

Electronic Supplementary Information

Direct annulation between glycine derivatives and thiiranes through photoredox/iron cooperative catalysis

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1. Experiment Information

1.1 General information

Unless otherwise noted, all reagents were purchased from commercial sources and used as received without further purification. *N*-arylglycine derivatives¹ and thiirane derivatives² were prepared according to literature procedures. Unless otherwise indicated, all experiments were carried out under air atmosphere. Irradiation of photochemical reactions was carried out using 18 W blue LED bulb or 5 W LED waveband light source. The LED bulb was purchased from Taobao store (Tai Di lighting, model number: YFGS-9). The silica gel (200–300 meshes) was used for column chromatography and TLC inspections were taken on silica gel GF254 plates. Liquid ¹H and ¹³C NMR spectra were recorded on a Bruker Avance III 400 MHz spectrometer. High resolution mass spectra (HRMS) were obtained on a mass spectrometer by using electrospray ionization (ESI) analyzed by quadrupole time-of-flight (QTof).

1.2 General procedure for the visible-light-induced aerobic oxidative [2 + 3] cycloaddition between glycine derivatives and thiiranes.

To a solution of *N*-arylglycine derivative (0.2 mmol, 1 eq) and Rh-6G (2 mol%) in dry DCE/CH₃CN (25/1, 2 mL) was added FeSO₄·7H₂O (20 mol%). The mixed solution was irradiated with 18 W blue LEDs under air atmosphere at room temperature, until the glycine derivatives were gone (monitored by TLC), then **2** (0.15 mmol, 1.5 eq) and HI (0.03 mmol, 15 mol%) were added and stirred at room temperature (without the irradiation of blue LEDs). After completion of the reaction as monitored by TLC, the solvent was removed under vacuo, and the residue was purified by silica gel column chromatography (with PE/EA = 64/1 to 16/1 as eluent) to afford the products.

1.3 General procedure for the visible-light-induced aerobic oxidative [2 + 3] cycloaddition between glycine derived peptides and thiiranes.

To a solution of glycine derived peptide (0.2 mmol, 1 eq) and Rh-6G (2 mol%) in dry DCE/CH₃CN (25/1, 2 mL) was added FeSO₄·7H₂O (20 mol%). The mixed solution was irradiated with 18 W blue LEDs under O₂ atmosphere at room temperature, until the glycine dipeptides were gone (monitored by TLC), then **2** (0.15 mmol, 1.5 eq) and HI (0.12 mmol, 30 mol%) were added and stirred at room temperature (without the irradiation of blue LEDs). After completion of the reaction as monitored by TLC, the

solvent was removed under vacuo, and the residue was purified by silica gel column chromatography (with PE/EA = 32/1 to 8/1 as eluent) to afford the products. *Note: The reaction can also be carried out under air atmosphere, but the reaction rate is slow.*

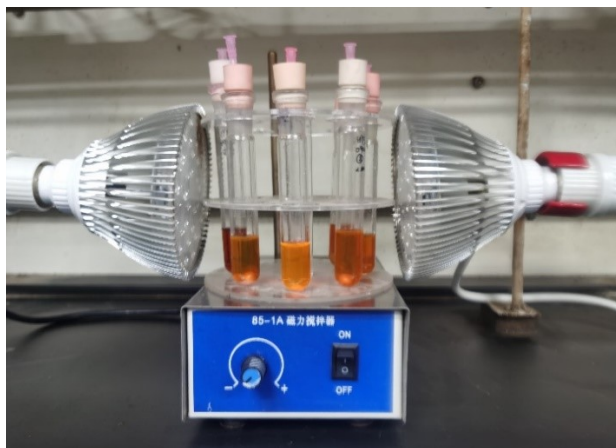
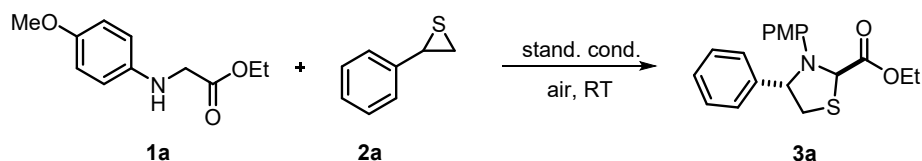
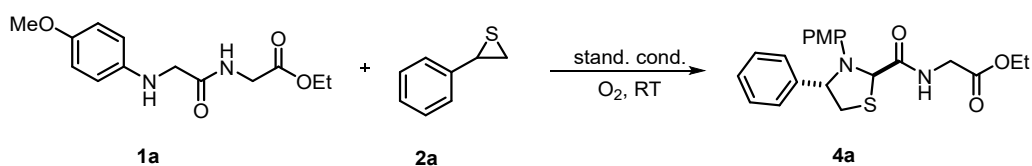


Fig. S1 Picture of photoreaction device.

1.4 Gram Scale Experiment



To a solution of **1a** (5 mmol, 1.05 g, 1 eq) and Rh-6G (0.1 mmol, 48 mg, 2 mol%) in dry DCE/CH₃CN (25/1, 50 mL) was added FeSO₄·7H₂O (1 mmol, 278 mg, 20 mol%). The mixed solution was irradiated with 18 W blue LEDs under air atmosphere at room temperature for 24 h, then **2a** (7.5 mmol, 1.02 g, 1.5 eq) and HI (0.75 mmol, 15 mol%) were added and stirred for another 6 h at room temperature (without the irradiation of blue LEDs). After completion of the reaction as monitored by TLC, the solvent was removed under vacuo, and the residue was purified by silica gel column chromatography (with PE/EA = 64/1 to 16/1 as eluent) to afford **3a** (yellow oil, 78 % yield, > 20:1 dr).



To a solution of **1x** (5 mmol, 1.05 g, 1 eq) and Rh-6G (0.1 mmol, 48 mg, 2 mol%) in dry DCE/CH₃CN (25/1, 50 mL) was added FeSO₄·7H₂O (1 mmol, 278 mg, 20 mol%).

The mixed solution was irradiated with 18 W blue LEDs under air atmosphere at room temperature for 36 h, then **2a** (7.5 mmol, 1.02 g, 1.5 eq) and HI (1.5 mmol, 30 mol%) was added and stirred at room temperature for another 15 h (without the irradiation of blue LEDs). After completion of the reaction as monitored by TLC, the solvent was removed under vacuo, and the residue was purified by silica gel column chromatography (with PE/EA = 32/1 to 8/1 as eluent) to afford **4a** (white solid, 58 % yield, > 20:1 dr).

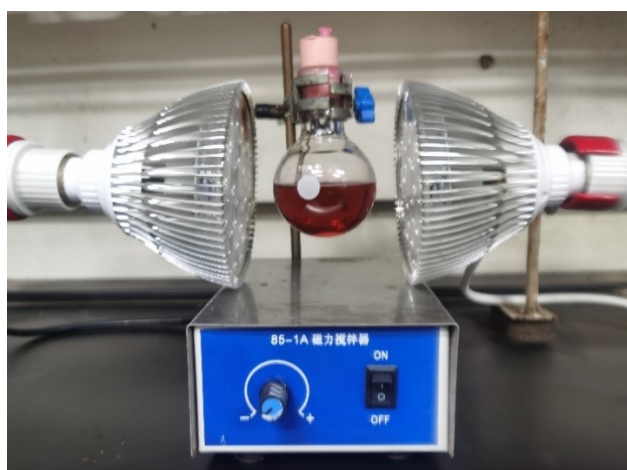
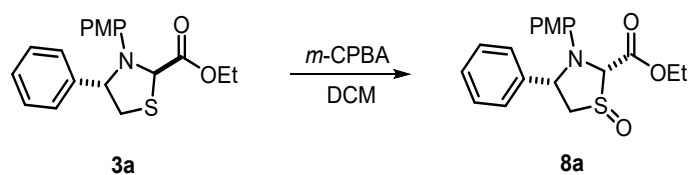


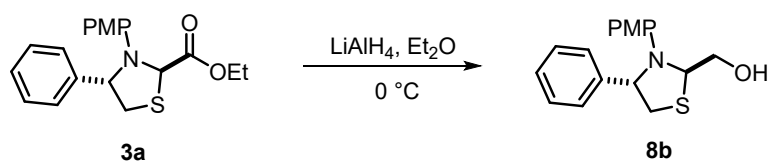
Fig. S2 Picture of set-up for the gram scale reaction.

1.5 Synthesis of compound **8a**



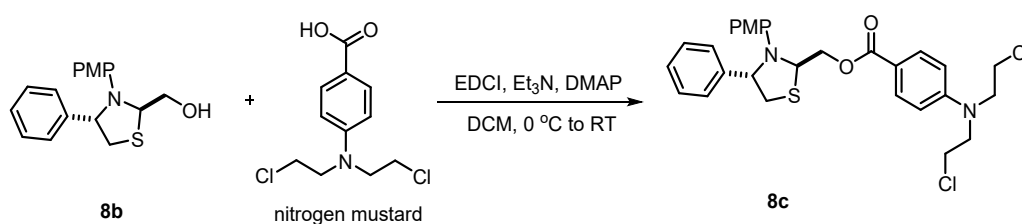
3a (0.2 mmol, 68.6 mg) was dissolved in DCM (4 mL), then *m*-CPBA (0.4 mmol, 70 mg) was added and stirred at room temperature. After completion of the reaction as monitored by TLC, the solvent was removed under vacuo, and the residue was purified by silica gel column chromatography to afford **8a**.

1.6 Synthesis of compound **8b**



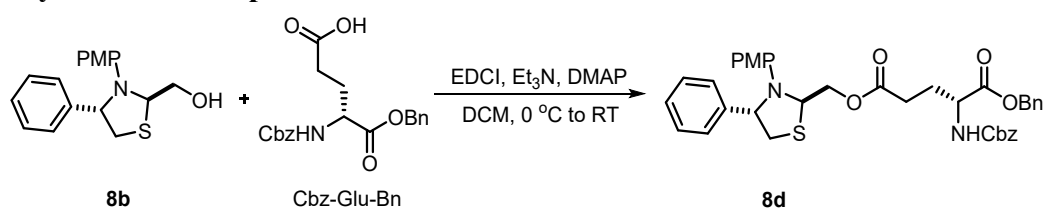
To the suspension of LiAlH₄ (0.12 g, 3.2 mmol) in dry ether (25 mL) was added the solution of **3a** (1.1 g, 3.2 mmol) in dry ether (25 mL) over a period of 10 minutes at 0 °C and let stir at the same temperature for another 1 h. The reaction mixture was then diluted with ether (50 mL) and small ice pieces were added carefully. The solid formed was filtered and the filtrate was evaporated to afford **8b** as a colorless liquid, which was taken ahead to the next step without further purification.

1.7 Synthesis of compound **8c**



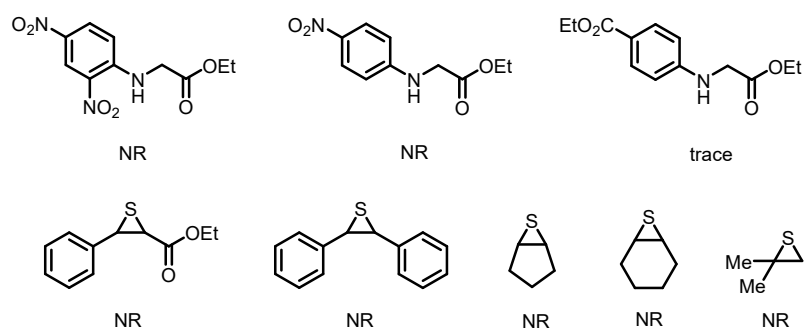
8b (0.2 mmol, 60.2 mg) was dissolved in DCM (4 mL) and placed in an ice bath, then Et₃N (0.3 mmol, 30.4 mg), DMAP (0.3 mmol, 37 mg), EDCI (0.4 mmol, 79.6 mg) and 4-(bis(2-chloroethyl)amino)benzoic acid (0.4 mmol, 104.4 mg) were added respectively. The mixture was stirred at 0 °C for 30 min and then allowed to react at room temperature. After completion of the reaction as monitored by TLC, the reaction was quenched by adding water, and then extracted with DCM and dried with anhydrous Na₂SO₄. The solvent was removed under vacuo, and the residue was purified by silica gel column chromatography to afford **8c**.

1.8 Synthesis of compound **8d**



8b (0.2 mmol, 60.2 mg) was dissolved in DCM (4 mL) and placed in an ice bath, then Et₃N (0.3 mmol, 30.4 mg), DMAP (0.3 mmol, 37 mg), EDCI (0.4 mmol, 79.6 mg) and Cbz-Glu-Bn (0.4 mmol, 104.4 mg) were added respectively. The mixture was stirred at 0 °C for 30 min and then allowed to react at room temperature. After completion of the reaction as monitored by TLC, the reaction was quenched by adding water, and then extracted with DCM and dried with anhydrous Na₂SO₄. The solvent was removed under vacuo, and the residue was purified by silica gel column chromatography to afford **8d**.

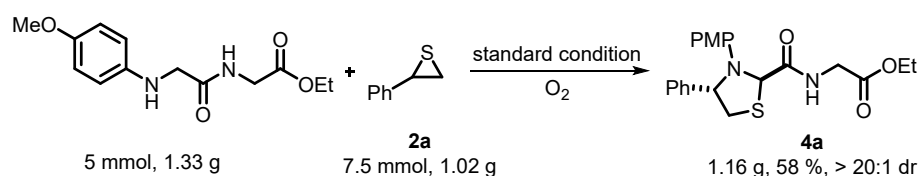
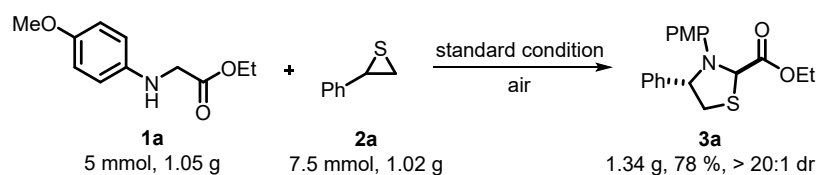
1.9 Substrate limitation



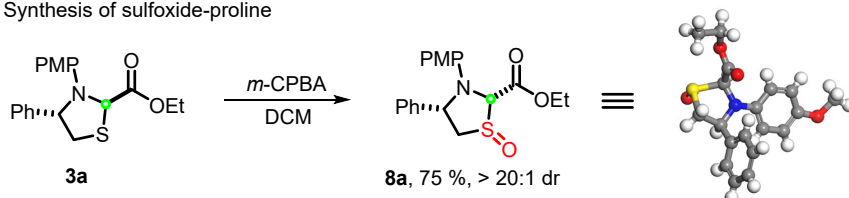
Scheme S1 Unsuccessful glycine derivatives and thiiranes (NR means no reaction).

1.10 Gram-scale reaction and synthetic application of the product

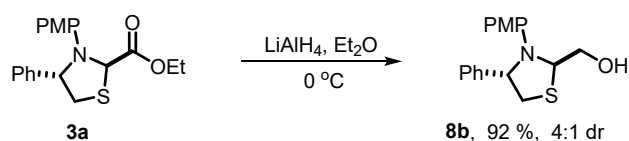
a) Gram-scale synthesis



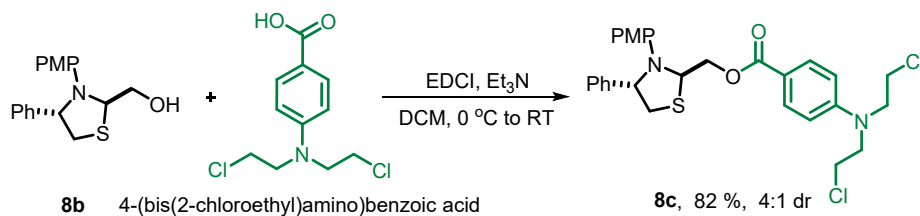
b) Synthesis of sulfoxide-proline



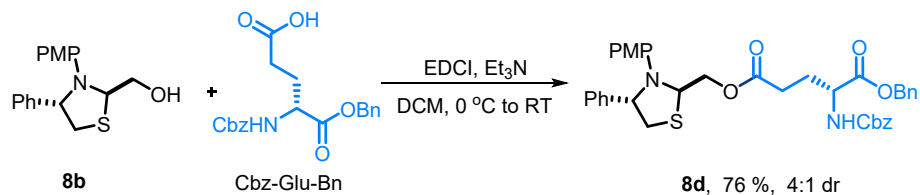
c) Synthesis of unnatural amino alcohol



d) Modification of 4-(bis(2-chloroethyl)amino)benzoic acid with unnatural amino alcohol **8b**



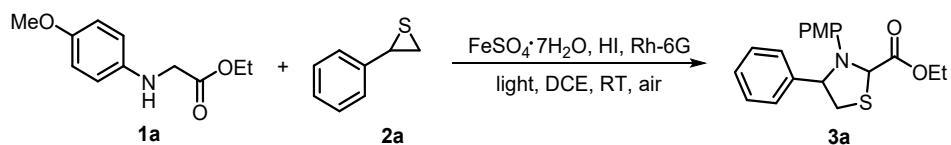
e) Modification of Cbz-Glu-Bn with unnatural amino alcohol **8b**



Scheme S2 Gram-scale reaction and synthetic application of the product.

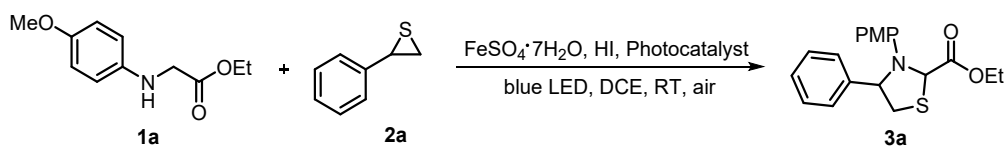
2. Optimization of Reaction Conditions

Table S1. Screening of light source ^a



Entry	Light Source	Yield (%) ^b	dr ^c
1	450-470 nm	66	1:1
2	Blue LED	68	5:1
3	Purple LED	58	2:1
4	Green LED	62	5:1
5	White LED	55	2:1

^a Reaction conditions: **1a** (0.1 mmol), Rh-6G (2 mol%), $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (3 mol%), DCE (1.0 mL), LED light irradiation under air at room temperature for 16 h, then **2a** (0.15 mmol) and HI (15 mol%) were added and stirred under air at room temperature. ^b Yields were determined by ¹H NMR analysis using 1,3,5-trimethoxybenzene as an internal standard. ^c Determined by ¹H NMR.

Table S2. Screening of photocatalyst ^a

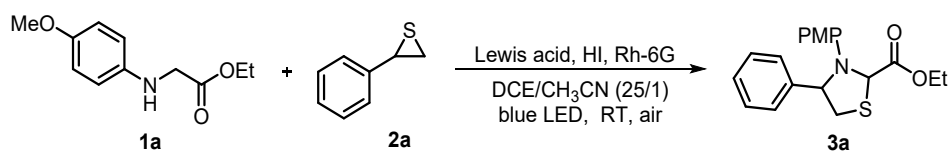
Entry	Photocatalyst	Yield (%) ^b	dr ^c
1 ^d	Rh-6G	57	4:1
2 ^e	Rh-6G	55	3:1
3	$\text{Ru}(\text{bpy})_3\text{Cl}_2 \cdot 6\text{H}_2\text{O}$	31	5.3:1
4	Eosin Y	trace	—
5	Victoria blue B	63	3:1
6	Eosin B	trace	—
7	Malachite Green	trace	—
8	Rhodamine B	35	5.3:1

^a Reaction conditions: **1a** (0.1 mmol), photocatalyst (2 mol%), $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (3 mol%), DCE (1.0 mL), 18 W blue LED light irradiation under air at room temperature for 16 h, then **2a** (0.15 mmol) and HI (15 mol%) were added and stirred under air at room temperature. ^b Yields were determined by ¹H NMR analysis using 1,3,5-trimethoxybenzene as an internal standard. ^c Determined by ¹H NMR. ^d 5 mol% Rh-6G was used. ^e 10 mol% Rh-6G was used.

Table S3. Screening of solvents ^a

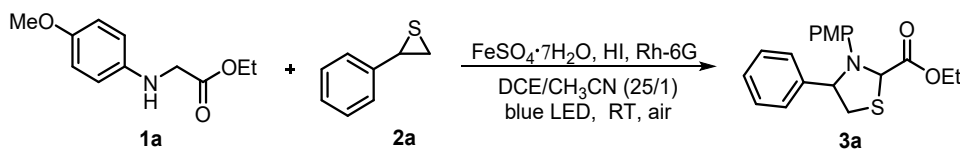
Entry	Solvent	Yield (%) ^b	dr ^c
1	CH ₃ CN	68	> 20:1
2	DCE/CH ₃ CN (10/1)	70	> 20:1
3	DCE/CH ₃ CN (15/1)	78	> 20:1
4	DCE/CH ₃ CN (20/1)	71	> 20:1
5	DCE/CH ₃ CN (25/1)	82	> 20:1
6	DCE/CH ₃ CN (30/1)	65	> 20:1
7	Toluene	ND	—
8	CH ₃ OH	trace	—
9	CH ₃ CH ₂ OH	trace	—
10	DMF	trace	—
11	DMAc	trace	—
12	DMSO	ND	—
13	THF	ND	—
14	Diethyl ether	ND	—
15	DCM	ND	—
16	1,4-dioxane	trace	—
17	CHCl ₃	58	> 20:1
18	TFA	ND	—
19	EtOAc	35	1.7:1
20 ^d	DCE/CH ₃ CN (25/1)	44	> 20:1
21 ^e	DCE/CH ₃ CN (25/1)	65	> 20:1
22 ^f	DCE/CH ₃ CN (25/1)	70	9:1

^a Reaction conditions: **1a** (0.1 mmol), Rh-6G (2 mol%), $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (3 mol%), solvent (1.0 mL), 18 W blue LED light irradiation under air at room temperature for 16 h, then **2a** (0.15 mmol) and HI (15 mol%) were added and stirred under air at room temperature. ^b Yields were determined by ¹H NMR analysis using 1,3,5-trimethoxybenzene as an internal standard. ^c Determined by ¹H NMR. ^d 3 mL DCE/CH₃CN (25/1) was used. ^e 2 mL DCE/CH₃CN (25/1) was used. ^f 0.5 mL DCE/CH₃CN (25/1) was used.

Table S4. Screening of Lewis acid ^a

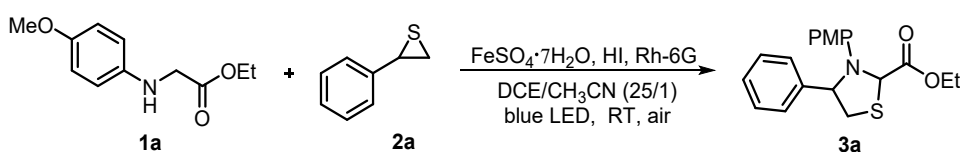
Entry	Lewis acid	Yield (%) ^b	dr ^c
1 ^d	FeSO ₄ ·7H ₂ O	79	> 20:1
2 ^e	FeSO₄·7H₂O	86	> 20:1
3 ^f	FeSO ₄ ·7H ₂ O	67	> 20:1
4	CuSO ₄ ·5H ₂ O	trace	—
5	Cu(OTf) ₂	39	> 20:1
6	Fe(OTf) ₂	48	> 20:1
7	Ce(OTf) ₃	53	> 20:1

^a Reaction conditions: **1a** (0.1 mmol), Rh-6G (2 mol%), Lewis acid (3 mol%), DCE/CH₃CN (25/1) (1.0 mL), 18 W blue LED light irradiation under air at room temperature for 16 h, then **2a** (0.15 mmol) and HI (15 mol%) were added and stirred under air at room temperature. ^b Yields were determined by ¹H NMR analysis using 1,3,5-trimethoxybenzene as an internal standard. ^c Determined by ¹H NMR. ^d 10 mol% FeSO₄·7H₂O was used. ^e 20 mol% FeSO₄·7H₂O was used. ^f 30 mol% FeSO₄·7H₂O was used.

Table S5. Screening the equivalent of **2a** ^a

Entry	Equivalent	Yield (%) ^b	dr ^c
1	1.0	43	60:40
2	1.2	48	63:37
3	1.5	86	> 20:1

^a Reaction conditions: **1a** (0.1 mmol), Rh-6G (2 mol%), FeSO₄·7H₂O (20 mol%), DCE/CH₃CN (25/1), 18 W blue LED light irradiation under air at room temperature for 16 h, then **2a** and HI (15 mol%) were added and stirred under air at room temperature. ^b Yields were determined by ¹H NMR analysis using 1,3,5-trimethoxybenzene as an internal standard. ^c Determined by ¹H NMR.

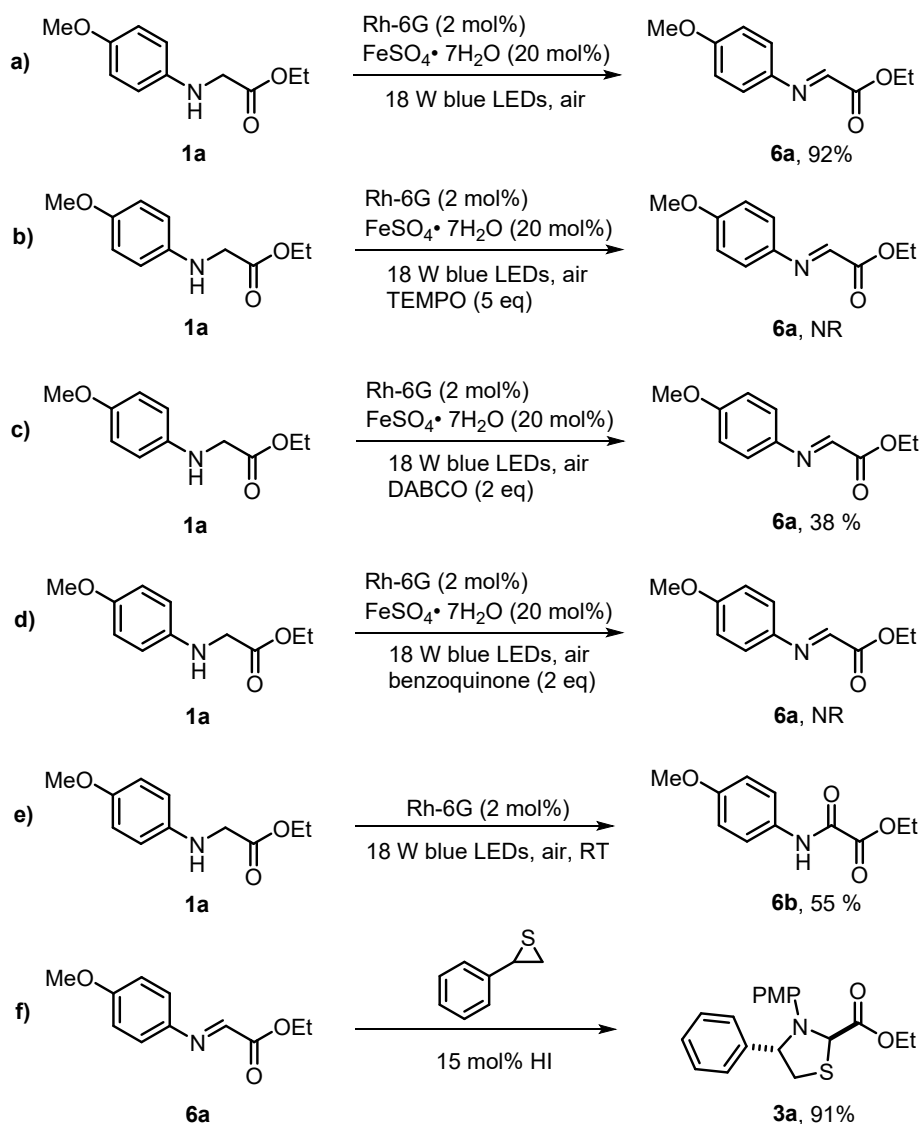
Table S6. Screening the equivalent of HI ^a

Entry	Equivalent	Yield (%) ^b	dr ^c
1	0.05	44	89:11
2	0.1	55	95:5
3	0.15	86	> 20:1
4	0.25	66	92:8

^a Reaction conditions: **1a** (0.1 mmol), Rh-6G (2 mol%), FeSO₄·7H₂O (20 mol%), DCE/CH₃CN (25/1) (1 mL), 18 W blue LED light irradiation under air at room temperature for 16 h, then **2a** (0.15 mmol) and HI were added and stirred under air at room temperature. ^b Yields were determined by ¹H NMR analysis using 1,3,5-trimethoxybenzene as an internal standard. ^c Determined by ¹H NMR.

3. Mechanistic Investigation

3.1 Control experiments



Scheme S3 Control experiment.

3.2 Cyclic voltammetry experiments

Cyclic Voltammetry was performed on a CH Instruments Electrochemical Workstation model CHI760E. A solution of **1a** or **1a-FeSO₄·7H₂O** in DCE (2×10^{-7} M) was tested with 0.1 M Bu₄NPF₆ as the supporting electrolyte, using a glassy carbon as the working electrode, a Pt as the counter electrode, and a saturated calomel electrode reference electrode. Scan rate = 0.05 V/s, 1 sweep segments, a sample interval of 0.001 V.

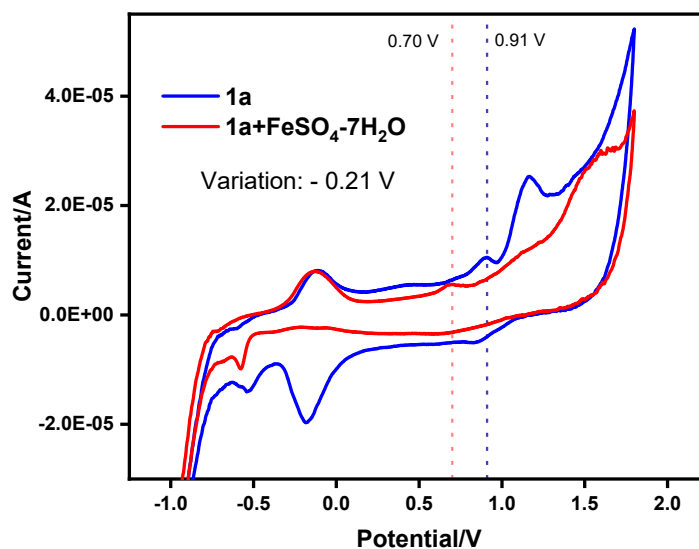


Fig. S3 Cyclic Voltammetry of **1a** and **1a-FeSO₄·7H₂O** in DCE

3.3 UV/Vis absorption spectra

The UV/Vis absorption spectra were recorded in 1 cm path quartz cuvettes by using a Varian Cary 300 Conc UV/Vis spectrometer. Sample preparation method: **1a** (0.125 mmol) was dissolved in 10 mL DCE, then the solution was divided into two parts, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (20 mol%) was added to one of them and ultrasonic treatment was performed for 60 min.

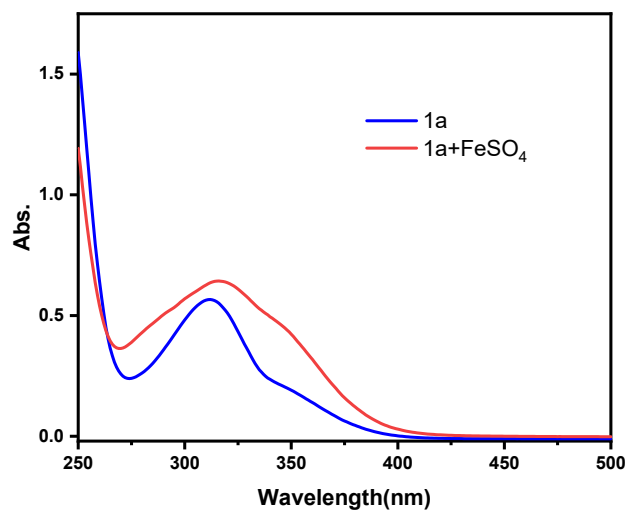


Fig. S4 The UV-Vis spectra of **1a** and **1a + FeSO₄·7H₂O**

3.4 EPR spectra

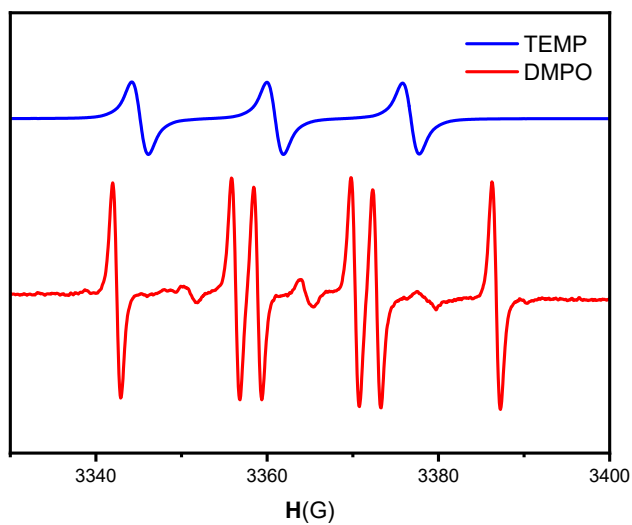


Fig. S5 EPR spectra of **1a** (0.1 M), Rh-6G (1×10^{-3} M) and DMPO (0.05 M) or TEMP (0.5 M) in air-saturated DCE upon irradiation with blue LED for 100 s. These results illustrate that $O_2^{\cdot -}$ generated from molecular oxygen is the primary active species in this photocatalytic oxidative reaction.

3.5 Stern-Volmer fluorescence quenching study

DCE was degassed with a stream of argon for 30 min. Rh-6G was dissolved in 10.0 mL DCE to prepare a 1.0×10^{-7} M solution. 0.1 mL of this solution was added to each of a set of 6 volumetric flasks (10 mL). Subsequently, the solution of quencher **1a** in DCE (1.0 mL, 2×10^{-3} M) was added in increasing amounts to the volumetric flasks, emission intensities were recorded.

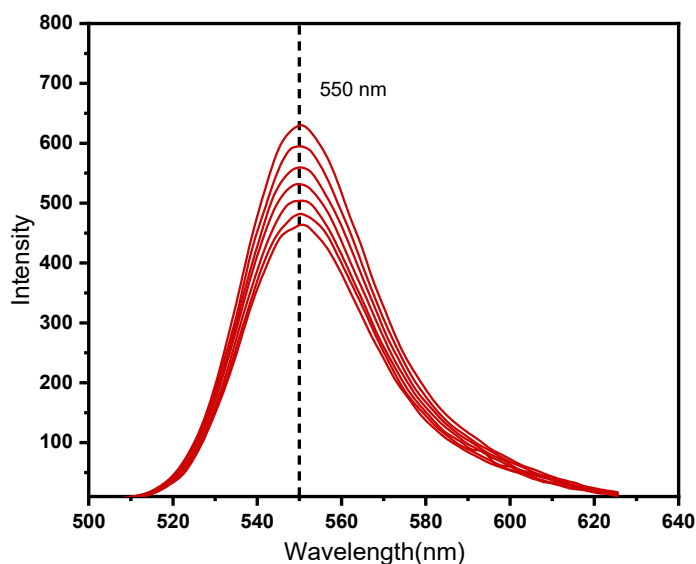


Fig. S6 Changes in the fluorescence spectra

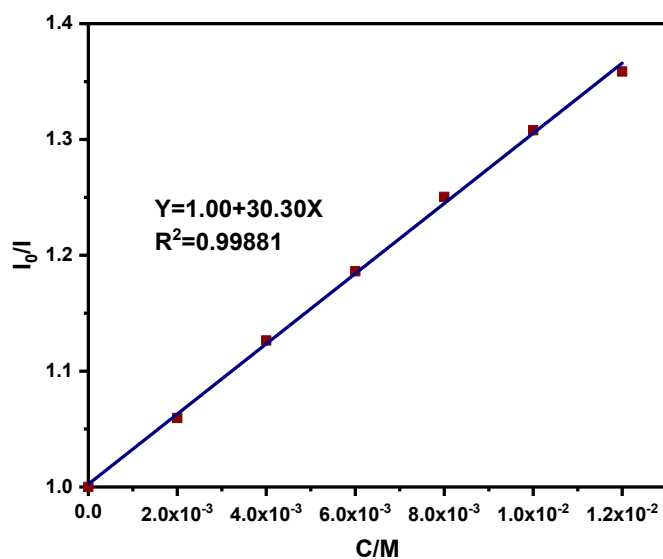


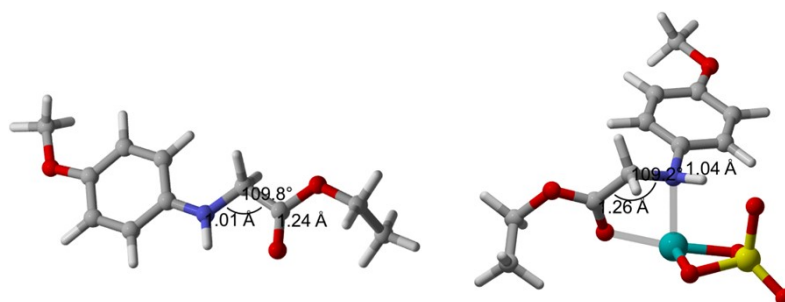
Fig. S7 Stern-Volmer Plot

4. Computational Study

4.1 Computational methods

All calculations were carried out with the Gaussian 09 D.01 programs.³ Ground state geometry were fully optimized by using density functional theory (DFT)⁴ and the B3LYP⁵-D3 method with the 6-31G(d,p) basis set for C, H, O, N, S atoms and Lanl2DZ for Fe atom. Frequency calculations have been performed. The 3D molecular structures were generated using the CYL-view.⁶ Using this geometry (singlet and triplet), single point time dependent density functional theory (TD-DFT) calculation was then performed using the CAM-B3LYP-D3/6-31G(d,p)/Lanl2DZ level of theory. The effect of solvent is considered from Truhlar and co-workers' universal solvation model (SMD⁷-DCE).

4.2 Optimized structure of 1a+ FeSO₄



Optimized structure of 1a and 1a + FeSO₄

	1a	FeSO ₄	1a + FeSO ₄	ΔE	$\Delta E/\text{kcal mol}^{-1}$
ZPE	-708.19	-822.16	-1530.46	-0.11	-69.03
Enthalpy	-708.17	-822.15	-1530.44	-0.12	-75.30
Gibbs	-708.24	-822.19	-1530.52	-0.09	-56.48

* Unmarked energies in the table are given in Hartree.

