Supporting Information for:

Diastereospecific arylation and cascade deconstructive amidation/thioesterification of readily available lactam-fused bromolactones

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Contents:

2. Experimental Section

All experiments involving air and moisture-sensitive reagents were carried out under an inert atmosphere of nitrogen and using freshly distilled solvents. 2-MeTHF was distilled from sodium benzophenone ketyl. Column chromatography was performed on silica gel (230-400 mesh). Thin-layer chromatography (TLC) was performed using Silicycle SiliaplateTM glass backed plates (250 μm thickness, 60 Å porosity, F-254 indicator) and visualized using UV (254 nm) or CAM, *p*-anisaldehyde, or $KMnO_4$ stain. All reported temperatures were internal to a reaction vessel. Unless otherwise indicated, ^{1}H, ^{13}C, and DEPT-135 spectra were acquired using $CDCl_3$ as solvent, at room temperature. Chemical shifts are quoted in parts per million (ppm). HRMS-EI^+ data were obtained using either electronspray ionization (ESI) or electron impact (EI) techniques. High-resolution ESI was obtained on an LTQ-FT (ion trap; analyzed using Excalibur). High resolution EI was obtained on an Autospec (magnetic sector; analyzed using MassLynx). Brine solutions are saturated solutions of aqueous sodium chloride. The lactam-bromolactones were prepared as previously reported by us.[1,2]

General Procedure A: Palladium-catalyzed Kumada cross-coupling (Schemes 1 and 2): Under a nitrogen atmosphere, an oven-dried 20-mL Schlenk tube containing a magnetic stirring bar was charged with dppp ligand (5 mol%), $Pd(PhCN)_2Cl_2$ (5 mol%), and bromolactone **3** (1.0 mmol) dissolved in 2-MeTHF (10.0 mL). The resulting suspension was cooled to 0 ºC and phenylmagnesium bromide (1.10 mL, 1.0 M in THF, 1.1 mmol, 1.1 equiv) was added dropwise. After complete addition of the Grignard reagent, the mixture was slowly warmed to room temperature. The cloudy suspension was stirred at room temperature until TLC and GC-MS showed full conversion (8-12 h). The mixture was quenched with saturated aqueous NH_4Cl. Then, the reaction mixture was diluted with EtOAc (20 mL) and washed successively with NH_4Cl and brine. The organic layer was dried over Na_2SO_4, filtered, and concentrated under reduced pressure to give the desired coupling product, which was purified by flash column chromatography on silica gel.

General Procedure B: Cobalt-catalyzed Kumada-cross coupling (Scheme 3): Under a nitrogen atmosphere, an oven-dried 20-mL Schlenk tube containing a magnetic stirring bar was charged with cobalt tris-(acetylacetonate) (18.0 mg, 0.05 mmol, 5 mol%), PN (15.0 mg, 0.05 mmol), and bromolactone **2** (1.0 mmol) dissolved in 2-MeTHF (10.0 mL). The resulting suspension was cooled to 0 ºC and phenylmagnesium bromide (1.10 mL, 1.0 M in THF, 1.1 mmol, 1.1 equiv) was added dropwise. After complete addition of the Grignard reagent, the mixture was slowly warmed to room temperature. The cloudy suspension was stirred at room temperature until TLC and GC-MS showed full conversion (8-12 h). The mixture was quenched with saturated aqueous NH_4Cl. Then, the reaction mixture was diluted with EtOAc (20 mL) and washed successively with NH_4Cl and brine. The organic layer was dried over Na_2SO_4, filtered, and concentrated under reduced pressure to give the desired coupling product, which was purified by flash column chromatography on silica gel.

General Procedure C: Deconstructive epoxy-amidation (Scheme 4): To an oven-dried 5 mL screw-cap vial equipped with a stir bar dissolved lactam-bromolactone **2** (0.50 mmol, 1 equiv) in DMF (4 mL). K_2CO_3 (1.50 mmol, 3 equiv) and the corresponding amine (1.00 mmol, 2 equiv) were added. The cloudy suspension was stirred at room temperature until TLC and GC-MS showed full conversion (~6 h). Then, the reaction mixture was diluted with EtOAc (20 mL) and washed successively with water and brine. The organic layer was dried over Na_2SO_4, filtered, and

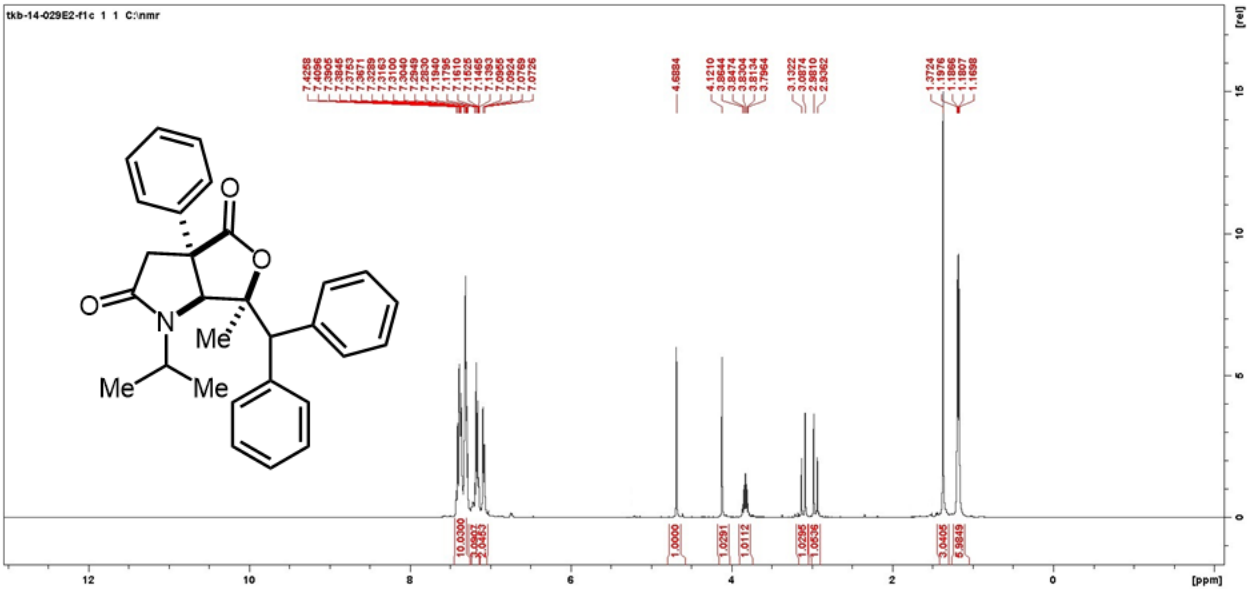
concentrated under reduced pressure to give the desired product, which was purified by flash chromatography on silica.

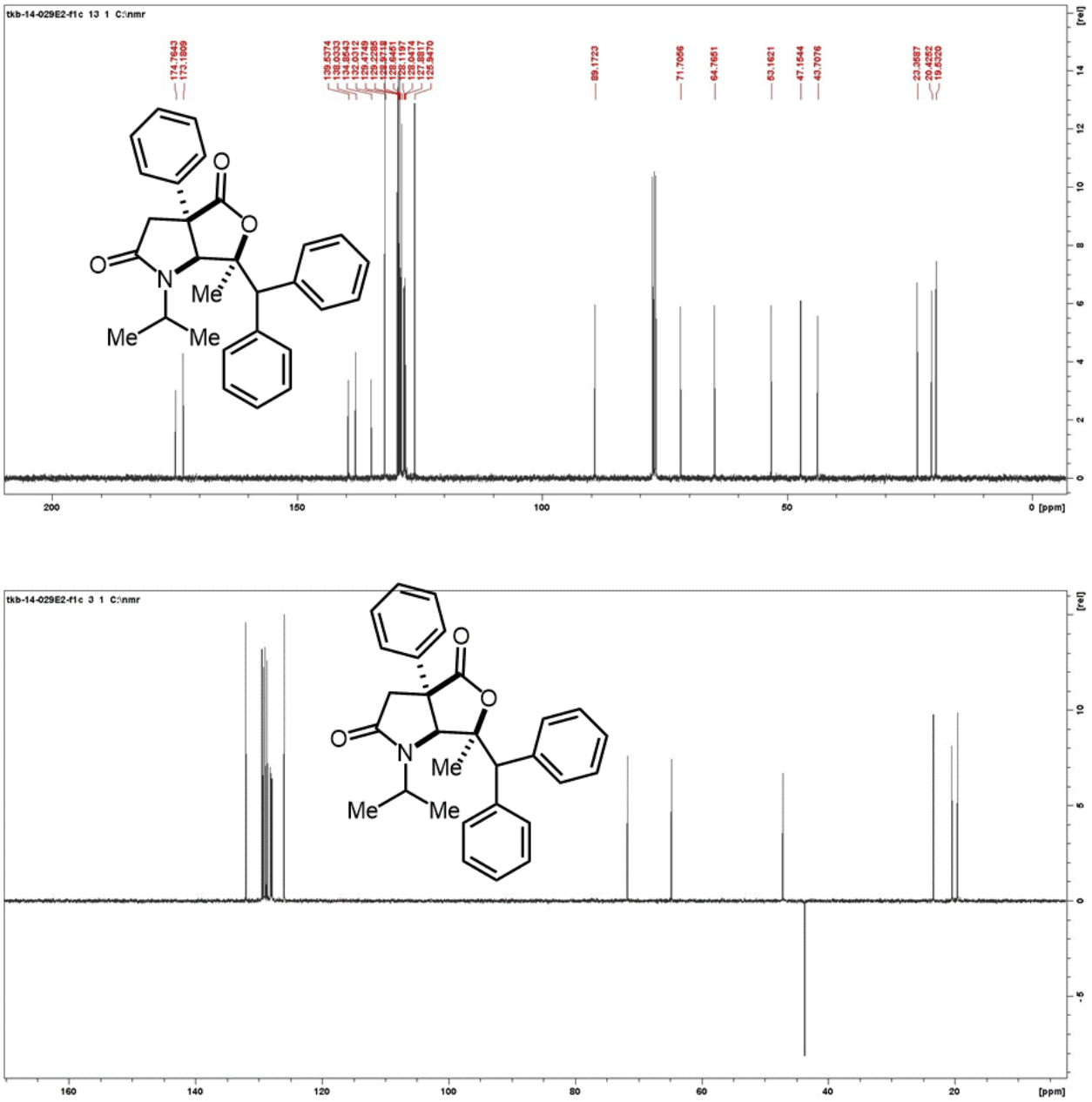
General Procedure D: Deconstructive thioesterification (Scheme 5): To an oven-dried 5 mL screw-cap vial equipped with a stir bar dissolved lactam-bromolactone **2** (0.50 mmol, 1 equiv) in DMF (4 mL). K_2CO_3 (1.50 mmol, 3 equiv) and the corresponding thiol (1.00 mmol, 2 equiv) were added. The cloudy suspension was heated to 100 ^oC and stirred until TLC and GC-MS showed full conversion (~18 h). Then, the reaction mixture was diluted with EtOAc (20 mL) and washed successively with water and brine. The organic layer was dried over Na_2SO_4, filtered, and concentrated under reduced pressure to give the desired product, which was purified by flash chromatography on silica.

Kumada cross-coupling with different bromides (Scheme 1 Results)

Compound 4a

Prepared in 1.0 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Yellowish oil. Yield = 391.2 mg, 89%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.43 – 7.37 (m, 10H), 7.33 – 7.28 (m, 3H), 7.19 – 7.07 (m, 2H), 4.69 (s, 1H), 4.12 (s, 1H), 3.83 (hept, *J* = 6.8 Hz, 1H), 3.11 (d, *J* = 17.9 Hz, 1H), 2.96 (d, *J* = 17.9 Hz, 1H), 1.37 (s, 3H), 1.18 (dd, *J* = 6.8, 4.3 Hz, 6H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.8, 173.2, 139.5, 138.0, 134.9, 132.0, 129.5, 129.2, 129.0, 128.6, 128.1, 128.0, 127.9, 125.9, 89.2, 71.7, 64.8, 53.2, 47.2, 43.7, 23.4, 20.4, 19.5. FTIR (KBr): 2984.1, 1733.5, 1654.3, 1606.9, 1511.0, 1448.5, 1414.7, 1384.9, 1357.4, 1299.7, 1242.5, 1179.3, 1031.8, 994.9, 823.7, 735.2. **HRMS-EI^{+}** (*m/z*): calc for $C_{29}H_{29}NO_3$ $[M]^{+}$ 439.2147, found 439.2153.

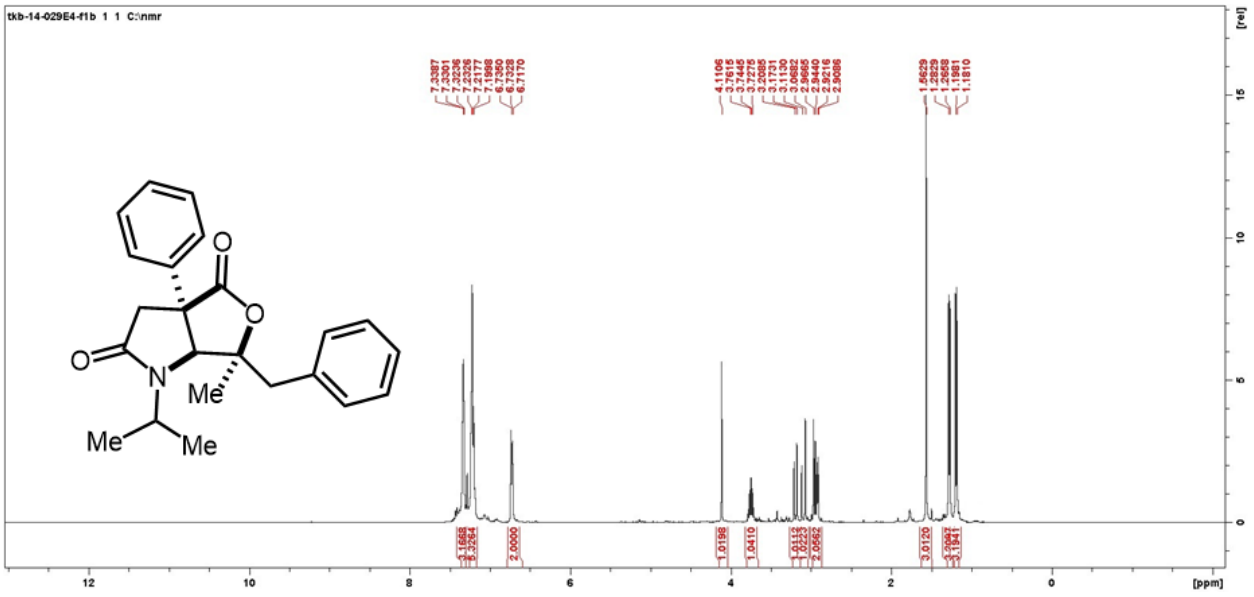




Reduction product **8a** was obtained as a side product.

Compound 8a

Yellowish oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.34 – 7.32 (m, 3H), 7.23 – 7.20 (m, 5H), 6.72 (dd, *J* = 7.5, 2.0 Hz, 2H), 4.11 (s, 1H), 3.74 (hept, *J* = 6.9 Hz, 1H), 3.19 (d, *J* = 17.9 Hz, 1H), 3.09 (d, *J* = 17.9 Hz, 1H), 2.99 – 2.87 (m, 2H), 1.56 (s, 3H), 1.27 (d, *J* = 6.8 Hz, 3H), 1.19 (d, *J* = 6.9 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 175.3, 173.1, 139.3, 134.1, 131.0, 129.0, 128.8, 127.9, 127.6, 125.3, 86.9, 71.0, 53.8, 47.0, 46.9, 42.6, 23.9, 20.3, 19.8. **HRMS-EI^{+}** (*m/z*): calc for $C_{23}H_{25}NO_3$ $[M]^{+}$ 363.1834, found 363.1838.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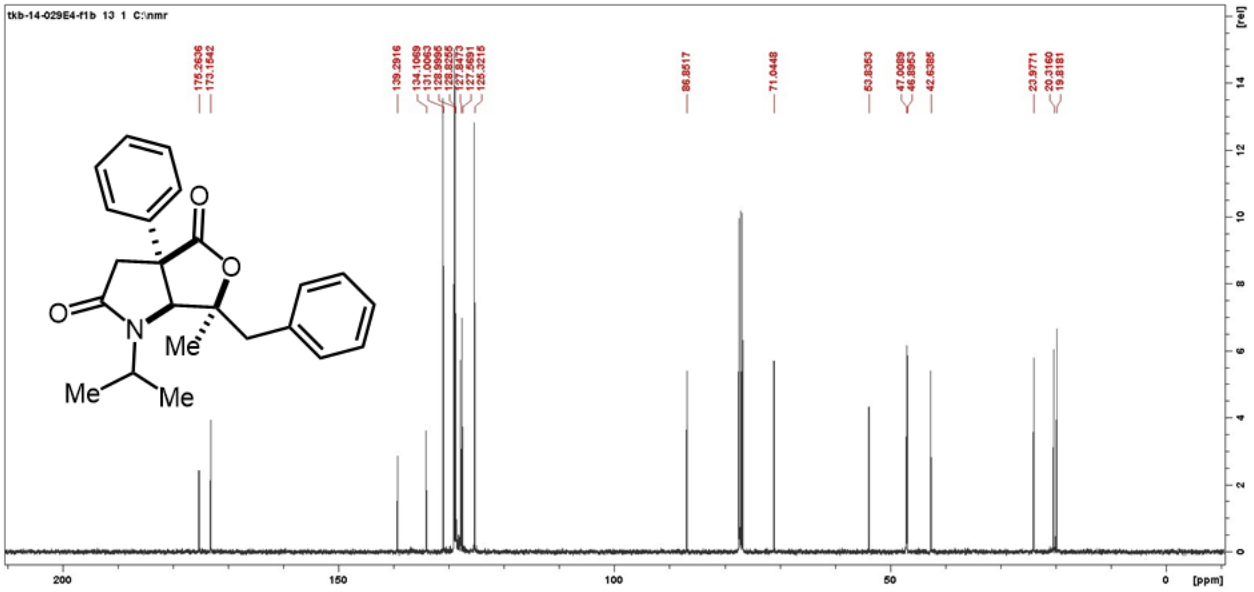
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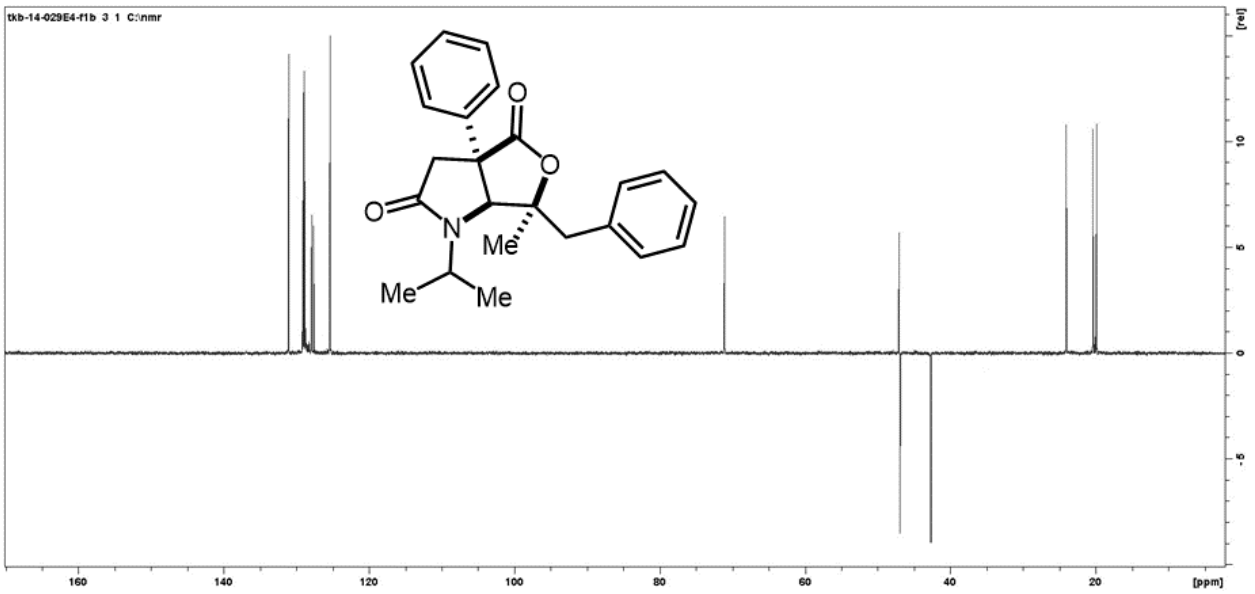
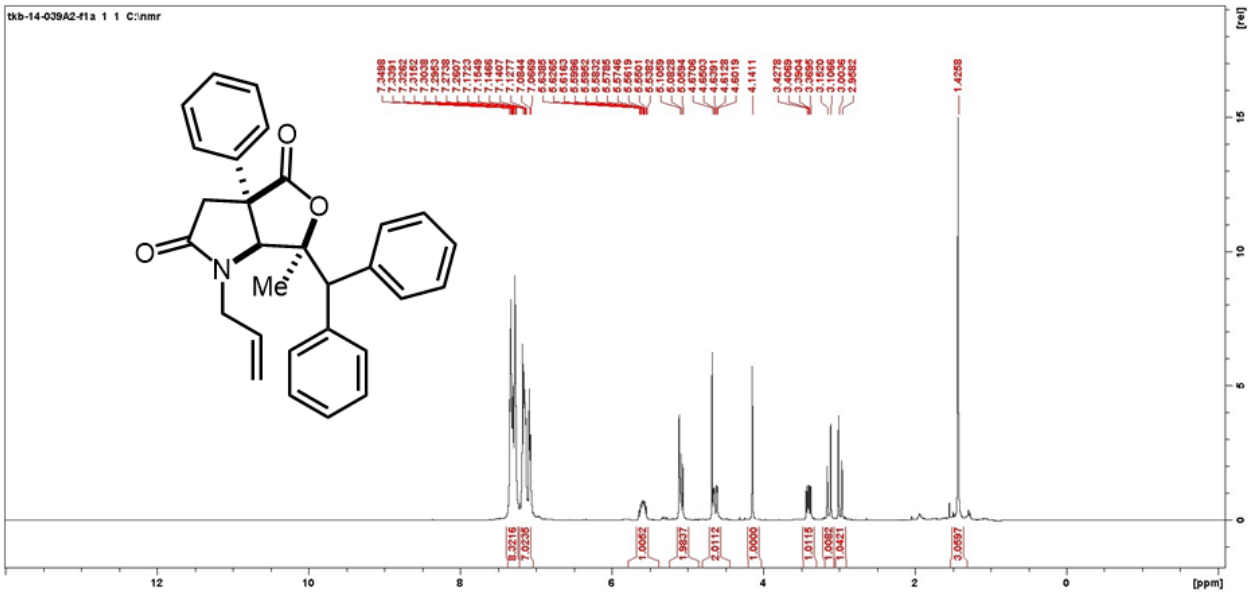


Compound **4b**

Prepared in 1.00 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Greenish-yellow oil. Yield = 371.9 mg, 85%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.34 – 7.06 (m, 15H), 5.66 – 5.52 (m, 1H), 5.13 – 5.04 (m, 2H), 4.69 – 4.56 (m, 2H), 4.14 (s, 1H), 3.40 (dd, *J* = 15.0, 8.4 Hz, 1H), 3.13 (d, *J* = 18.1 Hz, 1H), 3.00 (d, *J* = 18.1 Hz, 1H), 1.43 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.7, 172.1, 139.6, 137.5, 134.6, 131.9, 131.0, 129.7, 129.1, 129.0, 128.6, 128.1, 128.0, 127.8, 125.7, 120.2, 89.0, 69.9, 64.3, 52.2, 45.4, 43.5, 22.5. FTIR (KBr): 2939.4, 1723.5, 1696.3, 1604.9, 1511.0, 1448.5, 1414.7, 1384.9, 1357.4, 1298.7, 1247.5, 1179.3, 1135.9, 1031.8, 985.8, 833.0. **HRMS-EI^{+}** (*m/z*): calc for $C_{29}H_{27}NO_3$ $[M]^{+}$ 437.1991, found 437.1995.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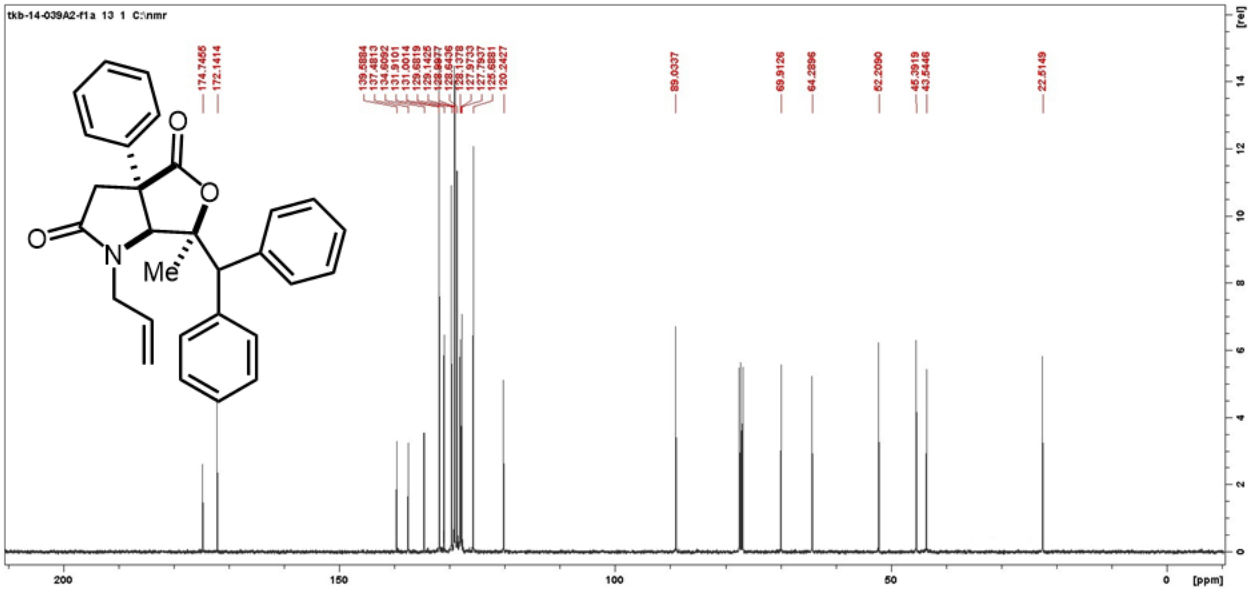
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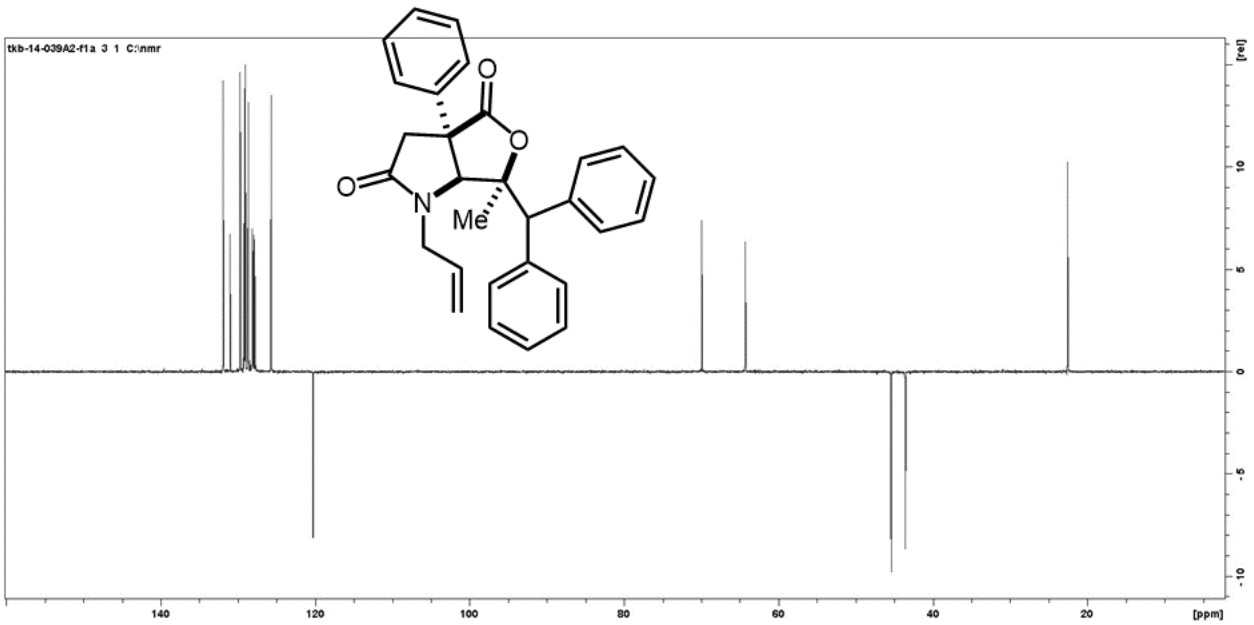
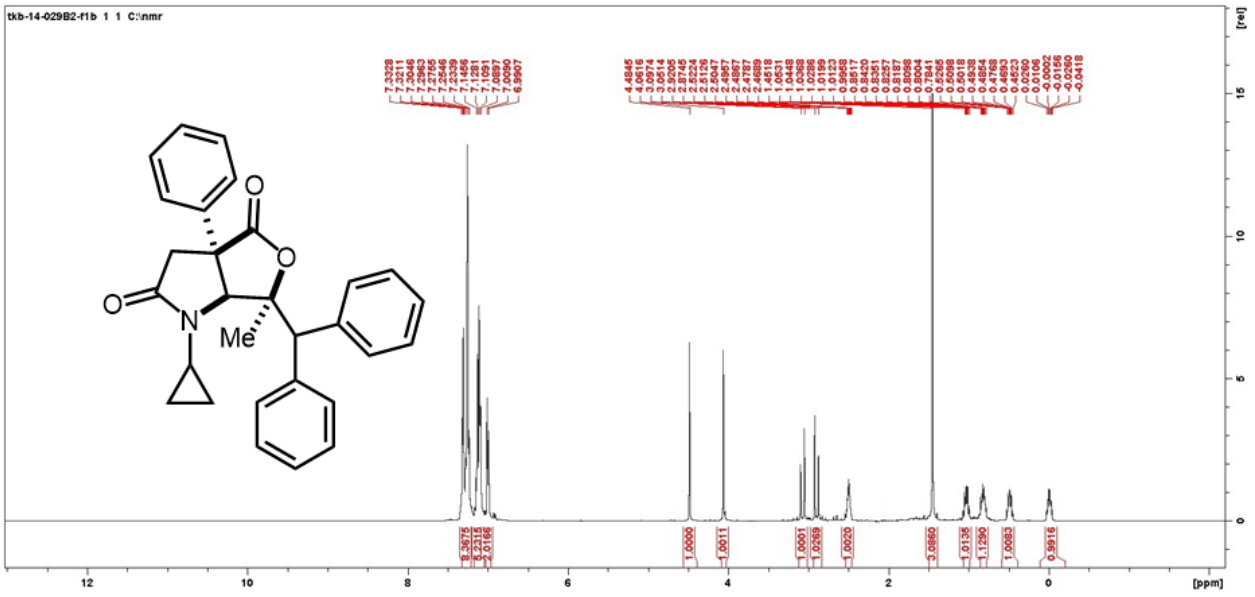


