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Electronic Supplementary Information

Development of chiral ferrocenyl P,P,N,N,O-ligands for ruthenium-catalyzed asymmetric hydrogenation of ketones

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1. General information

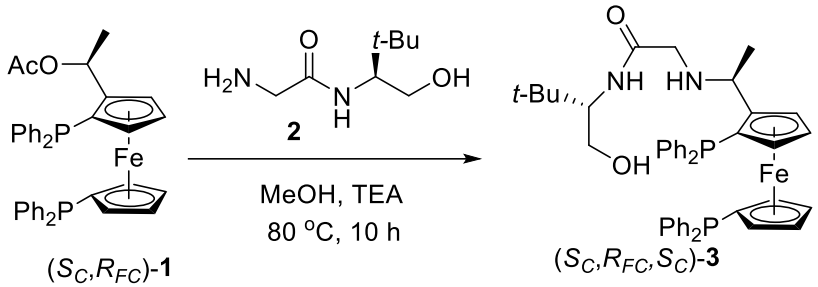
1.1. Materials

The following chemicals were purchased and used as received:
Benzeneruthenium(II) chloride dimer (CAS: 37366-09-9, Aldrich, 1 g), sodium *tert*-butoxide (CAS: 865-48-5, Macklin, 99.9%, 25 g), potassium *tert*-butoxide (CAS: 865-47-4, Macklin, 98%, 25 g), acetophenone (CAS: 98-86-2, Aladdin, 500 g), other ketones (J&K or Energy), Hydrogen gas (99.999%, Shanghai Regulator Factory Co., Ltd.), anhydrous *i*-PrOH were freshly distilled from calcium hydride.

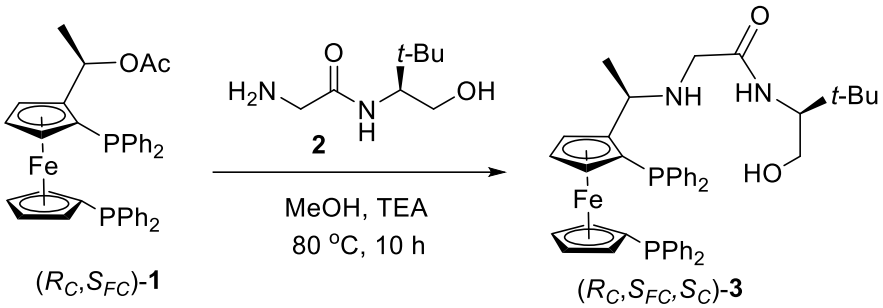
1.2. Analytical methods

^{1}H NMR, ^{13}C NMR and ^{19}F NMR spectra were recorded on a Bruker 400 MHz or 600 MHz spectrometer at 295 K in $CDCl_3$. HRMS ESI-mass data were acquired on Thermo LTQ Orbitrap XL instrument. GC (Agilent) analyses and HPLC (Agilent) analyses were performed with using chiral column. Chromatographic purification of products was accomplished using forced-flow chromatography on silica gel (200-300 mesh).

2. Synthesis of ligands.

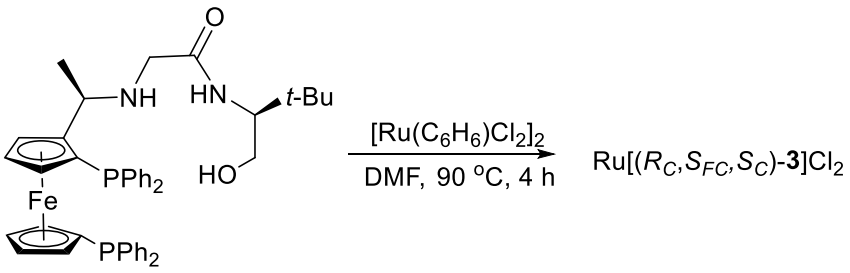


(R_C,S_{FC})-PPFOAc (2.0 mmol, 1.0 equiv, 1.28 g), (*S*)-2-amino-*N*-(1-hydroxy-3,3-dimethylbutan -2-yl)acetamide (6.0 mmol, 3.0 equiv, 1.0 g) were placed in a transparent Schlenk tube equipped with a stirring bar. The tube kept in vacuum then flushed with argon. This procedure was repeated for 3-4 times. Triethylamine (6.0 mmol, 3.0 equiv., 0.6 g), the solvent (methanol, 40 mL) was added under argon atmosphere. The reaction mixture was stirred at 80 °C for 10 h (oil bath). The reaction mixture was cooled to room temperature, then concentrated under vacuo. The product was purified by flash column chromatography on silica gel (petrol ether/ethyl acetate = 1:1), yellow oil (330 mg, 22%).



(S_C,R_{FC})-PPFOAc (2.0 mmol, 1.0 equiv, 1.28 g), (*S*)-2-amino-*N*-(1-hydroxy-3,3-dimethylbutan -2-yl)acetamide (6.0 mmol, 3.0 equiv, 1.0 g) were placed in a transparent Schlenk tube equipped with a stirring bar. The tube kept in vacuum then flushed with argon. This procedure was repeated for 3-4 times. Triethylamine (6.0 mmol, 3.0 equiv., 0.6 g), the solvent (methanol, 40 mL) was added under argon atmosphere. The reaction mixture was stirred at 80 °C for 10 h (oil bath). The reaction mixture was cooled to room temperature, then concentrated under vacuo. The product was purified by flash column chromatography on silica gel (petrol ether/ethyl acetate = 1:1), yellow oil (350 mg, 23%).

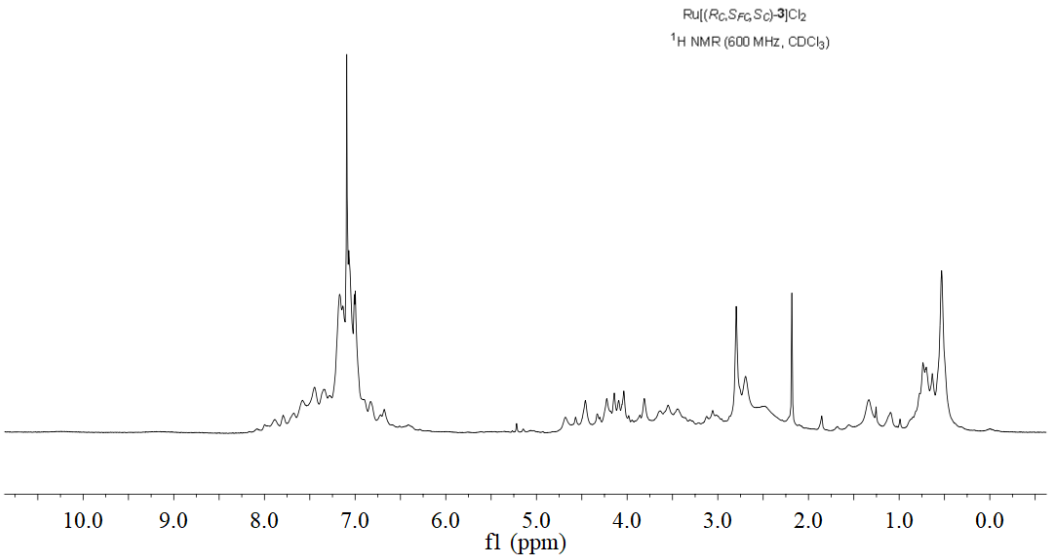
3. Synthesis of catalyst.

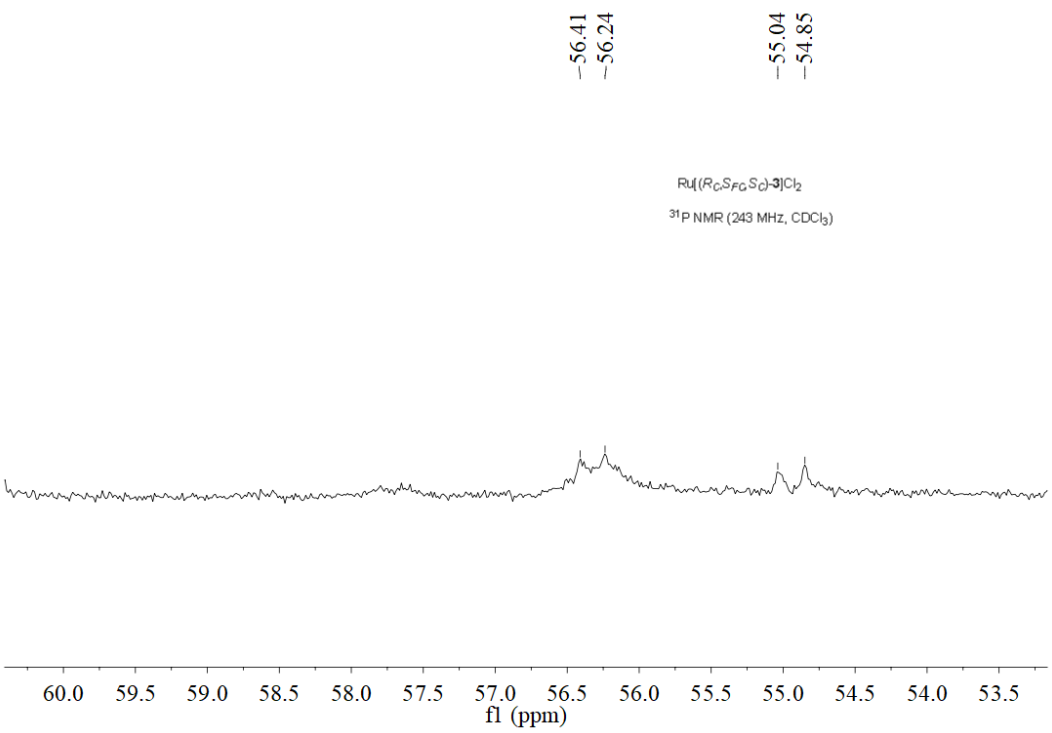


(R_C,S_{FC},S_C)-**3** **5**

Ligand *(R_C,S_{FC},S_C)*-**3** (0.105 mmol, 1.05 equiv, 79 mg), $[Ru(C_6H_6)Cl_2]_2$ (0.05 mmol, 0.5 equiv, 25 mg) were placed in a transparent Schlenk tube equipped with a stirring bar. The tube kept in vacuum then flushed with argon. This procedure was repeated for 3-4 times. The solvent (DMF, 3.0 mL, anhydrous) was added under argon atmosphere. The reaction mixture was stirred at 90 °C for 4.0 hours (oil bath). The reaction mixture was cooled to room temperature, then concentrated under vacuo. This catalyst is used without further purification.

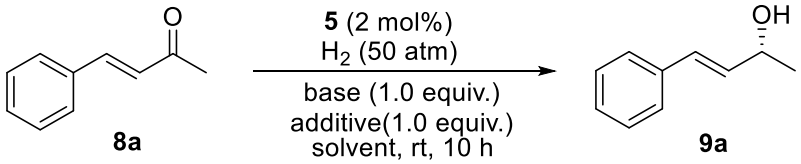
*Catalyst **5** can be purified using this method:* dissolve 180 mg of complex **5** (crude) in 30 mL of toluene (anhydrous, heated), filter and collect the filtrate. Add 150 mL of petroleum ether to the filtrate, filtered, the filter cake was vacuum dried to obtain the product (120 mg). *The interpretation of ^{1}H NMR seemed not to be practical.* ^{31}P NMR (243 MHz, $CDCl_3$) δ 56.32 (d, *J* = 41.9 Hz), 54.94 (d, *J* = 45.8 Hz). HRMS (ESI) Calcd for $C_{44}H_{48}ClFeN_2O_2P_2Ru$ $[M\text{-}Cl]^+$: 891.1267, Found: 891.1268.




−56.41
−56.24
−55.04
−54.85
Ru[(RC,SFC,SC)-3]Cl2
31P NMR (243 MHz, CDCl3)
60.0
59.5
59.0
58.5
58.0
57.5
57.0
56.5
56.0
55.5
55.0
54.5
54.0
53.5
f1 (ppm)

4. Optimization of the reaction condition

Table S1. Optimization of the reaction condition for *α,β*-unsaturated arylketones[a]



Entry	Solvent	Base	Additive	Yield (%)[b]	Ee
1	MeCN	*t*-BuONa	-	92	rac
2	*i*-PrOH	*t*-BuONa	-	90	rac
3	*o*-xylene	*t*-BuONa	-	20	11
4	*o*-xylene	DABCO	TMG	92	77
5	*o*-xylene	-	TMG	0	-
6	*o*-xylene	DABCO	-	10	-
7	*o*-xylene	DABCO	DMAP	0	-
8	*o*-xylene	DABCO	DBN	50	67
9	*o*-xylene	DMAP	TMG	70	76
10	MeCN	DABCO	TMG	40	20
11	EA	DABCO	TMG	80	76
12	THF	DABCO	TMG	93	71
13[c]	*o*-xylene	DABCO	TMG	92	75
14[d]	*o*-xylene	DABCO	TMG	92	76
15[e]	*o*-xylene	DABCO	TMG	91	76

[a]Reaction condition: *α,β*-unsaturated aryl ketone (0.1 mmol, 1.0 equiv), *o*-xylene (0.4 mL), **5** (1.8 mg, 0.002 mmol, 0.02 equiv), base (0.1 mmol, 1.0 equiv), additive (0.1 mmol, 1.0 equiv), H_2 (50 atm) stir for 10 hours. [b] isolated yield. [c]**5** (0.9 mg, 0.001 mmol, 0.01 equiv). [d] DABCO (0.05 mmol, 0.5 equiv). [e] TMG (0.05 mmol, 0.5 equiv). DABCO = triethylenediamine; TMG = tetramethylguanidine; EA = ethyl acetate; THF = tetrahydrofuran. *Discuss: using t-BuONa as the base, the reaction can proceed, but there is no ee value (entries1,2). When DABCO and TMG are used as bases, the target product can achieve high yields and moderate ee values (entry 4). It may be because DABCO can form active intermediates with olefins, similar to the MBH reaction (J. Org. Chem.,* **2001**, *66,* 5413; *Org. Lett.*, **2002**, *4*, 4723*). TMG (as well as DBN) can effectively promote hydrogen cracking to complete this conversion.*

5. General procedure

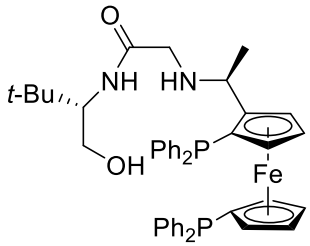
General procedure A (for simple ketones)

t-BuONa (0.02 mmol, 0.01 equiv, 1.9 mg), **5** (0.001 mmol, 0.001 eq., 1.8 mg) were placed in a transparent Schlenk tube equipped with a stirring bar. Then place it in the glove box. The solvent (*i*-PrOH, anhydrous, 2.0 mL) was added. Stir for 10 minutes, then ketone (2.0 mmol, 1.0 equiv) was added. Then charged with 10 atm of H_2 and stirred at room temperature for 10 hours. The hydrogen gas was released slowly in a well-ventilated hood and the solution was concentrated and passed through a short column of silica gel to remove the metal complex. The product was analyzed by chiral GC or chiral HPLC for ee values.

General procedure B (for *α,β*-unsaturated aryl ketones)

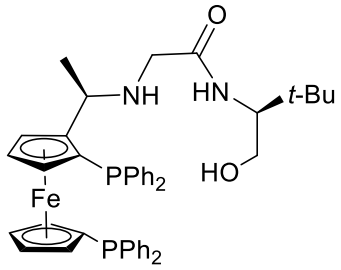
DABCO (0.1 mmol, 1.0 equiv, 11.2 mg), TMG (0.1 mmol, 1.0 equiv, 11.5 mg), **5** (0.001 mmol, 0.02 eq., 1.8 mg) were placed in a transparent Schlenk tube equipped with a stirring bar. Then place it in the glove box. The solvent (*o*-xylene, anhydrous, 0.4 mL) was added. Stir for 10 minutes, then *α,β*-unsaturated aryl ketone (2.0 mmol, 1.0 equiv) was added. Then charged with 50 atm of H_2 and stirred at room temperature for 10 hours. The hydrogen gas was released slowly in a well-ventilated hood and the solution was concentrated and then concentrated under vacuo. The product was purified by flash column chromatography on silica gel (petrol ether/ethyl acetate). The product was analyzed by chiral HPLC for ee values.

6. Characterization data for all products



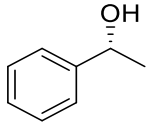
(S_C,R_{FC},S_C)-**3**

Yellow solid, 330 mg, 22% yield. $[\alpha]_D^{20}$=+288.60 (c = 1.0, CH_2Cl_2). ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.48 – 7.44 (m, 3H), 7.38 – 7.30 (m, 3H), 7.28 – 7.24 (m, 12H), 7.21 – 7.15 (m, 2H), 4.38 (s, 2H), 4.11 (d, *J* = 11.5 Hz, 3H), 4.02 (s, 1H), 3.77 (d, *J* = 11.2 Hz, 1H), 3.65 (t, *J* = 7.5 Hz, 3H), 3.50 – 3.29 (m, 1H), 2.93 (d, *J* = 17.5 Hz, 1H), 2.73 (d, *J* = 17.5 Hz, 1H), 1.29 (d, *J* = 6.7 Hz, 3H), 0.91 (s, 9H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 173.9, 139.6, 139.5, 139.0, 138.9, 138.4, 136.5, 136.5, 134.9, 134.7, 133.6, 133.5, 133.3, 133.2, 132.5, 132.4, 129.4, 128.7, 128.5, 128.3, 128.2, 128.1, 97.1 75.6, 75.0, 73.9, 73.3, 73.0, 72.5, 71.6, 71.2, 63.6, 60.2, 51.2, 48.0, 33.4, 27.0, 19.2. ^{31}P NMR (243 MHz, $CDCl_3$) δ -17.97 (s), -25.62 (s). HRMS (ESI) Calcd for $C_{44}H_{48}FeN_2O_2P_2$ [M+ H]$^+$: 755.2613, Found: 755.2606.



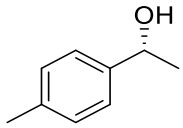
(R_C,S_{FC},S_C)-**3**

Yellow solid, 350 mg, 23% yield. $[\alpha]_D^{20}$= - 283.50 (c = 1.0, CH_2Cl_2). ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.49– 7.42 (m, 3H), 7.36– 7.33 (m, 3H), 7.27– 7.24 (m, 12H), 7.19– 7.16 (m, 2H), 4.37 (s, 2H), 4.20 – 3.99 (m, 4H), 3.81 (d, *J* = 13.9 Hz, 1H), 3.64 (dd, *J* = 14.3, 5.5 Hz, 3H), 3.52 – 3.38 (m, 1H), 2.96 (d, *J* = 17.4 Hz, 1H), 2.74 (d, *J* = 17.4 Hz, 1H), 1.30 (d, *J* = 6.7 Hz, 3H), 0.86 (s, 9H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 173.7, 139.5, 138.9, 138.5, 136.4, 134.9, 134.8, 133.6, 133.5, 133.3, 133.2, 132.5, 132.4, 129.4, 128.7, 128.6, 128.5, 128.5, 128.3, 128.3, 128.2, 128.2, 97.1, 75.4, 75.0, 73.9, 73.4, 73.0, 72.5 71.6, 71.3, 63.2, 60.0, 51.3, 48.5, 33.4, 27.0, 19.4. ^{31}P NMR (162 MHz, $CDCl_3$) δ -17.97 (s), -25.43 (s). HRMS (ESI) Calcd for $C_{44}H_{48}FeN_2O_2P_2$ [M+ H]$^+$: 755.2613, Found: 755.2610.



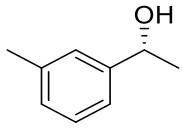
(*R*)-1-phenylethan-1-ol (7a) [1]

Colorless oil, 99% yield, 241 mg; 94% ee; $[\alpha]_D^{20}$=+48.50 (c = 1.0, $CHCl_3$). GC (Supelco β-DEX™ 120, df = 0.25 mm i.d.×30 cm, fused silica capillary column) carrier gas, N_2 (flow 1.2 mL/min); injection temp, 220 °C; initial column temperature, 80 °C; progress rate, 2.0 °C/min; final column temperature, 120 °C, this temperature is held for 20 min.; detector temp, 240 °C; t_R(major) = 23.73 min, t_R(minor) = 25.03 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 – 7.29 (m, 4H), 7.28 – 7.21 (m, 1H), 4.84 (q, *J* = 6.4 Hz, 1H), 2.15 (s, 1H), 1.46 (dd, *J* = 6.5, 1.1 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 145.9, 128.5, 127.5, 125.4, 70.4, 25.2.



(*R*)-1-(*p*-tolyl)ethan-1-ol (7b) [1]

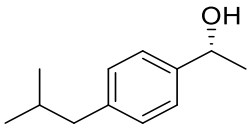
Colorless oil, 99% yield, 269 mg; 91% ee; $[\alpha]_D^{20}$=+40.2 (c = 1.0, $CHCl_3$). GC (Supelco β-DEX™ 225, df = 0.25 mm i.d.×30 cm, fused silica capillary column) carrier gas, N_2 (flow 1.2 mL/min); injection temp, 220 °C; initial column temperature, 90 °C; progress rate, 0.5 °C/min; final column temperature, 120 °C, this temperature is held for 10 min.; detector temp, 240 °C; t_R(major) = 40.79 min, t_R(minor) = 45.04 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.24 (d, *J* = 8.0 Hz, 2H), 7.14 (d, *J* = 8.0 Hz, 2H), 4.82 (q, *J* = 6.4 Hz, 1H), 2.33 (s, 3H), 2.02 (s, 1H), 1.45 (d, *J* = 6.5 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 142.9, 137.1, 129.2, 125.4, 70.2, 25.1, 21.1.



(*R*)-1-(*m*-tolyl)ethan-1-ol (7c) [1]

Colorless oil, 99% yield, 270 mg; 95% ee; $[\alpha]_D^{20}$=+43.2 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OJ-H, *n*-hexane/isopropanol 95:5 v/v, flow rate 0.8 mL/min，λ= 254 nm, 25 °C). Retention times: t_R(major)= 13.29 min，t_R(minor)= 12.54 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.22 (d, *J* = 7.5 Hz, 1H), 7.18-7.14 (m, 2H), 7.08 (d, *J* = 7.4 Hz, 1H), 4.84 (dd, *J* = 6.4, 1.8 Hz, 1H), 2.35 (s,

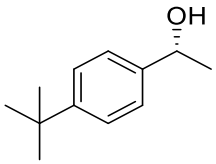
3H), 1.87 (s, 1H), 1.47 (d, *J* = 6.5 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 145.8, 138.2, 128.4, 128.2, 126.1, 122.4, 70.4, 25.1, 21.5.



(*R*)-1-(4-isobutylphenyl)ethan-1-ol (7d) [1]

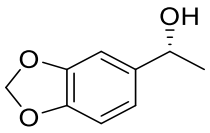
White solid, 99% yield, 352 mg; 93% ee; $[\alpha]_D^{20}$=+34.1 (c = 1.0, CH_2Cl_2).

The ee was determined by chiral HPLC (Chiralpak OD-H, *n*-hexane/isopropanol 98:2 v/v, flow rate 1.0 mL/min，λ= 254 nm, 25 °C). Retention times: t_R(major)= 9.17 min，t_R(minor)= 11.69 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.26 (d, *J* = 8.0 Hz, 2H), 7.11 (d, *J* = 8.0 Hz, 2H), 4.84 (q, *J* = 6.4 Hz, 1H), 2.46 (d, *J* = 7.2 Hz, 2H), 2.02 (s, 1H), 1.90 – 1.75 (m, 1H), 1.47 (d, *J* = 6.5 Hz, 3H), 0.90 (d, *J* = 6.6 Hz, 6H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 143.1, 141.0, 129.2, 125.2, 70.3, 45.1, 30.2, 25.0, 22.4.



(*R*) -1-(4-(tert-butyl)phenyl)ethan-1-ol (7e) [1]

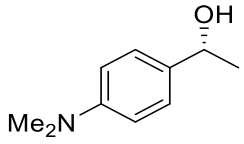
White solid, 99% yield, 351 mg; 94% ee; $[\alpha]_D^{20}$=+40.6 (c = 1.0, $CHCl_3$). The ee was determined by chiral HPLC (Chiralpak AD-H, *n*-hexane/isopropanol 98:2 v/v, flow rate 0.5 mL/min，λ= 210 nm, 25 °C). Retention times: t_R(major)= 25.54 min，t_R(minor)= 27.66 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.38 (d, *J* = 8.5 Hz, 2H), 7.31 (d, *J* = 8.3 Hz, 2H), 4.88 (q, *J* = 6.5 Hz, 1H), 1.73 (s, 1H), 1.50 (d, *J* = 6.5 Hz, 3H), 1.32 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 150.5, 142.8, 125.4, 125.2, 70.2, 34.5, 31.4, 24.9.



(*R*)-1-(benzo[d][1,3]dioxol-5-yl)ethan-1-ol (7f) [2]

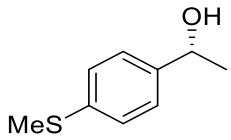
Colorless oil, 99% yield, 328 mg; 90% ee; $[\alpha]_D^{20}$ = +37.4 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OD-3, *n*-hexane/isopropanol 95:5 v/v, flow rate 1.0 mL/min，λ= 254 nm, 25 °C). Retention times: t_R(major)= 14.21 min，t_R(minor)= 15.54 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 6.85 (s, 1H), 6.78 (d, *J* = 7.9 Hz, 1H), 6.74 (d, *J* = 7.9 Hz, 1H), 5.91 (s, 2H), 4.79-4.74 (m, 1H), 2.34 (s, 1H),

1.42 (d, *J* = 6.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 147.7, 146.8, 140.0, 118.7, 108.1, 106.1, 101.0, 70.1, 25.1.



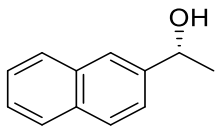
(*R*) -1-(4-(dimethylamino)phenyl)ethan-1-ol (7g) [2]

Yellow oil, 99% yield, 326 mg; 87% ee; $[\alpha]_D^{20}$ = +94.4 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OD-H, *n*-hexane/isopropanol 95:5 v/v, flow rate 1.0 mL/min，λ= 254 nm, 25 °C). Retention times: t_R(major) = 14.86 min，t_R(minor)= 16.80 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.25 (d, *J* = 8.8 Hz, 2H), 6.72 (d, *J* = 8.8 Hz, 2H), 4.83-4.78 (m, 1H), 2.93 (s, 6H), 1.82 (s, 1H), 1.47 (d, *J* = 6.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 150.2, 133.8, 126.5, 112.7, 70.1, 40.7, 24.7.



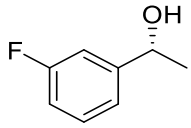
(*R*) -1-(4-(methylthio)phenyl)ethan-1-ol (7h) [3]

White solid, 99% yield, 332 mg; 92% ee; $[\alpha]_D^{20}$ = +48.50 (c = 1.0, $CHCl_3$). The ee was determined by chiral HPLC (Chiralpak AS-H, *n*-hexane/isopropanol 95:5 v/v, flow rate 0.8 mL/min，λ= 254 nm, 25 °C). Retention times: t_R(major) = 17.54 min, t_R(minor) = 20.17 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.29 (d, *J* = 8.4 Hz, 2H), 7.24 (d, *J* = 8.4 Hz, 2H), 4.85 (q, *J* = 6.4 Hz, 1H), 2.47 (s, 3H), 1.88 (s, 1H), 1.47 (d, *J* = 6.5 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 142.8, 137.4, 126.9, 126.0, 70.0, 25.1, 16.0.



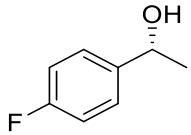
(*R*) -1-(naphthalen-2-yl)ethan-1-ol (7i) [1]

White solid, 99% yield, 340 mg; 89% ee; $[\alpha]_D^{20}$=+38.9 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OJ-3, *n*-hexane/isopropanol 95:5 v/v, flow rate 1.0 mL/min，λ= 254 nm, 25 °C). Retention times: t_R(major)= 37.27 min，t_R(minor) = 28.97 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.92 – 7.77 (m, 4H), 7.56 – 7.43 (m, 3H), 5.06 (q, *J* = 6.4 Hz, 1H), 1.98 (s, 1H), 1.59 (d, *J* = 6.5 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 143.2, 133.3, 132.9, 128.3, 128.0, 127.7, 126.2, 125.8, 123.8, 123.8, 70.5, 25.2.



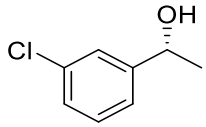
(*R*)-1-(3-fluorophenyl)ethan-1-ol (7j) [1]

Colorless oil, 99% yield, 277 mg; 88% ee; $[\alpha]_D^{20}$=+36.7 (c = 1.0, $CHCl_3$). GC (Supelco β-DEX^{TM} 120, df = 0.25 mm i.d.×30 cm, fused silica capillary column) carrier gas, N_2 (flow 1.2 mL/min); injection temp, 220 °C; initial column temperature, 90 °C; progress rate, 0.5 °C/min; final column temperature, 120 °C, this temperature is held for 10 min.; detector temp, 240 °C; t_R (major) = 40.91 min, t_R(minor) = 43.65 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.33 – 7.23 (m, 1H), 7.14 – 7.05 (m, 2H), 6.94 (td, *J* = 8.5, 2.6 Hz, 1H), 4.86 (q, *J* = 6.4 Hz, 1H), 2.20 (s, 1H), 1.46 (d, *J* = 6.5 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 163.0 (d, *J* = 246.0 Hz), 148.5 (d, *J* = 6.6 Hz), 130.0 (d, *J* = 8.2 Hz), 120.9 (d, *J* = 2.8 Hz), 114.2 (d, *J* = 21.2 Hz), 112.3 (d, *J* = 21.8 Hz), 69.8, 25.2.



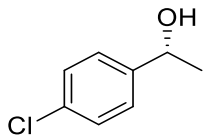
(*R*)-1-(4-fluorophenyl)ethan-1-ol (7k) [1]

Colorless oil, 99% yield, 278 mg; 90% ee; $[\alpha]_D^{20}$=+44.6 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OD-H, *n*-hexane/isopropanol 97:3 v/v, flow rate 0.75 mL/min，λ= 254 nm, 25 °C). Retention times: t_R(major)= 13.34 min，t_R(minor) = 12.86 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.48 – 7.28 (m, 2H), 7.09 – 6.93 (m, 2H), 4.85 (q, *J* = 6.4 Hz, 1H), 2.09 (s, 1H), 1.46 (d, *J* = 6.5 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 162.1 (d, *J* = 245.0 Hz), 141.5 (d, *J* = 2.9 Hz), 127.1 (d, *J* = 8.1 Hz), 115.2 (d, *J* = 21.2 Hz), 69.7, 25.3. ^{19}F NMR (376 MHz, $CDCl_3$) δ -115.38 (s).



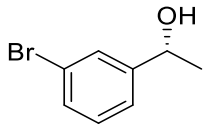
(*R*)-1-(3-chlorophenyl)ethan-1-ol (7l) [1]

Colorless oil, 99% yield, 309 mg; 87% ee; $[\alpha]_D^{20}$=+38.7 (c = 1.0, $CHCl_3$). The ee was determined by chiral HPLC (Chiralpak OJ-H, *n*-hexane/isopropanol 90:10 v/v, flow rate 0.8 mL/min，λ= 210 nm, 25 °C). Retention times: t_R(major)= 8.81 min，t_R(minor) = 8.08 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36 (s, 1H), 7.28 – 7.20 (m, 3H), 4.84 (q, *J* = 6.4 Hz, 1H), 2.14 (s, 1H), 1.46 (d, *J* = 6.5 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 147.9, 134.7, 129.8, 127.5, 125.6, 123.6, 69.8, 25.2.



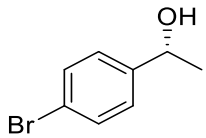
(*R*) -1-(4-chlorophenyl)ethan-1-ol (7m) [1]

Colorless oil, 99% yield, 310 mg; 88% ee; $[\alpha]_D^{20}$=+42.6 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OJ-H，*n*-hexane/isopropanol 95:5 v/v，flow rate 1.0 mL/min，λ= 254 nm，25 °C). Retention times: t_R(minor)=14.76 min，t_R(major) = 15.77 min. ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.32 (d, *J* = 8.4 Hz, 2H), 7.29 (d, *J* = 8.1 Hz, 2H), 4.85 (q, *J* = 6.3 Hz, 1H), 2.32 (s, 1H), 1.46 (d, *J* = 6.4 Hz, 3H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 144.2, 133.0, 128.5, 126.7, 69.6, 25.2.



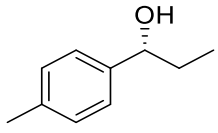
(*R*)-1-(3-bromophenyl)ethan-1-ol (7n) [1]

Colorless oil, 99% yield, 398 mg; 83% ee; $[\alpha]_D^{20}$=+27.3 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OD-3，*n*-hexane/isopropanol 95:5 v/v，flow rate 1.0 mL/min，λ= 210 nm，25 °C). Retention times: t_R(major)= 9.30 min，t_R(minor)= 8.47 min. ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.51 (s, 1H), 7.38 (d, *J* = 7.9 Hz, 1H), 7.26 (d, *J* = 8.1 Hz, 1H), 7.20 (t, *J* = 7.8 Hz, 1H), 4.83 (q, *J* = 6.5 Hz, 1H), 2.11 (s, 1H), 1.46 (d, *J* = 6.5 Hz, 3H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 148.1, 130.4, 130.1, 128.5, 124.0, 122.6, 69.7, 25.2.



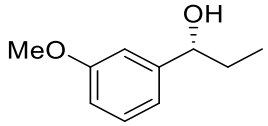
(*R*) -1-(4-bromophenyl)ethan-1-ol (7o) [1]

Colorless oil, 99% yield, 397 mg; 86% ee; $[\alpha]_D^{20}$=+31.2 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OD-H，*n*-hexane/isopropanol 97:3 v/v，flow rate 0.75 mL/min，λ= 254 nm，25 °C). Retention times: t_R(major) = 17.25 min，t_R(minor) = 15.6 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45 (d, *J* = 8.4 Hz, 2H), 7.22 (d, *J* = 8.4 Hz, 2H), 4.82 (q, *J* = 6.5 Hz, 1H), 2.15 (s, 1H), 1.44 (d, *J* = 6.5 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 144.8, 131.5, 127.2, 121.1, 69.7, 25.2.



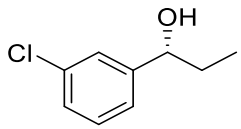
(*R*)-1-(p-tolyl)propan-1-ol (7p) [2]

Colorless oil, 99% yield, 297 mg; 95% ee; $[\alpha]_D^{20}$=+41.9 (c = 1.0, CH_2Cl_2). GC (Supelco β-DEX™ 225, df = 0.25 mm i.d.×30 cm, fused silica capillary column) carrier gas, N_2 (flow 1.2 mL/min); injection temp, 220 °C; initial column temperature, 90 °C; progress rate, 0.5 °C/min; final column temperature, 120 °C, this temperature is held for 10 min.; detector temp, 240 °C; t_R (major) = 44.17 min, t_R(minor) = 47.30 min. ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.23 (d, *J* = 8.0 Hz, 2H), 7.16 (d, *J* = 7.8 Hz, 2H), 4.55 (t, *J* = 6.6 Hz, 1H), 2.35 (s, 3H), 1.86 (s, 1H), 1.84 – 1.68 (m, 2H), 0.91 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 141.7, 137.1, 129.1, 126.0, 75.9, 31.8, 21.1, 10.2.



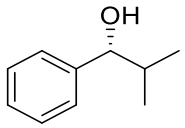
(*R*)-1-(3-methoxyphenyl)propan-1-ol (7q) [4]

Colorless oil, 99% yield, 328 mg; 95% ee; $[\alpha]_D^{20}$=+30.2 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OJ-H，*n*-hexane/isopropanol 95:5 v/v，flow rate 0.5 mL/min，λ= 254 nm，25 °C). Retention times: t_R(major) = 30.52 min，t_R(minor)= 29.08 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.24 (t, *J* = 6.1 Hz, 1H), 6.92 – 6.86 (m, 2H), 6.81 – 6.78 (m, 1H), 4.54 (t, *J* = 6.6 Hz, 1H), 3.80 (s, 3H), 2.07 (s, 1H), 1.80 – 1.61 (m, 2H), 0.91 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 159.7, 146.4, 129.4, 118.4, 112.9, 111.5, 75.9, 55.2, 31.8, 10.1.



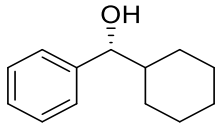
(*R*)-1-(3-chlorophenyl)propan-1-ol (7r) [5]

Colorless oil, 99% yield, 338 mg; 86% ee; $[\alpha]_D^{20}$=+29.7 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OJ-H，*n*-hexane/isopropanol 95:5 v/v，flow rate 0.8 mL/min，λ= 254 nm，25 °C). Retention times: t_R(major) = 11.79 min，t_R(minor)= 10.94 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.33 (s, 1H), 7.29 – 7.17 (m, 3H), 4.56 (t, *J* = 6.3 Hz, 1H), 2.05 (s, 1H), 1.84 – 1.64 (m, 2H), 0.90 (t, *J* = 7.4 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 146.7, 134.4, 129.7, 127.6, 126.2, 124.2, 75.4, 32.0, 10.0.



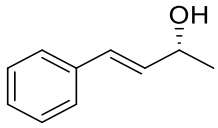
(*R*)-2-methyl-1-phenylpropan-1-ol (7s) [2]

Colorless oil, 99% yield, 297 mg; 96% ee; $[\alpha]_D^{20}$=+39.8 (c = 1.0, $CHCl_3$). The ee was determined by chiral HPLC (Chiralpak OD-H，*n*-hexane/isopropanol 98:2 v/v，flow rate 1.0 mL/min，λ= 210 nm，25 ºC). Retention times: t_R(major) = 12.73 min，t_R(minor)= 10.99 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.46 – 7.08 (m, 5H), 4.35 (d, *J* = 6.9 Hz, 1H), 1.95 (dq, *J* = 13.5, 6.8 Hz, 1H), 1.86 (s, 1H), 1.00 (d, *J* = 6.7 Hz, 3H), 0.79 (d, *J* = 6.8 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 143.7, 128.3, 127.5, 126.7, 80.1, 35.3, 19.1, 18.3.



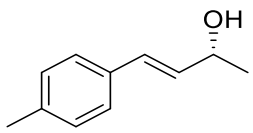
(*R*) -cyclohexyl(phenyl)methanol (7t) [6]

White solid, 99% yield, 376 mg; 96% ee; $[\alpha]_D^{20}$ = +28.9 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OD-H，*n*-hexane/isopropanol 95:5 v/v，flow rate 1.0 mL/min，λ= 254 nm，25 ºC). Retention times: t_R(major) = 11.48 min，t_R(minor)= 9.57 min. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45 – 7.06 (m, 5H), 4.34 (d, *J* = 7.2 Hz, 1H), 2.27 – 1.87 (m, 2H), 1.76 (d, *J* = 12.7 Hz, 1H), 1.69 – 1.56 (m, 3H), 1.37 (d, *J* = 9.5 Hz, 1H), 1.28 – 0.87 (m, 5H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 143.7, 128.2, 127.5, 126.7, 79.4, 45.0, 29.4, 28.9, 26.5, 26.2, 26.1.



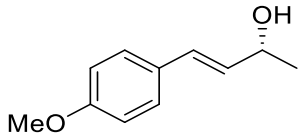
(*R,E*)-4-phenylbut-3-en-2-ol (9a) [7]

Colorless oil, 92% yield, 13.6 mg; 77% ee; $[\alpha]_D^{20}$=+2.7 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OD-3，*n*-hexane/isopropanol 95:5 v/v，flow rate 1.0 mL/min，λ= 254 nm，25 ºC). Retention times: t_R(major) = 24.19 min，t_R(minor)= 14.00 min. ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.41 (d, *J* = 7.7 Hz, 2H), 7.35 (t, *J* = 7.6 Hz, 2H), 7.27 (t, *J* = 7.3 Hz, 1H), 6.59 (d, *J* = 15.9 Hz, 1H), 6.29 (dd, *J* = 15.9, 6.4 Hz, 1H), 4.51 (p, *J* = 6.4 Hz, 1H), 2.01 (s, 1H), 1.40 (d, *J* = 6.4 Hz, 3H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 136.6, 133.5, 129.3, 128.5, 127.6, 126.4, 68.8, 23.3.



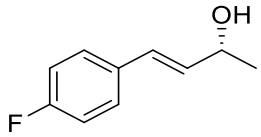
(*R,E*)-4-(*p*-tolyl)but-3-en-2-ol (9b) [7]

Colorless oil, 90% yield, 14.6 mg; 80% ee; $[\alpha]_D^{20}$=+3.3 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OJ-3，*n*-hexane/isopropanol 95:5 v/v，flow rate 1.0 mL/min，λ= 254 nm，25 °C). Retention times: t_R(major) = 13.83 min，t_R(minor)= 16.08 min. ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.31 (d, *J* = 7.9 Hz, 2H), 7.16 (d, *J* = 7.8 Hz, 2H), 6.56 (d, *J* = 15.9 Hz, 1H), 6.24 (dd, *J* = 15.9, 6.5 Hz, 1H), 4.50 (p, *J* = 6.4 Hz, 1H), 2.37 (s, 3H), 1.98 (s, 1H), 1.40 (d, *J* = 6.4 Hz, 3H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 137.4, 133.8, 132.5, 129.3, 129.2, 126.3, 68.9, 23.3, 21.1.



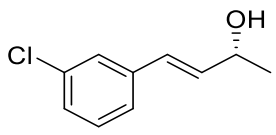
(*R*,*E*)-4-(4-methoxyphenyl)but-3-en-2-ol (9c) [7]

Colorless oil, 91% yield, 16.2 mg; 67% ee; $[\alpha]_D^{20}$=+1.4 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OD-3，*n*-hexane/isopropanol 95:5 v/v，flow rate 1.0 mL/min，λ= 254 nm，25 °C). Retention times: t_R(major) = 16.44 min，t_R(minor)= 14.22 min. ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.31 (d, *J* = 7.9 Hz, 2H), 6.85 (d, *J* = 7.9 Hz, 2H), 6.50 (d, *J* = 15.9 Hz, 1H), 6.12 (dd, *J* = 15.9, 6.5 Hz, 1H), 4.46 (p, *J* = 6.2 Hz, 1H), 3.80 (s, 3H), 1.74 (s, 1H), 1.36 (d, *J* = 6.3 Hz, 3H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 159.2, 131.4, 129.4, 129.0, 127.6, 114.0, 69.1, 55.3, 23.4.



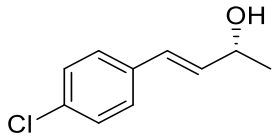
(*R*,*E*)-4-(4-fluorophenyl)but-3-en-2-ol (9d) [7]

Colorless oil, 92% yield, 15.3 mg; 79% ee; $[\alpha]_D^{20}$=+5.4 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OJ-H，*n*-hexane/isopropanol 95:5 v/v，flow rate 1.0 mL/min，λ= 254 nm，25 °C). Retention times: t_R(major) = 13.37 min，t_R(minor) = 14.18 min. ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.34 (dd, *J* = 8.5, 5.5 Hz, 2H), 7.00 (t, *J* = 8.6 Hz, 2H), 6.53 (d, *J* = 15.9 Hz, 1H), 6.17 (dd, *J* = 15.9, 6.4 Hz, 1H), 4.48 (p, *J* = 6.3 Hz, 1H), 1.72 (s, 1H), 1.37 (d, *J* = 6.4 Hz, 3H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 162.3 (d, *J* = 246.7 Hz), 133.3 (s), 132.9 (d, *J* = 3.2 Hz), 128.2, 128.0 (d, *J* = 8.1 Hz), 115.5 (d, *J* = 21.6 Hz), 68.8, 23.4. ^{19}F NMR (565 MHz, $CDCl_3$) δ -114.46 (s).



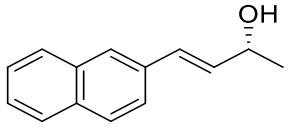
(*R*,*E*)-4-(3-chlorophenyl)but-3-en-2-ol (9e) [8]

Colorless oil, 93% yield, 17 mg; 80% ee; $[\alpha]_D^{20}$=+2.4 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OD-3，*n*-hexane/isopropanol 95:5 v/v，flow rate 1.0 mL/min，λ= 254 nm，25 °C). Retention times: t_R(major) = 19.76 min，t_R(minor) = 11.67 min. ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.37 (s, 1H), 7.26 – 7.21 (m, 3H), 6.52 (d, *J* = 15.9 Hz, 1H), 6.28 (dd, *J* = 15.9, 6.1 Hz, 1H), 4.50 (p, *J* = 6.1 Hz, 1H), 2.01 (s, 1H), 1.38 (d, *J* = 6.4 Hz, 3H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 138.7, 135.1, 134.5, 129.8, 127.9, 127.5, 126.4, 124.7, 68.6, 23.4.



(*R*,*E*)-4-(4-chlorophenyl)but-3-en-2-ol (9f) [9]

Colorless oil, 90% yield, 16.4 mg; 69% ee; $[\alpha]_D^{20}$=+0.2 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak OJ-H，*n*-hexane/isopropanol 95:5 v/v，flow rate 1.0 mL/min，λ= 254 nm，25 °C). Retention times: t_R(major) = 14.04 min，t_R(minor)= 14.96 min. ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.29 (d, *J* = 6.7 Hz, 4H), 6.52 (d, *J* = 15.7 Hz, 1H), 6.24 (dd, *J* = 15.8, 6.4 Hz, 1H), 4.49 (s, 1H), 2.03 (s, 1H), 1.38 (s, 3H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 135.2, 134.2, 133.2, 128.7, 128.1, 127.7, 68.7, 23.4.