4.3 Theory predicts UV-Vis spectrum of 1a and 1a+ FeSO₄

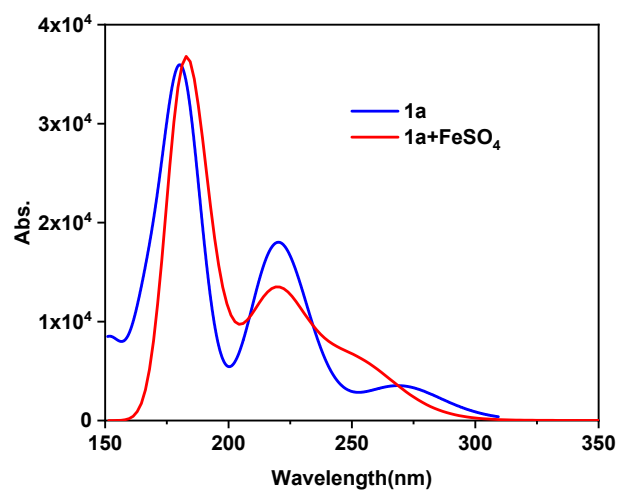
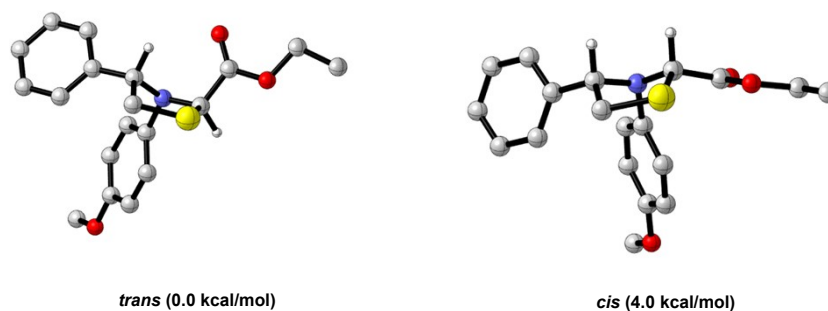


Fig. S8 Theory predicts UV/Vis absorption spectra

4.4 The relative energies of the *cis*- and *trans*-products



4.5 The Cartesian Coordinates

1a

0 1

C	-3.66387600	0.15410200	0.06597200
C	-3.08731000	1.43408700	0.07533000
C	-1.70875800	1.58472400	0.01303900
C	-0.85608100	0.45661700	-0.06072800
C	-1.44624900	-0.82086400	-0.06985900
C	-2.84008100	-0.97090400	-0.00686800
H	-3.74322400	2.29510400	0.13194900

H	-1.27449300	2.58051000	0.02084500
H	-0.82962700	-1.71078000	-0.12524100
H	-3.25663600	-1.97088700	-0.01602000
O	-5.06197100	0.12069800	0.13277100
C	-5.71372200	-1.17210200	0.12935000
H	-5.40980200	-1.77755700	0.99358700
H	-6.78103400	-0.95912700	0.18909600
H	-5.49995400	-1.72754800	-0.79348800
C	2.86859800	0.09777100	-0.25005500
O	3.16605400	1.29857100	-0.21559000
O	3.78120400	-0.91395200	-0.33827000
C	5.22128100	-0.53976400	-0.37540100
H	5.33049400	0.33280000	-1.02514900
H	5.69389700	-1.40997600	-0.83233300
C	5.73648800	-0.26384900	1.02952100
H	5.55948700	-1.12475100	1.68152400
H	6.81445900	-0.06764800	0.99972100
H	5.23873900	0.61295600	1.45294300
N	0.51986500	0.63691900	-0.12095500
H	0.90906900	1.56794900	-0.10912000
C	1.46074000	-0.44890400	-0.20277800
H	1.30803800	-1.07451900	-1.09793400
H	1.39306200	-1.13297100	0.65987300

1a + FeSO₄

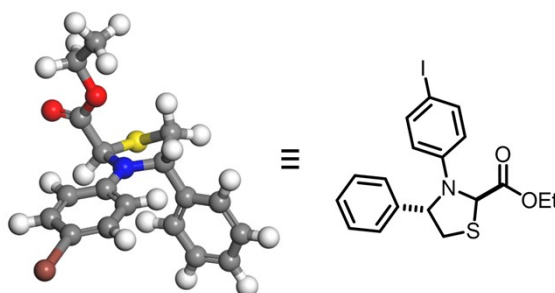
0 5

C	4.01031600	-0.44021500	-0.05643900
C	3.18058200	-1.57362800	0.01259600
C	1.83889600	-1.44090000	0.34105400

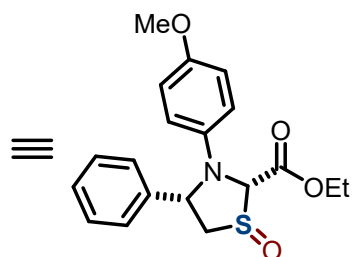
C	1.30610600	-0.16408100	0.61300800
C	2.12635900	0.96402000	0.53589300
C	3.48330800	0.82915700	0.20162100
H	3.61241500	-2.54414300	-0.19840500
H	1.18250000	-2.30372100	0.37368300
H	1.73953000	1.95732800	0.73892100
H	4.10335000	1.71519100	0.15301200
O	5.33498500	-0.69102700	-0.39114000
C	6.25669300	0.42739800	-0.48021300
H	6.34356800	0.94874700	0.48124100
H	7.21618900	-0.01343200	-0.74741800
H	5.94646900	1.13768200	-1.25677500
C	-0.96078200	2.13304500	0.39727600
O	-1.15525800	1.75870900	-0.79407800
O	-1.04992800	3.40020200	0.78258500
C	-1.49545400	4.44140700	-0.21573100
H	-0.96882000	4.24218300	-1.15162000
H	-1.13847900	5.36526500	0.23728900
C	-3.00532700	4.39457600	-0.37259100
H	-3.50181800	4.52830400	0.59264000
H	-3.32527800	5.20325800	-1.03902900
H	-3.32452500	3.44514700	-0.81136600
N	-0.10767200	-0.08543500	0.90702100
H	-0.45996400	-0.94351900	1.37706700
Fe	-1.24541400	-0.31260000	-0.99211500
S	-2.23017300	-2.54039800	0.16083600
O	-1.34311400	-2.57710400	1.55743900
O	-1.07380300	-2.24528000	-1.16087400
O	-2.89693700	-0.92042600	0.00359600

C	-0.64675600	1.14353100	1.50063700
H	0.00714300	1.60362100	2.24837700
H	-1.59918600	0.88482200	1.98012000
O	-3.26338100	-3.74264700	-0.11851900

5. X-ray Crystal Structure for Compound 3m and 8a



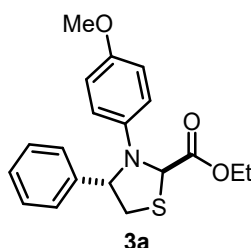
Empirical formula	C ₁₈ H ₁₈ INO ₂ S
Formula weight	439.29
Temperature/K	150.00(10)
Crystal system	monoclinic
Space group	P2 ₁ /c
a/Å	8.96313(11)
b/Å	6.06546(8)
c/Å	32.0458(3)
α/°	90
β/°	91.1858(10)
γ/°	90
Volume/Å³	1741.81(4)
Z	4
ρ_{calc}/cm³	1.675
μ/mm⁻¹	15.635
F(000)	872.0
Crystal size/mm³	0.12 × 0.08 × 0.07
Radiation	Cu Kα (λ = 1.54184)
2θ range for data collection/°	5.516 to 154.948
Index ranges	-11 ≤ h ≤ 11, -7 ≤ k ≤ 7, -24 ≤ l ≤ 40
Reflections collected	10301
Independent reflections	3442 [R _{int} = 0.0471, R _{sigma} = 0.0401]
Data/restraints/parameters	3442/0/209
Goodness-of-fit on F²	1.064
Final R indexes [I ≥ 2σ (I)]	R ₁ = 0.0412, wR ₂ = 0.1161
Final R indexes [all data]	R ₁ = 0.0421, wR ₂ = 0.1172
Largest diff. peak/hole / e Å⁻³	1.12/-1.38



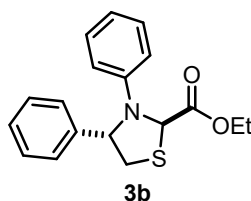
Empirical formula	C ₁₉ H ₂₁ NO ₄ S
Formula weight	338.51
Temperature/K	149.99(10)
Crystal system	monoclinic
Space group	P21/n
a/Å	6.61353(9)
b/Å	27.3767(4)
c/Å	10.14913(14)
α /°	90
β /°	104.4142(14)
γ /°	90
Volume/Å³	1779.73(4)
Z	4
ρ calcd/cm³	1.263
μ /mm⁻¹	1.813
F(000)	677.0
Crystal size/mm³	0.18 × 0.16 × 0.12
Radiation	Cu K α (λ = 1.54184)
2θ range for data collection/°	6.458 to 155.174
Index ranges	-6 ≤ h ≤ 8, -33 ≤ k ≤ 31, -12 ≤ l ≤ 12
Reflections collected	11436

Independent reflections	3576 [Rint = 0.0424, Rsigma = 0.0420]
Data/restraints/parameters	3576/0/229
Goodness-of-fit on F²	1.068
Final R indexes [I ≥ 2σ (I)]	R1 = 0.0406, wR2 = 0.1101
Final R indexes [all data]	R1 = 0.0437, wR2 = 0.1125
Largest diff. peak/hole / e Å⁻³	0.41/-0.51

6. Product Data

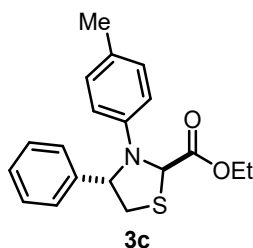


Ethyl 3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carboxylate (3a). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). Colorless oily liquid, 83 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.35-7.26 (m, 5H), 6.71 (d, *J* = 9.1 Hz, 2H), 6.46 (d, *J* = 9.2 Hz, 2H), 5.38 (s, 1H), 5.27 (dd, *J* = 7.2, 1.6 Hz, 1H), 4.30-4.17 (m, 2H), 3.98 (dd, *J* = 11.2, 7.2 Hz, 1H), 3.68 (s, 3H), 2.90 (dd, *J* = 11.2, 1.5 Hz, 1H), 1.28 (t, *J* = 7.1 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.9, 152.3, 142.6, 138.8, 128.7, 127.6, 126.5, 115.0, 114.9, 66.0, 64.1, 61.7, 55.7, 39.3, 14.3. HRMS (ESI) calcd for C₁₉H₂₂NO₃S (M+H⁺) 344.1315, found 344.1316.

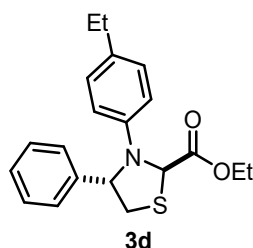


Ethyl 3,4-diphenylthiazolidine-2-carboxylate (3b). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). Light red oily liquid, 58 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.35-7.26 (m, 5H), 7.16-7.08 (m, 2H), 6.72-6.68 (m, 1H), 6.50-6.45 (m, 2H), 5.39 (s, 1H), 5.32 (d, *J* = 7.5 Hz, 1H), 4.32-4.16 (m, 2H), 4.01 (dd, *J* = 11.3, 7.1 Hz, 1H), 2.90 (dd, *J* = 11.2, 1.0 Hz, 1H), 1.29 (t, *J* = 7.1 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.7, 144.4, 142.3, 129.4, 128.7, 127.7, 126.4, 118.1, 113.6, 65.9, 63.6, 61.8, 39.3, 14.3. HRMS (ESI) calcd for C₁₈H₂₀NO₂S

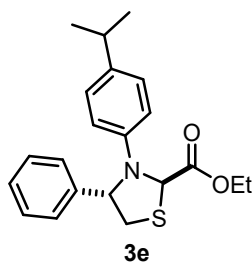
(M+H⁺) 314.1209, found 314.1210.



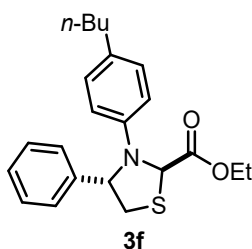
Ethyl 4-phenyl-3-(p-tolyl)thiazolidine-2-carboxylate (3c). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 62 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.25-7.19 (m, 5H), 6.90-6.82 (m, 2H), 6.37-6.29 (m, 2H), 5.31 (s, 1H), 5.22 (dd, *J* = 7.2, 1.1 Hz, 1H), 4.26-4.07 (m, 2H), 3.93 (dd, *J* = 11.2, 7.2 Hz, 1H), 2.82 (dd, *J* = 11.2, 1.2 Hz, 1H), 2.11 (s, 3H), 1.22 (t, *J* = 7.2 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.8, 142.5, 142.2, 129.9, 128.7, 127.6, 127.1, 126.4, 113.7, 65.8, 63.7, 61.7, 39.3, 20.3, 14.3. HRMS (ESI) calcd for C₁₉H₂₂NO₂S (M+H⁺) 328.1366, found 328.1365.



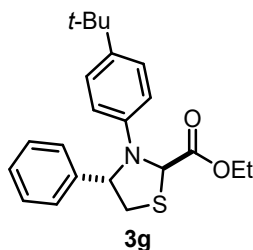
Ethyl 3-(4-ethylphenyl)-4-phenylthiazolidine-2-carboxylate (3d). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 71 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.32 (d, *J* = 4.3 Hz, 4H), 7.26-7.23 (m, 1H), 6.95 (d, *J* = 8.6 Hz, 2H), 6.41 (d, *J* = 8.6 Hz, 2H), 5.38 (s, 1H), 5.29 (d, *J* = 7.1 Hz, 1H), 4.33-4.15 (m, 2H), 4.00 (dd, *J* = 11.2, 7.2 Hz, 1H), 2.89 (dd, *J* = 11.3, 1.1 Hz, 1H), 2.48 (q, *J* = 7.6 Hz, 2H), 1.29 (t, *J* = 7.1 Hz, 3H), 1.13 (t, *J* = 7.6 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.9, 142.6, 142.4, 133.6, 128.74, 128.69, 127.6, 126.5, 113.6, 65.9, 63.7, 61.7, 39.3, 27.8, 15.7, 14.3. HRMS (ESI) calcd for C₂₀H₂₄NO₂S (M+H⁺) 342.1522, found 342.1524.



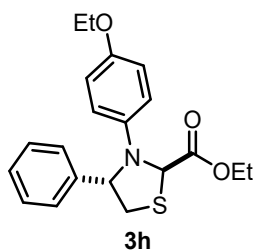
Ethyl 3-(4-isopropylphenyl)-4-phenylthiazolidine-2-carboxylate (3e). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 72 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.25-7.18 (m, 5H), 6.93-6.86 (m, 2H), 6.36-6.30 (m, 2H), 5.29 (s, 1H), 5.20 (d, *J* = 7.0 Hz, 1H), 4.25-4.07 (m, 2H), 3.92 (dd, *J* = 11.2, 7.2 Hz, 1H), 2.80 (dd, *J* = 11.2, 1.0 Hz, 1H), 2.67 (hept, *J* = 6.9 Hz, 1H), 1.21 (t, *J* = 7.1 Hz, 3H), 1.07 (dd, *J* = 6.9, 1.4 Hz, 6H); ¹³C NMR (101 MHz, CDCl₃) δ 171.9, 142.7, 142.4, 138.2, 128.7, 127.6, 127.3, 126.5, 113.5, 66.0, 63.7, 61.7, 39.3, 33.1, 24.2, 24.8, 14.3. HRMS (ESI) calcd for C₂₁H₂₆NO₂S (M+H⁺) 356.1679, found 356.1680.



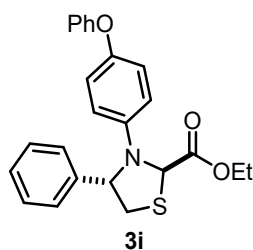
Ethyl 3-(4-butylphenyl)-4-phenylthiazolidine-2-carboxylate (3f). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 48 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.32-7.27 (m, 5H), 6.96-6.89 (m, 2H), 6.43-6.36 (m, 2H), 5.37 (s, 1H), 5.28 (d, *J* = 7.1 Hz, 1H), 4.31-4.16 (m, 2H), 4.00 (dd, *J* = 11.2, 7.2 Hz, 1H), 2.88 (dd, *J* = 11.2, 1.1 Hz, 1H), 2.48-2.40 (m, 2H), 1.53-1.44 (m, 2H), 1.29 (t, *J* = 7.1 Hz, 5H), 0.88 (t, *J* = 7.3 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.7, 142.5, 142.2, 132.2, 129.1, 128.5, 127.4, 126.3, 113.4, 65.8, 63.6, 61.6, 39.2, 34.5, 33.7, 22.3, 14.1, 13.9. HRMS (ESI) calcd for C₂₂H₂₈NO₂S (M+H⁺) 370.1835, found 370.1830.



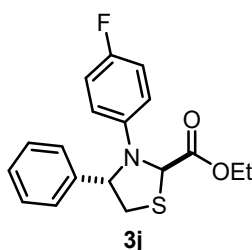
Ethyl 3-(4-(tert-butyl)phenyl)-4-phenylthiazolidine-2-carboxylate (3g). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 30 % yield, > 20:1 dr. ^1H NMR (400 MHz, CDCl_3) δ 7.36-7.26 (m, 5H), 7.18-7.11 (m, 2H), 6.45-6.39 (m, 2H), 5.38 (s, 1H), 5.29 (d, $J = 7.0$ Hz, 1H), 4.34-4.16 (m, 2H), 4.01 (dd, $J = 11.2, 7.2$ Hz, 1H), 2.88 (dd, $J = 11.3, 1.0$ Hz, 1H), 1.30 (t, $J = 7.1$ Hz, 3H), 1.22 (s, 9H); ^{13}C NMR (101 MHz, CDCl_3) δ 171.7, 142.6, 141.9, 140.4, 128.6, 127.5, 126.3, 126.1, 113.1, 65.9, 63.6, 61.6, 39.2, 33.6, 31.4, 14.1. HRMS (ESI) calcd for $\text{C}_{22}\text{H}_{28}\text{NO}_2\text{S}$ ($\text{M}+\text{H}^+$) 370.1835, found 370.1832.



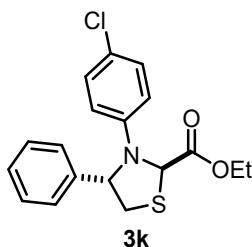
Ethyl 3-(4-ethoxyphenyl)-4-phenylthiazolidine-2-carboxylate (3h). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 81 % yield, > 20:1 dr. ^1H NMR (400 MHz, CDCl_3) δ 7.26-7.24 (m, 3H), 7.24-7.15 (m, 2H), 6.69-6.59 (m, 2H), 6.43-6.33 (m, 2H), 5.31 (s, 1H), 5.19 (dd, $J = 7.2, 1.5$ Hz, 1H), 4.23-4.07 (m, 2H), 3.91 (dd, $J = 11.1, 7.2$ Hz, 1H), 3.83 (q, $J = 7.0$ Hz, 2H), 2.83 (dd, $J = 11.2, 1.6$ Hz, 1H), 1.26 (t, $J = 7.0$ Hz, 3H), 1.21 (t, $J = 7.1$ Hz, 3H); ^{13}C NMR (101 MHz, CDCl_3) δ 171.9, 151.6, 142.6, 138.7, 128.7, 127.6, 126.5, 115.7, 115.0, 66.0, 64.1, 63.9, 61.7, 39.3, 15.1, 14.3. HRMS (ESI) calcd for $\text{C}_{20}\text{H}_{24}\text{NO}_3\text{S}$ ($\text{M}+\text{H}^+$) 358.1471, found 358.1474.



Ethyl 3-(4-phenoxyphenyl)-4-phenylthiazolidine-2-carboxylate (3i). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 73 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.27 (s, 2H), 7.25-7.19 (m, 2H), 7.18 (d, *J* = 1.9 Hz, 2H), 7.16 (d, *J* = 1.8 Hz, 1H), 6.95-6.90 (m, 1H), 6.84-6.81 (m, 2H), 6.79-6.73 (m, 2H), 6.42-6.37 (m, 2H), 5.31 (s, 1H), 5.25-5.19 (m, 1H), 4.24-4.12 (m, 2H), 3.94 (dd, *J* = 11.3, 7.2 Hz, 1H), 2.83 (dd, *J* = 11.2, 1.2 Hz, 1H), 1.22 (t, *J* = 7.2 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.6, 158.5, 148.3, 142.2, 140.9, 129.5, 128.7, 127.6, 126.3, 122.3, 120.8, 117.6, 114.5, 66.1, 63.8, 61.7, 39.2, 14.2. HRMS (ESI) calcd for C₂₄H₂₄NO₃S (M+H⁺) 406.1393, found 406.1388.

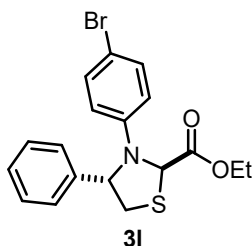


Ethyl 3-(4-fluorophenyl)-4-phenylthiazolidine-2-carboxylate (3j). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 91 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.36-7.26 (m, 5H), 6.87-6.79 (m, 2H), 6.45-6.38 (m, 2H), 5.36 (s, 1H), 5.26 (dd, *J* = 7.2, 1.3 Hz, 1H), 4.33-4.17 (m, 2H), 3.99 (dd, *J* = 11.2, 7.2 Hz, 1H), 2.90 (dd, *J* = 11.2, 1.3 Hz, 1H), 1.28 (t, *J* = 7.1 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.6, 156.1 (d, *J* = 237.8 Hz), 142.1, 140.9 (d, *J* = 1.9 Hz), 128.8, 127.8, 126.4, 115.9 (d, *J* = 22.4 Hz), 114.6 (d, *J* = 7.5 Hz), 66.2, 64.0, 61.9, 39.3, 14.3. HRMS (ESI) calcd for C₁₈H₁₉FNO₂S (M+H⁺) 332.1115, found 332.1116.

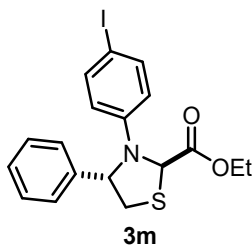


Ethyl 3-(4-chlorophenyl)-4-phenylthiazolidine-2-carboxylate (3k). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 66 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.31-7.19 (m, 5H), 7.18-7.12 (m, 2H), 6.33-6.27 (m, 2H), 5.29 (s, 1H), 5.22 (d, *J* = 7.1 Hz, 1H), 4.28-4.11 (m, 2H), 3.95 (dd,

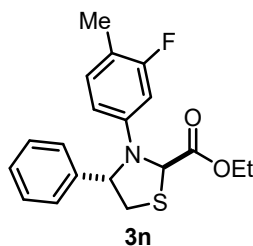
$J = 11.3, 7.1$ Hz, 1H), 2.85 (dd, $J = 11.3, 1.0$ Hz, 1H), 1.24 (t, $J = 7.1$ Hz, 3H); ^{13}C NMR (101 MHz, CDCl_3) δ 171.3, 143.4, 141.7, 132.1, 128.8, 127.8, 126.3, 115.2, 110.3, 66.0, 63.6, 62.0, 39.2, 14.3. HRMS (ESI) calcd for $\text{C}_{18}\text{H}_{19}\text{ClNO}_2\text{S}$ ($\text{M}+\text{H}^+$) 348.0820, found 348.0821.



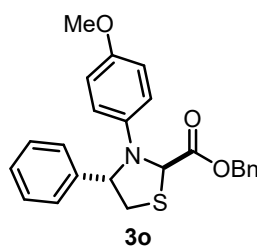
Ethyl 3-(4-bromophenyl)-4-phenylthiazolidine-2-carboxylate (3i). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 43 % yield, > 20:1 dr. ^1H NMR (400 MHz, CDCl_3) δ 7.32-7.19 (m, 5H), 7.05-6.98 (m, 2H), 6.38-6.32 (m, 2H), 5.30 (s, 1H), 5.22 (d, $J = 7.1$ Hz, 1H), 4.28-4.11 (m, 2H), 3.95 (dd, $J = 11.3, 7.1$ Hz, 1H), 2.85 (d, $J = 11.3$ Hz, 1H), 1.24 (t, $J = 7.1$ Hz, 3H); ^{13}C NMR (101 MHz, CDCl_3) δ 171.3, 143.0, 141.8, 129.3, 128.8, 127.8, 126.4, 123.1, 114.7, 66.0, 63.6, 61.9, 39.2, 14.3. HRMS (ESI) calcd for $\text{C}_{18}\text{H}_{19}\text{BrNO}_2\text{S}$ ($\text{M}+\text{H}^+$) 392.0314, found 392.0318.



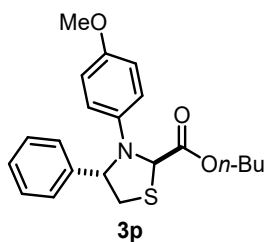
Ethyl 3-(4-iodophenyl)-4-phenylthiazolidine-2-carboxylate (3m). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 51 % yield, > 20:1 dr. ^1H NMR (400 MHz, CDCl_3) δ 7.35-7.30 (m, 2H), 7.30-7.20 (m, 5H), 6.21-6.19 (m, 2H), 5.29 (s, 1H), 5.22 (d, $J = 7.0$ Hz, 1H), 4.26-4.12 (m, 7.1 Hz, 2H), 3.95 (dd, $J = 11.3, 7.2$ Hz, 1H), 2.85 (dd, $J = 11.3, 1.0$ Hz, 1H), 1.25 (t, $J = 7.1$ Hz, 3H); ^{13}C NMR (101 MHz, CDCl_3) δ 171.3, 144.0, 141.6, 138.0, 128.8, 127.9, 126.3, 115.9, 79.7, 65.9, 63.4, 62.0, 39.2, 14.3. HRMS (ESI) calcd for $\text{C}_{18}\text{H}_{19}\text{INO}_2\text{S}$ ($\text{M}+\text{H}^+$) 440.1076, found 440.1076.



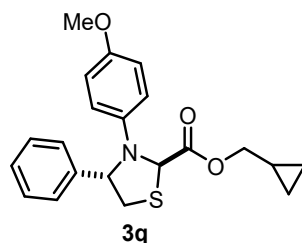
Ethyl 3-(3-fluoro-4-methylphenyl)-4-phenylthiazolidine-2-carboxylate (3n). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 46 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.37-7.26 (m, 5H), 6.90 (t, *J* = 8.5 Hz, 1H), 6.21-6.11 (m, 2H), 5.34 (s, 1H), 5.26 (d, *J* = 7.1 Hz, 1H), 4.35-4.16 (m, 2H), 4.00 (dd, *J* = 11.3, 7.2 Hz, 1H), 2.89 (dd, *J* = 11.4, 1.1 Hz, 1H), 2.09 (d, *J* = 1.8 Hz, 3H), 1.30 (t, *J* = 7.1 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.4, 161.9 (d, *J* = 243.3 Hz), 144.0 (d, *J* = 10.5 Hz), 142.0, 131.9 (d, *J* = 7.1 Hz), 128.8, 127.8, 126.4, 113.7 (d, *J* = 17.8 Hz), 109.1 (d, *J* = 2.8 Hz), 101.0 (d, *J* = 28.0 Hz), 66.0, 63.6, 61.9, 39.2, 14.3, 13.6 (d, *J* = 3.1 Hz). HRMS (ESI) calcd for C₁₉H₂₁FNO₂S (M+H⁺) 346.1272, found 346.1274.



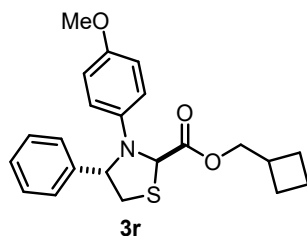
Benzyl 3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carboxylate (3o). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 73 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.33-7.17 (m, 10H), 6.65-6.56 (m, 2H), 6.44-6.34 (m, 2H), 5.38 (s, 1H), 5.22-5.18 (m, 1H), 5.19-5.07 (m, 2H), 3.89 (dd, *J* = 11.2, 7.2 Hz, 1H), 3.62 (s, 3H), 2.82 (dd, *J* = 11.2, 1.6 Hz, 1H); ¹³C NMR (101 MHz, CDCl₃) δ 171.7, 152.3, 142.5, 138.7, 135.6, 128.69, 128.67, 128.4, 128.2, 127.6, 126.4, 115.0, 114.9, 67.2, 66.0, 64.2, 55.7, 39.3. HRMS (ESI) calcd for C₂₄H₂₄NO₃S (M+H⁺) 406.1471, found 406.1474.



Butyl 3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carboxylate (3p). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 77 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.29-7.16 (m, 5H), 6.68-6.59 (m, 2H), 6.44-6.34 (m, 2H), 5.32 (s, 1H), 5.19 (dd, *J* = 7.3, 1.5 Hz, 1H), 4.11-4.08 (m, 2H), 3.91 (dd, *J* = 11.2, 7.2 Hz, 1H), 3.61 (s, 3H), 2.83 (dd, *J* = 11.1, 1.5 Hz, 1H), 1.55 (m, 2H), 1.35-1.23 (m, 2H), 0.85 (t, *J* = 7.4 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 172.0, 152.7, 142.6, 138.8, 128.7, 127.6, 126.5, 114.93, 114.91, 66.0, 65.5, 64.2, 55.7, 39.3, 30.7, 19.1, 13.8. HRMS (ESI) calcd for C₂₁H₂₆NO₃S (M+H⁺) 372.1628, found 372.1625.

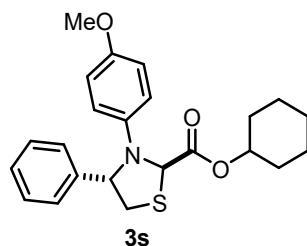


Cyclopropylmethyl 3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carboxylate (3q). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). Yellow solid, 86 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.26-7.16 (m, 5H), 6.67-6.60 (m, 2H), 6.43-6.37 (m, 2H), 5.33 (s, 1H), 5.19 (dd, *J* = 7.2, 1.5 Hz, 1H), 4.03-3.83 (m, 3H), 3.61 (s, 3H), 2.83 (dd, *J* = 11.2, 1.5 Hz, 1H), 1.20 (s, 1H), 1.13-1.01 (m, 1H), 0.53-0.45 (m, 2H), 0.25-0.17 (m, 2H); ¹³C NMR (101 MHz, CDCl₃) δ 172.0, 152.2, 142.6, 138.8, 128.7, 127.6, 126.5, 114.94, 114.88, 70.3, 66.0, 64.2, 55.7, 39.3, 9.9, 3.4, 3.4. HRMS (ESI) calcd for C₂₁H₂₄NO₃S (M+H⁺) 370.1471, found 370.1475.

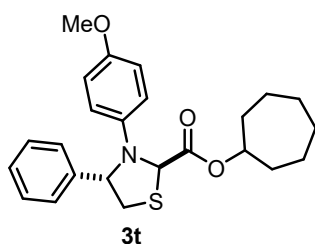


Cyclobutylmethyl 3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carboxylate (3r). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 72 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.27-7.16 (m, 5H),

6.67-6.61 (m, 2H), 6.42-6.36 (m, 2H), 5.33 (s, 1H), 5.17 (dd, $J = 7.3, 1.5$ Hz, 1H), 4.12-4.02 (m, 2H), 3.91 (dd, $J = 11.1, 7.3$ Hz, 1H), 3.61 (s, 3H), 2.83 (dd, $J = 11.2, 1.5$ Hz, 1H), 2.56 (hept, $J = 7.3$ Hz, 1H), 2.01-1.89 (m, 2H), 1.88-1.59 (m, 4H), 1.39-1.17 (m, 1H); ^{13}C NMR (101 MHz, CDCl_3) δ 172.2, 152.3, 142.6, 138.8, 128.7, 127.6, 126.5, 114.94, 114.90, 69.2, 66.0, 64.2, 55.7, 39.3, 34.2, 24.7, 24.7, 18.5. HRMS (ESI) calcd for $\text{C}_{22}\text{H}_{26}\text{NO}_3\text{S}$ ($\text{M}+\text{H}^+$) 384.1628, found 384.1627.

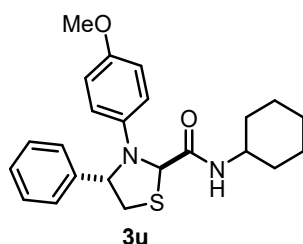


Cyclohexyl 3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carboxylate (3s). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 80 % yield, > 20:1 dr. ^1H NMR (400 MHz, CDCl_3) δ 7.38-7.26 (m, 5H), 6.75-6.68 (m, 2H), 6.50-6.44 (m, 2H), 5.38 (s, 1H), 5.25 (dd, $J = 7.3, 1.5$ Hz, 1H), 4.88-4.82 (m, 1H), 4.00 (dd, $J = 11.1, 7.3$ Hz, 1H), 3.69 (s, 3H), 2.90 (dd, $J = 11.1, 1.5$ Hz, 1H), 1.90-1.82 (m, 1H), 1.81-1.68 (m, 2H), 1.65-1.49 (m, 3H), 1.45-1.28 (m, 4H); ^{13}C NMR (101 MHz, CDCl_3) δ 171.3, 152.2, 142.6, 138.8, 128.6, 127.5, 126.4, 114.89, 114.85, 73.8, 66.0, 64.4, 55.6, 39.2, 31.5, 31.1, 25.3, 23.5, 23.3. HRMS (ESI) calcd for $\text{C}_{23}\text{H}_{28}\text{NO}_3\text{S}$ ($\text{M}+\text{H}^+$) 398.1784, found 398.1790.



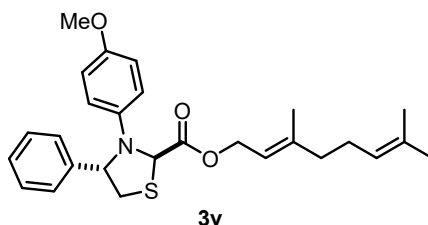
Cycloheptyl 3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carboxylate (3t). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 78 % yield, > 20:1 dr. ^1H NMR (400 MHz, CDCl_3) δ 7.27-7.16 (m, 5H), 6.68-6.59 (m, 2H), 6.43-6.34 (m, 2H), 5.28 (s, 1H), 5.16 (dd, $J = 7.3, 1.5$ Hz, 1H), 4.94-4.88 (m, 1H), 3.91 (dd, $J = 11.1, 7.3$ Hz, 1H), 3.61 (s, 3H), 2.81 (dd, $J = 11.1, 1.5$ Hz, 1H), 1.88-1.83 (m, 1H), 1.75-1.31 (m, 12H); ^{13}C NMR (101 MHz, CDCl_3) δ 171.3, 152.2, 142.7, 138.9, 128.7, 127.6, 126.4, 114.90, 114.87, 76.6, 66.1, 64.5, 55.7, 39.3, 33.9,

33.5, 28.30, 28.29, 23.0, 22.8. HRMS (ESI) calcd for C₂₄H₃₀NO₃S (M+H⁺) 412.1941, found 412.1946.

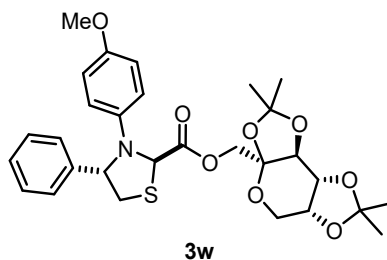


N-cyclohexyl-3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carboxamide (3u).

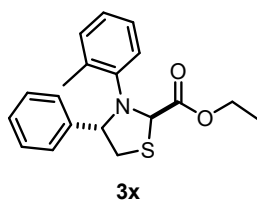
Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 60 % yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.30-7.22 (m, 3H), 7.16-7.10 (m, 2H), 6.72-6.66 (m, 2H), 6.52-6.46 (m, 2H), 6.17 (d, *J* = 8.7 Hz, 1H), 5.44 (d, *J* = 5.9 Hz, 1H), 5.19 (s, 1H), 3.83-3.73 (m, 2H), 3.68 (s, 3H), 2.93 (dd, *J* = 11.3, 1.3 Hz, 1H), 1.91 (dd, *J* = 12.6, 4.3 Hz, 1H), 1.83-1.72 (m, 1H), 1.72-1.52 (m, 3H), 1.43-1.27 (m, 2H), 1.19-1.04 (m, 2H), 1.03-0.84 (m, 1H); ¹³C NMR (101 MHz, CDCl₃) δ 170.5, 152.8, 140.4, 138.0, 128.5, 127.7, 126.9, 116.2, 114.8, 66.8, 66.7, 55.6, 48.3, 38.5, 33.1, 32.8, 25.5, 24.9, 24.7. HRMS (ESI) calcd for C₂₃H₂₉N₂O₂S (M+H⁺) 397.1944, found 397.1949.



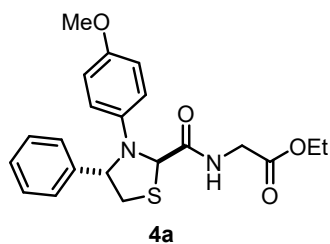
2-(((E)-3,7-dimethylocta-2,6-dien-1-yl)oxy)-1-((2R,4S)-3-(4-methoxyphenyl)-4-phenylthiazolidin-2-yl)ethan-1-one (3v). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 78% yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.35-7.22 (m, 5H), 6.74-6.67 (m, 2H), 6.48-6.42 (m, 2H), 5.40-5.29 (m, 2H), 5.26 (dd, *J* = 7.3, 1.5 Hz, 1H), 5.12-5.08 (m, 1H), 4.77-4.59 (m, 2H), 3.98 (dd, *J* = 11.1, 7.2 Hz, 1H), 3.68 (s, 3H), 2.89 (dd, *J* = 11.2, 1.5 Hz, 1H), 2.16-2.01 (m, 4H), 1.70 (dd, *J* = 3.6, 1.4 Hz, 6H), 1.62 (d, *J* = 1.3 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.9, 152.3, 143.4, 142.6, 138.8, 132.0, 128.7, 127.6, 126.5, 123.8, 117.8, 115.0, 114.9, 66.0, 64.1, 62.5, 55.7, 39.6, 39.3, 26.4, 25.8, 17.8, 16.7. HRMS (ESI) calcd for C₂₇H₃₄NO₃S (M+H⁺) 452.2254, found 452.2255.



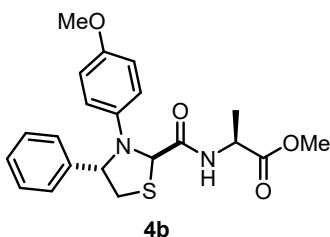
((3a*S*,5a*R*,8a*R*,8b*S*)-2,2,7,7-tetramethyltetrahydro-3a*H*-bis([1,3]dioxolo)[4,5-*b*:4',5'-*d*]pyran-3a-yl)methyl (2*R*,4*S*)-3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carboxylate (3w). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 56% yield, 14:11 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.33-7.10 (m, 5H), 6.75-6.58 (m, 2H), 6.46-6.35 (m, 2H), 5.35 (d, *J* = 4.1 Hz, 1H), 5.25-5.20 (m, 2H), 4.33-4.16 (m, 1H), 4.35-4.14 (m, 4H), 3.97-3.85 (m, 2H), 3.74 (dd, *J* = 13.0, 1.9 Hz, 1H), 3.63 (s, 3H), 2.85 (dd, *J* = 11.2, 1.6 Hz, 1H), 1.51 (d, *J* = 10.9 Hz, 3H), 1.46-1.39 (m, 4H), 1.35-1.28 (m, 4H); ¹³C NMR (101 MHz, CDCl₃) δ 171.1, 152.5, 142.3, 138.5, 128.7, 127.6, 126.5, 115.4, 115.1, 115.0, 114.9, 109.3, 109.0, 101.5, 70.9, 70.6, 70.2, 66.7, 66.0, 63.9, 61.5, 55.7, 39.3, 26.7, 26.1, 25.6, 24.3. HRMS (ESI) calcd for C₂₉H₃₆NO₈S (M+H⁺) 558.2156, found 558.2158.



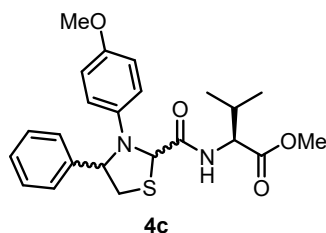
Ethyl 4-phenyl-3-(o-tolyl)thiazolidine-2-carboxylate (3x). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 40% yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.36-7.27 (m, 2H), 7.27-7.06 (m, 5H), 6.96 (dtd, *J* = 18.4, 7.4, 1.7 Hz, 2H), 5.52 (dd, *J* = 8.6, 6.4 Hz, 1H), 5.27 (s, 1H), 4.21-3.99 (m, 2H), 3.58 (dd, *J* = 10.0, 6.4 Hz, 1H), 3.16 (dd, *J* = 10.0, 8.6 Hz, 1H), 2.40 (s, 3H), 1.20 (t, *J* = 7.1 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.4, 142.2, 140.0, 134.3, 130.7, 128.4, 127.6, 127.5, 125.8, 125.0, 124.6, 66.5, 64.3, 61.0, 38.9, 18.2, 14.0. HRMS (ESI) calcd for C₁₉H₂₁NO₂S(M+Na⁺) 350.1185, found 350.1184.



Ethyl (3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carbonyl)glycinate (4a). Purified by flash column chromatography (silica gel, PE/EA = 16/1 to 6/1 as eluent). White solid, 70% yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.32-7.27 (m, 1H), 7.25-7.21 (m, 1H), 7.17-7.12 (m, 2H), 6.88 (dd, *J* = 6.7, 4.4 Hz, 1H), 6.73-6.67 (m, 2H), 6.54-6.48 (m, 2H), 5.47 (dd, *J* = 6.1, 1.5 Hz, 1H), 5.27 (s, 1H), 4.26-4.15 (m, 3H), 3.91-3.82 (m, 2H), 2.95 (dd, *J* = 11.3, 1.5 Hz, 1H), 1.26 (t, *J* = 7.2 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.9, 169.7, 152.9, 140.4, 137.9, 128.5, 127.7, 127.0, 116.2, 114.8, 66.9, 66.4, 61.7, 55.6, 41.4, 38.6, 14.2. HRMS (ESI) calcd for C₂₁H₂₅N₂O₄S (M+H⁺) 401.1530, found 401.1531.

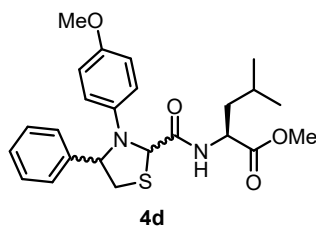


Methyl (3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carbonyl)-L-alaninate (4b). Purified by flash column chromatography (silica gel, PE/EA = 16/1 to 6/1 as eluent). White solid, 50% yield, 5:3 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.31-7.26 (m, 2H), 7.26-7.21 (m, 1H), 7.15 (dt, *J* = 7.8, 1.8 Hz, 2H), 6.83 (d, *J* = 8.0 Hz, 1H), 6.77-6.64 (m, 2H), 6.56-6.46 (m, 2H), 5.50-5.43 (m, 1H), 5.23 (d, *J* = 2.0 Hz, 1H), 4.73-4.53 (m, 1H), 3.88-3.77 (m, 1H), 3.76 (s, 2H), 3.68 (d, *J* = 1.8 Hz, 3H), 3.66 (s, 1H), 2.95 (dd, *J* = 11.3, 1.7 Hz, 1H), 1.44 (d, *J* = 7.2 Hz, 1H), 1.31 (d, *J* = 7.2 Hz, 2H); ¹³C NMR (101 MHz, CDCl₃) δ 173.5, 170.9, 153.0, 140.4, 137.9, 128.5, 127.7, 126.3, 116.3, 114.8, 66.9, 66.6, 55.6, 52.7, 48.1, 38.5, 18.5. HRMS (ESI) calcd for C₂₁H₂₅N₂O₄S (M+H⁺) 401.1530, found 401.1526.



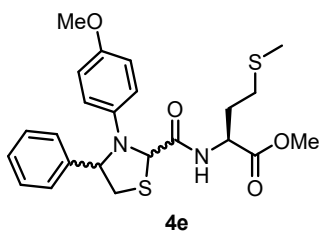
Methyl (3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carbonyl)-L-valinate (4c).

Purified by flash column chromatography (silica gel, PE/EA = 16/1 to 6/1 as eluent). White solid, 70% yield, 1:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.27-7.22 (m, 2H), 7.26-7.20 (m, 1H), 7.16-7.13 (m, 2H), 5.74-5.45 (m, 1H), 6.74-6.65 (m, 2H), 6.57-6.49 (m, 2H), 5.54-5.45 (m, 1H), 5.27 (d, *J* = 13.0 Hz, 1H), 4.72-4.53 (m, 1H), 3.92-3.76 (m, 1H), 3.75 (s, 2H), 3.68 (d, *J* = 1.8 Hz, 3H), 3.59 (s, 1H), 2.97-2.93 (m, 1H), 2.27-2.17 (m, 1H), 0.98-0.90 (m, 3H), 0.80-0.61 (m, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 172.6, 171.9, 171.8, 171.0, 153.02, 152.98, 140.5, 137.9, 137.8, 128.5, 127.7, 126.96, 126.95, 116.5, 116.2, 114.9, 114.8, 66.9, 66.7, 66.5, 57.1, 57.0, 55.7, 55.6, 52.4, 52.2, 38.7, 38.4, 31.7, 31.6, 29.8, 19.2, 19.1, 17.9, 17.3. HRMS (ESI) calcd for C₂₃H₂₉N₂O₄S (M+H⁺) 429.1843, found 429.1840.

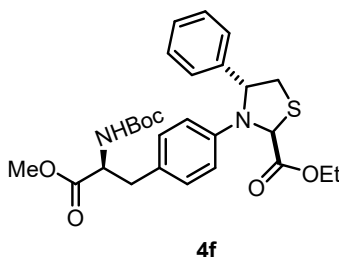


Methyl (3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carbonyl)-L-leucinate (4d).

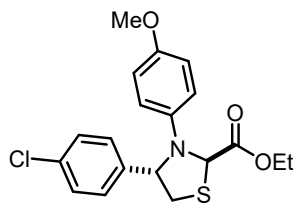
Purified by flash column chromatography (silica gel, PE/EA = 16/1 to 6/1 as eluent). White solid, 58% yield, 1:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.30-7.19 (m, 4H), 7.16-7.10 (m, 2H), 6.70-6.65 (m, 2H), 6.52-6.47 (m, 2H), 5.49-5.42 (m, 1H), 5.23 (d, *J* = 8.1 Hz, 1H), 4.71-4.60 (m, 1H), 3.90-3.68 (m, 3H), 3.66 (s, 3H), 3.58 (s, 2H), 2.95-2.91 (m, 1H), 1.73-1.61 (m, 1H), 1.60-1.50 (m, 1H), 1.44-1.29 (m, 1H), 0.93 (dd, *J* = 6.0, 1.4 Hz, 3H), 0.84 (d, *J* = 6.4 Hz, 2H), 0.74 (d, *J* = 6.5 Hz, 1H); ¹³C NMR (101 MHz, CDCl₃) δ 173.4, 172.7, 171.6, 171.0, 152.88, 152.86, 140.4, 140.3, 137.8, 137.7, 128.4, 127.60, 127.57, 126.9, 116.4, 116.1, 114.7, 114.6, 66.8, 66.7, 66.42, 66.37, 55.6, 55.5, 52.4, 52.2, 50.7, 50.5, 41.6, 41.5, 38.6, 38.4, 25.0, 24.6, 22.9, 22.8, 21.9, 21.6. HRMS (ESI) calcd for C₂₄H₃₁NO₄S (M+H⁺) 443.1999, found 443.2004.