Compound **4c**

Prepared in 1.0 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (60:40). Greenish-yellow oil. Yield = 385.1 mg, 88%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.33 – 7.23 (m, 8H), 7.19 – 7.04 (m, 5H), 7.00 (dd, *J* = 7.6, 1.8 Hz, 2H), 4.48 (s, 1H), 4.06 (s, 1H), 3.05 (d, *J* = 18.4 Hz, 1H), 2.92 (d, *J* = 18.4 Hz, 1H), 2.50 (tt, *J* = 7.3, 3.9 Hz, 1H), 1.45 (s, 3H), 1.03 (dq, *J* = 9.6, 6.5 Hz, 1H), 0.82 (dtd, *J* = 10.5, 6.5, 3.7 Hz, 1H), 0.49 (dq, *J* = 9.8, 6.7 Hz, 1H), 0.00 (dq, *J* = 9.8, 6.7 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.8, 173.0, 139.8, 137.9, 135.1, 131.9, 129.5, 129.2, 129.1, 128.7, 128.1, 128.0, 127.8, 125.5, 89.4, 72.4, 64.8, 51.8, 44.3, 25.8, 22.5, 9.2, 5.1. **HRMS-EI^{+}** (*m/z*): calc for $C_{29}H_{27}NO_3$ $[M]^{+}$ 437.1991, found 437.1995.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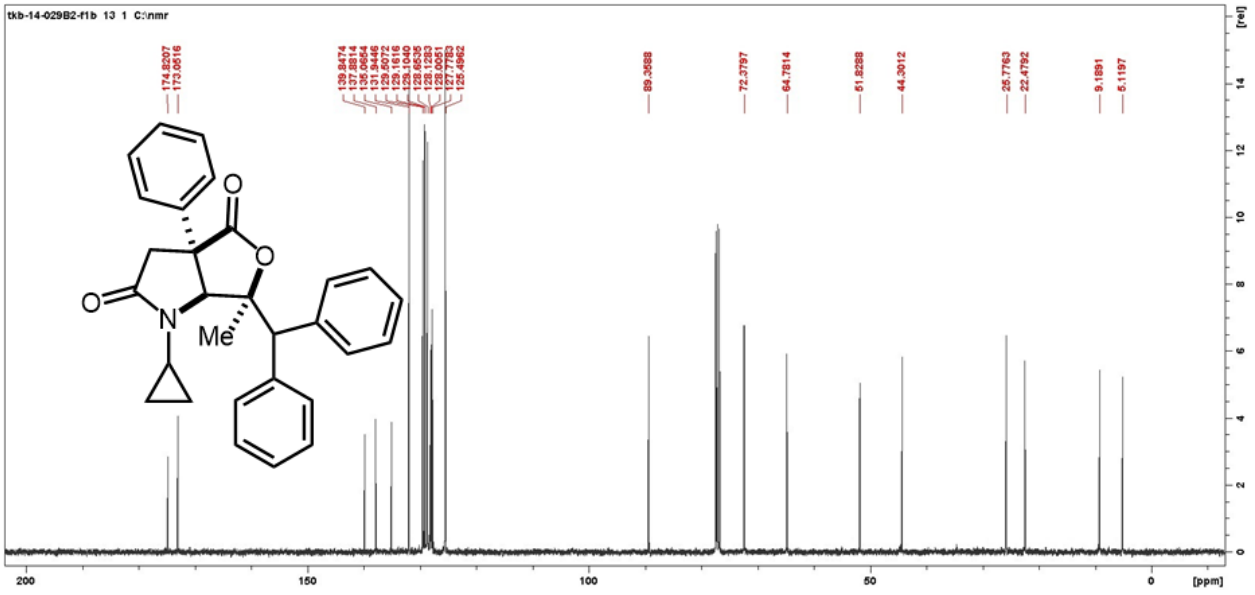
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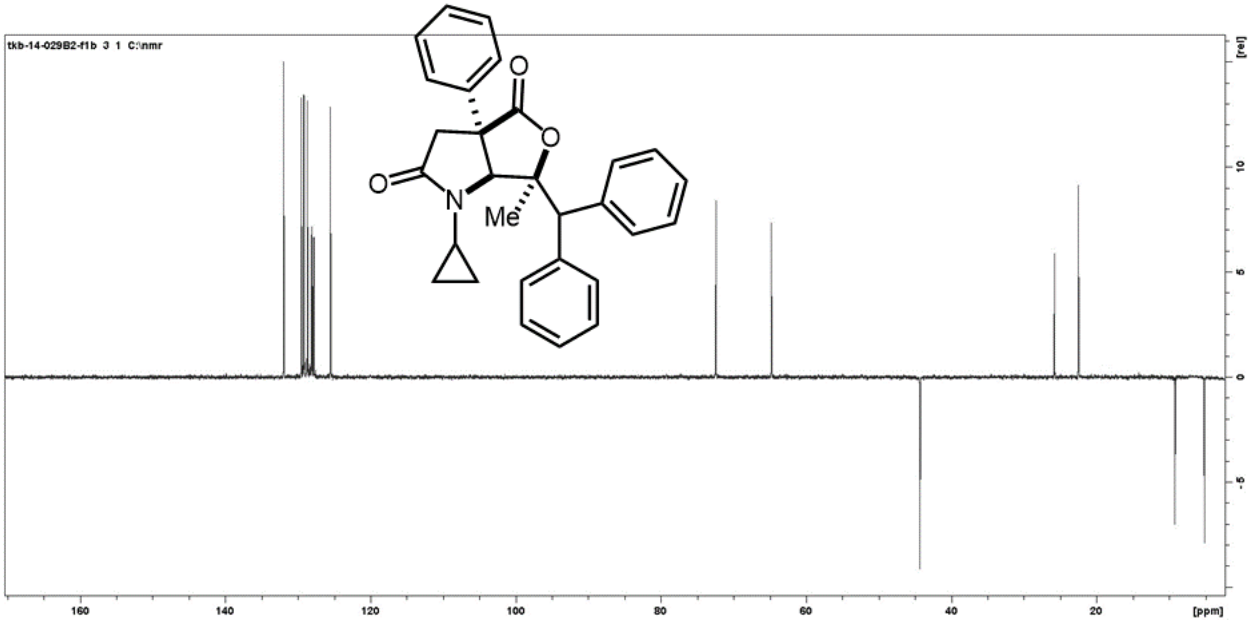
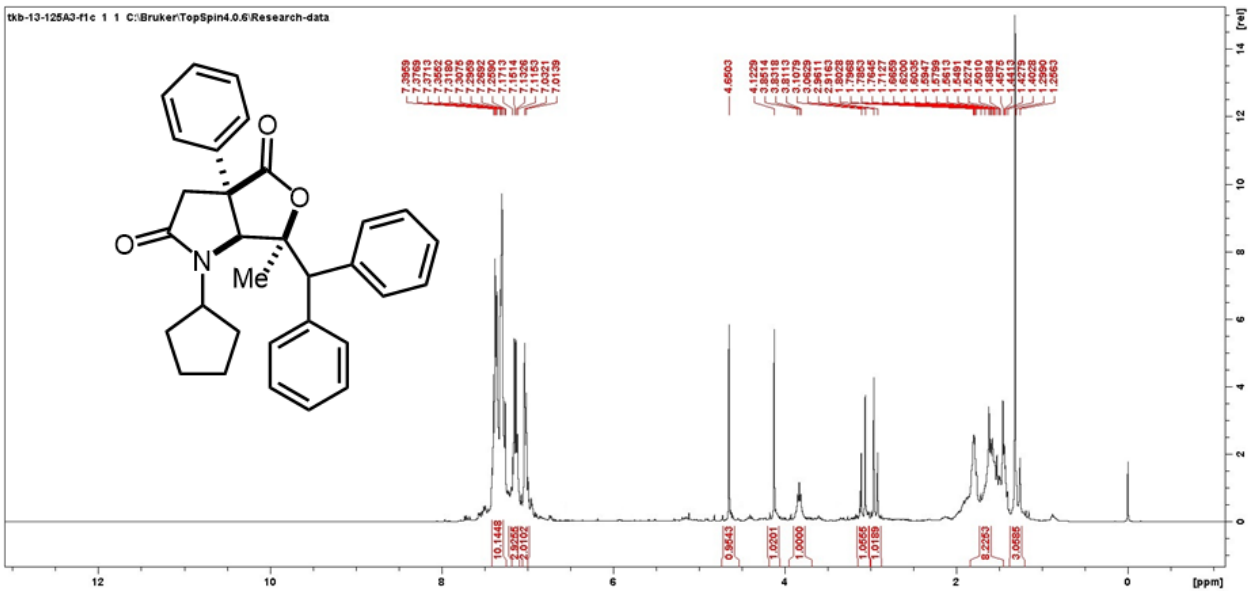


Compound **4d**

Prepared in 1.0 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (60:40). Yellow oil. Yield = 419.0 mg, 91%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40 – 7.26 (m, 10H), 7.17 – 7.11 (m, 3H), 7.03 – 7.00 (m, 2H), 4.65 (s, 1H), 4.12 (s, 1H), 3.84 (q, *J* = 8.2 Hz, 1H), 3.06 (d, *J* = 18.2 Hz, 1H), 1.89 (d, *J* = 18.2 Hz, 1H), 1.96 – 1.25 (m, 11H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.7, 172.8, 139.7, 138.1, 135.2, 131.9, 129.4, 129.2, 128.9, 128.6, 128.1, 128.0, 127.8, 125.8, 89.4, 72.3, 64.8, 56.6, 52.7, 44.2, 30.2, 28.3, 23.9, 23.3, 23.0. **HRMS-EI**$^{+}$ (*m/z*): calc for $C_{31}H_{31}NO_3$ $[M]^{+}$ 465.2304, found 465.2308.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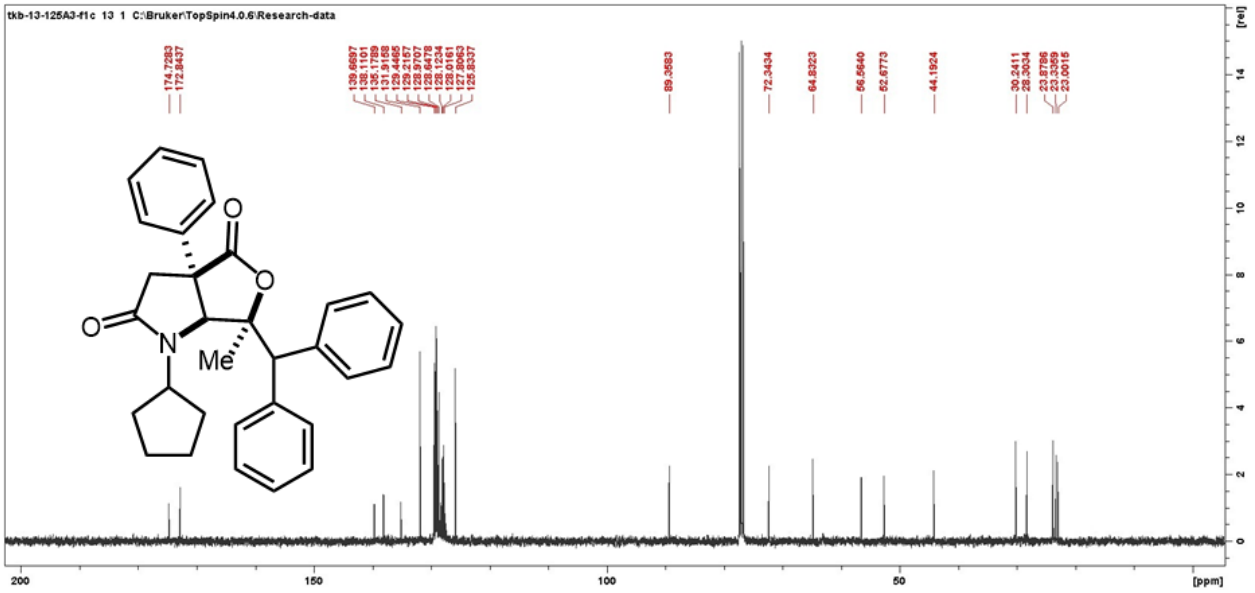
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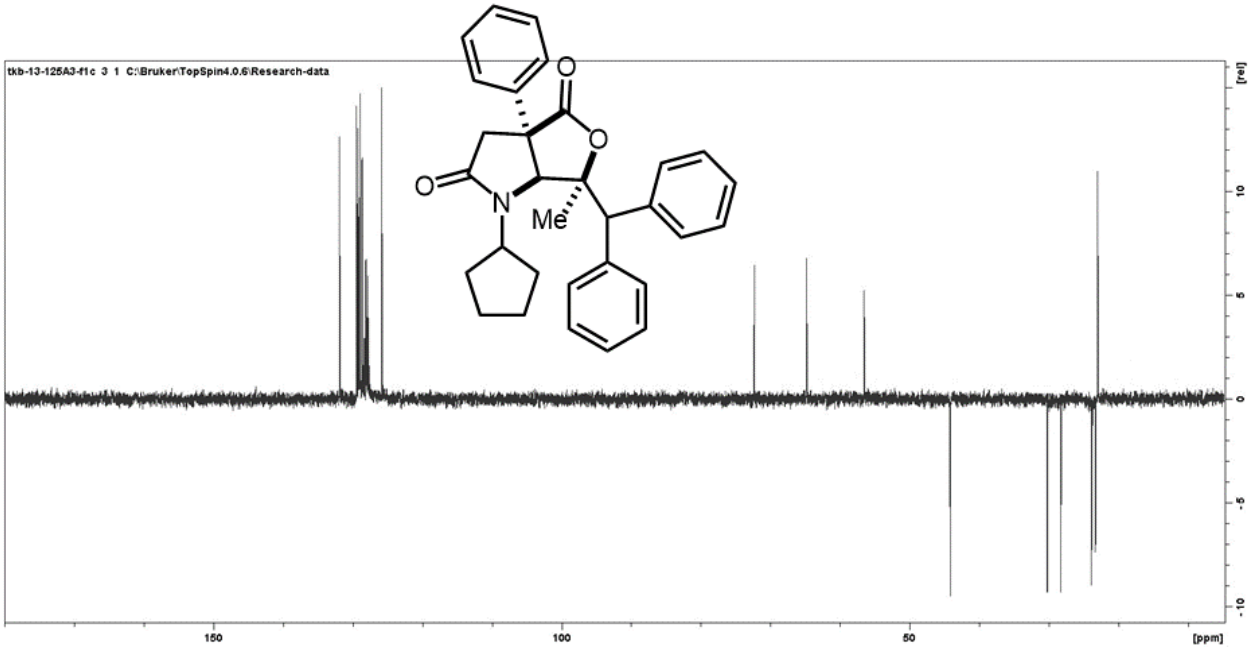
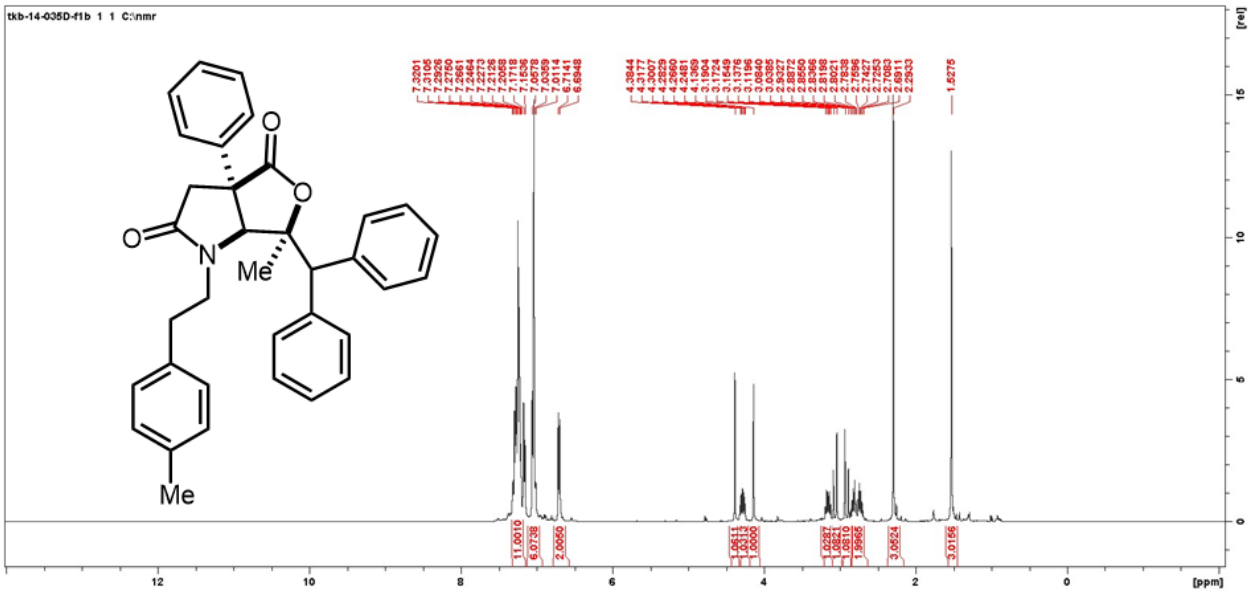


Compound 4e

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (35:65). Yellowish oil. Yield = 239.8 mg, 93%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32 – 7.20 (m, 11H), 7.17 – 7.01 (m, 6H), 6.70 (d, *J* = 7.7 Hz, 2H), 4.38 (s, 1H), 4.28 (dt, *J* = 14.0, 7.0 Hz, 1H), 4.14 (s, 1H), 3.21 – 3.06 (m, 2H), 2.96 – 2.67 (m, 3H), 2.29 (s, 3H), 1.53 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.9, 172.3, 139.3, 138.1, 137.6, 136.9, 132.2, 130.9, 130.0, 129.9, 128.9, 128.7, 128.6, 128.1, 127.7, 126.7, 125.8, 89.4, 70.8, 64.2, 52.5, 43.9, 43.2, 33.1, 22.4, 21.1. FTIR (KBr): 2985.4, 1737.5, 1691.2, 1644.9, 1511.0, 1448.5, 1414.7, 1384.9, 1357.4, 1298.7, 1247.5, 1179.3, 1002.8, 925.8, 791.0. **HRMS-EI^{+}** (*m/z*): calc for $C_{35}H_{33}NO_3$ $[M]^{+}$ 515.2460, found 515.2468.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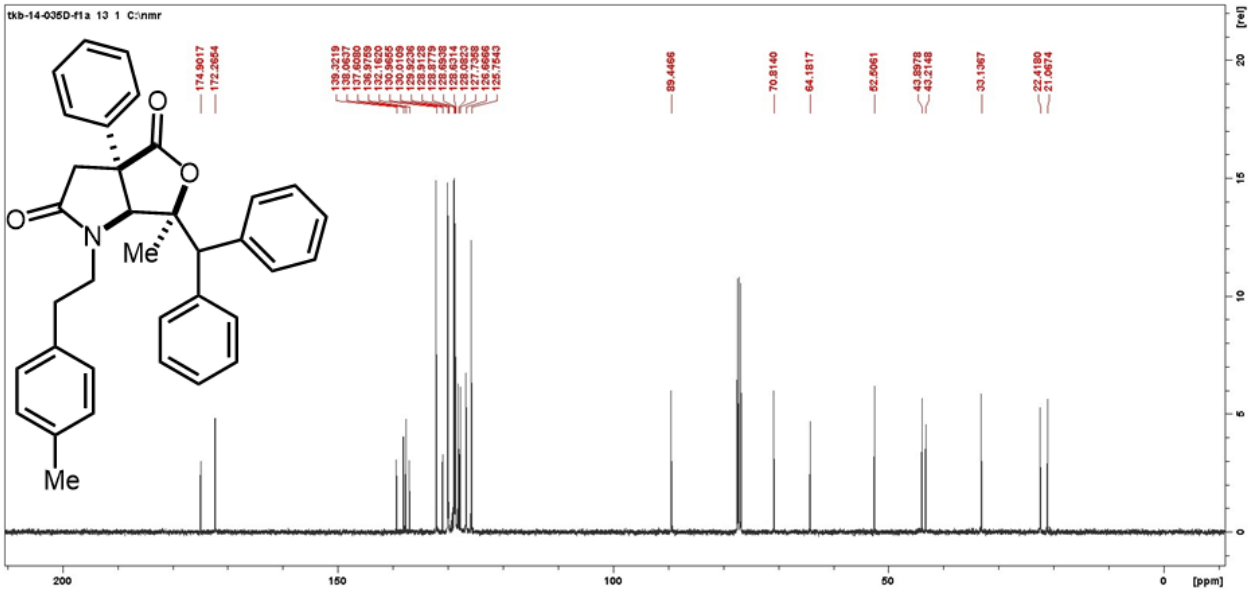
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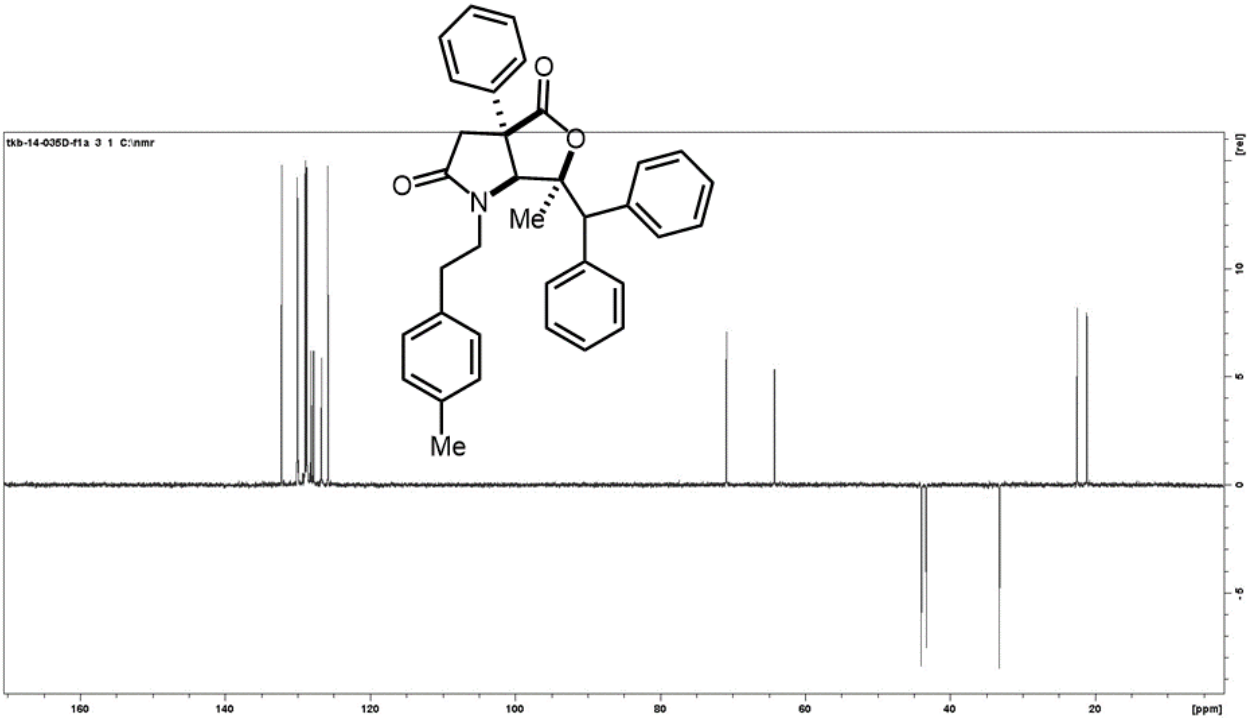
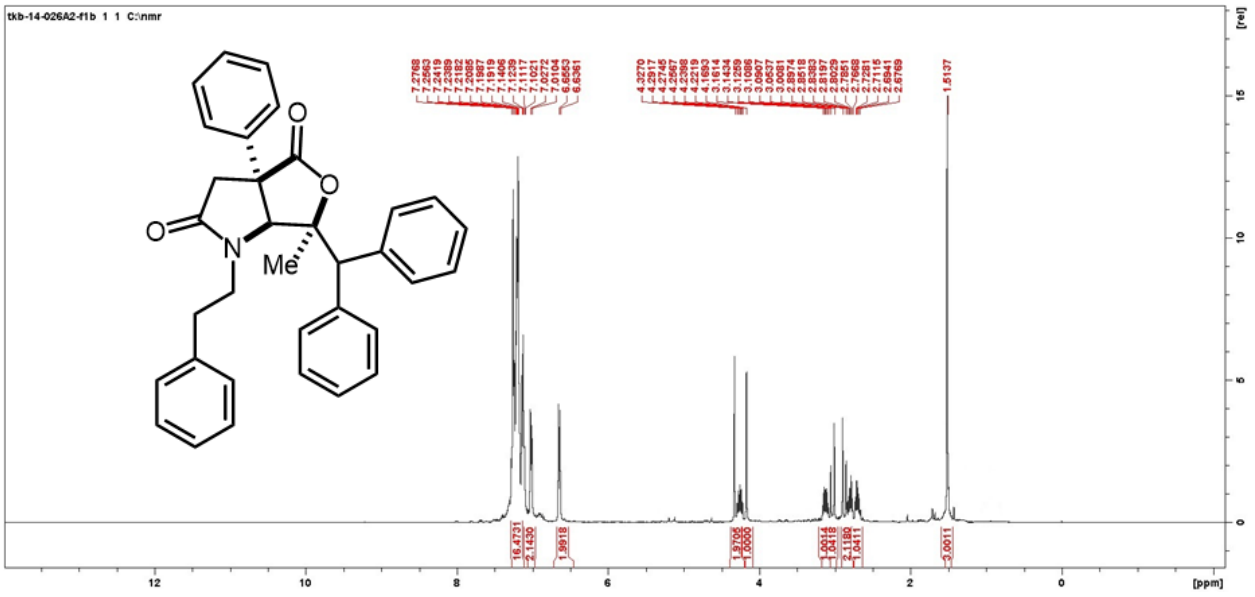


Compound 4f

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (35:65). Yellowish oil. Yield = 225.7 mg, 90%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.28 – 7.19 (m, 16H), 7.14 – 7.01 (m, 2H), 6.64 (dd, *J* = 7.6, 1.9 Hz, 2H), 4.33 (s, 1H), 4.28 – 4.20 (m, 1H), 4.17 (s, 1H), 3.18 – 3.02 (m, 1H), 3.01 (d, *J* = 18.6 Hz, 1H), 2.90 (d, *J* = 18.6 Hz, 1H), 2.87 – 2.61 (m, 2H), 1.51 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.9, 172.3, 139.2, 137.6, 136.7, 134.5, 131.7, 129.9, 129.2, 128.9, 128.8, 128.7, 128.2, 127.7, 126.7, 125.7, 89.4, 70.8, 63.6, 52.5, 43.9, 43.2, 33.1, 22.4. **HRMS-EI$^+$** (*m/z*): calc for $C_{34}H_{31}NO_3$ $[M]^+$ 501.2304, found 501.2307.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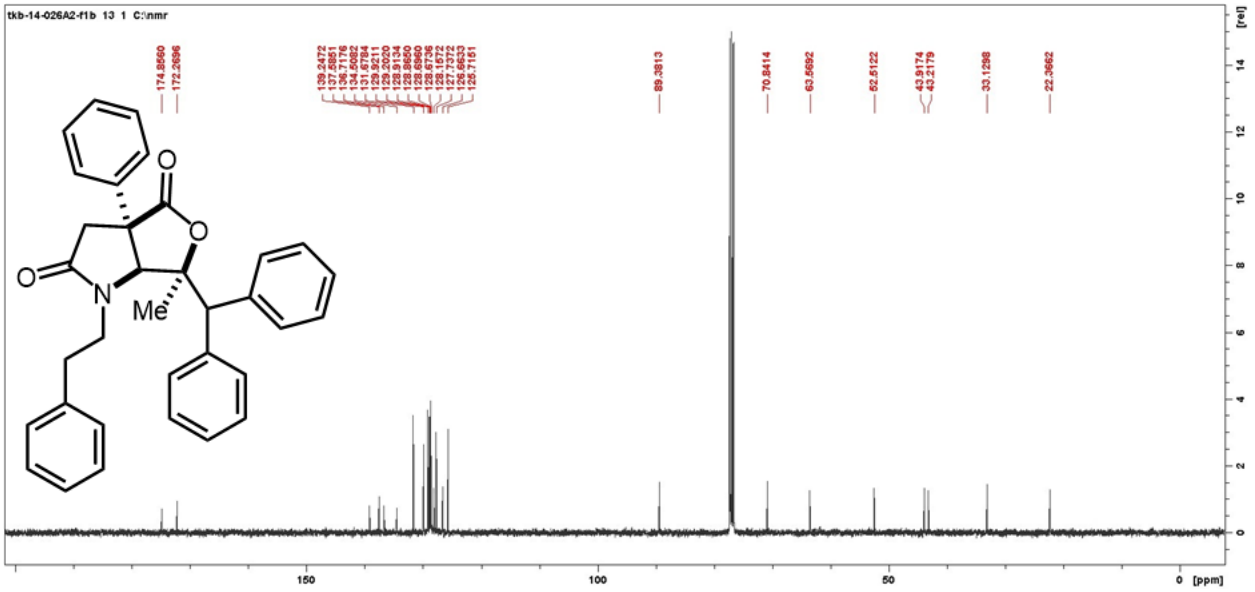
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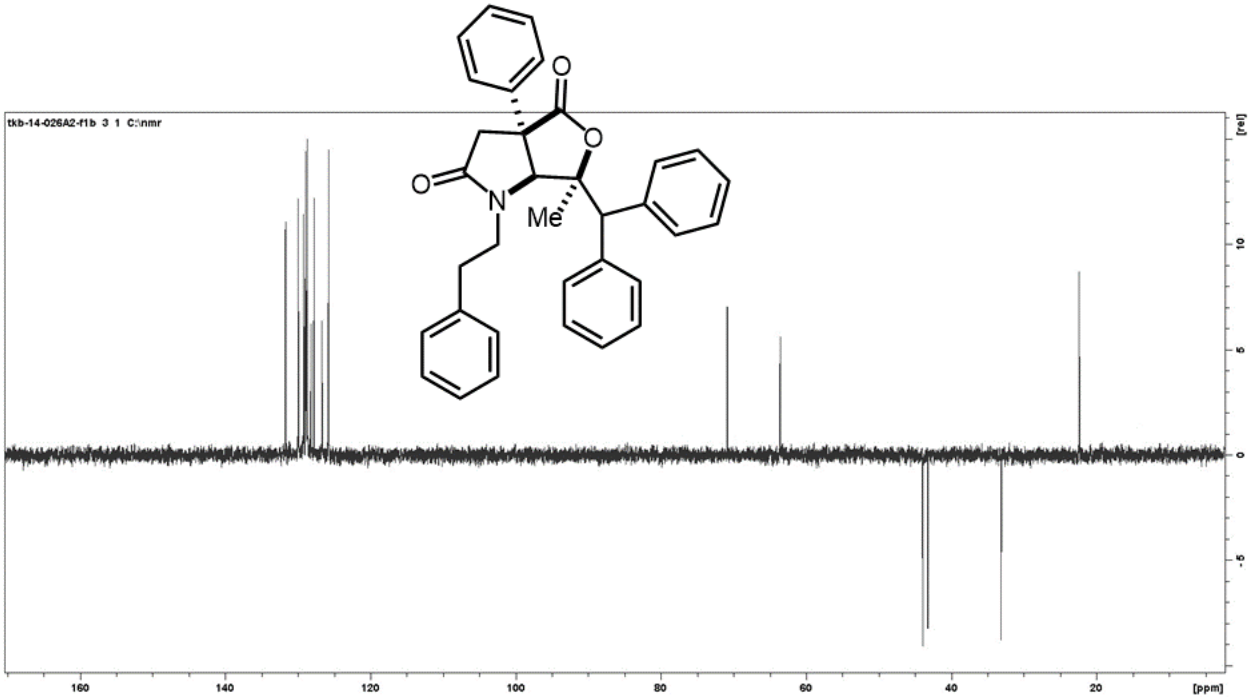
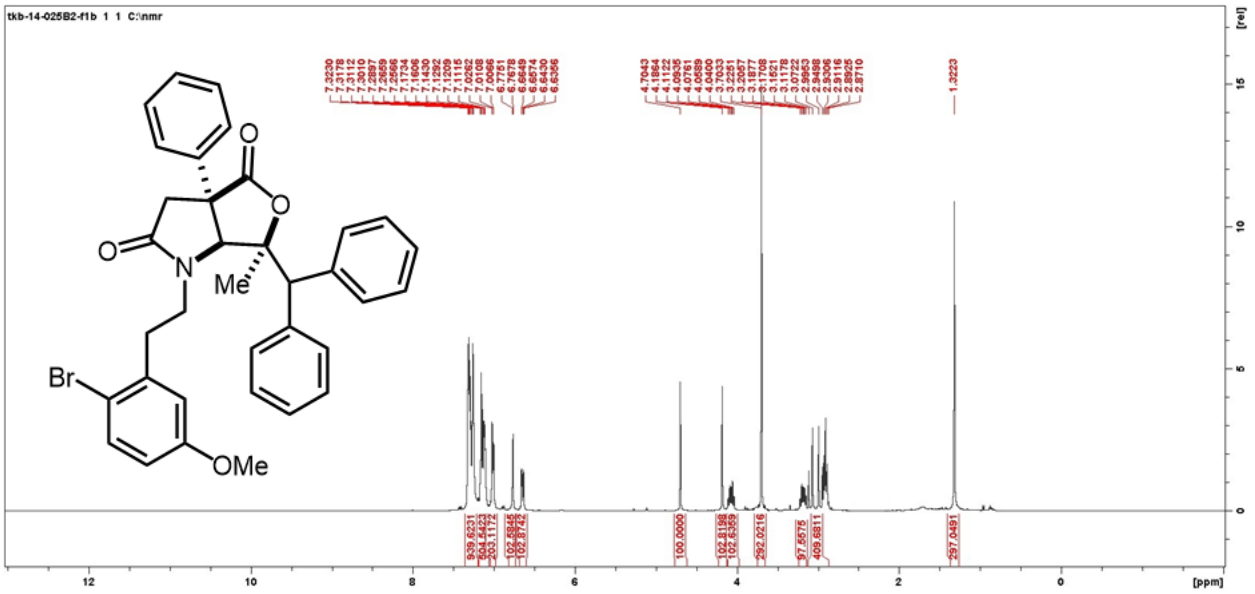


Compound 4g

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Amorphous solid. Yield = 253.4 mg, 83%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36 – 7.20 (m, 9H), 7.14 (dtd, *J* = 15.6, 7.4, 3.6 Hz, 5H), 7.07 – 6.97 (m, 2H), 6.77 (d, *J* = 3.1 Hz, 1H), 6.65 (dd, *J* = 8.8, 3.1 Hz, 1H), 4.70 (s, 1H), 4.19 (s, 1H), 4.08 (dt, *J* = 14.4, 7.5 Hz, 1H), 3.70 (s, 3H), 3.25 – 3.10 (m, 1H), 3.07 (s, 1H), 3.00 (s, 1H), 2.91 (p, *J* = 8.1 Hz, 2H), 1.32 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.8, 172.2, 159.3, 139.5, 137.9, 137.8, 134.4, 133.5, 131.7, 129.6, 129.2, 129.0, 128.6, 128.1, 127.9, 127.8, 125.7, 116.6, 114.6, 114.6, 89.2, 71.5, 64.5, 55.5, 52.2, 43.8, 42.6, 33.9, 22.6. **HRMS-EI$^+$** (*m/z*): calc for $C_{35}H_{32}BrNO_4$ $[M]^+$ 609.1515, found 609.1522.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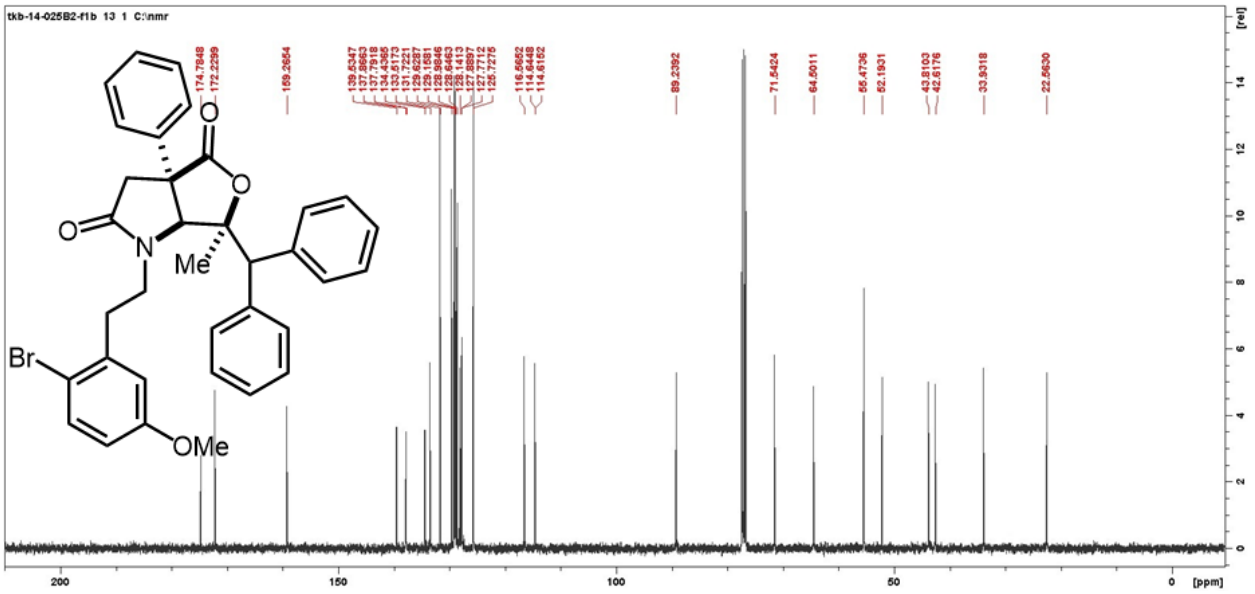
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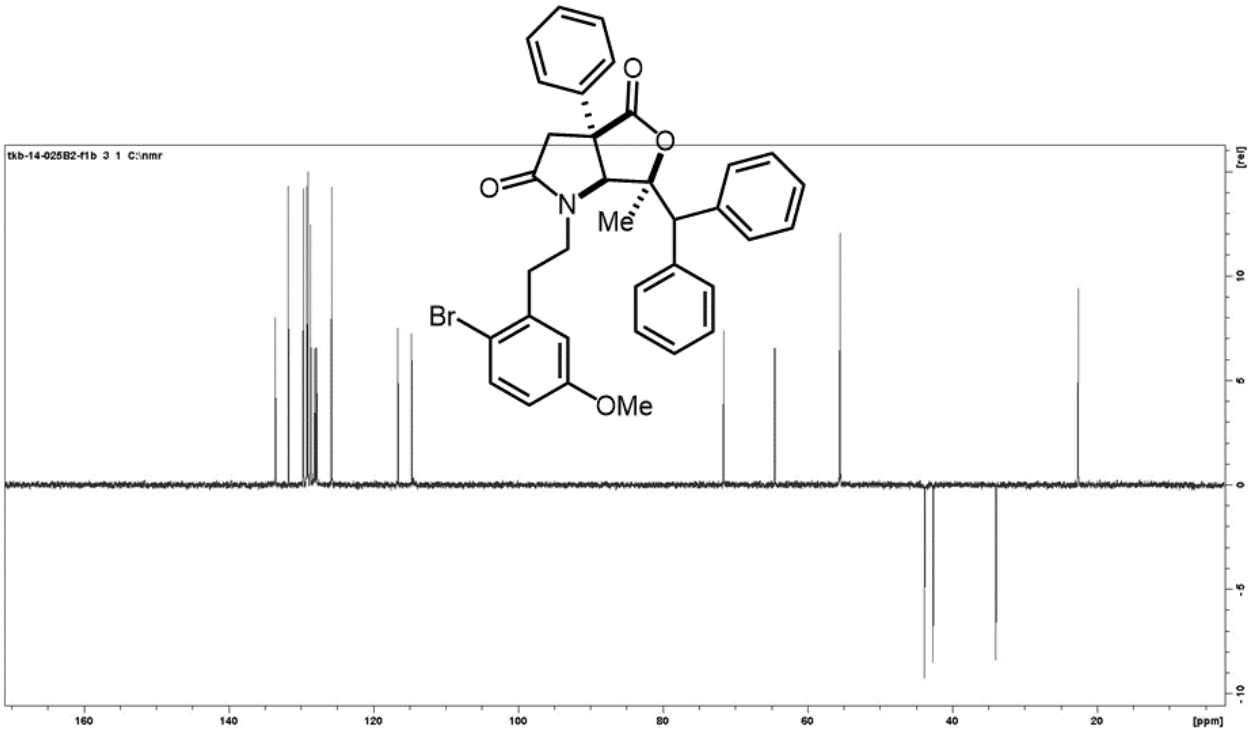
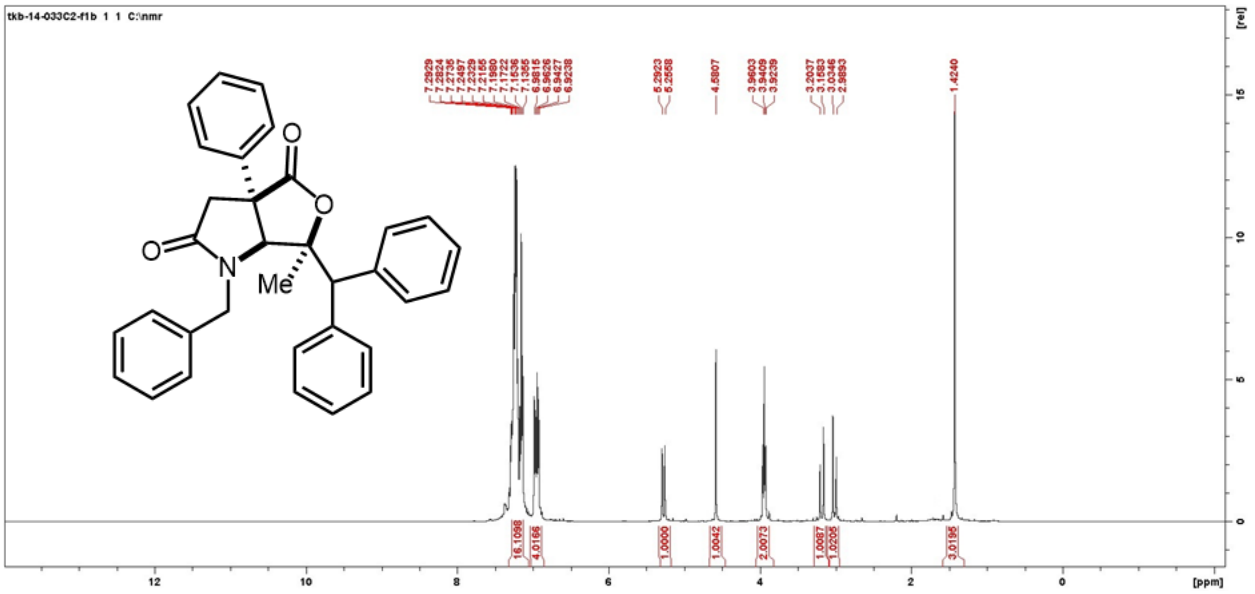


