Supporting Information

Synthesis of 3-Benzylidenetetrahydrofurans: Tf_2O-Catalyzed Hydroxylation/Cyclization of Cyclopropanemethanols with DMSO

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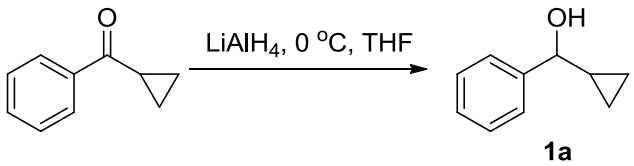
General remark

^{1}H NMR and ^{13}C NMR spectra were recorded on Bruker 400M and Mercury 300M in $CDCl_3$. All chemical shifts are given as δ value (ppm) with reference to tetramethylsilane (TMS) as an internal standard. All compounds were further characterized by HRMS; copies of ^{1}H NMR and ^{13}C NMR spectra were provided. Products were purified by flash chromatography on 200-300 mesh silica gels. All melting points were determined without correction. All reactions were carried out under argon atmosphere in oven-dried glassware, unless otherwise noted. All reagents were purchased commercially and used as received, unless otherwise noted.

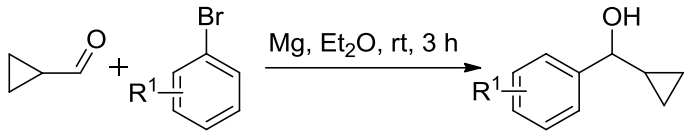
General procedure for the synthesis of cyclopropyl(phenyl)methanol 1a[1]



1a

Solid $LiAlH_4$ (0.31 g, 8.2 mmol) was added to dry THF (25 mL) and the suspension was cooled down to 0 ℃. A solution of cyclopropyl phenyl ketone (0.95 mL, 6.8 mmol) in dry THF (5.0 mL) was added dropwise. The reaction was allowed to stir at 0 ℃, with gradual warming to room temperature over 2 h. The reaction mixture was cooled down again to 0 ℃ after completion and was quenched with a very slow addition of the saturated NH_4Cl to avoid severe gas evolution. The reaction mixture was filtered over celite to separate the insoluble white precipitate and the filtrate was retained. The aqueous layer was extracted with Et_2O (3 × 5.0 mL). The organic layers were combined and dried over $MgSO_4$, filtered and concentrated under reduced pressure. The residue was purified by column chromatography on silica gel using petroleum ether/EtOAc (1:2) as eluent to provide the desired compounds **1a** in 98% yields as yellow oil.

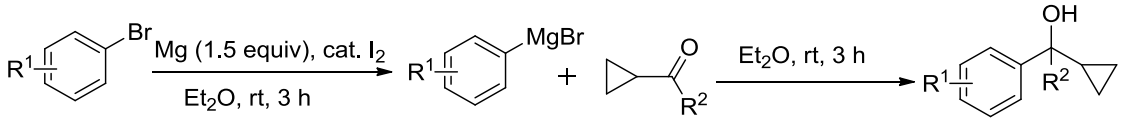
General procedure for the synthesis of cyclopropylmethanol 1b-1q, 1v-1w, 1aa-1bb[2]



1b-1q, **1v-1w, 1aa-1bb**

A dried 25 mL round-bottom flask containing a stir bar was charged with magnesium (1.2 equiv), a small piece of iodine and dry solvent Et_2O (1.0 M) were added under N_2 atmosphere. A solution of aryl bromide (1.0 equiv) in 2 mL of dry Et_2O was added dropwise to the round bottom flask and stirred the reaction for 1 h. After the formation of Grignard reagent (color indication: brownish-green color appeared), the reaction mixture was cooled to 0 ^oC under N_2 atmosphere. A solution of cyclopropanecarbaldehyde (5.0 mmol, 1.00 equiv) in Et_2O (2 mL) was added dropwise over 30 min and allowed to stir at room temperature for 3 h. Afterwards water (3 mL) was added and stirring was continued for additional 15 min, quenched with a saturated solution of NH_4Cl, extracted with AcOEt three times (3 × 20 mL), washed with small amounts of water (100 mL). The combined organic layers were dried with anhydrous Na_2SO_4 and the solvent was removed in vacuo to afford a residue. The residue was purified by column chromatography on silica gel using petroleum ether/EtOAc (40:1) as eluent to provide the desired compounds **1b-1q, 1v-1w**, **1aa-1bb** in 39%-57% yields as yellow oil.

General procedure for the synthesis of 1-cyclopropyl-1-phenylethanol 1r and 1s-1u[3]

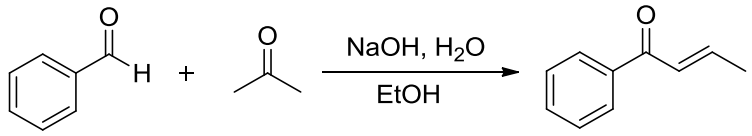


1r-1u

Grignard reactions were performed with thoroughly dried glass apparatus. To a magnetically stirred mixture of Mg turnings (7.5 mmol, 180 mg), I_2 (10 mg) was added and a solution of the bromobenzene derivative (6 mmol) in dry Et_2O (10 mL) dropwise during 10 min and allowed to stir at room temperature for 2 h. Then temperature was decreased to 0 ^oC and a solution of cyclopropyl methyl ketone (5.0 mmol, 1.00 equiv) in Et_2O (10 mL) was added dropwise over 30 min and allowed to stir at room temperature for 3 h. The mixture was cooled down to 0 ℃, Afterwards

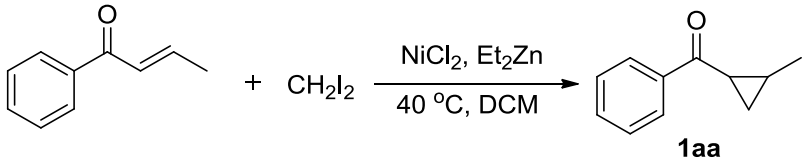
water (3 mL) was added and stirring was continued for additional 15 min. The precipitate was filtered off and the aqueous layer was extracted twice with Et_2O. The combined organic layers were washed with brine, dried over Na_2SO_4, filtered and concentrated in vacuo. Purification by column chromatography (50:1 pentane/ethyl acetate) afforded 80 %-93% yield of the **1r -1u**.

General procedure for the synthesis of (2-methylcyclopropyl)(phenyl)methanone 1y[4]



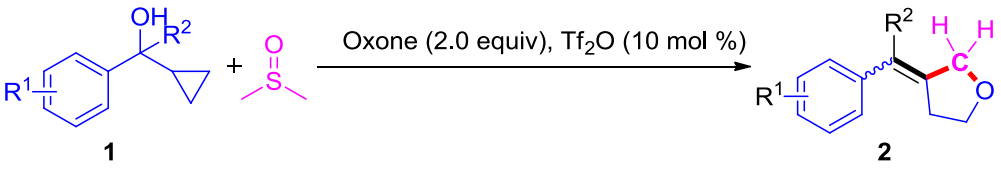
To a mixture of water (1.2 mL) and ethanol (20 mL), NaOH (0.24 g, 6 mmol) was added and the mixture cooled to 0 ^oC. Acetone (0.98 g, 8 mmol) and benzaldehyde (0.84 mL, 8 mmol) were added slowly and the mixture was allowed to warm to room temperature. After 4 h, reaction mixture was extracted with EtOH. The solvent was removed under reduced pressure and crude residue was purified by column chromatography.

Step 2



To a mixture of 13 mg $NiCl_2$ (0.1 mmol, 2 mol %), 5.36 g CH_2I_2 (20 mmol, 4 equiv) and 1.04 g chalcone (5 mmol) in 2mL DCM at 40 ^oC was added slowly 10mL solution of Et_2Zn in hexane (1M, 1 mmol, 2 equiv.) over 20 min under nitrogen. After the addition, the reaction was stirred for a further 10 min before diluted with EtOAc and quenched with saturated aqueous NH_4Cl solution. Purification by silica gel column chromatography afforded the pure cyclopropane product.

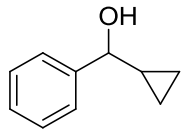
General procedure for synthesis of substituted 3-benzylidenetetrahydrofurans from cyclopropanemethanols and DMSO:



1 **2**

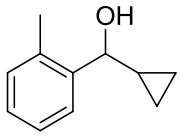
The cyclopropanemethanols **1** (1 equiv, 0.3 mmol), Oxone (2 equiv, 0.6 mmol), Tf_2O (10 mol %, 0.06 mmol) were mixed in DMSO (2 mL) were stirred at 170 ^oC in a sealed tube for 8 h (TLC monitored). Then the reaction mixture was cooled to room temperature. And the reaction mixture was extracted with ethyl acetate and washed with saturated brine, the organic phase was combined and dried with anhydrous Na_2SO_4. The solvent was evaporated to in vacuo, the crude product was purified by column chromatography, eluting with petroleum ether/EtOAc (50:1) to afford the desired **2**.

The data of products:



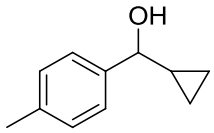
cyclopropyl(phenyl)methanol (1a)

Yellow oil (925.9 mg, 92% yield). ^{1}H NMR (300 MHz, $CDCl_3$, ppm): δ = 7.40-7.22 (m, 5 H), 3.95-3.93 (d, *J* = 6.0 Hz, 1 H), 2.35 (s, 1 H), 1.21-1.13 (m, 1 H), 0.58-0.34 (m, 4 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 143.8, 128.2, 127.4, 125.9, 78.4, 19.0, 3.6, 2.7.



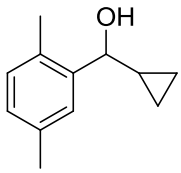
cyclopropyl(*o*-tolyl)methanol (1b)

Yellow oil (396.9 mg, 49% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.46-7.44 (d, *J* = 8.0 Hz, 1 H), 7.18-7.08 (m, 3 H), 4.34-4.32 (d, *J* = 8.0 Hz, 1 H), 2.55 (s, 1 H), 2.30 (s, 3 H), 1.25-1.19 (m, 1 H), 0.57-0.51 (m, 1 H), 0.46-0.40 (m, 1 H), 0.33-0.25 (m, 2 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 141.2, 135.0, 130.1, 127.0, 126.0, 125.8, 73.6, 19.2, 17.3, 3.1, 1.9.



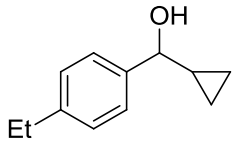
cyclopropyl(*p*-tolyl)methanol (1c)

Yellow oil (445.5 mg, 55% yield). ^{1}H NMR (300 MHz, $CDCl_3$, ppm): δ = 7.26-7.24 (d, *J* = 6.0 Hz, 2 H), 7.13-1.11 (d, *J* = 6.0 Hz, 2 H), 3.88-3.85 (d, *J* = 9.0 Hz, 1 H), 2.60 (s, 1 H), 2.32 (s, 3 H), 1.17-1.11 (m, 1 H), 0.57-0.27 (m, 4 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 140.9, 136.8, 128.8, 125.8, 78.1, 21.0, 18.9, 3.5, 2.6.



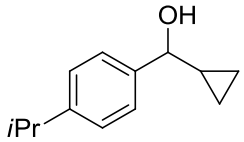
cyclopropyl(2,5-dimethylphenyl)methanol (1d)

Yellow oil (422.4 mg, 48% yield). ^{1}H NMR (300 MHz, $CDCl_3$, ppm): δ= 7.29 (s, 1 H), 7.17-6.94 (m, 2 H), 4.33-4.31 (d, *J* = 6.0 Hz, 1 H), 2.31-2.31 (m, 7 H), 1.28-1.20 (m, 1 H), 0.56-0.30 (m, 4 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 141.1, 135.2, 131.8, 130.1, 127.8, 126.6, 73.7, 21.0, 18.8, 17.5, 3.2, 2.0.



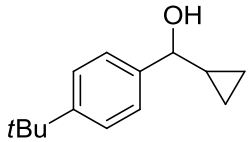
cyclopropyl(4-ethylphenyl)methanol (1e)

Yellow oil (413.6 mg, 47% yield). ^{1}H NMR (300 MHz, $CDCl_3$, ppm): δ = 7.30-7.27 (d, *J* = 9.0 Hz, 2 H), 7.16-7.13 (d, *J* = 9.0 Hz, 2 H), 3.88-3.86 (d, *J* = 6.0 Hz, 1 H), 2.67-2.58 (m, 3 H), 1.24-1.19 (m, 4 H), 0.55-0.27 (m, 4 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 143.2, 141.1, 127.6, 125.9, 78.1, 28.4, 18.8, 15.5, 3.5, 2.6.



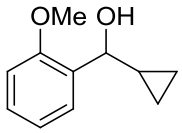
cyclopropyl(4-isopropylphenyl)methanol (1f)

Yellow oil (427.5 mg, 45% yield). ^{1}H NMR (300 MHz, $CDCl_3$, ppm): δ = 7.33-7.30 (d, *J* = 9.0 Hz, 2 H), 7.21-7.18 (d, *J* = 9.0 Hz, 2 H), 3.91-3.89 (d, *J* = 6.0 Hz, 1 H), 2.94-2.85 (m, 1 H), 2.42 (s, 1 H), 1.25-1.12 (m, 7 H), 0.59-0.30 (m, 4 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 147.9, 141.2, 126.2, 125.9, 78.2, 33.7, 23.9, 18.8, 3.5, 2.7.



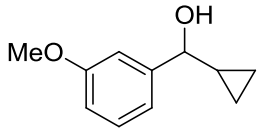
(4-(*tert*-butyl)phenyl)(cyclopropyl)methanol (1g)

Yellow oil (448.8 mg, 44% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.35-7.17 (m, 4 H), 3.87-3.85 (d, *J* = 8.0 Hz, 1 H), 2.70 (s, 1 H), 1.30 (s, 9 H), 1.18-1.09 (m, 1 H), 0.57-0.28 (m, 4 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 150.0, 140.9, 125.7, 125.0, 77.9, 34.3, 31.2, 18.7, 3.5, 2.7.



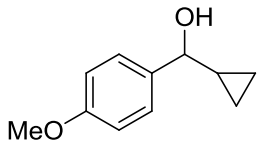
cyclopropyl(2-methoxyphenyl)methanol (1h)

Yellow oil (471.7 mg, 53% yield). ^{1}H NMR (300 MHz, $CDCl_3$, ppm):δ = 7.31-7.29 (m, 1 H), 7.19-7.13 (m, 1 H), 6.89-6.84 (m, 1 H), 6.80-6.77 (d, *J* = 9.0 Hz, 1 H), 4.13-4.11 (d, *J* = 6.0 Hz, 1 H), 3.74 (m, 3 H), 2.91 (m, 1 H), 1.28-1.17 (m, 1 H), 0.54-0.50 (m, 1 H), 0.43-0.35 (m, 2 H), 0.27-0.19 (m, 1 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 156.5, 131.6, 128.3, 127.2, 120.6, 110.3, 74.5, 55.1, 16.8, 3.7, 2.4.



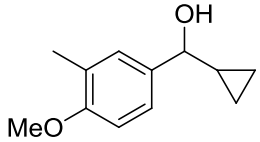
cyclopropyl(3-methoxyphenyl)methanol (1i)

Yellow oil (480.6 mg, 54% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm):δ = 7.26-7.22 (m, 1 H), 6.97 (d, *J* = 2.4 Hz, 2 H), 6.81-6.79 (d, *J* = 8.0 Hz, 1 H), 3.93-3.92 (m, 1 H), 3.78 (s, 3 H), 2.39 (m, 1 H), 1.20-1.14 (m, 1 H), 0.59-0.34 (m, 4 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 159.5, 145.5, 129.2, 118.3, 112.7, 111.5, 78.3, 55.1, 19.0, 3.5, 2.8.



cyclopropyl(4-methoxyphenyl)methanol (1j)

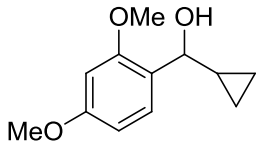
Yellow oil (489.5 mg, 55% yield). ^{1}H NMR (300 MHz, $CDCl_3$, ppm): δ = 7.17-7.14 (d, *J* = 6.0 Hz, 2 H), 6.72-6.69 (d, *J* = 9.0 Hz, 2 H), 3.74-3.72 (d, *J* = 6.0 Hz, 1 H), 3.61 (s, 3 H), 3.01 (s, 1 H), 1.06-0.94 (m, 1 H), 0.41-0.12 (m, 4 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 158.4, 136.1, 127.0, 113.2, 77.4, 54.8, 18.6, 3.4, 2.3.



cyclopropyl(4-methoxy-3-methylphenyl)methanol (1k)

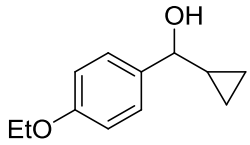
Yellow oil (470.4 mg, 49% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.16-7.14

(d, *J* = 8.0 Hz, 2 H), 6.76-7.74 (d, *J* = 8.0 Hz, 1 H), 3.84-3.82 (d, *J* = 8.0 Hz, 1 H), 3.78 (s, 3 H), 2.51 (s, 1 H), 2.21 (s, 3 H), 1.20-1.10 (m, 1 H), 0.61-0.54 (m, 1 H), 0.51-0.38 (m, 2 H), 0.30-0.24 (m, 1 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 156.9, 135.6, 128.3, 126.2, 124.3, 109.4, 78.0, 55.1, 18.8, 16.2, 3.5, 2.5.



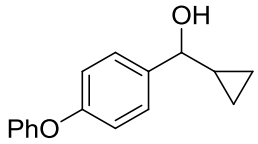
cyclopropyl(2,4-dimethoxyphenyl)methanol (1l)

Yellow oil (447.2 mg, 43% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.64-7.31 (m, 1 H), 6.49-6.47 (m, 2 H), 4.15-4.13 (d, *J* = 8.0 Hz, 1 H), 3.82-3.80 (d, *J* = 8.0 Hz, 6 H), 2.85 (s, 1 H), 1.35-1.25 (m, 1 H), 0.64-0.60 (m, 1 H), 0.51-0.44 (m, 2 H), 0.31-0.24 (m, 1 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 160.0, 157.7, 127.8, 124.3, 103.8, 98.5, 74.3, 55.2, 55.1, 16.8, 3.8, 2.4.



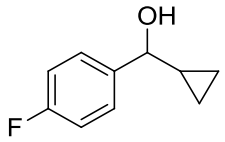
cyclopropyl(4-ethoxyphenyl)methanol (1m)

Yellow oil (441.6 mg, 46% yield). ^{1}H NMR (300 MHz, $CDCl_3$, ppm): δ = 7.28-7.25 (m, 2 H), 6.84-6.81 (m, 2 H), 4.01-3.94 (m, 2 H), 3.88-3.86 (d, *J* = 6.0 Hz, 1 H), 2.84 (s, 1 H), 1.40-1.35 (m, 3 H), 1.16-1.12 (m, 1 H), 0.56-0.25 (m, 4 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 158.0, 135.9, 127.0, 113.9, 77.7, 63.1, 18.7, 14.6, 3.4, 2.4.



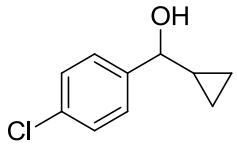
cyclopropyl(4-phenoxyphenyl)methanol (1n)

Yellow oil (504.0 mg, 42% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.40-7.38 (d, *J* = 8.0 Hz, 2 H), 7.36-7.32 (m, 2 H), 7.12-7.08 (m, 1 H), 7.03-6.99 (m, 4 H), 4.00-3.98 (d, *J* = 8.0 Hz, 1 H), 1.98 (s, 1 H), 1.27-1.18 (m, 1 H), 0.68-0.54 (m, 2 H), 0.50-0.44 (m, 1 H), 0.40-0.34 (m, 1 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 157.2, 156.6, 138.7, 129.7, 127.5, 123.2, 118.8, 118.7, 78.1, 19.2, 3.6, 2.9.



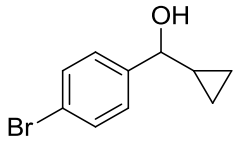
cyclopropyl(4-fluorophenyl)methanol (1o)

Yellow oil (415.0 mg, 50% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.37-7.33 (m, 2 H), 7.03-6.98 (m, 2 H), 3.94-3.92 (d, *J* = 8.0 Hz, 1 H), 2.54 (s, 1 H), 1.15-1.13 (m, 1 H), 0.60-0.51 (m, 2 H), 0.44-0.41 (m, 1 H), 0.33-0.31 (m, 1 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 162.0 (d, *J* = 244.0 Hz, 1 C), 139.6, 127.5 (d, *J* = 8.0 Hz, 1 C), 114.9 (d, *J* =22.0 Hz, 1 C), 77.7, 19.1, 3.5, 2.7.



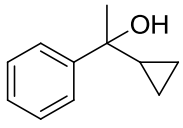
(4-chlorophenyl)(cyclopropyl)methanol (1p)

Yellow oil (382.2 mg, 42% yield).^{1}H NMR (300 MHz, $CDCl_3$, ppm): δ =7.31-7.25 (m, 4 H), 3.89-3.86 (d, *J*=9.0 Hz, 1 H), 2.80 (s, 1 H), 1.15-1.04 (m, 1 H), 0.61-0.26 (m, 4 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 142.2, 132.9, 128.2, 127.3, 77.6, 19.0, 3.6, 2.7



(4-bromophenyl)(cyclopropyl)methanol (1q)

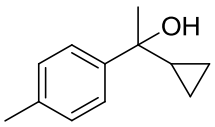
Yellow oil (652.5 mg, 58% yield). ^{1}H NMR (300 MHz, $CDCl_3$, ppm): δ = 7.46-7.42 (m, 2 H), 7.27-7.24 (m, 2 H), 3.92-3.89 (d, *J* = 9.0 Hz, 1 H), 2.50 (s, 1 H), 1.16-1.09 (m, 1 H), 0.60-0.32 (m, 4 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 142.7, 131.3, 127.7, 121.1, 77.7, 19.1, 3.6, 2.8.



1-cyclopropyl-1-phenylethanol (1r)

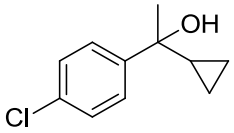
Colorless oil (688.5 mg, 85% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.50-7.48 (m, 2 H), 7.31-7.27 (m, 2 H), 7.22-7.18 (m, 1 H), 2.02 (s, 1 H), 1.44 (s, 3 H),

1.23-1.16 (m, 1 H), 0.50-0.34 (m, 4 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 148.0, 127.8, 126.5, 125.0, 73.0, 28.3, 22.6, 1.8, 1.0.



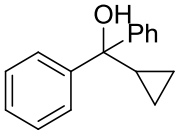
1-cyclopropyl-1-(*p*-tolyl)ethanol (1s)

Yellow oil (712.8 mg, 81% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.42-7.40 (d, *J* = 8.0 Hz, 2 H), 7.15-7.13 (d, *J* = 8.0 Hz, 2 H), 2.34 (s, 3 H), 1.93 (s, 1 H), 1.47 (s, 3 H), 1.25-1.19 (m, 1 H), 0.44-0.38 (m, 4 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 145.0, 136.0, 128.5, 125.0, 72.8, 28.4, 22.6, 20.8, 1.7, 1.0.



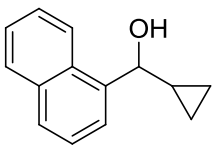
1-(4-chlorophenyl)-1-cyclopropylethanol (1t)

Yellow oil (656.6 mg, 67% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.45-7.42 (m, 2 H), 7.29-7.26 (m, 2 H), 1.80 (s, 1 H), 1.44 (s, 3 H), 1.24-1.17 (m, 1 H), 0.53-0.48 (m, 1 H), 0.46-0.34 (m, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 146.6, 132.4, 128.0, 126.6, 72.9, 28.4, 22.7, 2.0, 1.0.



cyclopropyldiphenylmethanol (1u)

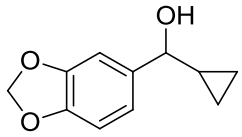
Yellow oil (840.0 mg, 75% yield). ^{1}H NMR (300 MHz, $CDCl_3$, ppm): δ = 7.42-7.40 (d, *J* = 6.0 Hz, 4 H), 7.29-7.20 (m, 6 H), 1.95 (s, 1 H), 1.62-1.53 (m, 1 H), 0.55-0.52 (m, 2 H), 0.46-0.44 (d, *J* = 6.0 Hz, 2 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 147.1, 127.8, 126.9, 126.8, 77.0, 21.5, 1.7.



cyclopropyl(naphthalen-2-yl)methanol (1v)

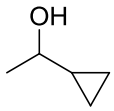
Yellow oil (524.7 mg, 53% yield). ^{1}H NMR (300 MHz, $CDCl_3$, ppm): δ = 8.18-8.15 (m, 1 H) , 7.83-7.80 (m, 1 H), 7.75-7.72 (d, *J* = 9.0 Hz, 1 H), 7.59-7.56 (d, *J* = 9.0 Hz,

1 H), 7.48-7.37 (m, 3 H), 4.73-4.71 (d, *J* = 6.0 Hz, 1 H), 2.45 (s, 1 H), 1.49-1.38 (m, 1 H), 0.63-0.55 (m, 1 H), 0.49-0.36 (m, 2 H) , 0.32-0.25 (m, 1 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 138.8, 133.7, 130.9, 128.6, 128.1, 125.4, 125.2, 123.9, 123.7, 74.8, 17.5, 3.9, 2.7.



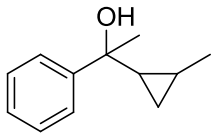
benzo[*d*][1,3]dioxol-5-yl(cyclopropyl)methanol (1w)

Yellow oil (374.4 mg, 39% yield). ^{1}H NMR (300 MHz, $CDCl_3$, ppm): δ = 6.92 (s, 1 H), 6.84-6.81 (d, *J* = 9.0 Hz, 1 H), 6.76-6.74 (d, *J* = 6.0 Hz, 1 H), 5.92 (s, 2 H), 3.88-3.85 (d, *J* = 9.0 Hz, 1 H), 2.48 (s, 1 H), 1.18-1.10 (m, 1 H), 0.60-0.39 (m, 3 H) , 0.34-0.26 (m, 1 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 147.2, 146.6, 137.9, 119.2, 107.8, 106.5, 100.8, 78.2, 19.0, 3.6, 2.6.



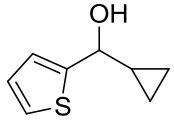
1-cyclopropylethanol (1x)

Yellow oil (150.5 mg, 35% yield). ^{1}H NMR (300 MHz, $CDCl_3$, ppm): δ = 3.72 (s, 1 H), 3.11-3.02 (m, 1 H), 1.28-1.24 (m, 3 H), 0.90-0.86 (m, 1 H), 0.48-0.44 (m, 2 H), 0.34-0.28 (m, 1 H), 0.18-0.12 (m, 1 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 72.0, 22.1, 18.5, 2.7, 1.9.



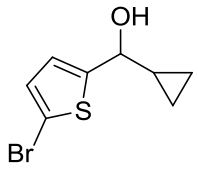
1-(2-methylcyclopropyl)-1-phenylethanol (1y)

Yellow oil (440.0 mg, 50% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.25-7.21 (m, 2 H), 7.14-7.10 (m, 1 H), 7.07-7.05 (d, *J* = 8.0 Hz, 2 H), 1.94-1.89 (m, 1 H), 1.63 (s, 1 H), 1.25-1.20 (m, 7 H), 1.04-1.00 (m, 1 H), 0.84-0.79 (m, 1 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 143.2, 128.2, 125.8, 125.3, 69.3, 34.0, 29.0, 28.8, 19.1, 11.7.



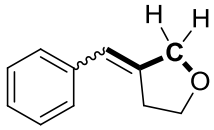
cyclopropyl(thiophen-2-yl)methanol (1aa)

Yellow oil (361.9 mg, 47% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm):δ = 7.23-7.20 (m, 1 H), 7.01-7.00 (d, *J* = 4.0 Hz, 1 H), 6.95-6.93 (m, 1 H), 4.18-4.16 (d, *J* = 8.0 Hz, 1 H), 2.70 (s, 1 H), 1.28-1.21 (m, 1 H), 0.63-0.56 (m, 2 H), 0.50-0.45 (m, 1 H), 0.39-0.34 (m, 1 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 147.8, 126.4, 124.3, 123.4, 74.2, 19.1, 3.5, 2.9.



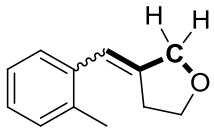
(5-bromothiophen-2-yl)(cyclopropyl)methanol (1bb)

Yellow oil (475.6 mg, 41% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 6.89-6.88 (d, *J* = 4.0 Hz, 1 H), 6.74-6.34 (m, 1 H), 4.09-4.07 (d, *J* = 8.0 Hz, 1 H), 2.85 (s, 1 H), 1.24-1.15 (m, 1 H), 0.66-0.58 (m, 2 H), 0.49-0.44 (m, 1 H) , 0.39-0.34 (m, 1 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 149.5, 129.2, 123.7, 111.1, 74.3, 18.9, 3.5, 3.0.



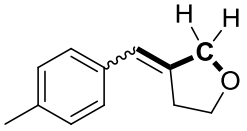
3-benzylidenetetrahydrofuran (2a)[5]

Yellow oil (34.5 mg, 72% yield), *Z/E* = 54:46. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.37-7.31 (m, 6 H), 7.22-7.21 (m, 2 H), 7.13-7.11 (d, *J* = 7.4 Hz, 2 H), 6.45-6.44 (t, *J* = 2.4 Hz, *Z* isomer, 1 H), 6.37-6.36 (t, *J* = 2.2 Hz, *E* isomer, 1 H), 4.58 (d, *J* = 1.8 Hz, *Z* isomer, 2 H), 4.45 (d, *J* = 1.7 Hz, *E* isomer, 2 H), 4.02-3.99 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.91-3.88 (t, *J* = 6.9 Hz, *Z* isomer, 2 H), 2.84-2.80 (m, *E* isomer, 2 H), 2.79-2.75 (m, *Z* isomer, 2 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 141.5, 140.9, 137.6, 137.4, 128.5, 128.4, 127.9, 127.8, 126.5, 126.4, 120.9, 119.5, 72.8, 69.6, 69.2, 67.3, 34.9, 31.2; HRMS calcd for $C_{11}H_{13}O$ $[M+H]^+$ 161.0961; found: 161.0965.



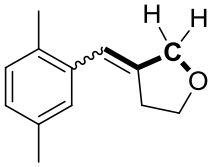
3-(2-methylbenzylidene)tetrahydrofuran (2b)

Yellow oil (36.5 mg, 70% yield), *Z/E* = 49:51. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.31-7.29 (d, *J* = 7.2 Hz, 1 H), 7.20-7.11 (m, 6 H), 7.03-7.01 (d, *J* = 7.2 Hz, 1 H), 6.54-6.53 (t, *J* = 2.0 Hz, *Z* isomer, 1 H), 6.46-6.45 (t, *J* = 2.0 Hz, *E* isomer, 1 H), 4.47-4.46 (d, *J* = 1.6 Hz, *Z* isomer, 2 H), 4.45-4.44 (d, *J* = 1.2 Hz, *E* isomer, 2 H), 3.96-3.93 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.93-3.89 (t, *J* = 5.2 Hz, *Z* isomer, 2 H), 2.79-2.75 (m, *E* isomer, 2 H), 2.72-2.68 (m, *Z* isomer, 2 H), 2.30 (s, *Z* isomer, 3 H), 2.91 (s, *E* isomer, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 141.5, 141.3, 136.5, 136.4, 136.0, 135.7, 130.0, 129.9, 127.7, 127.4, 126.8, 126.7, 125.8, 125.6, 119.0, 117.6, 72.3, 69.3, 69.0, 67.4, 34.2, 30.8, 20.0, 19.9. HRMS calcd for $C_{12}H_{15}O$ $[M+H]^+$ 175.1118; found: 175.1112.



3-(4-methylbenzylidene)tetrahydrofuran (2c)

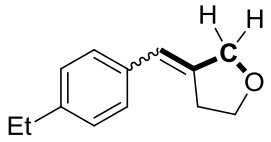
Yellow oil (37.5 mg, 72% yield), *Z/E* = 50:50. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.22-7.20 (d, *J* = 8.0 Hz, 2 H), 7.16-7.13 (m, 4 H), 7.02-7.00 (d, *J* = 8.0 Hz, 2 H), 6.41-4.40 (t, *J* = 2.0 Hz, *Z* isomer, 1 H), 6.33-6.32 (t, *J* = 2.0 Hz, E isomer, 1 H), 4.56 (d, *J* = 1.6 Hz, *Z* isomer, 2 H), 4.43 (d, *J* = 1.6 Hz, *E* isomer, 2 H), 4.01-3.97 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.90-3.86 (t, *J* = 6.8 Hz, *Z* isomer, 2 H), 2.81-2.77 (m, *E* isomer, 2 H), 2.76-2.73 (m, *Z* isomer, 2 H), 2.34 (s, *E* or *Z* isomer, 3 H), 2.33 (s, *E* or *Z* isomer, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 140.4, 139.8, 136.2, 136.1, 134.7, 134.6, 129.1, 129.0, 127.8, 127.6, 120.7, 119.3, 72.8, 69.6, 69.2, 67.3, 34.8, 31.2, 21.1, 21.0; HRMS calcd for $C_{12}H_{15}O$ $[M+H]^+$ 175.1118; found: 175.1111.



3-(2,5-dimethylbenzylidene)tetrahydrofuran (2d)

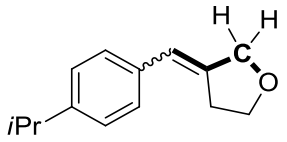
Yellow oil (38.3 mg, 68% yield), *Z/E* = 49:51. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.11 (s, 1 H), 7.07-7.04 (m, 2 H), 6.96-6.93 (t, *J* = 6.6 Hz, 2 H), 6.84 (s, 1 H), 6.51-6.50 (t, *J* = 2.4 Hz, *Z* isomer, 1 H), 6.43-6.42 (t, *J* = 2.4 Hz, *E* isomer, 1 H), 4.46

(d, *J* = 1.6 Hz, *Z* and E isomer, 4 H), 3.97-3.93 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.93-3.89 (t, *J* = 6.8 Hz, *Z* isomer, 2 H), 2.78-2.74 (m, *E* isomer, 2 H), 2.73-2.69 (m, *Z* isomer, 2 H), 2.32 (s, *E* isomer, 3 H), 2.30 (s, *Z* isomer, 3 H), 2.26 (s, *Z* isomer, 3 H), 2.45 (s, *E* isomer, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 141.2, 141.0, 136.4, 136.3, 135.1, 134.9, 132.9, 132.6, 129.9, 129.8, 128.3, 128.1, 127.5, 127.4, 119.2, 117.7, 72.3, 69.3, 69.0, 67.4, 34.2, 30.8, 21.1, 19.5, 19.4; HRMS calcd for $C_{13}H_{17}O$ $[M+H]^+$ 189.1274; found: 189.1279.



