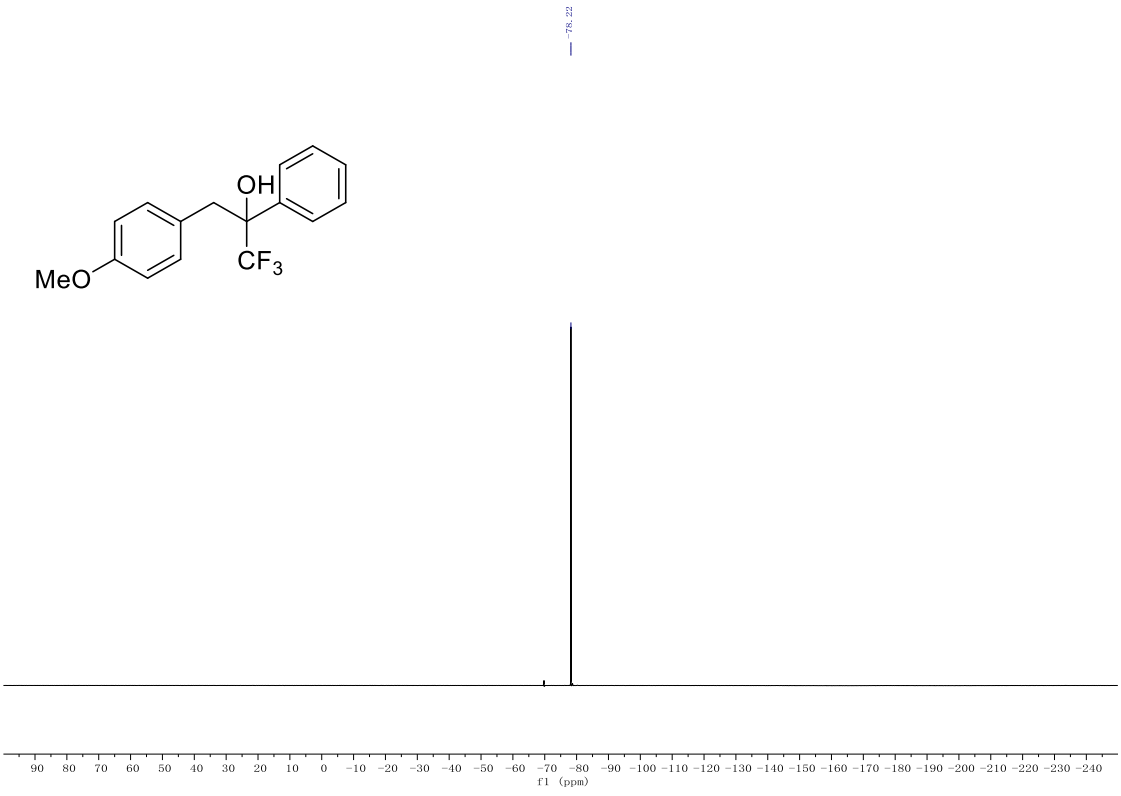
^{1}H and ^{13}C NMR spectrum of **3-[2-hydroxy-1-(4-methoxyphenyl)propan-2-yl]phenol 5e**



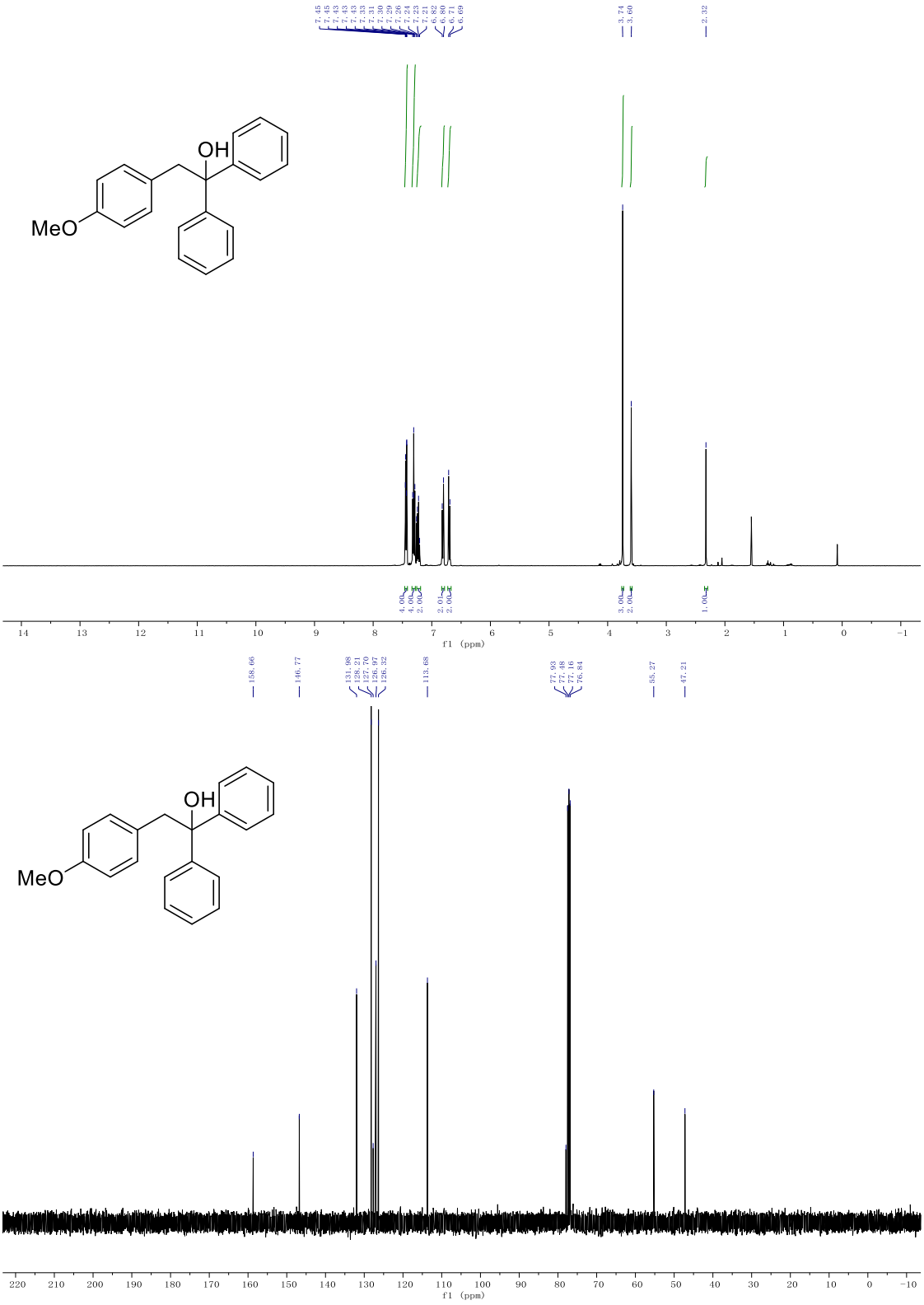