Compound 4h

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (70:30). Yellowish oil. Yield = 217.0 mg, 89%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.29 – 7.13 (m, 14H), 6.98 – 6.92 (m, 4H), 5.27 (d, J = 14.6 Hz, 1H), 4.58 (s, 1H), 3.96 – 3.92 (m, 2H), 3.16 (d, J = 18.3 Hz, 1H), 3.03 (d, J = 18.3 Hz, 1H), 1.42 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.7, 172.5, 139.2, 137.7, 134.8, 134.4, 131.9, 129.6, 129.1, 128.9, 128.9, 128.7, 128.6, 128.3, 128.1, 127.8, 127.8, 125.7, 88.9, 69.9, 64.7, 52.1, 46.8, 43.7, 22.6. **HRMS-EI^{+}** (*m/z*): calc for $C_{33}H_{29}NO_3$ $[M]^{+}$ 487.2147, found 487.2142.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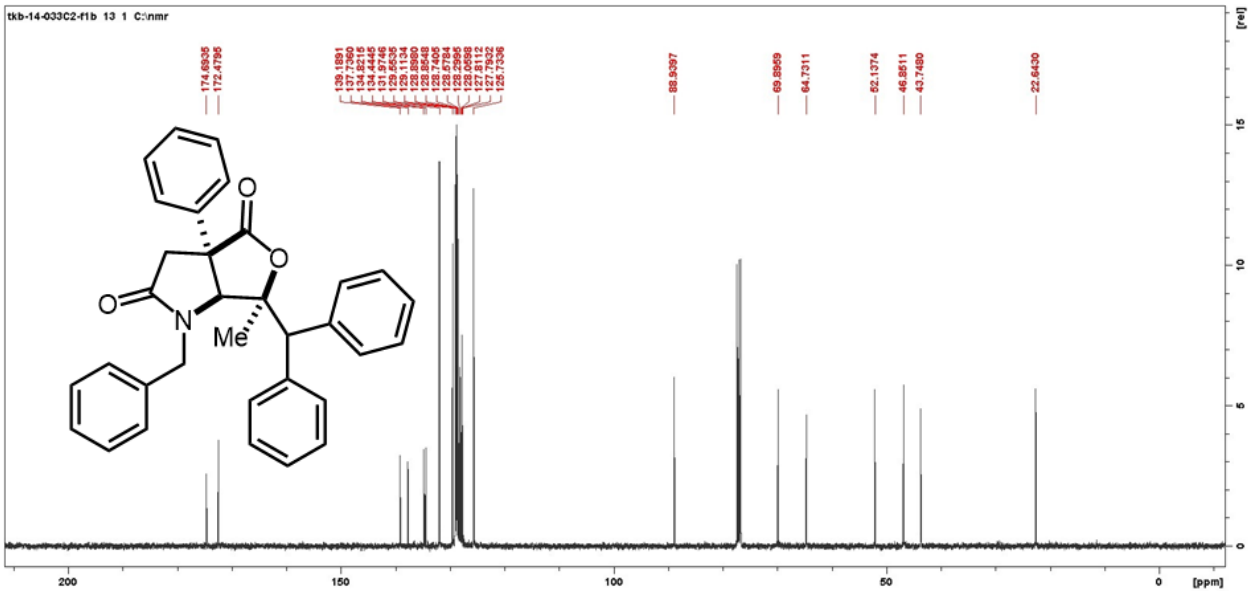
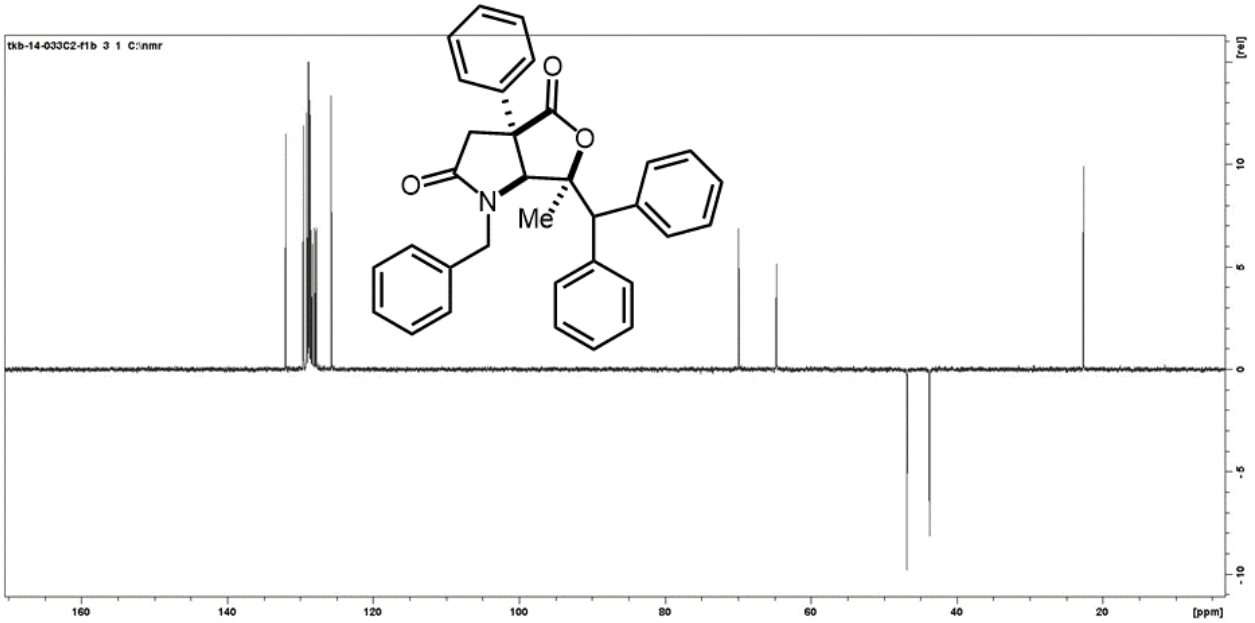
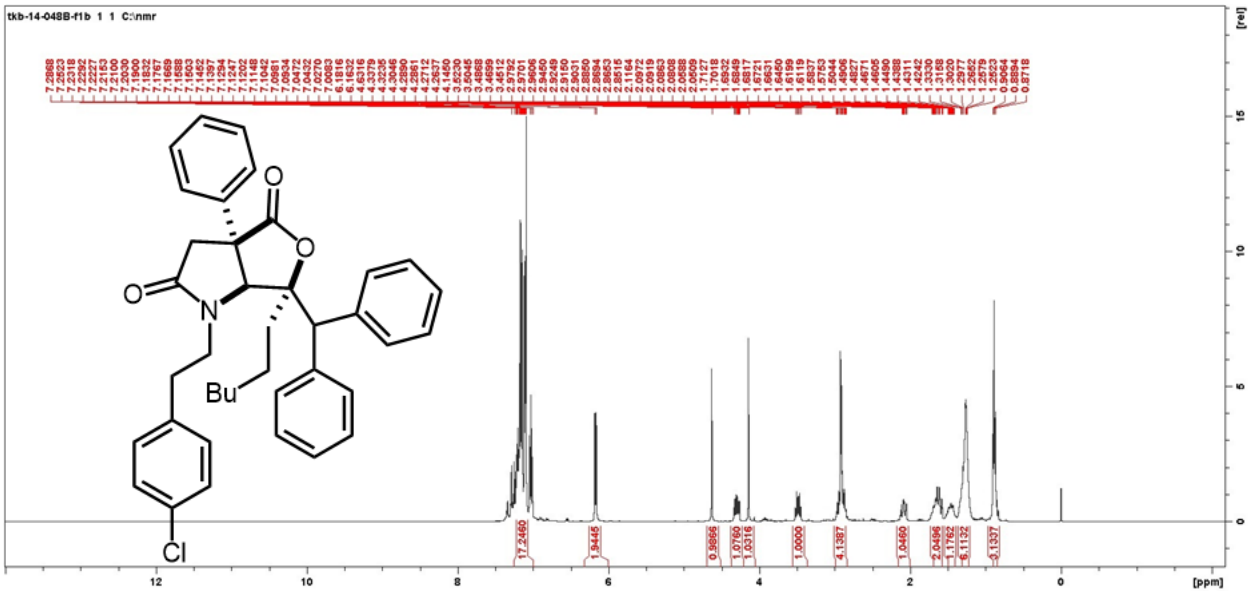
Me
[ppm]
[rel]


tkb-14-033C2-f1b 13 1 C:\nmr
Me
[ppm]
[rel]



Compound 4i

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (75:25). Yellowish oil. Yield = 227.3 mg, 75%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32 – 7.05 (m, 17H), 6.12 (d, *J* = 7.6 Hz, 2H), 4.71 (s, 1H), 4.37 – 4.26 (m, 1H), 4.06 (s, 1H), 3.57 (dt, *J* = 14.2, 7.3 Hz, 1H), 3.06 – 2.77 (m, 4H), 2.13 (ddd, *J* = 14.0, 11.5, 4.3 Hz, 1H), 1.75 – 1.54 (m, 3H), 1.37 – 1.16 (m, 6H), 0.90 (t, *J* = 6.9 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.8, 172.4, 138.6, 136.5, 134.5, 133.2, 132.4, 131.0, 130.5, 129.3, 128.8, 128.7, 128.1, 127.7, 127.6, 125.4, 90.0, 70.4, 56.9, 52.5, 43.9, 41.8, 35.3, 33.4, 31.6, 29.5, 23.0, 22.5, 14.0. **HRMS-EI**$^{+}$ (*m/z*): calc for $C_{39}H_{40}ClNO_3$ $[M]^{+}$ 605.2697, found 605.2692.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O
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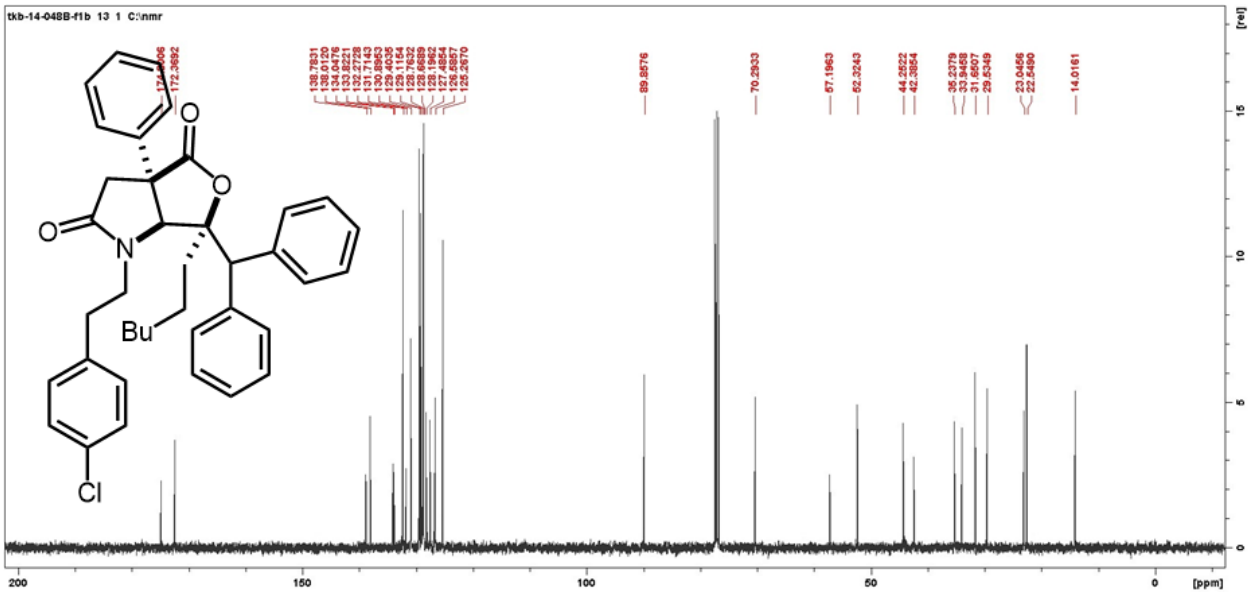
N
Bu
Cl
[rel]
[ppm]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O
O
N
Bu
Cl
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70.2933
67.1963
62.3243
44.3522
42.3854
35.2379
33.9468
31.6807
29.5049
23.0456
22.5490
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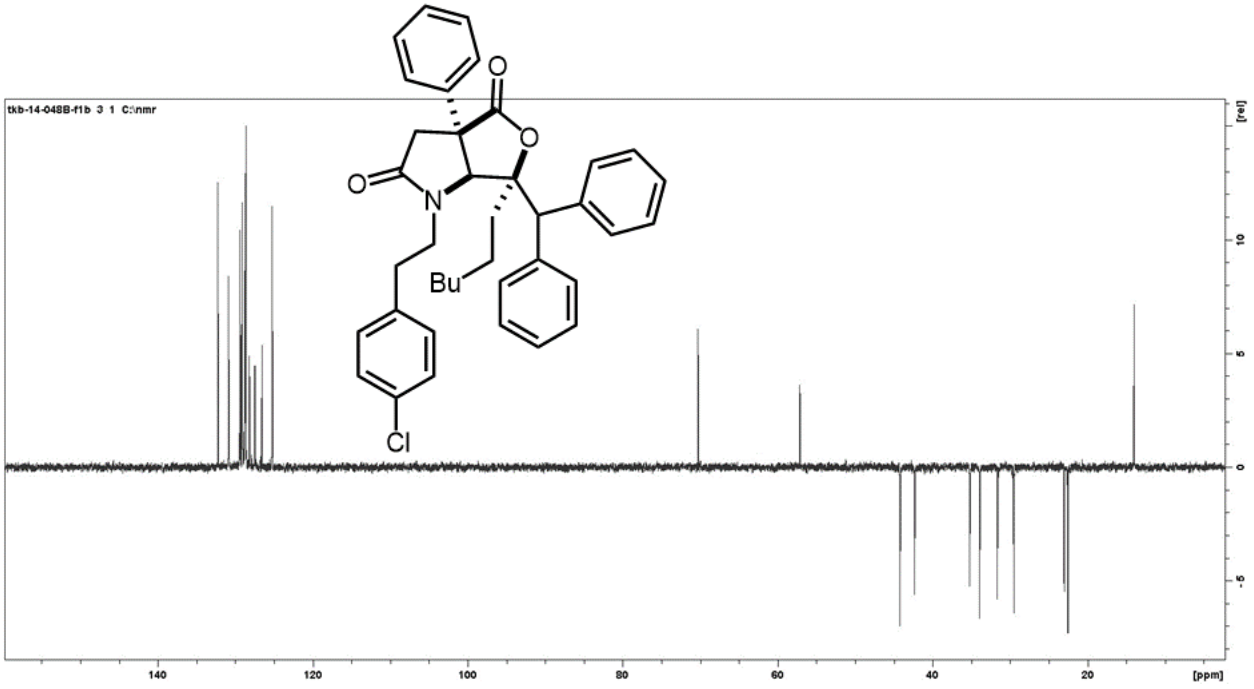
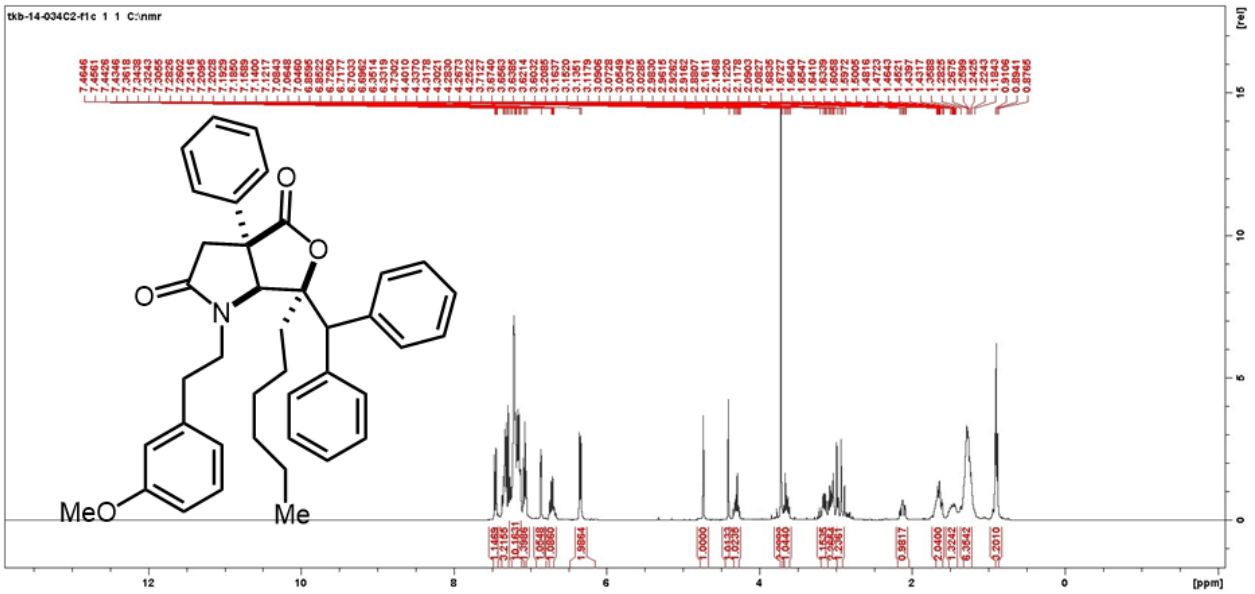
[rel]
[ppm]



Compound 4j

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (75:25). Yellowish oil. Yield = 216.6 mg, 72%. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45 (dd, *J* = 8.8, 3.4 Hz, 1H), 7.32 – 7.26 (m, 11H), 7.07 (t, *J* = 7.6 Hz, 2H), 6.86 (d, *J* = 3.0 Hz, 1H), 6.71 (qd, *J* = 8.0, 3.0 Hz, 2H), 6.34 (d, *J* = 7.7 Hz, 2H), 4.73 (s, 1H), 4.40 (s, 1H), 4.36 – 4.23 (m, 1H), 3.71 (s, 3H), 3.63 (dd, *J* = 14.1, 7.2 Hz, 1H), 3.23 – 2.77 (m, 4H), 2.12 (ddd, *J* = 13.9, 12.2, 4.5 Hz, 1H), 1.63 (ddd, *J* = 14.6, 10.1, 3.8 Hz, 2H), 1.54 – 1.40 (m, 1H), 1.39 – 1.18 (m, 6H), 0.89 (t, *J* = 6.8 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.8, 172.5, 159.2, 139.0, 138.4, 134.7, 133.6, 133.5, 131.5, 130.9, 130.8, 129.8, 129.2, 129.1, 129.0, 128.8, 128.6, 128.5, 128.1, 127.4, 125.6, 125.0, 116.4, 115.2, 114.4, 90.2, 70.3, 57.0, 55.4, 55.4, 52.2, 43.1, 42.7, 35.3, 34.0, 31.6, 29.5, 23.1, 22.5, 14.0. **HRMS-EI^{+}** (*m/z*): calc for $C_{40}H_{43}NO_4$ $[M]^{+}$ 601.3192, found 601.3196.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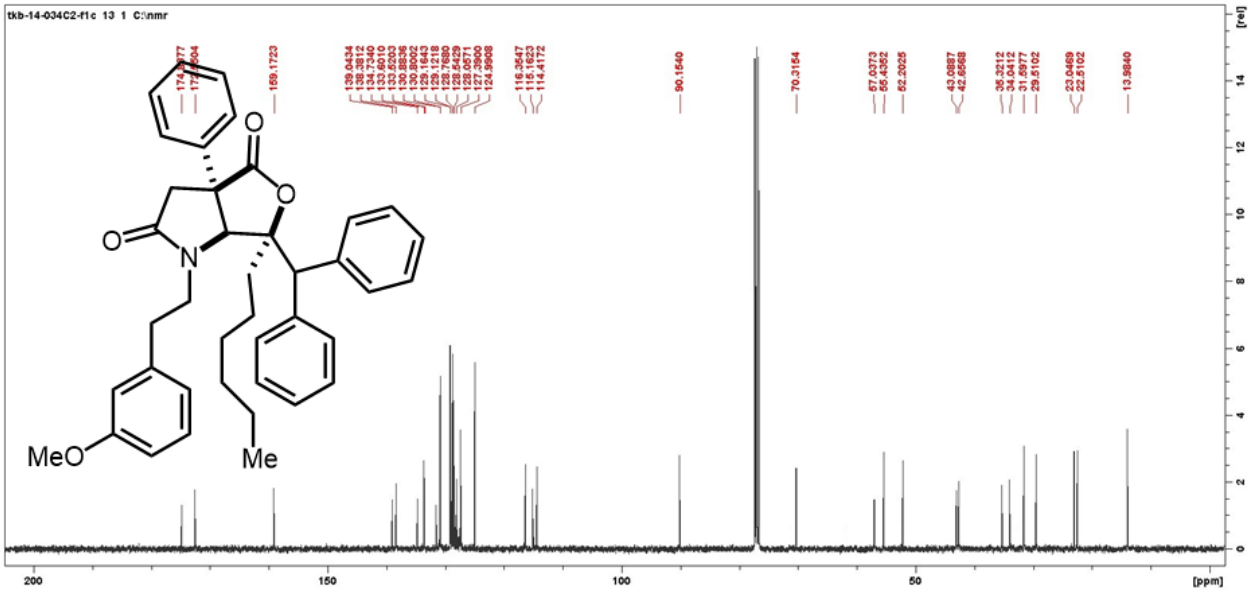
Me
[ppm]
[rel]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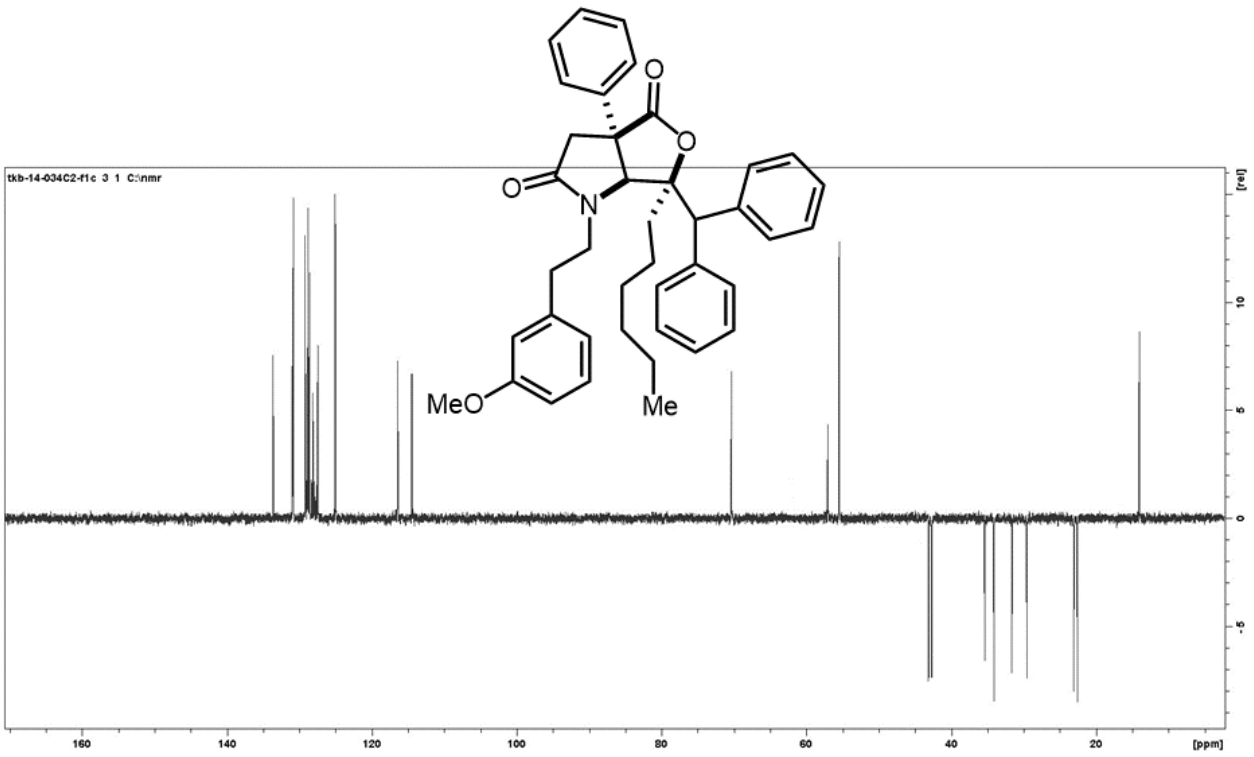
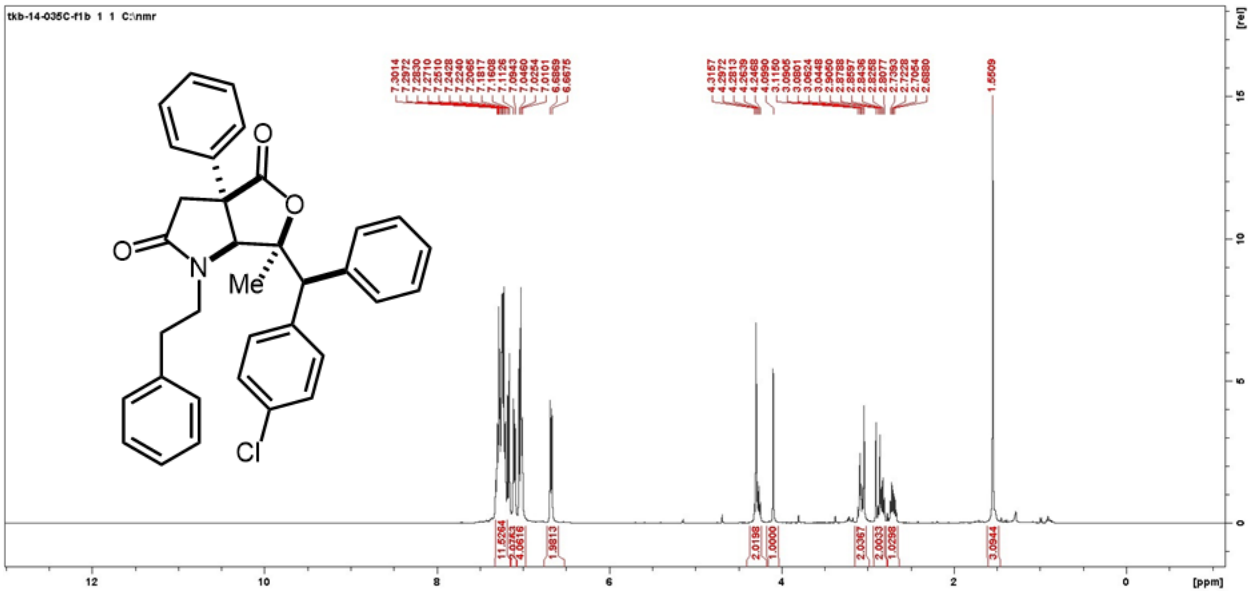


Compound 4k

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Yellowish oil. Yield = 241.2 mg, 90%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30 – 7.01 (m, 17H), 6.68 (d, *J* = 7.5 Hz, 2H), 4.30 (s, 1H), 4.34 – 4.22 (m, 1H), 4.10 (s, 1H), 3.14 – 3.02 (m, 2H), 2.93 – 2.77 (m, 2H), 2.71 (dt, *J* = 13.7, 6.7 Hz, 1H), 1.55 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.9, 172.3, 139.2, 137.6, 136.4, 134.1, 133.2, 132.7, 129.9, 129.3, 128.9, 128.8, 128.7, 128.3, 127.8, 126.7, 125.7, 89.3, 71.0, 63.9, 52.6, 44.0, 43.3, 33.1, 22.1. **HRMS-EI^{+}** (*m/z*): calc for $C_{34}H_{30}ClNO_3$ $[M]^{+}$ 535.1914, found 535.1918.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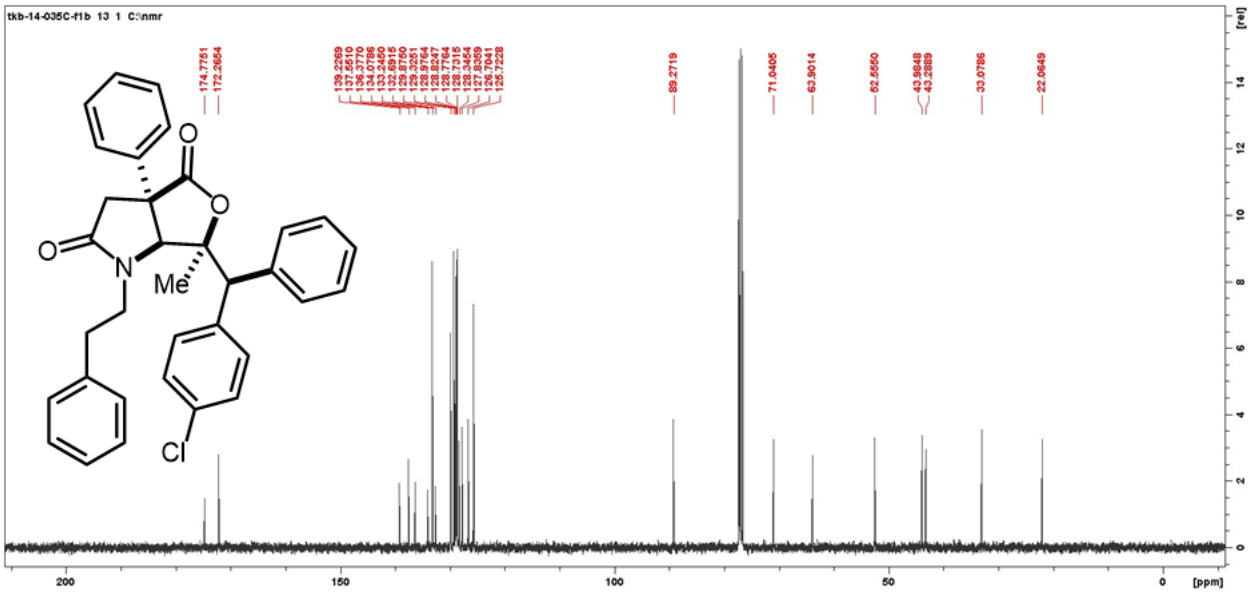
O
N
Me
Cl
[rel]
[ppm]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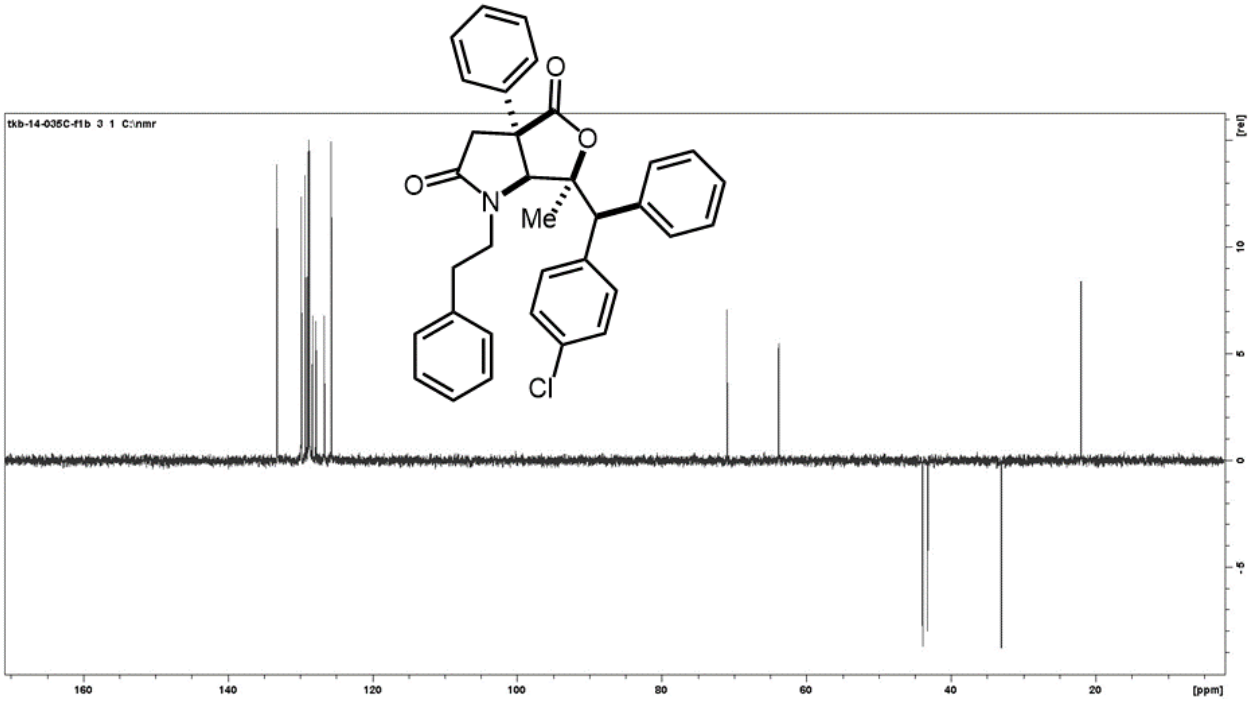
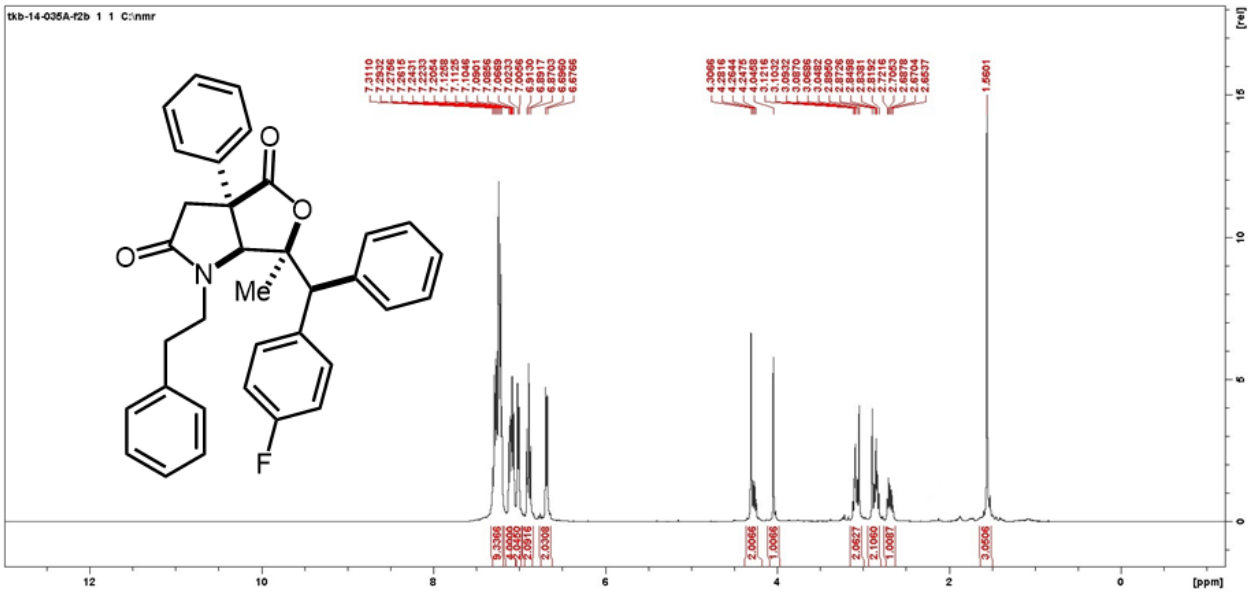
O
N
Me
Cl
[rel]
[ppm]