3-(4-ethylbenzylidene)tetrahydrofuran (2e)

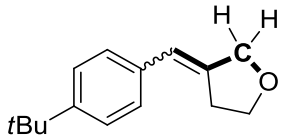
Yellow oil (39.4 mg, 70% yield), *Z/E* = 51:49. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.25-7.23 (m, 2 H), 7.18-7.16 (m, 4 H), 7.05-7.03 (d, *J* = 8.4 Hz, 2 H), 6.42-6.41 (t, *J* = 2.4 Hz, *Z* isomer, 1 H), 6.33-6.32 (t, *J* = 2.0 Hz, *E* isomer, 1 H), 4.57-4.56 (d, *J* = 1.6 Hz, *Z* isomer, 2 H), 4.44-4.43 (d, *J* = 1.6 Hz, *E* isomer, 2 H), 4.01-3.97 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.90-3.86 (t, *J* = 6.8 Hz, *Z* isomer, 2 H), 2.82-2.78 (m, *E* isomer, 2 H), 2.76-2.73 (m, *Z* isomer, 2 H), 2.67-2.60 (m, *Z* and *E* isomer, 4 H), 1.25-1.21 (m, *Z* and *E* isomer, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 142.6, 142.5, 140.4, 139.9, 135.0, 134.9, 127.9, 127.9, 127.7, 125.6, 120.7, 119.3, 72.8, 69.6, 69.2, 67.3, 34.8, 31.2, 28.5, 28.5, 15.5, 15.4; HRMS calcd for $C_{13}H_{17}O$ $[M+H]^+$ 189.1274; found: 189.1271.



3-(4-isopropylbenzylidene)tetrahydrofuran (2f)

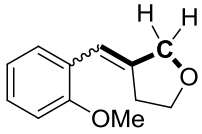
Yellow oil (39.3 mg, 65% yield), *Z/E* = 49:51. ^{1}H NMR (300 MHz, $CDCl_3$, ppm): δ = 7.24-7.29 (m, 6 H), 7.07-7.04 (d, *J* = 8.1 Hz, 2 H), 6.42-6.41 (t, *J* = 2.1 Hz, *Z* isomer, 1 H), 6.34-6.33 (t, *J* = 1.8 Hz, *E* isomer, 1 H), 4.58-4.57 (d, *J* = 1.8 Hz, *Z* isomer, 2 H), 4.44 (d, *J* = 1.8 Hz, *E* isomer, 2 H), 4.01-3.97 (t, *J* = 6.6 Hz, *E* isomer, 2 H), 3.91-3.86 (t, *J* = 6.9 Hz, *Z* isomer, 2 H), 2.94-2.72 (m, *Z* and *E* isomer, 6 H), 1.26 (d, *J* = 2.1 Hz,

E isomer, 6 H), 1.24-1.23 (d, *J* = 2.1 Hz, *E* isomer, 6 H); ^{13}C NMR (75 MHz, $CDCl_3$, ppm): δ = 147.2, 147.1, 140.4, 139.9, 135.2, 135.0, 127.9, 127.8, 126.5, 126.4, 120.7, 119.3, 72.8, 69.6, 69.2, 67.3, 34.8, 33.8, 33.7, 31.2, 23.9; HRMS calcd for $C_{14}H_{19}O$ $[M+H]^+$ 203.1431; found: 203.1438.



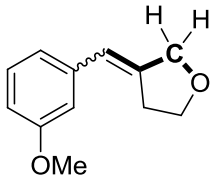
3-(4-(*tert*-butyl)benzylidene)tetrahydrofuran (2g)

Yellow oil (33.0 mg, 51% yield), *Z*/*E* = 40:60. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.39-7.35 (m, *Z* and *E* isomer, 4 H), 7.25 (s, *E* isomer, 2 H), 7.08-7.06 (d, *J* = 8.4 Hz, *Z* isomer, 2 H), 6.43-6.42 (t, *J* = 2.0 Hz, *Z* isomer, 1 H), 6.34 (s, *E* isomer, 1 H), 4.58 (d, *J* = 1.6 Hz, *Z* isomer, 2 H), 4.44 (d, *J* = 1.2 Hz, *E* isomer, 2 H), 4.02-3.98 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.91-3.87 (t, *J* = 6.8 Hz, *Z* isomer, 2 H), 2.84-2.80 (m, *E* isomer, 2 H), 2.78-2.74 (m, *Z* isomer, 2 H), 1.33 (s, *E* isomer, 9 H), 1.32 (s, *Z* isomer, 9 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 149.5, 149.4, 140.6, 140.0, 134.8, 134.7, 127.7, 127.5, 125.4, 125.3, 120.6, 119.2, 72.9, 69.6, 69.3, 67.3, 34.9, 34.5, 31.4, 31.3, 31.2; HRMS calcd for $C_{15}H_{21}O$ $[M+H]^+$ 217.1587; found: 217.1581.



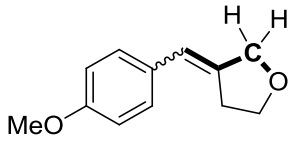
3-(2-methoxybenzylidene)tetrahydrofuran (2h)

Yellow oil (37.0 mg, 65% yield), *Z*/*E* = 52:48. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.35-7.33 (m, 1 H), 7.24-7.19 (m, 2 H), 7.03-7.01 (m, 1 H), 6.97-6.91 (m, 2 H), 6.89-6.86 (m, 2 H), 6.71-6.70 (t, *J* = 2.4 Hz, *Z* isomer, 1 H), 6.63-6.62 (t, *J* = 2.0 Hz, *E* isomer, 1 H), 4.51 (t, *J* = 0.8 Hz, *Z* isomer, 2 H), 4.49-4.48 (d, *J* = 1.6 Hz, *E* isomer, 2 H), 3.97-3.95 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.92-3.88 (t, *J* = 6.8 Hz, *Z* isomer, 2 H), 3.84 (d, *J* = 0.8 Hz, *Z* and *E* isomer, 6 H), 2.80-2.75 (m, *Z* and *E* isomer, 4 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 156.6, 156.3, 141.3, 141.0, 128.3, 128.3, 127.9, 127.9, 126.5, 126.4, 120.3, 120.2, 115.3, 113.9, 110.4, 110.4, 72.6, 69.5, 69.1, 67.4, 55.4, 55.4, 34.6, 31.1; HRMS calcd for $C_{12}H_{15}O_2$ $[M+H]^+$ 191.1067; found: 191.1068.



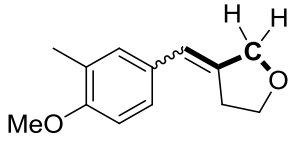
3-(3-methoxybenzylidene)tetrahydrofuran (2i)

Yellow oil (32.4 mg, 57% yield), *Z*/*E* = 50:50. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.29-7.24 (m, 2 H), 6.93-6.91 (d, *J* = 8.0 Hz, 1 H), 6.86 (s, 1 H), 6.79-6.76 (m, 2 H), 6.74-6.72 (d, *J* = 7.6 Hz, 1 H), 6.66 (s, 1 H), 6.42-6.41 (t, *J* = 2.4 Hz, *Z* isomer, 1 H), 6.34-6.33 (d, *J* = 1.6 Hz, *E* isomer, 1 H), 4.58 (s, *Z* isomer, 2 H), 4.45 (d, *J* = 1.6 Hz, *E* isomer, 2 H), 4.02-3.98 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.91-3.88 (t, *J* = 6.8 Hz, *Z* isomer, 2 H), 3.82-3.81 (d, *J* = 3.2 Hz, *Z* and *E* isomer, 6 H), 2.84-2.81 (m, *E* isomer, 2 H), 2.79-2.75 (m, *Z* isomer, 2 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 159.6, 159.5, 141.9, 141.4, 139.0, 138.8, 129.4, 129.3, 120.8, 120.6, 120.3, 119.4, 113.6, 113.5, 111.9, 72.8, 69.6, 69.2, 67.3, 55.2, 34.9, 31.3; HRMS calcd for $C_{12}H_{15}O_2$ $[M+H]^+$ 191.1067; found: 191.1069.



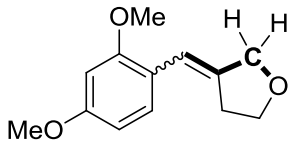
3-(4-methoxybenzylidene)tetrahydrofuran (2j)

Yellow oil (39.9 mg, 70% yield), *Z*/*E* = 53:47. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.27-7.25 (m, 2 H), 7.07-7.05 (d, *J* = 8.8 Hz, 2 H), 6.90-6.86 (m, 4 H), 6.39-6.38 (t, *J* = 2.0 Hz, *Z* isomer, 1 H), 6.31-6.30 (d, *J* = 2.4 Hz, *E* isomer, 1 H), 4.55 (d, *J* = 2.0 Hz, *Z* isomer, 2 H), 4.43 (d, *J* = 1.6 Hz, *E* isomer, 2 H), 4.02-3.98 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.90-3.88 (t, *J* = 4.8 Hz, *Z* isomer, 2 H), 3.81-3.80 (m, *Z* and *E* isomer, 6 H), 2.80-2.72 (m, *Z* and *E* isomer, 4 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 158.2, 158.1, 139.1, 138.5, 130.4, 130.3, 129.1, 128.9, 120.3, 118.8, 113.9, 113.8, 72.8, 69.5, 69.2, 67.3, 55.2, 34.8, 31.1; HRMS calcd for $C_{12}H_{15}O_2$ $[M+H]^+$ 191.1067; found: 191.1063.



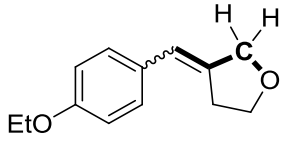
3-(4-methoxy-3-methylbenzylidene)tetrahydrofuran (2k)

Yellow oil (42.8 mg, 70% yield), *Z/E* = 50:50. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.14-7.11 (m, 2 H), 6.93-6.91 (d, *J* = 6.8 Hz, 2 H), 6.81-6.76 (m, 2 H), 6.36-6.35 (t, *J* = 2.0 Hz, *Z* isomer, 1 H), 6.28-6.27 (d, *J* = 2.0 Hz, *E* isomer, 1 H), 4.56-4.55 (d, *J* = 1.6 Hz, *Z* isomer, 2 H), 4.43-4.42 (d, *J* = 1.6 Hz, *E* isomer, 2 H), 4.01-3.98 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.89-3.86 (t, *J* = 6.8 Hz, *Z* isomer, 2 H), 3.83-3.81 (m, *Z* and *E* isomer, 6 H), 2.81-2.71 (m, *Z* and *E* isomer, 4 H), 2.22-2.21 (d, *J* = 3.2 Hz, *Z* and *E* isomer, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 156.6, 138.9, 138.3, 130.5, 130.5, 130.1, 130.0, 128.3, 126.5, 126.3, 124.3, 120.6, 119.1, 110.0, 109.9, 109.7, 80.7, 73.0, 69.4, 68.6, 67.5, 55.4, 34.9, 31.2, 26.2, 16.5; HRMS calcd for $C_{13}H_{17}O_2$ $[M+H]^+$ 205.1223; found: 205.1227.



3-(2,4-dimethoxybenzylidene)tetrahydrofuran (2l)

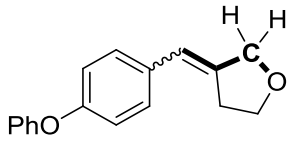
Yellow oil (27.0 mg, 41% yield), *Z/E* = 51:49. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.27 (s, 1 H), 6.94-6.92 (d, *J* = 8.4 Hz, 1 H), 6.63-6.62 (t, *J* = 2.0 Hz, *Z* isomer, 1 H), 6.55-6.54 (d, *J* = 2.0 Hz, *E* isomer, 1 H), 6.51-6.45 (m, 4 H), 4.50-4.49 (d, *J* = 2.0 Hz, *Z* isomer, 2 H), 4.47-4.46 (d, *J* = 1.6 Hz, *E* isomer, 2 H), 3.98-3.95 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.91-3.87 (t, *J* = 7.2 Hz, *Z* isomer, 2 H), 3.83-3.82 (d, *J* = 3.2 Hz, *Z* and *E* isomer, 12 H), 2.78-2.72 (m, *Z* and *E* isomer, 4 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 159.7, 159.6, 157.7, 157.5, 139.3, 138.9, 128.8, 128.8, 119.6, 119.5, 114.8, 113.4, 104.1, 98.4, 98.3, 72.6, 69.5, 69.1, 67.4, 55.5, 55.3, 34.6, 31.1; HRMS calcd for $C_{13}H_{17}O_3$ $[M+H]^+$ 221.1172; found: 221.1176.



3-(4-ethoxybenzylidene)tetrahydrofuran (2m)

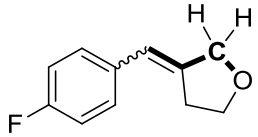
Yellow oil (39.7 mg, 65% yield), *Z/E* = 50:50. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.26-7.23 (m, 2 H), 7.05-7.03 (d, *J* = 8.8 Hz, 2 H), 6.89-6.84 (m, 4 H), 6.38-6.37 (t, *J*

= 2.0 Hz, *Z* isomer, 1 H), 6.30-6.29 (d, *J* = 2.0 Hz, *E* isomer, 1 H), 4.55 (d, *J* = 2.0 Hz, *Z* isomer, 2 H), 4.43-4.42 (d, *J* = 1.6 Hz, *E* isomer, 2 H), 4.06-3.98 (m, Z and *E* isomer, 6 H), 3.90-3.86 (t, *J* = 7.2 Hz, *Z* isomer, 2 H), 3.80-2.72 (m, *Z* and *E* isomer, 4 H), 1.43-1.39 (m, *Z* and *E* isomer, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 157.5, 138.9, 138.4, 130.2, 130.1, 129.1, 128.9, 120.3, 118.9, 114.4, 114.3, 72.8, 69.5, 69.2, 67.3, 63.4, 34.8, 31.1, 14.8; HRMS calcd for $C_{13}H_{17}O_2$ $[M+H]^+$ 205.1223; found: 205.1227.



3-(4-phenoxybenzylidene)tetrahydrofuran (2n)

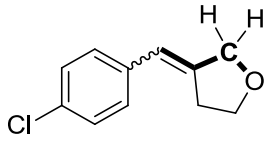
Yellow oil (44.6 mg, 59% yield), *Z*/*E* = 56:44. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.35-7.27 (m, 6 H), 7.12-7.07 (m, 4 H), 7.03-6.95 (m, 8 H), 6.41-6.40 (t, *J* = 2.0 Hz, *Z* isomer, 1 H), 6.33-6.32 (d, *J* = 2.0 Hz, *E* isomer, 1 H), 4.56-4.55 (d, *J* = 2.0 Hz, *Z* isomer, 2 H), 4.44-4.43 (d, *J* = 2.0 Hz, *E* isomer, 2 H), 4.01-3.98 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.90-3.87 (t, *J* = 6.8 Hz, *Z* isomer, 2 H), 2.80-2.73 (m, *Z* and *E* isomer, 4 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 157.0, 156.9, 155.7, 140.4, 139.9, 132.8, 132.7, 129.7, 129.3, 129.1, 123.3, 123.2, 120.1, 118.9, 118.8, 118.7, 118.6, 72.8, 69.5, 69.2, 67.3, 34.8, 31.1; HRMS calcd for $C_{17}H_{17}O_2$ $[M+H]^+$ 253.1223; found: 253.1220.



3-(4-fluorobenzylidene)tetrahydrofuran (2o)

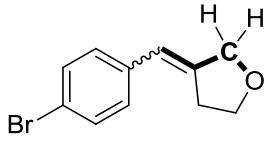
Yellow oil (21.8 mg, 41% yield), *Z*/*E* = 44:56. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.28-7.25 (m, 2 H), 7.09-7.00 (m, 6 H), 6.40-6.39 (t, *J* = 2.4 Hz, *Z* isomer, 1 H), 6.32-6.31 (d, *J* = 2.0 Hz, *E* isomer, 1 H), 4.53 (d, *J* = 1.6 Hz, *Z* isomer, 2 H), 4.44-4.43 (d, *J* = 2.0 Hz, *E* isomer, 2 H), 4.02-3.98 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.91-3.87 (t, *J* = 7.2 Hz, *Z* isomer, 2 H), 2.78-2.73 (m, *Z* and *E* isomer, 4 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 161.3 (d, *J* = 245.0 Hz, 1 C), 161.3 (d, *J* = 245.0 Hz, 1 C), 141.1, 140.5, 133.7 (d, *J* = 3.0 Hz, 1 C), 133.6 (d, *J* = 3.0 Hz, 1 C), 129.4 (d, *J* = 8.0 Hz, 1 C),

129.3-129.2 (d, *J* = 8.0 Hz, 1 C), 119.8, 118.3, 115.3 (d, *J* = 21.0 Hz, 1 C), 115. 2 (d, *J* = 21.0 Hz, 1 C), 72.7, 69.4, 69.1, 67.3, 34.7, 31.1; HRMS calcd for $C_{11}H_{12}FO$ $[M+H]^+$ 179.0867; found: 179.0862.



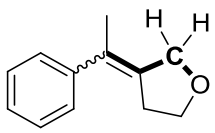
3-(4-chlorobenzylidene)tetrahydrofuran (2p)

Yellow oil (24.4 mg, 42% yield), *Z/E* = 53:47. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.32-7.29 (m, 4 H), 7.23-7.23 (m, 2 H), 7.05-7.03 (t, *J* = 8.4 Hz, 2 H), 6.40-6.39 (t, *J* = 2.0 Hz, *Z* isomer, 1 H), 6.32 (s, *E* isomer, 1 H), 4.54 (d, *J* = 1.6 Hz, *Z* isomer, 2 H), 4.45-4.44 (d, *J* = 1.6 Hz, *E* isomer, 2 H), 4.03-3.99 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.92-3.89 (t, *J* = 6.8 Hz, *Z* isomer, 2 H), 2.78-2.76 (m, *Z* and *E* isomer, 4 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 142.3, 141.8, 136.0, 135.9, 132.1, 131.2, 129.1, 129.0, 128.6, 128.5, 119.8, 118.4, 72.8, 69.5, 69.2, 67.3, 34.9, 31.2; HRMS calcd for $C_{11}H_{12}ClO$ $[M+H]^+$ 195.0571; found: 195.0577.



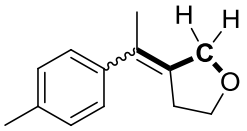
3-(4-bromobenzylidene)tetrahydrofuran (2q)

Yellow oil (32.1 mg, 45% yield), *Z/E* = 53:47. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.47-7.41 (m, 4 H), 7.19-7.17 (d, *J* = 8.4 Hz, *E* isomer, 2 H), 6.99-6.97 (d, *J* = 8.4 Hz, 2 H), 6.39-6.37 (t, *J* = 2.4 Hz, *Z* isomer, 1 H), 6.30-6.29 (t, *J* = 2.0 Hz, *E* isomer, 1 H), 4.53 (d, *J* = 1.6 Hz, *Z* isomer, 2 H), 4.44-4.43 (d, *J* = 1.6 Hz, *E* isomer, 2 H), 4.03-3.99 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.92-3.89 (t, *J* = 6.8 Hz, *Z* isomer, 2 H), 2.79-2.74 (m, *Z* and *E* isomer, 4 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 142.5, 142.0, 136.4, 136.3, 131.6, 131.5, 129.5, 129.3, 120.3, 119.9, 118.4, 72.9, 69.5, 69.2, 67.3, 34.9, 31.2; HRMS calcd for $C_{11}H_{12}BrO$ $[M+H]^+$ 239.0066; found: 239.0062.



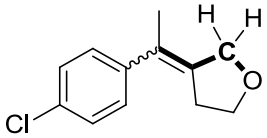
3-(1-phenylethylidene)tetrahydrofuran (2r)

Yellow oil (38.1 mg, 73% yield), *Z/E* = 49:51. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.36-7.30 (m, 4 H), 7.27-7.22 (m, 4 H), 7.17-7.15 (m, 2 H), 4.43-4.42 (d, *J* = 1.6 Hz, *Z* isomer, 2 H), 4.24-4.23 (m, *E* isomer, 2 H), 3.97-3.94 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.87-3.84 (t, *J* = 6.8 Hz, *Z* isomer, 2 H), 2.64-2.61 (m, *E* isomer, 2 H), 2.55-2.51 (m, *Z* isomer, 2 H), 2.06-2.04 (m, *E* isomer, 3 H), 1.96-1.95 (m, *Z* isomer, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 143.5, 143.3, 135.8, 135.7, 128.2, 128.1, 127.3, 127.0, 126.8, 126.5, 126.4, 126.0, 70.6, 70.4, 69.2, 68.3, 32.1, 31.5, 21.3, 20.4; HRMS calcd for $C_{12}H_{15}O$ $[M+H]^+$ 175.1118; found: 175.1113.



3-(1-(*p*-tolyl)ethylidene)tetrahydrofuran (2s)

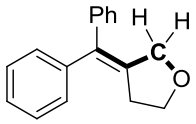
Yellow oil (38.9 mg, 69% yield), *Z/E* = 59:41. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.25-7.11 (m, 6 H), 7.06-7.04 (m, 2 H), 4.42-4.41 (d, *J* = 1.2 Hz, *Z* isomer, 2 H), 4.25-4.23 (m, *E* isomer, 2 H), 3.96-3.93 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.87-3.83 (t, *J* = 6.8 Hz, *Z* isomer, 2 H), 2.63-2.59 (m, *E* isomer, 2 H), 2.55-2.51 (m, *Z* isomer, 2 H), 2.34-2.33 (d, *J* = 2.8 Hz, *E* isomer, 6 H), 2.04-2.02 (m, *E* isomer, 3 H), 1.94-1.93 (m, *Z* isomer, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 140.5, 140.3, 136.1, 136.0, 135.2, 135.1, 128.8, 128.7, 127.2, 126.9, 126.6, 125.8, 70.6, 70.4, 69.2, 68.3, 32.1, 31.5, 21.2, 21.1, 20.4; HRMS calcd for $C_{13}H_{17}O$ $[M+H]^+$ 189.1274; found: 189.1270.



3-(1-(4-chlorophenyl)ethylidene)tetrahydrofuran (2t)

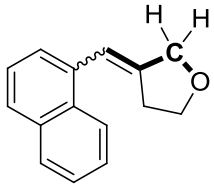
Yellow oil (25.5 mg, 41% yield), *Z/E* = 50:50. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.31-7.27 (m, 4 H), 7.20-7.17 (m, 2 H), 7.10-7.07 (d, *J* = 8.4 Hz, 2 H), 4.41 (d, *J* = 1.2 Hz, *Z* isomer, 2 H), 4.21-4.20 (d, *J* = 1.6 Hz, *E* isomer, 2 H), 3.97-3.94 (t, *J* = 7.2 Hz, *E* isomer, 2 H), 3.88-3.84 (t, *J* = 8.4 Hz, *Z* isomer, 2 H), 2.63-2.60 (m, *E* isomer, 2 H), 2.52-2.48 (m, *Z* isomer, 2 H), 2.03-2.02 (t, *J* = 1.6 Hz, Z or *E* isomer, 3 H), 1.93 (d, *J* = 1.2 Hz, Z or *E* isomer, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 141.8, 141.6,

136.5, 136.4, 132.2, 132.0, 128.7, 128.4, 128.3, 128.2, 125.6, 124.9, 70.6, 70.3, 69.2, 68.3, 32.1, 31.6, 21.2, 20.3; HRMS calcd for $C_{12}H_{14}ClO$ $[M+H]^+$ 209.0728; found: 209.0733.



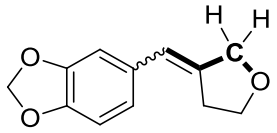
3-(diphenylmethylene)tetrahydrofuran (2u)

Yellow oil (42.4 mg, 60% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.34-7.29 (m, 4 H), 7.23-7.21 (m, 4 H), 7.14-7.12 (m, 2 H), 4.39 (s, 2 H), 3.95-3.92 (t, *J* = 2.8 Hz, 2 H), 2.74-2.68 (t, *J* = 6.8 Hz, 2 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 142.2, 141.8, 138.6, 132.8, 128.8, 128.6, 128.3, 128.2, 126.8, 126.6, 71.0, 68.7, 32.8; HRMS calcd for $C_{17}H_{17}O$ $[M+H]^+$ 237.1274; found: 237.1281.



3-(naphthalen-1-ylmethylene)tetrahydrofuran (2v)

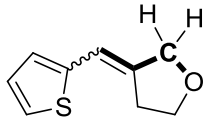
Yellow oil (40.9 mg, 65% yield). *Z*/*E* = 50:50. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 8.05-8.01 (m, 2 H), 7.87-7.83 (m, 2 H), 7.76-7.74 (m, 2 H), 7.52-7.41 (m, 7 H), 7.23-7.21 (d, *J* = 7.2 Hz, 1 H), 7.03 (s, *Z* isomer, 1 H), 6.94 (s, *E* isomer, 1 H), 4.57 (d, *J* = 1.2 Hz, *Z* isomer, 2 H), 4.44 (s, *E* isomer, 2 H), 3.98-3.93 (m, *Z* and *E* isomer, 4 H), 2.88-2.86 (m, *E* isomer, 2 H), 2.70-2.67 (d, *J* = 6.0 Hz, *Z* isomer, 2 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 143.3, 143.2, 134.7, 134.6, 133.5, 131.5, 131.3, 128.5, 127.4, 127.2, 125.9, 125.9, 125.9, 125.8, 125.8, 125.5, 125.3, 125.3, 125.3, 124.3, 124.3, 118.1, 116.9, 72.2, 69.5, 68.9, 67.6, 34.1, 31.0; HRMS calcd for $C_{15}H_{15}O$ $[M+H]^+$ 211.1118; found: 211.1112.



5-((dihydrofuran-3(2*H*)-ylidene)methyl)benzo[*d*][1,3]dioxole (2w)

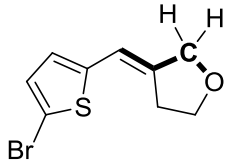
Yellow oil (26.9 mg, 44% yield), *Z*/*E* = 40:60. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ =

6.85 (s, 1 H), 6.81-6.78 (m, 4 H), 6.62 (s, 1 H), 6.36-6.35 (t, *J* = 2.4 Hz, *Z* isomer, 1 H), 6.28-6.27 (d, *J* = 2.0 Hz, *E* isomer, 1 H), 5.97-5.94 (m, *Z* and *E* isomer, 4 H), 4.53 (s, *Z* isomer, 2 H), 4.43-4.42 (d, *J* = 2.0 Hz, *E* isomer, 2 H), 4.02-3.98 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.90-3.87 (t, *J* = 7.2 Hz, *Z* isomer, 2 H), 2.79-2.72 (m, *Z* and *E* isomer, 4 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 147.8, 147.7, 146.1, 139.7, 139.1, 132.0, 131.9, 122.0, 121.7, 120.5, 119.1, 108.3, 108.2, 107.9, 107.8, 101.0, 72.8, 69.5, 69.2, 67.3, 34.8, 31.1; HRMS calcd for $C_{12}H_{13}O_3$ $[M+H]^+$ 205.0859; found: 205.0855.



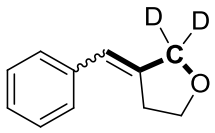
3-(thiophen-2-ylmethylene)tetrahydrofuran (2aa)

Yellow oil (19.4 mg, 39% yield), *Z*/*E* = 44:56. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.27-7.24 (m, 2 H), 7.04-7.01 (m, 2 H), 6.95 (d, *J* = 2.8 Hz, *E* isomer, 1 H), 6.85-6.84 (d, *J* = 3.6 Hz, *Z* isomer, 1 H), 6.64-6.32 (t, *J* = 2.0 Hz, *Z* isomer, 1 H), 6.59 (s, *E* isomer, 1 H), 4.55-4.54 (d, *J* = 2.0 Hz, *Z* isomer, 2 H), 4.44-4.43 (d, *J* = 2.0 Hz, *E* isomer, 2 H), 4.07-4.04 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.94-3.91 (t, *J* = 7.2 Hz, *Z* isomer, 2 H), 2.79-2.73 (m, *Z* and *E* isomer, 4 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 141.7, 141.3, 140.0, 139.2, 127.3, 127.1, 125.8, 125.4, 124.9, 124.7, 113.7, 112.9, 72.4, 70.1, 69.2, 68.0, 34.4, 31.6; HRMS calcd for $C_9H_{11}OS$ $[M+H]^+$ 167.0525; found: 167.0521.

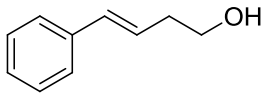


3-((5-bromothiophen-2-yl)methylene)tetrahydrofuran (2bb)

Yellow solid (21.9 mg, 30% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 6.98-6.97 (d, *J* = 4.0 Hz, 1 H), 6.69-6.68 (d, *J* = 4.0 Hz, 1 H), 6.48-6.47 (t, *J* = 2.0 Hz, *E* isomer, 1 H), 4.41 (d, *J* = 2.0 Hz, 2 H), 4.07-4.03 (t, *J* = 7.2 Hz, 2 H), 2.71-2.67 (m, 2 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 143.4, 140.0, 129.8, 125.8, 112.7, 112.4, 72.4, 69.2, 31.6; HRMS calcd for $C_9H_{10}BrOS$ $[M+H]^+$ 244.9630; found: 244.9625.



(3) Yellow oil (35.6 mg, 74% yield), *Z*/*E* = 51:49. ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.36-7.30 (m, 6 H), 7.23-7.18 (m, 2 H), 7.13-7.11 (d, *J* = 7.6 Hz, 2 H), 6.44 (s, *Z* isomer, 1 H), 6.36-6.35 (t, *J* = 2.4 Hz, *E* isomer, 1 H), 4.01-3.98 (t, *J* = 6.8 Hz, *E* isomer, 2 H), 3.91-3.87 (t, *J* = 6.8 Hz, *Z* isomer, 2 H), 2.83-2.79 (m, *E* isomer, 2 H), 2.78-2.74 (m, *Z* isomer, 2 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 141.4, 140.8, 137.6, 137.4, 128.5, 128.4, 127.9, 127.7, 126.5, 126.4, 121.0, 119.5, 69.2, 67.3, 34.9, 31.2; HRMS calcd for $C_{11}H_{11}D_2O$ $[M+H]^+$ 163.1087; found: 163.1081.



(*E*)-4-phenylbut-3-en-1-ol (4)

Yellow oil (17.7 mg, 40% yield). ^{1}H NMR (400 MHz, $CDCl_3$, ppm): δ = 7.36-7.27 (m, 4 H), 7.27-7.18 (m, 1 H), 6.50-6.46 (d, *J* = 16.0 Hz, 1 H), 6.23-6.16 (m, 1 H), 3.74-7.31 (m, 2 H), 2.49-2.44 (m, 2 H), 1.90 (s, 1 H); ^{13}C NMR (100 MHz, $CDCl_3$, ppm): δ = 137.2, 132.6, 128.5, 127.2, 126.3, 126.0, 61.9, 36.3; HRMS calcd for $C_{10}H_{13}O$ $[M+H]^+$ 149.0961; found: 149.0965.

Reference:

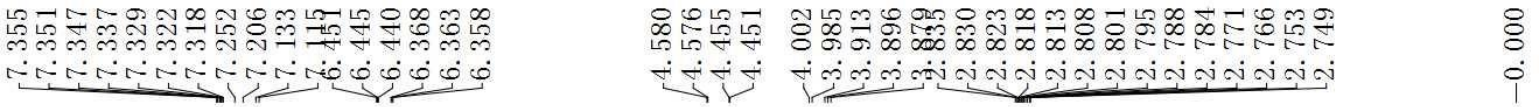
1. Hosseini, S. N.; Johnston, J. R. and West, F. G. Evidence for Heterolytic Cleavage of a Cyclic Oxoniumylide: Implications for the Mechanism of the Stevens [1,2]-Shift. *Chem. Commun.* **2017**, *53*, 12654.

2. Šolić, I.; Seankongsuk, P.; Loh, J. K.; Vilaivan, T. and Bates, R. W. Scandium as a Pre-Catalyst for the Deoxygenative Allylation of Benzylic Alcohols. *Org. Biomol. Chem.* **2018**, *16*, 119.

3. Bernasconi, M.; Ramella, V.; Tosatti, P,; and Pfaltz, A. Iridium-Catalyzed Asymmetric Hydrogenation of 3,3-Disubstituted Allylic Alcohols in Ethereal Solvents. *Chem. Eur. J.* **2014**, *20*, 2440.

4. Xu, J.; Samsuri, N. B. and Duong, H. A. Nickel-Catalysed Cyclopropanation of Electron-Deficient Alkenes with Diiodomethane and Diethylzinc. *Chem. Commun.* **2016**, *52*, 3372.

