Supporting Information

Direct Cycloaddition of Activated N-Heteroarenes via Site- and Stereoselective Dearomative Reactions

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Acknowledgment We acknowledge the Korea Basic Science Institute (KBSI) for the HRMS and X-ray

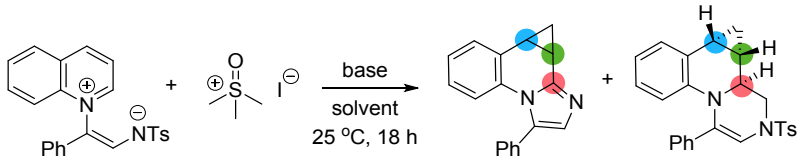
analysis.

I. General Methods

Unless otherwise stated, all commercial reagents and solvents were used without additional purification. The quinolinium zwitterions (**1**) were prepared according to the reported procedure.[S1] Analytical thin layer chromatography (TLC) was performed on Merck pre-coated silica gel 60 F254 plates. Visualization on TLC was achieved by use of UV light (254 nm). Flash column chromatography was undertaken on silica gel (Merck Kiesel gel 60 F254 230-400 mesh). ^{1}H NMR were recorded on Bruker DPX FT (400 MHz) and JEOL (300 MHz). Chemical shifts were quoted in parts per million (ppm) referenced to the appropriate solvent peak or 0.0 ppm for tetramethylsilane. The following abbreviations were used to describe peak splitting patterns when appropriate: br = broad, s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet. Coupling constants, *J*, were reported in hertz unit (Hz). ^{13}C NMR were recorded on Bruker FT AM 400 (100 MHz) and JEOL (75MHz). There were fully decoupled by broad band proton decoupling. Chemical shifts were reported in ppm referenced to the center line of a triplet at 77.0 ppm of chloroform-*d*. Infrared spectra were recorded on JASCO FT/IR-4700 and FT/IR-4200 FT-IR spectrometer. Frequencies are given in reciprocal centimeters (cm-1) and only selected absorbance is reported. Analytical normal-phase high-performance liquid chromatography (HPLC) was using an Agilent 1260 Infinity II series instrument equipped with a photodiode array detector (254 nm) and columns (chiral supports, 5 μm particle size, 4.6 x 250 mm) from Daicel Chemical Industries. High resolution mass spectra were obtained from the Korea Basic Science Institute (Daegu) by EI or ESI method.

II. Experimental Procedure

II-1. Optimization Studies of Divergent Cycloaddition of Quinolinium Zwitterion (1a) and Sulfoxonium Salt (2a) (Table 1)



1a **2a** **3a** **4a**

To a test tube with a triangular-shaped stir bar were added quinolinium zwitterion (**1a**, 0.1 mmol), trimethylsulfoxonium iodide (**2a**, 2 equiv), base (2 equiv) and solvent (1 mL) under N_2 atmospheric conditions. The reaction mixture was stirred at room temperature. After 18 h, it was filtered through a pad of silica and then washed with EtOAc (10 mL x 3). The organic solvent was removed under reduced pressure. The NMR yield of desired products (**3a** and **4a**) were determined by integration using an internal standard (CH_2Br_2).

II-2. Procedure for the Cycloaddition of Quinolinium Zwitterions (1) and Sulfur Ylides (2)

A. [2+1] Cycloaddition of Quinolinium Zwitterions (1) and Sulfoxonium Salt (2a) (Scheme 3).
To a test tube with a triangular-shaped stir bar were added quinolinium zwitterion (**1**, 0.1 mmol), trimethylsulfoxonium iodide (**2a**, 4 equiv), NaOMe (4 equiv), and DMF (2 mL) under N_2 atmospheric conditions. The reaction mixture was stirred at 40 °C for 3 h. After cooling the reaction mixture at room temperature, it was filtered through a pad of silica and then washed with EtOAc (10 mL x 3). The organic solvent was removed under reduced pressure. The organic residue was purified by chromatography on silica gel to give the desired product **3** (**3a**–**3h**).

B. [2+1] Cycloaddition of Quinolinium Zwitterion (1a) and Benzyldimethylsulfonium Salt (2) (Scheme 3).[S2]
To a test tube with a triangular-shaped stir bar were added quinolinium zwitterion (**1a**, 0.1 mmol), dimethyl(phenyl)sulfonium trifluoromethanesulfonate (2.5 equiv), NaH (2.5 equiv) and DCE (2.5 mL) under N_2 atmospheric conditions. The reaction mixture was stirred at 40 °C for for 3 h. After cooling the reaction mixture to room temperature, the reaction mixture was quenched by H_2O (5 mL) and extracted with CH_2Cl_2 (3 × 10 mL), the organic layer was combined, dried (Na_2SO_4), filtered and concentrated in vacuo to afford a crude oil. The organic residue was purified by chromatography on silica gel to give the desired product **3i**

C. [2+1] Cycloaddition of Quinolinium Zwitterions (1a) and Estersulfonium (or Ketosulfonium) Ylide (2) (Scheme 3).[S3]
To a test tube with a triangular-shaped stir bar were added quinolinium zwitterion (**1a**, 0.1 mmol), isolable sulfonium ylide (**2**, 2.5 equiv), and DCE (2.5 mL) under N_2 atmospheric conditions. The reaction mixture was stirred at 80 °C for 2 h. After cooling the reaction mixture at room temperature, it was filtered through a pad of silica and then washed with EtOAc (10 mL x 3). The organic solvent was removed under reduced pressure. The organic residue was purified by chromatography on silica gel to give the desired product **3** (**3j**–**3m**).

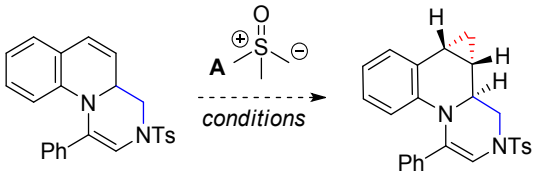
D. Cascade [2+1]/[5+1] Cycloaddition for Synthesis of Cyclopropane-fused N-Heterocycles (Scheme 4).

To a test tube with a triangular-shaped stir bar were added quinolinium zwitterion (**1**, 0.1 mmol), trimethylsulfoxonium iodide (2.5 equiv), NaH (2.5 equiv), and DMF (2.5 mL) under N_2 atmospheric conditions. The reaction mixture was stirred at room temperature. After 18 h, the reaction mixture was filtered through a pad of silica and then washed with EtOAc (10 mL x 3). The organic solvent was removed under reduced pressure. The organic residue was purified by chromatography on silica gel to give the desired product **4**.

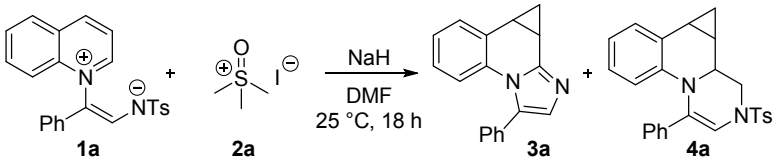
II-3. Control Experiment to Confirm the Sequence of Cascade Cycloaddition (Scheme 2)

To decipher the sequence of the cascade cycloaddition, we conducted a control experiment with isolated **5** and excess of ylide **A** under various reaction conditions. However, the expected compound **4a** was not observed at all.

A. Procedure: To a test tube with a triangular-shaped stir bar were added cyclic compound **5** (0.1 mmol), trimethylsulfoxonium iodide (**2a**, 2.5 equiv), NaH (2.5 equiv), and DMF (2.5 mL) under N_2 atmospheric conditions. The reaction mixture was stirred at room temperature for 18 h. However, the reaction mixture was not converted at all. In general, sulfur ylides do not undergo cyclopropanation when they are reacted with non-activated olefins.



B. Product ratio depending on the concentration: To a test tube with a triangular-shaped stir bar were added quinolinium zwitterion (**1a**, 0.1 mmol), trimethylsulfoxonium iodide (**2a**, 2.5 equiv), NaH (2.5 equiv), and DMF under N_2 atmospheric conditions. The reaction mixture was stirred at room temperature. After 18 h, the reaction mixture was filtered through a pad of silica and then washed with EtOAc (10 mL x 3). The organic solvent was removed under reduced pressure. The ratio of desired products (**3a** and **4a**) were determined by ^{1}H NMR.



Entry	Solvent (mL)	**3a** (%)	**4a** (%)
1	1	-	70
2	2	-	80
3	2.5	-	84
4	3	12	73
5	5	9	63

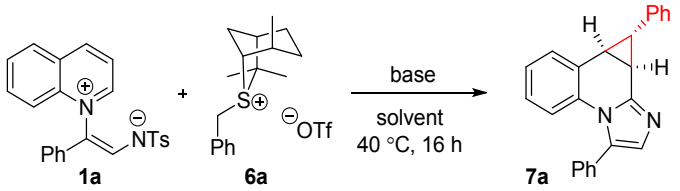
[a] Conditions: **1a** (0.1 mmol), **2a** (2.5 equiv), base (2.5 equiv) and 25 °C, 18 h.
[b] NMR yield using CH_2Br_2 as an internal standard.

II-4. Optimization Studies of the Asymmetric Cycloaddition of Quinolinium Zwitterion (1a) and Chiral Sulfur Ylides (Table S1)

To a test tube with a triangular-shaped stir bar were added quinolinium zwitterion (**1a**, 0.1 mmol), chiral sulfonium salt (**6a**), base and solvent under N_2 atmospheric conditions. The reaction mixture was stirred

at room temperature for 2 h and then it was heated to 40 °C for 16 h. After cooling the reaction mixture to room temperature, the reaction mixture was quenched by H_2O (5 mL) and extracted with CH_2Cl_2 (3 × 10 mL), the organic layer was combined, dried (Na_2SO_4), filtered and concentrated in vacuo to afford a crude oil. The organic residue was purified by chromatography on silica gel to give the desired product **7a**.

Table S1. Optimization Studies of Enantioselective Cyclopropanation



entry	equiv of **6a**	base	solvent	yield (%)	ee (%)
1	2.5	KOH	MeCN/H_2O (9:1)	50[a] [1:3.5]	96
2	2.5	KOH	MeCN/*t*BuOH (15:1)	29 [1.1:1]	95
3	2.5	NaOMe	DMF	30 [1.7:1]	93
4	2.5	NaH	DCE	73 [1.5:1]	86
5	2.5	NaH	DMF	41 [1.3:1]	93
6	2.5	NaH	MeCN	75 [1.3:1]	96
7	3.0	NaH	MeCN	78 [1.4:1]	95
8	3.0	KOH	MeCN	40 [1.2:1]	94
9	3.0	K_2CO_3	MeCN	77 [1.4:1]	77

[a]Reaction was stirred at room temperature.

II-5. Procedure for Enantioselective Cyclopropanation of Quinolinium Zwitterion (1) (Scheme 5)

To a test tube with a triangular-shaped stir bar were added quinolinium zwitterion (**1**, 0.1 mmol), chiral sulfonium salt (**6**, 3 equiv), NaH (3.5 equiv), and acetonitrile (2.5 mL) under N_2 atmospheric conditions. The reaction mixture was stirred at room temperature for 2 h and then it was heated to 40 °C for 16 h. After cooling the reaction mixture at room temperature, the reaction mixture was quenched by H_2O (5 mL) and extracted with CH_2Cl_2 (3 × 10 mL), the organic layer was combined, dried (Na_2SO_4), filtered and concentrated in vacuo to afford a crude oil. The organic solvent was removed under reduced pressure. The organic residue was purified by chromatography on silica gel to give the desired product **7**.

II-6. Synthetic Applications of Obtained Compound 4 (Scheme 6)

A. Scale-up Reaction for the Synthesis of Compound 4a.

To a 250 mL round bottom flask with a stir bar were added quinolinium zwitterion (**1a**, 4 mmol), trimethylsulfoxonium iodide (2.5 equiv), NaH (2.5 equiv), and DMF (100 mL) under N_2 atmospheric conditions. The reaction mixture was stirred at room temperature for 18 h, and the reaction was quenched with H_2O. The mixture was extracted with EtOAc (10 mL x 3), the organic phases were combined, dried over $MgSO_4$. Organic solvents were removed under reduced pressure. The organic residue was purified by chromatography on silica gel to give the desired product **4a** (1.35 g, 79%).

B. Detosylation of Compound 4h (Compound 8).

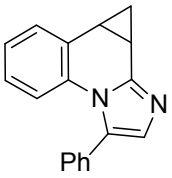
To a test tube with a triangular-shaped stir bar were added compound **4h** (0.1 mmol), Mg powder (10 equiv), THF (0.1 mL), and MeOH (1 mL) under N_2 atmospheric conditions. The reaction mixture was stirred at room temperature. After 1 h, the reaction mixture was filtered through a pad of silica and then

washed with DCM (10 mL x 3). The organic solvent was removed under reduced pressure and used in the next step without further purification.

C. Arylation of Detosylated Compound (Compound 9).
To a test tube with a stir bar were added detosylated compound **8** (0.08 mmol), iodobenzene (1.2 equiv), $Pd(OAc)_2$ (5 mol%), BINAP (5.5 mol%), NaO*t*Bu (1.4 equiv), and toluene (0.5 mL) under N_2 atmospheric conditions. The reaction mixture was stirred at 110 °C for 1 h. After cooling the reaction mixture at room temperature, it was filtered through a pad of celite and then washed with EtOAc (10 mL x 3). The organic solvent was removed under reduced pressure. The organic residue was purified by chromatography on silica gel to give the desired product **9**.

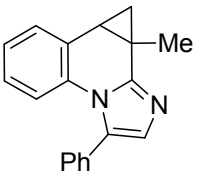
III. Spectroscopic data

3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3a):



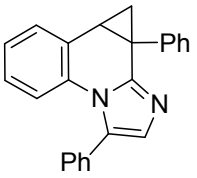
Pale yellow oil (83%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.47-7.42 (m, 6H), 7.09-7.05 (td, *J* = 7.43 Hz, 1.06 Hz, 1H), 7.01-6.98 (m, 2H), 6.92-6.88 (m, 1H), 2.90-2.84 (m, 1H), 2.69-2.64 (m, 1H), 1.68-1.62 (td, *J* = 8.80 Hz, 4.56 Hz, 1H), 0.49-0.45 (q, *J* = 4.80 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 146.9, 133.4, 132.1, 130.9, 130.8, 129.7, 129.3, 128.6, 128.1, 127.4, 126.2, 124.9, 117.7, 18.9, 14.3, 12.0; IR (liquid) ν 1709.59, 1494.56, 1386.57, 1362.46, 1220.72 cm^{-1}; HRMS (EI) m/z calcd. for $C_{18}H_{14}N_2$ [*M*+]: 258.1157, found: 258.1155.

9a-methyl-3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3b):



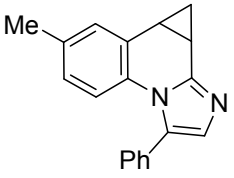
Pale yellow oil (75%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.43-7.41 (m, 6H), 7.08-6.98 (m, 3H), 6.91-6.86 (m, 1H), 2.46-2.43 (dd, *J* = 8.98 Hz, 5.21 Hz, 1H), 1.76 (s, 3H), 1.55-1.52 (m, 1H), 0.61-0.59 (t, *J* = 4.77 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 149.8, 133.3, 132.2, 131.1, 130.6, 129.1, 128.6, 128.0, 126.0, 124.7, 117.6, 27.3, 21.0, 19.9, 19.7; IR (liquid) ν 1738.51, 1494.56, 1467.56, 1365.35, 1216.86 cm^{-1}; HRMS (EI) m/z calcd. For $C_{19}H_{16}N_2$ [*M*+]: 272.1316, found: 272.1313.

3,9a-diphenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3c):



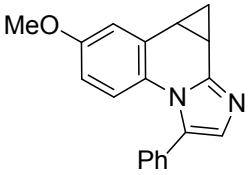
Pale yellow oil (34%); ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.55-7.53 (d, *J* = 7.19 Hz, 2H), 7.48-7.25 (m, 9H), 7.14-6.93 (m, 4H), 2.82-2.77 (m, 1H), 2.25-2.21 (dd, *J* = 9.38 Hz, 4.61 Hz, 1H), 1.00-0.97 (t, *J* = 5.10 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 149.0, 140.1, 133.2, 132.1, 131.1, 131.0, 129.7, 129.3, 129.2, 128.7, 128.7, 128.1, 127.5, 127.4, 126.5, 124.9, 117.9, 29.4, 28.4, 18.5; IR (liquid) ν 1635.34, 1267.00, 1244.83, 1234.22, 1209.15, 1183.11, 1128.15, 1101.15 cm^{-1}; HRMS (ESI) m/z calcd. For $C_{24}H_{18}N_2$ [*M*+] 334.1470, found: 334.1470.

7-methyl-3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3d):



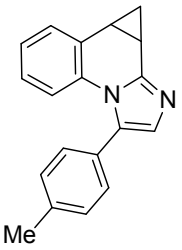
Pale yellow oil (77%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40 (s, 5H), 7.27-7.26 (m, 1H), 6.96 (s, 1H), 6.87-6.85 (d, *J* = 8.48 Hz, 1H), 6.71-6.68 (dd, *J* = 8.48 Hz, 1.52 Hz, 1H), 2.87-2.81 (m, 1H), 2.64-2.58 (m, 1H), 2.27 (s, 3H), 1.64-1.59 (td, *J* = 8.79 Hz, 4.54 Hz, 1H), 0.46-0.43 (q, *J* = 4.79 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 146.7, 134.5, 132.3, 131.1, 130.7, 130.5, 130.1, 129.3, 128.6, 128.0, 127.3, 126.8, 117.5, 20.5, 18.8, 14.3, 12.1; IR (liquid) ν 1737.55, 1505.17, 1375.00, 1228.43, 1216.86, 1206.26 cm^{-1}; HRMS (EI) m/z calcd. for $C_{19}H_{16}N_2$ [*M*+]: 272.1315, found: 272.1313

7-methoxy-3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3e):



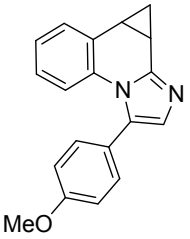
Pale yellow oil (86%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.41 (s, 5H), 7.00-6.96 (m, 2H), 6.92-6.90 (d, *J* = 9.13 Hz, 1H), 6.45-6.42 (dd, *J* = 9.13 Hz, 2.88 Hz, 1H), 3.76 (s, 3H), 2.87-2.82 (m, 1H), 2.64-2.58 (m, 1H), 1.66-1.60 (m, 1H), 0.49-0.45 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 156.5, 146.2, 132.3, 130.5, 130.4, 129.4, 129.0, 128.6, 128.1, 127.0, 118.7, 114.7, 111.3, 55.4, 19.0, 14.3, 12.2; IR (liquid) ν 1498.42, 1358.60, 1340.28, 1241.93, 1166.72, 1090.55 cm^{-1}; HRMS (EI) m/z calcd. for $C_{19}H_{16}N_2O$ [*M*+]: 288.1261, found: 288.1263.

3-(p-tolyl)-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3f):

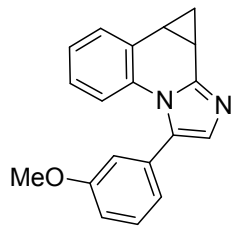


Pale yellow oil (67%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.47-7.44 (d, *J* = 6.18 Hz, 1H), 7.30-7.28 (m, 2H), 7.24-7.22 (m, 2H), 7.09-7.03 (m, 2H), 6.94-6.88 (m, 2H), 2.88-2.83 (m, 1H), 2.68-2.62 (m, 1H), 2.43 (s, 3H), 1.66-1.60 (td, *J* = 8.79 Hz, 4.54 Hz, 1H), 0.47-0.44 (q, *J* = 4.79 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 146.7, 138.1, 133.5, 130.9, 130.5, 129.6, 129.4, 129.3, 127.4, 126.2, 124.8, 117.6, 21.3, 18.9, 14.3, 12.0; IR (liquid) ν 1633.41, 1493.60, 1465.63, 1385.60, 1366.32, 1144.55 cm^{-1}; HRMS (EI) m/z calcd. for $C_{19}H_{16}N_2$ [*M*+]: 272.1312, found: 272.1313.

3-(4-methoxyphenyl)-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3g):



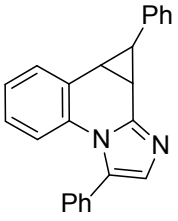
Pale yellow oil (69%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.47-7.44 (m, 1H), 7.33-7.31 (d, *J* = 8.18 Hz, 2H), 7.08-7.01 (m, 2H), 6.97-6.88 (m, 4H), 3.88 (s, 3H), 2.88-2.82 (m, 1H), 2.67-2.62 (m, 1H), 1.65- 1.60 (td, *J* = 8.79 Hz, 4.54 Hz, 1H), 0.46-0.42 (q, *J* = 4.78 Hz, 1H) ; ^{13}C NMR (100 MHz, $CDCl_3$) δ 159.6, 146.4, 133.5, 130.8, 130.5, 130.3, 129.6, 127.4, 126.2, 124.8, 124.5, 117.4, 114.1, 55.3, 18.7, 14.3, 11.9; IR (liquid) ν 1709.59, 1494.56, 1361.50, 1245.79, 1219.76 cm^{-1}; HRMS (EI) m/z calcd. for $C_{19}H_{16}N_2O$ [*M*+]: 288.1262, found: 288.1263.



3-(3-methoxyphenyl)-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3h):

Pale yellow oil (58%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.47-7.45 (dd, *J* = 7.52 Hz, 1.10 Hz, 1H), 7.35-7.31 (t, *J* = 7.93 Hz, 1H), 7.09-7.03 (m , 2H), 6.99-6.90 (m, 5H), 3.81 (s, 3H), 2.89-2.83 (m, 1H), 2.69-2.63 (m, 1H), 1.67-1.62 (td *J* = 8.78 Hz, 4.56 Hz, 1H), 0.48-0.45 (q, *J* = 4.78 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 159.7, 146.9, 133.4, 133.4, 130.8, 130.7, 129.7, 129.6, 127.3, 126.2, 124.9, 121.8, 117.7, 114.6, 113.9, 55.3, 18.9, 14.3, 12.0; IR (liquid) ν 1737.55, 1588.09, 1494.56, 1464.67, 1365.35, 1227.47, 1216.86 cm^{-1}; HRMS (EI) m/z calcd. for $C_{19}H_{16}N_2O$ [*M*+]: 288.1262, found: 288.1263.

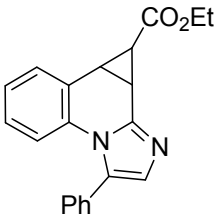
3,9-diphenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3i):



Pale yellow oil (41%); d.r.: 1:1.1; (major diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.58-7.56 (d, *J* = 7.43 Hz, 1H), 7.31-7.27 (m, 3H), 7.25-7.22 (m, 2H), 7.13-6.95 (m, 5H), 6.87-6.79 (m, 3H), 6.61-6.58 (d, *J* = 8.59 Hz, 1H), 3.41-3.36 (t, *J* = 8.36 Hz, 1H), 3.17-3.11 (t, *J* = 8.61 Hz, 1H), 3.03-2.97 (t, *J* = 8.93 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 144.5, 134.1, 131.9, 130.7, 130.7, 130.5, 130.1, 128.4, 127.7, 127.6, 126.4, 126.4, 124.8, 124.8, 117.5, 24.6, 22.6, 19.8; (minor diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.47-7.45 (m, 6H), 7.36-7.32 (m, 2H), 7.24-7.14 (m, 3H), 7.11-7.01 (m, 3H), 6.96-6.90

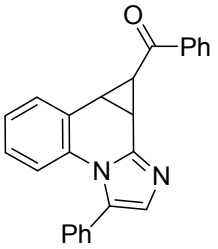
(m, 1H), 3.27-3.23 (dd, *J* = 8.49 Hz, 4.22 Hz, 1H), 2.98-2.93 (dd, *J* = 8.48 Hz, 4.55 Hz, 1H), 1.96-1.93 (t, *J* = 4.35 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 145.6, 139.6, 133.4, 132.1, 131.0, 131.0, 129.8, 129.4, 128.7, 128.6, 128.3, 126.6, 126.4, 126.4, 125.7, 125.1, 117.8, 29.7, 29.5, 24.7; IR (liquid) ν 1635.34, 1493.60, 1379.82, 1247.72 cm^{-1}; HRMS (ESI) m/z calcd. for $C_{24}H_{18}N_2$ [*M*+]: 334.1470, found: 334.1472.

ethyl 3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline-9-carboxylate (3j):



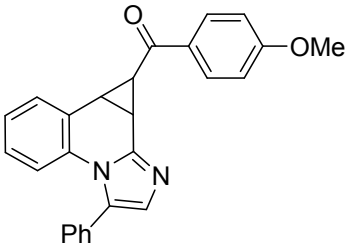
Pale yellow oil (57%); ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.53-7.41 (m, 6H), 7.14-6.93 (m, 4H), 4.31-4.17 (m, 2H), 3.47-3.43 (dd, *J* = 8.83 Hz, 3.59 Hz, 1H), 3.28-3.24 (m, 1H), 1.61-1.58 (m, 1H), 1.32-1.27 (t, *J* = 7.13 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 172.0, 133.6, 131.7, 131.1, 131.0, 131.0, 130.2, 130.2, 129.5, 128.7, 128.6, 128.5, 128.5, 127.3, 125.2, 125.2, 124.4, 124.4, 117.7, 117.6, 61.3, 27.5, 25.6, 23.5, 14.2; IR (liquid) ν 1720.19, 1641.13, 1412.60, 1381.75, 1329.68, 1302.68, 1270.86, 1182.15 cm^{-1}; HRMS (ESI) m/z calcd. for $C_{21}H_{18}N_2O_2$ [*M*+]: 330.1368, found:330.1372.

phenyl(3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinolin-9-yl)methanone (3k):



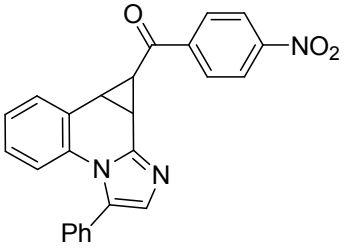
Pale yellow oil (98%); ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.97-7.94 (d, *J* = 7.45 Hz, 2H), 7.59-7.43 (m, 9H), 7.15-6.97 (m, 4H), 3.71-3.67 (dd, *J* = 8.66 Hz, 3.42 Hz, 1H), 3.71-3.67 (dd, *J* = 8.66 Hz, 3.42 Hz, 1H), 3.52-3.48 (dd, *J* = 8.63 Hz, 3.75 Hz, 1H), 2.62-2.59 (t, *J* = 3.51 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 197.3, 144.0, 137.2, 133.8, 133.2, 131.7, 131.1, 130.3, 129.6, 128.8, 128.6, 128.5, 128.2, 127.4, 125.3, 125.0, 117.6, 30.8, 29.3, 26.8; IR (liquid) ν 1652.70, 1637.27, 1397.17, 1380.78, 1334.50, 1220.72, 1033.66, 1023.05 cm^{-1}; HRMS (ESI) m/z calcd. for $C_{25}H_{18}N_2O$ [*M*+]: 362.1419, found: 362.1419.

4-methoxyphenyl)(3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinolin-9-yl)methanone (3l):



Pale yellow oil (90%); ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.96-7.93 (d, *J* = 8.82 Hz, 2H), 7.51-7.46 (m, 6H), 7.14-6.91 (m, 6H), 3.86 (s, 3H), 3.66-3.62 (dd, *J* = 8.75 Hz, 3.60 Hz, 1H), 3.49-3.45 (dd, *J* = 8.71 Hz, 3.89 Hz, 1H), 2.56-2.54 (t, *J* = 3.73 Hz, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 195.5, 163.7, 144.3, 133.8, 131.8, 131.1, 130.5, 130.5, 130.3, 130.3, 130.3, 129.6, 129.5, 128.8, 128.7, 128.5, 128.5, 127.3, 127.3, 125.3, 125.3, 125.2, 117.7, 117.6, 113.7, 55.4, 30.3, 28.9, 26.4; IR (liquid) ν 1668.12, 1599.66, 1510.95, 1422.24, 1321.00, 1263.15, 1174.44, 1153.22, 1086.69 cm^{-1}; HRMS (ESI) m/z calcd. for $C_{26}H_{20}N_2O_2$ [*M*+]: 392.1525, found: 392.1527 .

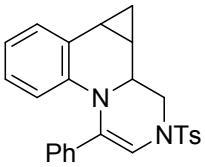
4-nitrophenyl)(3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinolin-9-yl)methanone (3m):



Pale yellow oil (76%); ^{1}H NMR (300 MHz, $CDCl_3$) δ 8.32-8.29 (d, *J* = 8.57 Hz, 2H), 8.12-8.09 (d, *J* = 8.60 Hz, 2H), 7.55-7.48 (m, 6H), 7.18-7.03 (m, 4H), 3.78-3.73 (dd, *J* = 8.74 Hz, 3.24 Hz, 1H), 3.61-3.57 (dd, *J* = 8.70 Hz, 3.62 Hz, 1H), 2.61-2.59 (m, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 196.1, 150.3, 143.4, 143.3, 141.6, 133.8, 131.5, 131.3, 131.2, 131.2, 130.4, 129.6, 129.2, 129.2, 128.8, 128.7, 128.7, 127.9, 127.8, 127.8, 125.5, 125.5, 124.4, 123.8, 123.8, 117.7, 117.7, 31.7, 30.1, 28.0; IR (liquid) ν 1636.30, 1524.45, 1347.03, 1334.50, 1216.86, 1037.52, 1010.52 cm^{-1};

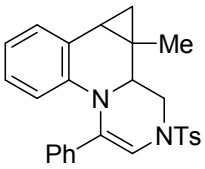
HRMS (ESI) m/z calcd. for $C_{25}H_{17}N_3O_3$ [*M*+]: 407.1270, found: 407.1272.

4-phenyl-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4a):



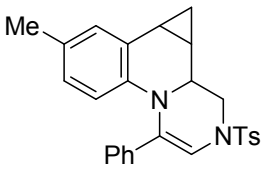
White solid (81%); m.p. 198.8-205.9 °C; ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.66-7.63 (d, *J* = 8.20 Hz, 2H), 7.44-7.42 (d, *J* = 7.42 Hz, 2H), 7.31-7.26 (m, 2H), 7.25-7.21 (m, 3H), 7.18 (s, 1H), 7.12-7.10 (m, 1H), 6.73-6.67 (m, 1H), 6.67-6.62 (m, 1H), 6.12-6.10 (d, *J* = 7.69 Hz, 1H), 3.89-3.84 (dd, *J* = 11.62 Hz, 1.89 Hz, 1H), 3.42-3.38 (d, *J* = 10.40 Hz, 1H), 3.00-2.93 (m, 1H), 2.38 (s, 3H), 2.00-1.92 (m, 1H), 1.64-1.60 (m, 1H), 1.47-1.42 (q, *J* = 4.73 Hz, 1H), 1.06-0.99 (td, *J* = 8.43 Hz, 4.51 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.0, 138.7, 136.3, 134.3, 129.8, 128.8, 128.7, 128.0, 127.3, 126.9, 126.1, 123.9, 119.7, 118.7, 116.0, 51.4, 47.5, 21.5, 17.8, 14.3, 9.0; IR (liquid) ν 1357.64, 1340.28, 1165.76, 1090.55, 1491.67 cm^{-1}; HRMS (EI) m/z calcd. for $C_{26}H_{24}N_2O_2S$ [*M*+]: 428.1558, found: 428.1559.

10a-methyl-4-phenyl-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4b):



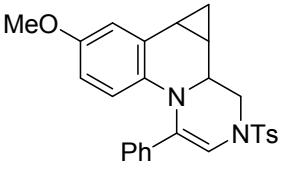
Pale yellow oil (59%); ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.66-7.64 (d, *J* = 8.28, 2H), 7.44-7.42 (m, 2H), 7.30-7.19 (m, 6H), 7.09-7.07 (m, 1H), 6.71-6.67 (m, 1H), 6.66-6.62 (m, 1H), 6.12-6.10 (dd, *J* = 7.82 Hz, 1.18 Hz, 1H), 4.04-4.01 (dd, *J* = 11.88 Hz, 1.84 Hz, 1H), 3.11-3.08 (dd, *J* = 10.64 Hz, 1.60 Hz, 1H), 2.87-2.81 (m, 1H), 2.39 (s, 3H), 1.83-1.79 (dd, *J* = 8.68 Hz, 4.72 Hz, 1H), 1.74-1.71 (m, 1H), 1.22 (s, 3H), 0.77-0.74 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.0, 138.3, 136.2, 134.1, 129.8, 129.0, 128.8, 127.5, 127.3, 127.0, 126.9, 125.9, 124.0, 119.8, 118.8, 115.8, 55.4, 45.3, 22.8, 21.5, 21.3, 17.4; IR (liquid) ν 2359.48, 2341.16, 1491.67, 1359.57, 1342.21, 1275.68, 1261.22, 1136.83 cm^{-1}; HRMS (EI) m/z calcd. for $C_{27}H_{26}N_2O_2S$ [*M*+]: 442.1715, found: 442.1713.

8-methyl-4-phenyl-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4c):



White solid (80%); m.p. 156.6-161.4 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65-7.63 (d, *J* = 8.32 Hz, 2H), 7.43-7.41 (m, 2H), 7.29-7.19 (m, 5H), 7.18-7.17 (m, 1H), 6.93-6.93 (d, *J* = 1.80 Hz, 1H), 6.51-6.49 (dd, *J* = 8.24 Hz, 1.52 Hz, 1H), 6.02-6.00 (d, *J* = 8.24 Hz, 1H), 3.86-3.83 (dd, *J* = 11.64 Hz, 1.96 Hz, 1H), 3.37-3.34 (d, *J* = 10.36 Hz, 1H), 2.98-2.92 (m, 1H), 2.38 (s, 3H), 2.13 (s, 3H), 1.94-1.88 (td, *J* = 8.46 Hz, 4.88 Hz, 1H), 1.60-1.55 (m, 1H), 1.44-1.40 (q, *J* = 4.79 Hz, 1H), 1.03-0.98 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.9, 136.4, 136.3, 134.4, 129.8, 128.9, 128.8, 128.8, 128.7, 127.2, 126.9, 126.7, 126.0, 123.9, 118.7, 115.7, 51.4, 47.3, 21.5, 20.3, 17.7, 14.3, 9.0; IR (liquid) ν 2360.44, 2341.16, 1499.38, 1359.57, 1339.32, 1257.36, 1167.69 cm^{-1}; HRMS (EI) m/z calcd. for $C_{27}H_{26}N_2O_2S$ [*M*+]: 442.1715, found: 442.1718.

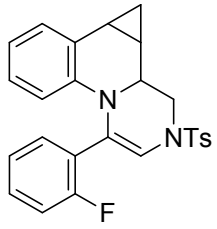
8-methoxy-4-phenyl-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4d):



White solid (85%); m.p. 178.0-181.7 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.66-7.64 (d, *J* =8.28 Hz, 2H), 7.44-7.42 (d, *J* = 7.36 Hz, 2H), 7.30-7.26 (m, 2H), 7.25-7.19 (m, 3H), 7.16 (s, 1H), 6.72-6.71 (d, *J* = 2.92 Hz, 1H), 6.29-6.26 (dd, *J* = 8.84 Hz, 2.92 Hz, 1H), 6.04-6.02 (d, *J* = 8.84 Hz, 1H), 3.85-3.82 (m, 1H), 3.65 (s, 3H), 3.33-3.31 (d, *J* = 10.36 Hz, 1H), 2.95-2.89 (m, 1H), 2.38 (s, 3H), 1.95-1.89 (m, 1H), 1.61-1.56 (m, 1H), 1.48-1.45 (q, *J* = 4.79 Hz, 1H), 1.05-1.00 (td, *J* = 8.47 Hz, 4.50 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 153.1, 143.9, 136.5, 134.3, 132.5, 129.8, 129.0, 128.8, 127.4, 127.3, 126.9, 123.9, 119.6, 115.6, 114.0, 111.1, 55.3, 51.4, 47.0, 21.5, 17.8, 14.7, 9.0; IR (liquid) ν 1498.42, 1358.60, 1340.28, 1241.93, 1218.79, 1166.72 cm^{-1}; HRMS (EI) m/z

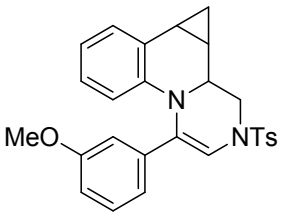
calcd. for $C_{27}H_{26}N_2O_3S$ [*M*+]: 458.1664, found: 458.1663.

4-(2-fluorophenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4e):



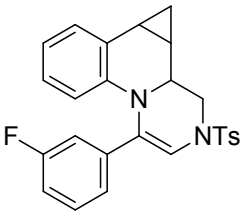
Pale yellow solid (63%); m.p. 68.4 -126.7 °C; ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.64-7.62 (d, *J* = 8.22 Hz, 2H), 7.45 (s, 1H), 7.32-7.27 (m, 1H), 7.22-7.19 (d, *J* = 8.14 Hz, 2H), 7.15-7.06 (m, 3H), 7.00-6.94 (m, 1H), 6.70-6.62 (m, 2H), 6.03-6.01 (d, *J* = 7.66 Hz, 1H), 3.90-3.85 (dd, *J* = 11.2 Hz, 2.00 Hz, 1H), 3.60-3.56 (d, *J* = 10.45 Hz, 1H), 2.94-2.86 (t, *J* = 10.99 Hz, 1H), 2.36 (s, 3H), 1.96-1.91 (m, 1H), 1.66-1.61 (m, 1H), 1.47-1.43 (q, *J* = 4.75 Hz, 1H), 1.07-1.01 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 160.8, 157.5, 143.9, 138.7, 133.9, 129.7, 128.0, 127.9, 127.7, 127.6, 126.9, 126.2, 126.1, 124.4, 124.3, 123.7, 123.6, 122.7, 122.6, 121.3, 121.1, 119.7, 117.8, 116.4, 116.1, 51.4, 47.5, 21.5, 18.0, 14.2, 8.8; IR (liquid) ν 3433.64, 1633.41, 1485.74, 1360.53, 1339.32, 1167.69 cm^{-1}; HRMS (EI) m/z calcd. for $C_{26}H_{23}FN_2O_2S$ [*M*+]: 446.1464, found: 446.1468.

4-(3-methoxyphenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4f):



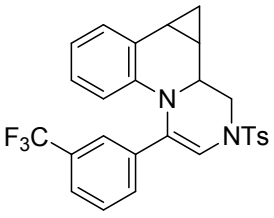
Pale yellow solid (71%); m.p. 81.7-139.7 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65-7.63 (d, *J* = 8.28 Hz, 2H), 7.25-7.21 (m, 3H), 7.19-7.17 (m, 1H), 7.11-7.09 (dd, *J* = 7.28 Hz, 1.60 Hz, 1H), 7.05-7.03 (d, *J* =7.96 Hz, 1H), 6.97-6.96 (m, 1H), 6.77-6.75 (m, 1H), 6.73-6.69 (m, 1H), 6.66-6.62 (m, 1H), 6.15-6.13 (d, *J* = 7.92 Hz, 1H), 3.87-3.84 (dd, *J* = 11.68 Hz, 2.00 Hz, 1H), 3.77 (s, 3H), 3.39-3.36 (d, *J* = 10.36 Hz, 1H), 2.98-2.93 (m, 1H), 2.38 (s, 3H), 1.98-1.92 (td, *J* = 8.44 Hz, 4.84 Hz, 1H), 1.62-1.57 (m, 1H), 1.44-1.41 (q, *J* = 4.79 Hz, 1H), 1.04-0.99 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 160.0, 144.0, 138.7, 138.0, 134.2, 129.8, 128.5, 128.0, 126.9, 126.1, 126.1, 119.7, 118.6, 116.5, 116.2, 112.3, 109.9, 55.2, 51.3, 47.4, 21.5, 17.8, 14.2, 9.0; IR (liquid) ν 1597.73, 1578.45, 1490.70, 1339.32, 1164.79 cm^{-1}; HRMS (EI) m/z calcd. for $C_{27}H_{26}N_2O_3S$ [*M*+]: 458.1664, found: 458.1667.

4-(3-fluorophenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinolone (4g):



White solid (58%); m.p. 153.8-188.1 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65-7.63 (d, *J* = 8.08 Hz, 2H), 7.28-7.21 (m, 5H), 7.13-7.11 (d, *J* = 7.08 Hz, 1H), 7.09-7.07 (d, *J* = 7.08 Hz, 1H), 6.91-6.87 (m, 1H), 6.75-6.71 (m, 1H), 6.69-6.65 (m, 1H), 6.10-6.08 (d, *J* = 7.96 Hz, 1H), 3.88-3.85 (m, 1H), 3.40-3.37 (d, *J* = 10.44 Hz, 1H), 2.98-2.92 (t, *J* = 11.16 Hz, 1H), 2.38 (s, 3H), 1.99-1.94 (m, 1H), 1.64-1.58 (m, 1H), 1.45-1.41 (q, *J* = 4.71 Hz, 1H), 1.07-1.01 (td, *J* = 8.41 Hz, 4.58 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 164.6, 162.1, 144.1, 139.0, 138.9, 138.5, 134.3, 130.4, 130.3, 129.9, 128.2, 127.4, 127.4, 126.9, 126.2, 126.2, 120.0, 119.3, 119.3, 118.5, 116.9, 114.1, 113.9, 111.0, 110.7, 51.4, 47.4, 21.5, 17.7, 14.3, 9.0; IR (liquid) ν 2359.48, 2341.16, 1609.31, 1582.31, 1491.67, 1360.53, 1340.28, 1167.69 cm^{-1}; HRMS (EI) m/z calcd. for $C_{26}H_{23}FN_2O_2S$ [*M*+]: 446.1464, found: 446.1465.

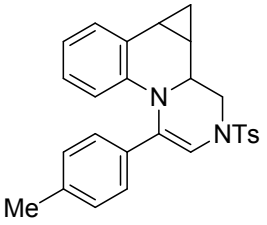
2-tosyl-4-(3-(trifluoromethyl)phenyl)-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4h):



Pale yellow solid (59%); m.p. 83.4-126.2 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.67-7.65 (m, 3H), 7.58-7.56 (d, *J* = 7.72 Hz, 1H), 7.47-7.45 (m, 1H), 7.41-7.37 (m, 1H), 7.27-7.26 (m, 3H), 7.15-7.12 (dd, *J* = 7.20 Hz, 1.76 Hz, 1H), 6.75-6.71 (m,

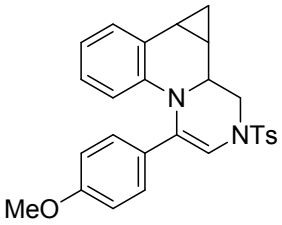
1H), 6.70-6.66 (m, 1H), 6.07-6.05 (dd, *J* = 7.88 Hz, 1.00 Hz, 1H), 3.90-3.86 (dd, *J* = 11.74 Hz, 1.98 Hz, 1H), 3.40-3.38 (d, *J* = 10.32 Hz, 1H), 3.00-2.94 (m, 1H), 2.39 (s, 3H), 2.01-1.95 (td, *J* = 8.47 Hz, 4.86 Hz, 1H), 1.66-1.60 (m, 1H), 1.45-1.42 (q, *J* = 4.83 Hz, 1H), 1.09-1.03 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.2, 138.4, 137.4, 134.3, 131.7, 131.4, 131.1, 130.8, 130.0, 129.4, 128.3, 127.2, 127.1, 126.9, 126.3, 126.3, 125.4, 123.9, 123.8, 122.7, 120.2, 120.2, 120.1, 118.5, 117.3, 51.4, 47.3, 21.6, 17.7, 14.3, 9.1; IR (liquid) ν 1491.67, 1354.75, 1330.64, 1306.54, 1166.72, 1124.3 cm^{-1}; HRMS (EI) m/z calcd. for $C_{27}H_{23}F_3N_2O_2S$ [*M*+]: 496.1432, found: 496.1435.

4-(p-tolyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4i):



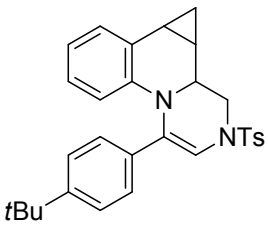
Pale yellow solid (73%); m.p. 84.0-136.5 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.64-7.62 (d, *J* = 8.24 Hz, 2H), 7.32-7.30 (d, *J* =8.12 Hz, 2H), 7.25-7.21 (m, 2H), 7.13 (s, 1H), 7.11-7.08 (m, 3H), 6.71-6.67 (m, 1H), 6.65-6.62 (m, 1H), 6.12-6.10 (d, *J* = 7.84 Hz, 1H), 3.87-3.84 (dd, *J* = 11.60 Hz, 1.96 Hz, 1H), 3.41-3.38 (d, *J* = 10.40 Hz, 1H), 2.98-2.92 (m, 1H), 2.37 (s, 3H), 2.31 (s, 3H), 1.97-1.92 (td, *J* = 8.44 Hz, 4.88 Hz, 1H), 1.62-1.56 (m, 1H), 1.46-1.42 (q, *J* = 4,76 Hz, 1H), 1.04-0.99 (td, *J* = 8.46 Hz, 4.52 Hz); ^{13}C NMR (100 MHz, $CDCl_3$) δ 143.9, 138.8, 137.1, 134.2, 133.4, 129.8, 129.5, 129.0, 128.0, 126.9, 126.1, 123.8, 119.6, 118.6, 115.3, 51.4, 47.5, 21.5, 21.1, 17.8, 14.3, 8.9; IR (liquid) ν 1492.63, 1357.64, 1338.36, 1166.72, 1090.55 cm^{-1}; HRMS (EI) m/z calcd. for $C_{27}H_{26}N_2O_2S$ [*M*+]: 442.1715, found: 442.1717.

4-(4-methoxyphenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4j):



White solid (58%); m.p. 176.0-191.0 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.64-7.62 (d, *J* = 8.28 Hz, 2H), 7.37-7.33 (d, *J* = 8.92 Hz, 2H), 7.24-7.22 (d, *J* = 7.97 Hz, 2H), 7.11-7.09 (dd, *J* = 7.22 Hz, 1.73 Hz, 1H), 7.05 (s, 1H), 6.85-6.81 (d, *J* = 8.91 Hz, 2H), 6.72-6.67 (m, 1H), 6.66-6.62 (m, 1H), 6.12-6.09 (dd, *J* = 7.93 Hz, 1.05 Hz, 1H), 3.87-3.83 (dd, *J* = 11.58 Hz, 2.02 Hz, 1H), 3.79 (s, 3H), 3.43-3.40 (d, *J* = 10.37 Hz, 1H), 2.96-2.91 (m, 1H), 2.38 (s, 3H), 1.98-1.92 (td, *J* = 8.46 Hz, 4.86 Hz, 1H), 1.63-1.59 (m, 1H), 1.45-1.41 (q, *J* = 4.79 Hz, 1H), 1.05-0.99 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 159.1, 143.9, 138.8, 134.2, 129.8, 128.9, 128.8, 128.0, 126.9, 126.1, 126.1, 125.2, 119.6, 118.6, 114.5, 114.2, 55.3, 51.5, 47.5, 21.5, 17.9, 14.3, 8.9; IR (liquid) ν 1509.99, 1491.67, 1340.28, 1249.65, 1166.72 cm^{-1}; HRMS (EI) m/z calcd. for $C_{27}H_{26}N_2O_3S$ [*M*+]: 458.1664, found: 458.1662.

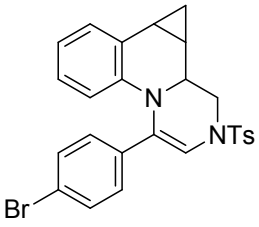
4-(4-(tert-butyl)phenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4k):



Pale yellow solid (84%); m.p. 188.4-191.5 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.64-7.62 (d, *J* = 8.32 Hz, 2H), 7.38-7.35 (m, 2H), 7.31-7.29 (m, 2H), 7.25-7.21 (m, 2H), 7.16 (s, 1H), 7.12-7.09 (dd, *J* = 7.28 Hz, 1.68 Hz, 1H), 6.73-6.69 (m, 1H), 6.66-6.62 (m, 1H), 6.14-6.12 (dd, *J* = 7.98 Hz, 0.86 Hz, 1H), 3.86-3.82(dd, *J* = 11.60 Hz, 2.08 Hz, 1H), 3.40-3.37 (d, *J* = 10.36 Hz, 2.99-2.93 (m, 1H), 2.37 (s, 3H), 1.98-1.92 (td, *J* = 8.46 Hz, 4.84 Hz, 1H), 1.62-1.57 (m, 1H), 1.46-1.43 (q, *J* = 4.79 Hz, 1H), 1.29 (s, 9H), 1.04-0.98 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 150.4, 143.9, 138.9, 134.2, 133.3, 129.8, 128.9, 128.0, 126.9, 126.1, 126.1, 125.7, 123.5, 119.6, 118.7, 115.5, 51.4, 47.5, 34.5, 31.3, 21.5, 17.9, 14.3, 8.9; IR (liquid) ν 1491.67, 1359.57, 1339.32, 1166.72, 1091.51 cm^{-1}; HRMS (EI) m/z calcd. for $C_{30}H_{32}N_2O_2S$ [*M*+]: 484.2184, found: 484.2185.

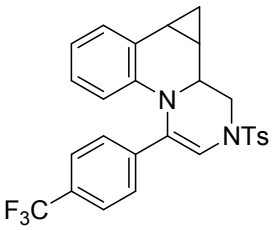
4-(4-bromophenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinolone

(4l):



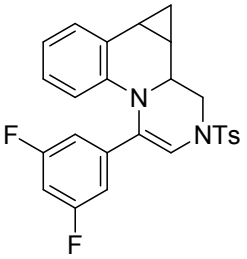
White solid (65%); m.p. 180.1-187.4 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65-7.62 (d, *J* = 8.28 Hz, 2H), 7.40-7.38 (m, 2H), 7.30-7.27 (m, 2H), 7.25-7.23 (d, *J* = 7.40 Hz, 2H), 7.18 (s, 1H), 7.13-7.11 (dd, *J* = 7.20 Hz, 1.72 Hz, 1H), 6.74-6.70 (m, 1H), 6.69-6.65 (m, 1H), 6.07-6.05 (dd, *J* = 7.92 Hz, 0.88 Hz, 1H), 3.88-3.84 (dd, *J* = 11.68 Hz, 2.00 Hz, 1H), 3.38-3.36 (d, *J* = 10.32 Hz, 1H), 2.97-2.92 (m, 1H), 2.38 (s, 3H), 1.99-1.93 (td, *J* = 8.45 Hz, 4.86 Hz, 1H), 1.64-1.58 (m, 1H), 1.43-1.39 (q, *J* = 4.81 Hz, 1H), 1.06-1.01 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.1, 138.4, 135.3, 134.3, 131.9, 129.9, 128.2, 127.5, 126.9, 126.2, 126.2, 125.4, 120.8, 120.0, 118.5, 116.4, 51.4, 47.4, 21.5, 17.7, 14.3, 9.0; IR (liquid) ν 1491.67, 0359.57, 1339.32, 1166.72, 1090.55 cm^{-1}; HRMS (EI) m/z calcd. for $C_{26}H_{23}BrN_2O_2S$ [*M*+]: 506.0664, found: 506.0662.

