Supplementary Material

Stereoselective synthesis towards unnatural proline-based amino acids

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1. Experimental Section

General Methods

Reagents and solvents were purchased from Aldrich, Merck and Fluka. All reactions were performed under an inert nitrogen/argon atmosphere. All NMR spectra were recorded on Bruker AVANCE III 400 MHz or 600 MHz instruments at ambient temperature. Chemical shifts are expressed in ppm and coupling constants are reported in Hz. DEPT135 experiment. Thin layer chromatography (TLC) was performed using Merck Kieselgel 60 F254. Crude compounds were purified with column chromatography using silica gel (60–200 mesh unless otherwise stated). All solvents were dried using standard procedures. Optical rotations were recorded on Bellingham + Stanley Polarimeter (Model 440+). High-resolution mass spectrometry data were obtained using a Bruker micrOTOF-Q II instrument operating at ambient temperature and a sample concentration of approximately 1 ppm. Agilent 1100 HPLC module equipped with ChiralPak IA/IB column was used for analytical HPLC.

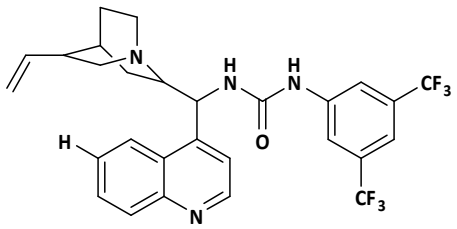
Representative procedure for the Mannich reaction

A mixture of *N*-Boc protected pyrrolidinone **1** (1.0 eq) and *N*-Boc-aldimines (1.2 eq) in toluene (0.5 mL) was stirred for 24 hours, in the presence of catalyst (0.20 eq) at 20 ^{o}C. Upon completion of the reaction as monitored using TLC, the solvent was evaporated under reduced pressure and the crude product mixture was purified by column chromatography.

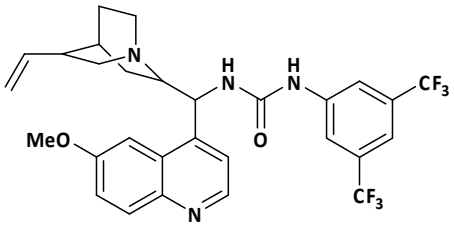
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2. Optimization tables

Table S1. Substrate scope for the asymmetric Mannich reaction with isolated yields and *ee* respectively



I



II

Entry	Solvent	Catalyst	Yield (%)	ee (%)
1	Toluene	Cinchonine urea	65	70
2	Toluene	Cinchonine thiourea	64	58
3	Toluene	Cinchonine urea	68	73
4	THF	Cinchonine urea	49	59
5	DCM	Cinchonine urea	42	59
6	DMF	Cinchonine urea	57	63
7	1.4-Dioxane	Cinchonine urea	59	67
8	Ethyl acetate	Cinchonine urea	57	67
9	ACN	Cinchonine urea	50	65

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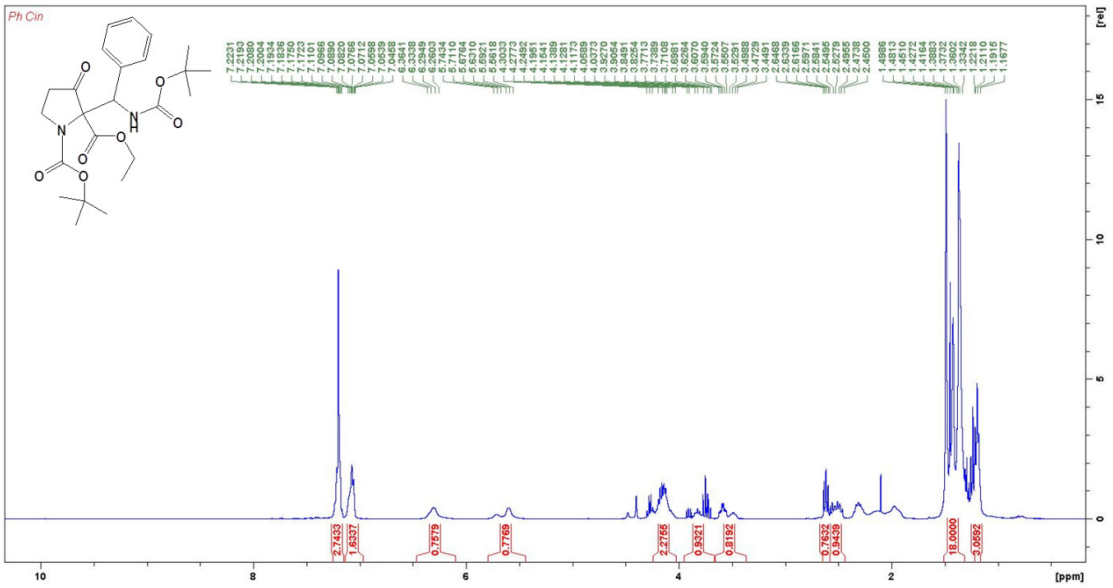
Table S2. Substrate scope for the asymmetric Mannich reaction with isolated yields and ee respectively

Entry	R	Cat I		Cat II	
		Yield (%)	ee (%)	Yield (%)	ee (%)
1	Ph(2a)	65	70	68	73
2	4-NO2Ph(2b)	60	79	66	74
3	4-CF3Ph(2c)	56	97	60	82
4	4-ClPh(2d)	80	61	65	76
5	Furfural(2e)	52	95	67	95
6	4-FPh(2f)	68	7.5	-	-
7	Benzofuranylimine(2g)	72	91	-	-
8	benzyl Cbz(2h)	69	89	-	-
9	4-MePh(2i)				
10	4-OMePh(2j)				
11	5-Bromofuranylimine(2k)				
12	5-Chlorofuranylimine(2l)				
13	5-Nitrofuranylimine(2m)				
14	4-Butoxybenzylimine(2n)				
15	2,2-dimethylpropylimine(2o)				
16	2,4-dinitrobenzylimine(2p)				

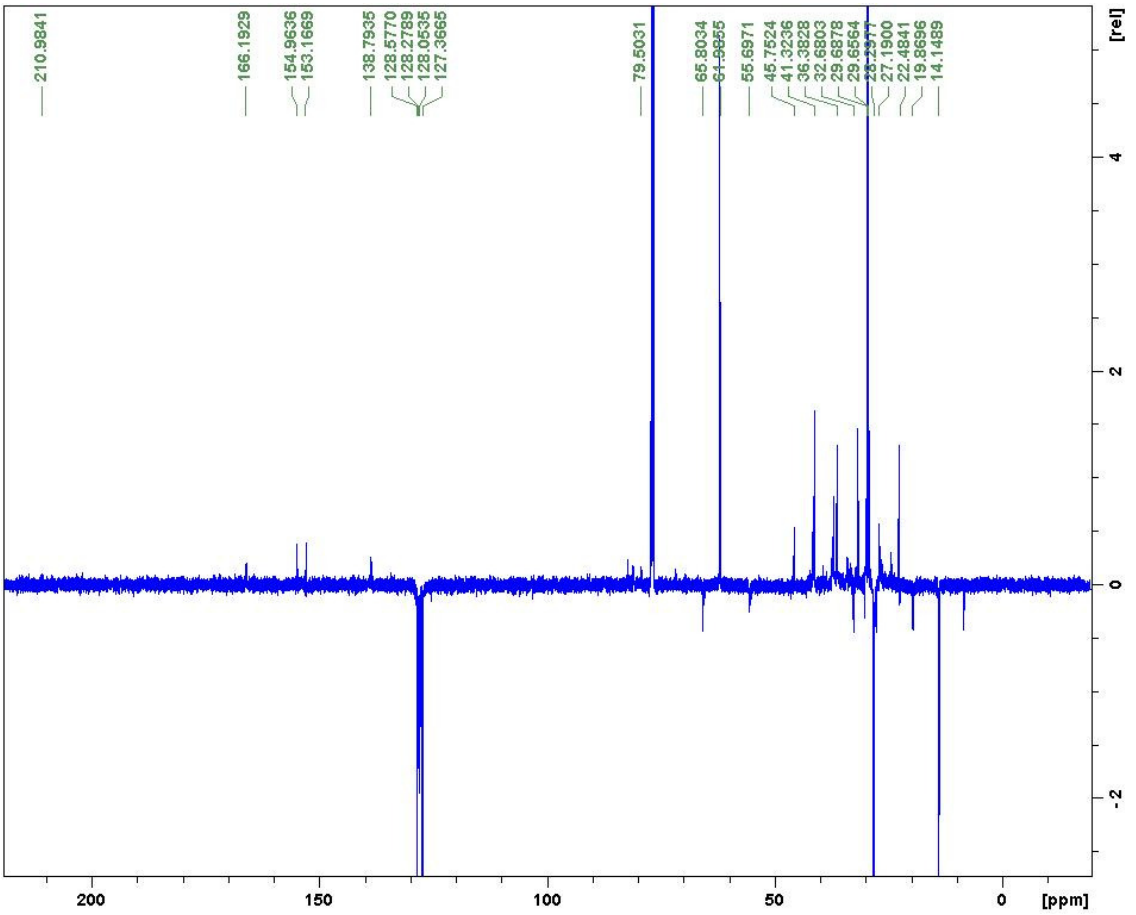
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3. NMR spectra for products

1-tert-butyl 2-ethyl 2-((tert-butoxycarbonylamino) (phenyl) methyl)-3-oxopyrrolidine-1,2-dicarboxylate (**3a**)