^{1}H and ^{13}C NMR spectrum of **1-(4-methoxyphenyl)-2-(naphthalen-1-yl)propan-2-ol 5f**



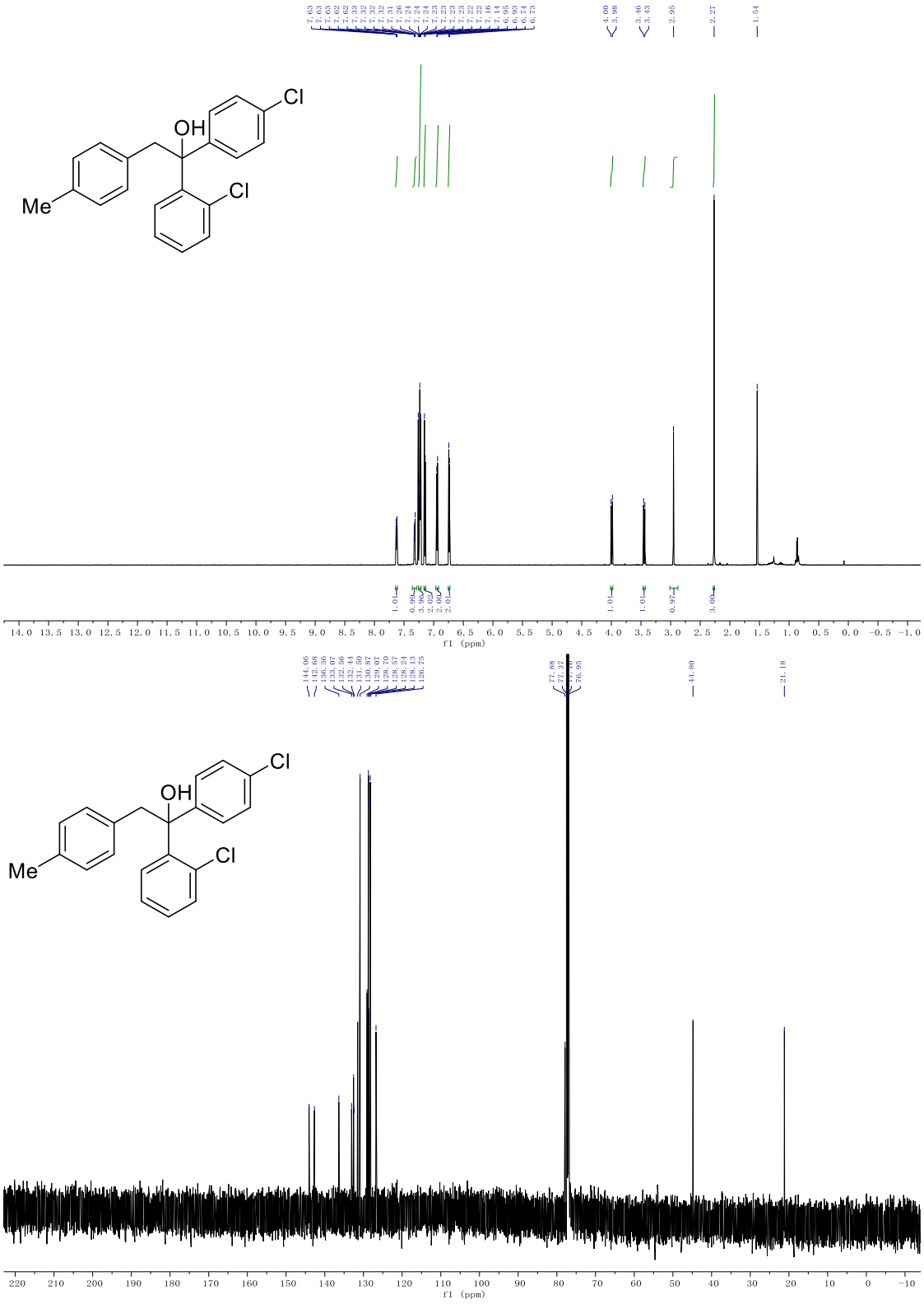
^{1}H and ^{13}C NMR spectrum