2-tosyl-4-(4-(trifluoromethyl)phenyl)-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4m):



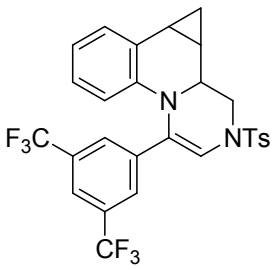
Pale yellow solid (42%); m.p. 153.5-162.2 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.66-7.64 (d, *J* = 8.28 Hz, 2H), 7.52 (s, 4H), 7.31 (s, 1H), 7.27-7.25 (m, 2H), 7.15-7.12 (dd, *J* = 7.20 Hz, 1.72 Hz, 1H), 6.75-6.71 (m, 1H), 6.70-6.66 (m, 1H), 6.06-6.04 (m, 1H), 3.90-3.86 (dd, *J* = 11.72 Hz, 2.00 Hz, 1H), 3.40-3.37 (d, *J* = 10.32 Hz, 1H), 3.01-2.95 (m, 1H), 2.39 (s, 3H), 2.01-1.96 (td, *J* = 8.44 Hz, 4.88 Hz, 1H), 1.65-1.60 (m, 1H), 1.45-1.42 (q, *J* = 4.81, 1H), 1.09-1.03 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 144.3, 139.9, 138.3, 134.3, 130.0, 129.1, 128.8, 128.3, 126.9, 126.3, 126.3, 125.9, 125.8, 125.8, 125.8, 125.5, 123.9, 122.8, 120.1, 118.5, 117.8, 51.4, 47.4, 21.5, 17.7, 14.3, 9.1; IR (liquid) ν 1611.23, 1492.63, 1323.89, 1166.72, 1121.40 cm^{-1}; HRMS (EI) m/z calcd. for $C_{27}H_{23}F_3N_2O_2S$ [*M*+]: 496.1432, found: 496.1434.

4-(3,5-difluorophenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4n):



White solid (50%); m.p. 215.5-216.2 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65-7.63 (d, *J* =8.24 Hz, 2H), 7.27-7.26 (m, 2H), 7.22 (s, 1H), 7.15-7.12 (dd, *J* = 7.26 Hz, 1.42 Hz, 1H), 6.95-6.90 (m, 2H), 6.78-6.74 (m, 1H), 6.72-6.68 (m, 1H), 6.66-6.61 (m, 1H), 6.09-6.07 (d, *J* = 8.00 Hz, 1H), 3.88-3.85 (dd, *J* = 11.72 Hz, 1.72 Hz, 1H), 3.37-3.35 (d, *J* = 1-.36 Hz, 1H), 2.97-2.91 (m, 1H), 2.40 (s, 3H), 1.64-1.59 (m, 1H), 1.43-1.40 (q, *J* = 4.81 Hz, 1H), 1.08-1.03 (td, *J* = 8.48 Hz, 4.64 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 164.8, 164.7, 162.3, 162.2, 144.3, 140.3, 140.3, 140.2, 138.3, 134.3, 130.0, 128.3, 126.9, 126.4, 126.4, 126.4, 126.3, 120.2, 118.4, 117.8, 106.7, 106.6, 106.5, 106.4, 102.6, 102.4, 102.1, 51.4, 47.2, 21.6, 17.7, 14.2, 9.1; IR (liquid) ν 2358.52, 1616.06, 1590.02, 1492.63, 1350.89, 1167.69, 983.52 cm^{-1}; HRMS (EI) m/z calcd. for $C_{26}H_{22}F_2N_2O_2S$ [*M*+]: 464.1370, found: 464.1372.

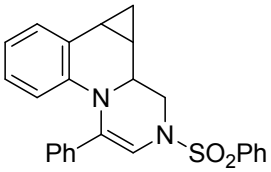
4-(3,5-bis(trifluoromethyl)phenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4o):



White solid (68%); m.p. 189.0-200.7 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.79 (s, 2H), 7.69 (s, 1H), 7.68-7.66 (d, *J* = 8.32 Hz, 2H), 7.35 (s, 1H), 7.30-2.28 (d, *J* = 8.00 Hz, 2H), 7.17-7.15 (m, 1H), 6.79-6.75 (m, 1H), 6.74-6.70 (m, 1H), 6.03-6.01 (dd, *J* = 7.84 Hz, 1.08 Hz, 1H), 3.90-3.87 (dd, *J* = 11.84 Hz, 2.04 Hz, 1H), 3.38-3.36 (d, *J* = 10.28 Hz, 1H), 3.02-2.96 (m, 1H), 2.41 (s, 3H), 2.03-1.98 (td, *J* = 8.46 Hz, 4.84 Hz, 1H), 1.67-1.62 (tdd, *J* = 8.18 Hz, 5.07 Hz, 1.19 Hz, 1H), 1.44-1.40 (q, *J* = 4.85 Hz, 1H), 1.12-1.06 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$)

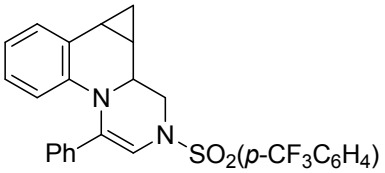
δ 144.5, 139.0, 138.0, 134.2, 132.7, 132.4, 132.0, 131.7, 130.1, 128.5, 126.9, 126.5, 126.4, 125.4, 124.6, 123.5, 123.5, 121.9, 120.6, 120.5, 118.9, 118.2, 51.4, 47.1, 21.6, 17.6, 14.2, 9.2; IR (liquid) ν 1491.67, 1362.46, 1335.46, 1306.54, 1276.65, 1165.76, 1129.12 cm^{-1}; HRMS (EI) m/z calcd. for $C_{28}H_{22}F_6N_2O_2S$ [*M*+]: 564.1306, found: 564.1307.

4-phenyl-2-(phenylsulfonyl)-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinolone (4p):



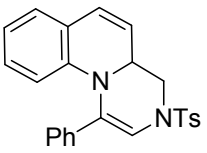
White solid (74%); m.p. 211.7-217.9 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.79-7.76 (m, 2H), 7.56-7.52 (m, 1H), 7.47-7.42 (m, 4H), 7.31-7.27 (m, 2H), 7.25-7.19 (m, 2H), 7.12-7.10 (dd, *J* = 7.22 Hz, 1.75 Hz, 1H), 6.72-6.68 (m, 1H), 6.66-6.63 (m, 1H), 6.13-6.10 (dd, *J* = 7.96 Hz, 1.08 Hz, 1H), 3.90-3.87 (dd, *J* = 11.59 Hz, 2.01 Hz, 1H), 3.42-3.40 (d, *J* = 10.39 Hz, 1H), 2.99-2.94 (m, 1H), 1.99-1.93 (td, *J* = 8.47 Hz, 4.86 Hz, 1H), 1.64-1.58(tdd, *J* = 8.21 Hz, 5.07 Hz, 1.24 Hz, 1H), 1.46-1.43 (q, *J* = 4.80 Hz, 1H), 1.06-1.00 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 138.6, 137.2, 136.2, 133.1, 129.2, 128.9, 128.8, 128.0, 127.4, 126.9, 126.2, 126.1, 123.9, 119.8, 118.6, 115.8, 51.4, 47.5, 17.8, 14.3, 9.0; IR (liquid) ν 1635.34, 1491.67, 1358.60, 1340.28, 1250.61, 1168.65, 1090.55 cm^{-1}; HRMS (EI) m/z calcd. for $C_{28}H_{22}F_6N_2O_2S$ [*M*+]: 414.1402, found: 414.1404.

4-phenyl-2-((4-(trifluoromethyl)phenyl)sulfonyl)-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4q):



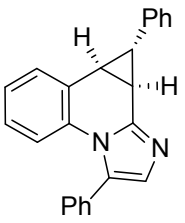
Pale yellow solid (71%); m.p. 218.8-223.3 °C; ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.88-7.86 (d, *J* = 8.18 Hz, 2H), 7.71-7.69 (d, *J* = 8.27 Hz, 2H), 7.44-7.42 (m, 2H), 7.32-7.28 (m, 2H), 7.26-7.22 (m, 1H), 7.15 (s, 1H), 7.12-7.09 (m, 1H), 6.69-6.62 (m, 2H), 6.03-6.00 (m, 1H), 3.92-3.89 (dd, *J* =11.32 Hz, 2.20 Hz, 1H), 3.55-3.52 (d, *J* = 10.36 Hz, 1H), 2.97-2.91 (t, *J* = 11.05 Hz, 1H), 2.00-1.94 (td, *J* = 8.48 Hz, 4.86 Hz, 1H), 1.67-1.62 (tdd, *J* = 8.20 Hz, 5.03 Hz, 1.28 Hz, 1H), 1.49-1.46 (q, *J* = 4.83 Hz, 1H), 1.9-1.03 (m, 1H) ; ^{13}C NMR (100 MHz, $CDCl_3$) δ 140.3, 138.6, 135.8, 134.8, 134.5, 130.6, 128.9, 128.1, 127.7, 127.4, 126.4, 126.4, 126.3, 126.3, 126.2, 126.1, 124.4, 124.0, 121.7, 120.0, 118.3, 115.4, 51.6, 47.8, 17.8, 14.3, 8.9; IR (liquid) ν 1634.38, 1491.67, 1364.39, 1321.96, 1171.54, 1133.94, 1061.62 cm^{-1}; HRMS (EI) m/z calcd. for $C_{28}H_{22}F_6N_2O_2S$ [*M*+]: 482.1276, found: 482.1280.

1-phenyl-3-tosyl-4,4a-dihydro-3H-pyrazino[1,2-a]quinoline (5):



Pale yellow solid (67%); m.p. 174.3-176.3 ℃; ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.69-7.66 (d, *J* = 8.24 Hz, 2H), 7.47-7.45 (d, *J* = 7.04 Hz, 2H), 7.33-7.21 (m, 5H), 7.08 (s, 1H), 6.88-6.85 (m, 1H), 6.78-6.72 (m, 1H), 6.63-6.58 (m, 1H), 6.48-6.45 (d, *J* = 9.80 Hz, 1H), 6.12-6.09 (d, *J* = 8.09 Hz, 1H), 5.69-5.64 (dd, *J* = 9.77 Hz, 5.23 Hz, 1H), 3.74-3.70 (m, 1H), 3.66-3.61 (m, 1H), 3.27-3.20 (m, 1H), 2.40 (s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 144.1, 140.4, 135.8, 134.5, 130.0, 128.9, 128.8, 128.0, 127.4, 127.3, 127.0, 125.3, 124.6, 121.6, 120.8, 119.2, 117.4, 115.5, 53.8, 47.4, 21.6; IR (liquid) ν 1631.48, 1488.78, 1351.86, 1165.76, 1092.48, 1025.94, 1002.80cm^{-1}; HRMS (EI) m/z calcd. for $C_{25}H_{22}N_2O_2S$ [*M*+]: 414.1402, found: 414.1398.

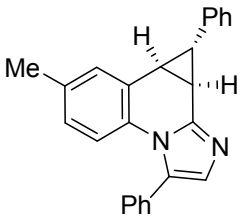
(8bS,9S,9aR)-3,9-diphenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7a):



Pale yellow oil (65%); d.r.: 3.0:1; (major diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.47-7.45 (m, 6H), 7.36-7.32 (m, 2H), 7.24-7.14 (m, 3H), 7.11-7.01 (m, 3H), 6.96-6.90 (m, 1H), 3.27-3.23 (dd, *J* = 8.49 Hz, 4.22 Hz, 1H), 2.98-2.93 (dd, *J* = 8.48 Hz, 4.55 Hz,

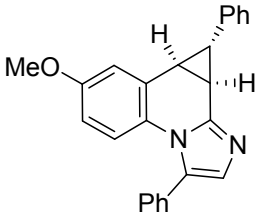
1H), 1.96-1.93 (t, *J* = 4.35 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 145.6, 139.6, 133.4, 132.1, 131.0, 131.0, 129.8, 129.4, 128.7, 128.6, 128.3, 126.6, 126.4, 126.4, 125.7, 125.1, 117.8, 29.7, 29.5, 24.7; (minor diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.58-7.56 (d, *J* = 7.43 Hz, 1H), 7.31-7.27 (m, 3H), 7.25-7.22 (m, 2H), 7.13-6.95 (m, 5H), 6.87-6.79 (m, 3H), 6.61-6.58 (d, *J* = 8.59 Hz, 1H), 3.41-3.36 (t, *J* = 8.36 Hz, 1H), 3.17-3.11 (t, *J* = 8.61 Hz, 1H), 3.03-2.97 (t, *J* = 8.93 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 144.5, 134.1, 131.9, 130.7, 130.7, 130.5, 130.1, 128.4, 127.7, 127.6, 126.4, 126.4, 124.8, 124.8, 117.5, 24.6, 22.6, 19.8; IR (liquid) ν 1635.34, 1493.60, 1379.82, 1247.72 cm^{-1}; HRMS (ESI) m/z calcd. for $C_{24}H_{18}N_2$ [*M*+]: 334.1470, found: 334.1472.; The product major diastereomer was analyzed by HPLC to determine the enantiomeric excess: 95% *ee* (CHIRALPAK OD-H, hexane/i-PrOH = 70/30, flow rate: 0.5 mL/min, T = 40 °C, 254 nm), tR (major) = 9.530 min, tR (minor) = 29.729 min.; The product minor diastereomer was analyzed by HPLC to determine the enantiomeric excess: 96% *ee* (CHIRALPAK AD-H, hexane/i-PrOH =90/10, flow rate: 0.3 mL/min, T = r.t, 254 nm), tR (minor) = 52.908 min, tR (major) = 80.654 min.

(8bS,9S,9aR)-9-phenyl-3-(m-tolyl)-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7b):



Pale yellow oil (65%); d.r.: 3.3:1; (major diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.47-7.44 (m, 1H), 7.36-7.31 (m, 4H), 7.26-7.23 (m, 3H), 7.16-7.14 (m, 2H), 7.11-7.06 (m, 2H), 6.99-6.91 (m, 2H), 3.26-3.22 (dd, *J* = 8.50 Hz, 4.22 Hz, 1H), 2.97-2.93 (dd, *J* = 8.50 Hz, 4.56 Hz, 1H), 2.40 (s, 3H), 1.96-1.93 (t, *J* = 4.36 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 145.5, 139.6, 138.5, 133.5, 132.0, 131.2, 130.8, 130.0, 129.7, 129.0, 128.6, 128.6, 126.6, 126.5, 126.4, 126.4, 125.7, 125.0, 117.8, 29.7, 29.6, 24.7, 21.4; (minor diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.57-7.54 (m, 1H), 7.12-6.97 (m, 7H), 6.92 (s, 1H), 6.86-6.79 (m, 3H), 6.62-6.59 (d, *J* = 8.21 Hz, 1H), 3.38-3.32 (t, *J* = 8.37 Hz, 1H), 3.16-3.10 (t, *J* = 8.71 Hz, 1H), 3.01-2.95 (t, *J* = 8.75 Hz, 1H), 2.26 (b, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 144.4, 134.2, 134.1, 131.6, 130.7, 130.7, 130.3, 130.0, 128.5, 127.7, 127.6, 126.4, 126.4, 124.8, 124.8, 117.7, 24.6, 22.6, 21.2, 19.8; IR (liquid) ν 1635.34, 1493.60, 1375.96, 1143.58 cm^{-1}; HRMS (ESI) m/z calcd. for $C_{25}H_{20}N_2$ [*M*+]: 348.1626, found: 348.1628.; The product major diastereomer was analyzed by HPLC to determine the enantiomeric excess: 96% *ee* (CHIRALPAK OD-H, hexane/i-PrOH = 70/30, flow rate: 0.5 mL/min, T = 40 °C, 254 nm), tR (major) = 9.751 min, tR (minor) = 64.132 min.; The product minor diastereomer was analyzed by HPLC to determine the enantiomeric excess: 96% *ee* (CHIRALPAK AD-H, hexane/i-PrOH =70/30, flow rate: 0.3 mL/min, T = r.t, 254 nm), tR (minor) = 18.050 min, tR (major) = 43.683 min.

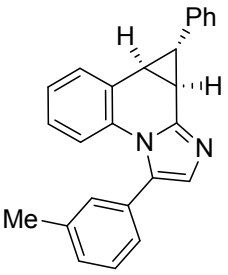
(8bS,9S,9aR)-7-methoxy-3,9-diphenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7c):



Pale yellow oil (58%); d.r.: 3.1:1; (major diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.44 (s, 5H), 7.37-7.32 (m, 2H), 7.24-7.14 (m, 3H), 7.00-6.94 (m, 3H), 6.49-6.45 (dd, *J* = 9.14 Hz, 2.90 Hz, 1H), 3.75 (s, 3H), 3.26-3.22 (dd, *J* = 8.45 Hz, 4.29 Hz, 1H), 2.93-2.89 (dd, *J* = 8.47 Hz, 4.51 Hz, 1H), 1.97-1.94 (t, *J* = 4.33 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 156.7, 144.9, 139.6, 132.2, 130.7, 130.5, 129.5, 128.7, 128.6, 128.2, 128.0, 127.0, 126.4, 125.7, 118.9, 114.5, 112.0, 55.4, 29.7, 29.7, 24.7; (minor diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.61-7.21 (m, 5H), 7.10-7.09 (m, 1H), 7.06-6.98 (m, 3H), 6.93 (s, 1H), 6.88-6.86 (m, 2H), 6.52-6.49 (m, 1H), 6.37-6.33 (m, 1H), 3.79 (s, 3H), 3.37-3.31 (t, *J* = 8.37 Hz, 1H), 3.11-3.05 (t, *J* = 8.74 Hz, 1H), 3.00-2.94 (t, *J* = 8.80 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 156.5, 143.8, 134.1, 131.8, 130.6, 130.6, 130.1, 130.0, 128.5, 128.4, 128.4, 127.8, 127.7, 127.7, 127.7, 127.6, 126.4, 126.4, 126.4, 118.6, 115.1, 111.5, 55.4, 24.7, 22.8, 19.7; IR (liquid) ν 1636.30, 1503.24, 1243.86, 1146.47, 1039.44 cm^{-1}; HRMS (ESI) m/z calcd. for $C_{25}H_{20}N_2O$ [*M*+]: 364.1576 , found: 364.1578.; The product major diastereomer was analyzed by HPLC to determine the enantiomeric excess: 96% *ee* (CHIRALPAK OD-H, hexane/i-PrOH = 90/10, flow rate: 0.5 mL/min, T = 40 °C, 254 nm), tR (major) = 23.208 min, tR (minor) = 27.969 min.; The product

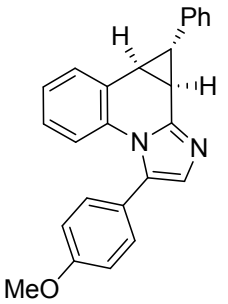
minor diastereomer was analyzed by HPLC to determine the enantiomeric excess: 97% *ee* (CHIRALPAK AD-H, hexane/i-PrOH =80/20, flow rate: 0.5 mL/min, T = r.t, 254 nm), tR (major) = 23.644 min, tR (minor) = 32.208 min.

(8bS,9S,9aR)-7-methyl-3,9-diphenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinolone (7d):



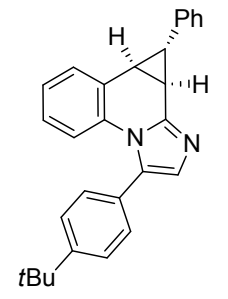
Pale yellow oil (66%); d.r.: 3.7:1; (major diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.44 (s, 5H), 7.36-7.28 (m, 3H), 7.23-7.14 (m, 3H), 7.00 (s, 1H), 6.92-6.89 (d, *J* = 8.50 Hz, 1H), 6.75-6.72 (d, *J* = 8.44 Hz, 1H), 3.25-3.21 (dd, *J* = 8.47 Hz, 4.21 Hz, 1H), 2.92-2.88 (dd, *J* = 8.46 Hz, 4.52 Hz, 1H), 2.26 (s, 3H), 1.93-1.90 (t, *J* = 4.31 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 145.3, 139.6, 134.9, 132.1, 131.0, 130.9, 130.4, 130.2, 129.5, 128.7, 128.6, 128.3, 127.2, 126.4, 126.3, 125.7, 117.6, 29.6, 29.5, 24.6, 20.5; (minor diastereomer) ^{1}H NMR (300 MHz, CD_2Cl_2) δ 7.32-7.31 (m, 1H), 7.19 (b, 3H) 7.00-6.89 (m, 4H), 6.81-6.75 (m, 4H), 6.55-6.51 (m, 1H), 6.39-6.36 (d, *J* = 8.46 Hz, 1H), 3.24-3.18 (t, *J* = 8.33 Hz, 1H), 3.04-2.98 (t, *J* = 8.75 Hz, 1H), 2.90-2.84 (t, *J* = 8.80, 1H), 2.22 (s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 144.3, 134.4, 134.2, 131.9, 131.8, 130.7, 130.5, 130.4, 130.4, 130.3, 128.4, 127.6, 127.6, 127.6, 127.1, 127.1, 127.0, 126.4, 126.4, 124.7, 117.4, 117.4, 24.5, 22.6, 20.7, 19.7; IR (liquid) ν 1638.23, 1529.27, 1503.24, 1380.78, 1380.78, 1264.11, 1242.90 cm^{-1}; HRMS (ESI) m/z calcd. for $C_{25}H_{20}N_2$ [*M*+]: 348.1626, found: 348.1629.; The product major diastereomer was analyzed by HPLC to determine the enantiomeric excess: 96% *ee* (CHIRALPAK OD-H, hexane/i-PrOH = 90/10, flow rate: 0.5 mL/min, T = 40 °C, 254 nm), tR (major) = 15.236 min, tR (minor) = 40.128 min.; The product minor diastereomer was analyzed by HPLC to determine the enantiomeric excess: 96% *ee* (CHIRALPAK OD-H, hexane/i-PrOH =90/10, flow rate: 0.3 mL/min, T = r.t, 254 nm), tR (minor) = 24.110 min, tR (major) = 34.446 min.

(8bS,9S,9aR)-3-(4-methoxyphenyl)-9-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7e):



Pale yellow oil (68%); d.r.: 2.1:1; (major diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.47-7.44 (d, *J* = 7.41 Hz, 1H), 7.37-7.31 (m, 4H), 7.26-7.06 (m, 5H), 7.00-6.92 (m, 4H), 3.89 (s, 3H), 3.26-3.22 (dd, *J* = 8.49 Hz, 4.22 Hz, 1H), 2.96-2.92 (dd, *J* = 8.47 Hz, 4.50 Hz, 1H), 1.93-1.90 (t, *J* = 4.30 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 159.7, 145.1, 139.7, 133.6, 130.9, 130.7, 130.5, 129.7, 128.6, 126.7, 126.4, 126.4, 125.7, 125.0, 124.4, 117.5, 114.2, 55.3, 29.5, 29.4, 24.7; (minor diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.57-7.54 (dd, *J* = 7.62 Hz, 1.49 Hz, 1H), 7.26 (m, 1H), 7.11-6.96 (m, 5H), 6.89-6.79 (m, 6H), 6.63-6.60 (d, *J* = 7.89 Hz, 1H), 3.81 (s, 3H), 3.37-3.31 (t, *J* = 8.39 Hz, 1H), 3.14-3.08 (t, *J* = 8.72 Hz, 1H), 2.98-2.93 (t, *J* = 8.76 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 159.3, 143.9, 134.3, 134.2, 134.2, 130.7, 130.7, 130.1, 130.1, 130.1, 130.0, 130.0, 127.6, 127.6, 126.4, 126.4, 126.4, 126.3, 124.8, 124.7, 124.7, 124.7, 124.2, 117.3, 117.3, 113.9, 55.3, 24.4, 22.4, 19.8; IR (liquid) ν 1637.27, 1493.60, 1248.68, 1029.80 cm^{-1}; HRMS (ESI) m/z calcd. for $C_{25}H_{20}N_2O$ [*M*+]: 394.1576 , found: 394.1578.; The product major diastereomer was analyzed by HPLC to determine the enantiomeric excess: 96% *ee* (CHIRALPAK OD-H, hexane/i-PrOH = 70/30, flow rate: 0.5 mL/min, T = 40 °C, 254 nm), tR (major) = 11.302 min, tR (minor) = 70.248 min.; The product minor diastereomer was analyzed by HPLC to determine the enantiomeric excess: 96% *ee* (CHIRALPAK AD-H, hexane/i-PrOH =80/20, flow rate: 0.5 mL/min, T = r.t, 254 nm), tR (major) = 21.015 min, tR (minor) = 32.129 min.

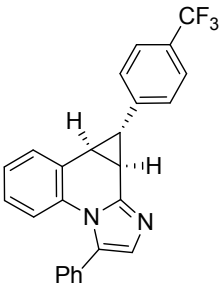
(8bS,9S,9aR)-3-(4-(tert-butyl)phenyl)-9-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7f):



Pale yellow oil (65%); d.r.: 2.3:1; (major diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$)

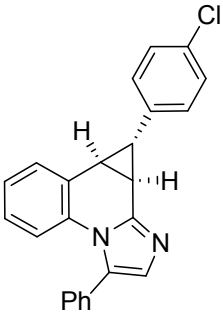
δ 7.48-7.45 (m, 3H), 7.38-7.31 (m, 4H), 7.26-7.06 (m, 5H), 6.99-6.92 (m, 2H), 3.28-3.24 (d, *J* = 8.36 Hz, 4.20 Hz, 1H), 2.97-2.93 (dd, *J* = 8.45 Hz, 4.54 Hz, 1H), 1.96-1.93 (t, *J* = 4.26 Hz, 1H), 1.39 (s, 9H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 151.5, 145.3, 139.5, 133.5, 131.1, 130.5, 129.7, 129.1, 129.0, 128.6, 126.7, 126.4, 126.4, 125.7, 125.6, 125.1, 117.8, 34.7, 31.3, 29.6, 29.5, 24.6; (minor diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.57-5.54 (dd, *J* = 7.55 Hz, 1.19 Hz, 1H), 7.26 (b, 3H), 7.11-6.96(m, 5H), 6.92 (s, 1H), 6.85-6.80 (m, 3H), 6.65-6.62 (d, *J* = 8.32 Hz, 1H), 3.38-3.32 (t, *J* = 8.35 Hz, 1H), 3.14-3.09 (t, *J* = 8.70 Hz, 1H), 3.00-2.94 (t, *J* = 8.73 Hz, 1H)1.31 (s, 9H); ^{13}C NMR (75 MHz, $CDCl_3$) 150.9, 144.2, 134.3, 134.2, 130.7, 130.5, 130.0, 128.9, 128.3, 127.6, 126.4, 125.4, 124.8, 124.7, 117.5, 34.6, 31.3, 24.5, 22.5, 19.8; IR (liquid) ν 1638.23, 1534.10, 1492.63, 1464.67, 1376.93, 1265.09, 1145.51 cm^{-1}; HRMS (ESI) m/z calcd. for $C_{28}H_{26}N_2$ [*M*+]: 390.2096, found: 390.2097.; The product major diastereomer was analyzed by HPLC to determine the enantiomeric excess: 96% *ee* (CHIRALPAK OD-H, hexane/i-PrOH = 70/30, flow rate: 0.5 mL/min, T = 40 °C, 254 nm), tR (major) = 8.591 min, tR (minor) = 37.323 min.; The product minor diastereomer was analyzed by HPLC to determine the enantiomeric excess: 97% *ee* (CHIRALPAK AD-H, hexane/i-PrOH =90/10, flow rate: 0.3 mL/min, T = r.t, 254 nm), tR (major) = 29.976 min, tR (minor) = 45.743 min.

(8bS,9S,9aR)-3-phenyl-9-(4-(trifluoromethyl)phenyl)-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7g):



Pale yellow oil (88%); d.r.: >20:1; ^{1}H NMR (300 MHz, CD_2Cl_2) δ 7.62-7.59 (d, *J* = 8.20 Hz, 2H), 7.49-7.43 (m, 6H), 7.28-7.26 (d, *J* = 8.14 Hz, 2H), 7.12-7.04 (m, 2H), 6.97-6.92 (m, 2H), 3.30-3.25 (dd, *J* = 8.62 Hz, 4.17 Hz, 1H), 3.06-3.01 (dd, *J* = 8.62 Hz, 4.51 Hz, 1H), 2.02-1.99 (t, *J* = 4.31 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 144. 9, 140.0, 140.0, 133.4, 131.9, 131.2, 131.0, 131.0, 129.8, 129.8, 129.5, 129.4, 128.8, 128.8, 128.8, 128.4, 128.4, 128.4, 127.0, 127.0, 125.8, 125.8, 125.8, 125.6, 125.6, 125.6, 125.5, 125.5, 125.5, 125.2, 117.8, 117.8, 30.1, 29.3, 25.2; IR (liquid) ν 1635.34, 1530.24, 1493.60, 1380.78, 1325.82, 1163.83, 1120.44, 1068.37 cm^{-1}; HRMS (ESI) m/z calcd. for $C_{25}H_{17}F_3N_2$ [*M*+]: 402.1344, found: 402.1344 ; The product was analyzed by HPLC to determine the enantiomeric excess: 95% *ee* (CHIRALPAK AD-H, hexane/i-PrOH = 50/50, flow rate: 0.5 mL/min, T = r.t, 254 nm), tR (minor) = 20.281 min, tR (major) = 36.392 min.

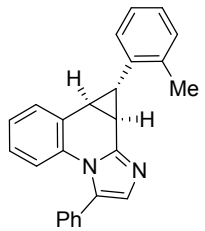
(8bS,9S,9aR)-9-(4-chlorophenyl)-3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7h):



Pale yellow oil (90%); d.r.: 1.6:1; (major diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.47-7.44 (m, 6H), 7.32-7.29 (d, *J* = 8.42 Hz, 2H), 7.11-7.00 (m, 5H), 6.98-6.91 (m, 1H), 3.24-3.20 (dd, *J* = 8.55 Hz, 4.21 Hz, 1H), 2.94-2.89 (dd, *J* = 8.54 Hz, 4.53 Hz, 1H), 1.93-1.90 (t, *J* = 4.35 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 145.2, 138.1, 133.4, 132.2, 132.0, 131.1, 131.0, 129.8, 129.7, 129.4, 128.8, 128.7, 128.7, 128.3, 128.3, 127.0, 126.8, 126.8, 126.0, 125.1, 125.1, 125.1, 117.8, 117.7, 29.6, 29.0, 24.7; (minor diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.56-7.54 (m, 1H), 7.30-7.27 (m, 4H), 7.13-7.08 (t, *J* = 7.34 Hz, 1H), 6.99-6.76 (m, 7H), 6.64-6.61 (d, *J* = 8.44 Hz, 1H), 3.38-3.33 (t, *J* = 8.39 Hz, 1H), 3.15-3.10 (t, *J* = 8.71 Hz, 1H), 2.94-2.88 (t, *J* = 8.83 Hz, 1H), ^{13}C NMR (75 MHz, $CDCl_3$) δ 144.0, 134.0, 132.7, 132.5, 132.1, 132.1, 131.7, 130.9, 130.6, 130.1, 130.1, 128.6, 127.9, 127.8, 127.8, 126.6, 124.9, 124.9, 124.4, 117.6, 117.6, 117.6, 24.5, 21.8, 19.9; IR (liquid) ν 1637.27, 1630.52, 1530.24, 1493.60, 1464.67, 1378.85, 1260.25, 1145.51, 1088.62, 1012.45 cm^{-1}; HRMS (ESI) m/z calcd. for $C_{24}H_{17}ClN_2$ [*M*+]: 368.1080, found: 368.1084; The product major diastereomer was analyzed by HPLC to determine the enantiomeric excess: 94% *ee* (CHIRALPAK AD-H, hexane/i-PrOH = 70/30, flow rate: 0.5 mL/min, T = r.t, 254 nm), tR (minor) = 33.971 min, tR (major) = 53.081 min.; The product minor diastereomer was

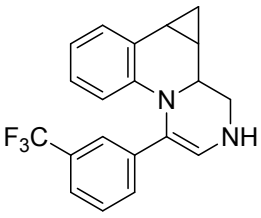
analyzed by HPLC to determine the enantiomeric excess: 93% *ee* (CHIRALPAK AD-H, hexane/i-PrOH =70/30, flow rate: 0.5 mL/min, T = r.t, 254 nm), tR (minor) = 10.557 min, tR (major) = 18.305 min.

(8bS,9S,9aR)-3-phenyl-9-(o-tolyl)-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7i):



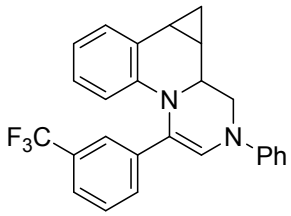
Pale yellow oil (81%); d.r.: 1.6:1; (major diastereomer) ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.54-7.52 (dd, *J* = 7.51 Hz, 1.20 Hz, 2H), 7.45-7.28 (m, 6H), 7.24-7.19 (m, 3H), 7.14-7.09 (m, 1H), 7.07-7.03 (m, 2H), 6.97-6.91 (m, 1H), 3.25-3.20 (dd, *J* = 8.47 Hz, 4.51 Hz, 1H), 2.88-2.83 (dd, *J* = 8.47 Hz, 4.86 Hz, 1H), 2.42 (s, 3H), 1.98-1.95 (t, *J* 4.60 Hz, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 145.8, 138.1, 137.0, 133.6, 132.2, 131.0, 131.0, 130.0, 129.7, 129.4, 128.7, 128.2, 126.9, 126.7, 126.6, 126.1, 125.8, 125.1, 117.8, 28.0, 27.6, 22.4, 20.0; (minor diastereomer) ^{1}H NMR (300 MHz, CD_2Cl_2) δ 7.60-7.57 (dd, *J* = 7.60 Hz, 1.53 Hz, 1H), 7.30-7.30 (b, 4H), 7.11-6.93(m, 5H), 6.85-6.74 (m, 2H), 6.66-6.64 (m, 1H), 6.52-6.49 (d, *J* = 7.66 Hz, 1H), 3.39-3.33 (t, *J* = 8.39 Hz, 1H), 3.20-3.14 (t, *J* = 8.72 Hz, 1H), 2.85-2.79 (t, *J* = 8.75 Hz, 1H), 2.33 (s, 3H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 144.8, 139.2, 134.4, 132.7, 131.9, 130.8, 130.6, 130.4, 129.7, 129.7, 129.6, 128.5, 127.7, 126.7, 126.5, 126.4, 124.8, 124.8, 124.8, 124.7, 124.6, 124.6, 117.4, 117.4, 25.2, 21.8, 20.0, 19.7; IR (liquid) ν 1630.52, 1589.06, 1530.24, 1492.63, 1463.71, 1378.85, 1262.18, 1145.51 cm^{-1}; HRMS (ESI) m/z calcd. for $C_{25}H_{20}N_2$ [*M*+]: 348.1626, found: 348.1626; The product major diastereomer was analyzed by HPLC to determine the enantiomeric excess: 97% *ee* (CHIRALPAK AD-H, hexane/i-PrOH = 30/70, flow rate: 0.7 mL/min, T = r.t, 254 nm), tR (minor) = 7.492 min, tR (major) = 16.941 min.; The product minor diastereomer was analyzed by HPLC to determine the enantiomeric excess: 96% *ee* (CHIRALPAK AD-H, hexane/i-PrOH = 30/70, flow rate: 0.7 mL/min, T = r.t, 254 nm), tR (minor) = 6.993 min, tR (major) = 8.597 min.

4-(3-(trifluoromethyl)phenyl)-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (8):



Pale yellow solid (93%); ^{1}H NMR (300 MHz, DMSO-*d*) δ 7.47-7.45 (m, 2H), 7.37-7.32 (m, 1H), 7.21-7.16 (m, 3H), 6.82-6.77 (t, *J* = 7.38 Hz, 1H), 6.62-6.57 (t, *J* = 7.23 Hz, 1H), 6.16-6.10 (m, 2H), 3.45-3.42 (m, 2H), 2.82-2.73 (t, *J* = 11.44 Hz, 1H), 2.04-1.97 (m, 1H), 1.86-1.81 (m, 1H), 1.39-1.35 (q, *J* = 4.49 Hz, 1H), 1.05-0.96 (m, 1H); HRMS (EI) m/z calcd. for $C_{20}H_{17}F_3N_2$ [*M*+]: 342.1344, found: 342.1344.

2-phenyl-4-(3-(trifluoromethyl)phenyl)-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (9):



Pale yellow solid (93%); m.p.180.4-194.2 °C; ^{1}H NMR (300 MHz, $CDCl_3$) δ 7.67 (s, 1H), 7.55-7.54 (m, 1H), 7.37-7.29 (m, 5H), 7.23-7.21 (d, *J* = 7.30 Hz, 1H), 7.03-7.00 (d, *J* = 8.42 Hz, 2H), 6.97-6.92 (t, *J* = 7.31 Hz, 1H), 6.87-6.82 (t, *J* = 7.70 Hz, 1H), 6.74-6.69 (t, *J* = 7.32 Hz, 1H), 6.33-6.30 (d, *J* = 8.06 Hz, 1H), 3.87-3.82 (m, 1H), 3.46-3.38 (t, *J* = 11.23 Hz, 1H), 2.10-2.03 (m, 1H), 1.81-1.74 (m, 1H), 1.63-1.58 (m, 1H), 1.14-1.07 (m, 1H); ^{13}C NMR (75 MHz, $CDCl_3$) δ 145.0, 139.8, 138.8, 131.7, 131.2, 130.8, 130.4, 129.7, 129.4, 129.2, 128.2, 126.3, 126.3, 126.1, 126.0, 126.0, 122.5, 121.8, 121.8, 121.8, 121.7, 121.1, 120.6, 119.4, 118.9, 118.8, 118.8, 118.7, 118.2, 115.5, 51.7, 49.7, 18.3, 14.3, 8.8; IR (liquid) ν 1629.55, 1597.73, 1490.70, 1320.04, 1253.50, 1242.90, 1163.83, 1122.37 cm^{-1}; HRMS (EI) m/z calcd. for $C_{26}H_{21}F_3N_2$ [*M*+]: 418.1657, found: 418.1661.

IV . X-ray crystal data (4a and 7f)

Compound 4a

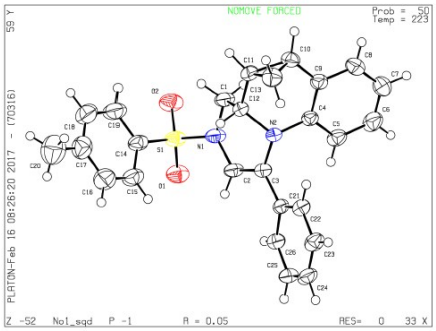


Table 1. Crystal data and structure refinement for compound 4a.

Identification code	No1_sqd	
Empirical formula	C_{26} H_{24} N_2 O_2 S	
Formula weight	428.53	
Temperature	223(2) K	
Wavelength	0.71073 Å	
Crystal system	Triclinic	
Space group	P-1	
Unit cell dimensions	a = 10.6565(7) Å	α= 69.374(3)°.
	b = 11.1408(9) Å	β= 76.912(3)°.
	c = 12.3000(10) Å	γ = 65.303(3)°.
Volume	1236.26(17) $Å^3$	
Z	2	
Density (calculated)	1.151 Mg/m^3	
Absorption coefficient	0.154 mm^{-1}	
F(000)	452	
Crystal size	0.220 x 0.150 x 0.080 mm^3	
Theta range for data collection	2.103 to 28.357°.	
Index ranges	-14<=h<=14, -14<=k<=14, -16<=l<=16	
Reflections collected	35044	
Independent reflections	6146 [R(int) = 0.0722]	
Completeness to theta = 25.242°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.7457 and 0.5829	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	6146 / 0 / 281	
Goodness-of-fit on F^2	1.077	
Final R indices [I>2sigma(I)]	R1 = 0.0504, wR2 = 0.1262	
R indices (all data)	R1 = 0.0782, wR2 = 0.1367	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.316 and -0.255 $e.Å^{-3}$	

Compound 7f

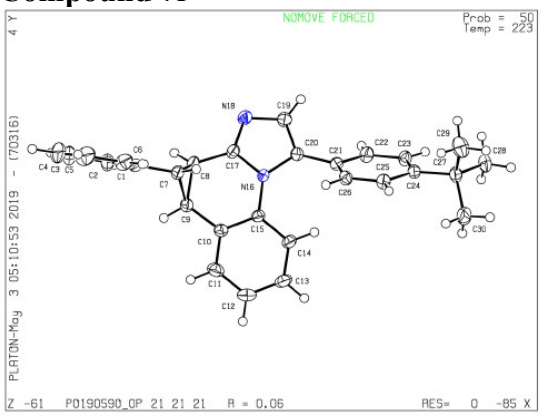


Table 1. Crystal data and structure refinement for compound 6f.

Empirical formula	$C_{28}H_{26}N_2$	
Formula weight	390.51	
Temperature	223(2) K	
Wavelength	0.730 Å	
Crystal system	Orthorhombic	
Space group	$P2_12_12_1$	
Unit cell dimensions	a = 9.0720(18) Å	α = 90°
	b = 9.846(2) Å	β = 90°
	c = 23.918(5) Å	γ = 90°
Volume	2136.4(7) $Å^3$	
Z	4	
Density (calculated)	1.214 Mg/m^3	
Absorption coefficient	0.073 mm^{-1}	
F(000)	832	
Crystal size	0.092 x 0.078 x 0.032 mm^3	
Theta range for data collection	1.749 to 33.528°.	
Index ranges	–13<=h<=13, –14<=k<=14, –33<=l<=33	
Reflections collected	22591	
Independent reflections	6930 [R(int) = 0.0826]	
Completeness to theta = 25.976°	100.0 %	
Absorption correction	Empirical	
Max. and min. transmission	1.000 and 0.963	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	6930 / 0 / 274	
Goodness-of-fit on F^2	1.154	
Final R indices [I>2sigma(I)]	R1 = 0.0588, wR2 = 0.1755	
R indices (all data)	R1 = 0.0643, wR2 = 0.1815	
Largest diff. peak and hole	0.409 and –0.333 $e \cdot Å^{-3}$	

V. Reference

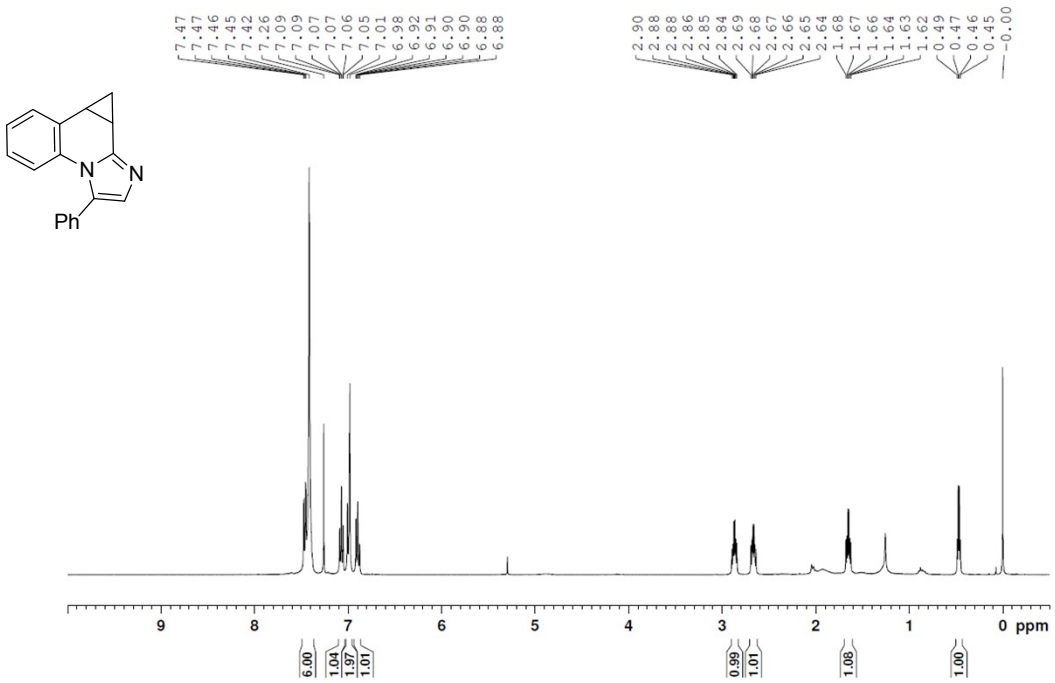
S1. (*a*) D. J. Lee, H. S. Han, J. Shin and E. J. Yoo, *J. Am. Chem. Soc.,* 2014, **136**, 11606; (*b*) J. Y. Lee, J. Y. Shim, H. K. Kim, D. Ko, M.-H. Baik and E. J. Yoo, *J. Org. Chem.,* 2017, **82**, 4352; (*c*) N. De, C. E. Song, D. H. Ryu and E. J. Yoo, *Chem. Commun.,* 2018, **54**, 6911.

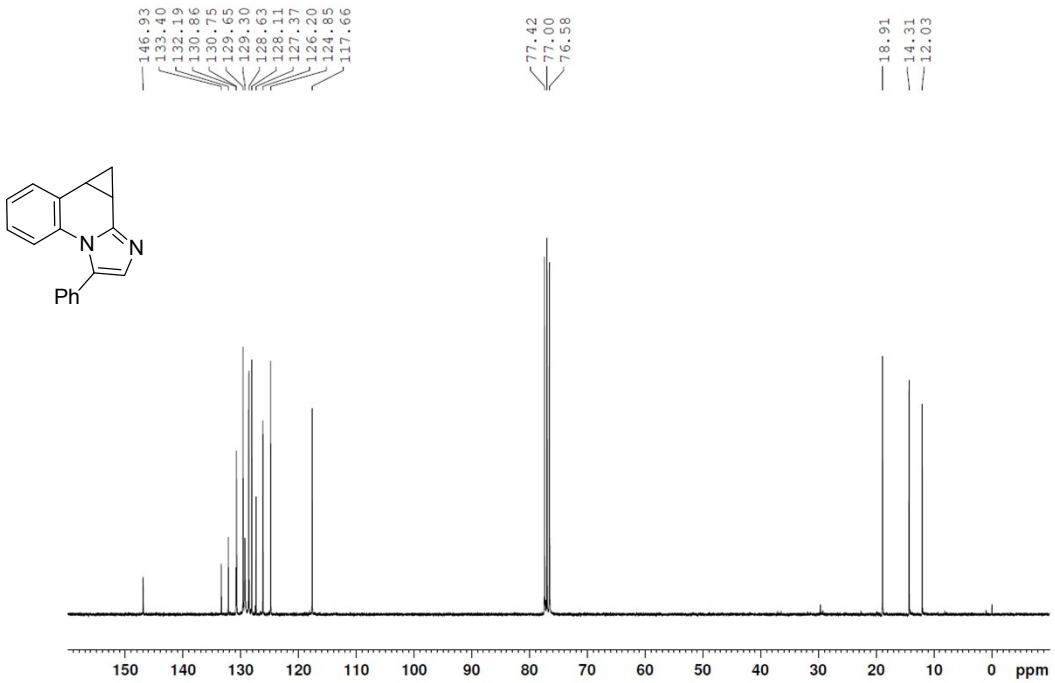
S2. (*a*) F. G. Buono, M. C. Eriksson, B-S. Yang, S. R. Kapadia, H. Lee, J. Brazzillo, J. C. Lorenz, L. Nummy, C. A. Busacca, N. Yee and C. Senanayake, *Org. Process Res. Dev.,* 2014, **18**, 1527; (*b*) J. Forrester, R. V. H. Jones, L. Newton and P. N. Preston, *Tetrahedron,* 2001, **57**, 2871.

S3. I. Stahl, S. Schomburg and H. O. Kalinowski, *Chem. Ber.,* 1984, **117**, 2247.