5. K. T. Sylvester and P. J. Chirik, Iron-Catalyzed, Hydrogen-Mediated Reductive Cyclization of 1,6-Enynes and Diynes: Evidence for Bis(imino)pyridine Ligand Participation. *J. Am. Chem. Soc.* **2009**, *131*, 8772.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7.322
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7.252
7.206
7.133
7.115
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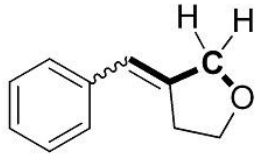
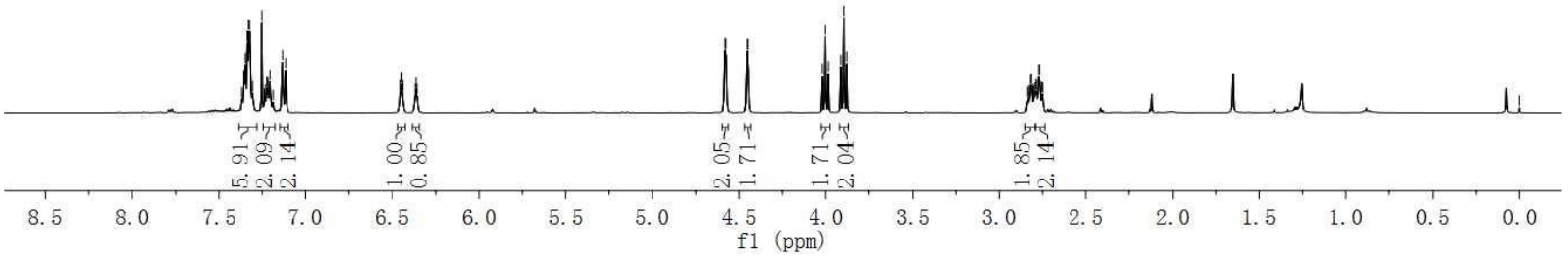
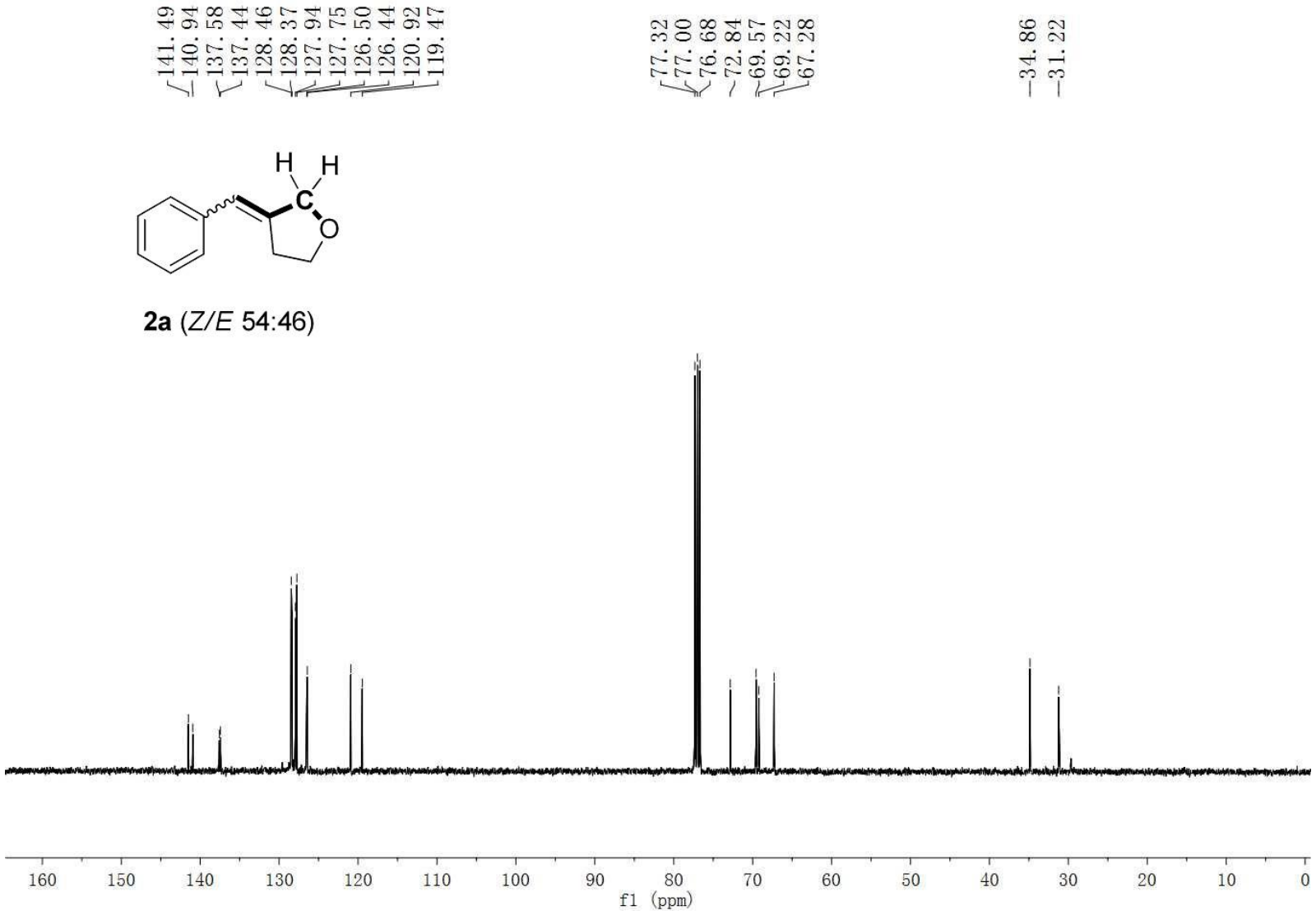
6.445
6.440
6.368
6.363
6.358
4.580
4.576
4.455
4.451
4.002
3.985
3.913
3.896
3.879
3.835
2.830
2.823
2.818
2.813
2.808
2.801
2.795
2.788
2.784
2.771
2.766
2.753
2.749
0.000


H
H
C
O

2a (*Z*/*E* 54:46)


5.91
2.09
2.14
1.00
0.85
2.05
1.71
1.71
2.04
1.85
2.14
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)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140.94
137.58
137.44
128.46
128.37
127.94
127.75
126.50
126.44
120.92
119.47
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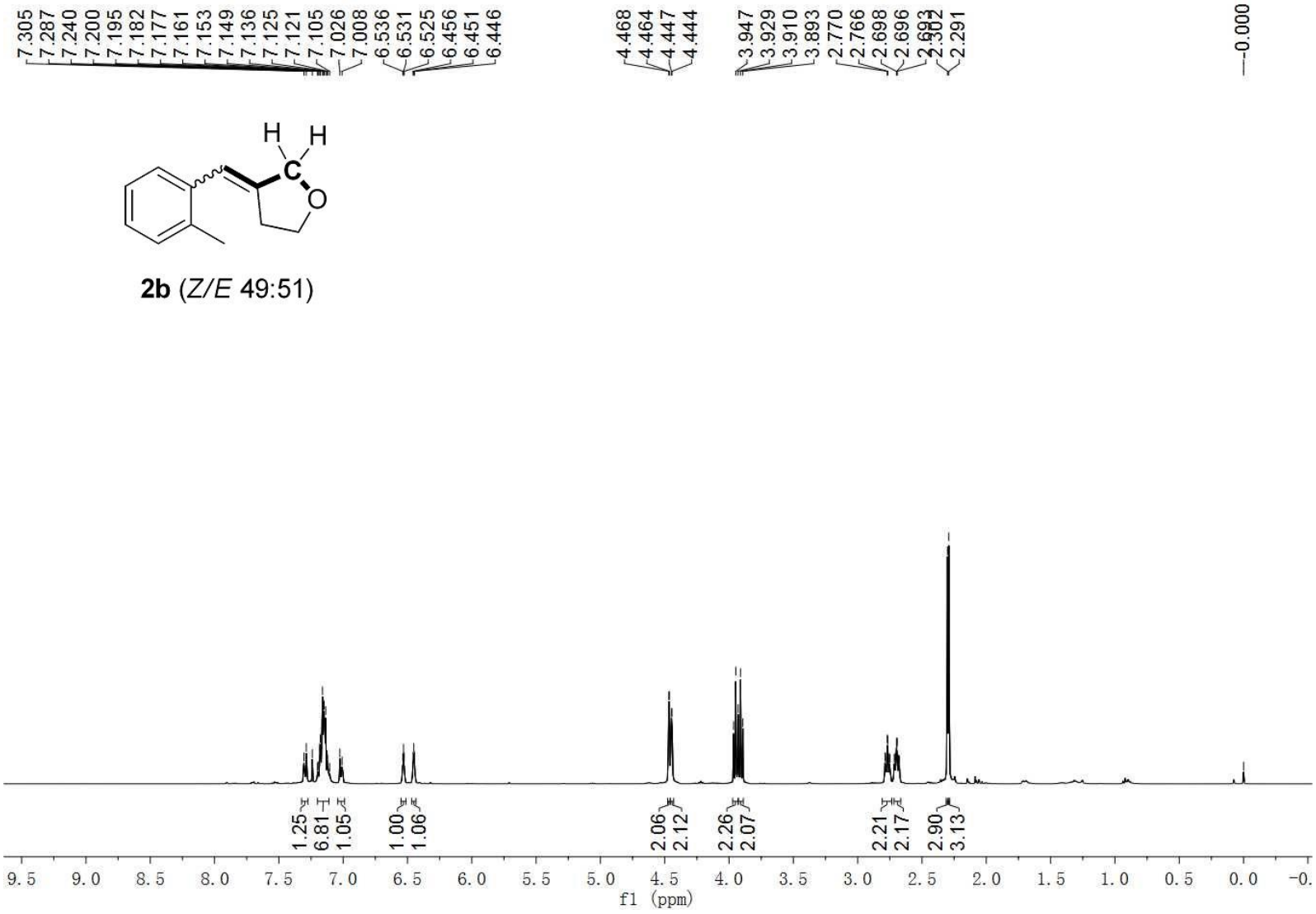
77.00
76.68
72.84
69.57
69.22
67.28
34.86
31.22
H
H
C
O
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

2a (*Z*/*E* 54:46)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7.287
7.240
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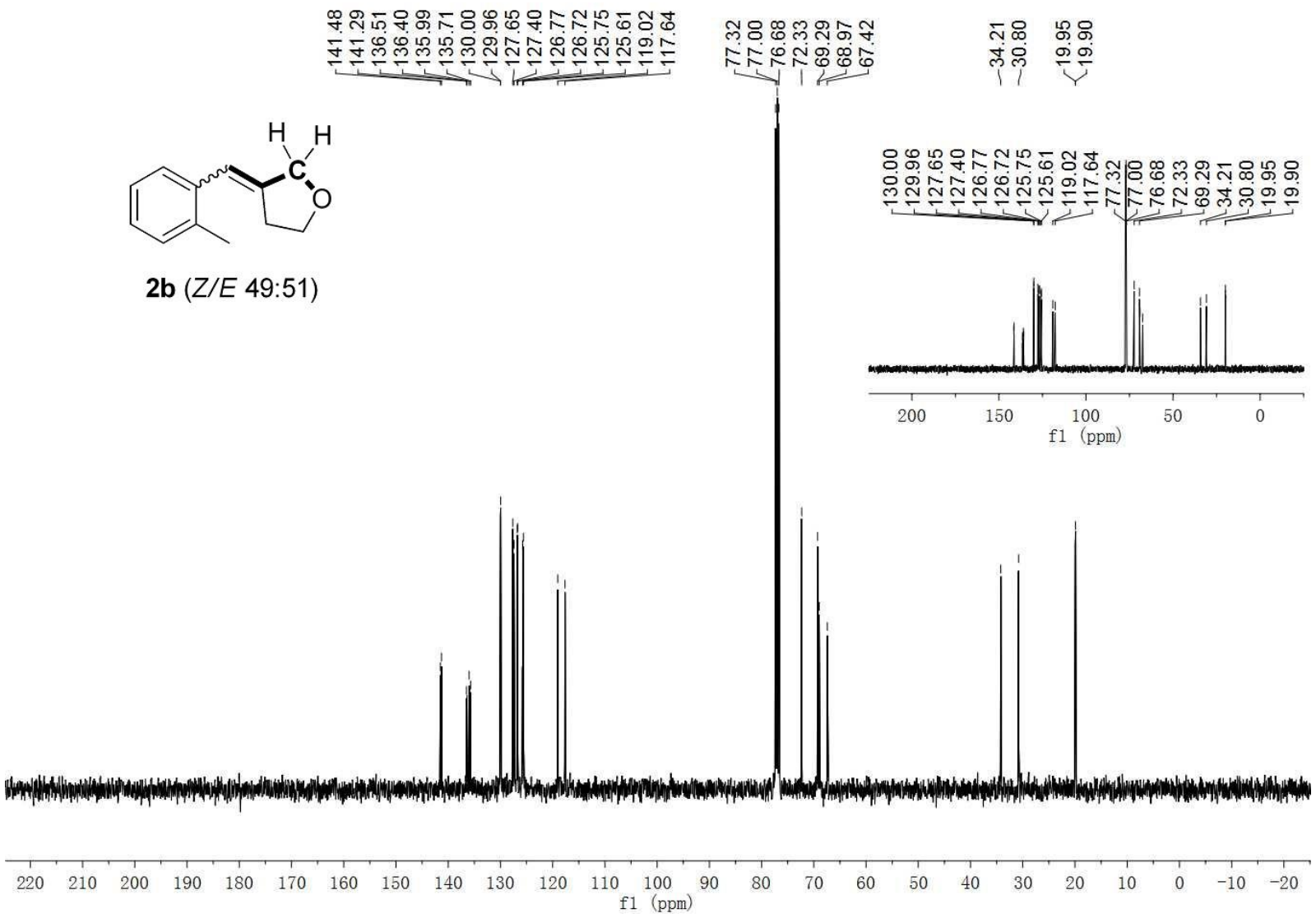
7.177
7.161
7.153
7.149
7.136
7.125
7.121
7.105
7.026
7.008
6.536
6.531
6.525
6.456
6.451
6.446
4.468
4.464
4.447
4.444
3.947
3.929
3.910
3.893
2.770
2.766
2.698
2.696
2.291
0.000
H
H
C
O
1.25
6.81
1.05
1.00
1.06
2.06
2.12
2.26
2.07
2.21
2.17
2.90
3.13
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.
f1 (ppm)

2b (*Z*/*E* 49:51)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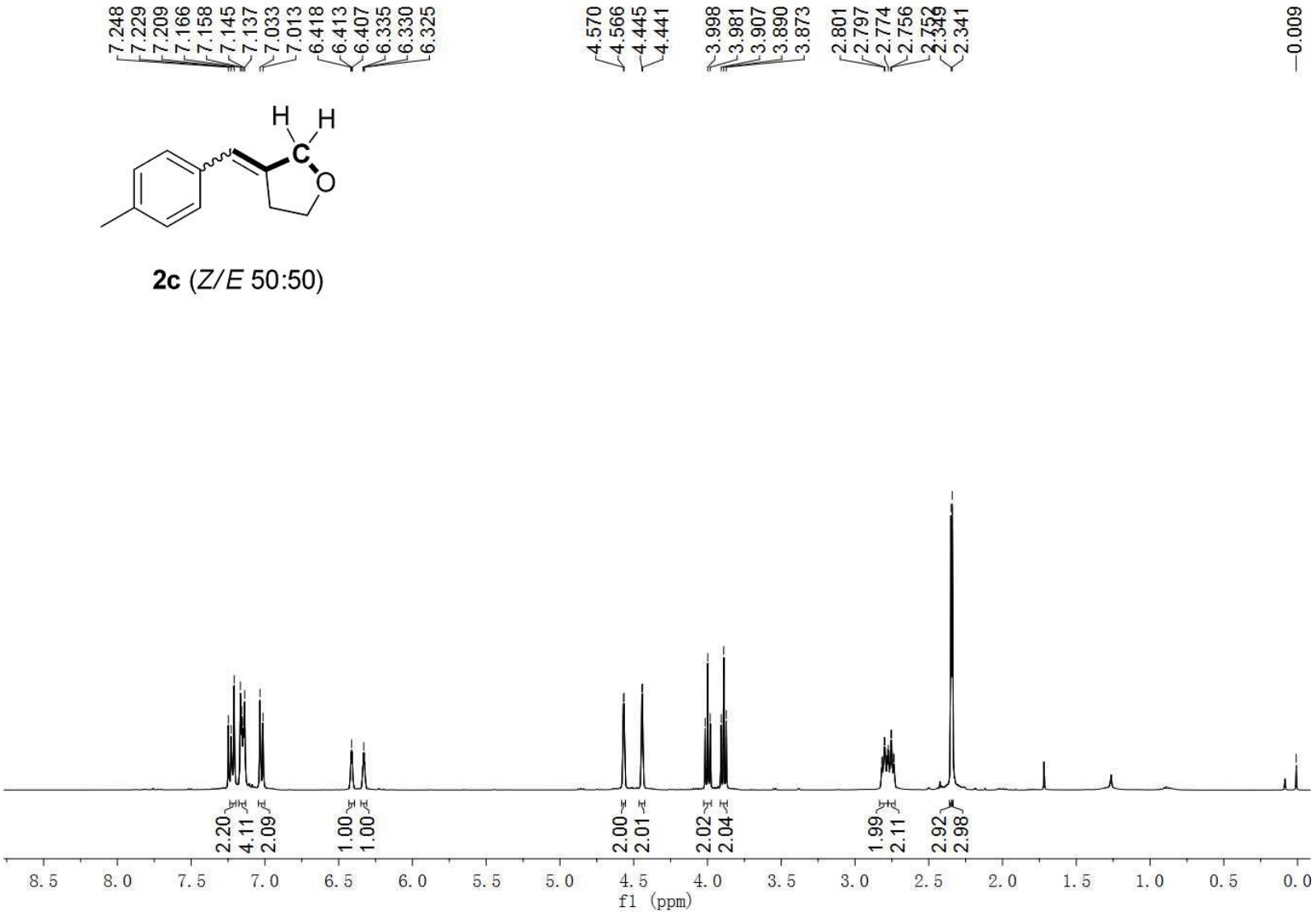
136.51
136.40
135.99
135.71
130.00
129.96
127.65
127.40
126.77
126.72
125.75
125.61
119.02
117.64
77.32
77.00
76.68
72.33
69.29
68.97
67.42
34.21
30.80
19.95
19.90
H
H
C
O
2b (Z/E 49:51)
130.00
129.96
127.65
127.40
126.77
126.72
125.75
125.61
119.02
117.64
77.32
77.00
76.68
72.33
69.29
34.21
30.80
19.95
19.90
200
150
100
50
0
f1 (ppm)
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
f1 (ppm)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7.209
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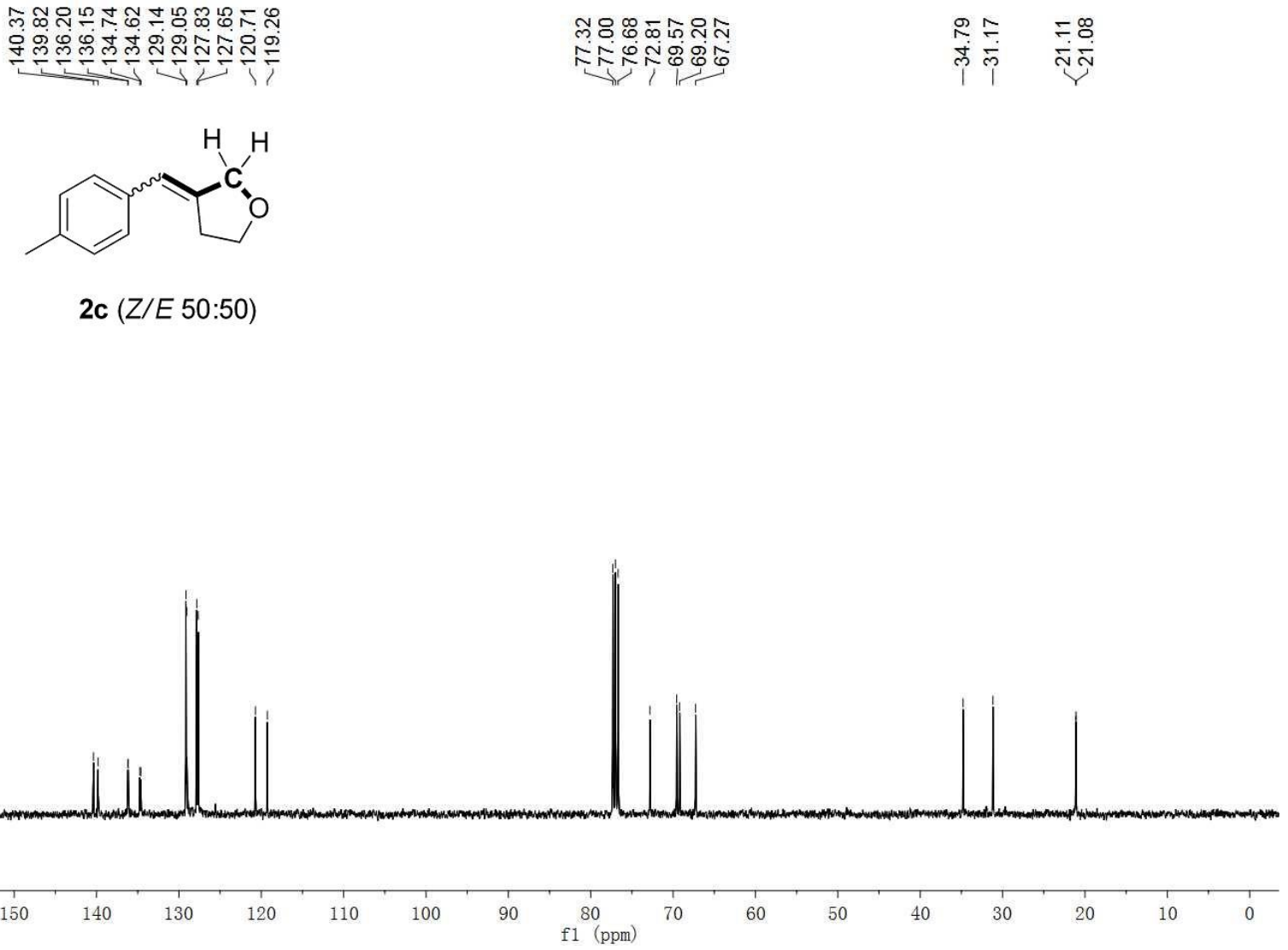
7.145
7.137
7.033
7.013
6.418
6.413
6.407
6.335
6.330
6.325
4.570
4.566
4.445
4.441
3.998
3.981
3.907
3.890
3.873
2.801
2.797
2.774
2.756
2.341
0.009
H
H
C
O
2.20
4.11
2.09
1.00
1.00
2.00
2.01
2.02
2.04
1.99
2.11
2.92
2.98
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

2c (*Z*/*E* 50:50)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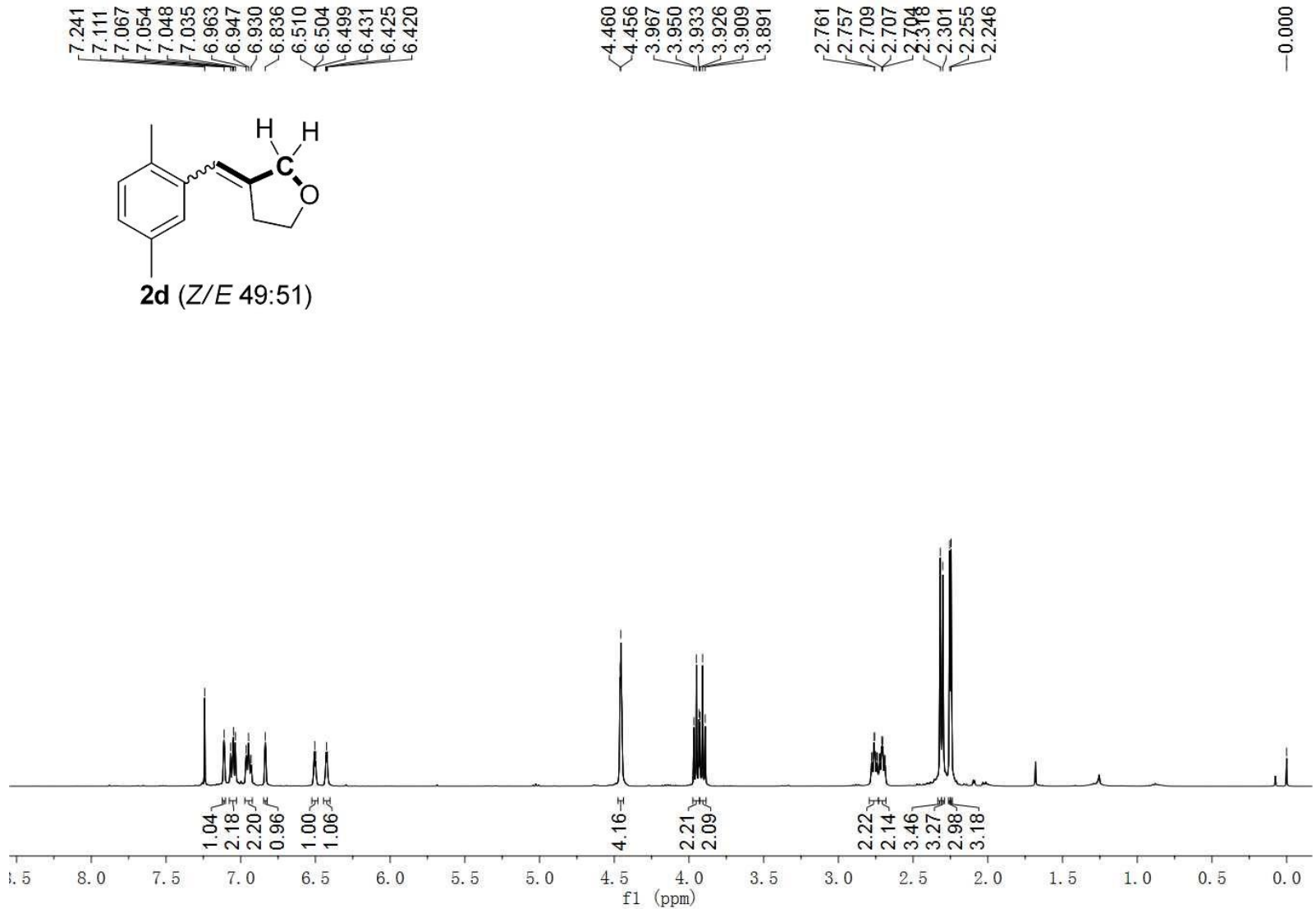
134.74
134.62
129.14
129.05
127.83
127.65
120.71
119.26
77.32
77.00
76.68
72.81
69.57
69.20
67.27
34.79
31.17
21.11
21.08
H
H
C
O
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

2c (*Z*/*E* 50:50)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7.111
7.067
7.054
7.048
7.035
6.963
6.947
6.930
6.836
6.510
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6.431
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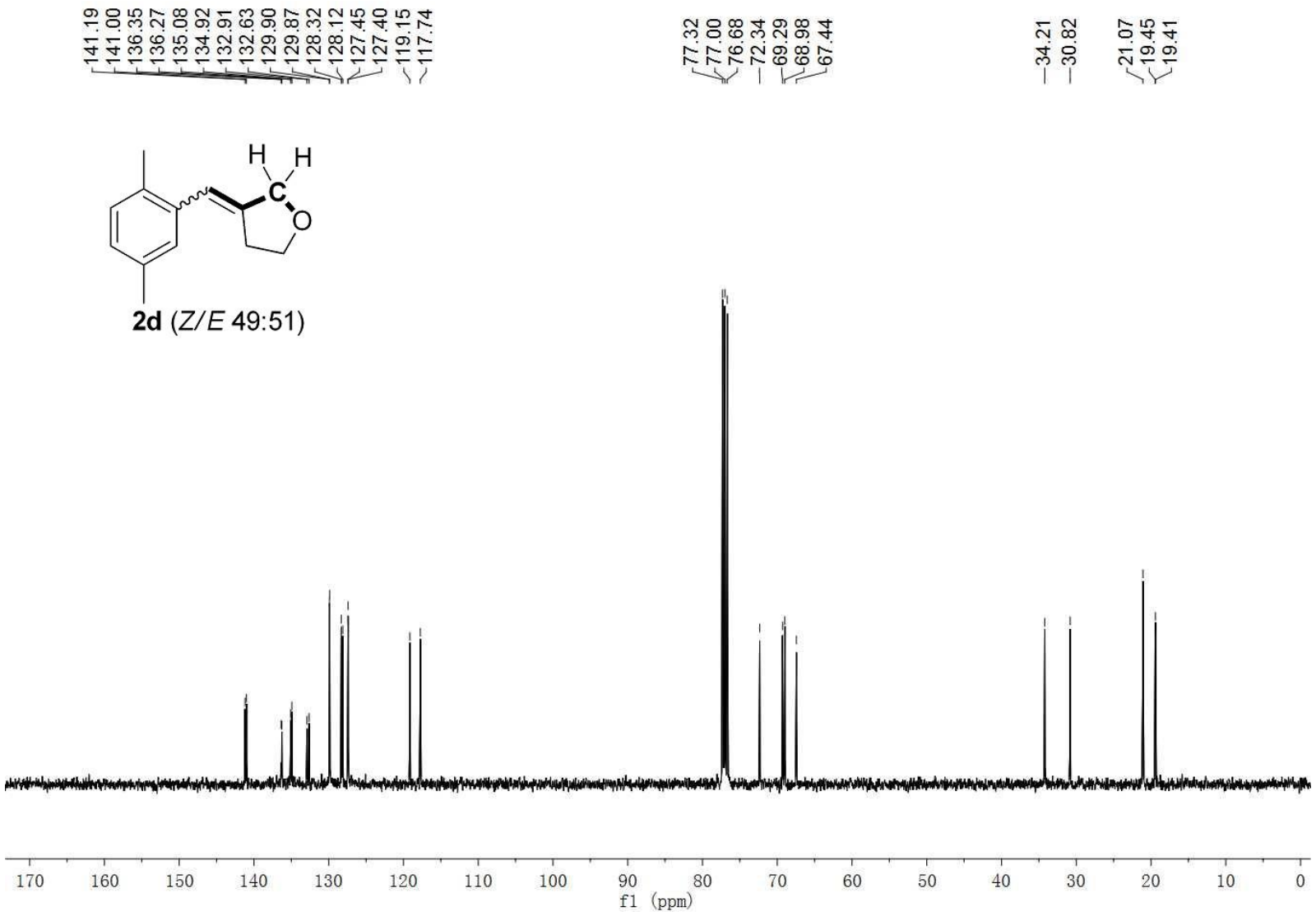
3.926
3.909
3.891
2.761
2.757
2.709
2.707
2.704
2.318
2.301
2.255
2.246
0.000
H
H
C
O
1.04
2.18
2.20
0.96
1.00
1.06
4.16
2.21
2.09
2.22
2.14
3.46
3.27
2.98
3.18
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