Methyl ((2R,4R)-3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carbonyl)-L-methioninate (4e). Purified by flash column chromatography (silica gel, PE/EA = 32/1 to 8/1 as eluent). White solid, 68% yield, 1:1 dr. ^1H NMR (400 MHz, CDCl_3) δ 7.31-7.22 (m, 3H), 7.17-7.14 (m, 2H), 6.75-6.66 (m, 2H), 6.56-6.47 (m, 2H), 5.49 (t, $J = 5.6$ Hz, 1H), 5.25 (d, $J = 7.7$ Hz, 1H), 4.82-4.62 (m, 1H), 3.93-3.78 (m, 1H), 3.76 (s, 1H), 3.68 (s, 3H), 3.65 (s, 2H), 2.98-2.94 (m, 1H), 2.59-2.44 (m, 1H), 2.30-2.21 (m, 1H), 2.14-1.98 (m, 3H), 1.97-1.82 (m, 2H); ^{13}C NMR (101 MHz, CDCl_3) δ 172.4, 171.9, 171.8, 171.2, 153.0, 140.5, 140.4, 137.9, 137.8, 128.5, 127.73, 127.70, 126.93, 126.92, 116.5, 116.0, 114.9, 114.8, 66.8, 66.7, 66.44, 66.35, 55.7, 55.6, 52.8, 52.6, 51.8, 51.6, 38.7, 38.5, 31.3, 31.0, 30.1, 29.7, 15.7, 15.2. HRMS (ESI) calcd for $\text{C}_{23}\text{H}_{29}\text{N}_2\text{O}_4\text{S}_2$ ($\text{M}+\text{H}^+$) 461.1563, found 461.1568.



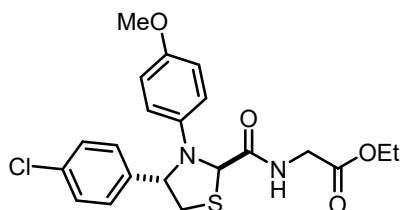
Ethyl 3-(4-(2-((tert-butoxycarbonyl)amino)-3-methoxy-3-oxopropyl)phenyl)-4-phenylthiazolidine-2-carboxylate (4f). Purified by flash column chromatography (silica gel, PE/EA = 32 to 8/1 as eluent). White solid, 40% yield, > 20:1 dr. ^1H NMR (400 MHz, CDCl_3) δ 7.37-7.26 (m, 5H), 6.86 (dd, $J = 8.3, 5.1$ Hz, 2H), 6.39 (dd, $J = 8.8, 2.2$ Hz, 2H), 5.35 (d, $J = 2.3$ Hz, 1H), 5.28 (d, $J = 7.0$ Hz, 1H), 4.88 (t, $J = 9.3$ Hz, 1H), 4.46 (p, $J = 6.7, 5.9$ Hz, 1H), 4.32-4.16 (m, 2H), 3.99 (dd, $J = 11.3, 7.1$ Hz, 1H), 3.65 (d, $J = 3.2$ Hz, 3H), 2.89 (t, $J = 9.5$ Hz, 2H), 1.39 (s, 9H), 1.30-1.29 (m, 3H); ^{13}C NMR (101 MHz, CDCl_3) δ 172.8, 172.6, 171.7, 143.4, 142.3, 130.3, 128.7, 127.7, 126.4, 125.0, 113.7, 80.0, 65.9, 63.6, 61.8, 54.6, 52.3, 39.3, 29.8, 28.4, 14.3. HRMS (ESI) calcd for $\text{C}_{27}\text{H}_{35}\text{N}_2\text{O}_6\text{S}$ ($\text{M}+\text{H}^+$) 515.2210, found 515.2206.



5a

Ethyl 4-(4-chlorophenyl)-3-(4-methoxyphenyl)thiazolidine-2-carboxylate (5a).

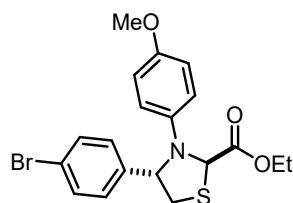
Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). Yellow solid, 70% yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.56 (d, *J* = 8.4 Hz, 2H), 7.28 (d, *J* = 8.5 Hz, 2H), 6.75-6.68 (m, 2H), 6.52-6.44 (m, 2H), 5.12 (s, 1H), 5.00 (dd, *J* = 10.0, 5.6 Hz, 1H), 4.34 (q, *J* = 7.1 Hz, 2H), 3.69 (s, 3H), 3.43 (dd, *J* = 11.7, 10.0 Hz, 1H), 3.33 (dd, *J* = 11.7, 5.6 Hz, 1H), 1.37 (t, *J* = 7.1 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 172.4, 153.0, 140.1, 139.8, 133.5, 129.2, 128.2, 116.0, 114.6, 69.1, 67.3, 62.0, 55.7, 40.1, 14.3. HRMS (ESI) calcd for C₁₉H₂₁ClNO₃S (M+H⁺) 378.0925, found 378.0922.



5b

Ethyl (4-(4-chlorophenyl)-3-(4-methoxyphenyl)thiazolidine-2-carbonyl)glycinate (5b).

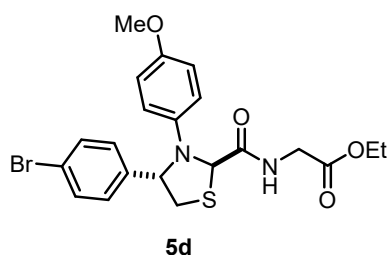
Purified by flash column chromatography (silica gel, PE/EA = 32/1 to 8/1 as eluent). Yellow solid, 57% yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.24 (d, *J* = 8.4 Hz, 2H), 7.09 (d, *J* = 8.4 Hz, 2H), 6.89-6.84 (m, 1H), 6.70 (d, *J* = 9.1 Hz, 2H), 6.48 (d, *J* = 9.1 Hz, 2H), 5.42 (d, *J* = 6.0 Hz, 1H), 5.25 (s, 1H), 4.25-4.11 (m, 3H), 3.90-3.82 (m, 2H), 3.67 (s, 3H), 2.89 (dd, *J* = 11.5, 1.4 Hz, 1H), 1.25 (t, *J* = 7.1 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.7, 169.8, 153.0, 139.0, 137.6, 133.5, 128.7, 128.4, 116.2, 114.9, 66.20, 66.19, 61.8, 55.6, 41.5, 38.5, 14.2. HRMS (ESI) calcd for C₂₁H₂₃ClN₂O₄SNa (M+Na⁺) 457.0959, found 457.0960.



5c

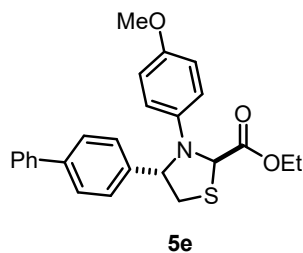
Ethyl 4-(4-bromophenyl)-3-(4-methoxyphenyl)thiazolidine-2-carboxylate (5c).

Purified by flash column chromatography (silica gel, PE/EA = 32/1 to 8/1 as eluent). Yellow solid, 69% yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.49-7.41 (m, 2H), 7.25-7.17 (m, 2H), 6.76-6.68 (m, 2H), 6.48-6.39 (m, 2H), 5.36 (d, *J* = 1.2 Hz, 1H), 5.21 (d, *J* = 7.2 Hz, 1H), 4.30-4.13 (m, 2H), 3.96 (dd, *J* = 11.2, 7.2 Hz, 1H), 3.69 (d, *J* = 1.2 Hz, 3H), 2.85 (dd, *J* = 11.3, 1.6 Hz, 1H), 1.26-1.30 (m, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.6, 152.4, 141.7, 138.4, 131.8, 128.2, 121.4, 114.9, 65.4, 64.0, 61.8, 55.7, 39.1, 14.3. HRMS (ESI) calcd for C₁₉H₂₁BrNO₃S (M+H⁺) 422.0420, found 422.0423.



Ethyl (4-(4-bromophenyl)-3-(4-methoxyphenyl)thiazolidine-2-carbonyl)glycinate (5d).

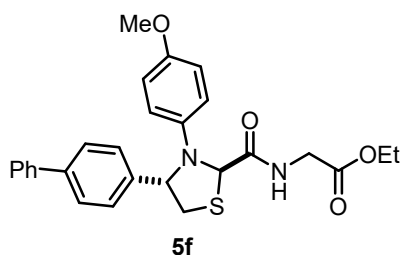
Purified by flash column chromatography (silica gel, PE/EA = 32/1 to 8/1 as eluent). Yellow solid, 53% yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.44-7.38 (m, 2H), 7.06-6.99 (m, 2H), 6.81 (dd, *J* = 6.7, 4.2 Hz, 1H), 6.73-6.68 (m, 2H), 6.52-6.44 (m, 2H), 5.41 (d, *J* = 5.9 Hz, 1H), 5.24 (s, 1H), 4.27-4.14 (m, 3H), 3.93-3.81 (m, 2H), 3.68 (s, 3H), 2.90 (dd, *J* = 11.5, 1.4 Hz, 1H), 1.25 (t, *J* = 7.2 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.6, 169.7, 153.0, 139.5, 137.6, 131.7, 128.7, 121.6, 116.2, 114.9, 66.24, 66.19, 61.8, 55.6, 41.4, 38.4, 14.2. HRMS (ESI) calcd for C₂₁H₂₄BrN₂O₄S (M+H⁺) 479.0635, found 479.0636.



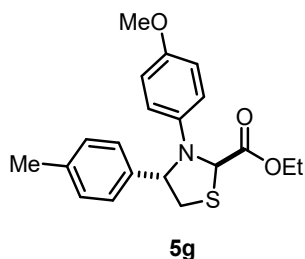
Ethyl 4-([1,1'-biphenyl]-4-yl)-3-(4-methoxyphenyl)thiazolidine-2-carboxylate (5e).

Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). Yellow solid, 87% yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.57 (t, *J* = 7.8 Hz, 4H), 7.45-7.39 (q, *J* = 7.9 Hz, 4H), 7.37-7.31 (m, 1H), 6.75 (d, *J* = 9.0 Hz, 2H), 6.51 (d, *J* = 9.1 Hz, 2H), 5.42 (s, 1H), 5.32 (d, *J* = 7.0 Hz, 1H), 4.33-4.17 (m, 2H), 4.02 (dd, *J* = 11.2, 7.2 Hz, 1H), 3.70 (s, 3H), 2.95 (dd, *J* = 11.2, 1.5 Hz, 1H), 1.30 (t, *J* = 7.1 Hz,

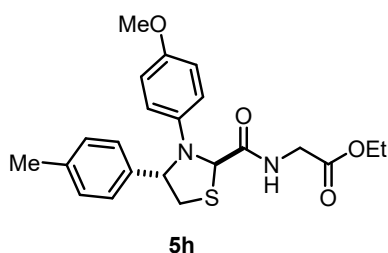
3H); ^{13}C NMR (101 MHz, CDCl_3) δ 171.8, 152.3, 141.6, 140.9, 140.5, 138.8, 128.9, 127.44, 127.37, 127.2, 126.9, 114.99, 114.96, 65.8, 64.1, 61.7, 55.7, 39.3, 14.3. HRMS (ESI) calcd for $\text{C}_{25}\text{H}_{26}\text{NO}_3\text{S}$ ($\text{M}+\text{H}^+$) 420.1628, found 420.1630.



Ethyl 3-(4-((1,1'-biphenyl)-4-yl)-3-(4-methoxyphenyl)thiazolidine-2-carbonyl)glycinate (5f). Purified by flash column chromatography (silica gel, PE/EA = 32/1 to 8/1 as eluent). Yellow solid, 52% yield, > 20:1 dr. ^1H NMR (400 MHz, CDCl_3) δ 7.58-7.48 (m, 4H), 7.45-7.38 (m, 2H), 7.37-7.29 (m, 1H), 7.21 (d, $J = 8.3$ Hz, 2H), 6.84 (dd, $J = 6.7, 4.1$ Hz, 1H), 6.76-6.70 (m, 2H), 6.59-6.52 (m, 2H), 5.53 (d, $J = 5.8$ Hz, 1H), 5.30 (s, 1H), 4.30-4.23 (m, 1H), 4.20 (q, $J = 7.2$ Hz, 2H), 3.95-3.82 (m, 2H), 3.69 (s, 3H), 3.00 (dd, $J = 11.4, 1.4$ Hz, 1H), 1.27 (t, $J = 7.1$ Hz, 3H); ^{13}C NMR (101 MHz, CDCl_3) δ 171.8, 169.8, 152.9, 140.7, 140.6, 139.3, 137.9, 128.9, 127.5, 127.4, 127.24, 127.15, 116.2, 114.9, 66.6, 66.4, 61.8, 55.6, 41.5, 38.7, 14.3. HRMS (ESI) calcd for $\text{C}_{27}\text{H}_{29}\text{N}_2\text{O}_4\text{S}$ ($\text{M}+\text{H}^+$) 477.1843, found 477.1848.

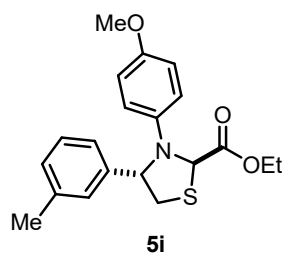


Ethyl 3-(4-methoxyphenyl)-4-(p-tolyl)thiazolidine-2-carboxylate (5g). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). Colourless oil, 82% yield, > 20:1 dr. ^1H NMR (400 MHz, CDCl_3) δ 7.49 (d, $J = 8.1$ Hz, 2H), 7.12 (d, $J = 7.9$ Hz, 2H), 6.74-6.66 (m, 2H), 6.55-6.46 (m, 2H), 5.12 (s, 1H), 4.99 (dd, $J = 10.1, 5.5$ Hz, 1H), 4.34 (q, $J = 7.1$ Hz, 2H), 3.68 (s, 3H), 3.50-3.44 (m, 1H), 3.33 (dd, $J = 11.7, 5.5$ Hz, 1H), 2.31 (s, 3H), 1.38 (t, $J = 7.1$ Hz, 3H); ^{13}C NMR (101 MHz, CDCl_3) δ 172.5, 152.9, 140.6, 138.1, 137.5, 129.7, 126.7, 116.0, 114.6, 69.6, 67.4, 61.9, 55.7, 40.3, 21.3, 14.3. HRMS (ESI) calcd for $\text{C}_{20}\text{H}_{23}\text{NO}_3\text{SNa}$ ($\text{M}+\text{Na}^+$) 380.1291, found 380.1292.

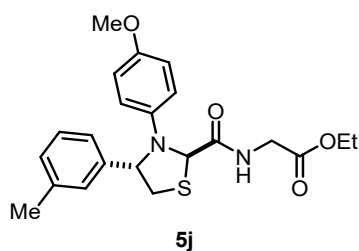


Ethyl 3-(4-methoxyphenyl)-4-(p-tolyl)thiazolidine-2-carboxylate (5h).

Purified by flash column chromatography (silica gel, PE/EA = 32/1 to 8/1 as eluent). White solid, 66% yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.08 (d, *J* = 8.0 Hz, 2H), 7.02 (d, *J* = 8.2 Hz, 2H), 6.89-6.85 (m, 1H), 6.73-6.67 (m, 2H), 6.55-6.48 (m, 2H), 5.44 (dd, *J* = 6.1, 1.4 Hz, 1H), 5.25 (s, 1H), 4.29-4.21 (m, 1H), 4.20-4.15 (m, 2H), 3.92-3.81 (m, 2H), 3.68 (s, 3H), 2.92 (dd, *J* = 11.4, 1.5 Hz, 1H), 2.30 (s, 3H), 1.26 (t, *J* = 7.1 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.9, 169.7, 152.9, 138.0, 137.4, 137.3, 129.2, 126.9, 116.3, 114.8, 66.7, 66.4, 61.7, 55.6, 41.5, 38.7, 21.2, 14.2. HRMS (ESI) calcd for C₂₂H₂₇N₂O₄S (M+H⁺) 415.1686, found 415.1691.

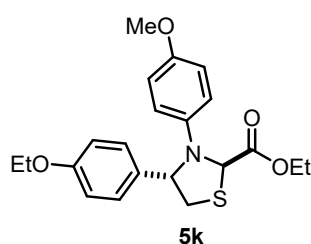


Ethyl 3-(4-methoxyphenyl)-4-(m-tolyl)thiazolidine-2-carboxylate (5i). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 85% yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.38-7.26 (m, 2H), 7.21 (dd, *J* = 16.4, 7.6 Hz, 2H), 6.87-6.80 (m, 2H), 6.61-6.55 (m, 2H), 5.49 (s, 1H), 5.34 (dd, *J* = 7.3, 1.5 Hz, 1H), 4.42-4.27 (m, 2H), 4.08 (dd, *J* = 11.1, 7.2 Hz, 1H), 3.80 (s, 3H), 3.00 (dd, *J* = 11.2, 1.5 Hz, 1H), 2.45 (s, 3H), 1.40 (t, *J* = 7.1 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.9, 152.2, 142.6, 138.8, 138.3, 128.5, 128.4, 127.0, 123.6, 114.9, 66.0, 64.1, 61.6, 55.6, 39.3, 21.7, 14.3. HRMS (ESI) calcd for C₂₀H₂₄NO₃S (M+H⁺) 358.1471, found 358.1472.



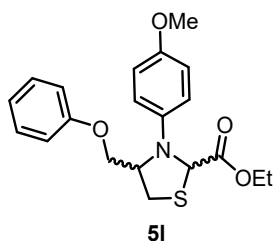
Ethyl 3-(4-methoxyphenyl)-4-(*m*-tolyl)thiazolidine-2-carboxylate (5j).

Purified by flash column chromatography (silica gel, PE/EA = 32/1 to 8/1 as eluent). White solid, 61% yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.43 (t, *J* = 7.6 Hz, 1H), 7.33 (d, *J* = 7.6 Hz, 1H), 7.19 (d, *J* = 7.7 Hz, 1H), 7.13 (dd, *J* = 6.6, 4.3 Hz, 1H), 7.03-6.95 (m, 2H), 6.83-6.76 (m, 2H), 5.71 (d, *J* = 6.0 Hz, 1H), 5.55 (s, 1H), 4.59-4.41 (m, 3H), 4.23-4.09 (m, 2H), 3.96 (s, 3H), 3.22 (dd, *J* = 11.4, 1.4 Hz, 1H), 2.59 (s, 3H), 1.54 (t, *J* = 7.2 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 172.0, 169.8, 152.8, 140.4, 138.1, 138.0, 128.5, 128.3, 127.5, 124.1, 116.1, 114.8, 66.8, 66.3, 61.7, 55.6, 41.5, 38.6, 21.7, 14.2. HRMS (ESI) calcd for C₂₂H₂₇N₂O₄S (M+H⁺) 415.1686, found 415.1687.



Ethyl 4-(4-ethoxyphenyl)-3-(4-methoxyphenyl)thiazolidine-2-carboxylate (5k).

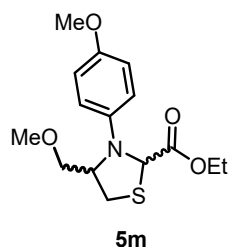
Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 82% yield, > 20:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.22 (d, *J* = 8.6 Hz, 2H), 6.83 (d, *J* = 8.6 Hz, 2H), 6.71 (d, *J* = 9.0 Hz, 2H), 6.45 (d, *J* = 9.0 Hz, 2H), 5.34 (s, 1H), 5.21 (dd, *J* = 7.1, 1.5 Hz, 1H), 4.27-4.15 (m, 2H), 4.02-3.90 (m, 3H), 3.68 (s, 3H), 2.86 (dd, *J* = 11.0, 1.6 Hz, 1H), 1.39 (t, *J* = 7.0 Hz, 3H), 1.27 (t, *J* = 7.1 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.9, 158.4, 152.2, 138.8, 134.3, 127.5, 115.0, 114.9, 114.6, 65.5, 64.0, 63.5, 61.7, 55.7, 39.5, 15.0, 14.3. HRMS (ESI) calcd for C₂₁H₂₆NO₄S (M+H⁺) 388.1577, found 388.1582.



Ethyl 3-(4-methoxyphenyl)-4-(phenoxymethyl)thiazolidine-2-carboxylate (5l).

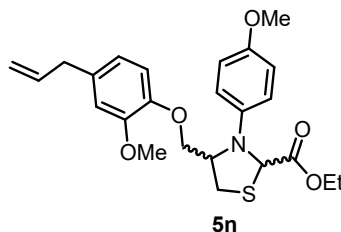
Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 70% yield, 11:9 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.27-7.20 (m, 2H), 7.08-6.48 (m, 7H), 5.11 (s, 1H), 4.29-4.07 (m, 3H), 4.06-3.85 (m, 4H), 3.71 (d, *J* = 6.6 Hz, 3H), 1.70-1.25 (m, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.8, 158.5, 153.9, 141.1,

129.7, 121.3, 116.9, 114.9, 114.7, 70.2, 65.4, 61.7, 55.7, 53.7, 46.0, 14.2. HRMS (ESI) calcd for C₂₀H₂₄NO₄S (M+H⁺) 374.1421, found 374.1420.



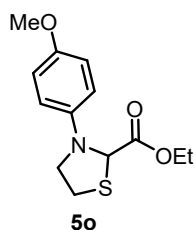
Ethyl 4-(methoxymethyl)-3-(4-methoxyphenyl)thiazolidine-2-carboxylate (5m).

Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). Colourless oil, 68% yield, 1:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 6.87-6.79 (m, 2H), 6.76-6.66 (m, 2H), 5.18 (d, *J* = 40.3 Hz, 1H), 4.27-4.11 (m, 2H), 3.96-3.86 (m, 1H), 3.85-3.78 (m, 1H), 3.76 (t, *J* = 2.0 Hz, 3H), 3.73-3.64 (m, 1H), 3.61-3.40 (m, 2H), 3.37 (d, *J* = 7.1 Hz, 3H), 1.27-1.21 (m, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 172.0, 171.7, 153.8, 153.0, 141.2, 140.7, 117.0, 115.3, 115.0, 114.9, 74.6, 65.2, 63.3, 61.7, 61.6, 59.2, 59.1, 56.7, 55.8, 55.7, 53.9, 46.5, 45.7, 14.2. HRMS (ESI) calcd for C₁₅H₂₂NO₄S (M+H⁺) 312.1264, found 312.1260.

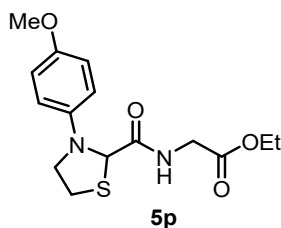


Ethyl 4-((4-allyl-2-methoxyphenoxy)methyl)-3-(4-methoxyphenyl)thiazolidine-2-carboxylate (5n).

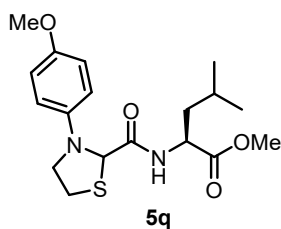
Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). White solid, 75% yield, 1:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 6.89-6.78 (m, 3H), 6.76-6.67 (m, 4H), 6.02-5.88 (m, 1H), 5.31-5.13 (m, 1H), 5.12-5.04 (m, 2H), 4.27-3.90 (m, 7H), 3.85 (d, *J* = 3.7 Hz, 3H), 3.75 (d, *J* = 5.1 Hz, 3H), 3.33 (dd, *J* = 6.7, 1.7 Hz, 2H), 1.24 (dt, *J* = 17.4, 7.1 Hz, 3H); ¹³C NMR (101 MHz, CDCl₃) δ 171.9, 171.5, 153.8, 153.1, 149.9, 149.8, 146.4, 146.2, 141.2, 140.6, 137.7, 137.6, 134.3, 134.1, 120.73, 120.68, 116.8, 115.84, 115.80, 115.78, 115.4, 115.1, 114.92, 114.88, 112.7, 72.1, 71.8, 65.3, 63.1, 61.7, 61.5, 56.9, 56.0, 55.9, 55.7, 53.7, 45.9, 45.4, 39.9, 14.18, 14.16. HRMS (ESI) calcd for C₂₄H₃₀NO₅S (M+H⁺) 444.1839, found 444.1835.



Ethyl 3-(4-methoxyphenyl)thiazolidine-2-carboxylate (5o). Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). Colourless oil, 78% yield. ^1H NMR (400 MHz, CDCl_3) δ 6.86-6.79 (m, 2H), 6.74-6.67 (m, 2H), 5.13 (s, 1H), 4.26-4.14 (m, 2H), 3.85-3.75 (m, 2H), 3.75 (s, 3H), 3.61-3.30 (m, 1H), 3.10-3.04 (m, 1H), 1.27 (t, $J = 7.1$ Hz, 3H); ^{13}C NMR (101 MHz, CDCl_3) δ 171.8, 153.4, 141.0, 116.1, 114.9, 64.9, 61.6, 55.8, 53.7, 30.6, 14.2. HRMS (ESI) calcd for $\text{C}_{13}\text{H}_{18}\text{NO}_3\text{S}$ ($\text{M}+\text{H}^+$) 268.1002, found 268.1000.

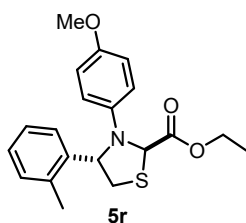


Ethyl (3-(4-methoxyphenyl)thiazolidine-2-carbonyl)glycinate (5p). Purified by flash column chromatography (silica gel, PE/EA = 32/1 to 8/1 as eluent). Yellow oil, 61% yield, ^1H NMR (400 MHz, CDCl_3) δ 7.35-7.27 (m, 1H), 6.96-6.72 (m, 4H), 4.98 (s, 1H), 4.21-4.12 (m, 3H), 3.97 (dd, $J = 18.3, 5.0$ Hz, 1H), 3.84-3.78 (m, 1H), 3.77 (d, $J = 8.6$ Hz, 3H), 3.68-3.62 (m, 1H), 3.36-3.19 (m, 1H), 2.99-3.04 (m, 1H), 1.26 (t, $J = 7.3$ Hz, 3H); ^{13}C NMR (101 MHz, CDCl_3) δ 172.0, 169.7, 154.5, 141.5, 117.4, 114.9, 69.2, 61.7, 55.73, 55.68, 41.4, 30.7, 14.2. HRMS (ESI) calcd for $\text{C}_{15}\text{H}_{21}\text{N}_2\text{O}_4\text{S}$ ($\text{M}+\text{H}^+$) 325.1217, found 325.1218.



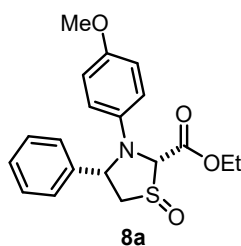
Methyl (3-(4-methoxyphenyl)thiazolidine-2-carbonyl)-L-leucinate (5q). Purified by flash column chromatography (silica gel, PE/EA = 32/1 to 8/1 as eluent). Yellow oil,

57% yield, 1:1 dr. ^1H NMR (400 MHz, CDCl_3) δ 7.13 (dd, $J = 9.1, 4.3$ Hz, 1H), 6.82 (d, $J = 15.8$ Hz, 4H), 4.95 (d, $J = 15.3$ Hz, 1H), 4.61-4.72 (m, 1H), 3.77 (t, $J = 1.4$ Hz, 3H), 3.73 (s, 1H), 3.68 (s, 3H), 3.15-3.31 (m, 1H), 2.98-3.06 (m, 1H), 1.78-1.43 (m, 4H), 0.95 (dd, $J = 6.3, 2.4$ Hz, 3H), 0.91 (d, $J = 6.1$ Hz, 2H), 0.85 (d, $J = 6.1$ Hz, 1H); ^{13}C NMR (101 MHz, CDCl_3) δ 173.5, 173.1, 171.8, 171.3, 154.6, 154.4, 141.6, 141.4, 117.6, 117.2, 114.9, 114.8, 69.4, 69.1, 55.8, 55.74, 55.69, 55.6, 52.5, 52.4, 50.8, 50.6, 41.7, 41.3, 30.8, 30.6, 25.2, 25.0, 23.03, 22.99, 22.0, 21.8. HRMS (ESI) calcd for $\text{C}_{18}\text{H}_{27}\text{N}_2\text{O}_4\text{S}$ ($\text{M}+\text{H}^+$) 367.1686, found 367.1690.



Ethyl (2R,4S)-3-(4-methoxyphenyl)-4-(o-tolyl)thiazolidine-2-carboxylate (5r).

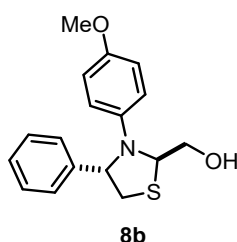
Purified by flash column chromatography (silica gel, PE/EA = 64/1 to 16/1 as eluent). Light yellow solid, 75% yield, >20:1 dr. ^1H NMR (400 MHz, CDCl_3) δ 7.27-7.03 (m, 4H), 6.69 (d, $J = 9.0$ Hz, 2H), 6.34 (d, $J = 9.1$ Hz, 2H), 5.39 (d, $J = 5.7$ Hz, 2H), 4.23 (dd, $J = 7.9, 7.1$ Hz, 2H), 3.97 (dd, $J = 11.0, 7.3$ Hz, 1H), 3.67 (s, 3H), 2.81 (dd, $J = 11.0, 1.5$ Hz, 1H), 2.48 (s, 3H), 1.28 (t, $J = 7.1$ Hz, 3H); ^{13}C NMR (400 MHz, CDCl_3) δ 171.8, 152.1, 139.6, 138.6, 133.9, 130.7, 127.3, 126.5, 126.1, 114.9, 114.6, 64.1, 63.0, 61.6, 55.6, 37.5, 19.4, 14.2. HRMS (ESI) calcd for $\text{C}_{20}\text{H}_{23}\text{NO}_3\text{S}$ ($\text{M}+\text{Na}^+$) 380.1291, found 380.1291.



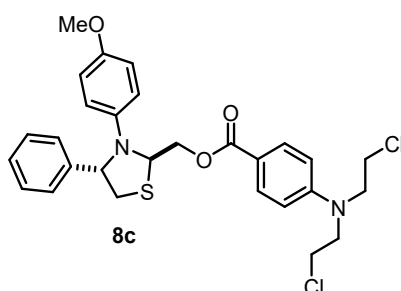
Ethyl 3-(4-methoxyphenyl)-4-phenylthiazolidine-2-carboxylate 1-oxide (8a).

Purified by flash column chromatography (silica gel, PE/EA = 8/1 to 4/1 as eluent). White solid, 75 % yield, > 20:1 dr. ^1H NMR (400 MHz, CDCl_3) δ 7.61 (dd, $J = 7.3, 1.7$ Hz, 2H), 7.35 (t, $J = 7.5$ Hz, 2H), 7.28 (d, $J = 7.2$ Hz, 1H), 6.76-6.68 (m, 2H), 6.67-6.62 (m, 2H), 5.75 (dd, $J = 11.6, 4.9$ Hz, 1H), 5.29 (s, 1H), 4.36 (q, $J = 7.2$ Hz, 2H), 3.68 (s, 3H), 3.61-3.56 (m, 1H), 3.15-3.08 (m, 1H), 1.39 (t, $J = 7.1$ Hz, 3H); ^{13}C NMR (101 MHz, CDCl_3)

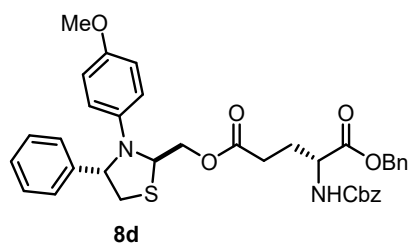
δ 168.0, 154.0, 140.3, 139.6, 129.3, 128.2, 126.8, 117.5, 114.7, 89.4, 65.8, 62.8, 58.6, 55.6, 14.3. HRMS (ESI) calcd for $C_{19}H_{22}NO_4S$ ($M+H^+$) 360.1264, found 360.1264.



3-(4-Methoxyphenyl)-4-phenylthiazolidin-2-ylmethanol (8b). Purified by flash column chromatography (silica gel, PE/EA = 6/1 to 2/1 as eluent). White solid, 92 % yield, 4:1 dr. 1H NMR (400 MHz, $CDCl_3$) δ 7.23-7.14 (m, 5H), 6.69-6.64 (m, 2H), 6.62-6.57 (m, 2H), 5.22 (dd, $J = 7.3, 3.9$ Hz, 1H), 5.08 (dd, $J = 6.4, 3.3$ Hz, 1H), 3.88 (dd, $J = 11.6, 3.9$ Hz, 1H), 3.63 (s, 3H), 3.62-3.52 (m, 2H), 2.87 (dd, $J = 11.2, 3.3$ Hz, 1H), 2.52 (s, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 152.6, 141.0, 138.3, 128.3, 127.4, 127.2, 117.9, 114.6, 69.1, 65.8, 63.2, 55.5, 37.6. HRMS (ESI) calcd for $C_{17}H_{20}NO_2S$ ($M+H^+$) 302.1209, found 302.1211.



3-(4-Methoxyphenyl)-4-phenylthiazolidin-2-ylmethyl 4-(bis(2-chloroethyl)amino)benzoate (8c). Purified by flash column chromatography (silica gel, PE/EA = 8/1 to 4/1 as eluent). White solid, 82 % yield, 4:1 dr. 1H NMR (400 MHz, $CDCl_3$) δ 7.90 (d, $J = 8.9$ Hz, 2H), 7.25-7.15 (m, 5H), 6.71 (d, $J = 5.8$ Hz, 2H), 6.65 (d, $J = 8.8$ Hz, 2H), 5.47 (dd, $J = 7.9, 4.3$ Hz, 1H), 5.17 (dd, $J = 6.5, 2.8$ Hz, 1H), 4.80-4.75 (m, 1H), 4.16 (dd, $J = 11.3, 7.9$ Hz, 1H), 3.79 (t, $J = 7.0$ Hz, 4H), 3.72 (dd, $J = 11.4, 6.5$ Hz, 1H), 3.66-3.62 (m, 7H), 2.94 (dd, $J = 11.3, 2.8$ Hz, 1H); ^{13}C NMR (101 MHz, $CDCl_3$) δ 166.4, 152.6, 149.9, 141.3, 138.4, 132.1, 128.4, 127.2, 126.0, 118.6, 117.9, 114.7, 110.9, 65.5, 65.1, 64.8, 55.6, 53.4, 40.2, 38.1. HRMS (ESI) calcd for $C_{28}H_{31}Cl_2N_2O_3S$ ($M+H^+$) 545.1427, found 545.1431.

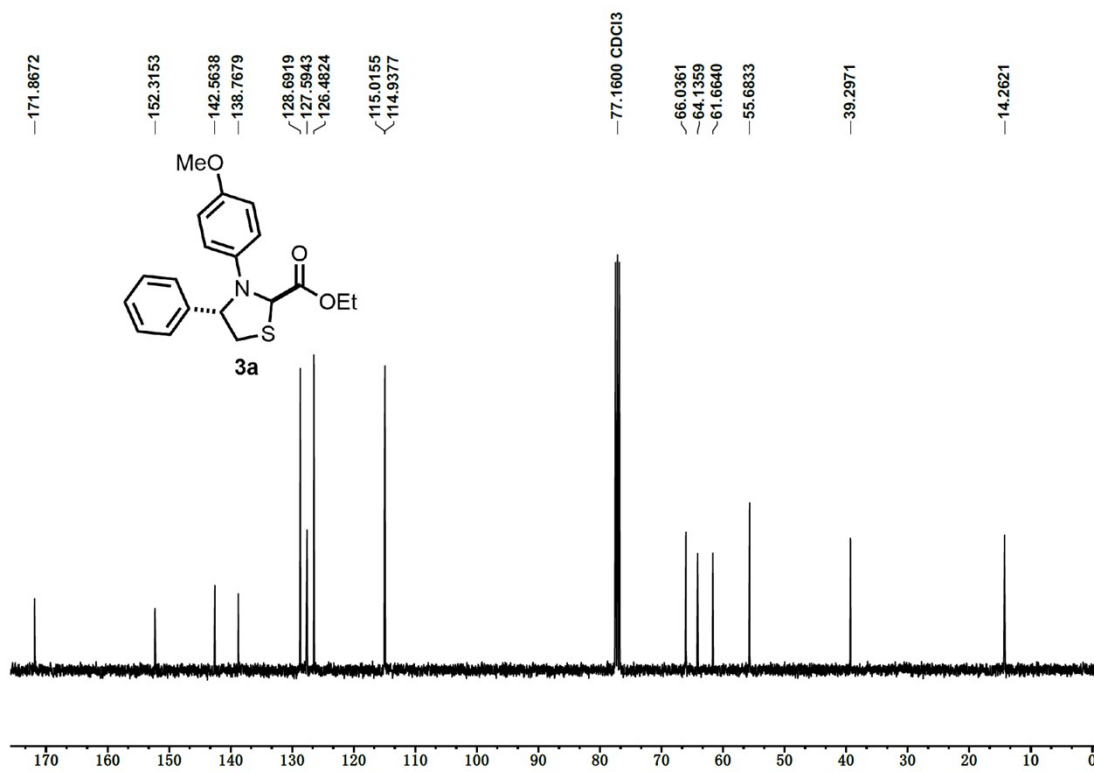
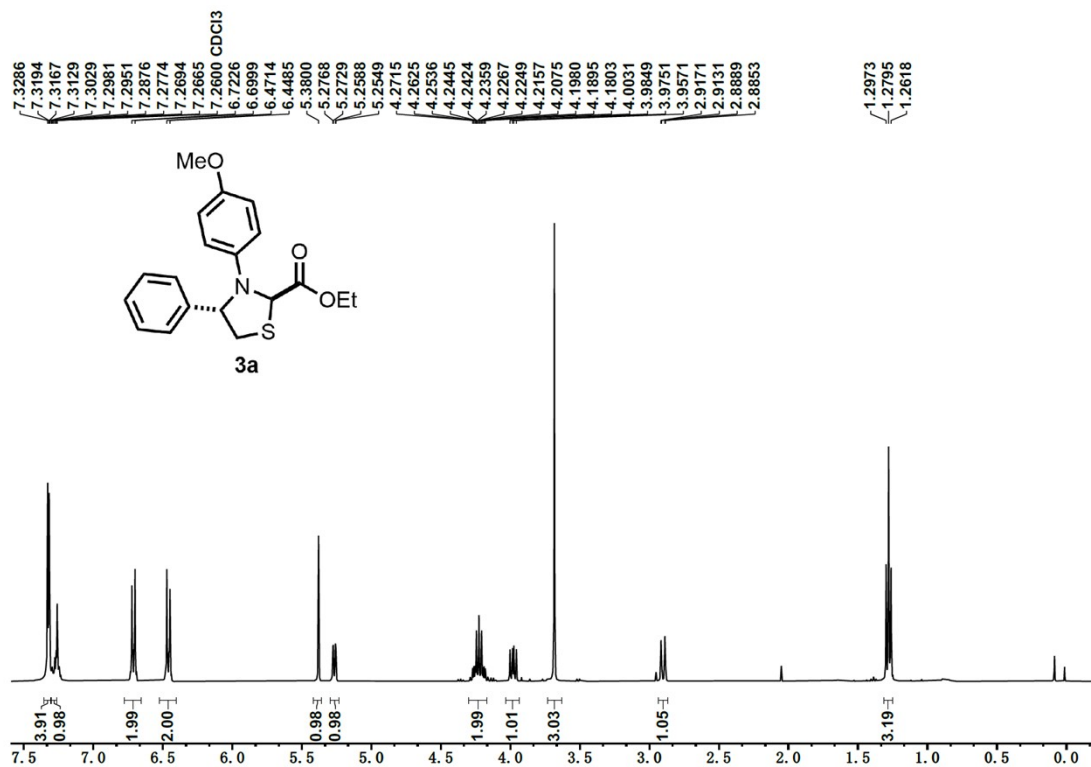


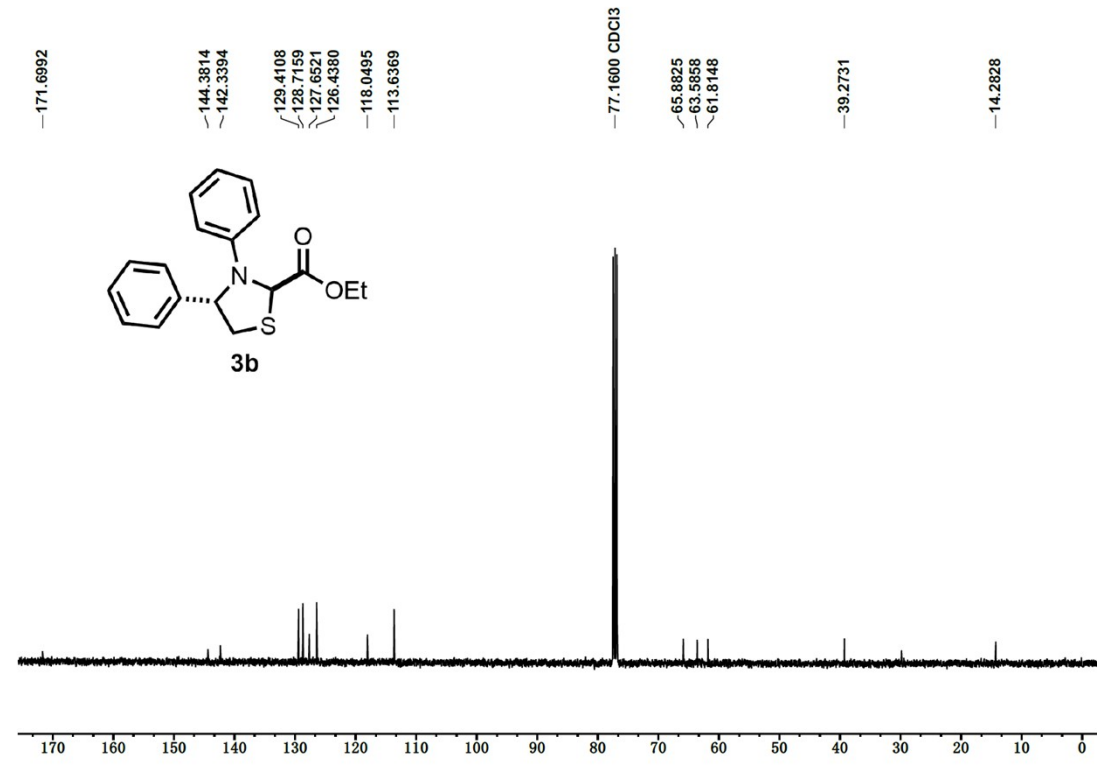
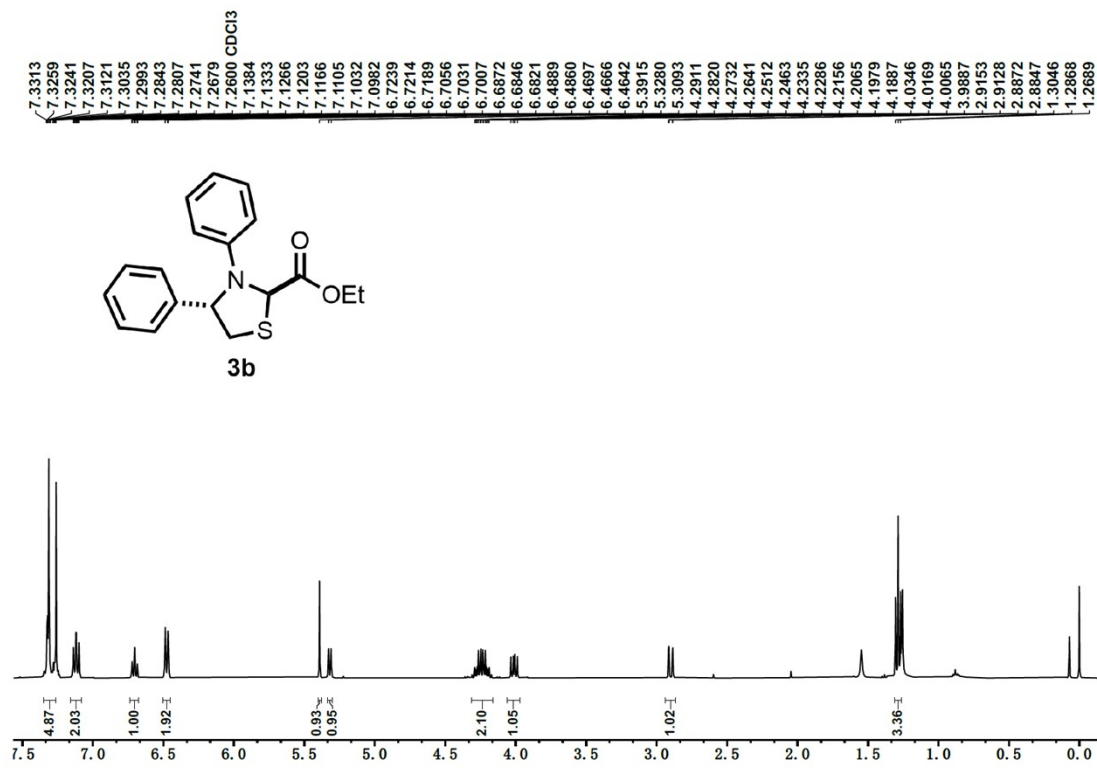
1-Benzyl 5-((3-(4-methoxyphenyl)-4-phenylthiazolidin-2-yl)methyl) ((benzyloxy) carbonyl)-D-glutamate (8d). Purified by flash column chromatography (silica gel, PE/EA = 6/1 to 2/1 as eluent). White solid, 76 % yield, 4:1 dr. ¹H NMR (400 MHz, CDCl₃) δ 7.41-7.30 (m, 12H), 7.25-7.18 (m, 3H), 6.76 (d, *J* = 2.1 Hz, 1H), 6.71-6.63 (m, 3H), 5.56 (dd, *J* = 22.1, 8.3 Hz, 1H), 5.35 (dd, *J* = 7.8, 4.6 Hz, 1H), 5.19 (s, 2H), 5.13 (d, *J* = 3.8 Hz, 2H), 4.60-4.54 (m, 1H), 4.52-4.46 (m, 1H), 4.02-3.96 (m, 1H), 3.67 (s, 3H), 2.88-2.93 (m, 1H), 2.52-2.20 (m, 3H), 2.05-1.91 (m, 1H); ¹³C NMR (101 MHz, CDCl₃) δ 172.5, 171.7, 156.0, 152.6, 141.1, 138.2, 136.2, 135.2, 128.7, 128.59, 128.57, 128.5, 128.3, 128.24, 128.17, 127.4, 127.1, 125.9, 117.8, 114.6, 67.4, 67.2, 65.5, 65.0, 64.6, 55.5, 53.4, 37.9, 30.1, 27.6. HRMS (ESI) calcd for C₃₇H₃₉N₂O₇S (M+H⁺) 655.2472, found 655.2468.