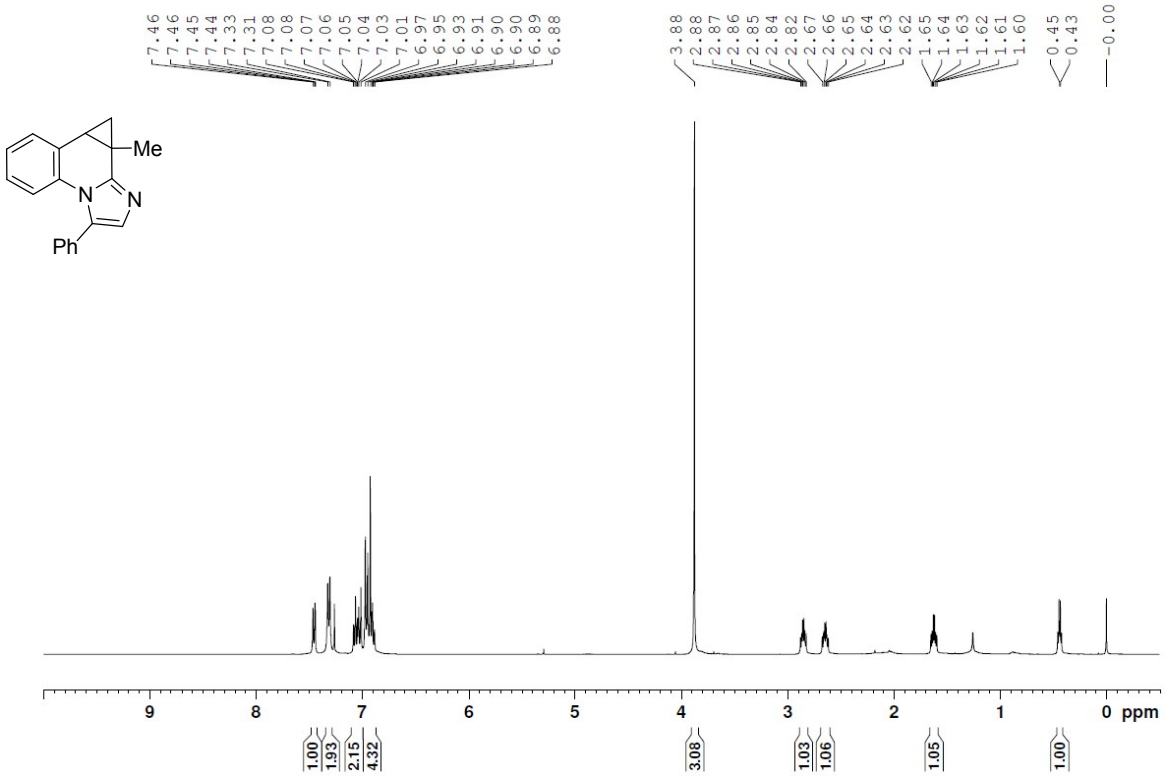
VI. Copies of Spectral Data of Compounds Obtained in this Study

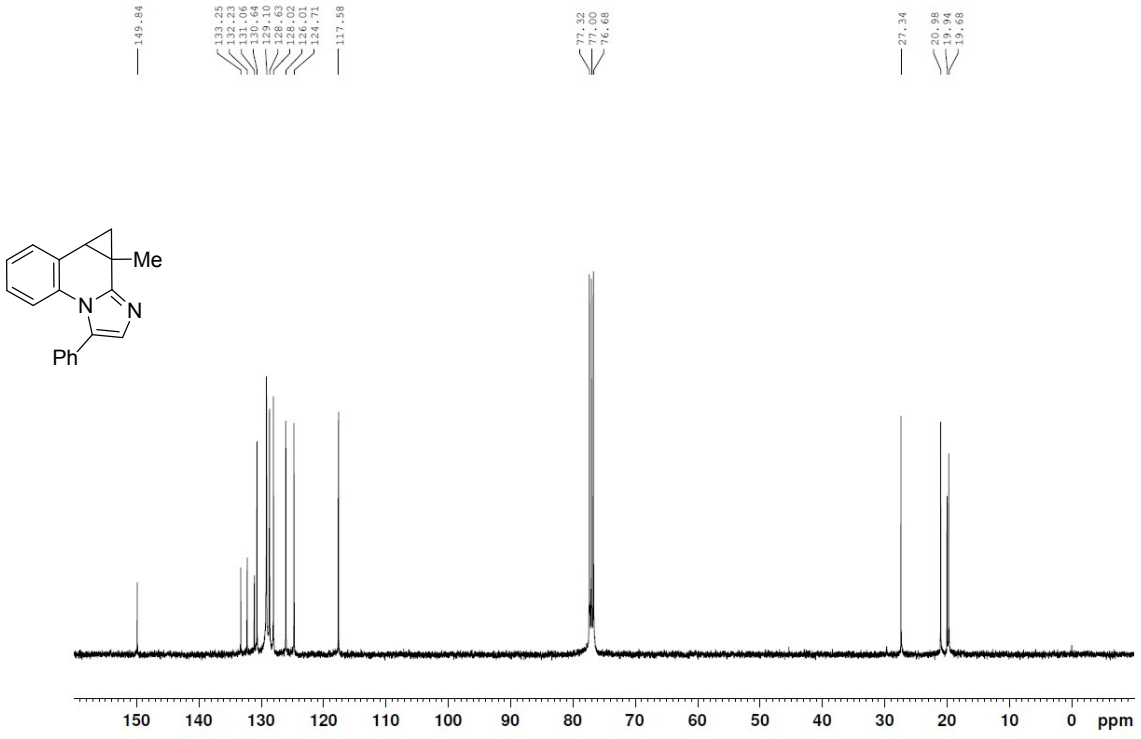
3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3a) :



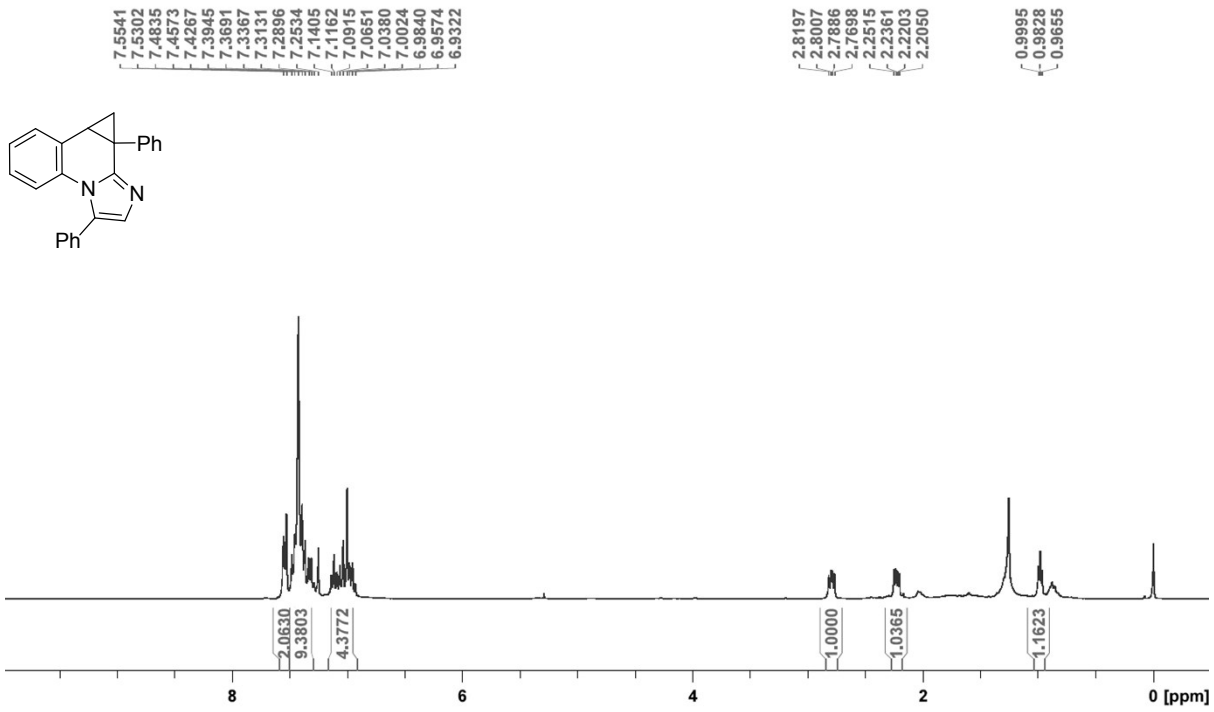


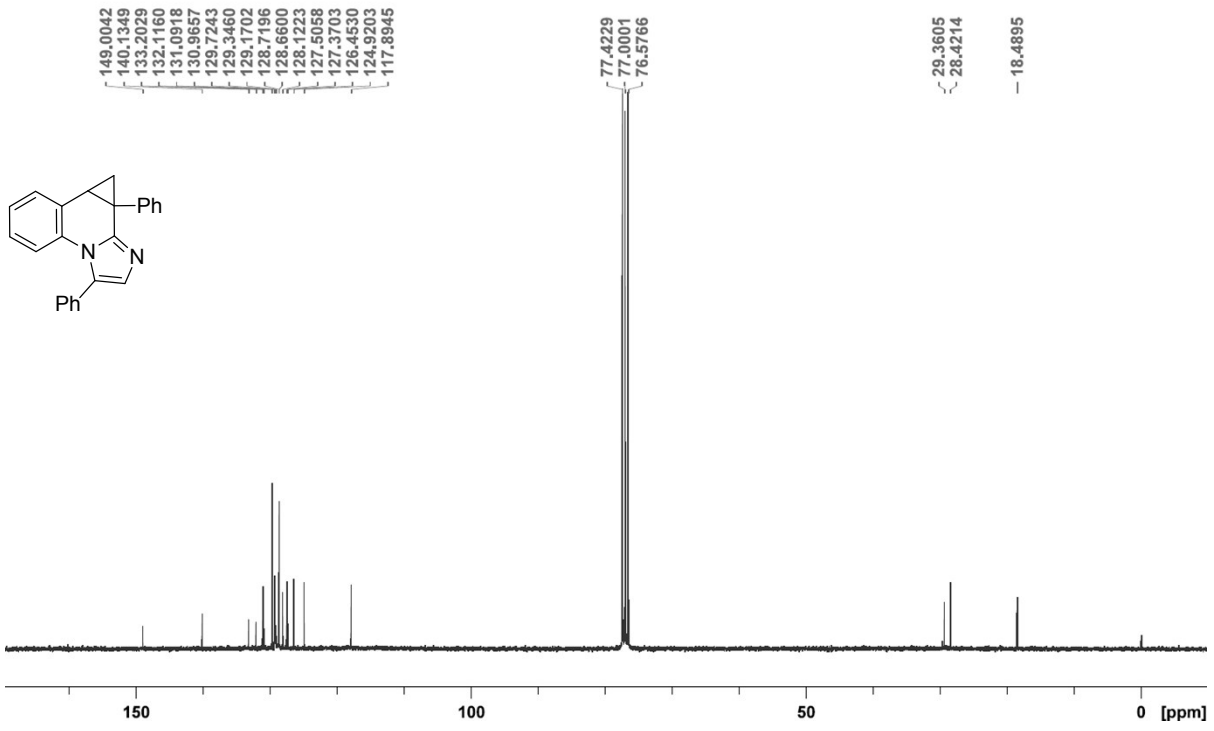
9a-methyl-3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3b):



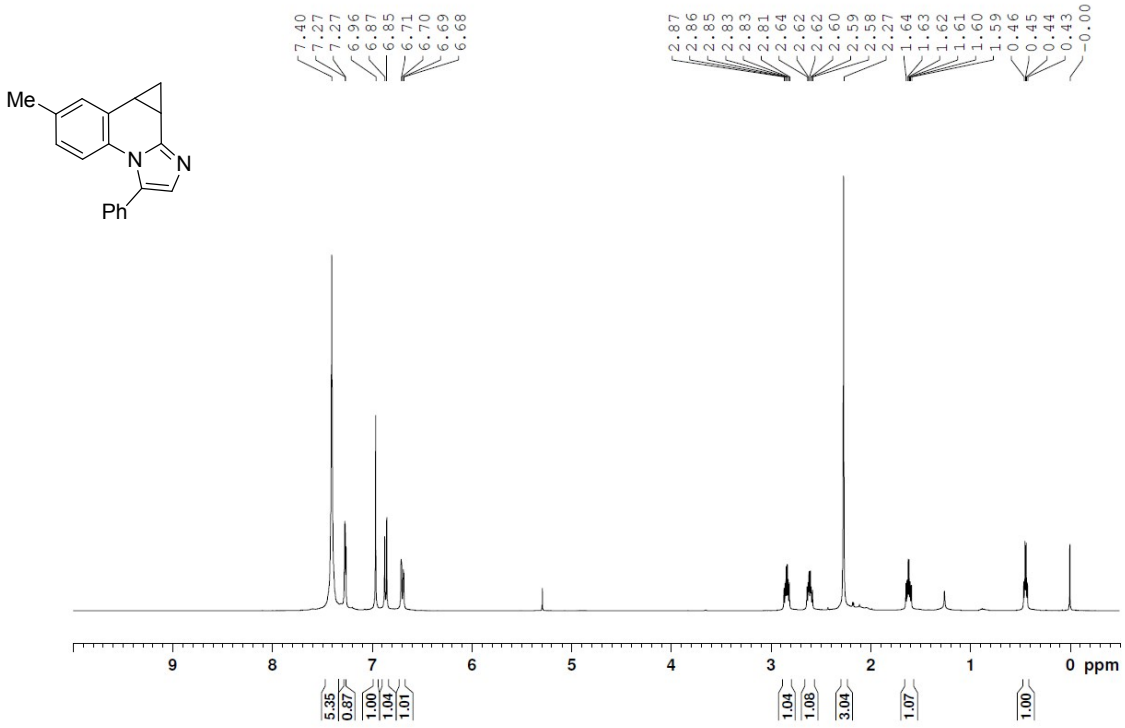


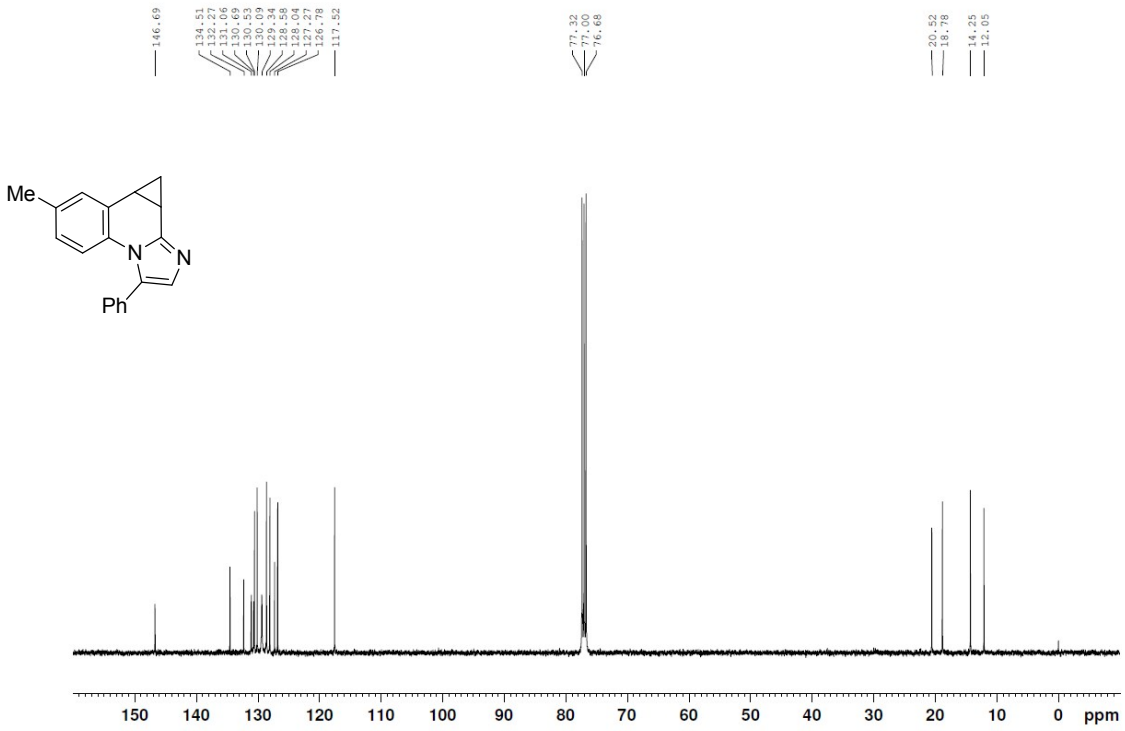
3,9a-diphenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3c):



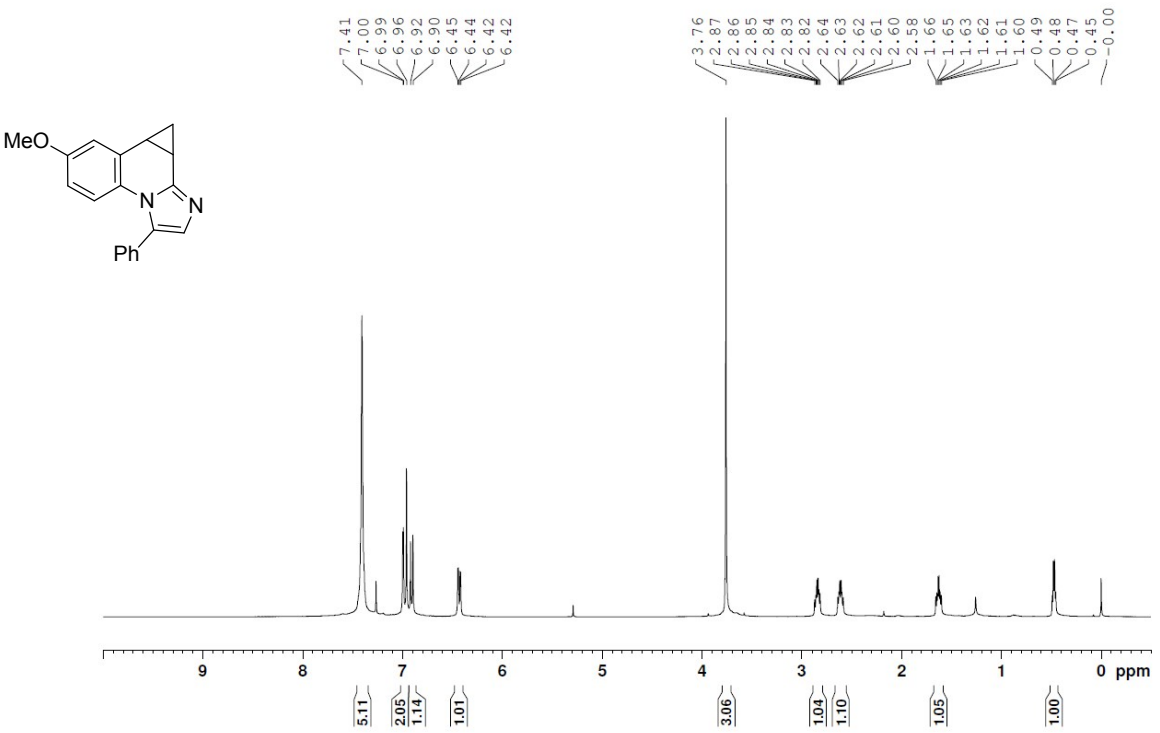


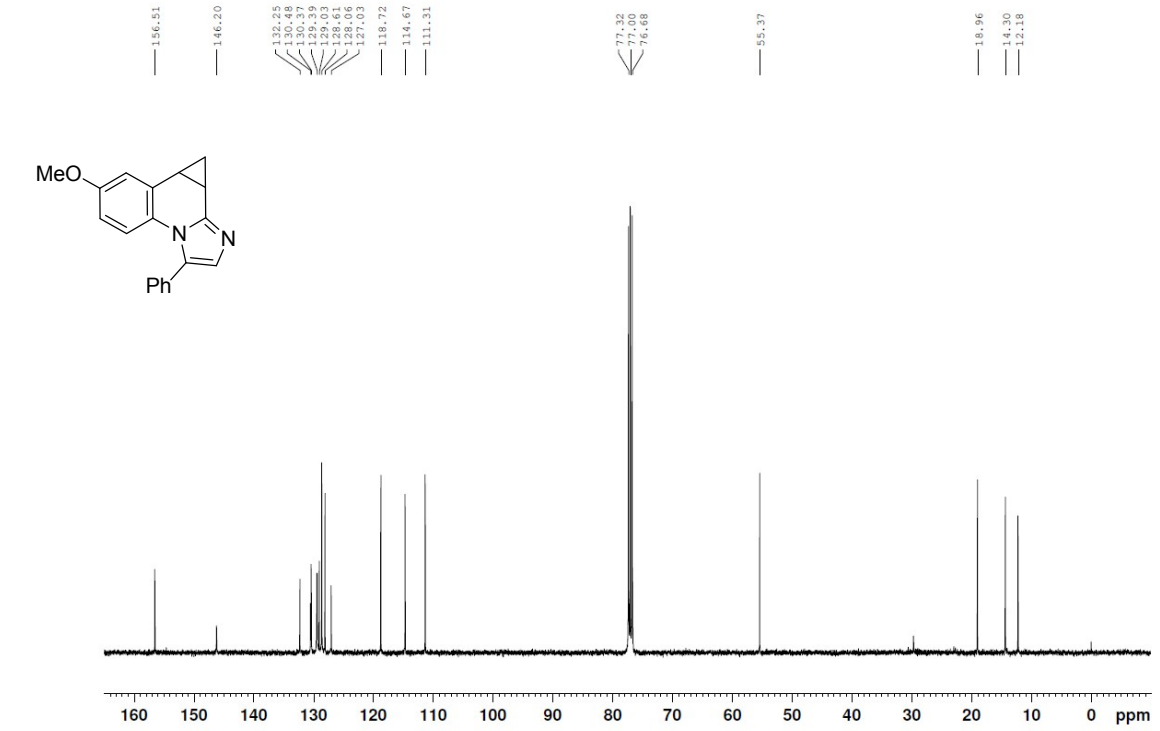
7-methyl-3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3d):



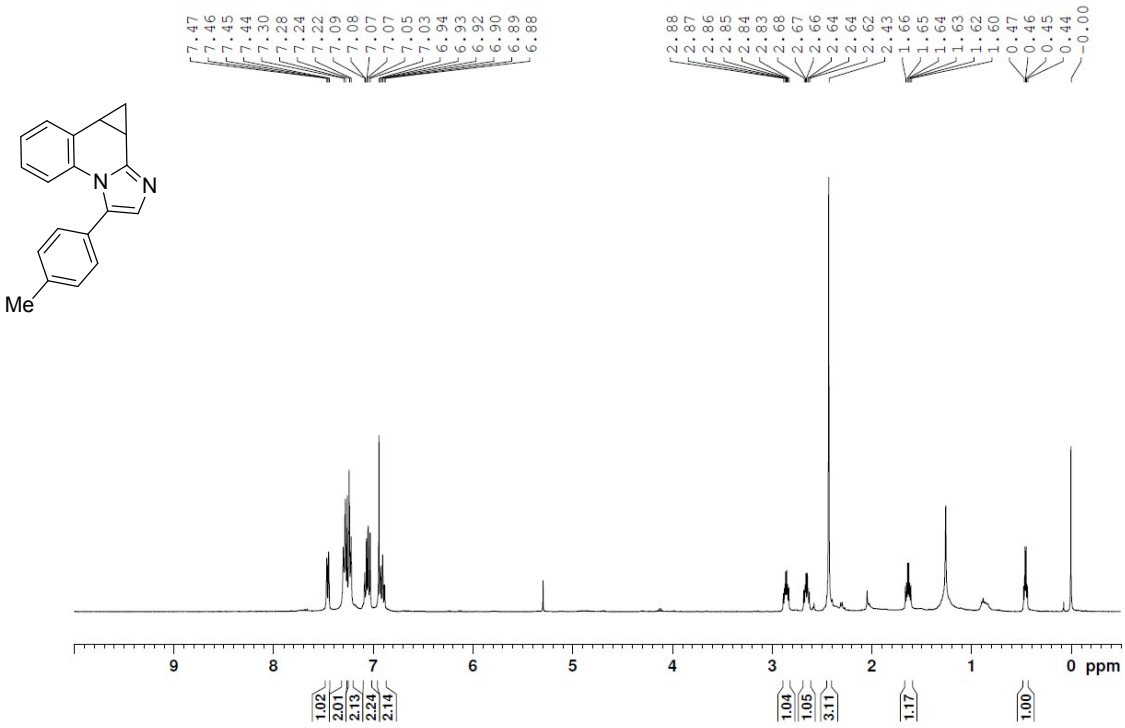


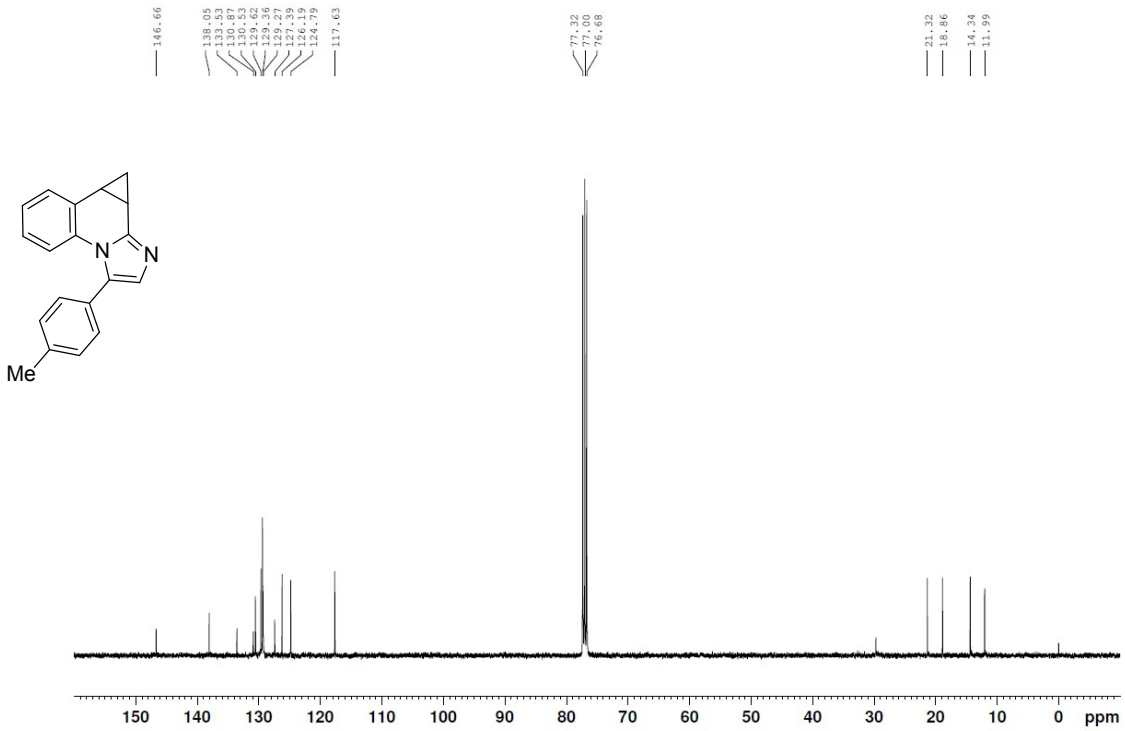
7-methoxy-3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3e):



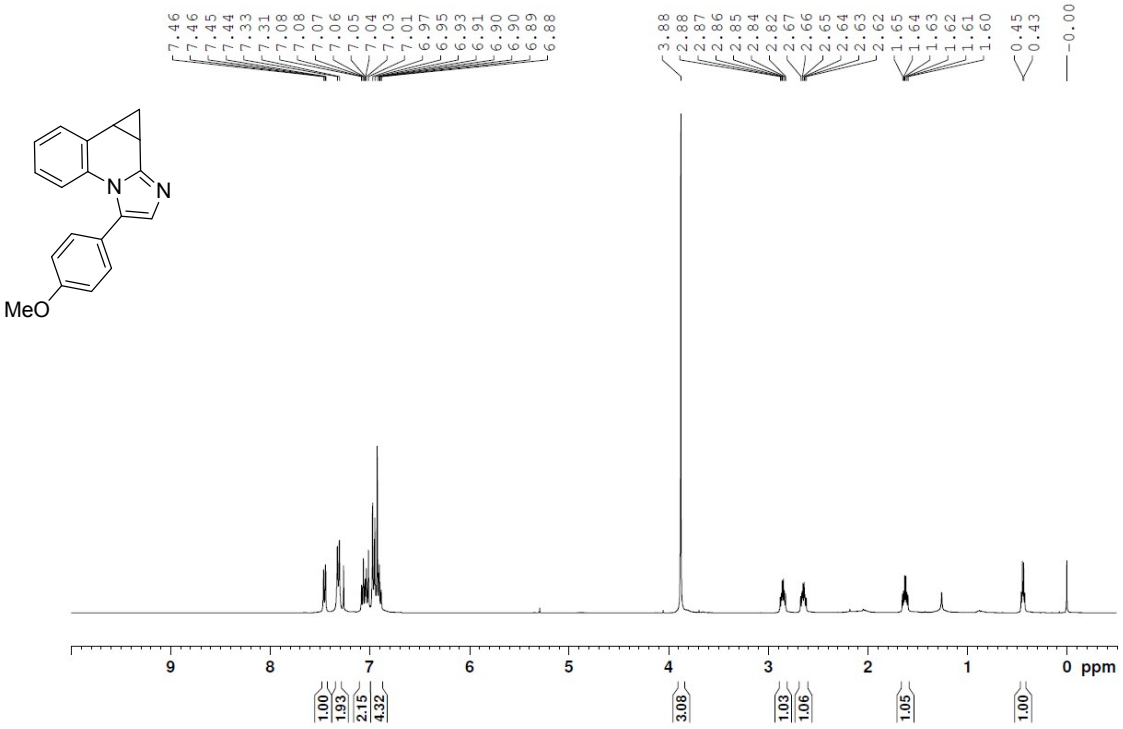


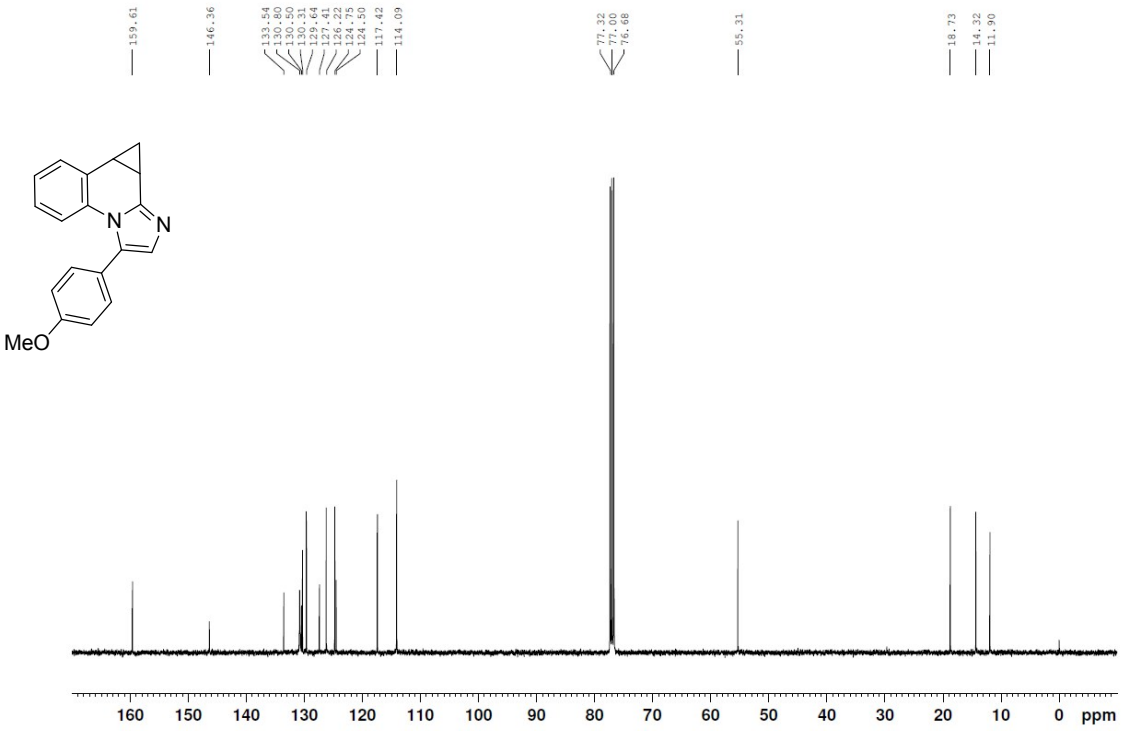
3-(p-tolyl)-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3f):



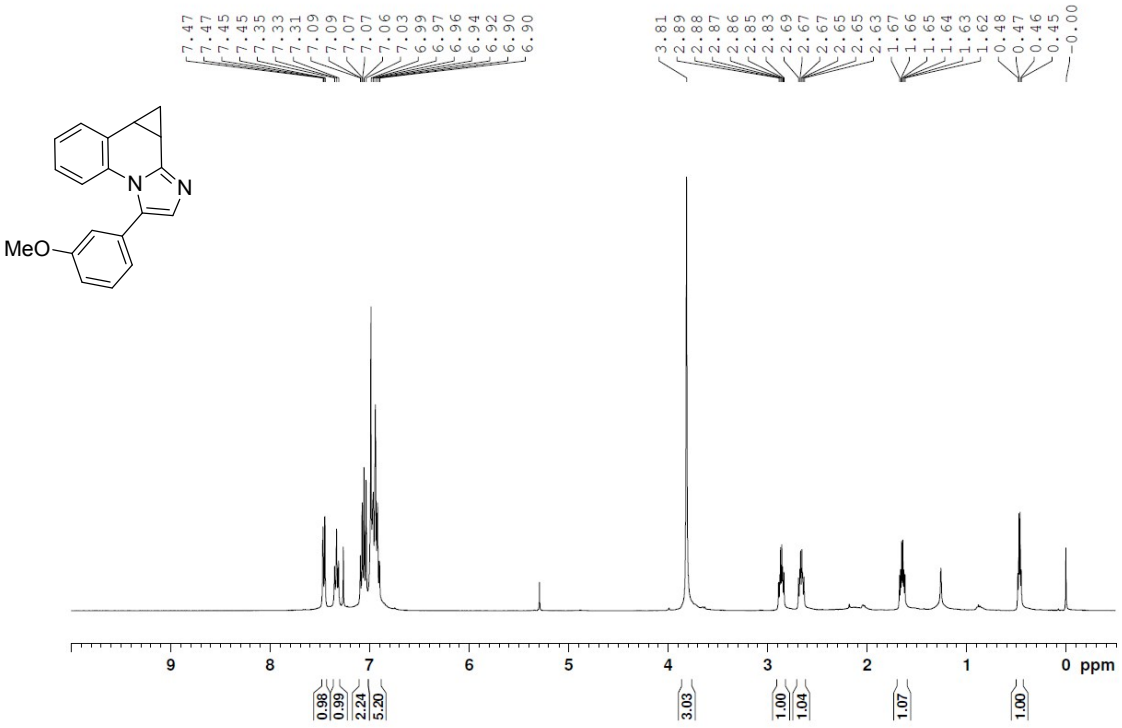


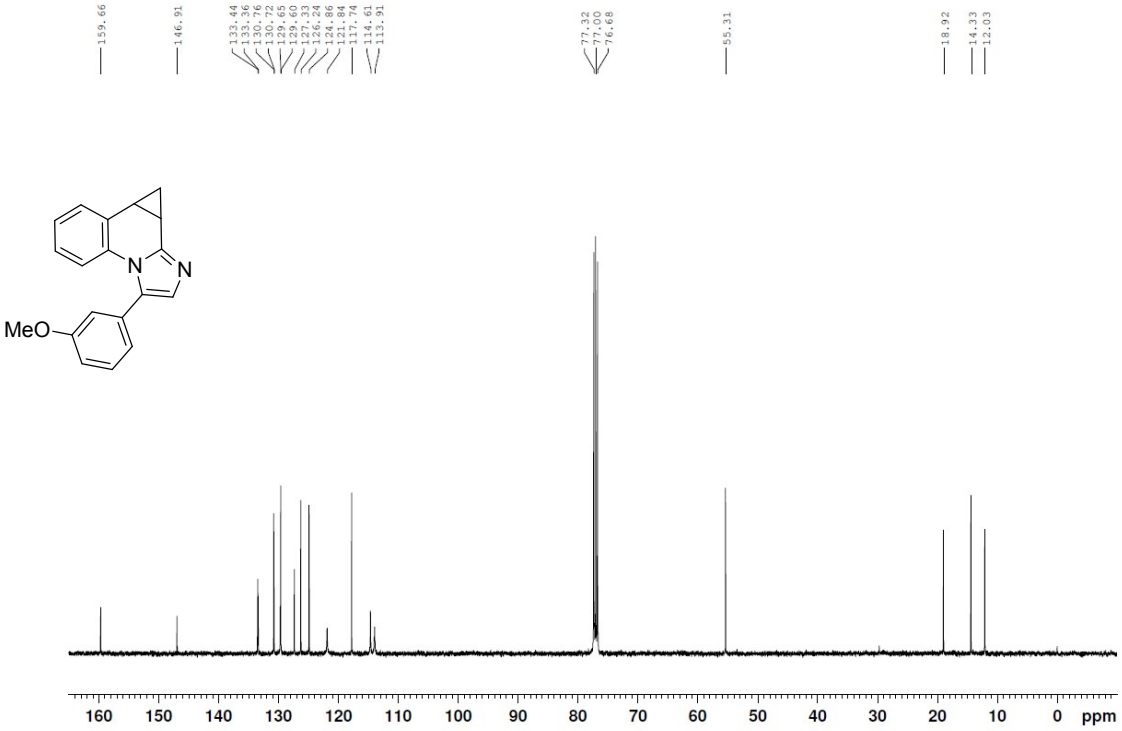
3-(4-methoxyphenyl)-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3g):



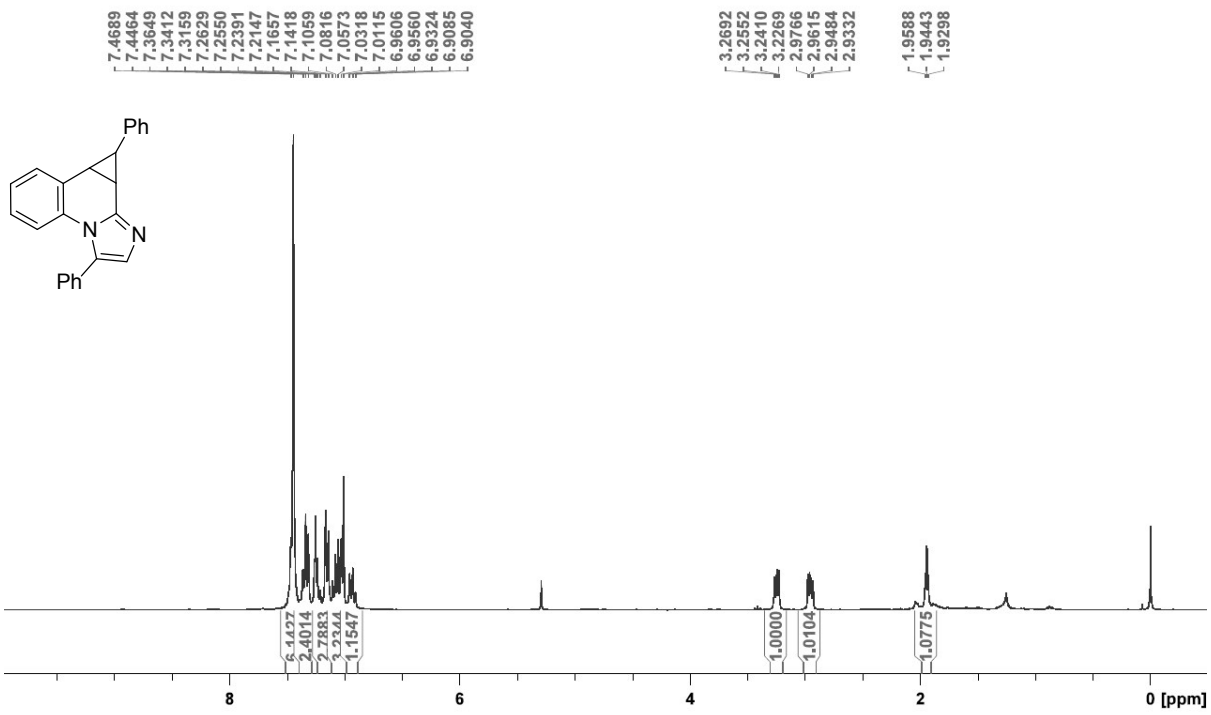


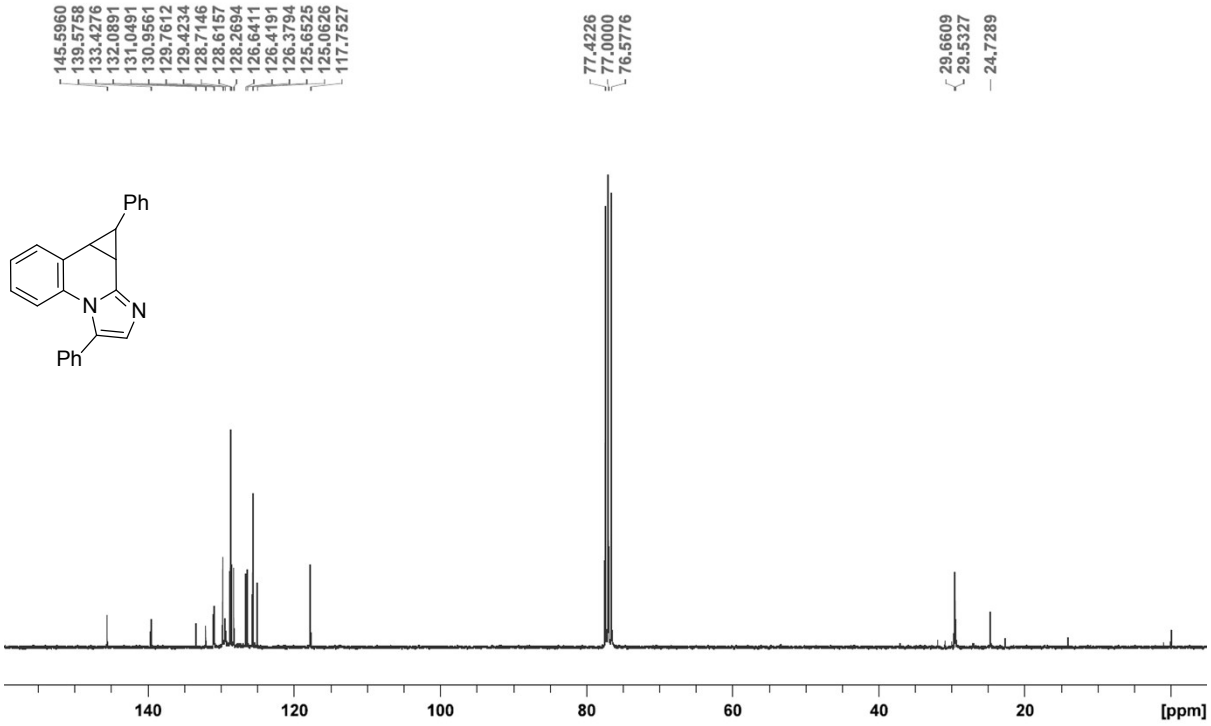
3-(3-methoxyphenyl)-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3h):

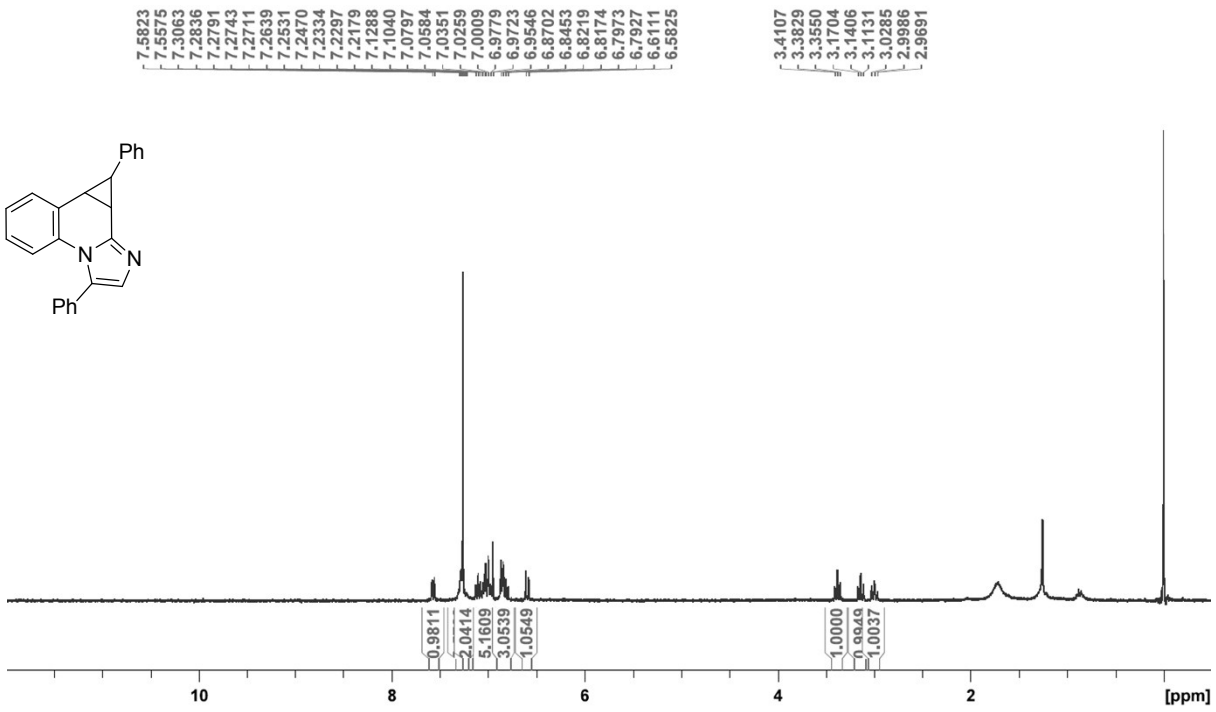




3,9-diphenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (3i):