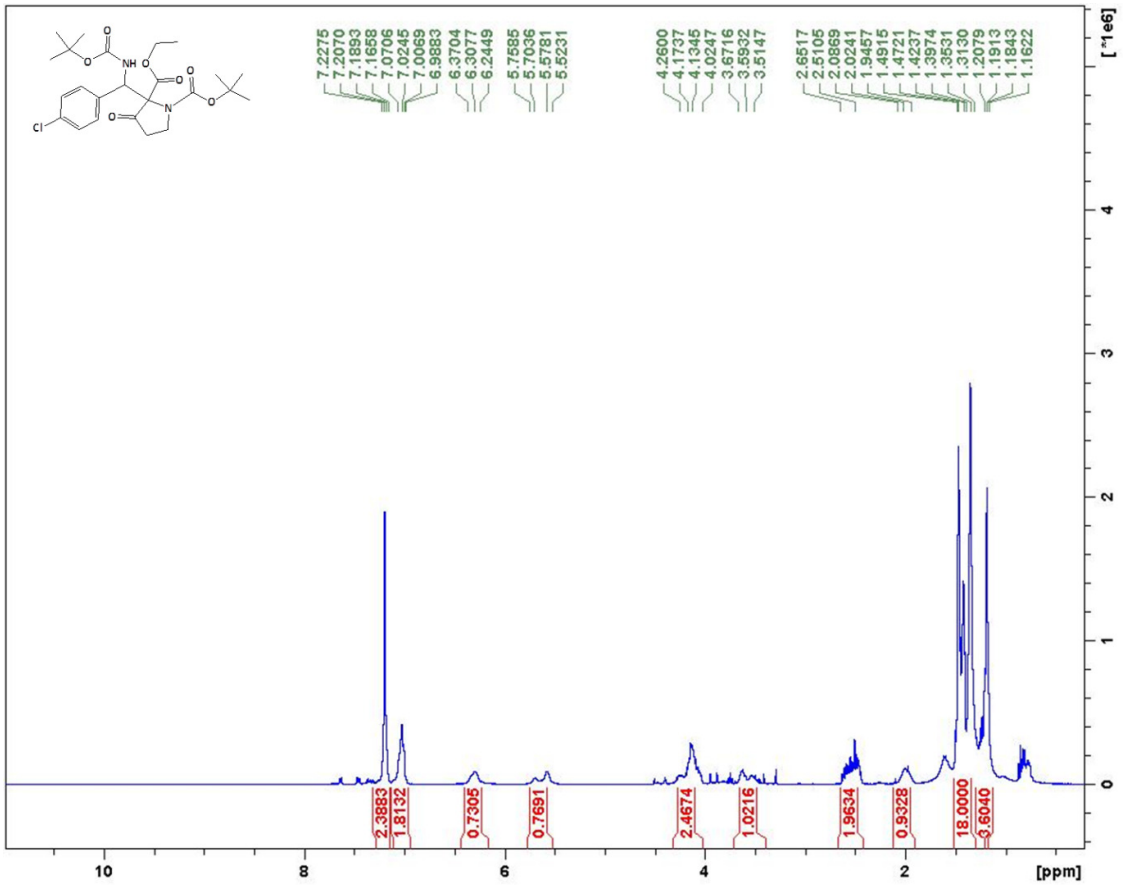
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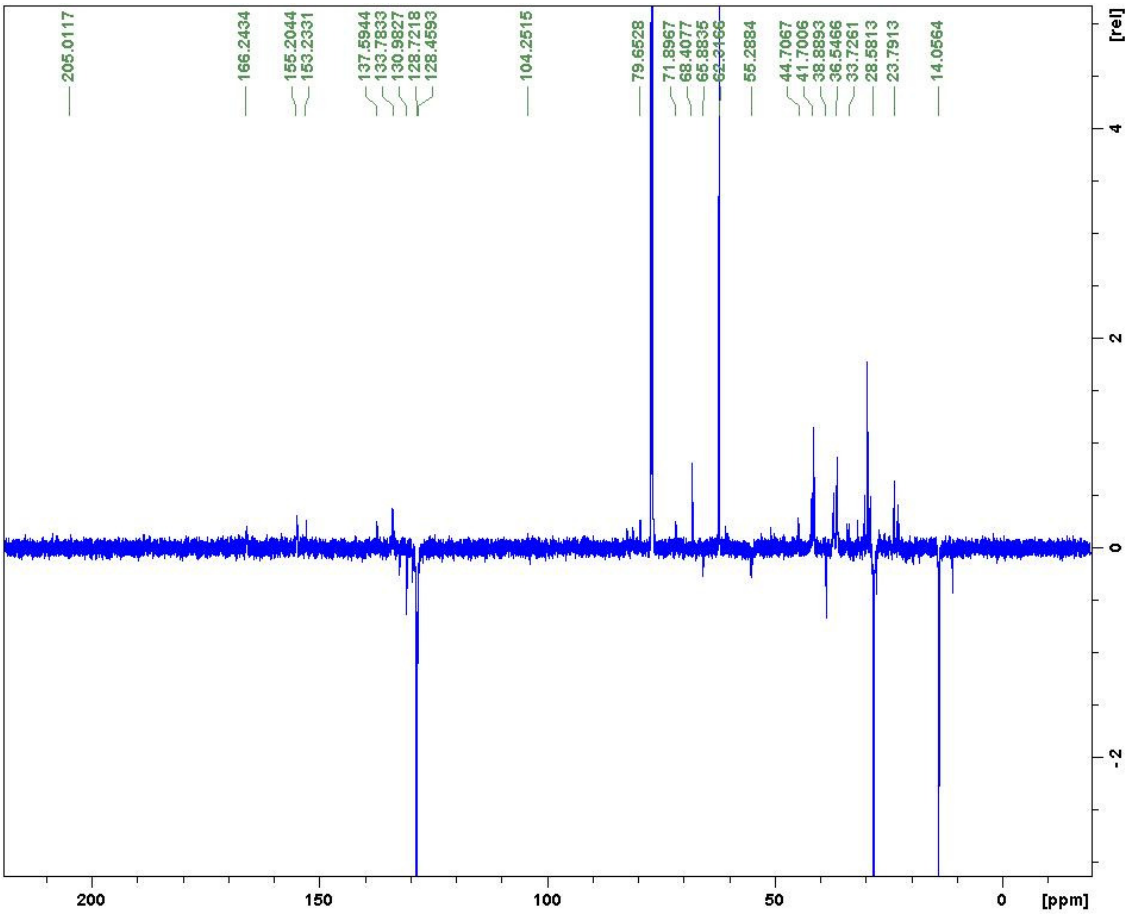
The crude material was purified by column chromatography (ethyl acetate/hexane, 15:85, R_f = 0.3) to afford the product (65%) as a yellowish oil. $[\alpha]^{23}_D$ = +0.20 (c = 0.01 in CH_2Cl_2). ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.22-7.17 (m, 3H), 7.11-7.04 (m, 2H), 6.63-6.26 (m, 1H), 5.74-5.56 (m, 1H) , 4.30-4.03 (m, 2H); 3.92-3.69 (m, 1H), 3.62-3.44 (m, 1H), 2.64-2.58 (m, 1H), 2.54-2.45 (m, 1H), 1.49-1.33 (m, 18H), 1.22-1.16 (m, 3H);; ^{13}C NMR (100 MHz, $CDCl_3$): δ 166.1 (CO), 154.9 (CO), 153.1 (CO), 138.7 (C), 128.5 (2CH), 128.0 (CH), 127.3 (2CH), 79.5 (2C) 61.9(CH_2), 55.6 (CH), 41.3 (CH_2), 36.3 (CH_2), 28.3 (6CH_3), 14.0 (CH_3); HRMS (ESI+) *m/z* calcd. for $C_{24}H_{35}N_2O_7$: 463.2439; found [M+H] 463.2446; The enantiomeric excess was determined by HPLC with a Chiralpak IA-H column (hexane/2-PrOH = 97/3, 220 nm, 0.7 mL/min); t_{major} = 11.18 min, t_{minor} = 13.36 min, 70% ee.

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1-tert-butyl 2-ethyl 2-((tert-butoxycarbonylamino) (4-chlorophenyl) methyl)-3-oxopyrrolidine-1,2-dicarboxylate (**3b**)



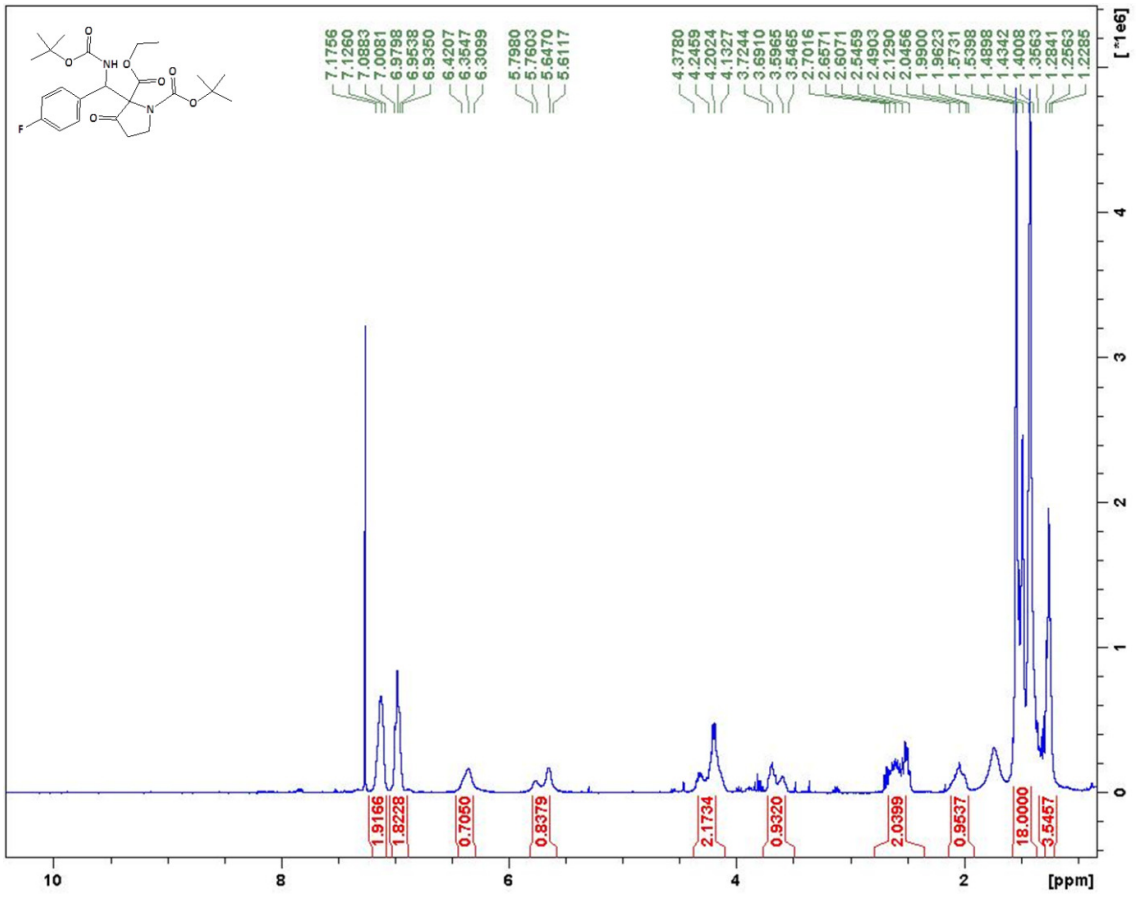
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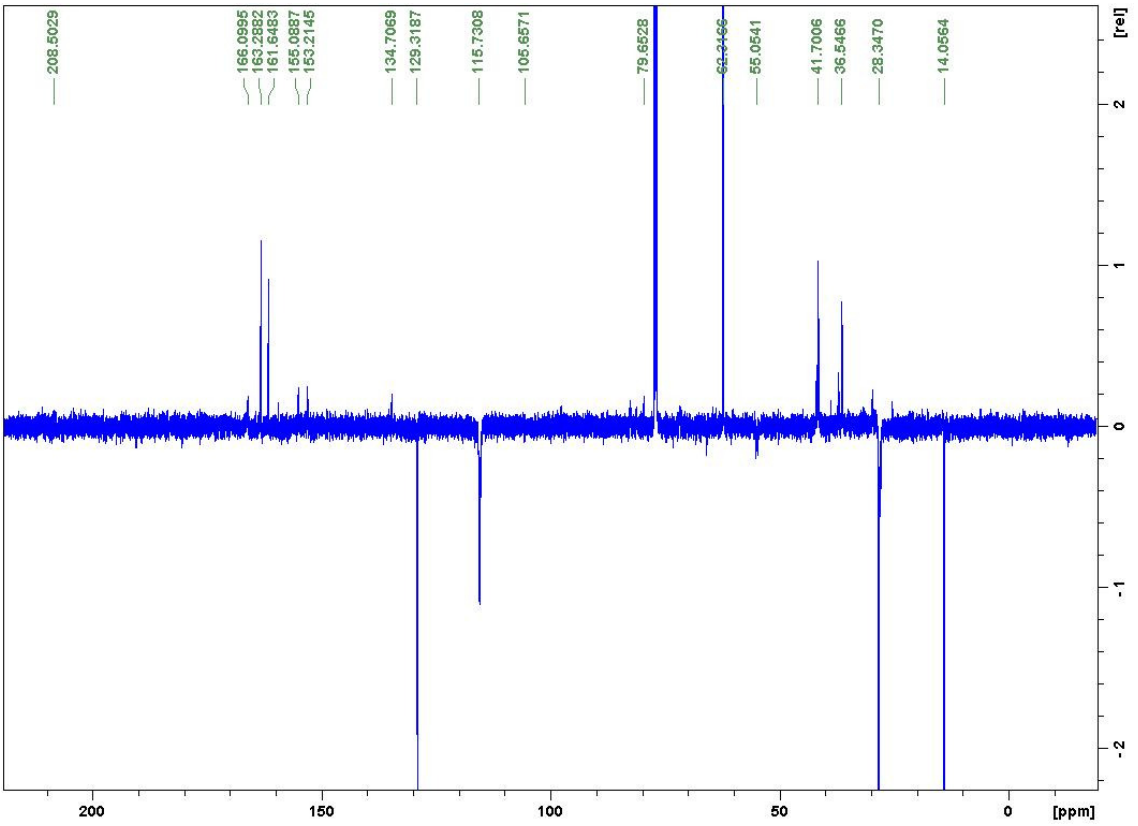
The crude material was purified by column chromatography (ethyl acetate/hexane, 15:85, R_f = 0.4) to afford the product (80%) as a yellowish oil. $[\alpha]^{23}_D$ = +0.24 (c = 0.01 in CH_2Cl_2). ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.22-7.14 (m, 2H), 7.06-7.00 (m, 2H), 6.34-6.27 (m, 1H), 5.72-5.60 (m, 1H) , 4.34-4.03 (m, 2H), 3.95-3.48 (m, 1H), 3.62-3.44 (m, 1H), 2.63-2.42 (m, 2H), 1.65-1.27 (m, 18H), 1.20-1.15 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 205.0 (CO), 166.2 (CO), 155.2 (CO), 153.2 (CO), 137.5 (C), 133.7 (C), 128.7 (2CH), 128.4 (2CH), 104.2 (C), 79.6 (2C), 62.3 (CH_2), 55.2 (CH) 41.7 (CH_2), 36.5 (CH_2), 28.5 ($6CH_3$), 14.0 (CH_3) HRMS (ESI+) *m/z* calcd. for $C_{24}H_{34}ClN_2O_7$: 497.2049 [M+H] 497.2050; The enantiomeric excess was determined by HPLC with a Chiralpak IA-H column (hexane/2-PrOH = 97/3, 254 nm, 0.7 mL/min); t_{major} = 12.70 min, t_{minor} = 14.83 min, 61% ee