7. References

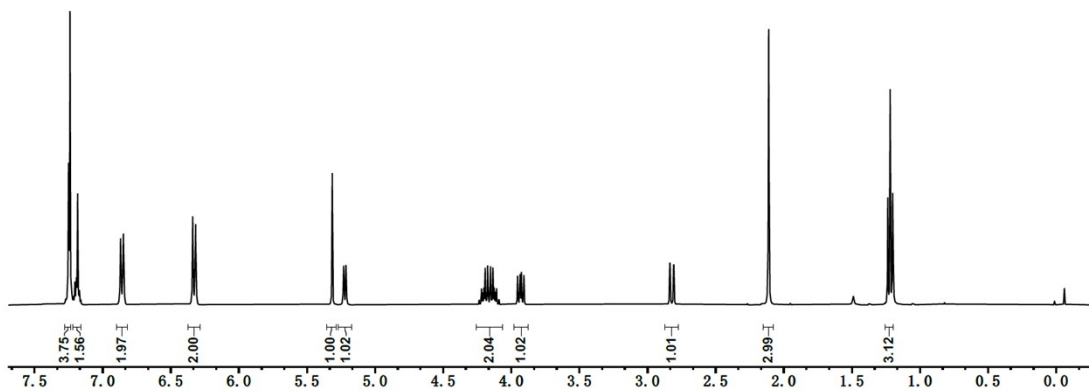
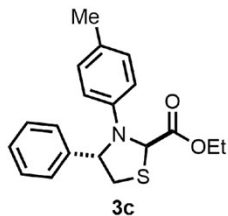
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8. Copies of ^1H and ^{13}C NMR Spectra

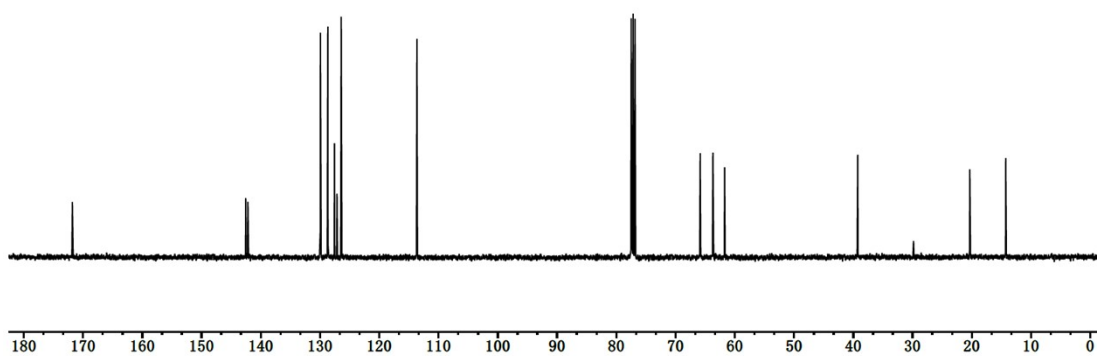
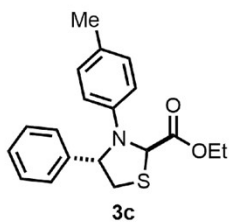


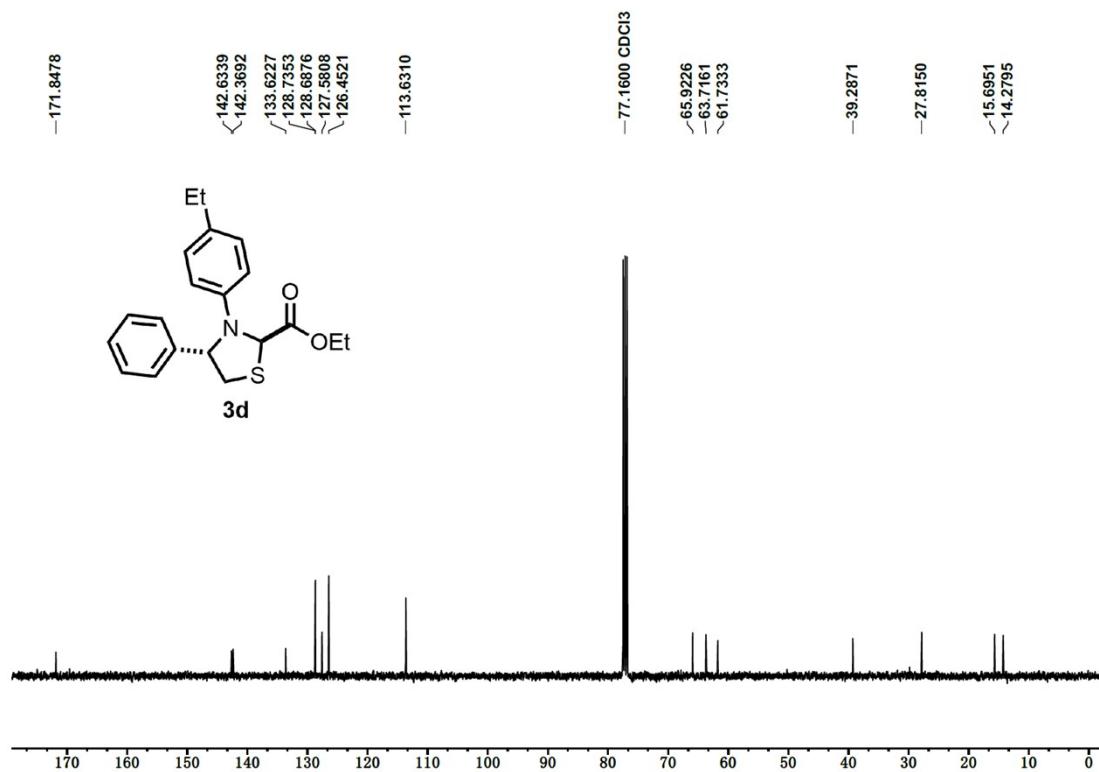
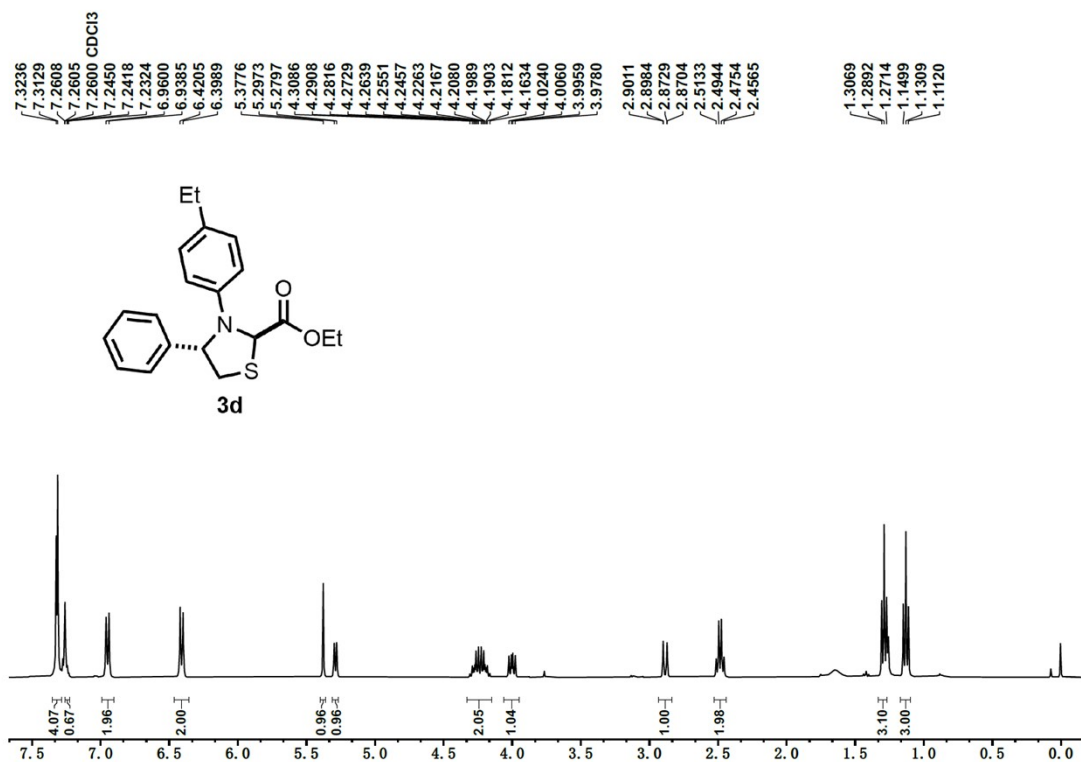


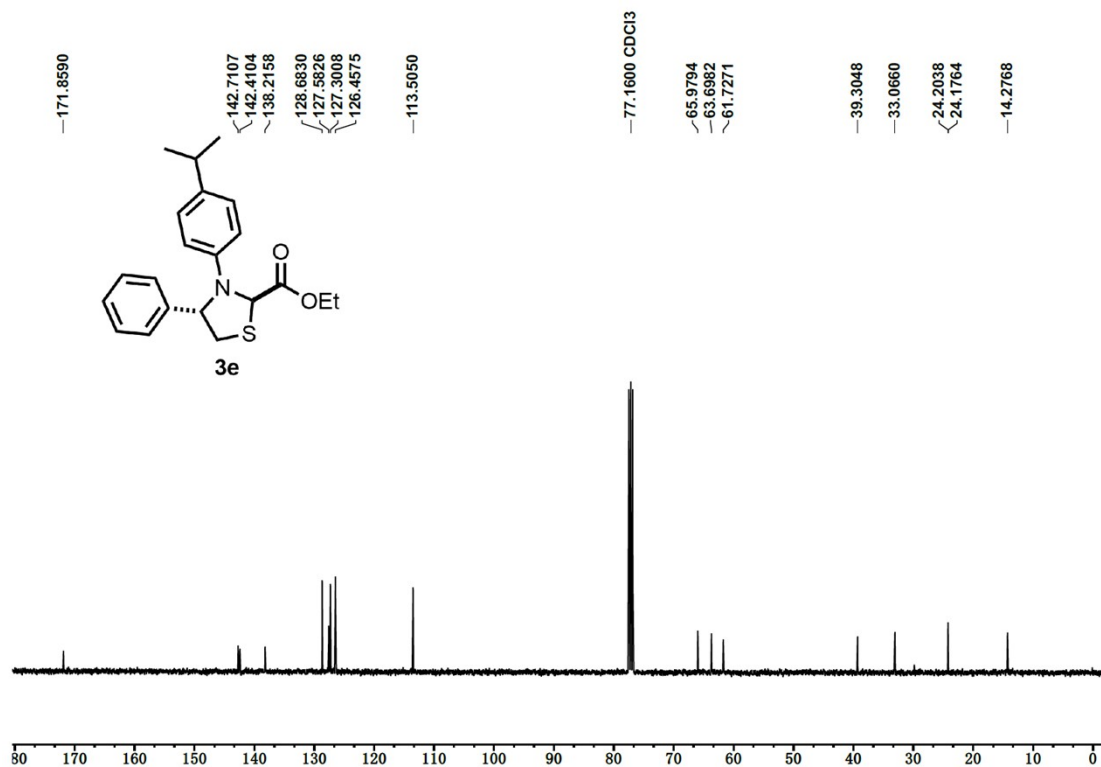
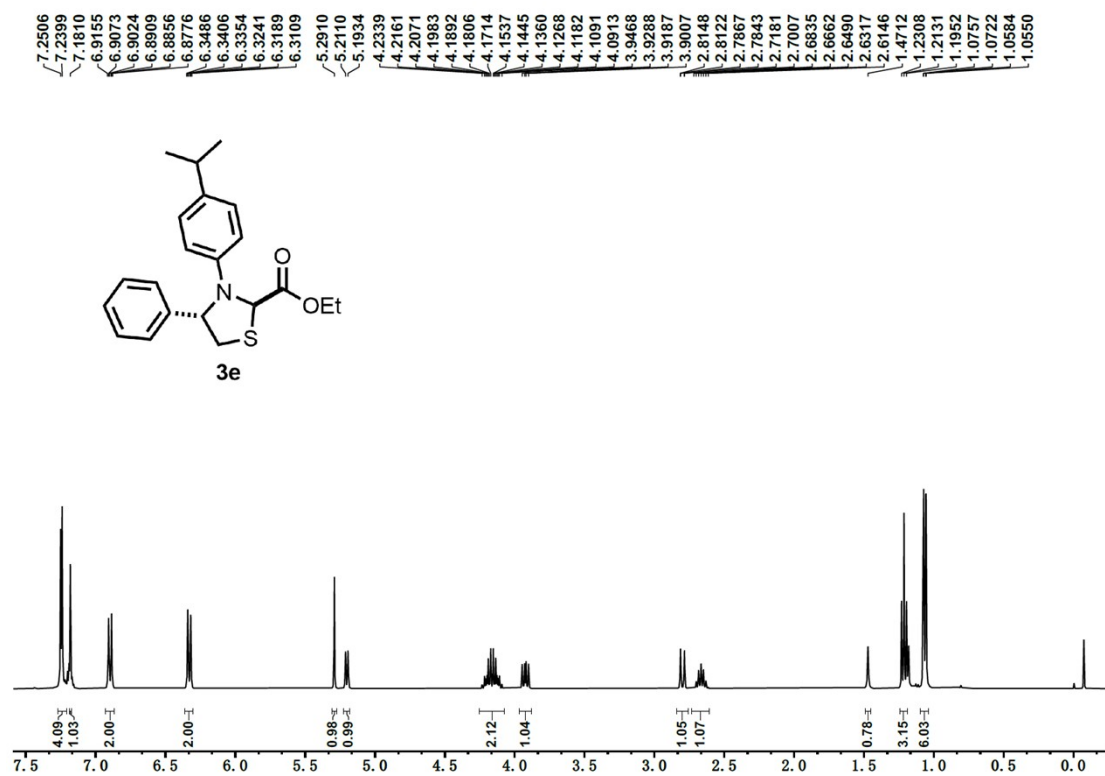
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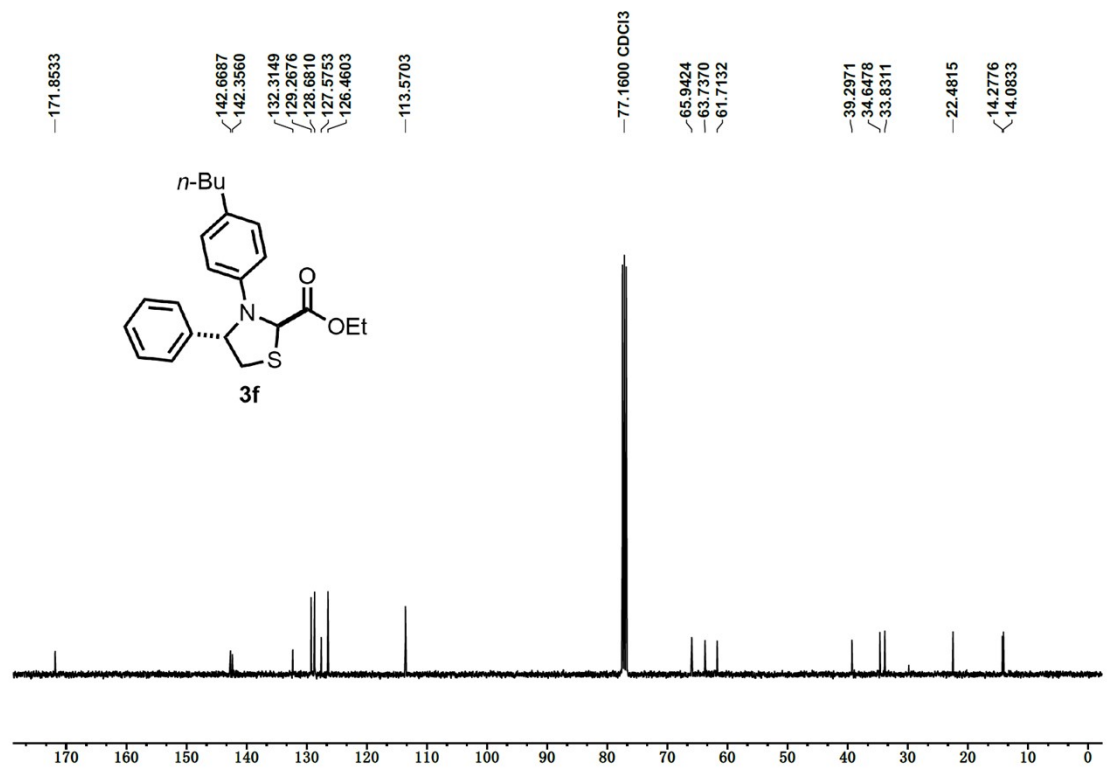
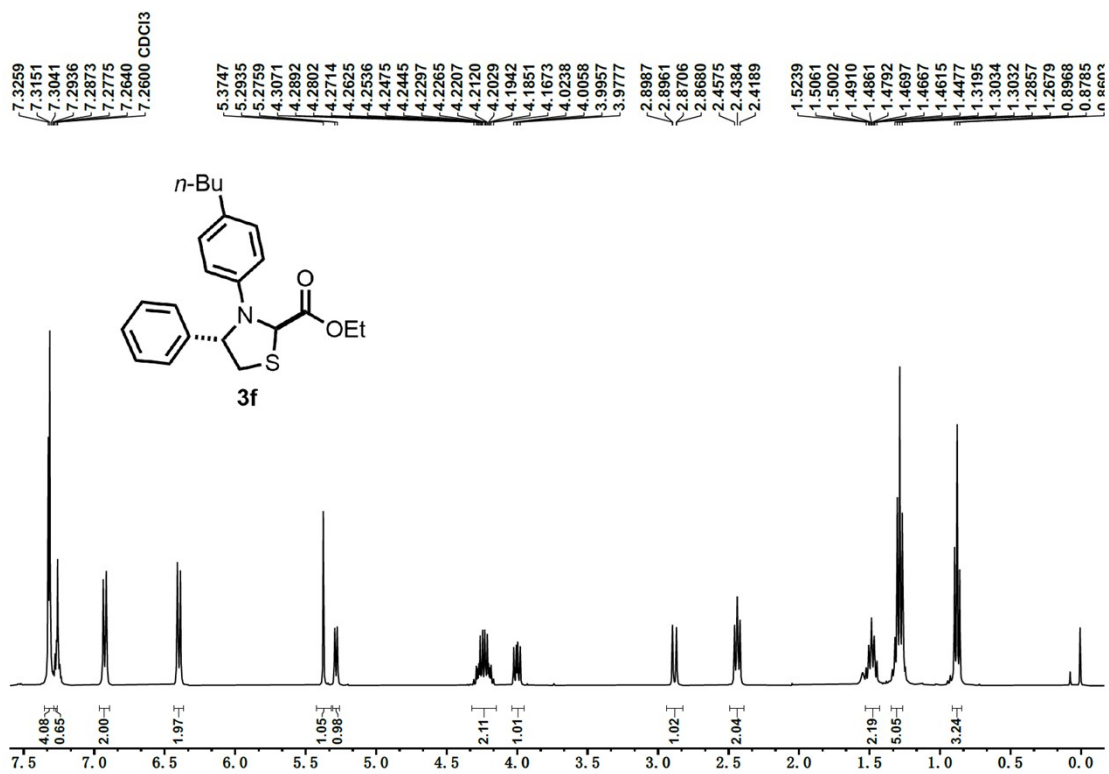


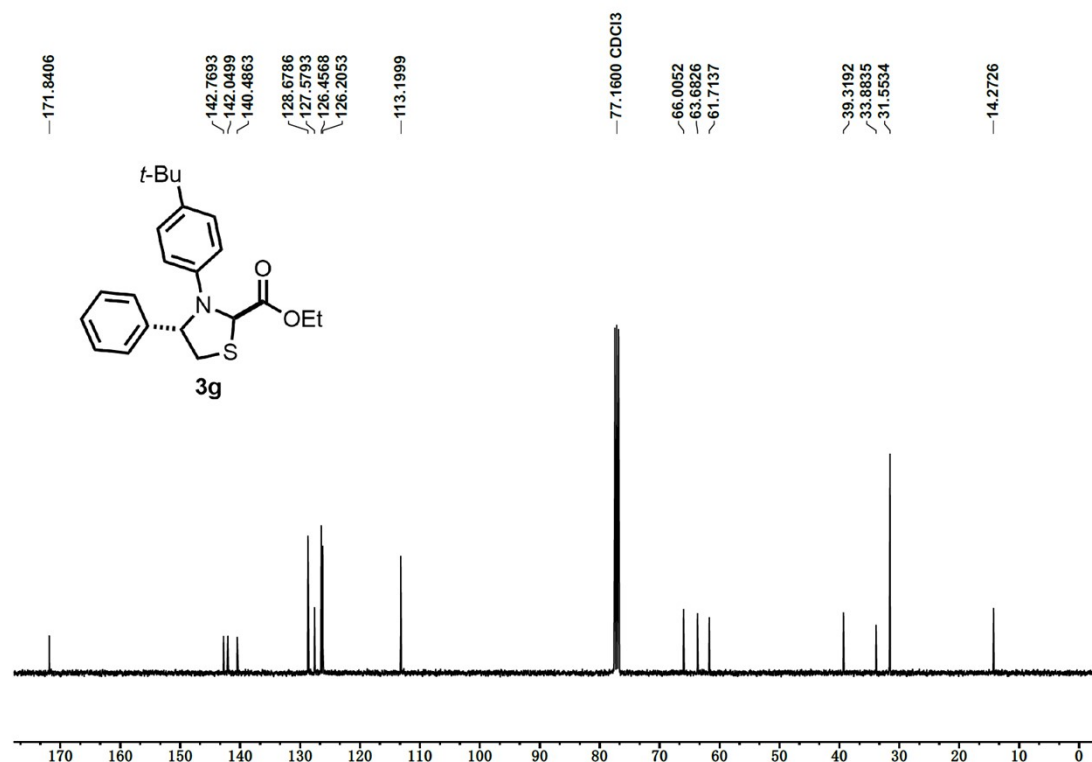
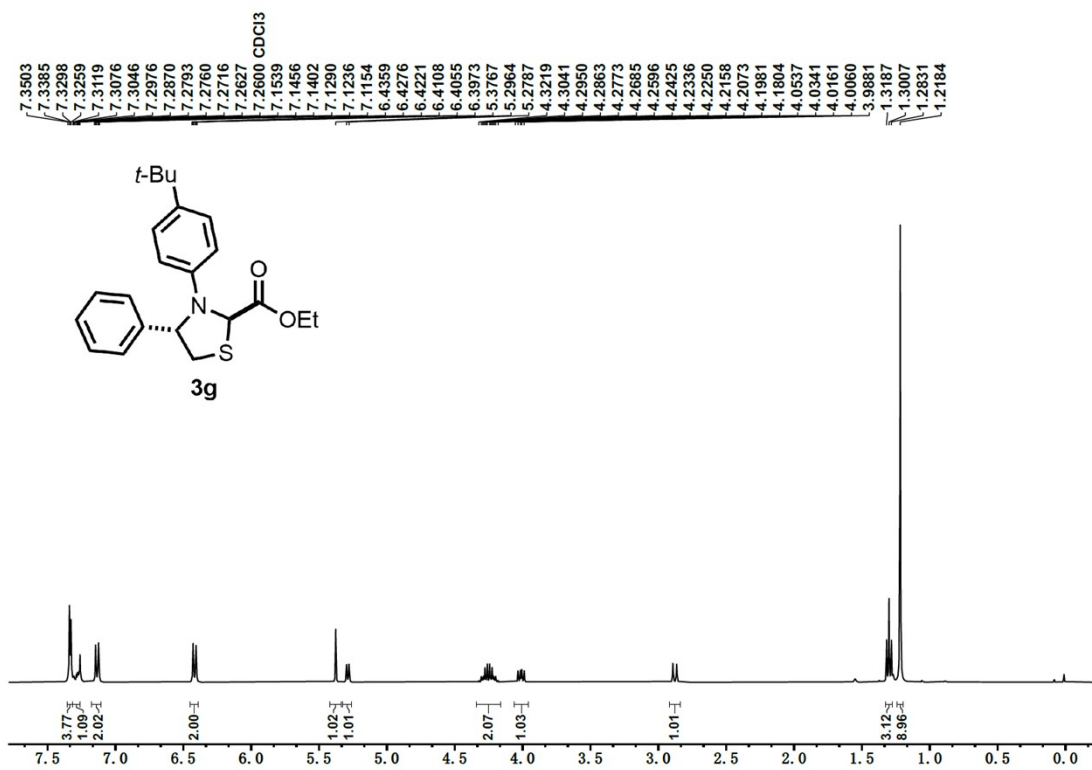
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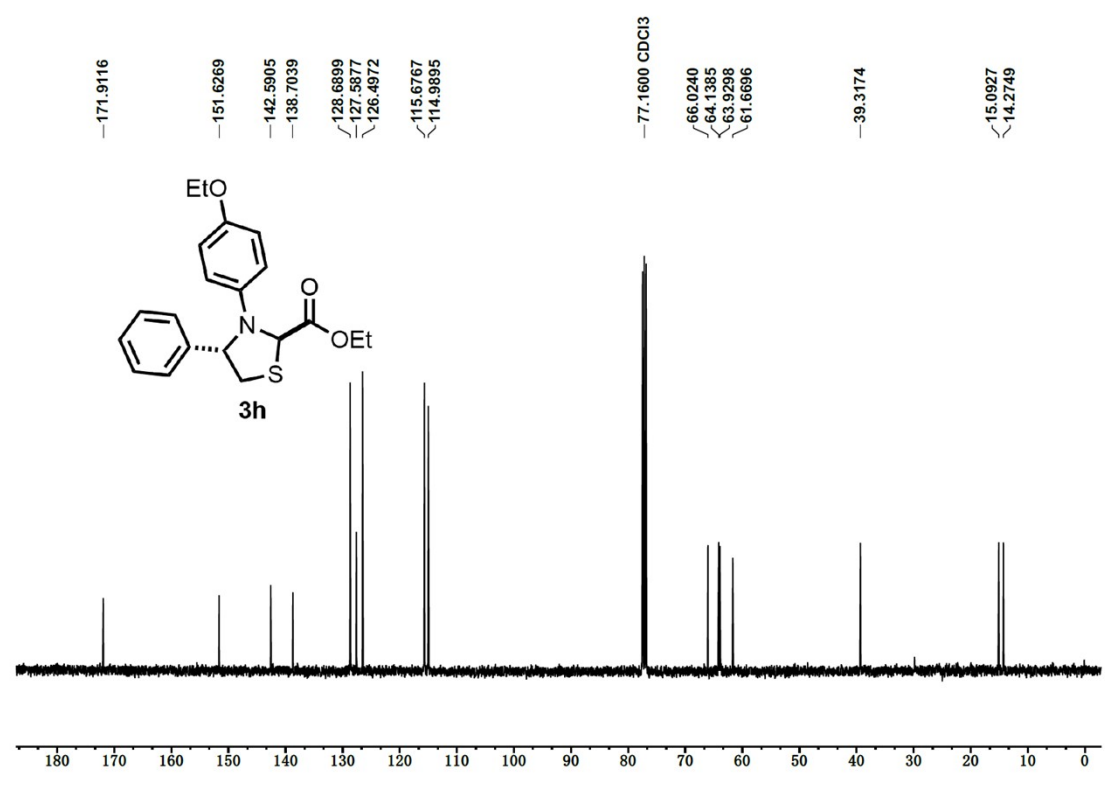
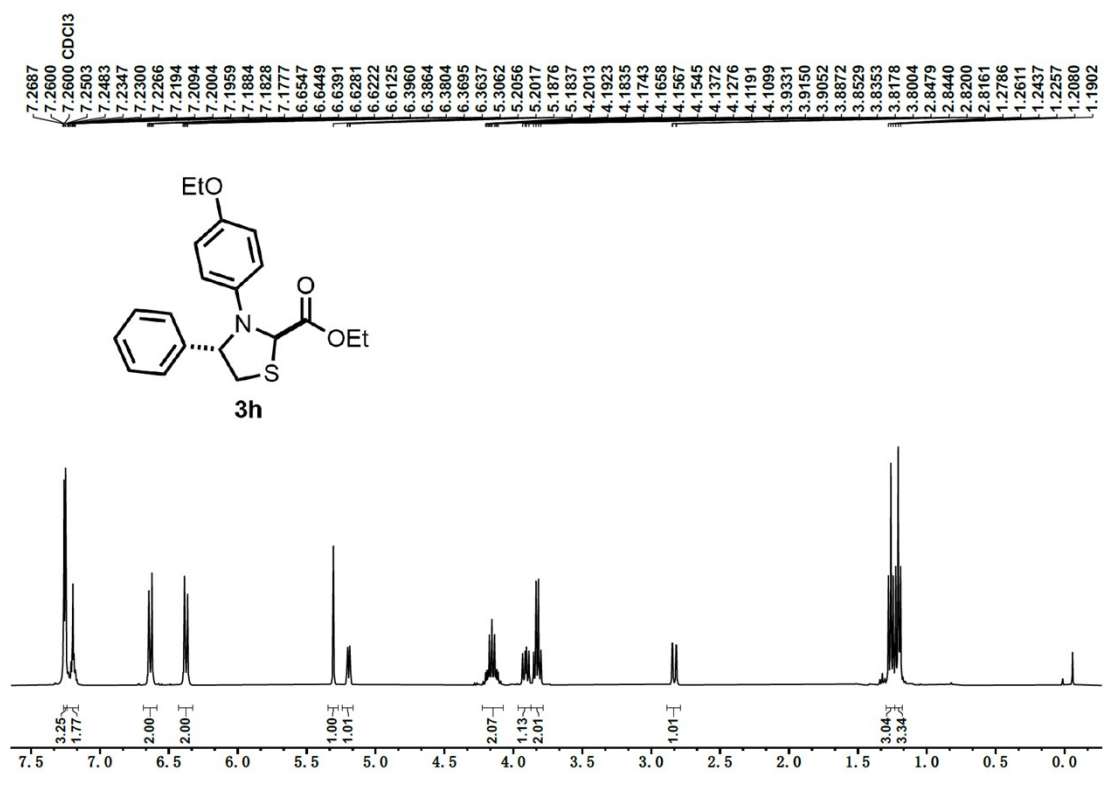


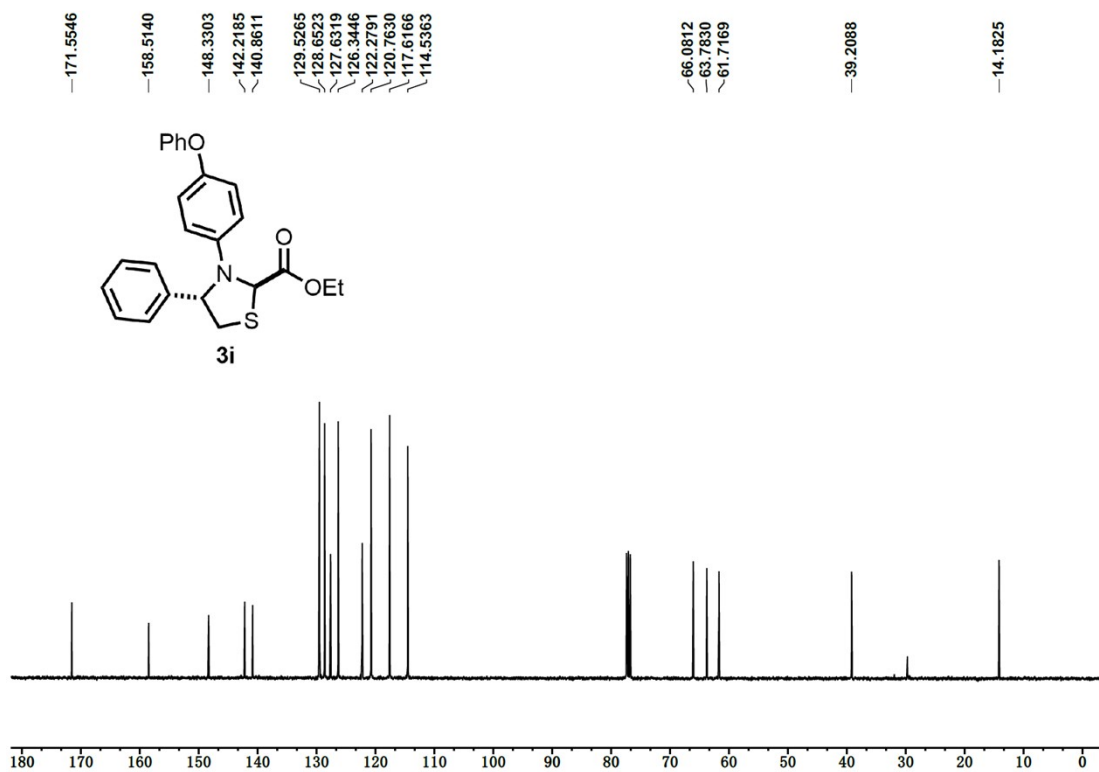
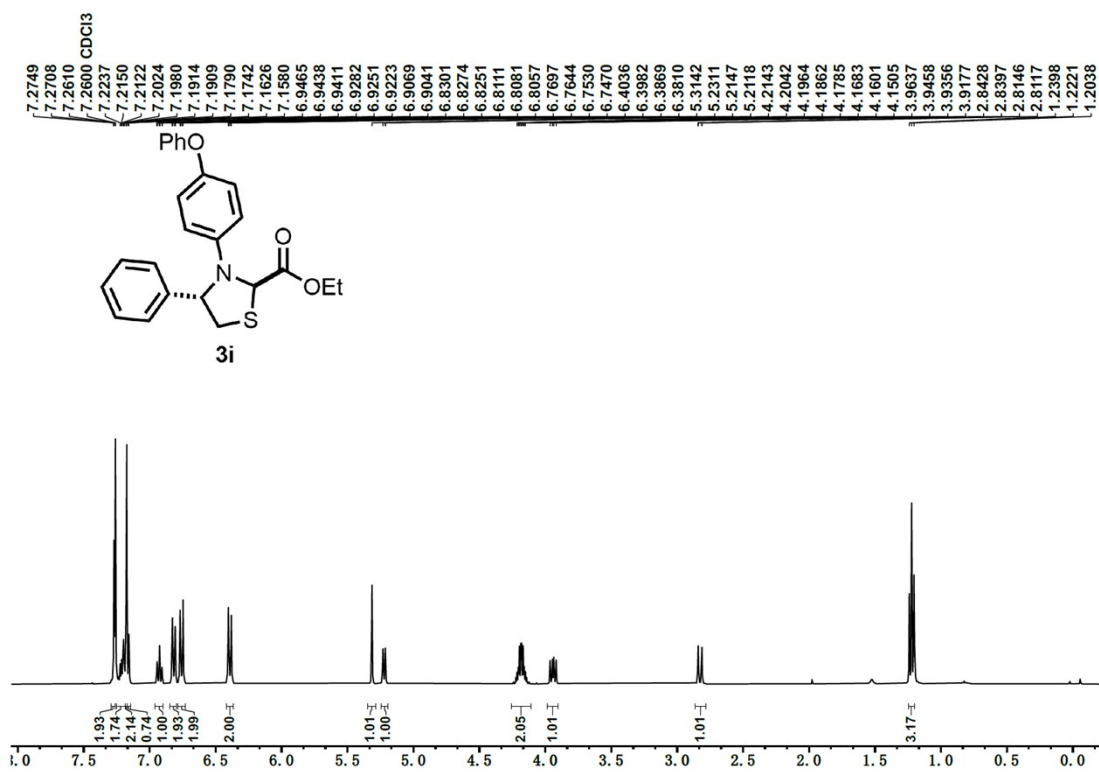