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7.1040
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3.3550
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Ph
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1.0549
1.0000
1.0037
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4
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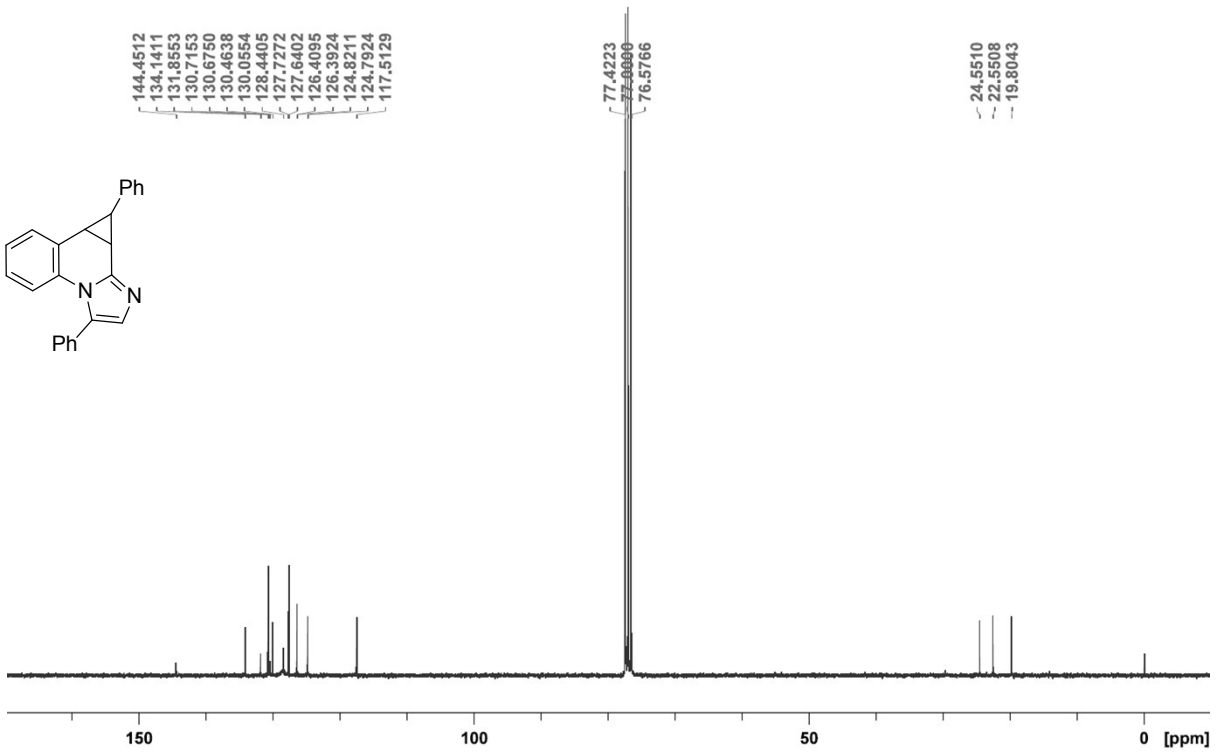
[ppm]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Ph
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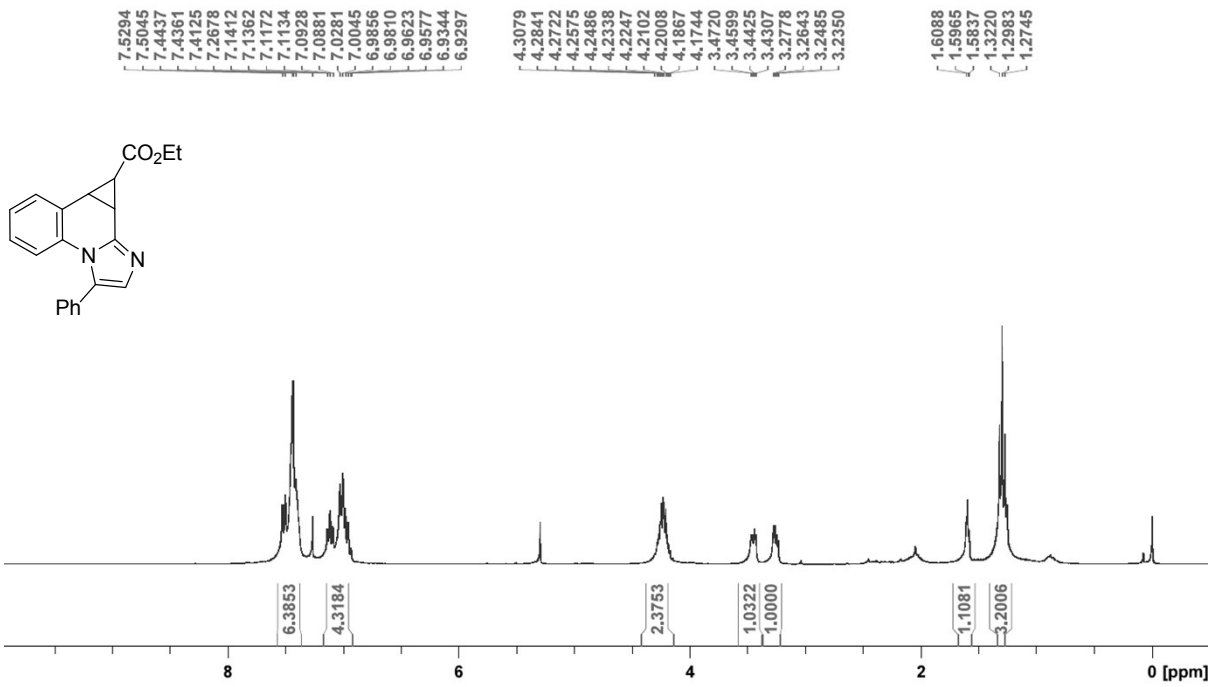
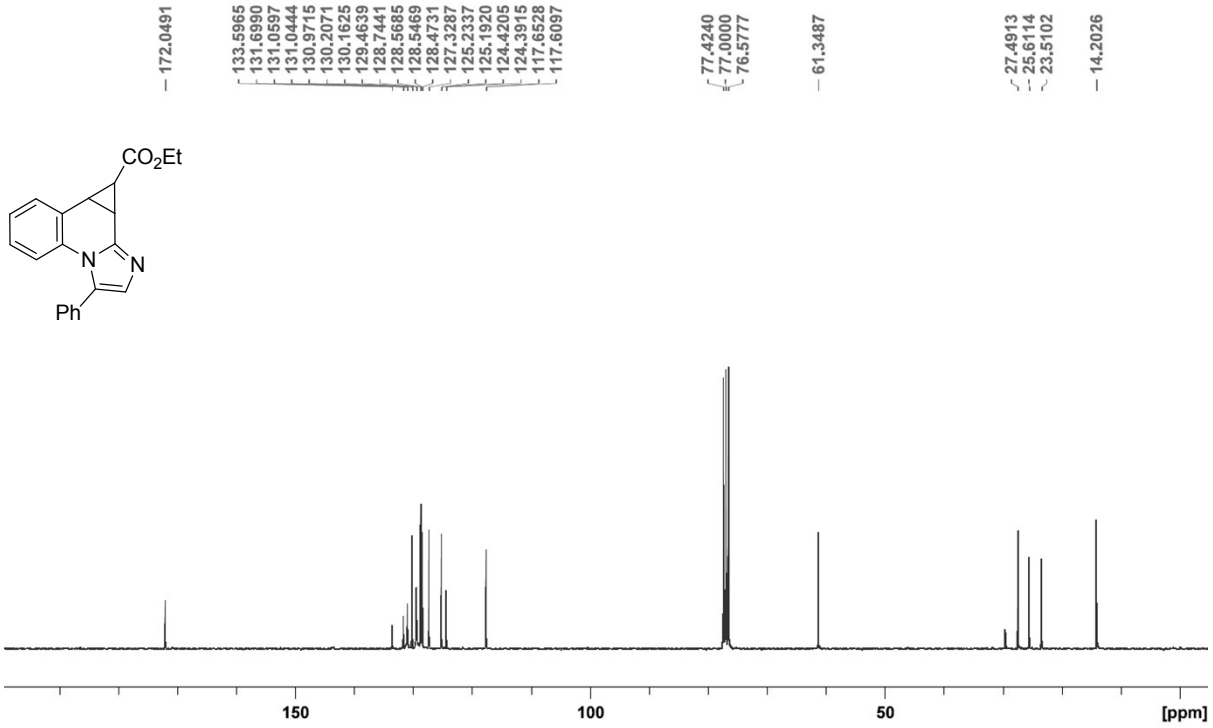
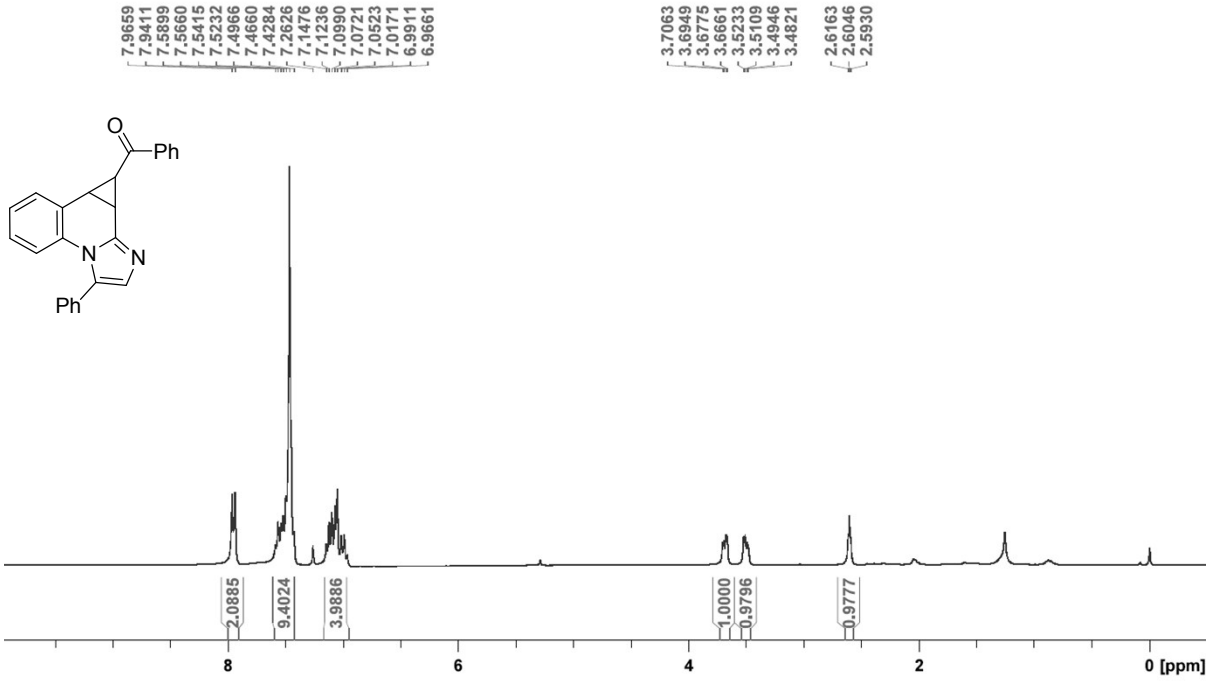
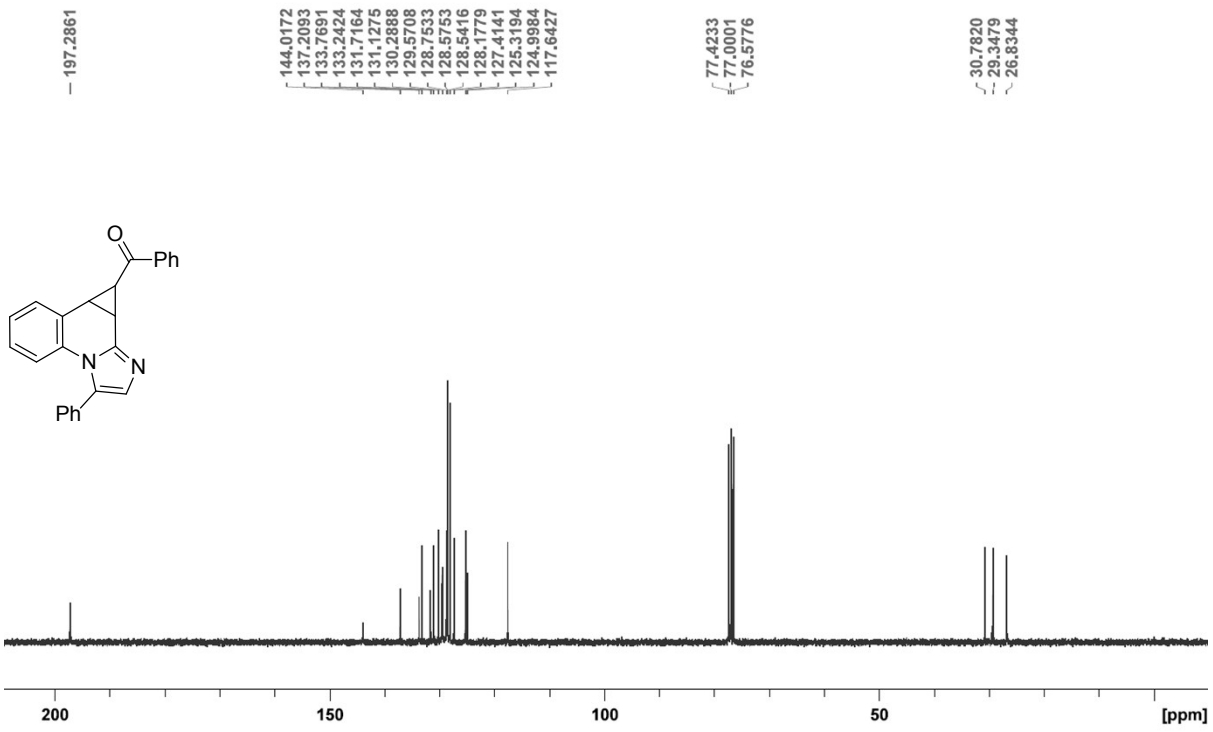
ethyl 3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline-9-carboxylate (3j):



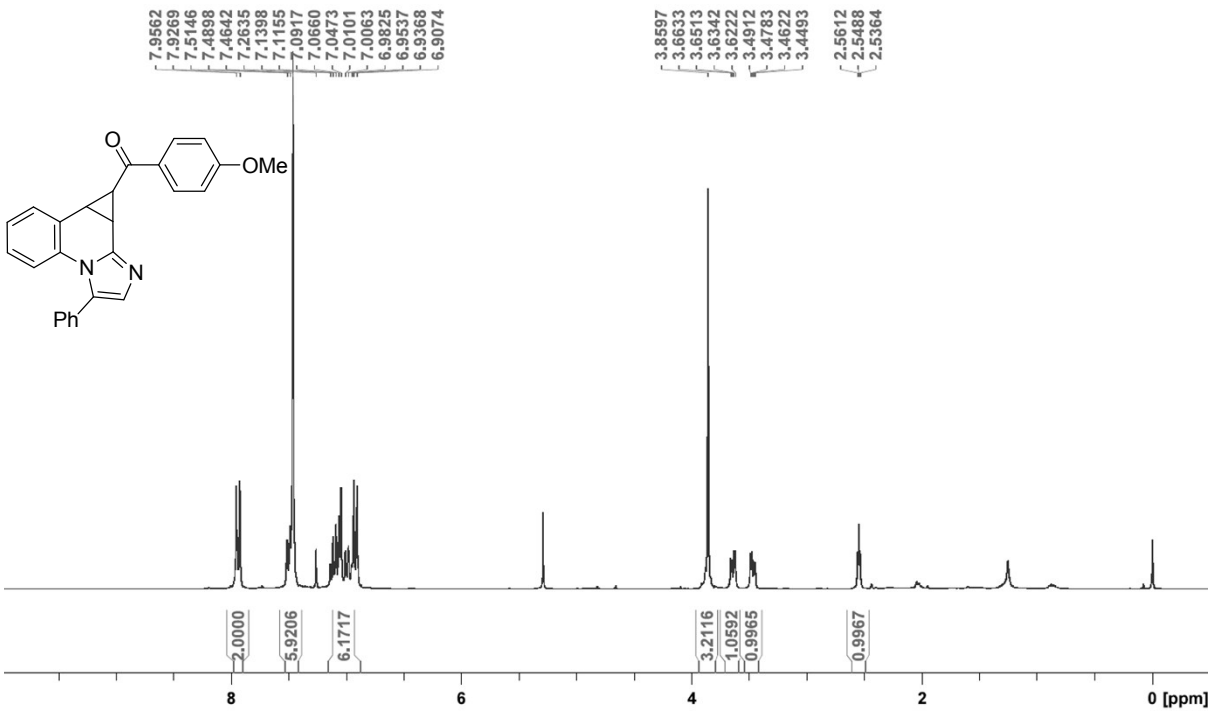


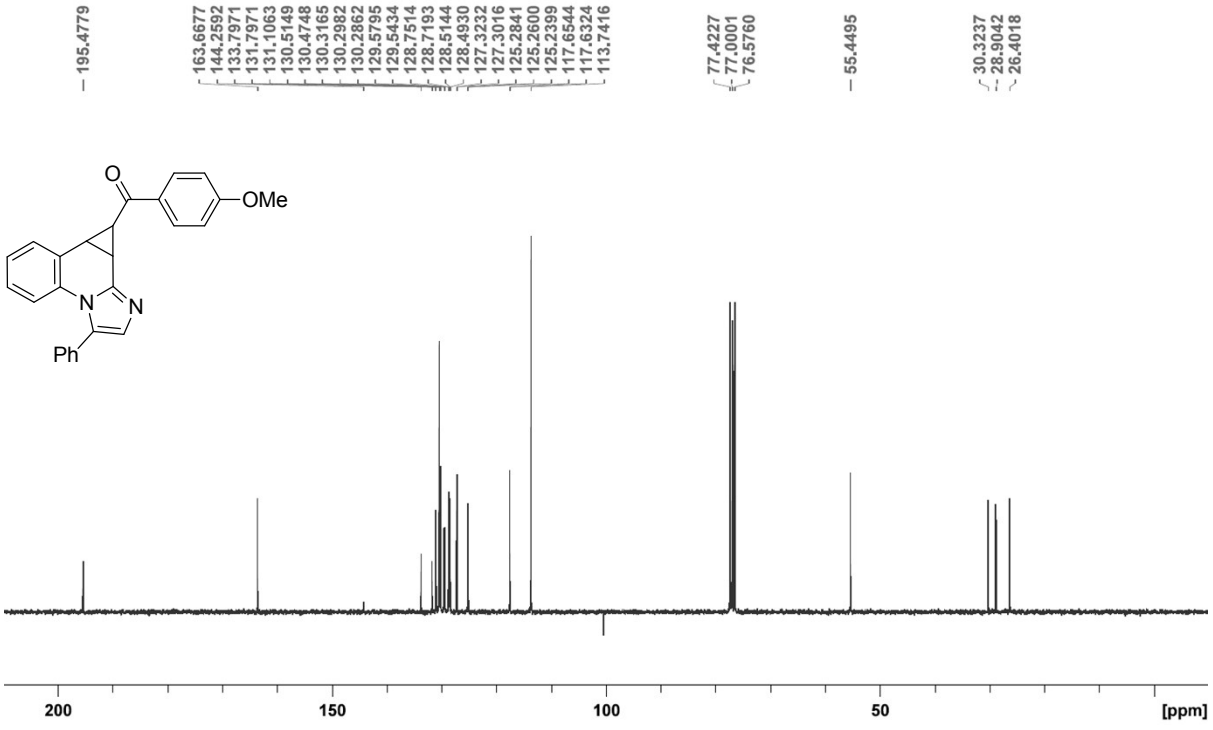
phenyl(3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinolin-9-yl)methanone (3k):



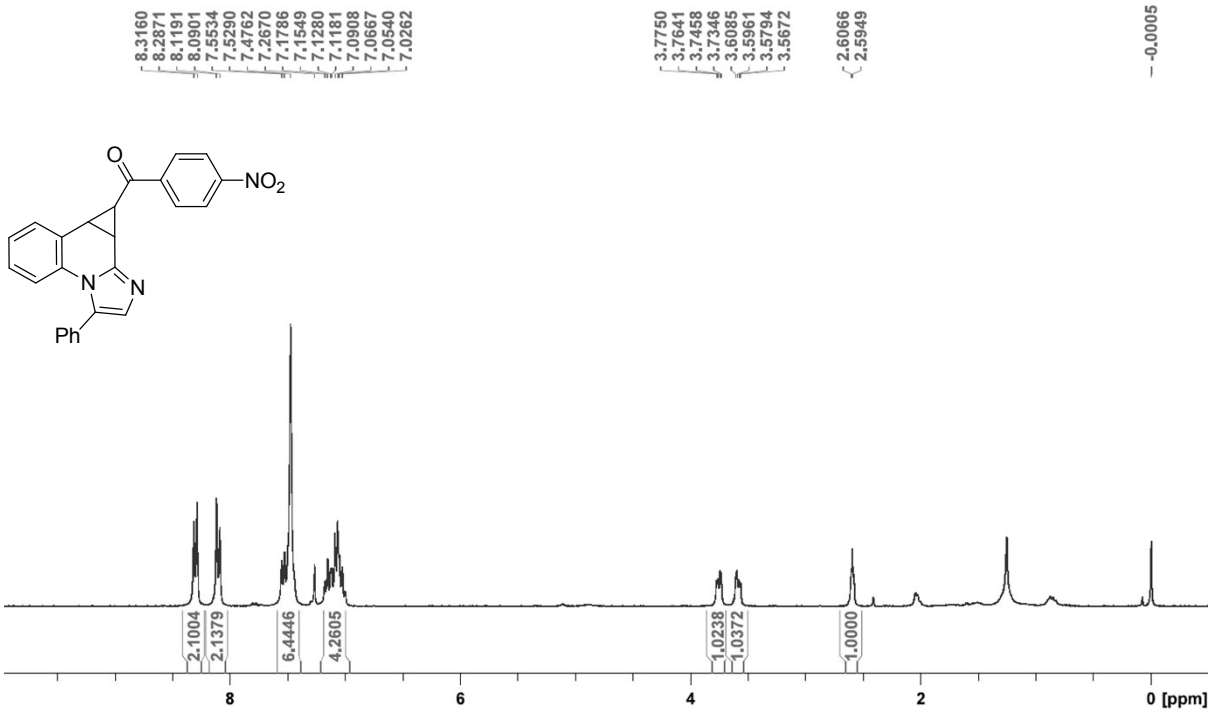


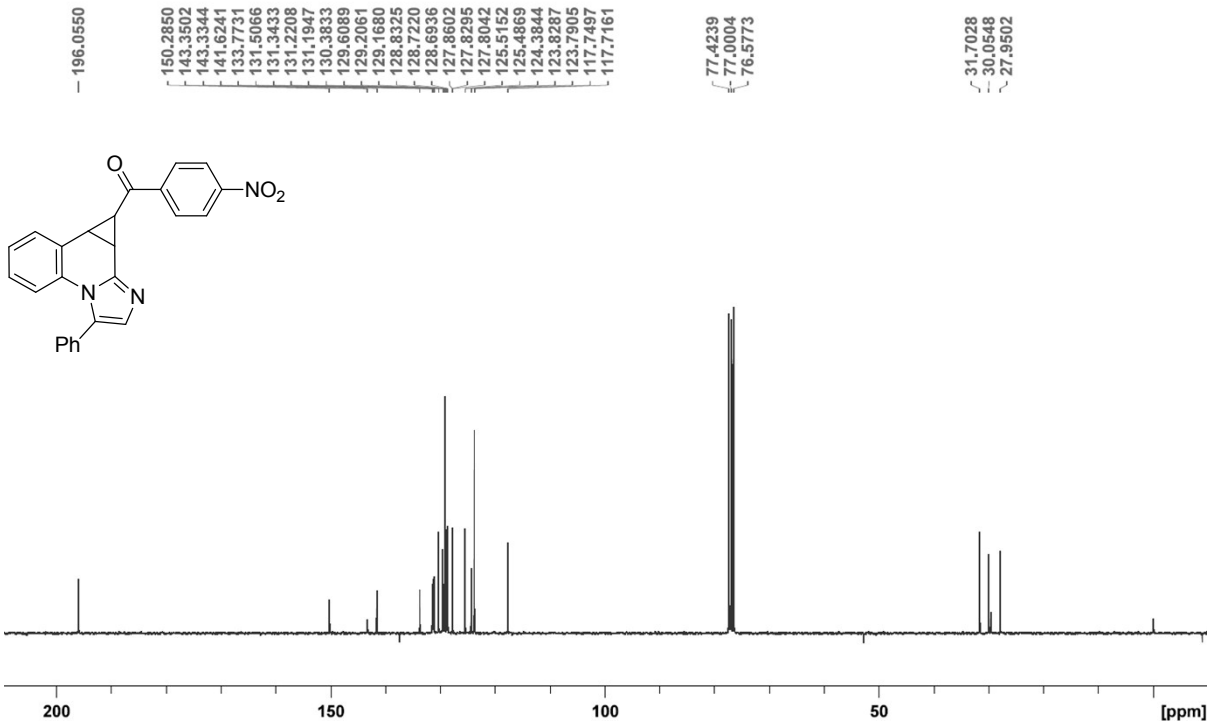
4-methoxyphenyl)(3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinolin-9-yl)methanone (3l):



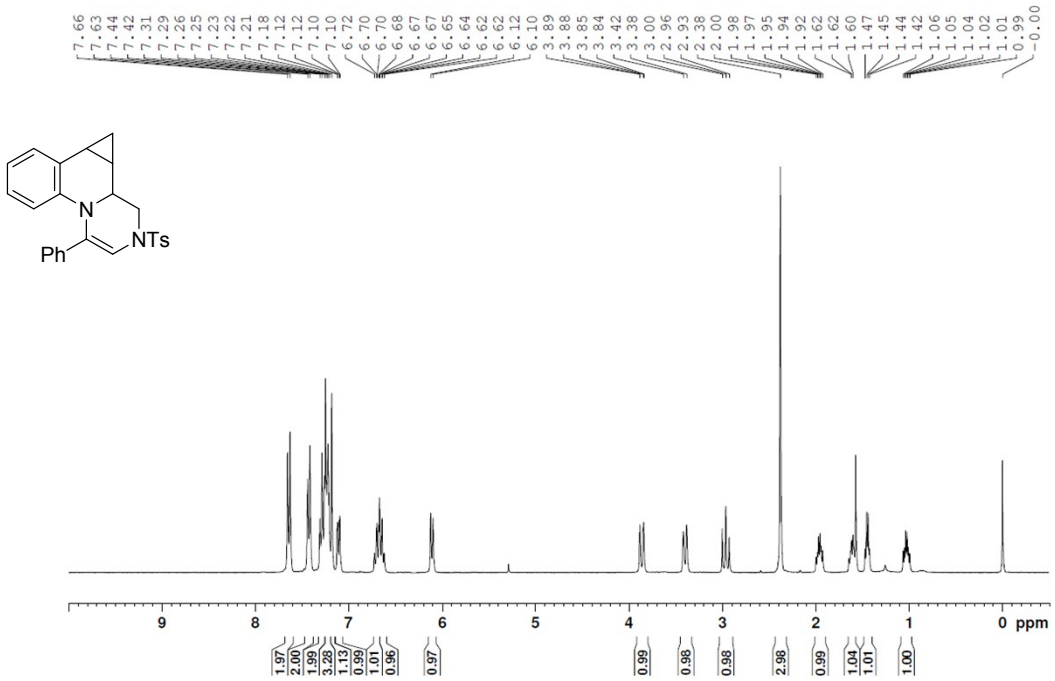


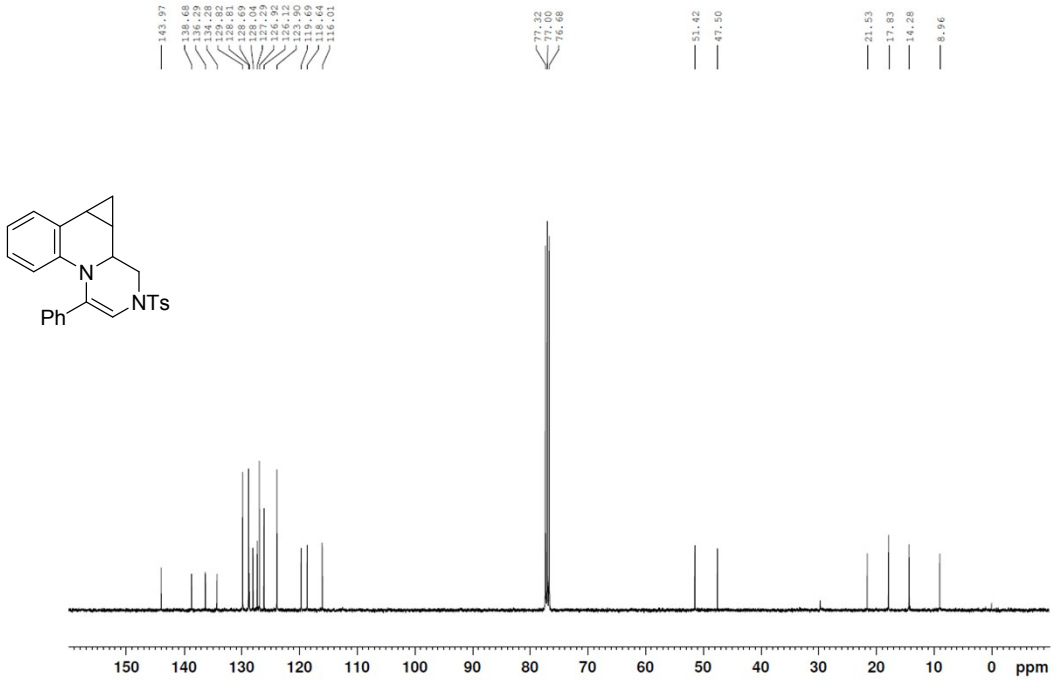
4-nitrophenyl)(3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinolin-9-yl)methanone (3m):



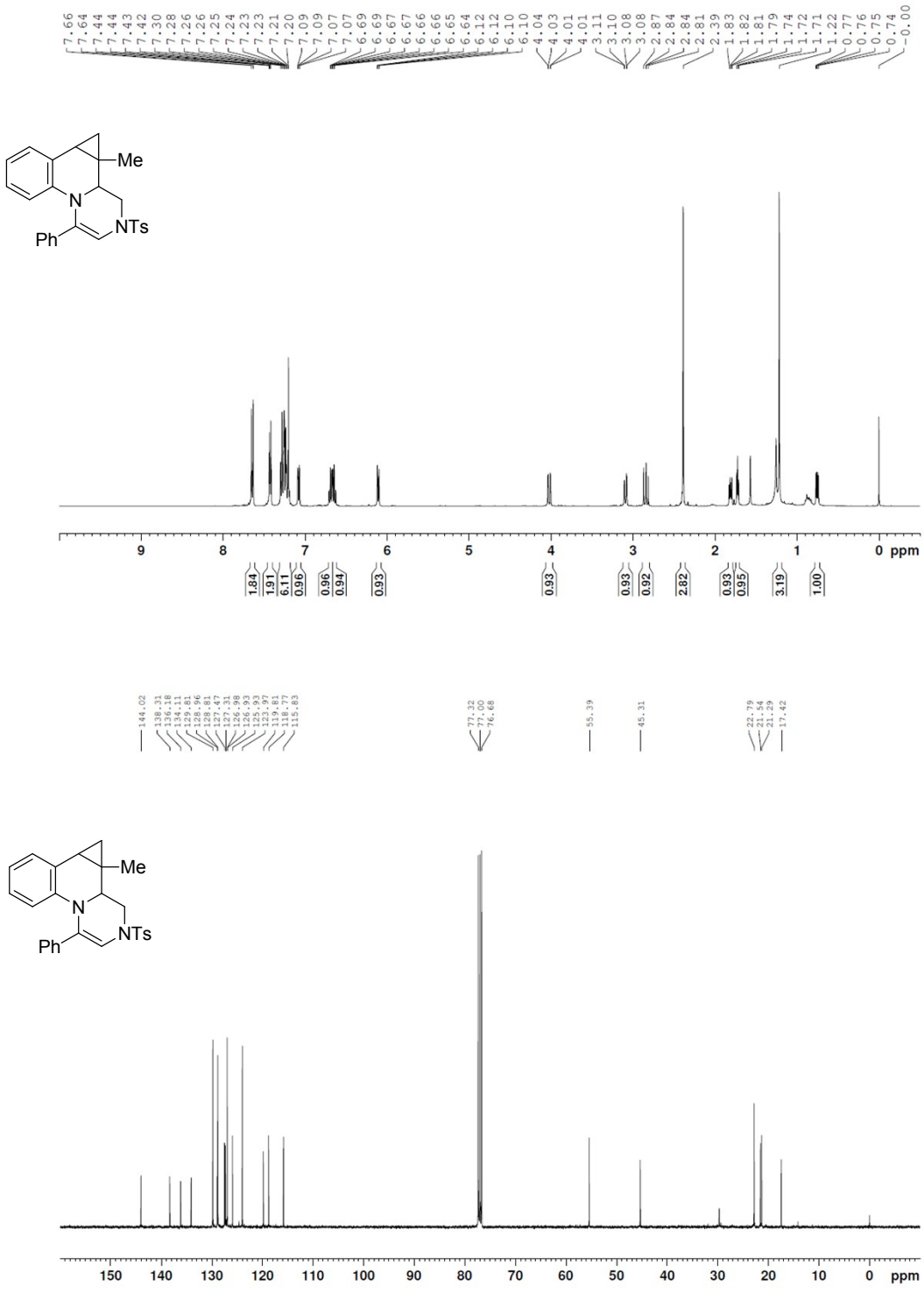


4-phenyl-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4a):

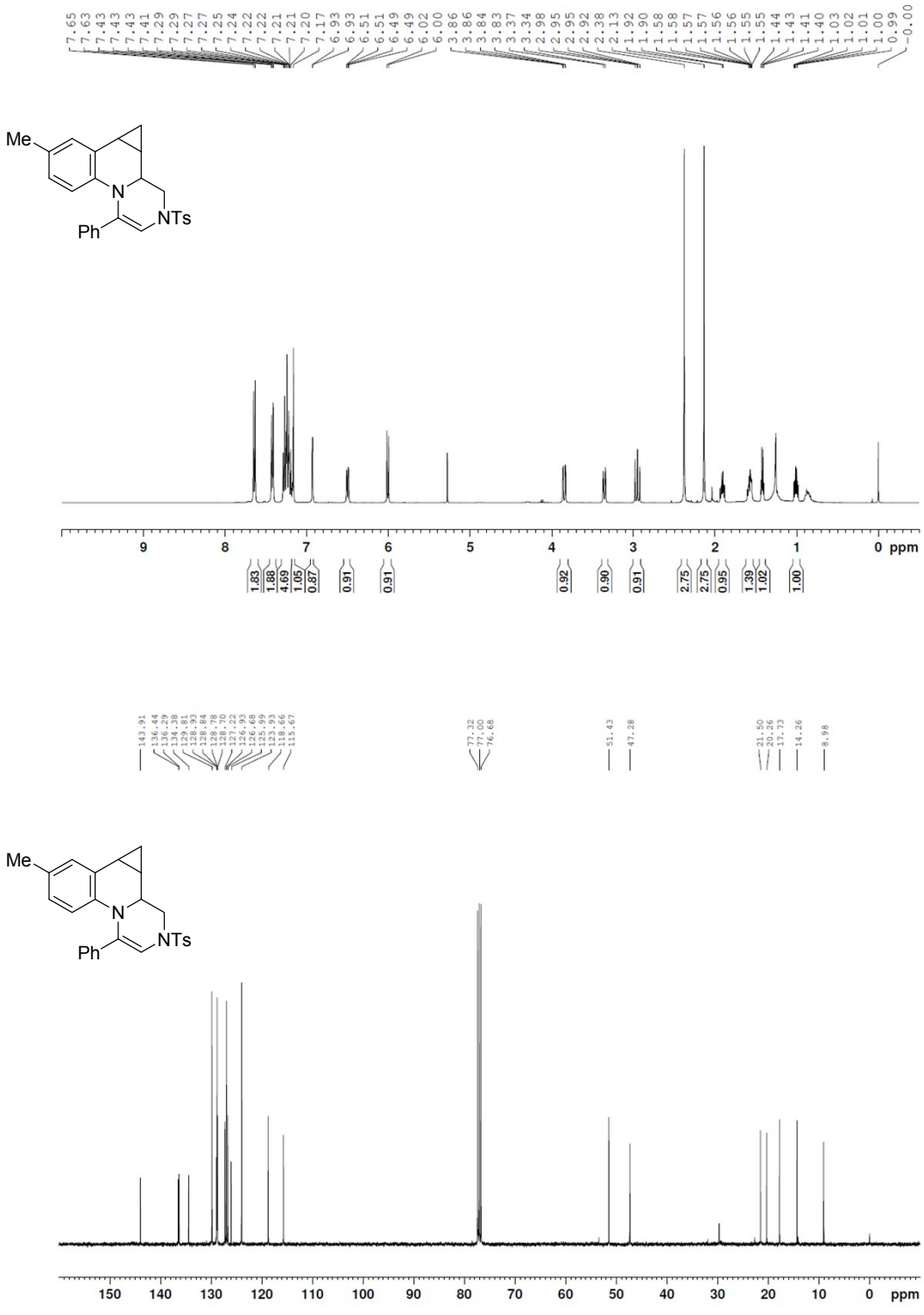




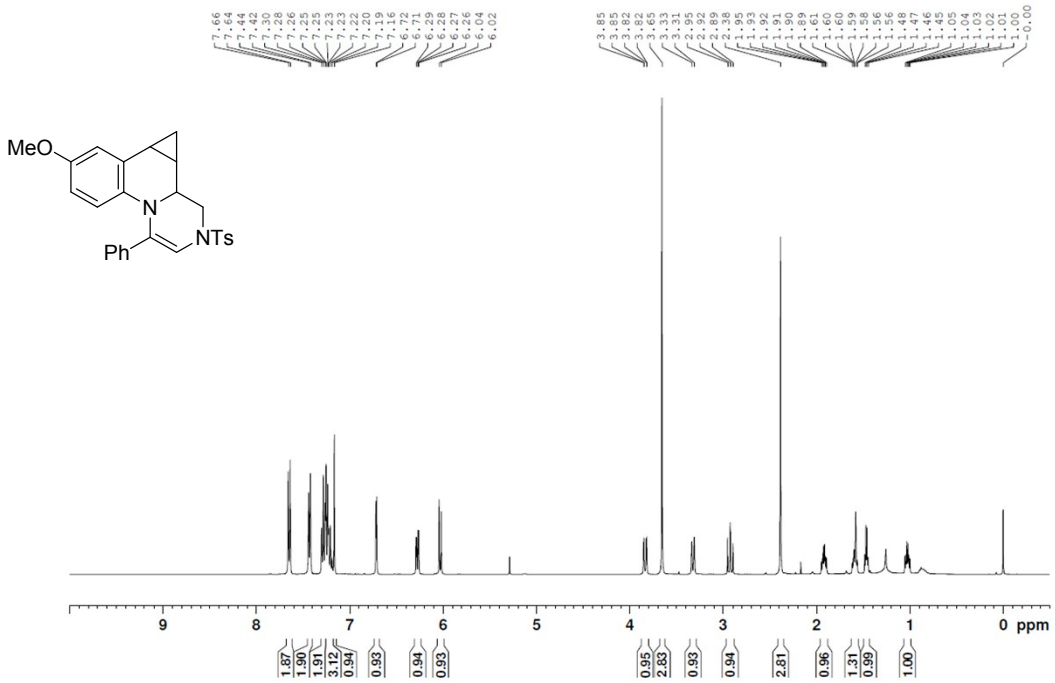
10a-methyl-4-phenyl-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4b):

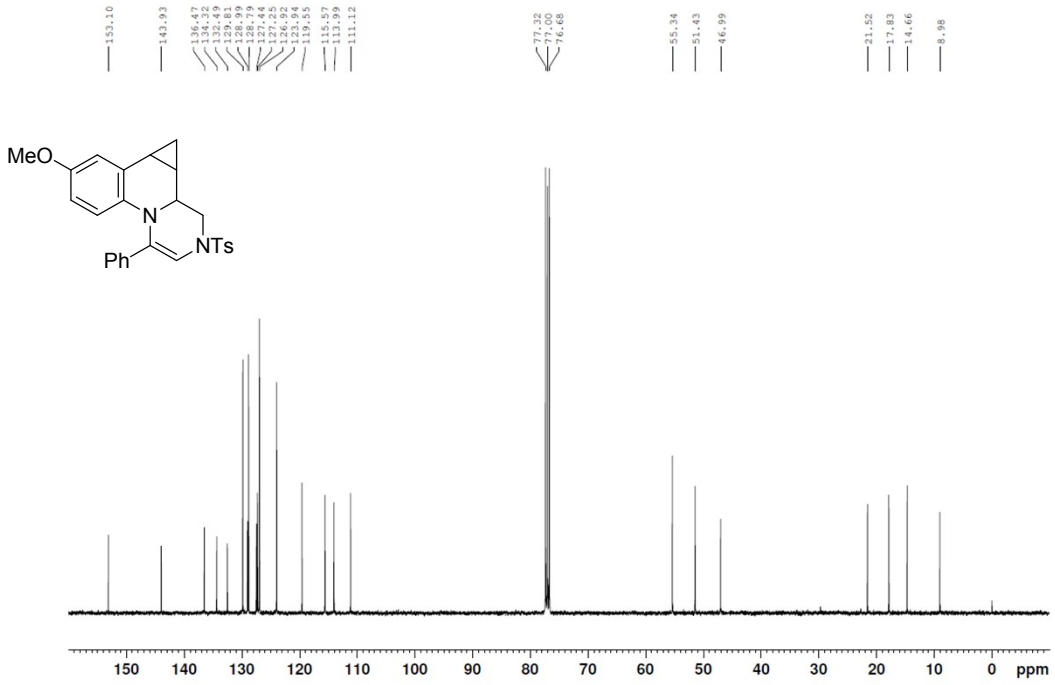


8-methyl-4-phenyl-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4c):

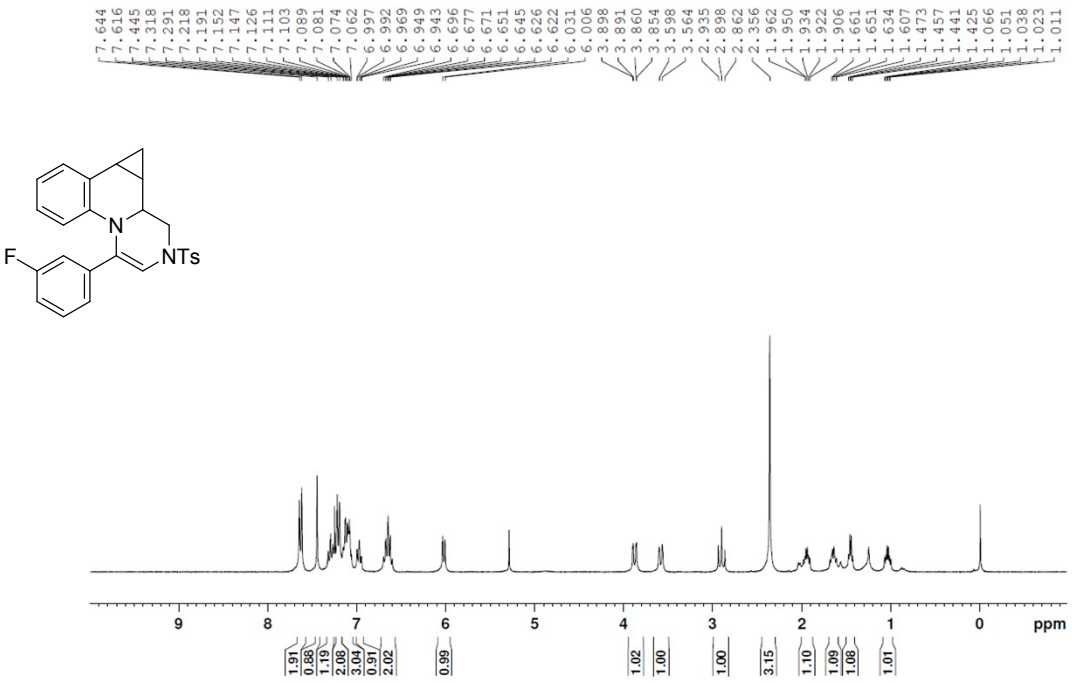


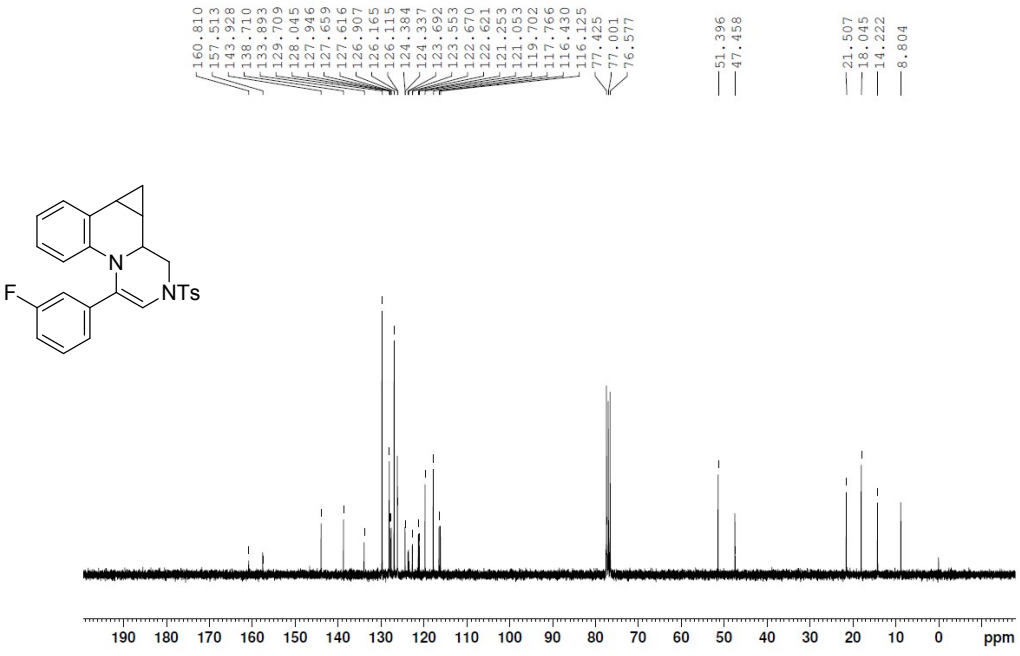
8-methoxy-4-phenyl-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4d):



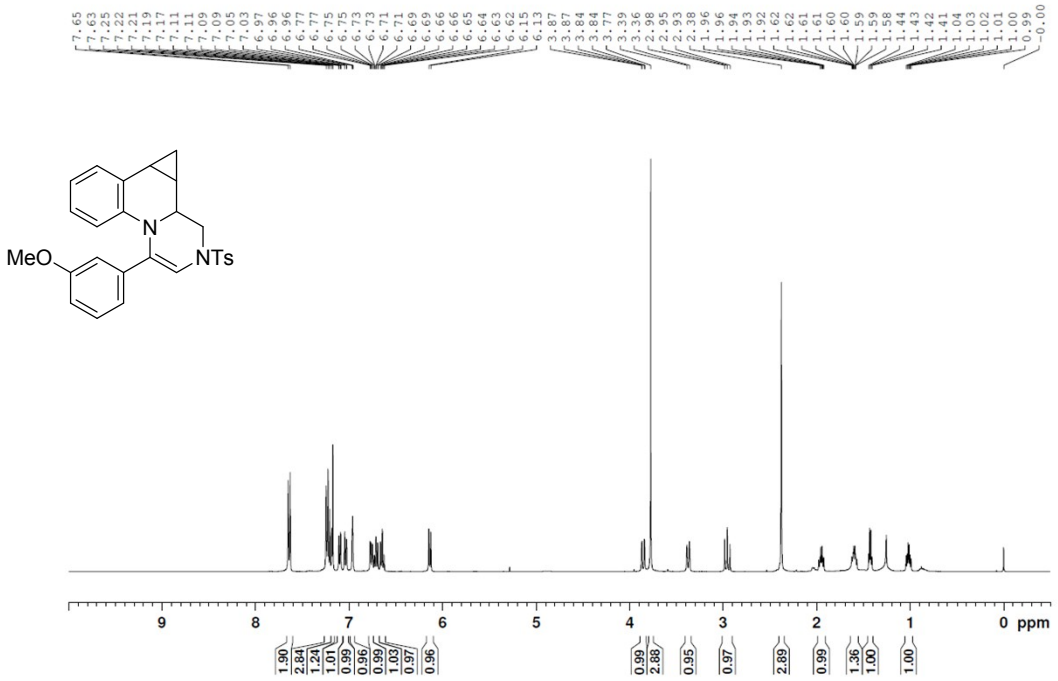


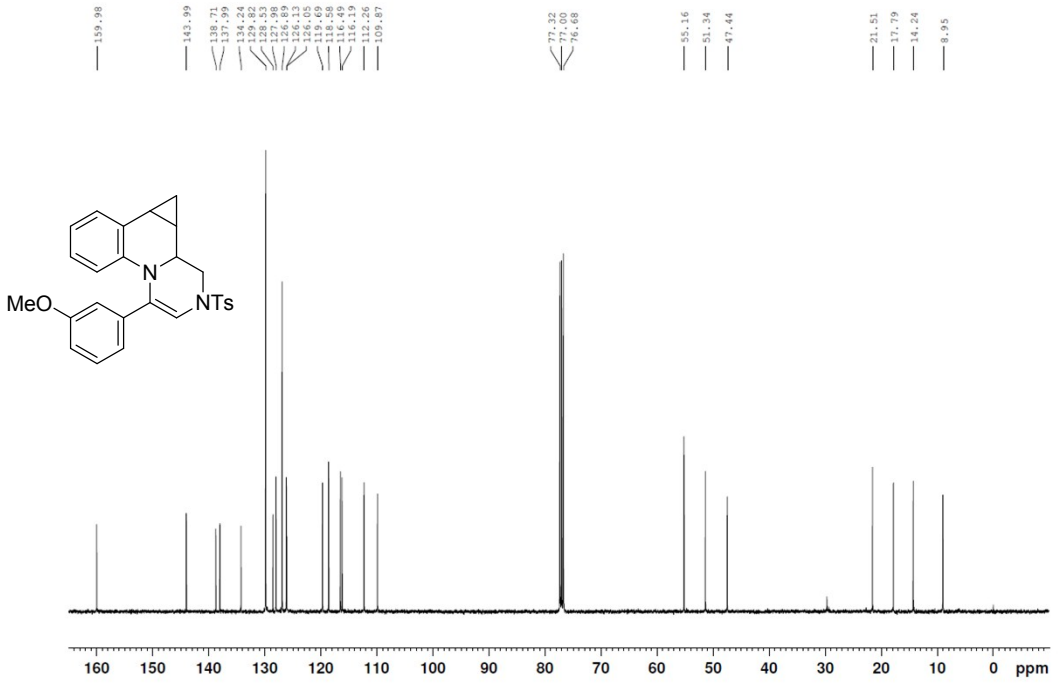
4-(3-fluorophenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4e):



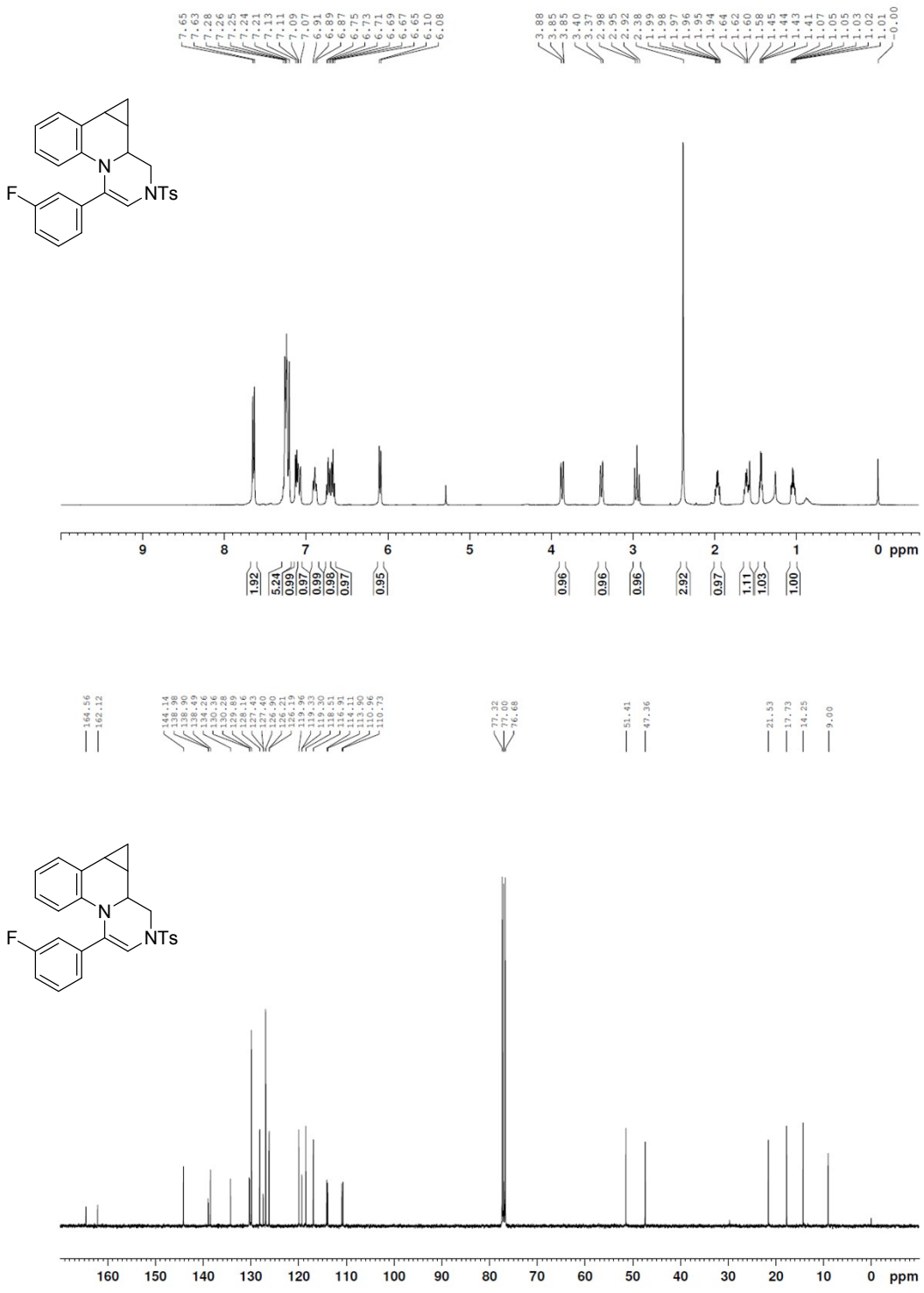


4-(3-methoxyphenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4f):