Compound 4l

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Yellowish oil. Yield = 226.0 mg, 87%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31 – 7.20 (m, 9H), 7.12 – 7.00 (m, 6H), 6.89 (t, *J* = 8.5 Hz, 2H), 6.69 (d, *J* = 7.8 Hz, 2H), 4.31 (s, 1H), 4.28 (dt, *J* = 13.8, 6.9 Hz, 1H), 4.05 (s, 1H), 3.14 – 3.01 (m, 2H), 2.93 – 2.78 (m, 2H), 2.69 (dt, *J* = 13.8, 6.7 Hz, 1H), 1.56 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.9, 172.3, 163.8, 161.4, 139.3, 137.6, 136.6, 134.8, 134.7, 129.9, 128.9, 128.85, 128.7, 128.3, 127.8, 126.7, 125.8, 116.4, 116.2, 89.4, 71.1, 64.6, 52.6, 44.0, 43.3, 33.0, 21.9. **HRMS-EI^{+}** (*m/z*): calc for $C_{34}H_{30}FNO_3$ $[M]^{+}$ 519.2210, found 519.2215.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N
Me
F
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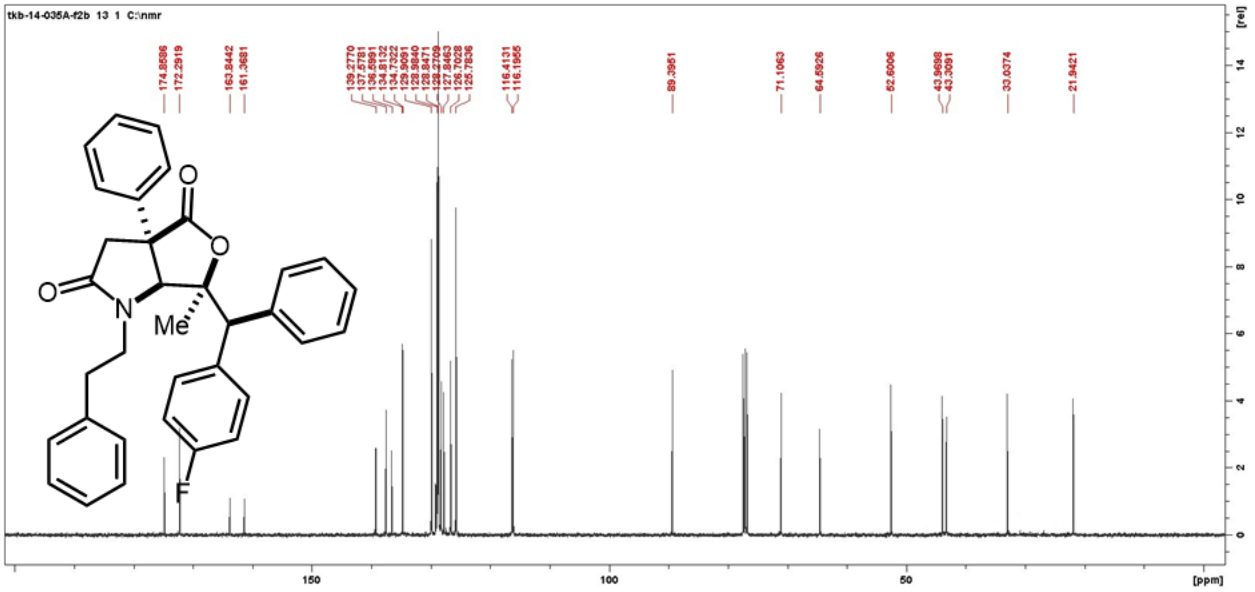
[ppm]
[rel]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163.8442
161.3681
139.2770
137.5781
134.6181
134.4332
134.7322
129.9091
128.9840
128.8471
128.2709
127.8463
126.7028
125.7836
116.4131
116.1966
89.3951
71.1063
64.5926
62.6006
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21.9421
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O
O
N
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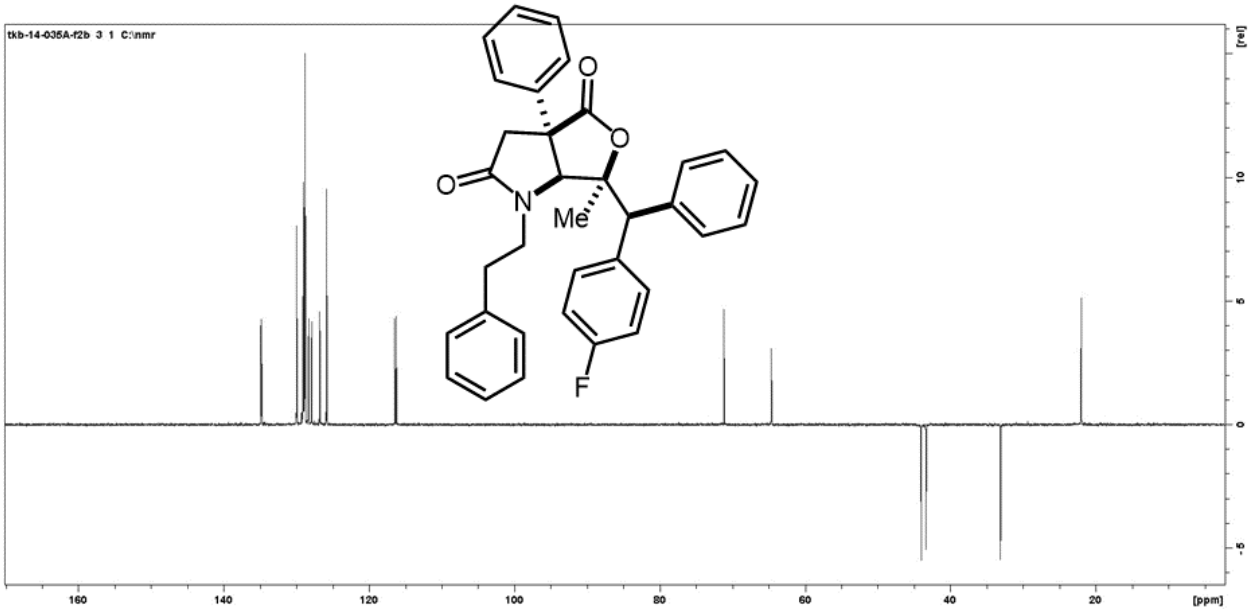
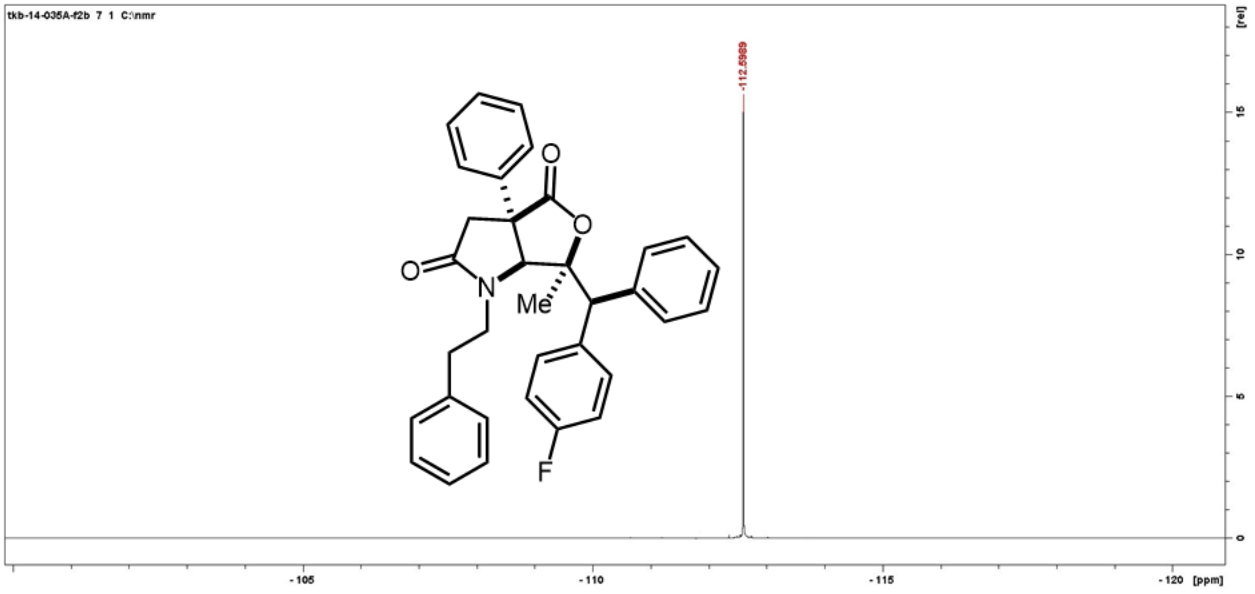
F
[ppm]
[rel]

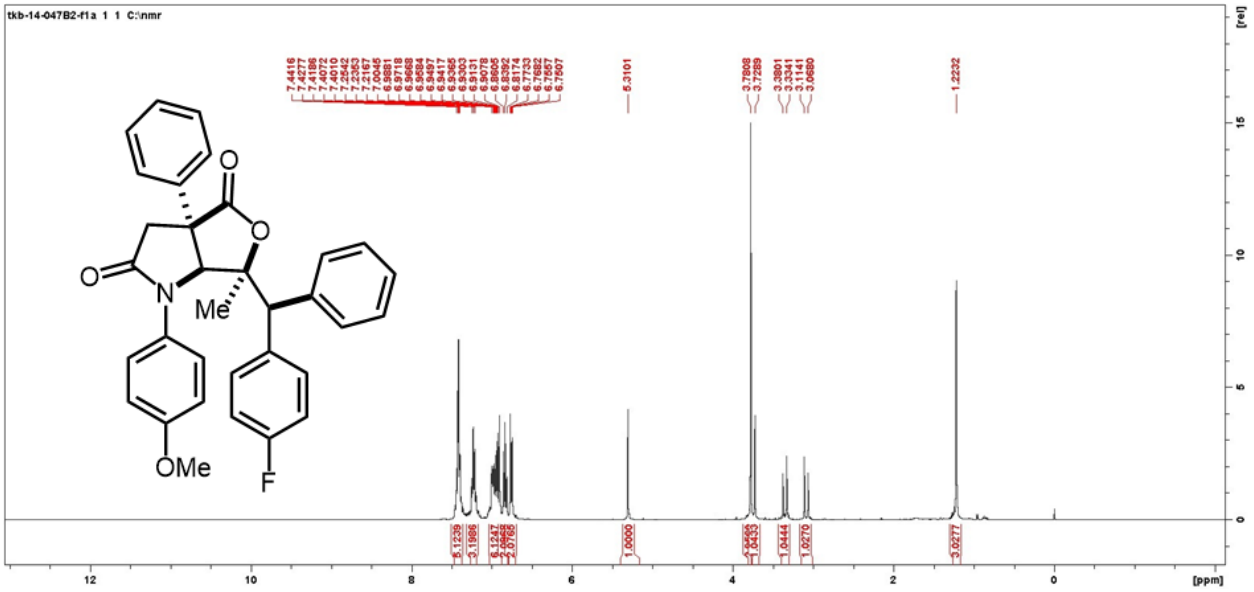


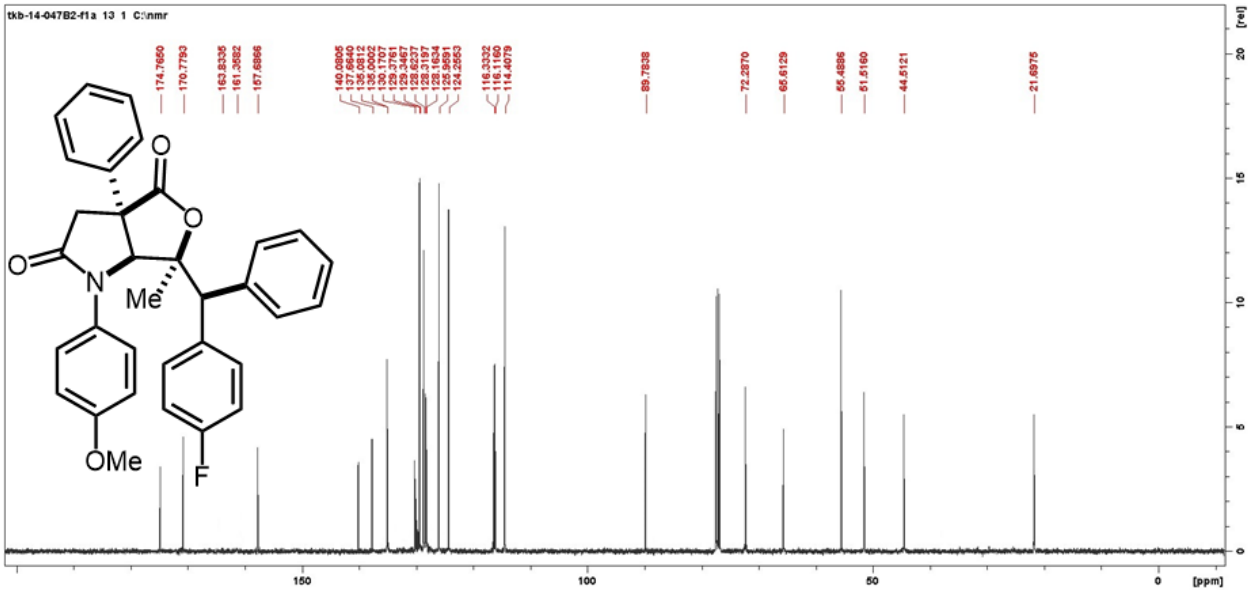


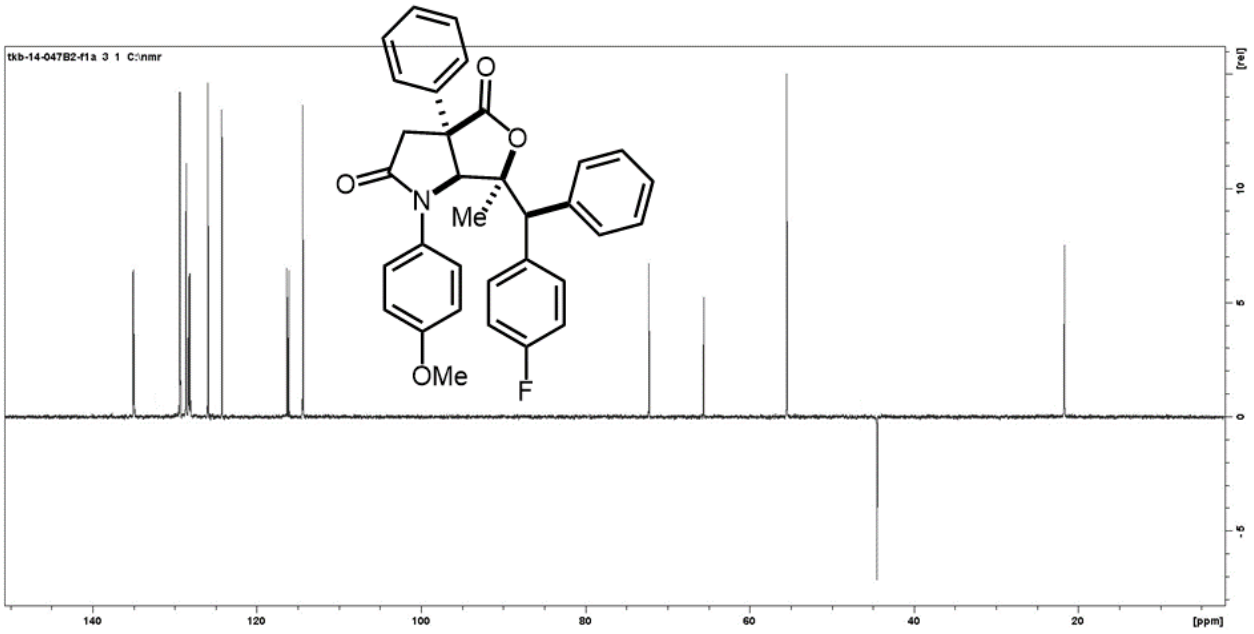
Compound 4m

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Yellowish oil. Yield = 211.2 mg, 81%, 95:5 dr. ^{1}H NMR (400 MHz, CDCl3) δ 7.50 – 7.28 (m, 5H), 7.32 – 7.15 (m, 3H), 7.08 – 6.68 (m, 10H), 5.31 (s, 1H), 3.78 (s, 3H), 3.73 (s, 1H), 3.36 (d, J = 18.4 Hz, 1H), 3.09 (d, J = 18.4 Hz, 1H), 1.22 (s, 3H). ^{13}C NMR (101 MHz, CDCl3) δ 174.8, 170.8, 163.8, 161.4, 157.7, 140.1, 137.7, 135.1, 135.0, 130.2,

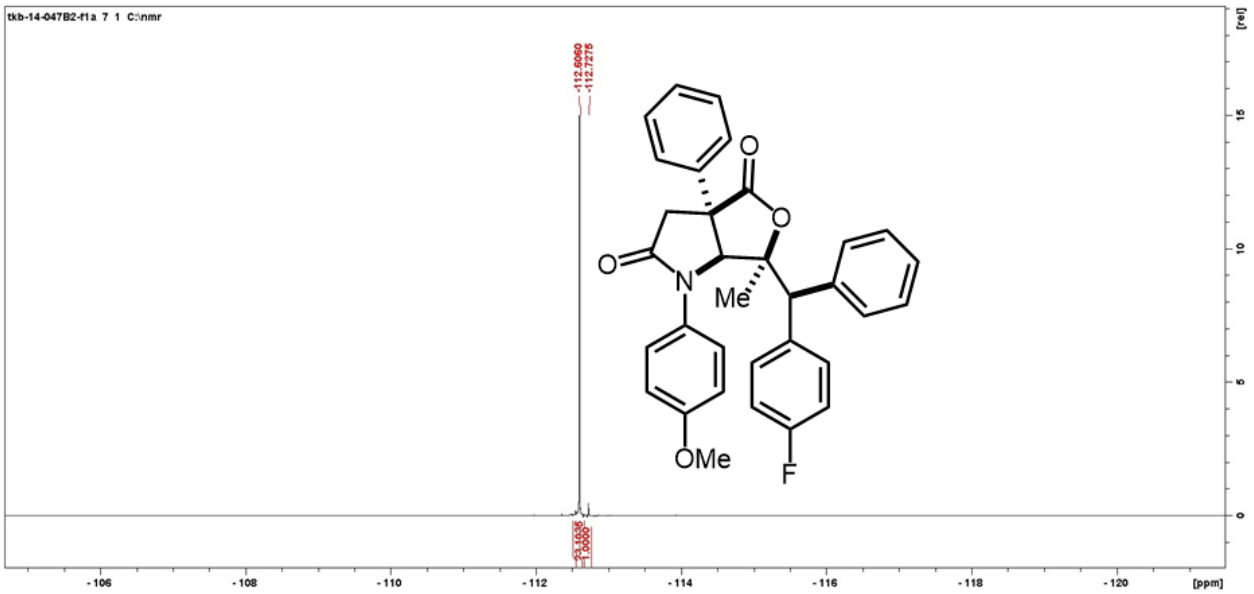
129.4, 129.3, 128.6, 128.3, 128.2, 126.0, 124.3, 116.3, 116.1, 114.4, 89.8, 72.3, 65.6, 55.5, 51.5, 44.5, 21.7. **HRMS-EI**$^{+}$ (*m/z*): calc for $C_{33}H_{28}FNO_4$ $[M]^{+}$ 521.2002, found 521.2008.







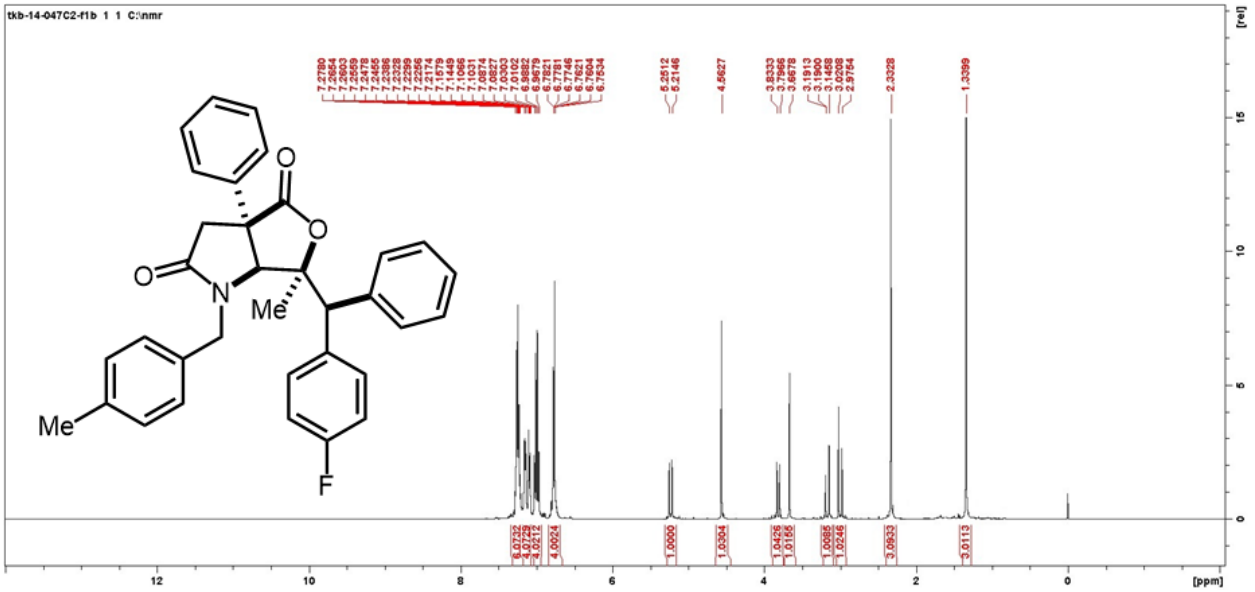
^{19}F NMR

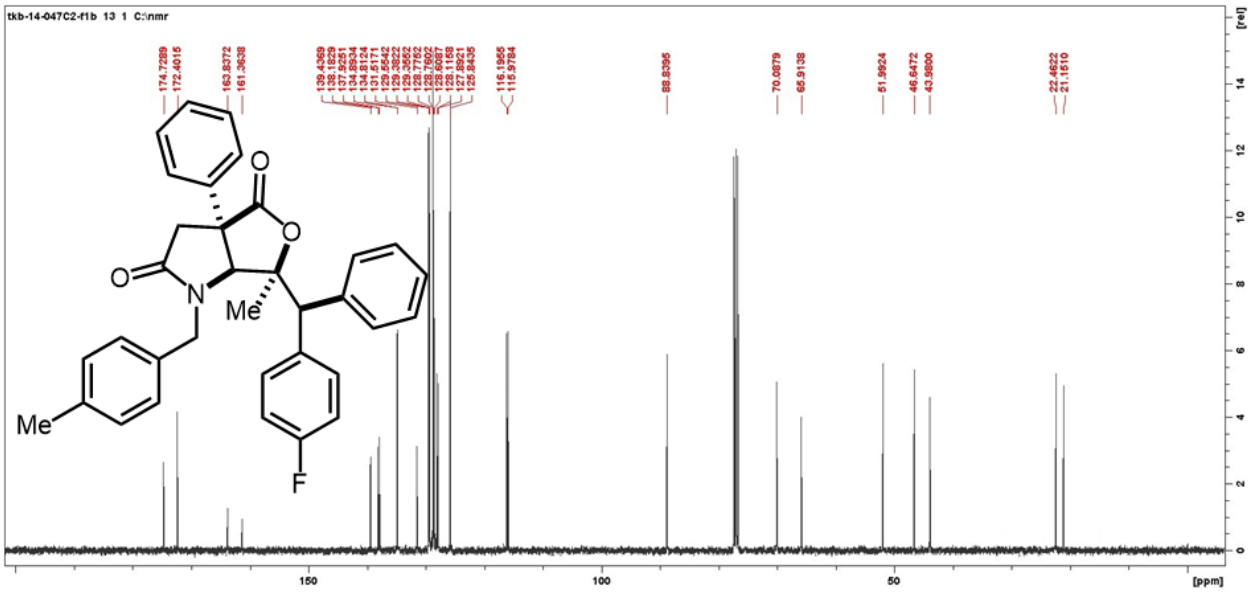


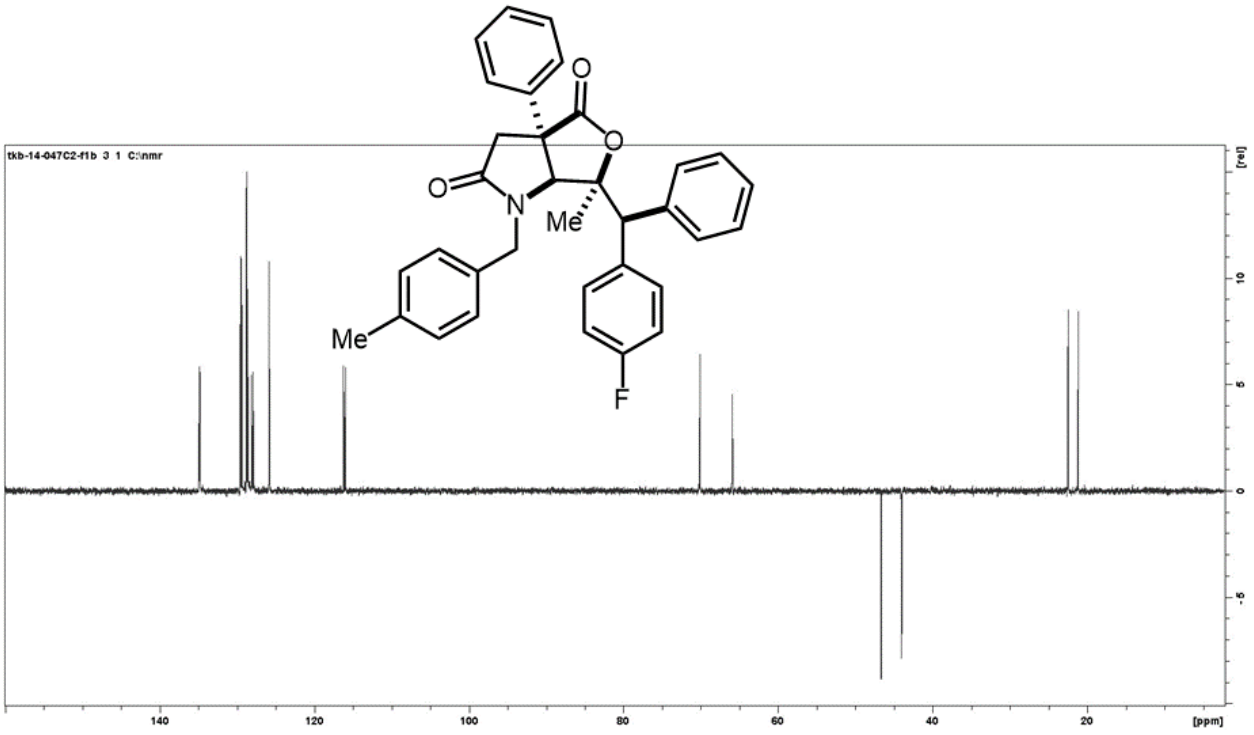
Compound 4n

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Yellowish oil. Yield = 202.6 mg, 78%, 95:5 dr. ^{1}H NMR (400 MHz, CDCl3) δ 7.32 –7.04 (m, 14H), 6.84 – 6.69 (m, 4H), 5.23 (d, J = 14.7 Hz, 1H), 4.56 (s, 1H), 3.81 (d, J = 14.7 Hz, 1H), 3.67 (s, 1H), 3.17 (d, J = 18.1 Hz, 1H), 3.02 (d, J = 18.1 Hz, 1H), 2.33 (s, 3H), 1.34 (s, 3H). ^{13}C NMR (101 MHz, CDCl3) δ 174.7, 172.4, 163.8, 161.4, 139.4, 138.2,

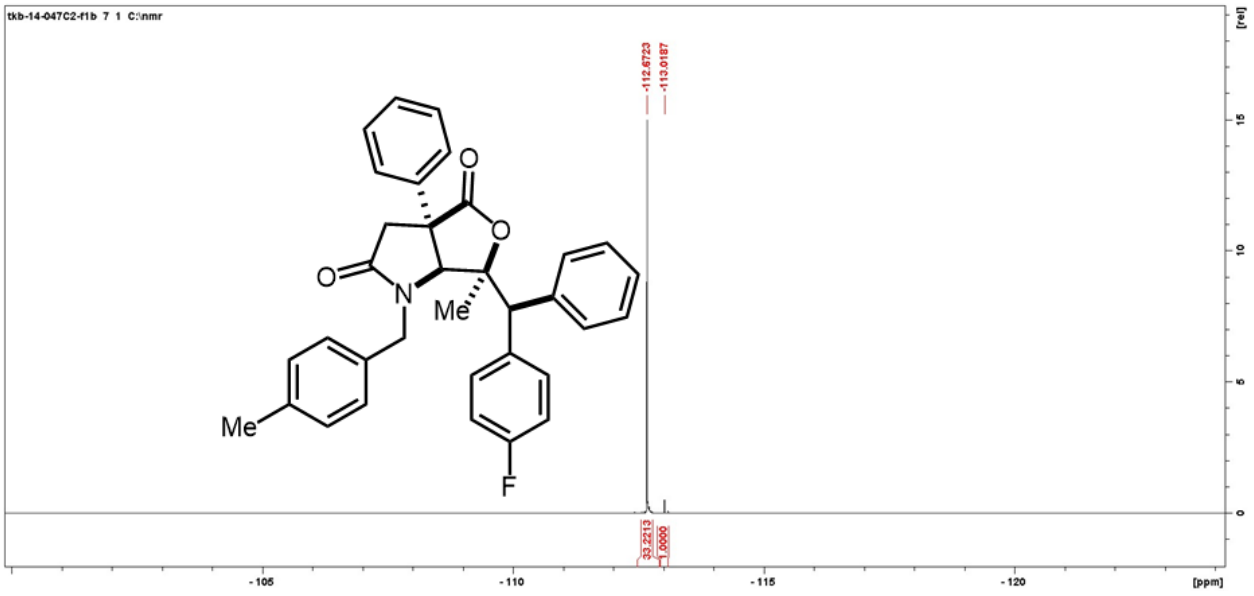
137.9, 134.9, 134.8, 131.5, 129.6, 129.4, 128.8, 128.8, 128.6, 128.5, 128.1, 127.9, 125.8, 116.2, 116.0, 88.8, 70.1, 65.9, 52.0, 46.6, 44.0, 22.5, 21.2. **HRMS-EI**$^+$ (*m/z*): calc for $C_{34}H_{30}FNO_3$ $[M]^+$ 519.2210, found 519.2214.