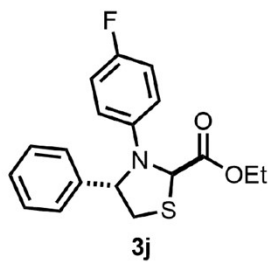
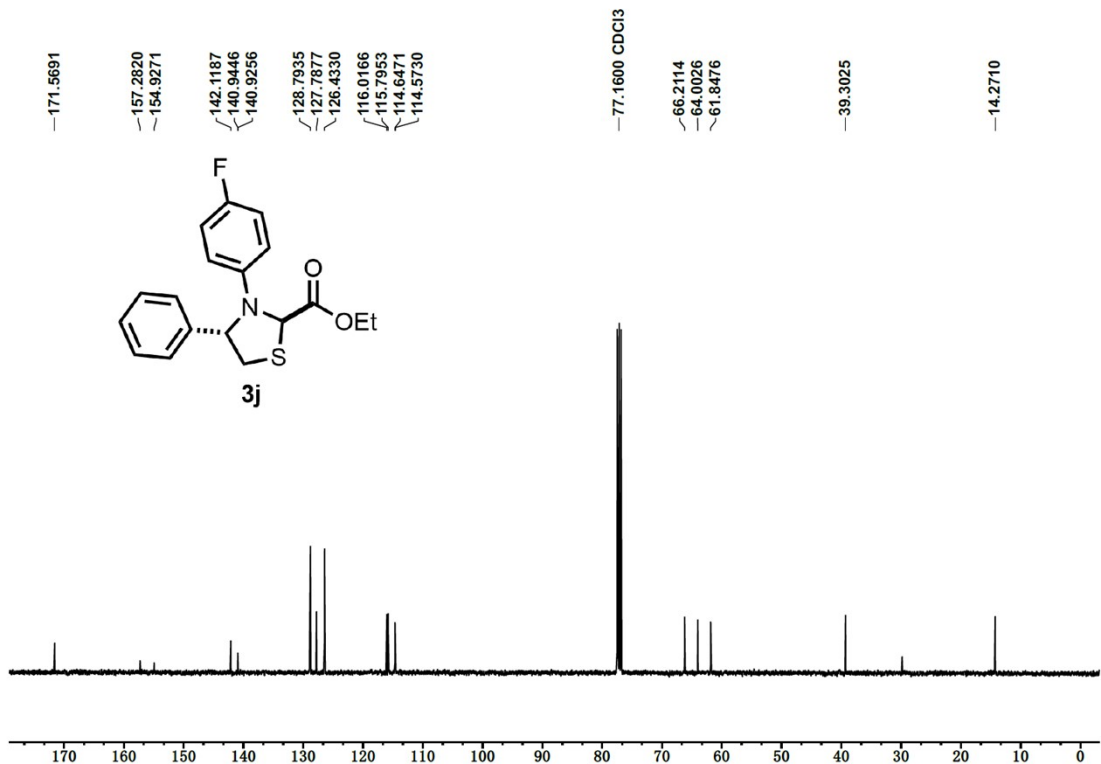
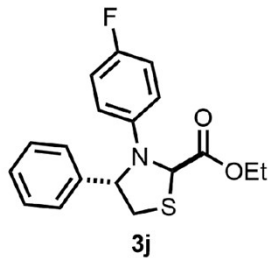
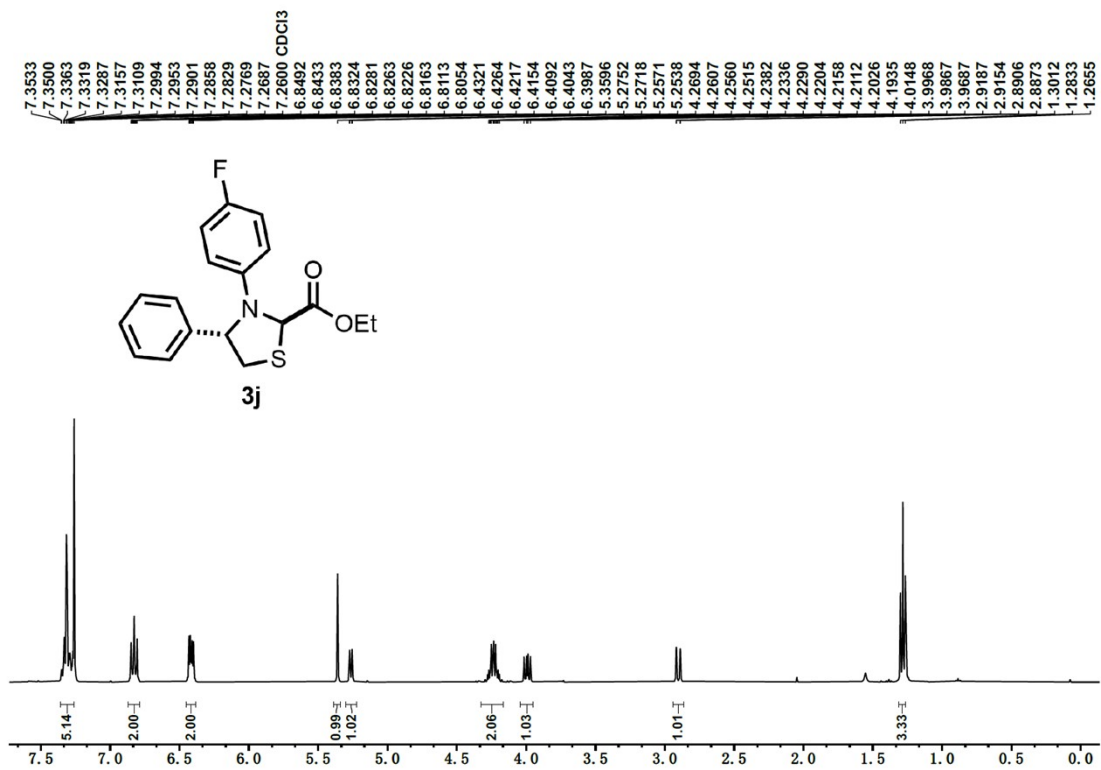


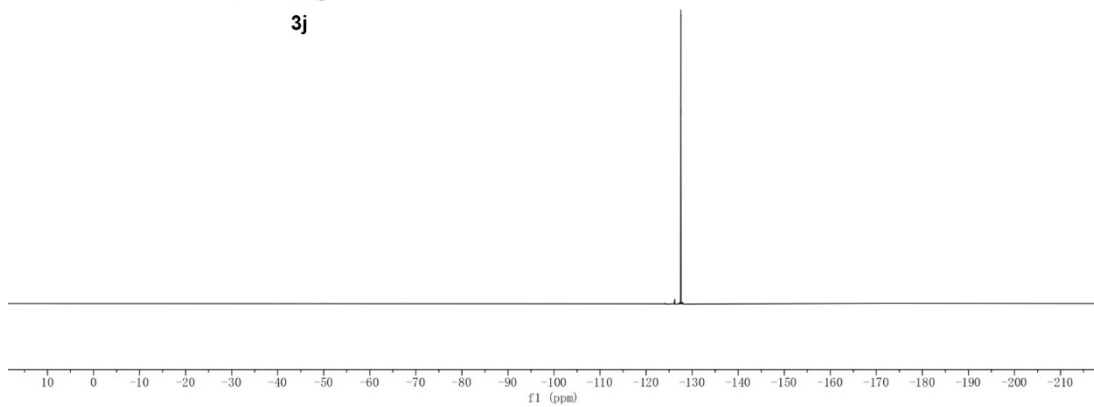
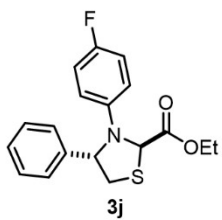




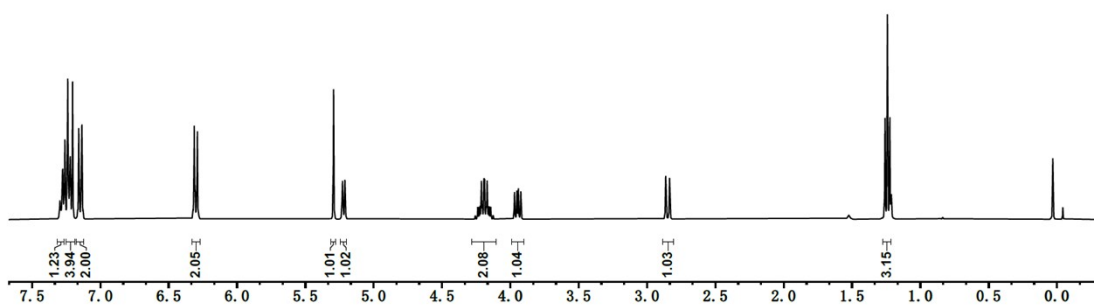
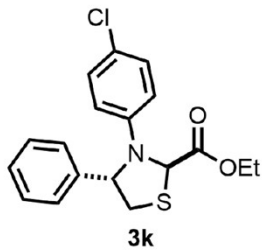








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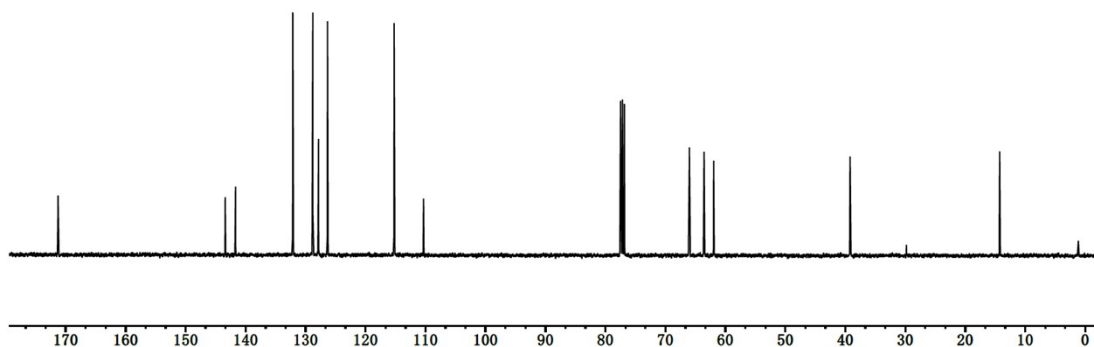
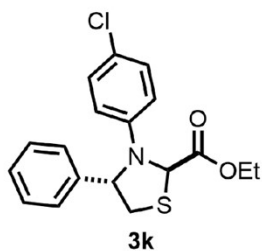
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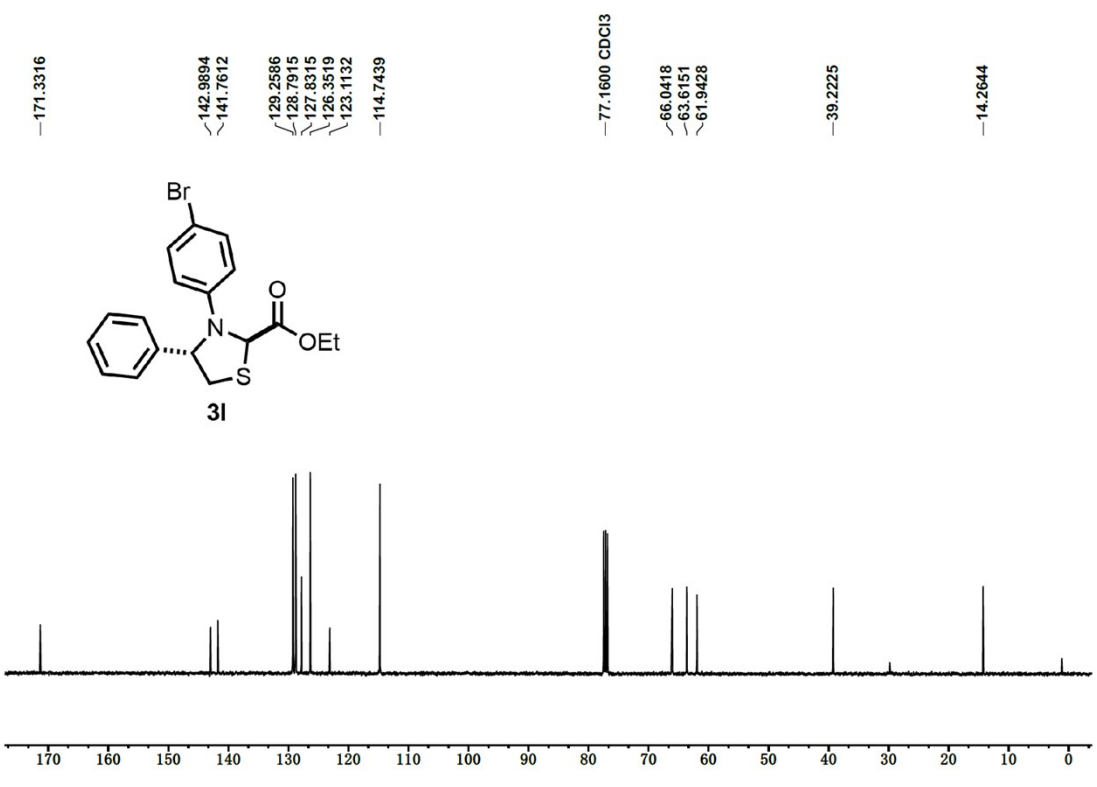
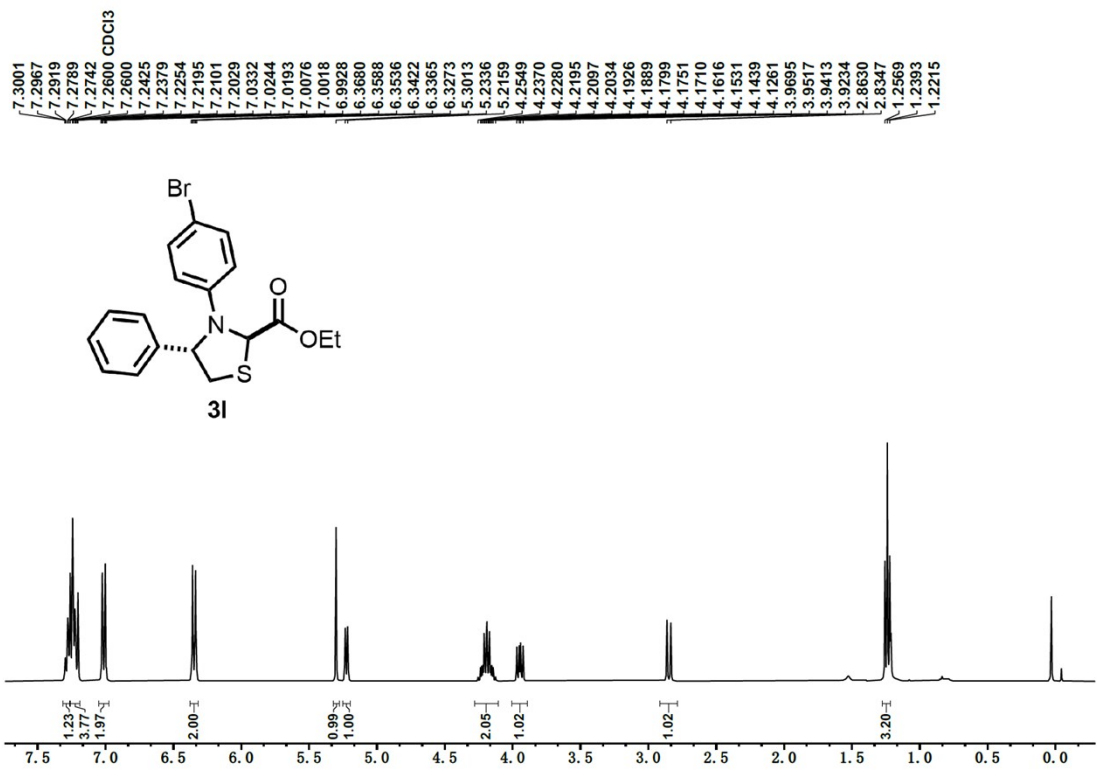
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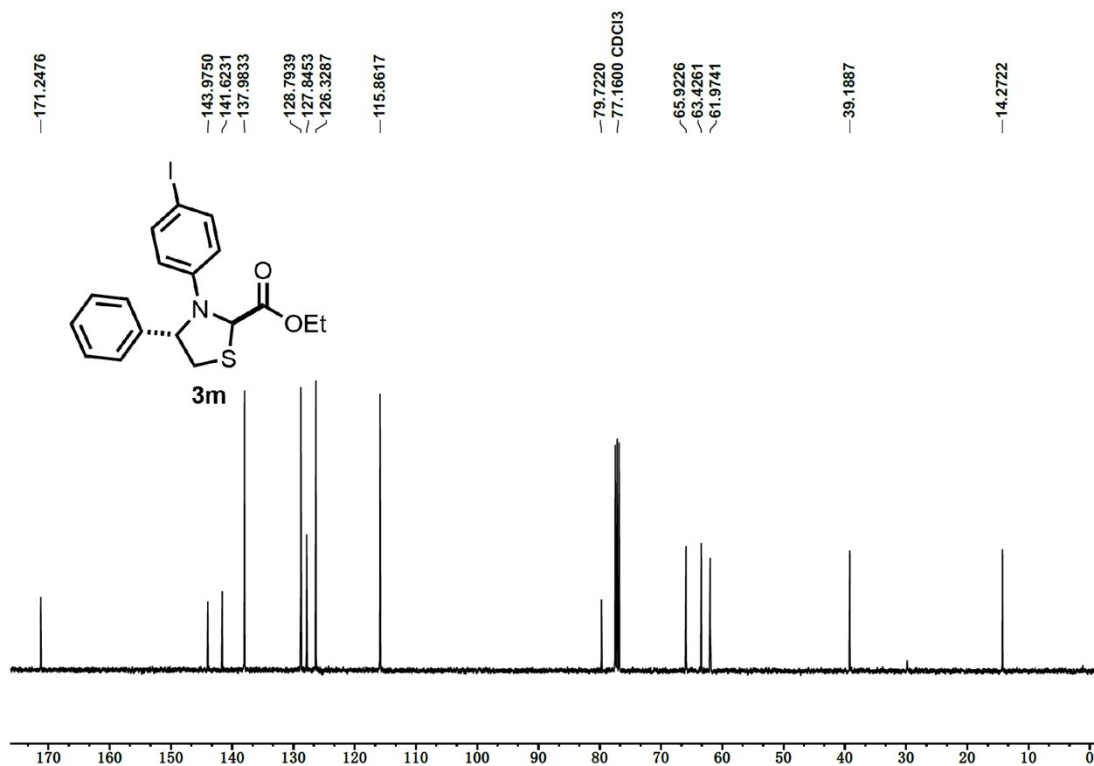
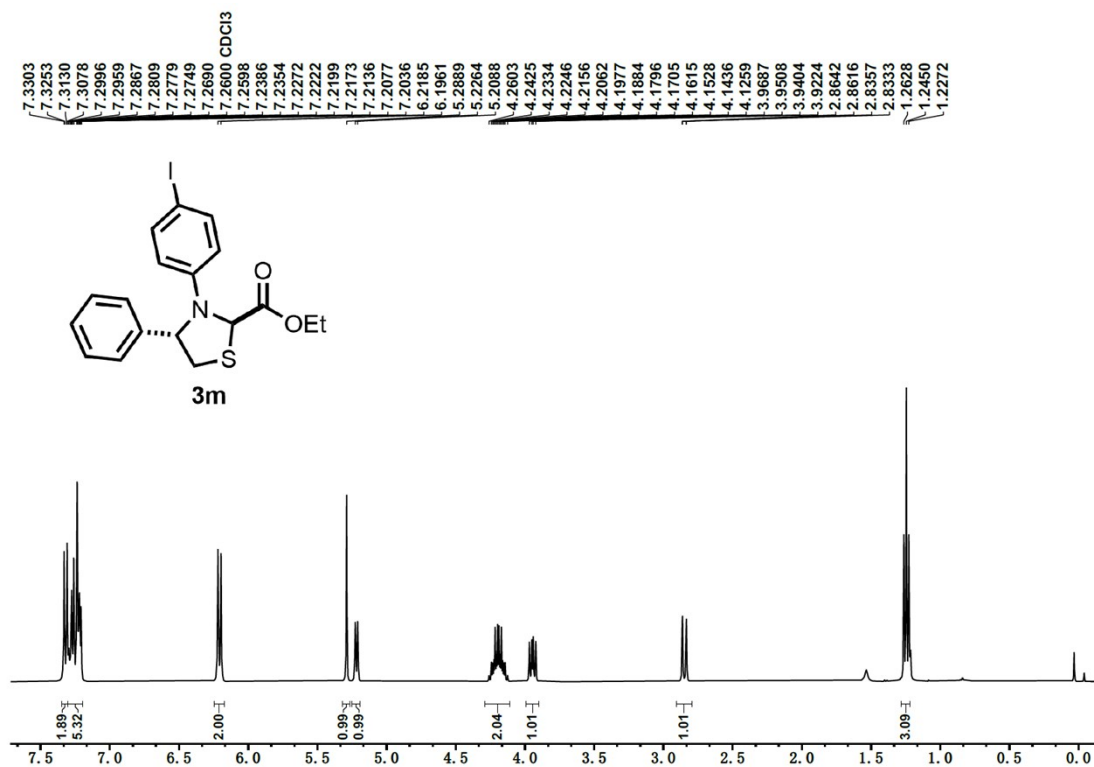
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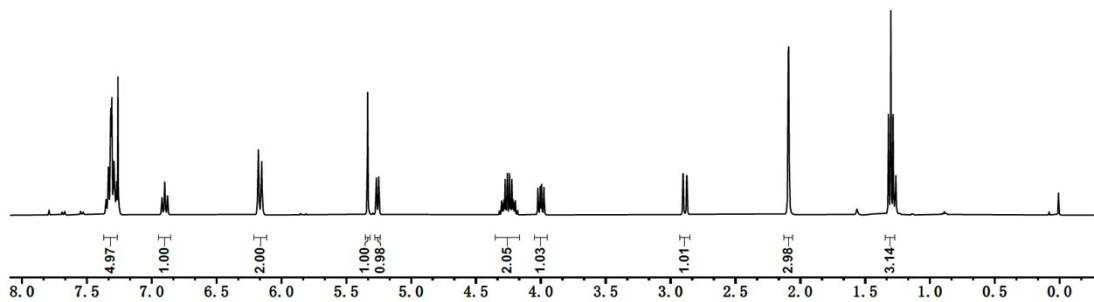
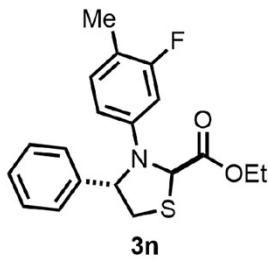
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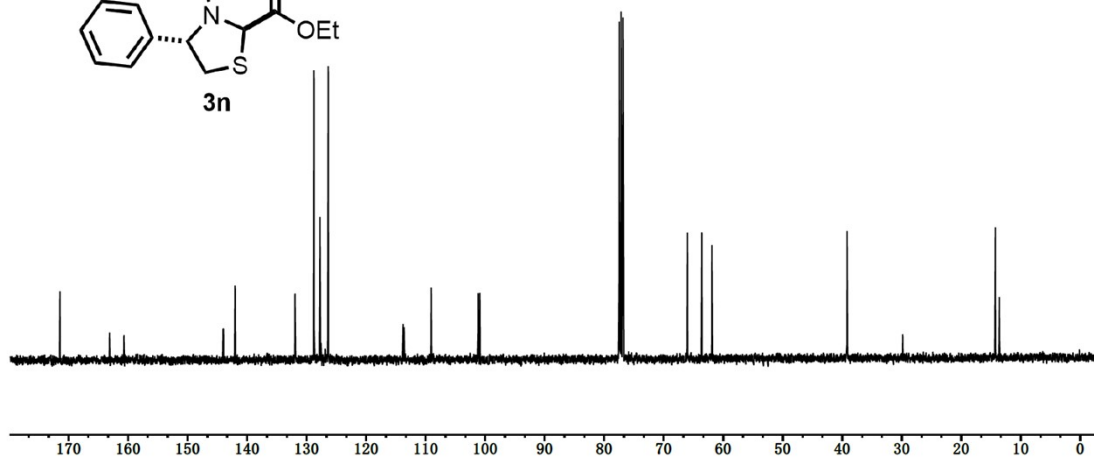
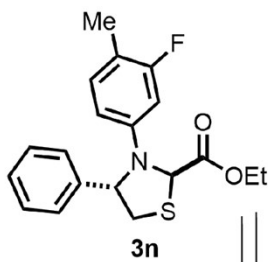




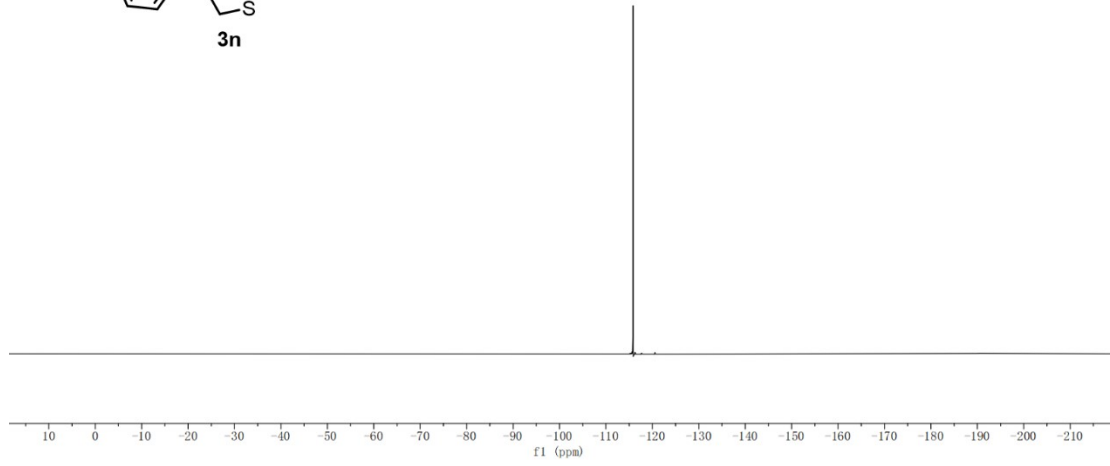
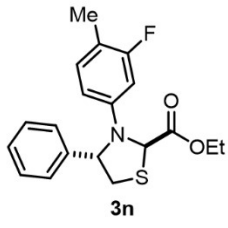
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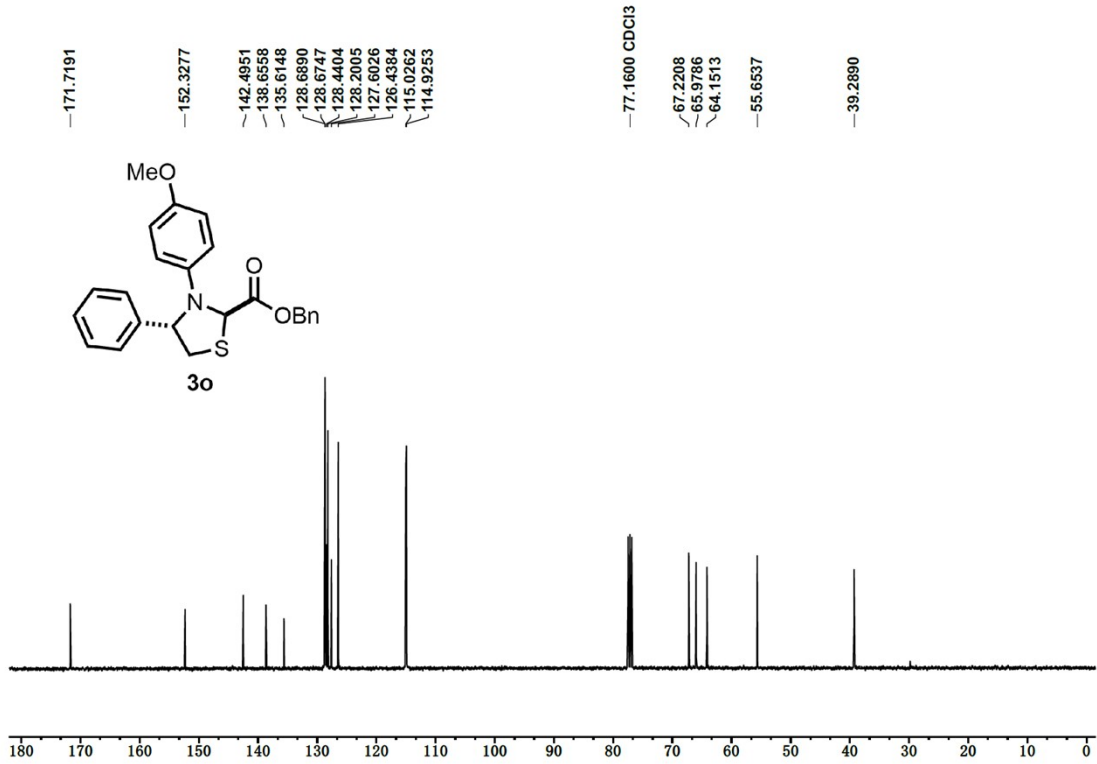
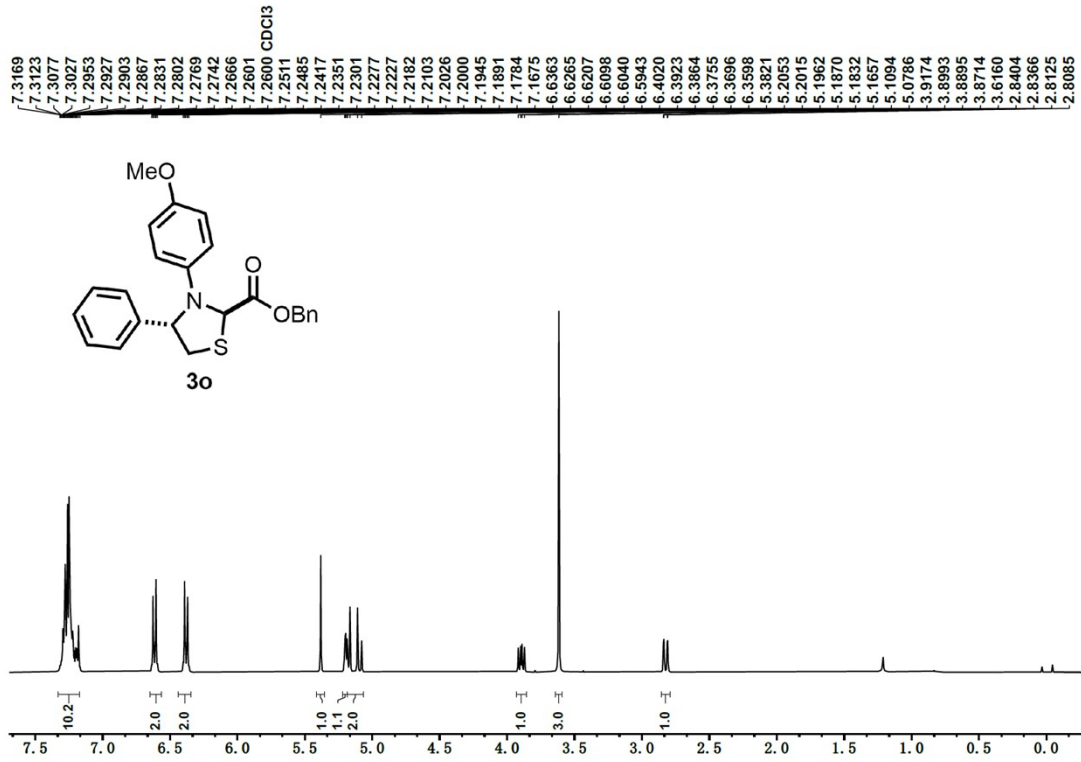


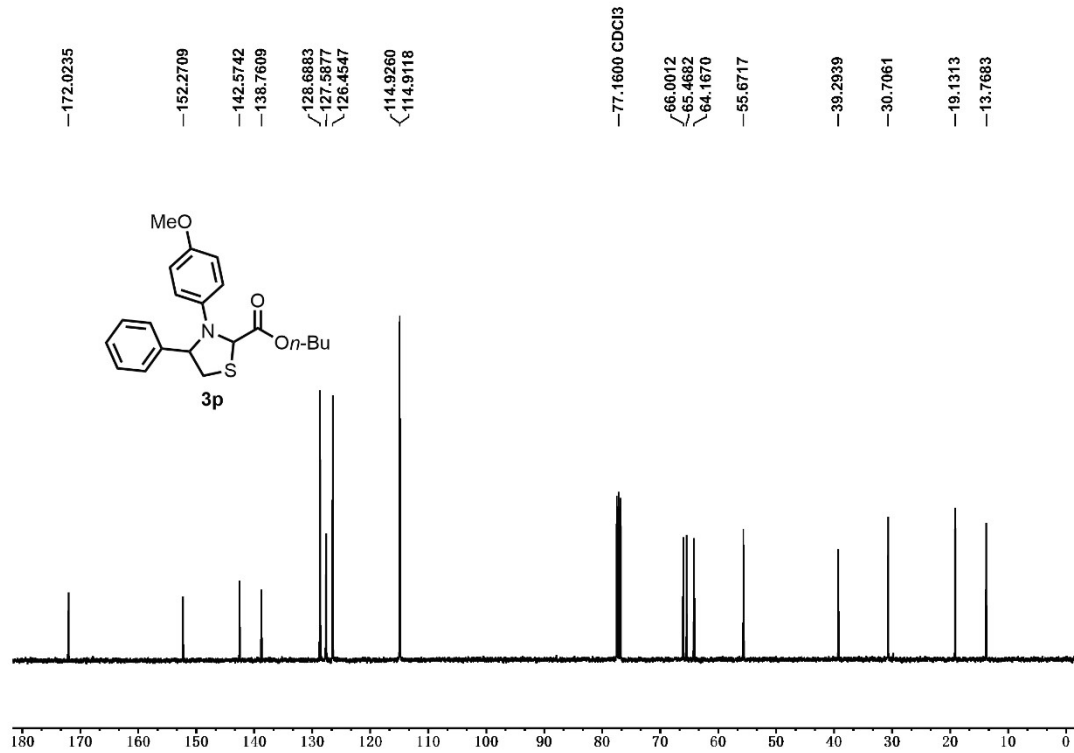
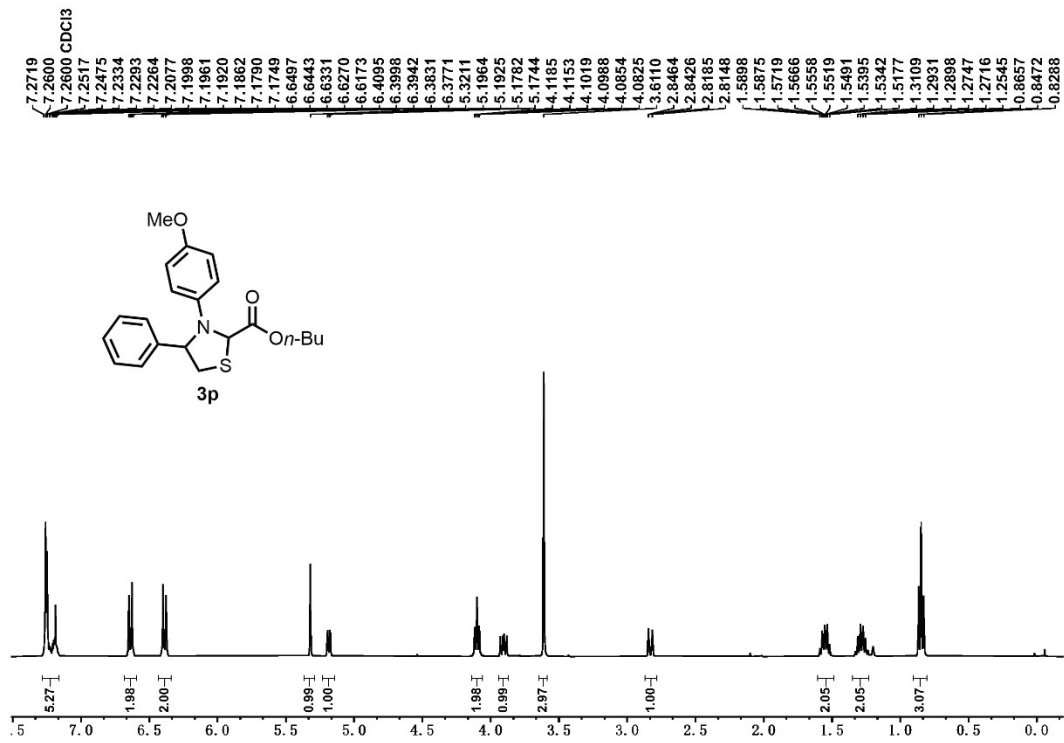
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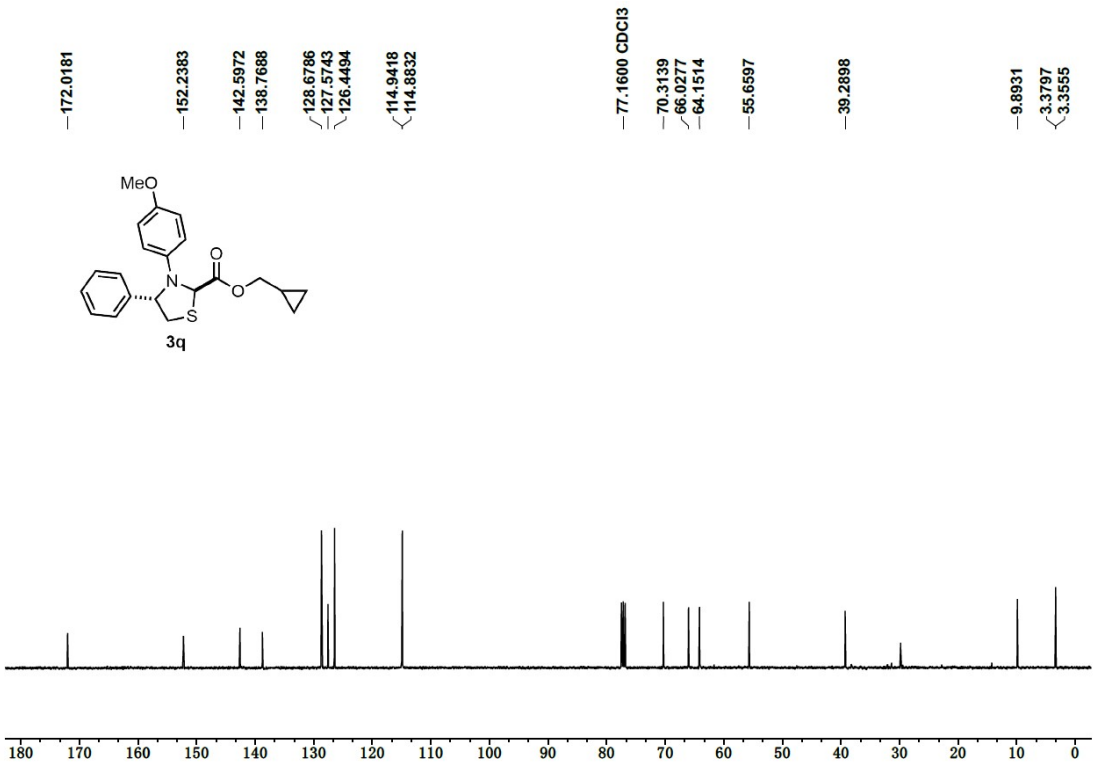
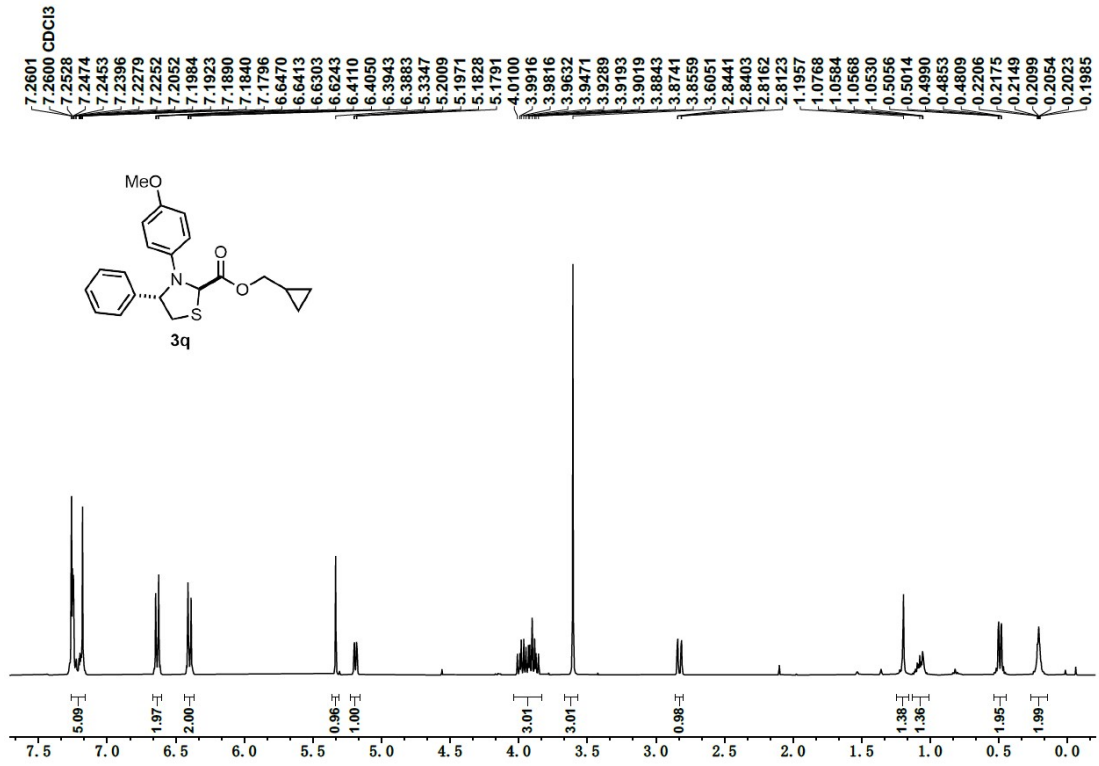