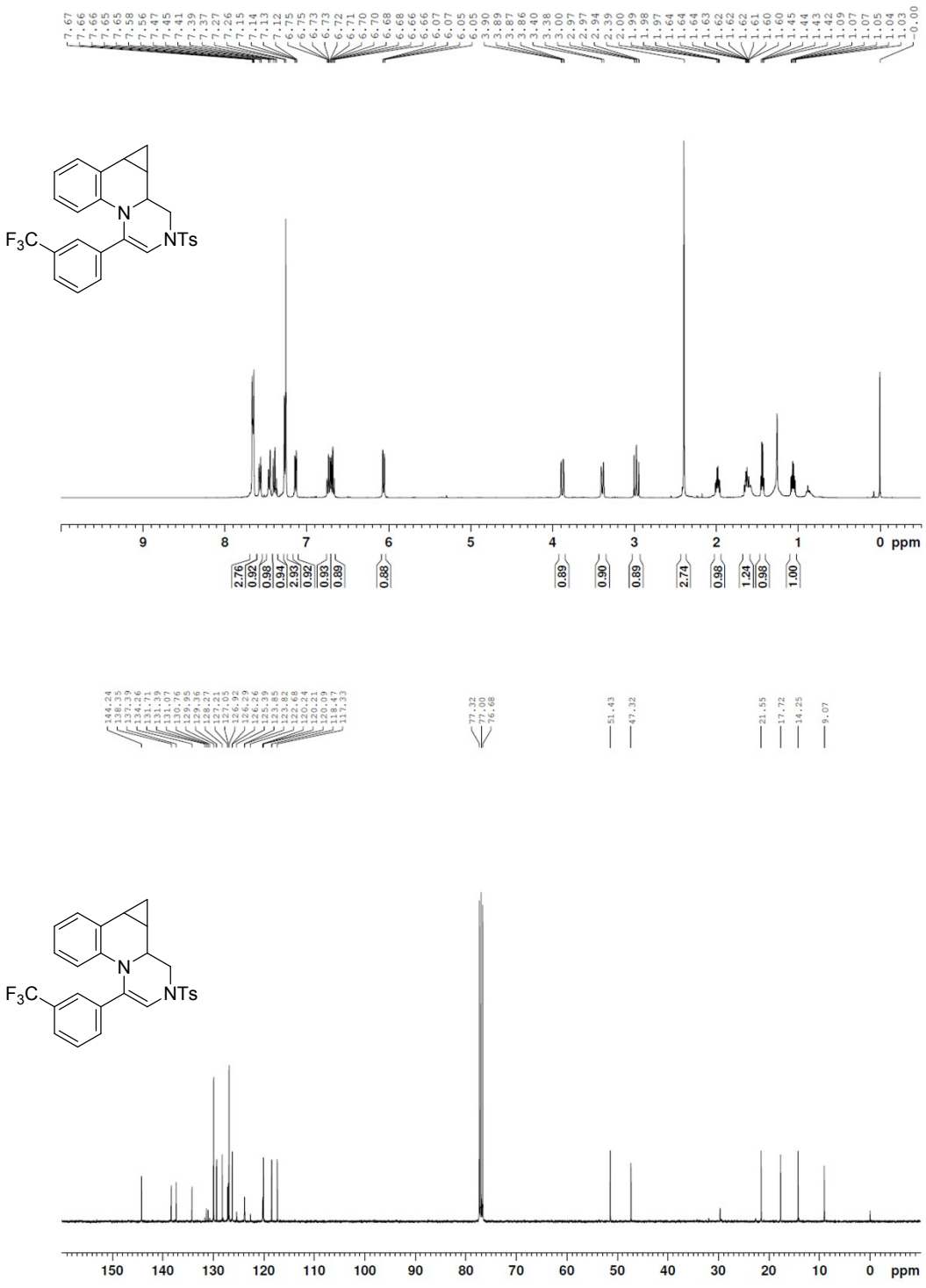




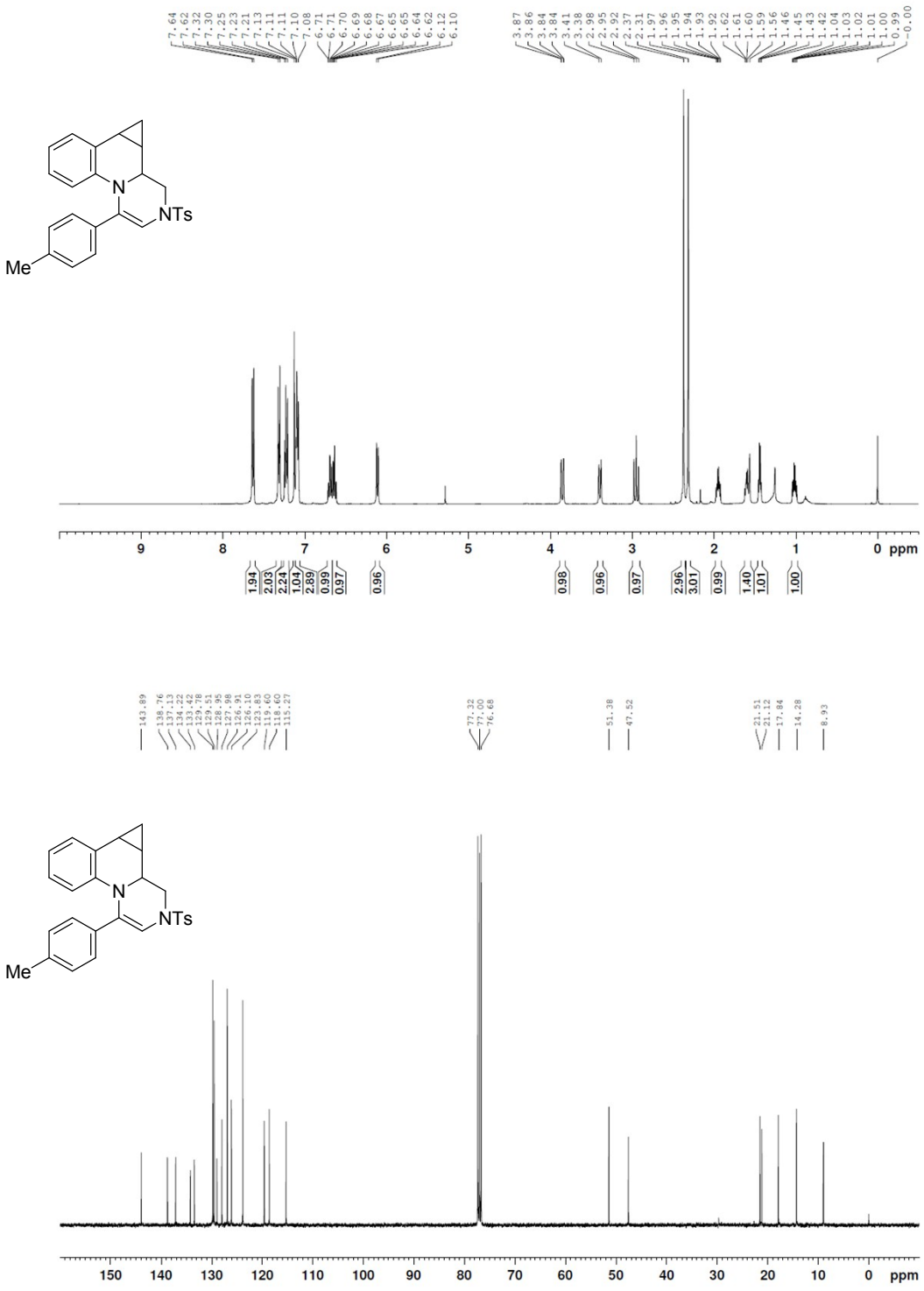
4-(3-fluorophenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinolone (4g):



2-tosyl-4-(3-(trifluoromethyl)phenyl)-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4h):

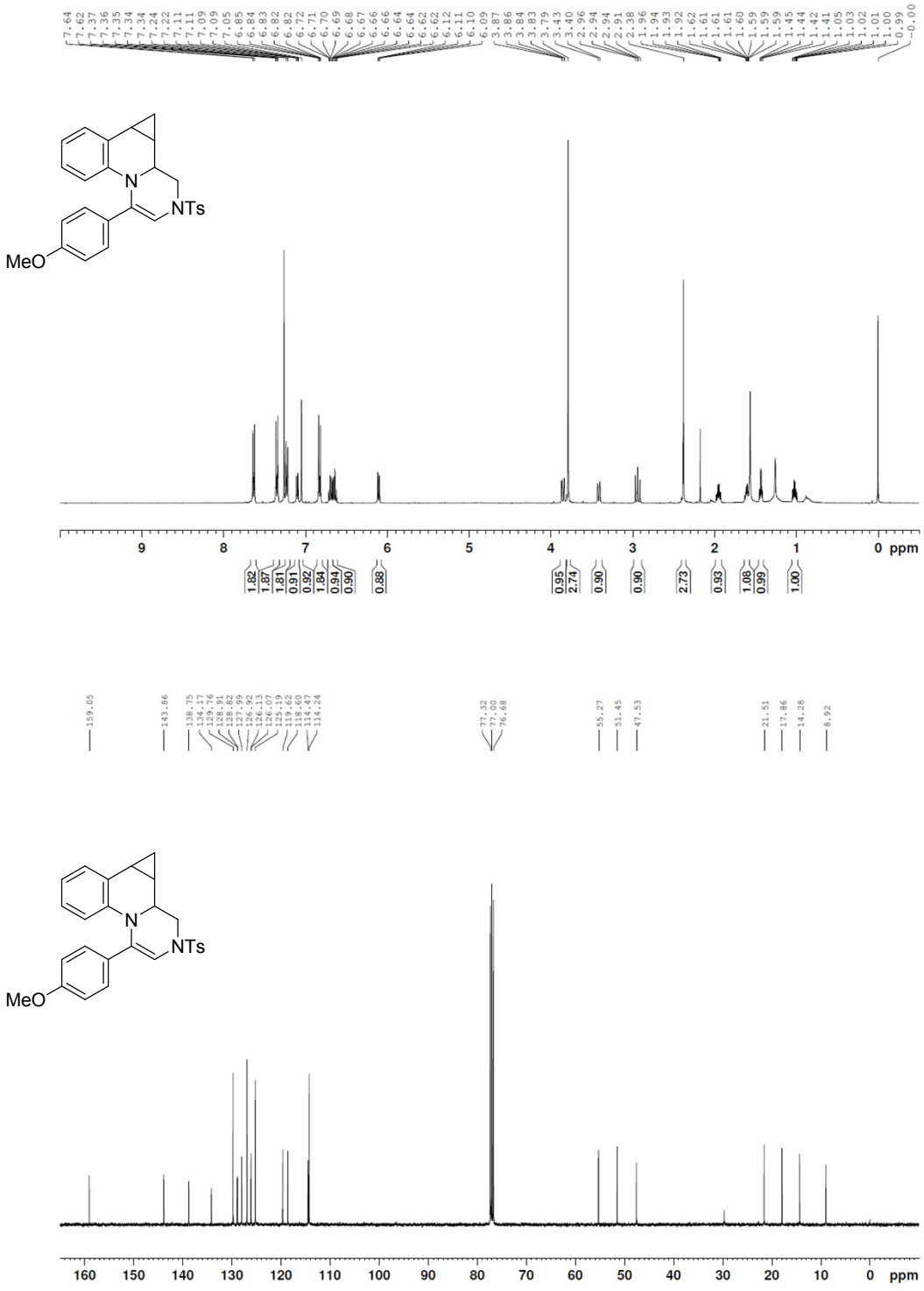


4-(p-tolyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4i):



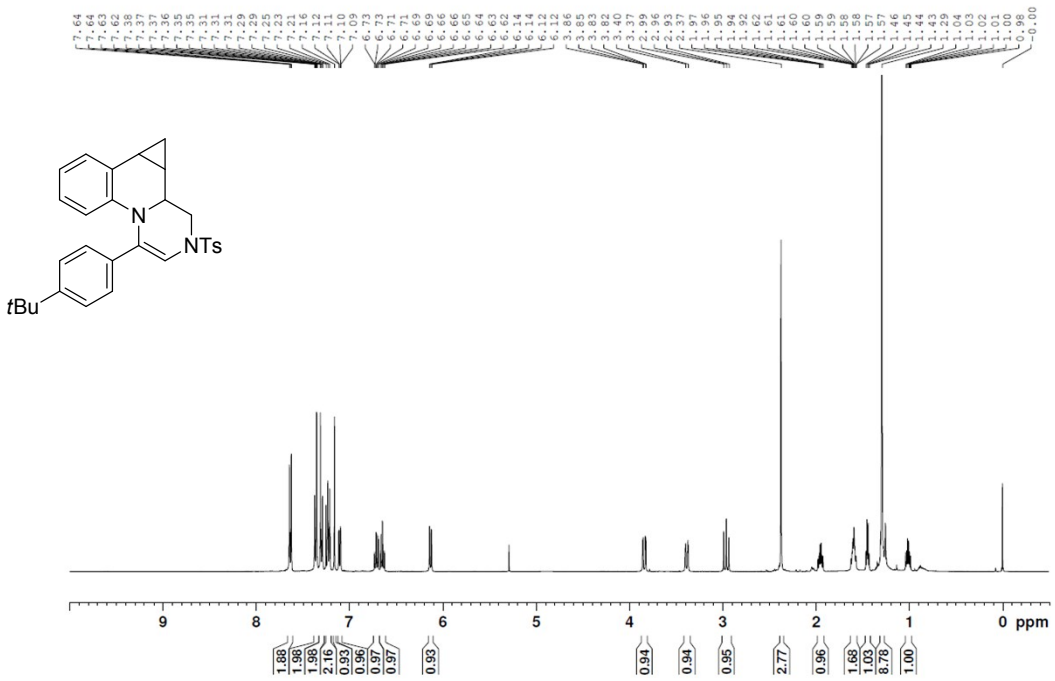
4-(4-methoxyphenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-

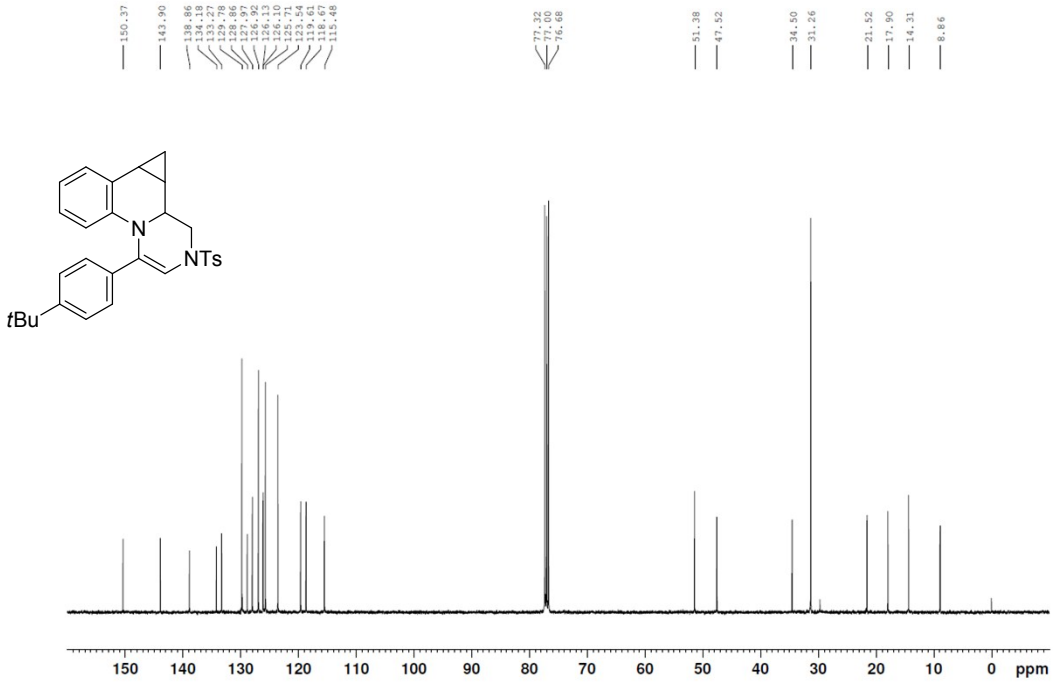
a]quinoline (4j):



4-(4-(tert-butyl)phenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-

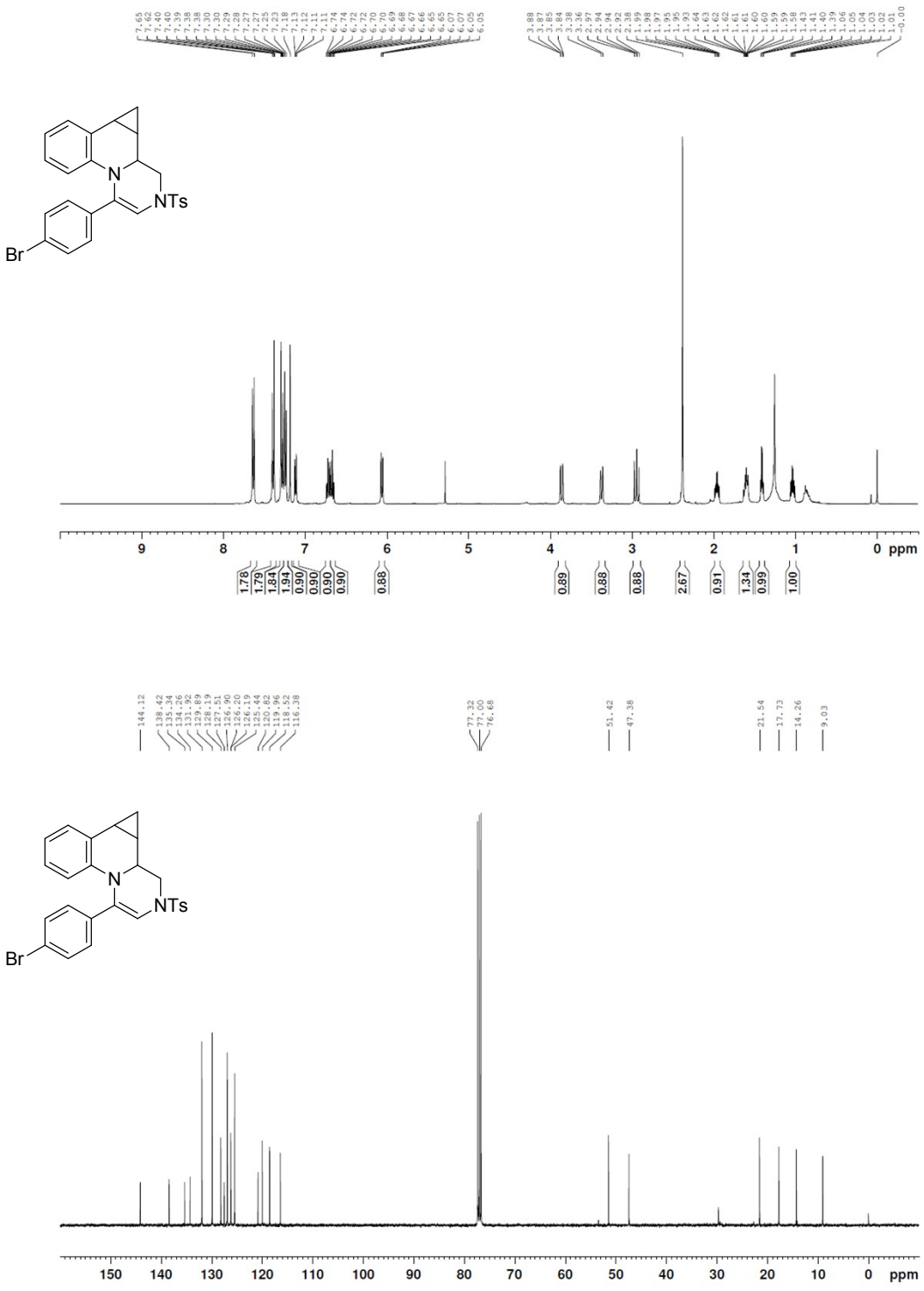
a]quinoline (4k):





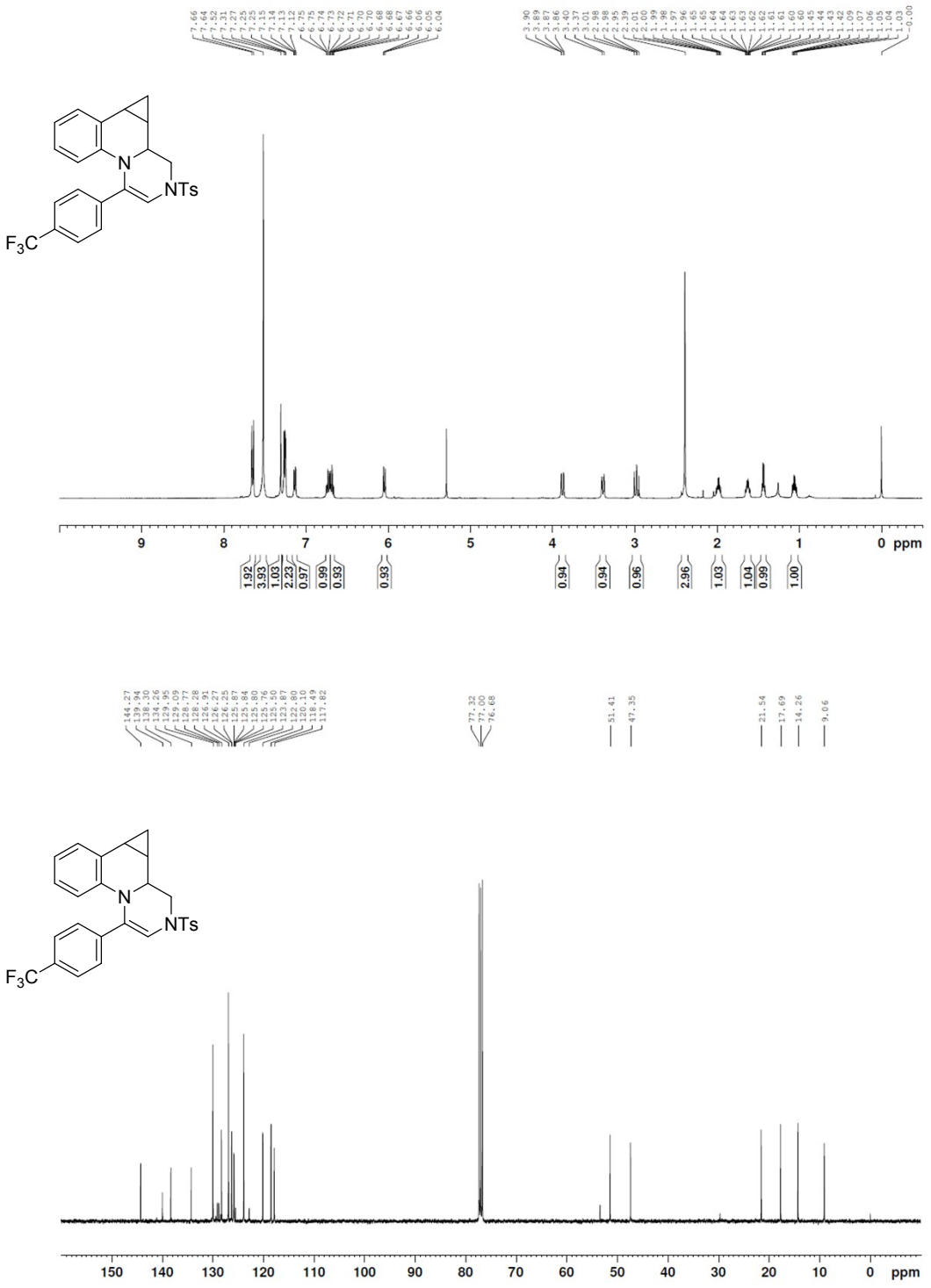
4-(4-bromophenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinolone

(4l):



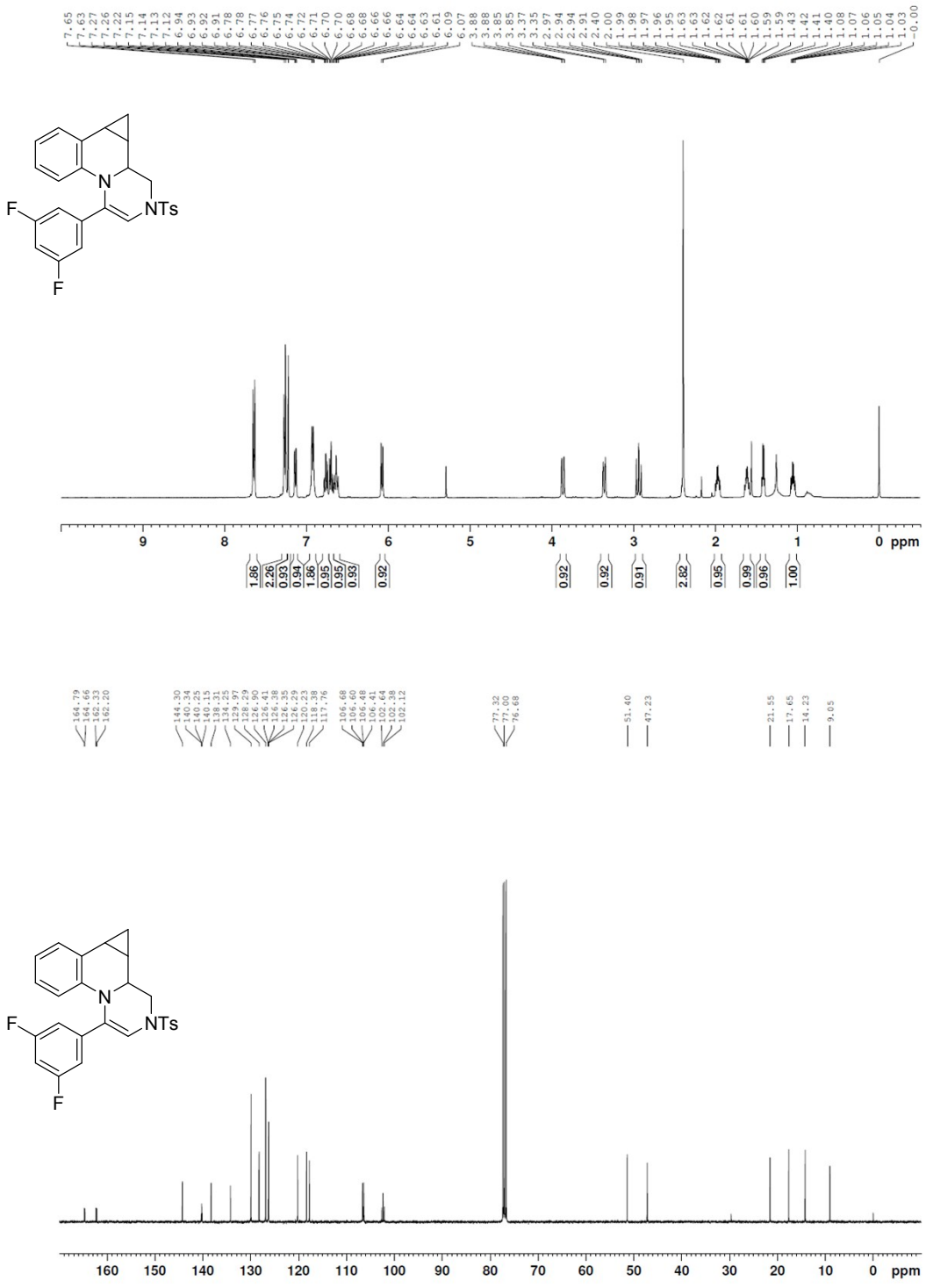
2-tosyl-4-(4-(trifluoromethyl)phenyl)-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-

a]quinoline (4m):



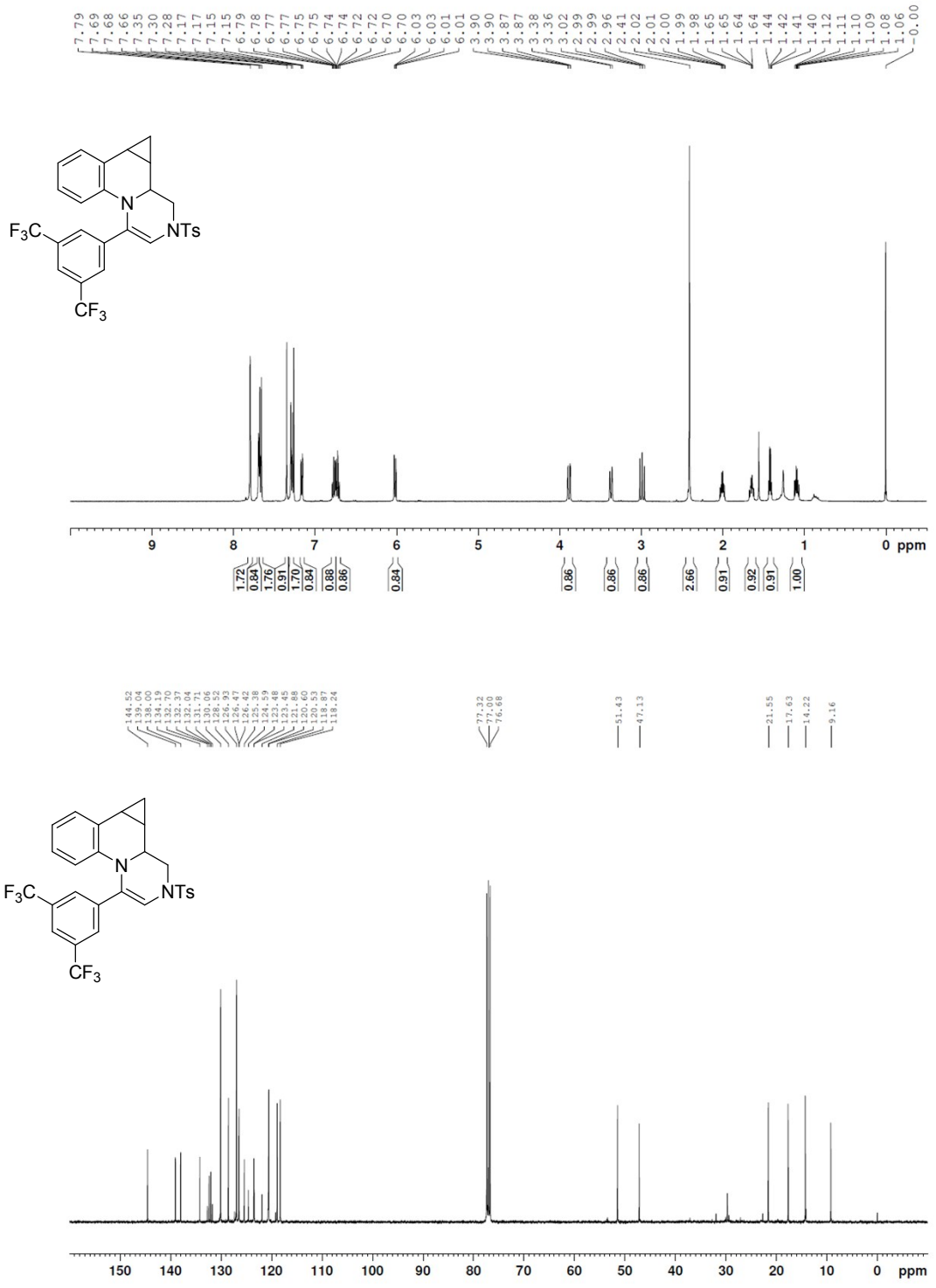
4-(3,5-difluorophenyl)-2-tosyl-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-

a]quinoline (4n):



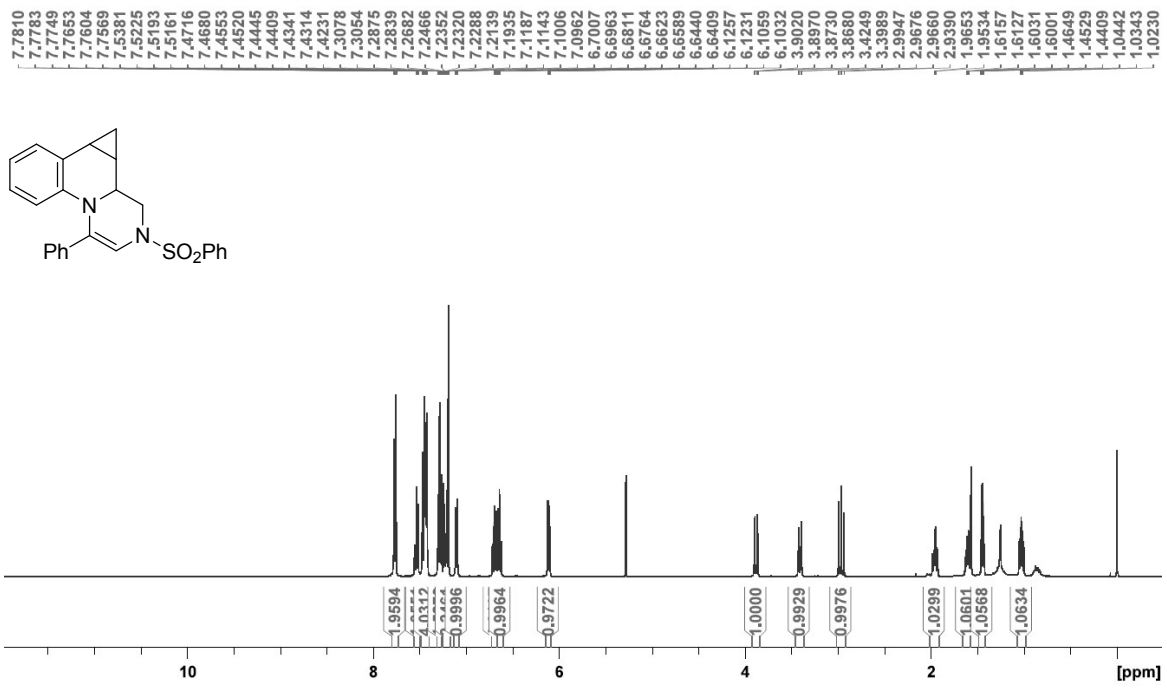
4-(3,5-bis(trifluoromethyl)phenyl)-2-tosyl-1,2,9b,10,10a,10b-

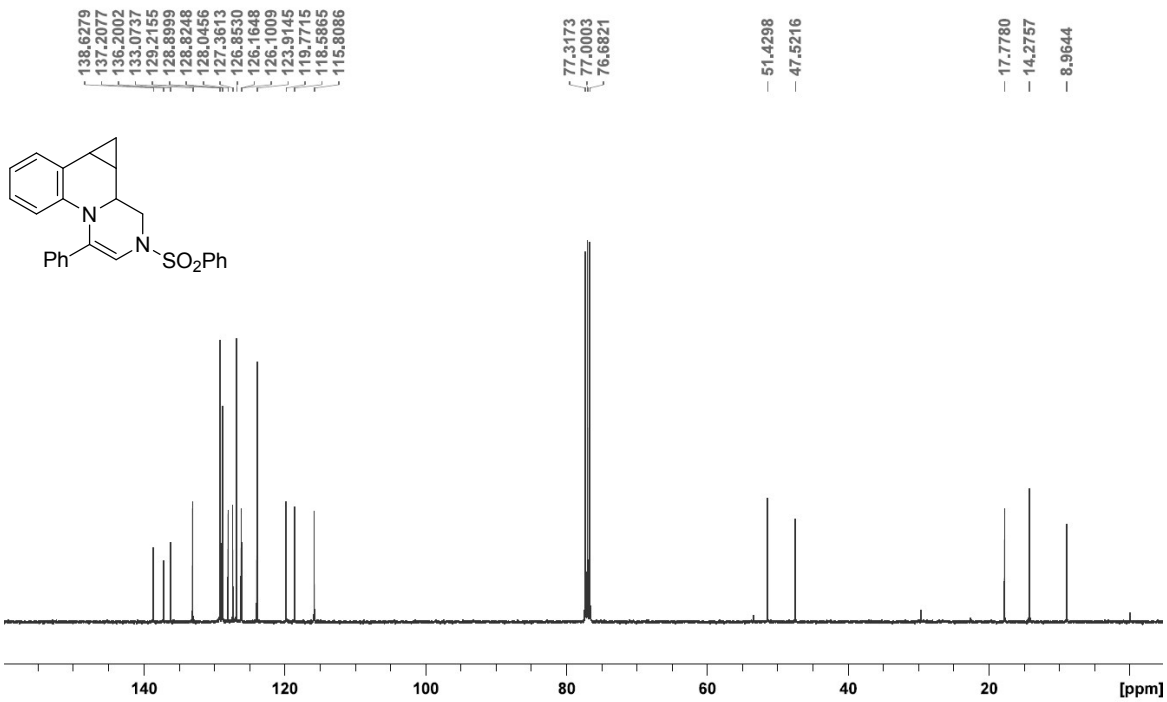
hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4o):



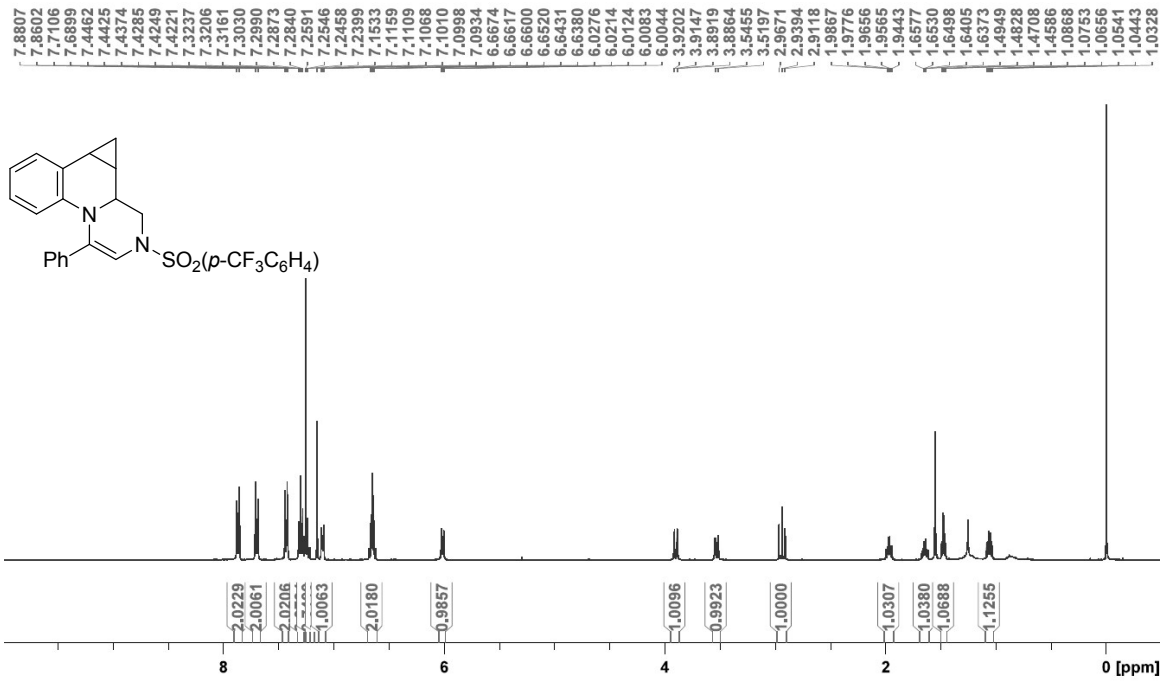
4-phenyl-2-(phenylsulfonyl)-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-

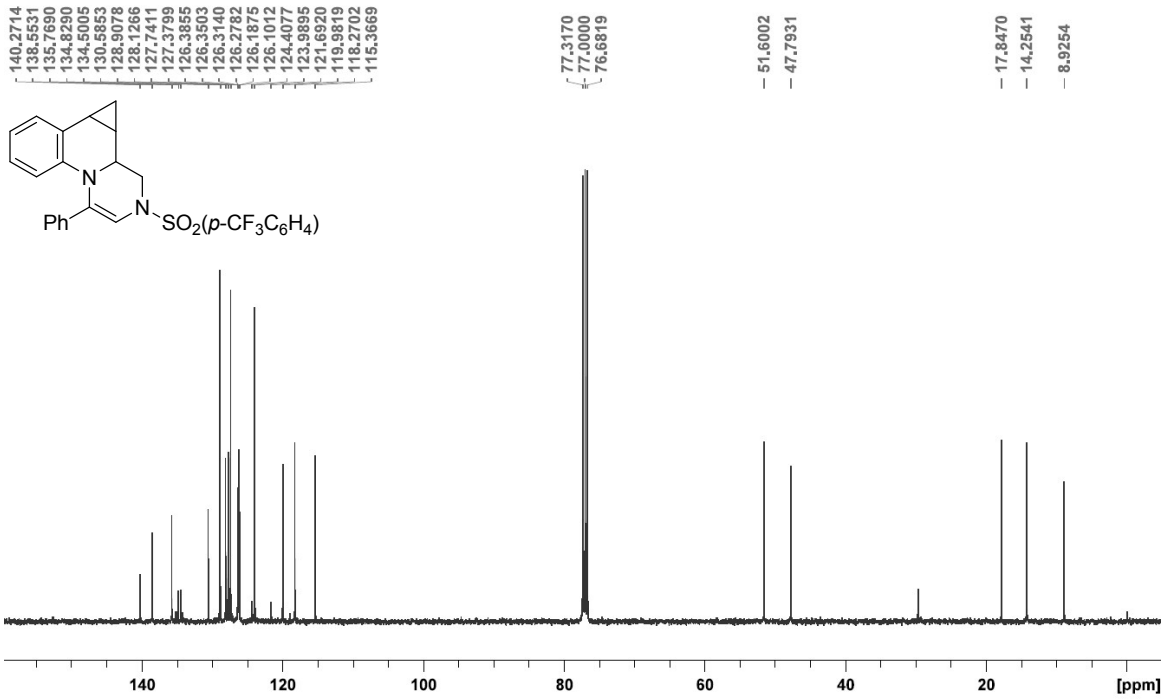
a]quinolone (4p):



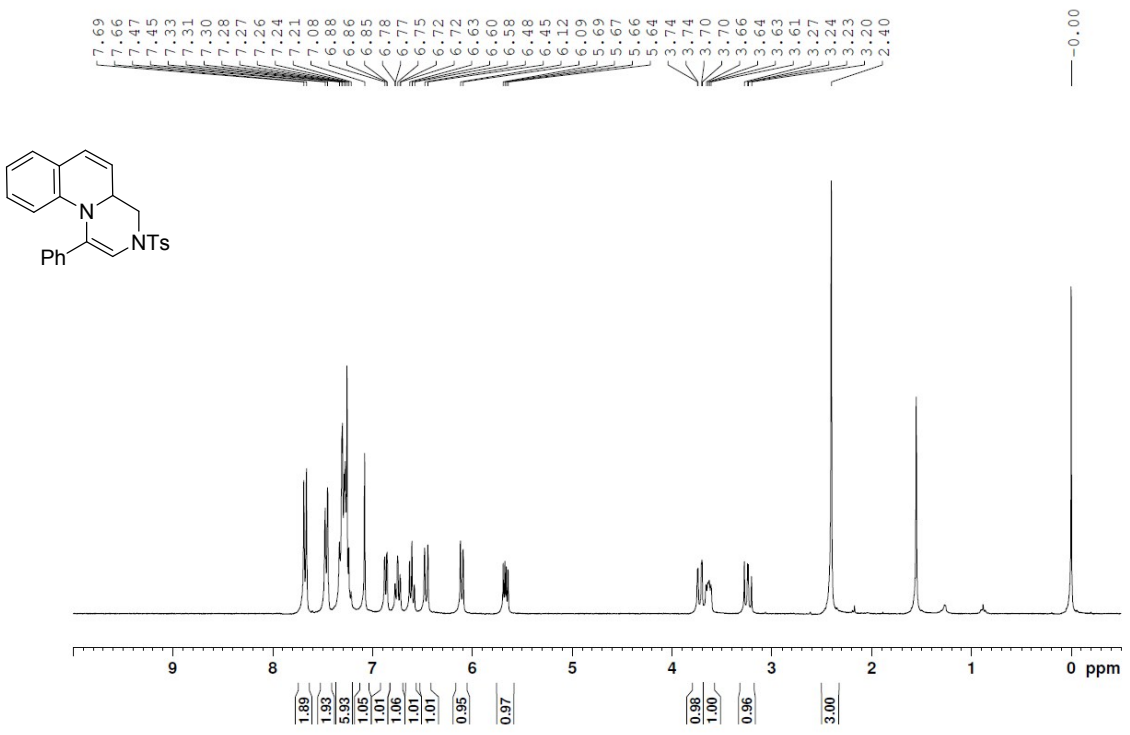


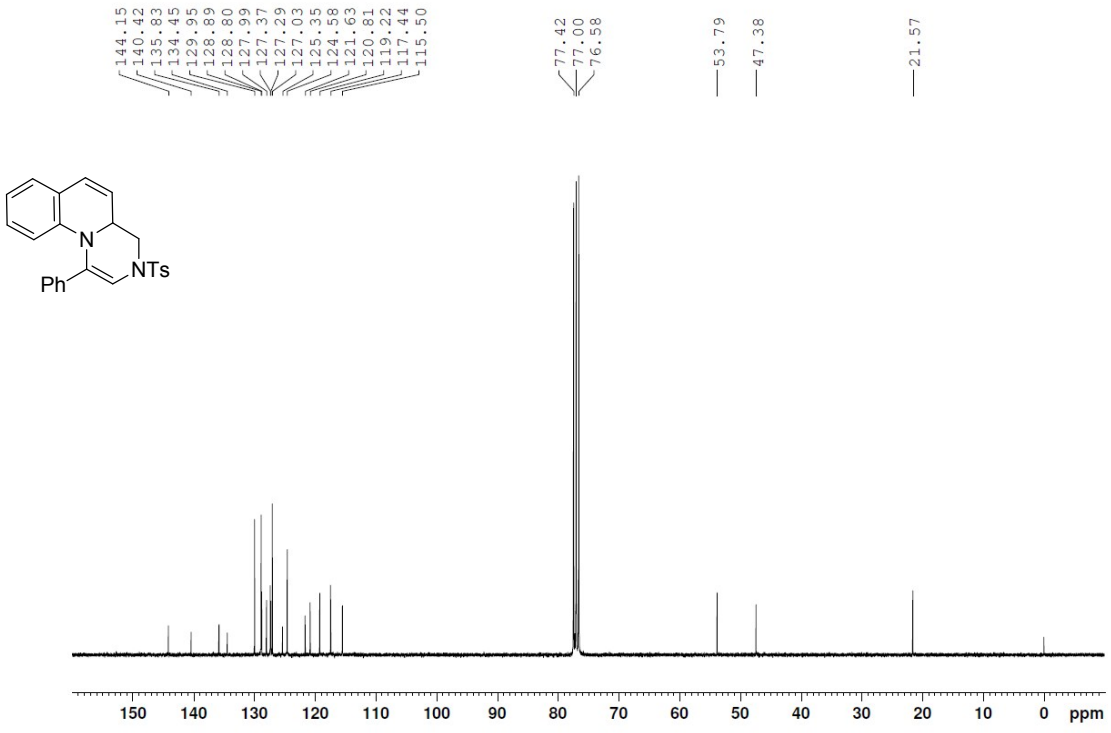
4-phenyl-2-((4-(trifluoromethyl)phenyl)sulfonyl)-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (4q):



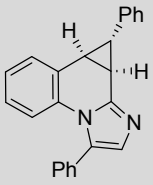


1-phenyl-3-tosyl-4,4a-dihydro-3H-pyrazino[1,2-a]quinoline (5):

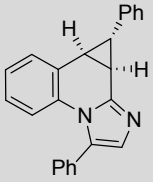




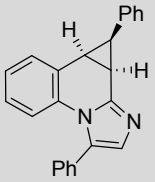
(8bS,9S,9aR)-3,9-diphenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7a):



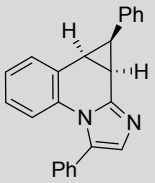
major



major

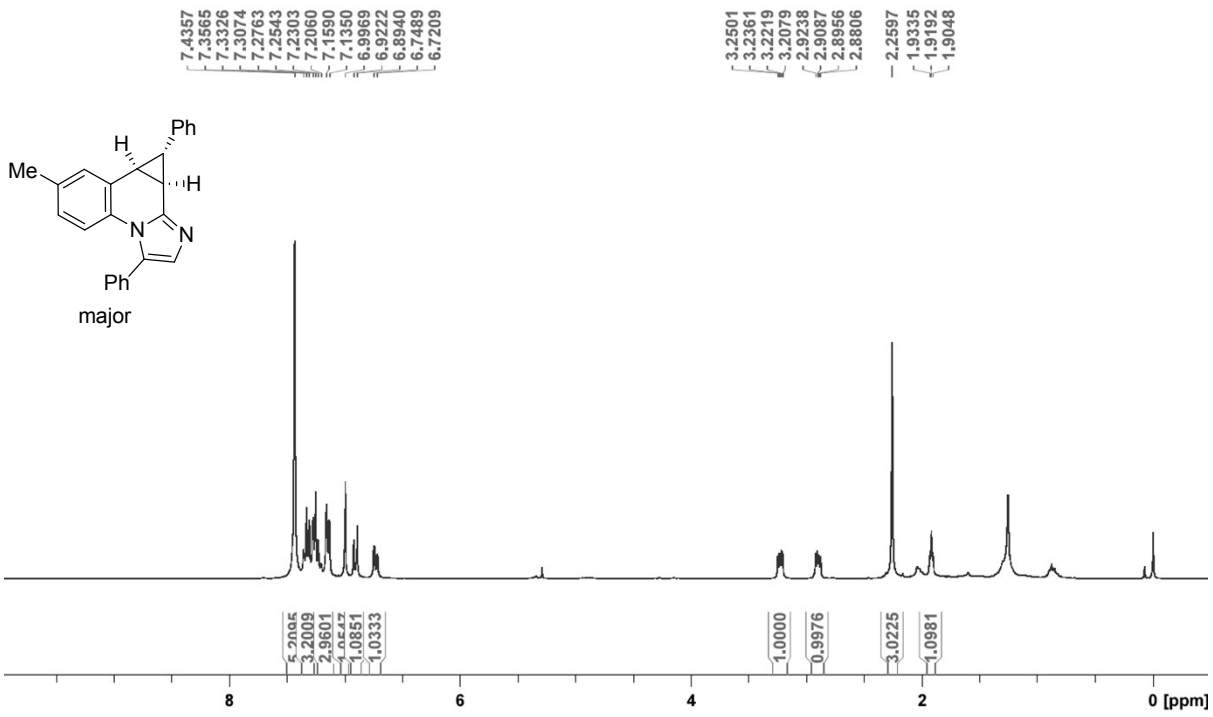


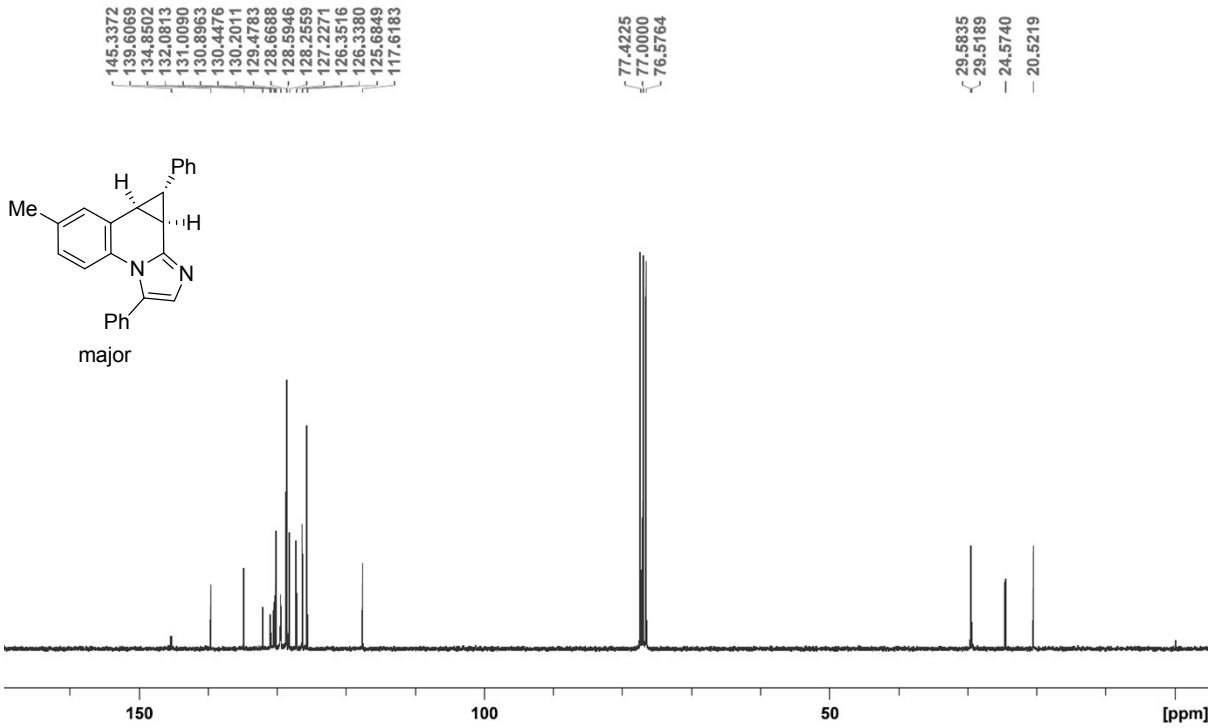
minor

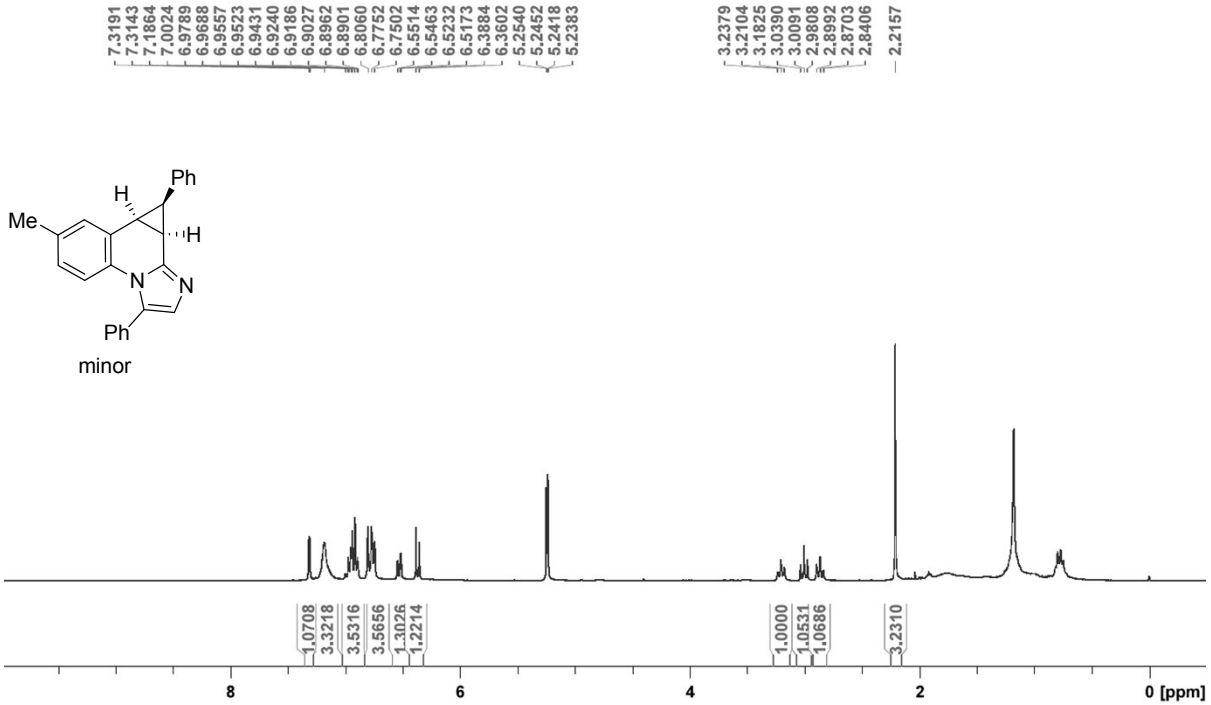


minor

(8bS,9S,9aR)-7-methyl-3,9-diphenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinolone (7b):