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1-tert-butyl 2-ethyl 2-((tert-butoxycarbonylamino)(4-fluorophenyl)methyl)-3-oxopyrrolidine-1,2-dicarboxylate (**3c**)



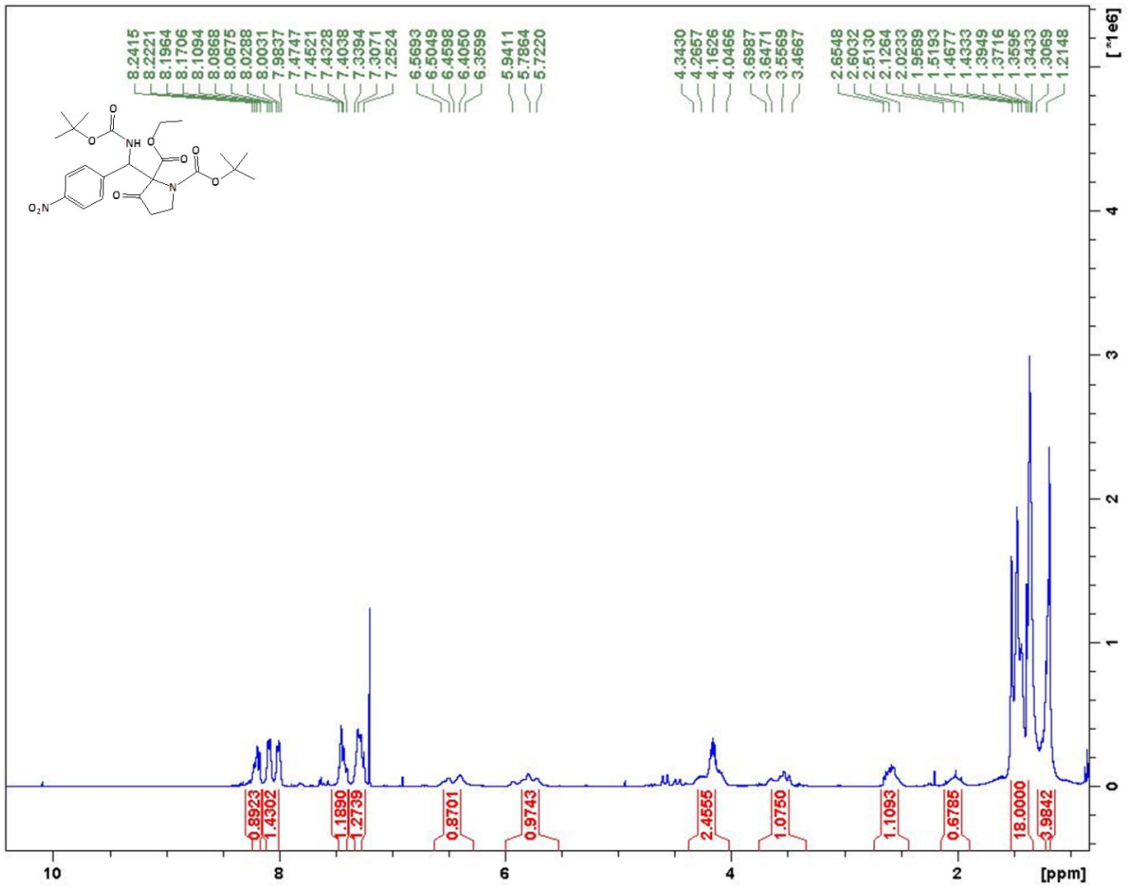
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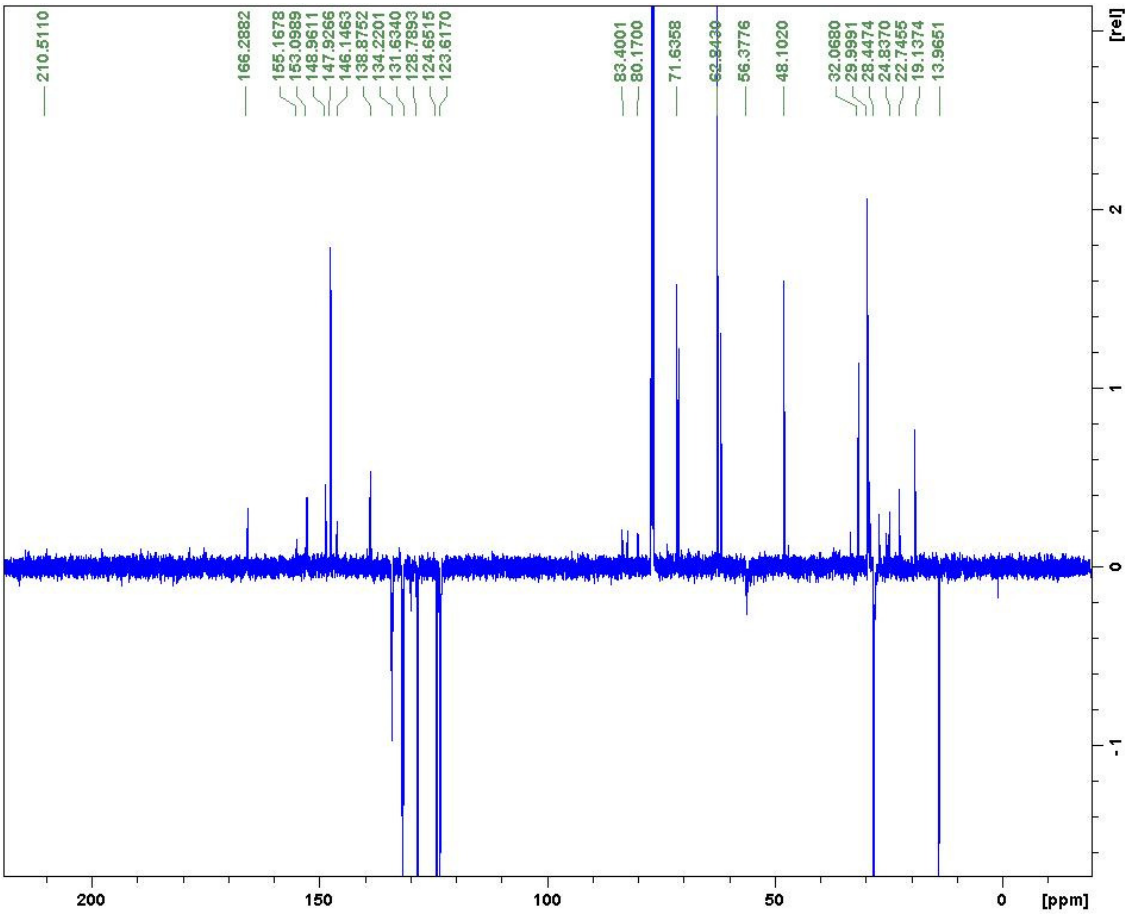
The crude material was purified by column chromatography (ethyl acetate/hexane, 15:85, R_f = 0.4) to afford the product (68%) as a yellowish oil. $[\alpha]^{23}_D$ = +0.04 (c = 0.01 in CH_2Cl_2). ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.22-7.14 (m, 2H), 7.06-7.00 (m, 2H), 6.34-6.27 (m, 1H), 5.72-5.60 (m, 1H) , 4.34-4.09 (m, 2H), 4.03-3.48 (m, 2H), 2.63-2.42 (m, 2H), 1.46-1.32 (m, 18H), 1.27-1.18 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 208 (CO), 166 (CO), 163 (C), 155 (CO), 153 (CO), 134 (C), 129 (2CH), 115 (2CH), 105 (CH), 79.6 (2C), 62.3 (CH_2), 55 (CH), 41.7 (CH_2), 36.5 (CH_2), 28.3 ($6CH_3$), 14.0 (CH_3); HRMS (ESI+) *m/z* calcd. For $C_{24}H_{34}FN_2O_7$: 481.2345; found [M+H] 481.2343; The enantiomeric excess was determined by HPLC with a Chiralpak IA-H column (hexane/2-PrOH = 93/7, 254 nm, 0.7 mL/min); t_{major} = 13.98 min, t_{minor} = 15.79 min, 7.5% ee.