of **1,1,1-trifluoro-3-(4-methoxyphenyl)-2-phenylpropan-2-ol 5g**



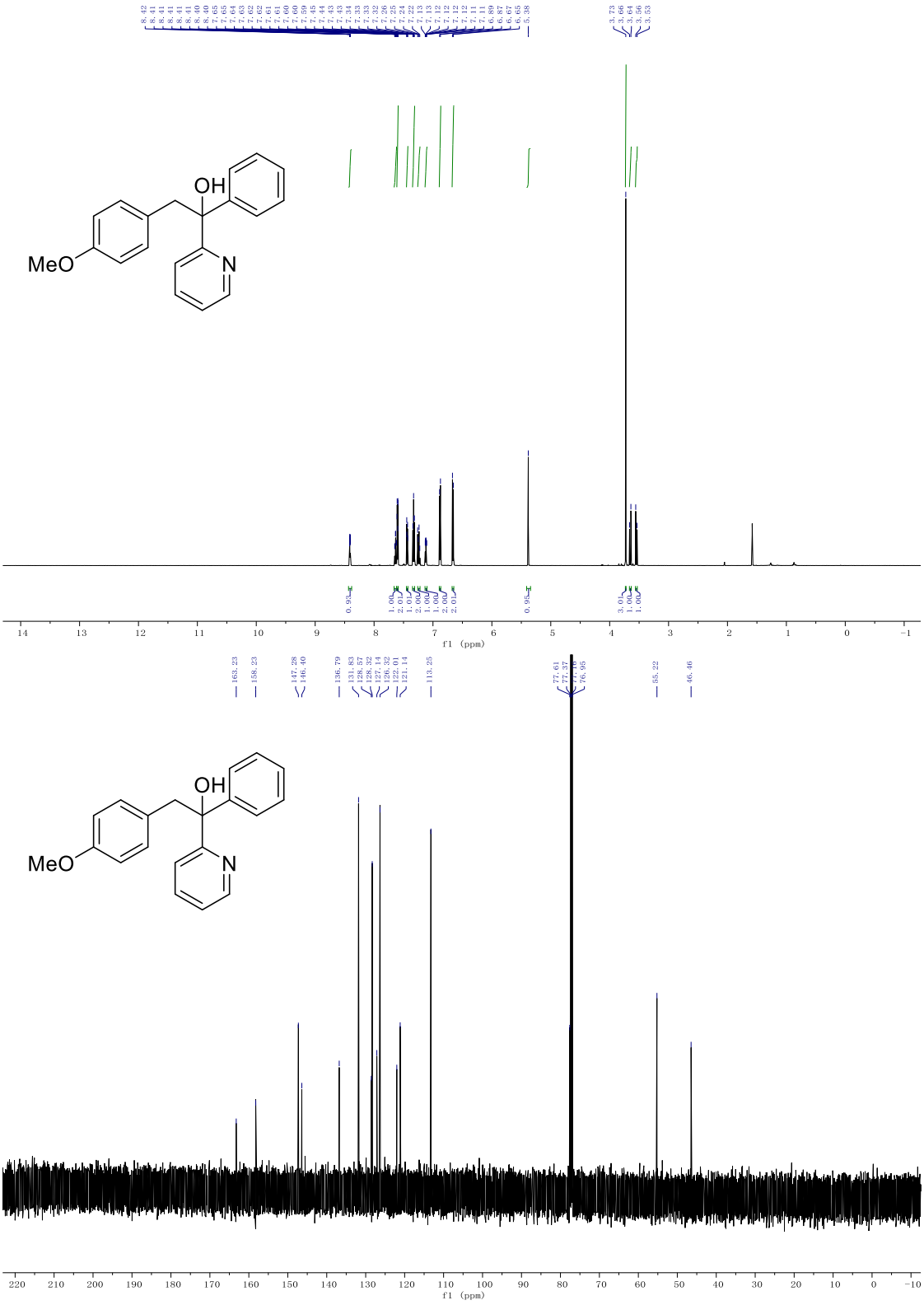
^{19}F NMR spectra of **1,1,1-trifluoro-3-(4-methoxyphenyl)-2-phenylpropan-2-ol 