2d (*Z*/*E* 49:51)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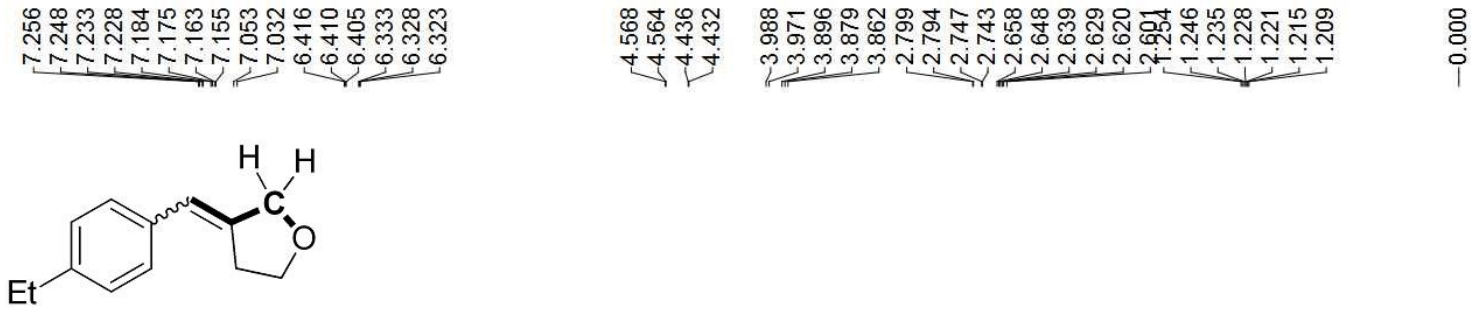
136.27
135.08
134.92
132.91
132.63
129.90
129.87
128.32
128.12
127.45
127.40
119.15
117.74
77.32
77.00
76.68
72.34
69.29
68.98
67.44
34.21
30.82
21.07
19.45
19.41
H
H
C
O
2d (Z/E 49:51)
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)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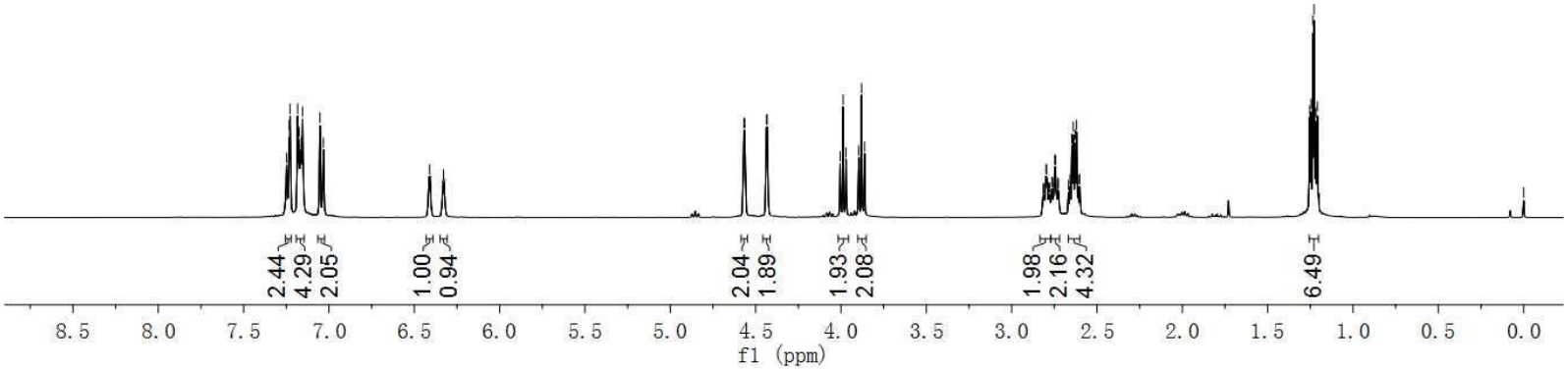
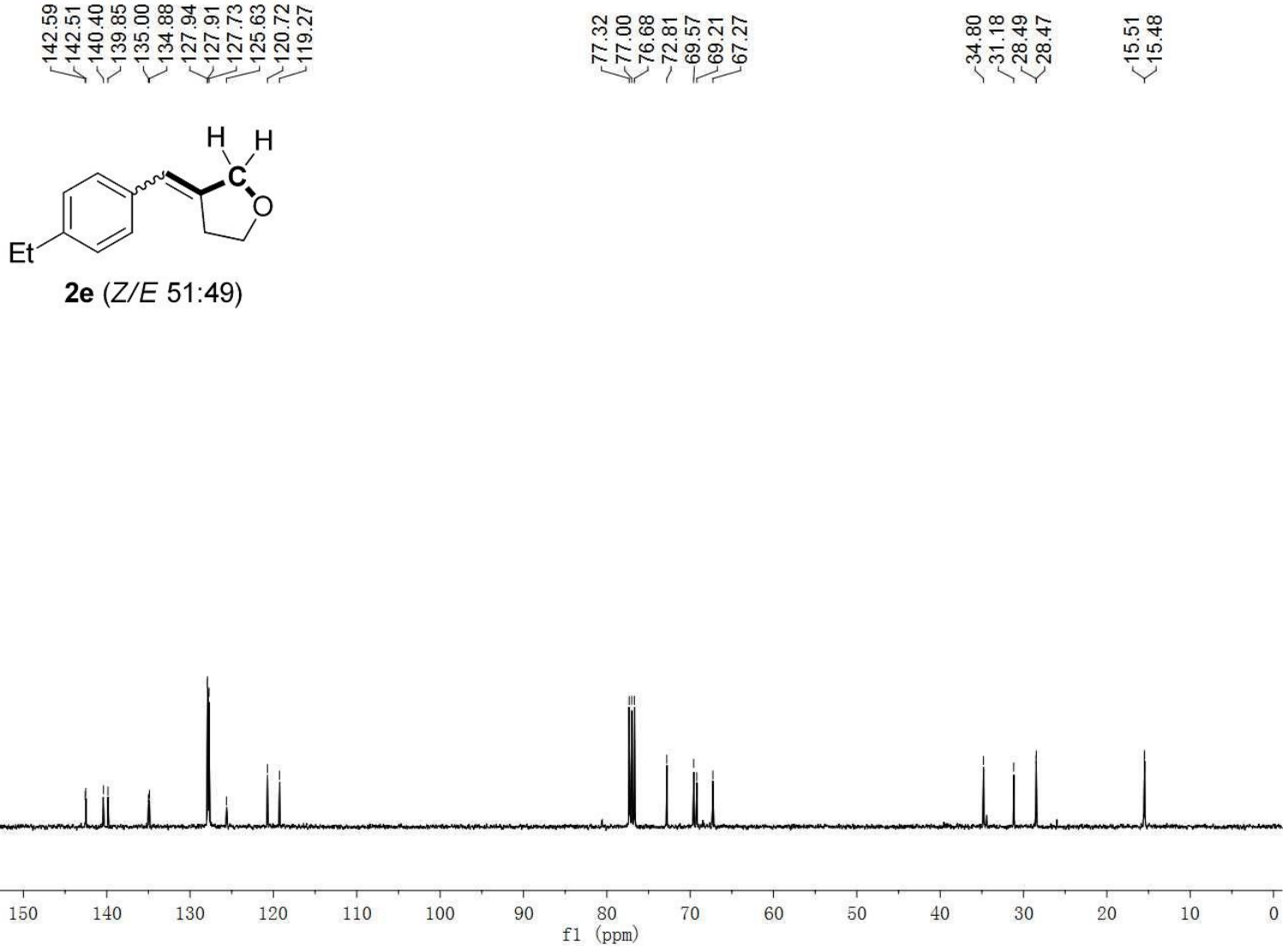
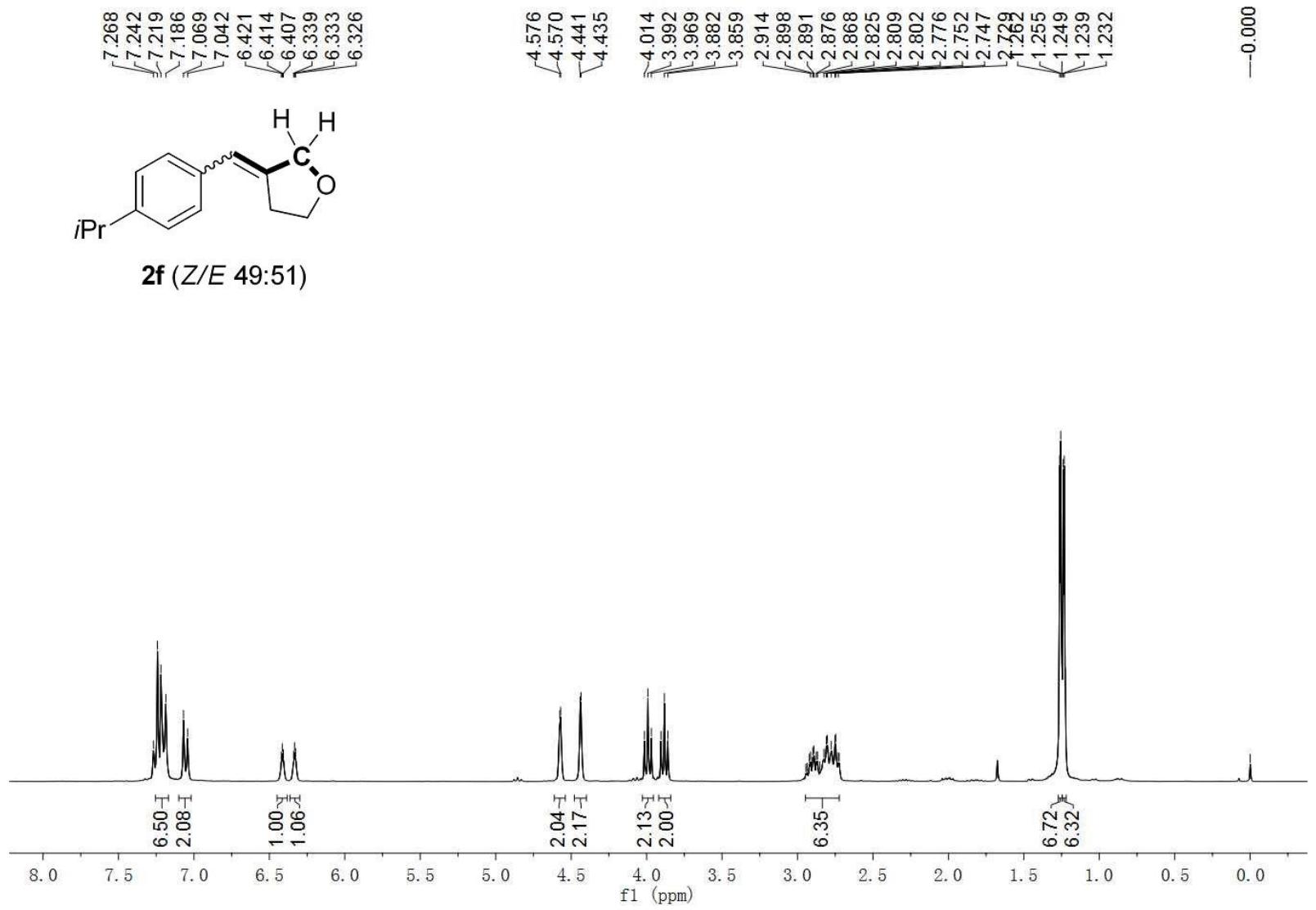
7.184
7.175
7.163
7.155
7.053
7.032
6.416
6.410
6.405
6.333
6.328
6.323
4.568
4.564
4.436
4.432
3.988
3.971
3.896
3.879
3.862
2.799
2.794
2.747
2.743
2.658
2.648
2.639
2.629
2.620
2.601
1.254
1.246
1.235
1.228
1.221
1.215
1.209
0.000
H
H
C
O
Et

2e (*Z*/*E* 51:49)


2.44
4.29
2.05
1.00
0.94
2.04
1.89
1.93
2.08
1.98
2.16
4.32
6.49
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


142.59
142.51
140.40
139.85
135.00
134.88
127.94
127.91
127.73
125.63
120.72
119.27
77.32
77.00
76.68
72.81
69.57
69.21
67.27
34.80
31.18
28.49
28.47
15.51
15.48
H
H
C
O
Et
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

2e (*Z*/*E* 51:49)


7.268
7.242
7.219
7.186
7.069
7.042
6.421
6.414
6.407
6.339
6.333
6.326
4.576
4.570
4.441
4.435
4.014
3.992
3.969
3.882
3.859
2.914
2.898
2.891
2.876
2.868
2.825
2.809
2.802
2.776
2.752
2.747
1.255
1.249
1.239
1.232
0.000
H
H
C
O
iPr
6.50
2.08
1.00
1.06
2.04
2.17
2.13
2.00
6.35
6.72
6.32
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

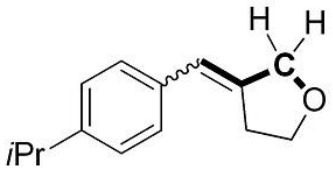
2f (*Z*/*E* 49:51)

147.22
147.14
140.44
139.89
135.17
135.04
127.92
127.75
126.52
126.42
120.71
119.27

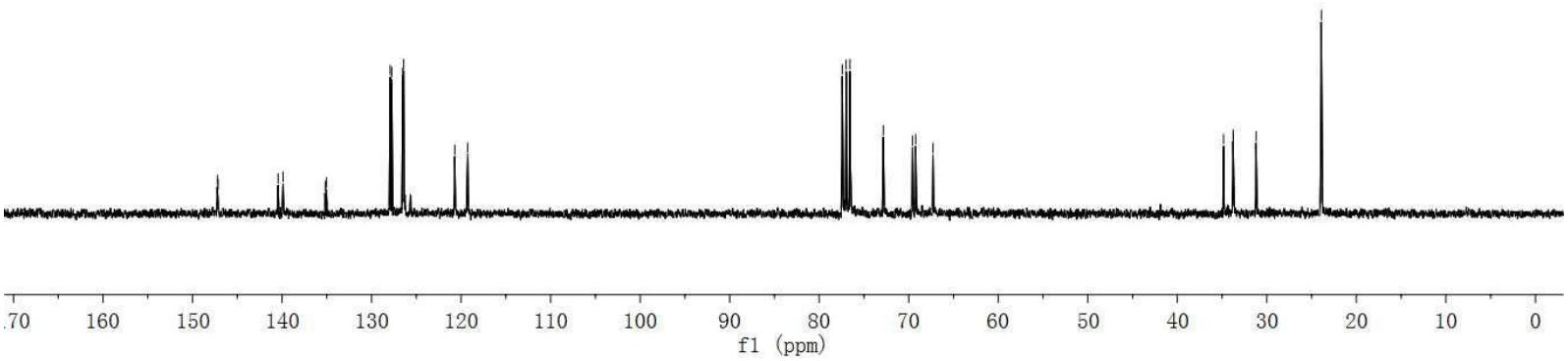
77.42
77.00
76.58
72.83
69.60
69.23
67.29

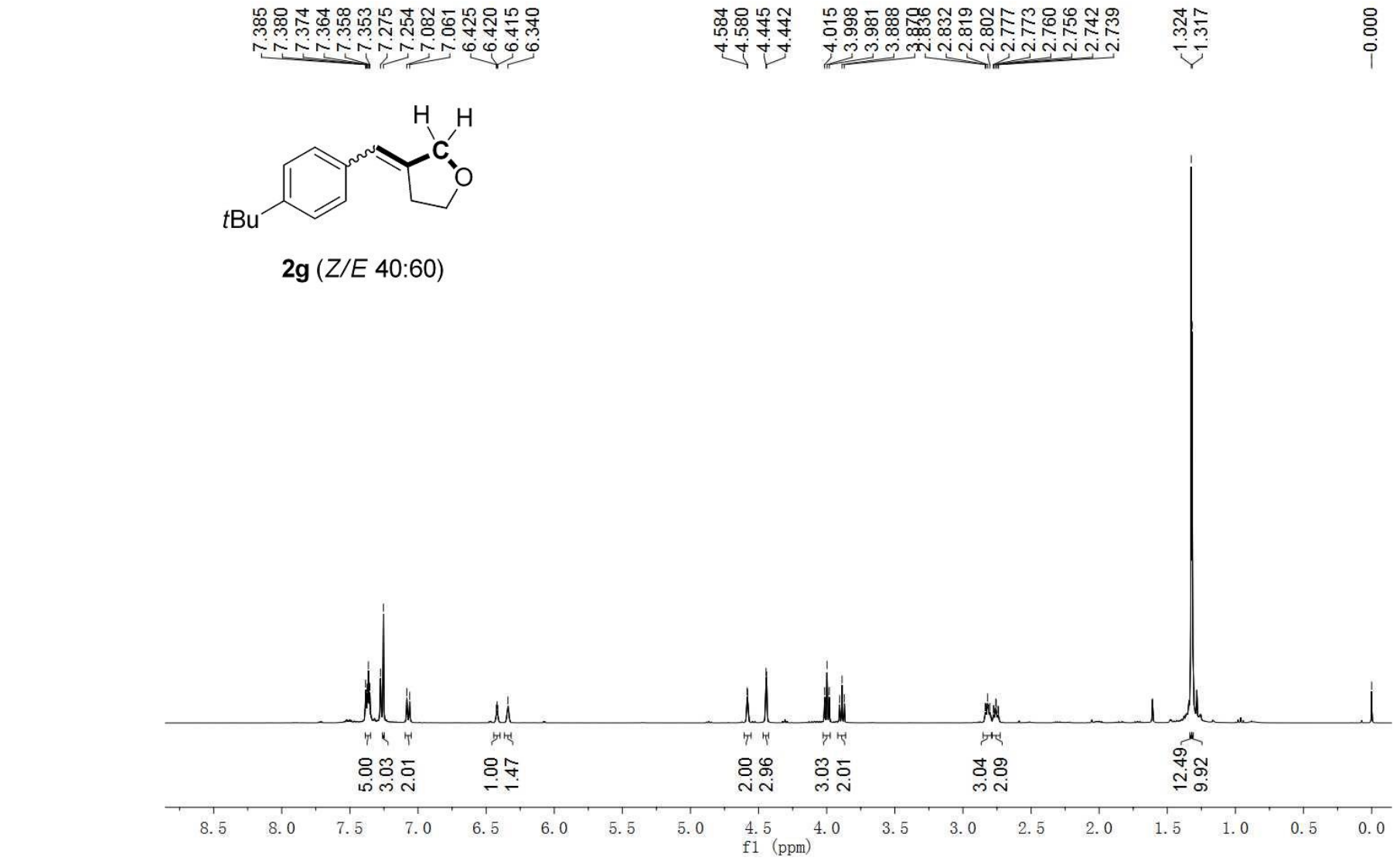
34.83
33.77
33.74
31.20

23.90

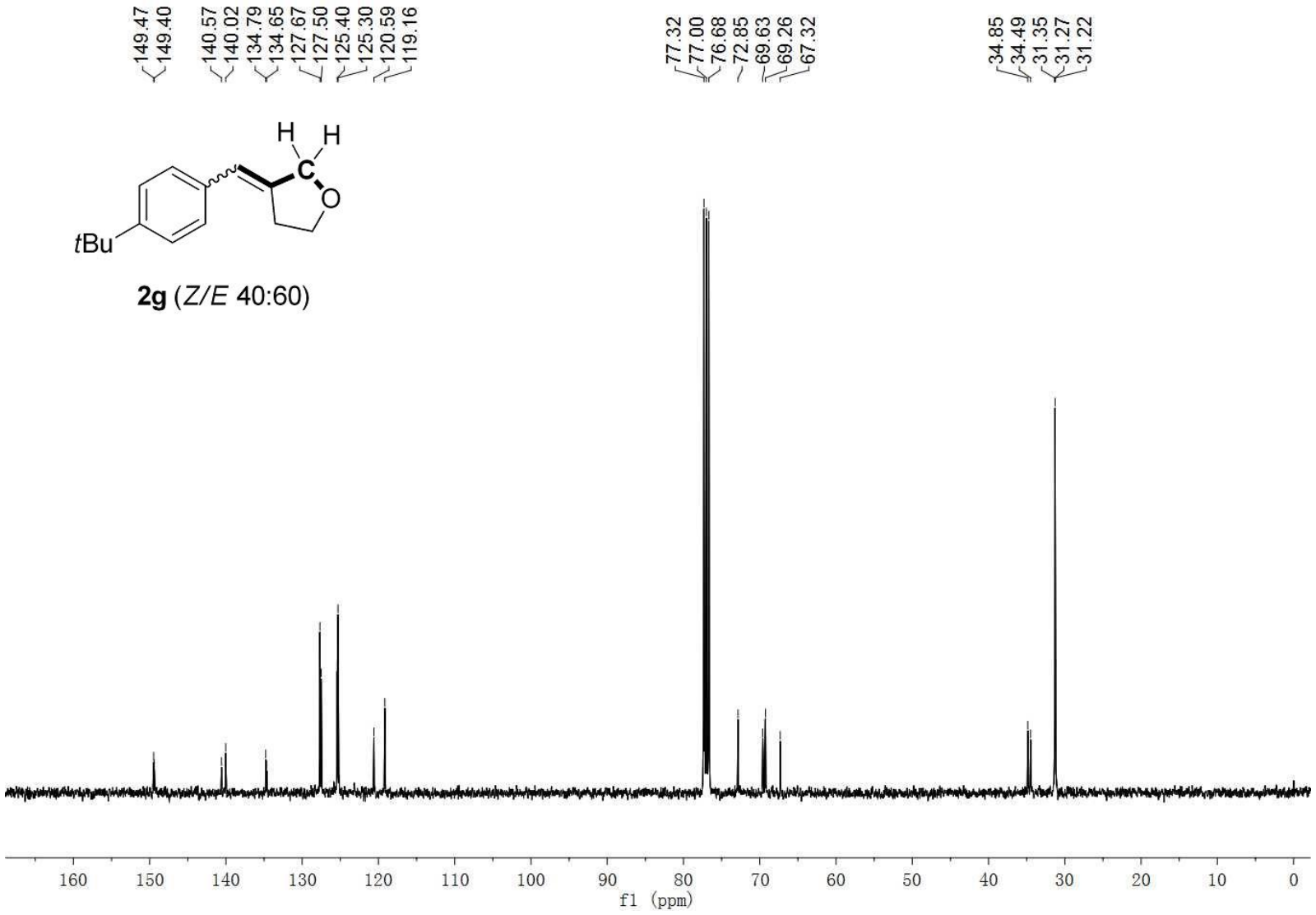


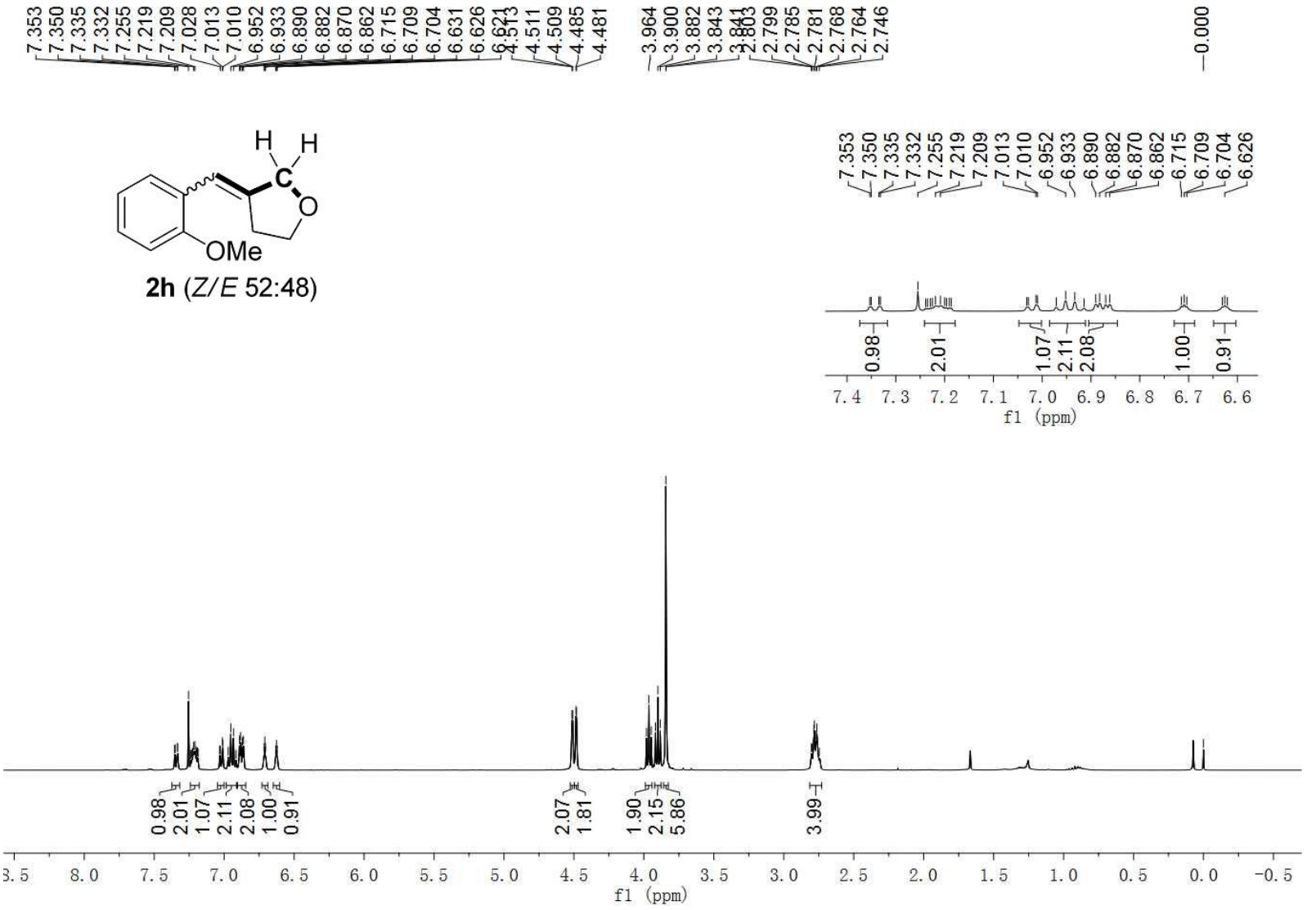
2f (*Z*/*E* 49:51)

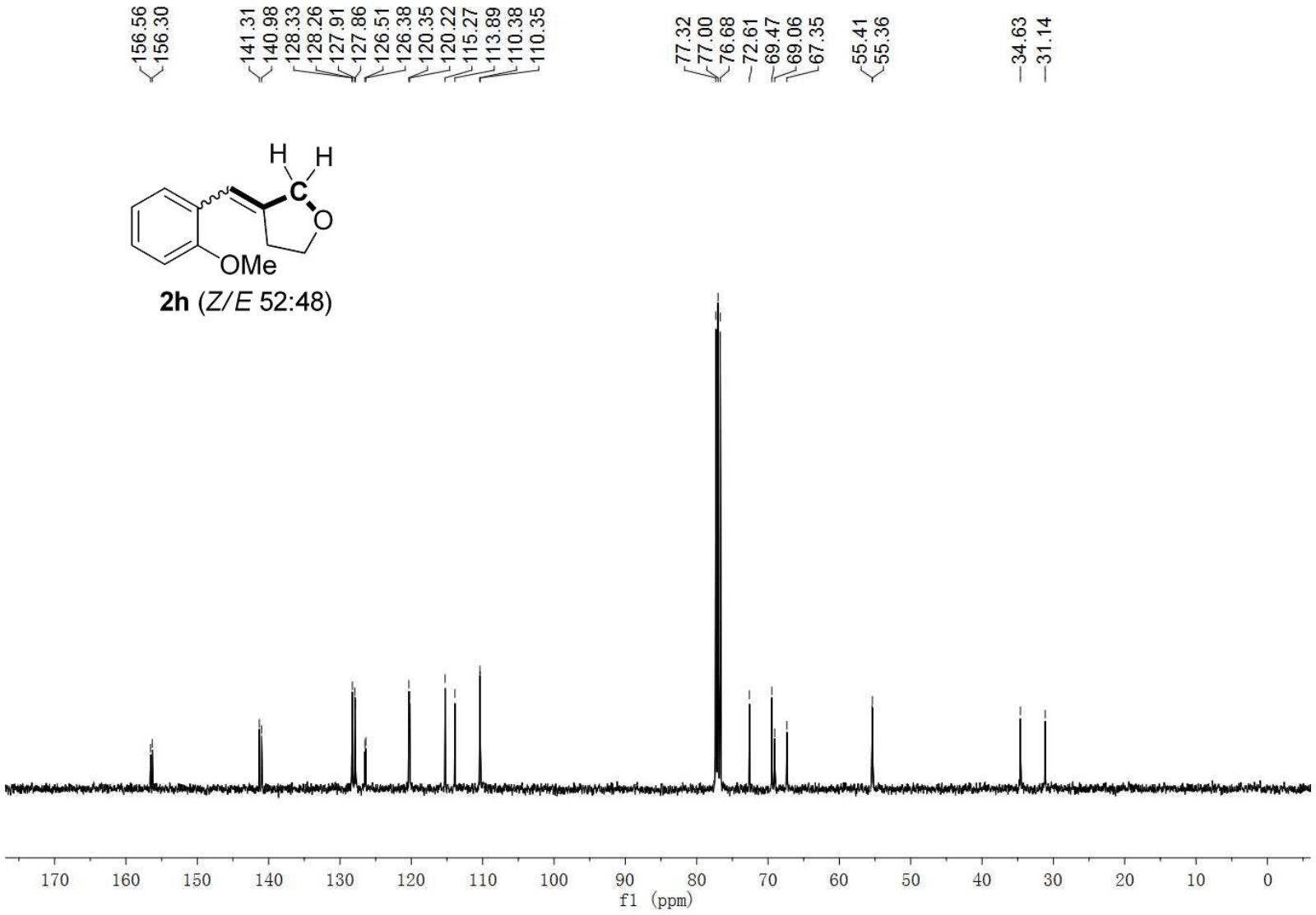


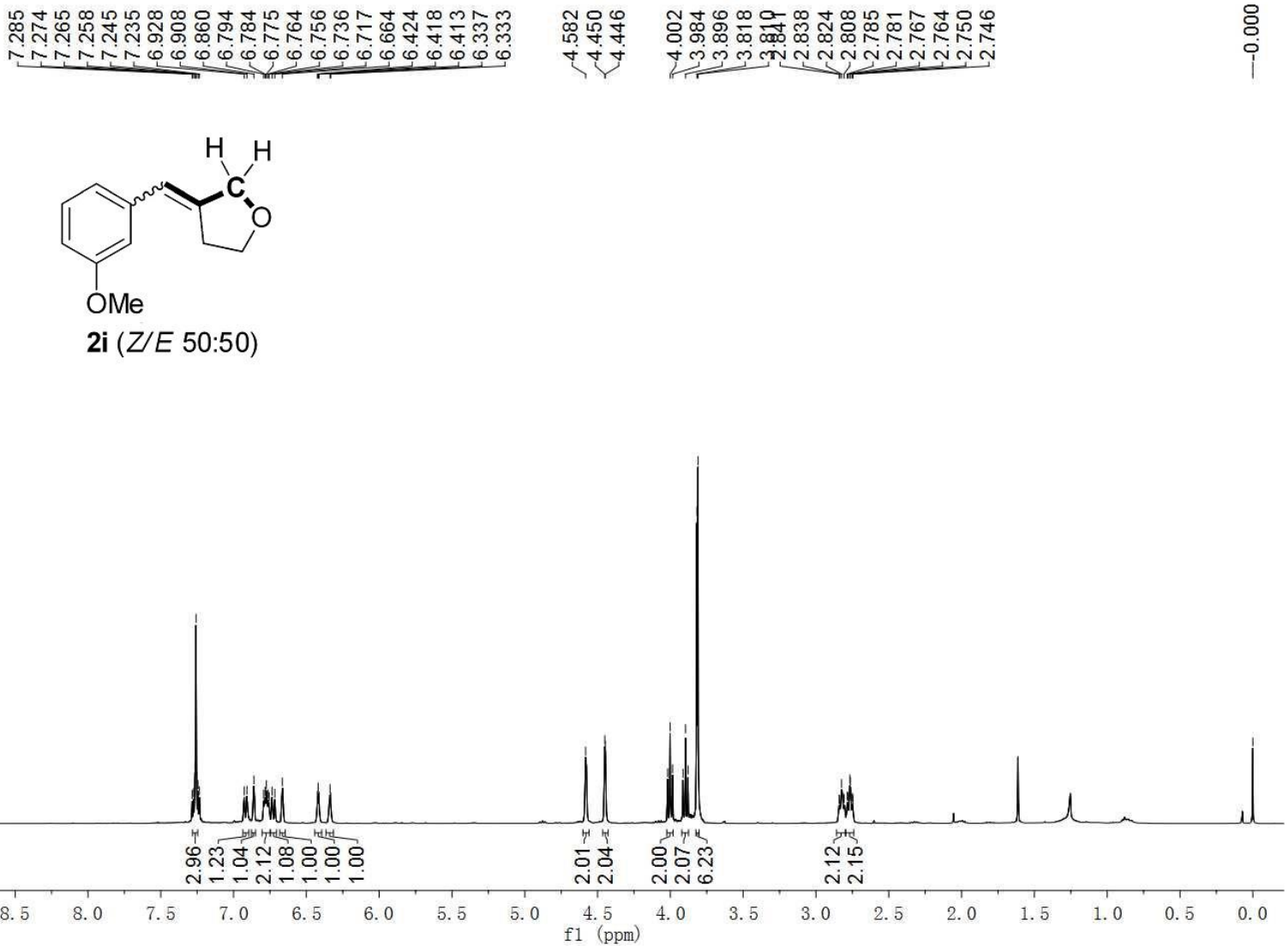

7.385
7.380
7.374
7.364
7.358
7.353
7.275
7.254
7.082
7.061
6.425
6.420
6.415
6.340
4.584
4.580
4.445
4.442
4.015
3.998
3.981
3.888
3.870
3.836
2.832
2.819
2.802
2.777
2.773
2.760
2.756
2.742
2.739
1.324
1.317
0.000
H
H
C
O
tBu
5.00
3.03
2.01
1.00
1.47
2.00
2.96
3.03
2.01
3.04
2.09
12.49
9.92
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

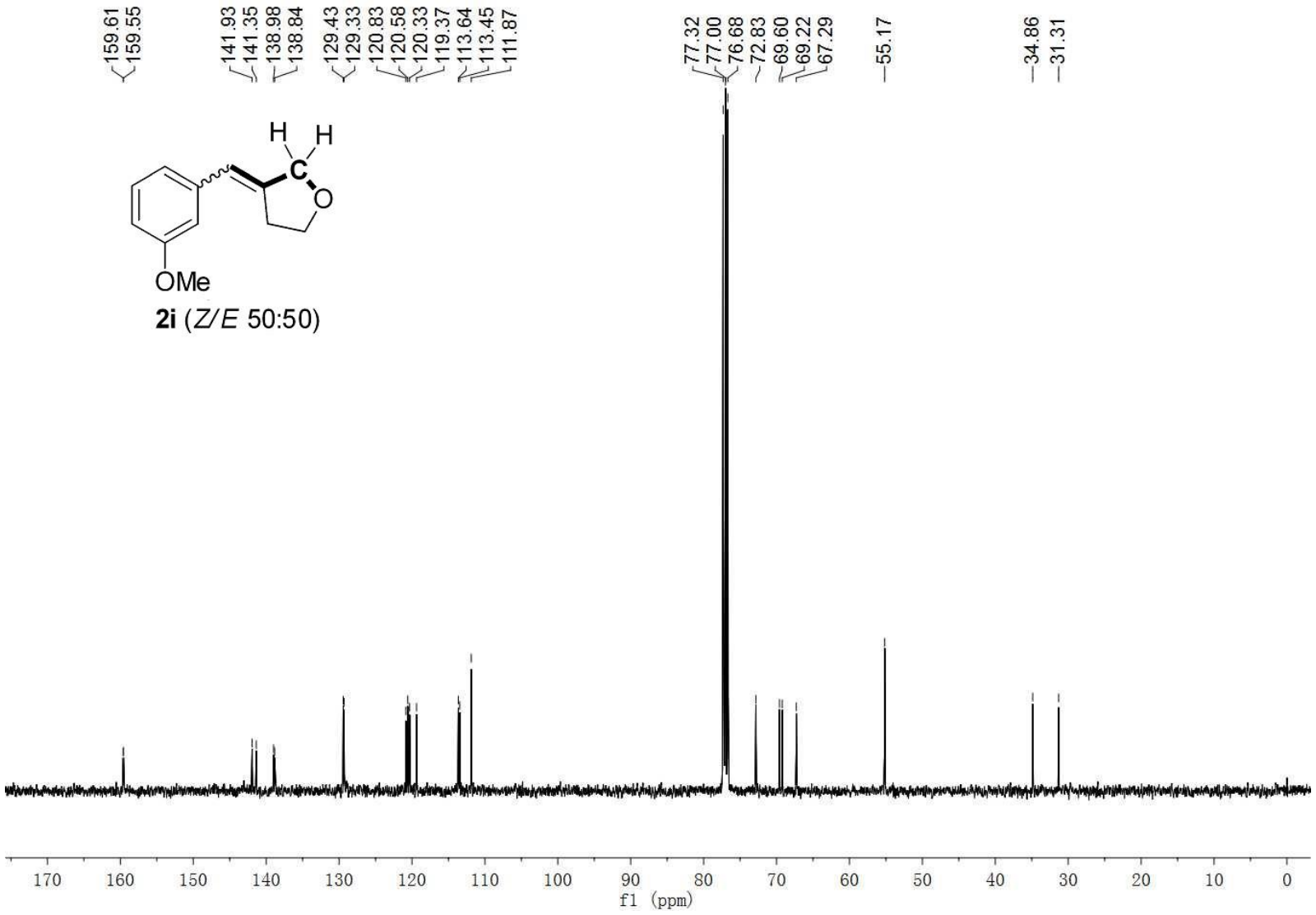
2g (*Z*/*E* 40:60)