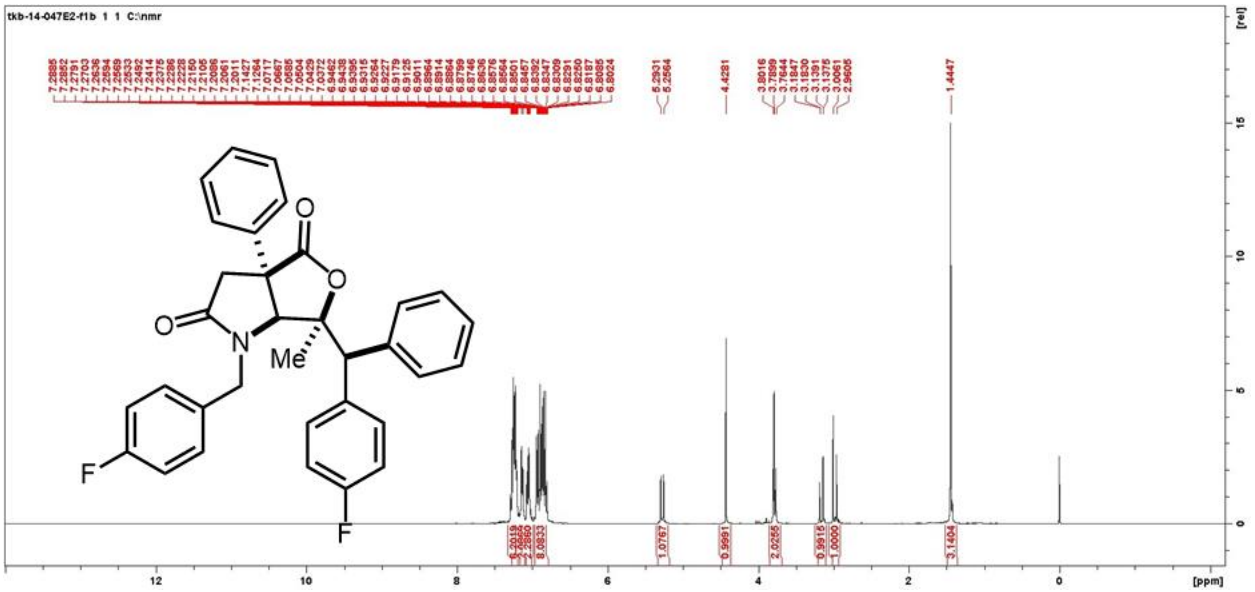
^{19}F NMR

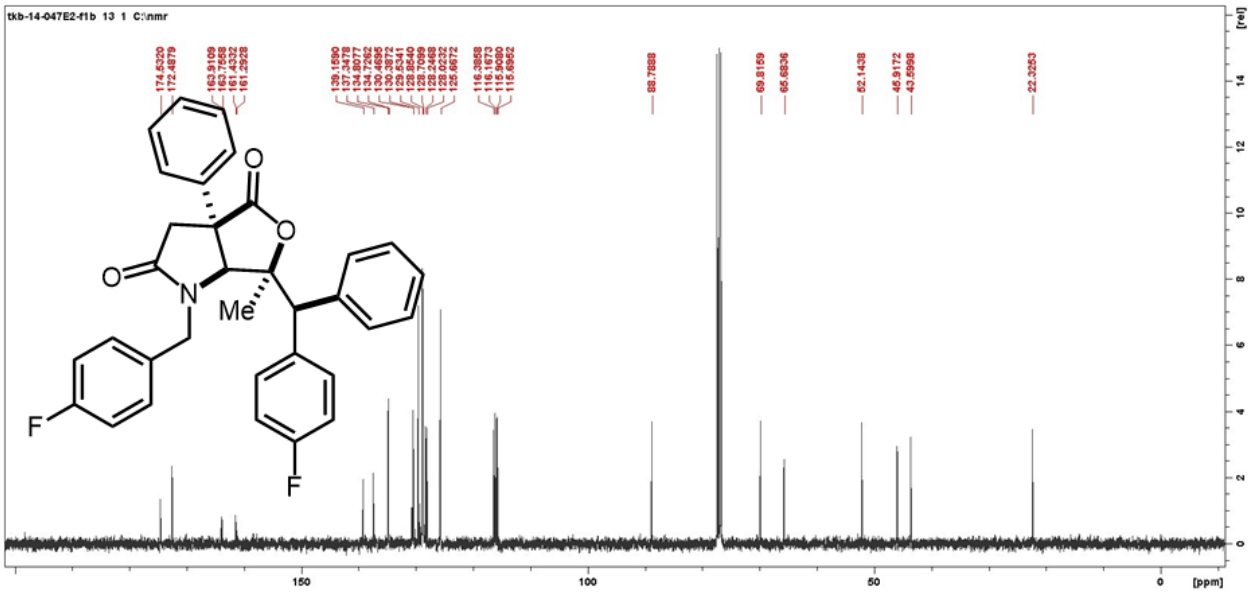


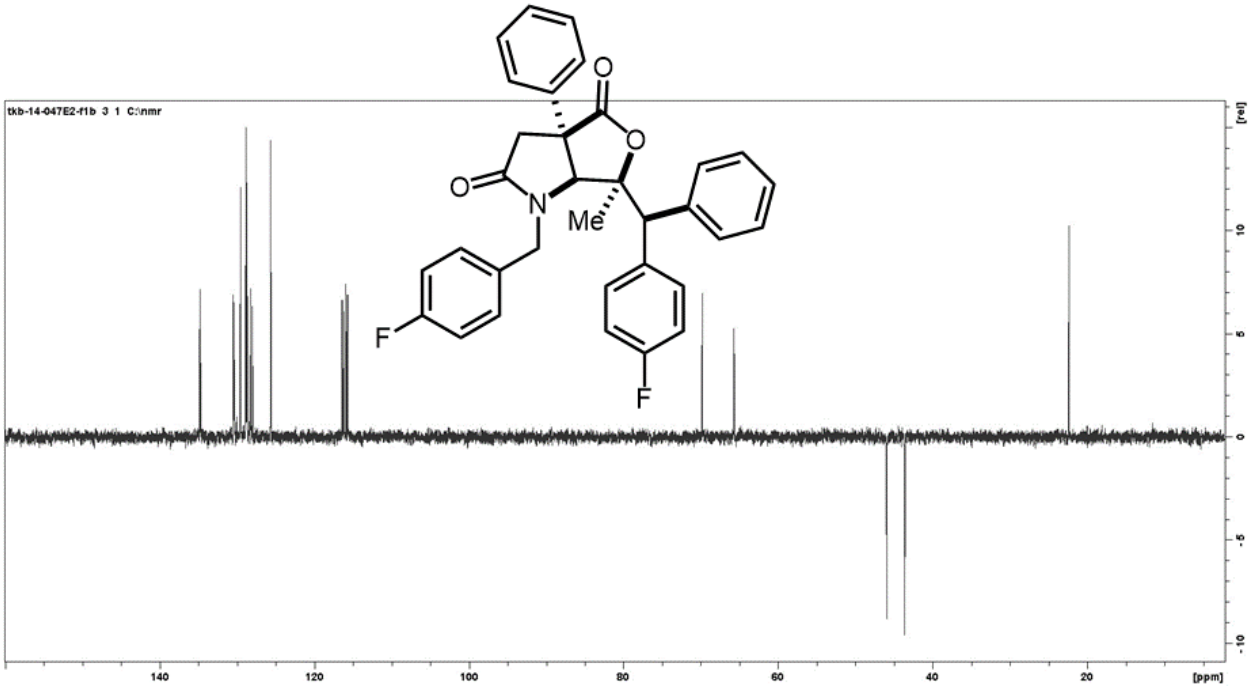
Compound 4o

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Yellowish oil. Yield = 196.3 mg, 75%, 95:5 dr. ^{1}H NMR

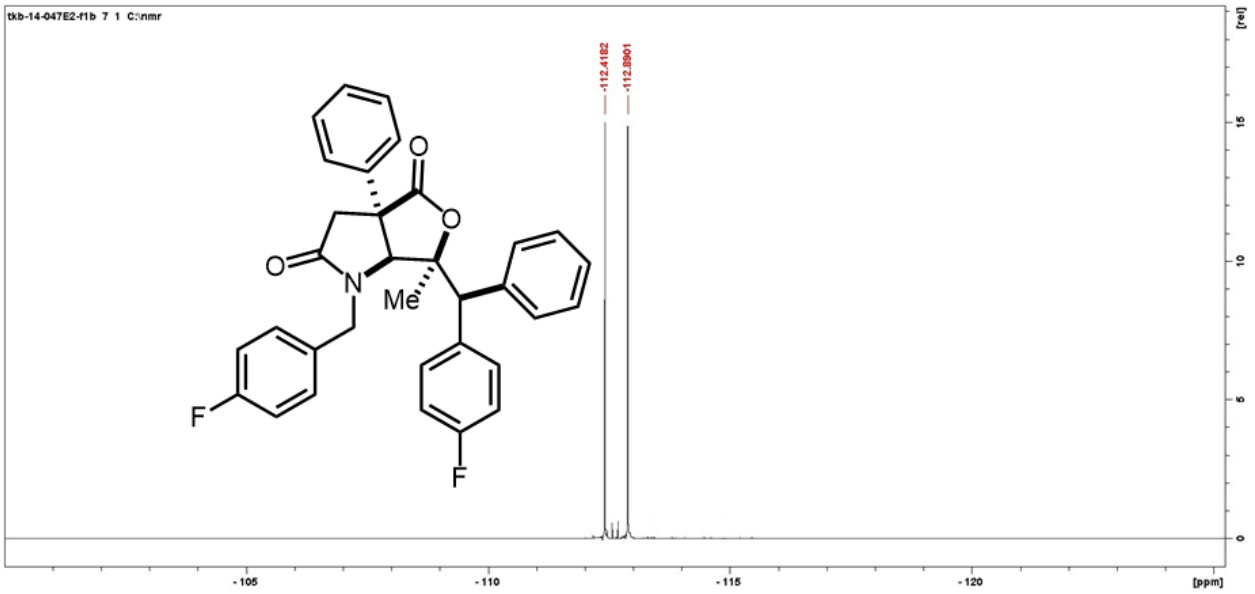
(400 MHz, CDCl3) δ 7.29 – 7.04 (m, 8H), 6.99 – 6.77 (m, 8H), 5.27 (d, J = 14.7 Hz, 1H), 4.43 (s, 1H), 3.84 – 3.74 (m, 2H), 3.16 (d, J = 18.2 Hz, 1H), 2.98 (d, J = 18.2 Hz, 1H), 1.45 (s, 3H). ^{13}C NMR (101 MHz, CDCl3) δ 174.5, 172.5, 163.9, 163.8, 161.4, 161.3, 139.2, 137.3, 134.8, 134.7, 130.5, 130.4, 129.5, 128.9, 128.7, 128.2, 128.0, 125.6, 116.4, 116.2, 115.9, 115.7, 88.8, 69.8, 65.7, 52.1, 45.9, 43.6, 22.3. **HRMS-EI$^+$** (*m/z*): calc for $C_{33}H_{27}F_2NO_3$ $[M]^+$ 523.1959, found 523.1966.







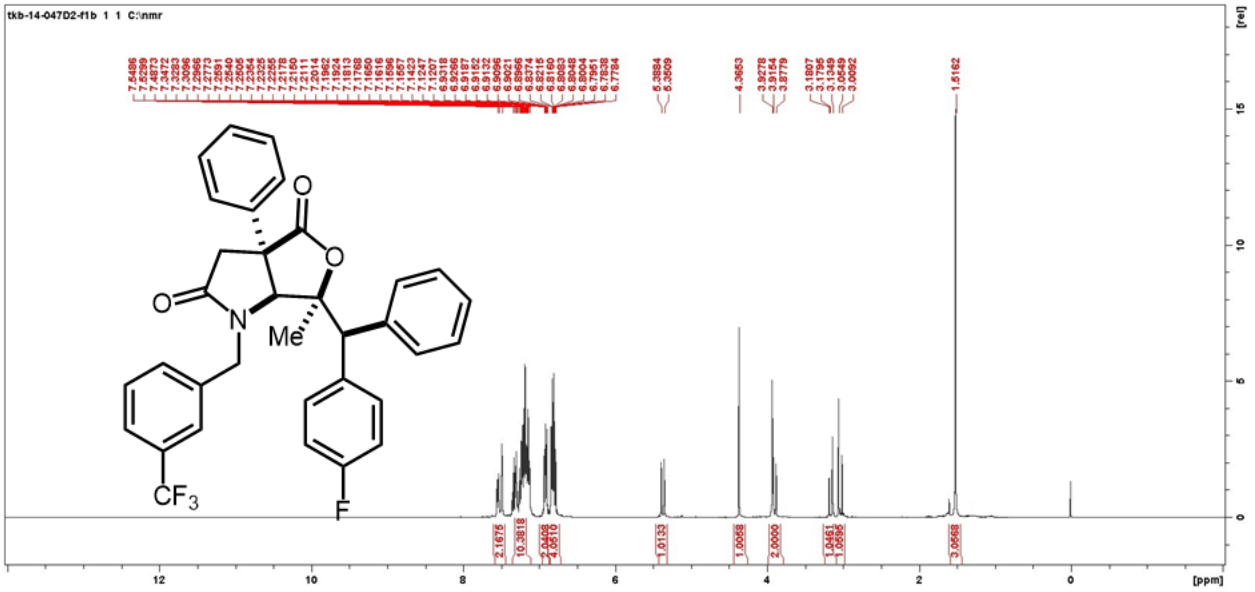
^{19}F NMR

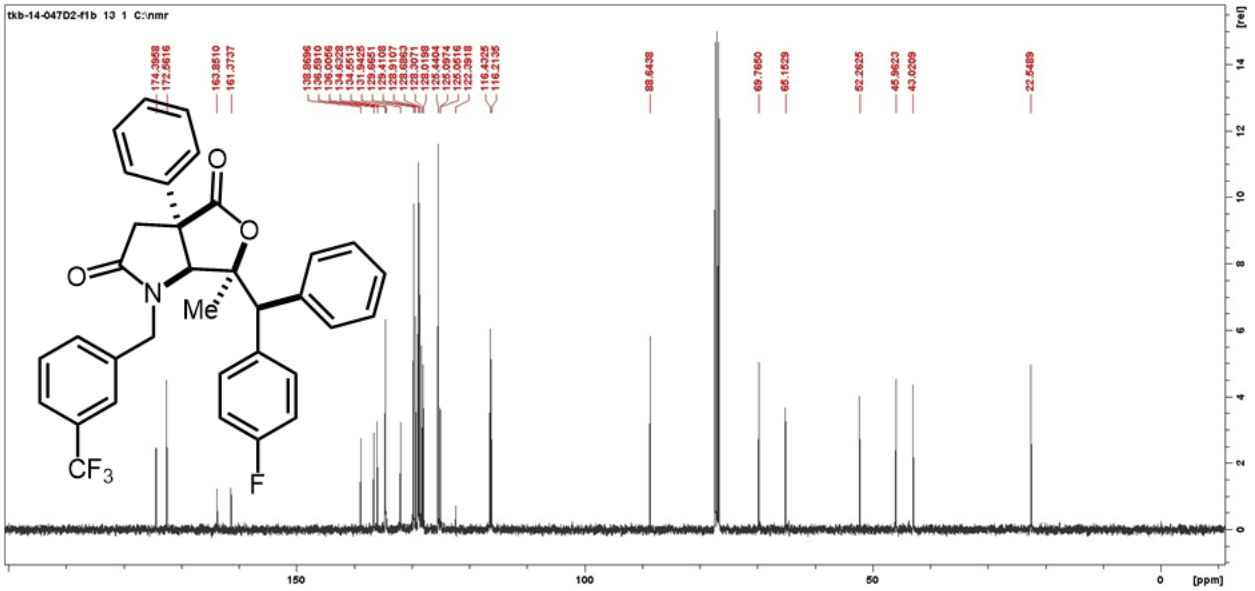


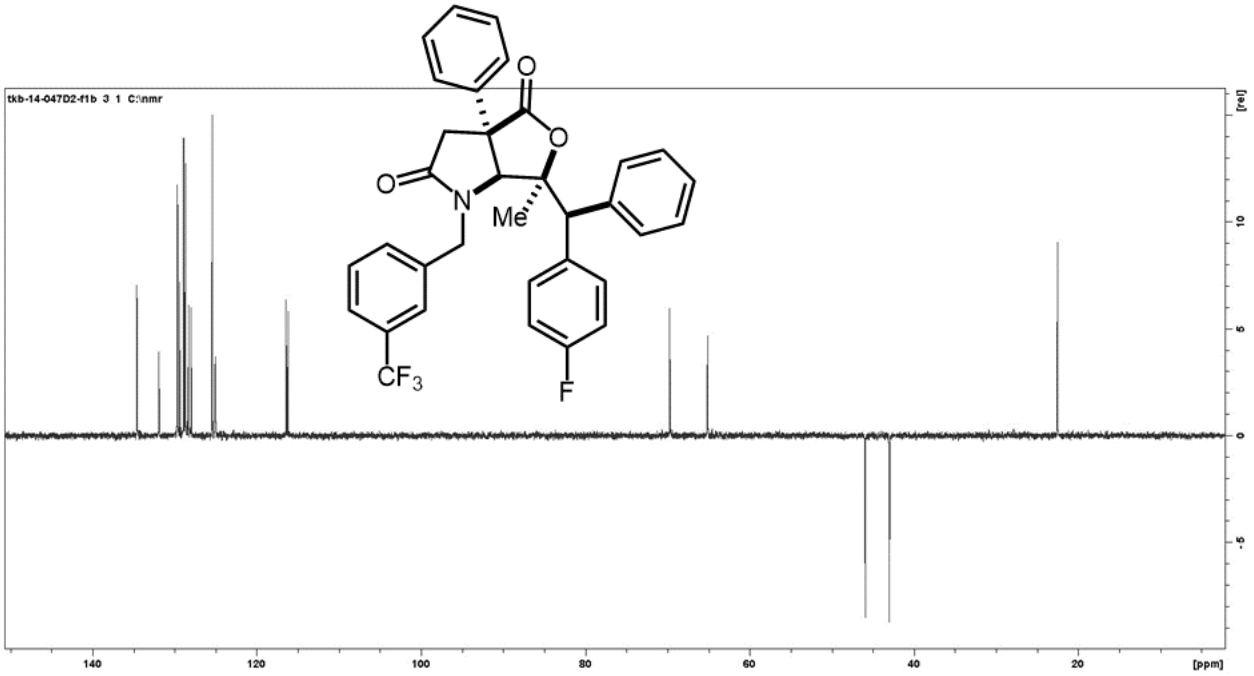
Compound 4p

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (60:40). Yellowish oil. Yield = 226.6 mg, 79%, 95:5 dr. ^{1}H NMR (400 MHz, CDCl3) δ 7.55 – 7.51 (m, 2H), 7.34 – 7.12 (m, 10H), 6.97 – 6.68 (m, 6H), 5.37 (d, J = 15.0 Hz, 1H), 4.37 (s, 1H), 3.97 – 3.85 (m, 2H), 3.16 (d, J = 18.3 Hz, 1H), 3.03 (d, J = 18.3 Hz, 1H), 1.52 (s, 3H). ^{13}C NMR (101 MHz, CDCl3) δ 174.4, 172.6, 163.8, 161.4, 138.9, 136.6, 136.0,

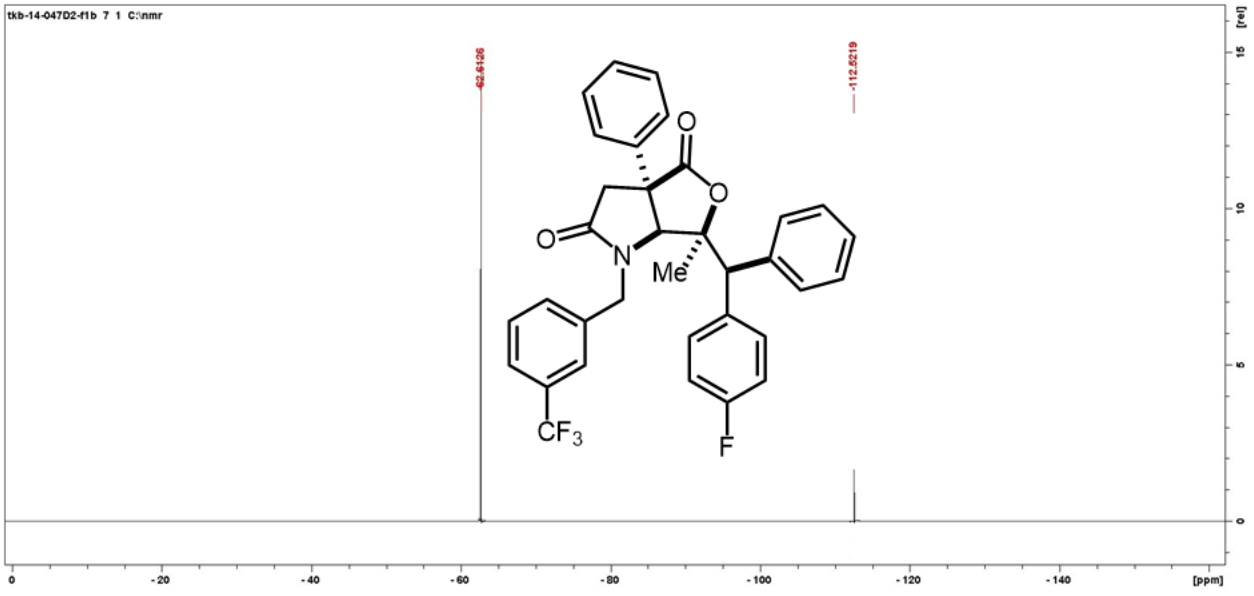
134.6, 134.5, 131.9, 129.7, 129.4, 128.9, 128.7, 128.3, 128.0, 125.5, 125.1, 125.0, 116.4, 116.2, 88.6, 69.8, 65.2, 52.3, 46.0, 43.0, 22.5. **HRMS-EI**$^{+}$ (*m/z*): calc for $C_{34}H_{27}F_4NO_3$ $[M]^{+}$ 573.1927, found 573.1922.







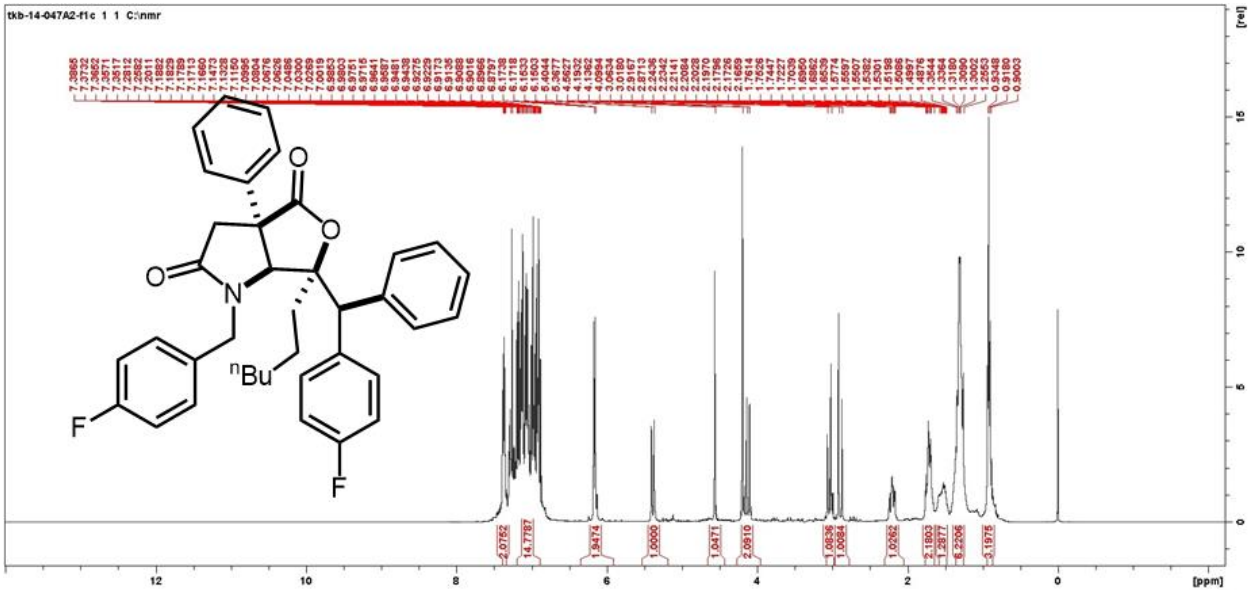
^{19}F NMR

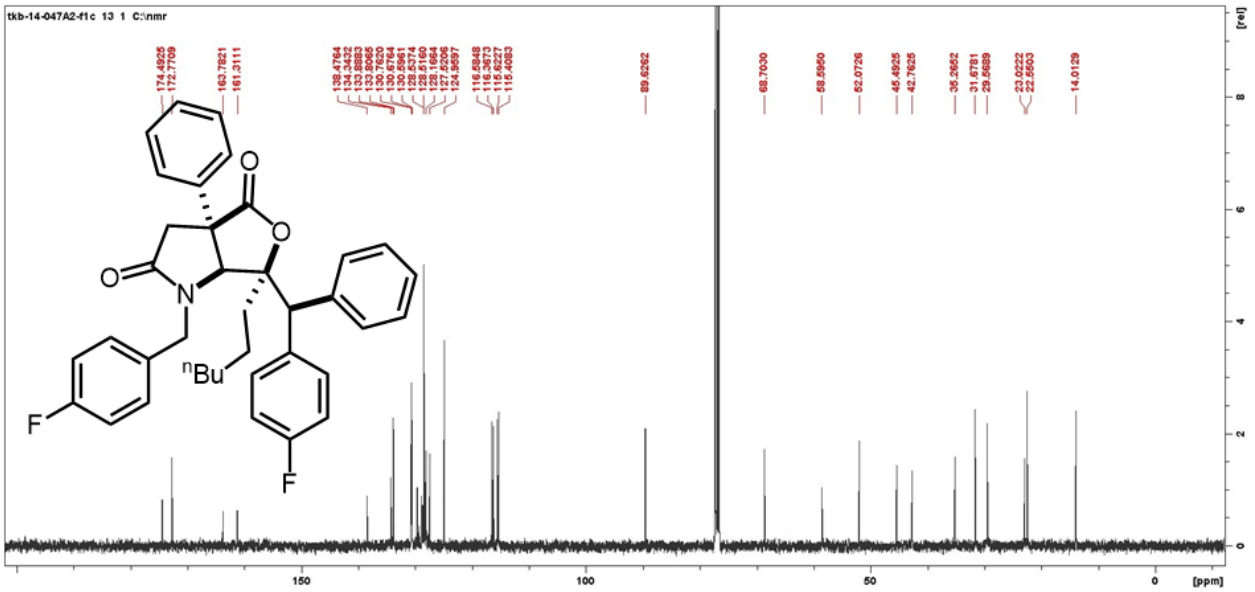


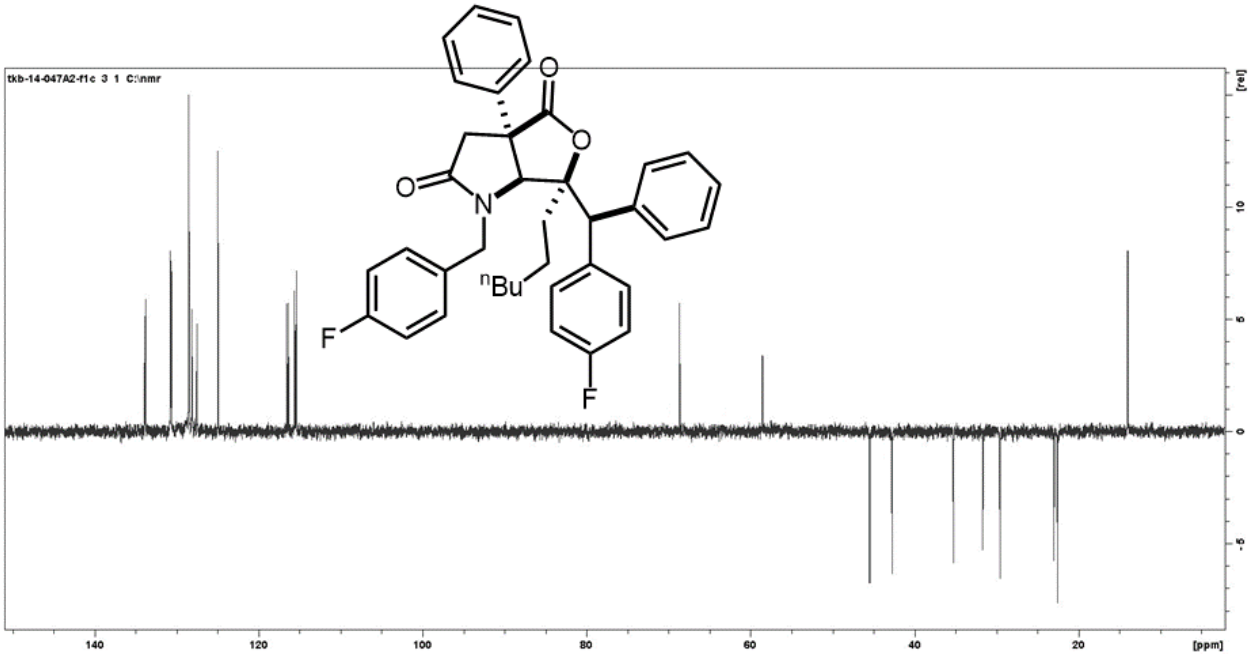
Compound 4q

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (75:25). Yellowish oil. Yield = 210.8 mg, 71%, 95:5 dr. ^{1}H NMR (400 MHz, CDCl3) δ 7.47 – 6.79 (m, 16H), 6.20 – 6.10 (m, 2H), 5.39 (d, J = 14.7 Hz, 1H), 4.56 (s, 1H), 4.19 (s, 1H), 4.12 (d, J = 14.7 Hz, 1H), 3.03 (d, J = 18.2 Hz, 1H), 2.89 (d, J = 18.2 Hz,

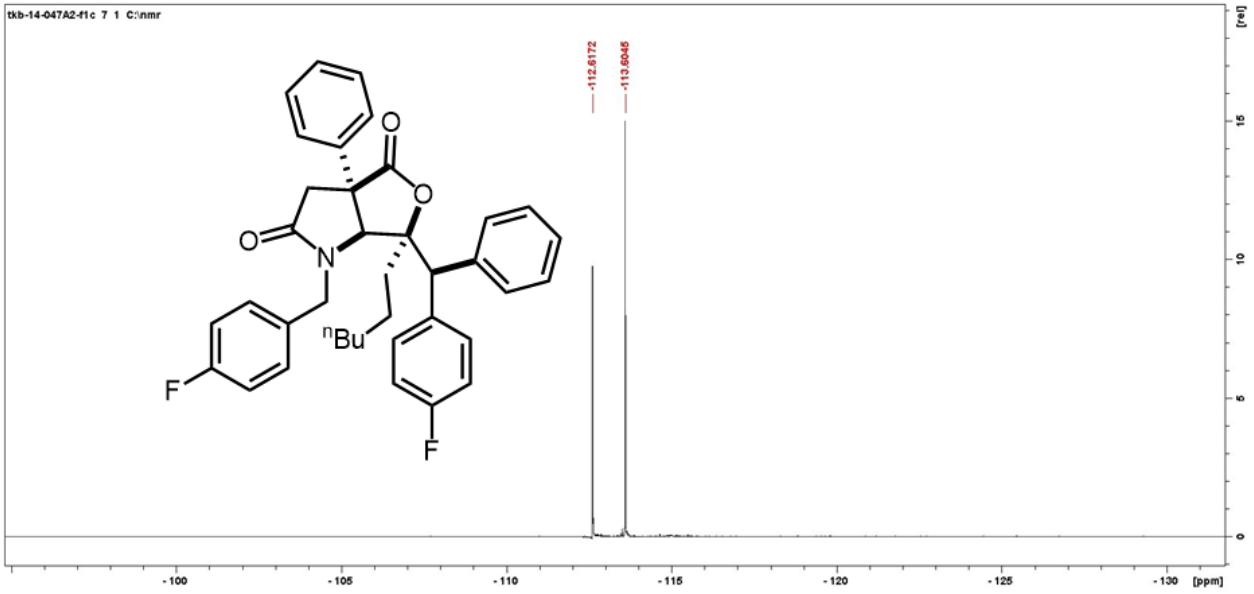
1H), 2.21 (ddd, J = 14.7, 12.0, 4.7 Hz, 1H), 1.78 – 1.66 (m, 3H), 1.41 – 1.22 (m, 6H), 0.91 (t, J = 6.7 Hz, 3H). ^{13}C NMR (101 MHz, CDCl3) δ 174.5, 172.8, 163.8, 161.3, 134.3, 133.9, 133.8, 131.4, 130.8, 130.7, 130.6, 129.7, 128.9, 128.8, 128.5, 128.2, 127.5, 125.9, 124.9, 124.9, 116.6, 116.4, 116.2, 115.6, 115.4, 89.6, 68.7, 58.6, 52.1, 45.5, 42.8, 35.3, 31.7, 29.6, 23.0, 22.5, 14.0. **HRMS-EI$^+$** (*m/z*): calc for $C_{38}H_{37}F_2NO_3$ $[M]^+$ 593.2742, found 593.2746.