5g**



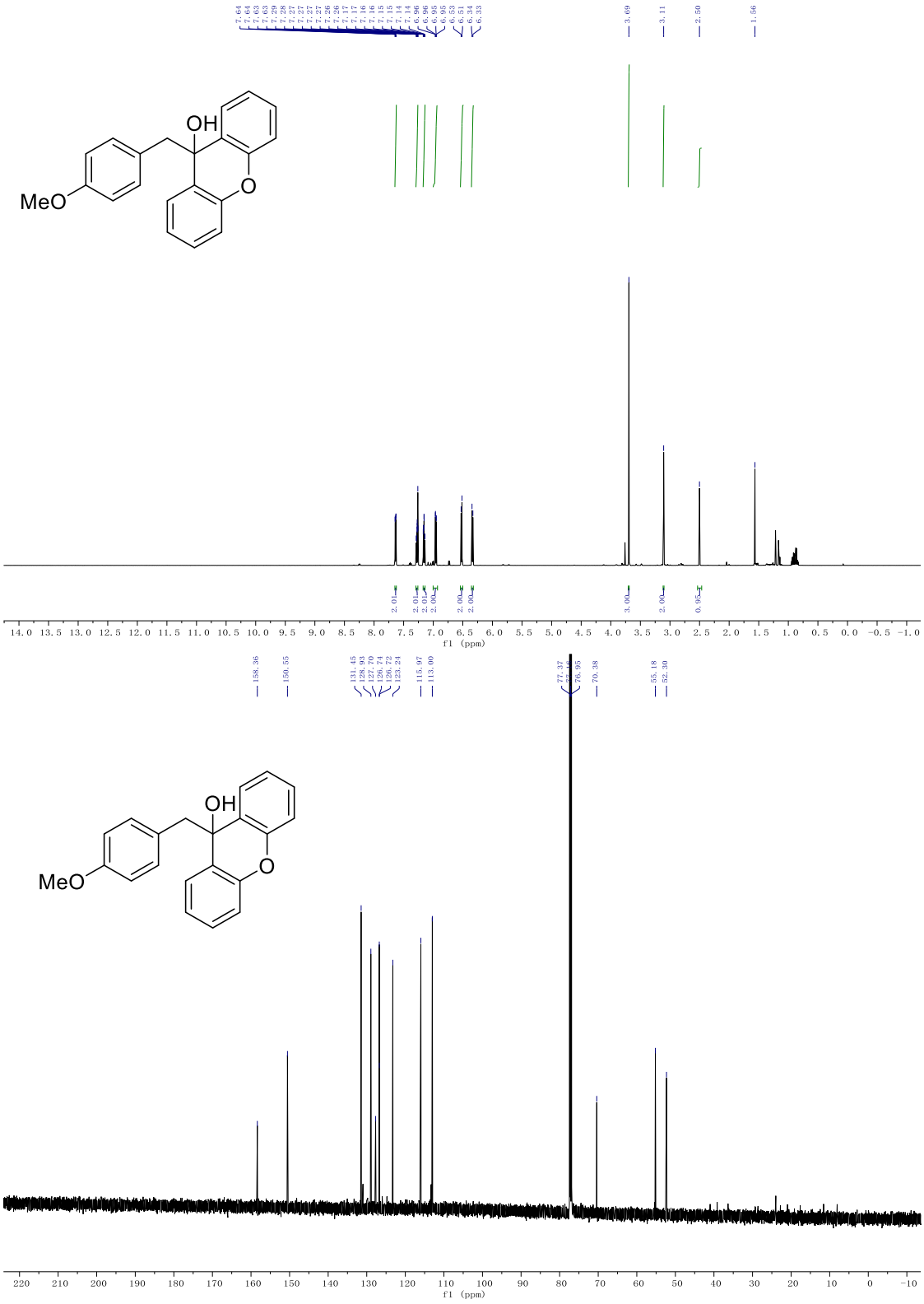
^{1}H and ^{13}C NMR spectrum of **2-(4-methoxyphenyl)-1,1-diphenylethan-1-ol 5h**