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1-tert-butyl 2-ethyl 2-((tert-butoxycarbonylamino) (4-nitrophenyl) methyl)-3-oxopyrrolidine-1,2-dicarboxylate



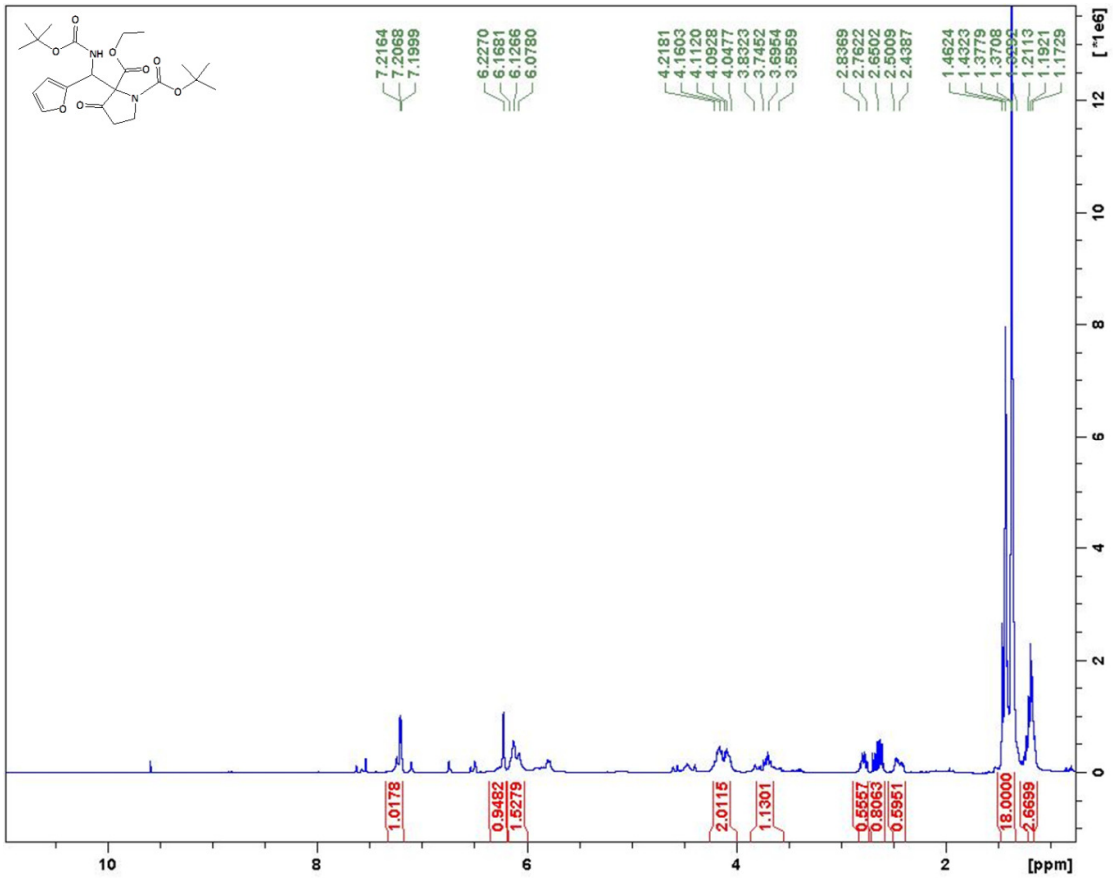
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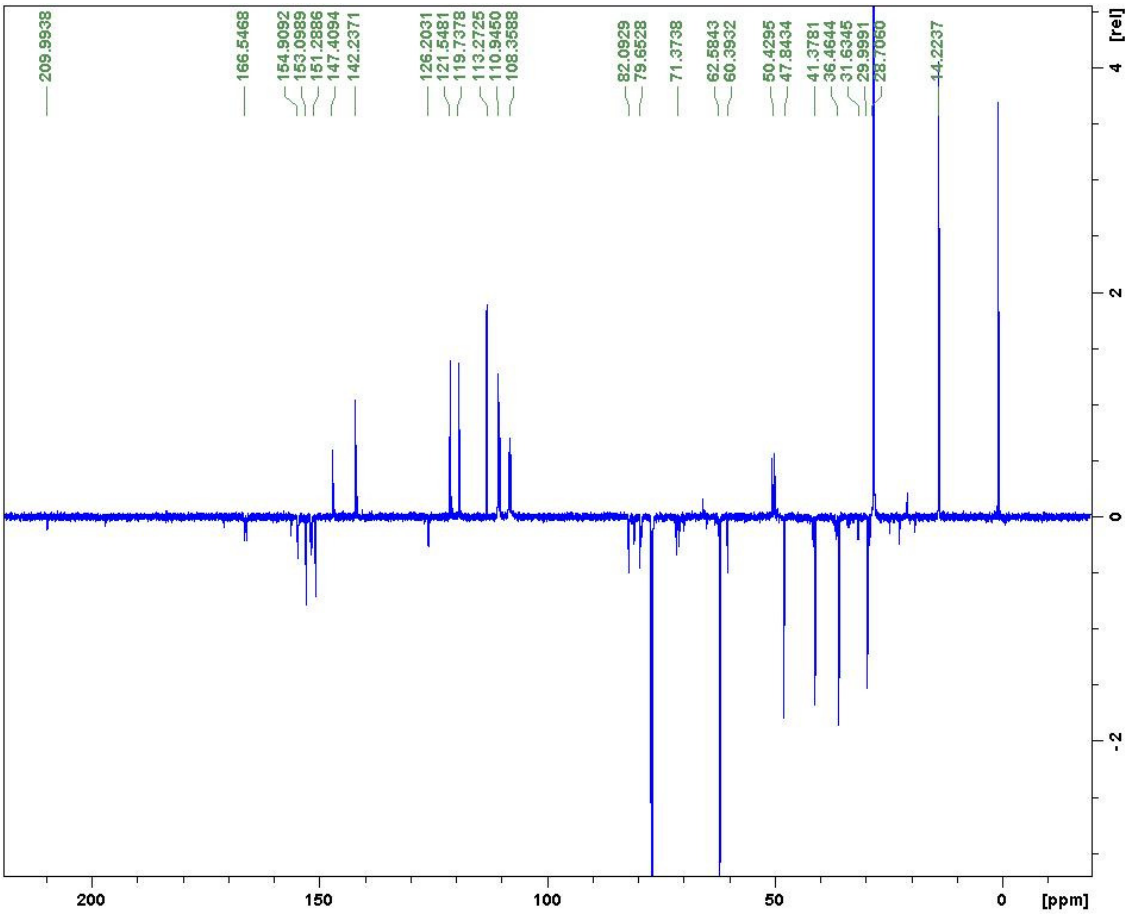
The crude material was purified by column chromatography (ethyl acetate/hexane, 15:85, R_f = 0.3) to afford the product (60%) as a yellowish oil. $[\alpha]^{23}_D$ = +0.04 (c = 0.01 in CH_2Cl_2). ^{1}H NMR (400 MHz, $CDCl_3$): δ 8.28-8.06 (m, 2H), 7.52-7.31 (m, 2H), 6.61-6.41 (m, 1H), 5.92-5.77 (m, 1H) , 4.38-4.17 (m, 2H), 4.14-4.09 (m, 2H), 3.74-3.52 (m, 1H), 2.70-2.54 (m, 1H), 1.59-1.36 (m, 18H), 1.27-1.22 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 210.5 (CO), 166.2 (CO), 155.1 (CO), 153.0 (CO),148.7 (C), 147.9 (C), 124.6(2CH),123.6 (2CH), 80.1 (2C), 62.8 (CH_2), 56.3 (CH) 48.1 (CH_2), 32.0 (CH_2), 28.4 (6CH_3), 13.9 (CH_3); HRMS (ESI+) *m/z* calcd. For $C_{24}H_{34}N_3O_9$: 508.2290; found [M+H] 508.2292; The enantiomeric excess was determined by HPLC with a Chiralpak IA-H column (hexane/2-PrOH = 97/3, 254 nm, 0.7 mL/min); t_{major} = 22.65 min, t_{minor} = 25.61 min, 79% ee.

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1-tert-butyl 2-ethyl 2-((tert-butoxycarbonylamino) (furan-2-yl) methyl)-3-oxopyrrolidine-1,2-dicarboxylate