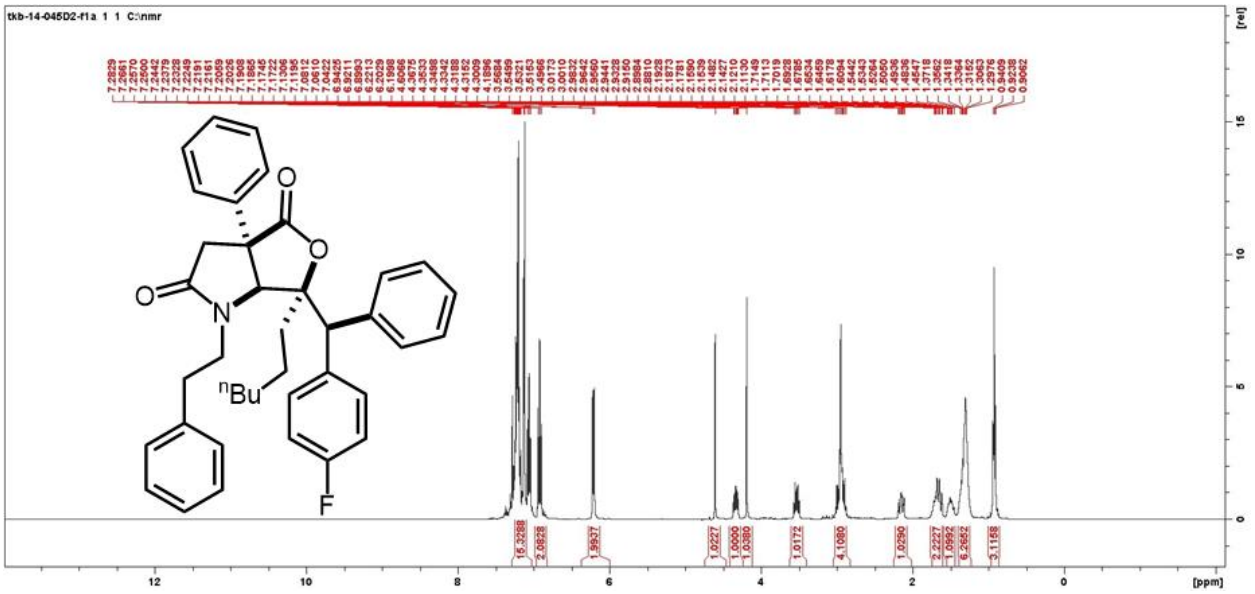
^{19}F NMR

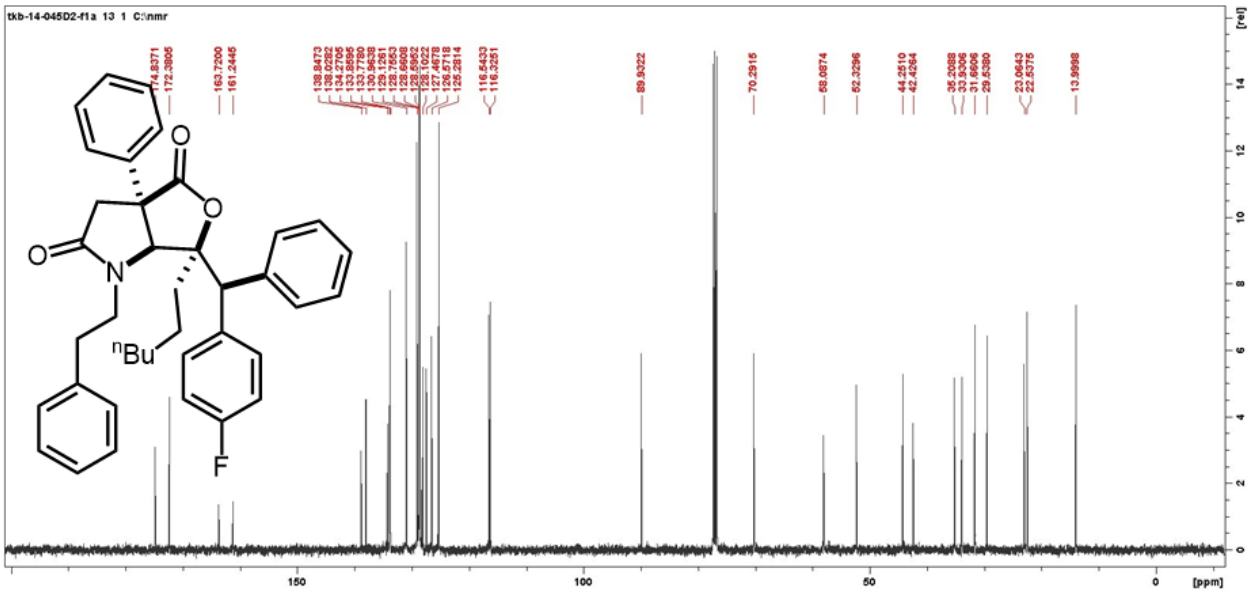


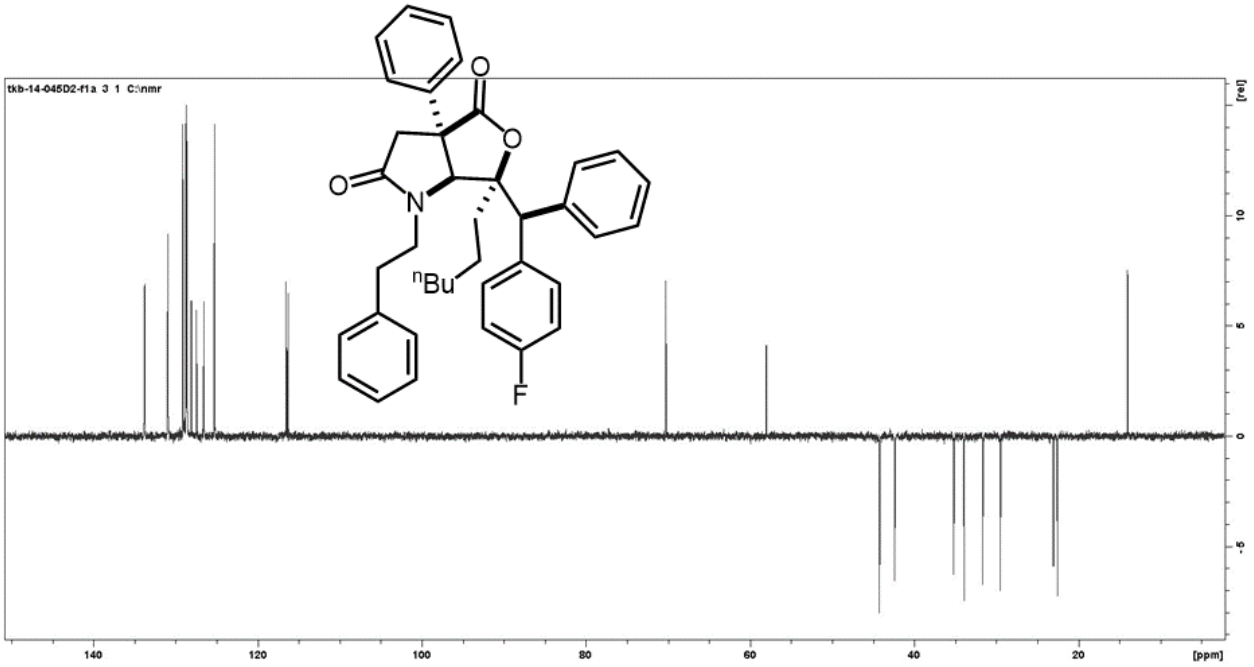
Compound 4r

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (80:20). Amorphous solid. Yield = 244.7 mg, 83%, 95:5 dr. ^{1}H NMR (400 MHz, CDCl3) δ 7.29 – 7.04 (m, 15H), 6.94 – 6.90 (m, 2H), 6.22 – 6.20 (m, 2H), 4.61 (s, 1H), 4.33 (ddd, J = 13.4, 7.3, 5.5 Hz, 1H), 4.19 (s, 1H), 3.53 (dt, J = 14.3, 7.4 Hz, 1H), 3.04 –

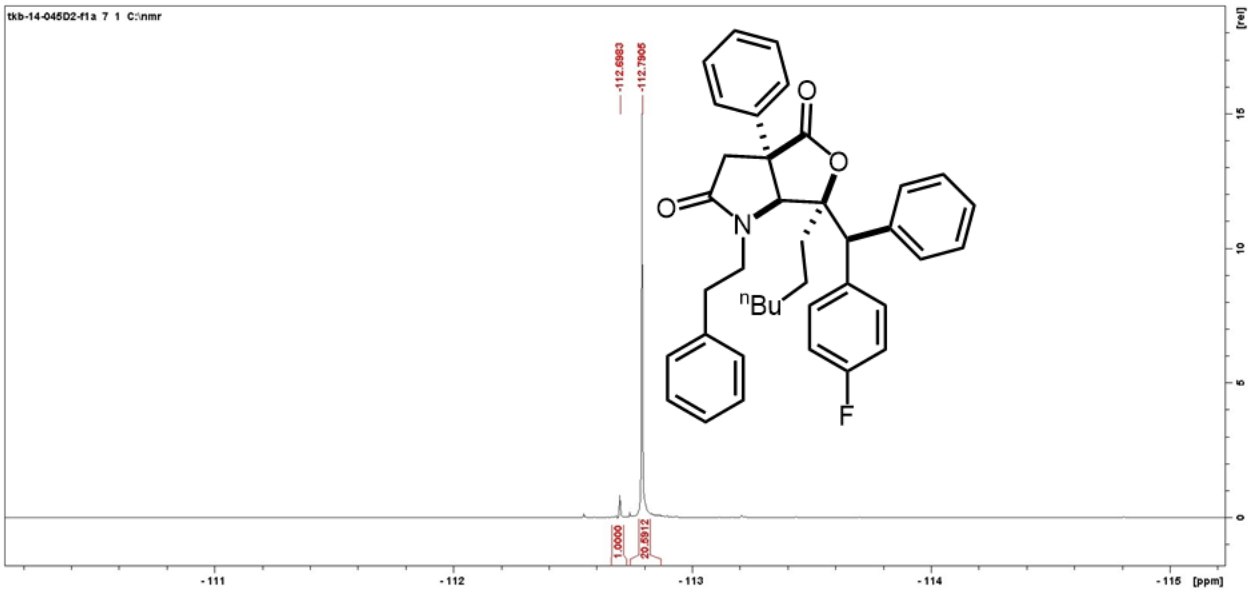
2.84 (m, 4H), 2.22 – 2.09 (m, 1H), 1.67 (dddd, J = 17.7, 14.4, 11.8, 3.4 Hz, 2H), 1.50 (tdd, J = 11.5, 5.8, 3.3 Hz, 1H), 1.41 – 1.22 (m, 6H), 0.92 (t, J = 6.8 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.8, 172.4, 163.7, 161.2, 138.8, 138.0, 134.3, 133.9, 133.8, 130.9, 129.1, 128.9, 128.8, 128.7, 128.6, 128.3, 128.2, 128.1, 127.5, 126.6, 125.3, 116.5, 116.3, 89.9, 70.3, 58.1, 52.3, 44.2, 42.4, 35.2, 33.9, 31.7, 29.5, 23.1, 22.5, 14.0. **HRMS-EI$^+$** (*m/z*): calc for $C_{39}H_{40}FNO_3$ $[M]^+$ 589.2992, found 589.2998.







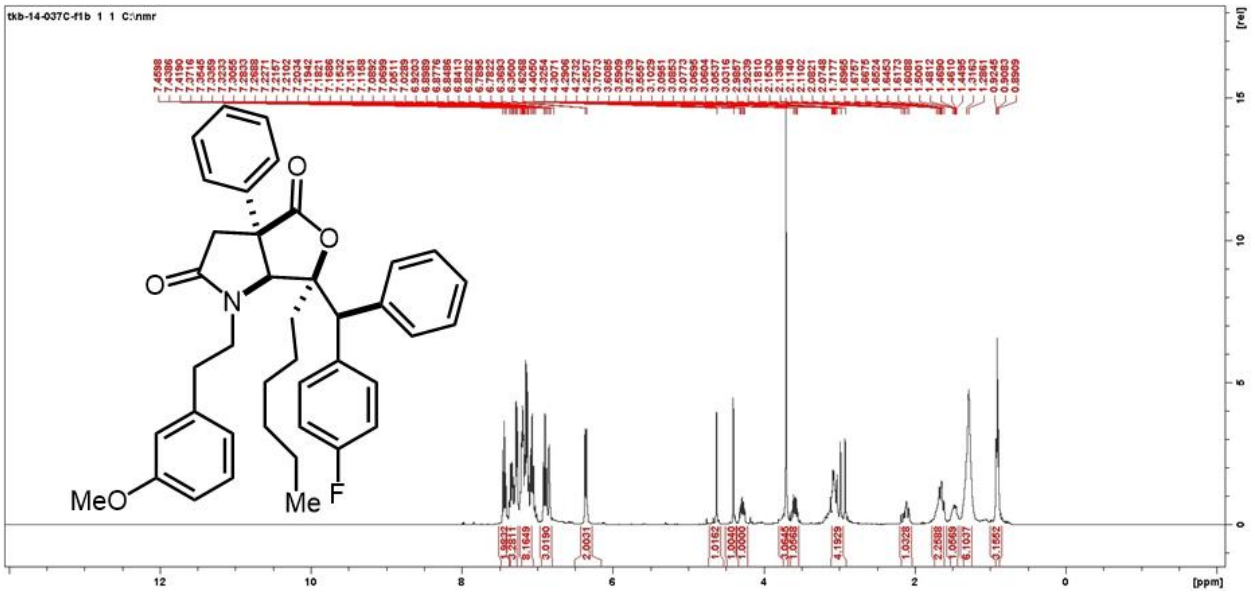
^{19}F NMR

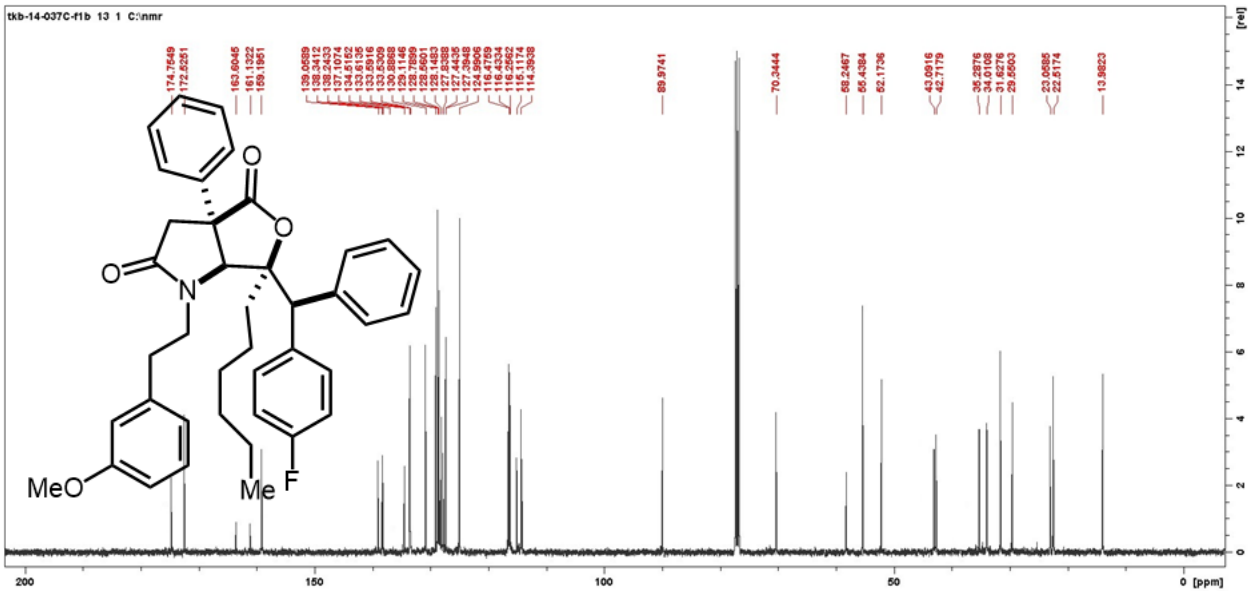


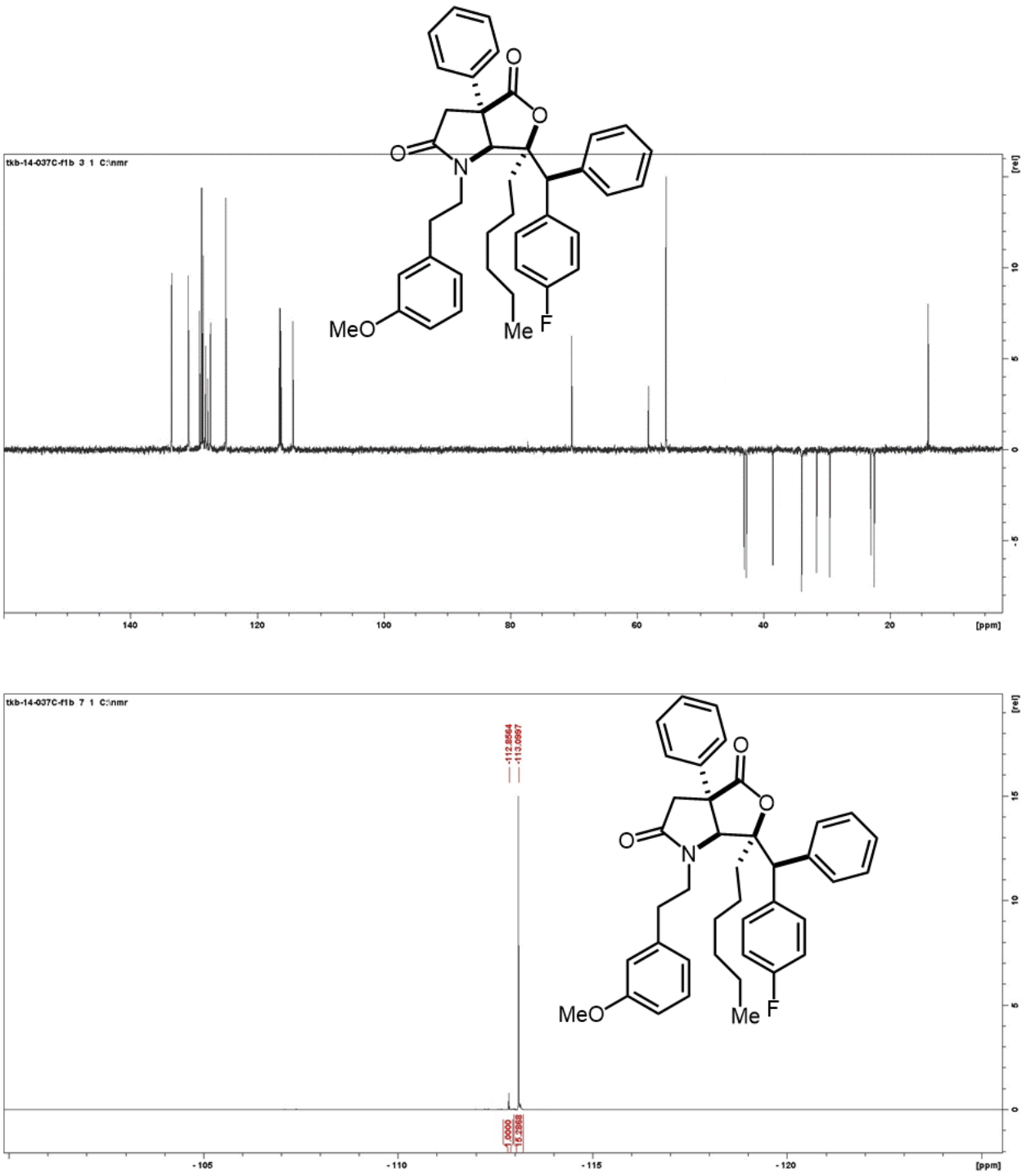
Compound 4s

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (60:40). Amorphous solid. Yield = 247.9 mg, 80%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.46 – 7.02 (m, 13H), 6.92 – 6.78 (m, 3H), 6.36 (d, J = 7.8 Hz, 2H), 4.63 (s, 1H), 4.41 (s, 1H), 4.29 (ddd, J = 14.1, 8.2, 6.1 Hz, 1H), 3.86 – 3.64 (m, 4H), 3.23 – 2.96

(m, 4H), 2.20 – 2.05 (m, 1H), 1.66 (tdd, J = 14.6, 9.8, 3.7 Hz, 2H), 1.46 (dt, J = 11.4, 6.2 Hz, 1H), 1.38 – 1.23 (m, 6H), 0.91 (t, J = 6.8 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.7, 172.5, 159.2, 139.1, 138.3, 134.5, 133.6, 133.5, 130.9, 129.1, 128.8, 128.6, 128.1, 127.8, 127.4, 127.4, 124.9, 116.6, 116.5, 116.4, 116.3, 115.1, 114.4, 114.2, 90.0, 70.3, 58.2, 55.4, 52.2, 43.1, 42.7, 35.3, 34.0, 31.6, 29.5, 23.1, 22.5, 14.0. **HRMS-EI$^+$** (*m/z*): calc for $C_{40}H_{42}FNO_4$ $[M]^+$ 619.3098, found 619.3093.



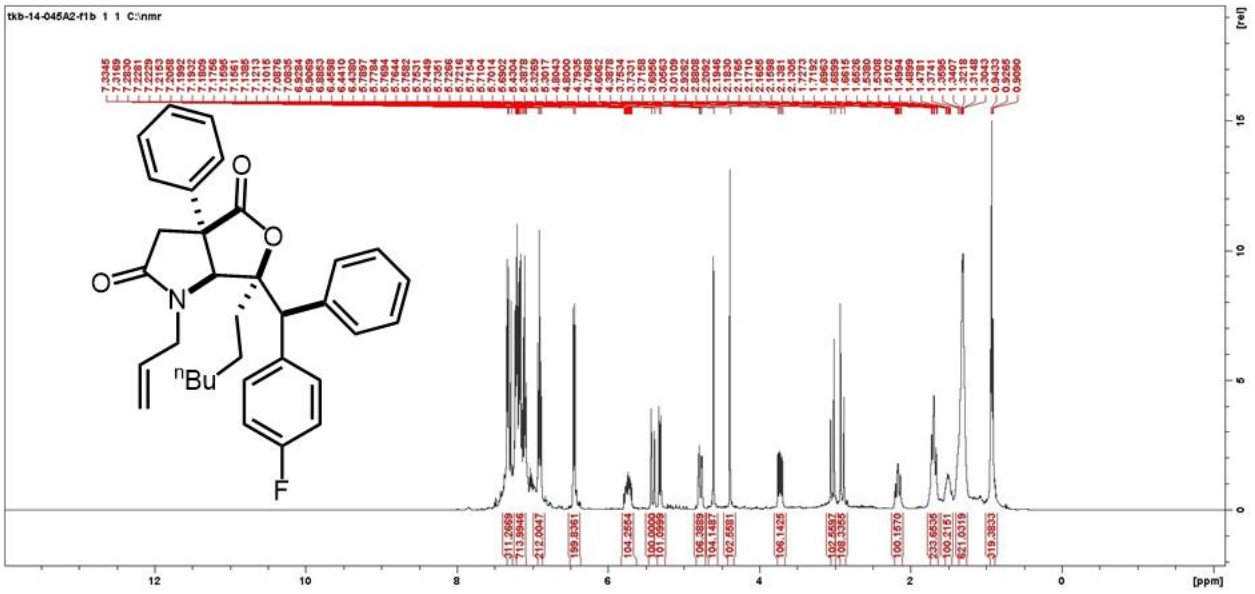


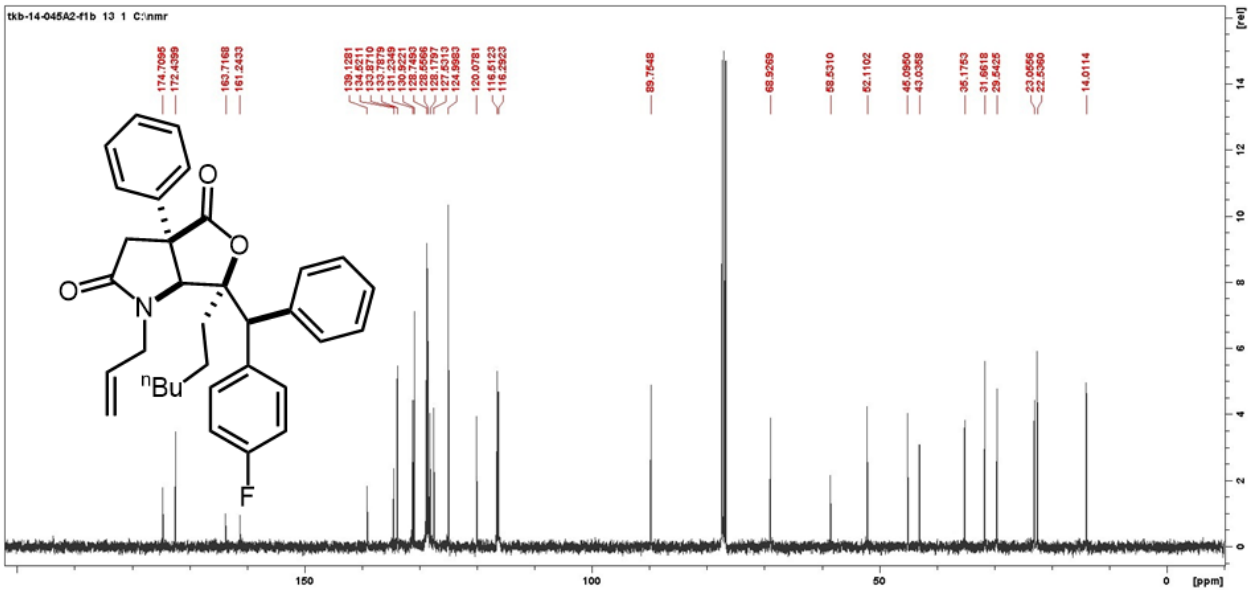


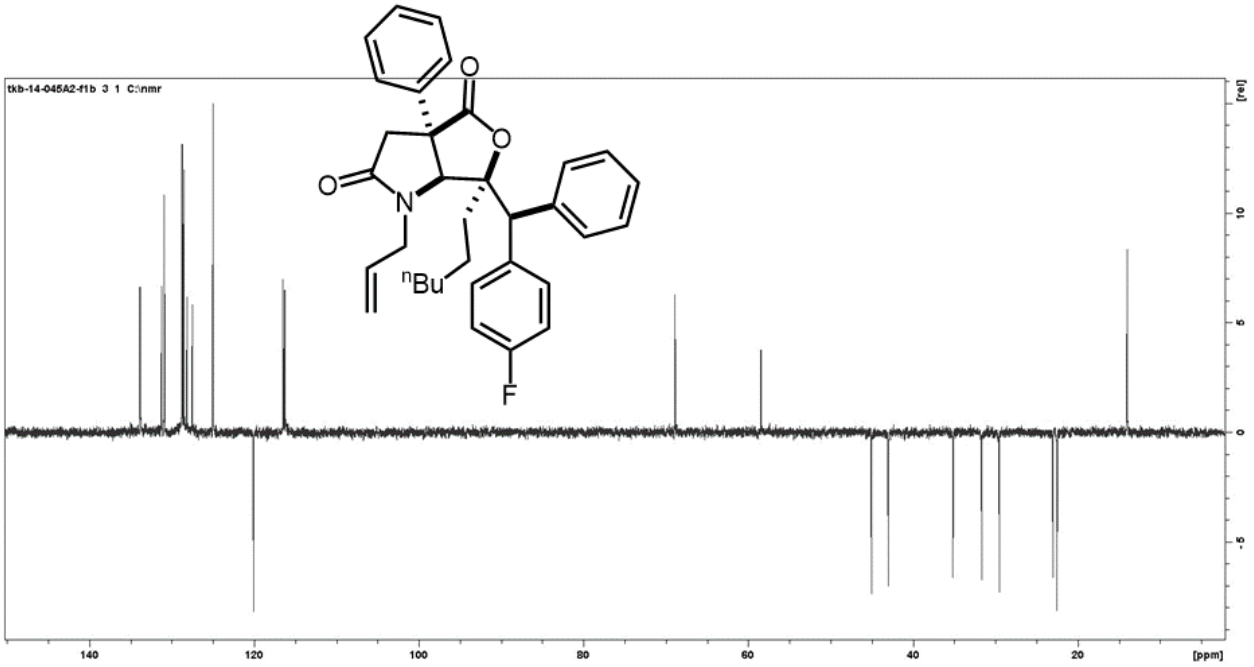
Compound 4t

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (70:30). Greenish-yellow oil. Yield = 207.6 mg, 79%, 95:5 dr. ^{1}H NMR (400 MHz, CDCl3) δ 7.33 – 7.08 (m, 10H), 6.93 – 6.89 (m, 2H), 6.46 – 6.43 (m, 2H),

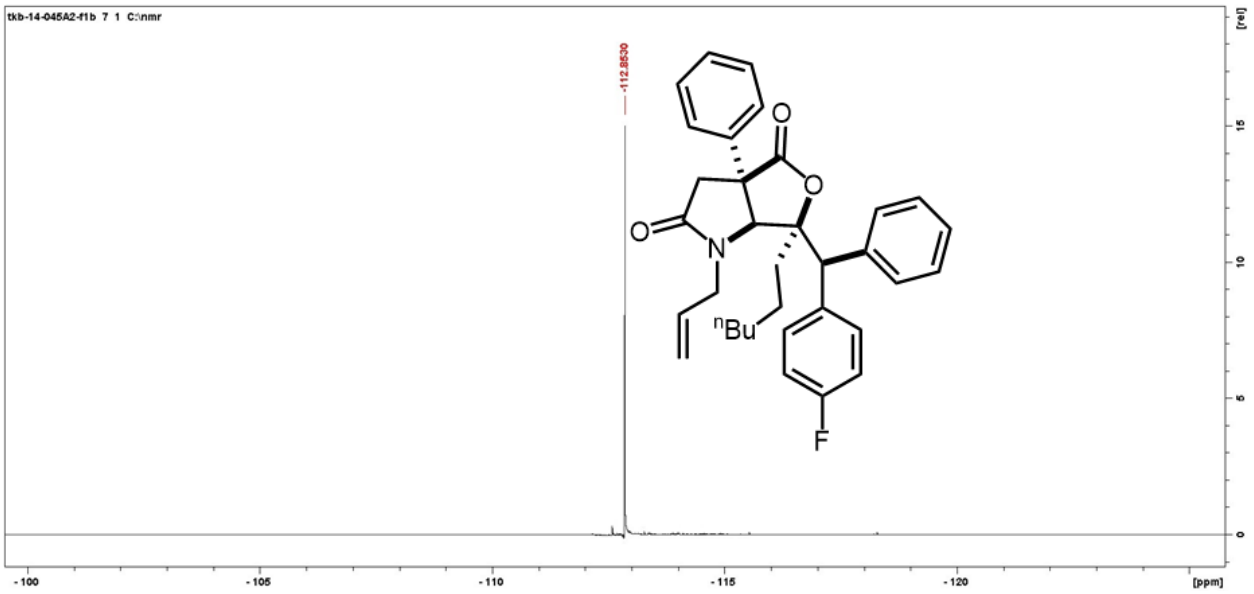
5.74 (dddd, J = 17.1, 10.1, 8.1, 4.5 Hz, 1H), 5.45 – 5.36 (m, 1H), 5.31 (d, J = 10.2 Hz, 1H), 4.83 – 4.73 (m, 1H), 4.61 (s, 1H), 4.39 (s, 1H), 3.72 (dd, J = 15.1, 8.1 Hz, 1H), 3.02 (d, J = 18.1 Hz, 1H), 2.90 (d, J = 18.1 Hz, 1H), 2.23 – 2.11 (m, 1H), 1.69 (ddt, J = 14.7, 11.1, 3.5 Hz, 2H), 1.42 – 1.23 (m, 7H), 0.93 (t, J = 6.8 Hz, 3H). ^{13}C NMR (101 MHz, CDCl3) δ 174.7, 172.4, 163.7, 161.2, 139.1, 134.5, 133.9, 133.8, 131.6, 131.2, 131.0, 130.9, 129.5, 129.0, 128.8, 128.6, 128.4, 128.2, 127.5, 125.0, 120.1, 116.5, 116.3, 89.8, 68.9, 58.5, 52.1, 45.1, 43.0, 35.2, 31.7, 29.5, 23.0, 22.5, 14.0. **HRMS-EI**$^+$ (*m/z*): calc for $C_{34}H_{36}FNO_3$ $[M]^+$ 525.2679, found 525.2682.







^{19}F NMR

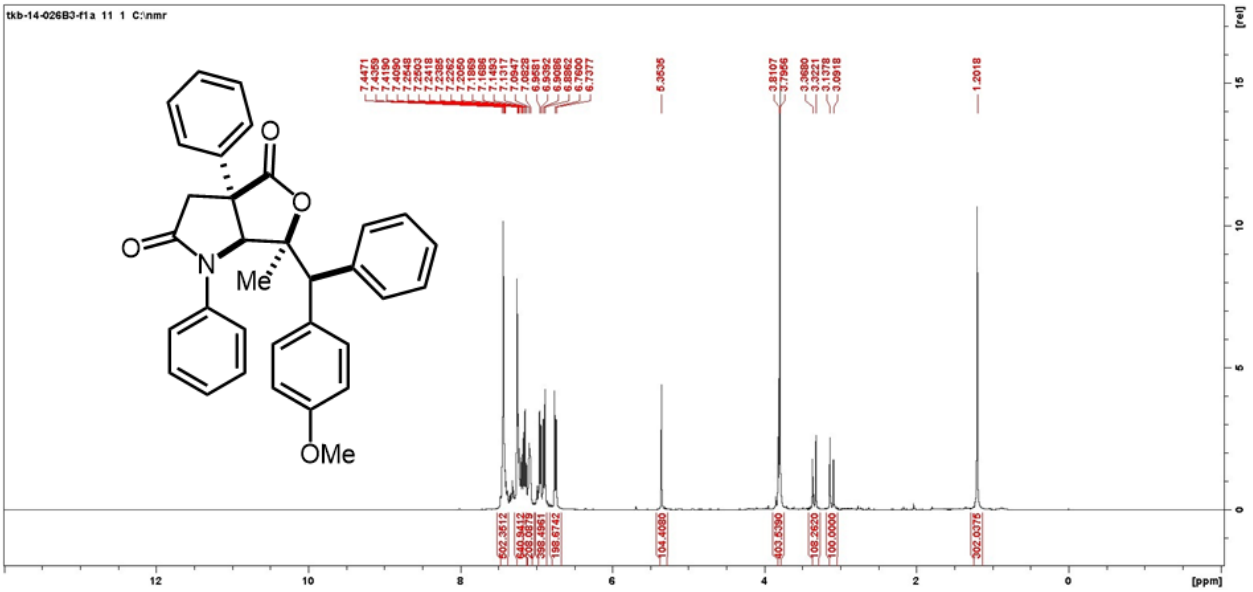


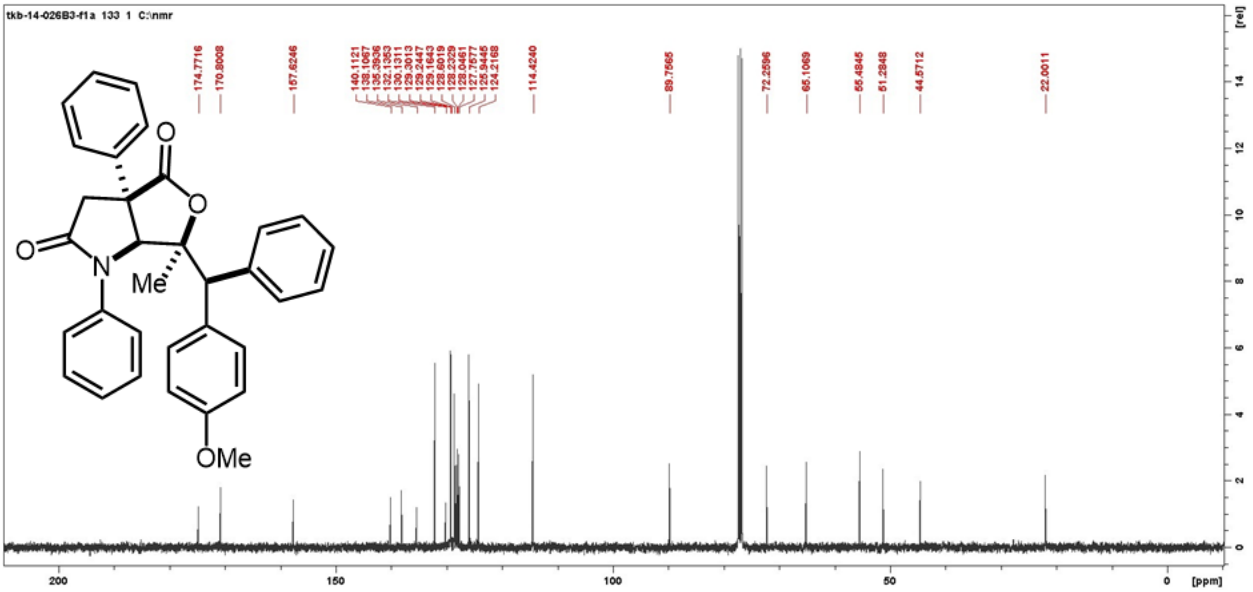
Compound 4u

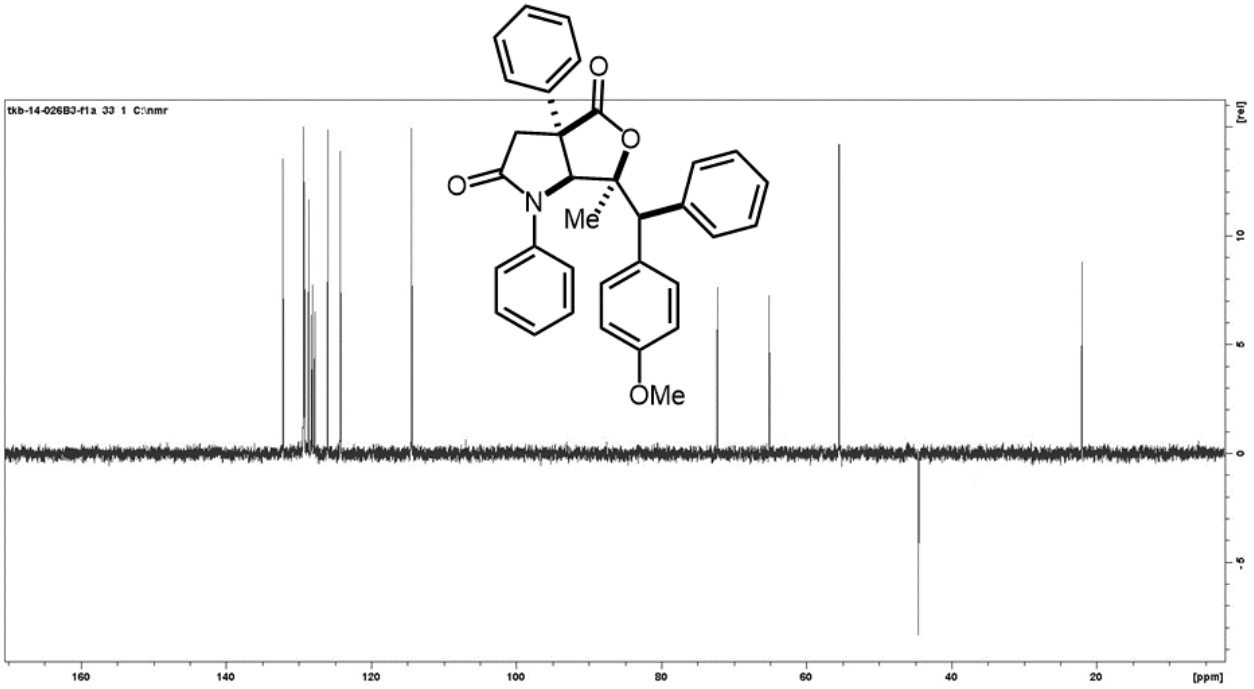
Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Orange oil. Yield = 224.1 mg, 89%, 95:5 dr.