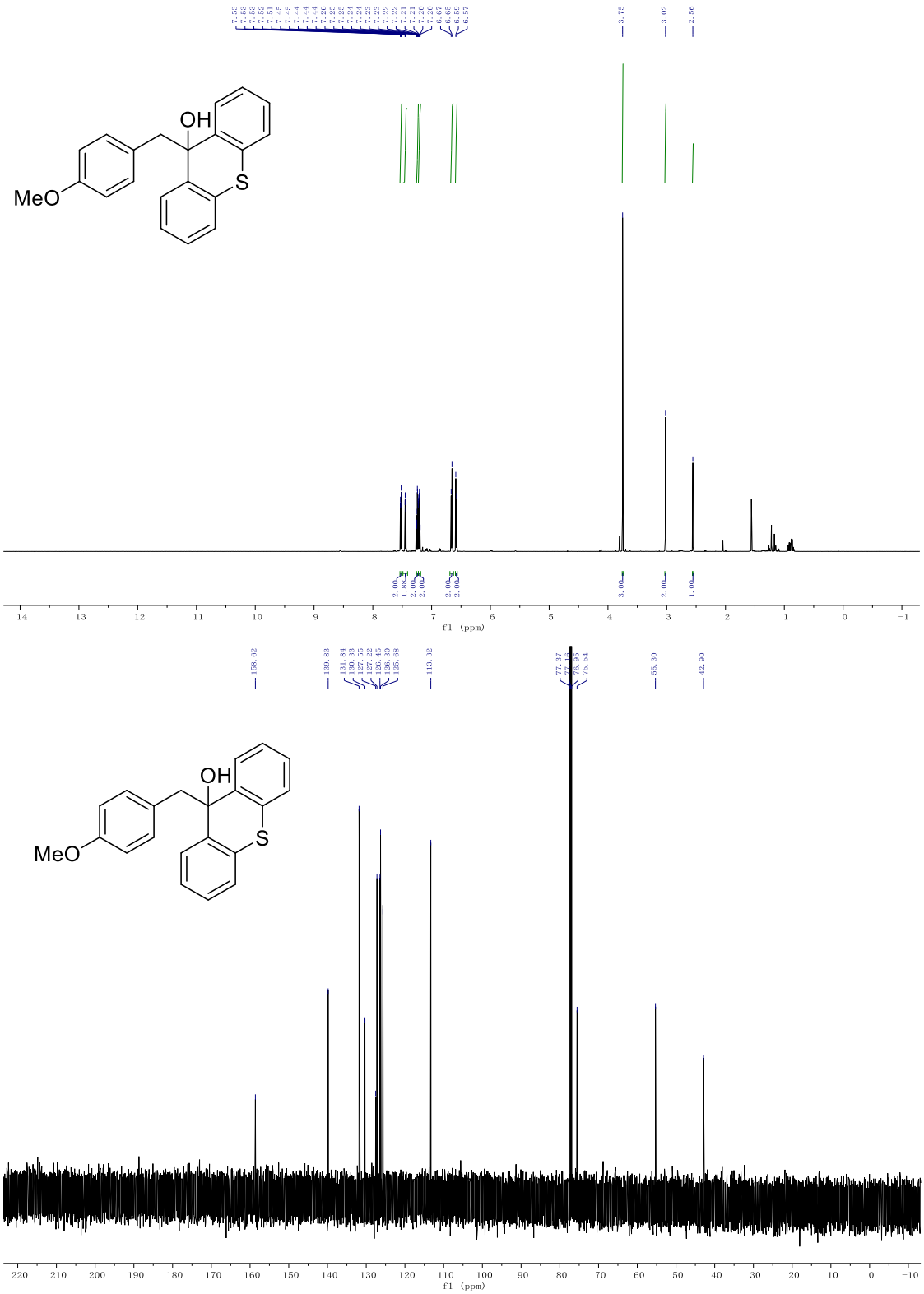
^{1}H and ^{13}C NMR spectrum of **1-(2-chlorophenyl)-1-(4-chlorophenyl)-2-(*p*-tolyl)ethan-1-ol 5i**



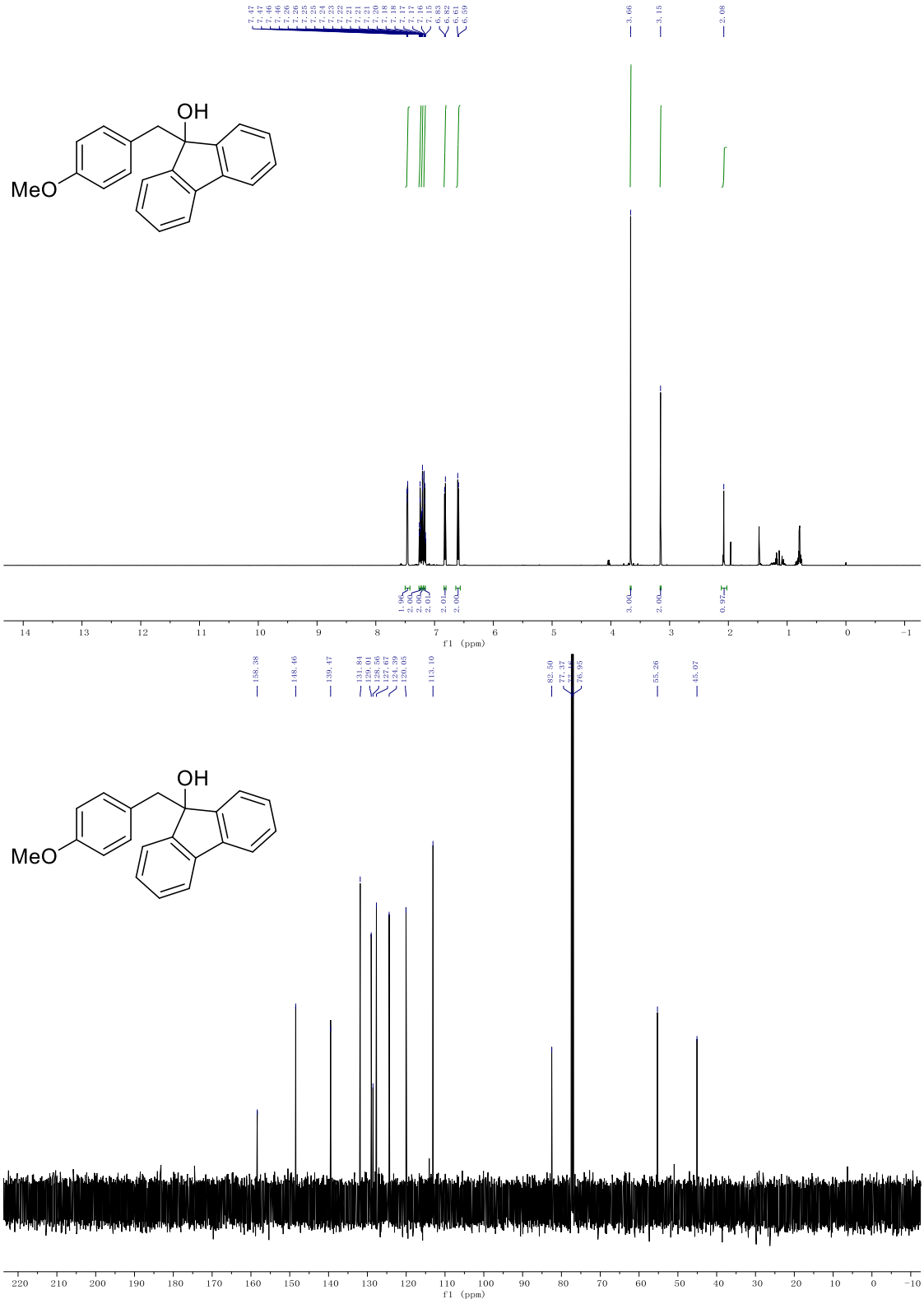