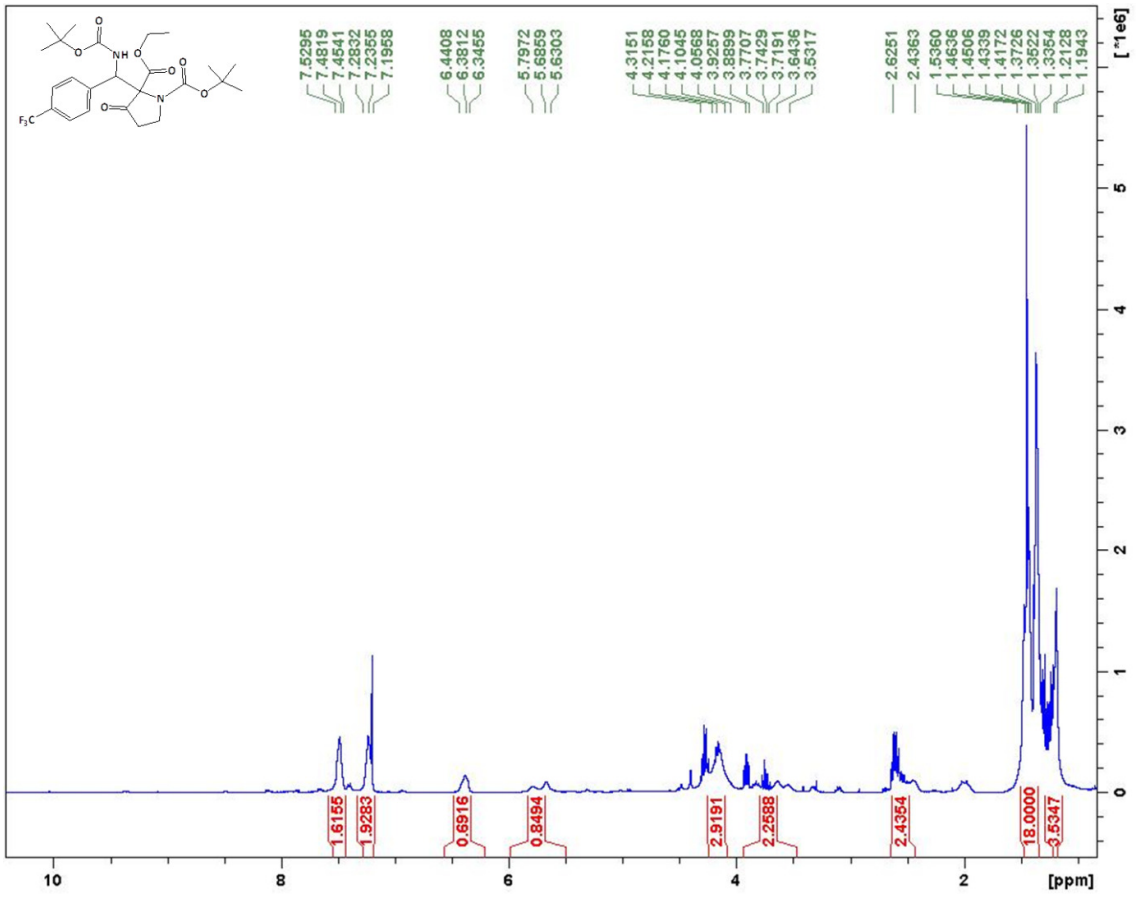
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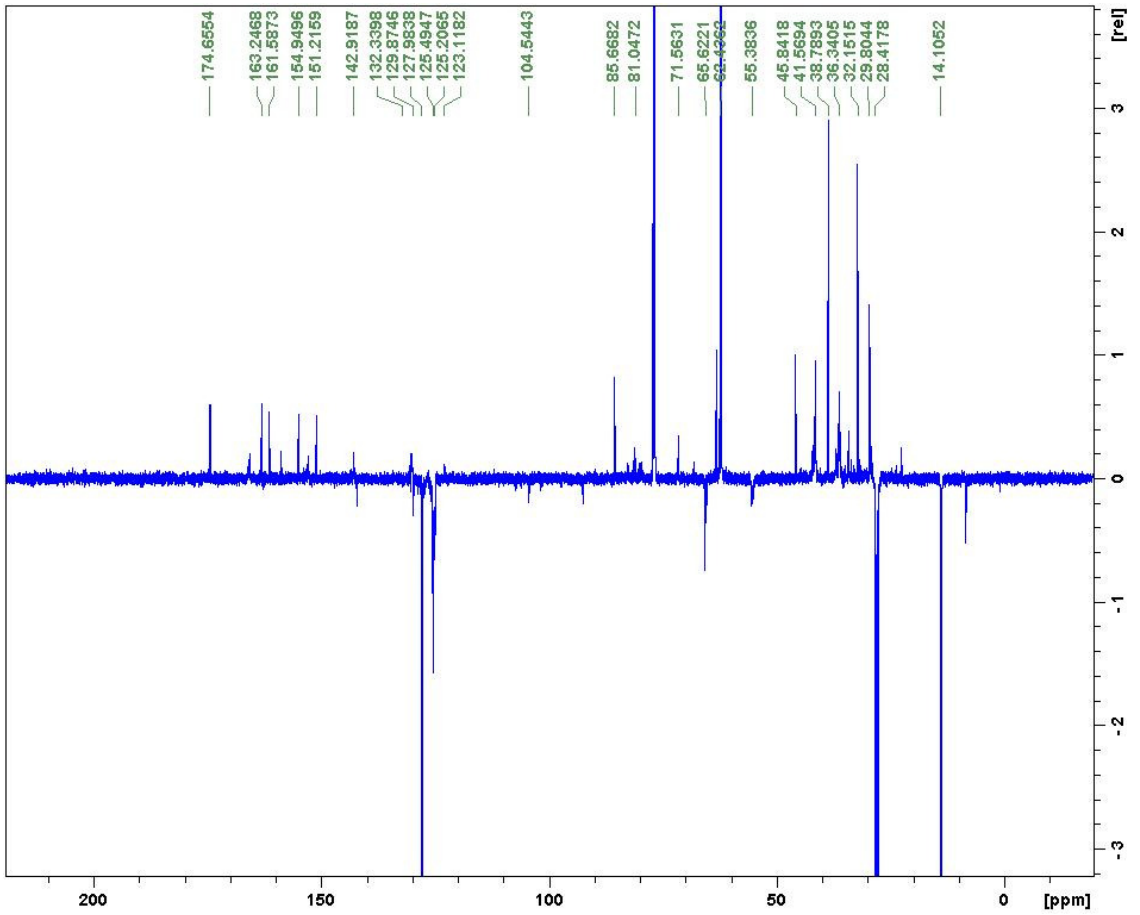
The crude material was purified by column chromatography (ethyl acetate/hexane, 15:85, R_f = 0.3) to afford the product (52%) as a yellowish oil. $[\alpha]^{23}_D$ = +0.04 (c = 0.01 in CH_2Cl_2). ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.30-7.28 (m, 1H), 6.32-6.30 (m, 1H), 6.23-6.05 (m, 2H), 5.90-5.85 (m, 1H), 4.31-4.12 (m, 2H) , 3.82-3.70 (m, 1H), 2.91-2.83 (m, 1H), 2.77-2.72 (m, 1H), 2.58-2.49 (m, 1H), 1.59-1.43 (m, 18H), 1.30-1.25 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 209.9 (CO), 166.5 (CO), 154.9 (CO), 153.0 (CO), 151.2 (C), 142.2 (CH), 113.2 (CH), 110.9 (CH), 108.3 (CH) 79.6 (2C), 62.5 (CH_2), 50.4 (CH), 47.8 (CH_2), 36.4 (CH_2), 28.7 (6CH_3), 14.2 (CH_3); HRMS (ESI+) *m/z* calcd. For $C_{22}H_{33}N_2O_8$: 453.2231; found [M+H] 453.2252; The enantiomeric excess was determined by HPLC with a Chiralpak IA-H column (hexane/2-PrOH = 97/3, 254 nm, 0.7 mL/min); t_{major} = 14.91 min, t_{minor} = 15.87 min, 95% ee

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1-tert-butyl 2-ethyl 2-((tert-butoxycarbonylamino) (4-(trifluoromethyl) phenyl) methyl)-3-oxopyrrolidine-1, 2-dicarboxylate



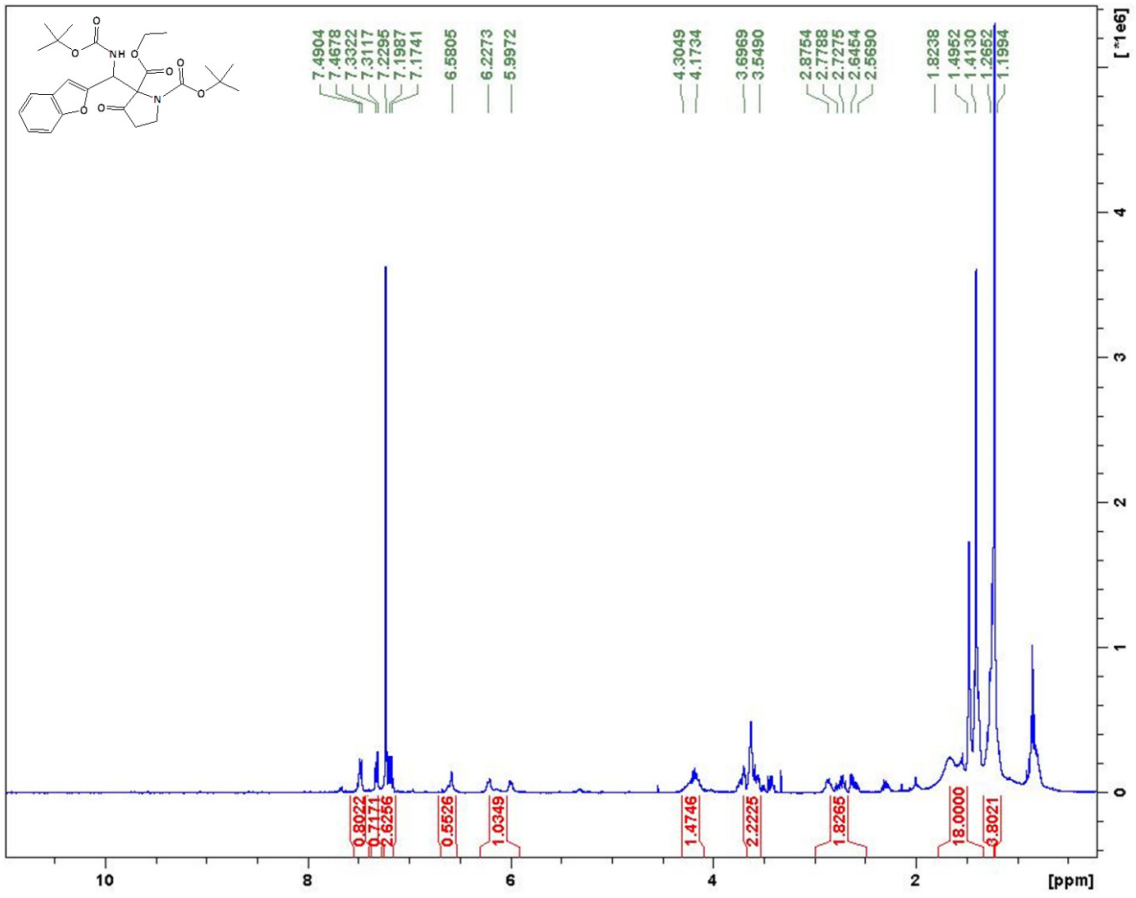
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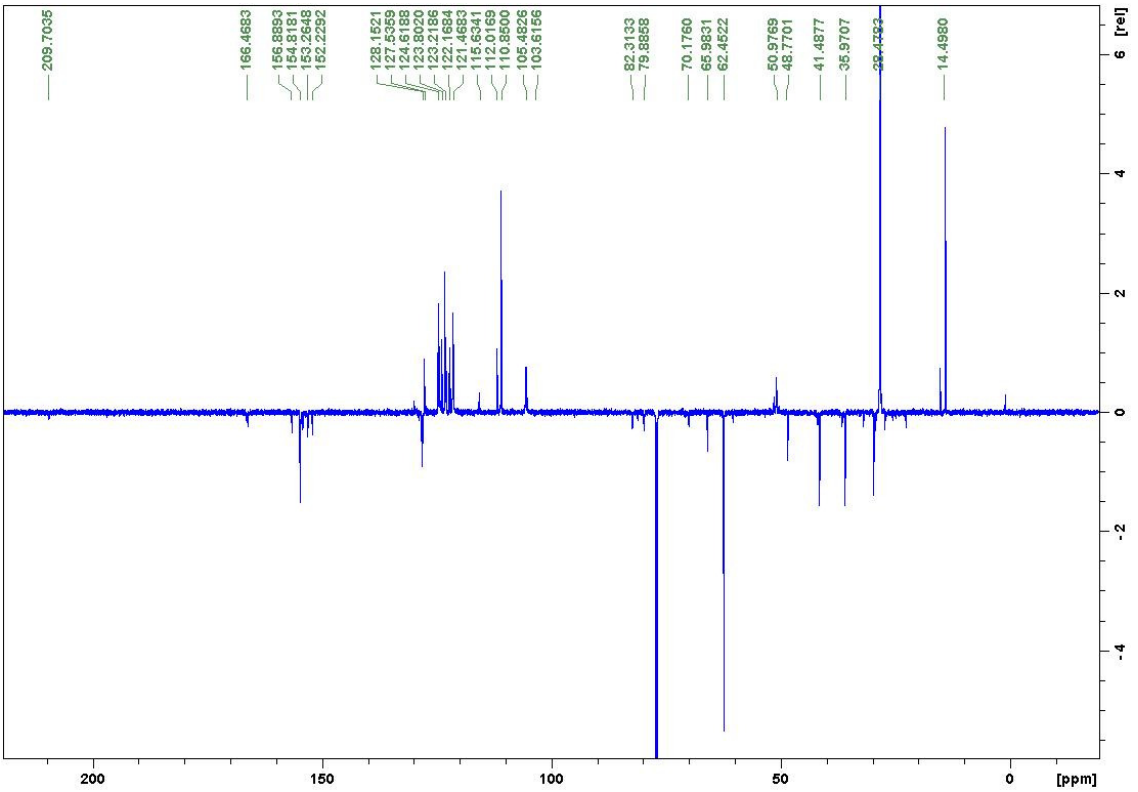
The crude material was purified by column chromatography (ethyl acetate/hexane, 15:85, R_f = 0.5) to afford the product (56%) as a yellowish oil. $[\alpha]^{23}_D$ = +0.28 (c = 0.01 in CH_2Cl_2). ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.55-7.51 (m, 2H), 7.29-7.25 (m, 2H), 6.47-6.42 (m, 1H), 5.85-5.78 (m, 1H) , 4.28-4.16 (m, 2H), 3.73-3.69 (m, 2H), 2.68-2.46 (m, 2H), 1.59-1.32 (m, 18H), 1.29-1.21 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 174.6 (CO), 163.2 (CO), 154.9 (CO), 151.2 (CO), 129.8 (C), 127.9 (2CH), 125.4 (2CH), 123.1 (CF), 105 (CH), 85 (2C), 62.4 (CH_2), 55.3 (CH), 38.7 (CH_2), 32.1 (CH_2), 28.4 (6 CH_3), 14.1 (CH_3); HRMS (ESI+) *m/z* calcd. For $C_{24}H_{34}F_3N_2O_7$: 531.2313; found [M+H] 531.2316; The enantiomeric excess was determined by HPLC with a Chiralpak IA-H column (hexane/2-PrOH = 97/3, 254 nm, 0.7 mL/min); t_{major} = 8.07 min, t_{minor} = 10.40 min, 97% ee.