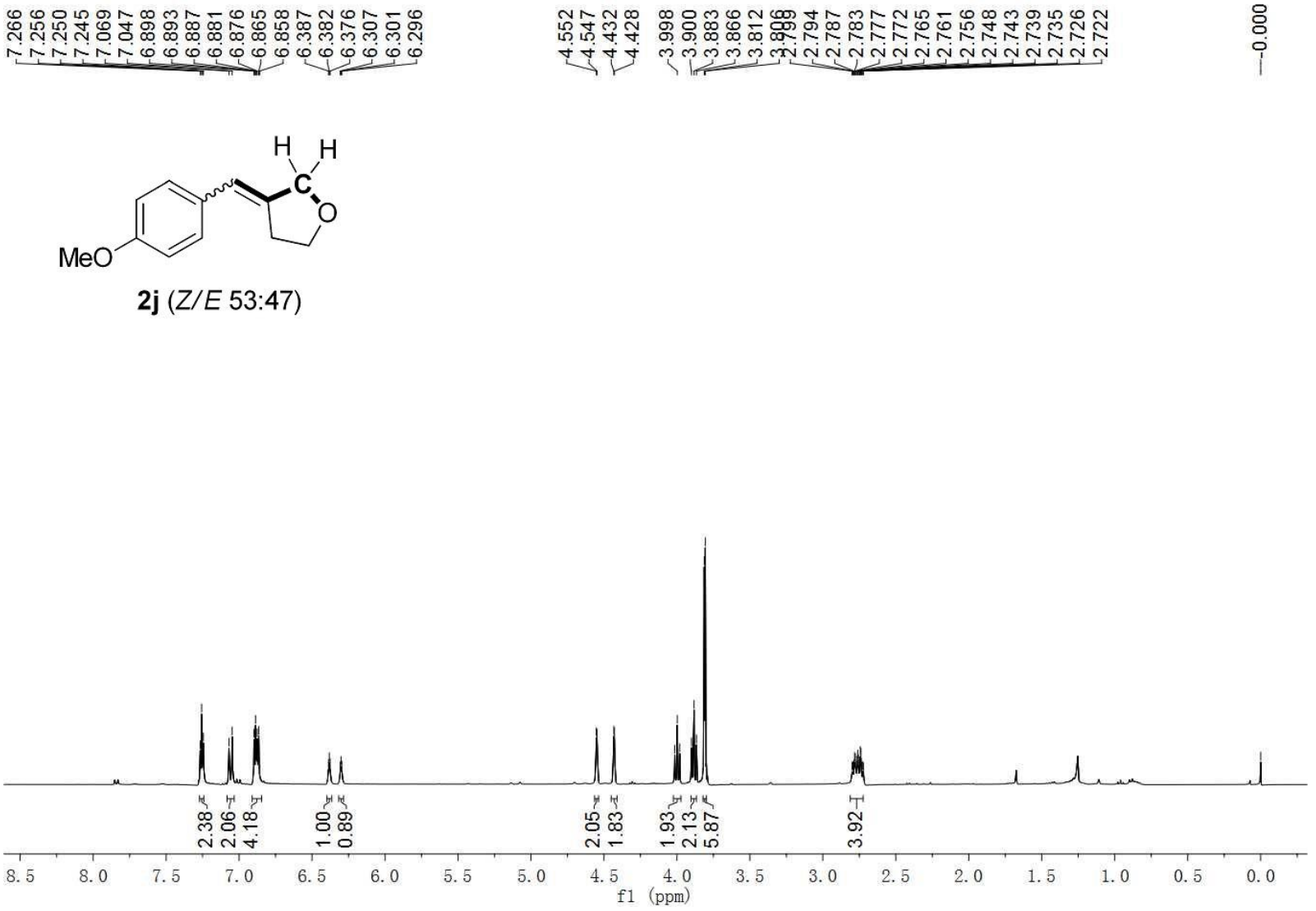

149.47
149.40
140.57
140.02
134.79
134.65
127.67
127.50
125.40
125.30
120.59
119.16
77.32
77.00
76.68
72.85
69.63
69.26
67.32
34.85
34.49
31.35
31.27
31.22
H
H
C
O
tBu
2g (Z/E 40:60)
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


7.353
7.350
7.335
7.332
7.255
7.219
7.209
7.028
7.013
7.010
6.952
6.933
6.890
6.882
6.870
6.862
6.715
6.709
6.704
6.631
6.626
6.621
4.513
4.511
4.509
4.485
4.481
3.964
3.900
3.882
3.843
3.841
3.803
2.799
2.785
2.781
2.768
2.764
2.746
0.000
H
H
C
O
OMe
2h (Z/E 52:48)
0.98
2.01
1.07
2.11
2.08
1.00
0.91
2.07
1.81
1.90
2.15
5.86
3.99
f1 (ppm)

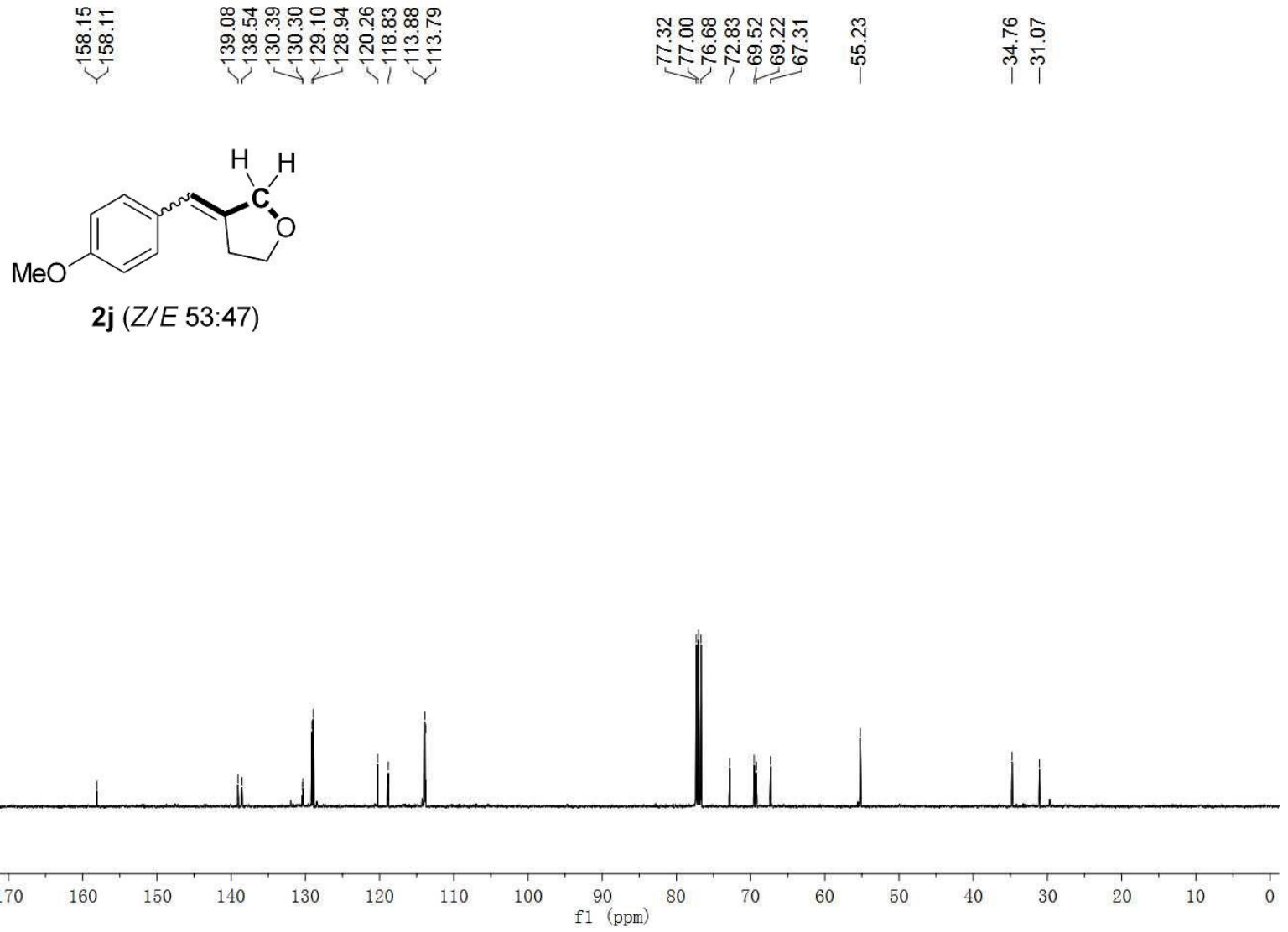

156.56
156.30
141.31
140.98
128.33
128.26
127.91
127.86
126.51
126.38
120.35
120.22
115.27
113.89
110.38
110.35
77.32
77.00
76.68
72.61
69.47
69.06
67.35
55.41
55.36
34.63
31.14
H
H
C
O
OMe
2h (Z/E 52:48)
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


7.285
7.274
7.265
7.258
7.245
7.235
6.928
6.908
6.860
6.794
6.784
6.775
6.764
6.756
6.736
6.717
6.664
6.424
6.418
6.413
6.337
6.333
4.582
4.450
4.446
4.002
3.984
3.896
3.818
3.810
3.641
2.838
2.824
2.808
2.785
2.781
2.767
2.764
2.750
2.746
0.000
H
H
C
O
OMe
2i (Z/E 50:50)
2.96
1.23
1.04
2.12
1.08
1.00
1.00
1.00
2.01
2.04
2.00
2.07
6.23
2.12
2.15
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

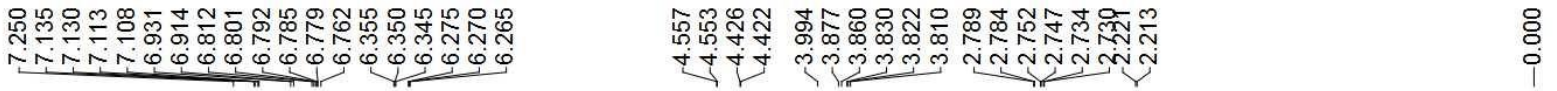

159.61
159.55
141.93
141.35
138.98
138.84
129.43
129.33
120.83
120.58
120.33
119.37
113.64
113.45
111.87
77.32
77.00
76.68
72.83
69.60
69.22
67.29
55.17
34.86
31.31
H
H
C
O
OMe
2i (Z/E 50:50)
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

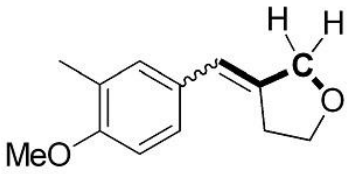

7.266
7.256
7.250
7.245
7.069
7.047
6.898
6.893
6.887
6.881
6.876
6.865
6.858
6.387
6.382
6.376
6.307
6.301
6.296
4.552
4.547
4.432
4.428
3.998
3.900
3.883
3.866
3.812
2.794
2.787
2.783
2.777
2.772
2.765
2.761
2.756
2.748
2.743
2.739
2.735
2.726
2.722
0.000
H
H
C
O
MeO
2.38
2.06
4.18
1.00
0.89
2.05
1.83
1.93
2.13
5.87
3.92
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

2j (*Z*/*E* 53:47)

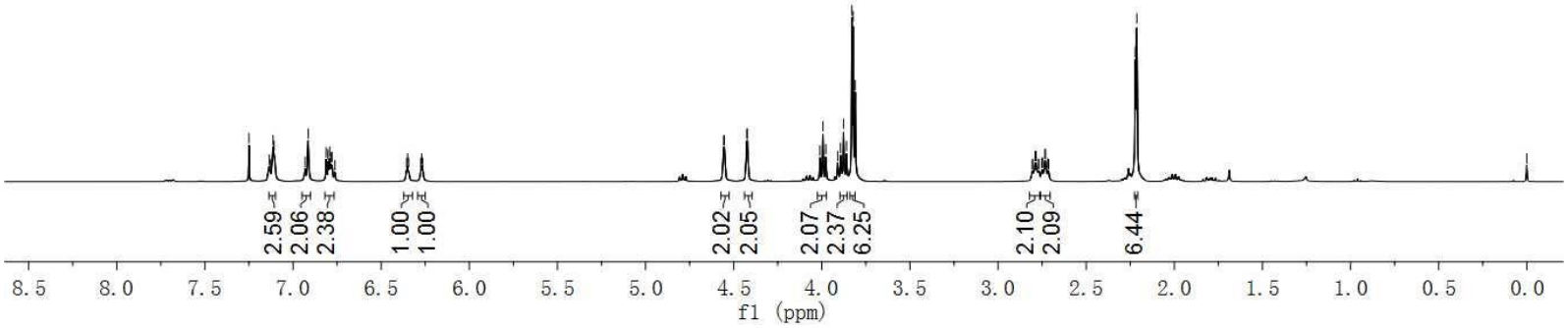

158.15
158.11
139.08
138.54
130.39
130.30
129.10
128.94
120.26
118.83
113.88
113.79
77.32
77.00
76.68
72.83
69.52
69.22
67.31
55.23
34.76
31.07
H
H
C
O
MeO
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

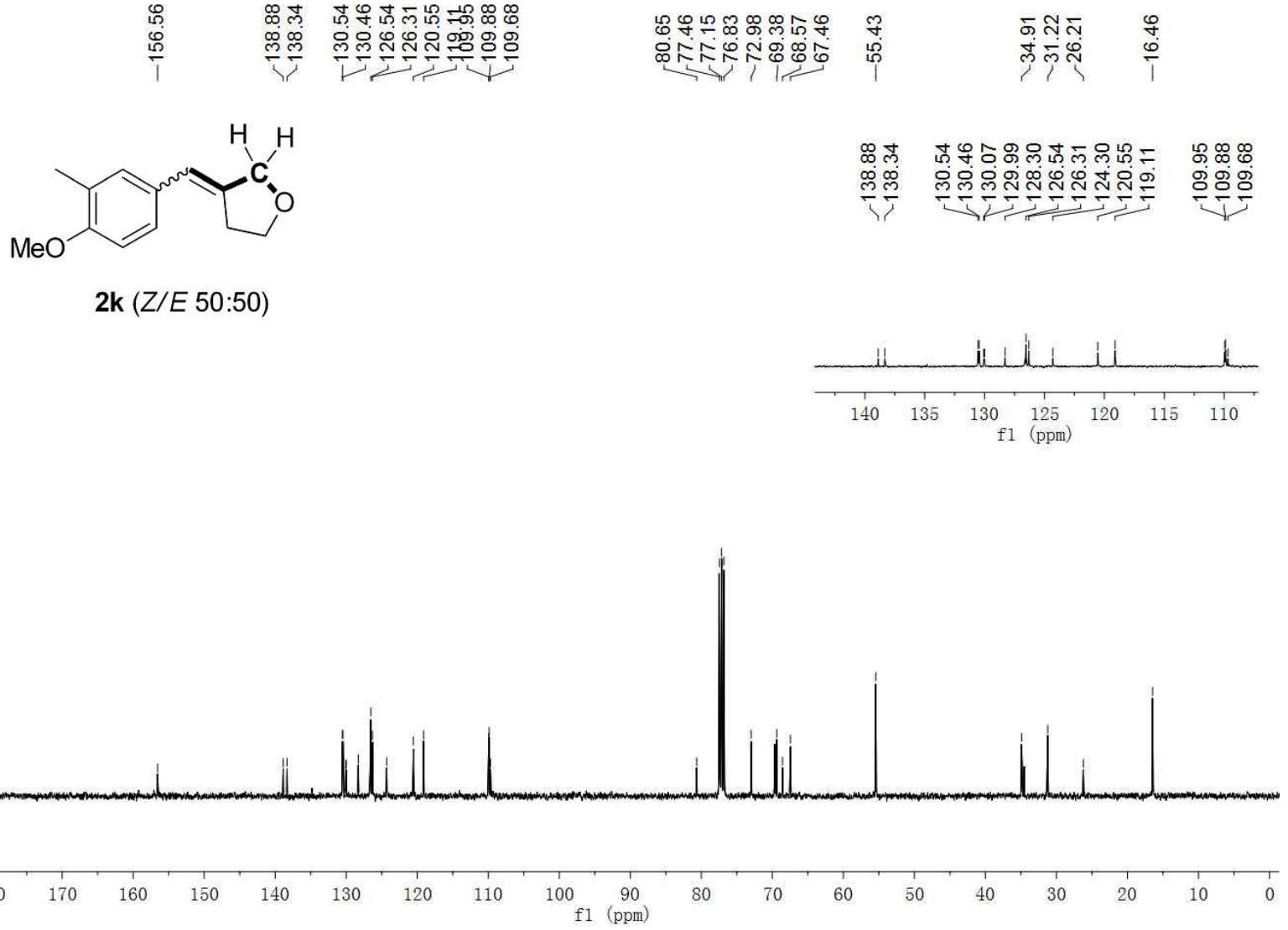
2j (*Z*/*E* 53:47)

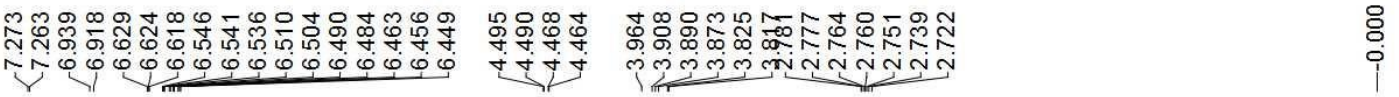

7.250
7.135
7.130
7.113
7.108
6.931
6.914
6.812
6.801
6.792
6.785
6.779
6.762
6.355
6.350
6.345
6.275
6.270
6.265
4.557
4.553
4.426
4.422
3.994
3.877
3.860
3.830
3.822
3.810
2.789
2.784
2.752
2.747
2.734
2.730
2.221
2.213
0.000

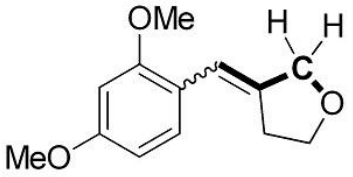

H
H
C
O
MeO

2k (*Z*/*E* 50:50)

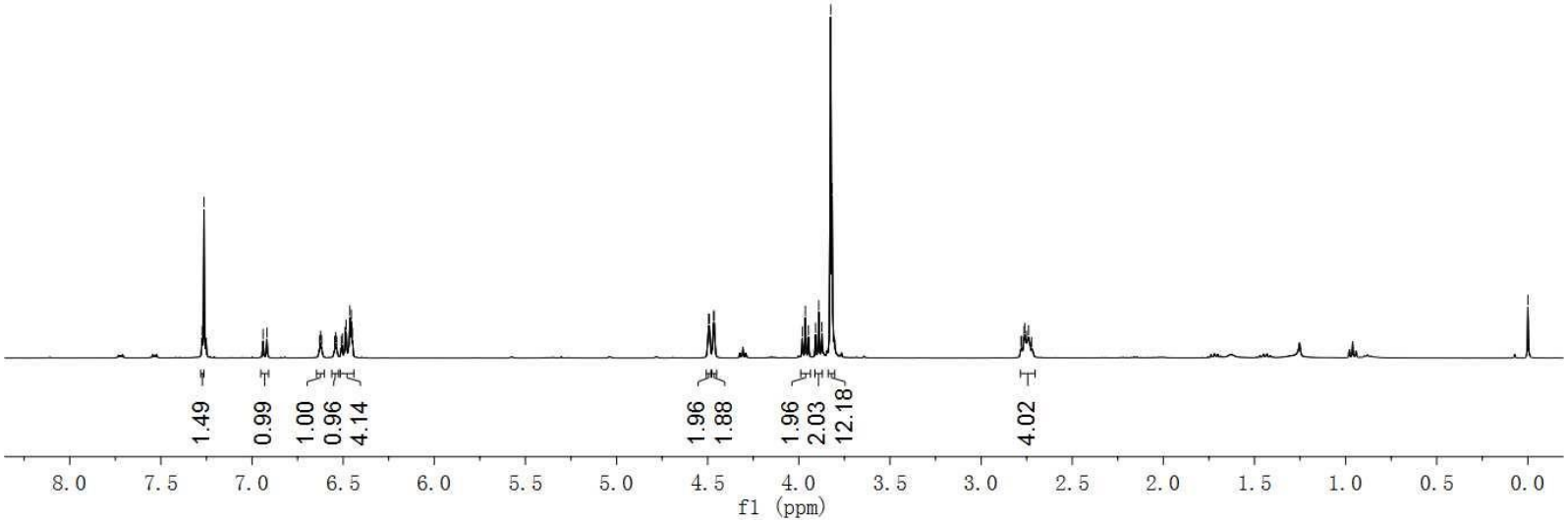

2.59
2.06
2.38
1.00
1.00
2.02
2.05
2.07
2.37
6.25
2.10
2.09
6.44
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

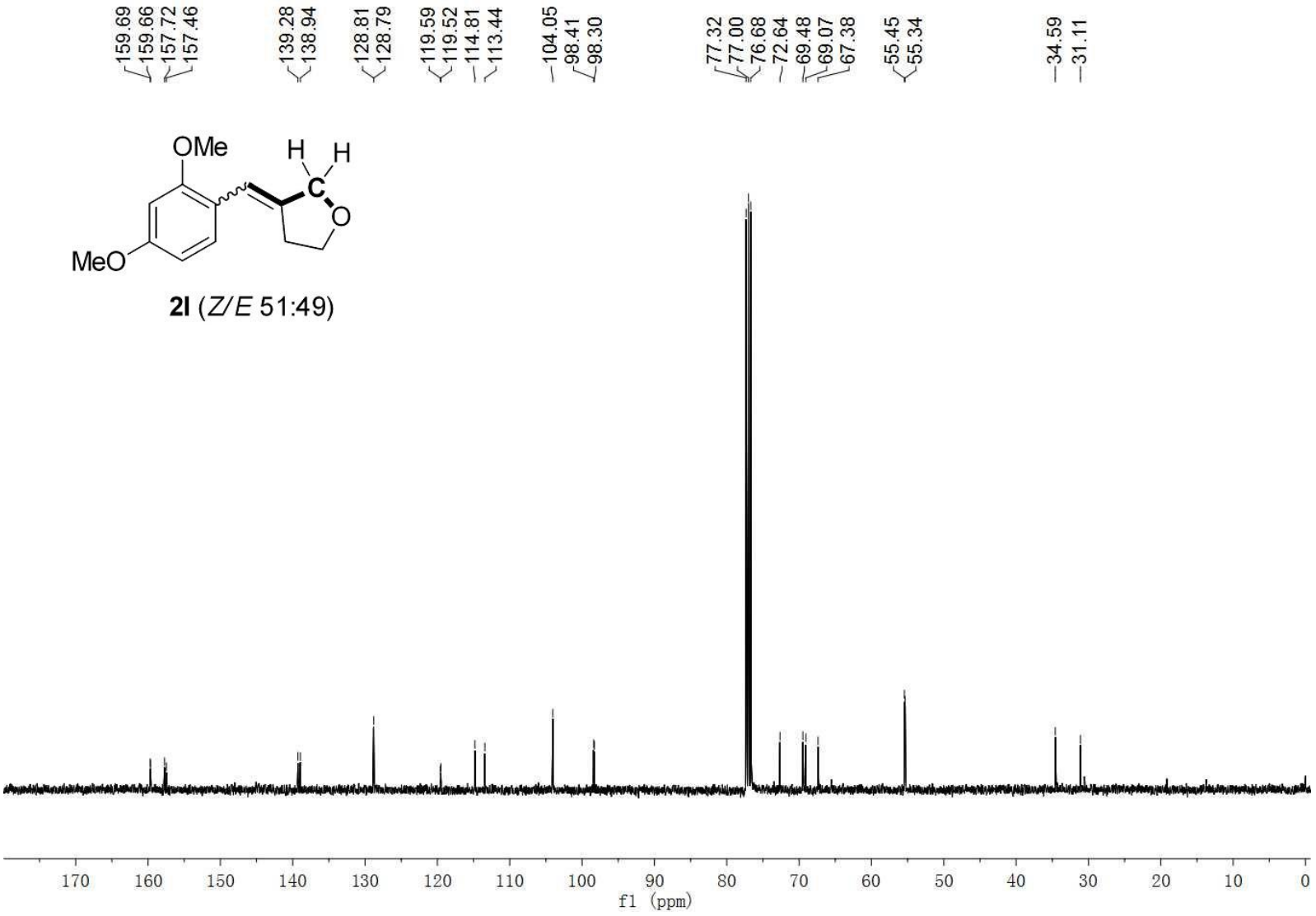

156.56
138.88
138.34
130.54
130.46
126.54
126.31
120.55
119.11
109.95
109.88
109.68
80.65
77.46
77.15
76.83
72.98
69.38
68.57
67.46
55.43
34.91
31.22
26.21
16.46
H
H
C
O
MeO
2k (Z/E 50:50)
138.88
138.34
130.54
130.46
130.07
129.99
128.30
126.54
126.31
124.30
120.55
119.11
109.95
109.88
109.68
140
135
130
125
120
115
110
f1 (ppm)
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

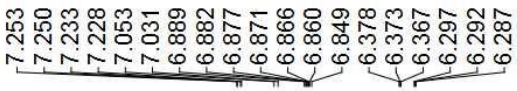

7.273
7.263
6.939
6.918
6.629
6.624
6.618
6.546
6.541
6.536
6.510
6.504
6.490
6.484
6.463
6.456
6.449
4.495
4.490
4.468
4.464
3.964
3.908
3.890
3.873
3.825
3.817
3.781
2.777
2.764
2.760
2.751
2.739
2.722
0.000

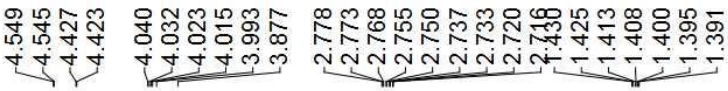

OMe
H
H
C
O
MeO

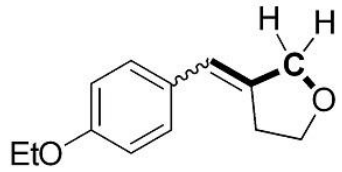
2l (*Z*/*E* 51:49)


1.49
0.99
1.00
0.96
4.14
1.96
1.88
1.96
2.03
12.18
4.02
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

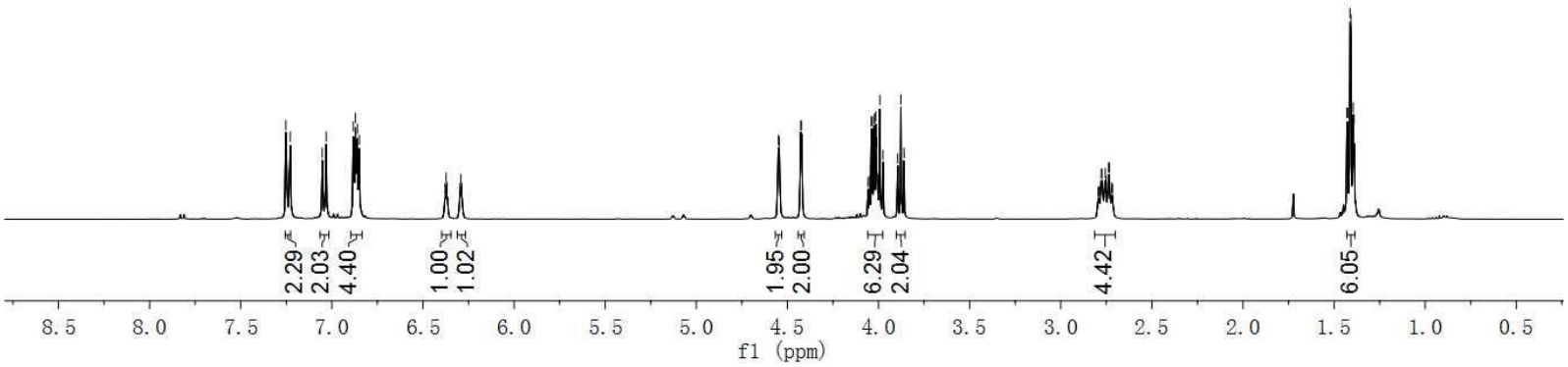

159.69
159.66
157.72
157.46
139.28
138.94
128.81
128.79
119.59
119.52
114.81
113.44
104.05
98.41
98.30
77.32
77.00
76.68
72.64
69.48
69.07
67.38
55.45
55.34
34.59
31.11
OMe
H
H
C
O
MeO
2l (Z/E 51:49)
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

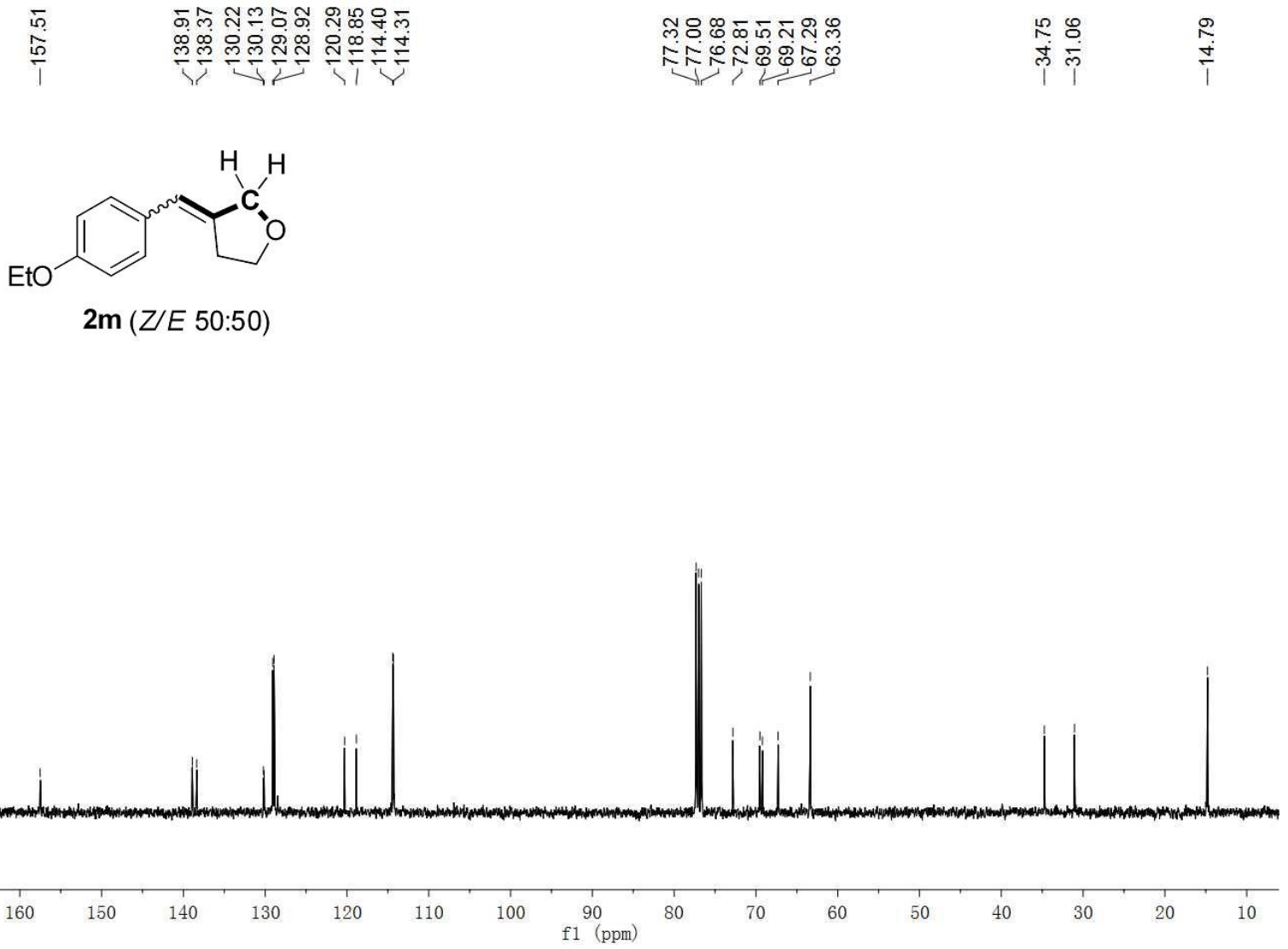

7.253
7.250
7.233
7.228
7.053
7.031
6.889
6.882
6.877
6.871
6.866
6.860
6.849
6.378
6.373
6.367
6.297
6.292
6.287

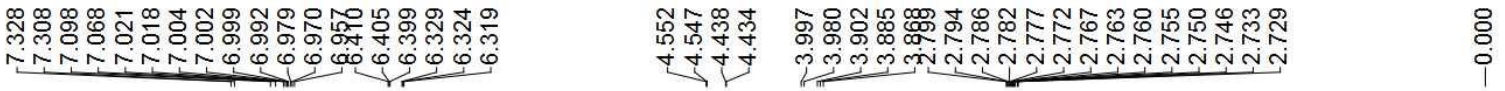

4.549
4.545
4.427
4.423
4.040
4.032
4.023
4.015
3.993
3.877
2.778
2.773
2.768
2.755
2.750
2.737
2.733
2.720
1.425
1.413
1.408
1.400
1.395
1.391

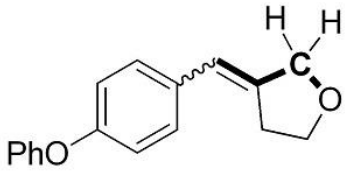

H
H
C
O
EtO

2m (*Z*/*E* 50:50)

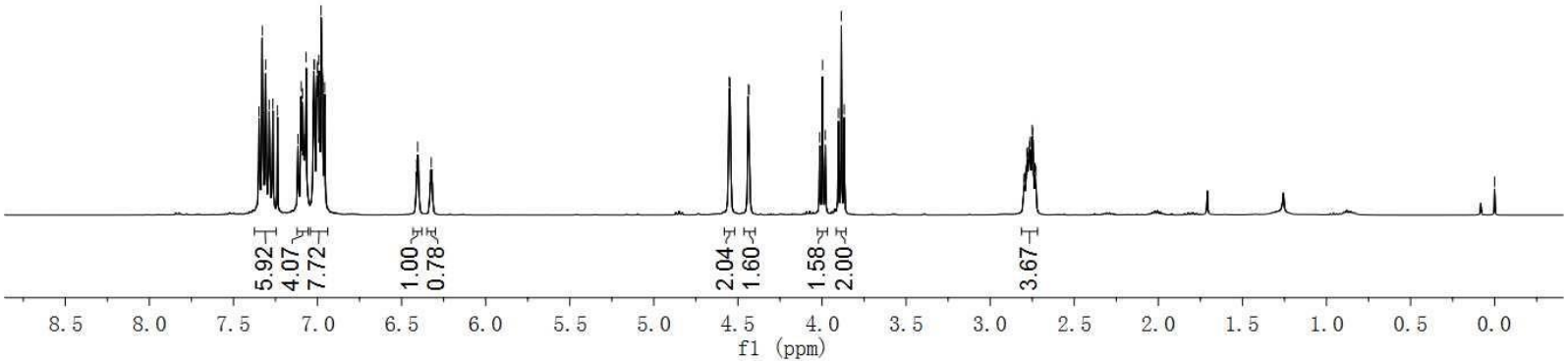

2.29
2.03
4.40
1.00
1.02
1.95
2.00
6.29
2.04
4.42
6.05
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
f1 (ppm)