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45 – 7.41 (m, 5H), 7.25 – 7.08 (m, 8H), 6.96 – 6.89 (m, 4H), 6.75 (d, *J* = 8.1 Hz, 2H), 5.35 (s, 1H), 3.81-3.79 (m, 4H), 3.35 (d, *J* = 18.3 Hz, 1H), 3.12 (d, *J* = 18.3

Hz, 1H), 1.20 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.8, 170.8, 157.6, 140.1, 138.1, 135.4, 132.1, 130.1, 129.3, 129.2, 129.2, 128.6, 128.2, 128.0, 127.7, 125.9, 124.2, 114.4, 89.8, 72.3, 65.1, 55.5, 51.3, 44.6, 22.0. **HRMS-EI$^+$** (*m/z*): calc for $C_{33}H_{29}NO_4$ $[M]^+$ 503.2097, found 503.2093.

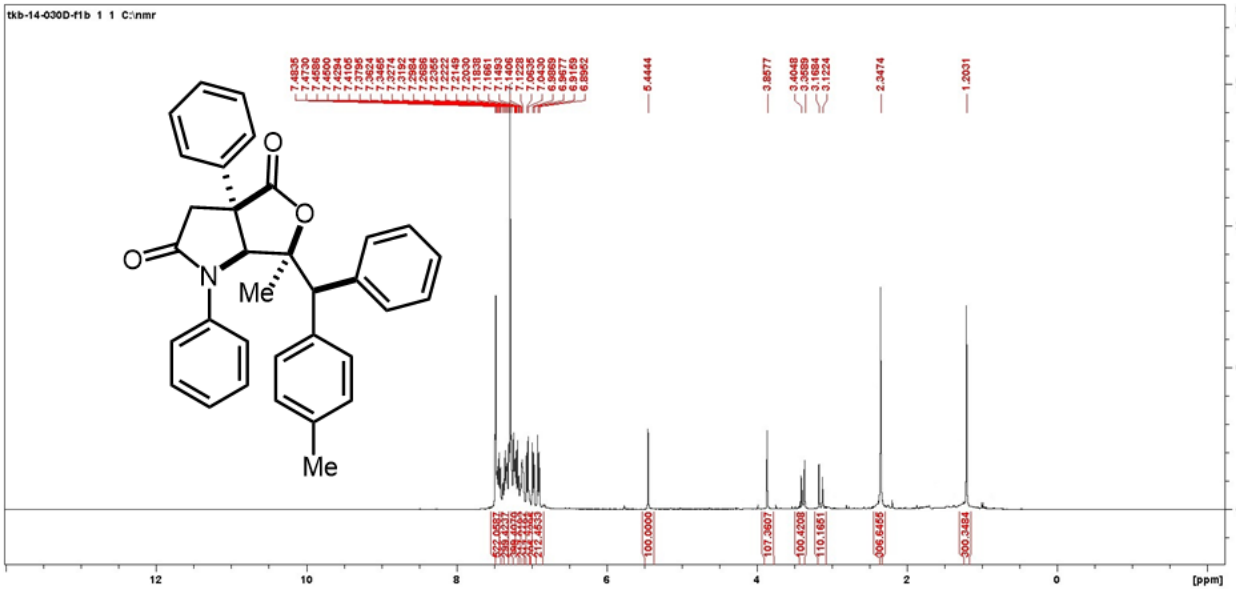


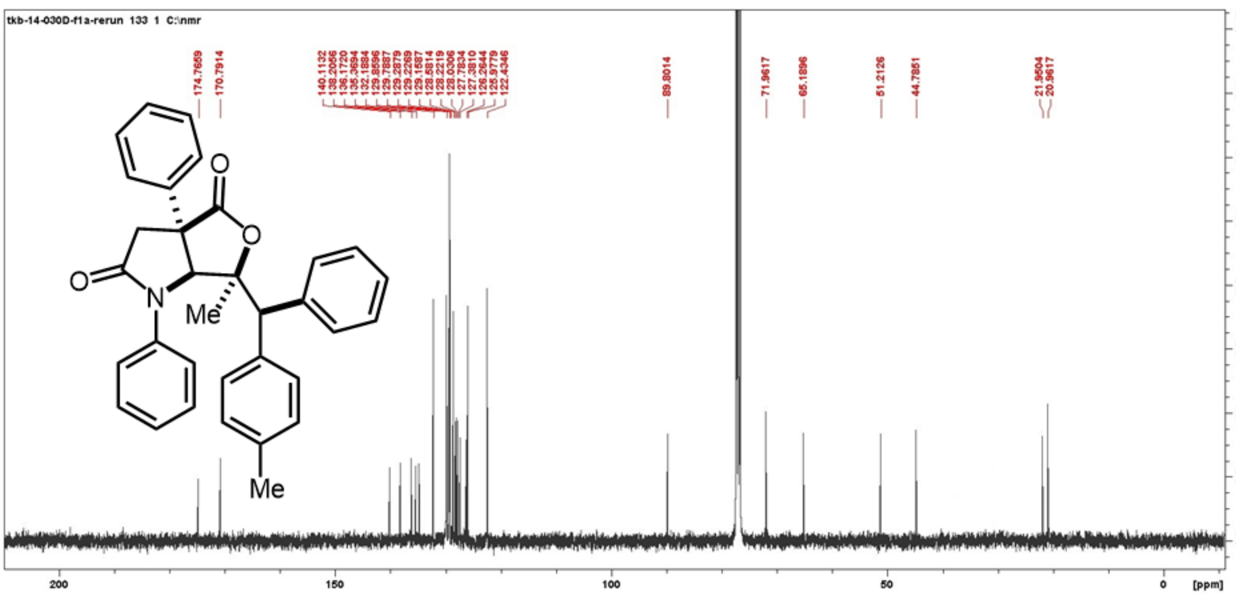


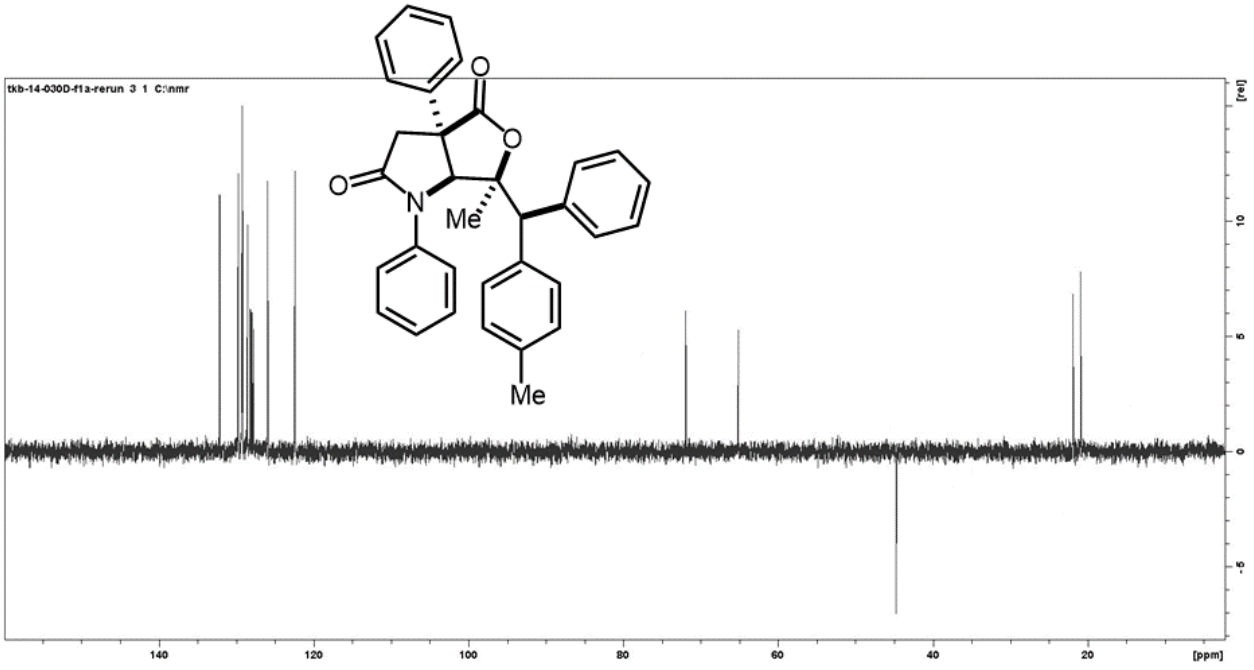


Compound 4v

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (60:40). Orange oil. Yield = 212.1 mg, 87%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.48 – 7.04 (m, 15H), 6.98 (d, *J* = 7.5 Hz, 2H), 6.91 (d, *J* = 8.1 Hz, 2H), 5.44 (s, 1H), 3.86 (s, 1H), 3.40 (d, *J* = 18.4 Hz, 1H), 3.15 (d, *J* = 18.4 Hz, 1H), 2.38 (s, 3H), 1.20 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.8, 170.8, 140.1, 138.2, 136.2, 135.4, 134.7, 132.2, 129.9, 129.8, 129.2, 128.6, 128.2, 128.0, 127.8, 127.4, 126.3, 126.0, 122.4, 89.8, 72.0, 65.2, 51.2, 44.8, 21.9, 21.0. **HRMS-EI^{+}** (*m/z*): calc for $C_{33}H_{29}NO_3$ $[M]^{+}$ 487.2147, found 487.2141.



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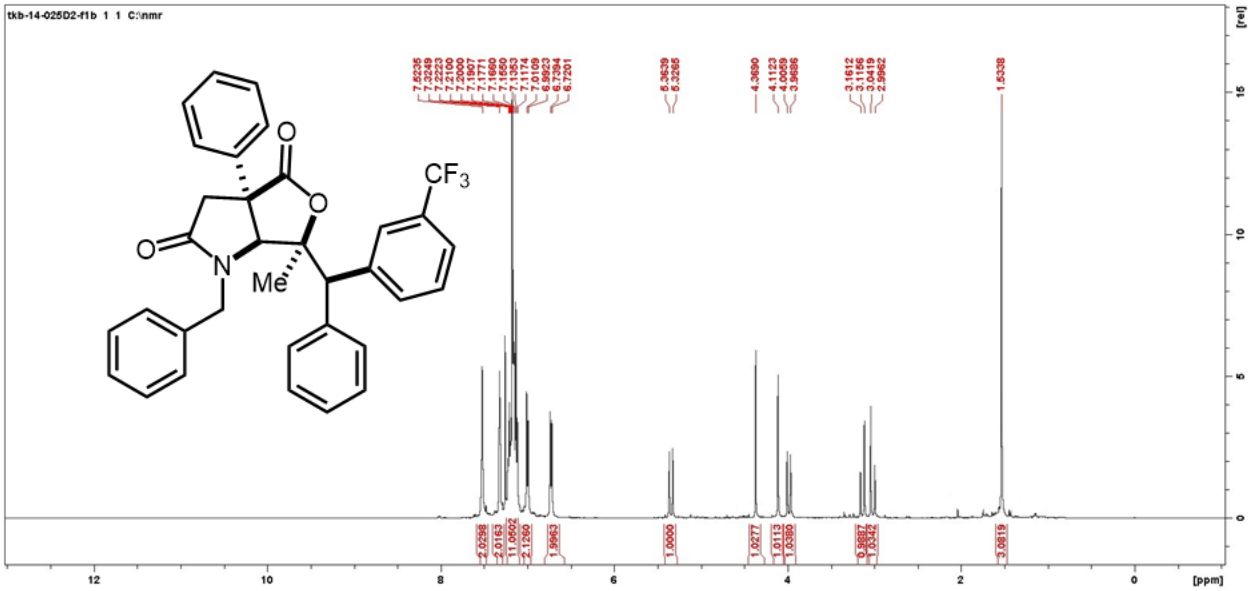
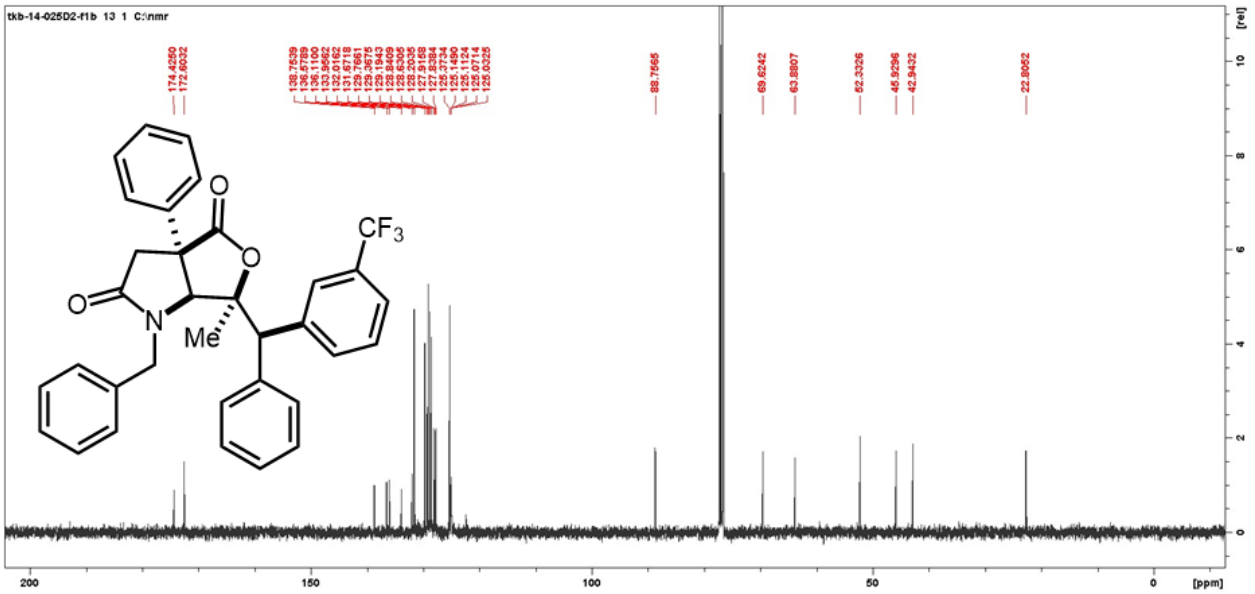
Kumada cross-coupling with different Grignard reagents (Scheme 2 Results)

Compound 4w

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Yellowish oil. Yield = 239.8 mg, 86%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52 (s, 2H), 7.36 – 7.27 (m, 2H), 7.27 – 7.08 (m, 11H), 7.00 (dd, *J* = 7.9, 1.7 Hz, 2H), 6.73 (d, *J* = 7.5 Hz, 2H), 5.35 (d, *J* = 14.9 Hz, 1H), 4.37 (s, 1H), 4.11 (s, 1H), 3.99 (d, *J* = 15.0 Hz, 1H), 3.12 (d, *J* = 18.3 Hz, 1H), 3.02 (d, *J* = 18.3 Hz, 1H), 1.53 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.4, 172.6, 138.8, 136.6, 136.1, 133.9, 132.0, 131.7, 131.1, 129.8, 129.4, 129.2, 128.8, 128.6, 128.2, 127.9, 127.8, 125.4, 125.1, 125.0, 122.4, 88.8, 69.6, 63.9, 52.3, 45.9, 42.9, 22.8. FTIR (KBr): 2972.9, 2932.8, 1638.2, 1449.1, 1364.7, 1290.2, 1270.3, 1247.8, 1206.5, 1179.9, 1131.1, 1071.4, 994.4, 924.8, 881.7. **HRMS-EI^{+}** (*m/z*): calc for $C_{34}H_{28}F_3NO_3$ $[M]^{+}$ 555.2021, found 555.2028.

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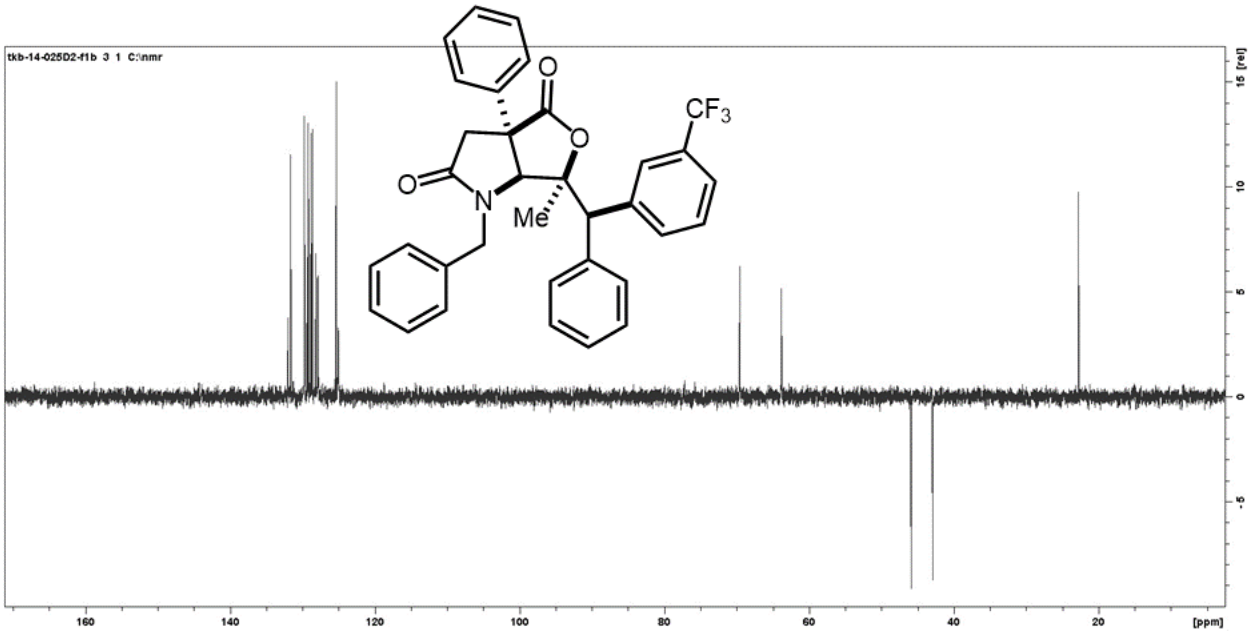
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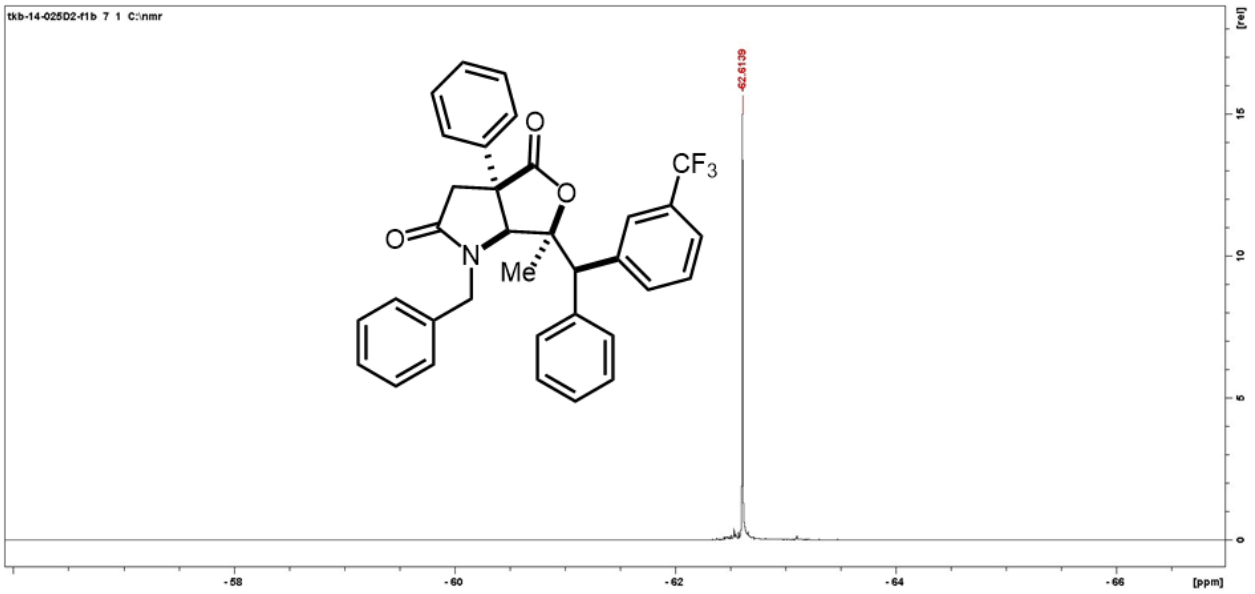
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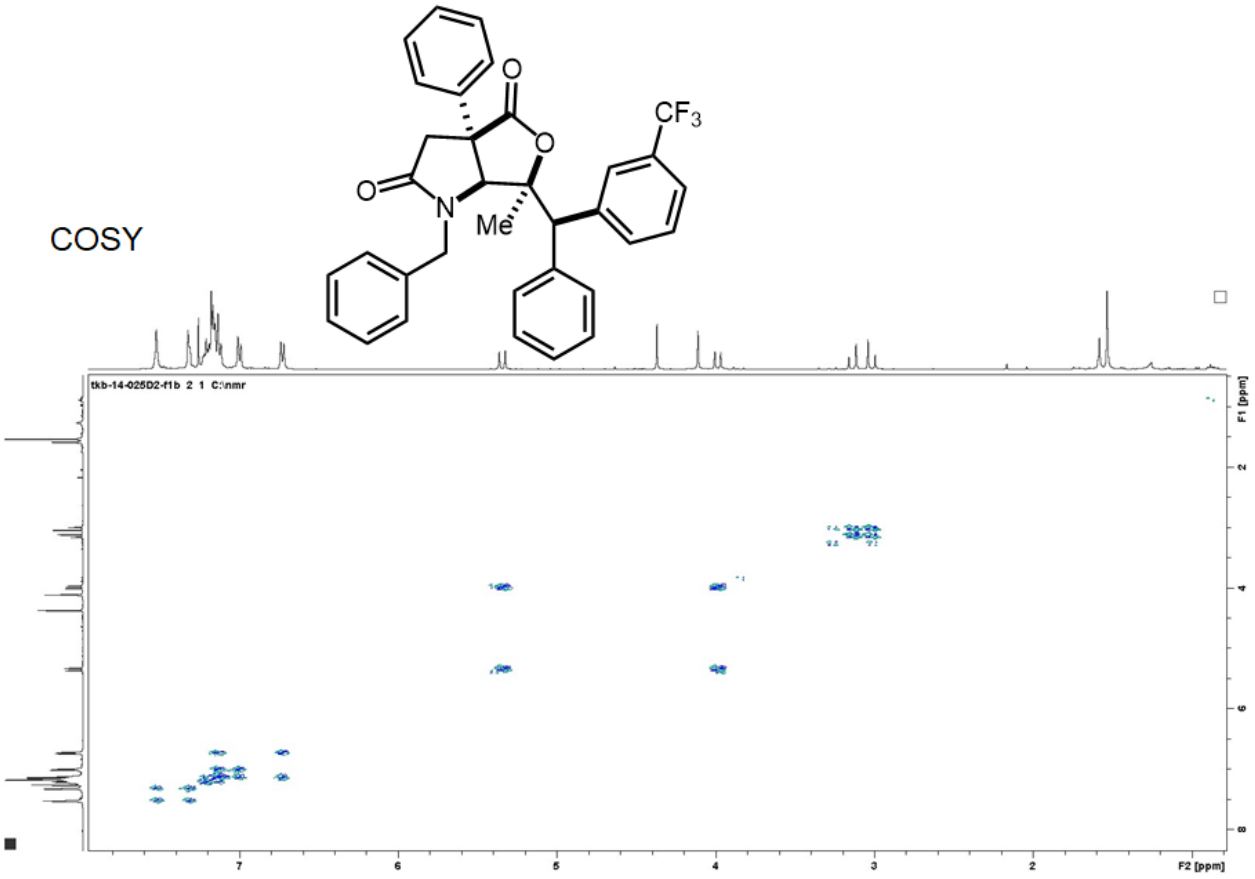
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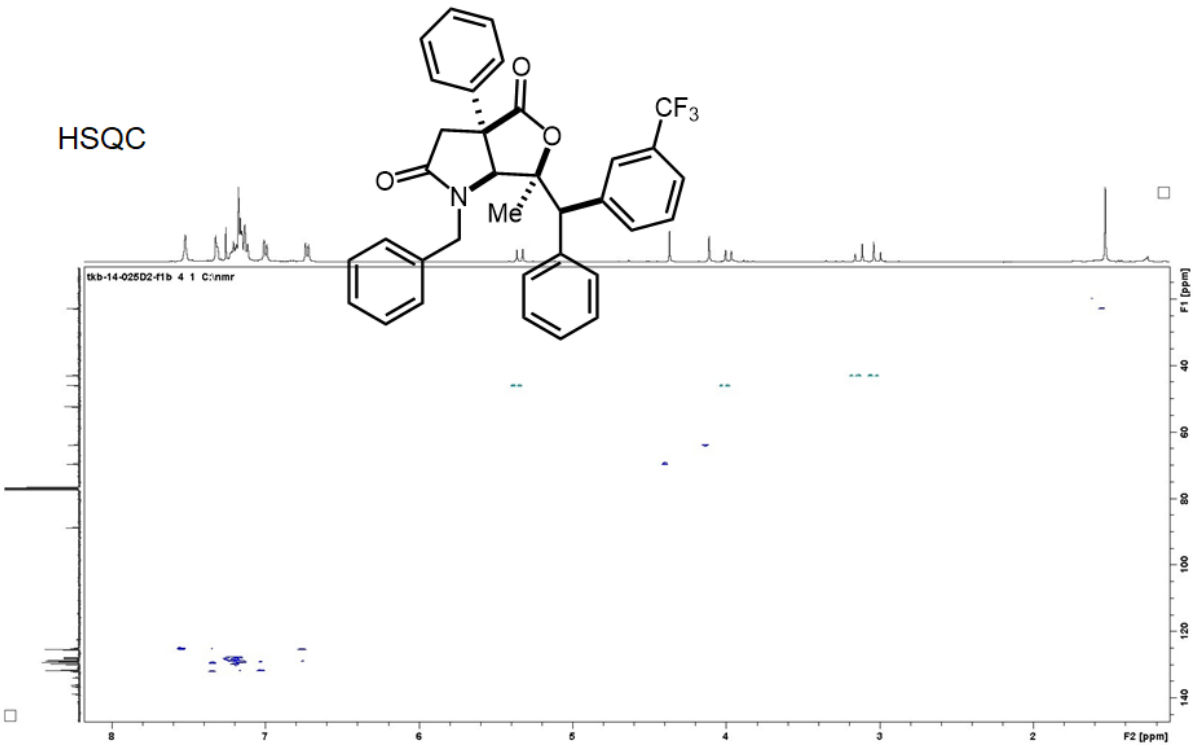
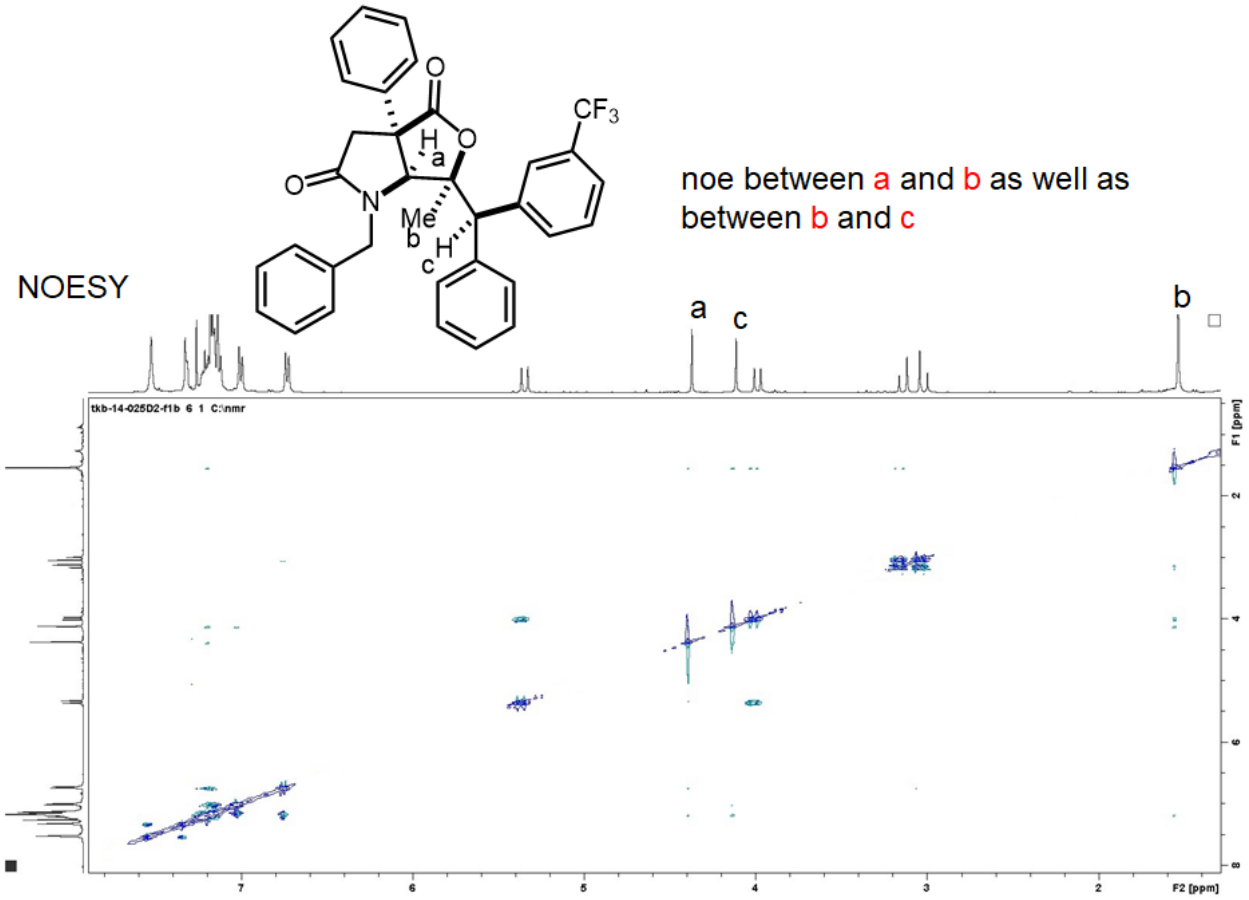
HSQC



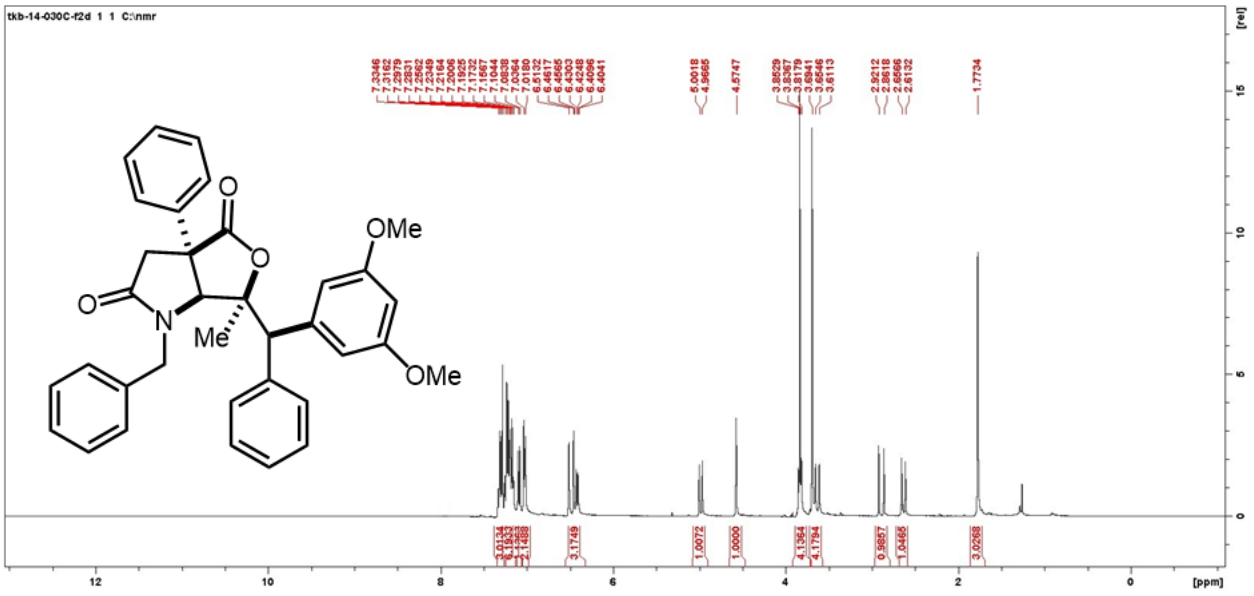
NOESY

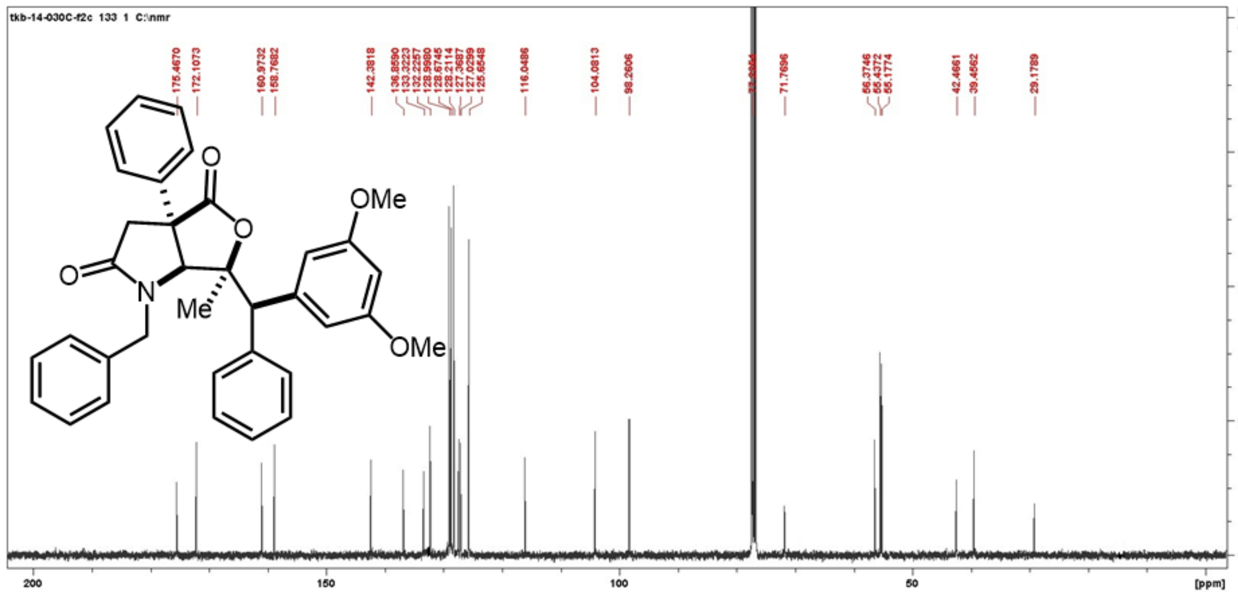
noe between a and b as well as between b and c



Compound 4x

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Yellowish oil. Yield = 224.5 mg, 82%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.36 – 7.13 (m, 7H), 7.13 – 6.99 (m, 3H), 6.51 (s, 1H), 6.48 – 6.37 (m, 2H), 4.98 (d, *J* = 14.1 Hz, 1H), 4.58 (s, 1H), 3.84 (s, 1H), 3.82 (s, 3H), 3.69 (s, 3H), 3.63 (d, *J* = 14.1 Hz, 1H), 2.90 (d, *J* = 17.4 Hz, 1H), 2.64 (d, *J* = 17.4 Hz, 1H), 1.77 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 175.5, 172.0, 161.0, 158.8, 142.3, 136.9, 133.3, 132.2, 129.0, 128.7, 128.2, 127.4, 127.0, 125.7, 116.1, 104.1, 98.3, 77.2, 71.7, 56.4, 55.4, 55.2, 42.5, 39.4. FTIR (KBr): 2994.1, 1763.4, 1669.4, 1608.2, 1511.1, 1431.8, 1414.7, 1344.9, 1298.4, 1135.3, 1031.8, 996.7, 706.4. **HRMS-EI^{+}** (*m/z*): calc for $C_{35}H_{33}NO_5$ $[M]^{+}$ 547.2359, found 547.2366.