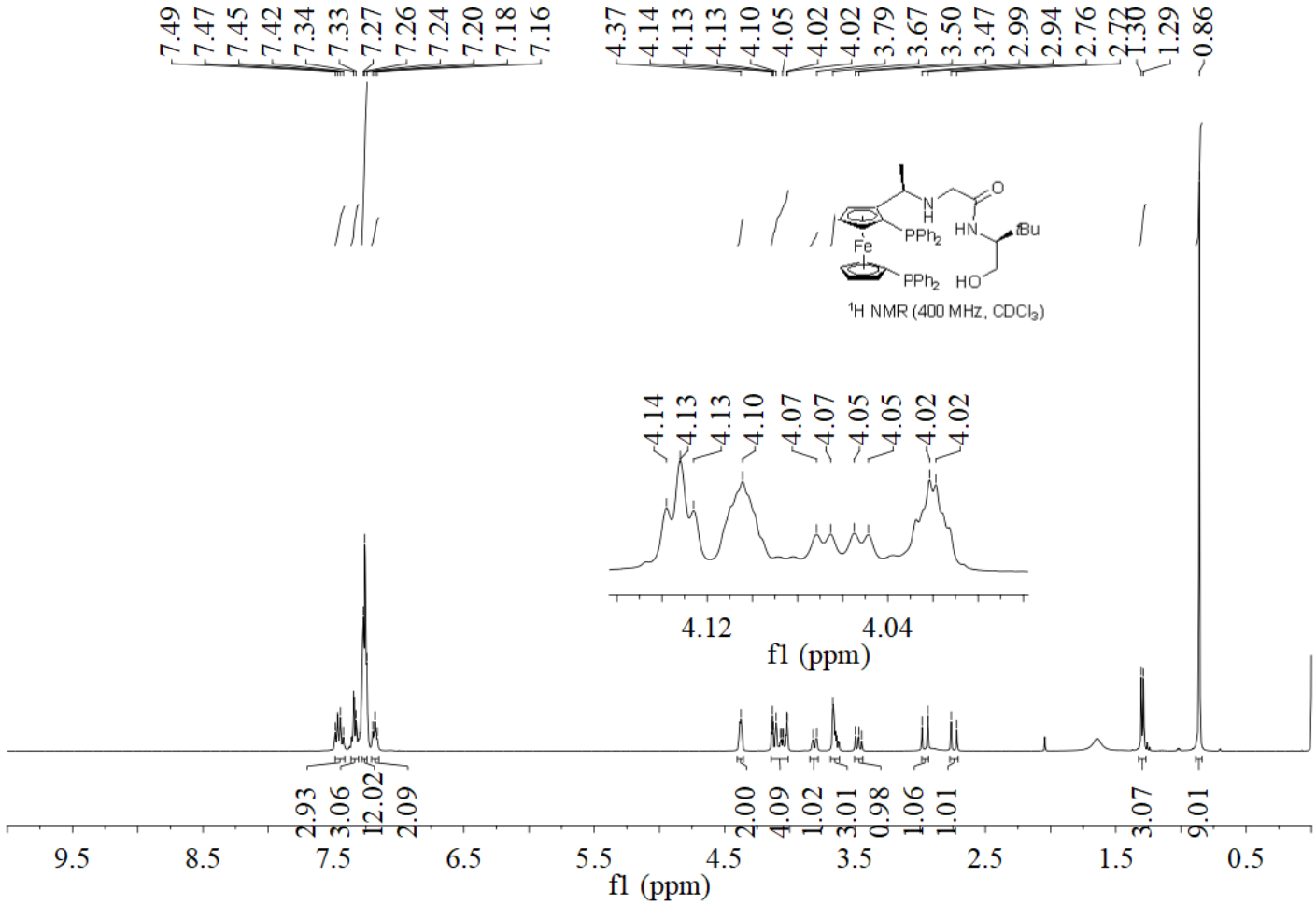


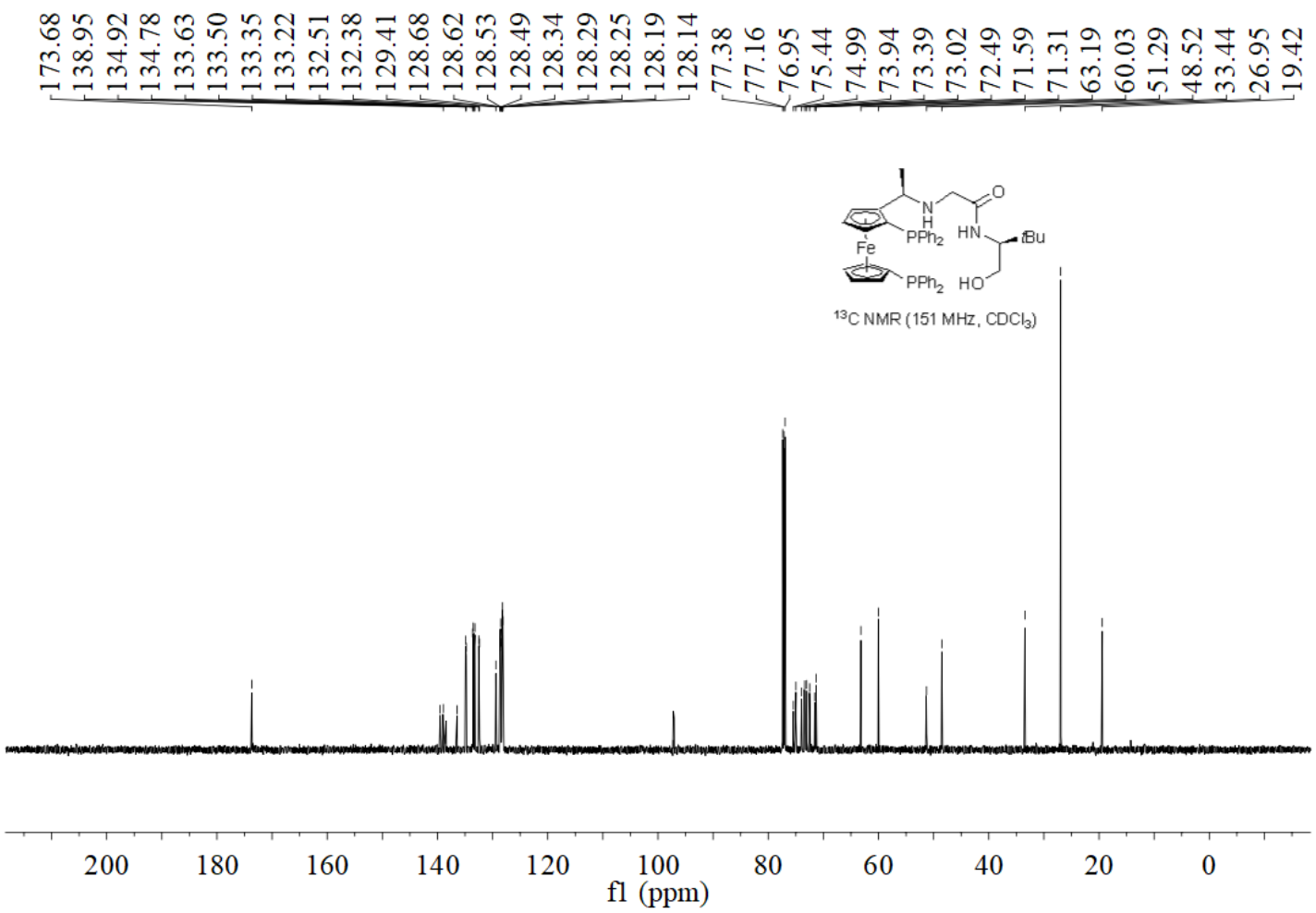
(*R*,*E*)-4-(naphthalen-2-yl)but-3-en-2-ol (9g)[8]

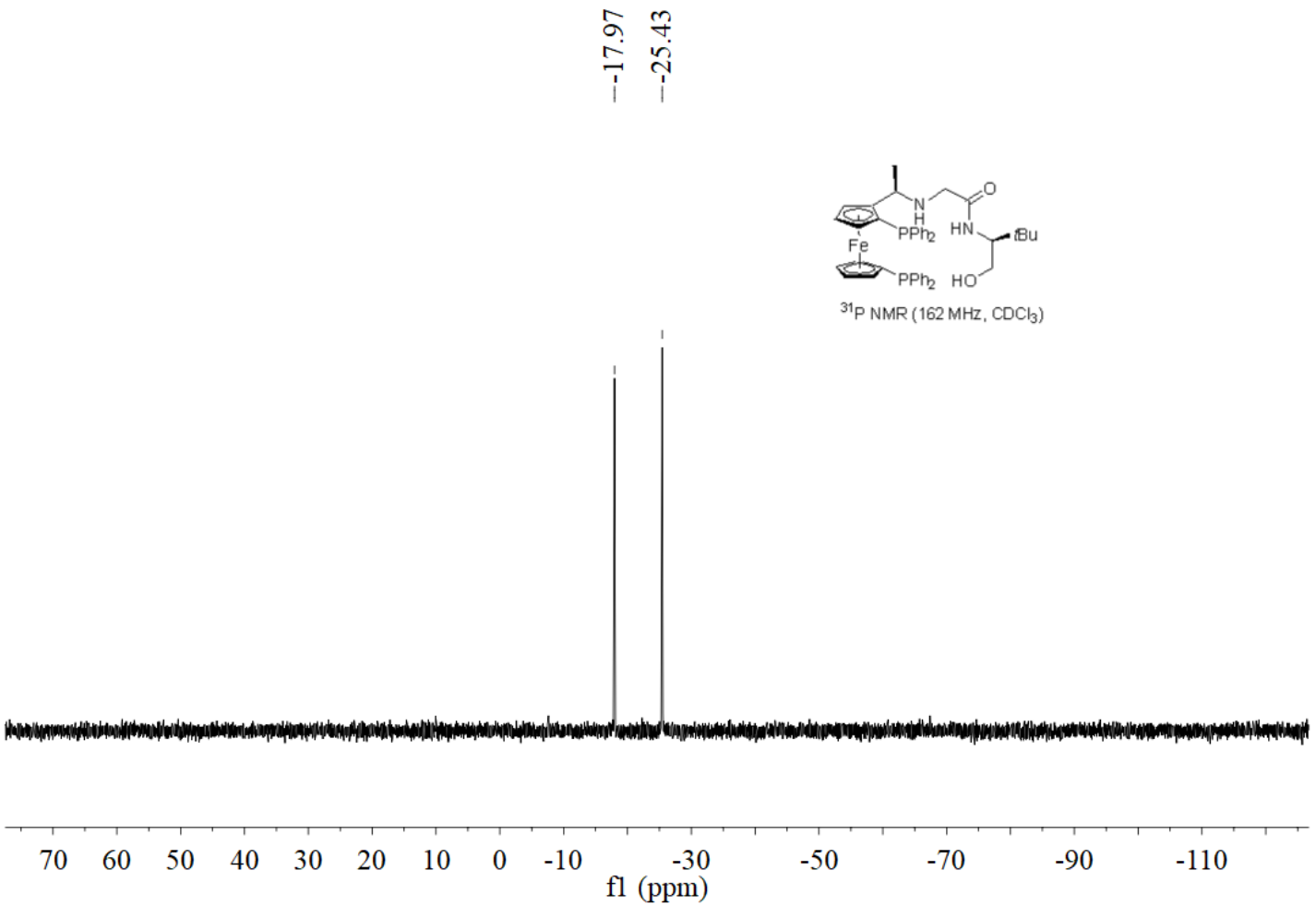
Colorless oil, 93% yield, 18.4 mg; 82% ee; $[\alpha]_D^{20}$=+8.1 (c = 1.0, CH_2Cl_2). The ee was determined by chiral HPLC (Chiralpak IC，*n*-hexane/isopropanol 95:5 v/v，flow rate 1.0 mL/min，λ= 254 nm，25 °C). Retention times: t_R(major) = 12.52 min，t_R(minor)= 11.51 min. ^{1}H NMR (600 MHz, $CDCl_3$) δ 7.71-7.63 (m, 3H), 7.63 (s, 1H), 7.50 (d, *J* = 8.5 Hz, 1H), 7.38-7.34 (m, 2H), 6.63 (d, *J* = 15.9 Hz, 1H), 6.30 (dd, *J* = 15.9, 6.3 Hz, 1H), 4.45 (p, *J* = 6.3 Hz, 1H), 1.69 (s, 1H), 1.32 (d, *J* = 6.4 Hz, 3H). ^{13}C NMR (151 MHz, $CDCl_3$) δ 134.1, 133.9, 133.6, 133.0, 129.5, 128.2, 127.9, 127.6, 126.4, 126.2, 125.9, 123.5, 69.0, 23.4.

7. Copies of NMR spectra

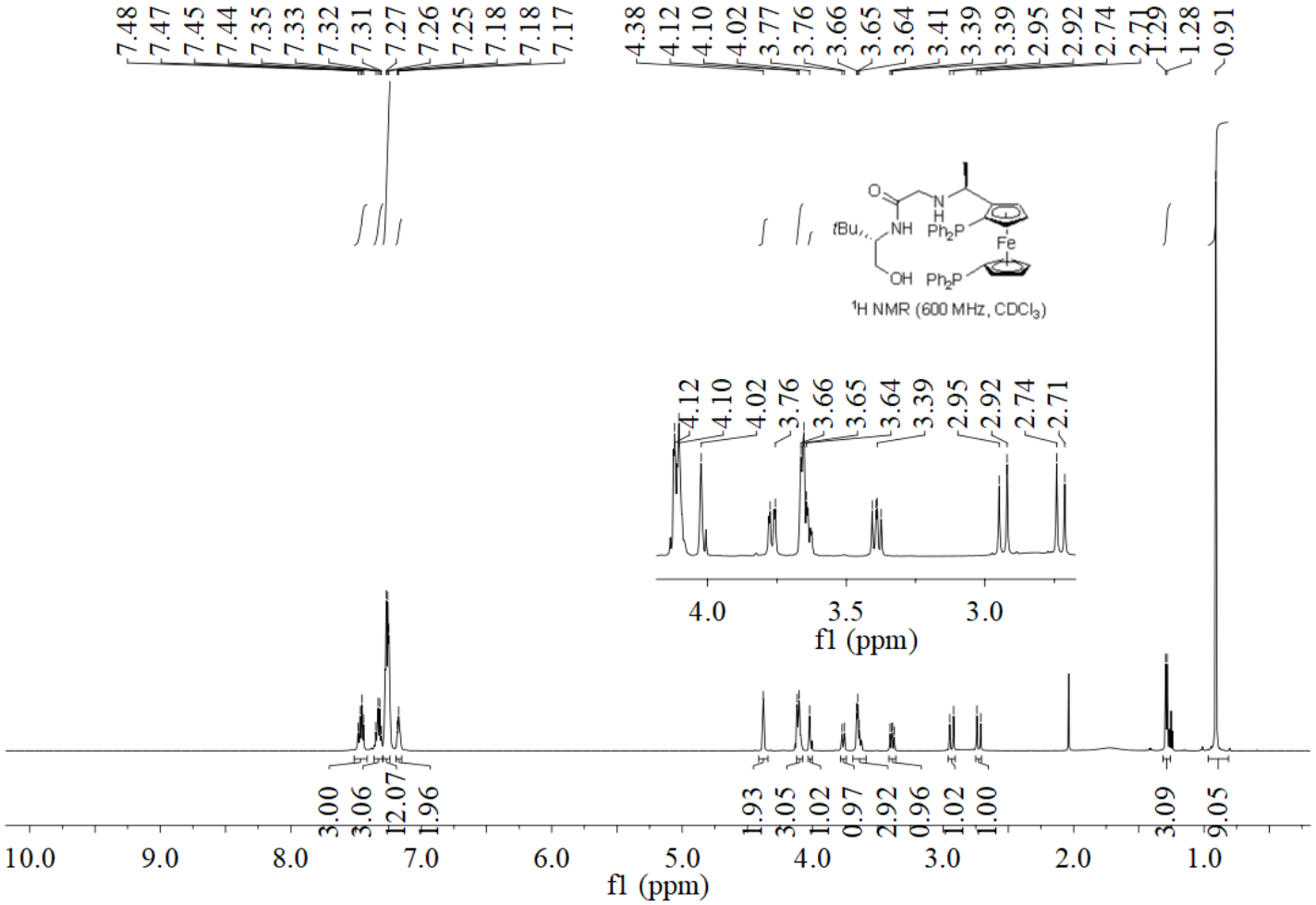
(R_C,S_{FC},S_C)-**3**

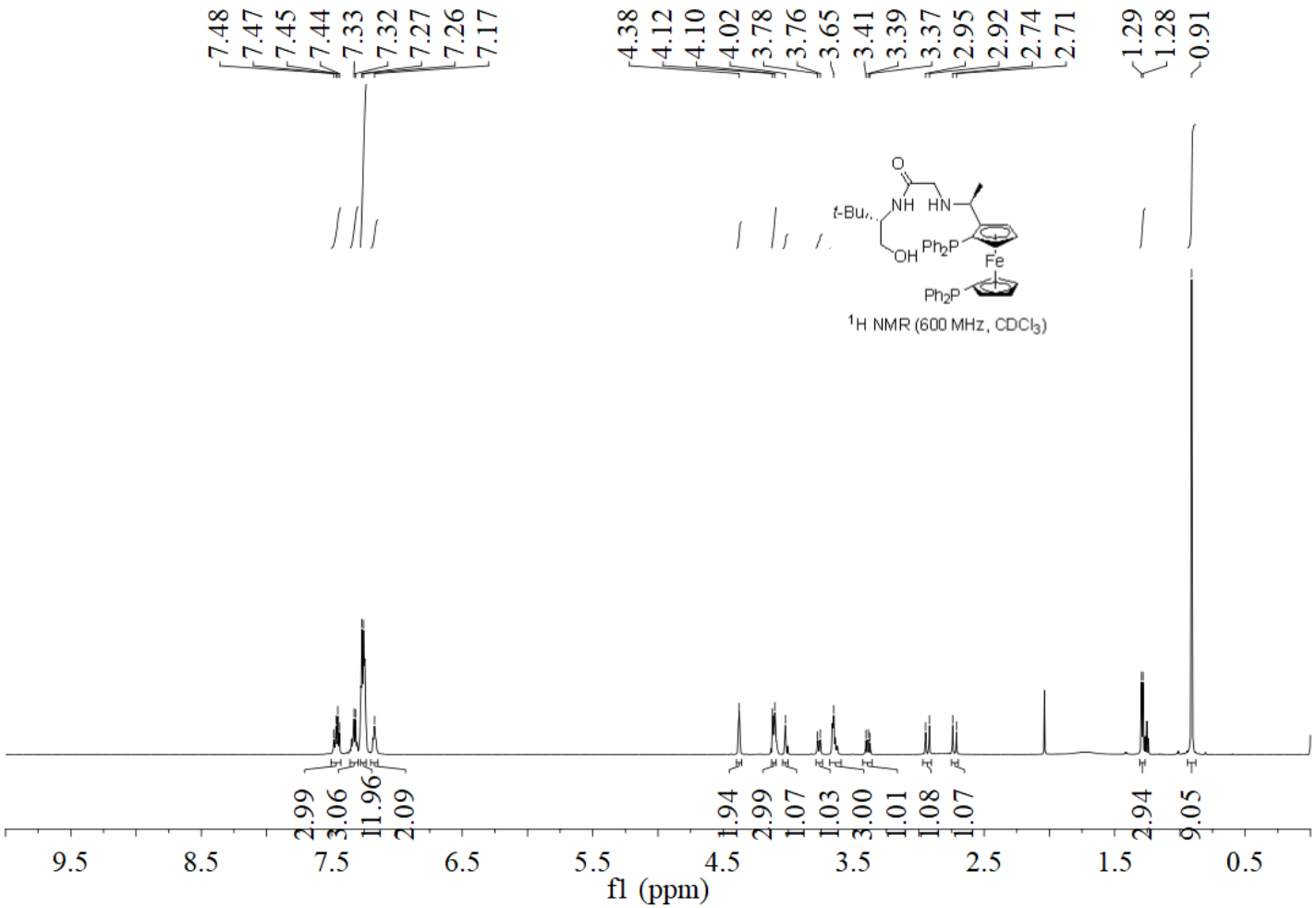


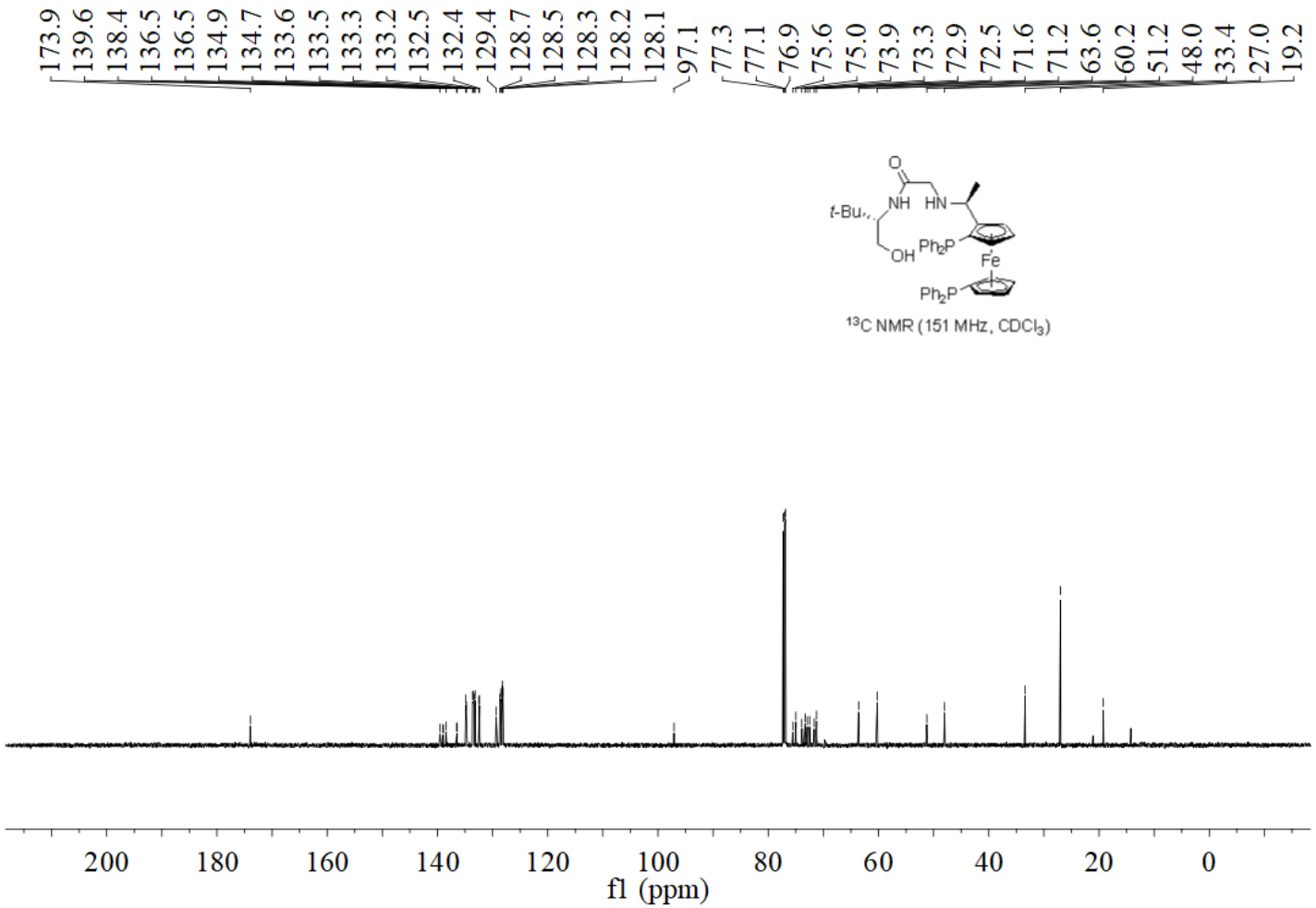

173.68
138.95
134.92
134.78
133.63
133.50
133.35
133.22
132.51
132.38
129.41
128.68
128.62
128.53
128.49
128.34
128.29
128.25
128.19
128.14
77.38
77.16
76.95
75.44
74.99
73.94
73.39
73.02
72.49
71.59
71.31
63.19
60.03
51.29
48.52
33.44
26.95
19.42
Fe
PPh2
PPh2
HN
tBu
HO
O
13C NMR (151 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)


-17.97
-25.43
PPh2
HN
tBu
Fe
PPh2
HO
31P NMR (162 MHz, CDCl3)
70 60 50 40 30 20 10 0 -10 -30 -50 -70 -90 -110
f1 (ppm)

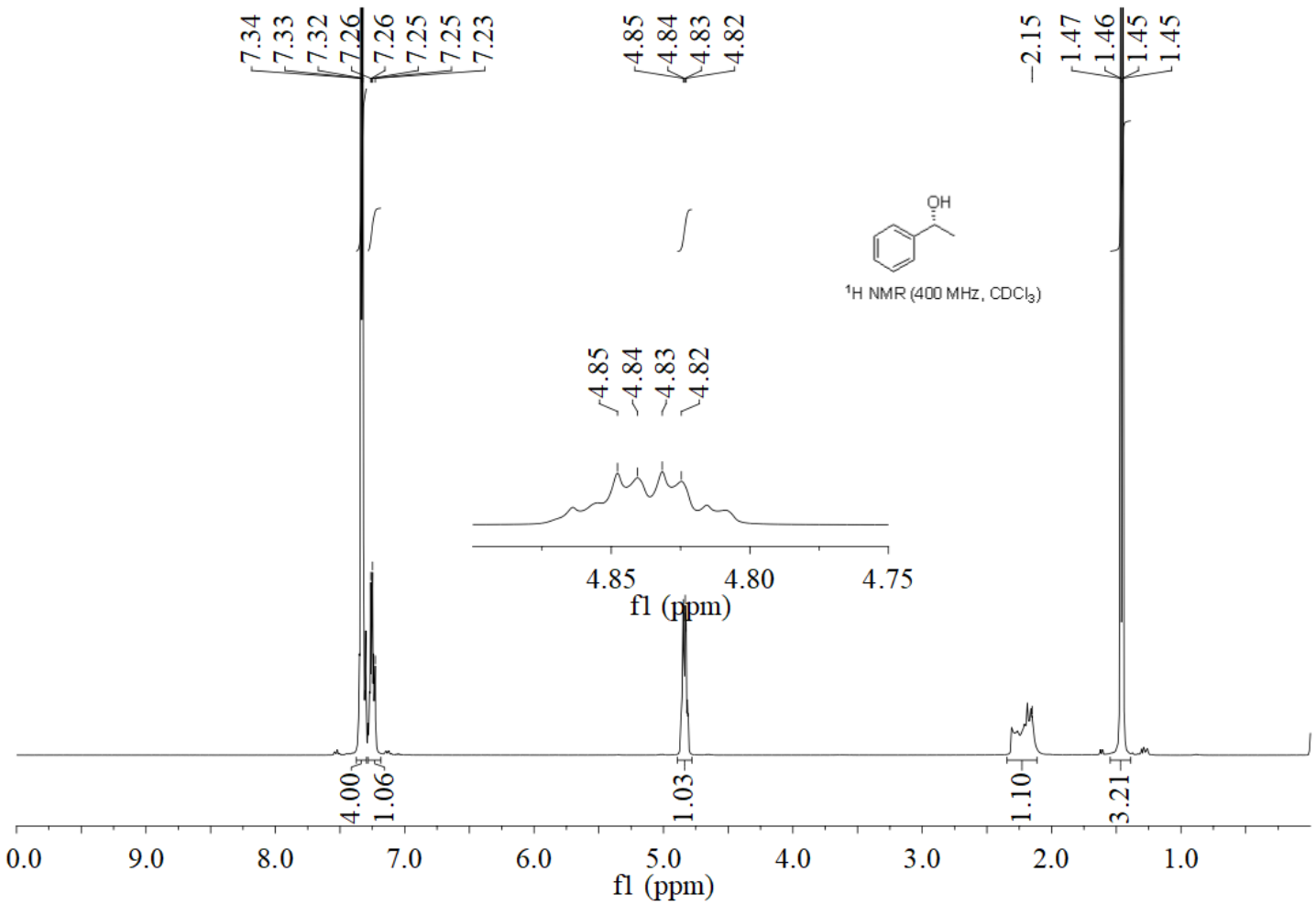
(S_C,R_{FC},S_C)-**3**

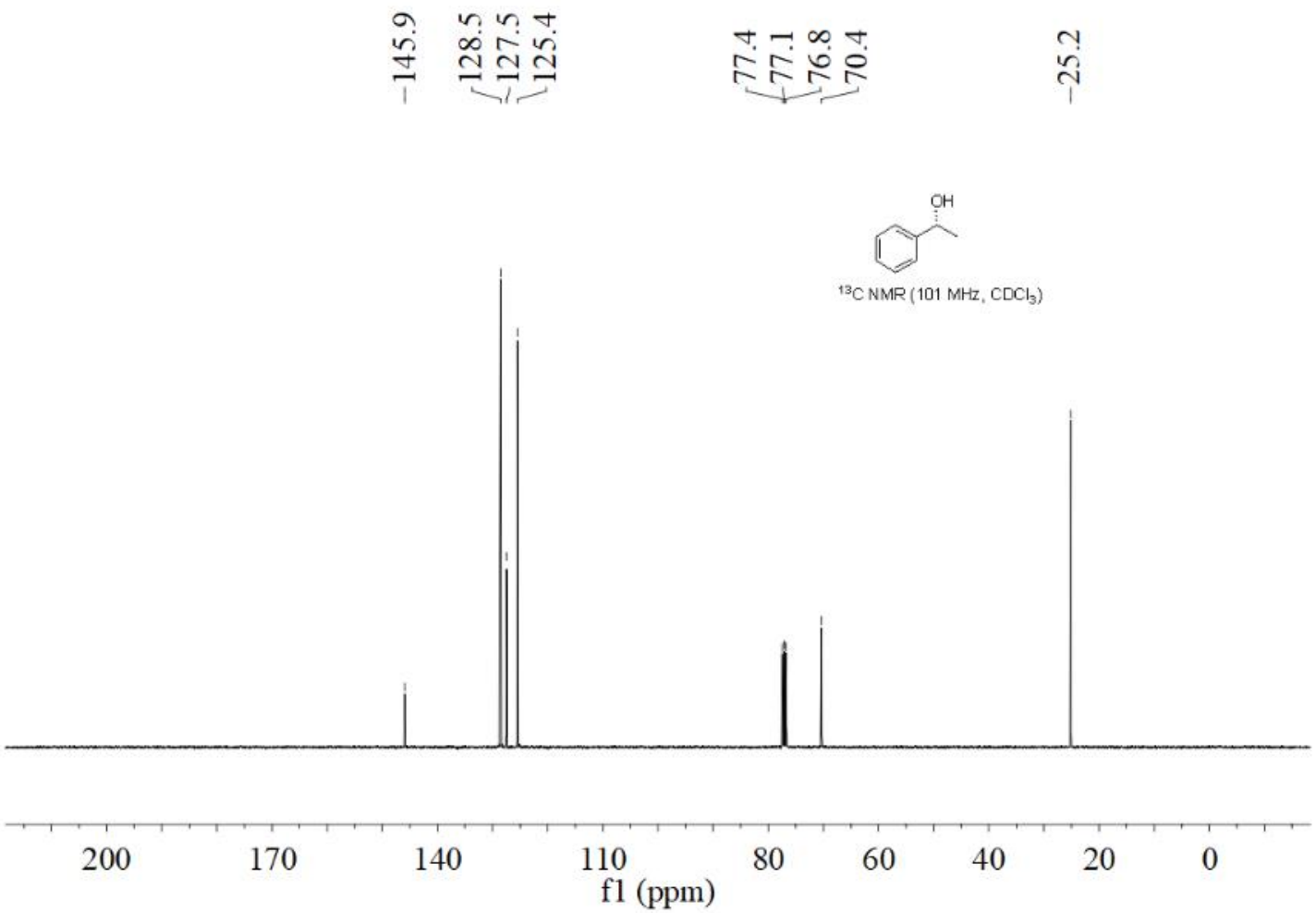

7.48 7.47 7.45 7.44 7.35 7.33 7.32 7.31 7.27 7.26 7.25 7.18 7.18 7.17
4.38 4.12 4.10 4.02 3.77 3.76 3.66 3.65 3.64 3.41 3.39 3.39 2.95 2.92 2.74 2.71 1.29 1.28 0.91
tBu
NH
Ph2P
Fe
OH
Ph2P
1H NMR (600 MHz, CDCl3)
4.12 4.10 4.02 3.76 3.66 3.65 3.64 3.39 2.95 2.92 2.74 2.71
4.0 3.5 3.0
f1 (ppm)
3.00 3.06 12.07 1.96 1.93 3.05 1.02 0.97 2.92 0.96 1.02 1.00 3.09 9.05
10.0 9.0 8.0 7.0 6.0 5.0 4.0 3.0 2.0 1.0
f1 (ppm)


7.48
7.47
7.45
7.44
7.33
7.32
7.27
7.26
7.17
4.38
4.12
4.10
4.02
3.78
3.76
3.65
3.41
3.39
3.37
2.95
2.92
2.74
2.71
1.29
1.28
0.91
t-Bu
NH
HN
OH
Ph2P
Fe
Ph2P
1H NMR (600 MHz, CDCl3)
2.99
3.06
11.96
2.09
1.94
2.99
1.07
1.03
3.00
1.01
1.08
1.07
2.94
9.05
9.5
8.5
7.5
6.5
5.5
4.5
3.5
2.5
1.5
0.5
f1 (ppm)

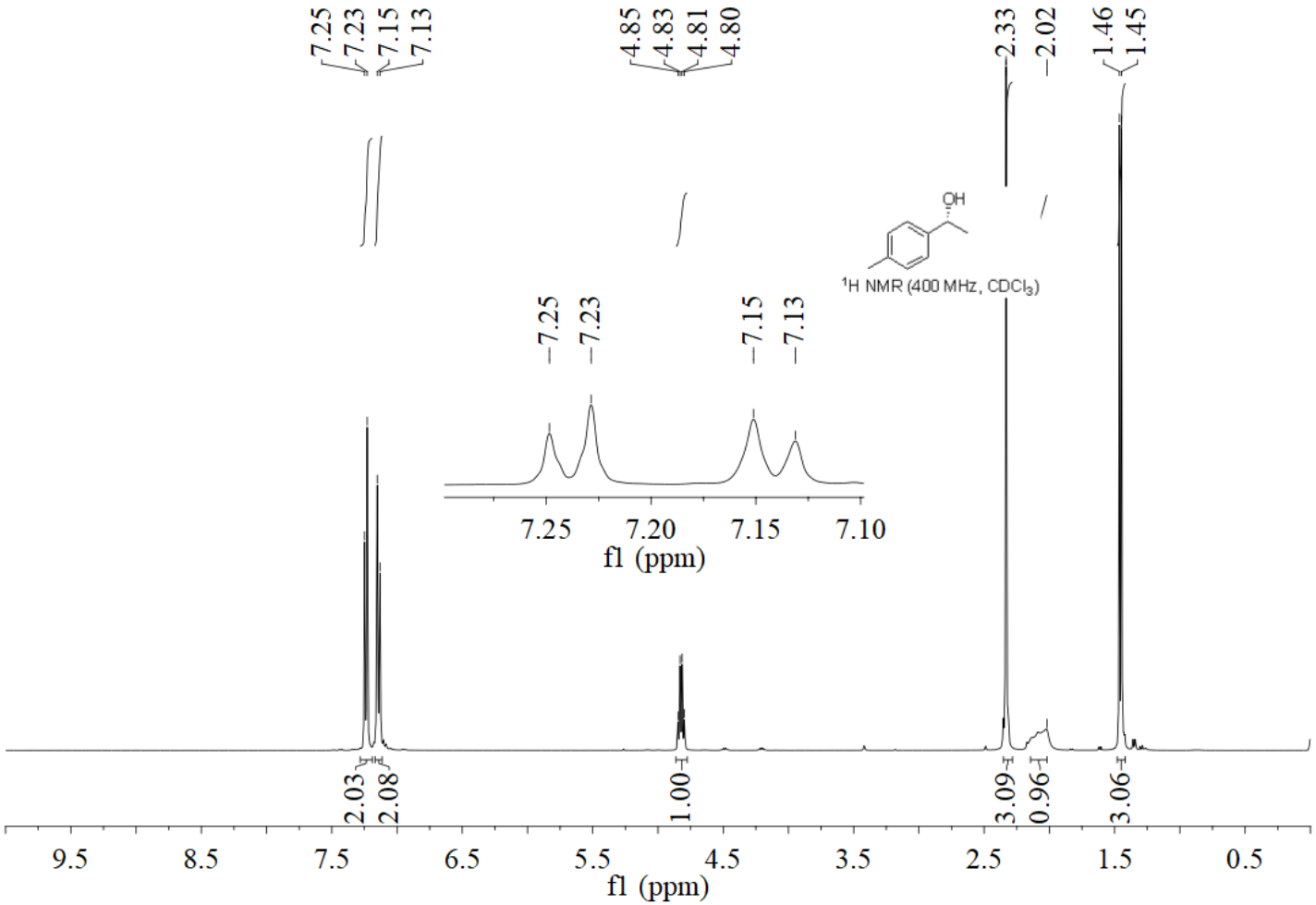

173.9
139.6
138.4
136.5
136.5
134.9
134.7
133.6
133.5
133.3
133.2
132.5
132.4
129.4
128.7
128.5
128.3
128.2
128.1
97.1
77.3
77.1
76.9
75.6
75.0
73.9
73.3
72.9
72.5
71.6
71.2
63.6
60.2
51.2
48.0
33.4
27.0
19.2
O
NH
HN
t-Bu
OH
Ph2P
Fe
Ph2P
13C NMR (151 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

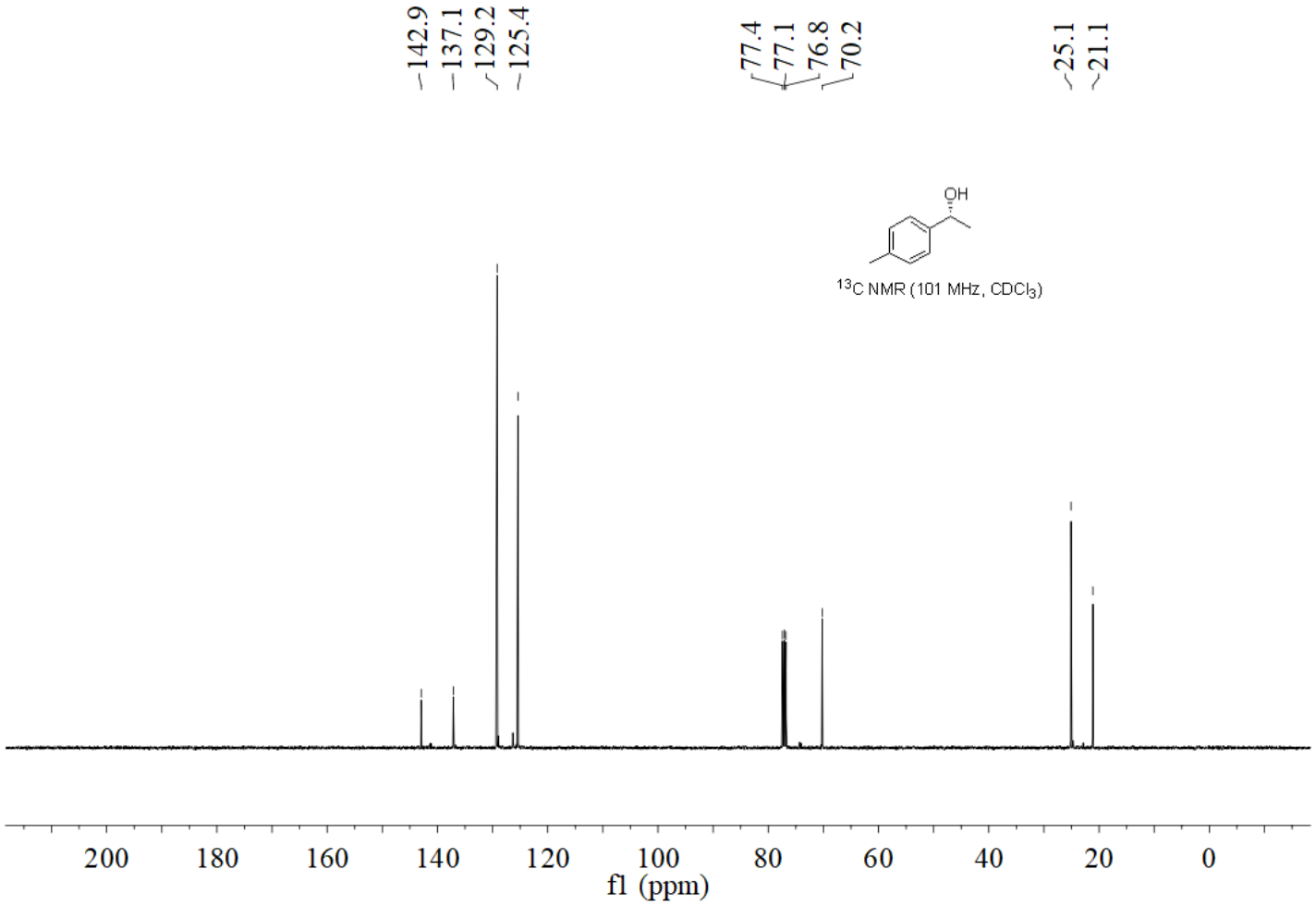
(*R*)-1-phenylethan-1-ol (7a)



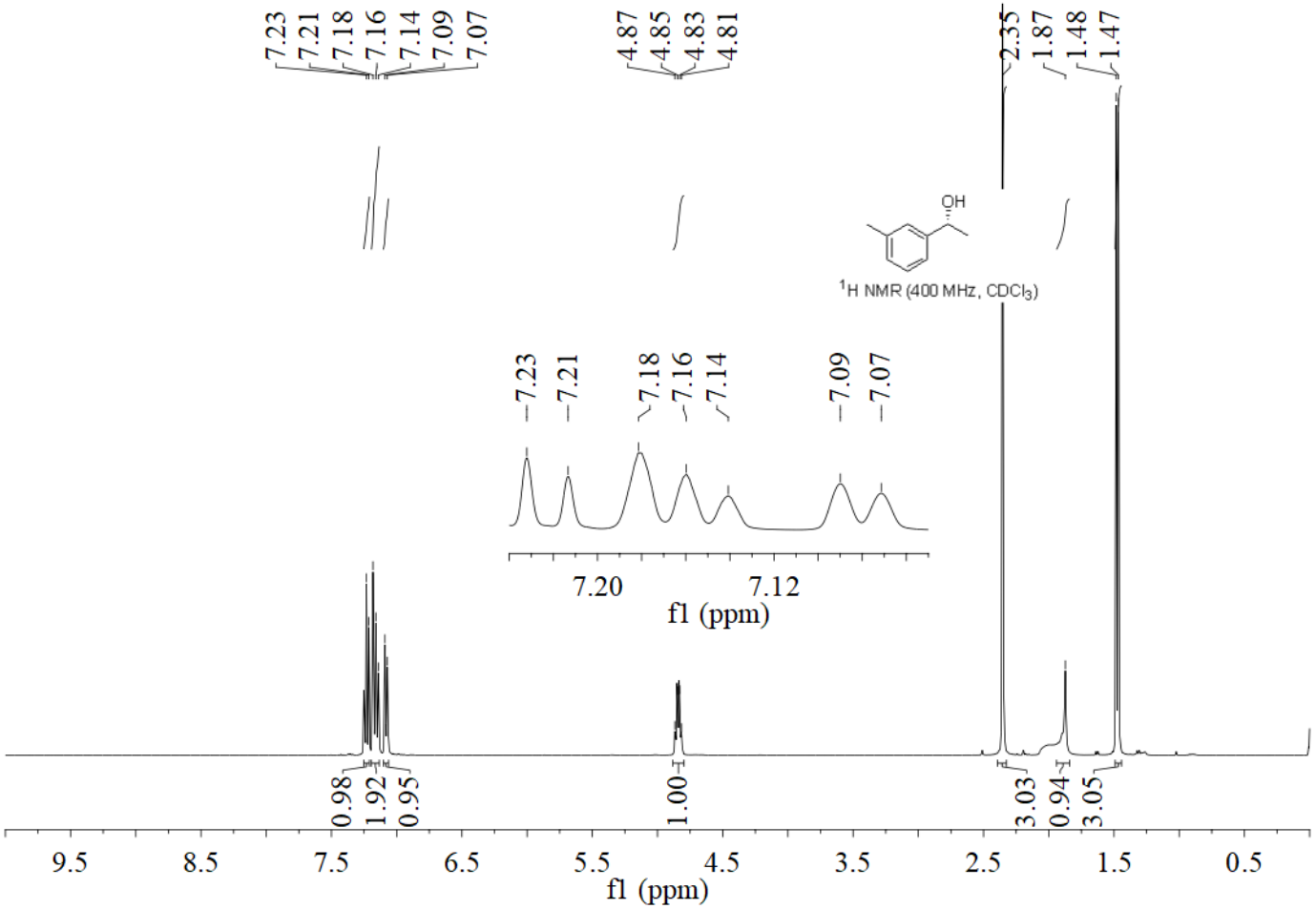

145.9
128.5
127.5
125.4
77.4
77.1
76.8
70.4
25.2
OH
13C NMR (101 MHz, CDCl3)
200
170
140
110
80
60
40
20
0
f1 (ppm)

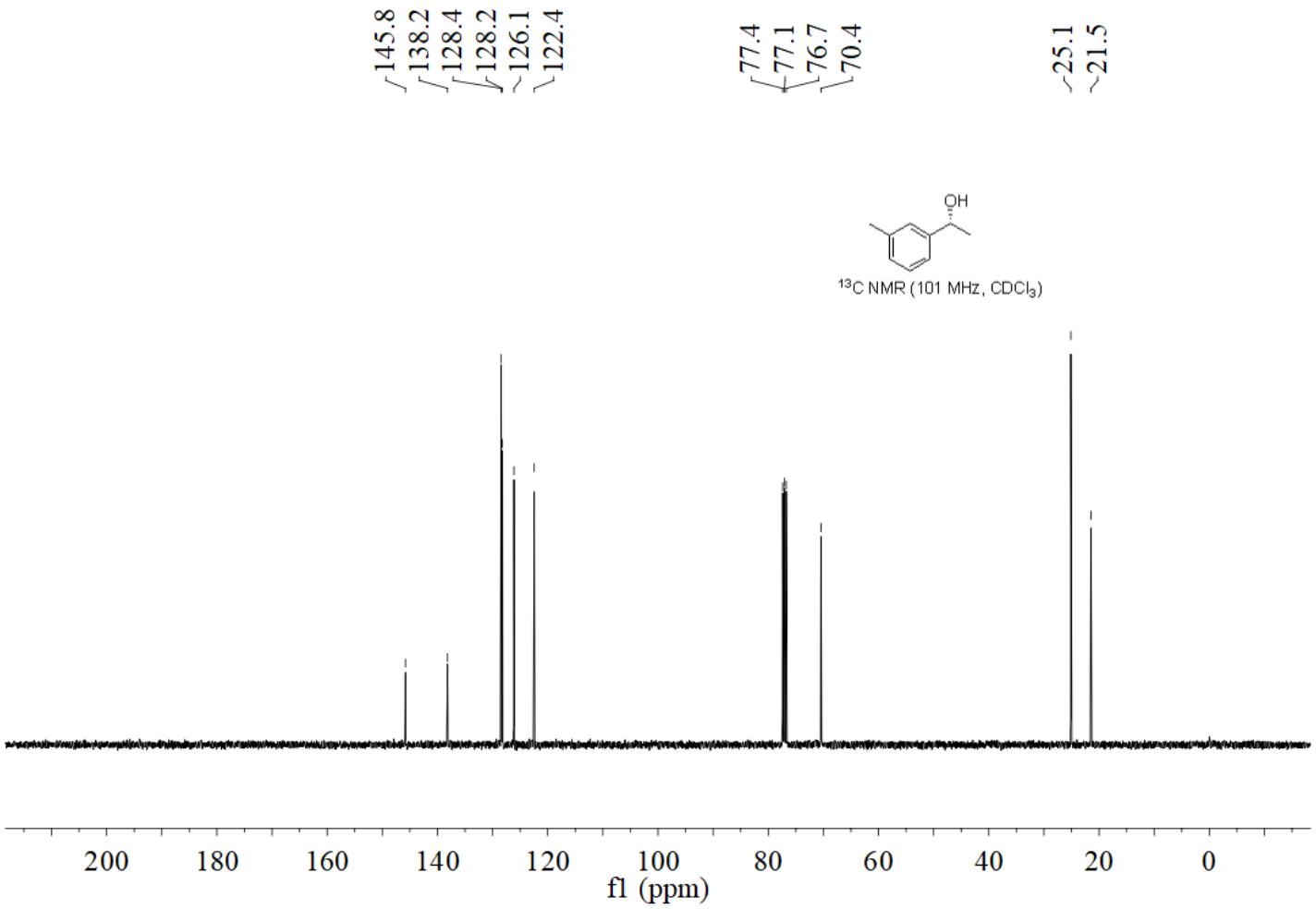
(*R*)-1-(*p*-tolyl)ethan-1-ol (7b)