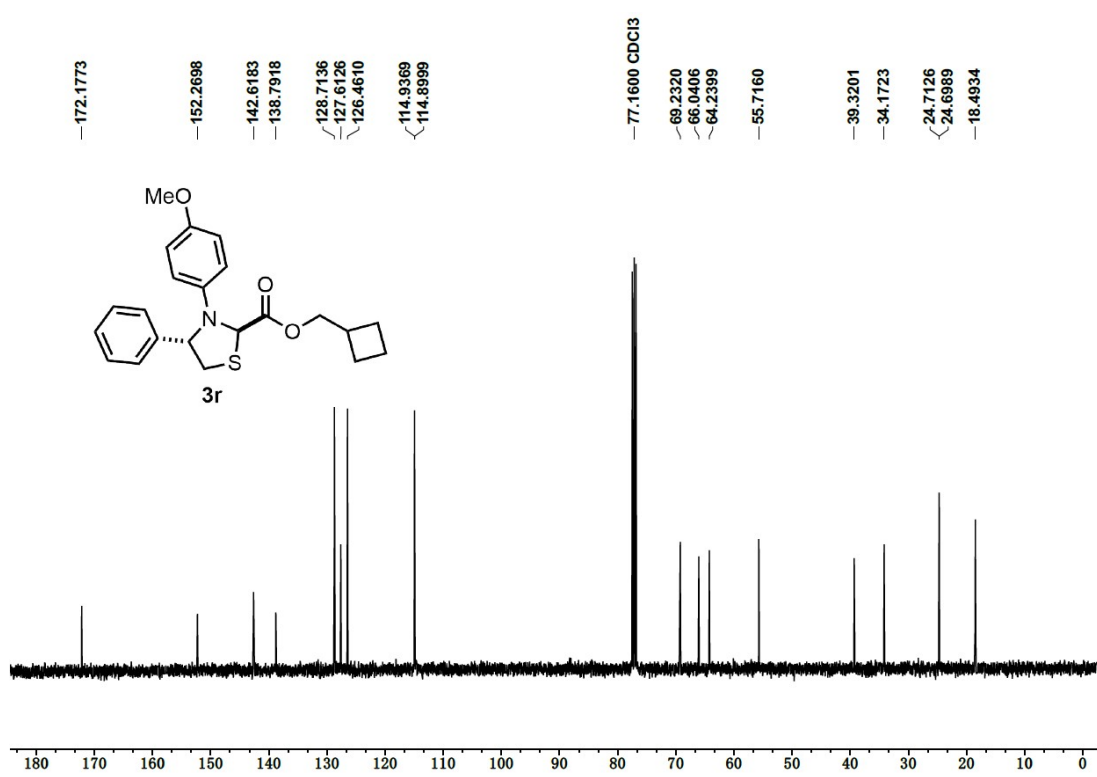
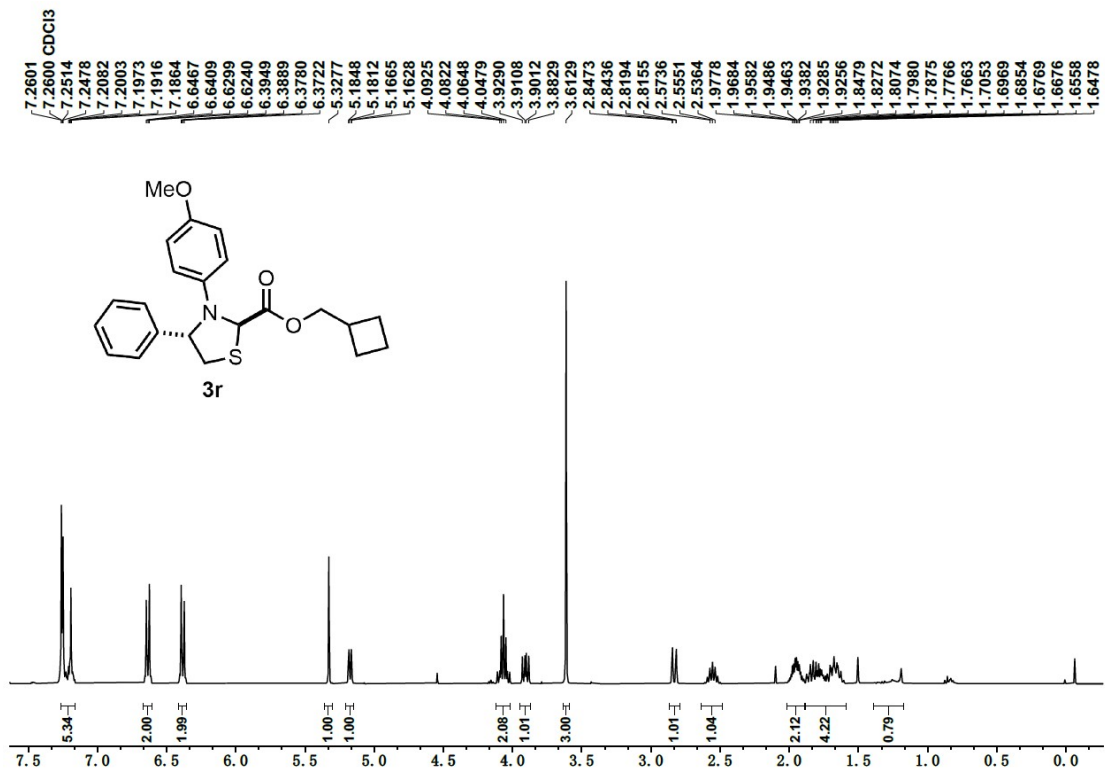
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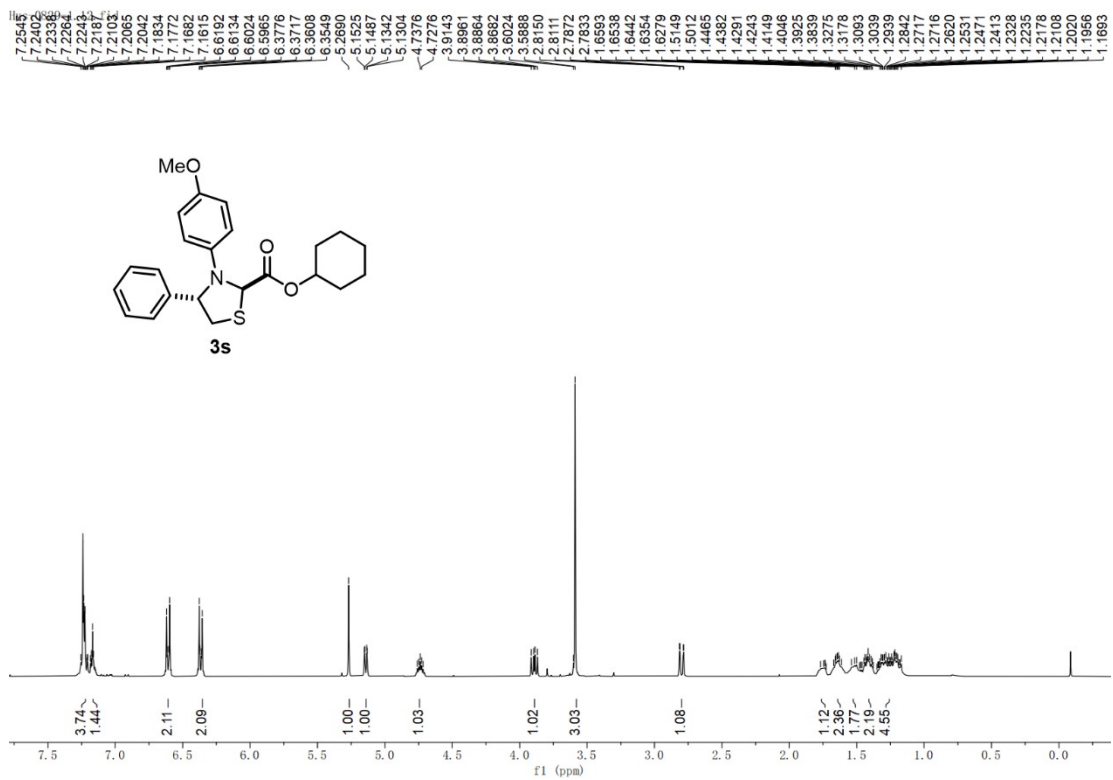




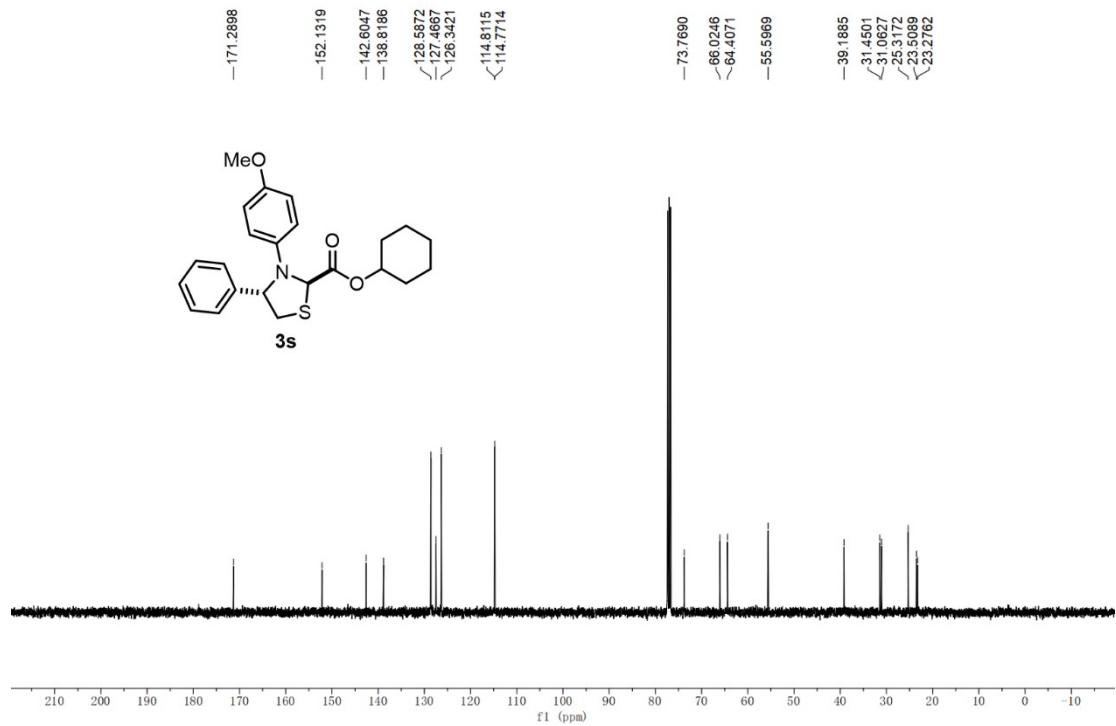


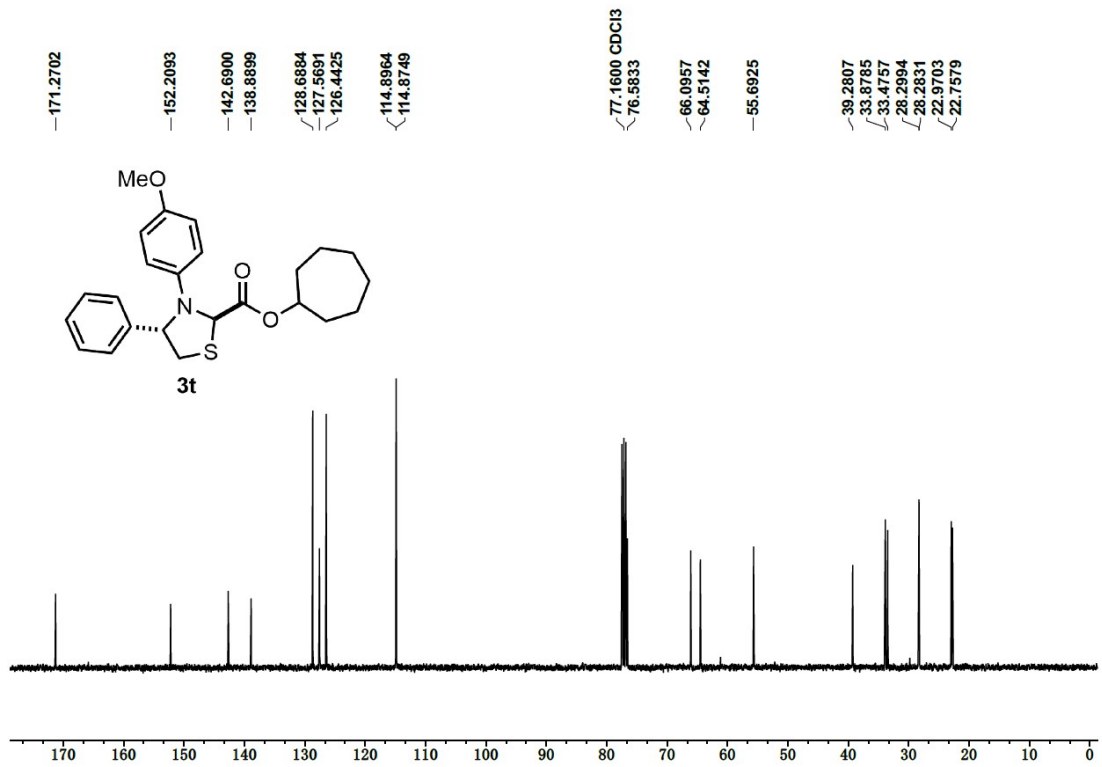
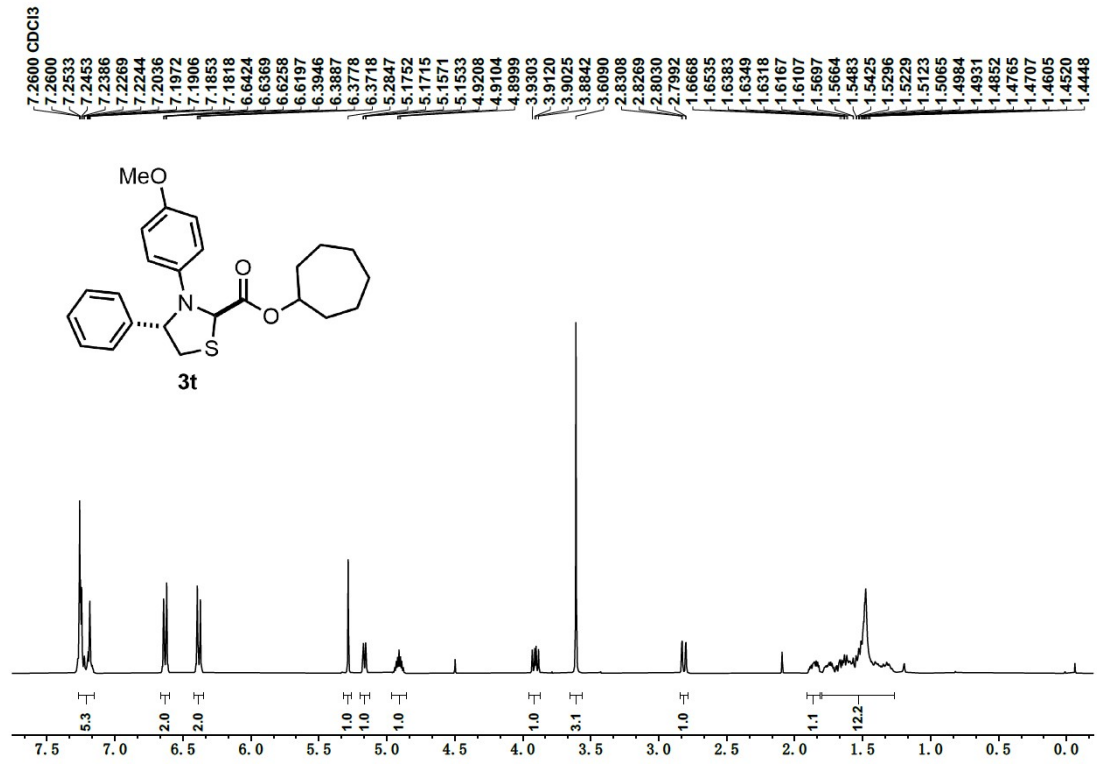


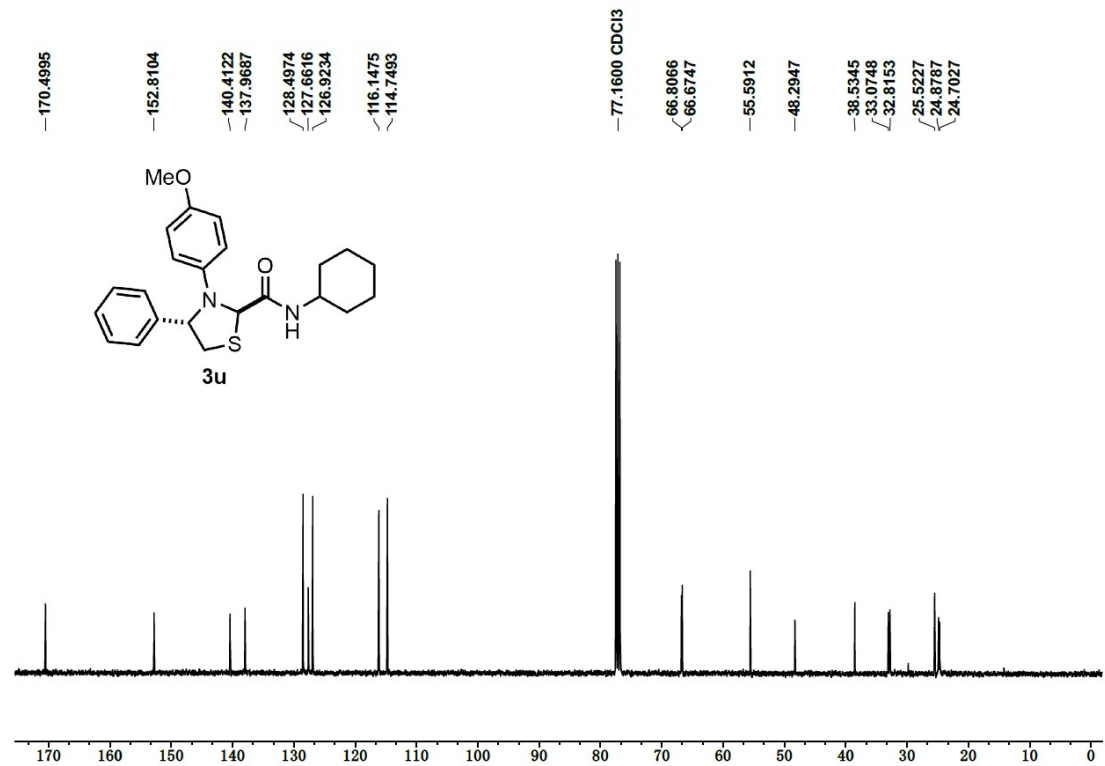
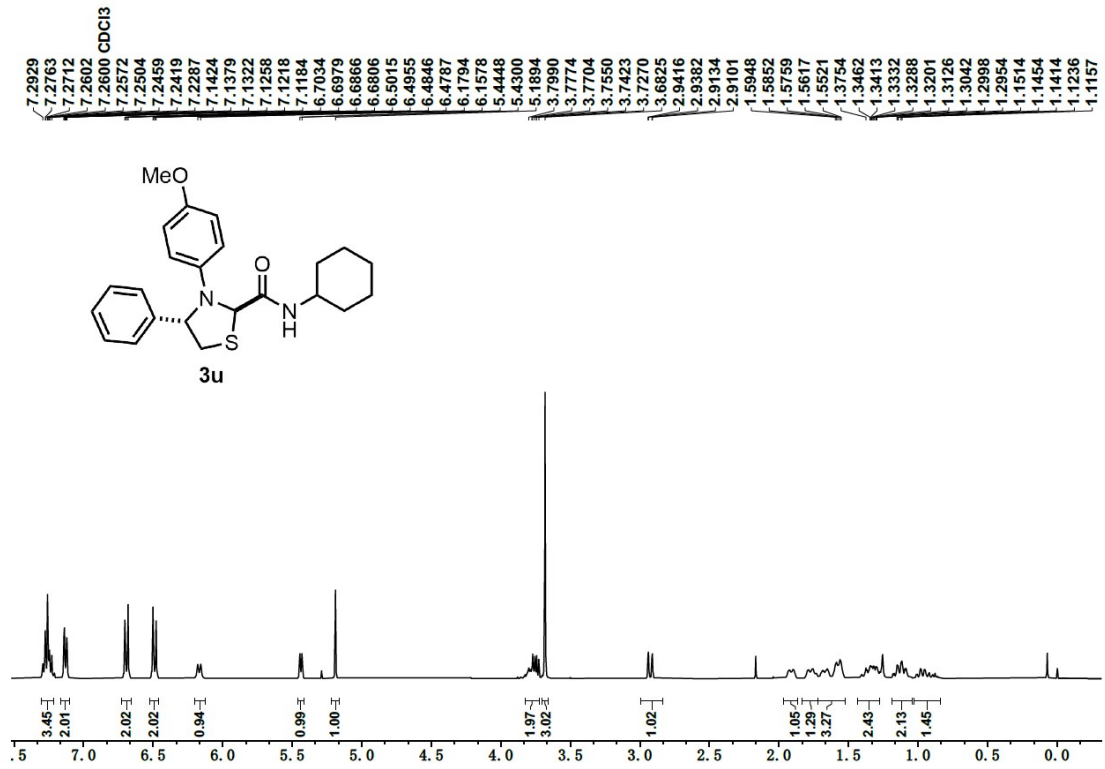


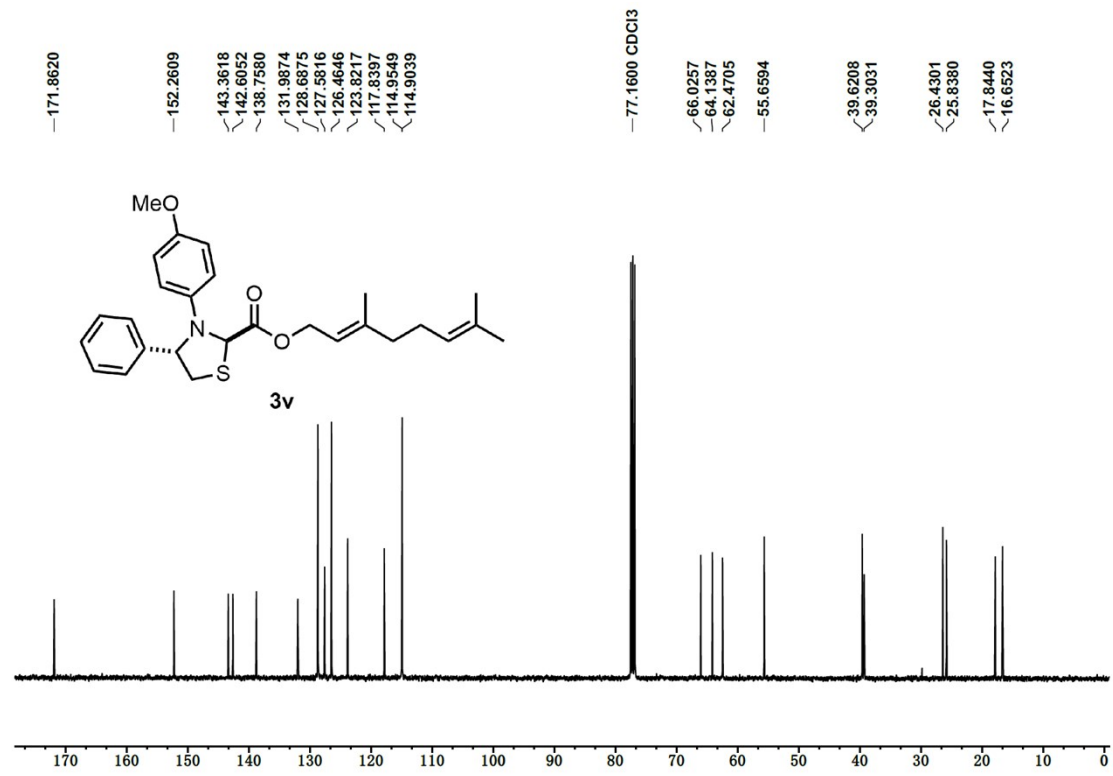
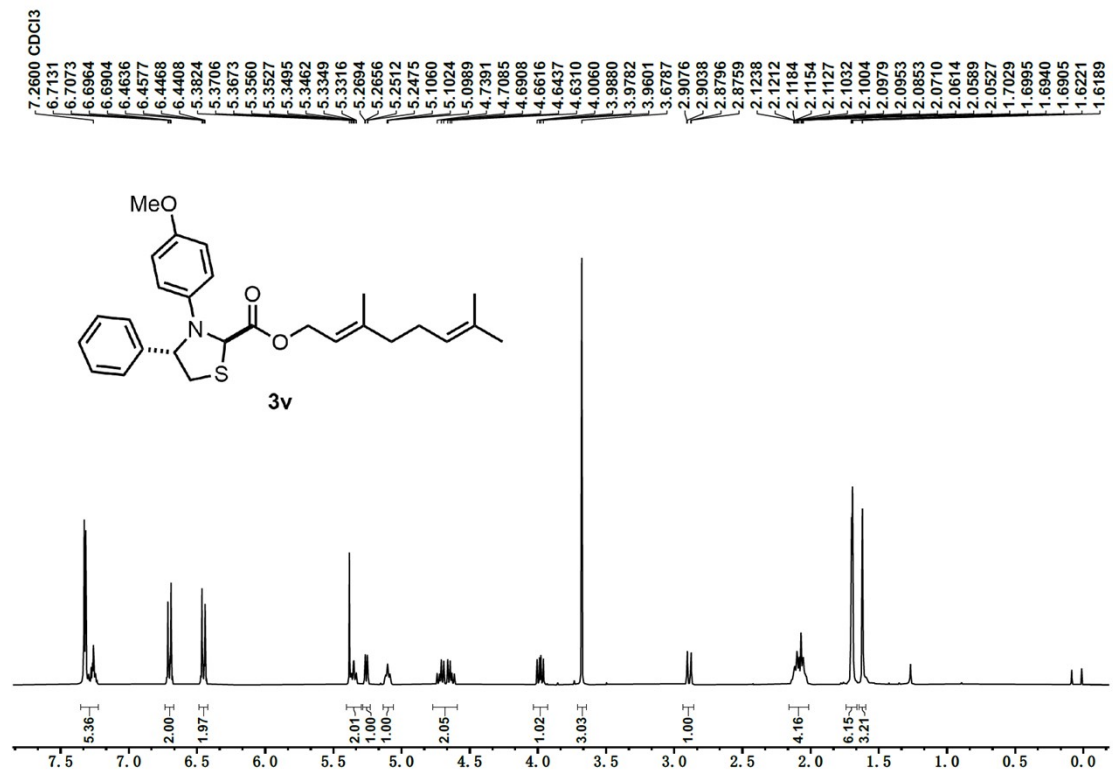


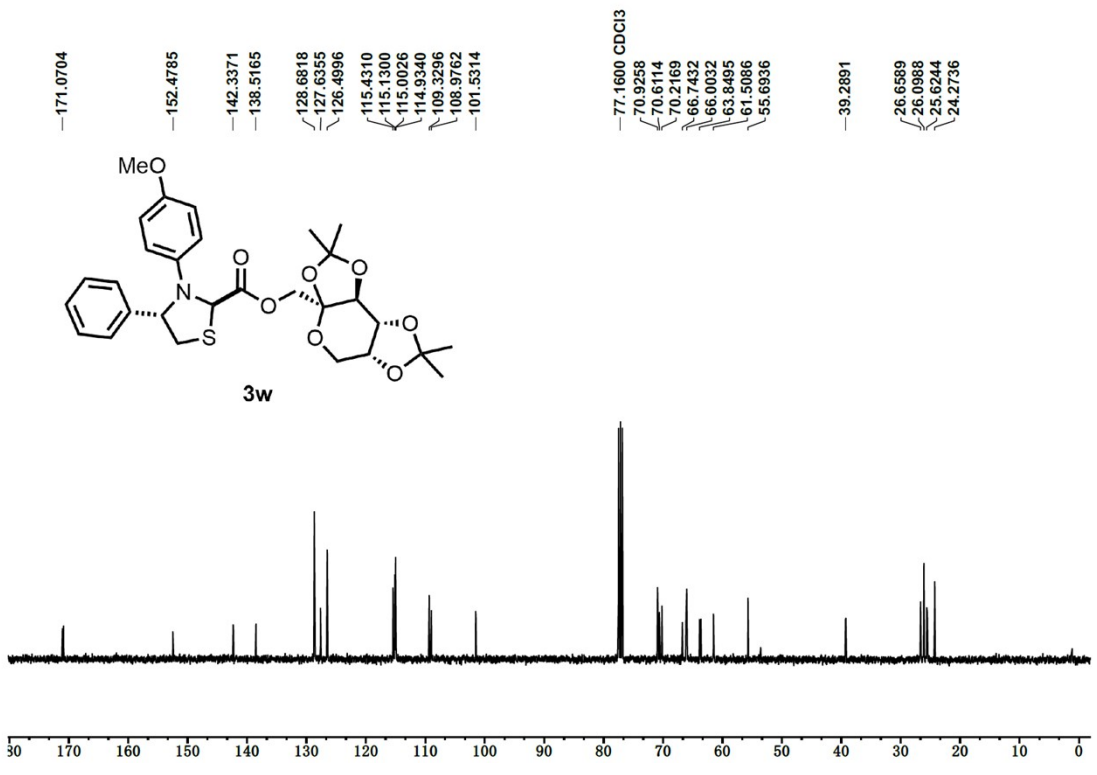
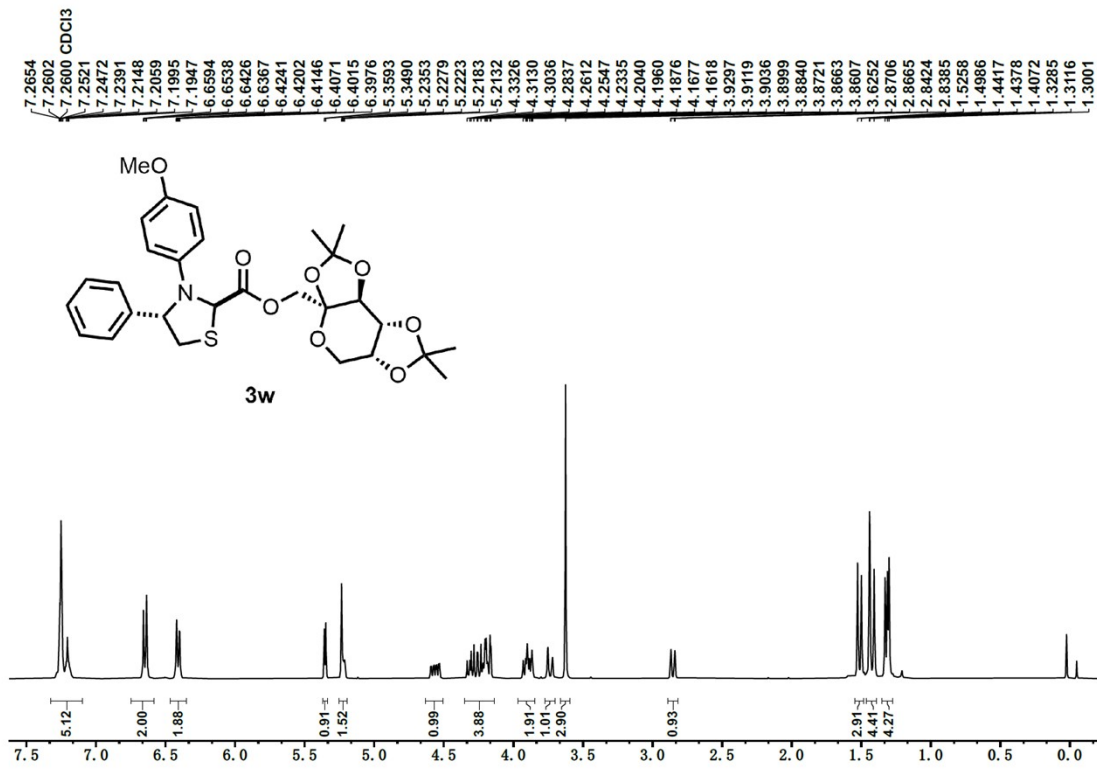
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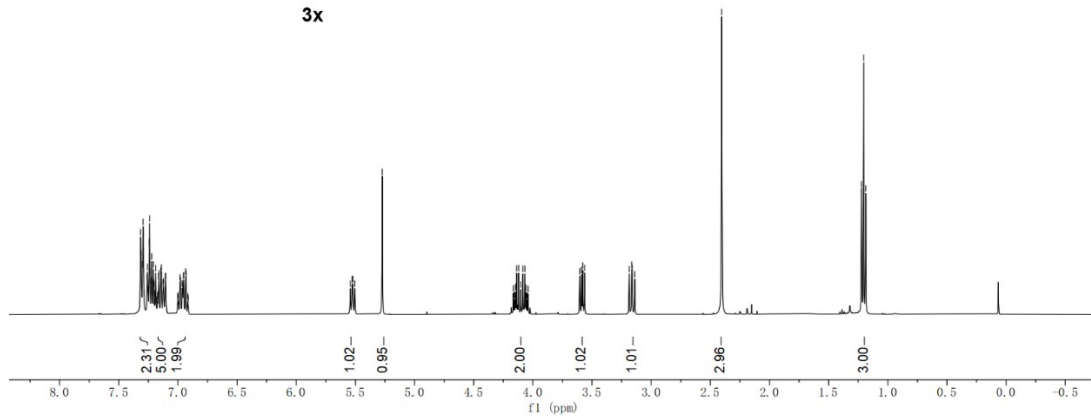
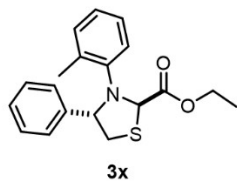






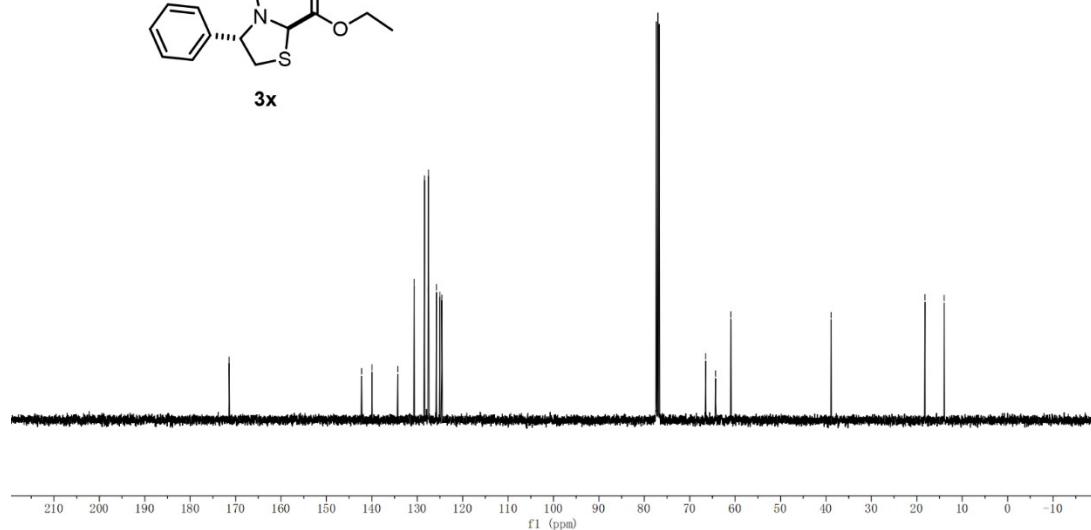
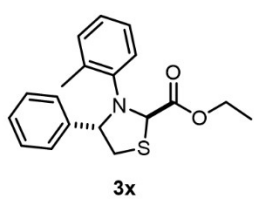


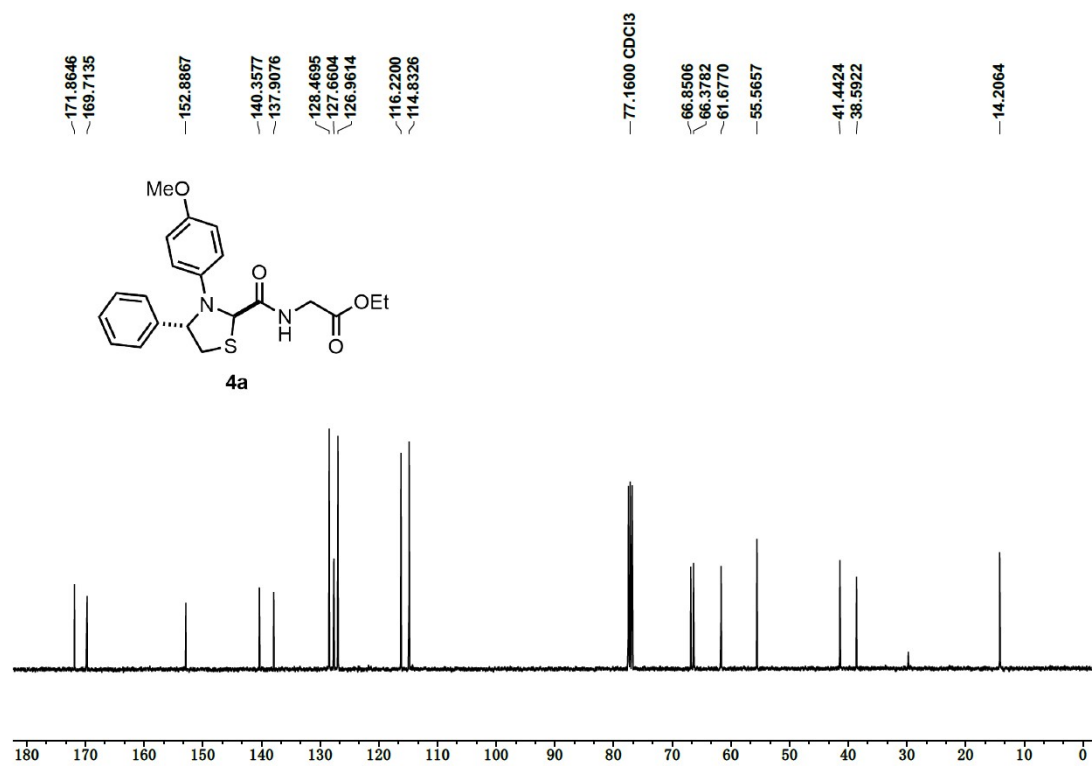
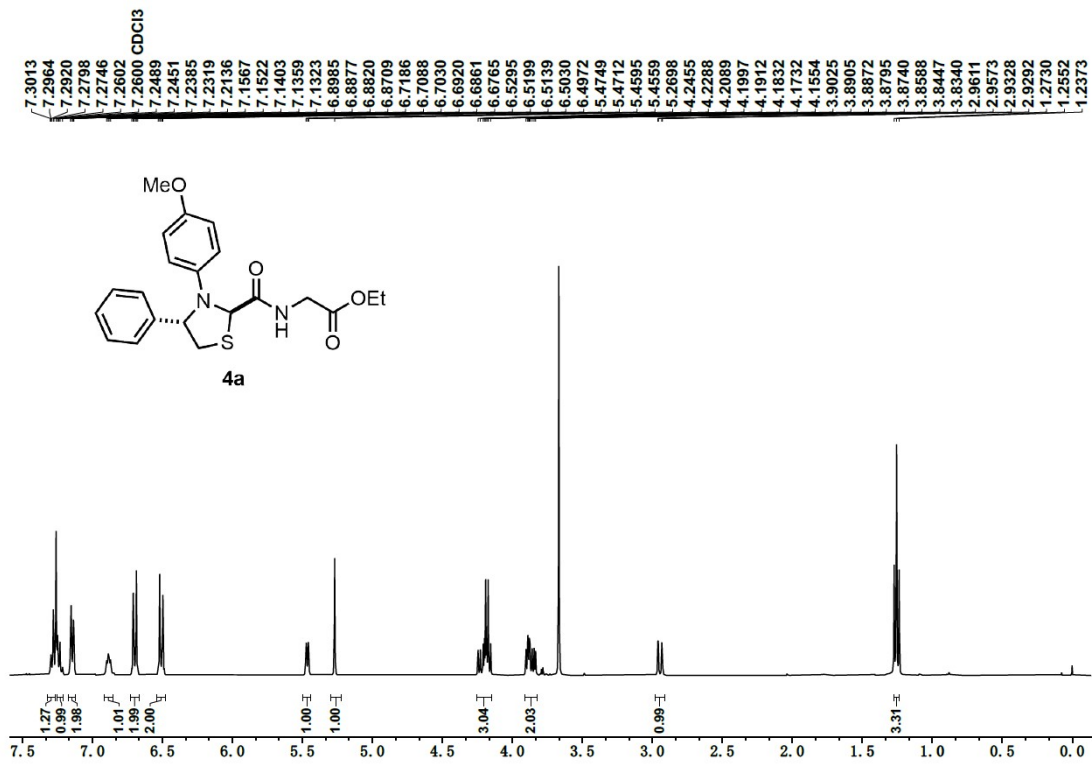
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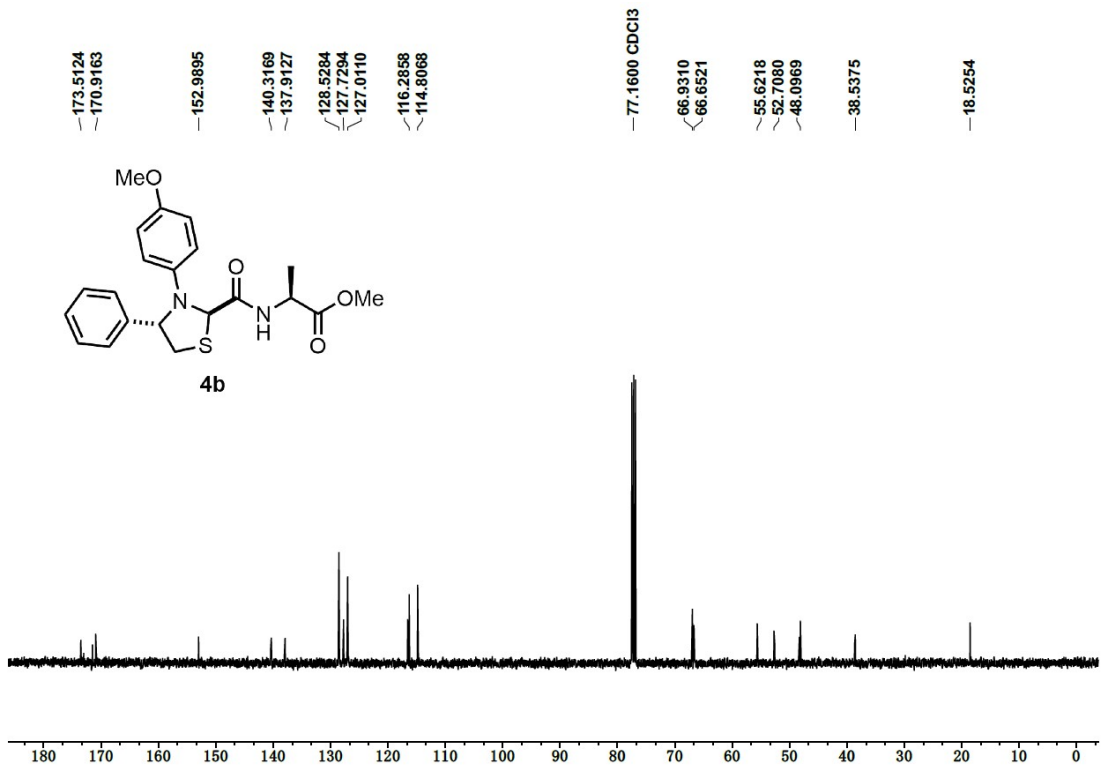
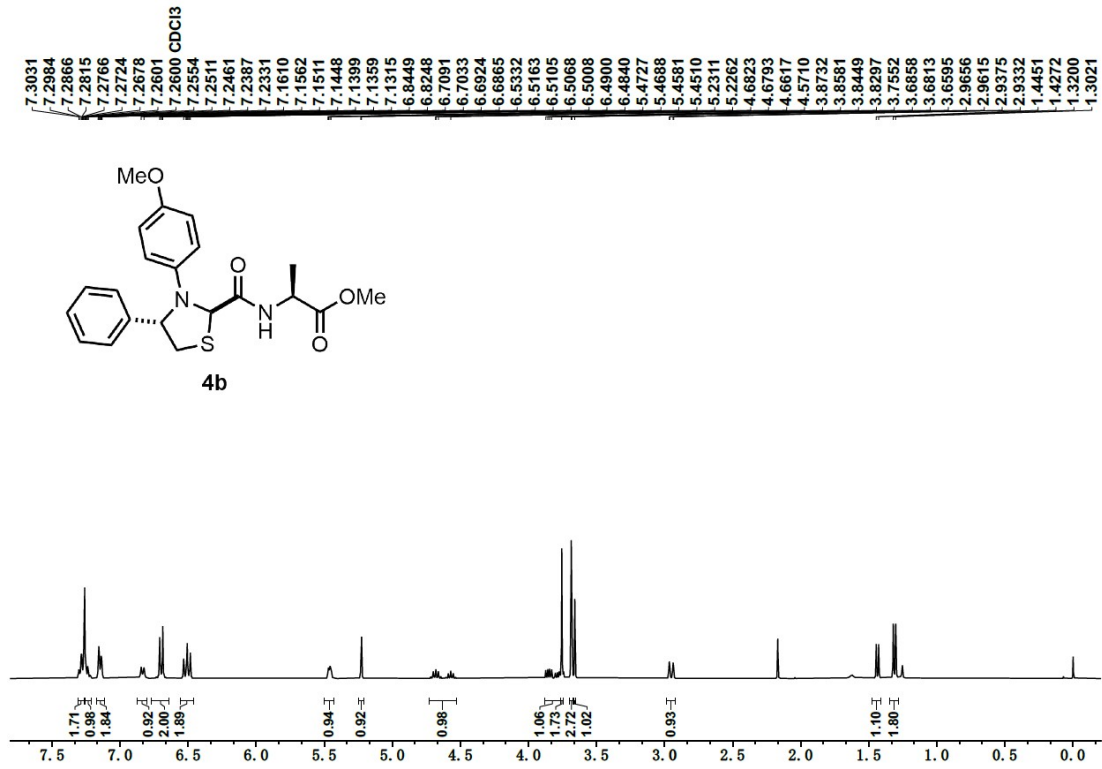