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1-tert-butyl 2-ethyl 2-(benzofuran-2-yl (tert-butoxycarbonylamino)methyl)-3-oxopyrrolidine-1,2-dicarboxylate



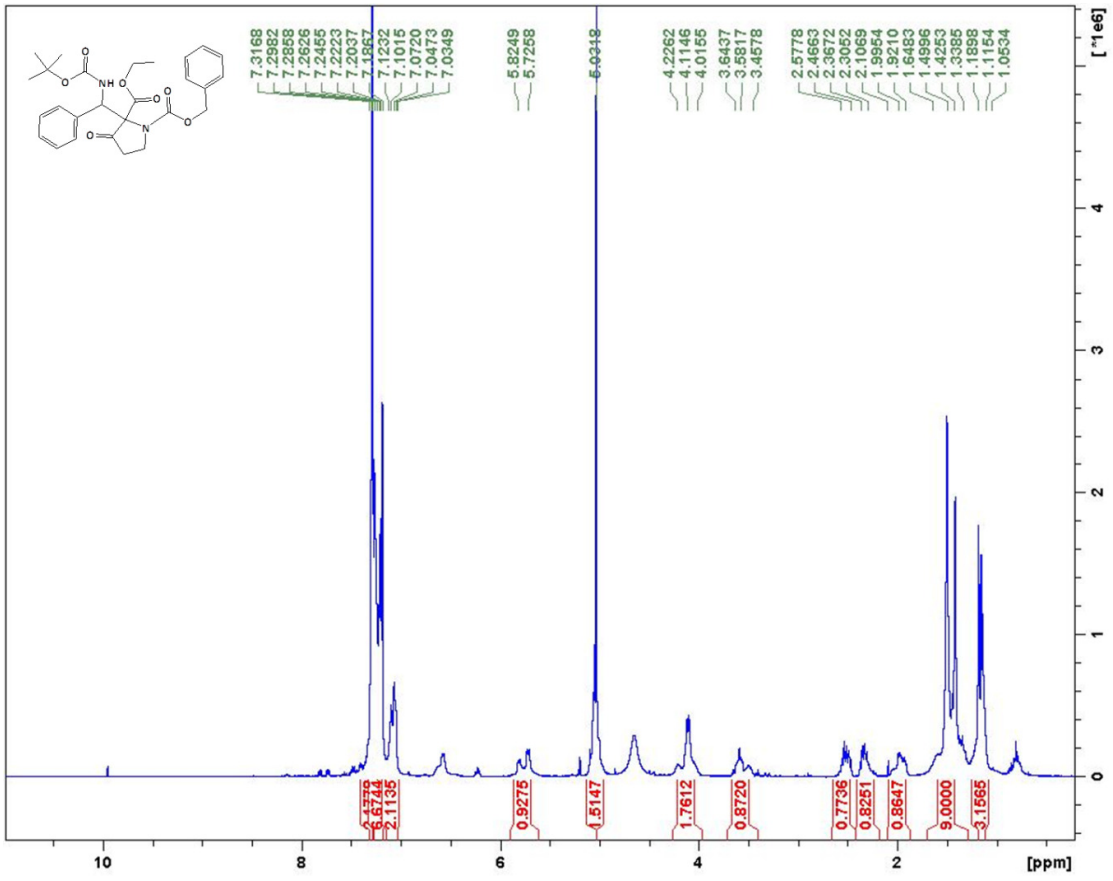
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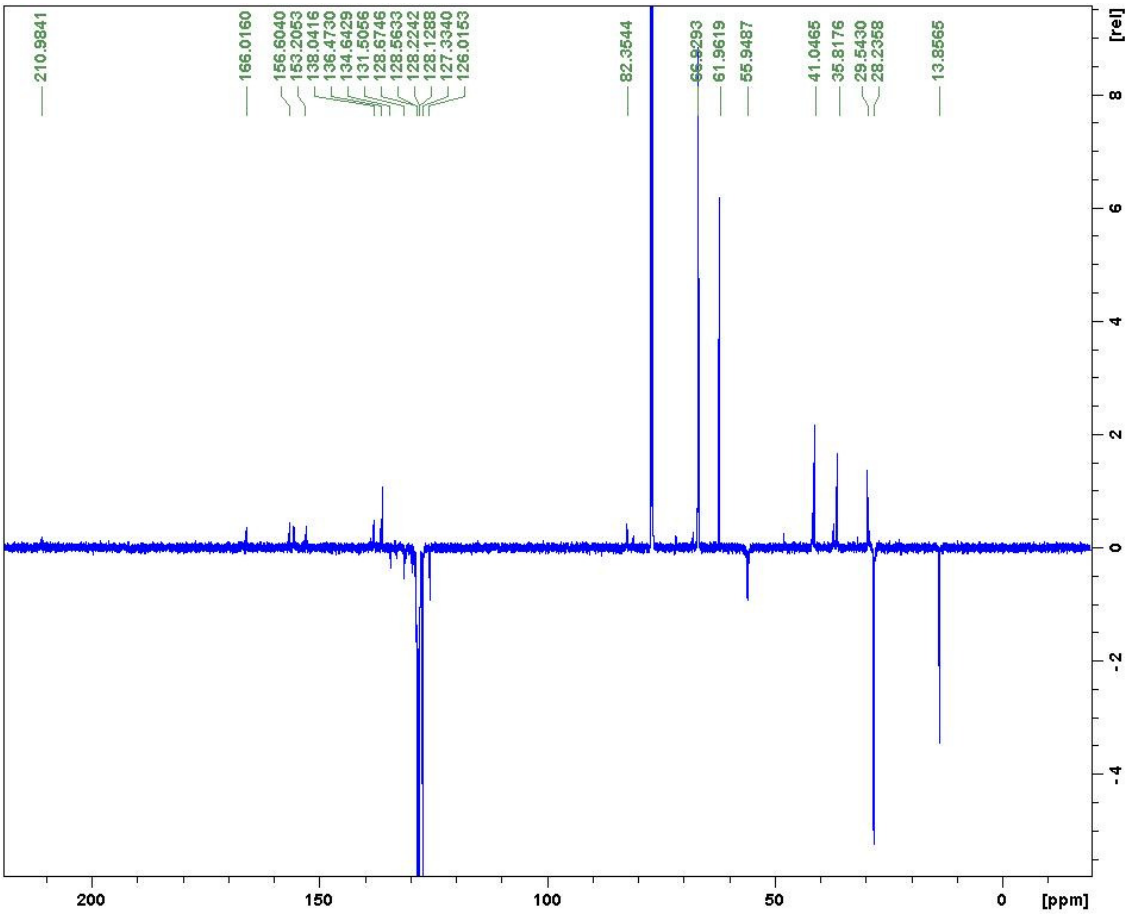
The crude material was purified by column chromatography (ethyl acetate/hexane, 15:85, R_f = 0.4) to afford the product (72%) as a yellowish oil. $[\alpha]^{23}_D$ = +0.04 (c = 0.01 in CH_2Cl_2). ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.51-7.49 (m, 1H), 7.39-7.33 (m, 1H), 7.25-7.19 (m, 2H), 6.66-6.58 (m, 1H) , 6.25-6.15 (m, 1H), 6.10-6.00 (m, 1H), 4.28-4.08 (m, 2H), 2.93-2.88 (m, 1H), 28.2-2.75 (m, 1H), 2.66-2.60 (m, 1H); 2.18-2.07 (m, 1H), 1.60-1.32 (m, 18H), 1.29-1.23 (m, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 209.7 (CO),166.4 (CO), 156.8 (C), 154.8 (CO), 154.1 (C), 153.2 (C), 152.2 (CO), 128.1 (C), 124.6 (CH), 123.8 (CH), 121.4 (CH), 105.4 (CH), 103.6 (CH), 79.8 (2C), 62.4 (CH_2), 50.9 (CH), 41.4 (CH_2), 35.9 (CH_2), 28.4 ($3CH_3$), 14.4 (CH_3); HRMS (ESI+) *m/z* calcd. For $C_{26}H_{35}N_2O_8$: 503.2388; found [M+H] 503.2387; The enantiomeric excess was determined by HPLC with a Chiralpak IA-H column (hexane/2-PrOH = 97/3, 254 nm, 0.7 mL/min); t_{major} = 13.57 min, t_{minor} = 15.34 min, 91% ee.