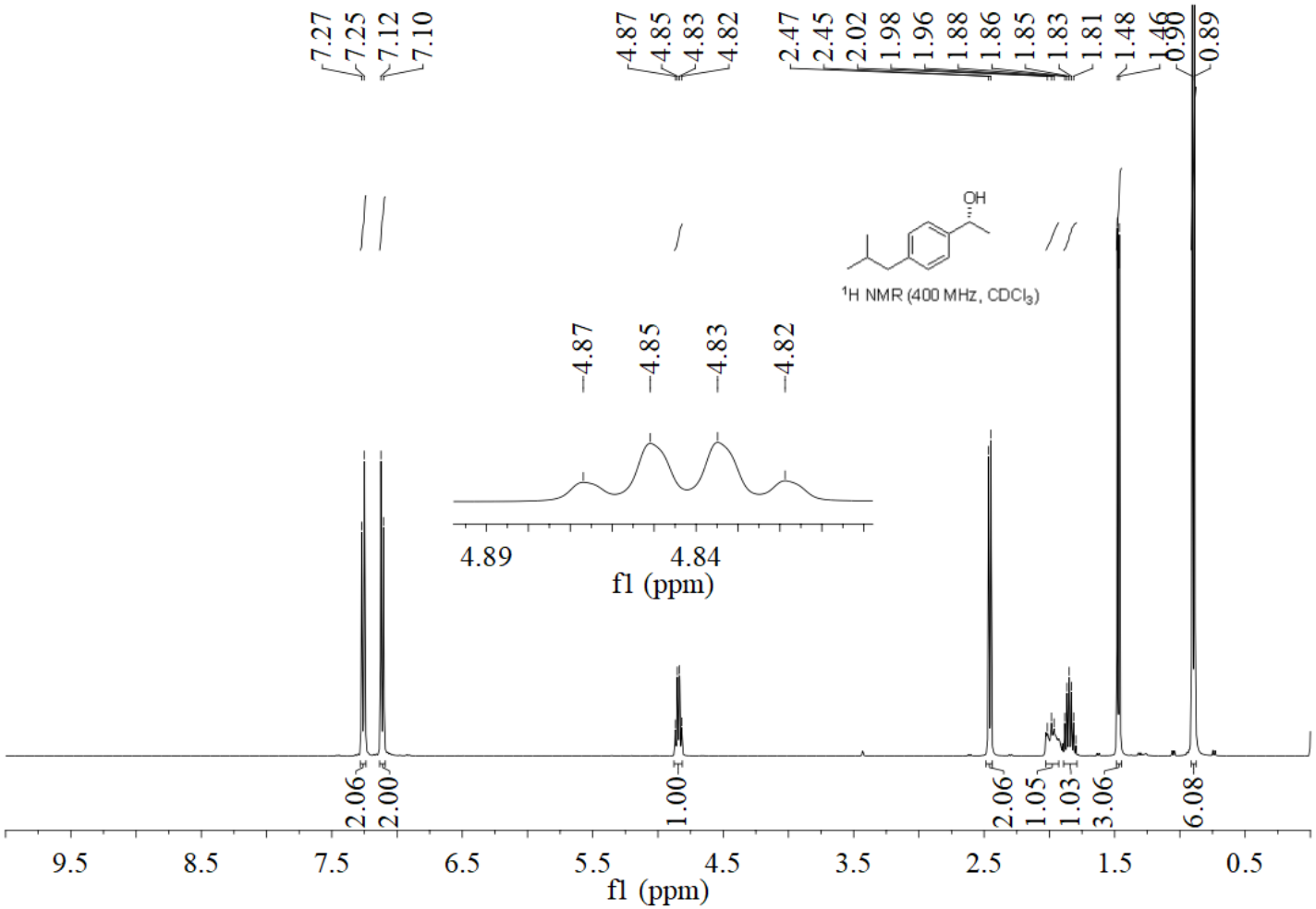

142.9
137.1
129.2
125.4
77.4
77.1
76.8
70.2
25.1
21.1
OH
^{13}C NMR (101 MHz, $CDCl_3$)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

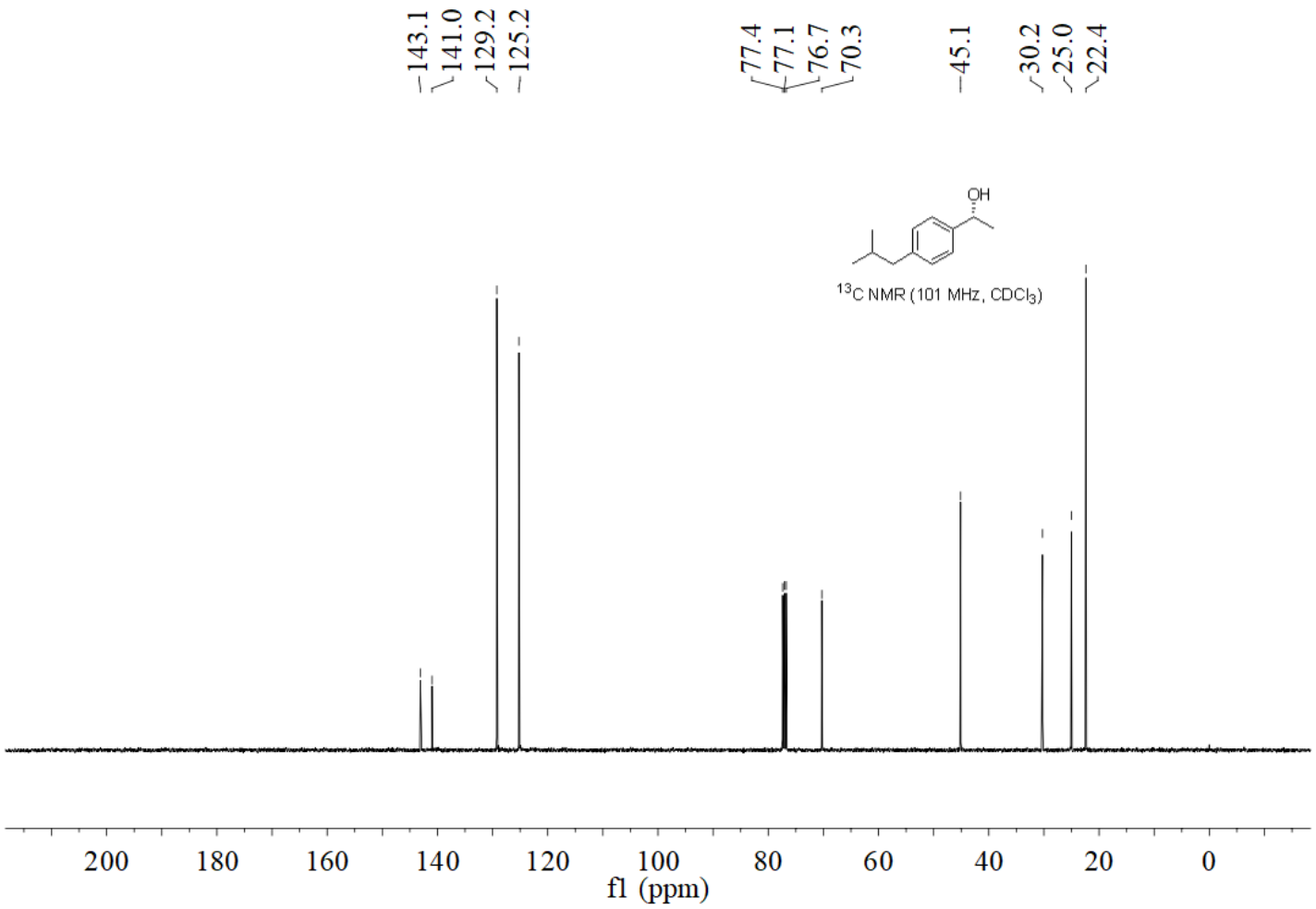
(*R*)-1-(*m*-tolyl)ethan-1-ol (7c)



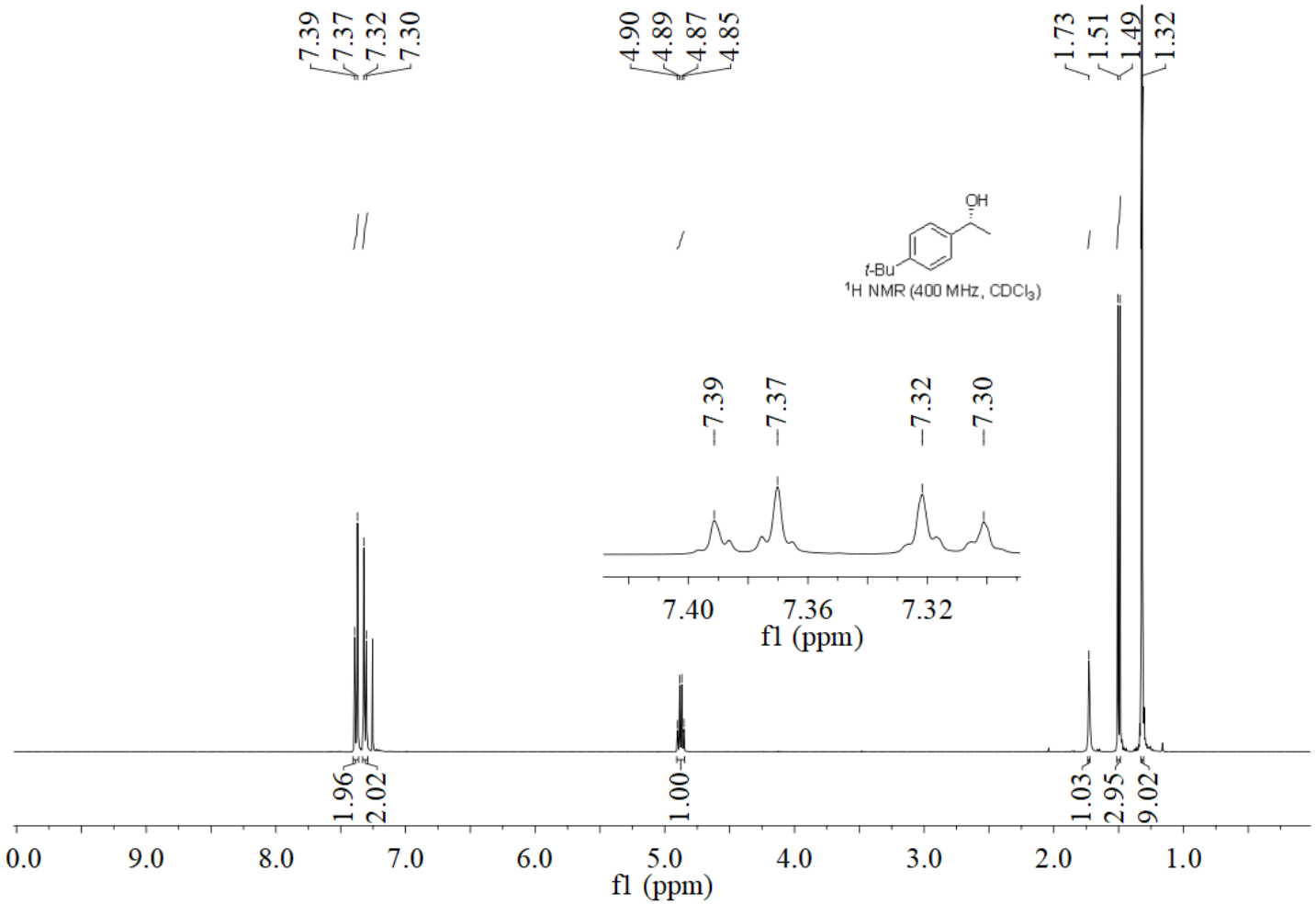

145.8
138.2
128.4
128.2
126.1
122.4
77.4
77.1
76.7
70.4
25.1
21.5
OH
13C NMR (101 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

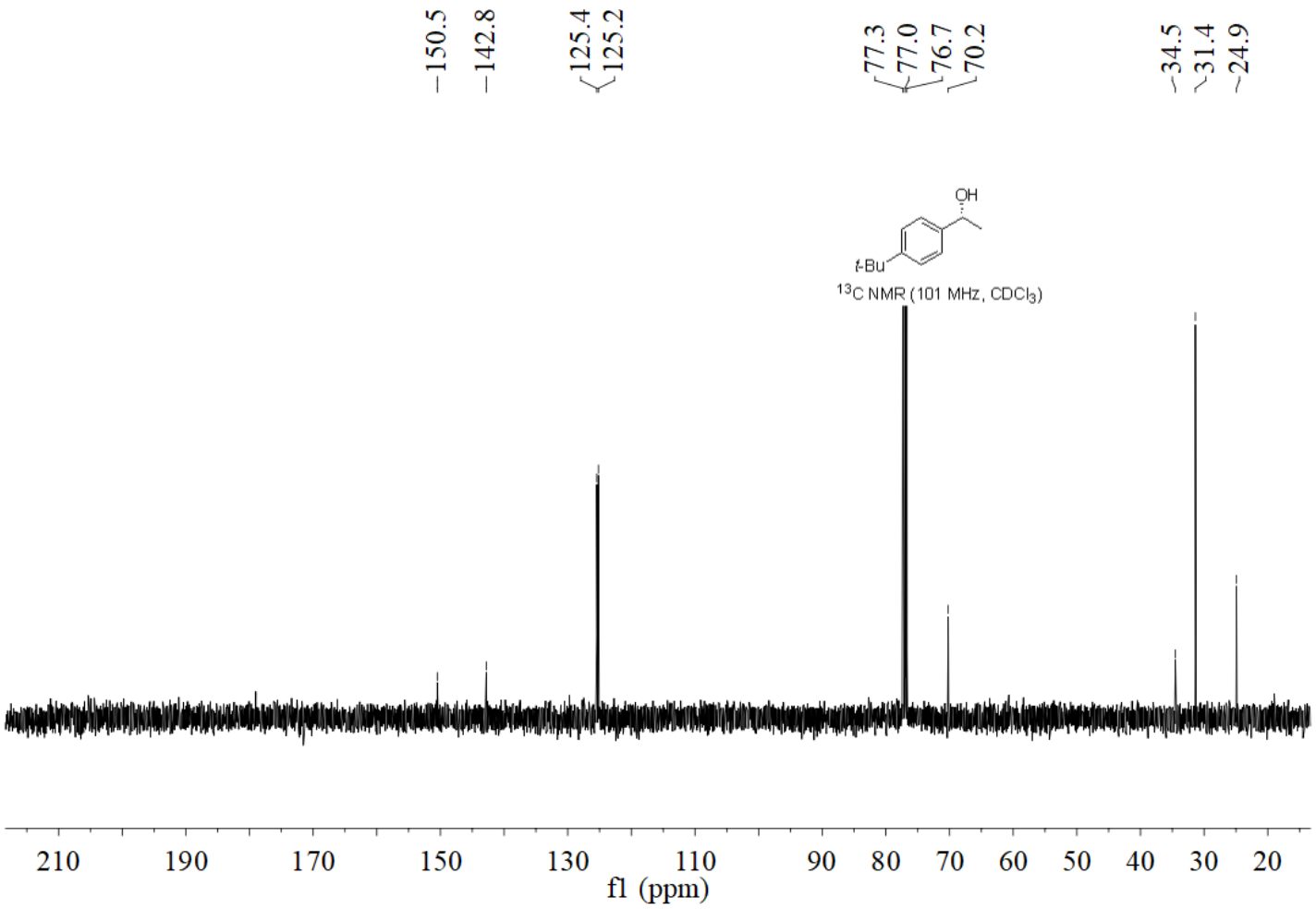
(*R*)-1-(4-isobutylphenyl)ethan-1-ol (7d)



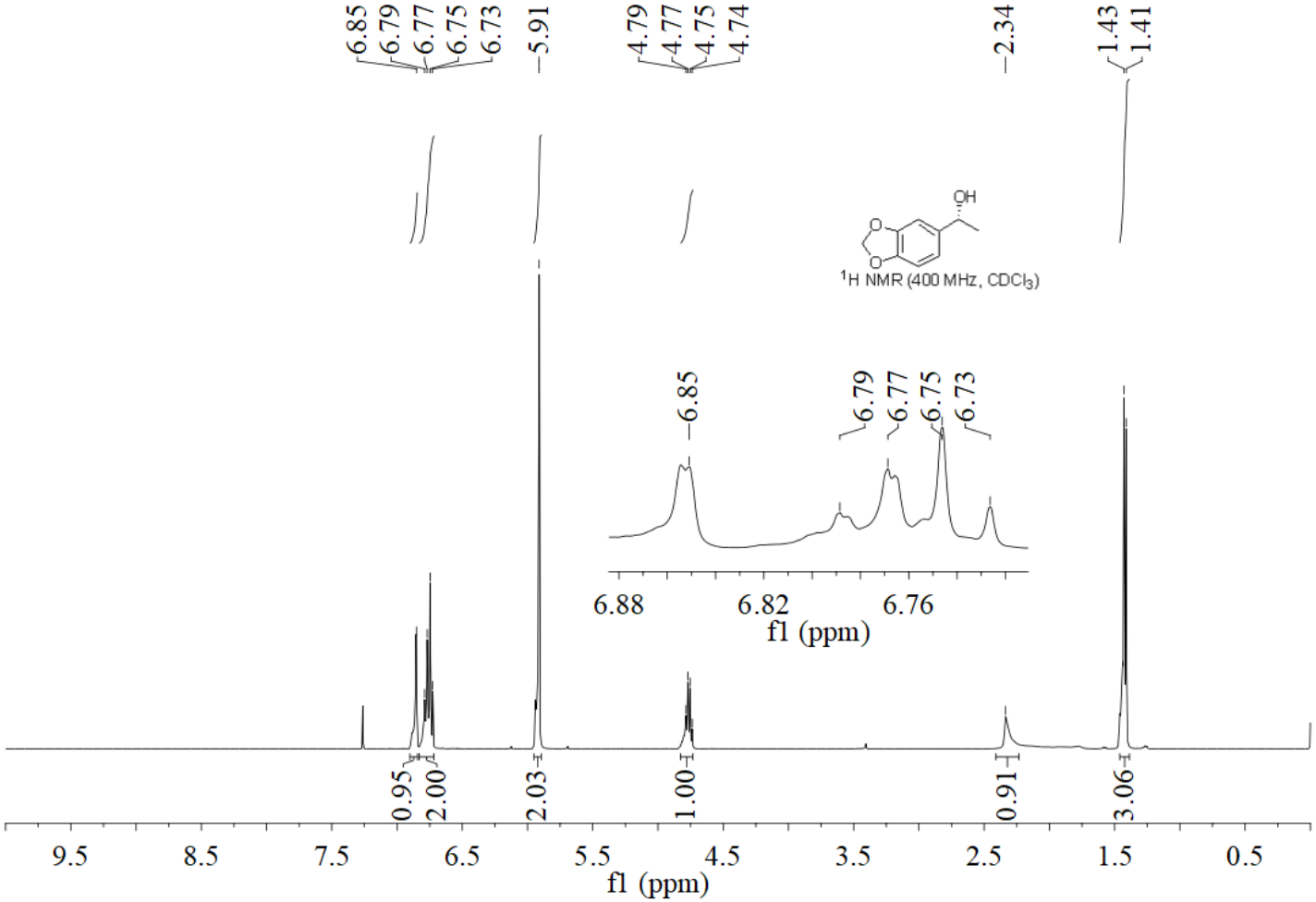

143.1
141.0
129.2
125.2
77.4
77.1
76.7
70.3
45.1
30.2
25.0
22.4
OH
^{13}C NMR (101 MHz, CDCl$_3$)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

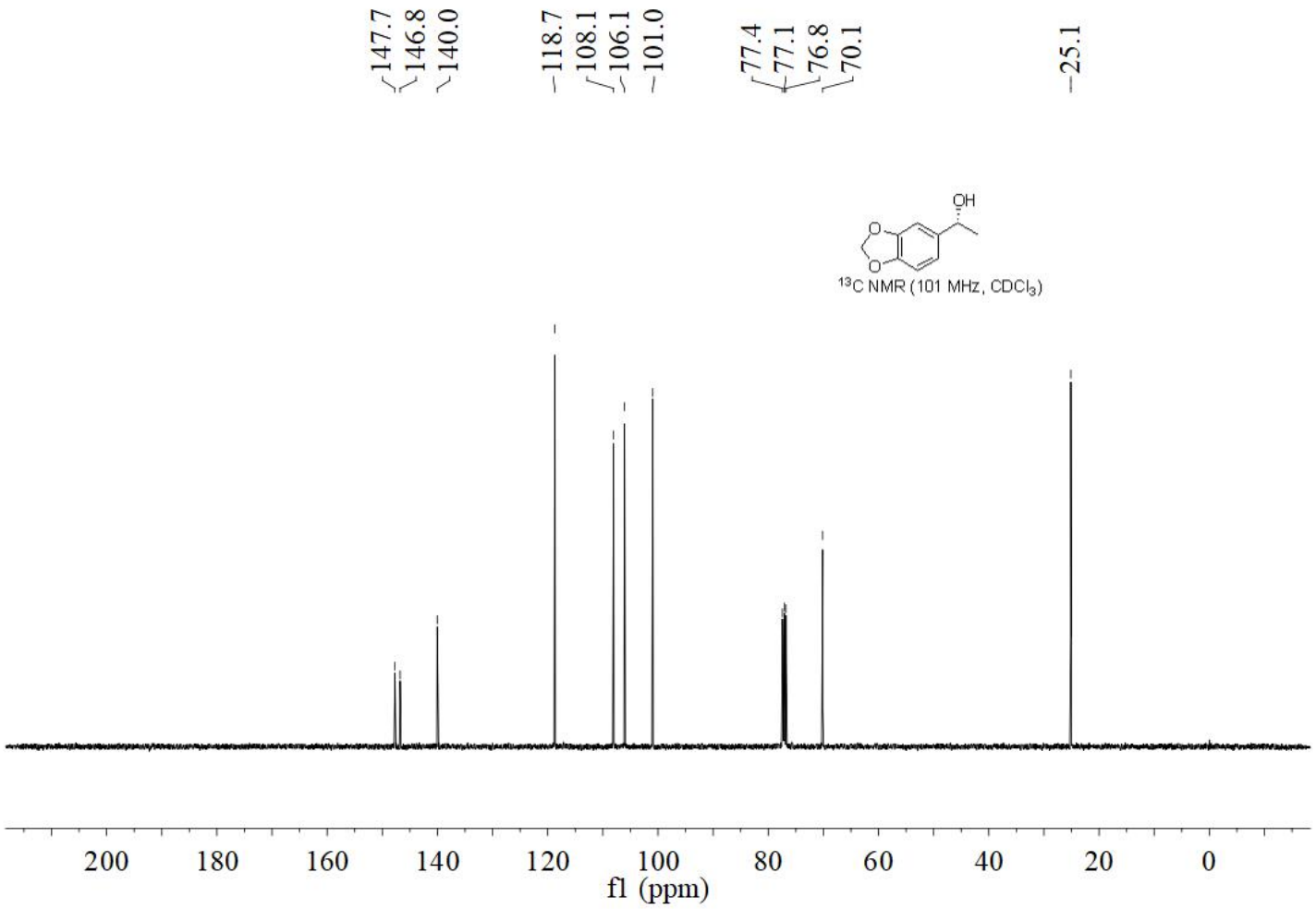
(*R*) -1-(4-(tert-butyl)phenyl)ethan-1-ol (7e)



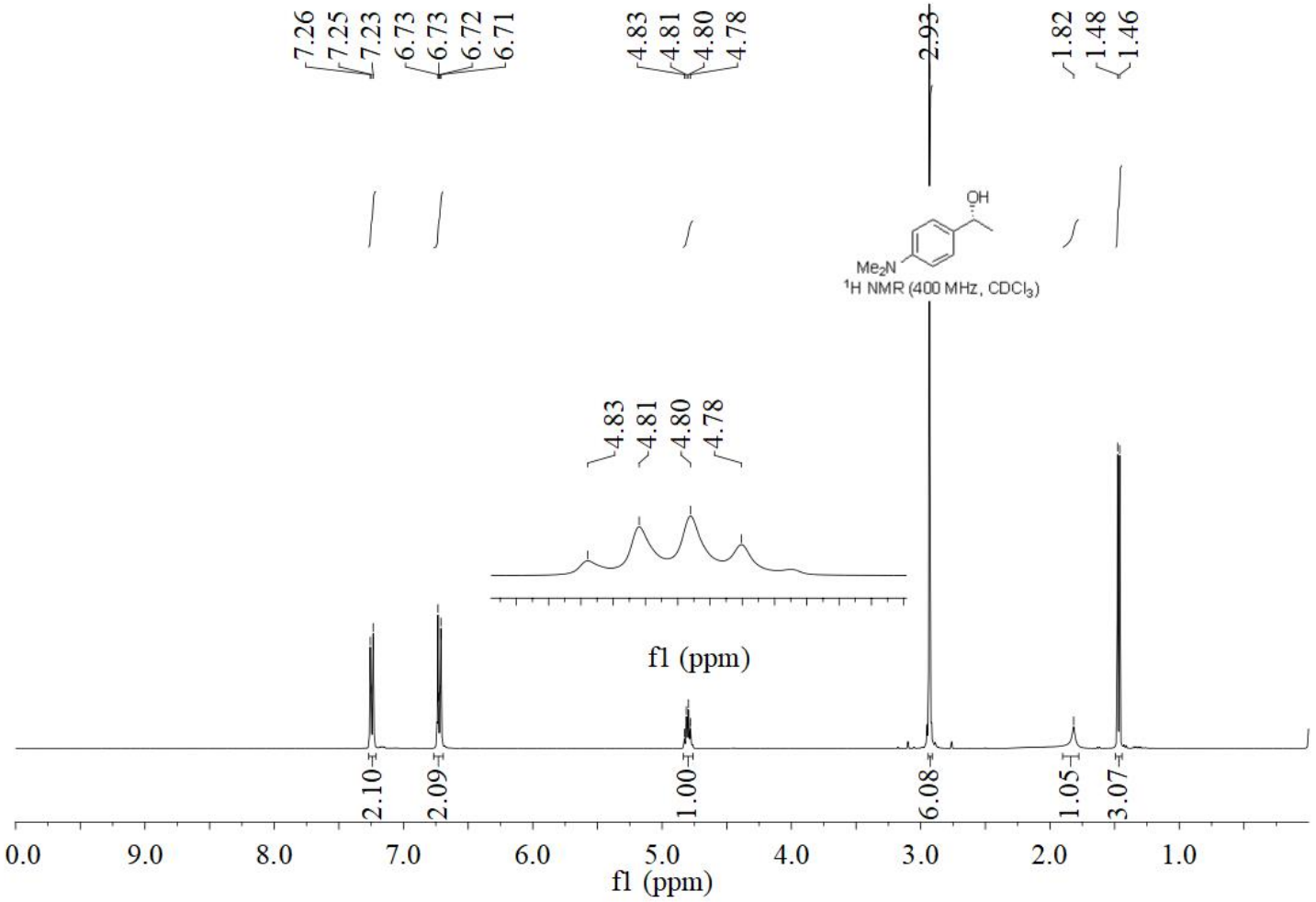

150.5
142.8
125.4
125.2
77.3
77.0
76.7
70.2
34.5
31.4
24.9
OH
t-Bu
13C NMR (101 MHz, CDCl3)
210
190
170
150
130
110
90
80
70
60
50
40
30
20
f1 (ppm)

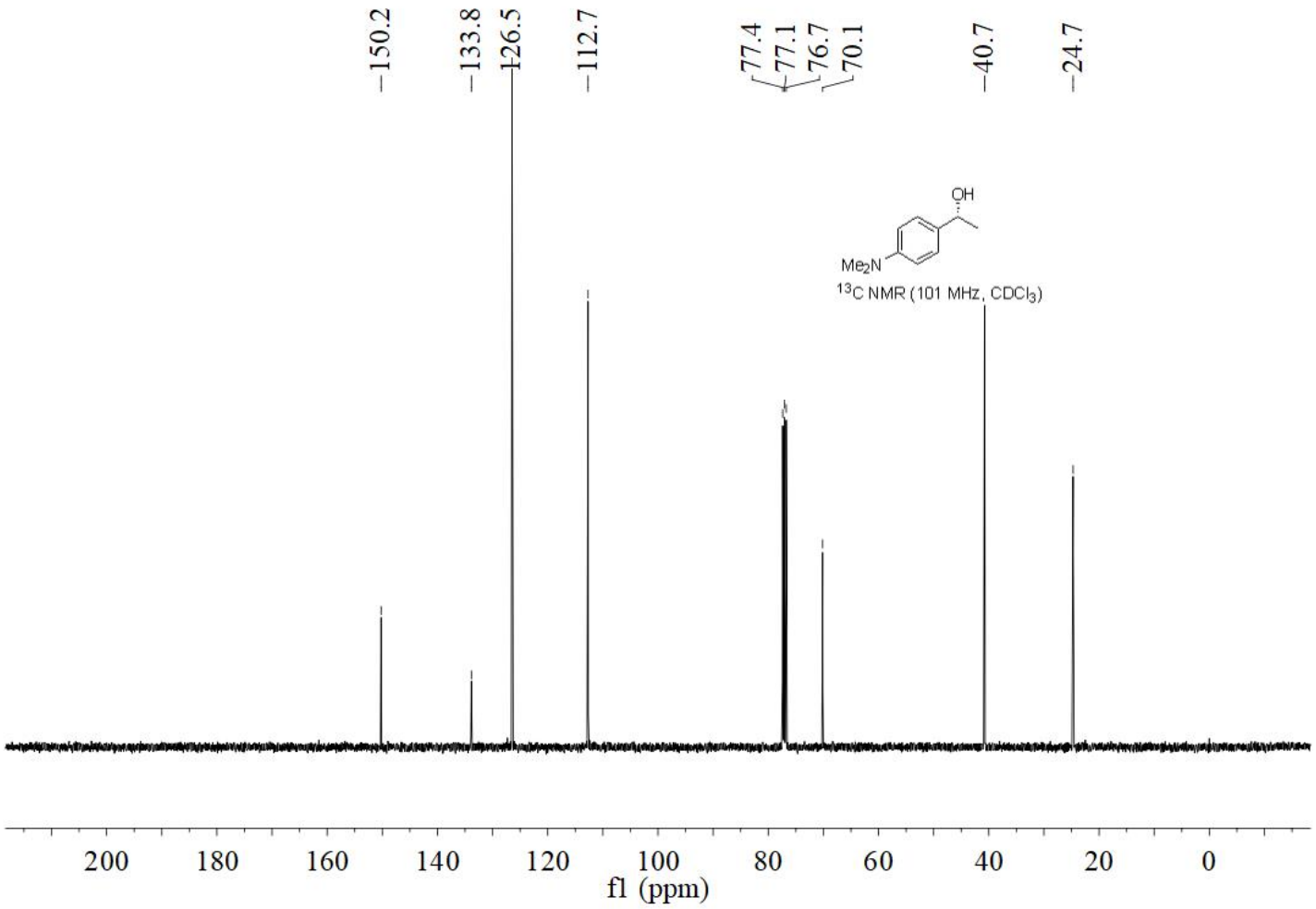
(*R*)-1-(benzo[d][1,3]dioxol-5-yl)ethan-1-ol (7f)



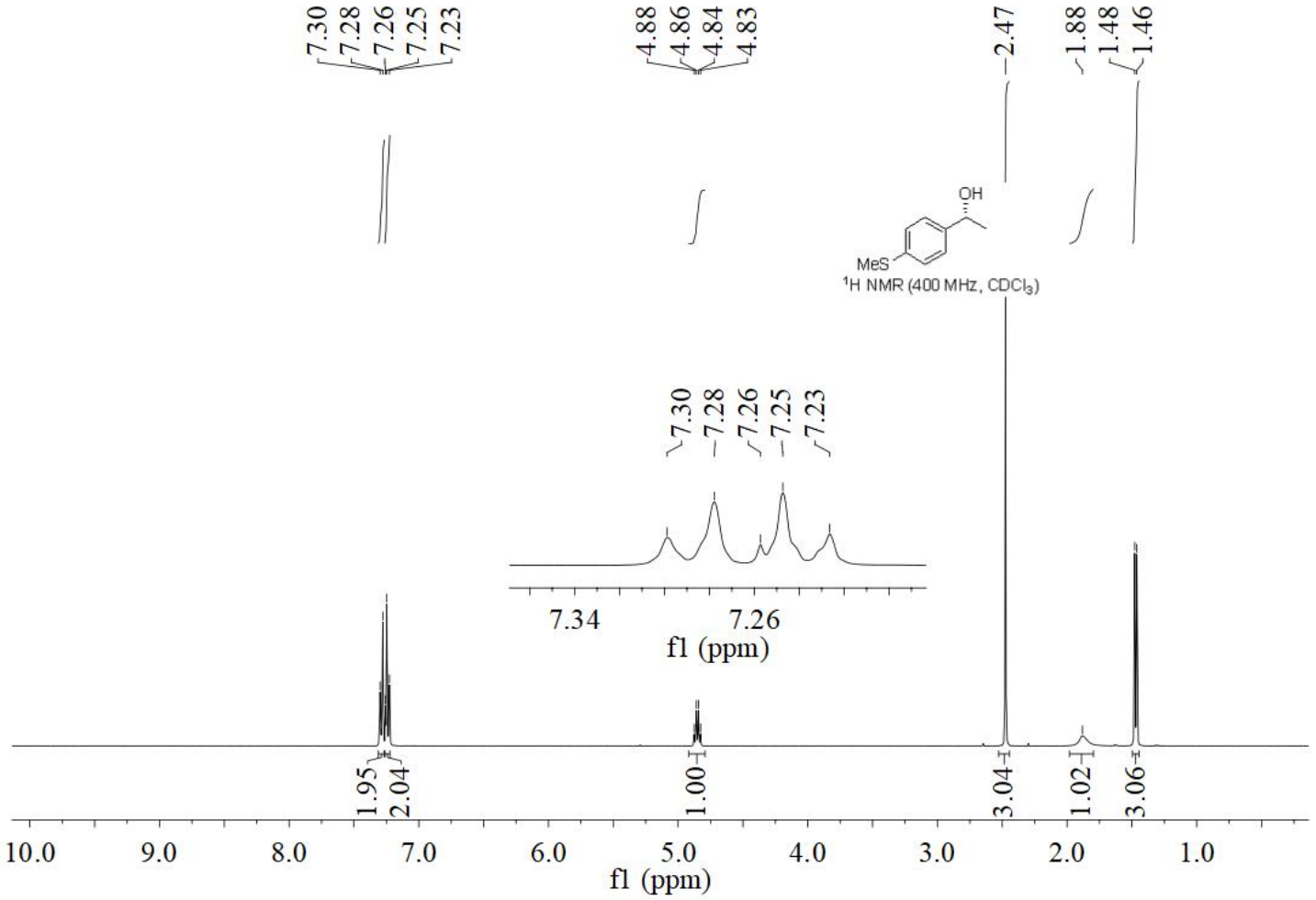

147.7
146.8
140.0
118.7
108.1
106.1
101.0
77.4
77.1
76.8
70.1
25.1
OH
O
O
^{13}C NMR (101 MHz, CDCl$_3$)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

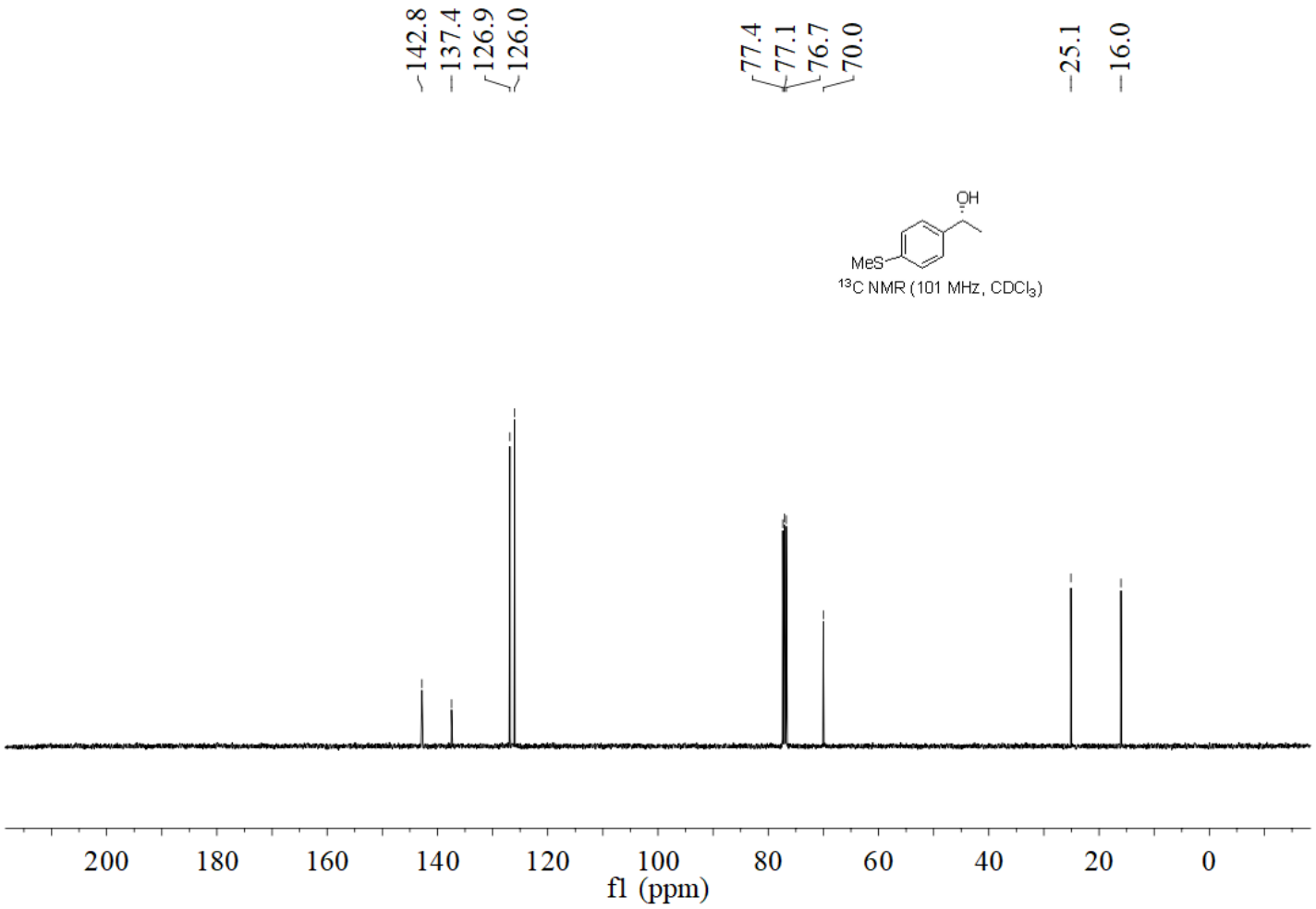
(*R*) -1-(4-(dimethylamino)phenyl)ethan-1-ol (7g)



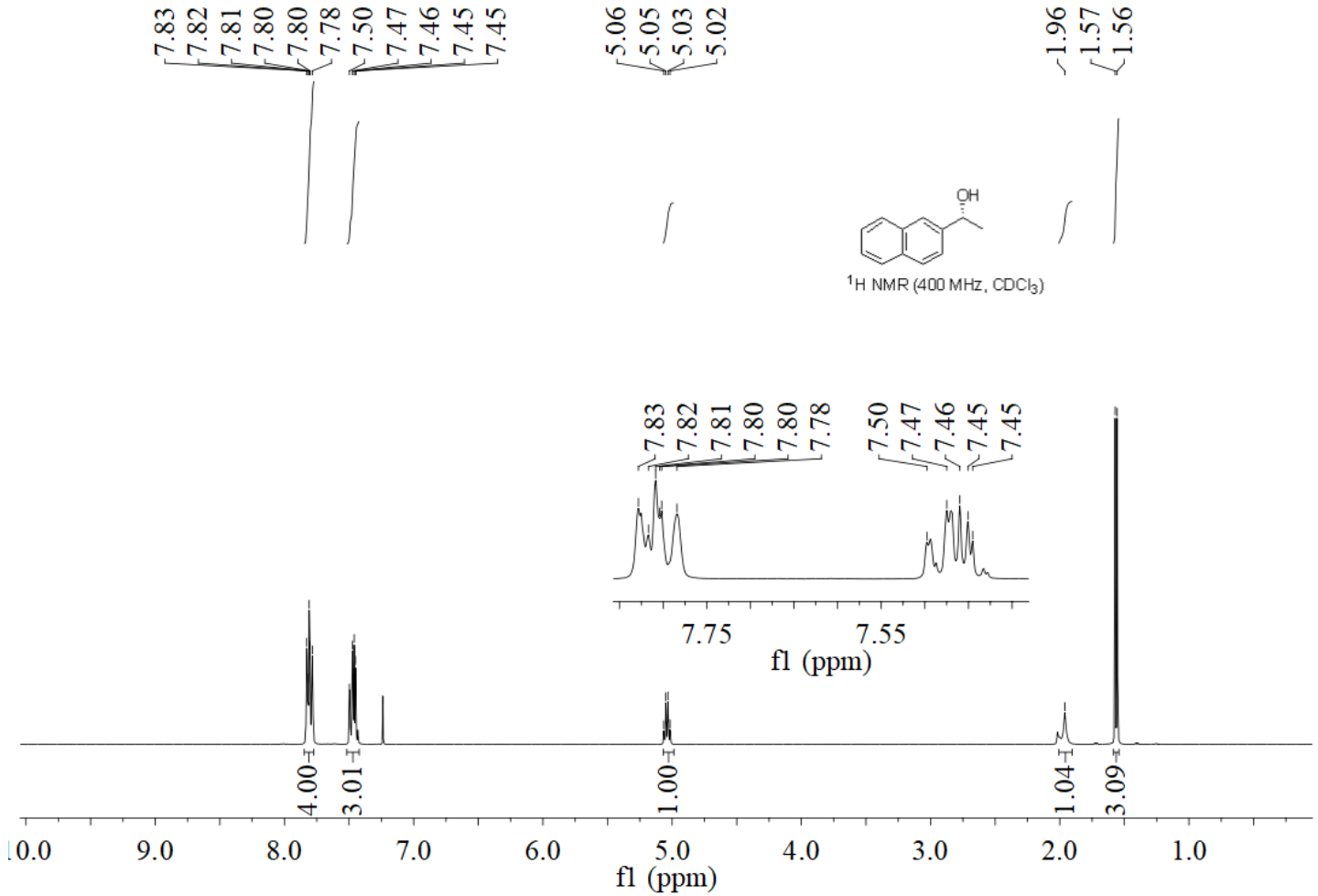

150.2
133.8
126.5
112.7
77.4
77.1
76.7
70.1
40.7
24.7
OH
Me2N
13C NMR (101 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

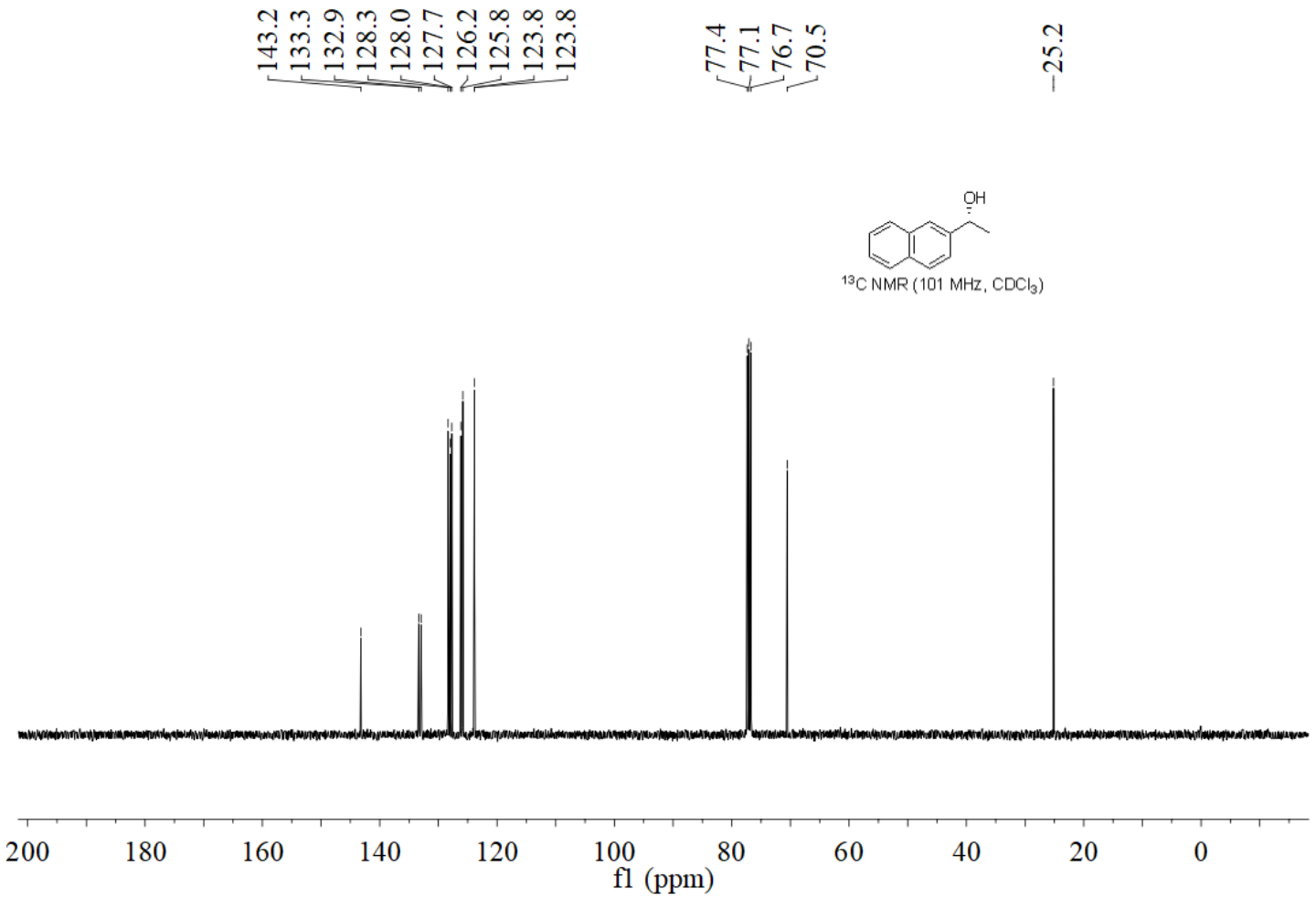
(*R*) -1-(4-(methylthio)phenyl)ethan-1-ol (7h)