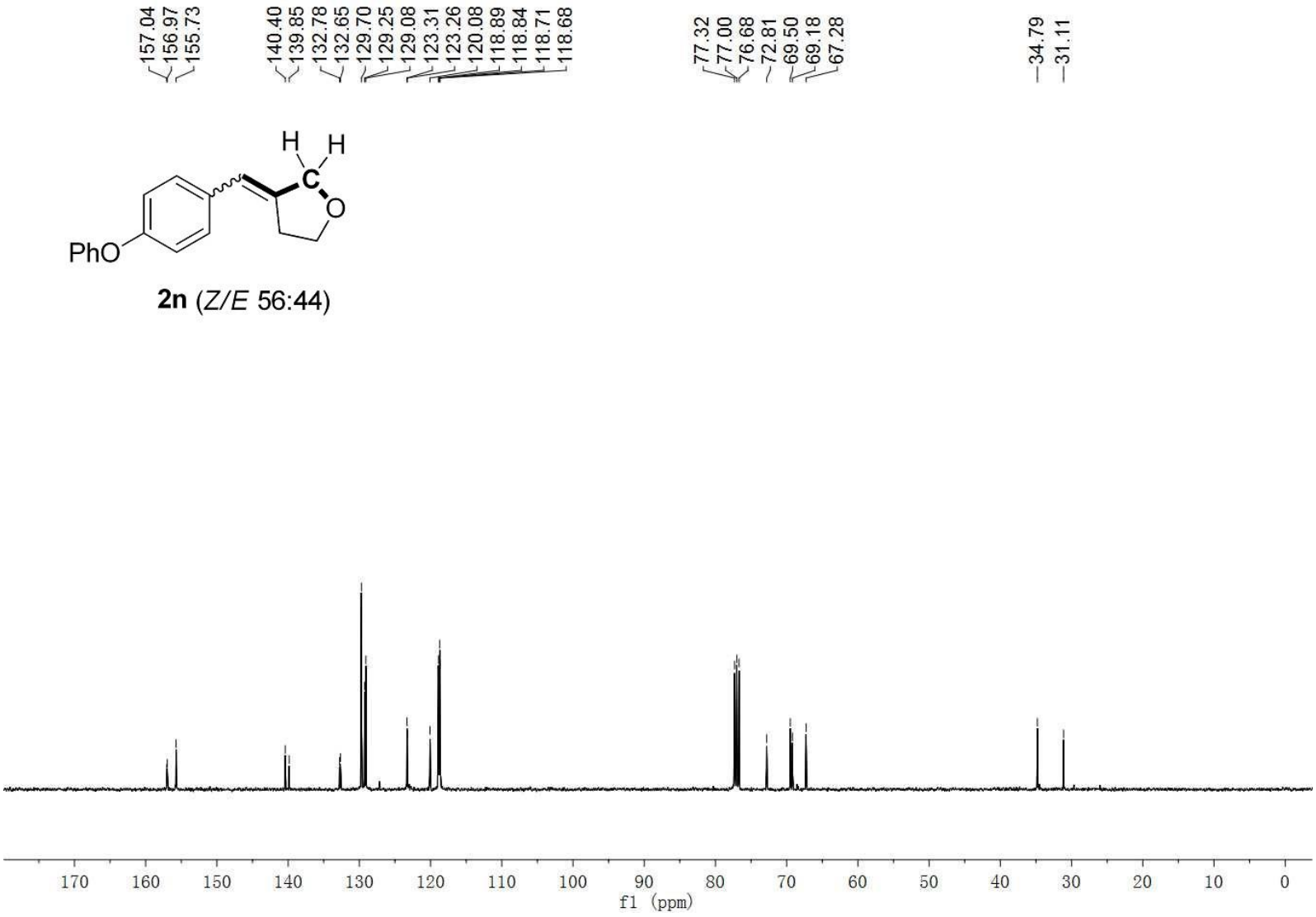

157.51
138.91
138.37
130.22
130.13
129.07
128.92
120.29
118.85
114.40
114.31
77.32
77.00
76.68
72.81
69.51
69.21
67.29
63.36
34.75
31.06
14.79
H
H
C
O
EtO
2m (Z/E 50:50)
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
f1 (ppm)


7.328
7.308
7.098
7.068
7.021
7.018
7.004
7.002
6.999
6.992
6.979
6.970
6.957
6.410
6.405
6.399
6.329
6.324
6.319
4.552
4.547
4.438
4.434
3.997
3.980
3.902
3.885
2.794
2.786
2.782
2.777
2.772
2.767
2.763
2.760
2.755
2.750
2.746
2.733
2.729
0.000

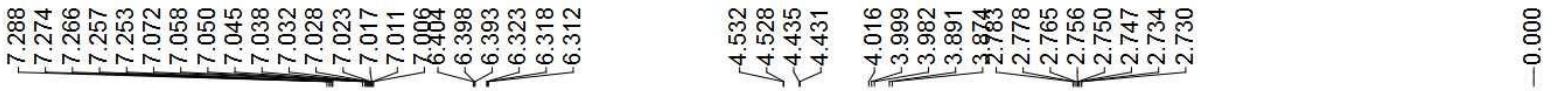

H
H
C
O
PhO

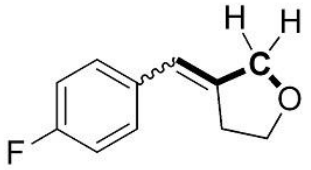
2n (*Z*/*E* 56:44)


5.92
4.07
7.72
1.00
0.78
2.04
1.60
1.58
2.00
3.67
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

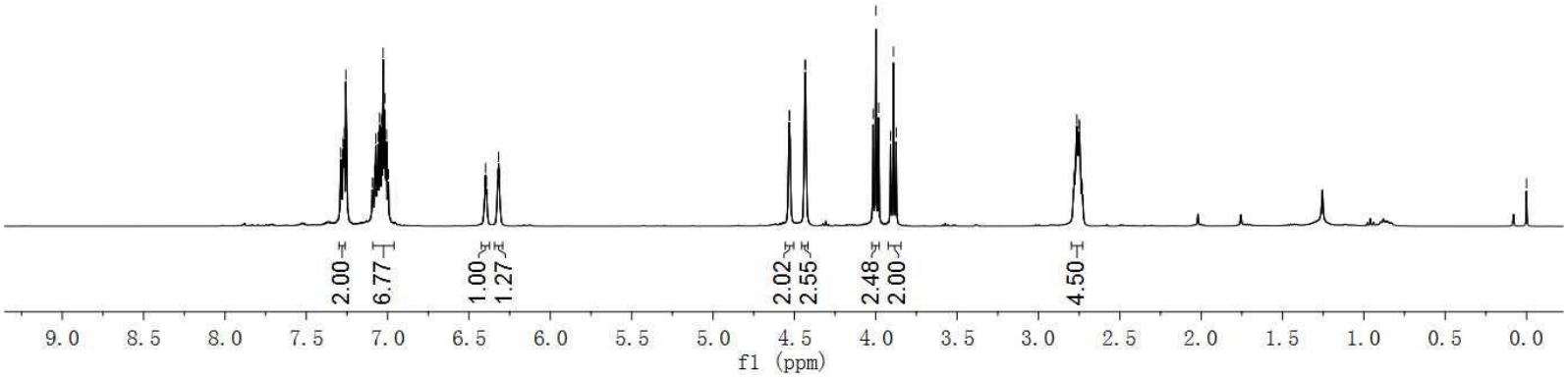

157.04
156.97
155.73
140.40
139.85
132.78
132.65
129.70
129.25
129.08
123.31
123.26
120.08
118.89
118.84
118.71
118.68
77.32
77.00
76.68
72.81
69.50
69.18
67.28
34.79
31.11
H
H
C
O
PhO
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

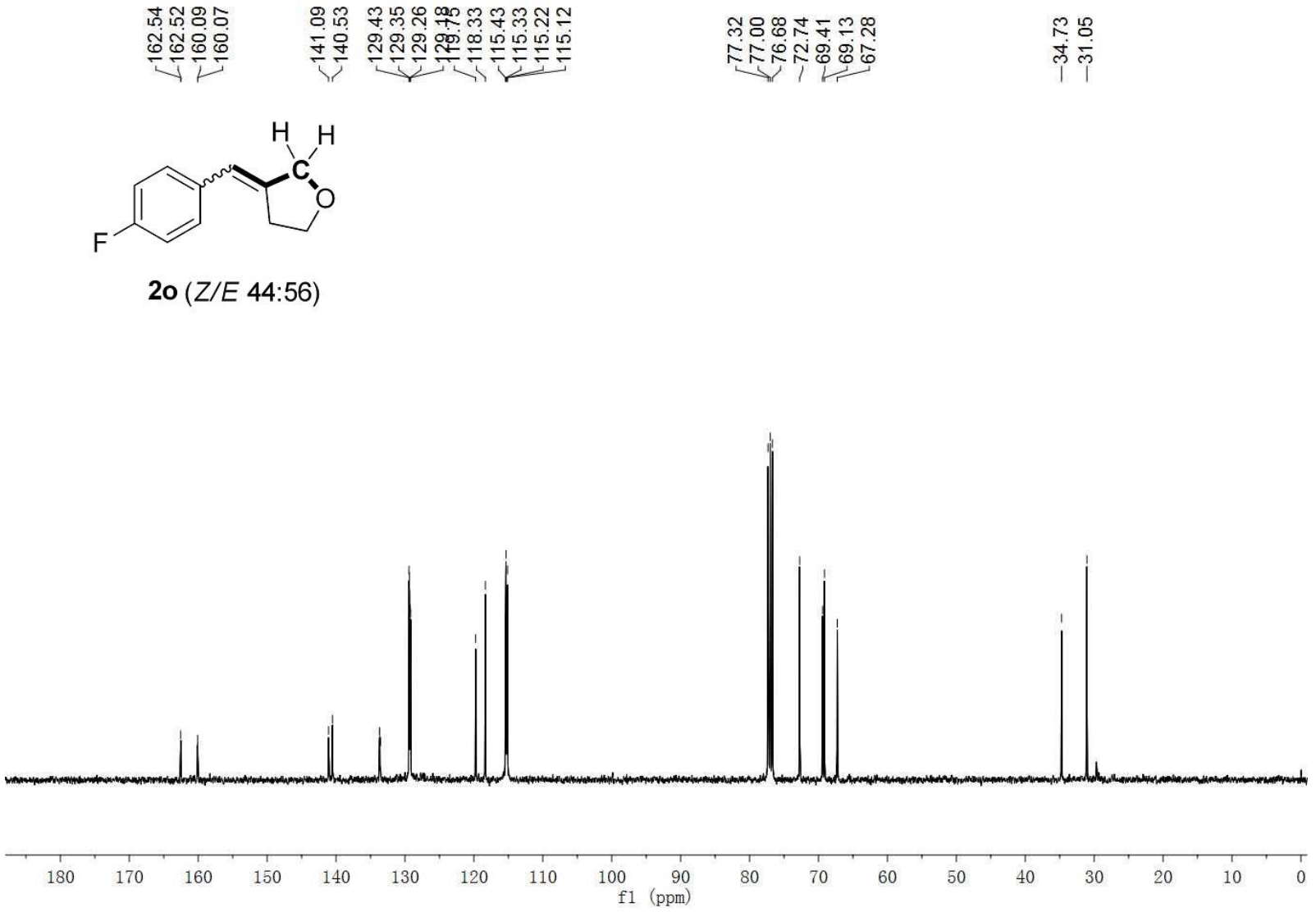
2n (*Z*/*E* 56:44)


7.288
7.274
7.266
7.257
7.253
7.072
7.058
7.050
7.045
7.038
7.032
7.028
7.023
7.017
7.011
6.398
6.393
6.323
6.318
6.312
4.532
4.528
4.435
4.431
4.016
3.999
3.982
3.891
2.778
2.765
2.756
2.750
2.747
2.734
2.730
0.000

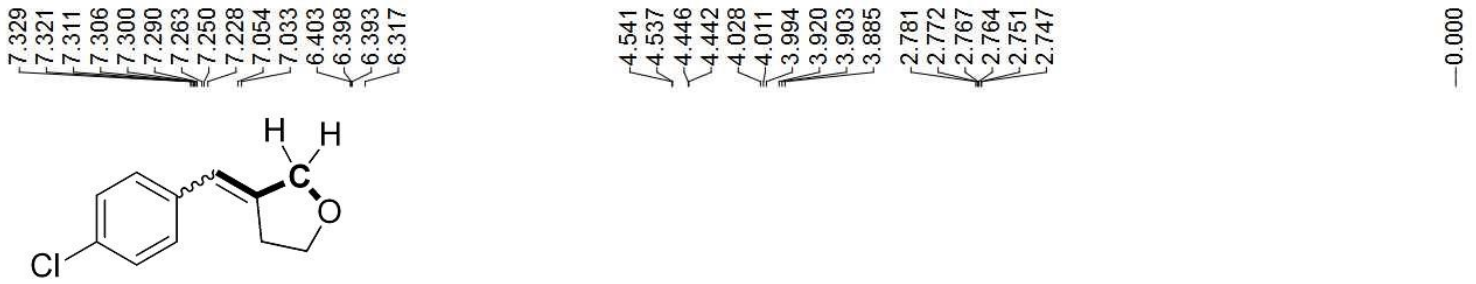

H
H
C
O
F

2o (*Z*/*E* 44:56)

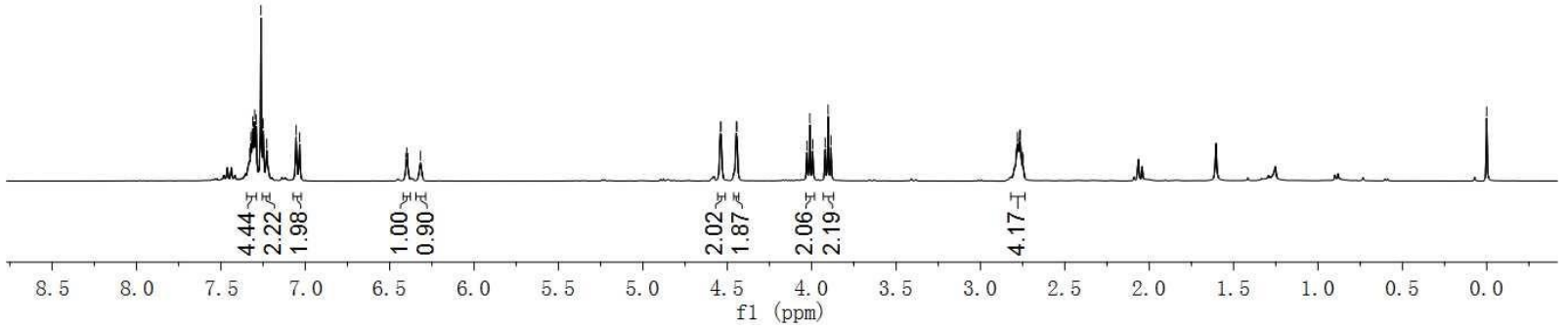

2.00
6.77
1.00
1.27
2.02
2.55
2.48
2.00
4.50
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

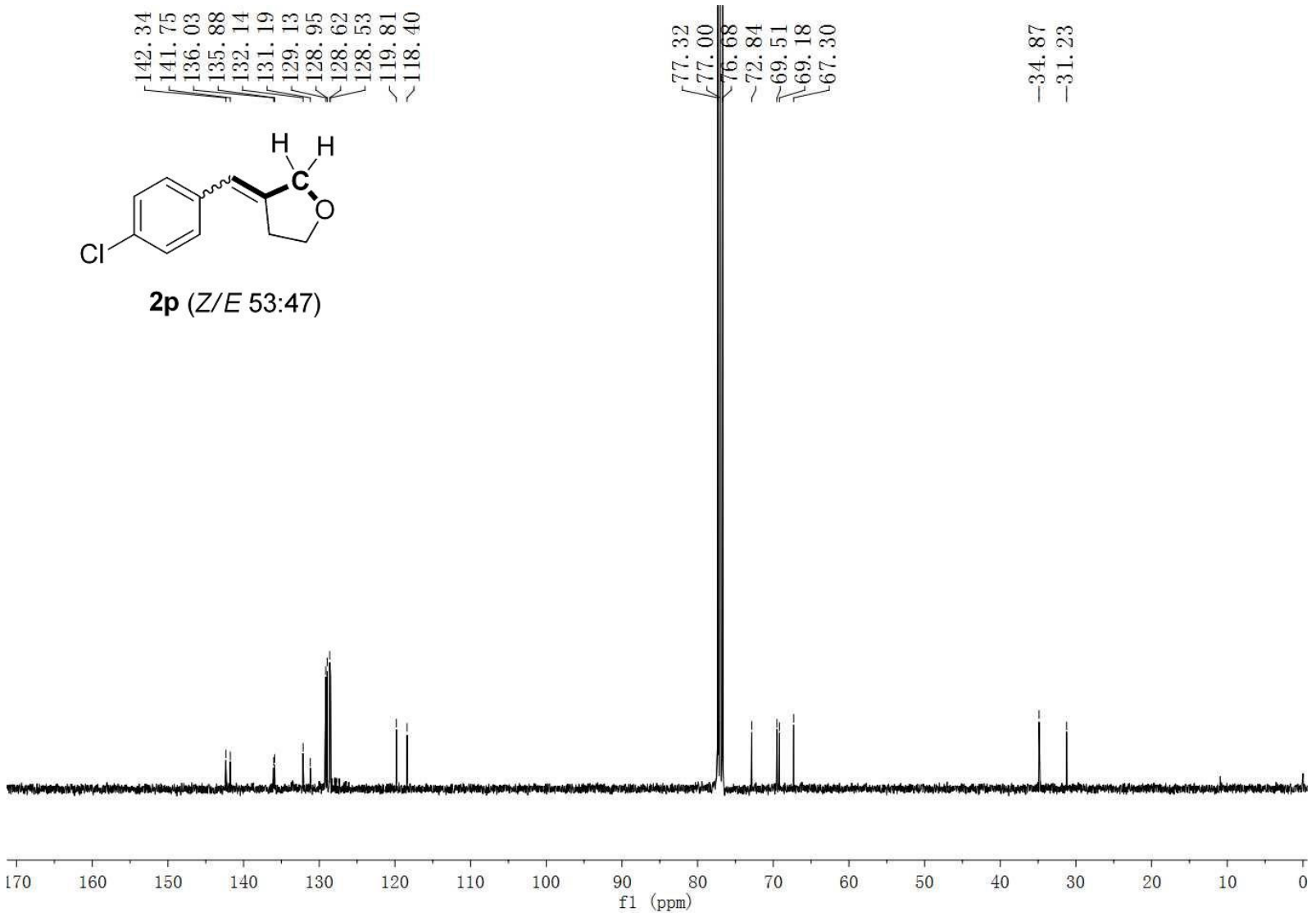

162.54
162.52
160.09
160.07
141.09
140.53
129.43
129.35
129.26
118.33
115.43
115.33
115.22
115.12
77.32
77.00
76.68
72.74
69.41
69.13
67.28
34.73
31.05
H
H
C
O
F
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

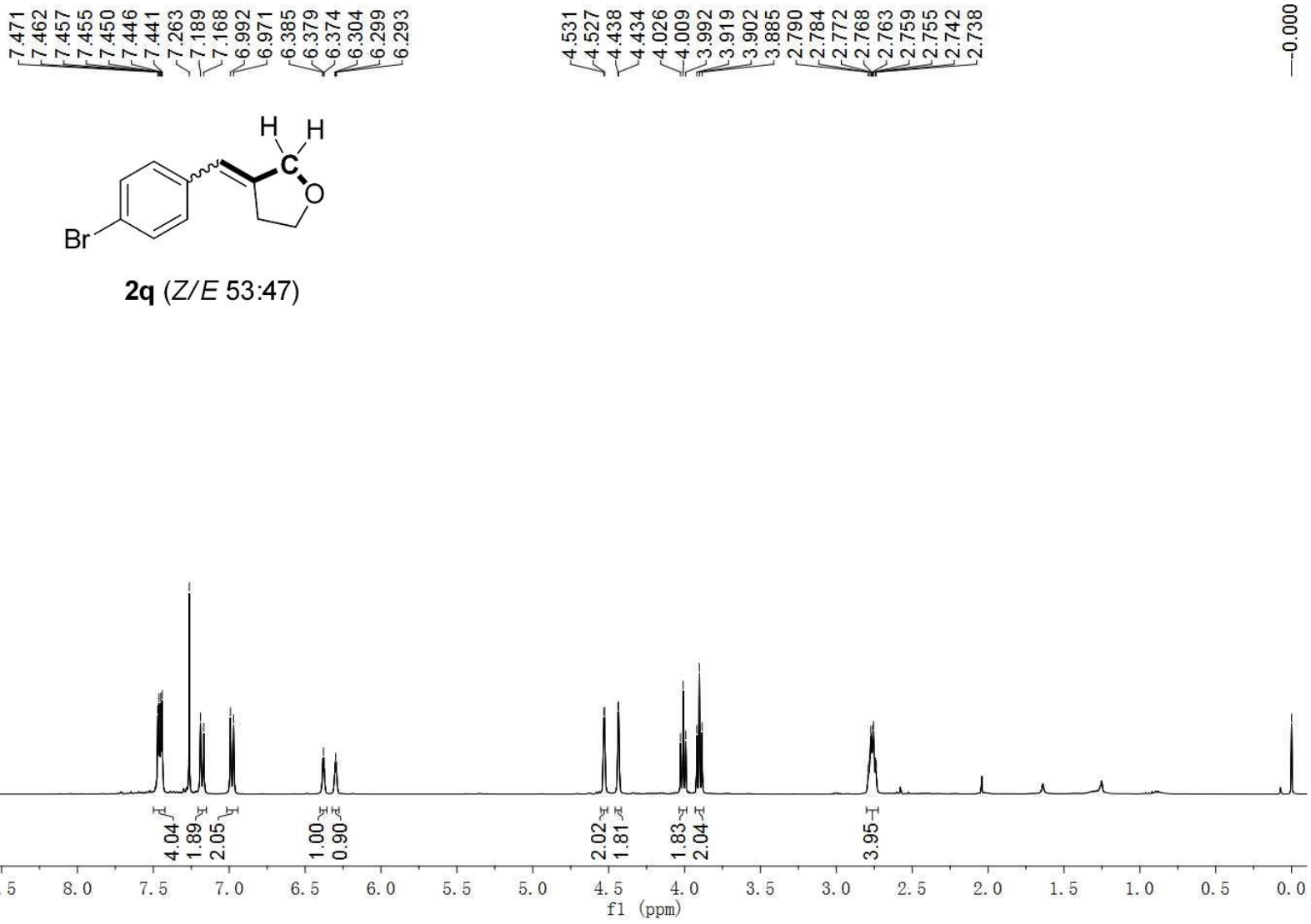
2o (*Z*/*E* 44:56)


7.329
7.321
7.311
7.306
7.300
7.290
7.263
7.250
7.228
7.054
7.033
6.403
6.398
6.393
6.317
4.541
4.537
4.446
4.442
4.028
4.011
3.994
3.920
3.903
3.885
2.781
2.772
2.767
2.764
2.751
2.747
0.000
H
H
C
O
Cl

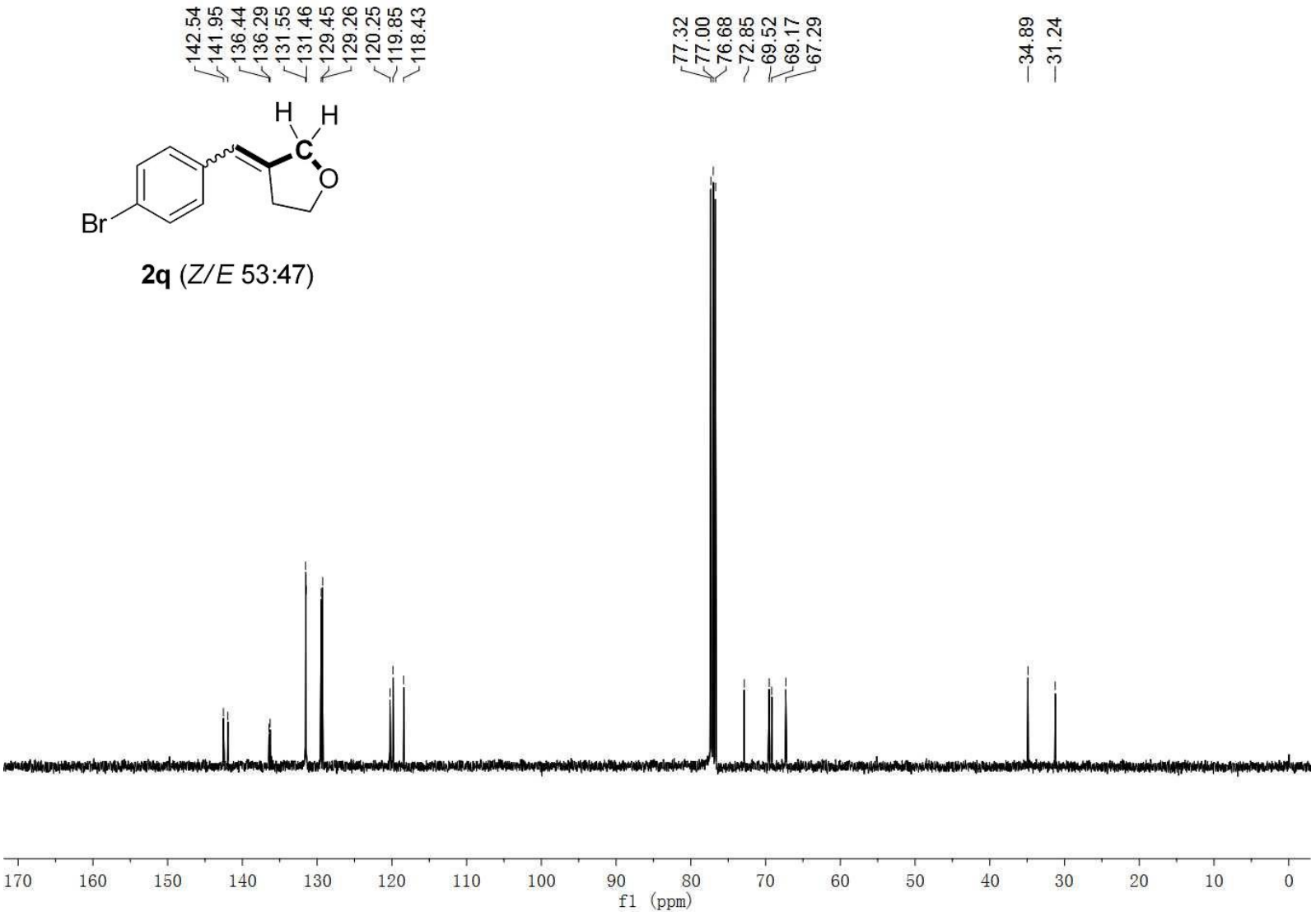
2p (*Z*/*E* 53:47)

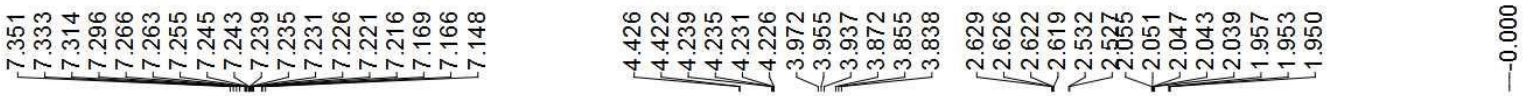

4.44
2.22
1.98
1.00
0.90
2.02
1.87
2.06
2.19
4.17
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

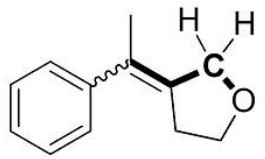

142.34
141.75
136.03
135.88
132.14
131.19
129.13
128.95
128.62
128.53
119.81
118.40
77.32
77.00
76.68
72.84
69.51
69.18
67.30
34.87
31.23
H
H
C
O
Cl
2p (Z/E 53:47)
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


7.471
7.462
7.457
7.455
7.450
7.446
7.441
7.263
7.189
7.168
6.992
6.971
6.385
6.379
6.374
6.304
6.299
6.293
4.531
4.527
4.438
4.434
4.026
4.009
3.992
3.919
3.902
3.885
2.790
2.784
2.772
2.768
2.763
2.759
2.755
2.742
2.738
0.000
H
H
C
O
Br
4.04
1.89
2.05
1.00
0.90
2.02
1.81
1.83
2.04
3.95
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

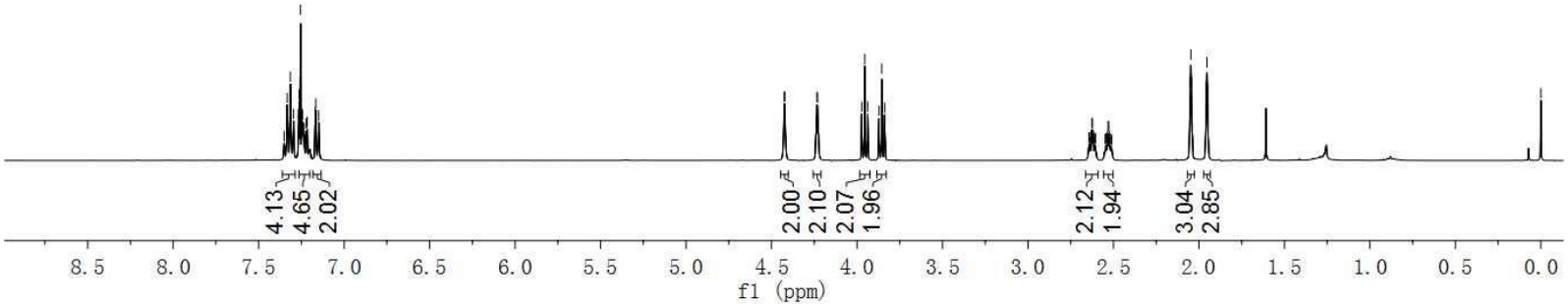
2q (*Z*/*E* 53:47)

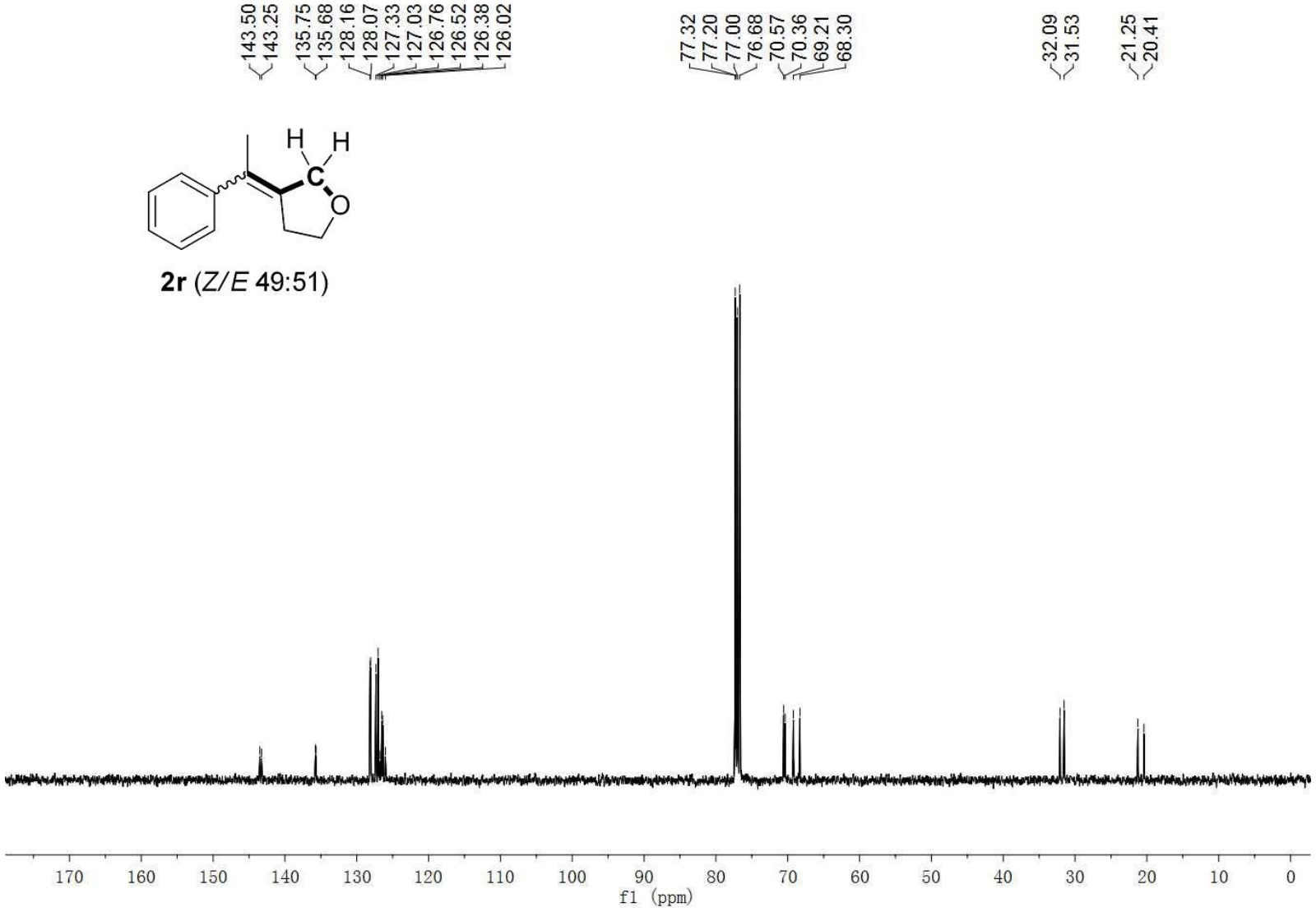

142.54
141.95
136.44
136.29
131.55
131.46
129.45
129.26
120.25
119.85
118.43
77.32
77.00
76.68
72.85
69.52
69.17
67.29
34.89
31.24
H
H
C
O
Br
2q (Z/E 53:47)
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