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2.2157
Ph
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Me
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N
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Ph
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4
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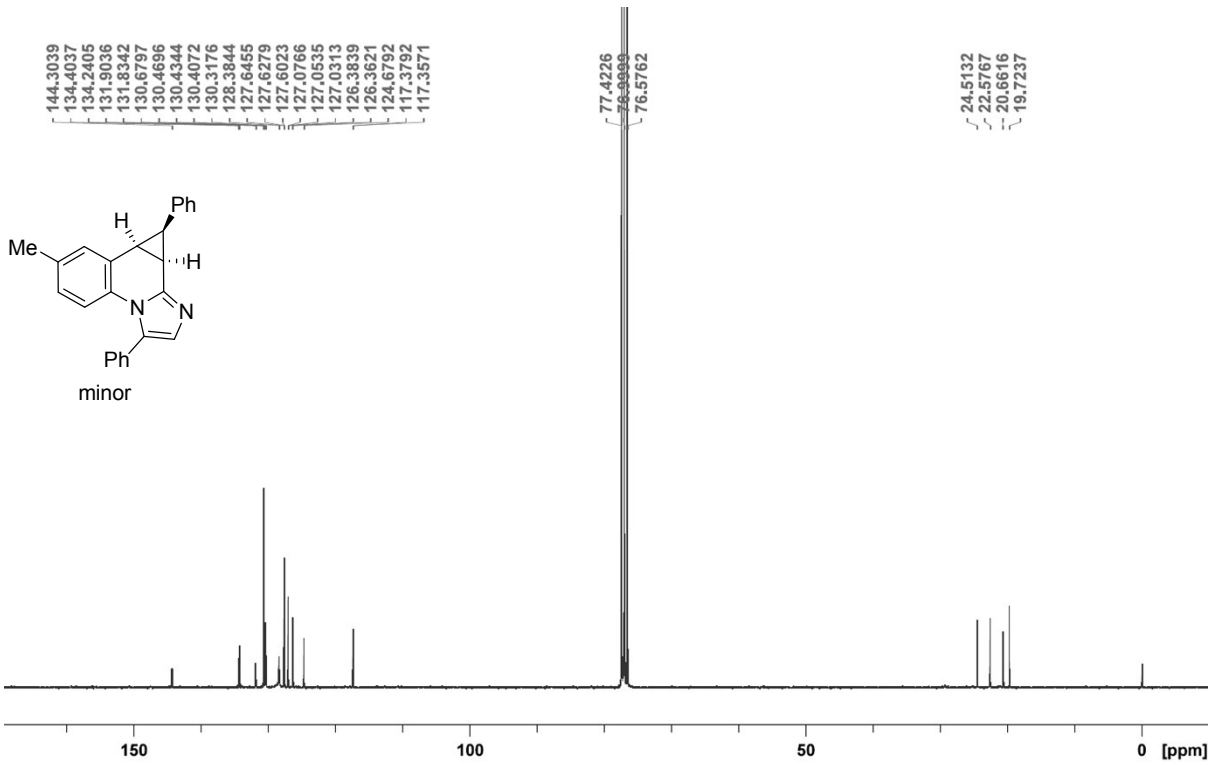
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Me
H
N
N
Ph
minor
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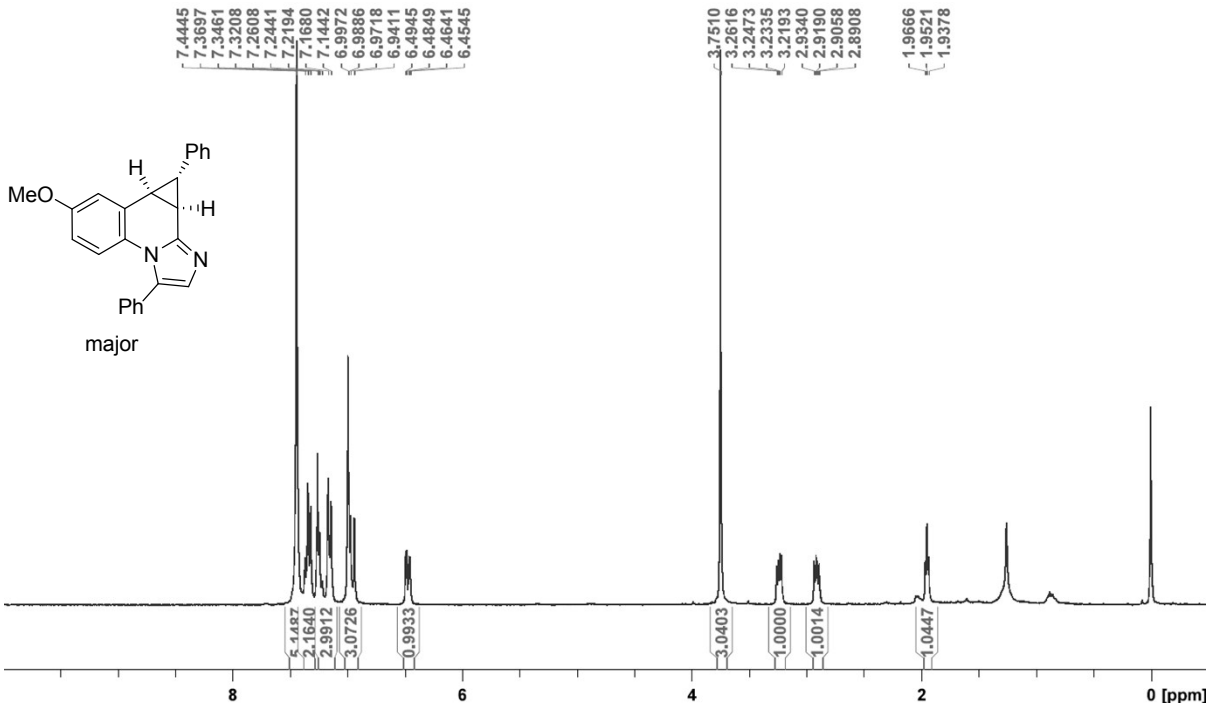
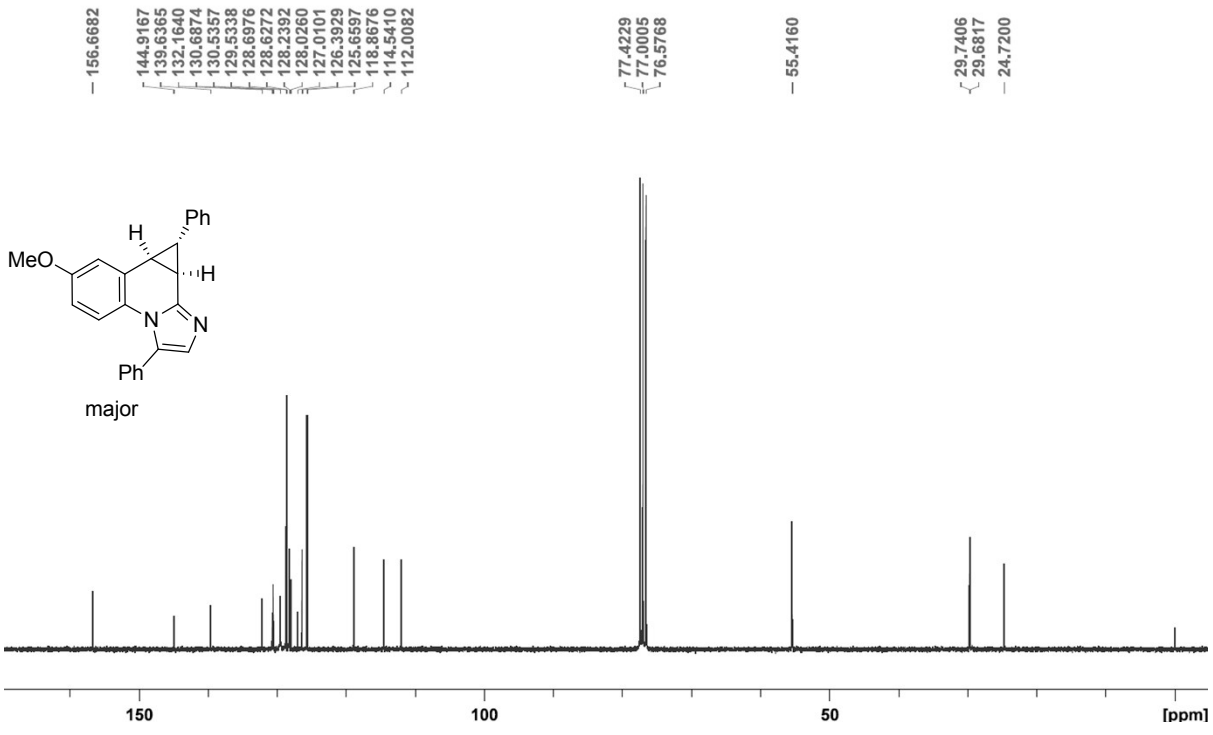
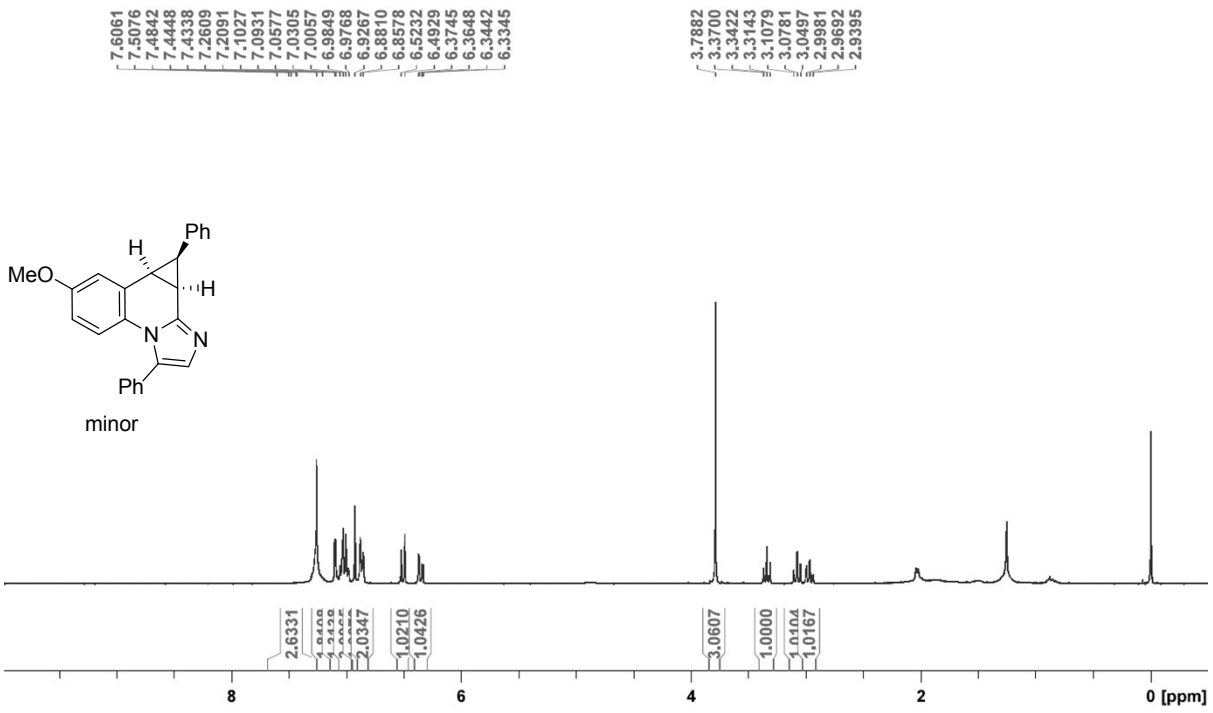
(8bS,9S,9aR)-7-methoxy-3,9-diphenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7c):



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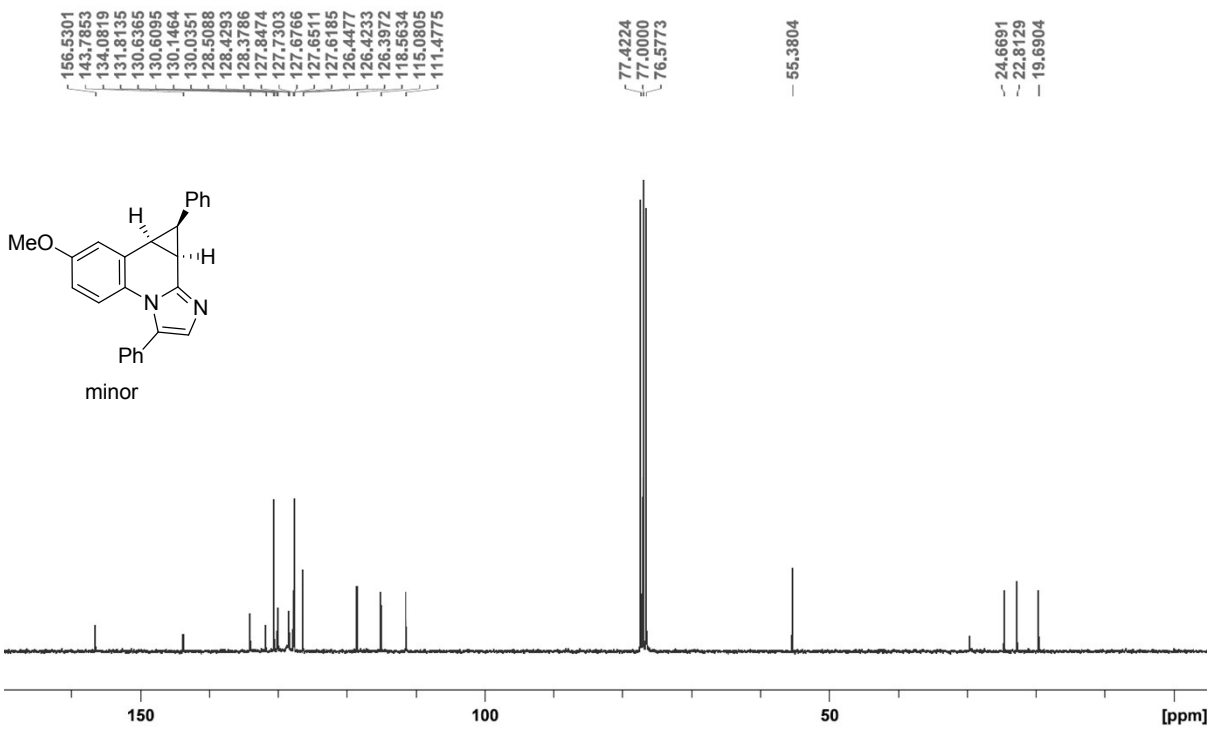
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77.4224
77.0000
76.5773
55.3804
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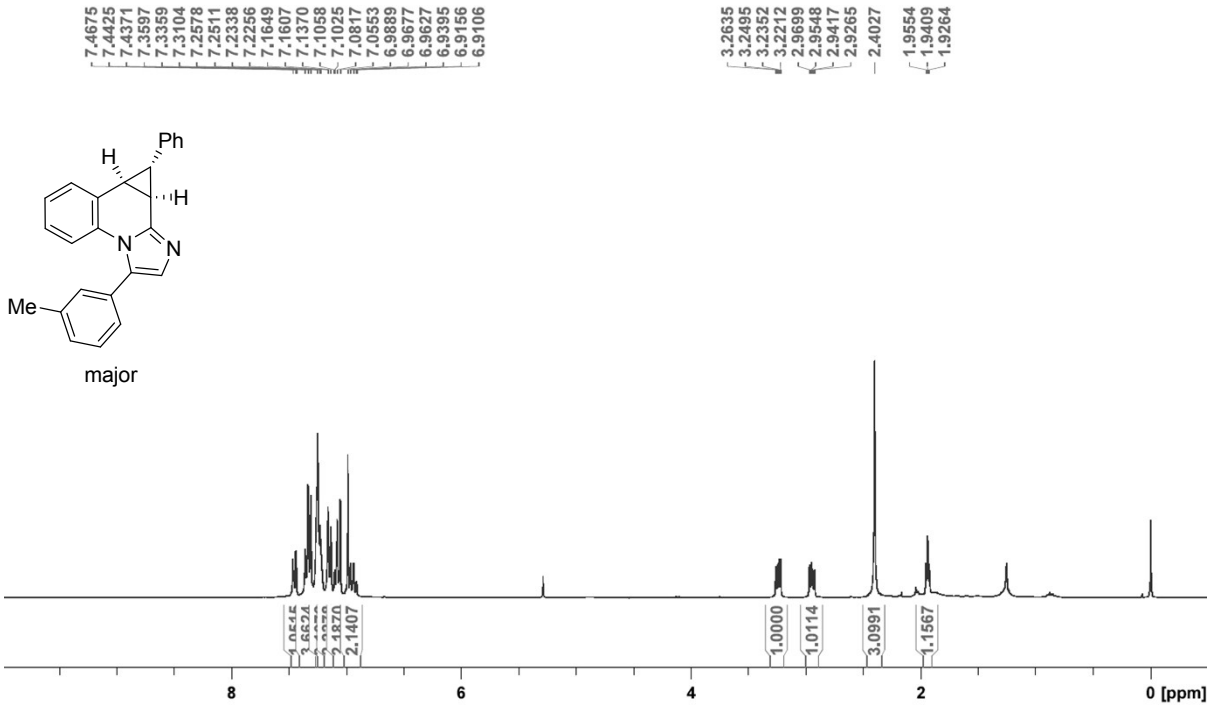
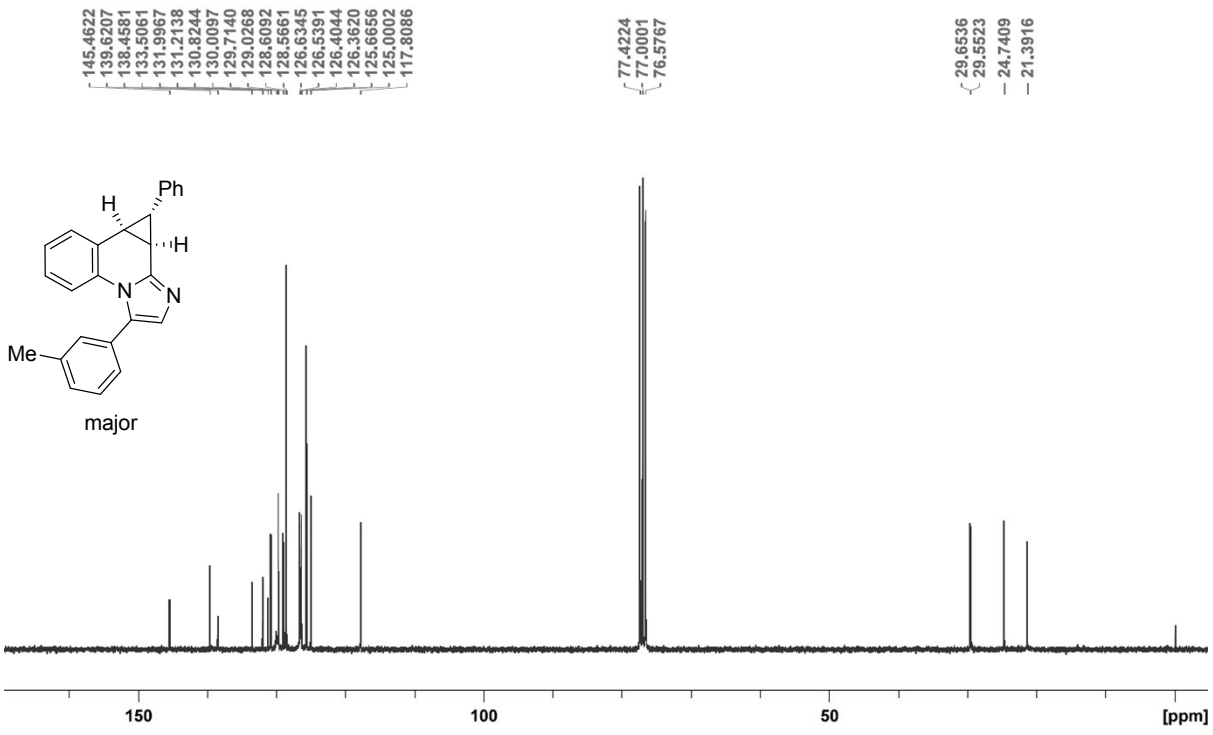
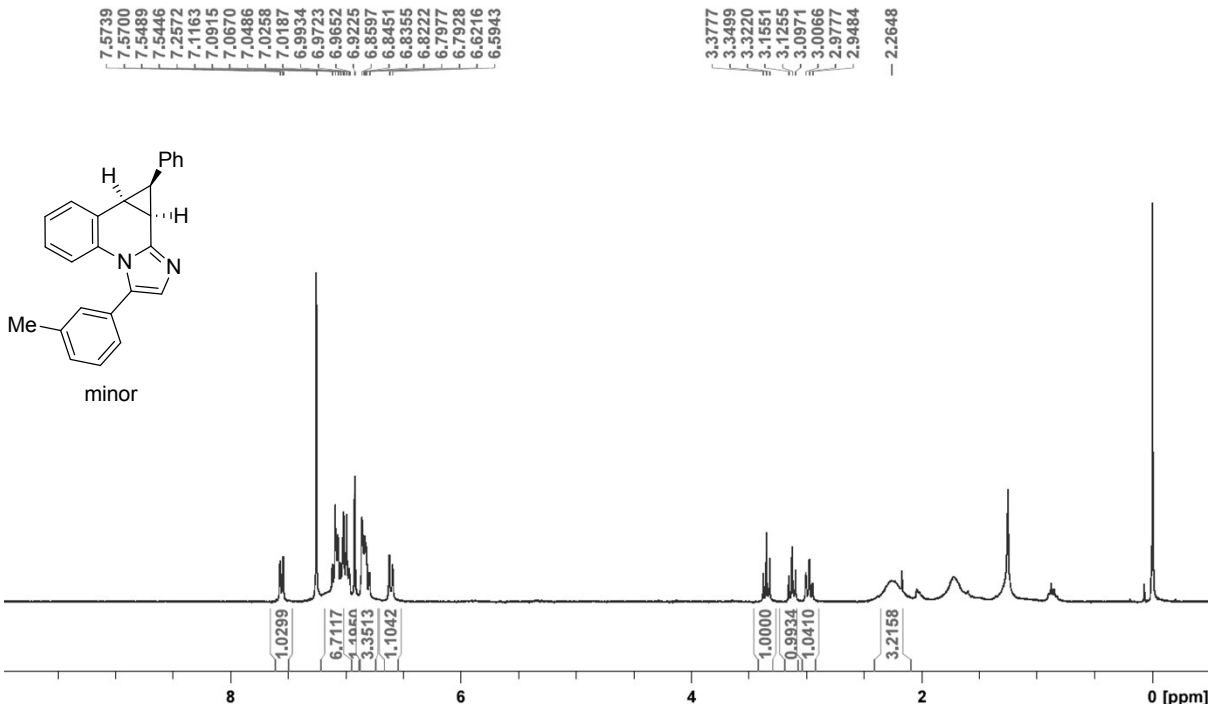
19.6904
MeO
H
Ph
H
N
N
Ph
minor
150
100
50
[ppm]

(8bS,9S,9aR)-9-phenyl-3-(m-tolyl)-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7d):



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7.5700
7.5489
7.5446
7.2572
7.1163
7.0915
7.0670
7.0486
7.0258
7.0187
6.9934
6.9723
6.9652
6.9225
6.8597
6.8451
6.8355
6.8222
6.7977
6.7928
6.6216
6.5943
3.3777
3.3499
3.3220
3.1551
3.1255
3.0971
3.0066
2.9777
2.9484
2.2648
Ph
H
H
N
N
Me
minor
1.0299
6.7117
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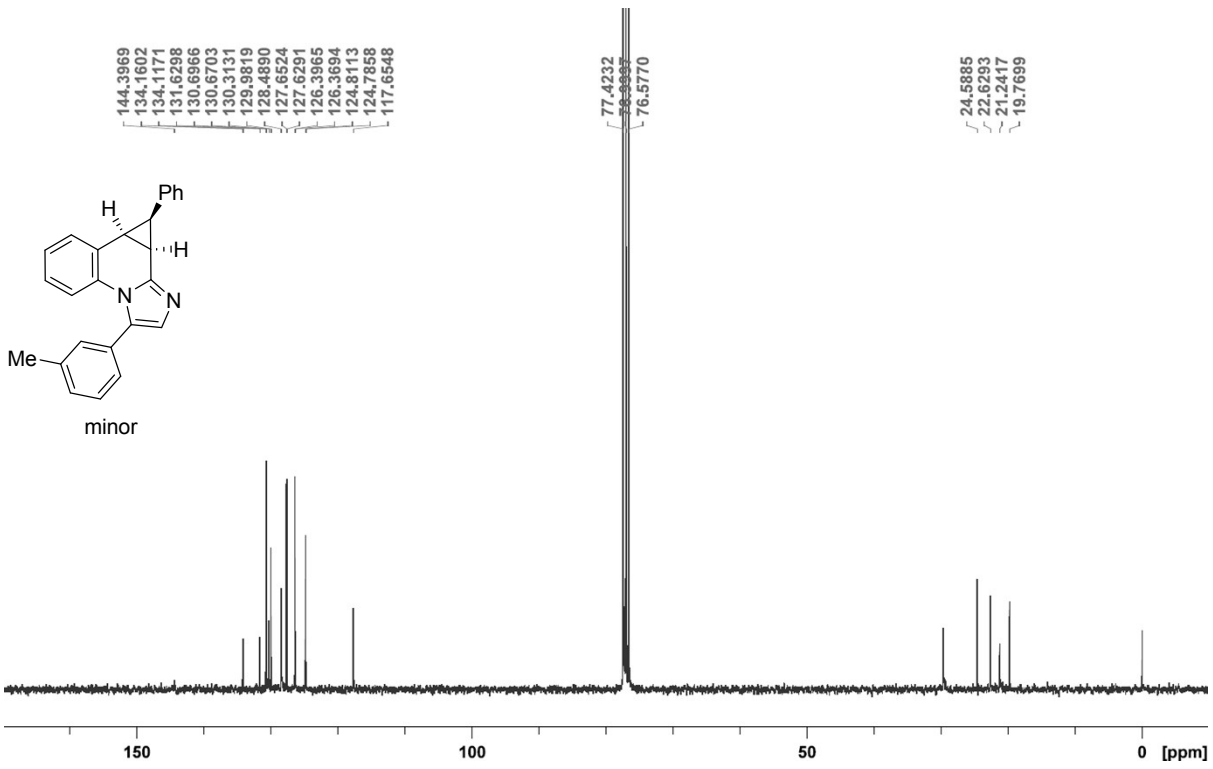
1.1042
1.0000
0.9934
1.0410
3.2158
8
6
4
2
0 [ppm]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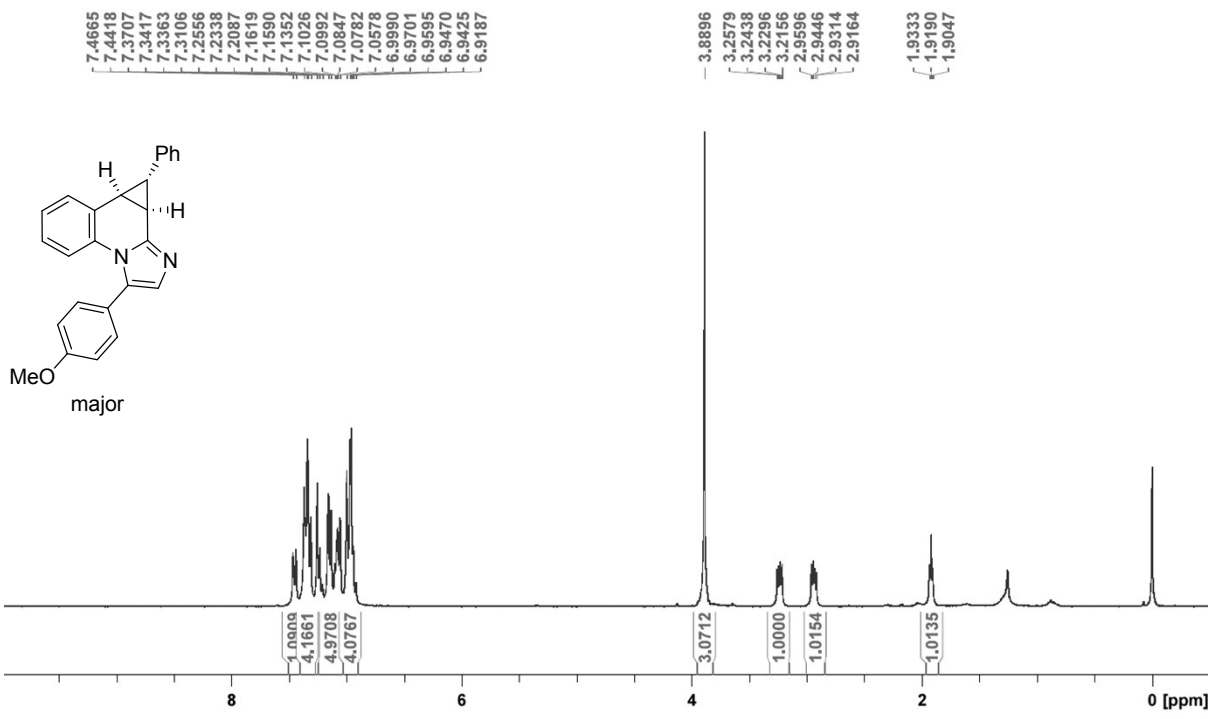
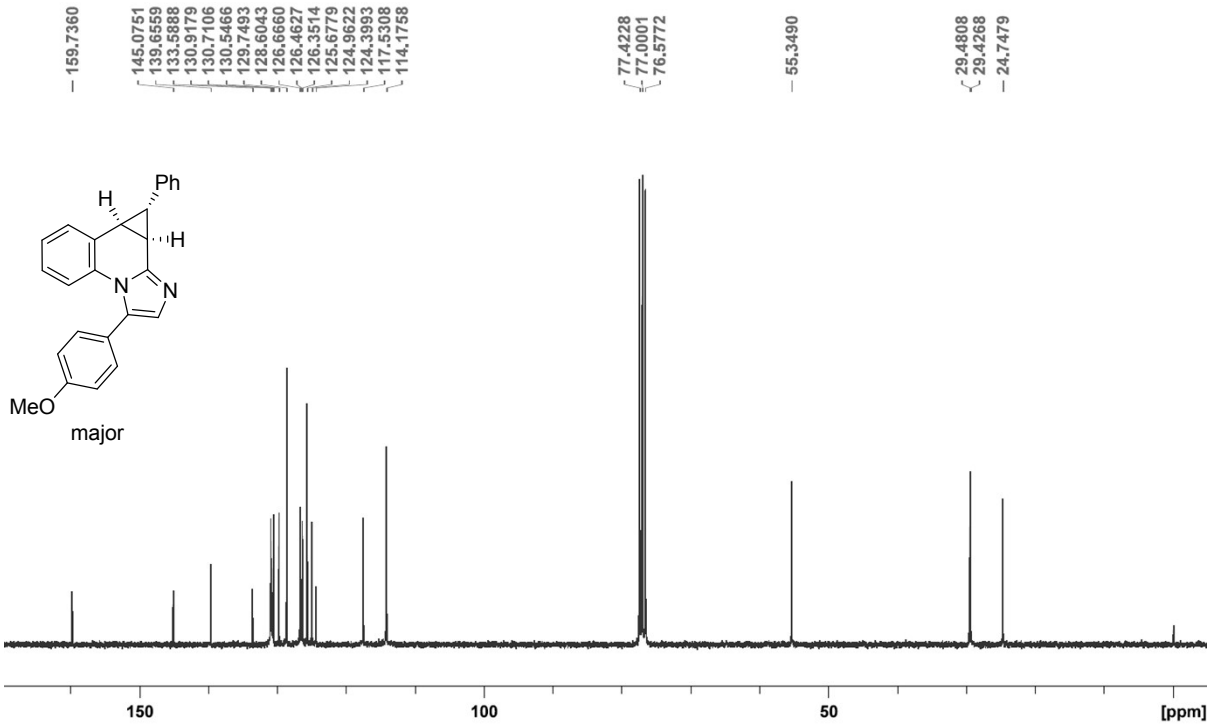
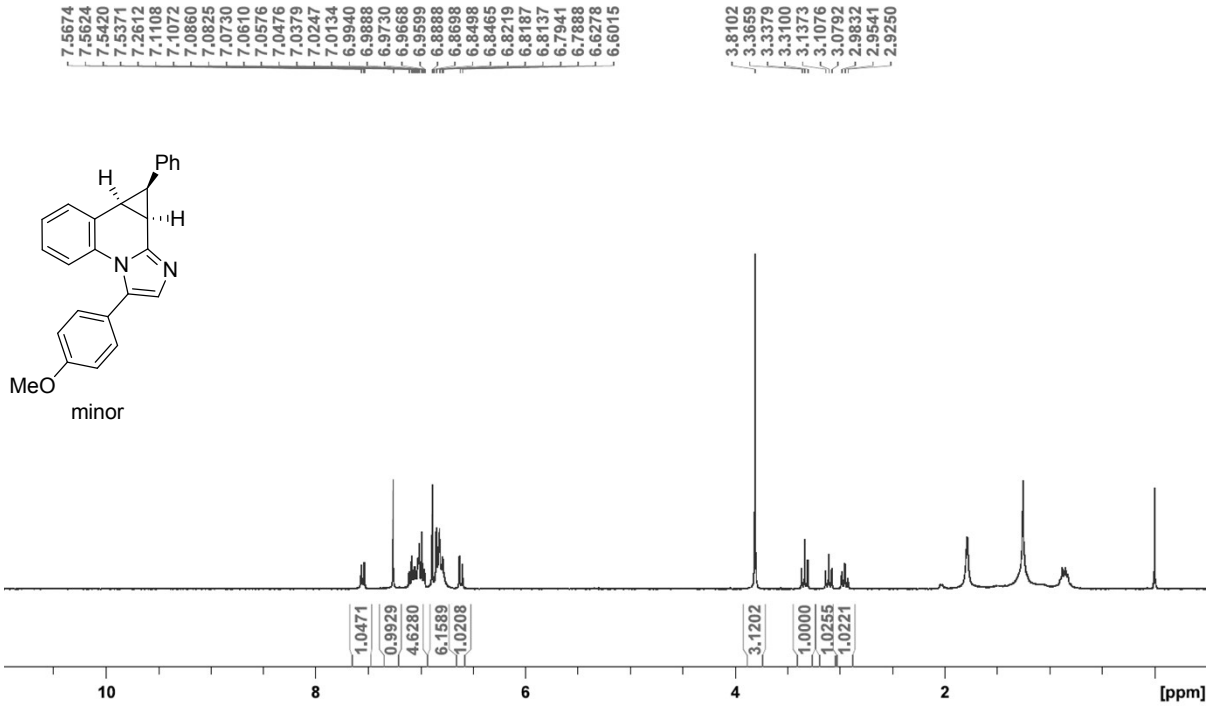
134.1602
134.1171
131.6298
130.6966
130.6703
130.3131
129.9819
128.4890
127.6524
127.6291
126.3965
126.3694
124.8113
124.7858
117.6548
77.4232
76.5770
24.5885
22.6293
21.2417
19.7699
Ph
H
H
N
N
Me
minor
150
100
50
0 [ppm]

(8bS,9S,9aR)-3-(4-methoxyphenyl)-9-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7e):



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7.5420
7.5371
7.2612
7.1108
7.1072
7.0860
7.0825
7.0730
7.0610
7.0576
7.0476
7.0379
7.0247
7.0134
6.9940
6.9888
6.9730
6.9668
6.9599
6.8888
6.8698
6.8498
6.8465
6.8219
6.8187
6.8137
6.7941
6.7888
6.6278
6.6015
3.8102
3.3659
3.3379
3.3100
3.1373
3.1076
3.0792
2.9832
2.9541
2.9250
H
Ph
H
N
N
MeO
minor
1.0471
0.9929
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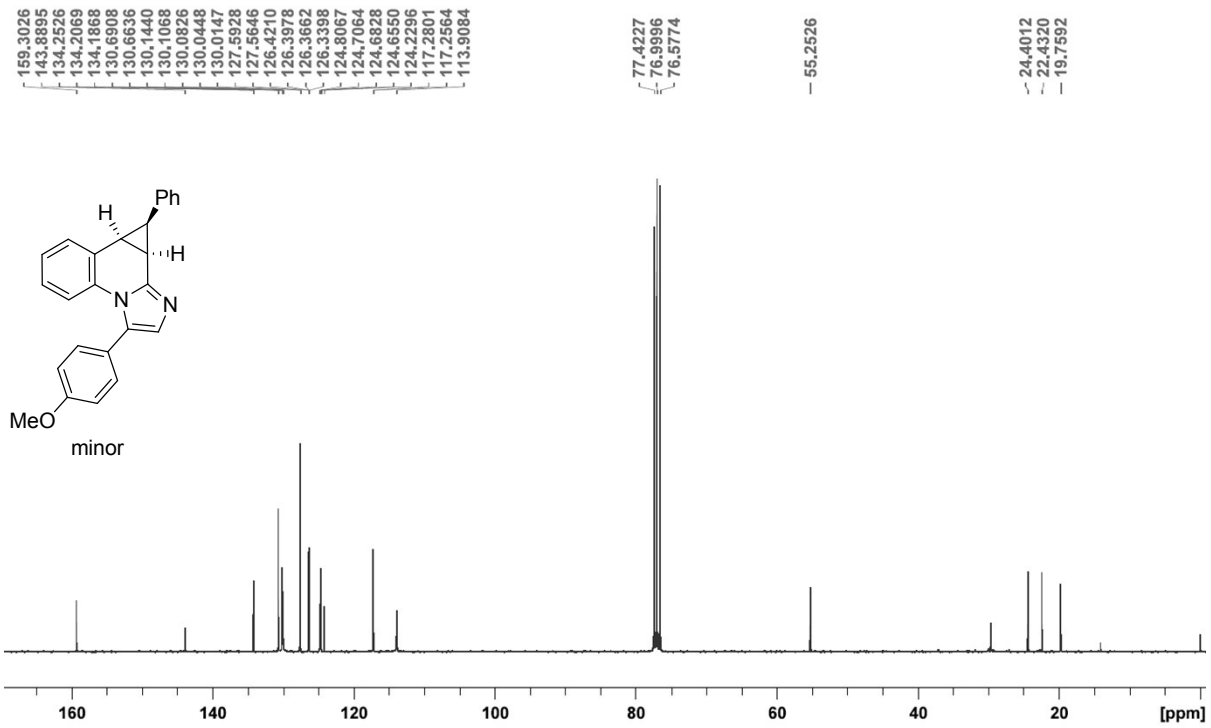
6.1589
1.0208
3.1202
1.0000
1.0255
1.0221
10
8
6
4
2
[ppm]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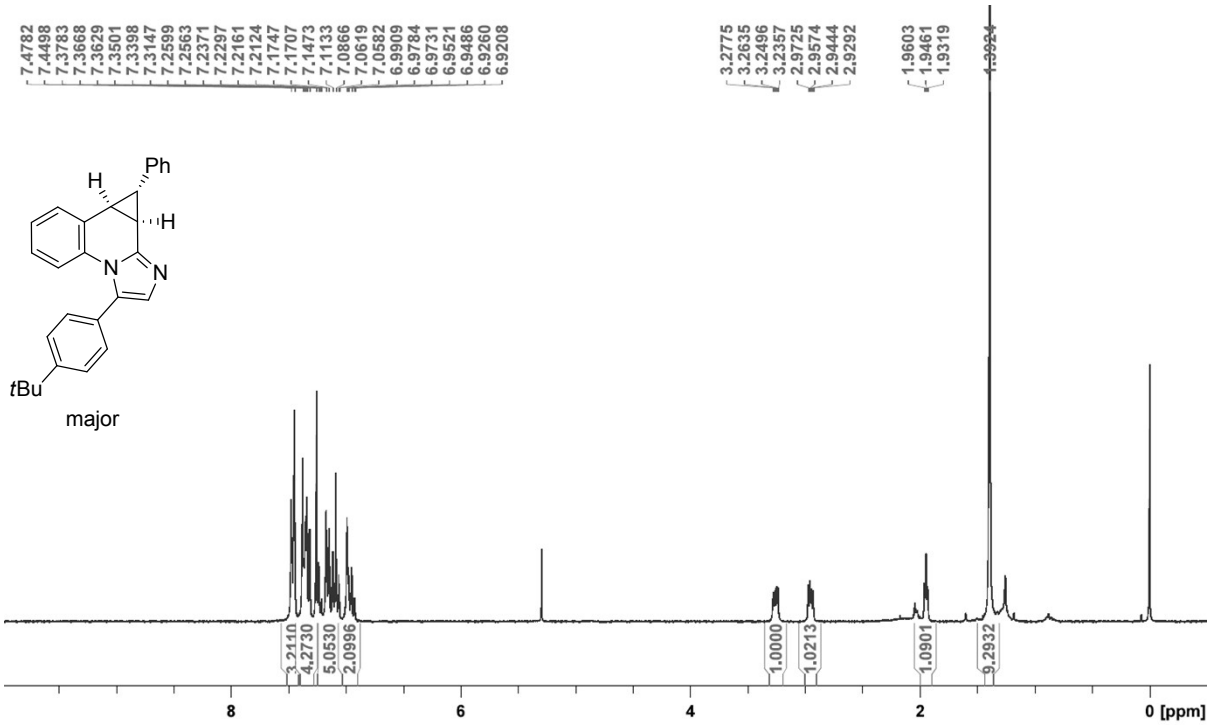
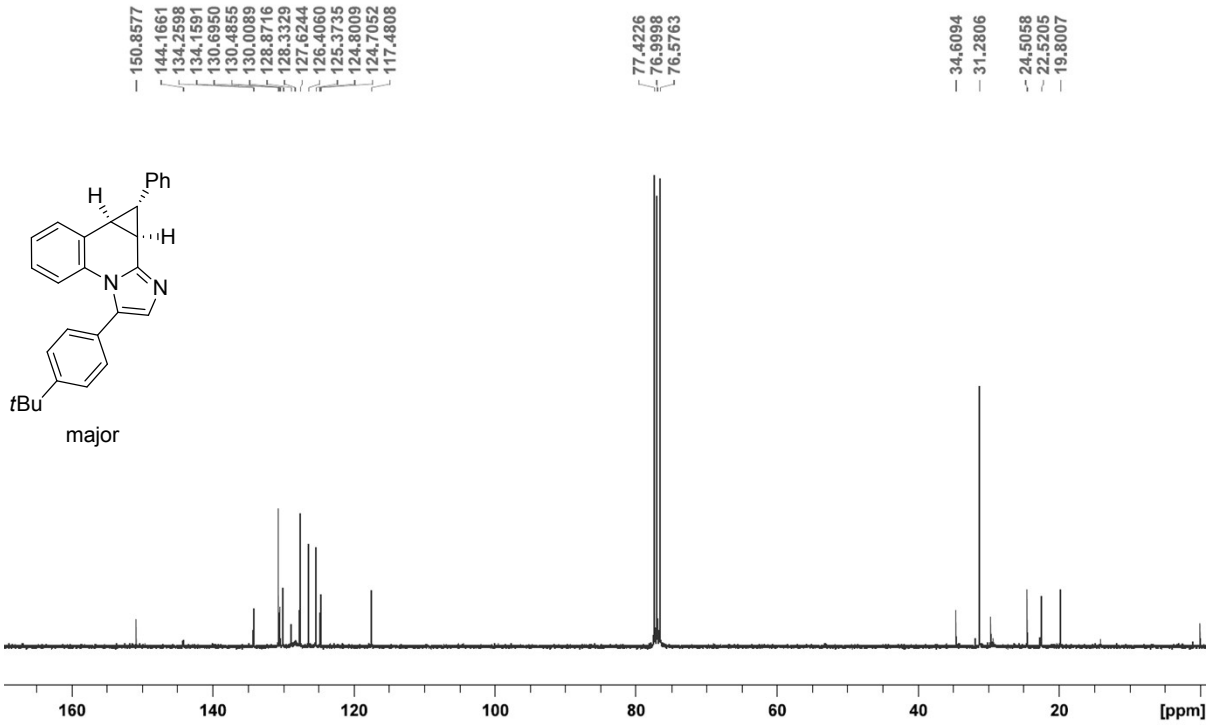
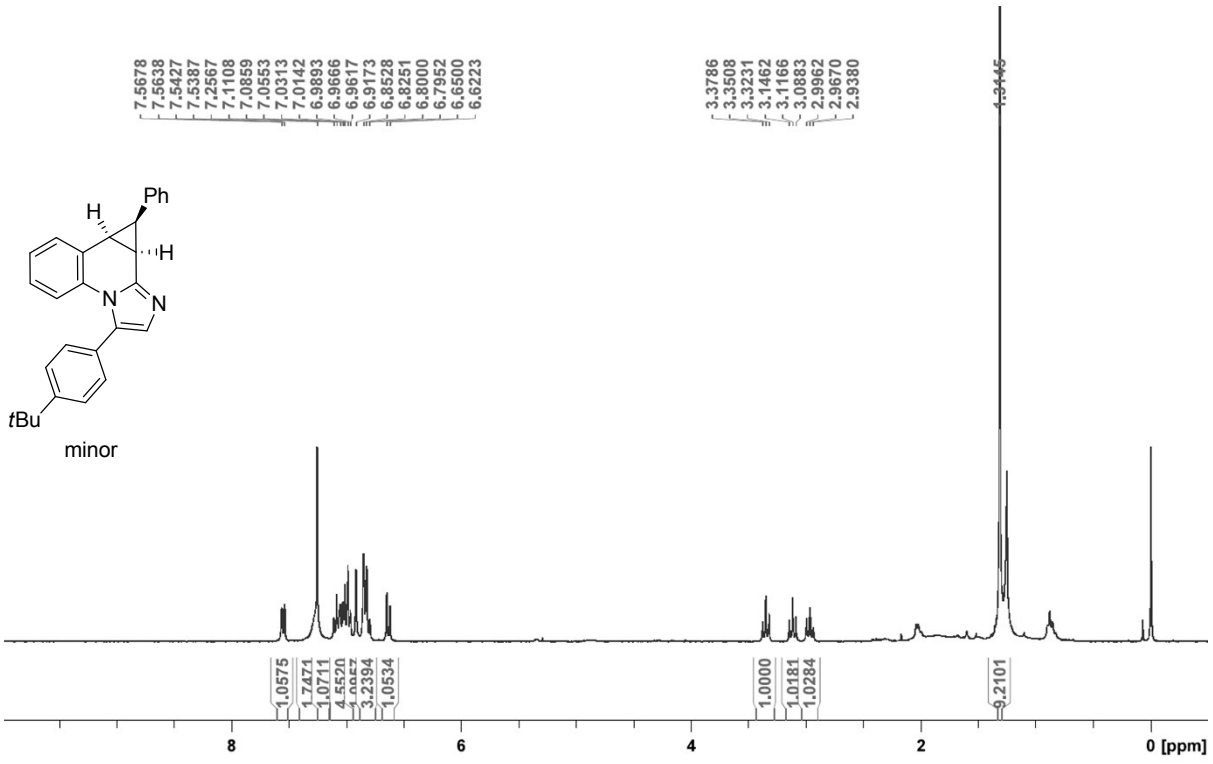
134.2526
134.2069
134.1868
130.6908
130.6636
130.1440
130.1068
130.0826
130.0448
130.0147
127.5928
127.5646
126.4210
126.3978
126.3662
126.3398
124.8067
124.7064
124.6828
124.6550
124.2296
117.2801
117.2564
113.9084
77.4227
76.9996
76.5774
55.2526
24.4012
22.4320
19.7592
H
Ph
H
N
N
MeO
minor
160
140
120
100
80
60
40
20
[ppm]