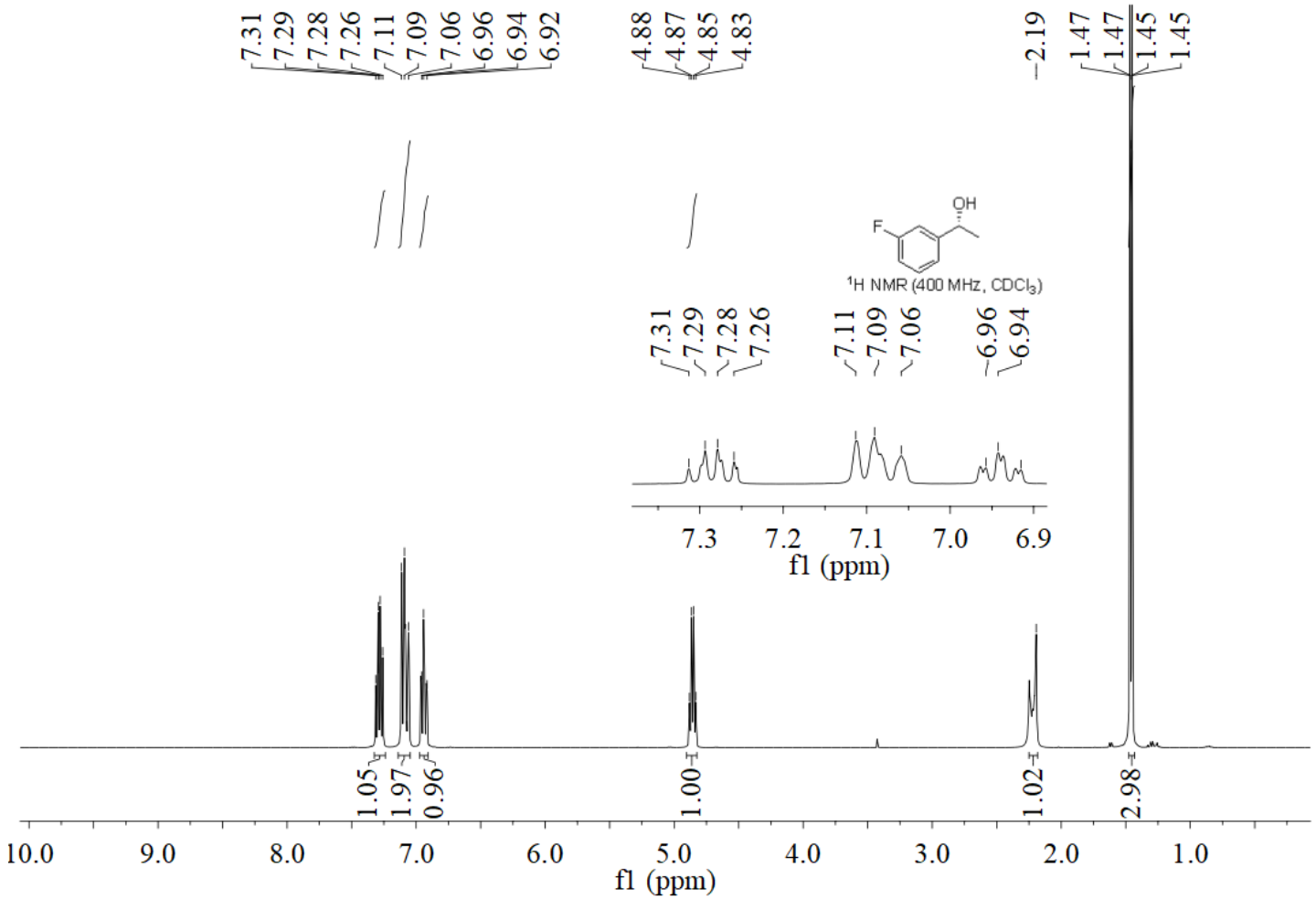

142.8
137.4
126.9
126.0
77.4
77.1
76.7
70.0
25.1
16.0
OH
MeS
13C NMR (101 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

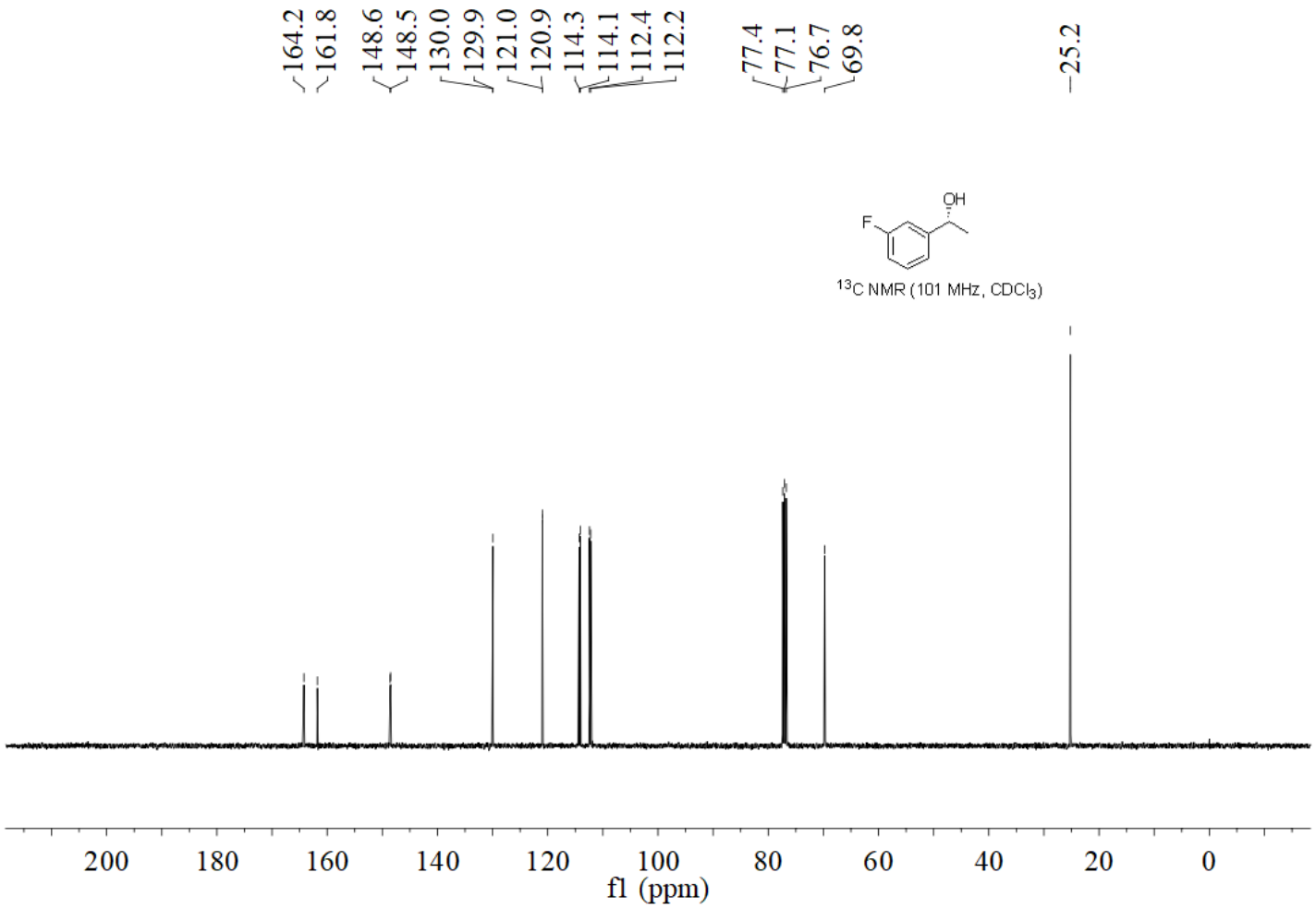
(*R*) -1-(naphthalen-2-yl)ethan-1-ol (7i)



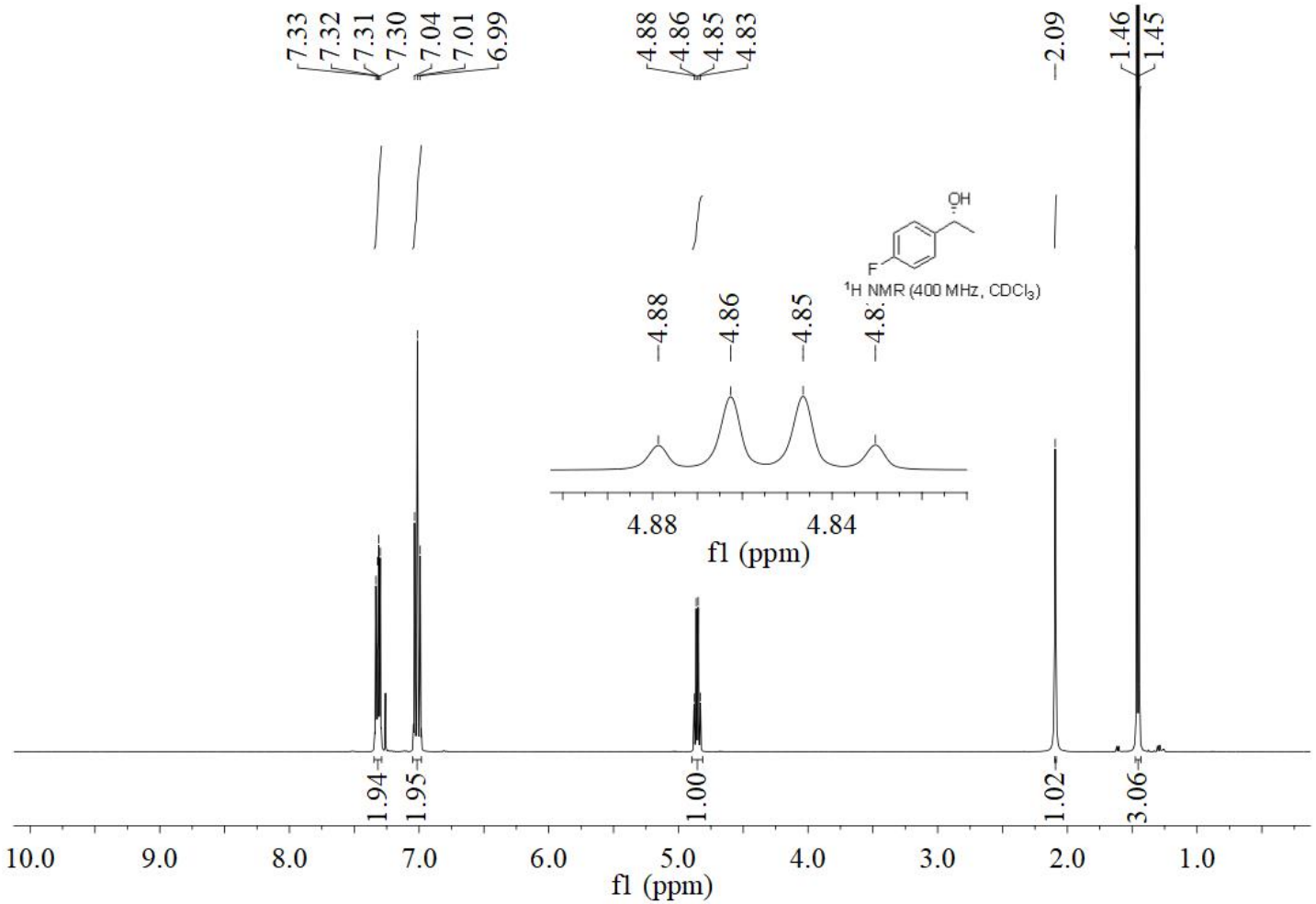

143.2
133.3
132.9
128.3
128.0
127.7
126.2
125.8
123.8
123.8
77.4
77.1
76.7
70.5
25.2
OH
^{13}C NMR (101 MHz, $CDCl_3$)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

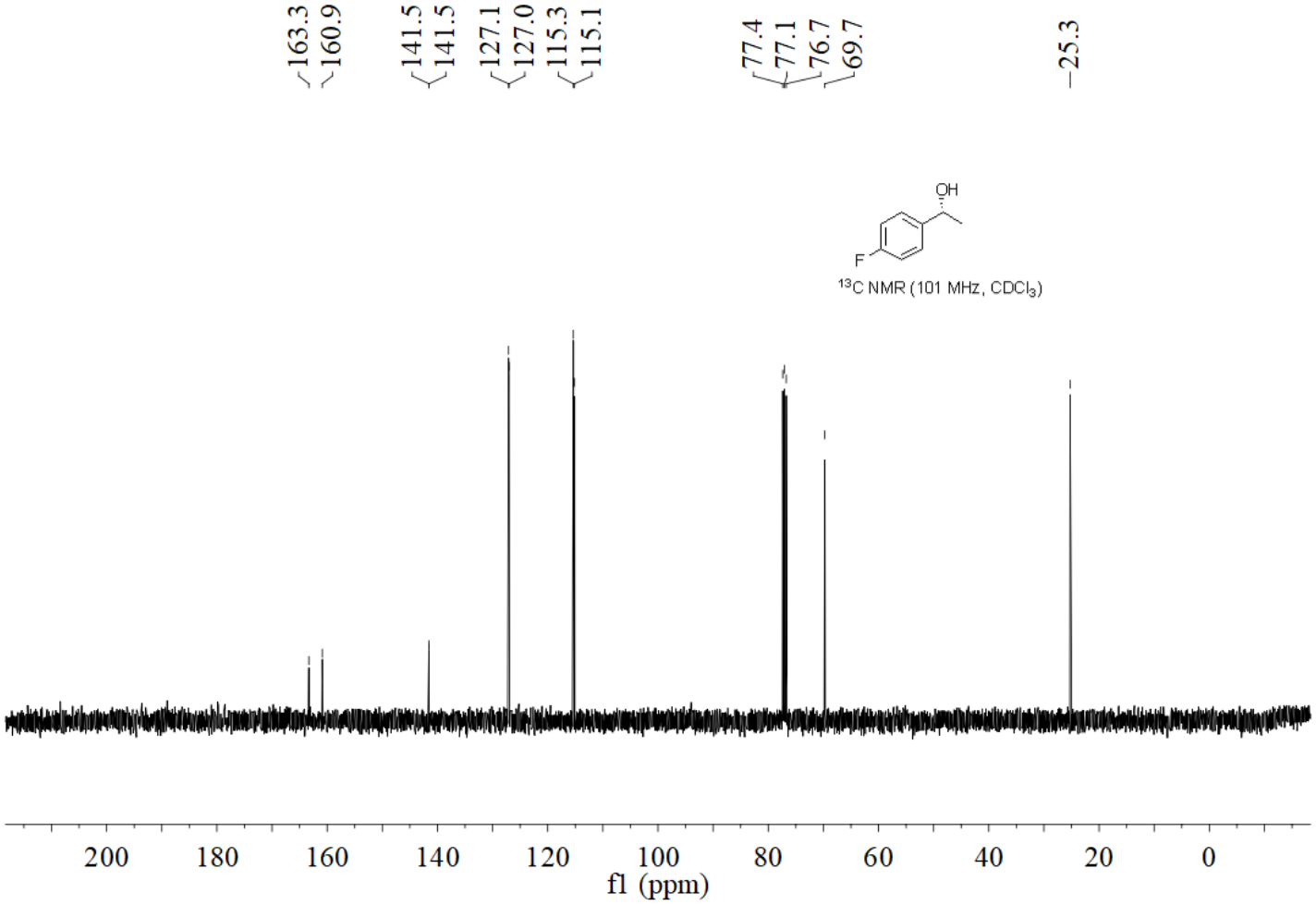
(*R*)-1-(3-fluorophenyl)ethan-1-ol (7j)

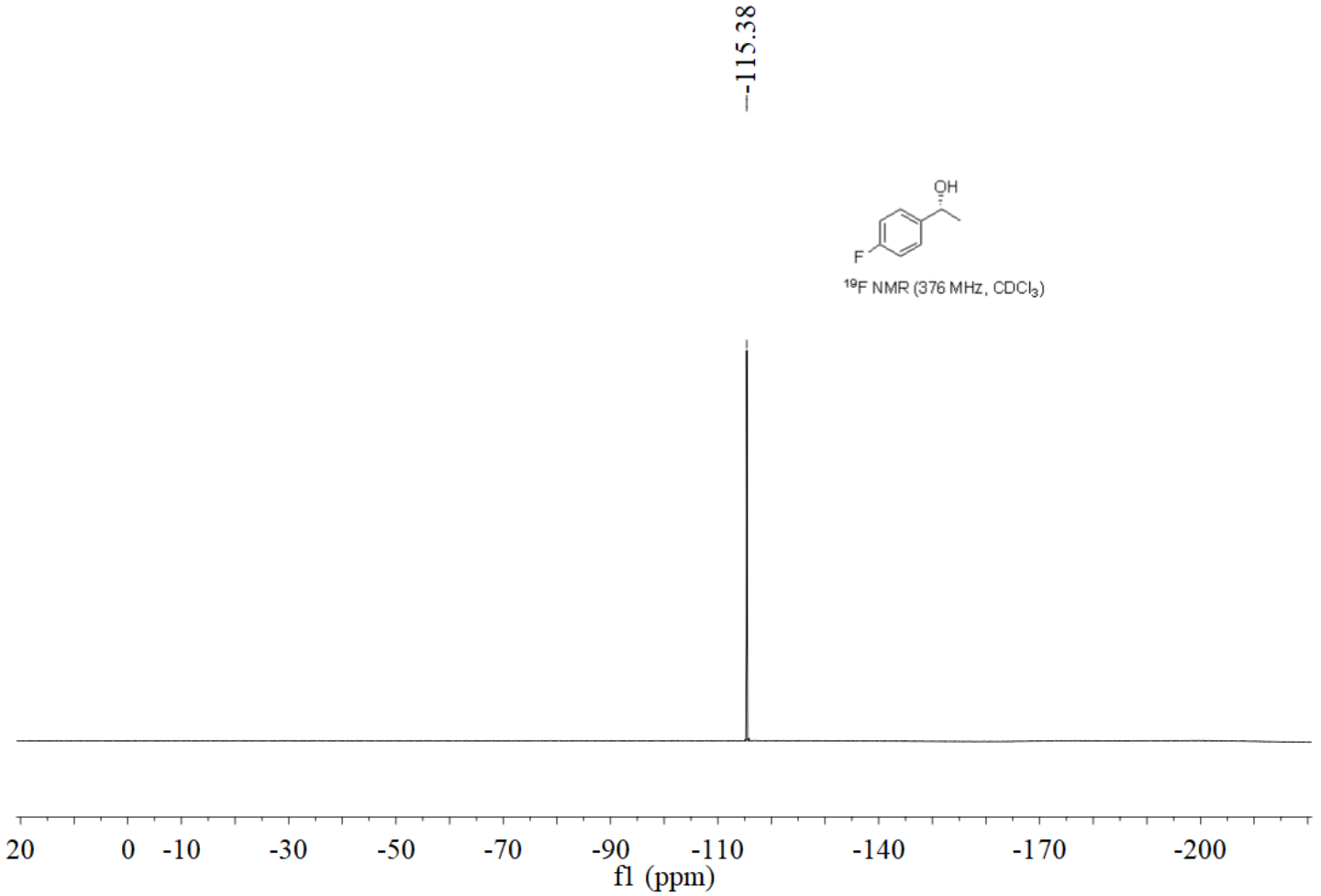



164.2
161.8
148.6
148.5
130.0
129.9
121.0
120.9
114.3
114.1
112.4
112.2
77.4
77.1
76.7
69.8
25.2
OH
F
^{13}C NMR (101 MHz, CDCl$_3$)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

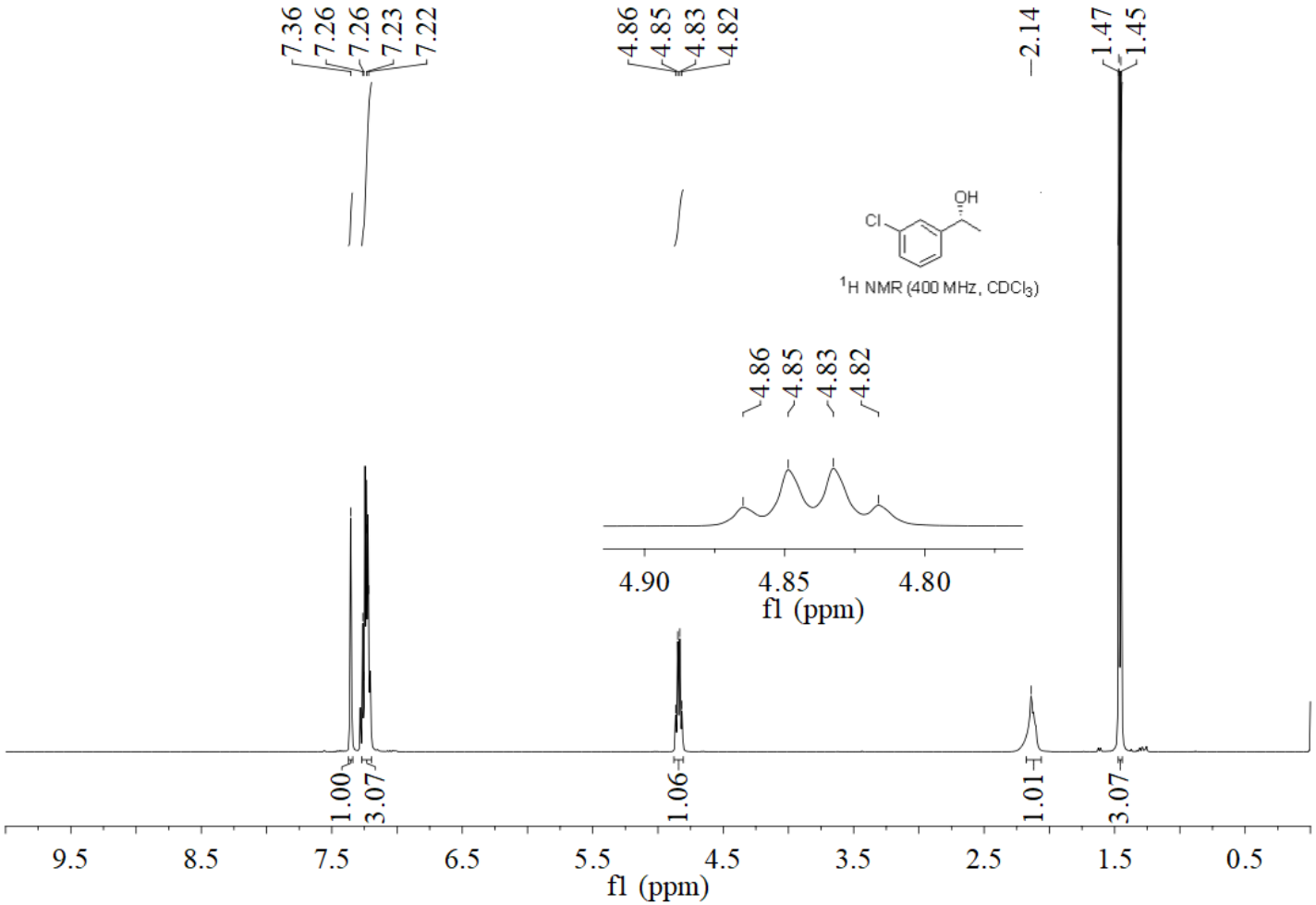
(*R*)-1-(4-fluorophenyl)ethan-1-ol (7k)

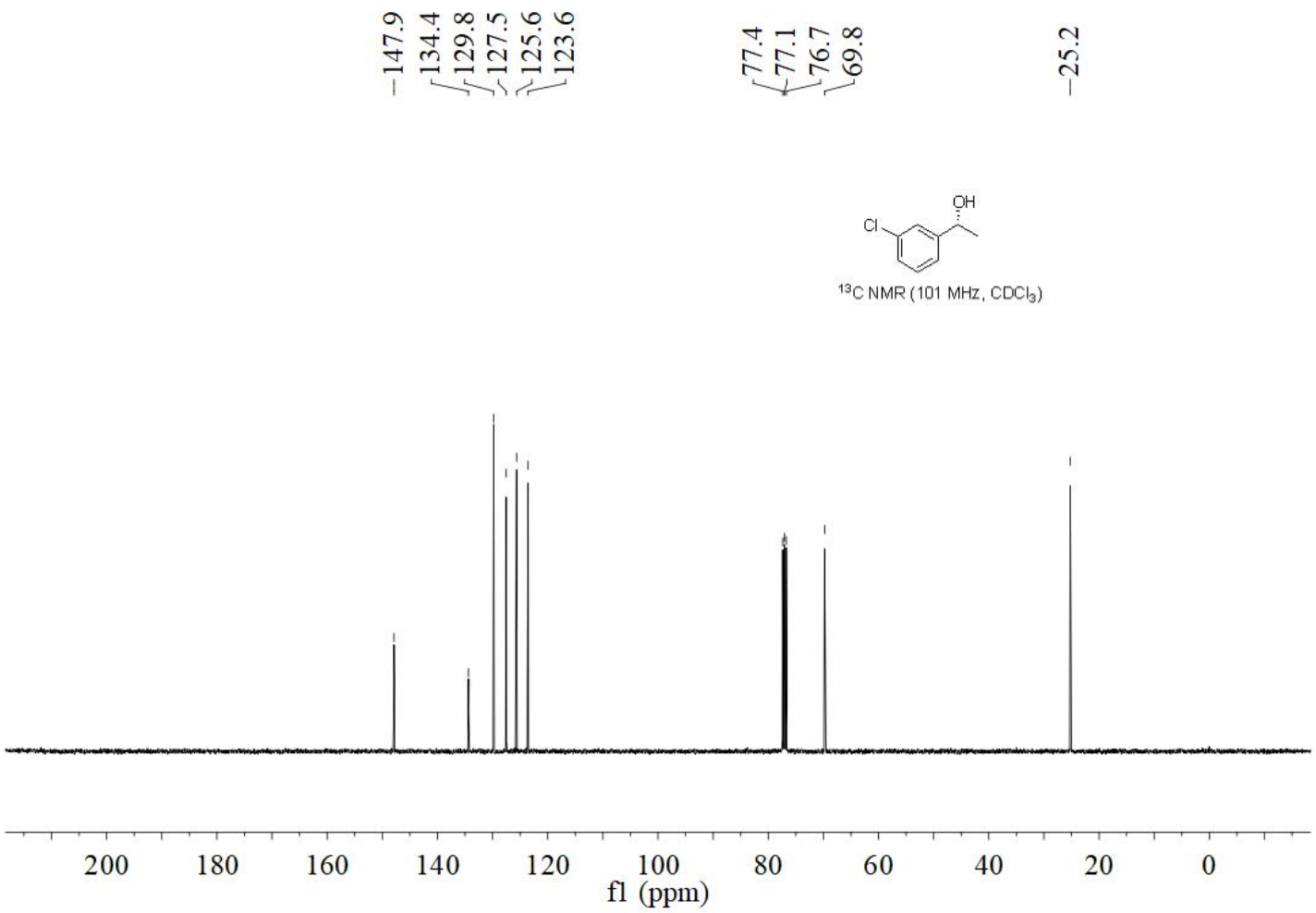



163.3
160.9
141.5
141.5
127.1
127.0
115.3
115.1
77.4
77.1
76.7
69.7
25.3
OH
F
^{13}C NMR (101 MHz, CDCl$_3$)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

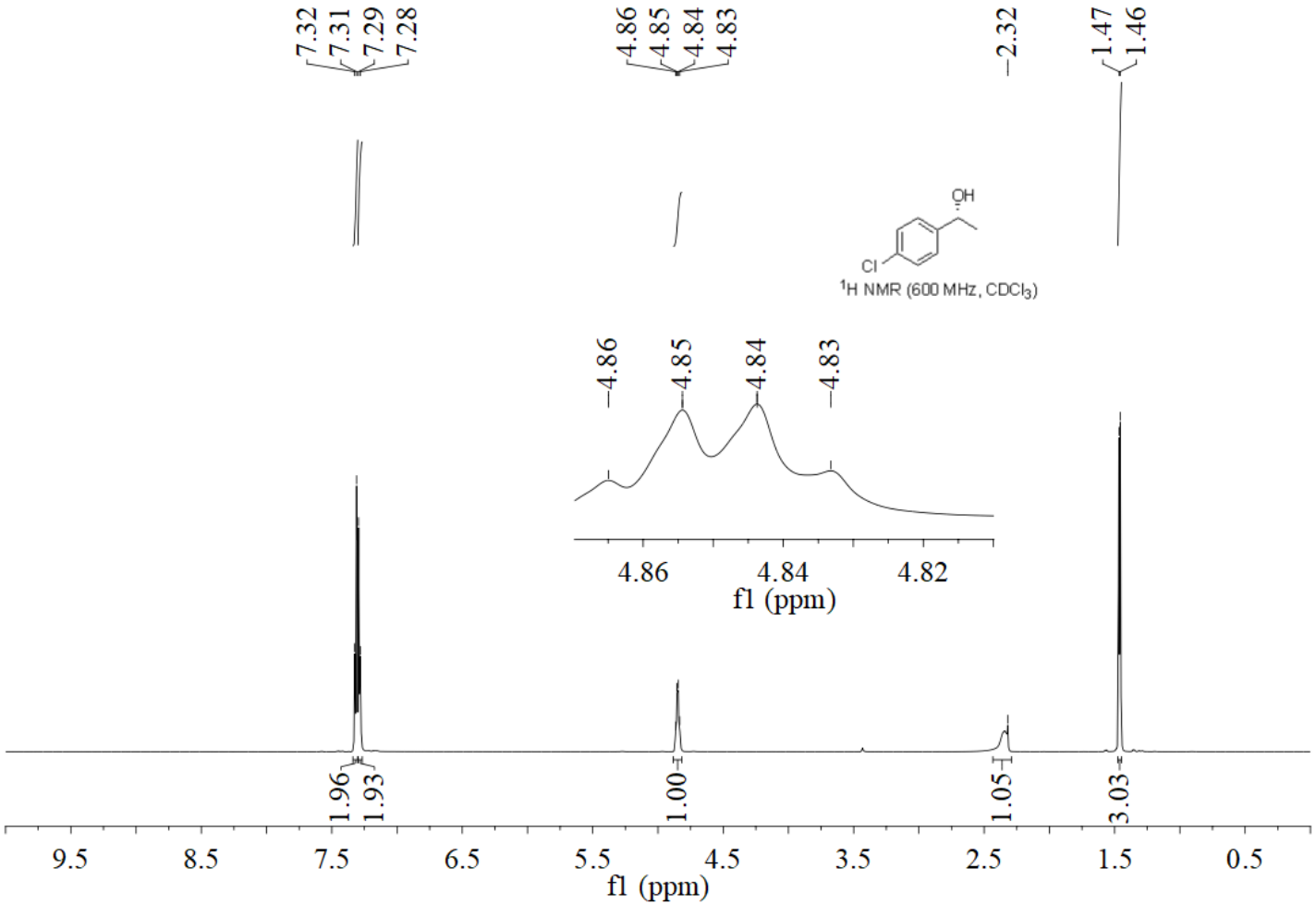

-115.38
OH
F
^{19}F NMR (376 MHz, $CDCl_3$)
20
0
-10
-30
-50
-70
-90
-110
-140
-170
-200
f1 (ppm)

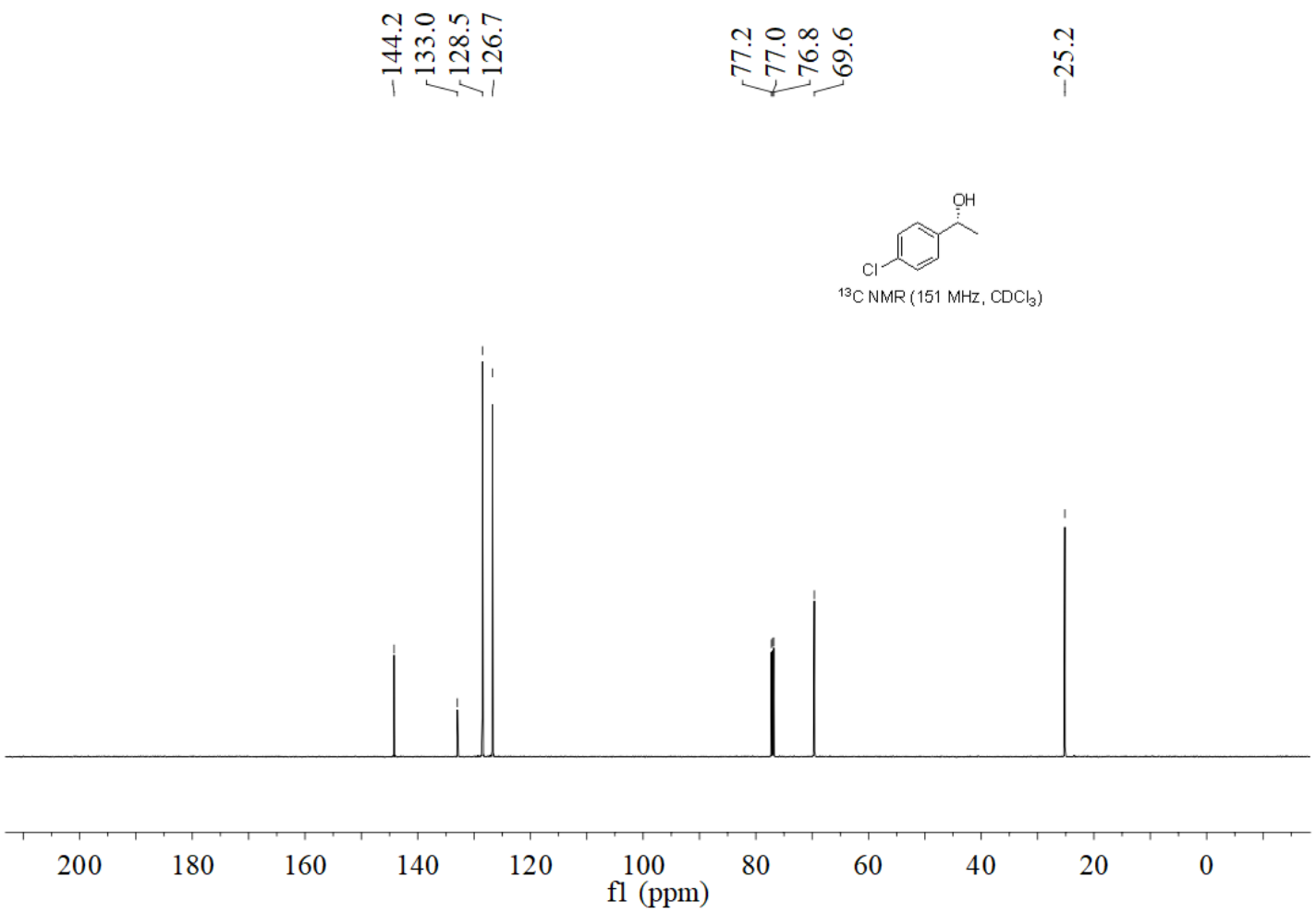
(*R*)-1-(3-chlorophenyl)ethan-1-ol (7l)



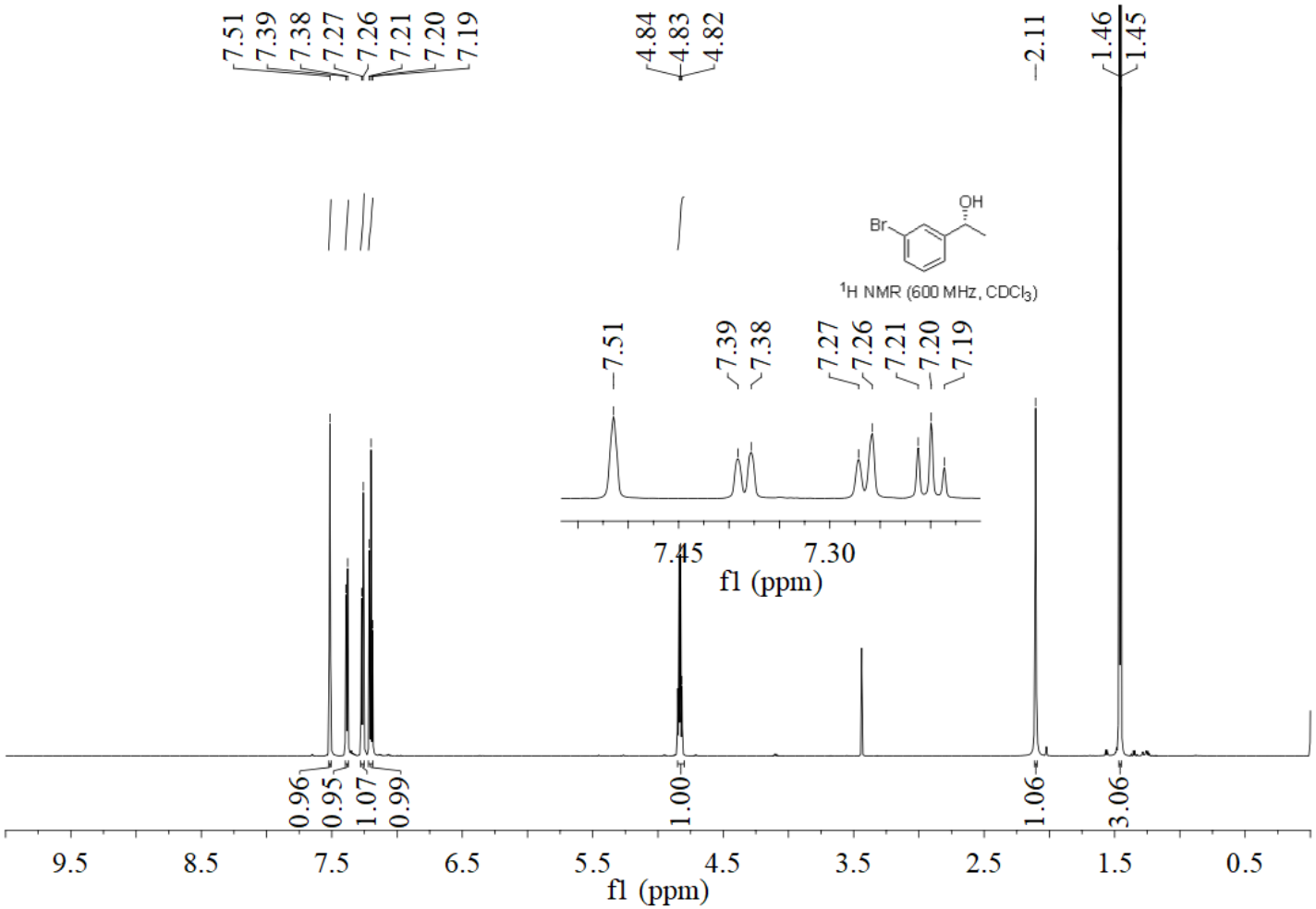

147.9
134.4
129.8
127.5
125.6
123.6
77.4
77.1
76.7
69.8
25.2
OH
Cl
13C NMR (101 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

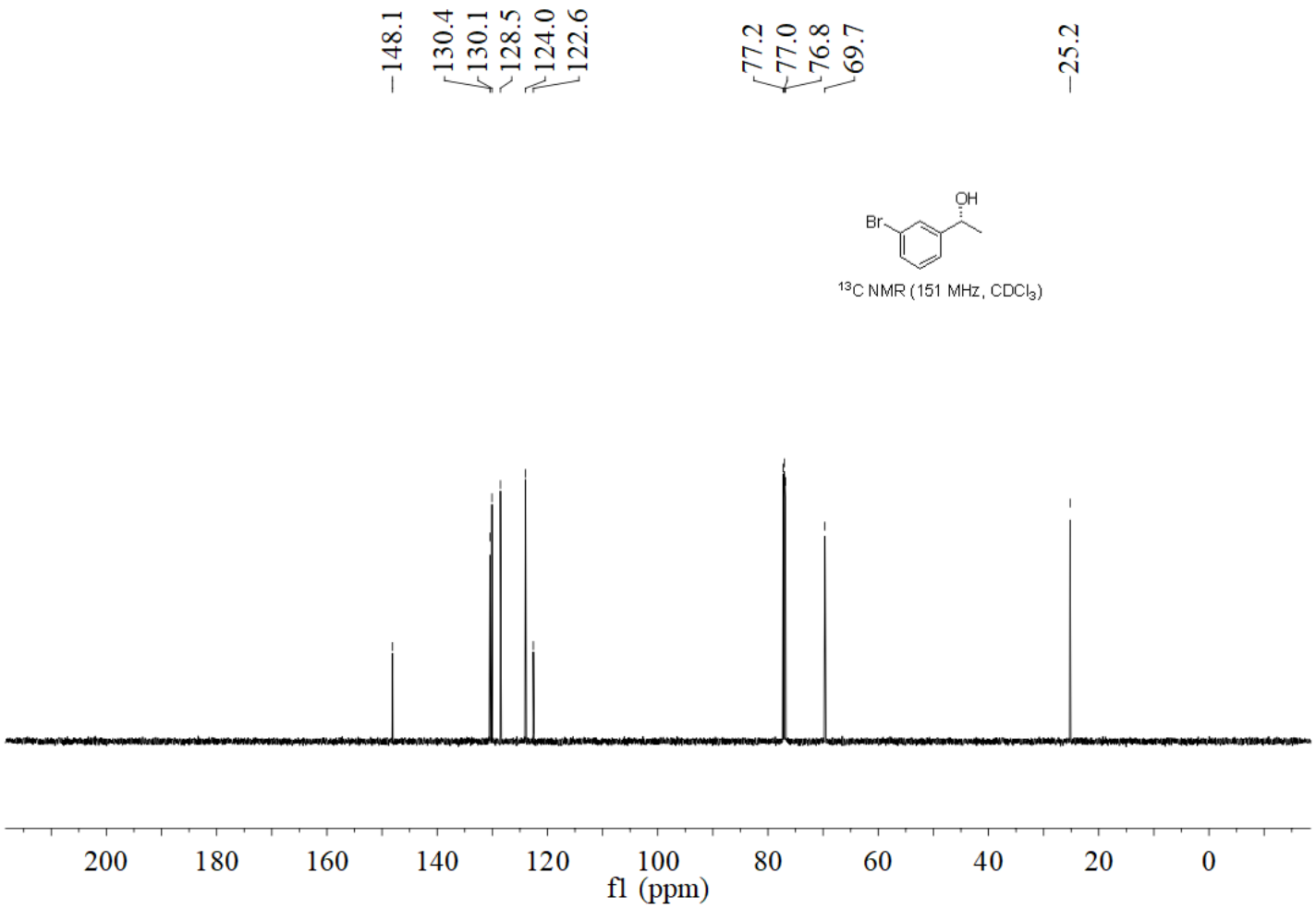
(*R*) -1-(4-chlorophenyl)ethan-1-ol (7m)



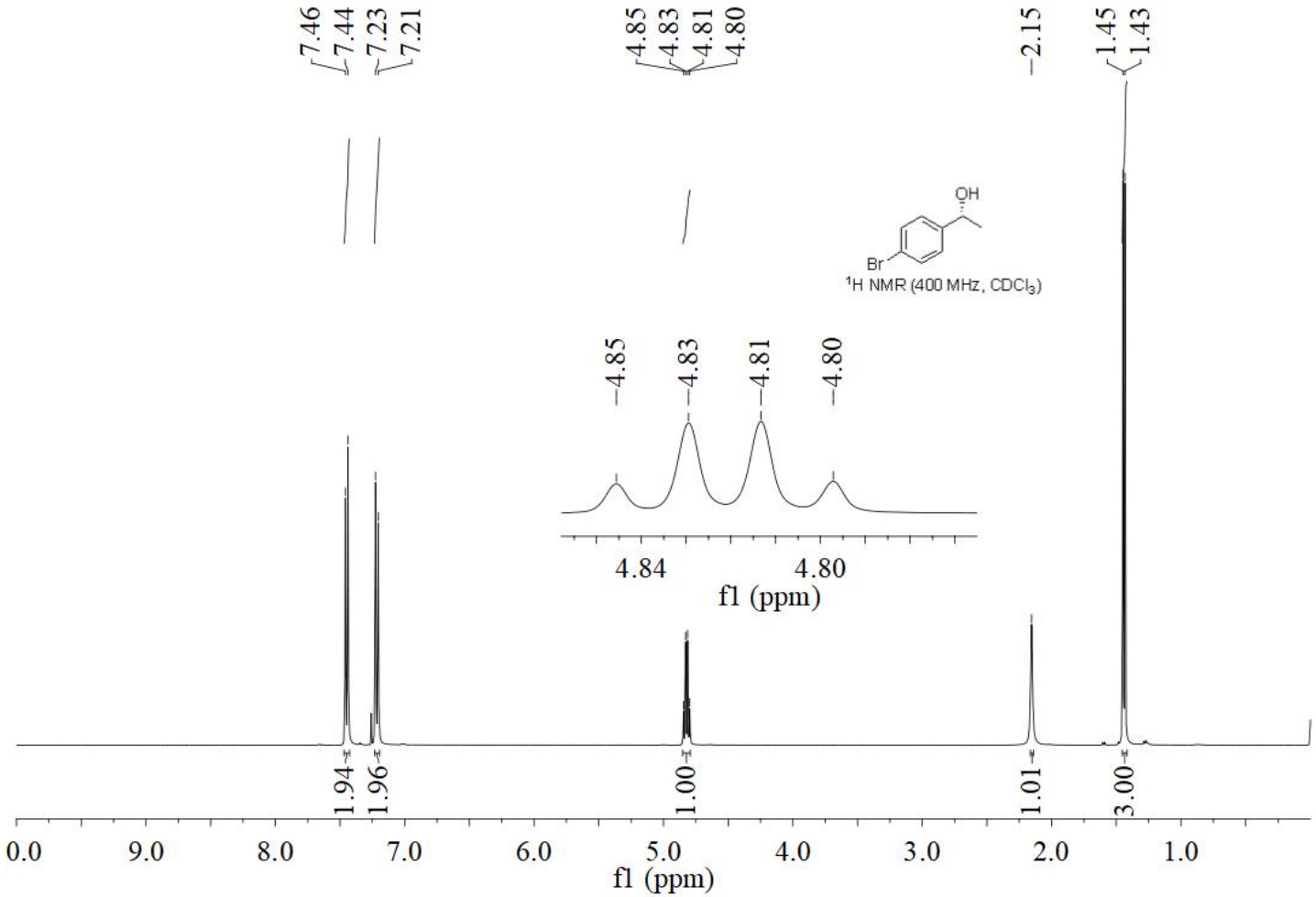

144.2
133.0
128.5
126.7
77.2
77.0
76.8
69.6
25.2
OH
Cl
13C NMR (151 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

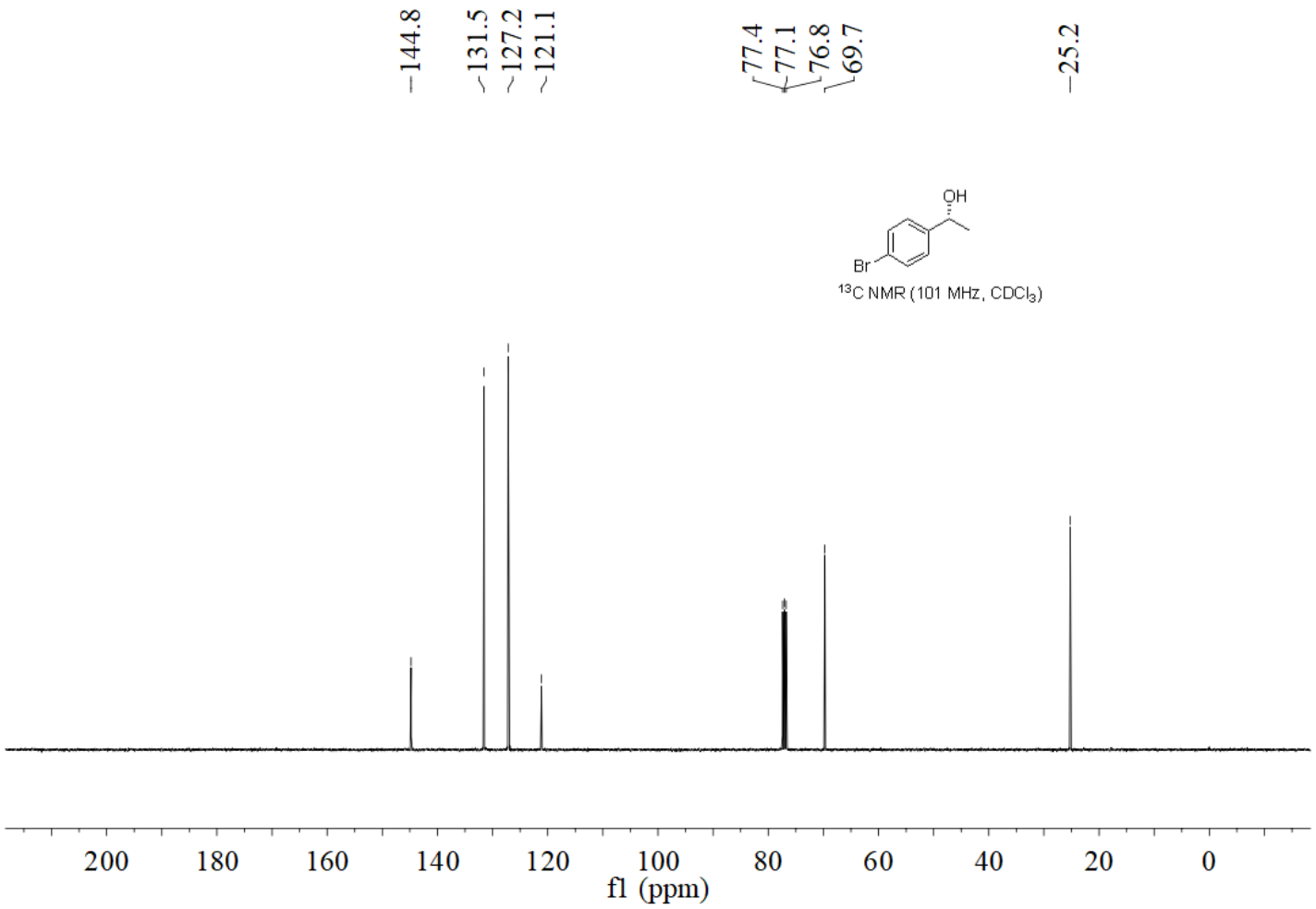
(*R*)-1-(3-bromophenyl)ethan-1-ol (7n)