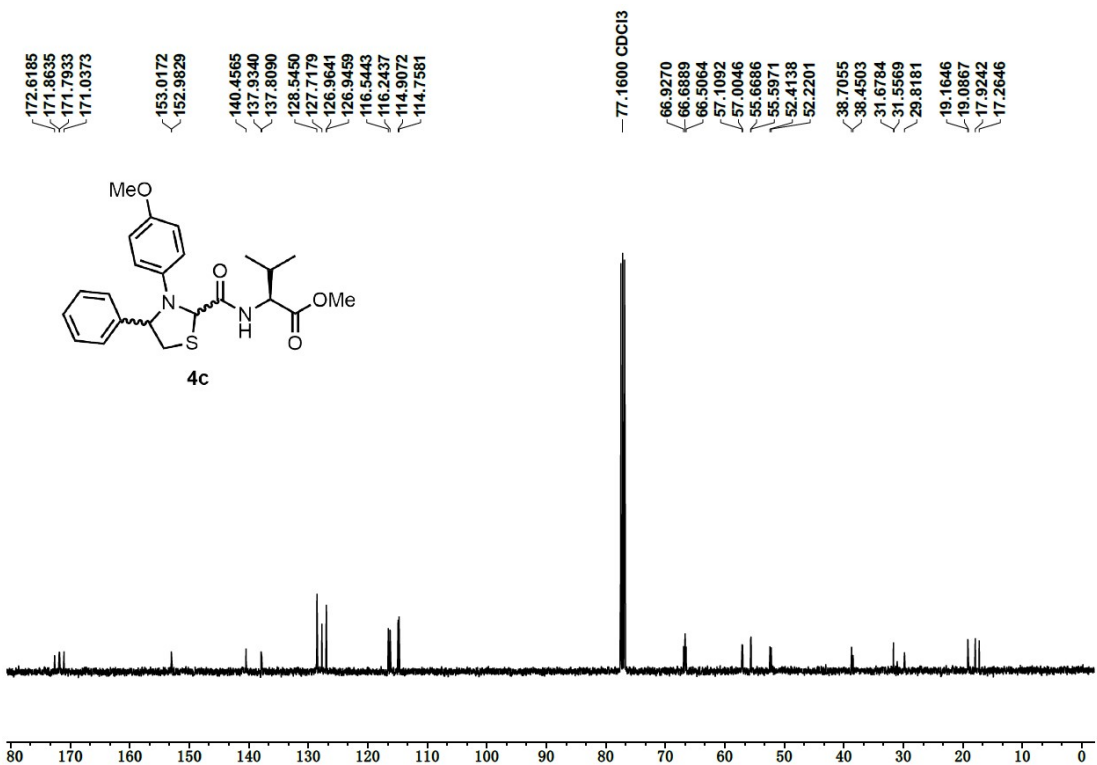
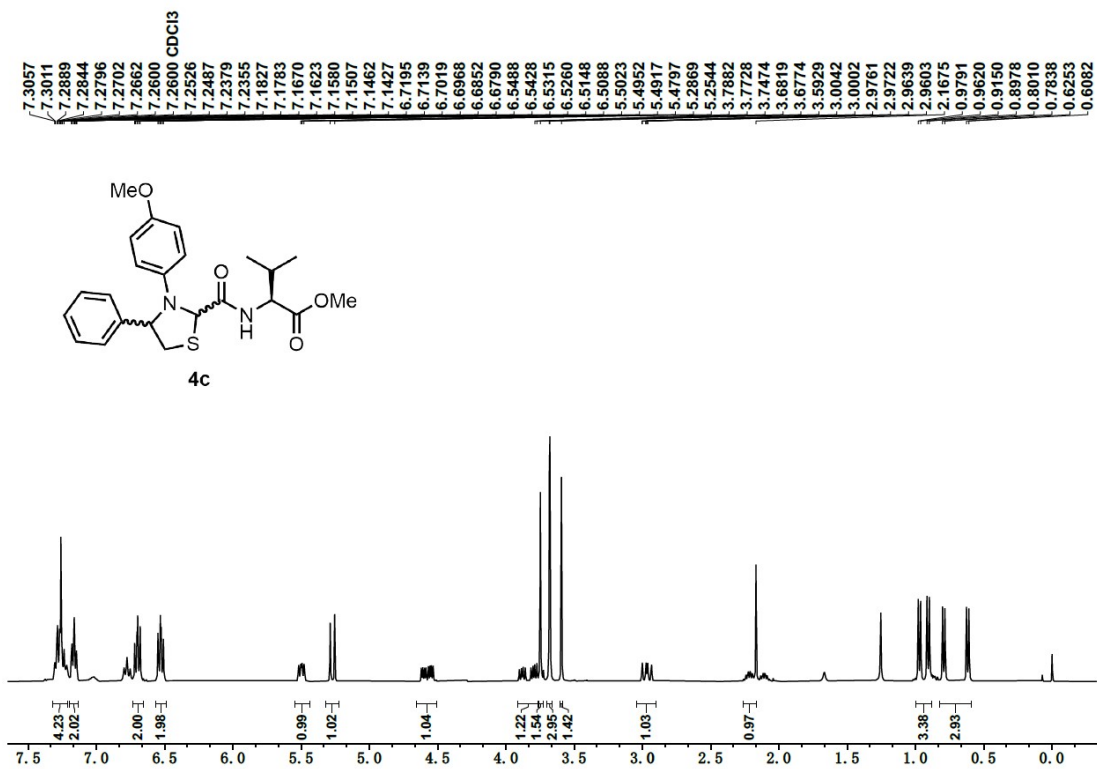
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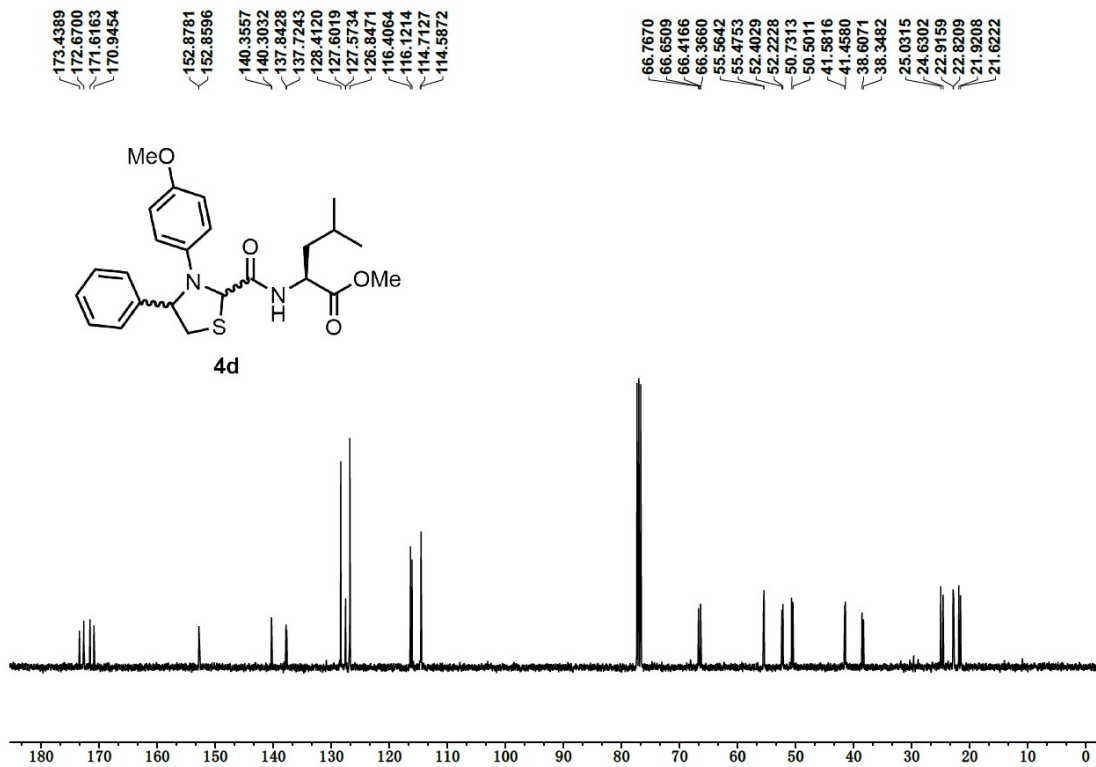
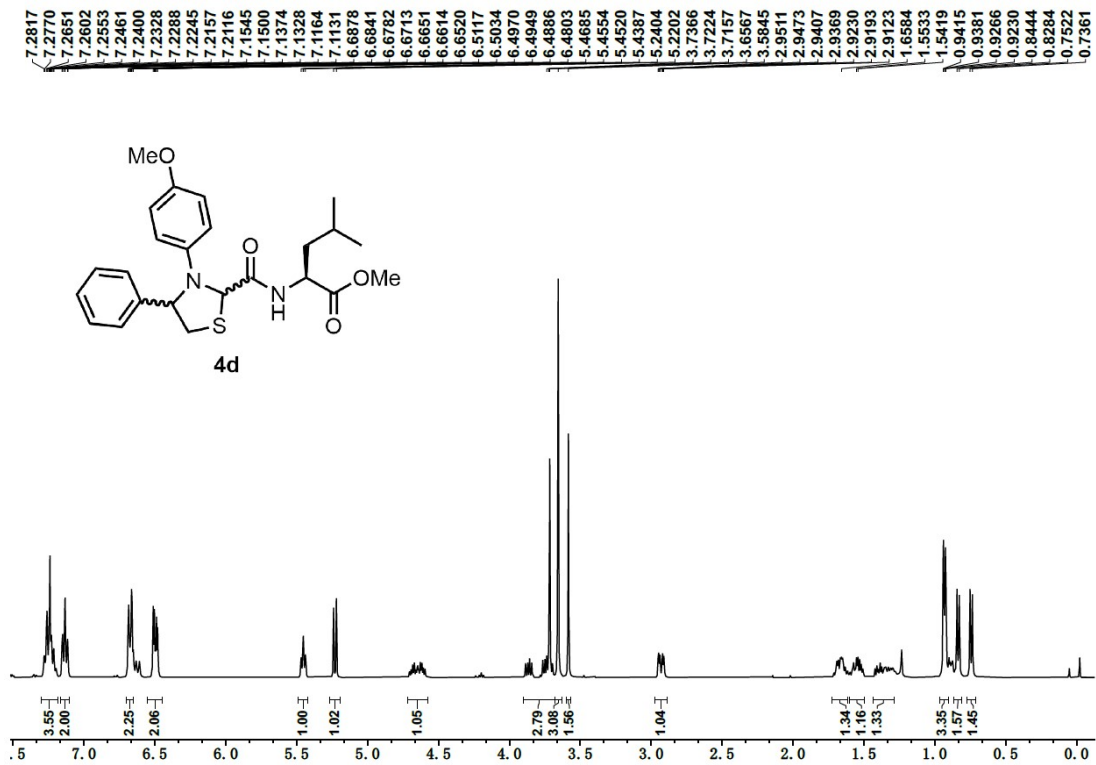
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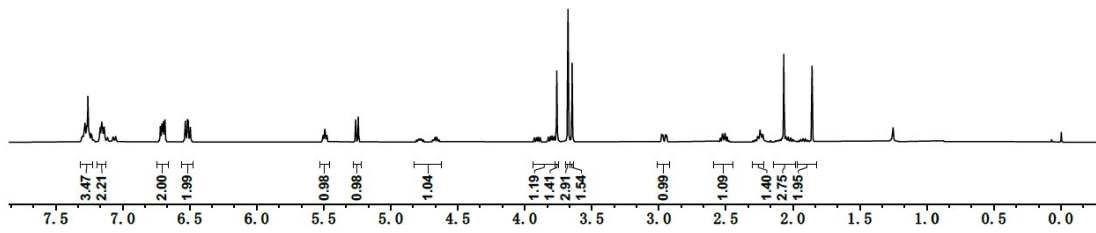
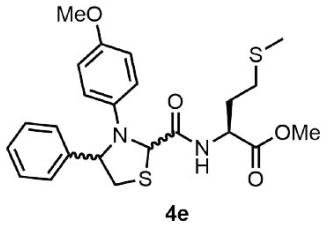






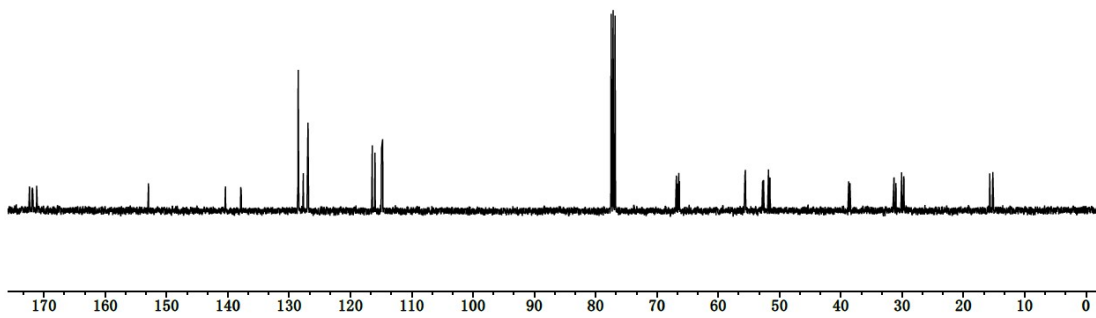
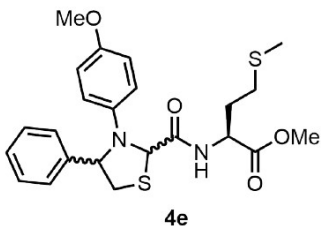


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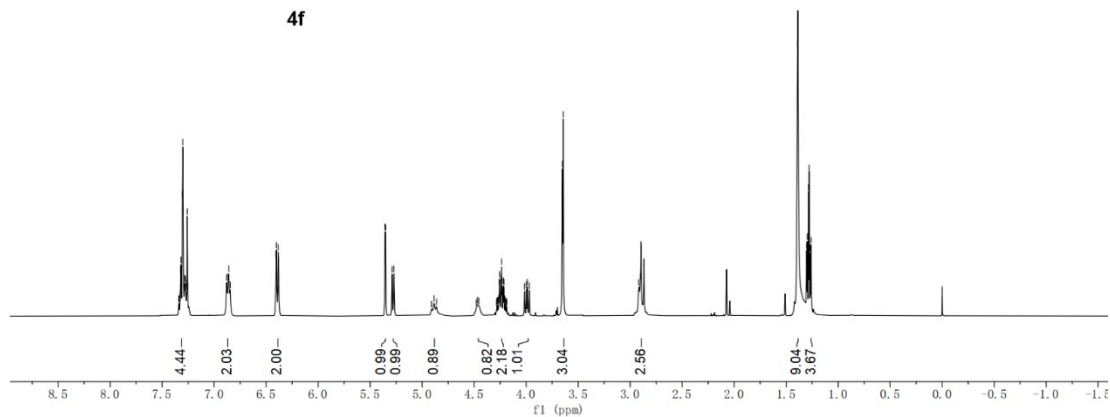
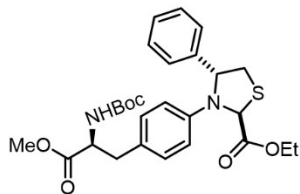
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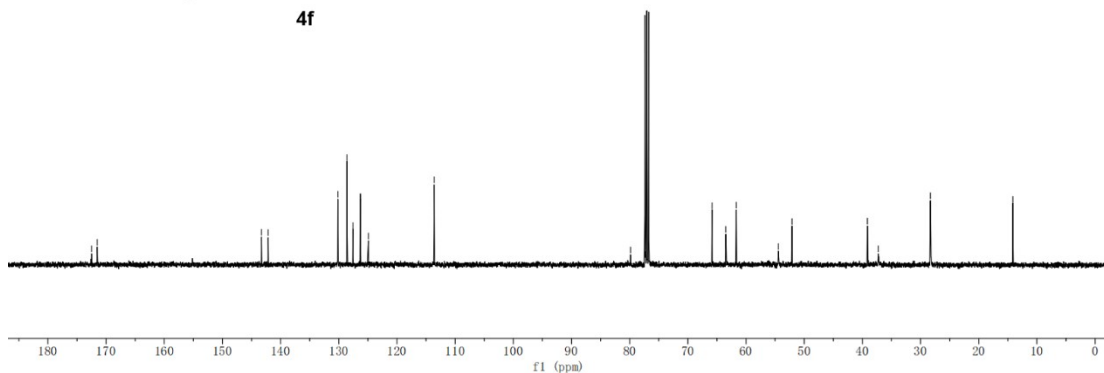
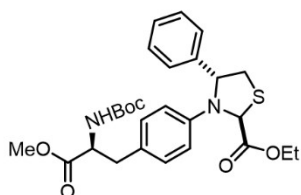
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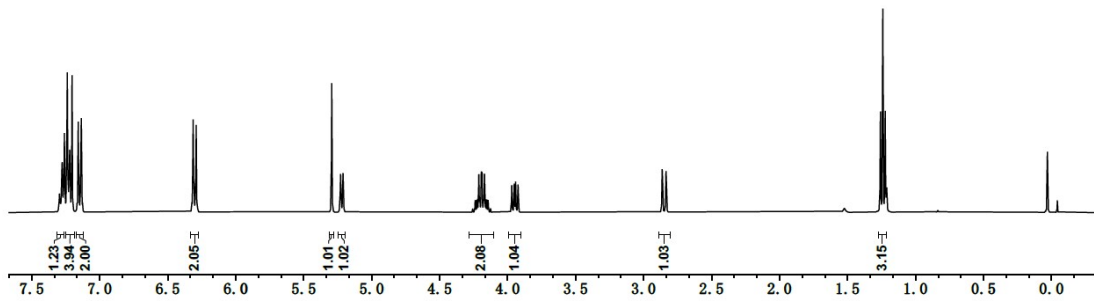
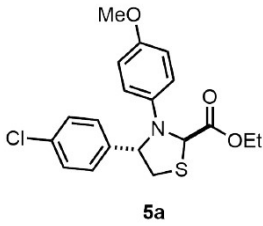
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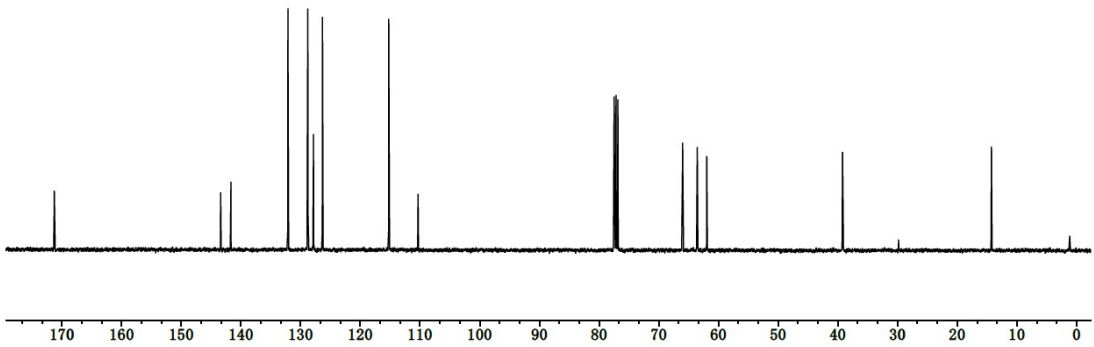
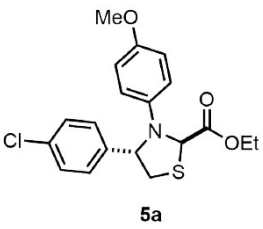
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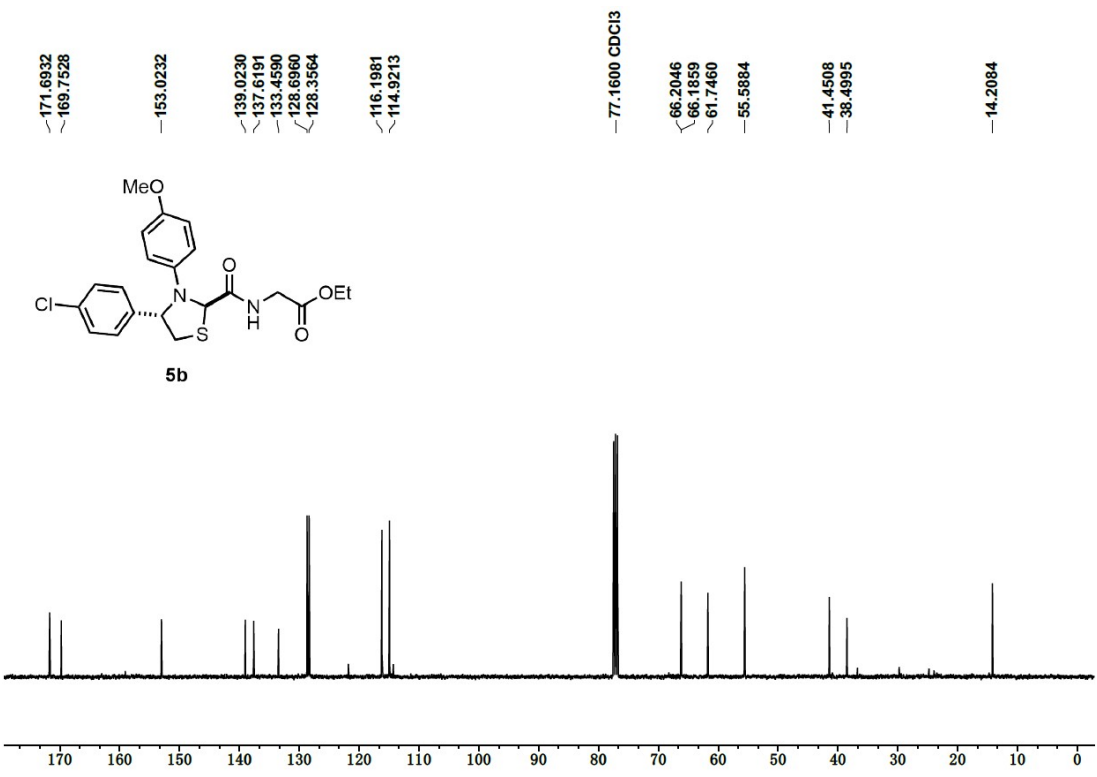
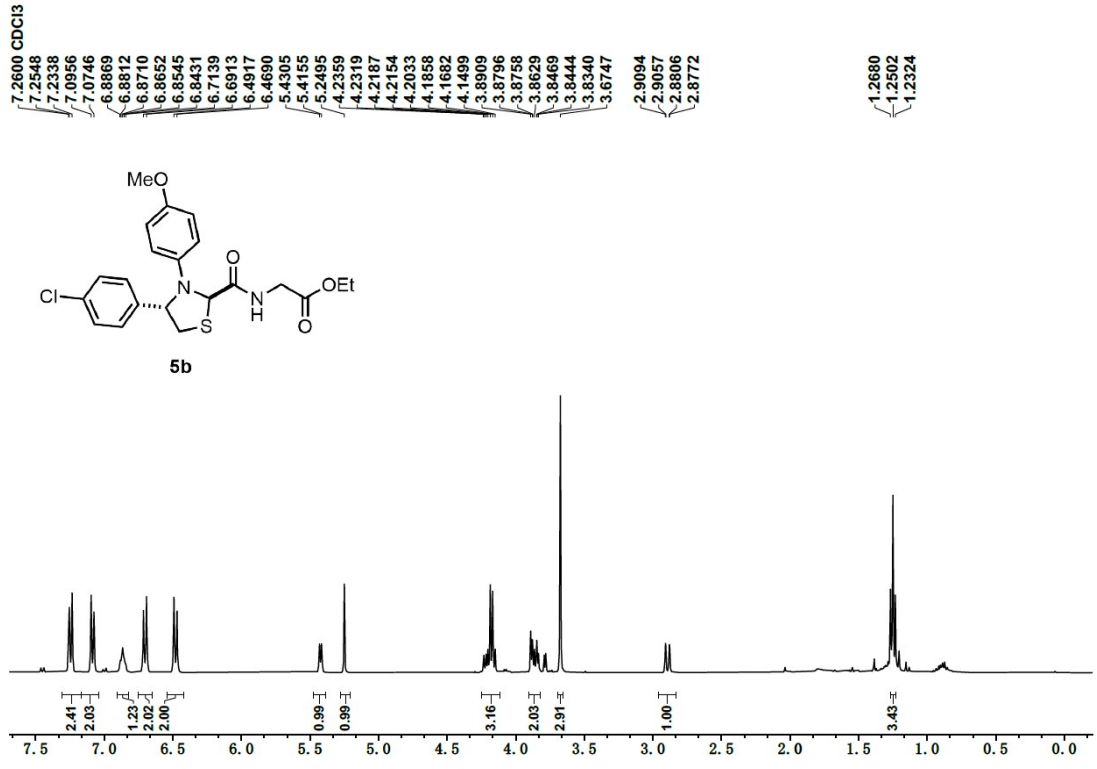


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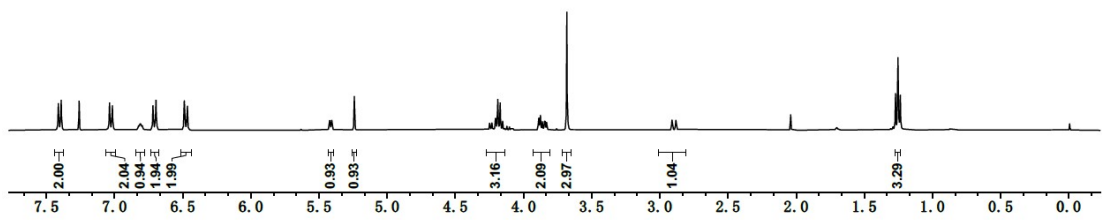
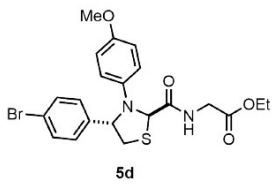


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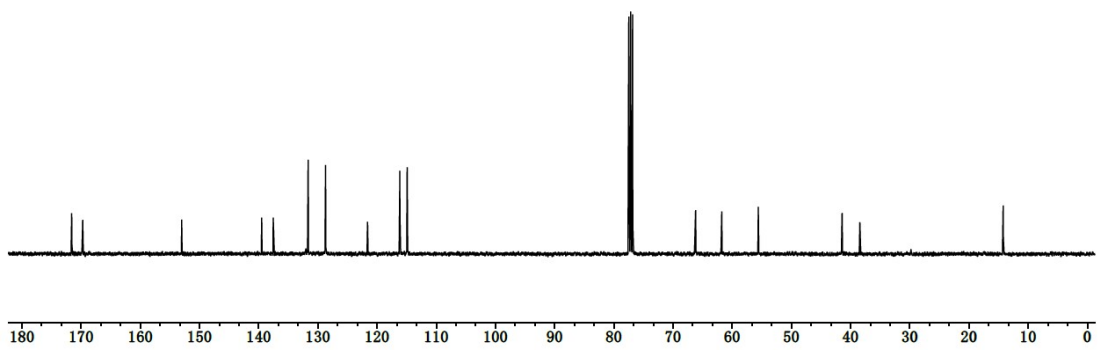
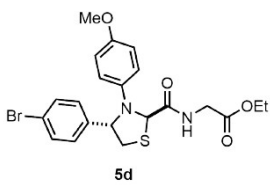
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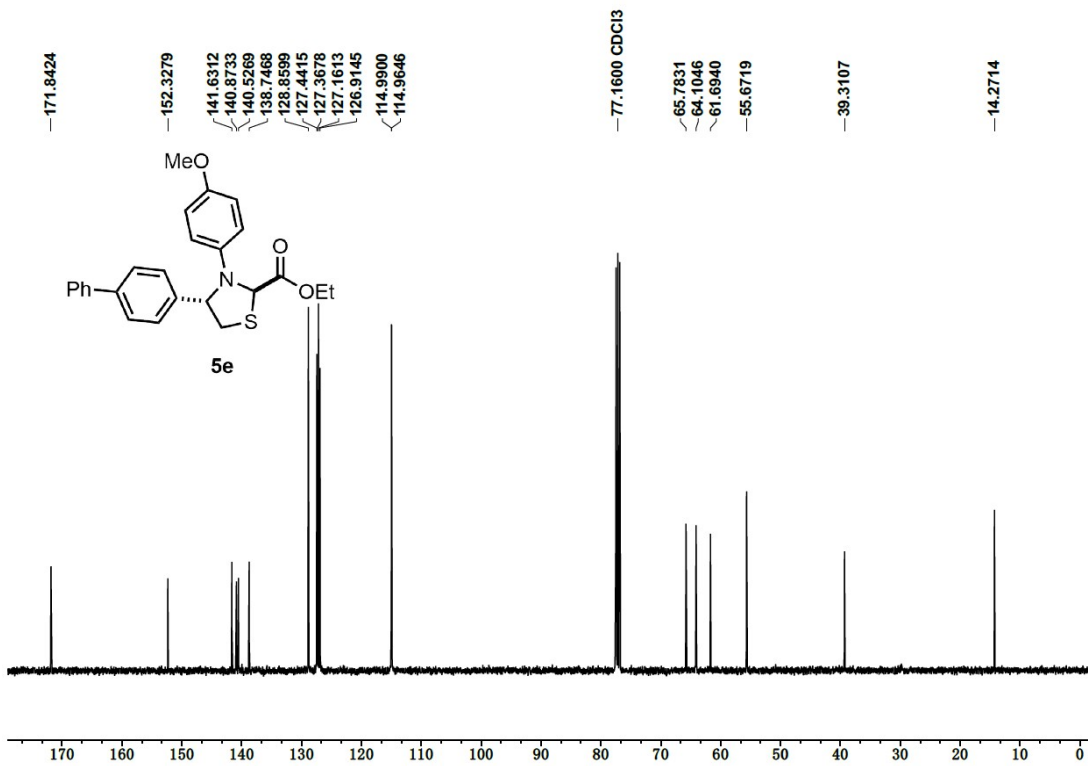
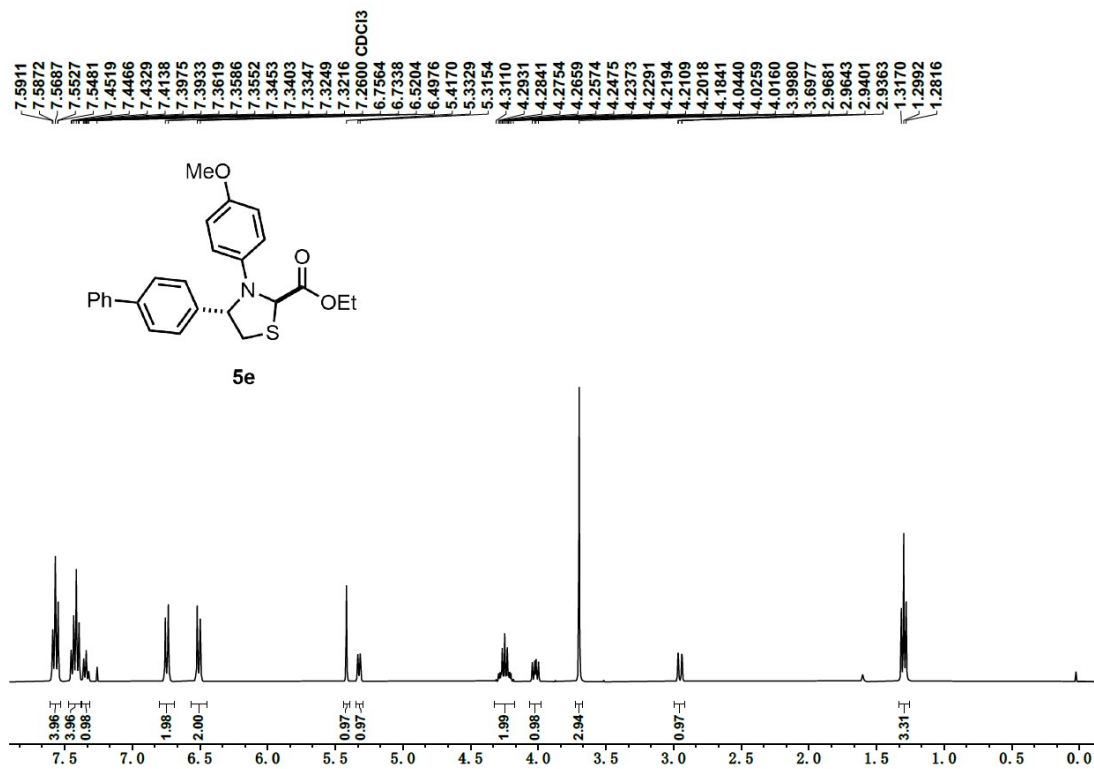
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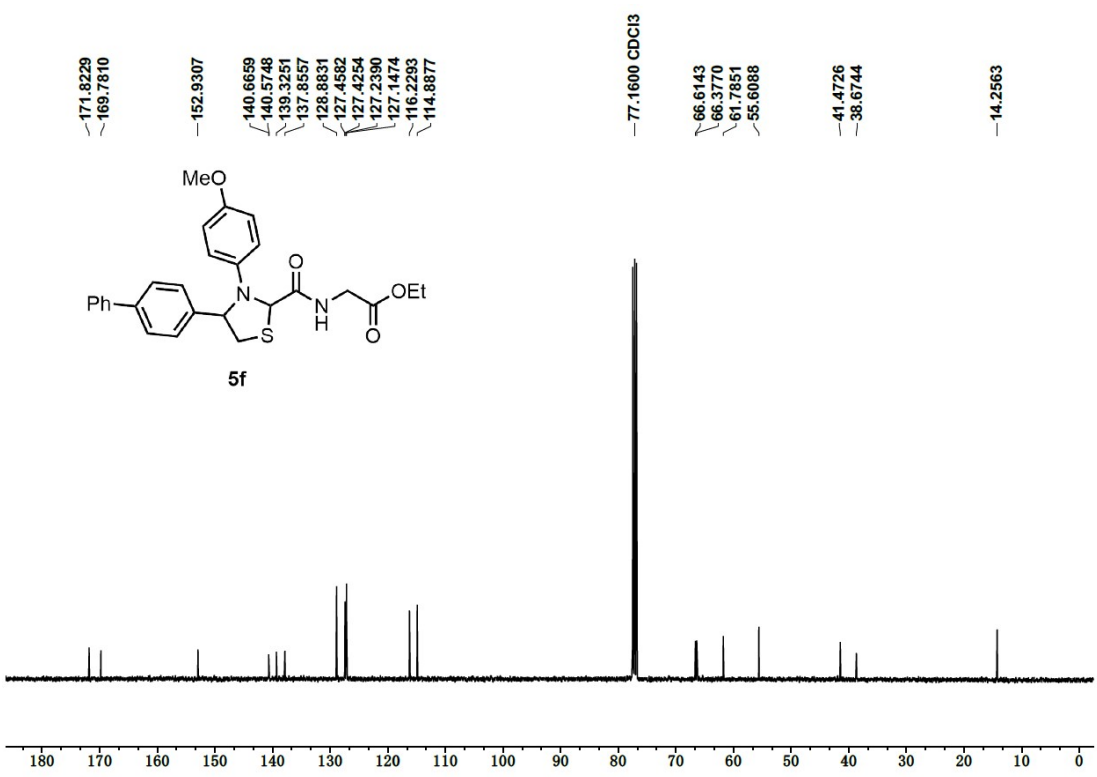
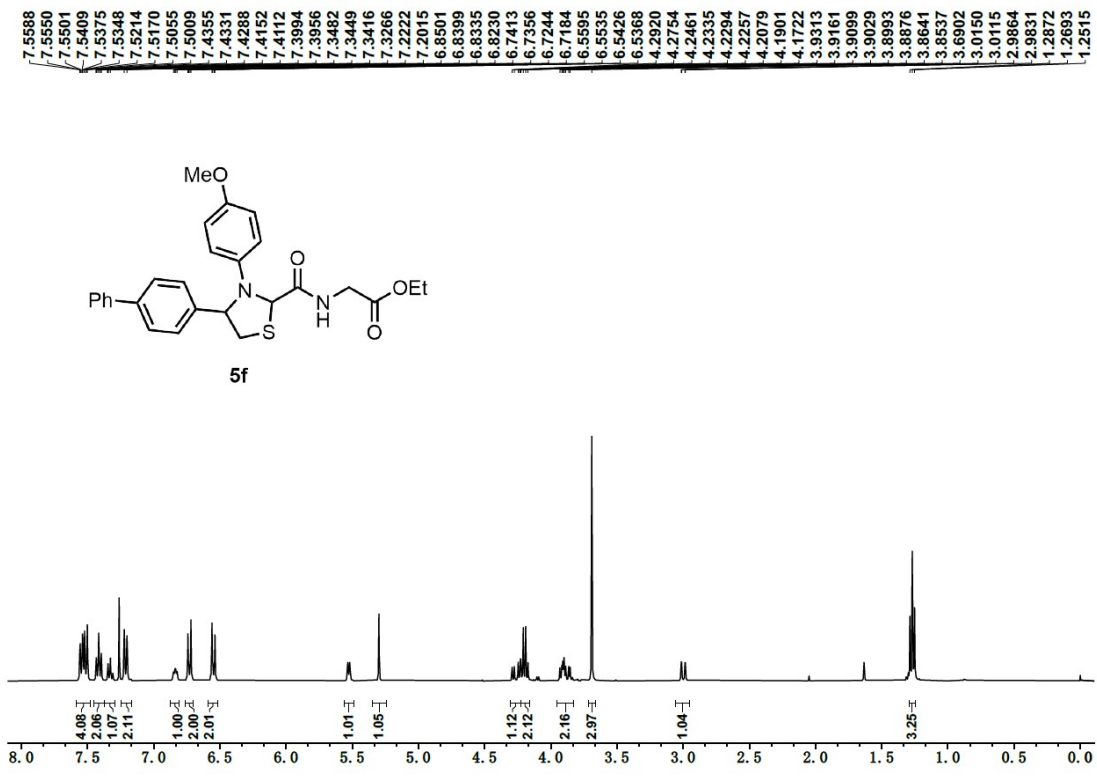
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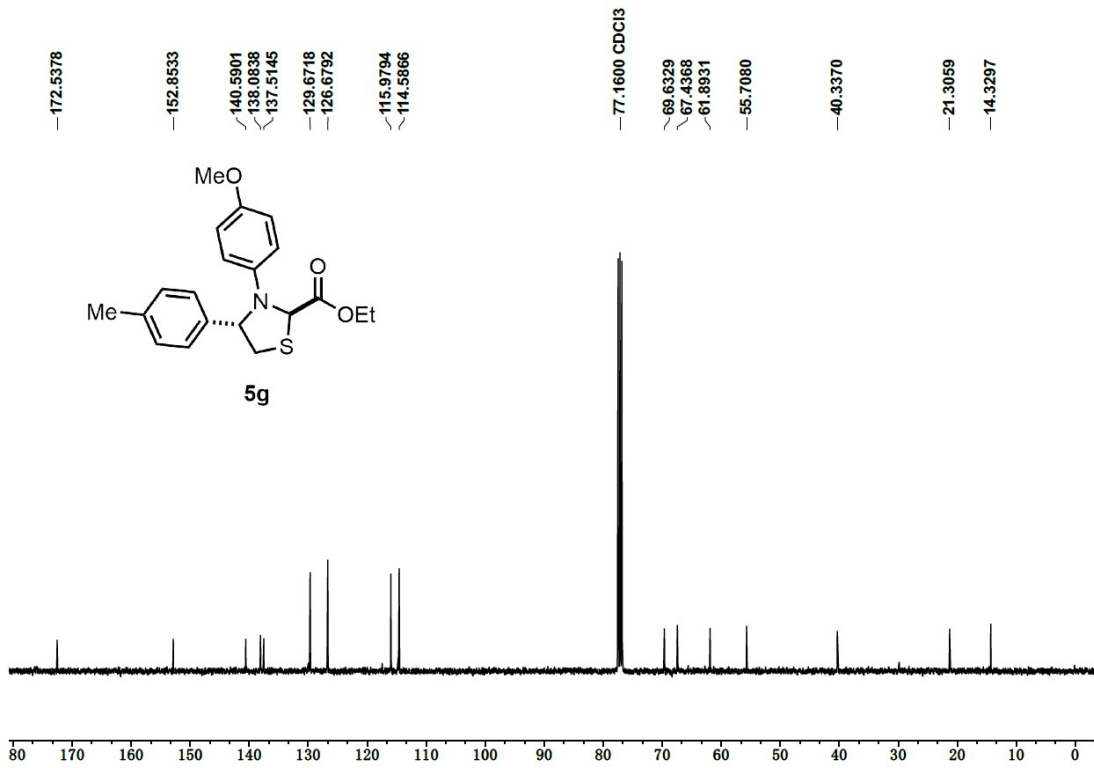
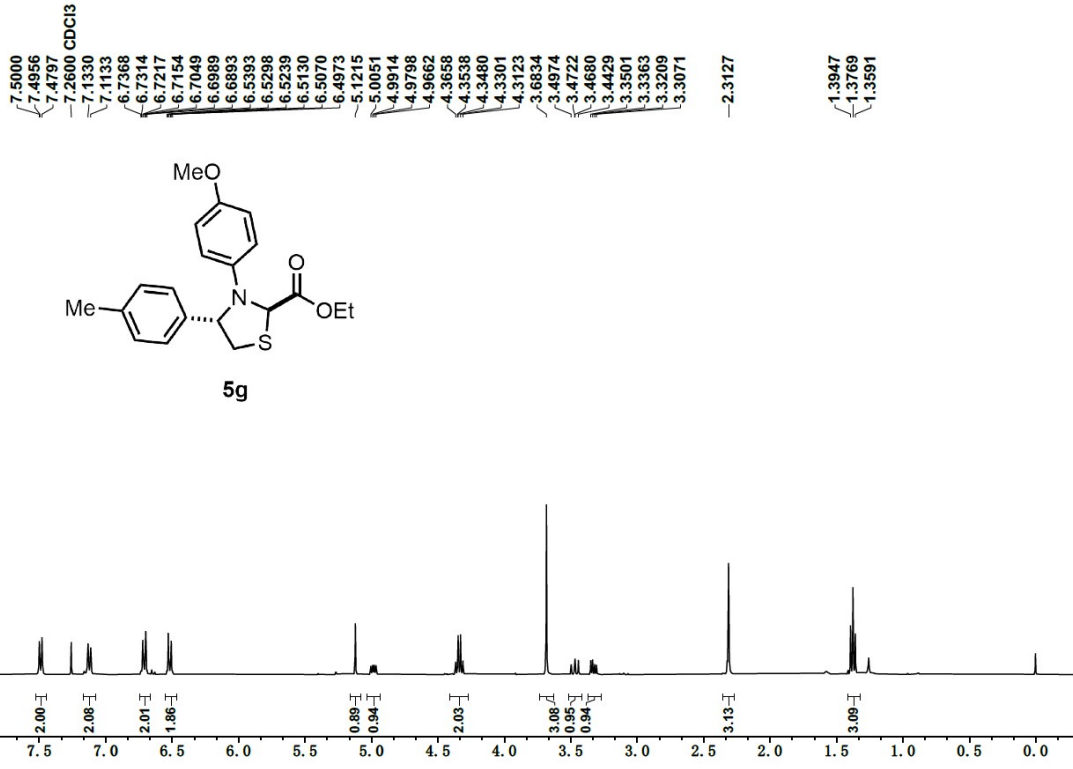
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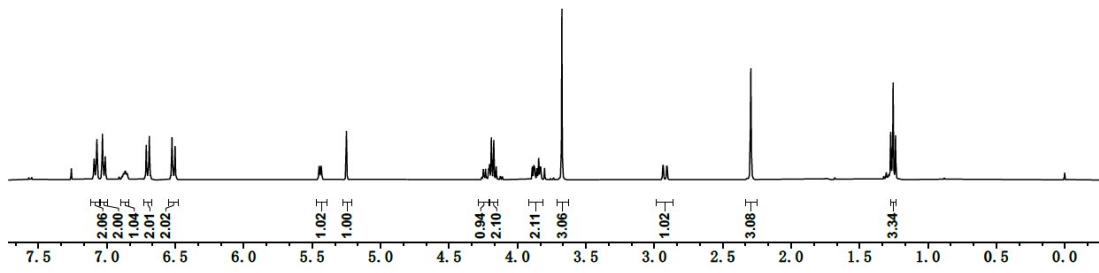
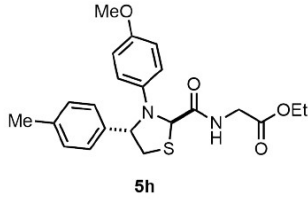