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1-tert-butyl 2-ethyl 3-oxo-2-((phenoxycarbonylamino)(phenyl)methyl)pyrrolidine-1,2-dicarboxylate



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The crude material was purified by column chromatography (ethyl acetate/hexane, 15:85, R_f = 0.3) to afford the product (69%) as a yellowish oil. $[\alpha]^{23}_D$ = +0.12 (c = 0.01 in CH_2Cl_2). Please redo the proton and carbon for this; the proton peaks you listed here look different to the spectrum above^{1}H NMR (400 MHz, $CDCl_3$): δ 7.27-7.7.26 (m, 2H), 7.24-7.14 (m, 6H), 6.64-6.61 (m, 1H), 5.79-5.67 (m, 1H) , 5.0 (m, 1H), 4.20-4.0 (m, 2H), 2.53-2.46 (m, 1H), 2.32-2.26 (m, 1H), 2.19-2.12 (m, 2H); 1.51-1.44 (m, 9H), 1.30-1.25 (m, 3H), ^{13}C NMR (100 MHz, $CDCl_3$): δ 211 (CO), 166 (CO), 155 (CO), 153 (CO), 138 (C), 138 (C), 128.6 (4 CH), 128.1 (2CH), 127 (4CH), 82.6 (2C), 67.0 (CH_2), 62.3 (CH_2), 56.2 (CH), 41.4 (CH_2), 36.5 (CH_2), 28.3 ($3CH_3$), 14.0 (CH_3); HRMS (ESI+) *m/z* calcd. For $C_{27}H_{33}N_2O_7$: 497.2282; found [M+H] 497.2270; The enantiomeric excess was determined by HPLC with a Chiralpak IA-H column (hexane/2-PrOH = 97/3, 254 nm, 0.7 mL/min); t_{major} = 30.72 min, t_{minor} = 32.39, 89% ee.

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4. **Computational Details**

The Gaussian 09[i] package was used for all calculations carried out. The structures of the diastereoisomers of 3c were fixed (due to time constraints dihedral scans could not be carried out to determine the conformers for each absolute configuration) at (S,R), (R,S), (S,S) and (R,R) absolute configurations and optimized using B3LYP/6-31+g(d).[ii] The optimised B3LYP structures were further optimized at m062x/6-311++g(d).[iii] Then the TDDFT[iv] calculation at the m062x/6-311++g(d) level was performed to obtain the ECD spectrum. The ECD spectrum was plotted from the excitation energies and the rotational strengths by overlapping the Gaussian functions for each transition.[v] Since the experimental measurements were carried out in methanol, the self-consistent reaction field (SCRF) with polarizable continuum model (PCM) was used for the solution state ECD spectra in methanol.[vi] Similarly, the ECD spectrum for the solution state was plotted from the excitation energies and the rotational strengths by overlapping the Gaussian functions for each transition.

Plotting the ECD spectra from velocity rotatory strengths

The ECD spectrum is usually plotted as $\Delta\varepsilon$ versus λ (excitation wavelength in nm) and assumes a Gaussian band shape. The equation for a Gaussian band shape is:

$$\Delta\varepsilon_i(\tilde{\nu}) = \Delta\varepsilon_i^{max}\, exp\left[-\left(\frac{\tilde{\nu}-\tilde{\nu}_i}{\sigma}\right)^2\right] \quad (1)$$

where *i* refers to the electronic excitation of interest; $\tilde{\nu}_i$ is the excitation energy (in wavenumbers) that corresponds to the electronic excitation of interest; $\Delta\varepsilon_i^{max}$ is the value of $\Delta\varepsilon_i$ at the maximum of the band, i.e. when the energy of the incident radiation $\tilde{\nu} = \tilde{\nu}_i$; σ is the standard deviation in wavenumbers (which is related to the width of the simulated band, particularly it's the half-width of the Gaussian band at $\Delta\varepsilon = \Delta\varepsilon^{max}/e$); and noting that wavenumbers are the reciprocal of the wavelengths, $\tilde{\nu} = {}^1/_{\lambda}$.

The relationship between $\Delta\varepsilon_i^{max}$ and the velocity rotatory strengths (*R*) is shown in the equation that relates *R* with $\Delta\varepsilon$ and $\tilde{\nu}$:

$$R_{cgs\ units} = 2.296 \times 10^{-39} \int \frac{\Delta\varepsilon(\tilde{\nu})}{\tilde{\nu}}\, d\tilde{\nu} \quad (cgs\ units\ of\ erg-esu-\frac{cm}{gauss}) \quad (2)$$

which at the maximum of the band turns into:

$$R_i = 2.296 \times 10^{-39} \Delta\varepsilon_i^{max} \sqrt{\pi}\, \frac{\sigma}{\tilde{\nu}_i} \quad (3)$$

where again σ is the standard deviation, which is related to the width of the band. Using equation (3) to transform equation (1):

$$\Delta\varepsilon_i(\tilde{\nu}) = \frac{R_i}{2.296 \times 10^{-39}\sqrt{\pi}\,\tilde{\nu}_i}\, exp\left[-\left(\frac{\tilde{\nu}-\tilde{\nu}_i}{\sigma}\right)^2\right] \quad (4)$$

The default in GaussView is to use a value for corresponding to a λ of 3099.6 nm (0.4 eV). Only two values from the G09 output are needed to simulate the spectrum: the velocity rotatory strengths (R_1) and the wavelength (λ_1). These two values will give:

$$\Delta\varepsilon_1(\lambda) = \frac{R_1 \cdot {}^1/_{\lambda_1}}{2.296 \times 10^{-39}\sqrt{\pi} \cdot {}^1/_{3099.6}}\, exp\left[-\left(\frac{{}^1/_{\lambda} - {}^1/_{\lambda_1}}{{}^1/_{3099.6}}\right)^2\right] \quad (5)$$

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Since the region of the spectrum of interest ranged from 400 nm to 195 nm, $\Delta\varepsilon_1(\lambda)$ values for λ were calculated (using equation 5) ranging from 100 to 400 nm, every 2 nm to obtain the following simulated ECD spectra:

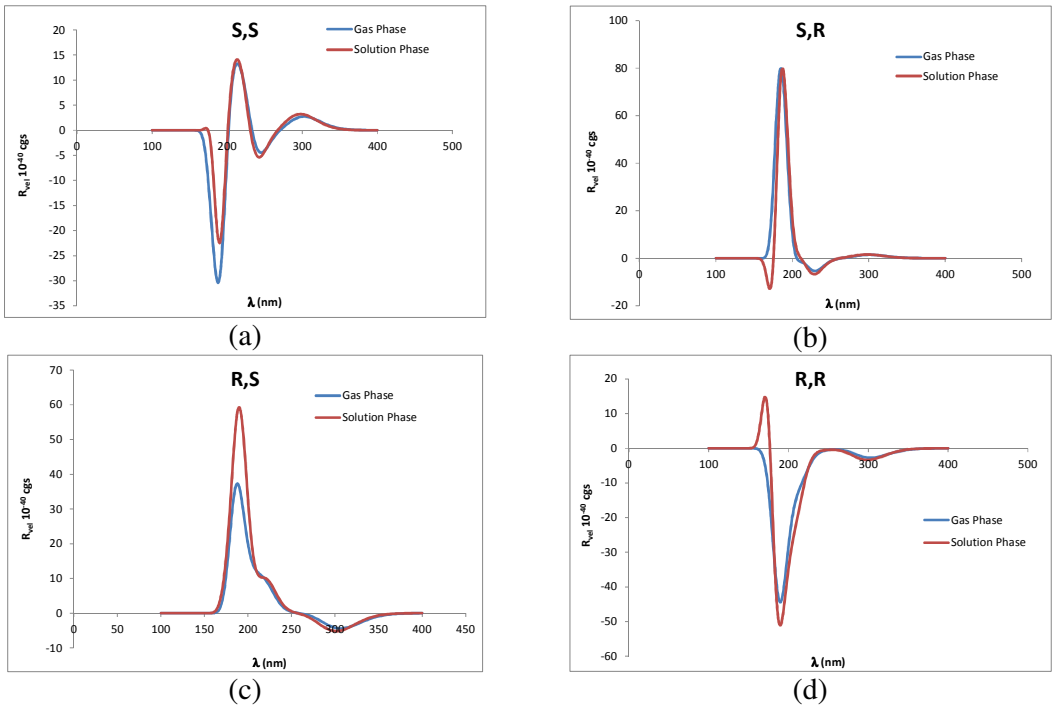


Figure 1. Calculated ECD spectra for the four diastereoisomers of 3a in gas and solution (methanol) phase.

Experimental ECD Spectra

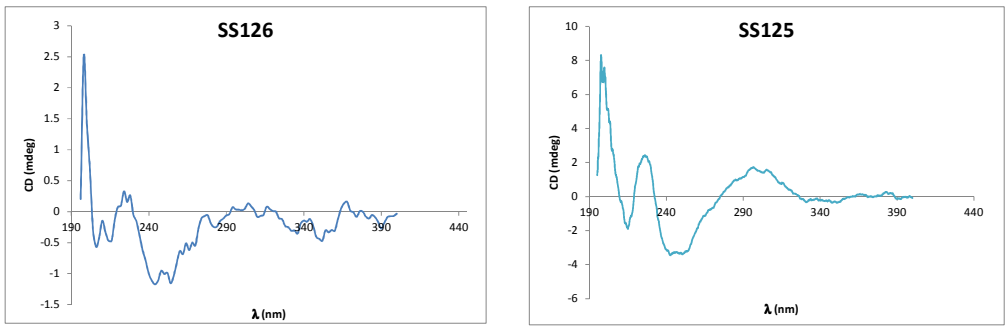


Figure 2. Experimental ECD spectrum of products 3a and 3c-best match to (*S,S*).