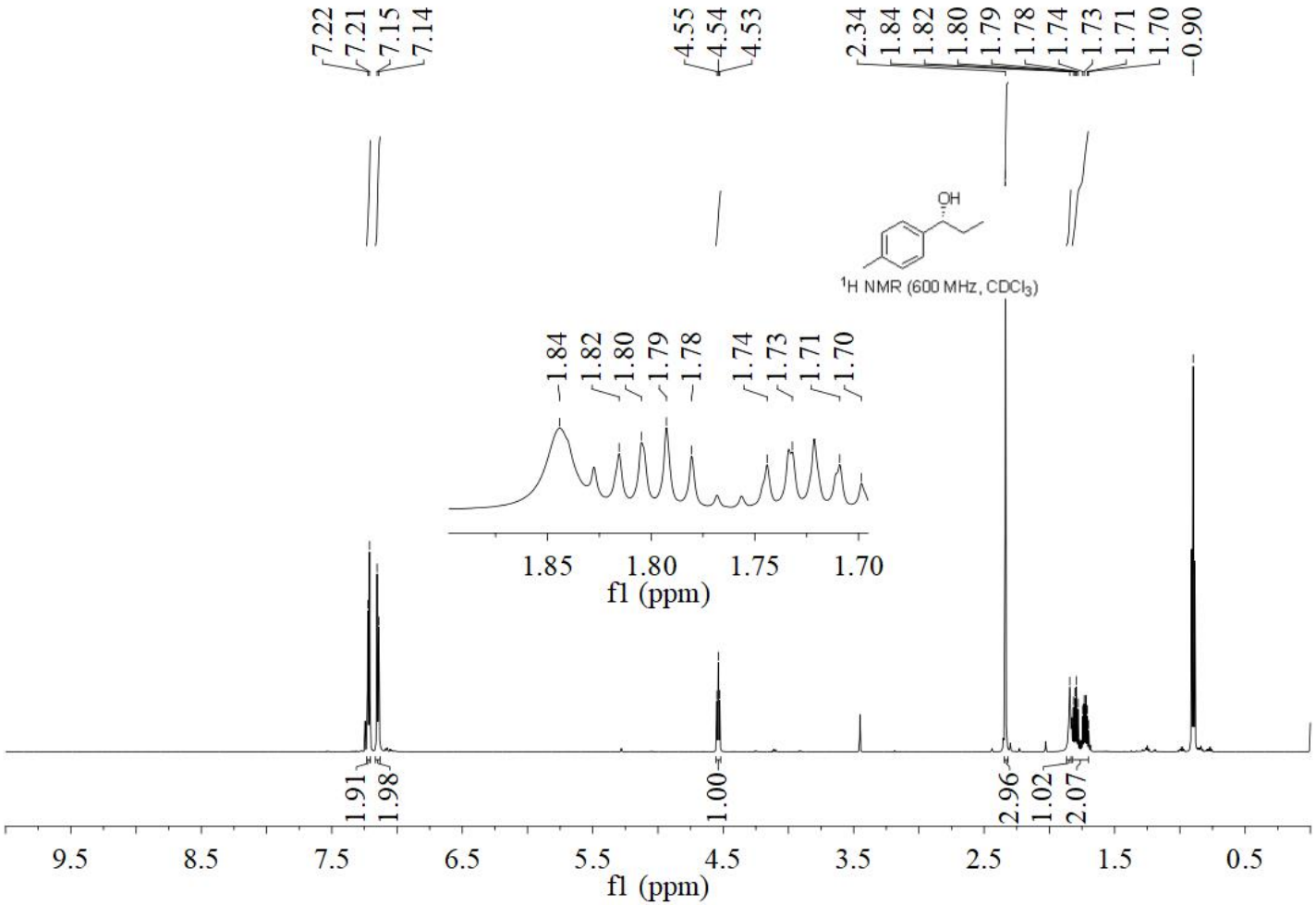

148.1
130.4
130.1
128.5
124.0
122.6
77.2
77.0
76.8
69.7
25.2
OH
Br
13C NMR (151 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

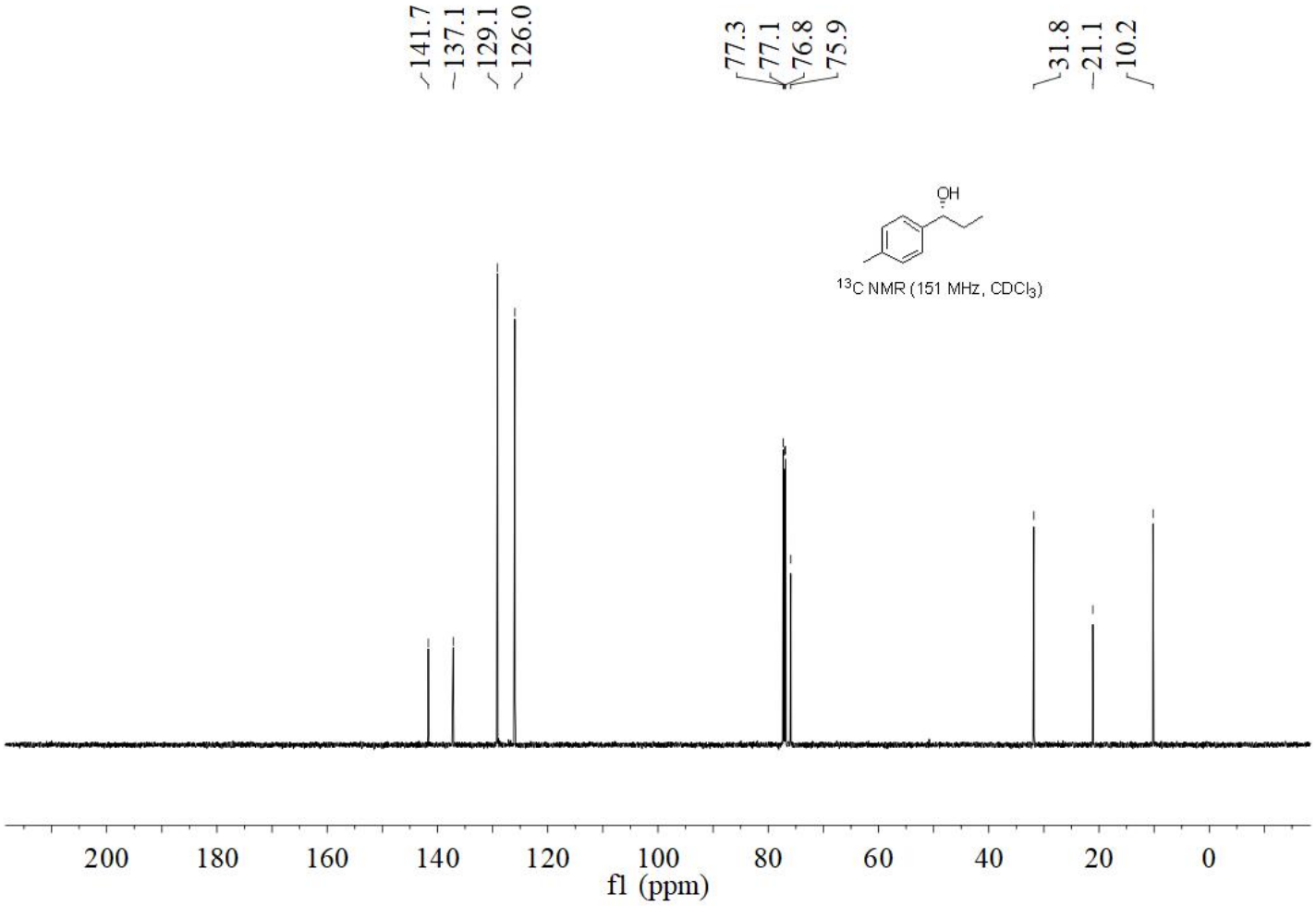
(*R*) -1-(4-bromophenyl)ethan-1-ol (7o)



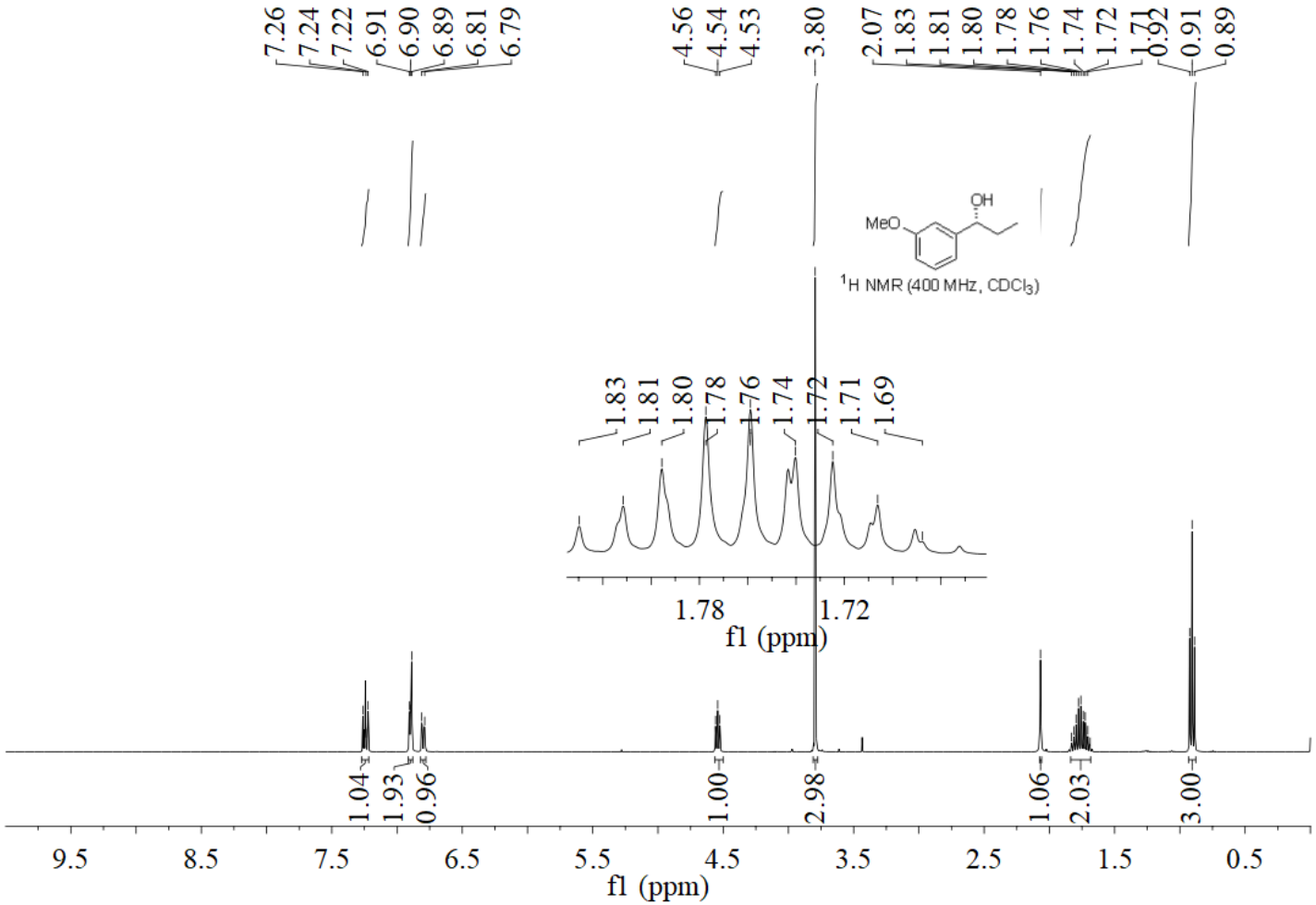

144.8
131.5
127.2
121.1
77.4
77.1
76.8
69.7
25.2
OH
Br
^{13}C NMR (101 MHz, CDCl$_3$)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

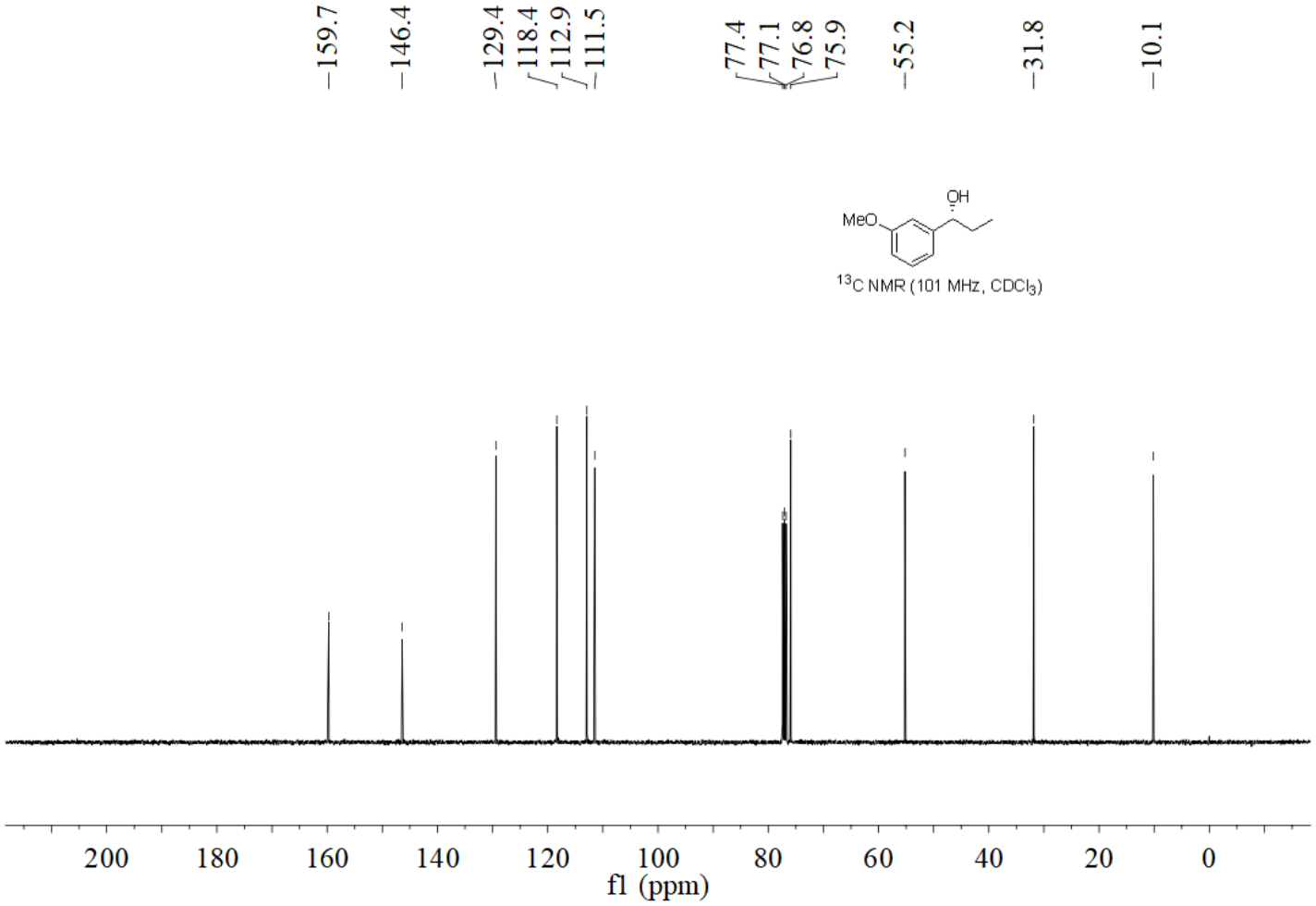
(*R*)-1-(p-tolyl)propan-1-ol (7p)



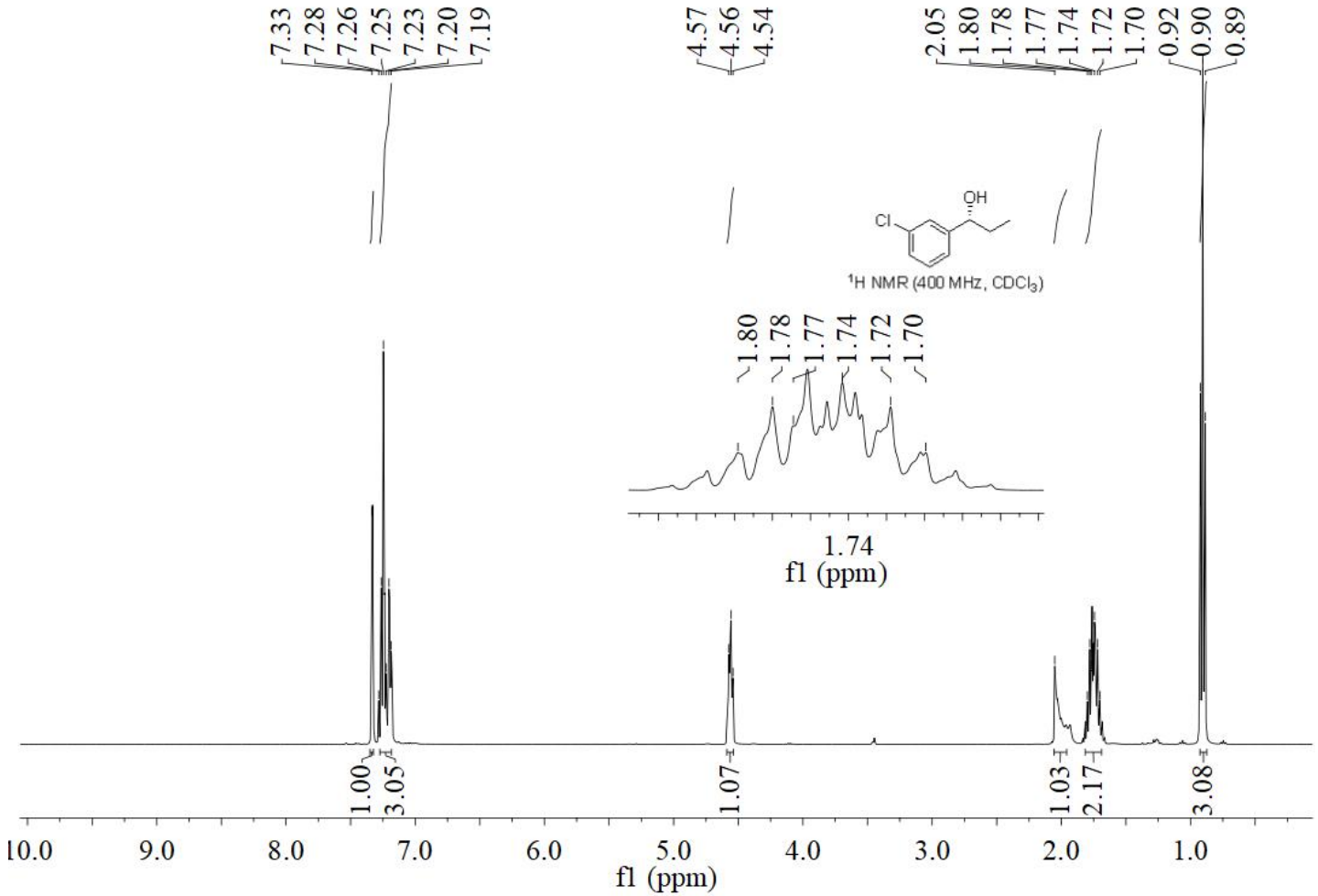

141.7
137.1
129.1
126.0
77.3
77.1
76.8
75.9
31.8
21.1
10.2
OH
^{13}C NMR (151 MHz, CDCl$_3$)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

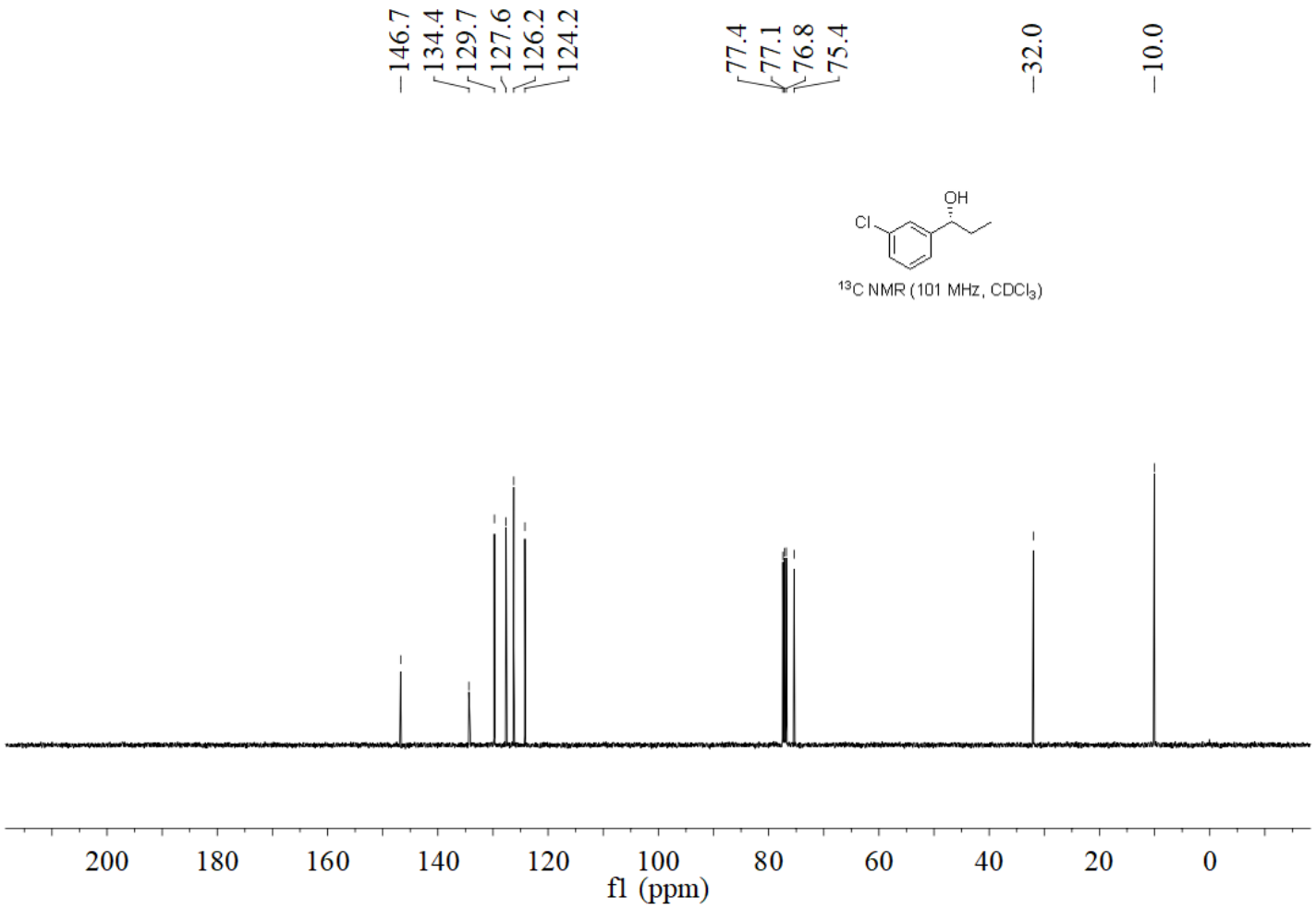
(*R*)-1-(3-methoxyphenyl)propan-1-ol (7q)



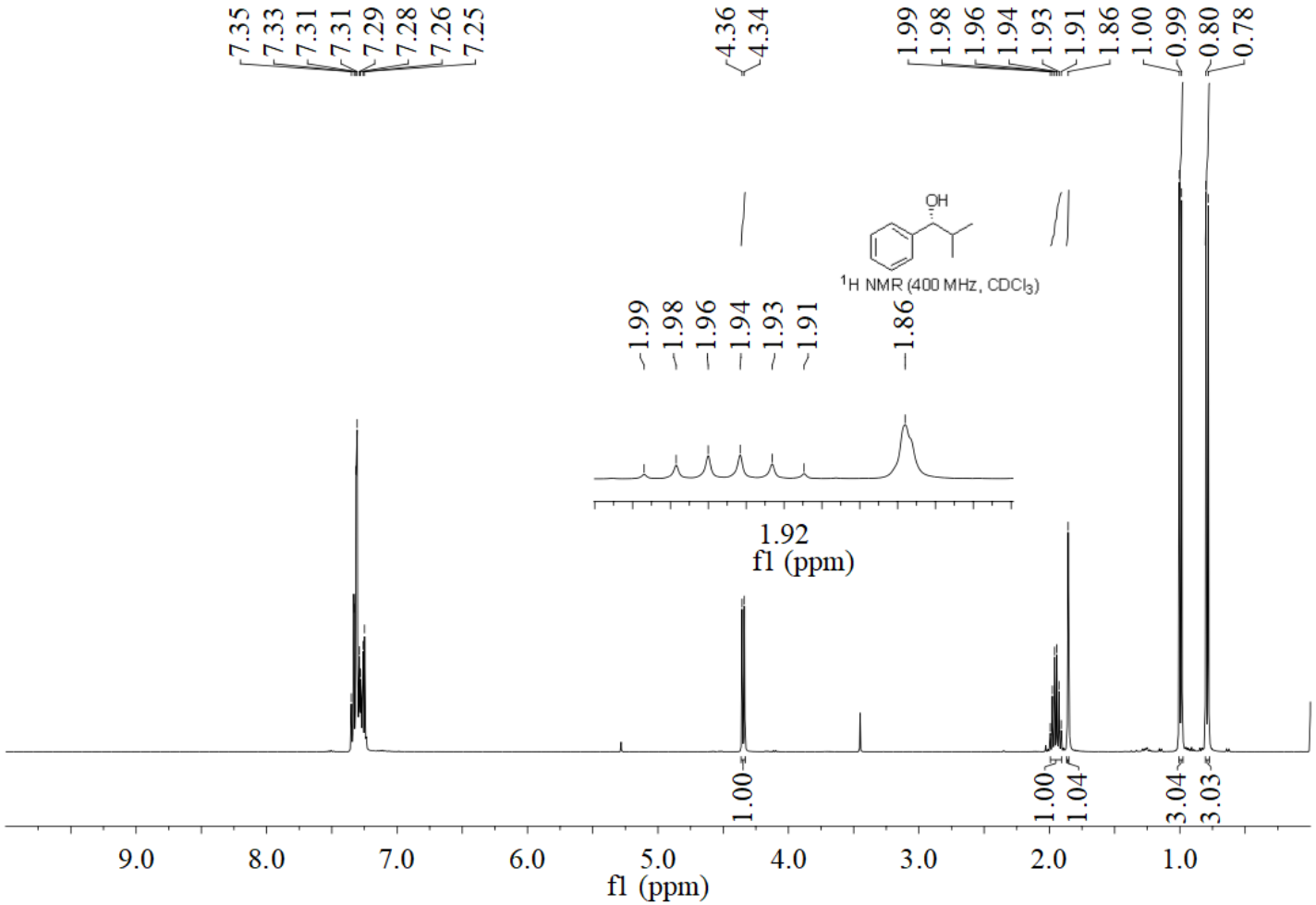

159.7
146.4
129.4
118.4
112.9
111.5
77.4
77.1
76.8
75.9
55.2
31.8
10.1
MeO
OH
13C NMR (101 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

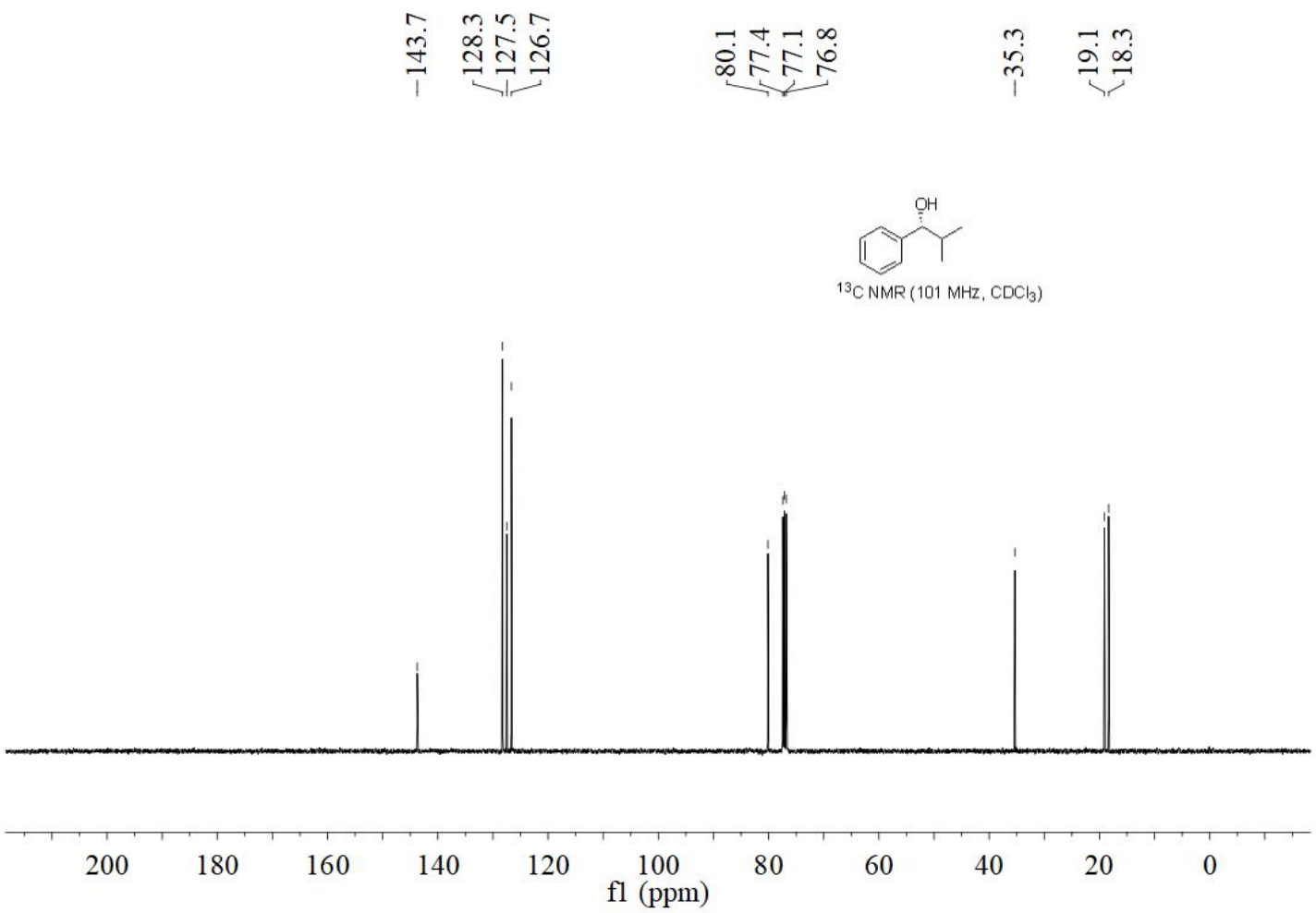
(*R*)-1-(3-chlorophenyl)propan-1-ol (7r)



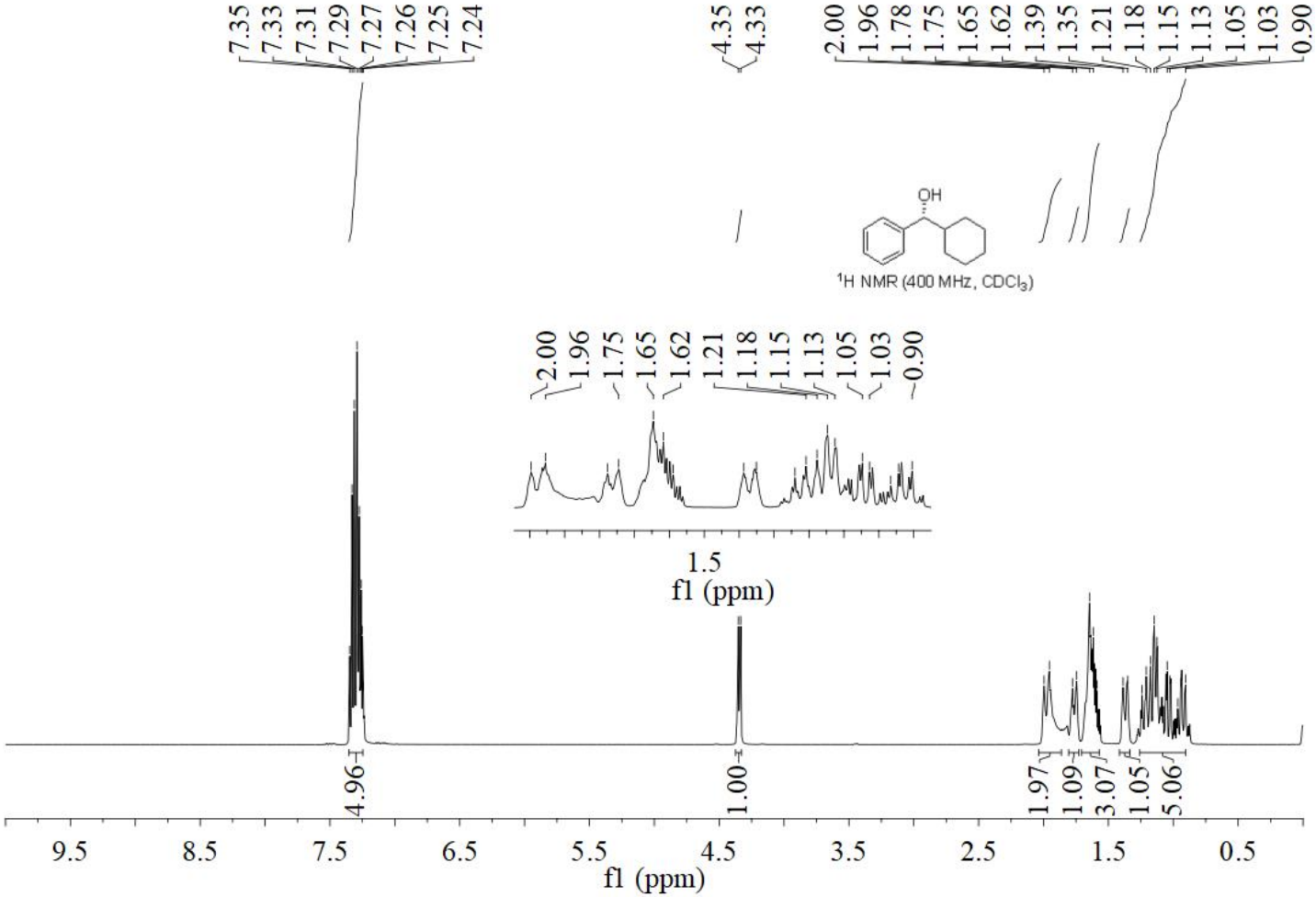

146.7
134.4
129.7
127.6
126.2
124.2
77.4
77.1
76.8
75.4
32.0
10.0
OH
Cl
13C NMR (101 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

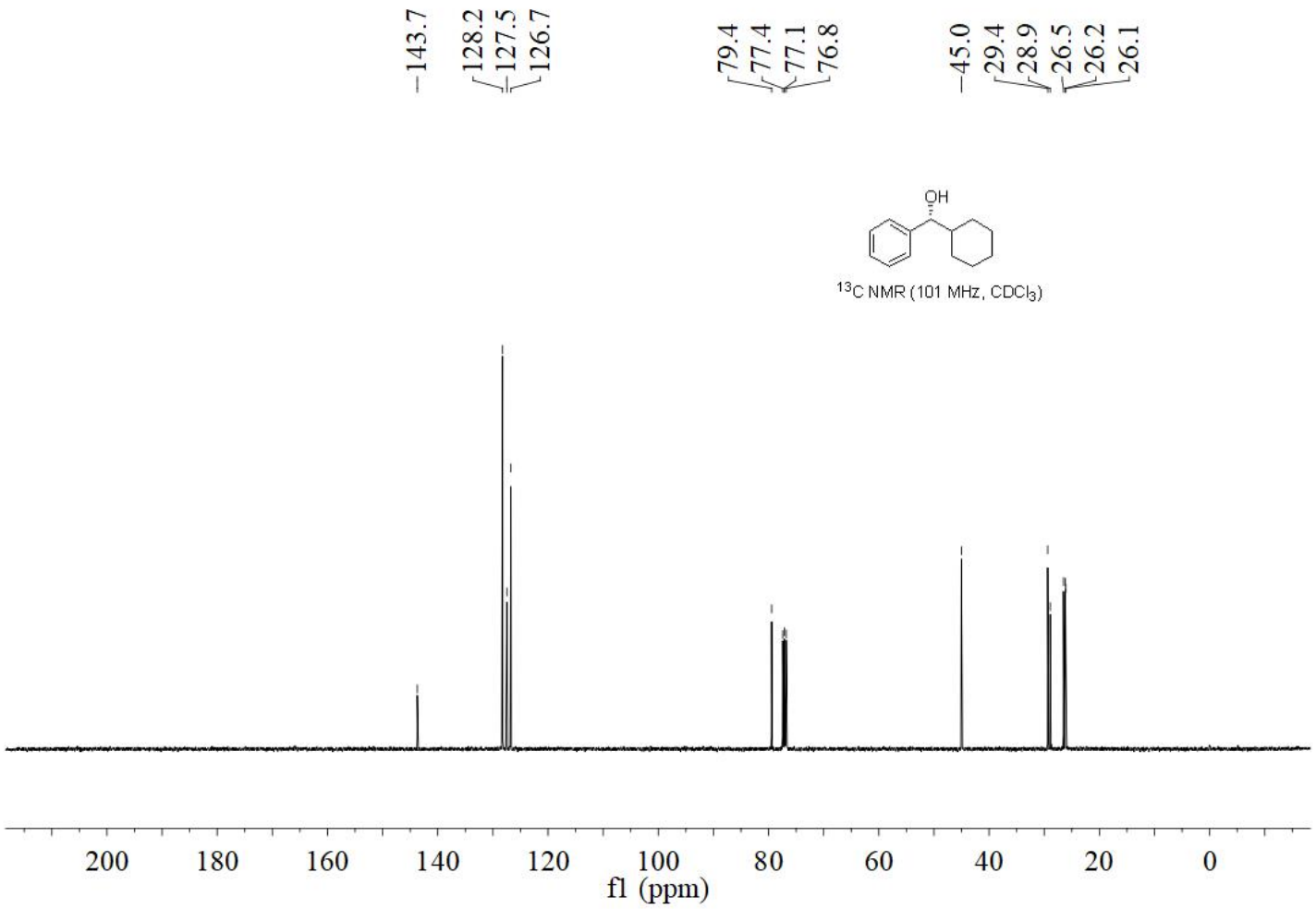
(*R*)-2-methyl-1-phenylpropan-1-ol (7s)



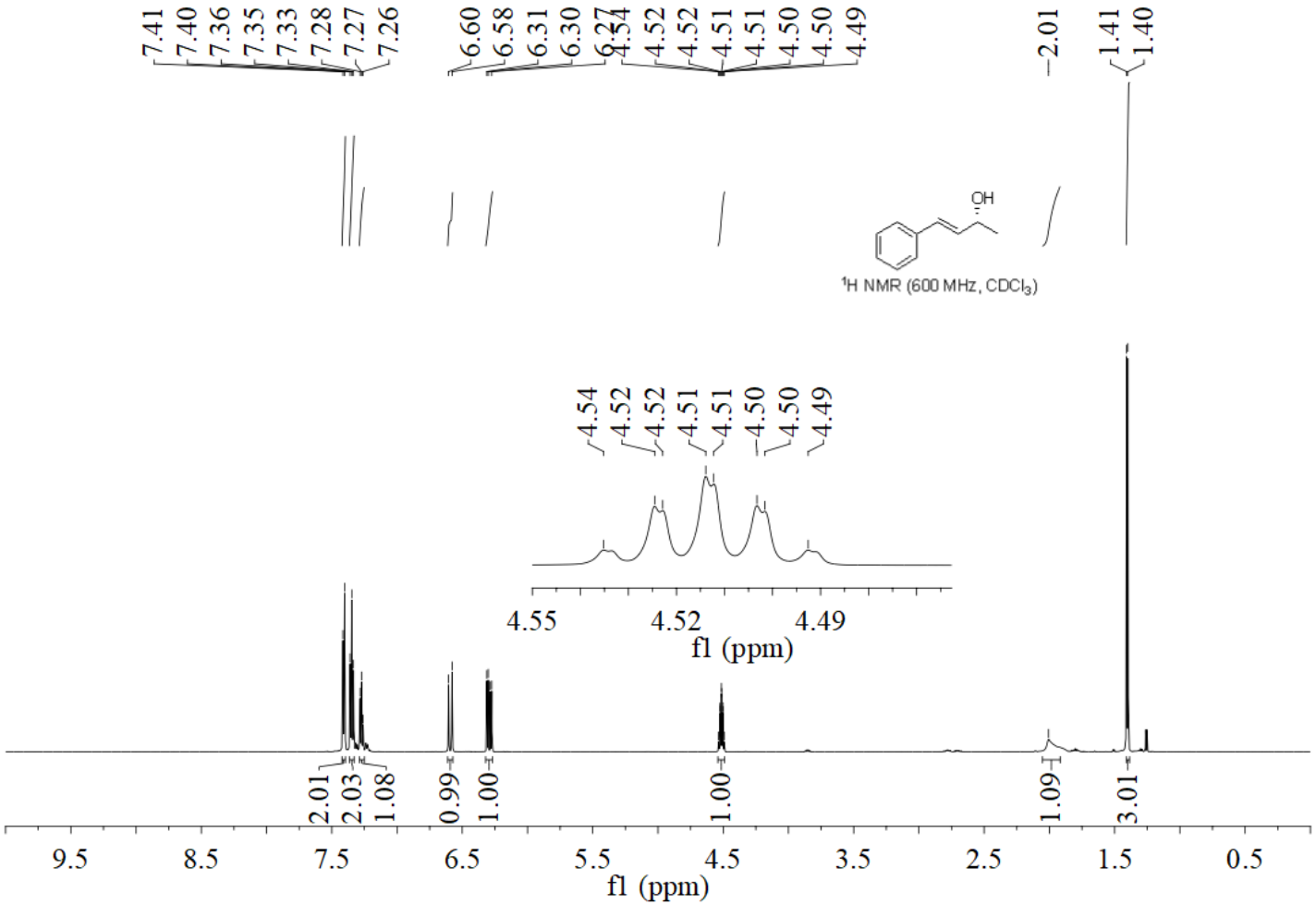

143.7
128.3
127.5
126.7
80.1
77.4
77.1
76.8
35.3
19.1
18.3
OH
13C NMR (101 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

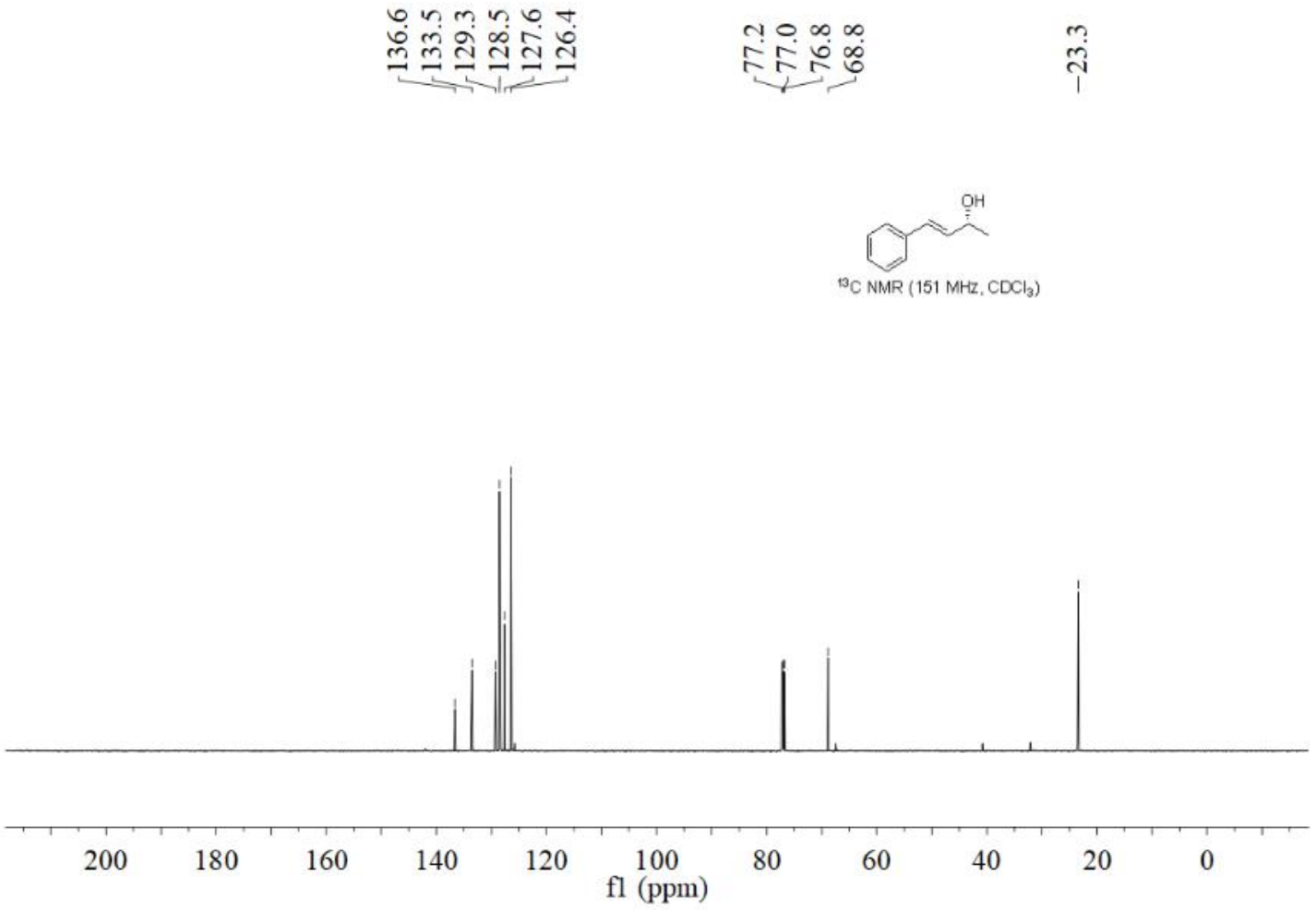
(*R*) -cyclohexyl(phenyl)methanol (7t)