(8bS,9S,9aR)-3-(4-(tert-butyl)phenyl)-9-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7f):



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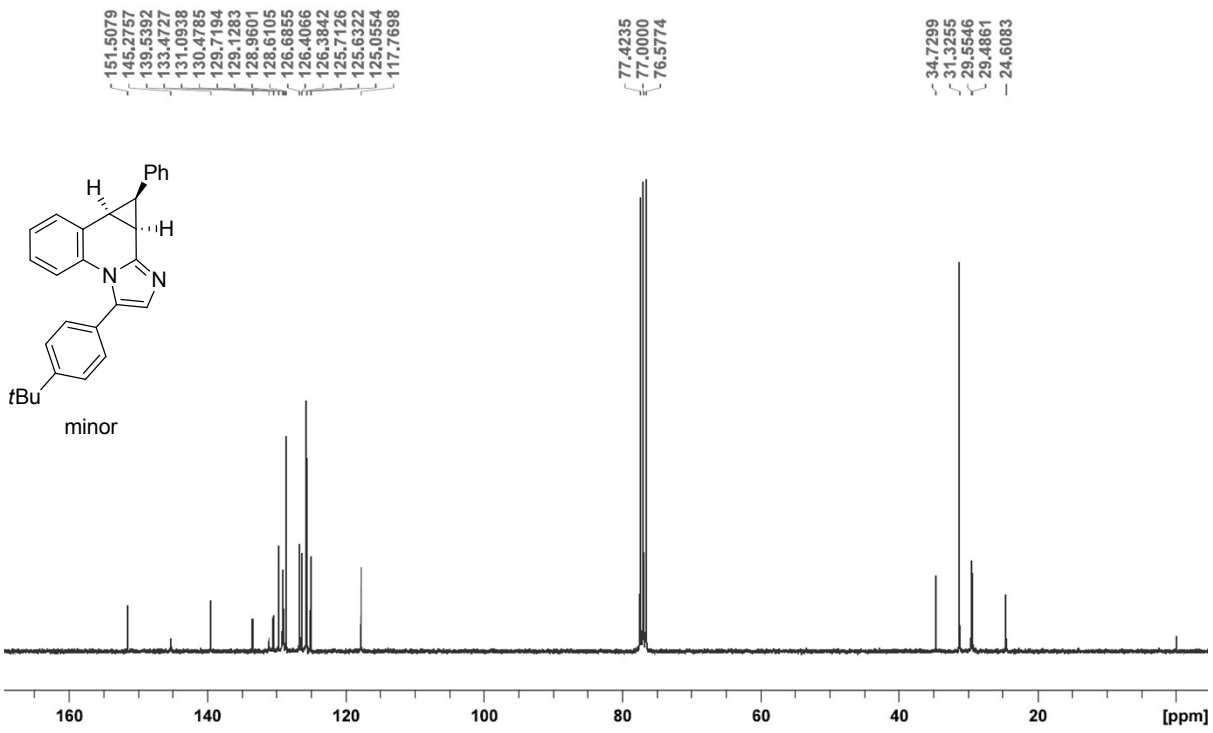
7.5427
7.5387
7.2567
7.1108
7.0859
7.0553
7.0313
7.0142
6.9893
6.9666
6.9617
6.9173
6.8528
6.8251
6.8000
6.7952
6.6500
6.6223
3.3786
3.3508
3.3231
3.1462
3.1166
3.0883
2.9962
2.9670
2.9380
1.3445
Ph
H
H
N
N
tBu
minor
1.0575
1.7471
1.0711
4.5520
3.2394
1.0534
1.0000
1.0181
1.0284
9.2101
8
6
4
2
0 [ppm]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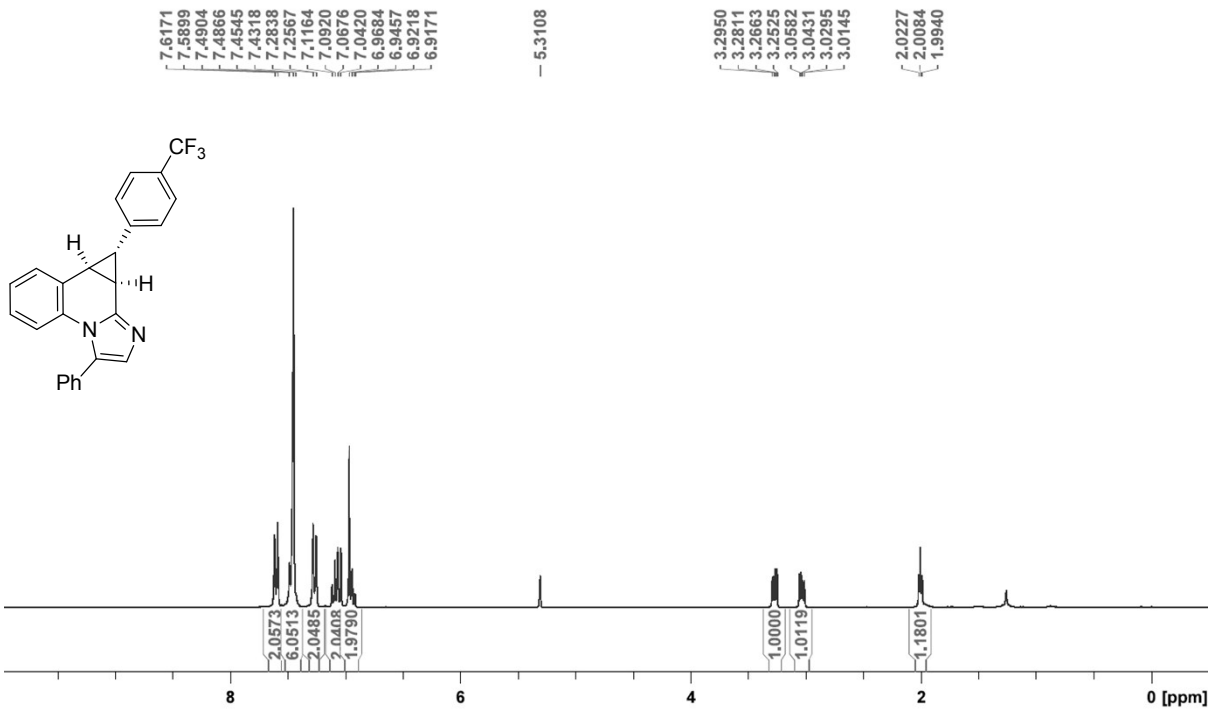
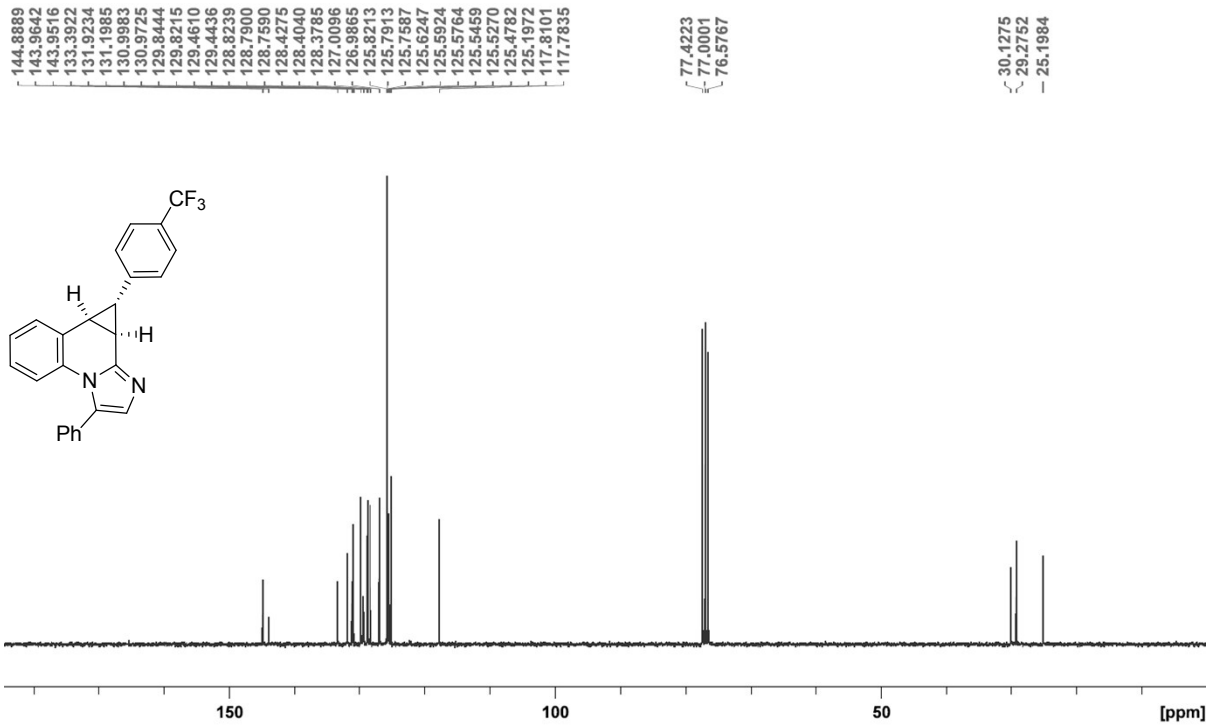
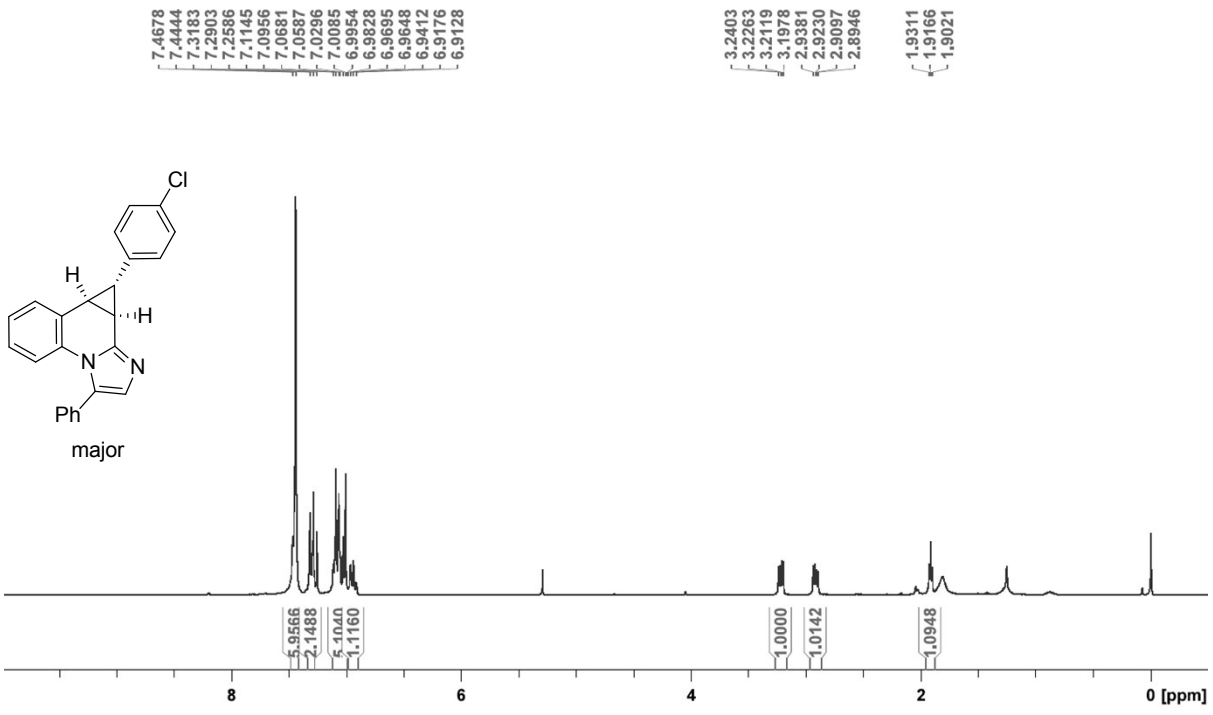
139.5392
133.4727
131.0938
130.4785
129.7194
129.1283
128.9601
128.6105
126.6855
126.4066
126.3842
125.7126
125.6322
125.0554
117.7698
77.4235
77.0000
76.5774
34.7299
31.3255
29.5546
29.4861
24.6083
Ph
H
H
N
N
tBu
minor
160
140
120
100
80
60
40
20
[ppm]

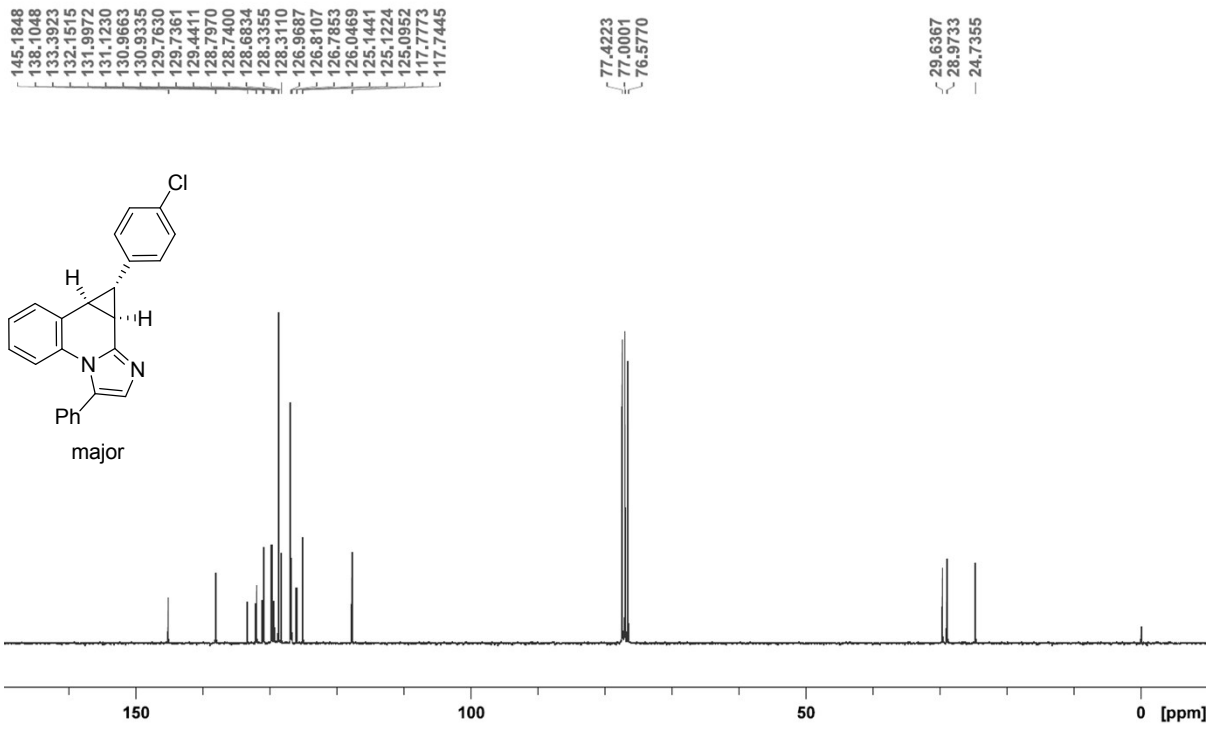
(8bS,9S,9aR)-3-phenyl-9-(4-(trifluoromethyl)phenyl)-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7g):

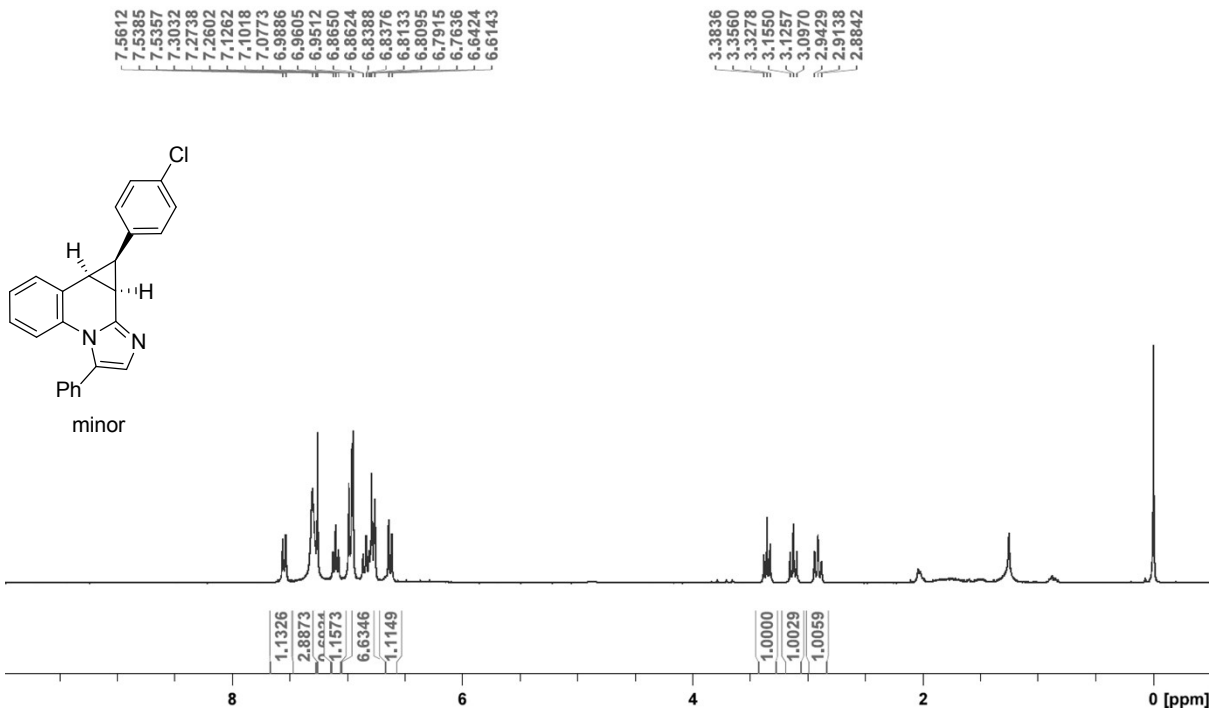




(8bS,9S,9aR)-9-(4-chlorophenyl)-3-phenyl-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7h):



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7.5357
7.3032
7.2738
7.2602
7.1262
7.1018
7.0773
6.9886
6.9605
6.9512
6.8650
6.8624
6.8388
6.8376
6.8133
6.8095
6.7915
6.7636
6.6424
6.6143
3.3836
3.3560
3.3278
3.1550
3.1257
3.0970
2.9429
2.9138
2.8842
Cl
H
H
N
N
Ph
minor
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1.1573
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1.1149
1.0000
1.0029
1.0059
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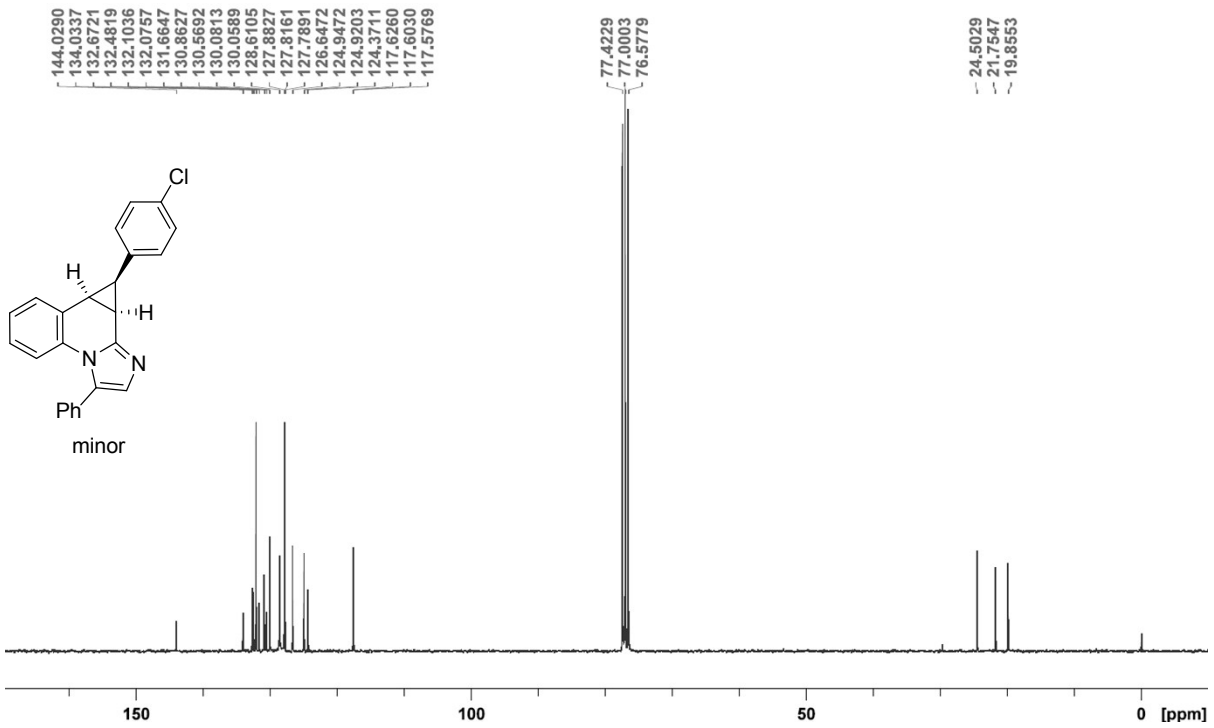
6
4
2
0 [ppm]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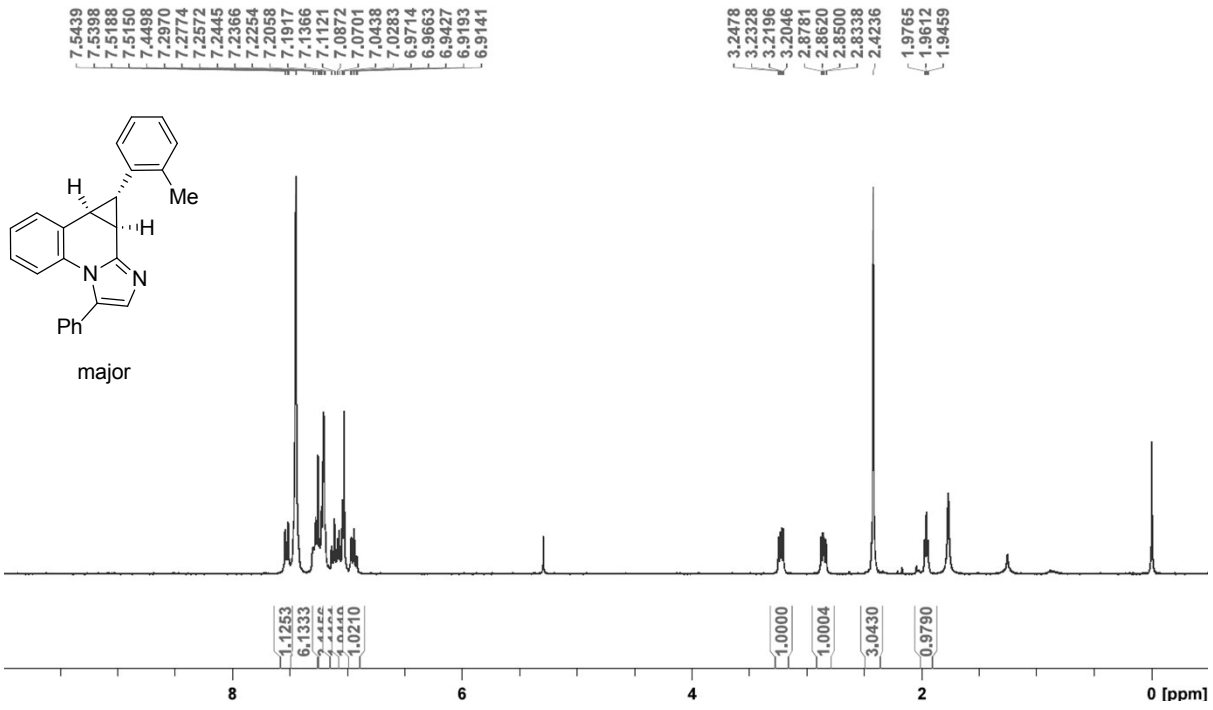
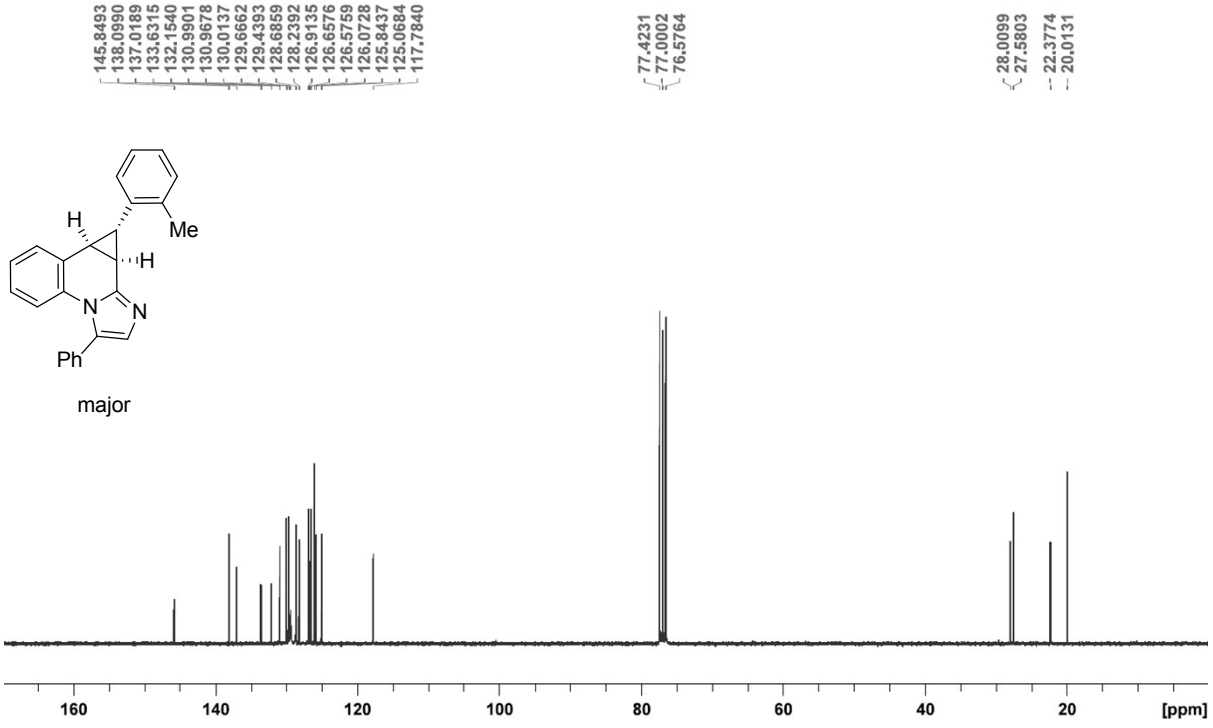
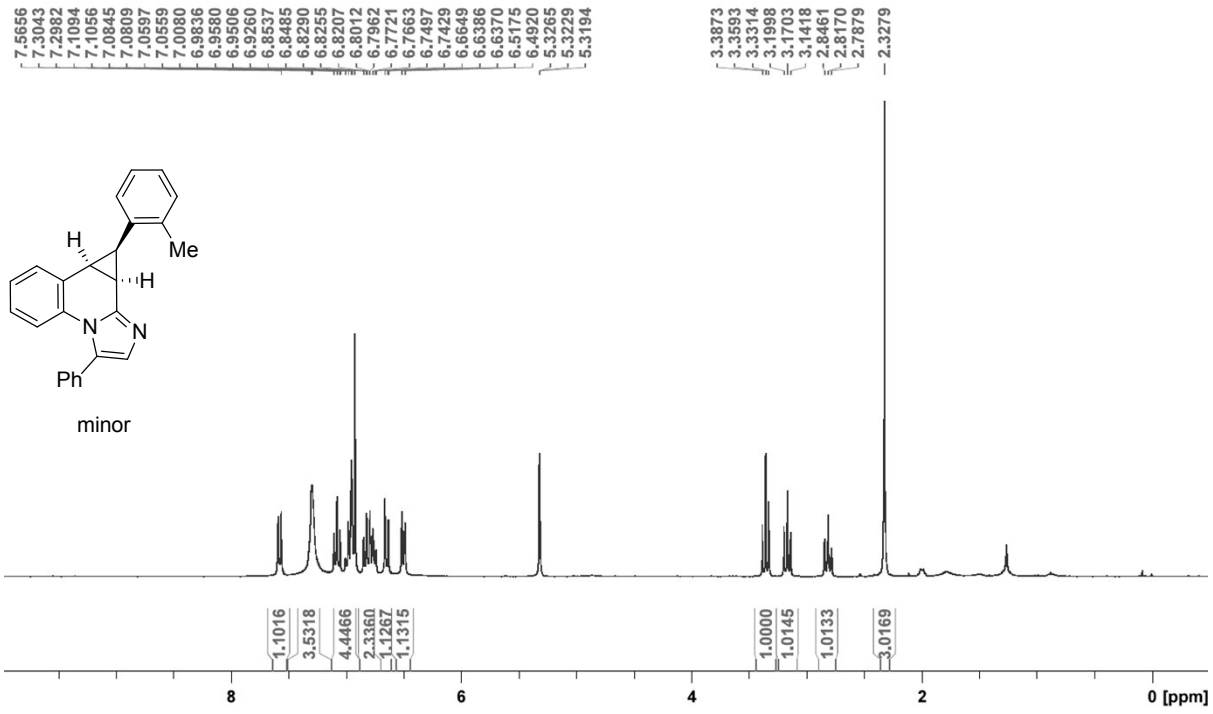
132.6721
132.4819
132.1036
132.0757
131.6647
130.8627
130.5692
130.0813
130.0589
128.6105
127.8827
127.8161
127.7891
126.6472
124.9472
124.9203
124.3711
117.6260
117.6030
117.5769
77.4229
77.0003
76.5779
24.5029
21.7547
19.8553
Cl
H
H
N
N
Ph
minor
150
100
50
0 [ppm]

(8bS,9S,9aR)-3-phenyl-9-(o-tolyl)-9,9a-dihydro-8bH-cyclopropa[c]imidazo[1,2-a]quinoline (7i):



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7.1094
7.1056
7.0845
7.0809
7.0597
7.0559
7.0080
6.9836
6.9580
6.9506
6.9260
6.8537
6.8485
6.8290
6.8255
6.8207
6.8012
6.7962
6.7721
6.7663
6.7497
6.7429
6.6649
6.6386
6.6370
6.5175
6.4920
5.3265
5.3229
5.3194
3.3873
3.3593
3.3314
3.1998
3.1703
3.1418
2.8461
2.8170
2.7879
2.3279
H
Me
H
N
N
Ph
minor
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1.0000
1.0145
1.0133
3.0169
8
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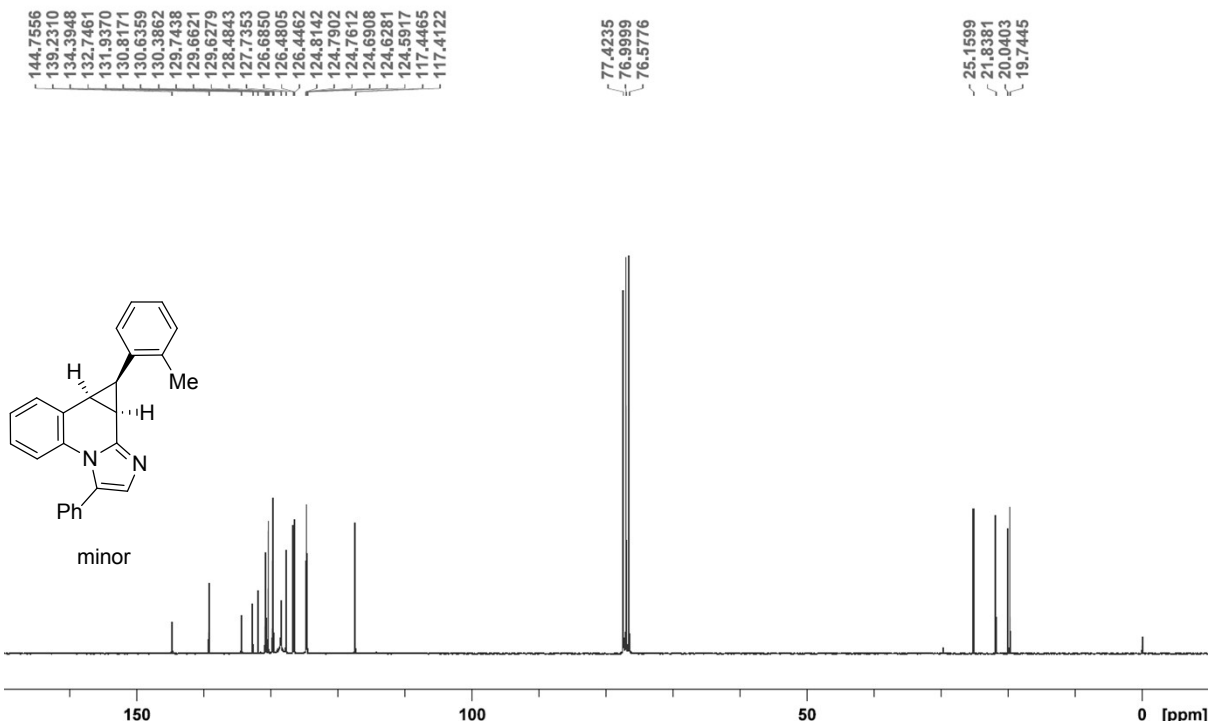
4
2
0 [ppm]


144.7556
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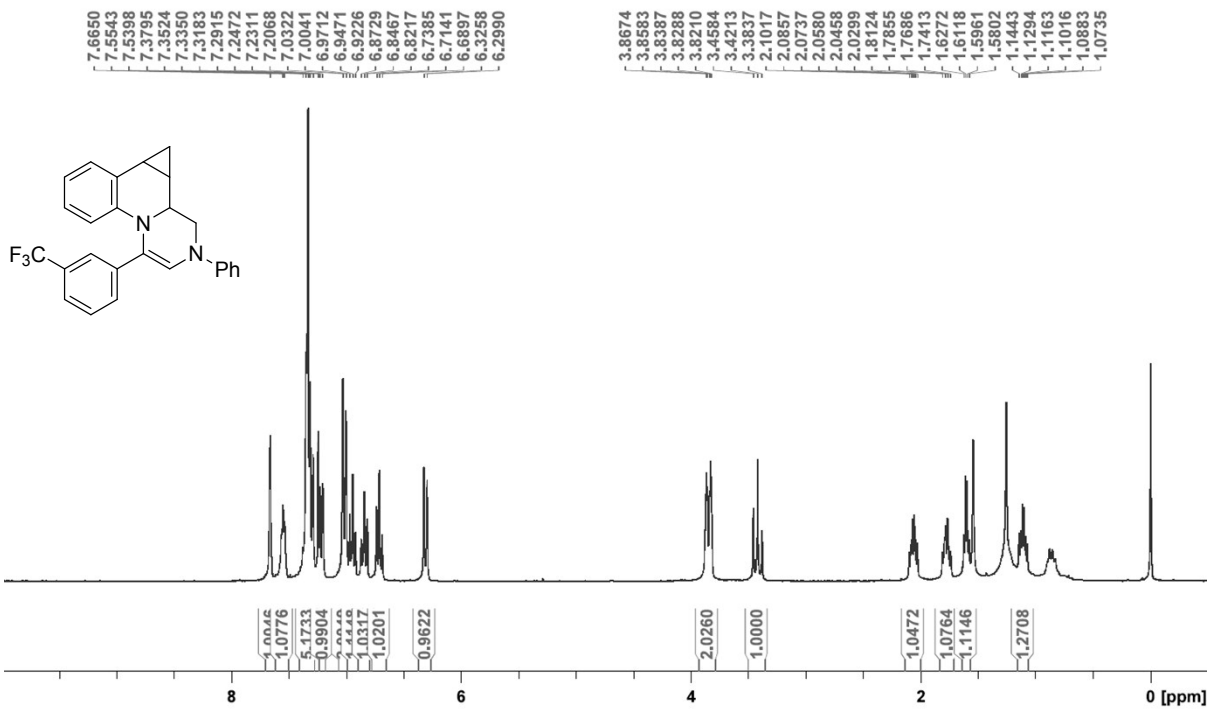
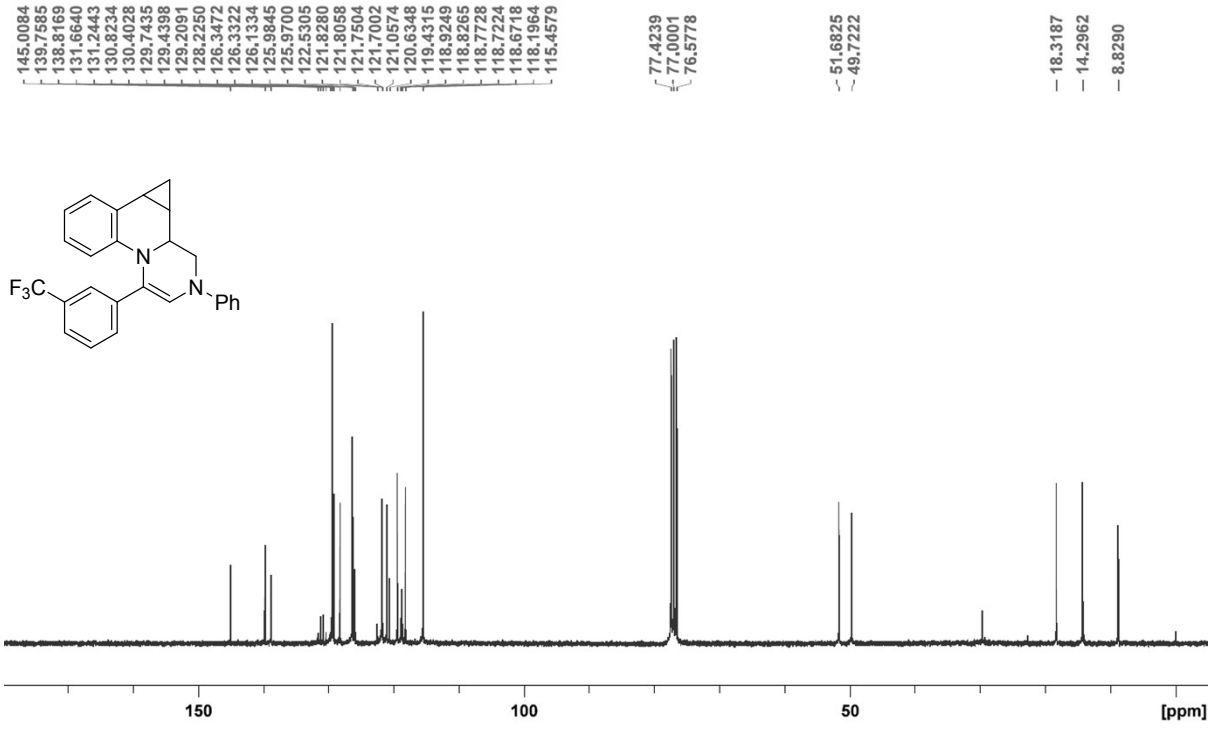
134.3948
132.7461
131.9370
130.8171
130.6359
130.3862
129.7438
129.6621
129.6279
128.4843
127.7353
126.6850
126.4805
126.4462
124.8142
124.7902
124.7612
124.6908
124.6281
124.5917
117.4465
117.4122
77.4235
76.9999
76.5776
25.1599
21.8381
20.0403
19.7445
H
Me
H
N
N
Ph
minor
150
100
50
0 [ppm]

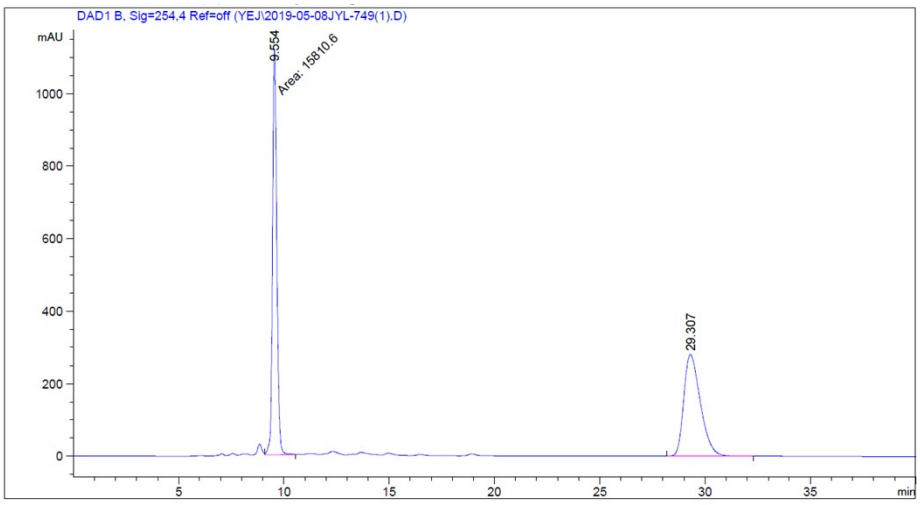
2-phenyl-4-(3-(trifluoromethyl)phenyl)-1,2,9b,10,10a,10b-hexahydrocyclopropa[c]pyrazino[1,2-a]quinoline (9):

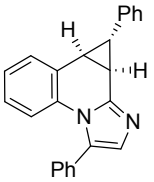




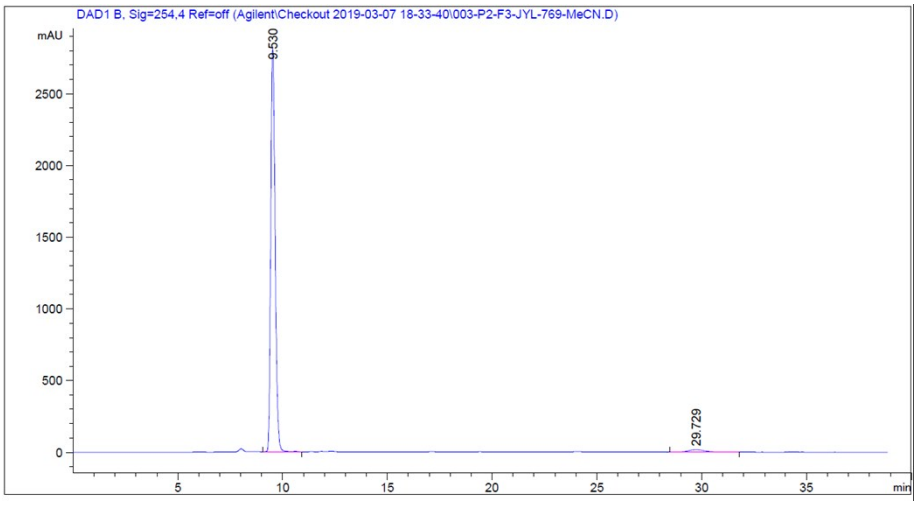
VII. HPLC of products

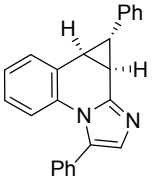
7a major diastereomer





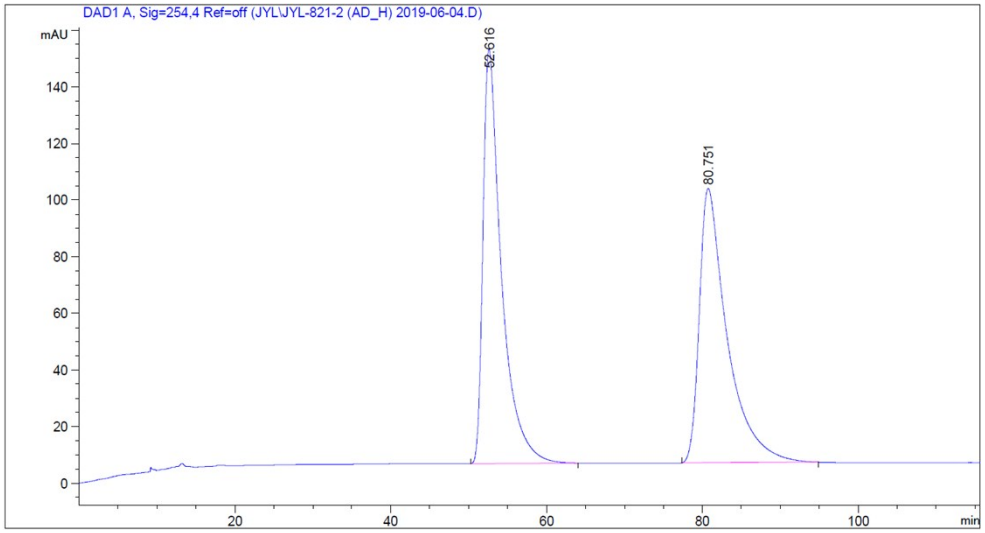
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.554	FM	0.2360	1.58106e4	1116.41833	50.7543
2	29.307	BB	0.8421	1.53407e4	280.48782	49.2457
Totals :				3.11513e4	1396.90616	

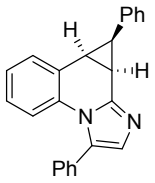




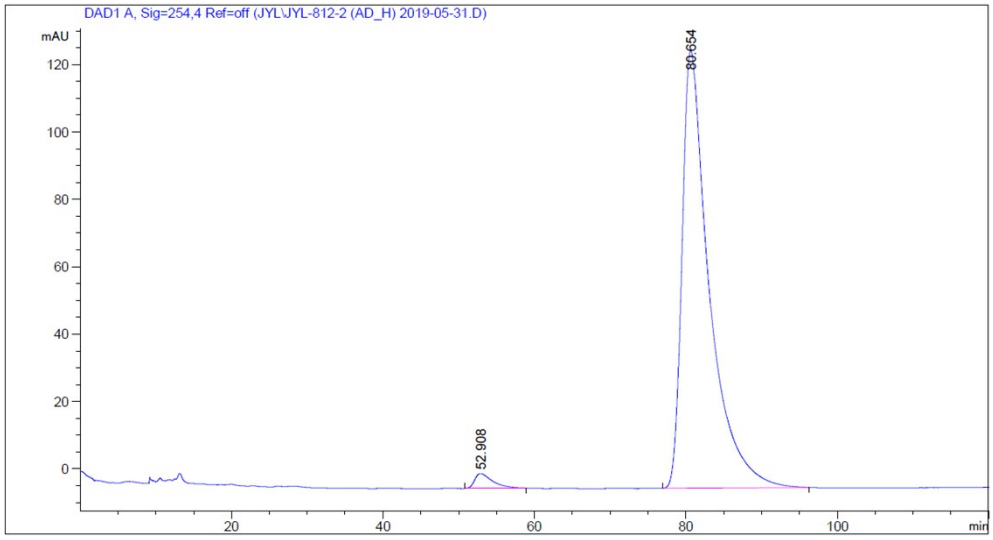
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.530	BV R	0.2269	4.12200e4	2813.56543	97.7388
2	29.729	BB	0.8447	953.61121	16.89080	2.2612
Totals :				4.21736e4	2830.45623	

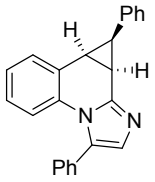
7a minor diastereomer





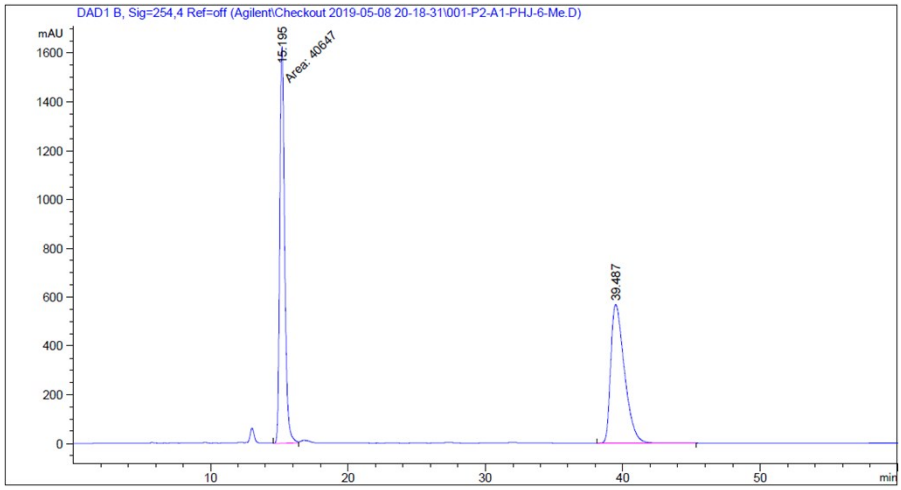
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	52.616	BB	2.3309	2.40837e4	146.27423	50.0869
2	80.751	BB	3.2372	2.40001e4	96.84647	49.9131
Totals :				4.80838e4	243.12070	

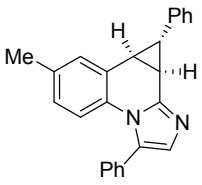




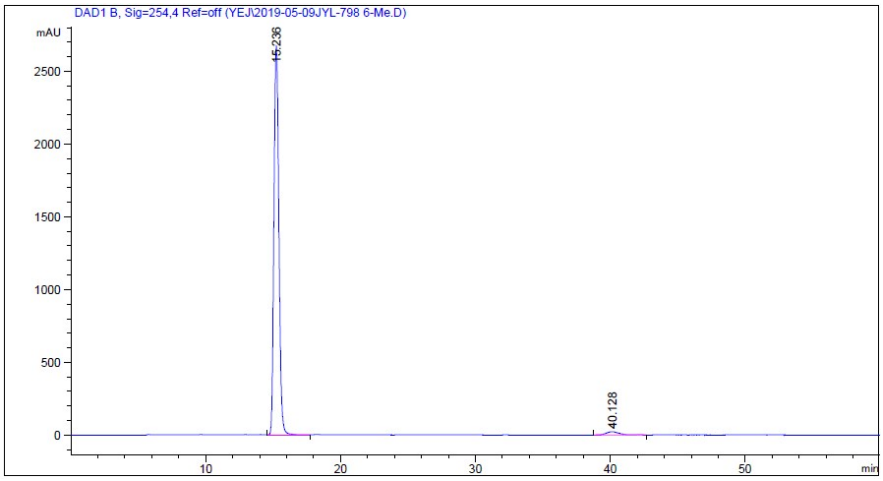
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	52.908	BB	1.9572	732.33685	4.40145	2.2182
2	80.654	BB	3.3713	3.22824e4	129.90094	97.7818
Totals :				3.30147e4	134.30239	