XYZ coordinates of optimised TDDFT structures in the gas phase

S,S

C	4.611595	3.409688	1.575726
C	3.292611	1.802652	0.220876

S,R

C	3.067553	2.977045	3.689233
C	3.024092	1.177189	1.960627

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C	3.128248	3.710776	1.755573	C	2.154293	1.855291	4.166727
H	4.960696	2.746856	2.374826	H	3.771554	3.340476	4.436194
H	5.261492	4.280073	1.518164	H	2.489993	3.828209	3.311991
H	2.844343	4.638351	1.246719	H	1.164205	2.202747	4.459582
H	2.821255	3.789896	2.795031	H	2.588553	1.299602	5.001483
N	2.457607	2.554578	1.139933	N	2.035749	0.975622	2.997751
C	4.617649	2.637757	0.281084	C	3.803592	2.405175	2.500536
O	5.411405	2.717211	-0.60873	O	4.807985	2.826114	1.998966
C	3.667963	0.425761	0.812237	C	4.008672	-0.0099	1.950129
O	3.168995	-0.06058	1.786876	O	4.434606	-0.46538	2.977072
O	4.728369	-0.07909	0.184008	O	4.360008	-0.41069	0.736492
C	5.21607	-1.33571	0.685689	C	5.48021	-1.31707	0.644343
H	5.495927	-1.20363	1.733121	H	5.890592	-1.1191	-0.34518
H	4.393329	-2.05228	0.651511	H	6.209549	-1.03074	1.402512
C	6.385081	-1.7382	-0.18213	C	5.051687	-2.75935	0.810391
H	6.744884	-2.72574	0.114329	H	5.930898	-3.40635	0.774657
H	6.093111	-1.7695	-1.23242	H	4.558506	-2.90751	1.772188
H	7.205082	-1.02639	-0.07634	H	4.378982	-3.06213	0.007168
C	1.235477	2.193307	1.668613	C	1.252611	-0.13529	3.106322
O	0.696713	2.86353	2.521354	O	0.534209	0.355519	4.052208
C	2.827756	1.862236	-1.30037	C	2.39968	1.560633	0.567096
C	1.328444	1.911033	-1.56344	H	1.864694	0.680871	0.21328
C	3.891505	-0.88641	-0.26104	C	1.418405	2.707576	0.747641
C	3.874178	-1.05583	-0.34227	C	1.802108	4.025429	0.504671
C	3.856852	-1.22525	-0.42349	C	0.130126	2.455832	1.223175
H	3.839525	-1.39467	-0.50471	C	0.922915	5.075324	0.757301
H	3.822198	-1.5641	-0.58594	H	2.789802	4.230032	0.106414
H	3.804872	-1.73352	-0.66716	C	-0.75029	3.502117	1.473936
H	3.787545	-1.90294	-0.74839	H	-0.1889	1.431871	1.393699
N	3.770218	-2.07236	-0.82961	C	-0.35219	4.817286	1.2488
C	3.752892	-2.24178	-0.91084	H	1.234848	6.095542	0.562951
O	3.735565	-2.4112	-0.99206	H	-1.74827	3.290241	1.841151
C	3.718239	-2.58062	-1.07328	H	-1.03744	5.634638	1.443635
O	3.700912	-2.75005	-1.15451	N	3.448366	1.873613	-0.39004
O	3.683585	-2.91947	-1.23573	H	4.305973	2.25411	-0.00723
C	3.666259	-3.08889	-1.31696	C	3.711573	1.080359	-1.47761
H	3.648932	-3.25831	-1.39818	O	4.806014	0.99552	-1.98416
H	3.631605	-3.42773	-1.47941	O	2.600844	0.466744	-1.91671
C	3.614279	-3.59715	-1.56063	C	2.666927	-0.44621	-3.05004
H	3.596952	-3.76657	-1.64185	C	3.504071	-1.66181	-2.66906
H	3.579626	-3.93599	-1.72308	H	3.456923	-2.40778	-3.46591
H	3.562299	-4.10542	-1.8043	H	4.546654	-1.38654	-2.51195
C	3.544972	-4.27484	-1.88553	H	3.107809	-2.10968	-1.75423
O	3.527646	-4.44426	-1.96675	C	1.209986	-0.83961	-3.25762
C	3.510319	-4.61368	-2.04797	H	0.803586	-1.31202	-2.36215
C	3.492992	-4.7831	-2.1292	H	0.607248	0.040894	-3.48752

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C	3.475666	-4.95252	-2.21042	H	1.127232	-1.54457	-4.08704
C	3.458339	-5.12194	-2.29165	C	3.194518	0.258933	-4.29626
C	3.441013	-5.29137	-2.37287	H	4.253626	0.48973	-4.21448
H	3.423686	-5.46079	-2.4541	H	3.037834	-0.38722	-5.16344
H	3.406359	-5.63021	-2.53532	H	2.642443	1.18696	-4.46237
H	3.389033	-5.79963	-2.61654	O	1.38489	-0.90646	2.012355
H	3.371706	-5.96905	-2.69777	C	0.649062	-2.16184	1.893065
N	3.354379	-6.13847	-2.77899	C	-0.84975	-1.88695	1.864407
C	3.337053	-6.30789	-2.86022	H	-1.38339	-2.8174	1.657032
O	3.319726	-6.47732	-2.94144	H	-1.19951	-1.49046	2.815939
C	3.3024	-6.64674	-3.02266	H	-1.08899	-1.17689	1.068391
O	3.285073	-6.81616	-3.10389	C	1.125323	-2.68669	0.546685
O	3.267746	-6.98558	-3.18511	H	0.919726	-1.95354	-0.23573
C	3.25042	-7.155	-3.26634	H	2.200398	-2.87008	0.572286
H	3.233093	-7.32442	-3.34756	H	0.614475	-3.61922	0.299249
H	3.215767	-7.49384	-3.42879	C	1.047818	-3.11215	3.015618
C	3.19844	-7.66327	-3.51001	H	0.670064	-2.77497	3.978913
H	3.181113	-7.83269	-3.59123	H	0.644	-4.10575	2.807378
H	3.163787	-8.00211	-3.67246	H	2.136388	-3.18964	3.070895

R,S

C	3.395337	-2.77021	0.00082
C	3.696804	-0.62024	1.103154
C	4.785427	-2.81935	0.627102
H	2.817403	-3.67556	0.164559
H	3.438231	-2.58177	-1.07695
H	5.587389	-3.10537	-0.05308
H	4.807801	-3.49701	1.485449
C	3.381465	-0.1653	2.536031
O	3.400676	-0.93511	3.454862
O	3.132702	1.133212	2.621915
C	2.916159	1.662983	3.944849
H	2.38454	2.598219	3.773959
H	2.269025	0.975998	4.490494
C	4.240429	1.885125	4.64747
H	4.071991	2.363402	5.614582
H	4.751753	0.937241	4.816406
H	4.885029	2.529969	4.047377
C	1.41771	-1.52427	0.929603
O	0.935662	-0.598	1.547585
C	3.828045	0.47292	-0.00349
C	4.922581	1.521106	0.188288
C	6.196537	1.281146	-0.32397
C	4.655043	2.765952	0.757603
C	7.195374	2.244539	-0.23947
H	6.412598	0.331181	-0.80415
C	5.650668	3.733219	0.844071

R,R

C	2.672437	-2.32937	0.355074
C	3.163958	-0.26675	1.586348
C	4.109788	-2.45766	0.844136
H	2.0729	-3.21253	0.55905
H	2.628933	-2.11059	-0.71682
H	4.821967	-2.79334	0.091761
H	4.172019	-3.12655	1.708718
C	3.107408	-0.11265	3.115968
O	2.656114	-0.95819	3.83769
O	3.712602	0.997822	3.5087
C	3.877777	1.173675	4.929424
H	4.035838	2.24406	5.047971
H	2.949922	0.888318	5.42566
C	5.058392	0.367966	5.432254
H	5.223632	0.574103	6.491734
H	4.874312	-0.70068	5.317417
H	5.963079	0.632557	4.882872
C	0.828471	-0.96613	1.348324
O	0.403709	0.013268	1.931186
C	3.283443	1.065828	0.797646
H	4.261501	1.477068	1.055007
C	3.254029	0.755944	-0.69386
C	2.036861	0.656439	-1.36949
C	4.438687	0.528921	-1.39216
C	2.004744	0.317885	-2.71748
H	1.111304	0.861281	-0.83854

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H	3.657412	2.988427	1.116335	C	4.408302	0.192189	-2.74386
C	6.925922	3.474516	0.351519	H	5.389978	0.630492	-0.87848
H	8.180603	2.036352	-0.6415	C	3.191329	0.080505	-3.40797
H	5.424223	4.697743	1.285481	H	1.053083	0.2462	-3.23281
H	7.700364	4.230712	0.41563	H	5.337131	0.02738	-3.27888
N	2.520818	1.053987	-0.25747	H	3.166565	-0.17799	-4.46068
H	1.902972	1.199601	0.530564	N	2.26251	2.0194	1.190072
C	2.317388	1.906294	-1.30944	H	1.397126	1.672162	1.585029
O	1.409209	2.700513	-1.37148	C	2.210302	3.26983	0.648766
O	3.25263	1.703599	-2.25449	O	1.248925	4.00059	0.712338
C	3.480371	2.689082	-3.30225	O	3.382532	3.564856	0.053628
C	3.830883	4.030761	-2.66872	C	3.486783	4.683495	-0.86944
H	4.121814	4.737106	-3.44988	C	3.295279	6.006987	-0.13757
H	2.982726	4.446671	-2.12534	H	3.525153	6.832407	-0.8161
H	4.671833	3.910079	-1.98024	H	2.273905	6.116798	0.220974
C	4.687312	2.120203	-4.03657	H	3.977085	6.06631	0.71403
H	5.530768	2.018034	-3.35006	C	4.913444	4.556168	-1.38792
H	4.45352	1.138499	-4.45403	H	5.626934	4.636602	-0.56532
H	4.978179	2.784067	-4.85312	H	5.052446	3.589008	-1.87621
C	2.274647	2.777112	-4.23065	H	5.124005	5.347663	-2.11006
H	1.413402	3.206478	-3.72301	C	2.490608	4.498431	-2.00961
H	2.52694	3.400569	-5.09208	H	1.463663	4.592681	-1.65853
H	2.009087	1.782576	-4.59695	H	2.667411	5.257294	-2.77556
C	5.023245	-1.42428	1.178676	H	2.624507	3.512491	-2.464
O	6.046372	-0.99837	1.621466	C	4.47432	-1.07441	1.33305
N	2.755991	-1.64976	0.694327	O	5.56898	-0.63463	1.520843
H	4.100765	-0.08739	-0.90488	N	2.150349	-1.19082	1.121632
O	0.743017	-2.55136	0.403311	O	0.079834	-1.94745	0.837258
C	-0.71414	-2.61772	0.522375	C	-1.37995	-1.88065	0.908819
C	-1.04712	-3.90826	-0.21388	C	-1.88219	-0.66497	0.137834
H	-2.12538	-4.07722	-0.20127	H	-1.61013	0.265489	0.632872
H	-0.71667	-3.85279	-1.25281	H	-1.47232	-0.66672	-0.87548
H	-0.55751	-4.7598	0.262711	H	-2.97089	-0.71126	0.061711
C	-1.35078	-1.42236	-0.1772	C	-1.80322	-3.16705	0.212791
H	-1.14676	-0.49273	0.350096	H	-2.89212	-3.2391	0.191732
H	-0.97613	-1.33883	-1.1999	H	-1.43322	-3.18717	-0.81411
H	-2.43252	-1.56806	-0.22269	H	-1.40852	-4.03645	0.742006
C	-1.11918	-2.71764	1.988358	C	-1.84056	-1.88089	2.361703
H	-0.58634	-3.53898	2.473034	H	-1.39181	-2.71934	2.899018
H	-0.90993	-1.79445	2.524737	H	-1.57438	-0.95503	2.867018
H	-2.19016	-2.92424	2.050773	H	-2.92626	-1.99912	2.392533

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