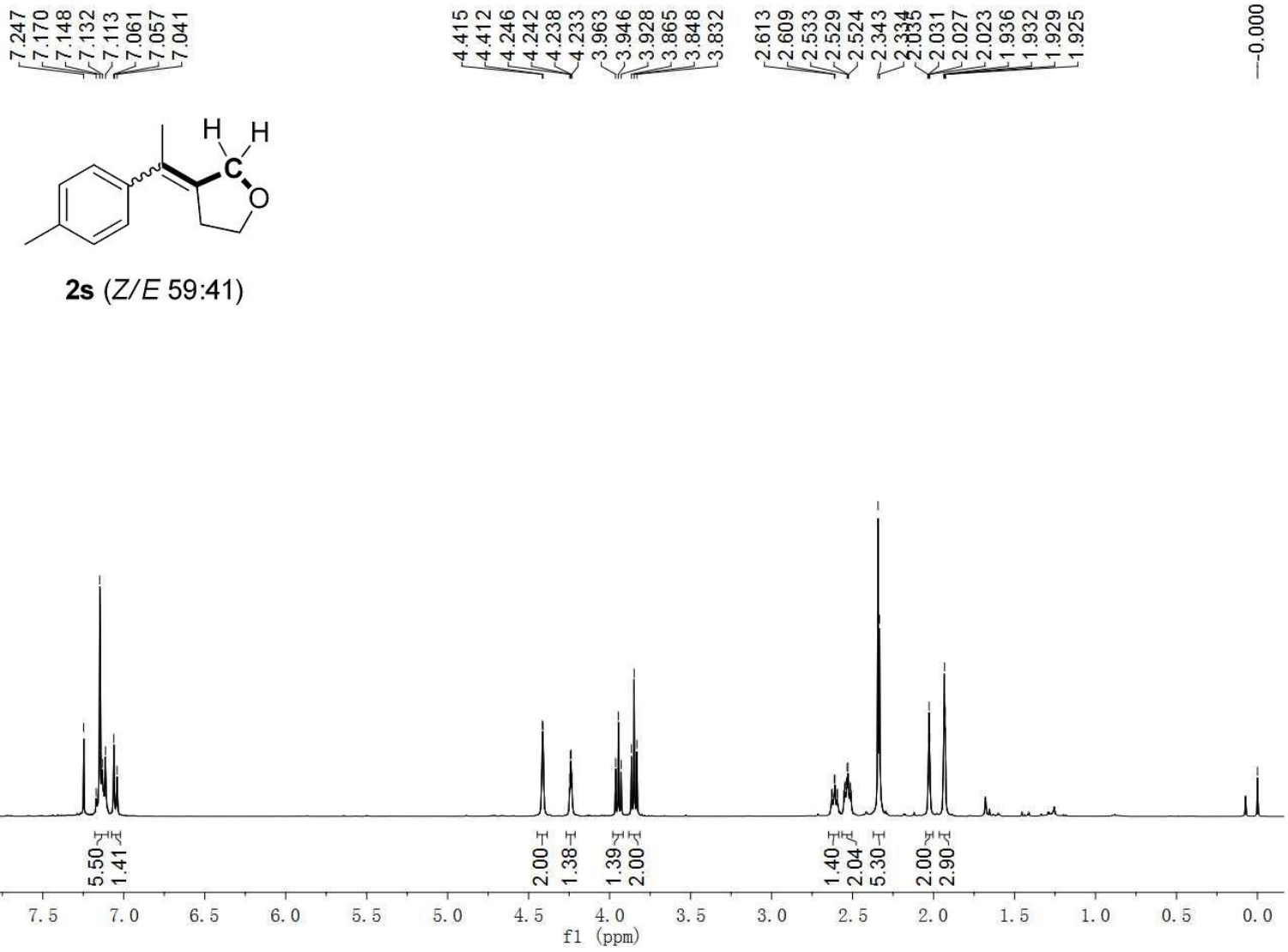

7.351
7.333
7.314
7.296
7.266
7.263
7.255
7.245
7.243
7.239
7.235
7.231
7.226
7.221
7.216
7.169
7.166
7.148
4.426
4.422
4.239
4.235
4.231
4.226
3.972
3.955
3.937
3.872
3.855
3.838
2.629
2.626
2.622
2.619
2.532
2.527
2.055
2.051
2.047
2.043
2.039
1.957
1.953
1.950
0.000


H
H
C
O

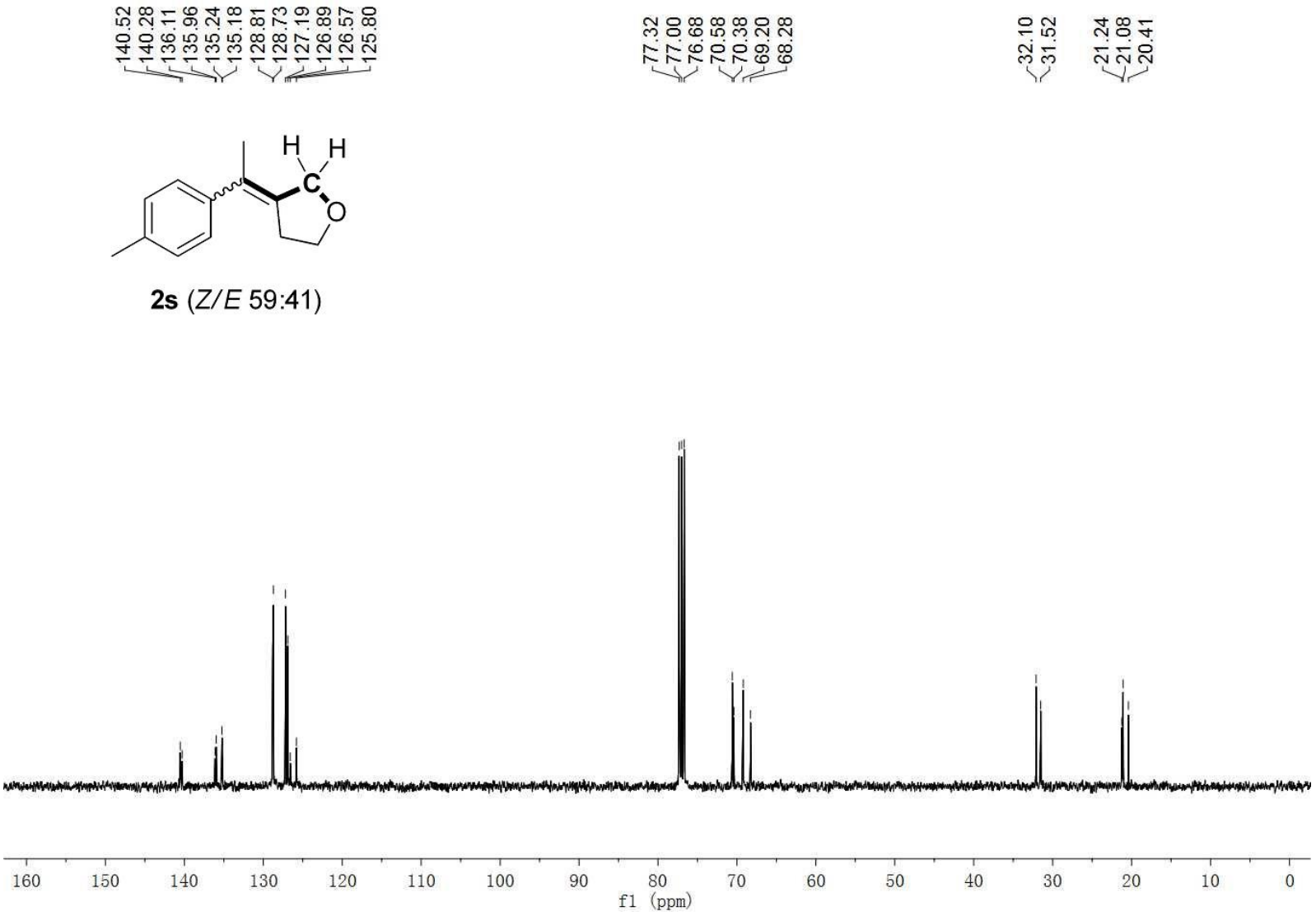
2r (*Z*/*E* 49:51)


4.13
4.65
2.02
2.00
2.10
2.07
1.96
2.12
1.94
3.04
2.85
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

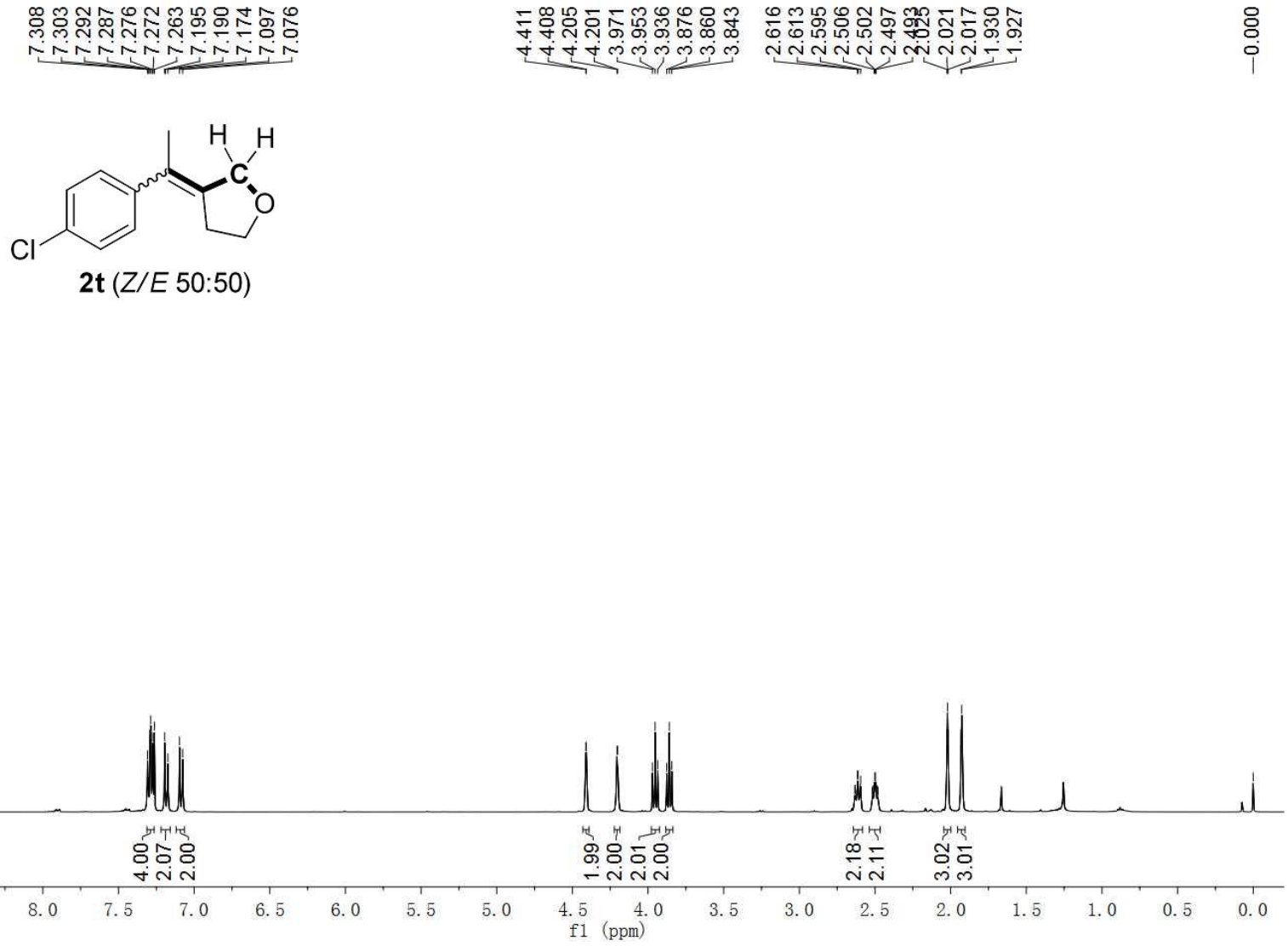

143.50
143.25
135.75
135.68
128.16
128.07
127.33
127.03
126.76
126.52
126.38
126.02
77.32
77.20
77.00
76.68
70.57
70.36
69.21
68.30
32.09
31.53
21.25
20.41
H
H
C
O
2r (Z/E 49:51)
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


7.247
7.170
7.148
7.132
7.113
7.061
7.057
7.041
4.415
4.412
4.246
4.242
4.238
4.233
3.963
3.946
3.928
3.865
3.848
3.832
2.613
2.609
2.533
2.529
2.524
2.343
2.031
2.027
2.023
1.936
1.932
1.929
1.925
0.000
H
H
C
O
5.50
1.41
2.00
1.38
1.39
2.00
1.40
2.04
5.30
2.00
2.90
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

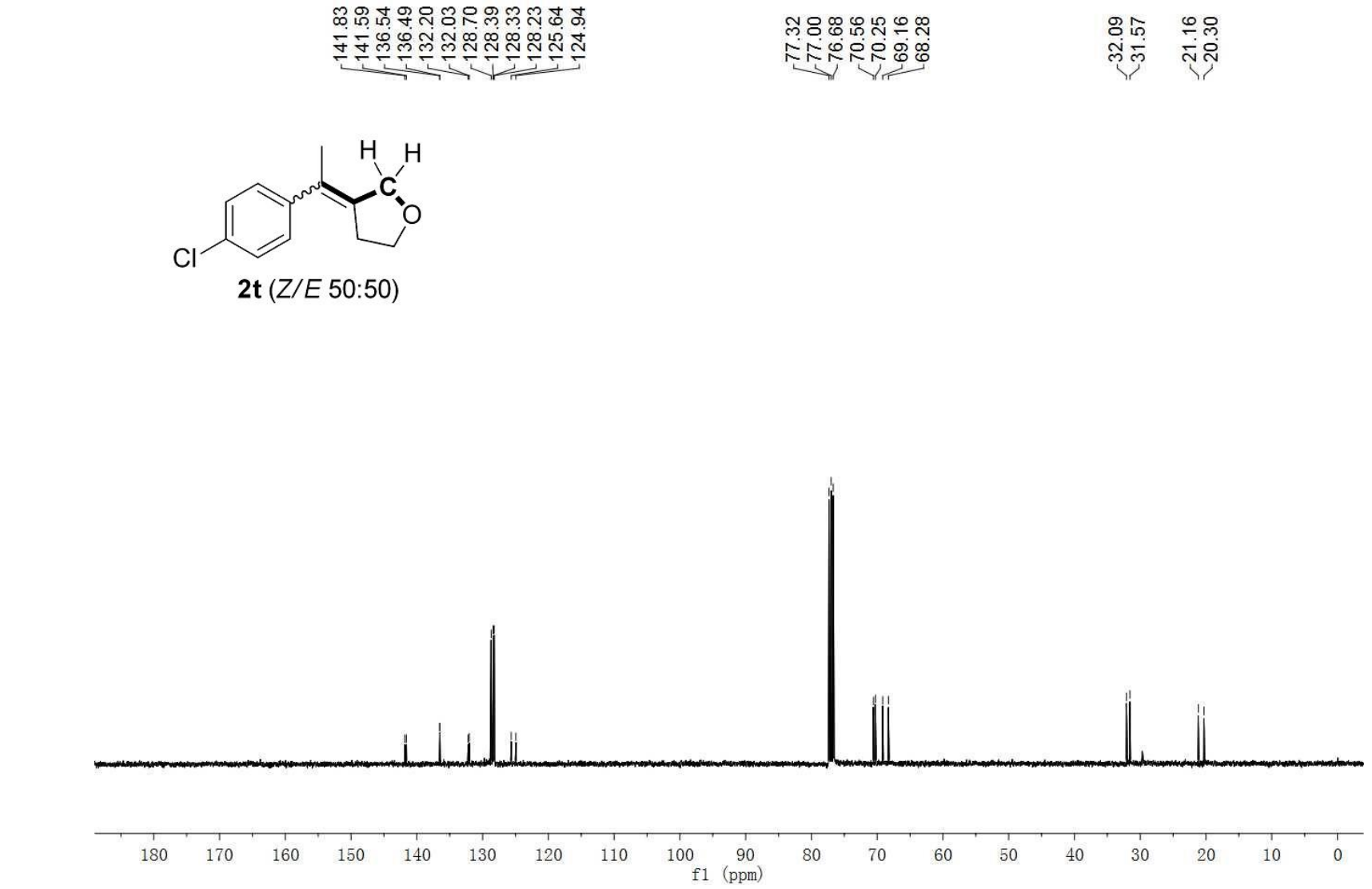
2s (*Z*/*E* 59:41)


140.52
140.28
136.11
135.96
135.24
135.18
128.81
128.73
127.19
126.89
126.57
125.80
77.32
77.00
76.68
70.58
70.38
69.20
68.28
32.10
31.52
21.24
21.08
20.41
H
H
C
O
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

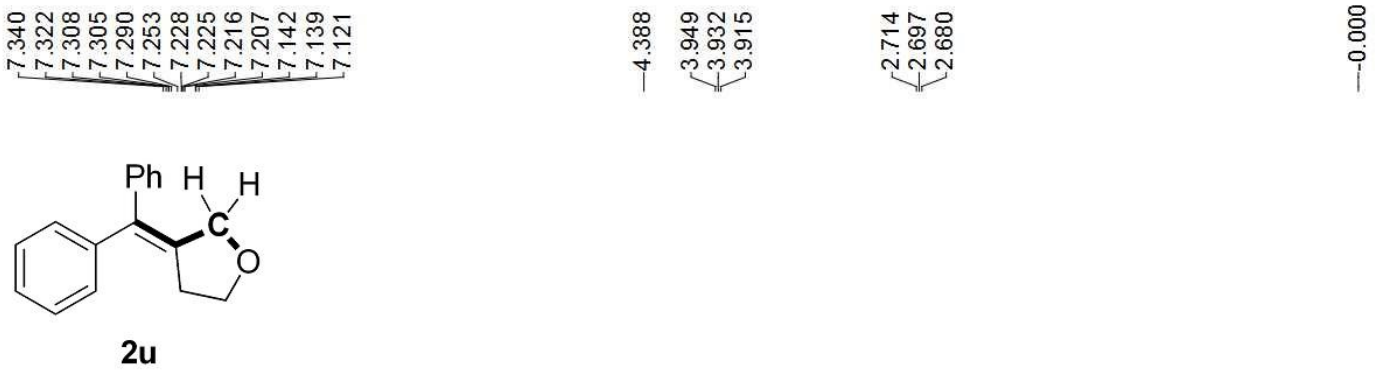
2s (*Z*/*E* 59:41)


7.308
7.303
7.292
7.287
7.276
7.272
7.263
7.195
7.190
7.174
7.097
7.076
4.411
4.408
4.205
4.201
3.971
3.953
3.936
3.876
3.860
3.843
2.616
2.613
2.595
2.506
2.502
2.497
2.021
2.017
1.930
1.927
0.000
H
H
C
O
Cl
4.00
2.07
2.00
1.99
2.00
2.01
2.00
2.18
2.11
3.02
3.01
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

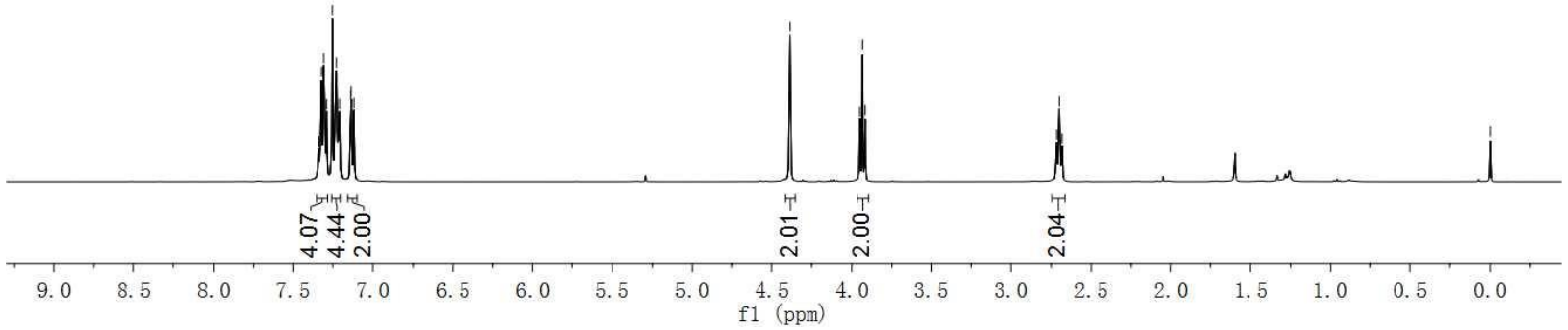
2t (*Z*/*E* 50:50)

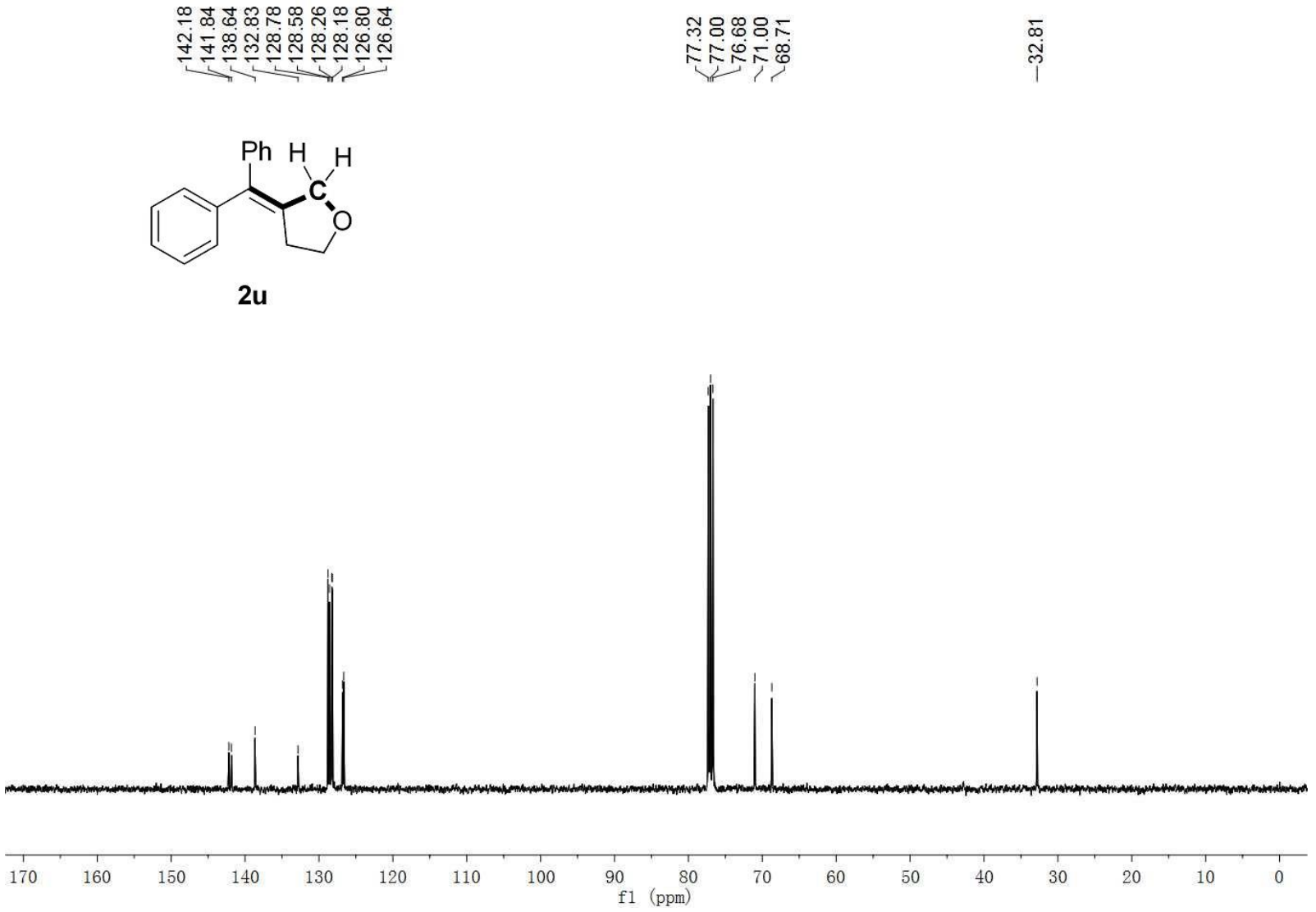

141.83
141.59
136.54
136.49
132.20
132.03
128.70
128.39
128.33
128.23
125.64
124.94
77.32
77.00
76.68
70.56
70.25
69.16
68.28
32.09
31.57
21.16
20.30
H
H
C
O
Cl
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

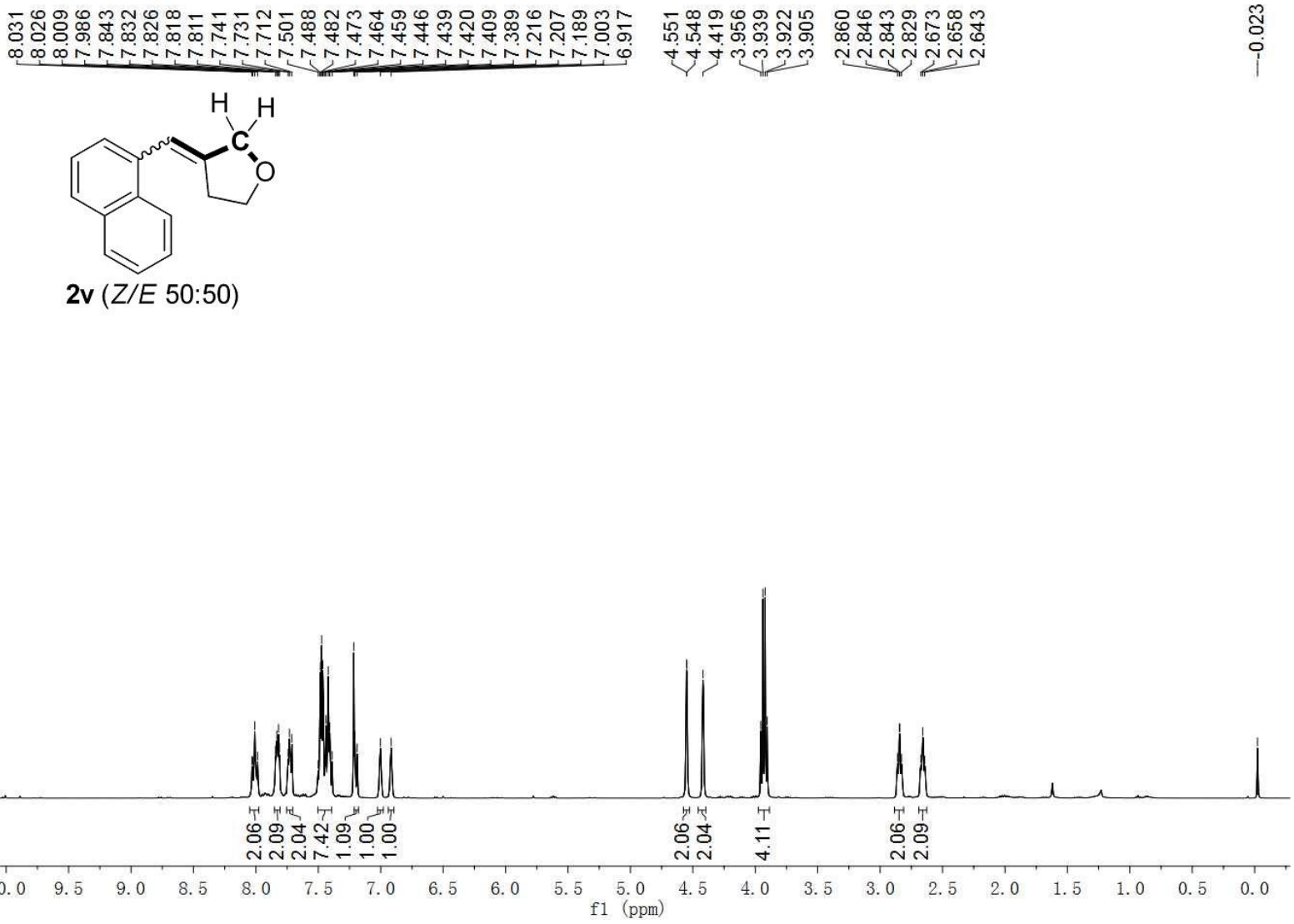
2t (*Z*/*E* 50:50)

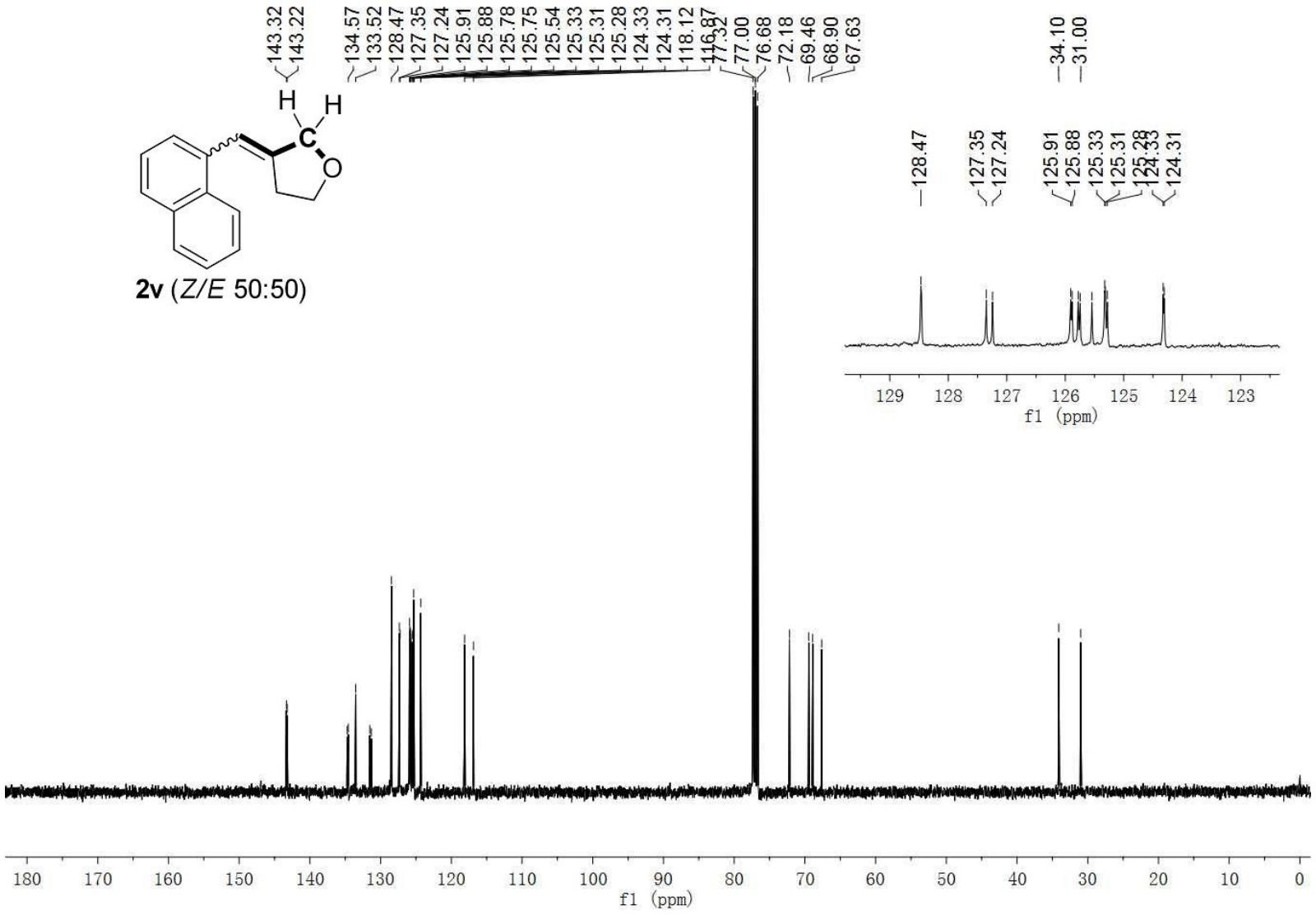

7.340
7.322
7.308
7.305
7.290
7.253
7.228
7.225
7.216
7.207
7.142
7.139
7.121
4.388
3.949
3.932
3.915
2.714
2.697
2.680
0.000
Ph
H
H
C
O

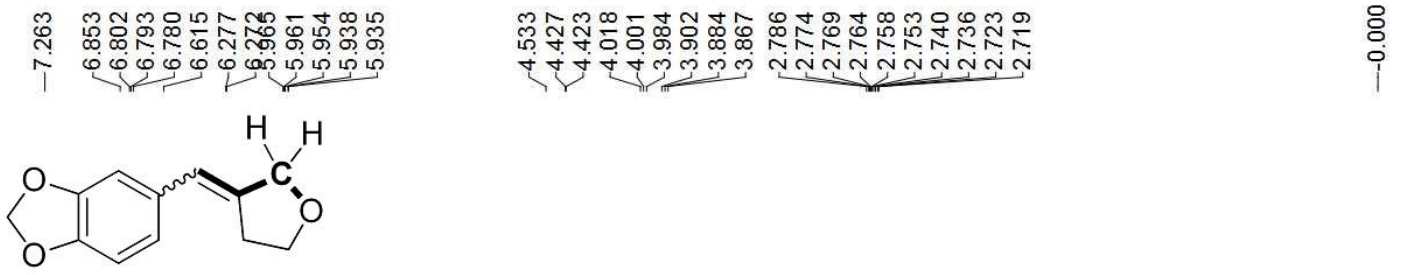
2u


4.07
4.44
2.00
2.01
2.00
2.04
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)

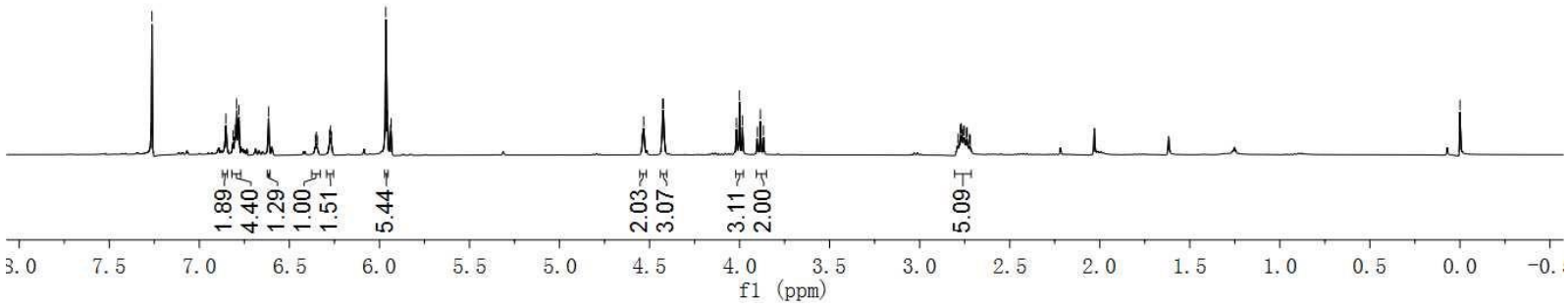

142.18
141.84
138.64
132.83
128.78
128.58
128.26
128.18
126.80
126.64
77.32
77.00
76.68
71.00
68.71
32.81
Ph
H
H
C
O
2u
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