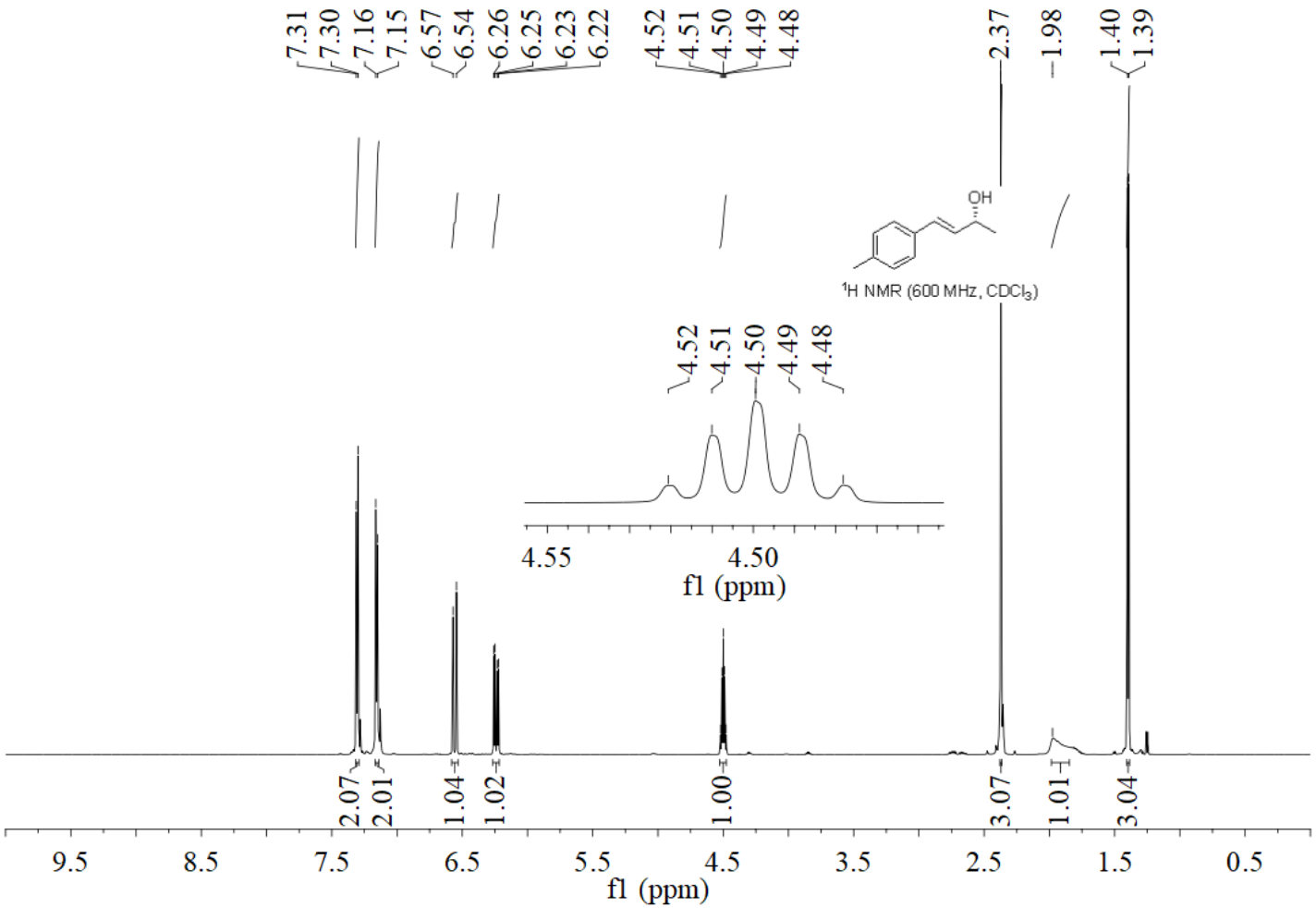

143.7
128.2
127.5
126.7
79.4
77.4
77.1
76.8
45.0
29.4
28.9
26.5
26.2
26.1
OH
13C NMR (101 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

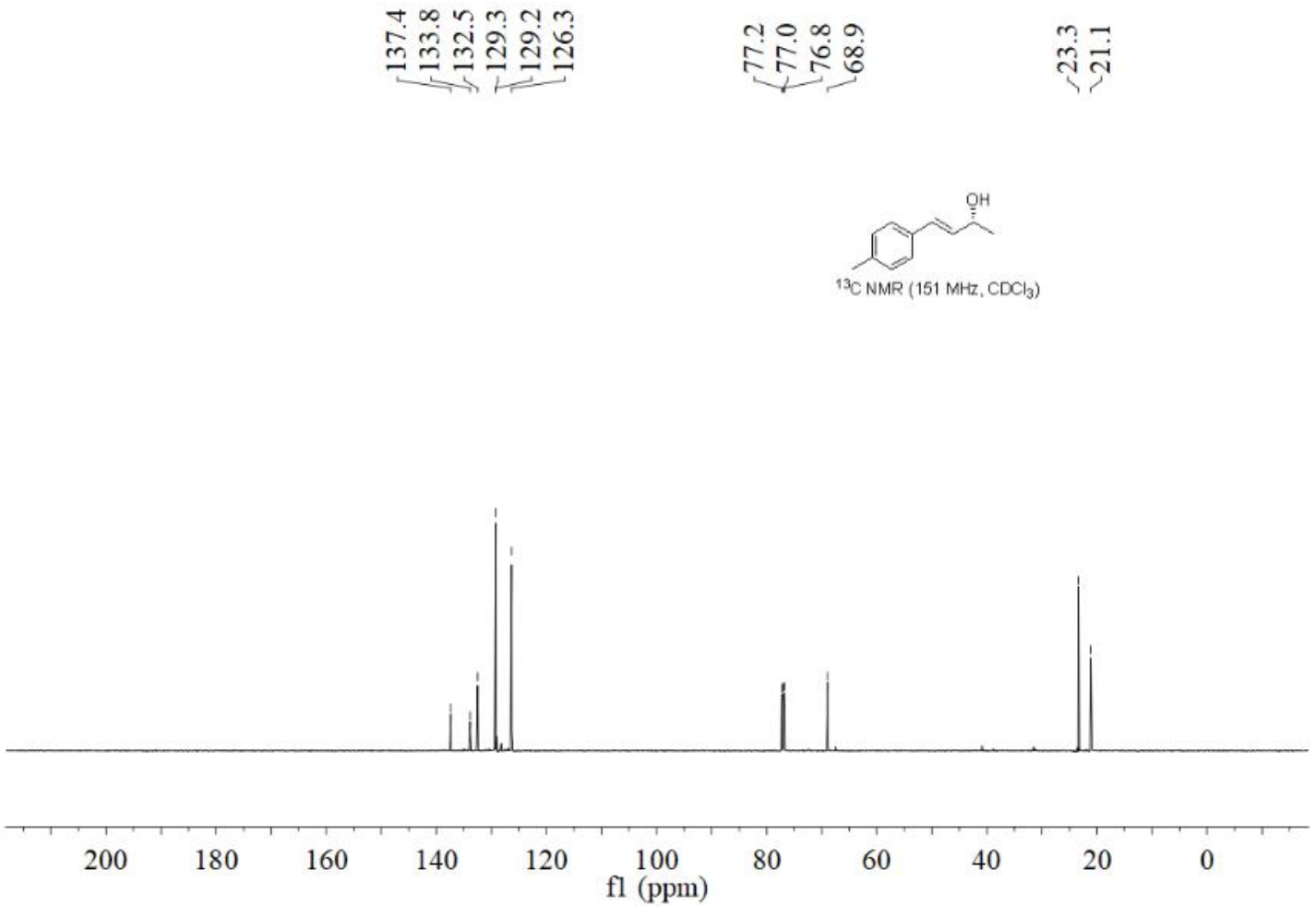
(*R*,*E*)-4-phenylbut-3-en-2-ol (9a)



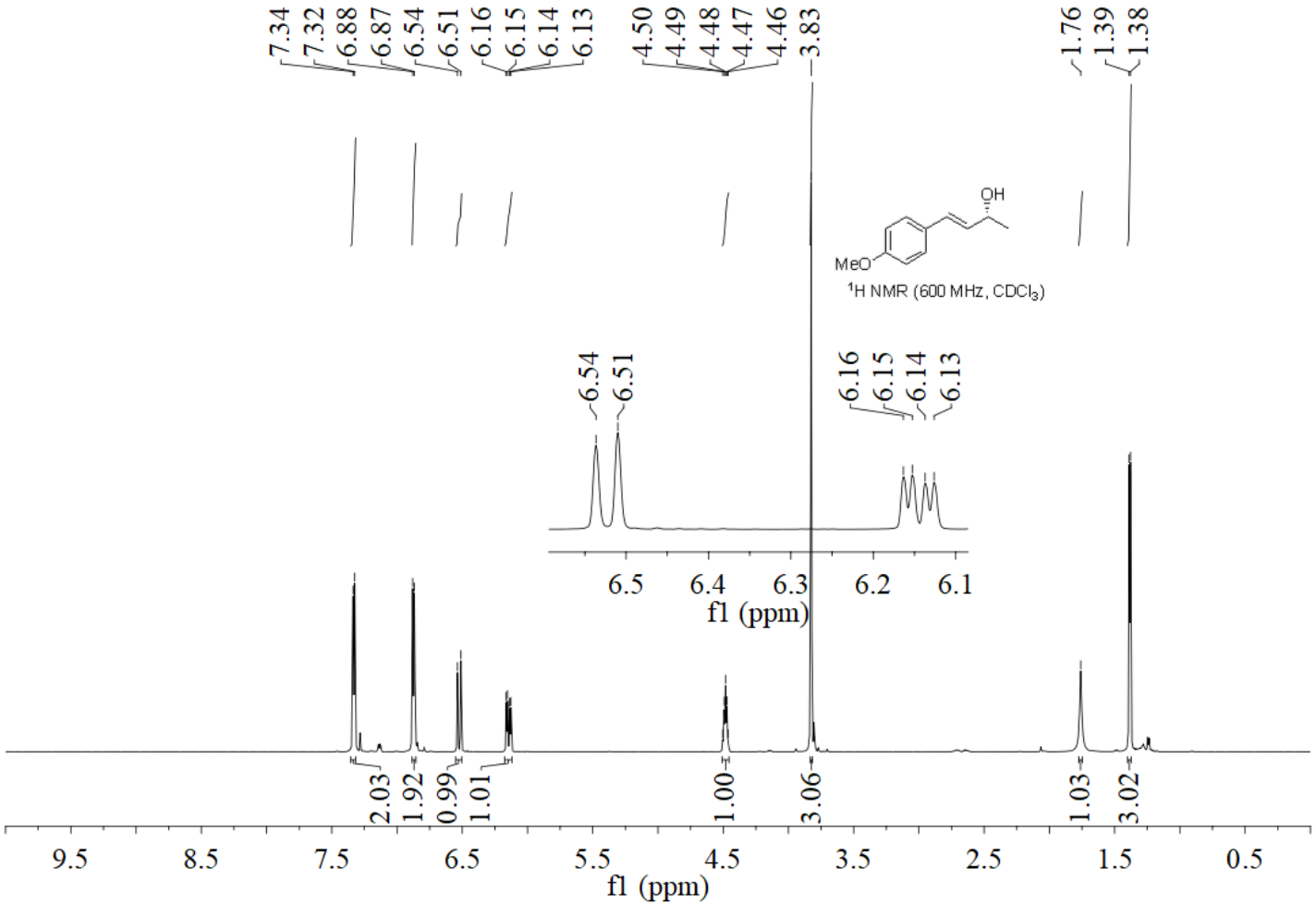


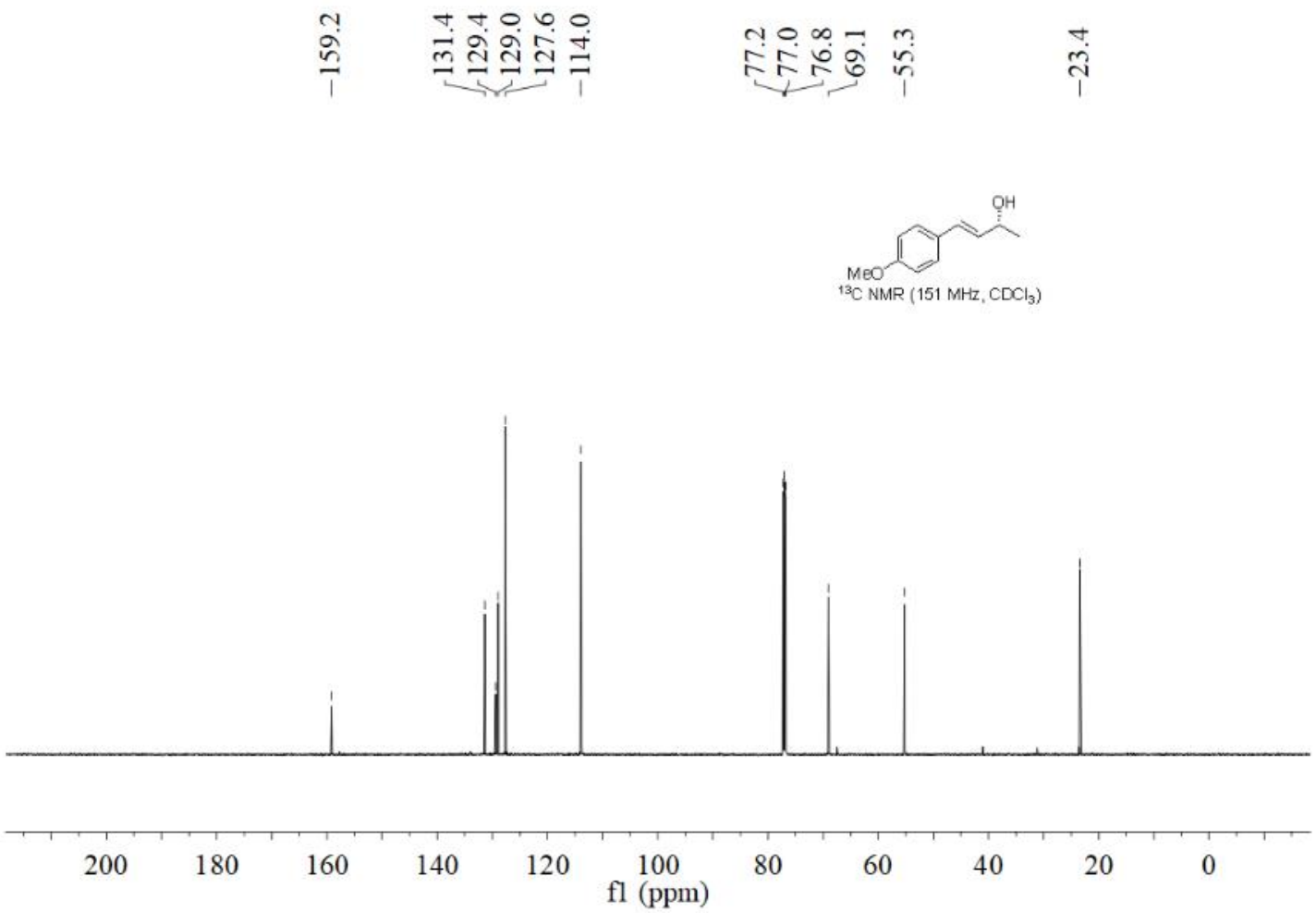
(*R*,*E*)-4-(*p*-tolyl)but-3-en-2-ol (9b)


7.31
7.30
7.16
7.15
6.57
6.54
6.26
6.25
6.23
6.22
4.52
4.51
4.50
4.49
4.48
2.37
1.98
1.40
1.39
OH
1H NMR (600 MHz, CDCl3)
4.55
4.50
f1 (ppm)
2.07
2.01
1.04
1.02
1.00
3.07
1.01
3.04
9.5
8.5
7.5
6.5
5.5
4.5
3.5
2.5
1.5
0.5
f1 (ppm)

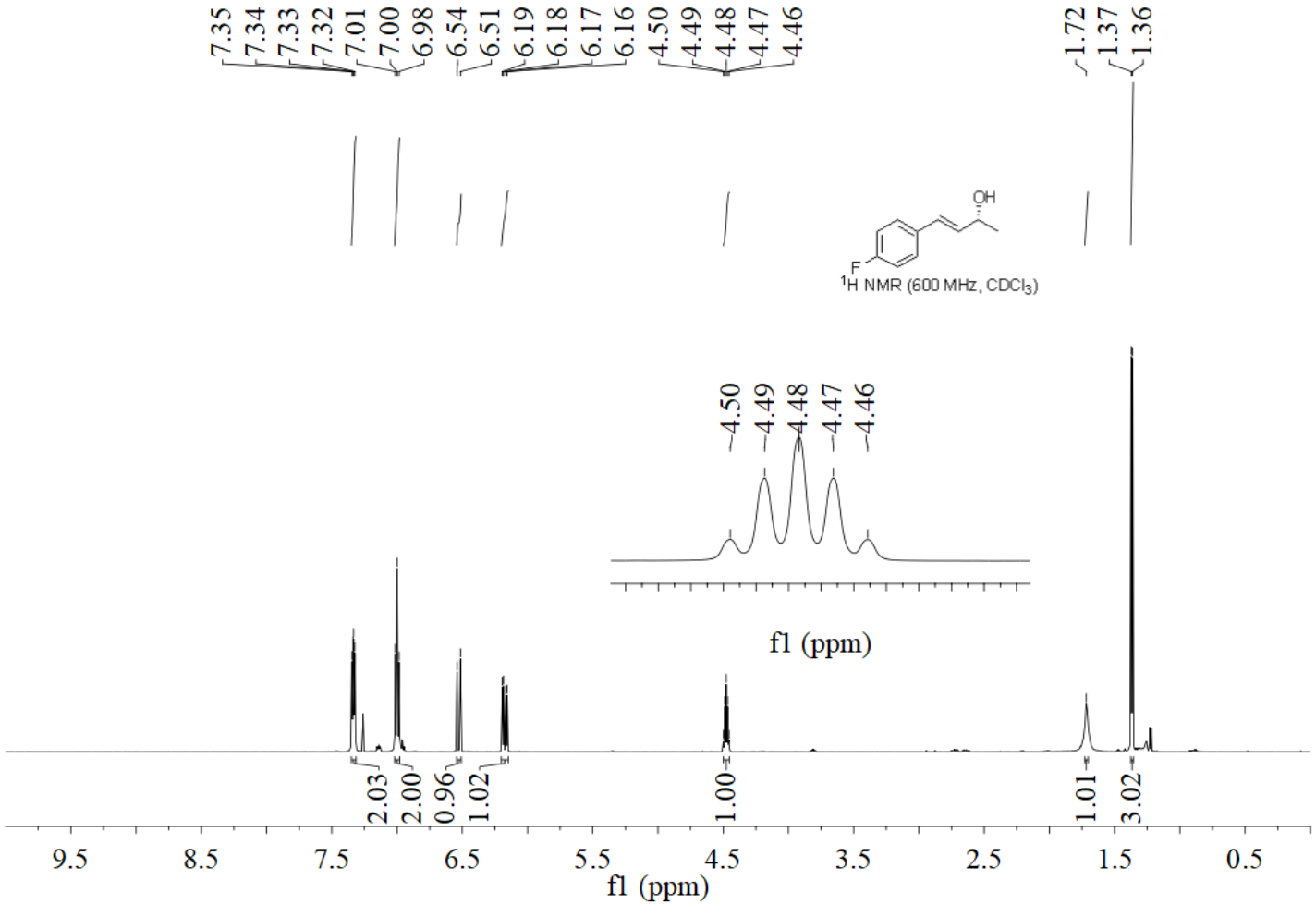

137.4
133.8
132.5
129.3
129.2
126.3
77.2
77.0
76.8
68.9
23.3
21.1
OH
^{13}C NMR (151 MHz, $CDCl_3$)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

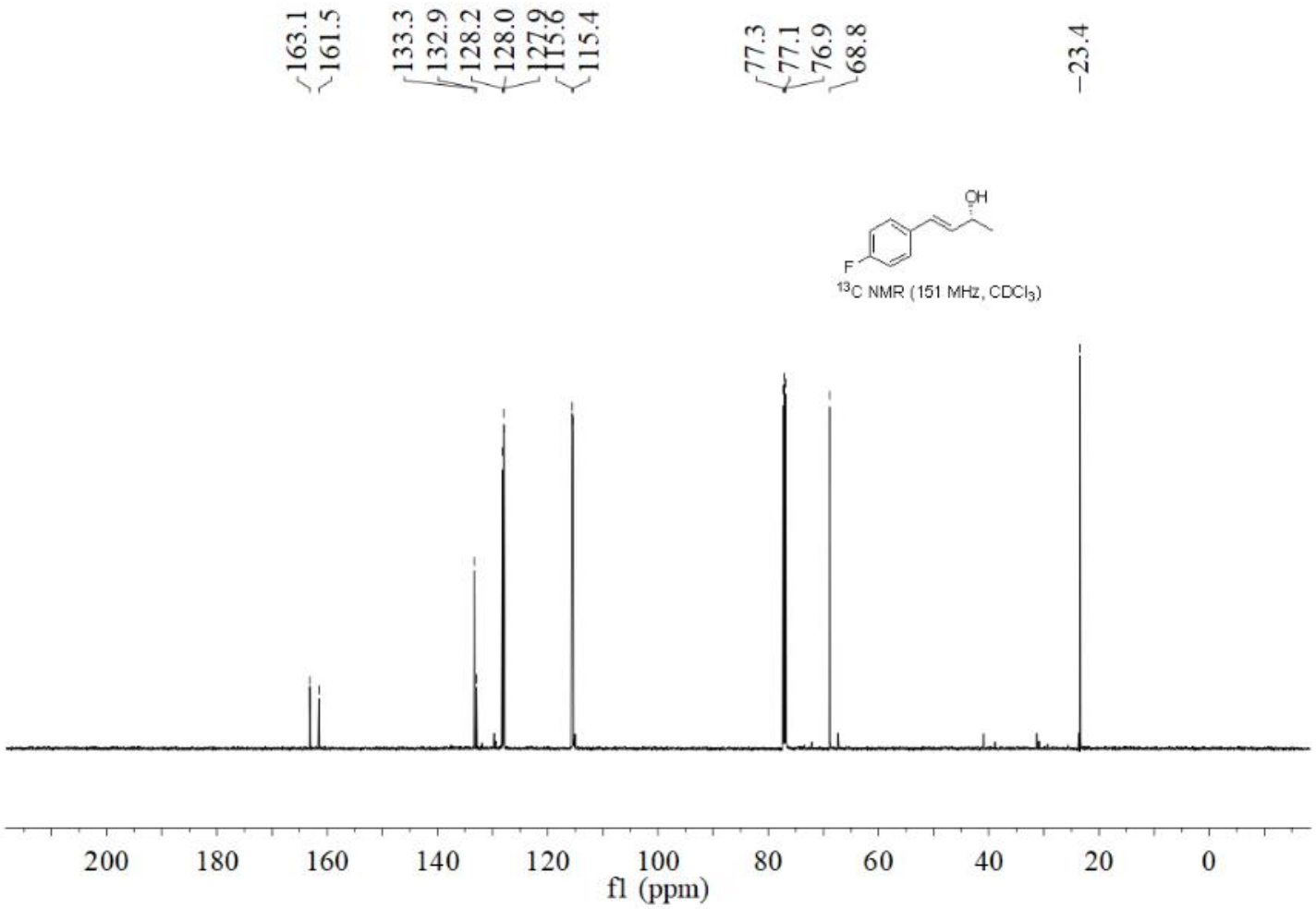
(*R*,*E*)-4-(4-methoxyphenyl)but-3-en-2-ol (9c)

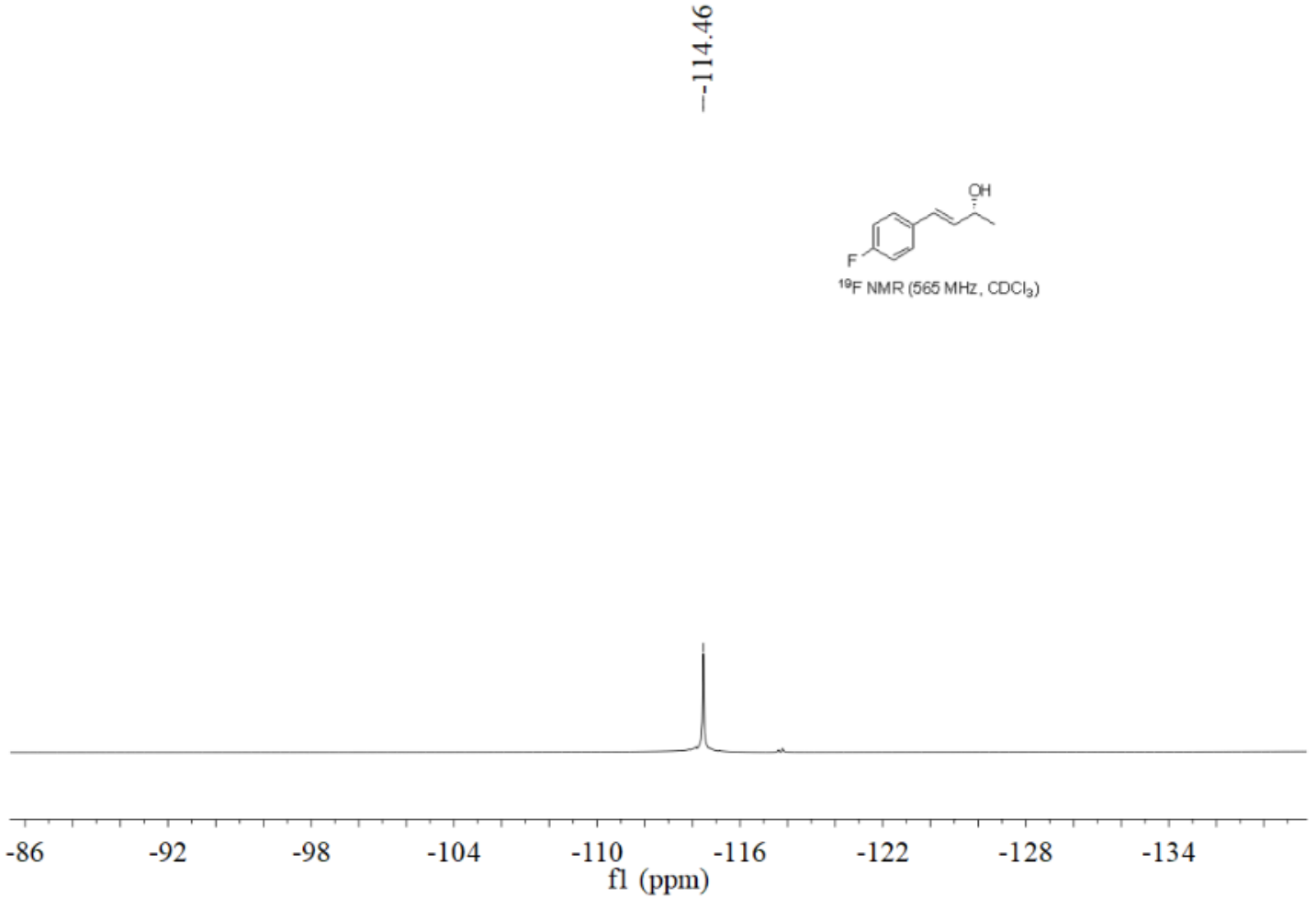



159.2
131.4
129.4
129.0
127.6
114.0
77.2
77.0
76.8
69.1
55.3
23.4
OH
MeO
13C NMR (151 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

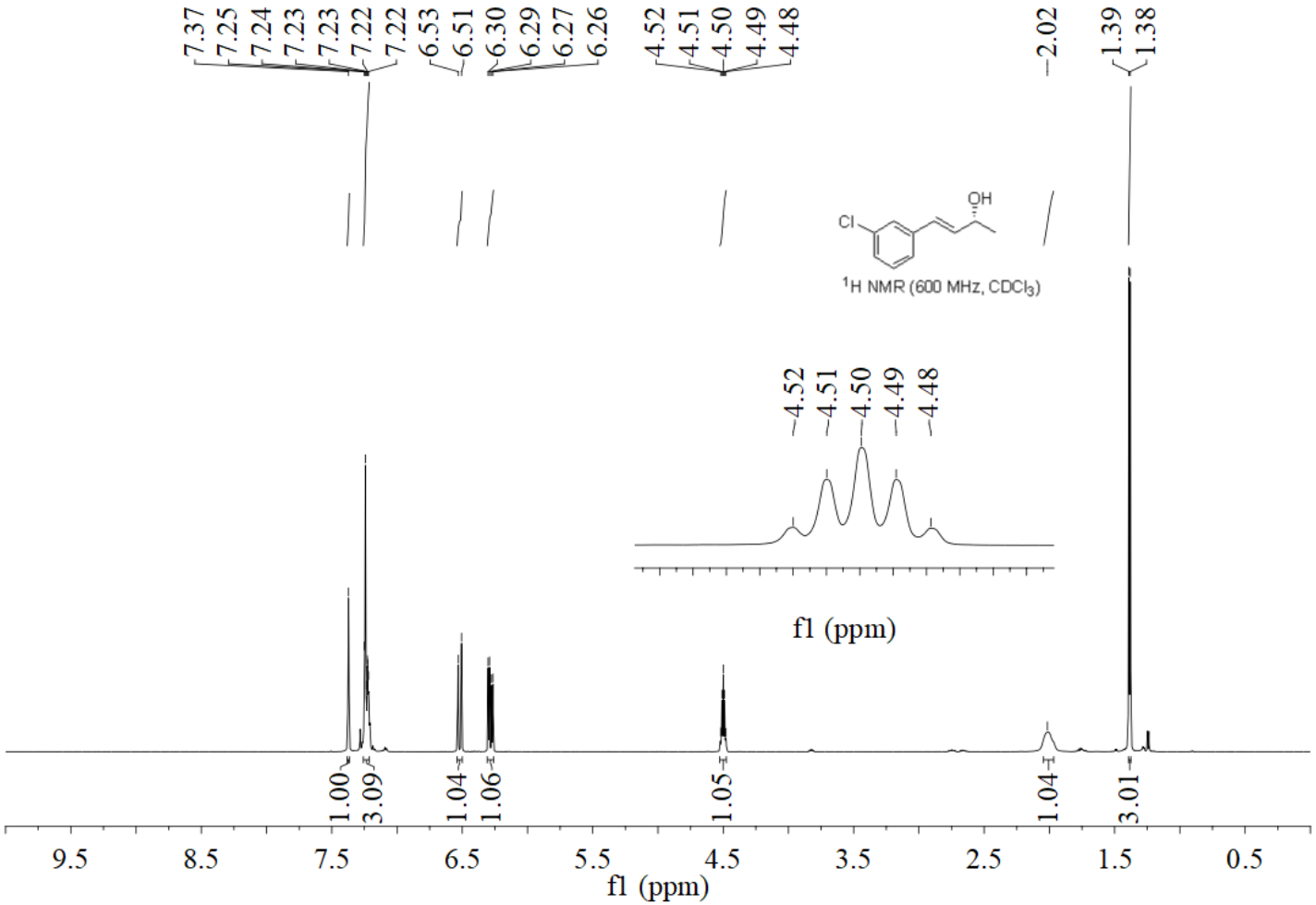
(*R*,*E*)-4-(4-fluorophenyl)but-3-en-2-ol (9d)

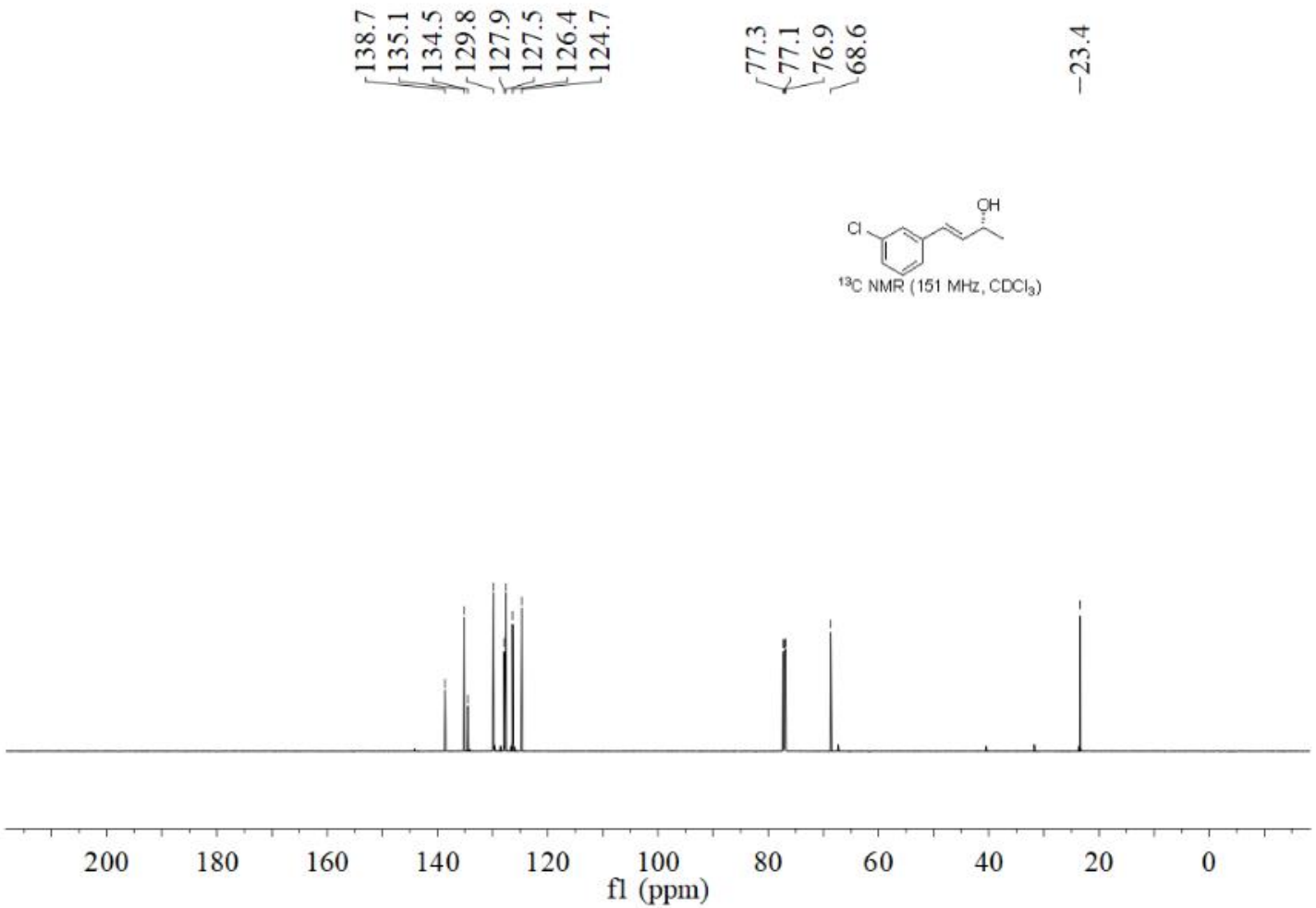



163.1
161.5
133.3
132.9
128.2
128.0
127.9
115.6
115.4
77.3
77.1
76.9
68.8
23.4
OH
F
^{13}C NMR (151 MHz, CDCl$_3$)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

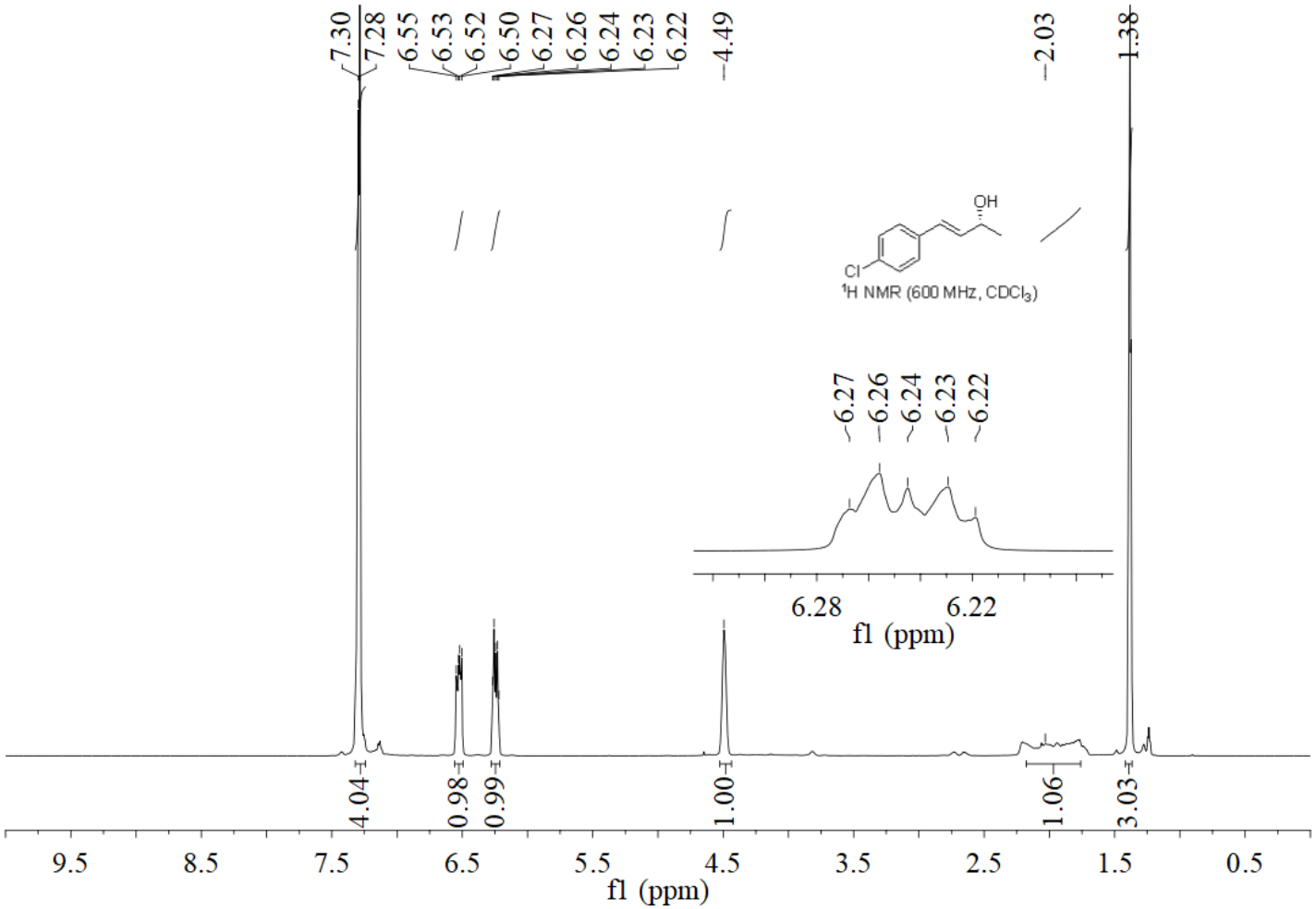

-114.46
OH
F
^{19}F NMR (565 MHz, $CDCl_3$)
-86
-92
-98
-104
-110
-116
-122
-128
-134
f1 (ppm)

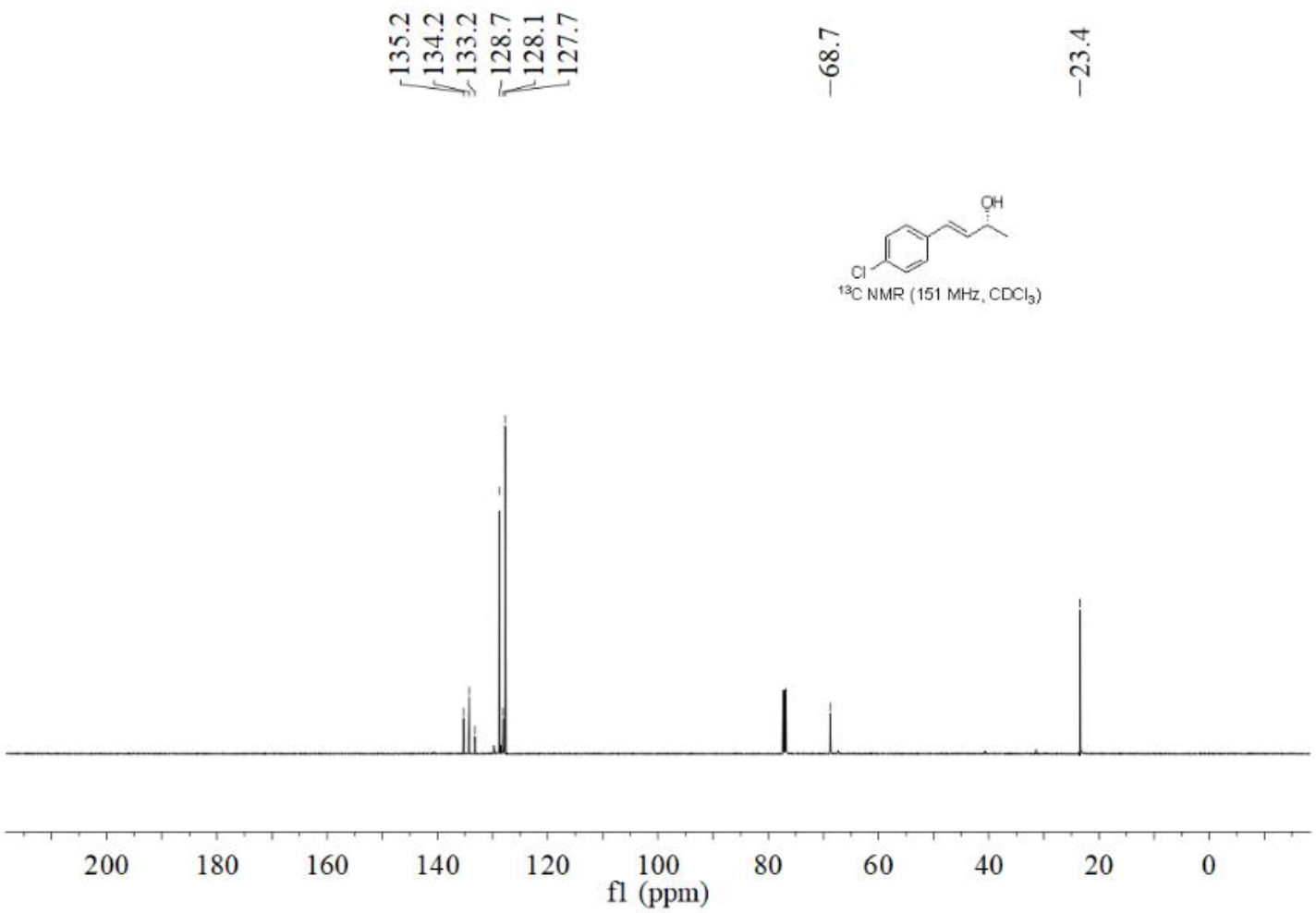
(*R*,*E*)-4-(3-chlorophenyl)but-3-en-2-ol (9e)



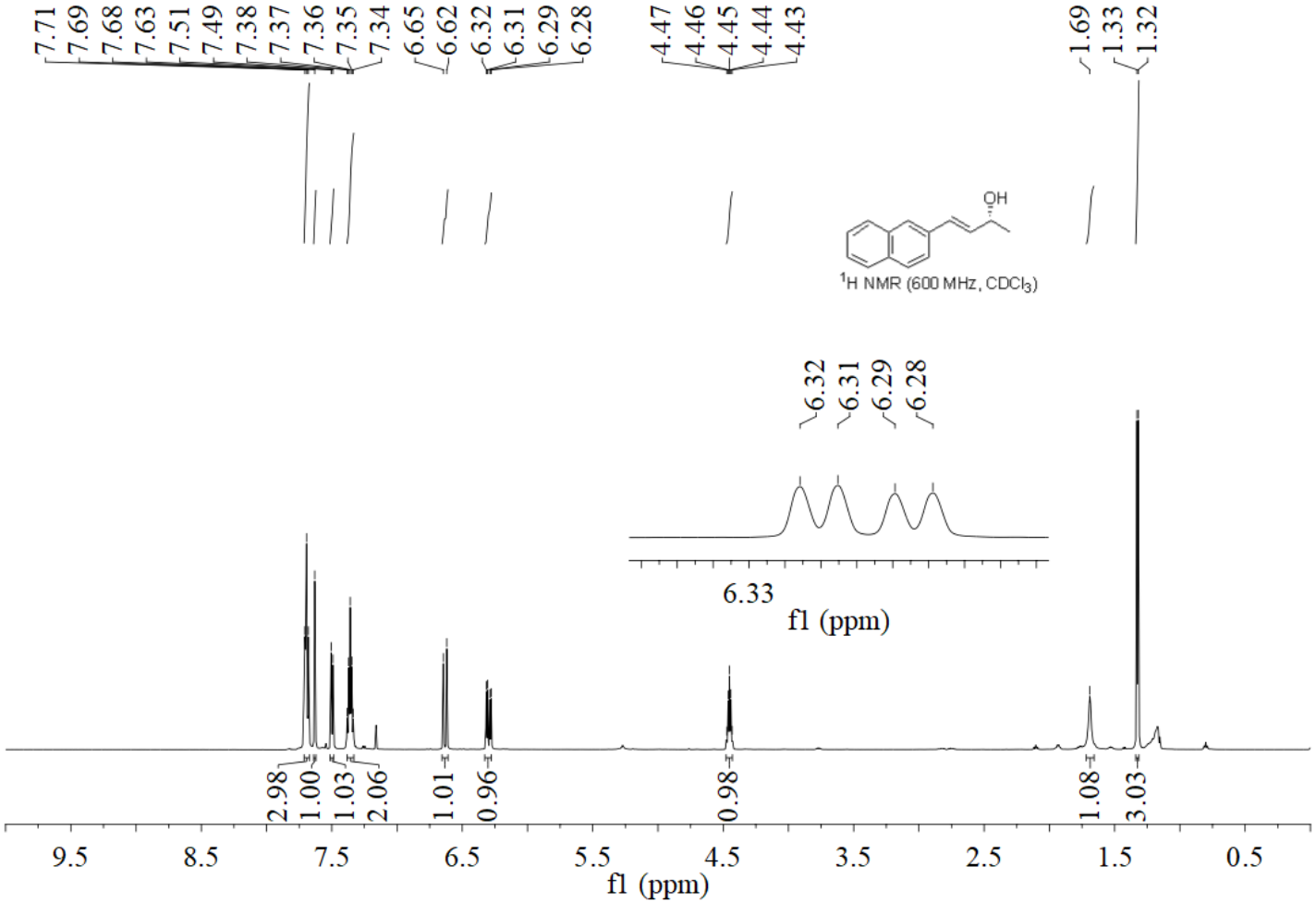

138.7
135.1
134.5
129.8
127.9
127.5
126.4
124.7
77.3
77.1
76.9
68.6
23.4
Cl
OH
^{13}C NMR (151 MHz, $CDCl_3$)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