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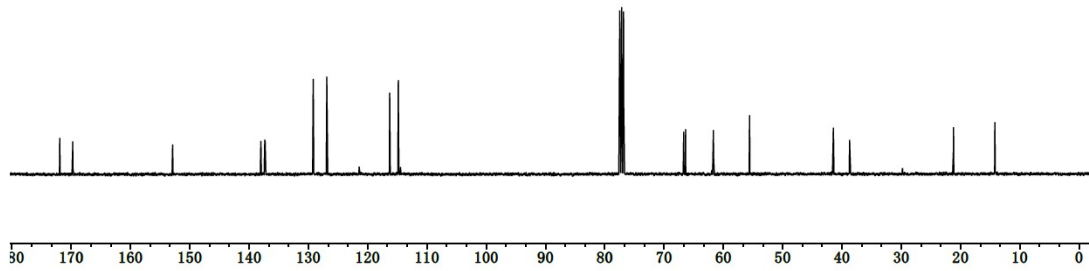
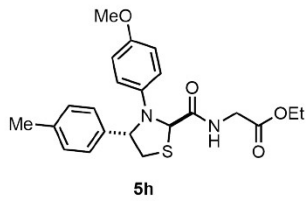
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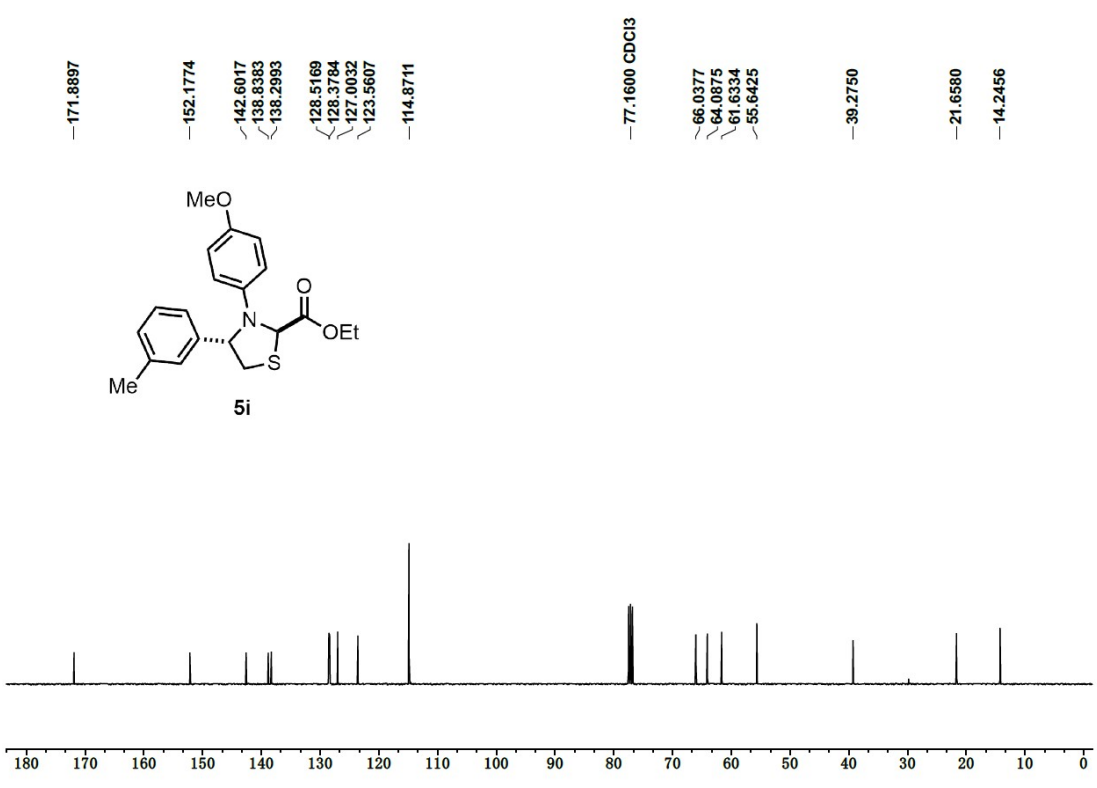
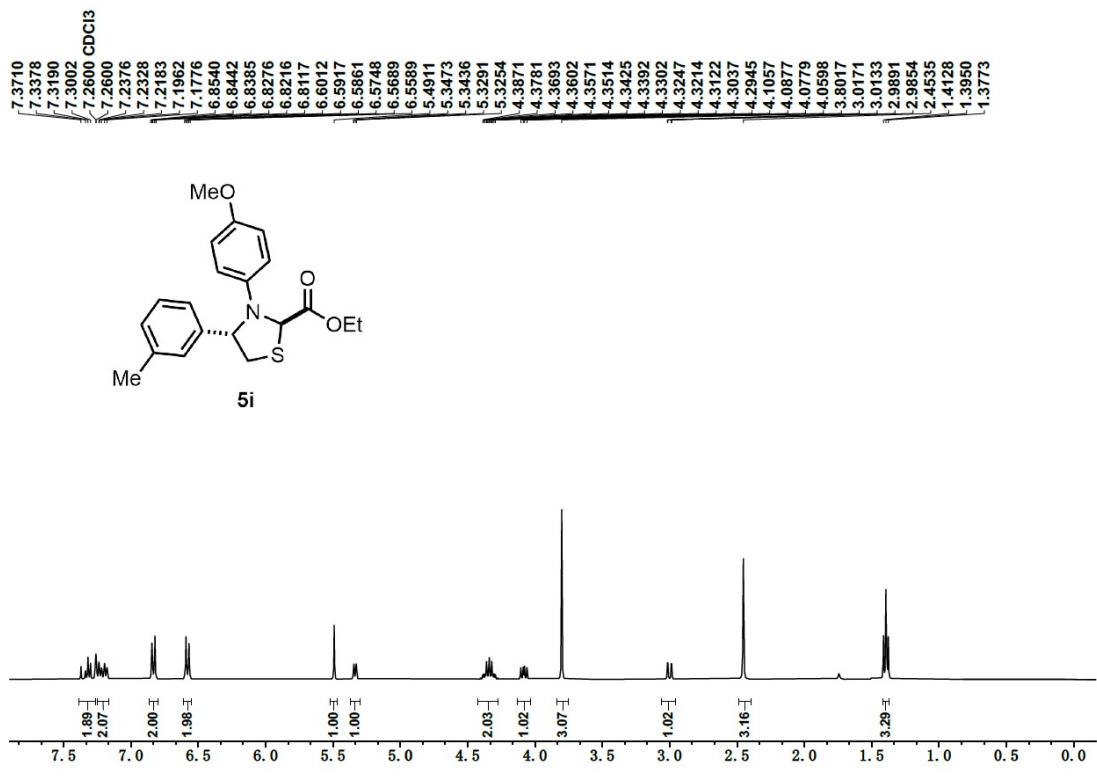
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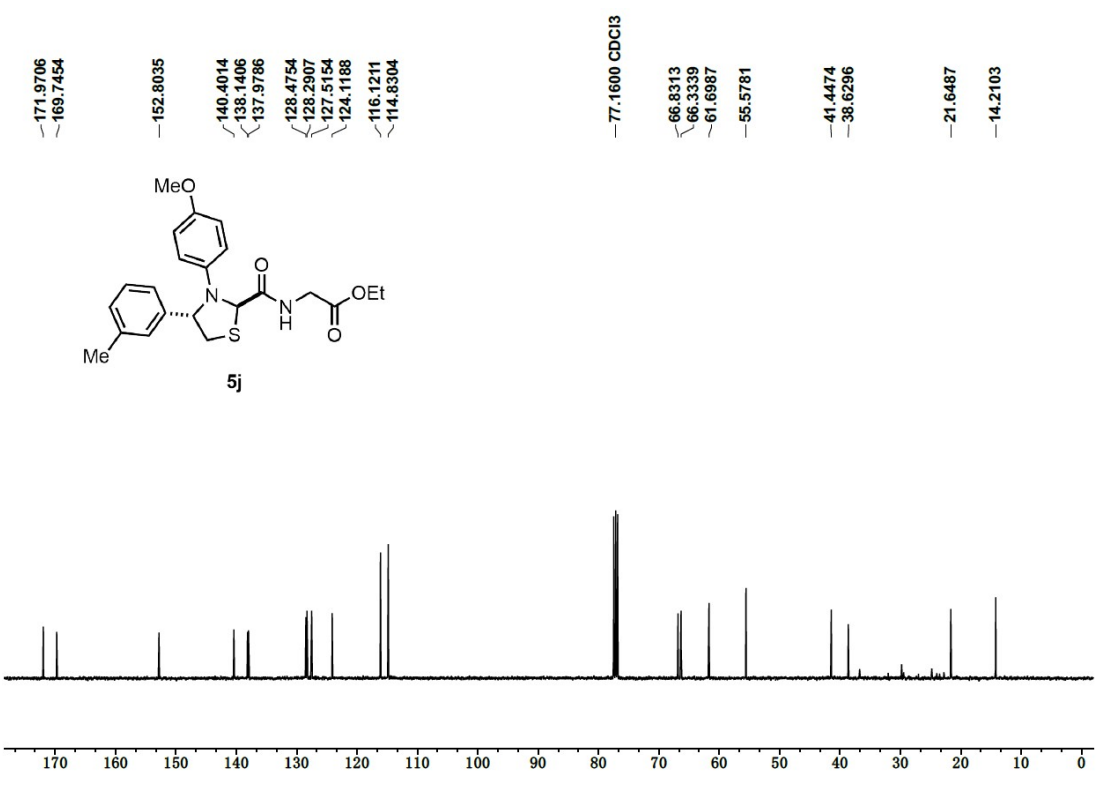
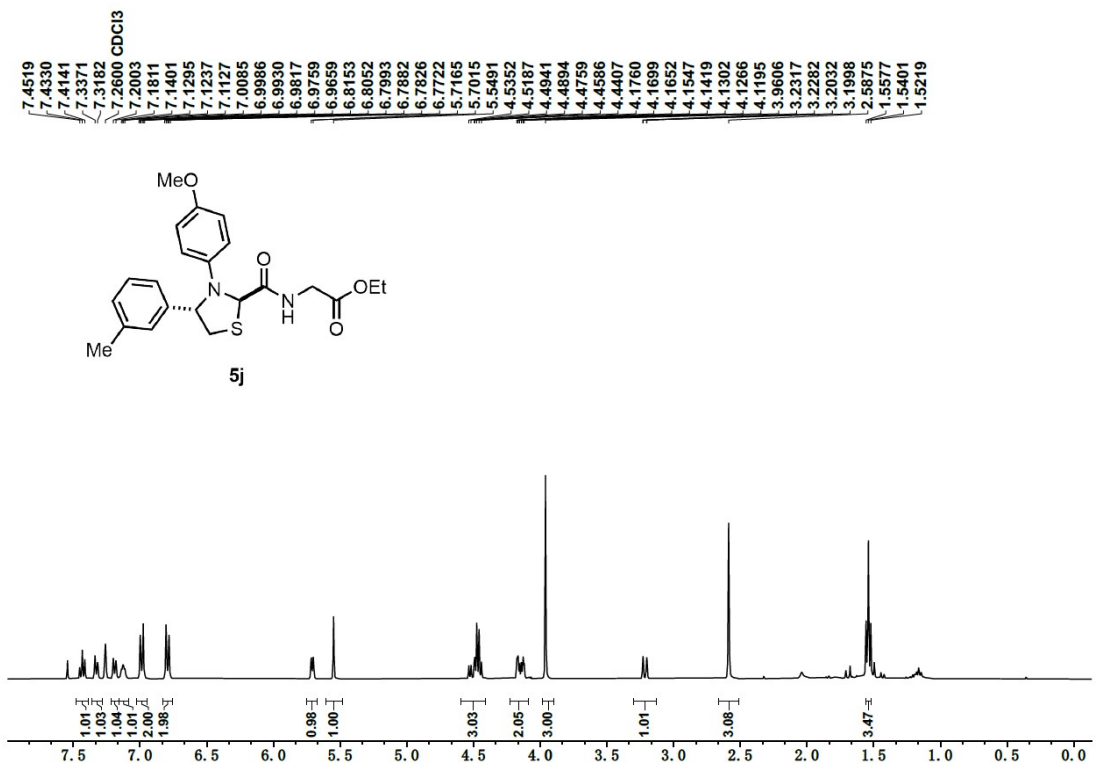
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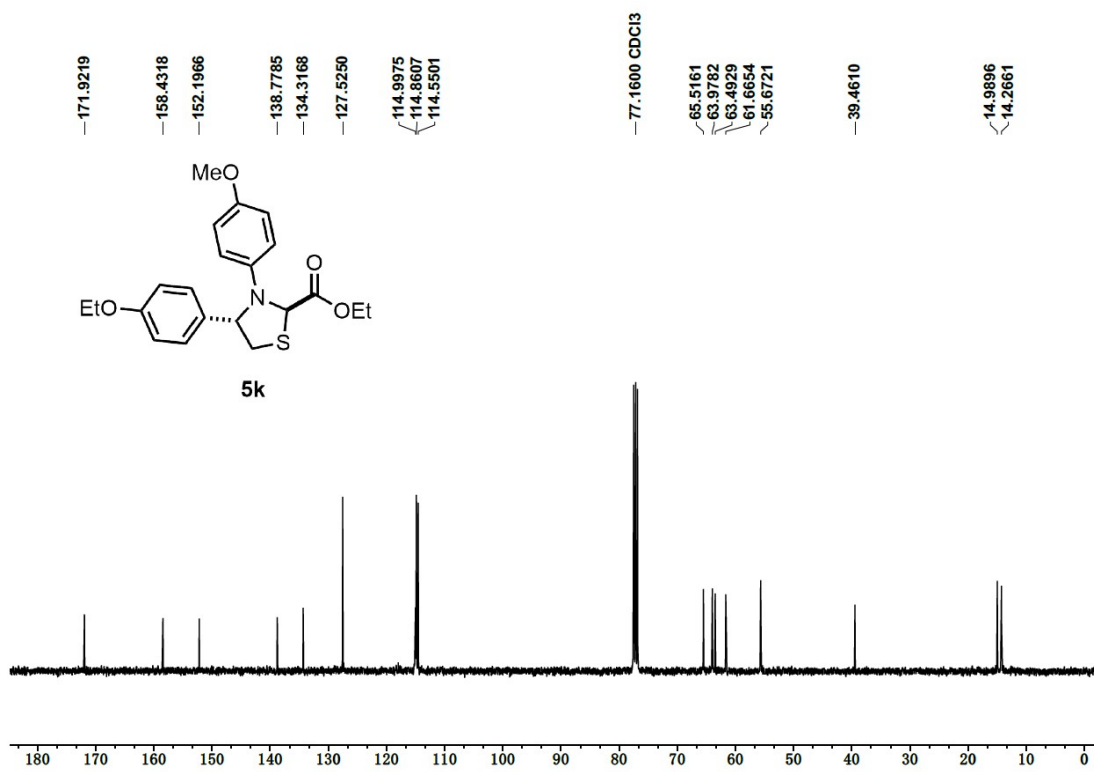
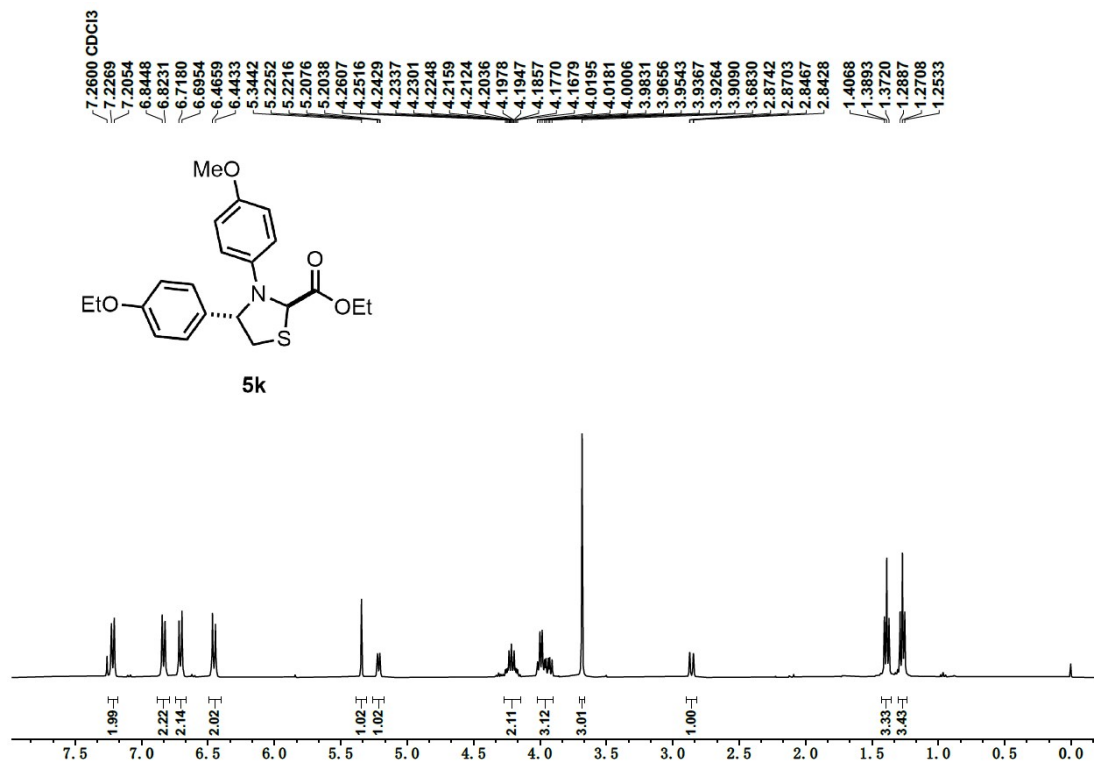
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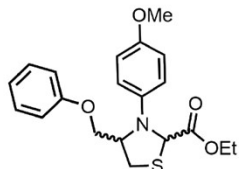




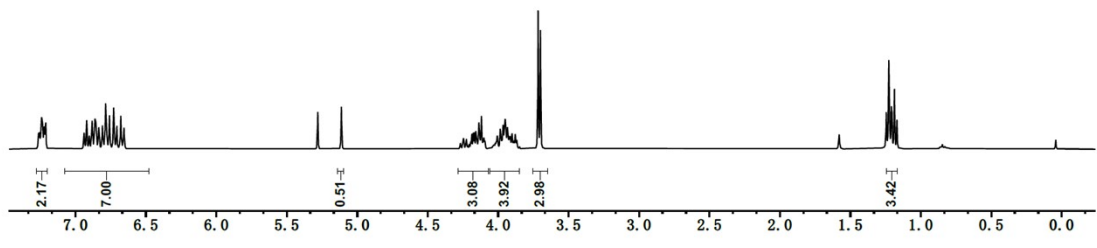




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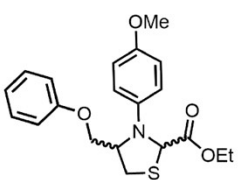
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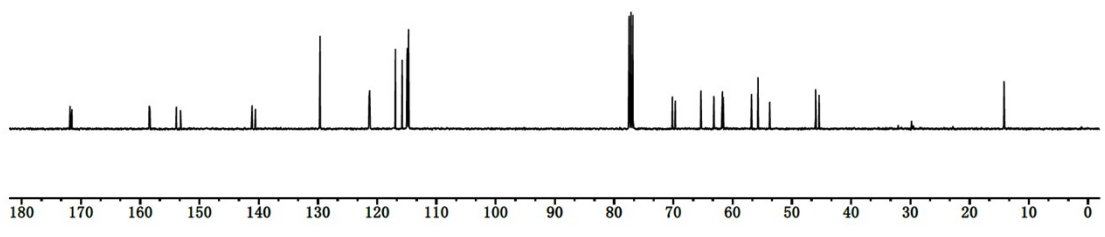
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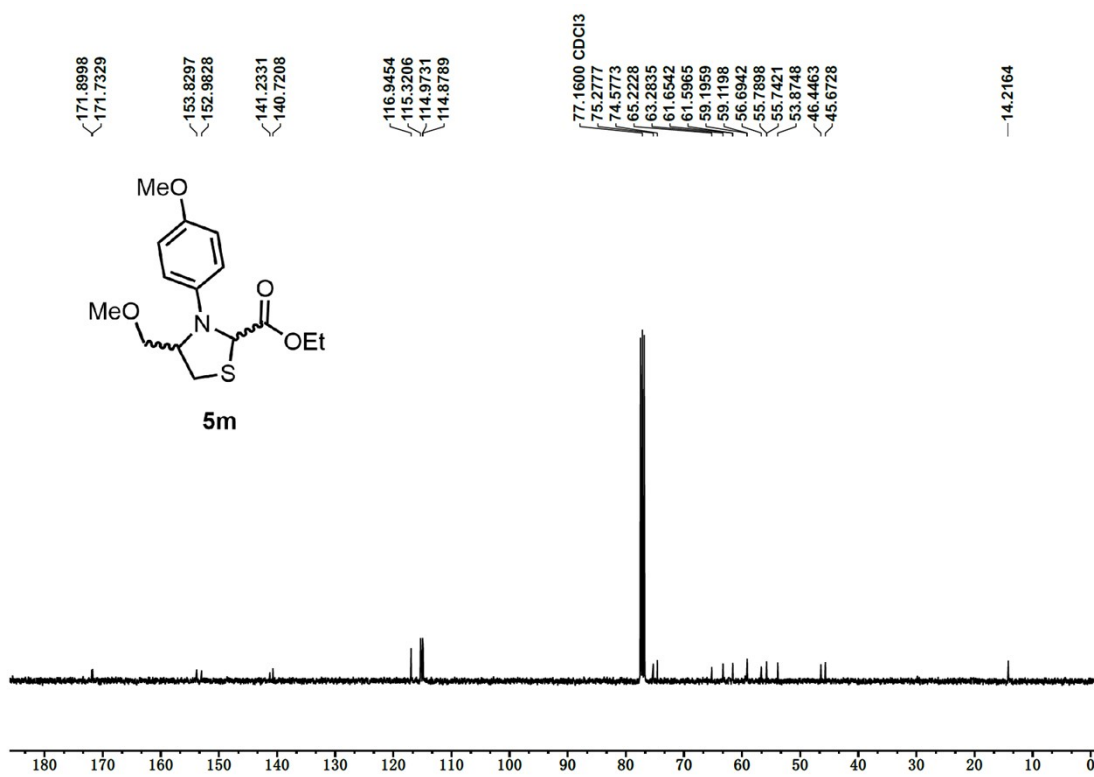
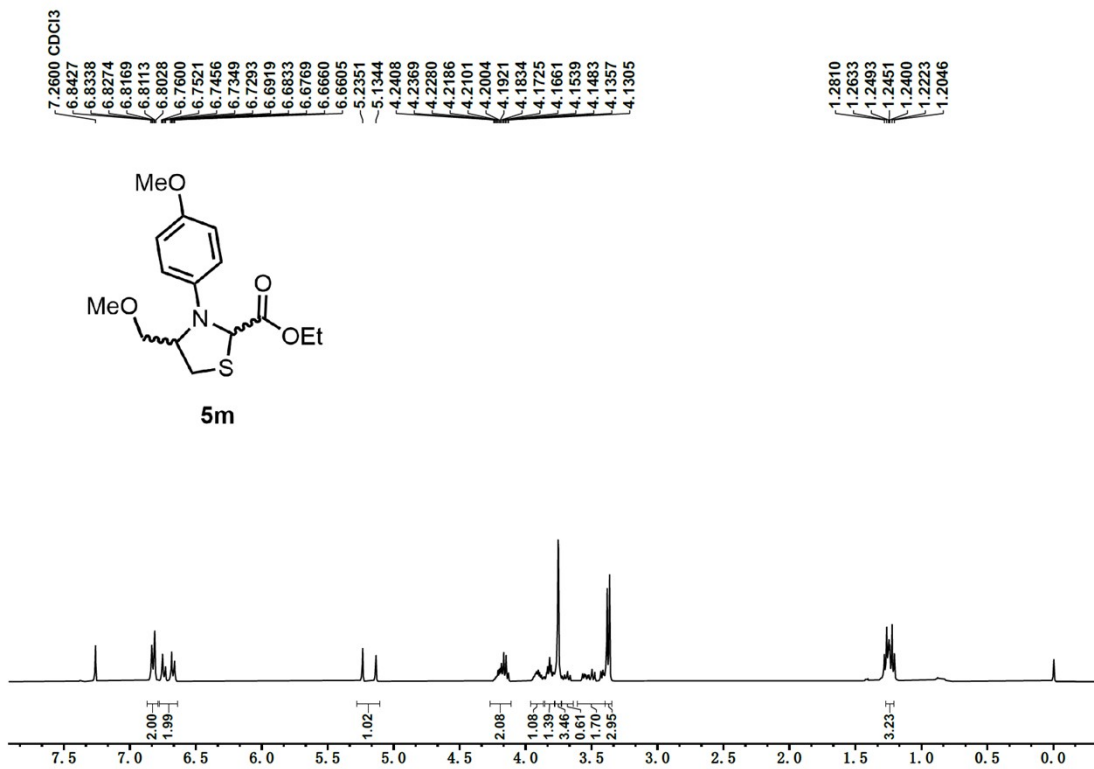
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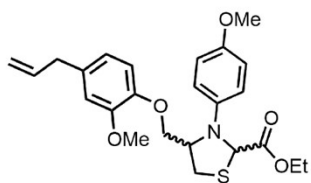


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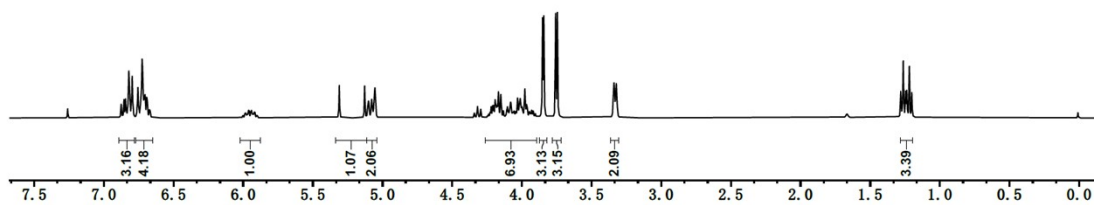




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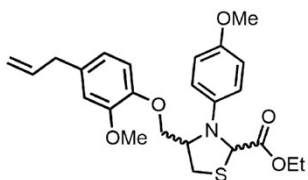
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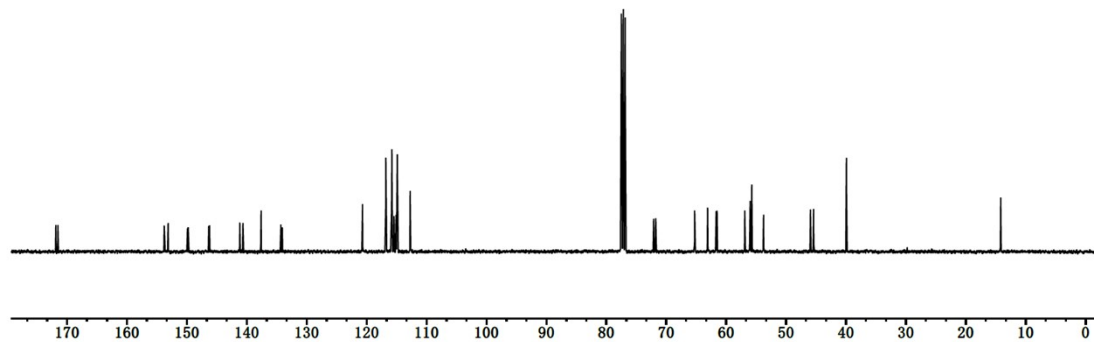
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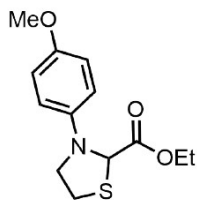
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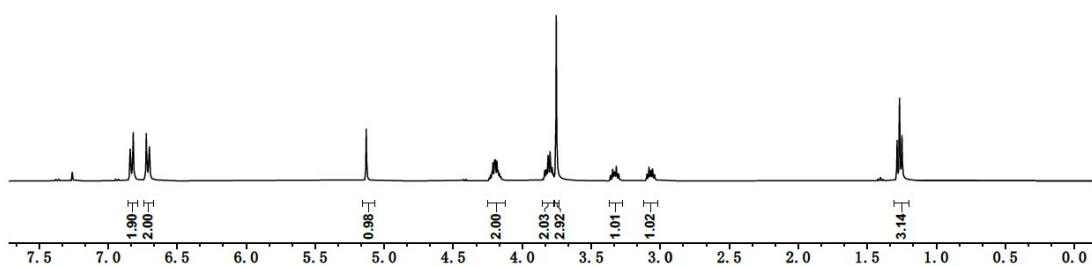
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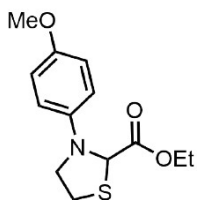
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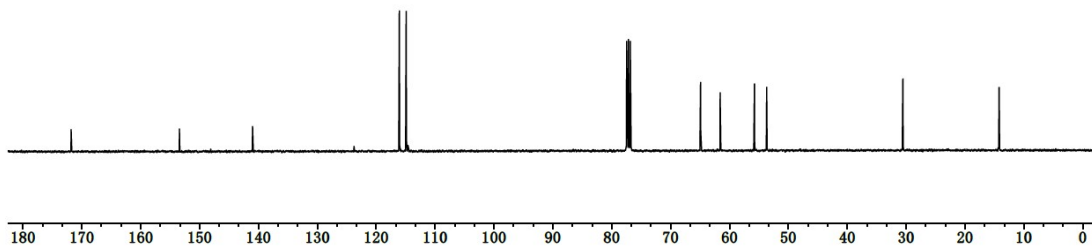
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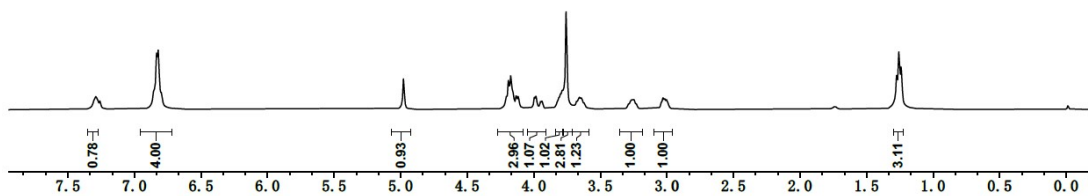
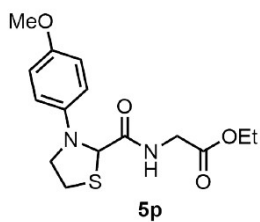
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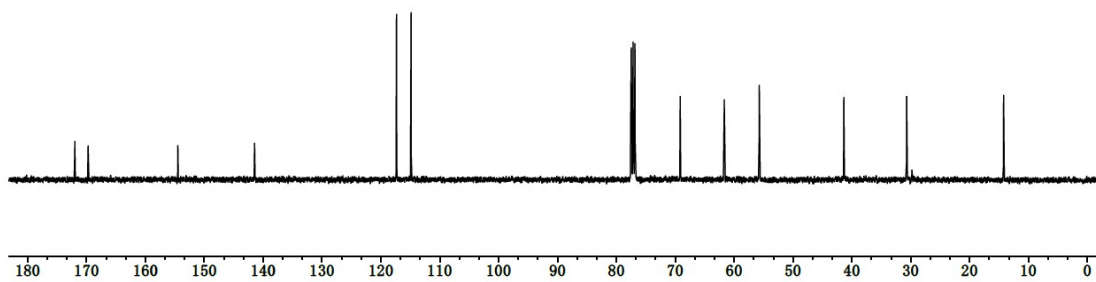
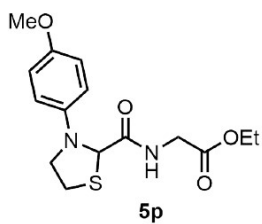
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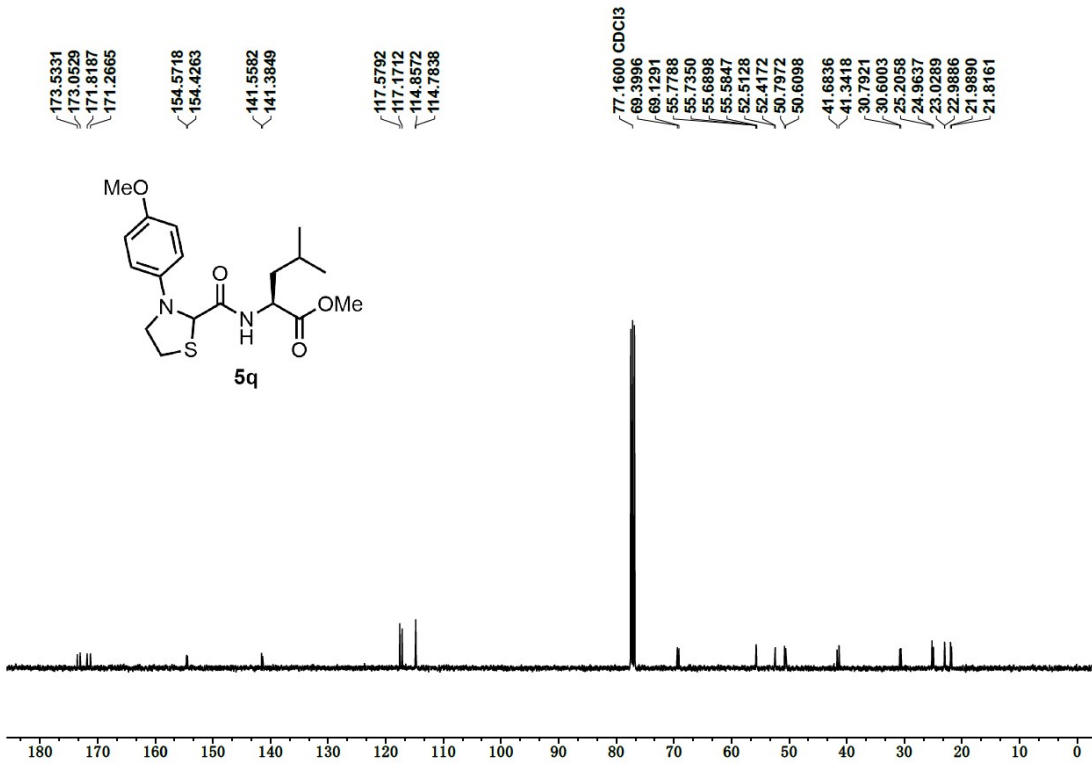
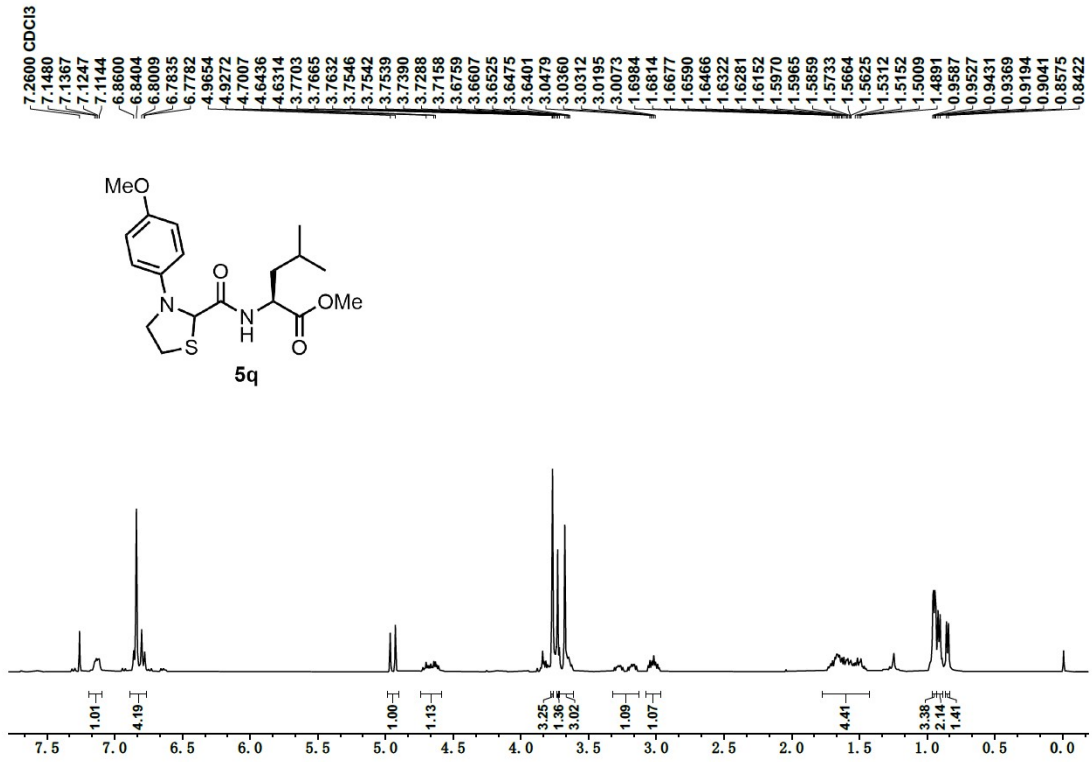
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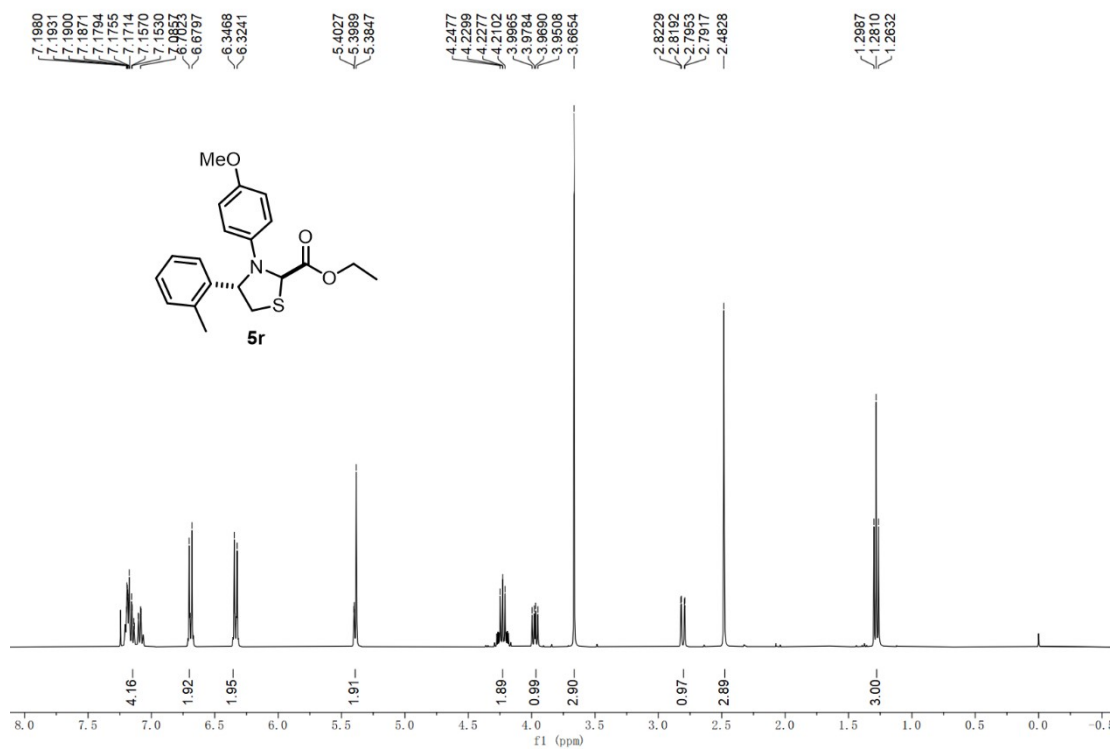
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