^{1}H and ^{13}C NMR spectrum of **2-(4-methoxyphenyl)-1-phenyl-1-(pyridin-2-yl)ethan-1-ol 5j**



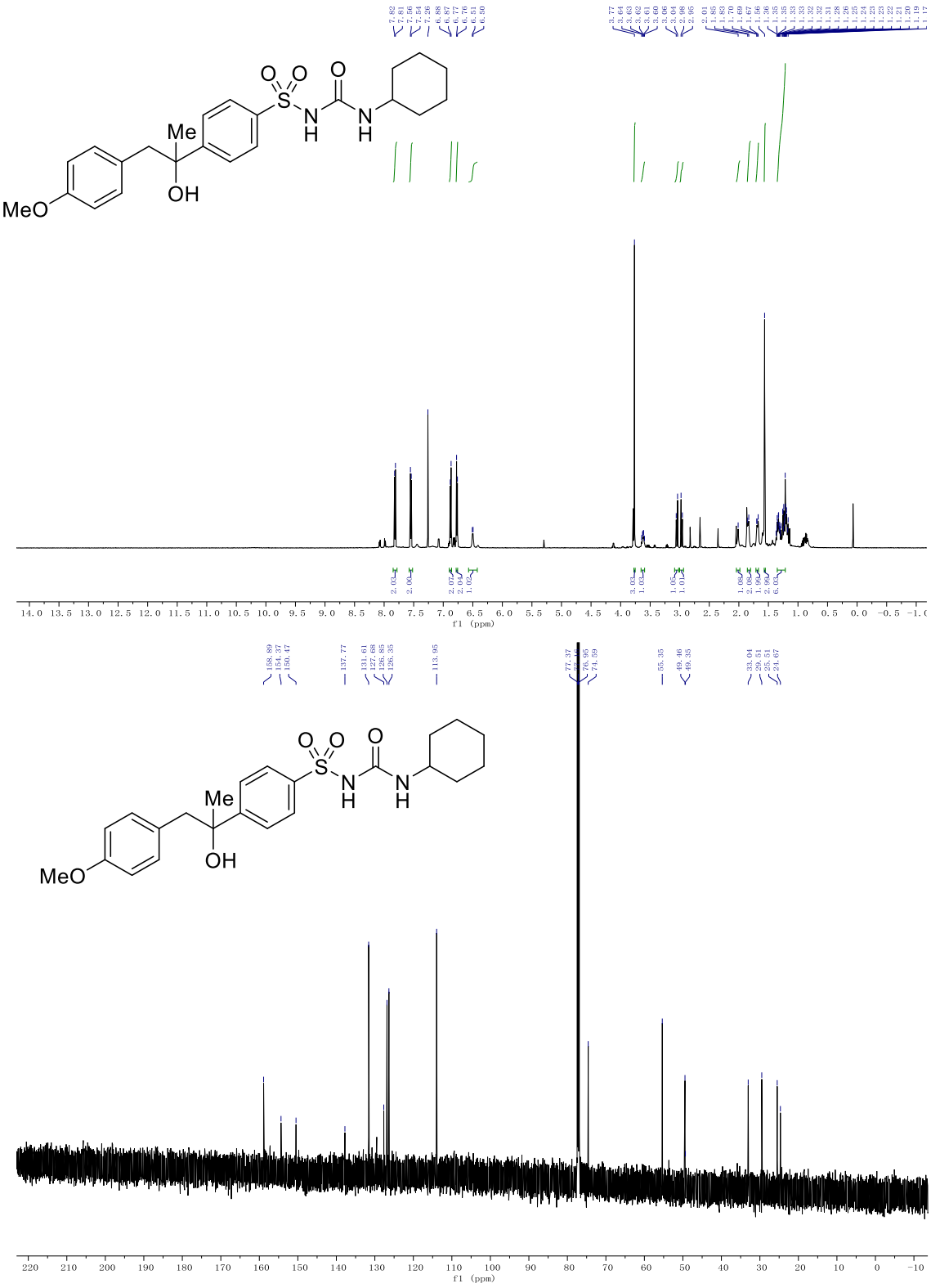
^{1}H and ^{13}C NMR spectrum of **9-(4-methoxybenzyl)-9*H*-xanthen-9-ol 5k**



^{1}H and ^{13}C NMR spectrum of **9-(4-methoxybenzyl)-9*H*-thioxanthen-9-ol 5l**



^{1}H and ^{13}C NMR spectrum of **9-(4-methoxybenzyl)-9*H*-fluoren-9-ol 5m**



^{1}H and ^{13}C NMR spectrum of ***N*-(cyclohexylcarbamoyl)-4-(2-hydroxy-1-(4-methoxyphenyl)propan-2-yl)benzenesulfonamide 5n**