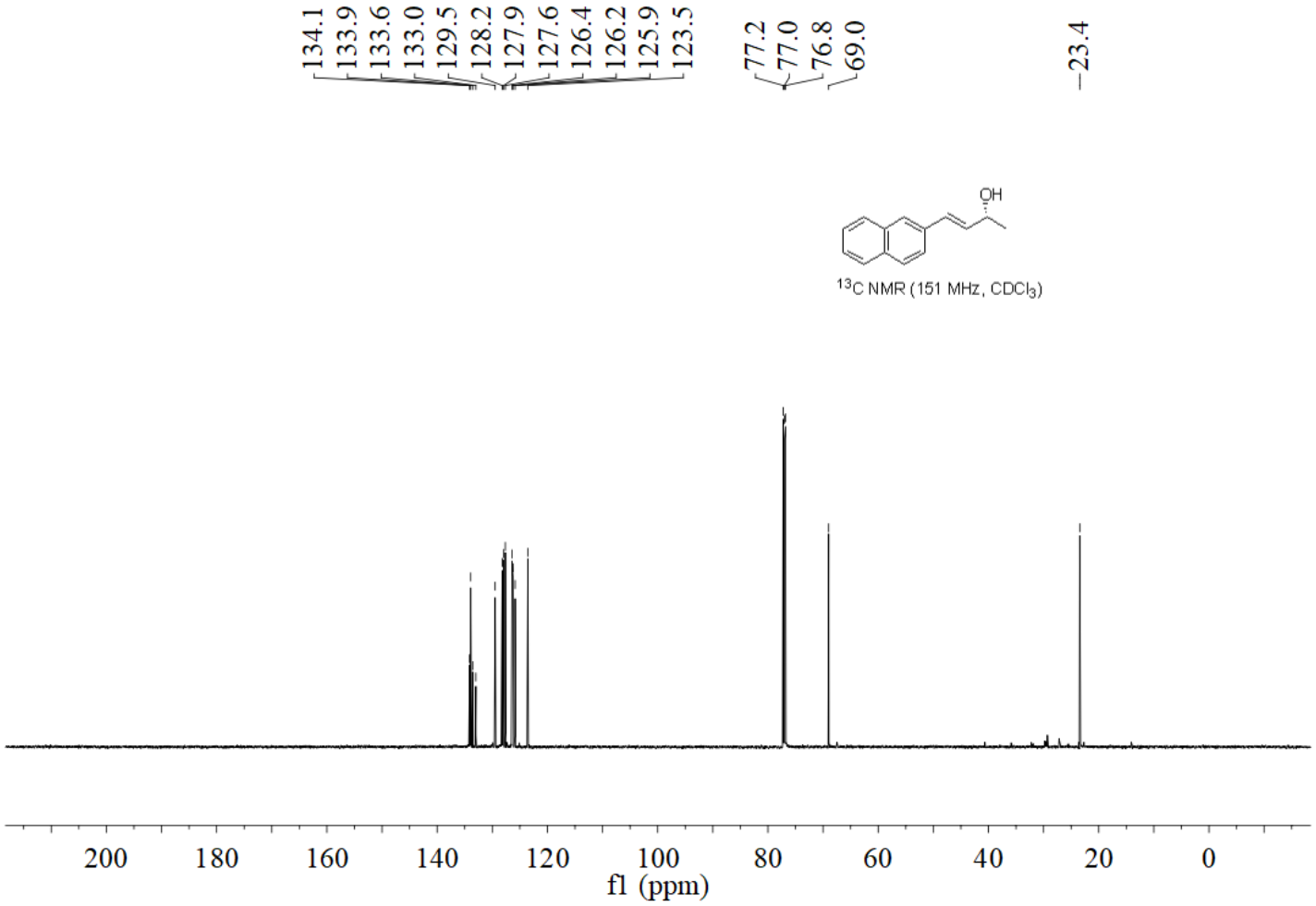
(*R*,*E*)-4-(4-chlorophenyl)but-3-en-2-ol (9f)



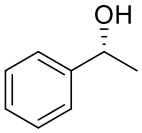

135.2
134.2
133.2
128.7
128.1
127.7
68.7
23.4
OH
Cl
13C NMR (151 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

(*R*,*E*)-4-(naphthalen-2-yl)but-3-en-2-ol (9g)



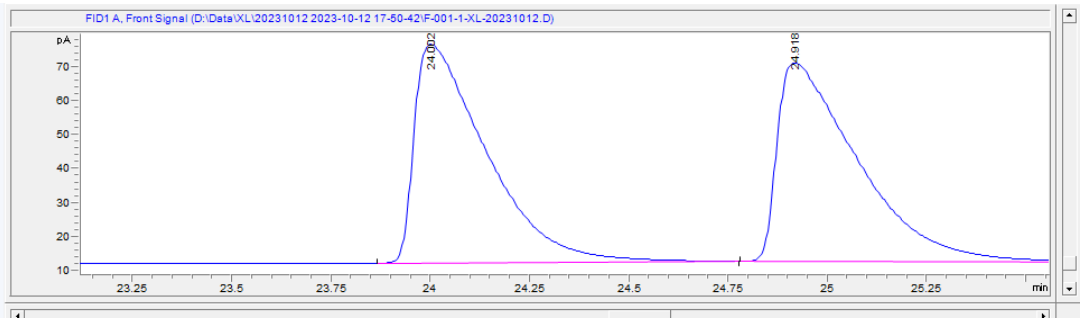

134.1
133.9
133.6
133.0
129.5
128.2
127.9
127.6
126.4
126.2
125.9
123.5
77.2
77.0
76.8
69.0
23.4
OH
13C NMR (151 MHz, CDCl3)
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)

8. GC and HPLC spectra



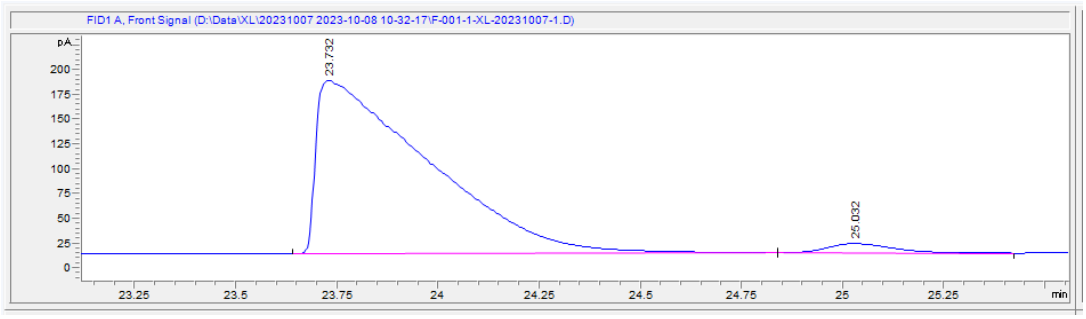
7a

```
Data File D:\Data\XL\20231012 2023-10-12 17-50-42\F-001-1-XL-20231012.D
Sample Name: XL-20231012

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   1
    Acq. Instrument : GC7890B                         Location :   1  (F)
    Injection Date  : 10/12/2023 5:52:39 PM               Inj :   1
                                                    Inj Volume : 2 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 5 µl
    Method          : D:\Data\XL\20231012 2023-10-12 17-50-42\WYZ-B-120-80-2-120-40min.M (
                      Sequence Method)
    Last changed    : 5/25/2023 8:03:00 PM by SYSTEM
```

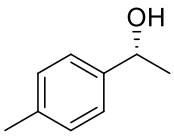


#	Time	Type	Area	Height	Width	Area%	Symmetı
1	24.002	BB	814.2	64.6	0.1751	49.478	0.275
2	24.918	BB	831.4	58.6	0.1914	50.522	0.251

```
Data File D:\Data\XL\20231007 2023-10-08 10-32-17\F-001-1-XL-20231007-1.D
Sample Name: XL-20231007-1

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   1
    Acq. Instrument : GC7890B                         Location :   1  (F)
    Injection Date  : 10/8/2023 10:34:21 AM               Inj :   1
                                                    Inj Volume : 2 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 5 µl
    Method          : D:\Data\XL\20231007 2023-10-08 10-32-17\WYZ-B-120-80-2-120-40min.M (
                      Sequence Method)
    Last changed    : 5/25/2023 8:03:00 PM by SYSTEM
    Additional Info : Peak(s) manually integrated
```

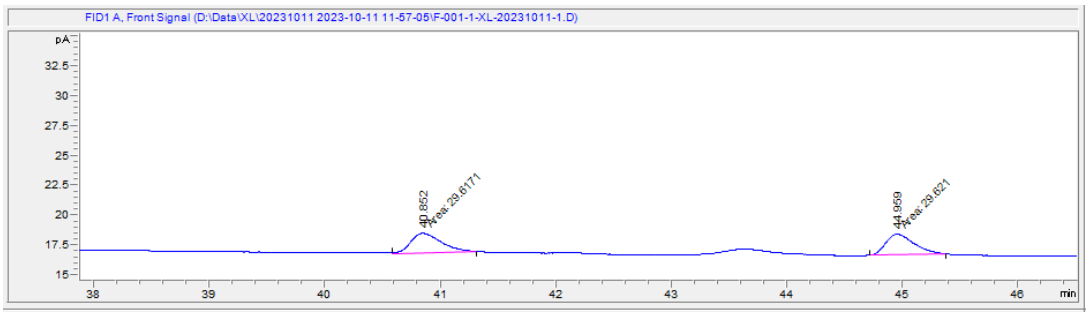


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	23.732	BB	3356.6	174.4	0.2395	97.038	0.121
2	25.032	BB	102.4	9.3	0.1612	2.962	0.709



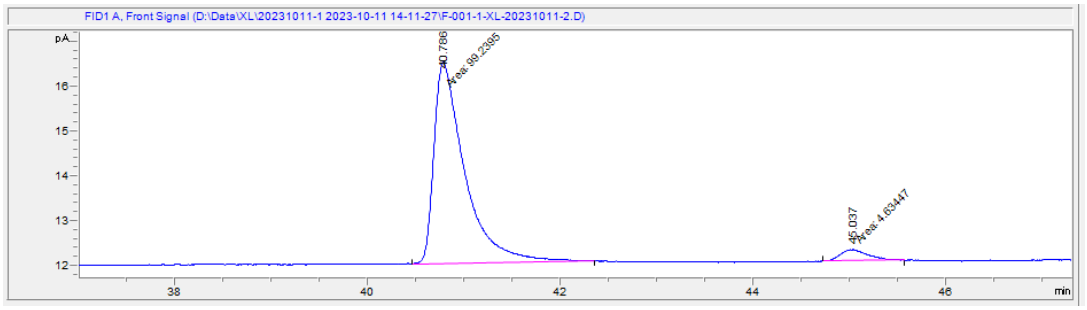
7b

```
Data File D:\Data\XL\20231011 2023-10-11 11-57-05\F-001-1-XL-20231011-1.D
Sample Name: XL-20231011-1

    ========================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   1
    Acq. Instrument : GC7890B                         Location :   1  (F)
    Injection Date  : 10/11/2023 11:59:08 AM               Inj :   1
                                                    Inj Volume : 2 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 5 µl
    Method          : D:\Data\XL\20231011 2023-10-11 11-57-05\20231011-1.M (Sequence Method)
    Last changed    : 10/11/2023 11:55:57 AM by SYSTEM
    Additional Info : Peak(s) manually integrated
```

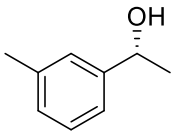


#	Time	Type	Area	Height	Width	Area%	Symmetr
1	40.852	MM	29.6	1.6	0.3036	49.997	0.653
2	44.959	MM	29.6	1.7	0.2853	50.003	0.667

```
Data File D:\Data\XL\20231011-1 2023-10-11 14-11-27\F-001-1-XL-20231011-2.D
Sample Name: XL-20231011-2

    ========================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   1
    Acq. Instrument : GC7890B                         Location :   1  (F)
    Injection Date  : 10/11/2023 2:13:41 PM                Inj :   1
                                                    Inj Volume : 2 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 5 µl
    Method          : D:\Data\XL\20231011-1 2023-10-11 14-11-27\20231011-1.M (Sequence Method)
    Last changed    : 10/11/2023 11:55:57 AM by SYSTEM
    Additional Info : Peak(s) manually integrated
```

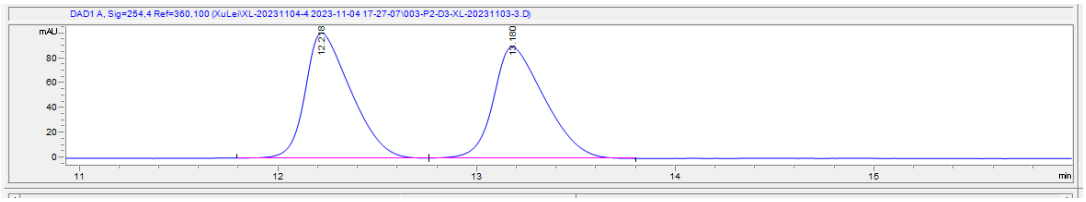


#	Time	Type	Area	Height	Width	Area%	Symmet
1	40.786	MM	99.2	4.5	0.3689	95.538	0.422
2	45.037	MM	4.6	2.4E-1	0.3174	4.462	0.828



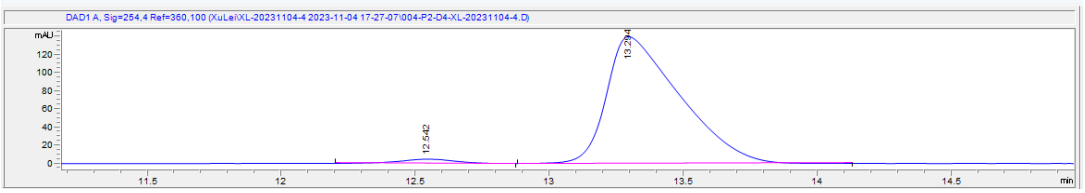
7c

```
Data File d:\Chem32\...a\XuLei\XL-20231104-4 2023-11-04 17-27-07\003-P2-D3-XL-20231103-3.D
Sample Name: XL-20231103-3

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   3
    Acq. Instrument : 1260-DAD                        Location :   P2-D-03
    Injection Date  : 11/4/2023 17:48:45                   Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 3.000 µl
    Method          : d:\Chem32\1\Data\XuLei\XL-20231104-4 2023-11-04 17-27-07\xl-0.8-5%-30min.M
                      (Sequence Method)
    Last changed    : 11/4/2023 17:07:35 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

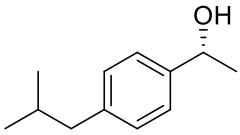


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	12.218	BB	1603.2	100.8	0.2376	50.012	0.541
2	13.18	BB	1602.5	89.6	0.2687	49.988	0.568

```
Data File d:\Chem32\...a\XuLei\XL-20231104-4 2023-11-04 17-27-07\004-P2-D4-XL-20231104-4.D
Sample Name: XL-20231104-4

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   4
    Acq. Instrument : 1260-DAD                        Location :   P2-D-04
    Injection Date  : 11/4/2023 18:19:35                   Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 3.000 µl
    Method          : d:\Chem32\1\Data\XuLei\XL-20231104-4 2023-11-04 17-27-07\xl-0.8-5%-30min.M
                      (Sequence Method)
    Last changed    : 11/4/2023 17:07:35 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

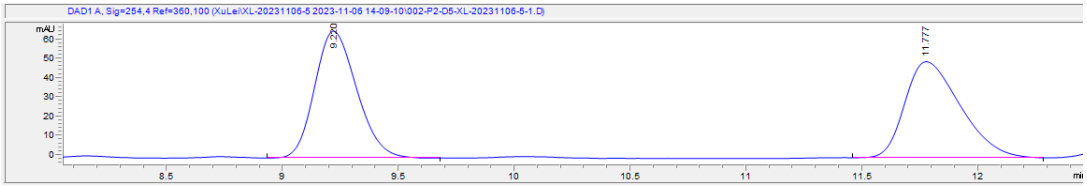


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	12.542	BB	67.6	4.7	0.2176	2.491	1.01
2	13.294	BB	2646.5	139.6	0.2791	97.509	0.417



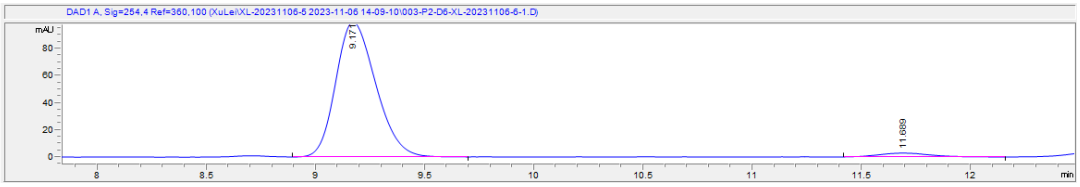
7d

```
Data File d:\Chem32\...XuLei\XL-20231106-5 2023-11-06 14-09-10\002-P2-D5-XL-20231106-5-1.D
Sample Name: XL-20231106-5-1

    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   2
    Acq. Instrument : 1260-DAD                      Location :   P2-D-05
    Injection Date  : 11/6/2023 14:21:57                Inj :   1
                                                  Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 2.000 µl
    Method          : d:\Chem32\1\Data\XuLei\XL-20231106-5 2023-11-06 14-09-10\XL-OD-H-1.0-2%-
                      20min.M (Sequence Method)
    Last changed    : 10/12/2023 11:00:37 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

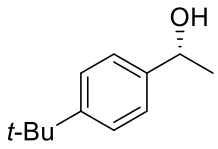


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	9.22	BB	834.1	66.1	0.1953	50.130	0.777
2	11.777	BB	829.7	50	0.2555	49.870	0.601

```
Data File d:\Chem32\...XuLei\XL-20231106-5 2023-11-06 14-09-10\003-P2-D6-XL-20231106-6-1.D
Sample Name: XL-20231106-6-1

    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   3
    Acq. Instrument : 1260-DAD                      Location :   P2-D-06
    Injection Date  : 11/6/2023 14:42:46                Inj :   1
                                                  Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 2.000 µl
    Method          : d:\Chem32\1\Data\XuLei\XL-20231106-5 2023-11-06 14-09-10\XL-OD-H-1.0-2%-
                      20min.M (Sequence Method)
    Last changed    : 10/12/2023 11:00:37 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

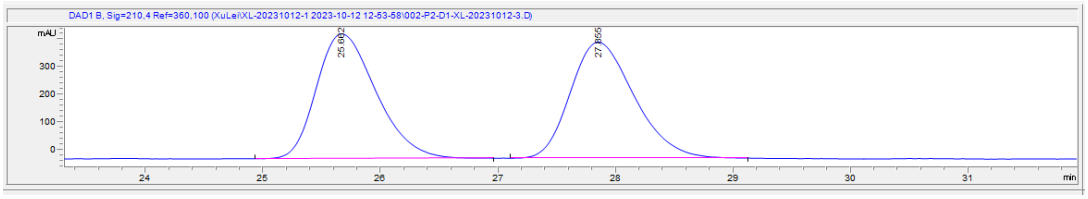


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	9.171	VB	1255.5	98.8	0.1962	96.448	0.737
2	11.689	BB	46.2	2.8	0.2264	3.552	0.831



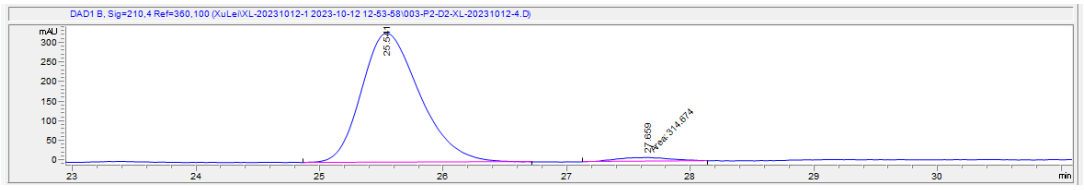
7e

```
Data File d:\Chem32\...a\XuLei\XL-20231012-1 2023-10-12 12-53-58\002-P2-D1-XL-20231012-3.D
Sample Name: XL-20231012-3

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   2
    Acq. Instrument : 1260-DAD                        Location :   P2-D-01
    Injection Date  : 10/12/2023 13:05:14                  Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Method          : d:\Chem32\1\Data\XuLei\XL-20231012-1 2023-10-12 12-53-58\XL-0.5-2%-40min.M
                      (Sequence Method)
    Last changed    : 10/12/2023 12:36:45 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

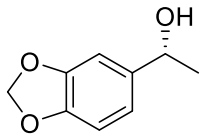


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	25.662	VV R	16103.8	456.2	0.5358	50.102	0.68
2	27.855	BV R	16038.4	424.8	0.5485	49.898	0.743

```
Data File d:\Chem32\...a\XuLei\XL-20231012-1 2023-10-12 12-53-58\003-P2-D2-XL-20231012-4.D
Sample Name: XL-20231012-4

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   3
    Acq. Instrument : 1260-DAD                        Location :   P2-D-02
    Injection Date  : 10/12/2023 13:46:03                  Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Method          : d:\Chem32\1\Data\XuLei\XL-20231012-1 2023-10-12 12-53-58\XL-0.5-2%-40min.M
                      (Sequence Method)
    Last changed    : 10/12/2023 12:36:45 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

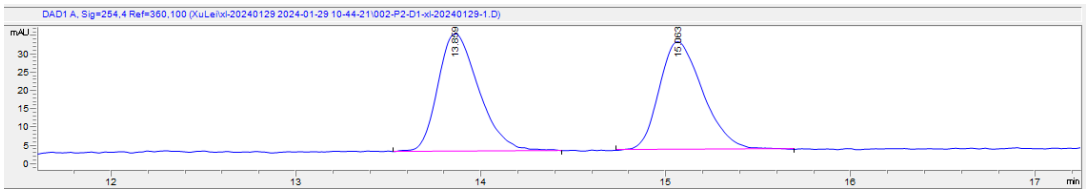


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	25.541	BV R	10798.6	329.5	0.4924	97.168	0.72
2	27.659	MM	314.7	9.9	0.5284	2.832	1.181



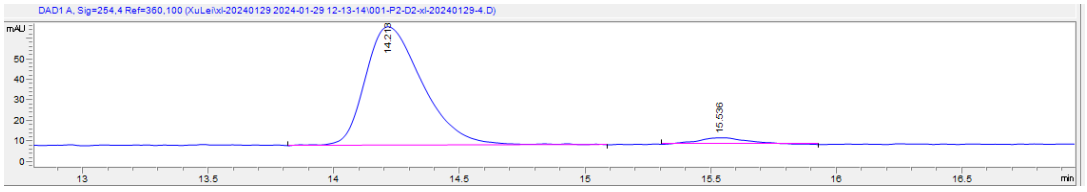
7f

```
Data File d:\Chem32\1\Data\XuLei\xl-20240129 2024-01-29 10-44-21\002-P2-D1-xl-20240129-1.D
Sample Name: xl-20240129-1

    ========================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   2
    Acq. Instrument : 1260-DAD                        Location :   P2-D-01
    Injection Date  : 1/29/2024 11:07:08                   Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Method          : d:\Chem32\1\Data\XuLei\xl-20240129 2024-01-29 10-44-21\XL-1.0-5%-20min.M (
                      Sequence Method)
    Last changed    : 10/13/2023 17:56:57 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

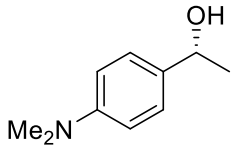


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	13.859	BB	495.3	32.1	0.2383	50.310	0.702
2	15.063	BB	489.2	29.6	0.2589	49.690	0.696

```
Data File d:\Chem32\1\Data\XuLei\xl-20240129 2024-01-29 12-13-14\001-P2-D2-xl-20240129-4.D
Sample Name: xl-20240129-4

    ========================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   1
    Acq. Instrument : 1260-DAD                        Location :   P2-D-02
    Injection Date  : 1/29/2024 12:14:46                   Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Acq. Method     : d:\Chem32\1\Data\XuLei\xl-20240129 2024-01-29 12-13-14\XL-1.0-5%-20min.M
    Last changed    : 1/29/2024 12:34:05 by SYSTEM
                      (modified after loading)
    Analysis Method : d:\Chem32\1\Data\XuLei\xl-20240129 2024-01-29 12-13-14\XL-1.0-5%-20min.M (
                      Sequence Method)
    Last changed    : 1/29/2024 12:34:07 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

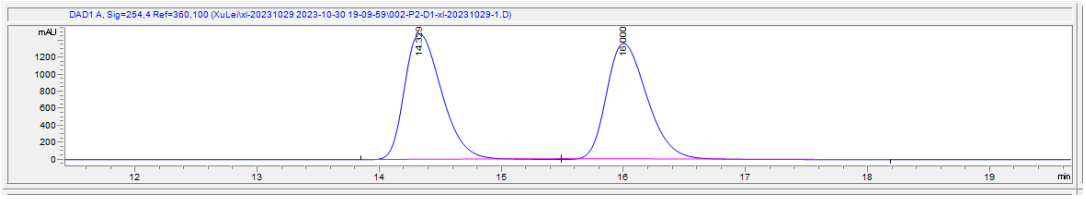


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	14.213	BV R	919.8	57.8	0.2438	95.088	0.618
2	15.536	BB	47.5	3.2	0.1949	4.912	0.779



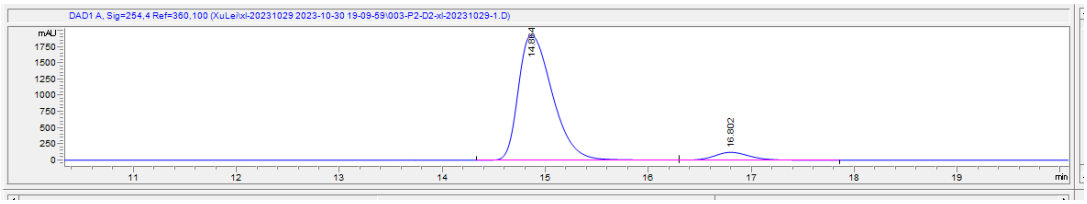
7g

```
Data File d:\Chem32\1\Data\XuLei\xl-20231029 2023-10-30 19-09-59\002-P2-D1-xl-20231029-1.D
Sample Name: xl-20231029-1

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   2
    Acq. Instrument : 1260-DAD                        Location :   P2-D-01
    Injection Date  : 10/30/2023 19:41:27                  Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Method          : d:\Chem32\1\Data\XuLei\xl-20231029 2023-10-30 19-09-59\XL-1.0-5%-30min.M (
                      Sequence Method)
    Last changed    : 10/30/2023 19:00:59 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

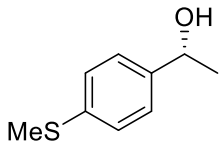


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	14.329	BB	31492.5	1480.8	0.3301	49.796	0.653
2	16	BB	31750	1365.1	0.3613	50.204	0.688

```
Data File d:\Chem32\1\Data\XuLei\xl-20231029 2023-10-30 19-09-59\003-P2-D2-xl-20231029-1.D
Sample Name: xl-20231029-1

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   3
    Acq. Instrument : 1260-DAD                        Location :   P2-D-02
    Injection Date  : 10/30/2023 20:12:16                  Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Method          : d:\Chem32\1\Data\XuLei\xl-20231029 2023-10-30 19-09-59\XL-1.0-5%-30min.M (
                      Sequence Method)
    Last changed    : 10/30/2023 19:00:59 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

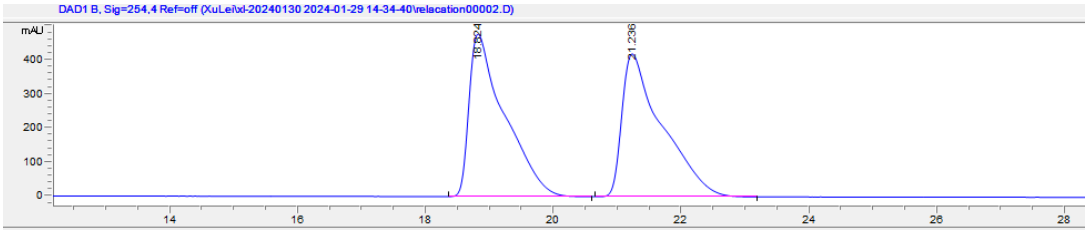


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	14.864	BV	44494	1940.7	0.3575	93.735	0.582
2	16.802	VB	2974.1	123.2	0.3716	6.265	0.83



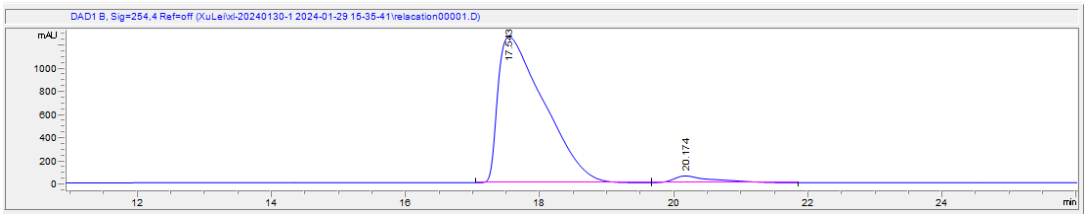
7h

```
Data File D:\ChemStation\1\Data\XuLei\xl-20240130 2024-01-29 14-34-40\relacation00002.D
Sample Name: xl-20240130-1

    ========================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   2
    Sample Operator : SYSTEM
    Acq. Instrument : LC                            Location :   P2-D-01
    Injection Date  : 29/01/2024 14:47:19               Inj :   1
                                                   Inj Volume : 1.000 µl
    Method          : D:\ChemStation\1\Data\XuLei\xl-20240130 2024-01-29 14-34-40\XL-0.8-5%-40MIN
                      -4.M (Sequence Method)
    Last changed    : 28/01/2024 17:47:28 by SYSTEM
```

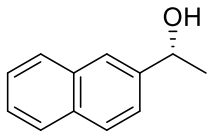


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	18.824	BB	18451.8	480.1	0.5344	50.048	0.315
2	21.236	BB	18416.7	422.1	0.6071	49.952	0.315

```
Data File D:\ChemStation\1\Data\XuLei\xl-20240130-1 2024-01-29 15-35-41\relacation00001.D
Sample Name: xl-20240130-2

    ========================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   1
    Sample Operator : SYSTEM
    Acq. Instrument : LC                            Location :   P2-D-02
    Injection Date  : 29/01/2024 15:37:19               Inj :   1
                                                   Inj Volume : 1.000 µl
    Acq. Method     : D:\ChemStation\1\Data\XuLei\xl-20240130-1 2024-01-29 15-35-41\XL-0.8-5%-
                      40MIN-4.M
    Last changed    : 29/01/2024 16:07:25 by SYSTEM
                      (modified after loading)
    Analysis Method : D:\ChemStation\1\Data\XuLei\xl-20240130-1 2024-01-29 15-35-41\XL-0.8-5%-
                      40MIN-4.M (Sequence Method)
    Last changed    : 29/01/2024 16:07:28 by SYSTEM
    Additional Info : Peak(s) manually integrated
```



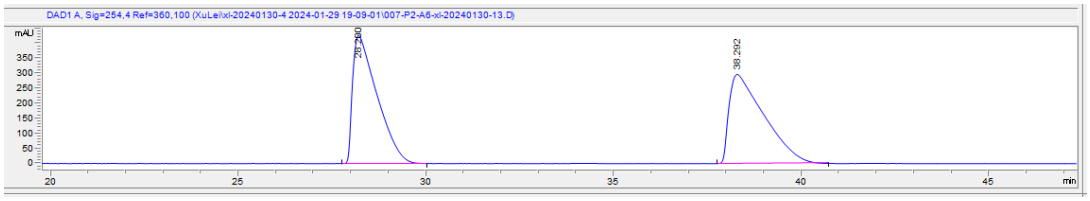
#	Time	Type	Area	Height	Width	Area%	Symmetry
1	17.543	BV	59846.6	1253.5	0.657	96.097	0.297
2	20.174	VB	2430.9	58.7	0.5695	3.903	0.374



7i

Data File d:\Chem32\...\XuLei\xl-20240130-4 2024-01-29 19-09-01\007-P2-A6-xl-20240130-13.D
Sample Name: xl-20240130-13

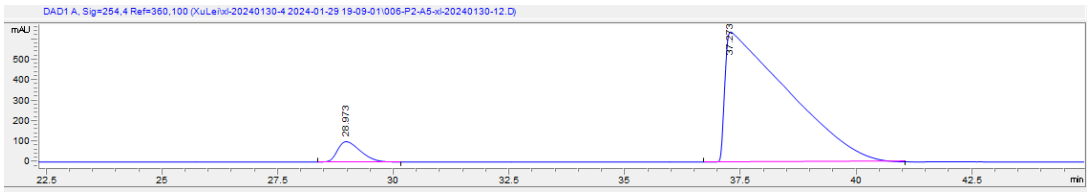
```
=====================================================================
Acq. Operator   : SYSTEM                       Seq. Line :   7
Acq. Instrument : 1260-DAD                     Location :   P2-A-06
Injection Date  : 1/29/2024 23:24:10               Inj :   1
                                             Inj Volume : 5.000 µl
Method          : d:\Chem32\1\Data\XuLei\xl-20240130-4 2024-01-29 19-09-01\XL-1.0-5%-50min.M
                  (Sequence Method)
Last changed    : 10/26/2023 09:35:00 by SYSTEM
```



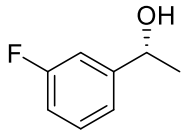
#	Time	Type	Area	Height	Width	Area%	Symmetry
1	28.2	BV R	19377.6	429.3	0.6166	49.968	0.305
2	38.292	BB	19402.1	298.2	0.879	50.032	0.282

Data File d:\Chem32\...\XuLei\xl-20240130-4 2024-01-29 19-09-01\006-P2-A5-xl-20240130-12.D
Sample Name: xl-20240130-12

```
=====================================================================
Acq. Operator   : SYSTEM                       Seq. Line :   6
Acq. Instrument : 1260-DAD                     Location :   P2-A-05
Injection Date  : 1/29/2024 22:33:17               Inj :   1
                                             Inj Volume : 5.000 µl
Method          : d:\Chem32\1\Data\XuLei\xl-20240130-4 2024-01-29 19-09-01\XL-1.0-5%-50min.M
                  (Sequence Method)
Last changed    : 10/26/2023 09:35:00 by SYSTEM
Additional Info : Peak(s) manually integrated
```

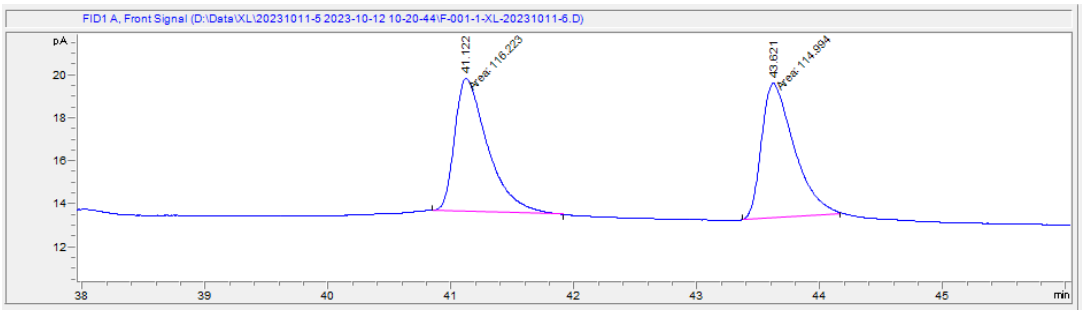


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	28.973	BV R	3430.9	99.7	0.4956	5.393	0.597
2	37.273	VB R	60182.3	639.7	1.1556	94.607	9.39E-2



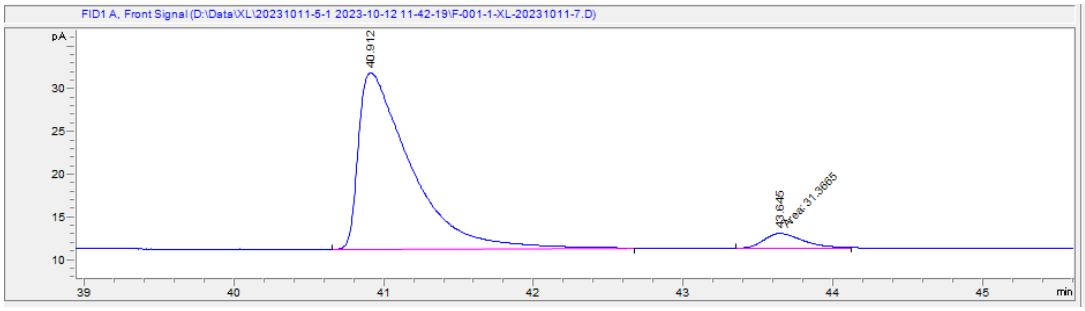
7j

```
Data File D:\Data\XL\20231011-5 2023-10-12 10-20-44\F-001-1-XL-20231011-6.D
Sample Name: XL-20231011-6

    ========================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   1
    Acq. Instrument : GC7890B                          Location :   1  (F)
    Injection Date  : 10/12/2023 10:22:48 AM               Inj :   1
                                                     Inj Volume : 2 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 5 µl
    Method          : D:\Data\XL\20231011-5 2023-10-12 10-20-44\20231011-1.M (Sequence Method)
    Last changed    : 10/11/2023 11:55:57 AM by SYSTEM
    Additional Info : Peak(s) manually integrated
```

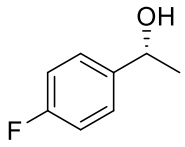


#	Time	Type	Area	Height	Width	Area%	Symmetı
1	41.122	MM	116.2	6.2	0.3136	50.266	0.514
2	43.621	MM	115	6.2	0.3071	49.734	0.536

```
Data File D:\Data\XL\20231011-5-1 2023-10-12 11-42-19\F-001-1-XL-20231011-7.D
Sample Name: XL-20231011-7

    ========================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   1
    Acq. Instrument : GC7890B                          Location :   1  (F)
    Injection Date  : 10/12/2023 11:44:15 AM               Inj :   1
                                                     Inj Volume : 2 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 5 µl
    Method          : D:\Data\XL\20231011-5-1 2023-10-12 11-42-19\20231011-1.M (Sequence Method)
    Last changed    : 10/11/2023 11:55:57 AM by SYSTEM
    Additional Info : Peak(s) manually integrated
```

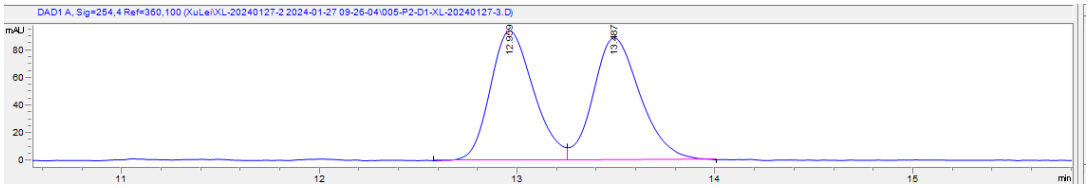


#	Time	Type	Area	Height	Width	Area%	Symmetı
1	40.912	BB	498.8	20.6	0.3157	94.083	0.278
2	43.645	MM	31.4	1.7	0.3039	5.917	0.653



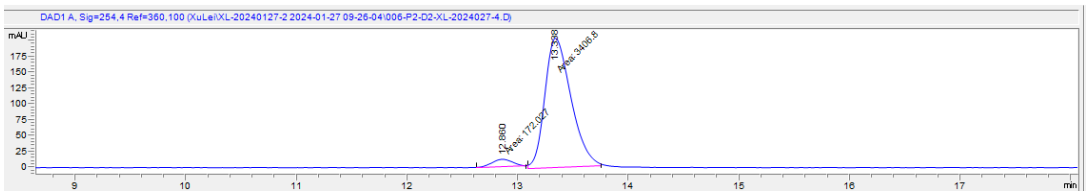
7k

```
Data File d:\Chem32\...a\XuLei\XL-20240127-2 2024-01-27 09-26-04\005-P2-D1-XL-20240127-3.D
Sample Name: XL-20240127-3

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   5
    Acq. Instrument : 1260-DAD                        Location :   P2-D-01
    Injection Date  : 1/27/2024 12:09:31                   Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Acq. Method     : d:\Chem32\1\Data\XuLei\XL-20240127-2 2024-01-27 09-26-04\0.75-3%-40min.M
    Last changed    : 1/27/2024 12:28:35 by SYSTEM
                      (modified after loading)
    Analysis Method : d:\Chem32\1\Data\XuLei\XL-20240127-2 2024-01-27 09-26-04\0.75-3%-40min.M (
                      Sequence Method)
    Last changed    : 1/27/2024 12:28:38 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

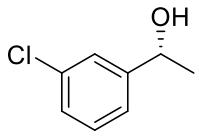


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	12.959	BV	1413.9	93	0.2313	49.407	0.776
2	13.487	VB	1447.9	87.7	0.2546	50.593	0.755

```
Data File d:\Chem32\...ta\XuLei\XL-20240127-2 2024-01-27 09-26-04\006-P2-D2-XL-2024027-4.D
Sample Name: XL-2024027-4

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   6
    Acq. Instrument : 1260-DAD                        Location :   P2-D-02
    Injection Date  : 1/27/2024 12:29:26                   Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Acq. Method     : d:\Chem32\1\Data\XuLei\XL-20240127-2 2024-01-27 09-26-04\0.75-3%-40min.M
    Last changed    : 1/27/2024 12:28:35 by SYSTEM
    Analysis Method : d:\Chem32\1\Data\XuLei\XL-20240127-2 2024-01-27 09-26-04\0.75-3%-40min.M (
                      Sequence Method)
    Last changed    : 1/27/2024 12:28:38 by SYSTEM
```

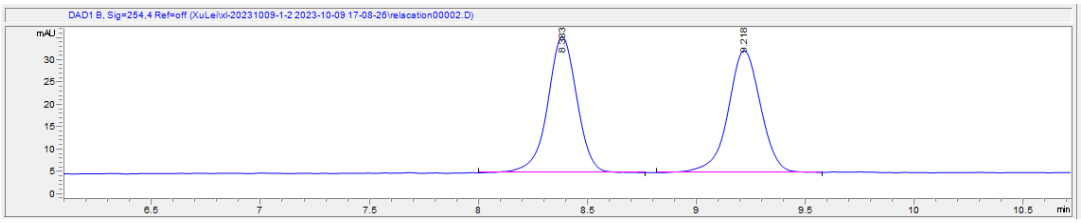


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	12.86	MM	172	12.5	0.2296	4.807	1.025
2	13.338	MM	3406.8	206.4	0.2751	95.193	0.669



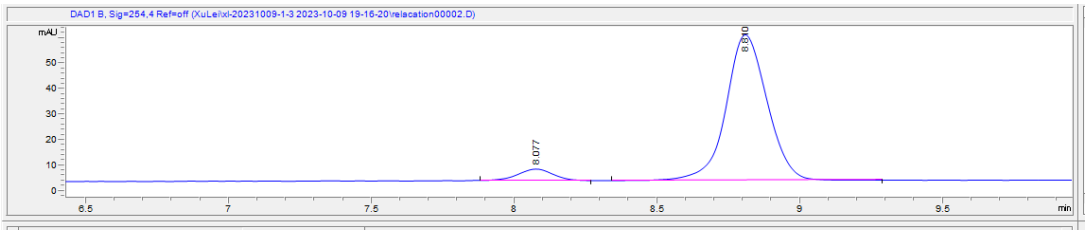
7l

```
Data File D:\ChemSta...\1\Data\XuLei\xl-20231009-1-2 2023-10-09 17-08-26\relacation00002.D
Sample Name: xl-20231009-1

    ==================================================================
    Acq. Operator   : SYSTEM                       Seq. Line :   2
    Sample Operator : SYSTEM
    Acq. Instrument : LC                           Location :   P2-D-01
    Injection Date  : 09/10/2023 17:20:36              Inj :   1
                                                  Inj Volume : 1.000 µl
    Method          : D:\ChemStation\1\Data\XuLei\xl-20231009-1-2 2023-10-09 17-08-26\XL-0.8-10%-
                      60MIN-4.M (Sequence Method)
    Last changed    : 09/10/2023 15:53:34 by SYSTEM
```

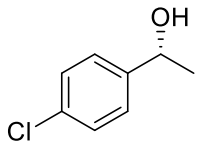


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	8.383	BB	287.1	30.6	0.1433	50.159	0.99
2	9.218	BB	285.3	27.5	0.1591	49.841	0.97

```
Data File D:\ChemSta...\1\Data\XuLei\xl-20231009-1-3 2023-10-09 19-16-20\relacation00002.D
Sample Name: xl-20231009-2

    ==================================================================
    Acq. Operator   : SYSTEM                       Seq. Line :   2
    Sample Operator : SYSTEM
    Acq. Instrument : LC                           Location :   P2-D-01
    Injection Date  : 09/10/2023 19:29:05              Inj :   1
                                                  Inj Volume : 1.000 µl
    Method          : D:\ChemStation\1\Data\XuLei\xl-20231009-1-3 2023-10-09 19-16-20\XL-0.8-10%-
                      30MIN-4.M (Sequence Method)
    Last changed    : 09/10/2023 18:34:29 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

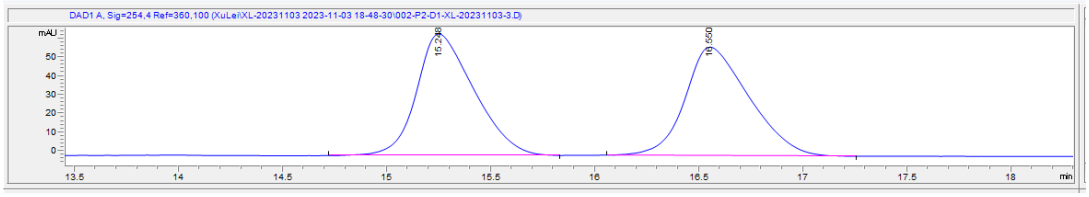


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	8.077	BB	38.6	4.5	0.1319	6.313	1.043
2	8.81	BB	572.6	57.1	0.155	93.687	0.878



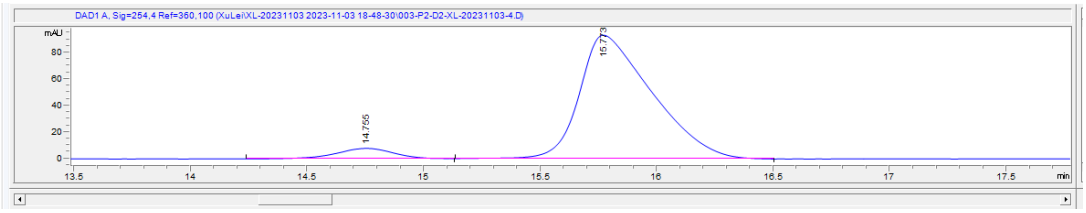
7m

```
Data File d:\Chem32\1\Data\XuLei\XL-20231103 2023-11-03 18-48-30\002-P2-D1-XL-20231103-3.D
Sample Name: XL-20231103-3

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   2
    Acq. Instrument : 1260-DAD                        Location :   P2-D-01
    Injection Date  : 11/3/2023 19:01:24                   Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 3.000 µl
    Method          : d:\Chem32\1\Data\XuLei\XL-20231103 2023-11-03 18-48-30\xl-0.8-5%-40min.M (
                      Sequence Method)
    Last changed    : 10/19/2023 09:28:17 by SYSTEM
```

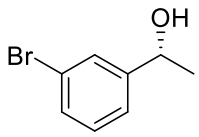


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	15.248	BB	1240.9	64.6	0.2842	50.124	0.626
2	16.55	BB	1234.7	57.6	0.326	49.876	0.63

```
Data File d:\Chem32\1\Data\XuLei\XL-20231103 2023-11-03 18-48-30\003-P2-D2-XL-20231103-4.D
Sample Name: XL-20231103-4

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   3
    Acq. Instrument : 1260-DAD                        Location :   P2-D-02
    Injection Date  : 11/3/2023 20:02:15                   Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 3.000 µl
    Method          : d:\Chem32\1\Data\XuLei\XL-20231103 2023-11-03 18-48-30\xl-0.8-5%-40min.M (
                      Sequence Method)
    Last changed    : 10/19/2023 09:28:17 by SYSTEM
```

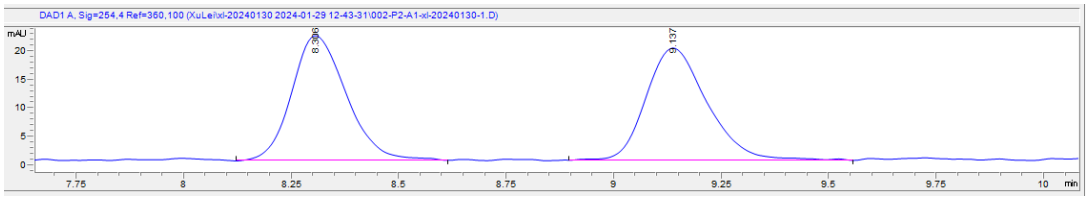


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	14.755	BB	134.3	7.9	0.2613	6.195	1.136
2	15.773	BB	2032.8	93.8	0.3148	93.805	0.488