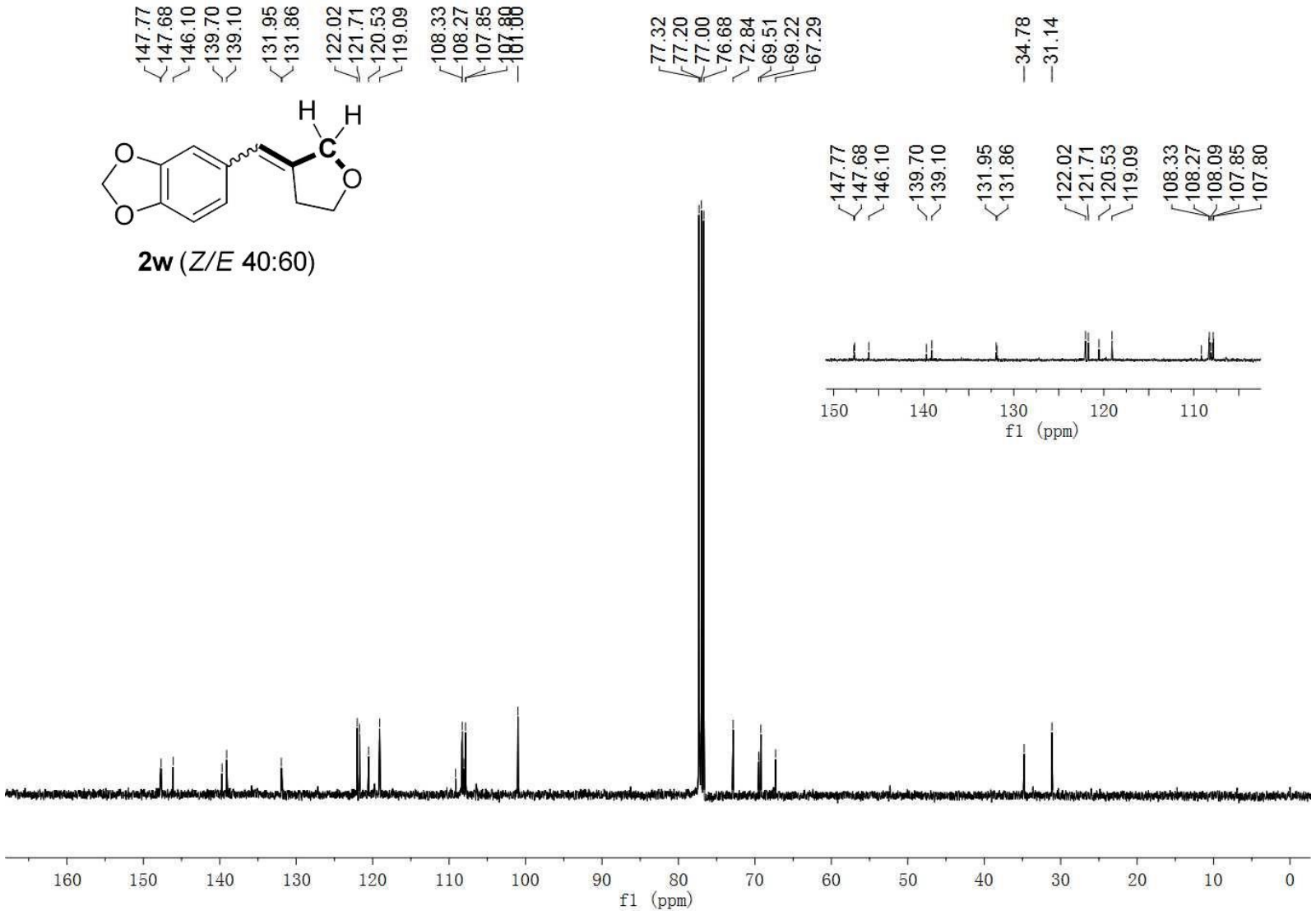

8.031
8.026
8.009
7.986
7.843
7.832
7.826
7.818
7.811
7.741
7.731
7.712
7.501
7.488
7.482
7.473
7.464
7.459
7.446
7.439
7.420
7.409
7.389
7.216
7.207
7.189
7.003
6.917
4.551
4.548
4.419
3.956
3.939
3.922
3.905
2.860
2.846
2.843
2.829
2.673
2.658
2.643
0.023
H
H
C
O
2v (Z/E 50:50)
2.06
2.09
2.04
7.42
1.09
1.00
1.00
2.06
2.04
4.11
2.06
2.09
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)

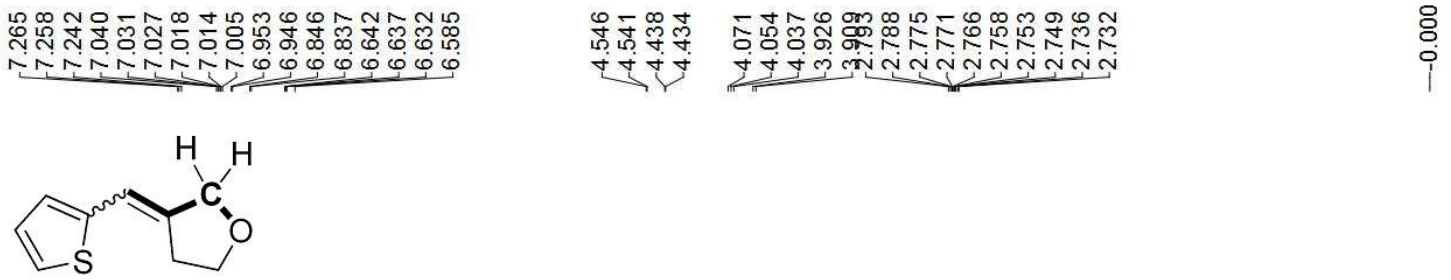

143.32
143.22
134.57
133.52
128.47
127.35
127.24
125.91
125.88
125.78
125.75
125.54
125.33
125.31
125.28
124.33
124.31
118.12
116.87
77.32
77.00
76.68
72.18
69.46
68.90
67.63
34.10
31.00
H
H
C
O
2v (Z/E 50:50)
128.47
127.35
127.24
125.91
125.88
125.33
125.31
124.33
124.31
129
128
127
126
125
124
123
f1 (ppm)
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


7.263
6.853
6.802
6.793
6.780
6.615
6.277
5.961
5.954
5.938
5.935
4.533
4.427
4.423
4.018
4.001
3.984
3.902
3.884
3.867
2.786
2.774
2.769
2.764
2.758
2.753
2.740
2.736
2.723
2.719
0.000
H
H
C
O
O
O

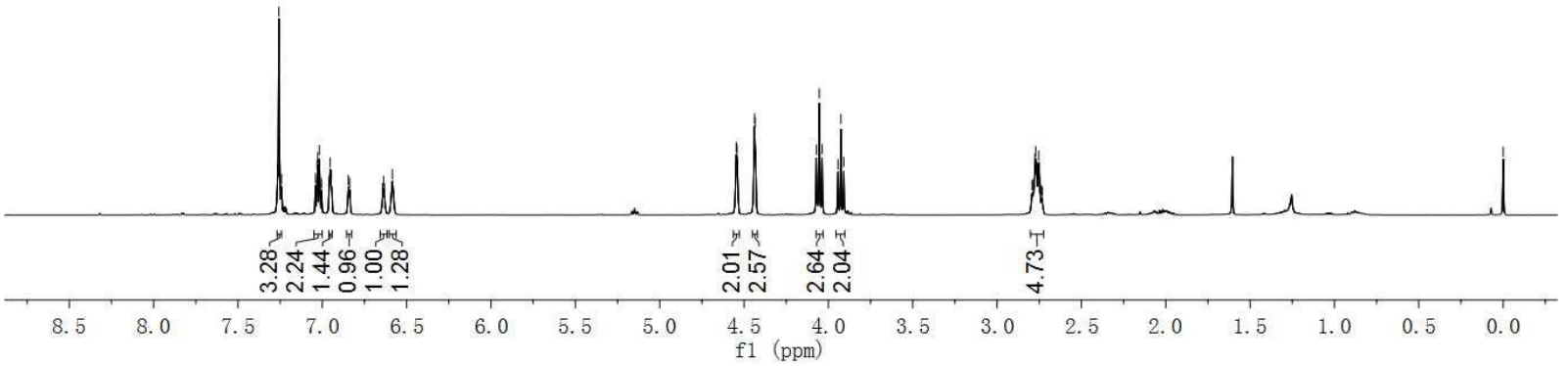
2w (*Z*/*E* 40:60)

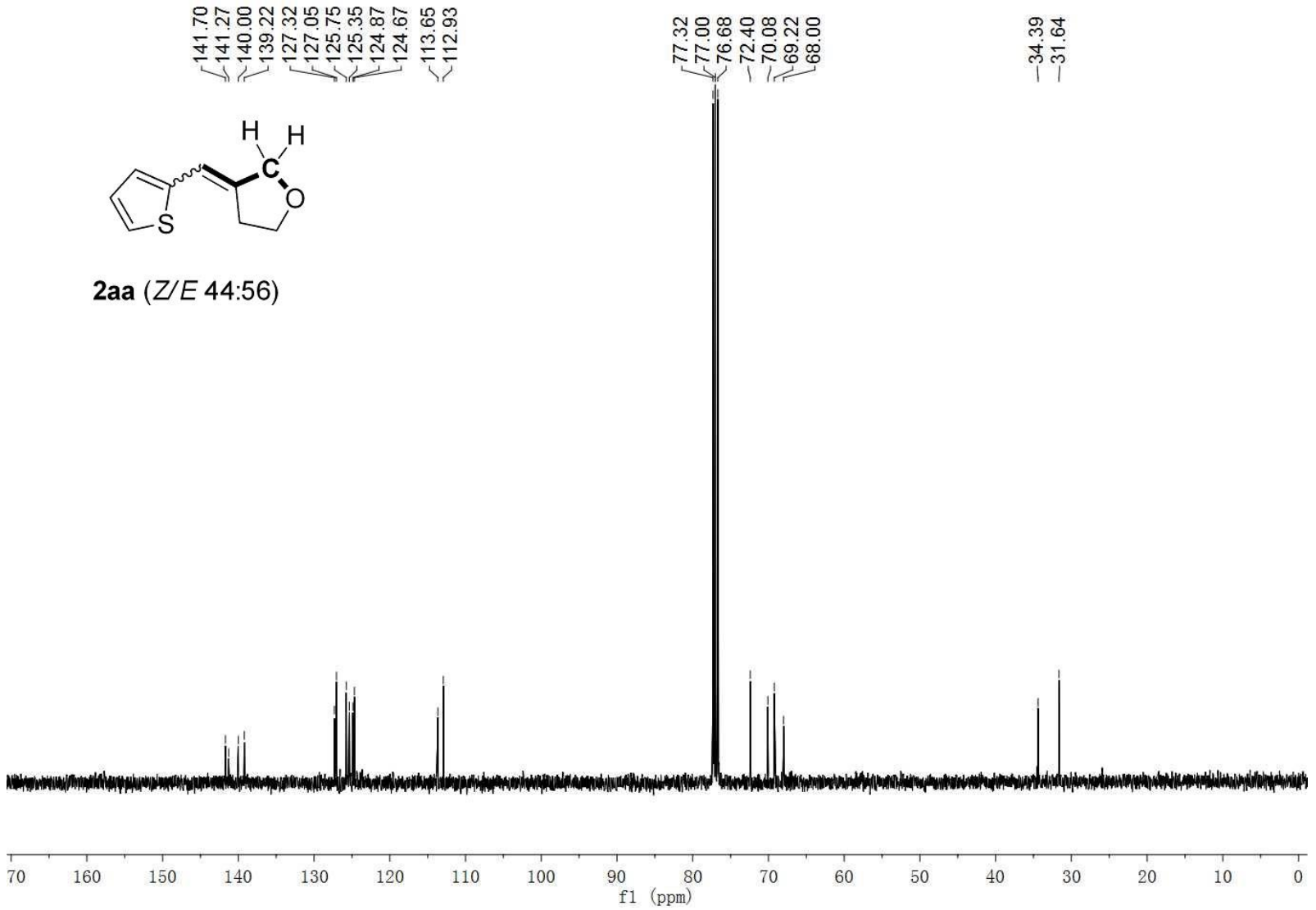

1.89
4.40
1.29
1.00
1.51
5.44
2.03
3.07
3.11
2.00
5.09
f1 (ppm)

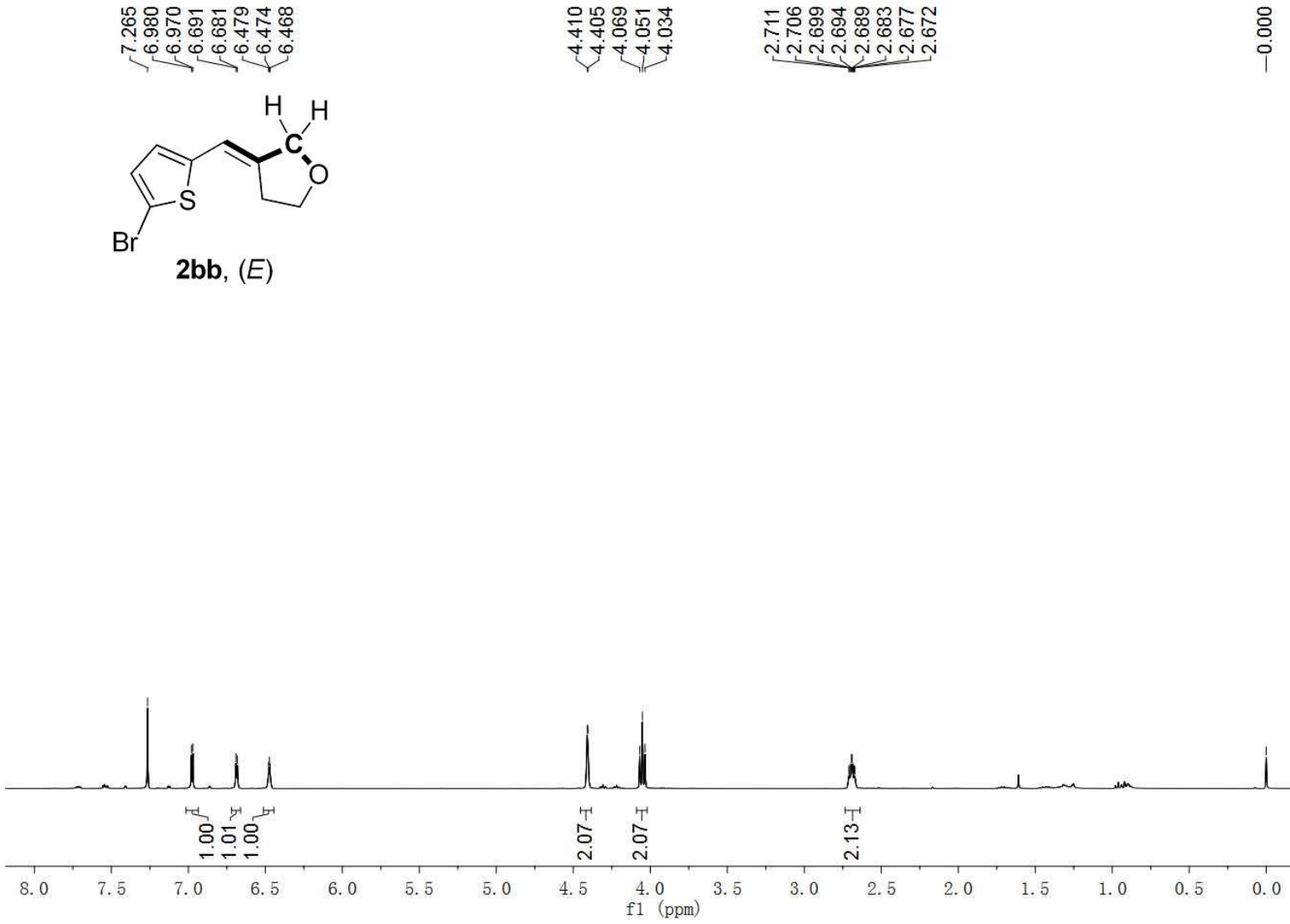

147.77
147.68
146.10
139.70
139.10
131.95
131.86
122.02
121.71
120.53
119.09
108.33
108.27
107.85
77.32
77.20
77.00
76.68
72.84
69.51
69.22
67.29
34.78
31.14
H
H
C
O
O
O
2w (Z/E 40:60)
150
140
130
120
110
f1 (ppm)
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

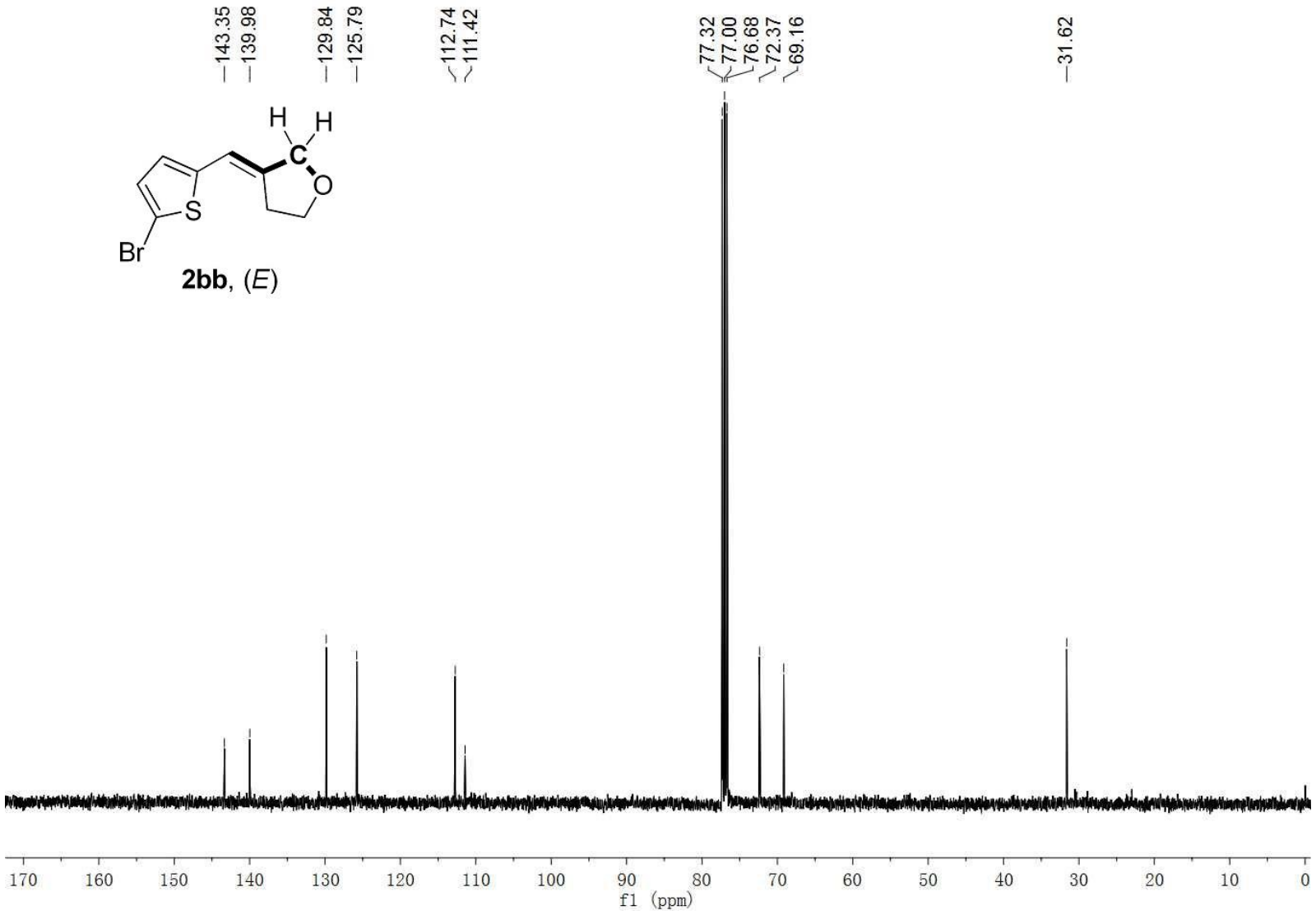

7.265
7.258
7.242
7.040
7.031
7.027
7.018
7.014
7.005
6.953
6.946
6.846
6.837
6.642
6.637
6.632
6.585
4.546
4.541
4.438
4.434
4.071
4.054
4.037
3.926
2.788
2.775
2.771
2.766
2.758
2.753
2.749
2.736
2.732
0.000
H
H
C
O
S

2aa (*Z*/*E* 44:56)

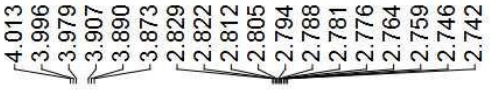

3.28
2.24
1.44
0.96
1.00
1.28
2.01
2.57
2.64
2.04
4.73
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


141.70
141.27
140.00
139.22
127.32
127.05
125.75
125.35
124.87
124.67
113.65
112.93
77.32
77.00
76.68
72.40
70.08
69.22
68.00
34.39
31.64
H
H
C
O
S
2aa (Z/E 44:56)
70
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

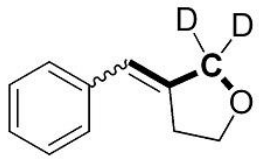

7.265
6.980
6.970
6.691
6.681
6.479
6.474
6.468
4.410
4.405
4.069
4.051
4.034
2.711
2.706
2.699
2.694
2.689
2.683
2.677
2.672
0.000
H
H
C
O
S
Br
2bb, (E)
1.00
1.01
1.00
2.07
2.07
2.13
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


143.35
139.98
129.84
125.79
112.74
111.42
77.32
77.00
76.68
72.37
69.16
31.62
H
H
C
O
S
Br
2bb, (E)
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

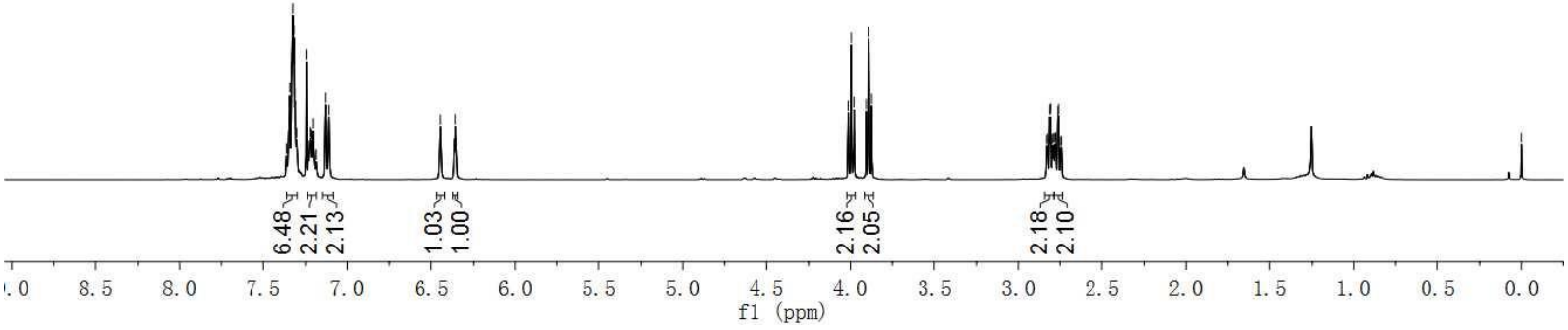

7.348
7.343
7.332
7.325
7.319
7.313
7.303
7.245
7.229
7.218
7.213
7.201
7.128
6.363
6.357
6.350

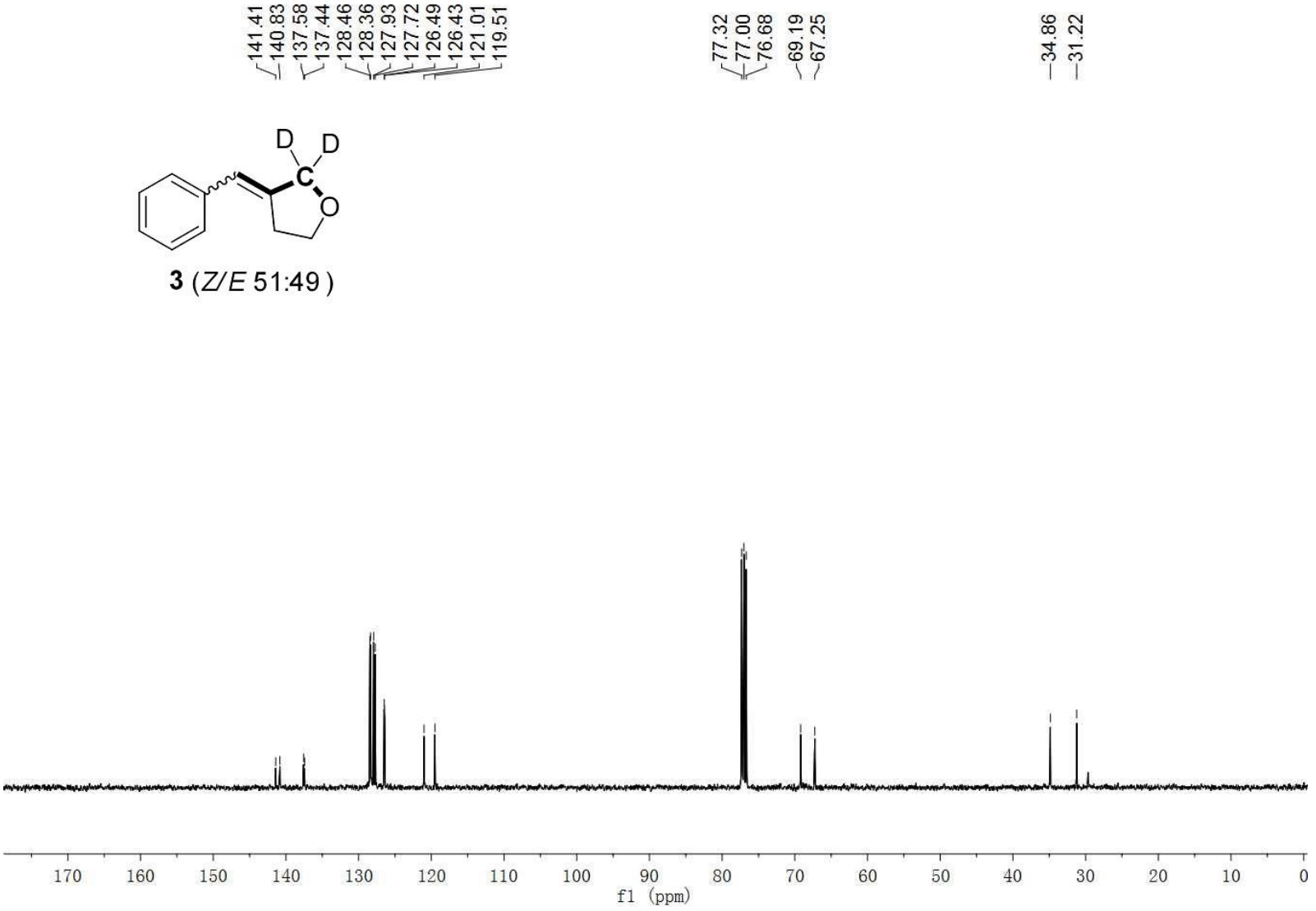

4.013
3.996
3.979
3.907
3.890
3.873
2.829
2.822
2.812
2.805
2.794
2.788
2.781
2.776
2.764
2.759
2.746
2.742

0.000

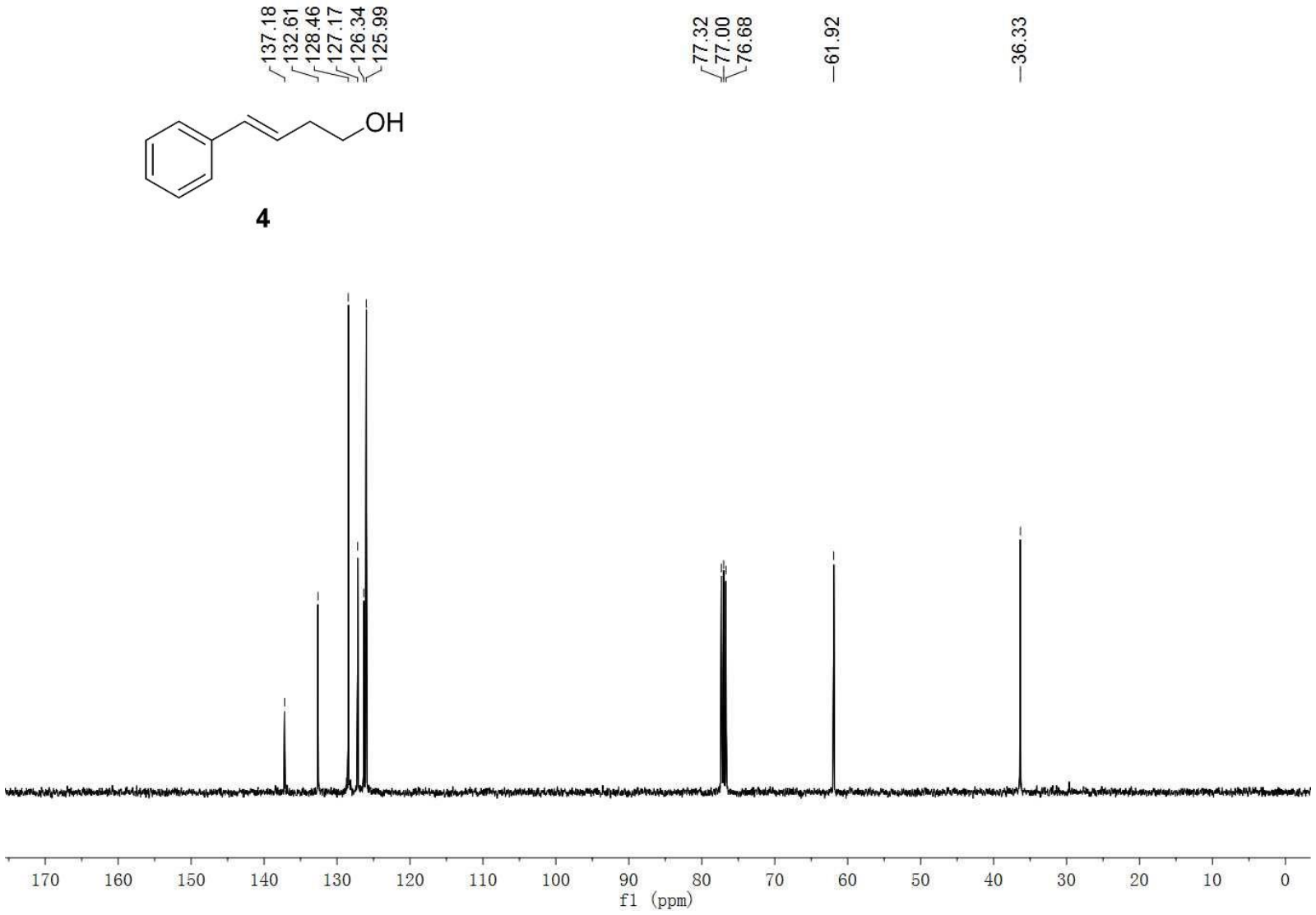

D
D
C
O

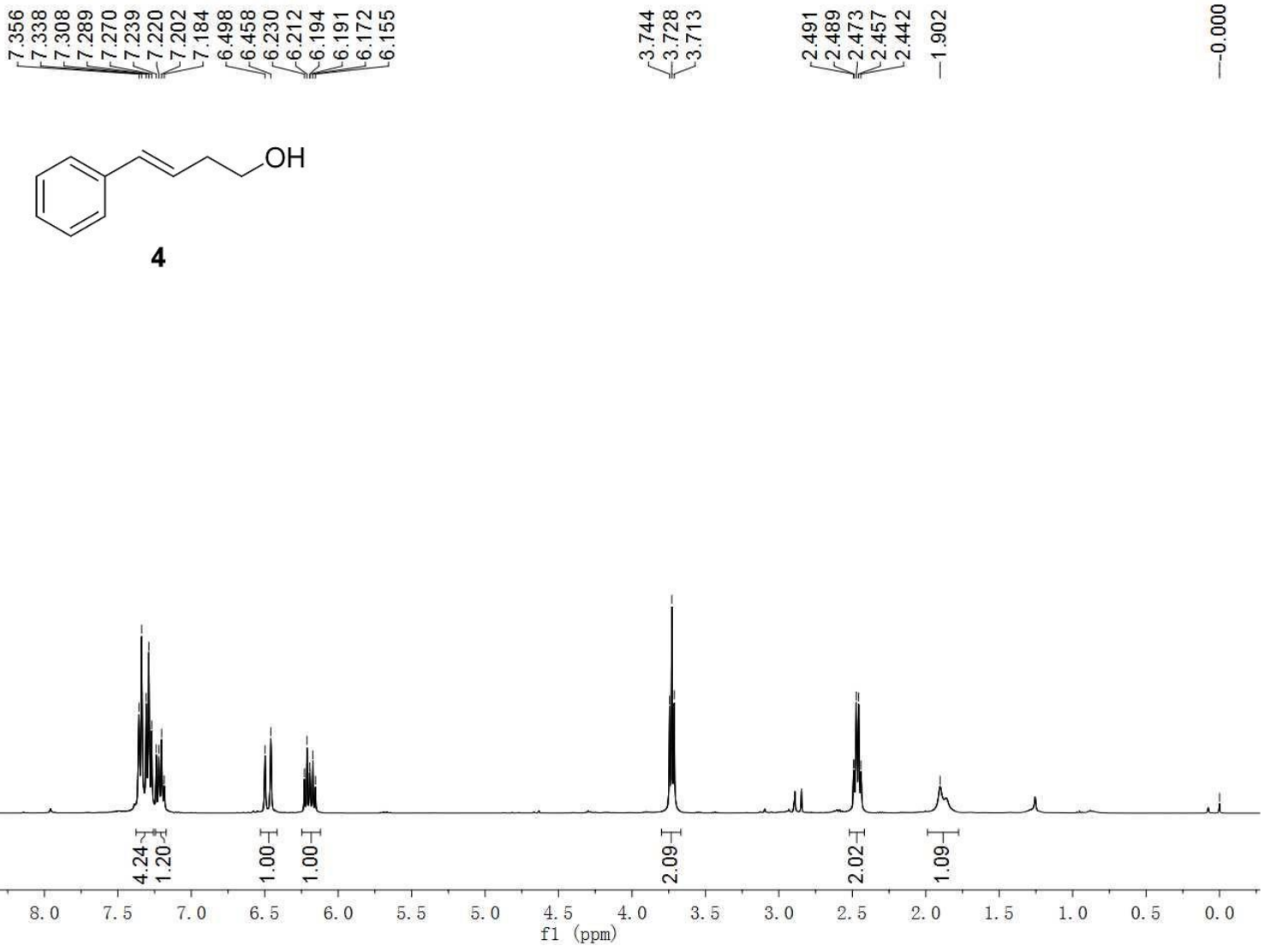
3 (*Z*/*E* 51:49)


6.48
2.21
2.13
1.03
1.00
2.16
2.05
2.18
2.10
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)


141.41
140.83
137.58
137.44
128.46
128.36
127.93
127.72
126.49
126.43
121.01
119.51
77.32
77.00
76.68
69.19
67.25
34.86
31.22
D
D
C
O
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

3 (*Z*/*E* 51:49)


137.18
132.61
128.46
127.17
126.34
125.99
77.32
77.00
76.68
61.92
36.33
OH
4
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)


7.356
7.338
7.308
7.289
7.270
7.239
7.220
7.202
7.184
6.498
6.458
6.230
6.212
6.194
6.191
6.172
6.155
3.744
3.728
3.713
2.491
2.489
2.473
2.457
2.442
1.902
0.000
OH
4
4.24
1.20
1.00
1.00
2.09
2.02
1.09
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
f1 (ppm)