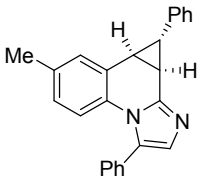
7b major diastereomer





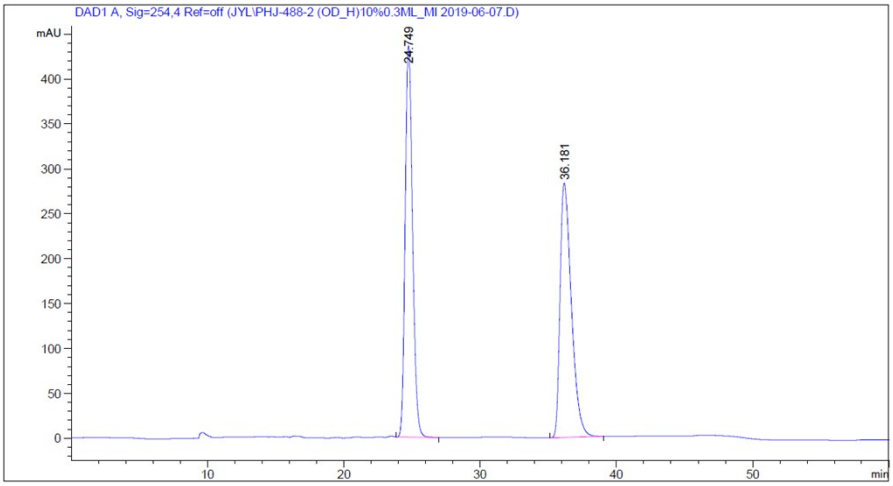
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	15.195	MM	0.4163	4.06470e4	1627.22803	50.8568
2	39.487	BB	1.0646	3.92774e4	568.12988	49.1432
Totals :				7.99244e4	2195.35791	

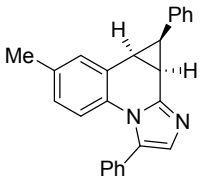




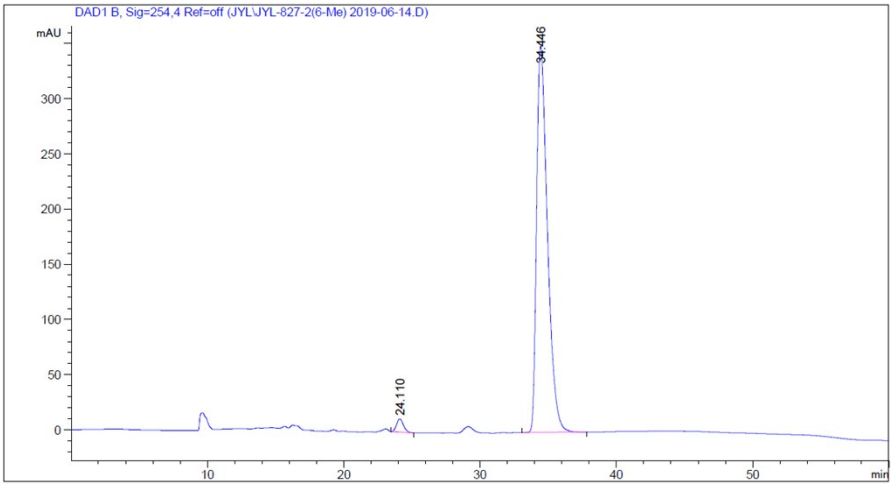
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	15.236	BB	0.4004	6.79041e4	2672.94434	97.9014
2	40.128	BB	0.9686	1455.61096	22.09552	2.0986
Totals :				6.93597e4	2695.03985	

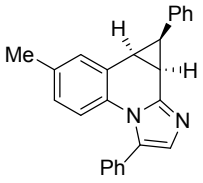
7b minor diastereomer





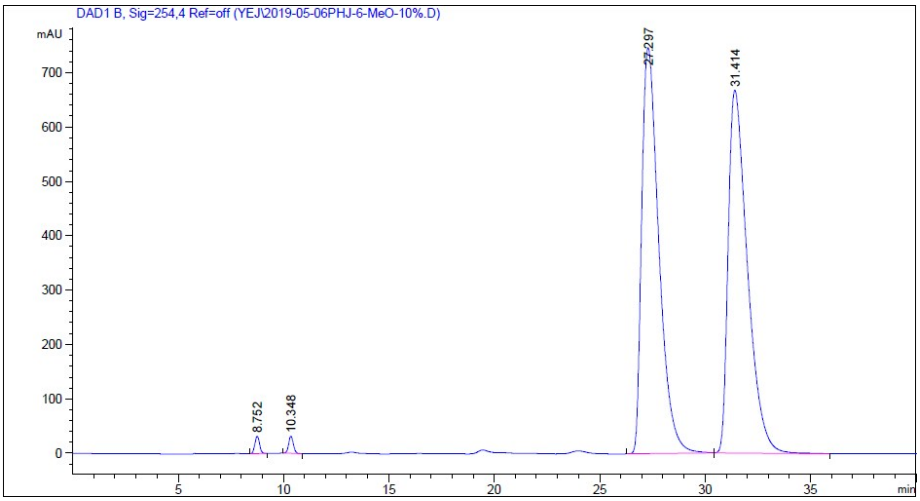
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	24.749	BB	0.5834	1.63337e4	435.67093	50.0797
2	36.181	BB	0.8808	1.62817e4	283.17307	49.9203
Totals :				3.26154e4	718.84399	

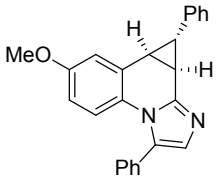




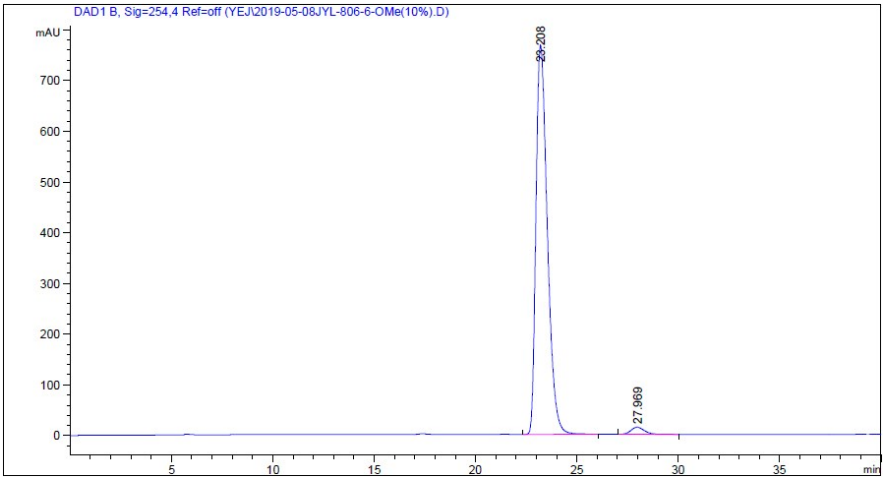
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	24.110	BB	0.5414	416.39615	11.86674	2.1063
2	34.446	BB	0.8403	1.93528e4	350.42163	97.8937
Totals :				1.97692e4	362.28837	

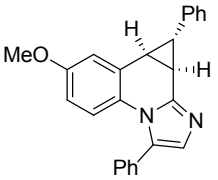
7c major diastereomer





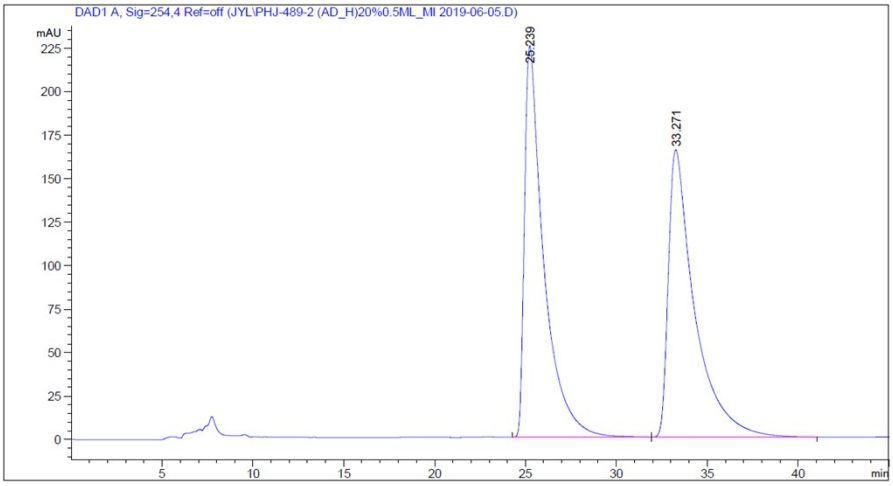
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	8.752	BB	0.2462	492.78775	31.55720	0.5771
2	10.348	BB	0.2449	490.46402	31.27710	0.5744
3	27.297	BB	0.8717	4.22285e4	746.78320	49.4538
4	31.414	BB	0.9635	4.21780e4	667.25378	49.3947
Totals :				8.53898e4	1476.87128	

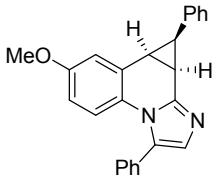




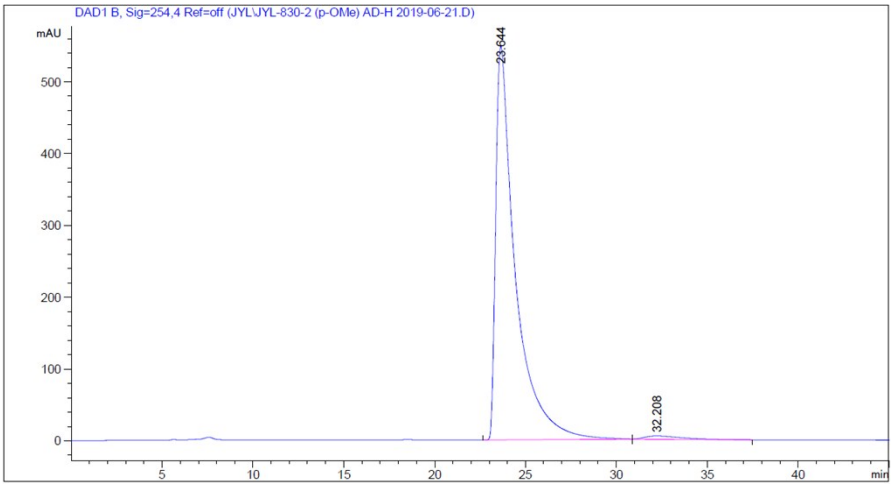
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	23.208	BB	0.6022	2.97540e4	767.61761	97.9137
2	27.969	BB	0.6944	633.99249	13.94585	2.0863
Totals :				3.03880e4	781.56346	

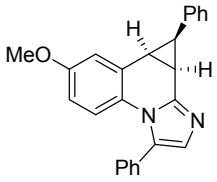
7c minor diastereomer





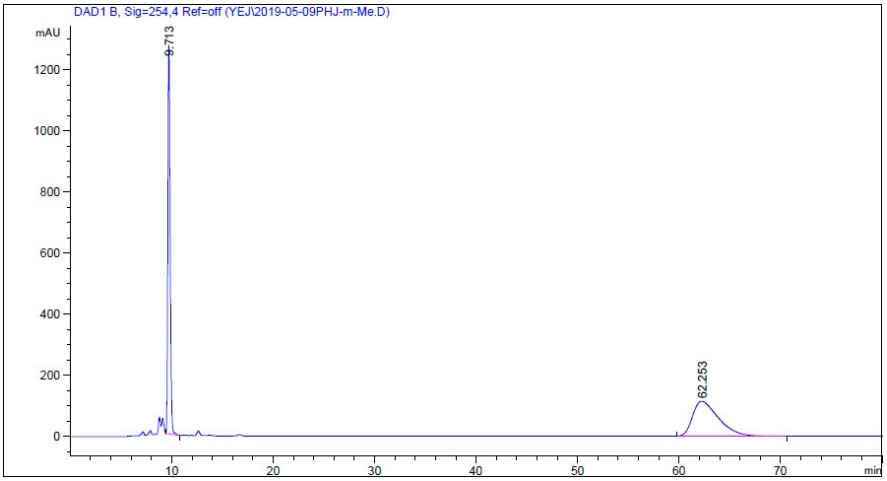
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	25.239	BB	1.0432	1.65733e4	225.04286	50.0629
2	33.271	BB	1.4095	1.65317e4	165.20308	49.9371
Totals :				3.31049e4	390.24594	

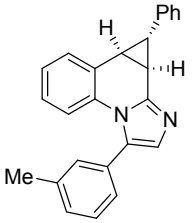




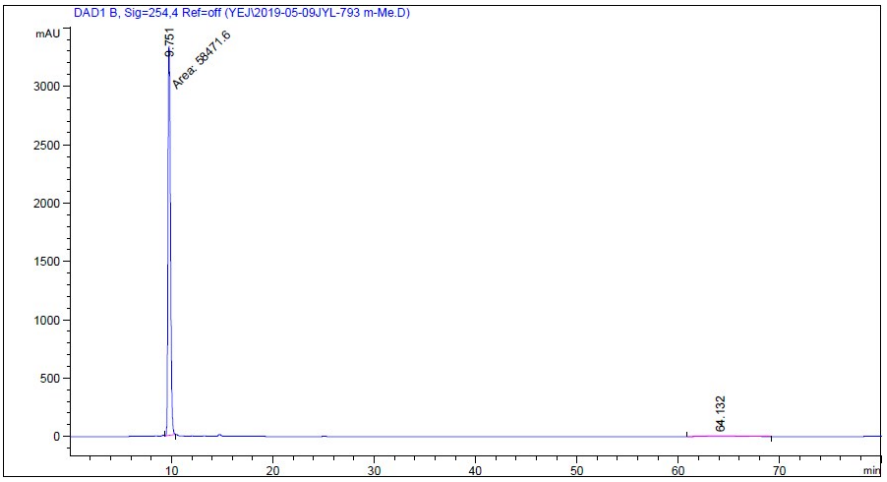
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	23.644	BB	1.0620	4.11928e4	548.59381	98.4934
2	32.208	BB	1.6061	630.08698	4.59412	1.5066
Totals :				4.18229e4	553.18793	

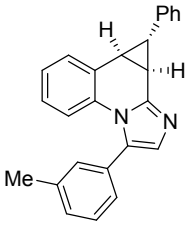
7d major diastereomer





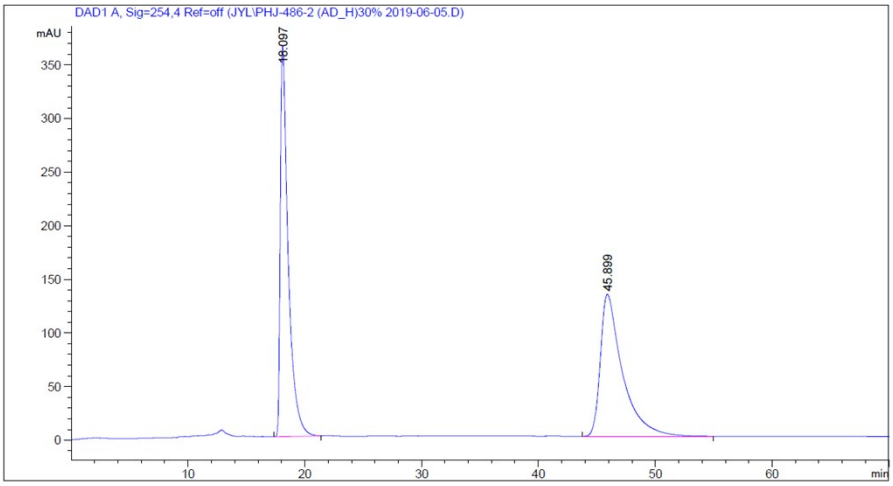
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.713	BB	0.2470	2.01774e4	1272.68823	49.8160
2	62.253	BB	2.4034	2.03264e4	114.37392	50.1840
Totals :				4.05038e4	1387.06216	

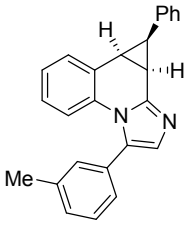




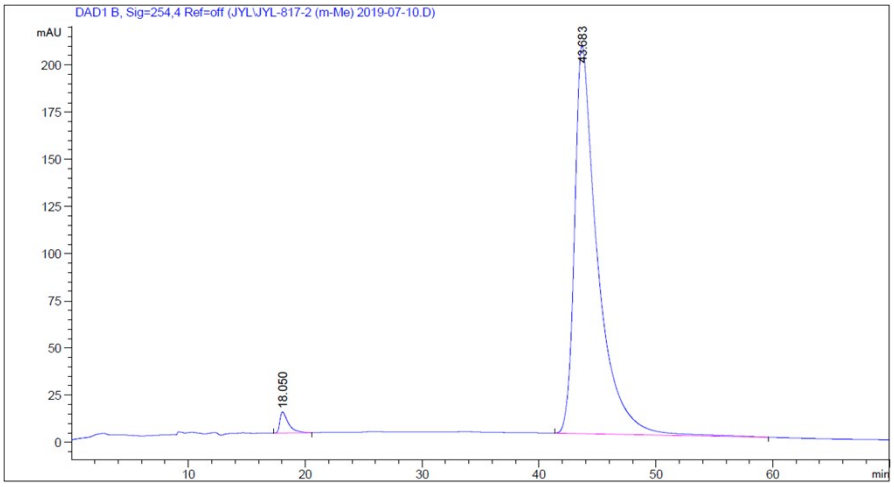
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.751	MM	0.2922	5.84716e4	3335.68384	97.9965
2	64.132	BV R	2.1719	1195.44971	6.43937	2.0035
Totals :				5.96670e4	3342.12321	

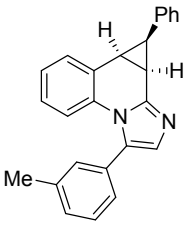
7d minor diastereomer





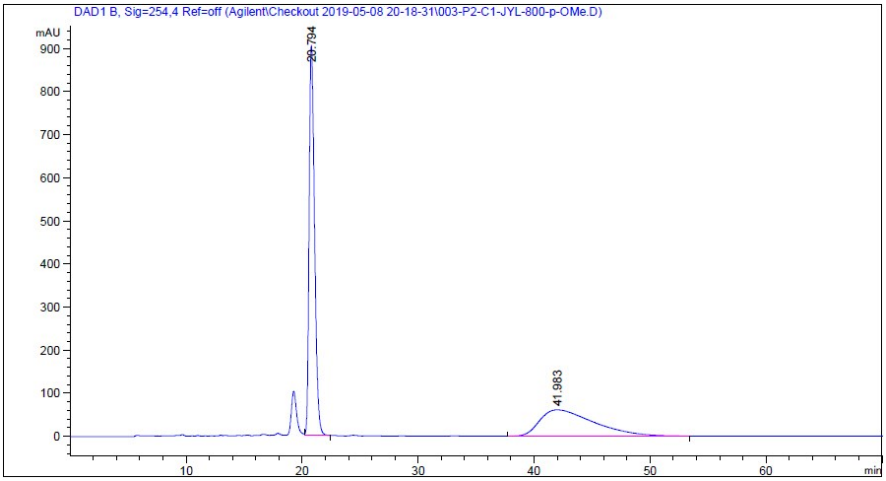
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	18.097	BB	0.6836	1.72048e4	363.91937	49.9082
2	45.899	BB	1.8264	1.72681e4	132.33507	50.0918
Totals :				3.44729e4	496.25444	

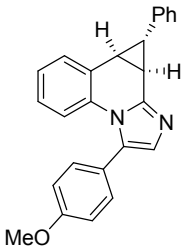




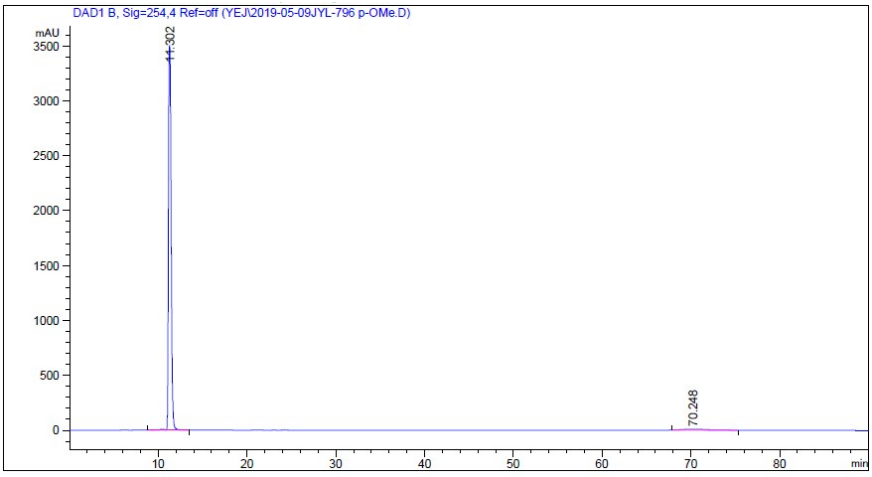
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	18.050	BB	0.7291	580.04578	11.22108	2.0242
2	43.683	BB	1.9181	2.80758e4	205.47939	97.9758
Totals :				2.86558e4	216.70046	

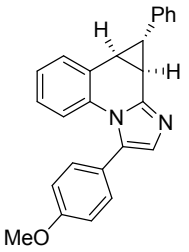
7e major diastereomer





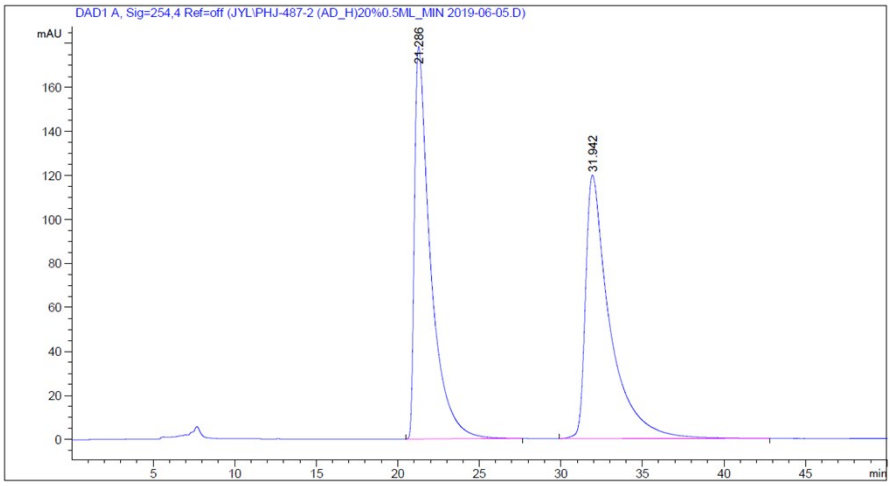
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	20.794	VB	0.5006	2.92082e4	904.95648	59.5585
2	41.983	BB	3.8062	1.98329e4	60.95187	40.4415
Totals :				4.90411e4	965.90835	

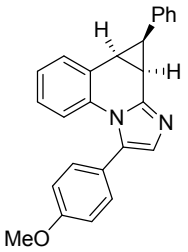




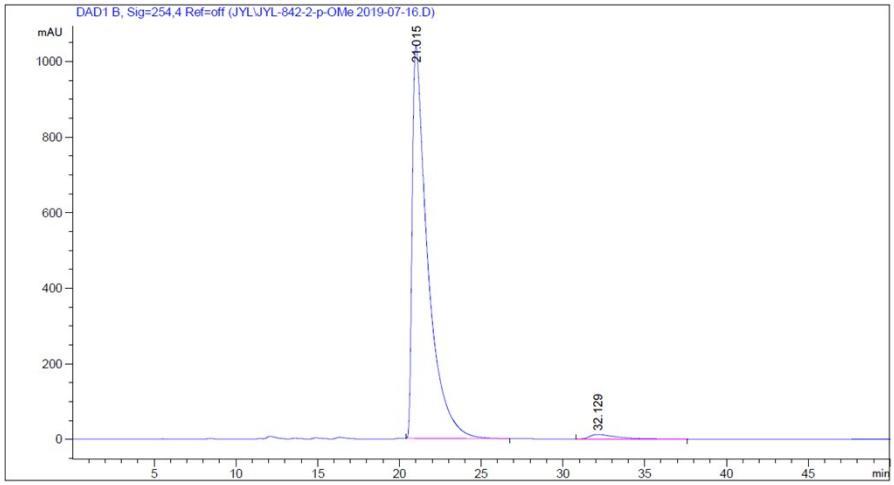
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	11.302	VV R	0.3326	7.44260e4	3505.95361	97.8781
2	70.248	BB	1.9786	1613.45850	9.58129	2.1219
Totals :				7.60394e4	3515.53490	

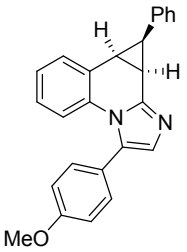
7e minor diastereomer





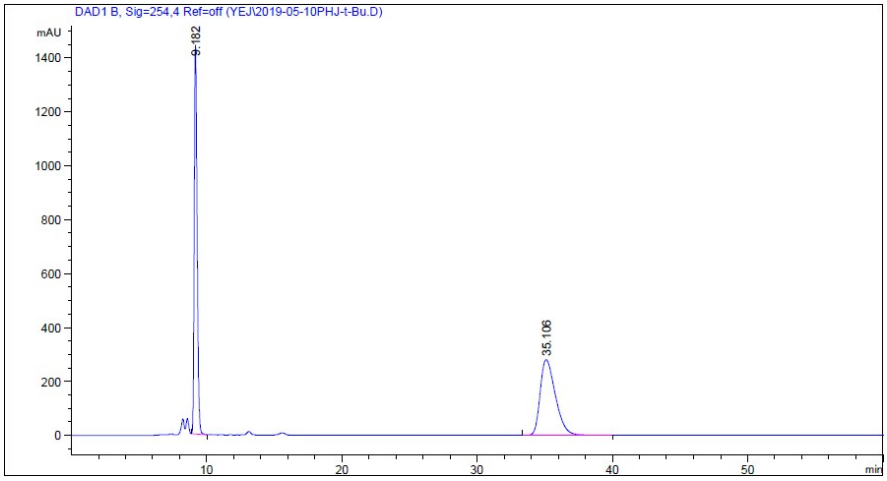
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	21.286	BB	0.9764	1.21763e4	178.38322	49.5828
2	31.942	BB	1.4497	1.23813e4	119.80899	50.4172
Totals :				2.45576e4	298.19221	

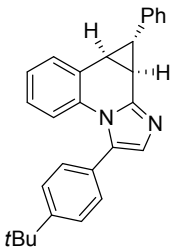




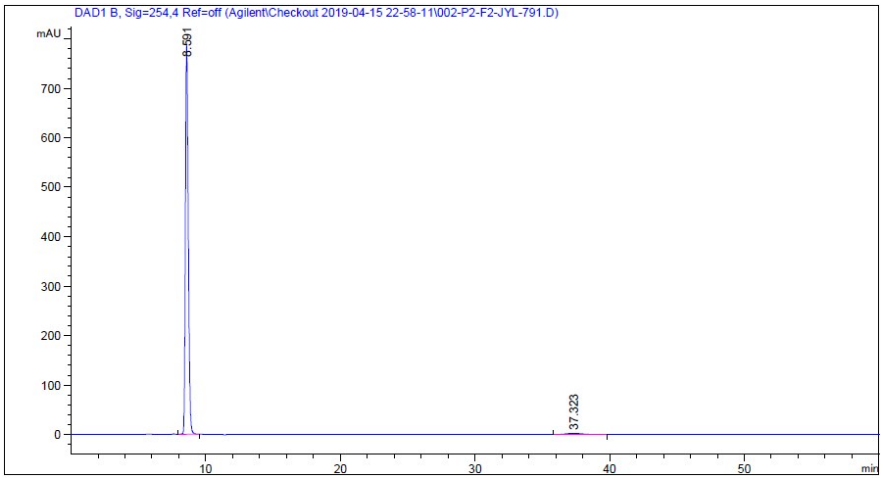
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	21.015	BB	0.9261	6.83116e4	1040.33972	97.9231
2	32.129	BB	1.5220	1448.86365	12.37480	2.0769
Totals :				6.97605e4	1052.71452	

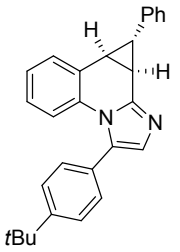
7f major diastereomer





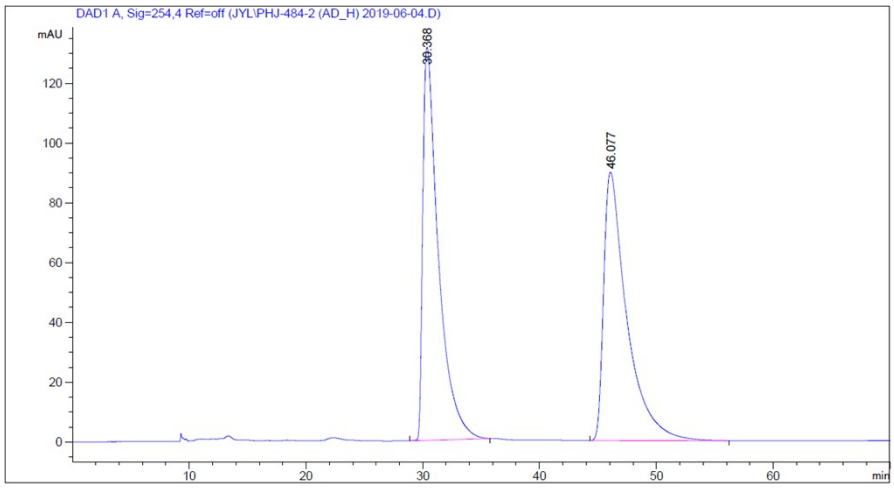
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	9.182	BB	0.2276	2.12156e4	1442.62268	49.2683
2	35.106	BB	1.1937	2.18457e4	280.79013	50.7317
Totals :				4.30613e4	1723.41281	

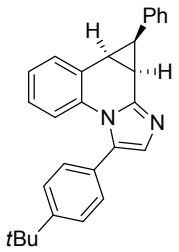




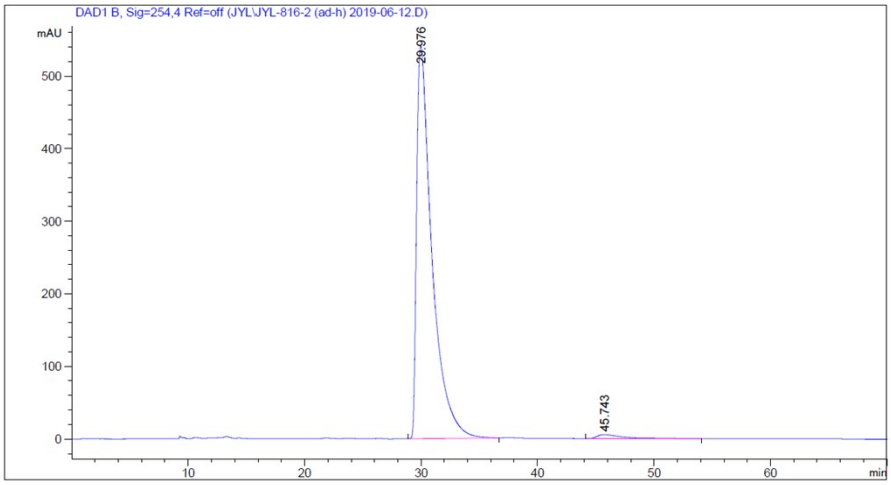
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	8.591	BB	0.2330	1.17818e4	785.40503	98.0935
2	37.323	BB	1.0316	228.98817	2.63048	1.9065
Totals :				1.20108e4	788.03551	

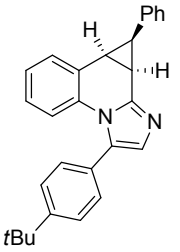
7f minor diastereomer





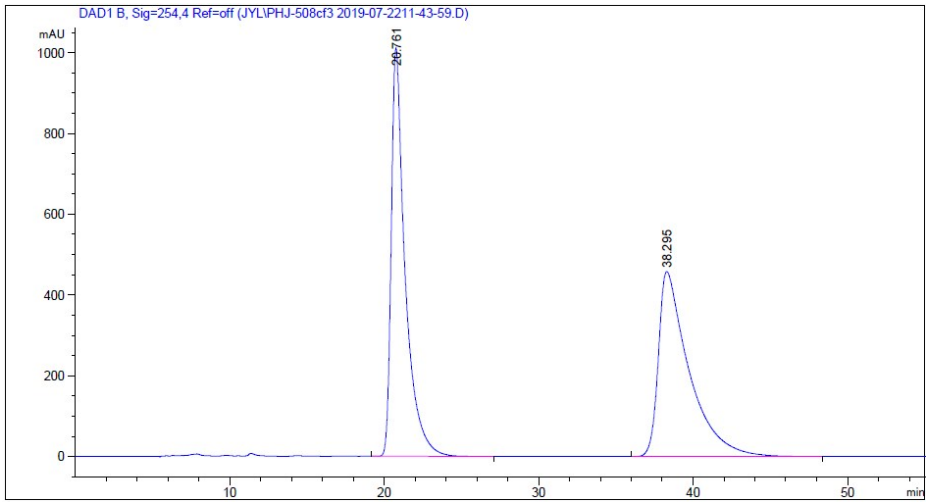
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	30.368	BB	1.3318	1.21992e4	131.56087	49.6876
2	46.077	BB	1.9026	1.23525e4	89.81352	50.3124
Totals :				2.45517e4	221.37439	

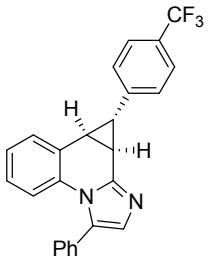




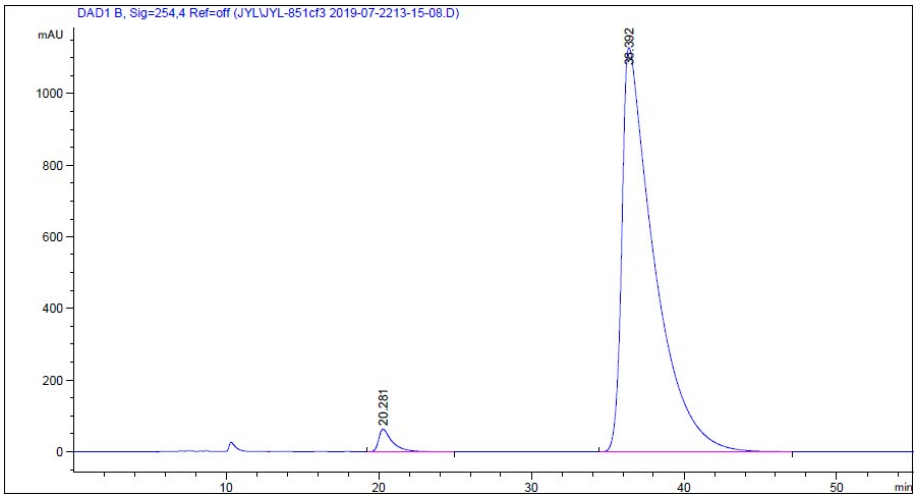
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	29.976	BB	1.3257	4.93794e4	540.57227	98.2588
2	45.743	BB	1.8317	875.02460	5.59167	1.7412
Totals :				5.02544e4	546.16394	

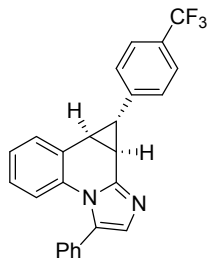
7g





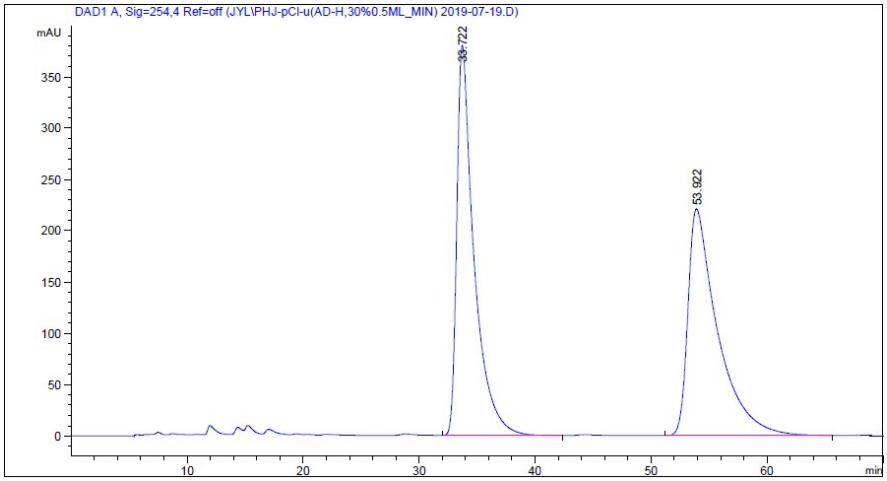
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	20.761	BB	0.8899	6.31403e4	1011.96063	50.0655
2	38.295	BB	1.9143	6.29751e4	458.54788	49.9345
Totals :				1.26115e5	1470.50851	

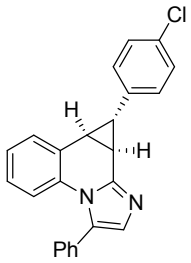




Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	20.281	BB	0.8750	3839.18896	62.64167	2.2824
2	36.392	BB	1.9860	1.64369e5	1128.01184	97.7176
Totals :				1.68208e5	1190.65351	

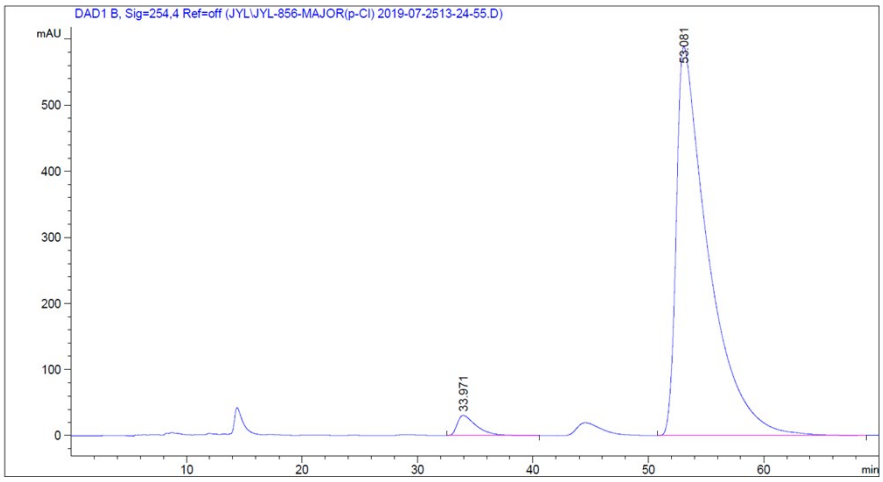
7h major diastereomer

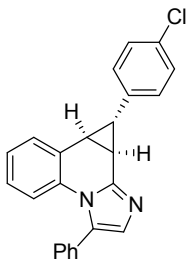




Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	33.722	BB	1.4630	3.92100e4	380.27359	50.0545
2	53.922	BB	2.4410	3.91247e4	220.82919	49.9455

Totals : 7.83347e4 601.10278

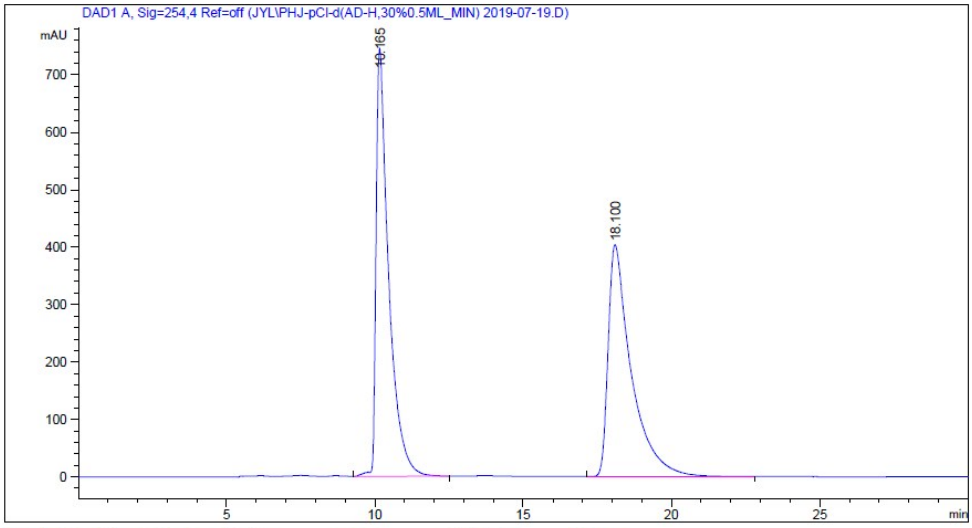


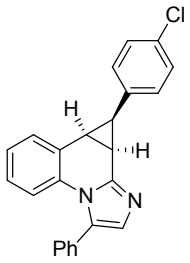


Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	33.971	BB	1.5770	3502.84839	30.51932	3.0070
2	53.081	BB	2.6323	1.12985e5	588.38055	96.9930

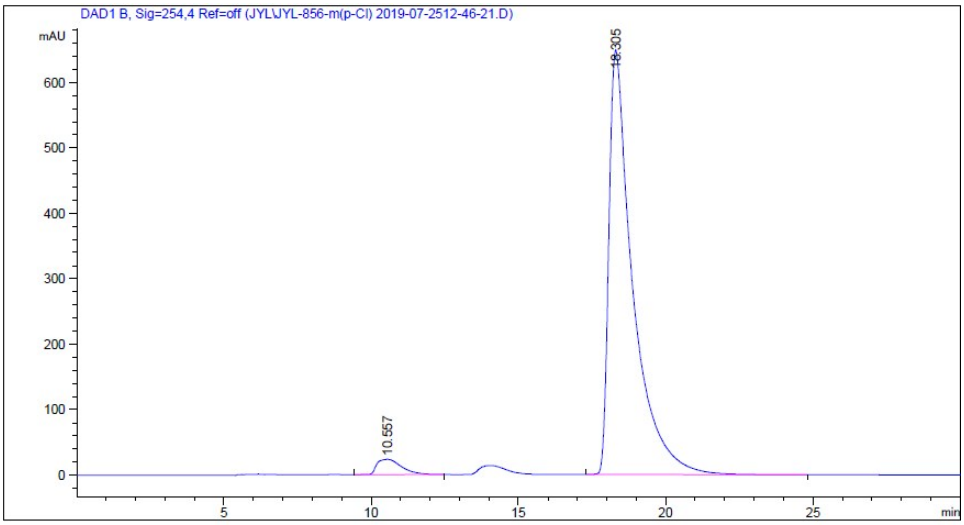
Totals : 1.16488e5 618.89987

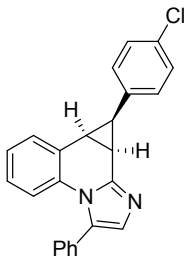
7h minor diastereomer





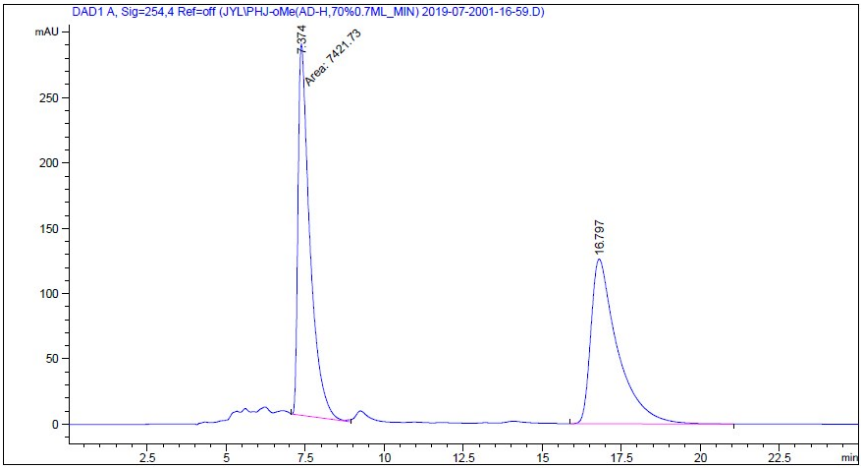
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	10.165	BB	0.4201	2.19571e4	744.35358	50.2048
2	18.100	BB	0.7635	2.17779e4	403.63522	49.7952
Totals :				4.37350e4	1147.98880	

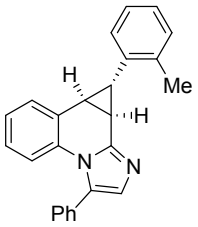




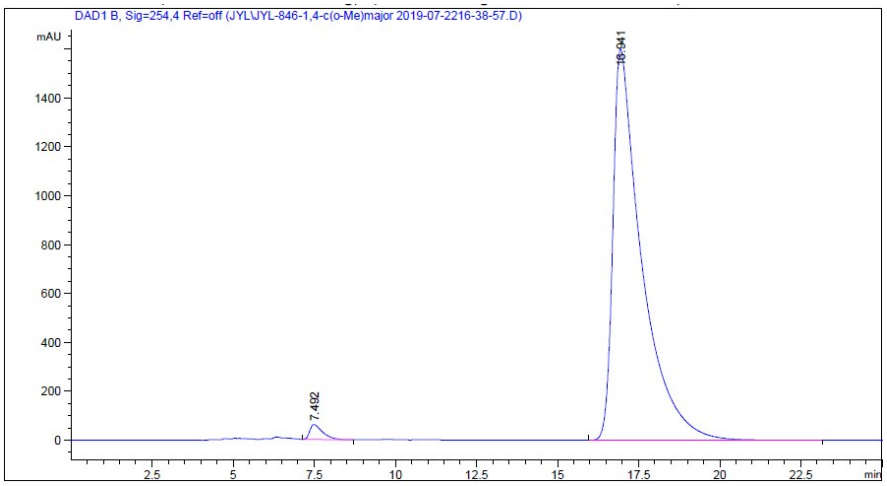
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	10.557	BB	0.9005	1368.25354	23.59773	3.6128
2	18.305	BB	0.7961	3.65044e4	649.13269	96.3872
Totals :				3.78726e4	672.73042	

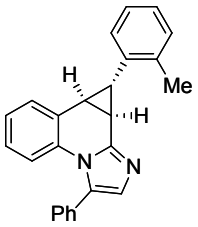
7i major diastereomer





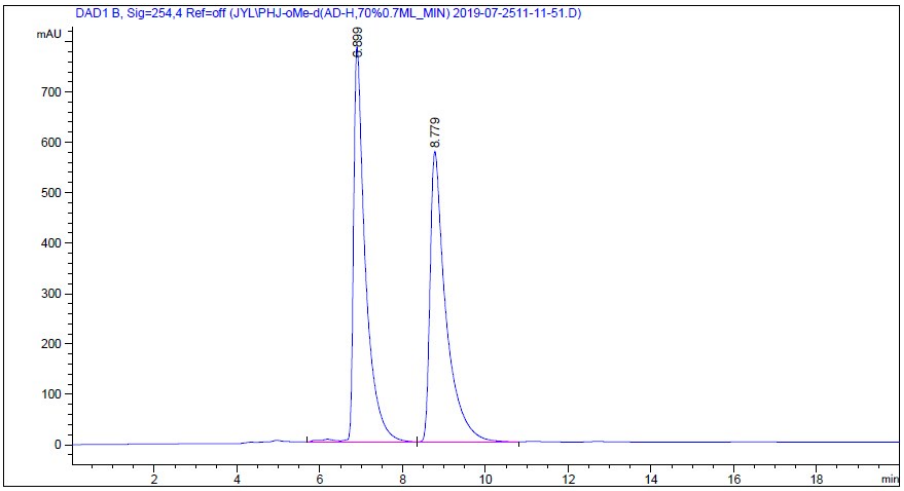
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	7.374	MM	0.4350	7421.72607	284.35568	50.2870
2	16.797	BB	0.8293	7336.99951	126.00552	49.7130
Totals :				1.47587e4	410.36120	

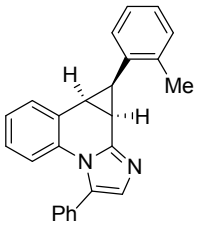




Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	7.492	BB	0.4049	1667.50891	60.99730	1.6675
2	16.941	BB	0.8559	9.83331e4	1598.12390	98.3325
Totals :				1.00001e5	1659.12120	

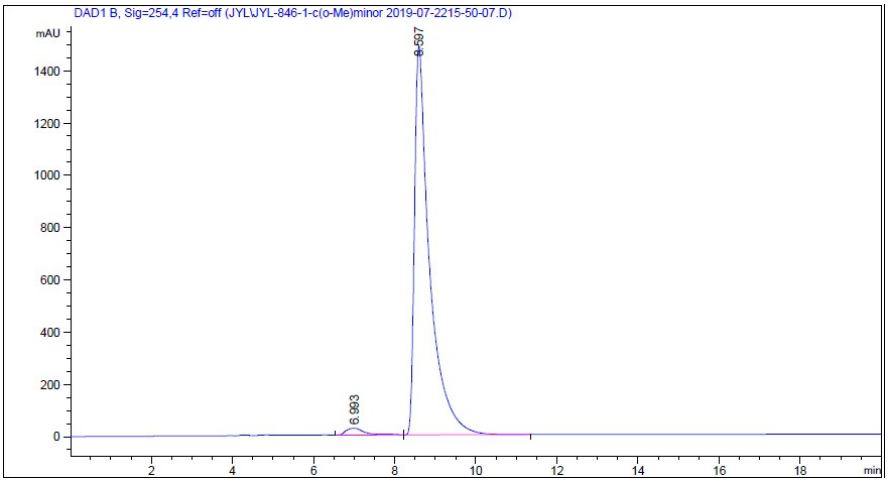
7i minor diastereomer

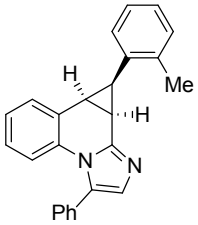




Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	6.899	VB R	0.2797	1.55497e4	783.53229	50.5387
2	8.779	BB	0.3741	1.52182e4	576.25116	49.4613

Totals : 3.07679e4 1359.78345





Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	6.993	BV	0.4992	852.22192	26.35856	2.1669
2	8.597	VB	0.3656	3.84761e4	1488.43445	97.8331

Totals : 3.93283e4 1514.79301