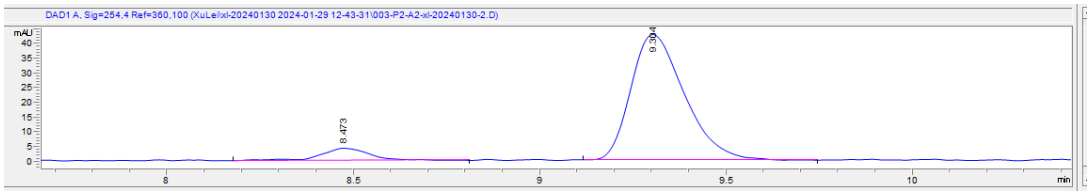
7n

```
Data File d:\Chem32\1\Data\XuLei\xl-20240130 2024-01-29 12-43-31\002-P2-A1-xl-20240130-1.D
Sample Name: xl-20240130-1

    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   2
    Acq. Instrument : 1260-DAD                      Location :   P2-A-01
    Injection Date  : 1/29/2024 13:06:16                 Inj :   1
                                                  Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Method          : d:\Chem32\1\Data\XuLei\xl-20240130 2024-01-29 12-43-31\XL-1.0-5%-20min.M (
                      Sequence Method)
    Last changed    : 10/13/2023 17:56:57 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

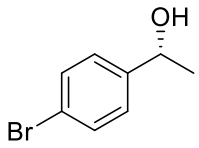


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	8.306	BB	195.9	22.1	0.1353	49.925	0.746
2	9.137	BV R	196.5	19.9	0.1514	50.075	0.748

```
Data File d:\Chem32\1\Data\XuLei\xl-20240130 2024-01-29 12-43-31\003-P2-A2-xl-20240130-2.D
Sample Name: xl-20240130-2

    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   3
    Acq. Instrument : 1260-DAD                      Location :   P2-A-02
    Injection Date  : 1/29/2024 13:27:06                 Inj :   1
                                                  Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Method          : d:\Chem32\1\Data\XuLei\xl-20240130 2024-01-29 12-43-31\XL-1.0-5%-20min.M (
                      Sequence Method)
    Last changed    : 10/13/2023 17:56:57 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

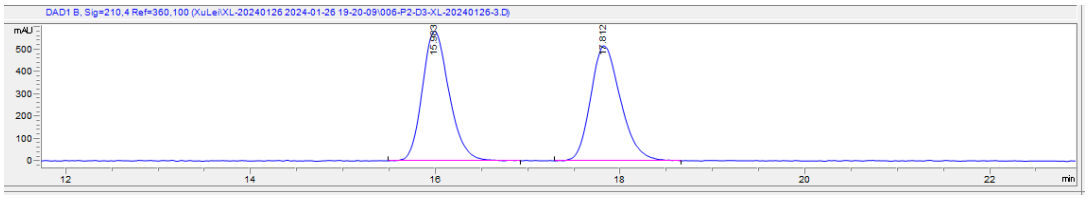


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	8.473	VB R	40.4	4.2	0.1438	8.677	0.846
2	9.304	BB	425	42.6	0.1524	91.323	0.661



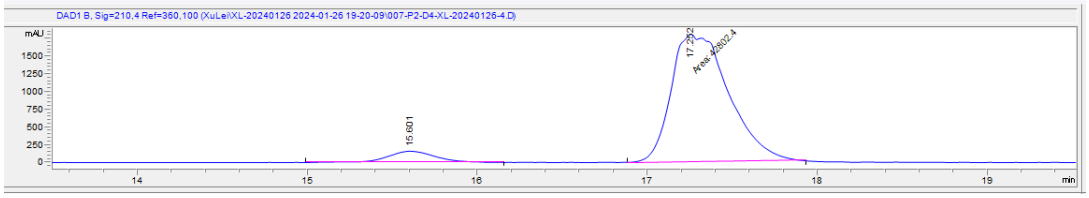
7o

```
Data File d:\Chem32\1\Data\XuLei\XL-20240126 2024-01-26 19-20-09\006-P2-D3-XL-20240126-3.D
Sample Name: XL-20240126-3

    ========================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   6
    Acq. Instrument : 1260-DAD                        Location :   P2-D-03
    Injection Date  : 1/26/2024 22:44:47                   Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Acq. Method     : d:\Chem32\1\Data\XuLei\XL-20240126 2024-01-26 19-20-09\0.75-3%-40min.M
    Last changed    : 1/26/2024 23:16:59 by SYSTEM
                      (modified after loading)
    Analysis Method : d:\Chem32\1\Data\XuLei\XL-20240126 2024-01-26 19-20-09\0.75-3%-40min.M (
                      Sequence Method)
    Last changed    : 1/26/2024 23:37:24 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

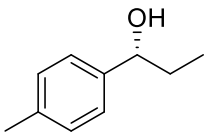


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	15.983	VV R	11661.5	577.7	0.3032	50.201	0.805
2	17.812	VV R	11567.9	513.2	0.3206	49.799	0.751

```
Data File d:\Chem32\1\Data\XuLei\XL-20240126 2024-01-26 19-20-09\007-P2-D4-XL-20240126-4.D
Sample Name: XL-20240126-4

    ========================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   7
    Acq. Instrument : 1260-DAD                        Location :   P2-D-04
    Injection Date  : 1/26/2024 23:17:50                   Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Acq. Method     : d:\Chem32\1\Data\XuLei\XL-20240126 2024-01-26 19-20-09\0.75-3%-40min.M
    Last changed    : 1/26/2024 23:37:21 by SYSTEM
                      (modified after loading)
    Analysis Method : d:\Chem32\1\Data\XuLei\XL-20240126 2024-01-26 19-20-09\0.75-3%-40min.M (
                      Sequence Method)
    Last changed    : 1/26/2024 23:37:24 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

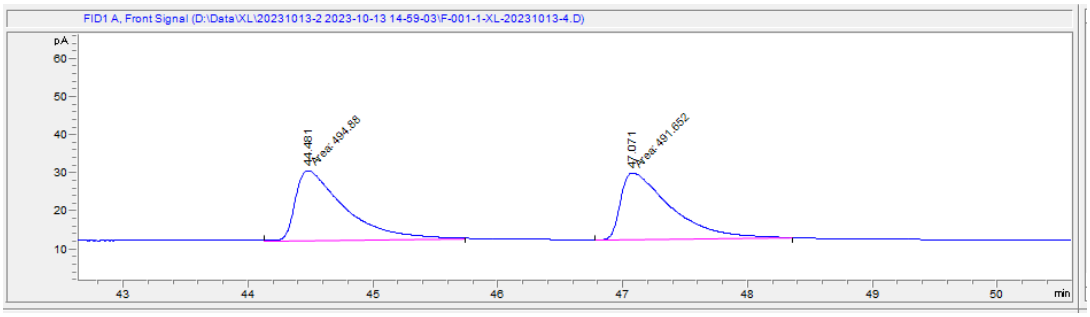


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	15.601	VB R	3148.9	158.6	0.2786	6.853	0.931
2	17.252	MM	42802.4	1803.2	0.3956	93.147	0.509



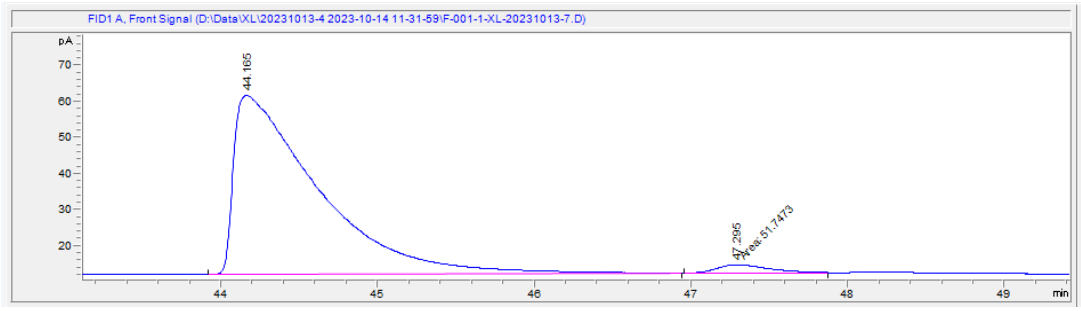
7p

```
Data File D:\Data\XL\20231013-2 2023-10-13 14-59-03\F-001-1-XL-20231013-4.D
Sample Name: XL-20231013-4

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   1
    Acq. Instrument : GC7890B                         Location :   1  (F)
    Injection Date  : 10/13/2023 3:01:00 PM               Inj :   1
                                                    Inj Volume : 2 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 5 µl
    Method          : D:\Data\XL\20231013-2 2023-10-13 14-59-03\20231011-1.M (Sequence Method)
    Last changed    : 10/11/2023 11:55:57 AM by SYSTEM
    Additional Info : Peak(s) manually integrated
```

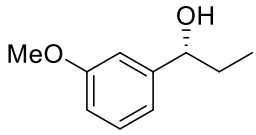


#	Time	Type	Area	Height	Width	Area%	Symmetı
1	44.481	MM	494.9	18.3	0.4515	50.164	0.331
2	47.071	MM	491.7	17.5	0.4681	49.836	0.269

```
Data File D:\Data\XL\20231013-4 2023-10-14 11-31-59\F-001-1-XL-20231013-7.D
Sample Name: XL-20231013-7

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   1
    Acq. Instrument : GC7890B                         Location :   1  (F)
    Injection Date  : 10/14/2023 11:34:02 AM              Inj :   1
                                                    Inj Volume : 2 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 5 µl
    Method          : D:\Data\XL\20231013-4 2023-10-14 11-31-59\20231011-1.M (Sequence Method)
    Last changed    : 10/11/2023 11:55:57 AM by SYSTEM
    Additional Info : Peak(s) manually integrated
```

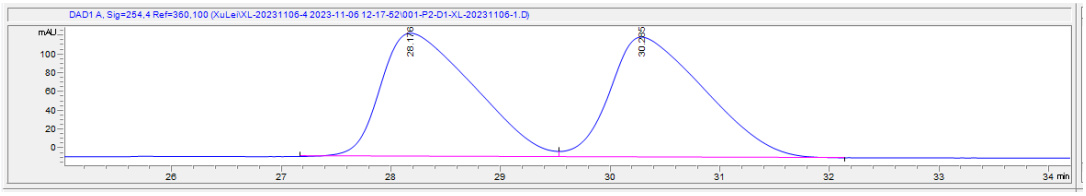


#	Time	Type	Area	Height	Width	Area%	Symmetı
1	44.165	BB	1849.3	49.7	0.4645	97.278	0.163
2	47.295	MM	51.7	2.3	0.3811	2.722	0.619



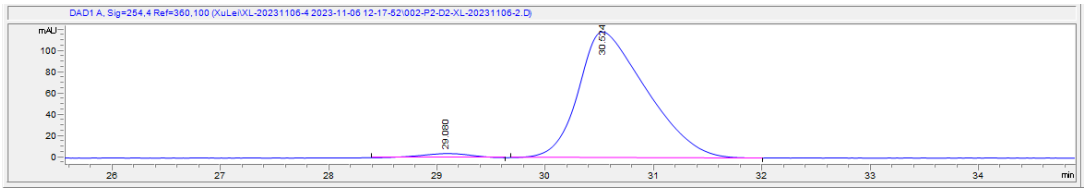
7q

```
Data File d:\Chem32\...a\XuLei\XL-20231106-4 2023-11-06 12-17-52\001-P2-D1-XL-20231106-1.D
Sample Name: XL-20231106-1

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   1
    Acq. Instrument : 1260-DAD                        Location :   P2-D-01
    Injection Date  : 11/6/2023 12:20:57                   Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 2.000 µl
    Method          : d:\Chem32\1\Data\XuLei\XL-20231106-4 2023-11-06 12-17-52\xl-0.5-5%-50min.M
                      (Sequence Method)
    Last changed    : 11/6/2023 11:39:58 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

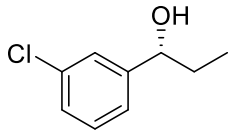


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	28.176	BV	7706.6	131	0.8343	50.181	0.456
2	30.285	VB	7651.2	127.4	0.8248	49.819	0.492

```
Data File d:\Chem32\...a\XuLei\XL-20231106-4 2023-11-06 12-17-52\002-P2-D2-XL-20231106-2.D
Sample Name: XL-20231106-2

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   2
    Acq. Instrument : 1260-DAD                        Location :   P2-D-02
    Injection Date  : 11/6/2023 13:11:47                   Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 2.000 µl
    Method          : d:\Chem32\1\Data\XuLei\XL-20231106-4 2023-11-06 12-17-52\xl-0.5-5%-50min.M
                      (Sequence Method)
    Last changed    : 11/6/2023 11:39:58 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

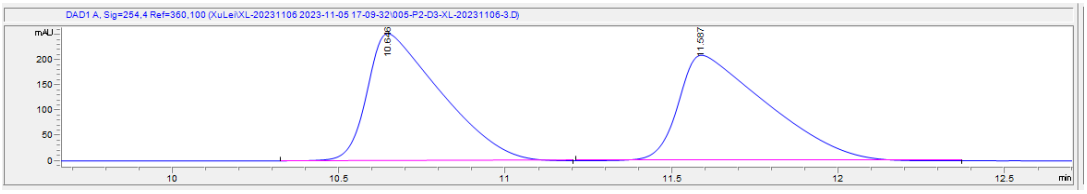


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	29.08	BB	125	3.9	0.3903	2.372	1.06
2	30.524	BB	5147	118.1	0.6342	97.628	0.537



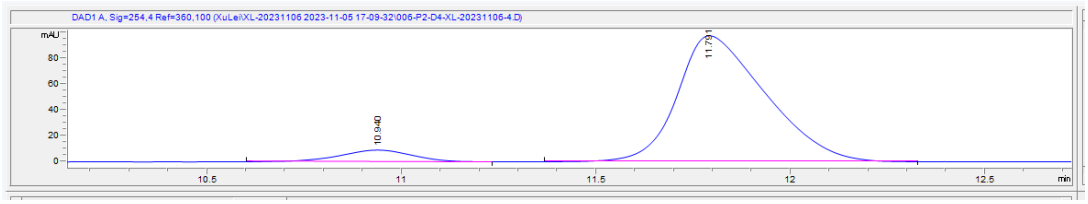
7r

```
Data File d:\Chem32\1\Data\XuLei\XL-20231106 2023-11-05 17-09-32\005-P2-D3-XL-20231106-3.D
Sample Name: XL-20231106-3

    ==================================================================
    Acq. Operator   : SYSTEM                       Seq. Line :   5
    Acq. Instrument : 1260-DAD                      Location :   P2-D-03
    Injection Date  : 11/5/2023 19:15:59                Inj :   1
                                                  Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 3.000 µl
    Method          : d:\Chem32\1\Data\XuLei\XL-20231106 2023-11-05 17-09-32\xl-0.8-5%-50min.M (
                      Sequence Method)
    Last changed    : 11/5/2023 13:24:11 by SYSTEM
```

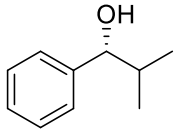


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	10.646	BB	3853.1	251.4	0.2268	49.949	0.372
2	11.587	BB	3861	208.5	0.27	50.051	0.336

```
Data File d:\Chem32\1\Data\XuLei\XL-20231106 2023-11-05 17-09-32\006-P2-D4-XL-20231106-4.D
Sample Name: XL-20231106-4

    ==================================================================
    Acq. Operator   : SYSTEM                       Seq. Line :   6
    Acq. Instrument : 1260-DAD                      Location :   P2-D-04
    Injection Date  : 11/5/2023 20:06:49                Inj :   1
                                                  Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 3.000 µl
    Method          : d:\Chem32\1\Data\XuLei\XL-20231106 2023-11-05 17-09-32\xl-0.8-5%-50min.M (
                      Sequence Method)
    Last changed    : 11/5/2023 13:24:11 by SYSTEM
```

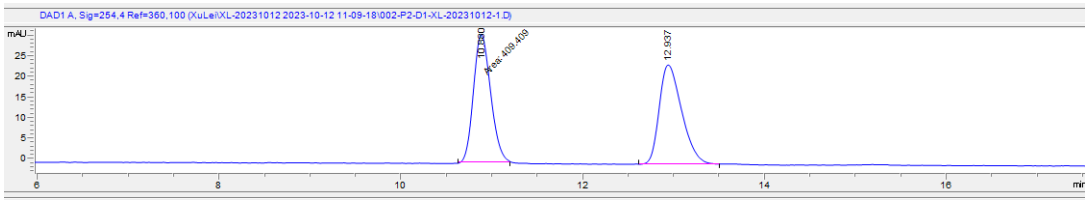


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	10.94	BB	118.1	9	0.1965	7.136	1.108
2	11.791	BB	1536.6	97.2	0.2344	92.864	0.566



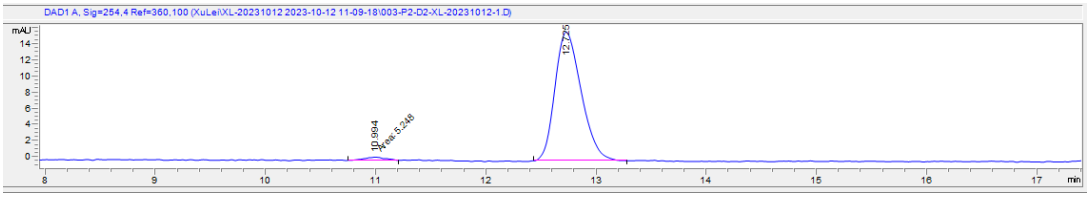
7s

```
Data File d:\Chem32\1\Data\XuLei\XL-20231012 2023-10-12 11-09-18\002-P2-D1-XL-20231012-1.D
Sample Name: XL-20231012-1

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   2
    Acq. Instrument : 1260-DAD                        Location :   P2-D-01
    Injection Date  : 10/12/2023 11:21:51                  Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Method          : d:\Chem32\1\Data\XuLei\XL-20231012 2023-10-12 11-09-18\XL-OD-H-1.0-2%-20min
                      .M (Sequence Method)
    Last changed    : 10/12/2023 11:00:37 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

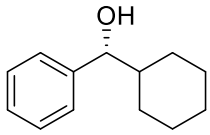


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	10.88	MM	409.4	31	0.2198	49.878	0.8
2	12.937	BB	411.4	24	0.2583	50.122	0.638

```
Data File d:\Chem32\1\Data\XuLei\XL-20231012 2023-10-12 11-09-18\003-P2-D2-XL-20231012-1.D
Sample Name: XL-20231012-1

    ======================================================================
    Acq. Operator   : SYSTEM                          Seq. Line :   3
    Acq. Instrument : 1260-DAD                        Location :   P2-D-02
    Injection Date  : 10/12/2023 11:42:40                  Inj :   1
                                                    Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Method          : d:\Chem32\1\Data\XuLei\XL-20231012 2023-10-12 11-09-18\XL-OD-H-1.0-2%-20min
                      .M (Sequence Method)
    Last changed    : 10/12/2023 11:00:37 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

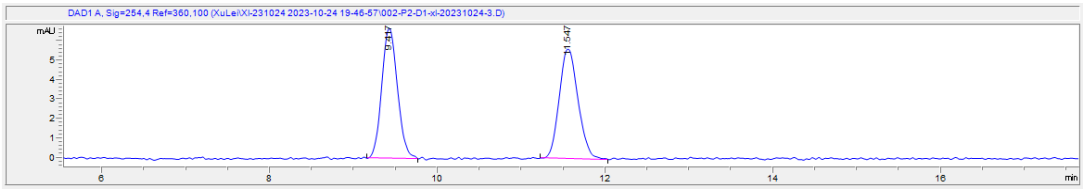


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	10.994	MM	5.2	4.1E-1	0.2153	1.941	1.087
2	12.725	BB	265.1	16	0.2557	98.059	0.718



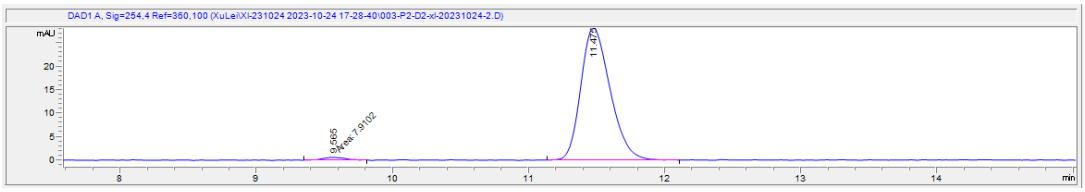
7t

```
Data File d:\Chem32\1\Data\XuLei\Xl-231024 2023-10-24 19-46-57\002-P2-D1-xl-20231024-3.D
Sample Name: xl-20231024-3

    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   2
    Acq. Instrument : 1260-DAD                      Location :   P2-D-01
    Injection Date  : 10/24/2023 19:58:13               Inj :   1
                                                  Inj Volume : 5.000 µl
    Method          : d:\Chem32\1\Data\XuLei\Xl-231024 2023-10-24 19-46-57\xl-0.8-5%-40min.M (
                      Sequence Method)
    Last changed    : 10/19/2023 09:28:17 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

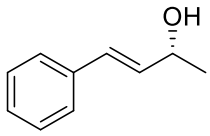


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	9.417	BB	87.2	6.7	0.2043	49.847	0.874
2	11.547	BB	87.7	5.6	0.2319	50.153	0.833

```
Data File d:\Chem32\1\Data\XuLei\Xl-231024 2023-10-24 17-28-40\003-P2-D2-xl-20231024-2.D
Sample Name: xl-20231024-2

    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   3
    Acq. Instrument : 1260-DAD                      Location :   P2-D-02
    Injection Date  : 10/24/2023 18:40:44               Inj :   1
                                                  Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Method          : d:\Chem32\1\Data\XuLei\Xl-231024 2023-10-24 17-28-40\xl-0.8-5%-40min.M (
                      Sequence Method)
    Last changed    : 10/19/2023 09:28:17 by SYSTEM
    Additional Info : Peak(s) manually integrated
```



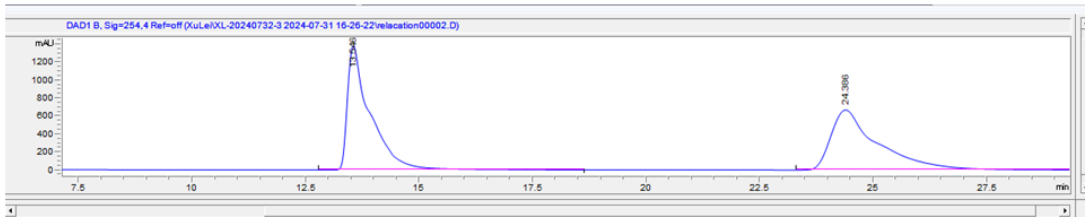
#	Time	Type	Area	Height	Width	Area%	Symmetry
1	9.565	MM	7.9	6.3E-1	0.2106	1.839	0.93
2	11.475	BB	422.3	28.3	0.2302	98.161	0.716



9a

Data File D:\ChemStation\1\Data\XuLei\XL-20240732-3 2024-07-31 16-26-22\relacation00002.D
Sample Name: XL-20240732-2

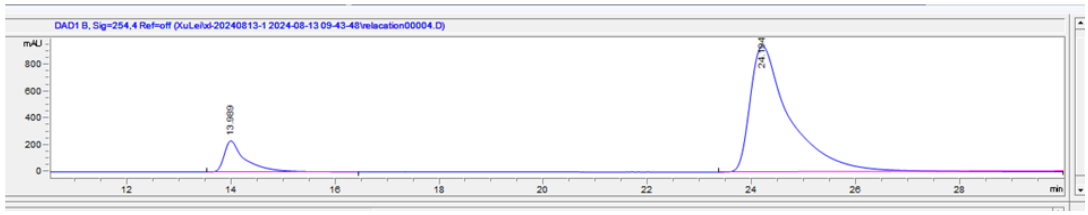
```
======================================================================
Acq. Operator   : SYSTEM                        Seq. Line :   2
Sample Operator : SYSTEM
Acq. Instrument : LC                            Location :   P2-D-05
Injection Date  : 31/07/2024 16:53:44               Inj :   1
                                               Inj Volume : 1.000 µl
Method          : D:\ChemStation\1\Data\XuLei\XL-20240732-3 2024-07-31 16-26-22\XL-1.0-5%-
                  30MIN-2.M (Sequence Method)
Last changed    : 31/07/2024 16:22:21 by SYSTEM
Additional Info : Peak(s) manually integrated
```



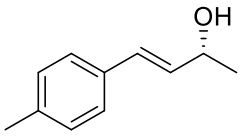
#	Time	Type	Area	Height	Width	Area%	Symmetry
1	13.546	BB	49223.6	1394.5	0.4858	50.212	0.307
2	24.386	BBA	48808.3	674.4	1.0163	49.788	0.402

Data File D:\ChemStation\1\Data\XuLei\xl-20240813-1 2024-08-13 09-43-48\relacation00004.D
Sample Name: xl-20240813-3

```
======================================================================
Acq. Operator   : SYSTEM                        Seq. Line :   4
Sample Operator : SYSTEM
Acq. Instrument : LC                            Location :   P2-D-03
Injection Date  : 13/08/2024 10:59:38               Inj :   1
                                               Inj Volume : 1.000 µl
Method          : D:\ChemStation\1\Data\XuLei\xl-20240813-1 2024-08-13 09-43-48\XL-1.0-5%-
                  30MIN-2.M (Sequence Method)
Last changed    : 31/07/2024 16:22:21 by SYSTEM
Additional Info : Peak(s) manually integrated
```

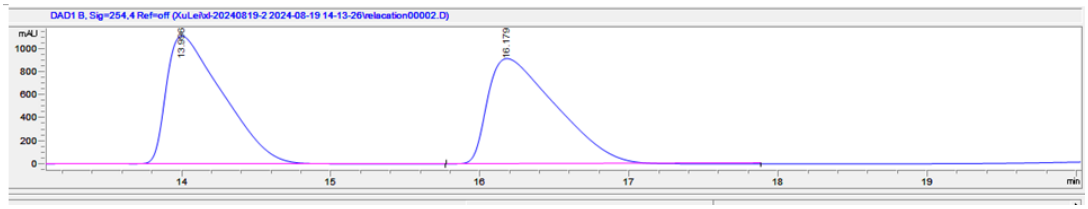


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	13.989	BB	6580.4	233.7	0.3965	11.450	0.409
2	24.194	BBA	50890.3	948.8	0.7658	88.550	0.389



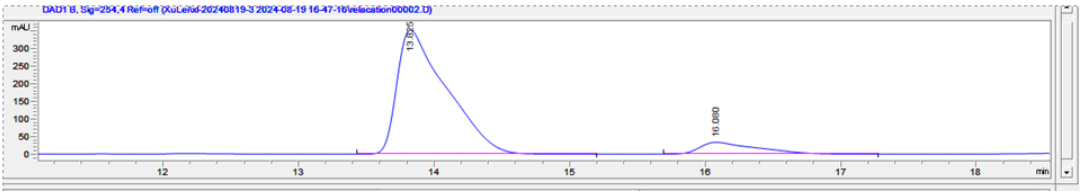
9b

```
Data File D:\ChemStation\1\Data\XuLei\xl-20240819-2 2024-08-19 14-13-26\relacation00002.D
Sample Name: xl-20240819-2

    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   2
    Sample Operator : SYSTEM
    Acq. Instrument : LC                             Location :   P2-D-01
    Injection Date  : 19/08/2024 14:26:08                 Inj :   1
                                                  Inj Volume : 1.000 µl
    Method          : D:\ChemStation\1\Data\XuLei\xl-20240819-2 2024-08-19 14-13-26\XL-1.0-5%-
                      30MIN-3.M (Sequence Method)
    Last changed    : 31/07/2024 16:22:47 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

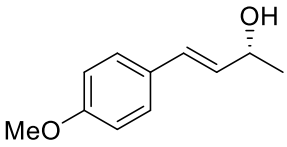


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	13.996	VB R	29383.2	1120.4	0.3796	50.026	0.356
2	16.179	BB	29352.4	922.3	0.4713	49.974	0.368

```
Data File D:\ChemStation\1\Data\XuLei\xl-20240819-3 2024-08-19 16-47-16\relacation00002.D
Sample Name: xl-20240819-5

    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   2
    Sample Operator : SYSTEM
    Acq. Instrument : LC                             Location :   P2-D-02
    Injection Date  : 19/08/2024 17:00:29                 Inj :   1
                                                  Inj Volume : 1.000 µl
    Method          : D:\ChemStation\1\Data\XuLei\xl-20240819-3 2024-08-19 16-47-16\XL-1.0-5%-
                      30MIN-3.M (Sequence Method)
    Last changed    : 31/07/2024 16:22:47 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

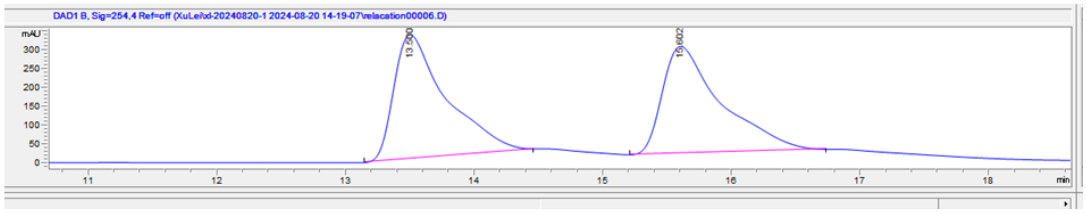


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	13.825	BB	8975	355.8	0.3483	90.201	0.35
2	16.08	BB	975	33.7	0.3992	9.799	0.38



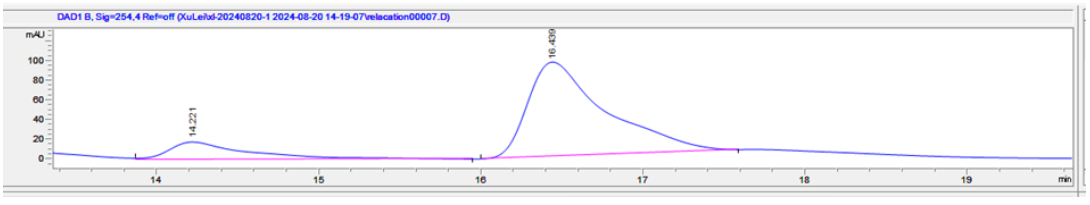
9c

```
Data File D:\ChemStation\1\Data\XuLei\xl-20240820-1 2024-08-20 14-19-07\relacation00006.D
Sample Name: xl-20240820-9

    ======================================================================
    Acq. Operator   : SYSTEM                       Seq. Line :   6
    Sample Operator : SYSTEM
    Acq. Instrument : LC                           Location :   P2-D-05
    Injection Date  : 20/08/2024 16:34:27              Inj :   1
                                                  Inj Volume : 1.000 µl
    Acq. Method     : D:\ChemStation\1\Data\XuLei\xl-20240820-1 2024-08-20 14-19-07\XL-1.0-5%-
                      30MIN-2.M
    Last changed    : 20/08/2024 16:55:30 by SYSTEM
                      (modified after loading)
    Analysis Method : D:\ChemStation\1\Data\XuLei\xl-20240820-1 2024-08-20 14-19-07\XL-1.0-5%-
                      30MIN-2.M (Sequence Method)
    Last changed    : 20/08/2024 17:21:21 by SYSTEM
```

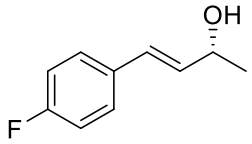


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	13.5	BB	9265.7	329.8	0.4037	50.816	0.42
2	15.602	BB	8968.1	284	0.4544	49.184	0.417

```
Data File D:\ChemStation\1\Data\XuLei\xl-20240820-1 2024-08-20 14-19-07\relacation00007.D
Sample Name: xl-20240820-10

    ======================================================================
    Acq. Operator   : SYSTEM                       Seq. Line :   7
    Sample Operator : SYSTEM
    Acq. Instrument : LC                           Location :   P2-D-06
    Injection Date  : 20/08/2024 16:56:18              Inj :   1
                                                  Inj Volume : 1.000 µl
    Acq. Method     : D:\ChemStation\1\Data\XuLei\xl-20240820-1 2024-08-20 14-19-07\XL-1.0-5%-
                      30MIN-2.M
    Last changed    : 20/08/2024 16:57:11 by SYSTEM
                      (modified after loading)
    Analysis Method : D:\ChemStation\1\Data\XuLei\xl-20240820-1 2024-08-20 14-19-07\XL-1.0-5%-
                      30MIN-2.M (Sequence Method)
    Last changed    : 20/08/2024 17:21:21 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

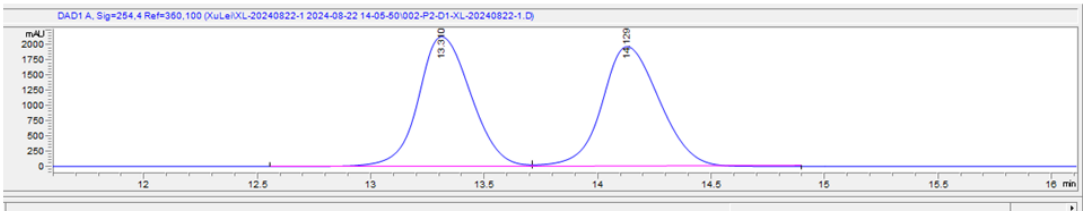


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	14.221	VB	620.8	17.8	0.4806	16.331	0.379
2	16.439	BB	3180.9	95.7	0.4777	83.669	0.433



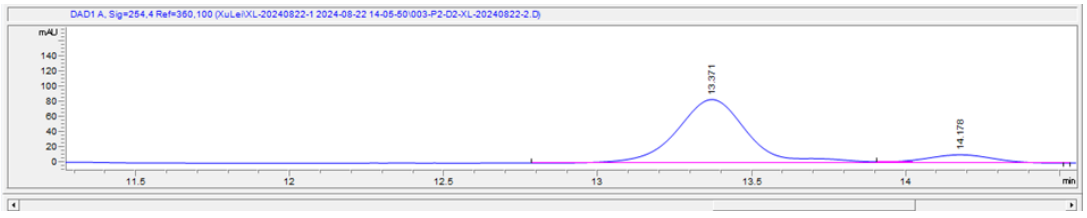
9d

```
Data File d:\Chem32\...a\XuLei\XL-20240822-1 2024-08-22 14-05-50\002-P2-D1-XL-20240822-1.D
Sample Name: XL-20240822-1

    ======================================================================
    Acq. Operator   : SYSTEM                       Seq. Line :   2
    Acq. Instrument : 1260-DAD                     Location :   P2-D-01
    Injection Date  : 8/22/2024 14:19:46               Inj :   1
                                                  Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Acq. Method     : d:\Chem32\1\Data\XuLei\XL-20240822-1 2024-08-22 14-05-50\XL-1.0-5%-30min.M
    Last changed    : 8/22/2024 14:35:07 by SYSTEM
                      (modified after loading)
    Analysis Method : d:\Chem32\1\Data\XuLei\XL-20240822-1 2024-08-22 14-05-50\XL-1.0-5%-30min.M
                      (Sequence Method)
    Last changed    : 8/22/2024 14:36:49 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

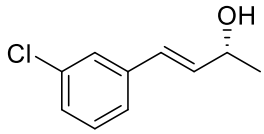


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	13.31	BV	34828.7	2159.5	0.2502	49.703	0.79
2	14.129	VB	35245.2	1994.8	0.2721	50.297	0.773

```
Data File d:\Chem32\...a\XuLei\XL-20240822-1 2024-08-22 14-05-50\003-P2-D2-XL-20240822-2.D
Sample Name: XL-20240822-2

    ======================================================================
    Acq. Operator   : SYSTEM                       Seq. Line :   3
    Acq. Instrument : 1260-DAD                     Location :   P2-D-02
    Injection Date  : 8/22/2024 14:37:36               Inj :   1
                                                  Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Acq. Method     : d:\Chem32\1\Data\XuLei\XL-20240822-1 2024-08-22 14-05-50\XL-1.0-5%-30min.M
    Last changed    : 8/22/2024 14:35:07 by SYSTEM
    Analysis Method : d:\Chem32\1\Data\XuLei\XL-20240822-1 2024-08-22 14-05-50\XL-1.0-5%-30min.M
                      (Sequence Method)
    Last changed    : 8/22/2024 14:36:49 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

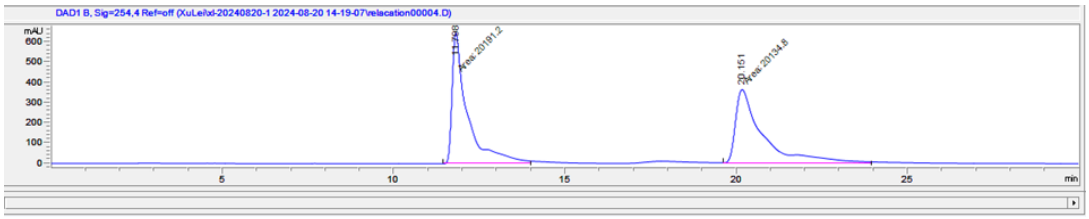


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	13.371	BV R	1360.7	84.1	0.2448	89.459	0.921
2	14.178	VB E	160.3	10.9	0.2302	10.541	0.975



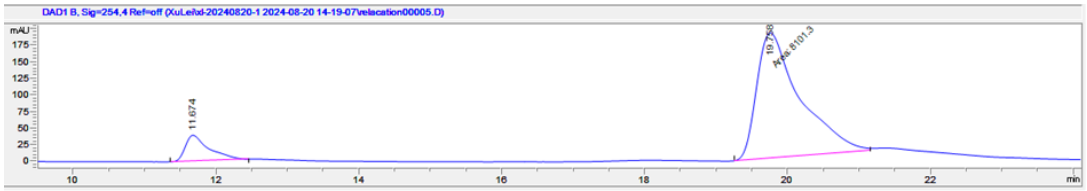
9e

```
Data File D:\ChemStation\1\Data\XuLei\xl-20240820-1 2024-08-20 14-19-07\relacation00004.D
Sample Name: xl-20240820-7

    ======================================================================
    Acq. Operator   : SYSTEM                       Seq. Line :   4
    Sample Operator : SYSTEM
    Acq. Instrument : LC                           Location :   P2-D-03
    Injection Date  : 20/08/2024 15:32:51              Inj :   1
                                                  Inj Volume : 1.000 µl
    Acq. Method     : D:\ChemStation\1\Data\XuLei\xl-20240820-1 2024-08-20 14-19-07\XL-1.0-5%-
                      30MIN-2.M
    Last changed    : 31/07/2024 16:22:21 by SYSTEM
    Analysis Method : D:\ChemStation\1\Data\XuLei\xl-20240820-1 2024-08-20 14-19-07\XL-1.0-5%-
                      30MIN-2.M (Sequence Method)
    Last changed    : 20/08/2024 17:21:21 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

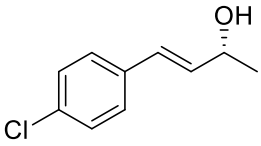


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	11.798	MM	20191.2	646.2	0.5208	50.070	0.31
2	20.151	MM	20134.8	364.5	0.9205	49.930	0.309

```
Data File D:\ChemStation\1\Data\XuLei\xl-20240820-1 2024-08-20 14-19-07\relacation00005.D
Sample Name: xl-20240820-8

    ======================================================================
    Acq. Operator   : SYSTEM                       Seq. Line :   5
    Sample Operator : SYSTEM
    Acq. Instrument : LC                           Location :   P2-D-04
    Injection Date  : 20/08/2024 16:03:40              Inj :   1
                                                  Inj Volume : 1.000 µl
    Acq. Method     : D:\ChemStation\1\Data\XuLei\xl-20240820-1 2024-08-20 14-19-07\XL-1.0-5%-
                      30MIN-2.M
    Last changed    : 31/07/2024 16:22:21 by SYSTEM
    Analysis Method : D:\ChemStation\1\Data\XuLei\xl-20240820-1 2024-08-20 14-19-07\XL-1.0-5%-
                      30MIN-2.M (Sequence Method)
    Last changed    : 20/08/2024 17:21:21 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

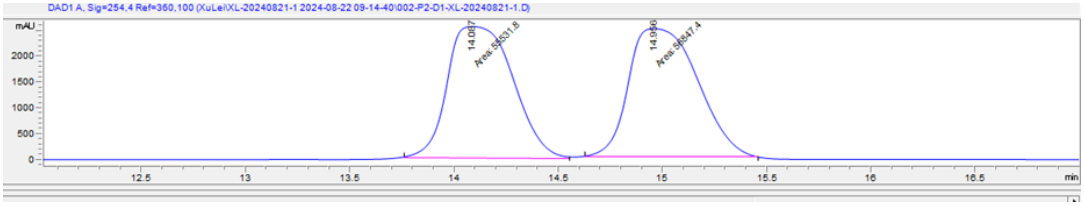


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	11.674	BB	898.9	39.1	0.3299	9.987	0.444
2	19.758	MM	8101.3	190.9	0.7074	90.013	0.446



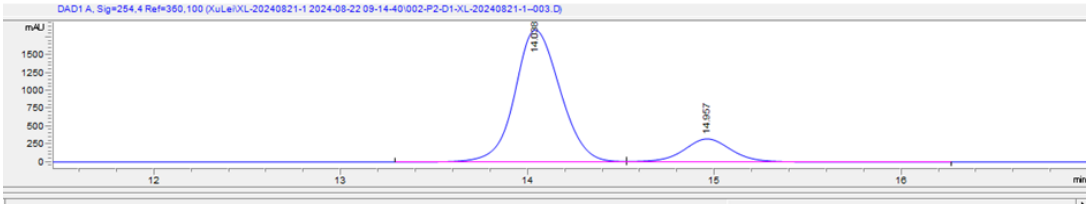
9f

```
Data File d:\Chem32\...a\XuLei\XL-20240821-1 2024-08-22 09-14-40\002-P2-D1-XL-20240821-1.D
Sample Name: XL-20240821-1

    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   2
    Acq. Instrument : 1260-DAD                      Location :   P2-D-01
    Injection Date  : 8/22/2024 09:28:41                Inj :   1
                                                   Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Acq. Method     : d:\Chem32\1\Data\XuLei\XL-20240821-1 2024-08-22 09-14-40\XL-1.0-5%-30min.M
    Last changed    : 8/22/2024 09:45:37 by SYSTEM
                      (modified after loading)
    Analysis Method : d:\Chem32\1\Data\XuLei\XL-20240821-1 2024-08-22 09-14-40\XL-1.0-5%-30min.M
                      (Sequence Method)
    Last changed    : 8/22/2024 09:45:44 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

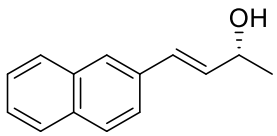


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	14.087	MM	55531.8	2535.2	0.3651	49.415	0.615
2	14.956	MM	56847.4	2469.3	0.3837	50.585	0.564

```
Data File d:\Chem32\...ei\XL-20240821-1 2024-08-22 09-14-40\002-P2-D1-XL-20240821-1--003.D
Sample Name: XL-20240821-2

    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   3
    Acq. Instrument : 1260-DAD                      Location :   P2-D-02
    Injection Date  : 8/22/2024 09:46:31                Inj :   1
                                                   Inj Volume : 5.000 µl
    Different Inj Volume from Sample Entry!  Actual Inj Volume : 1.000 µl
    Acq. Method     : d:\Chem32\1\Data\XuLei\XL-20240821-1 2024-08-22 09-14-40\XL-1.0-5%-30min.M
    Last changed    : 8/22/2024 09:45:37 by SYSTEM
    Analysis Method : d:\Chem32\1\Data\XuLei\XL-20240821-1 2024-08-22 09-14-40\XL-1.0-5%-30min.M
                      (Sequence Method)
    Last changed    : 8/22/2024 09:45:44 by SYSTEM
    Additional Info : Peak(s) manually integrated
```

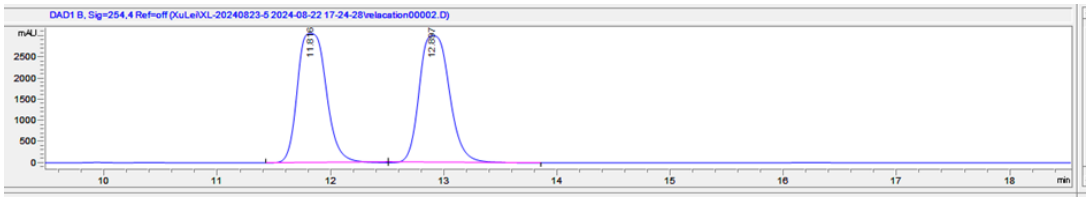


#	Time	Type	Area	Height	Width	Area%	Symmetry
1	14.038	BV	31496.7	1866.7	0.2608	84.309	0.826
2	14.957	VB	5861.8	327.4	0.2729	15.691	0.945



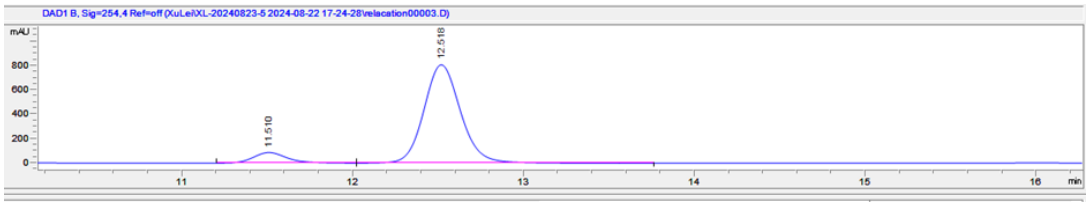
9g

```
Data File D:\ChemStation\1\Data\XuLei\XL-20240823-5 2024-08-22 17-24-28\relacation00002.D
Sample Name: XL-20240823-10

    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   2
    Sample Operator : SYSTEM
    Acq. Instrument : LC                            Location :   P2-D-01
    Injection Date  : 22/08/2024 17:36:32               Inj :   1
                                                  Inj Volume : 1.000 µl
    Acq. Method     : D:\ChemStation\1\Data\XuLei\XL-20240823-5 2024-08-22 17-24-28\XL-1.0-5%-
                      50MIN-4.M
    Last changed    : 22/08/2024 18:06:21 by SYSTEM
                      (modified after loading)
    Analysis Method : D:\ChemStation\1\Data\XuLei\XL-20240823-5 2024-08-22 17-24-28\XL-1.0-5%-
                      50MIN-4.M (Sequence Method)
    Last changed    : 22/08/2024 18:27:25 by SYSTEM
    Additional Info : Peak(s) manually integrated
```



#	Time	Type	Area	Height	Width	Area%	Symmetry
1	11.816	BB	53531.8	3034.1	0.2778	49.312	0.78
2	12.897	BB	55025.4	2983.4	0.2912	50.688	0.771

```
Data File D:\ChemStation\1\Data\XuLei\XL-20240823-5 2024-08-22 17-24-28\relacation00003.D
Sample Name: XL-20240823-11

    ======================================================================
    Acq. Operator   : SYSTEM                        Seq. Line :   3
    Sample Operator : SYSTEM
    Acq. Instrument : LC                            Location :   P2-D-02
    Injection Date  : 22/08/2024 18:07:22               Inj :   1
                                                  Inj Volume : 1.000 µl
    Acq. Method     : D:\ChemStation\1\Data\XuLei\XL-20240823-5 2024-08-22 17-24-28\XL-1.0-5%-
                      50MIN-4.M
    Last changed    : 22/08/2024 18:07:14 by SYSTEM
                      (modified after loading)
    Analysis Method : D:\ChemStation\1\Data\XuLei\XL-20240823-5 2024-08-22 17-24-28\XL-1.0-5%-
                      50MIN-4.M (Sequence Method)
    Last changed    : 22/08/2024 18:27:25 by SYSTEM
    Additional Info : Peak(s) manually integrated
```



#	Time	Type	Area	Height	Width	Area%	Symmetry
1	11.51	BV	1190	86.7	0.2081	8.970	0.806
2	12.518	VB	12076.3	810.5	0.2278	91.030	0.862

9. references

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