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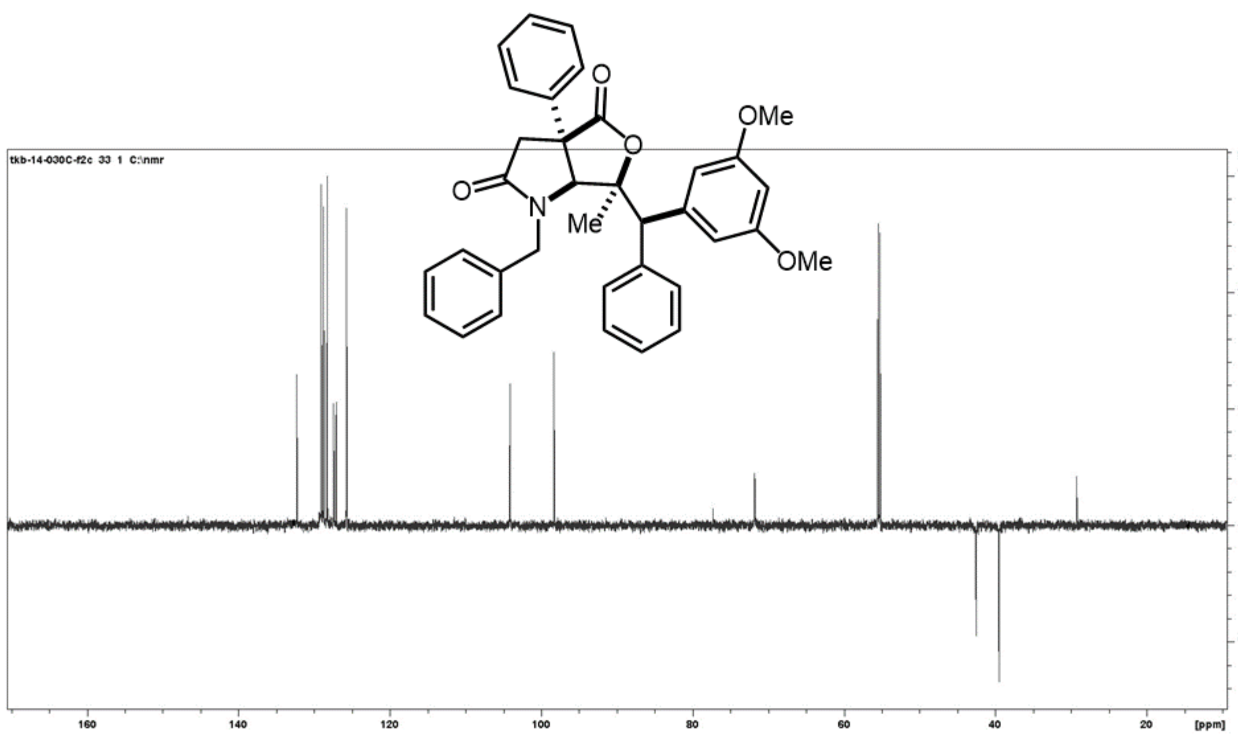
OMe
OMe
Me
N
O
[ppm]
[rel]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OMe
Me
N
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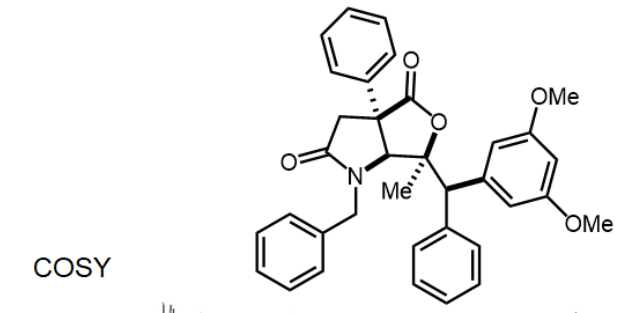
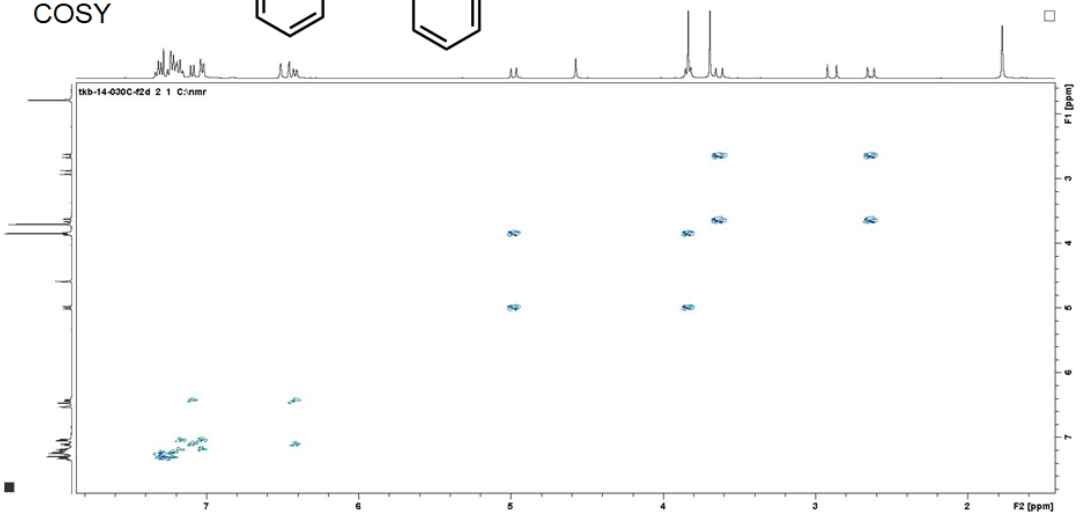
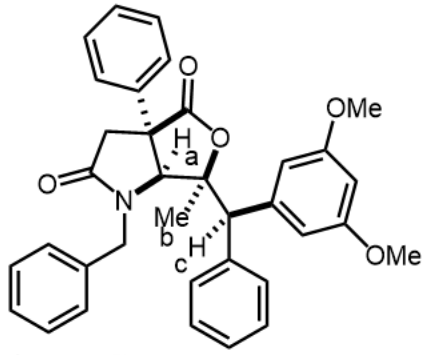
[ppm]
[rel]



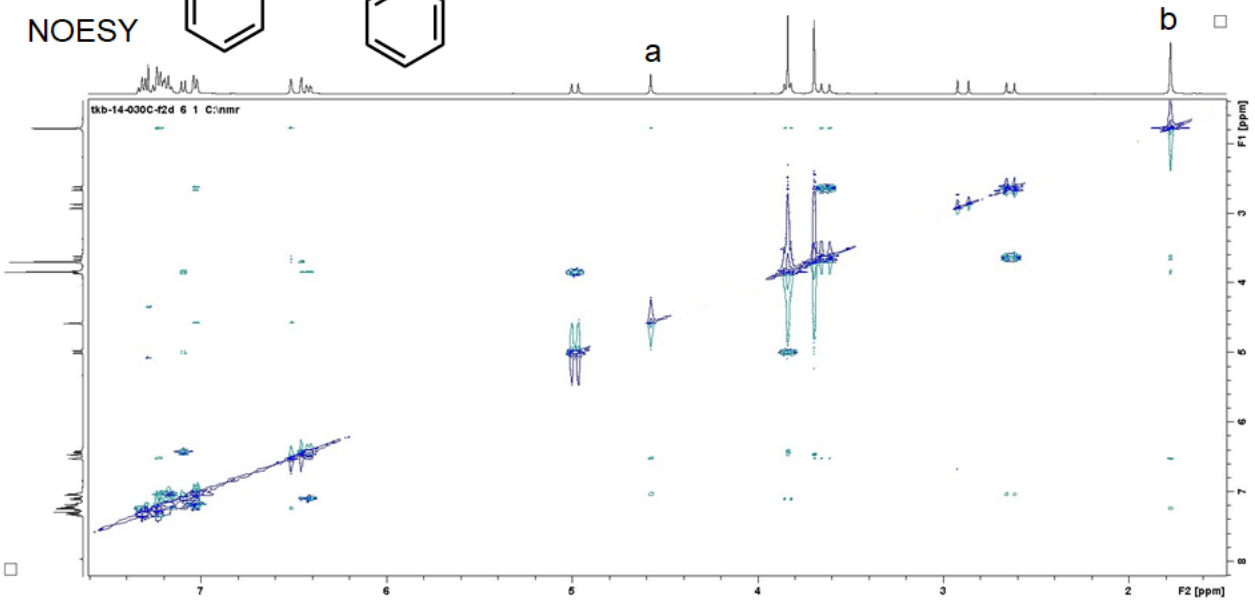
COSY





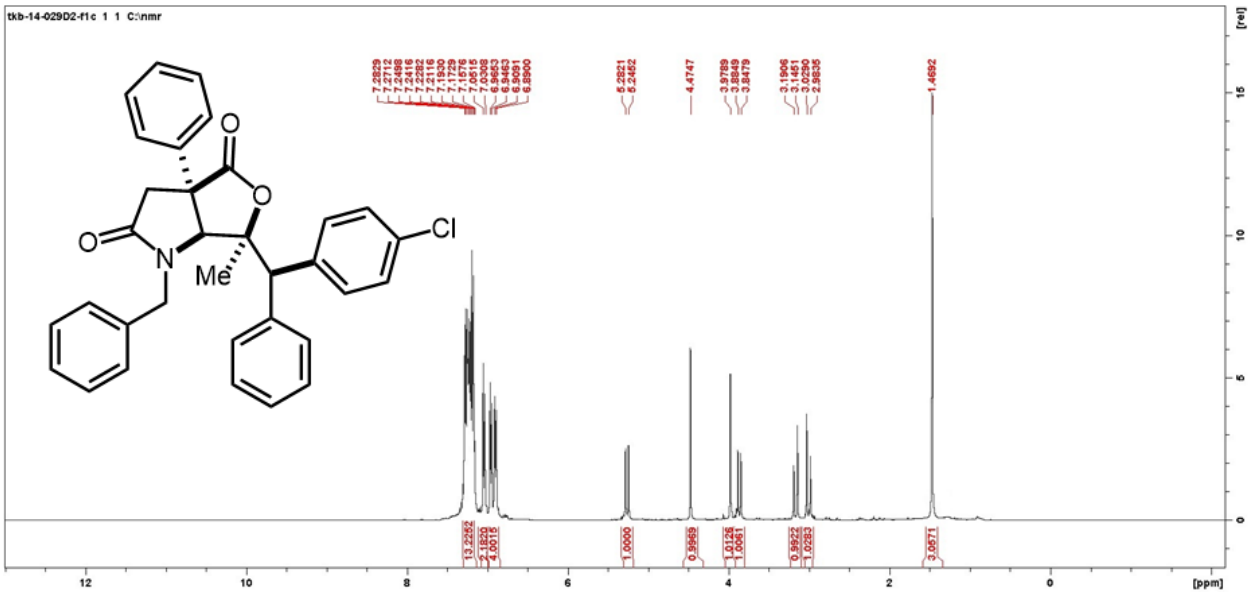
noe between a and b as well as between b and c

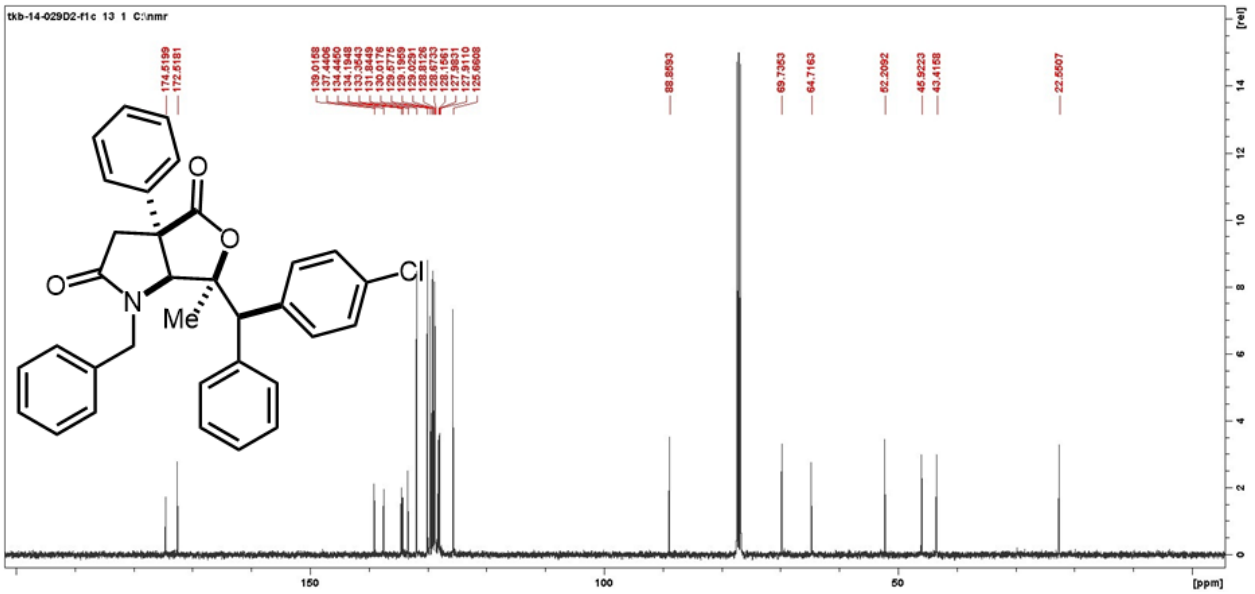
NOESY



Compound 4y

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Greenish-yellow oil. Yield = 219.2 mg, 84%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35 – 7.11 (m, 13H), 7.04 (d, *J* = 8.2 Hz, 2H), 6.96 (d, *J* = 7.3 Hz, 2H), 6.93 – 6.87 (m, 2H), 5.26 (d, *J* = 14.8 Hz, 1H), 4.47 (s, 1H), 3.98 (s, 1H), 3.87 (d, *J* = 14.8 Hz, 1H), 3.15 (d, *J* = 17.8 Hz, 1H), 3.03 (d, *J* = 17.8 Hz, 1H), 1.47 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.5, 172.5, 139.0, 137.4, 134.4, 134.2, 133.4, 131.8, 130.0, 129.6, 129.2, 129.0, 128.8, 128.7, 128.2, 128.0, 127.9, 125.7, 88.9, 69.7, 64.7, 52.2, 45.9, 43.4, 22.5. FTIR (KBr): 3057.1, 2924.0, 1764.2, 1666.3, 1494.3, 1361.2, 1225.6, 1180.2, 1091.7, 1032.3, 996.4, 775.4. **HRMS-EI^{+}** (*m/z*): calc for $C_{33}H_{28}ClNO_3$ $[M]^{+}$ 521.1758, found 521.1753.

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137.4456
134.4450
134.1948
131.3543
131.0446
130.0176
129.5775
129.1969
129.0761
128.8126
128.6733
128.1561
127.9531
127.9110
125.6608
88.8893
69.7353
64.7163
52.2092
45.9223
43.4158
22.5507
Cl
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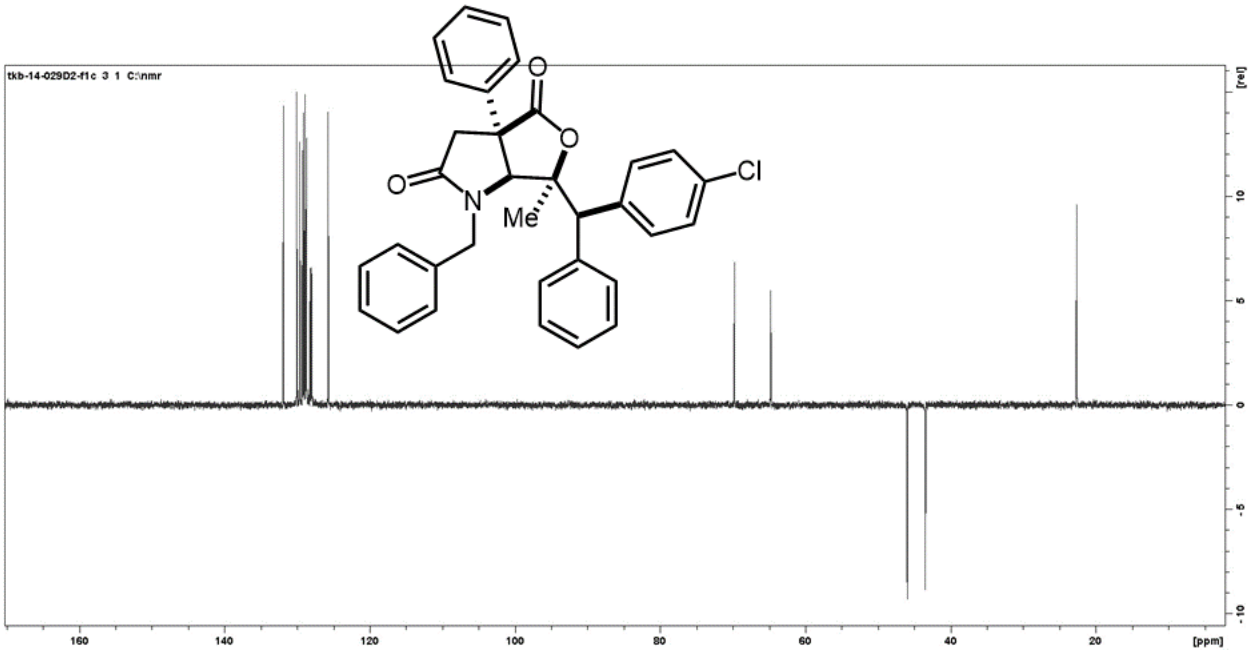
O
O
N
Me
150
100
50
[ppm]
[rel]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O
N
Me
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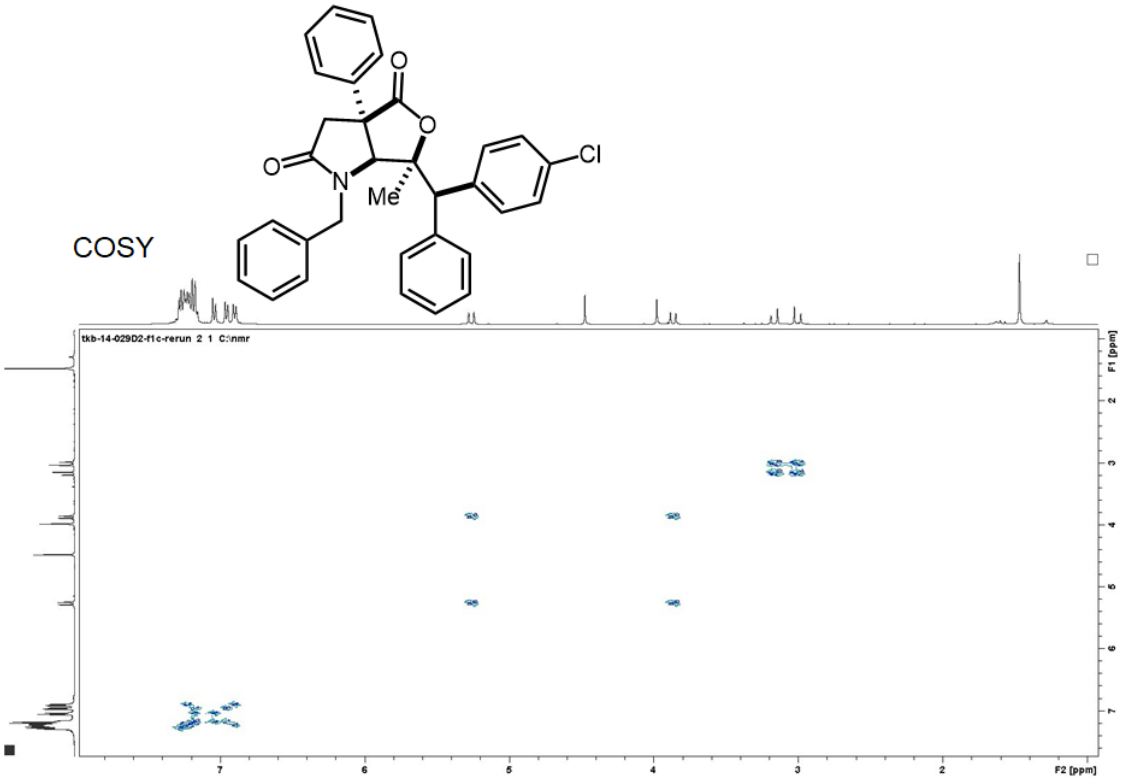
140
120
100
80
60
40
20
[ppm]
[rel]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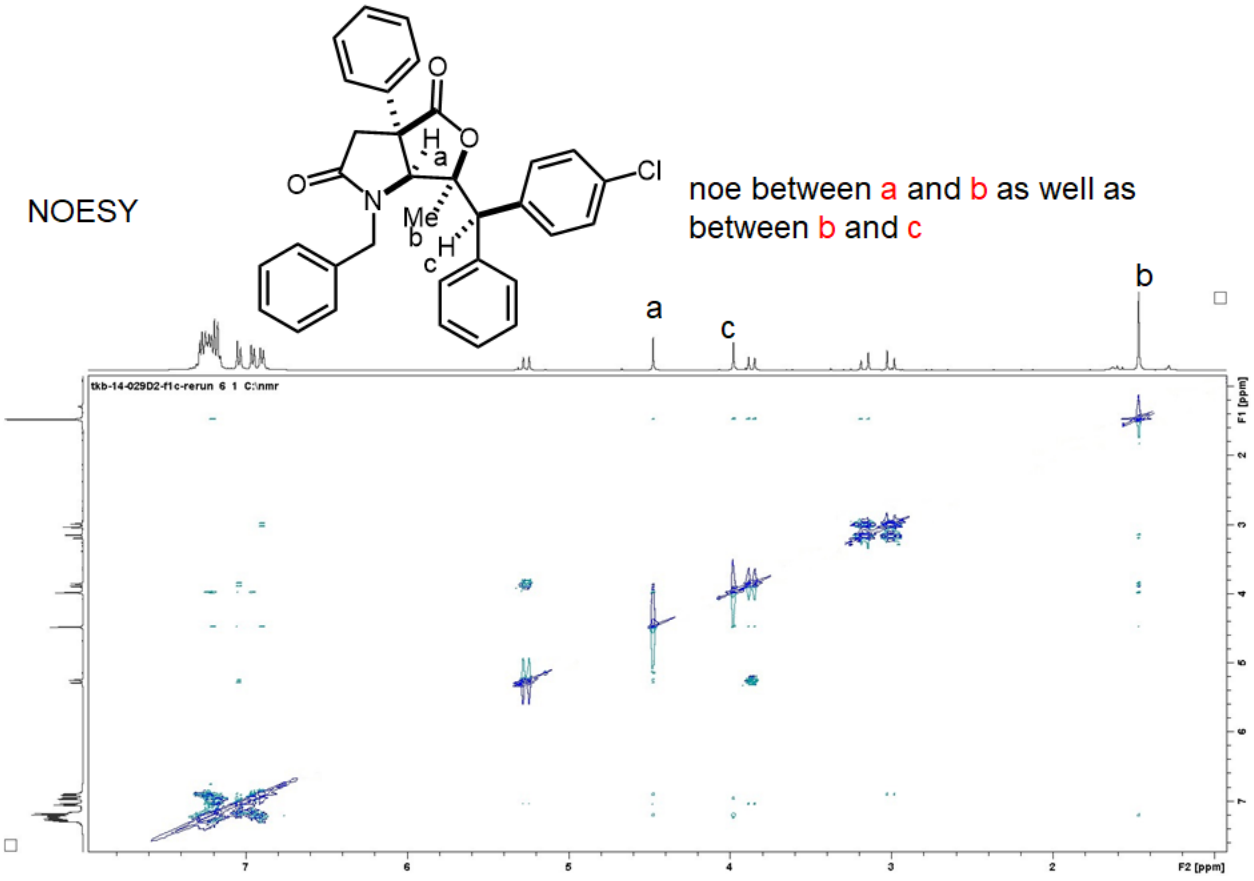
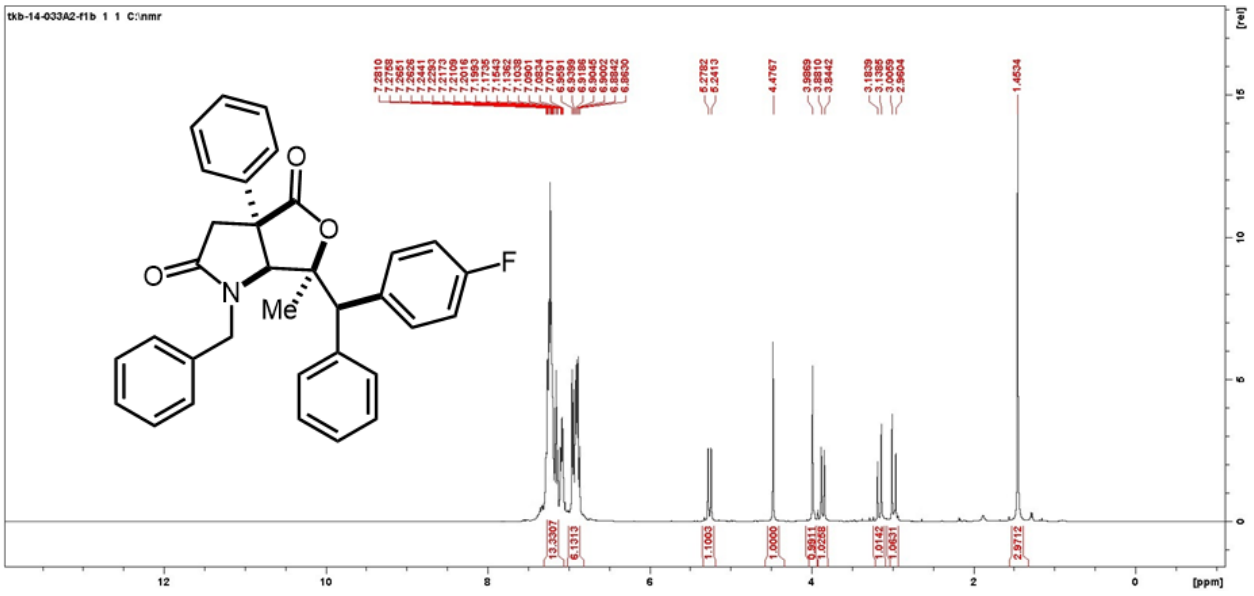
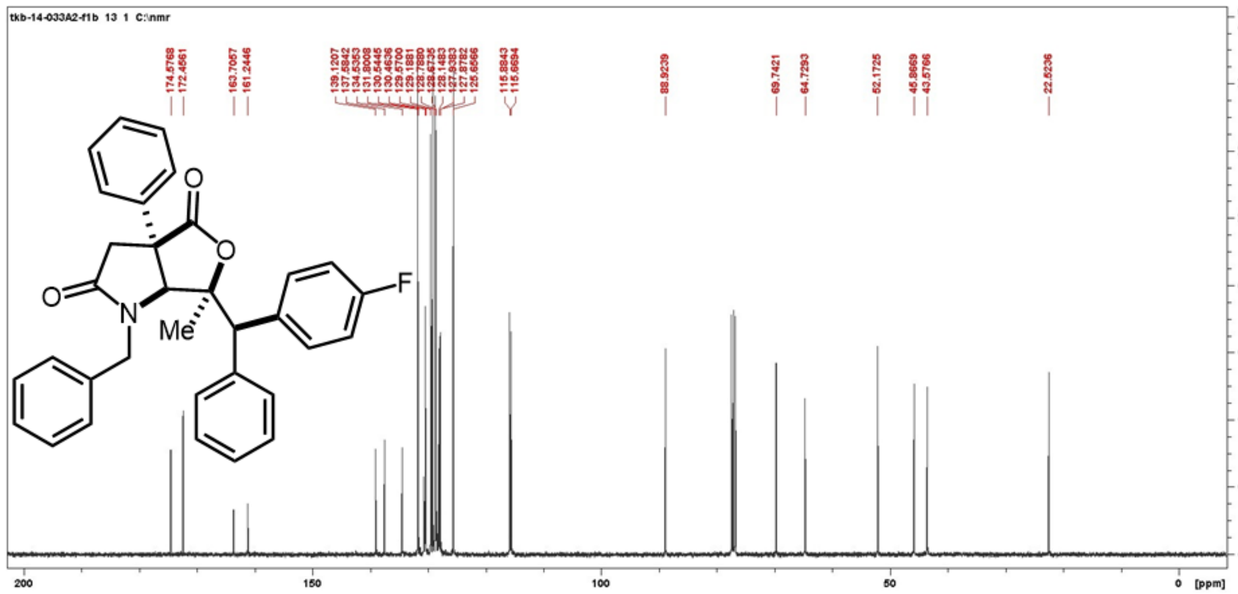
O
O
N
Me
Cl
tkb-14-029D2-f1c-rerun 2 1 C:\nmr
F1 [ppm]
F2 [ppm]

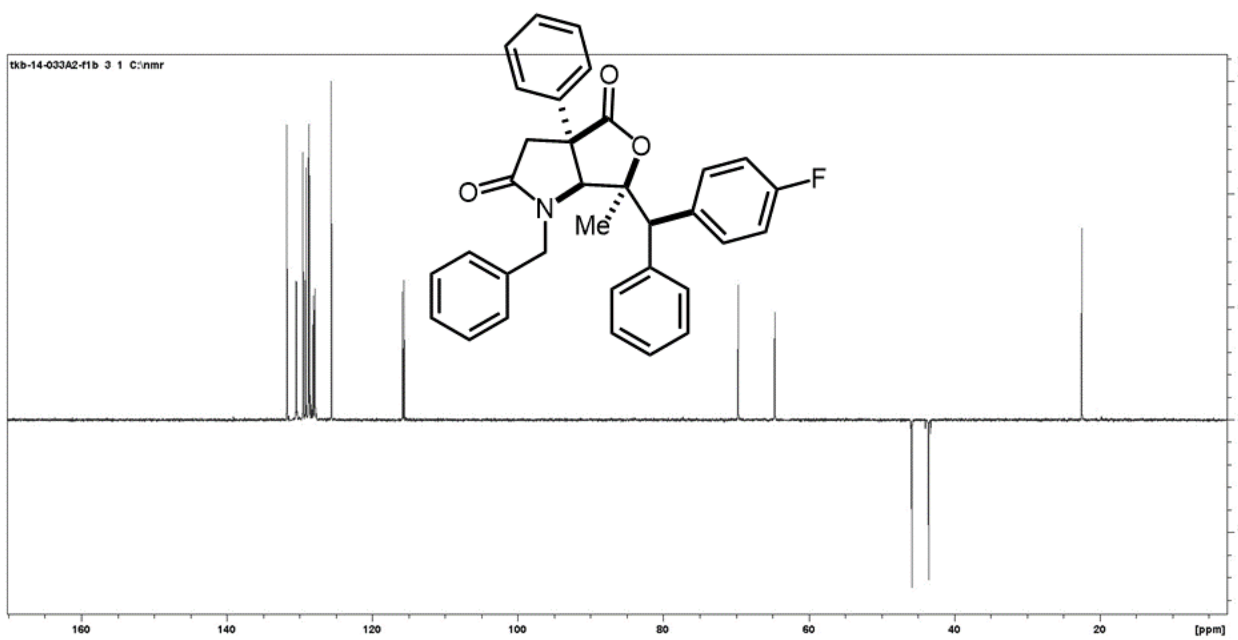

NOESY
noe between a and b as well as
between b and c
O
O
H
a
O
N
Me
b
H
c
Cl
a
c
b
tkb-14-029D2-f1c-rerun 6 1 C:\nmr
F1 [ppm]
F2 [ppm]

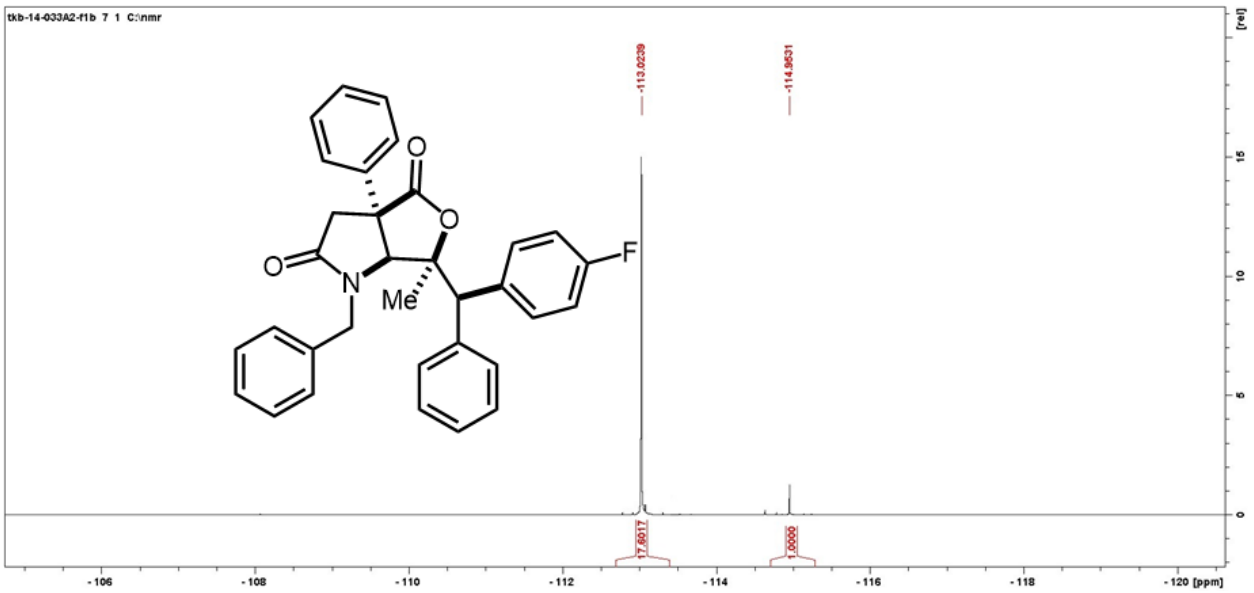
Compound 4z

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Greenish-yellow oil. Yield = 202.2 mg, 80%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.28 – 7.07 (m, 13H), 6.96 – 6.86 (m, 6H), 5.25 (d, *J* = 14.7 Hz, 1H), 4.48 (s, 1H), 3.99 (s, 1H), 3.86 (d, *J* = 14.7 Hz, 1H), 3.14 (d, *J* = 18.2 Hz, 1H), 2.98 (d, *J* = 18.2 Hz, 1H), 1.45 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.6, 172.5, 163.7, 161.2, 139.1, 137.6, 134.5, 131.8, 130.8, 130.7, 130.5, 130.5, 129.6, 129.2, 128.8, 128.7, 128.1, 127.9, 127.9, 125.7, 115.9, 115.7, 88.9, 69.7, 64.7, 52.2, 45.9, 43.6, 22.5. FTIR (KBr): 2998.4, 2924.0, 1734.2, 1668.3, 1474.3, 1452.8, 1361.9, 1342.0, 1205.6, 1144.2, 1081.7, 1038.3, 986.4, 705.2. **HRMS-EI^{+}** (*m/z*): calc for $C_{33}H_{28}FNO_3$ $[M]^{+}$ 505.2053, found 505.2058.





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1.0000
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-108
-110
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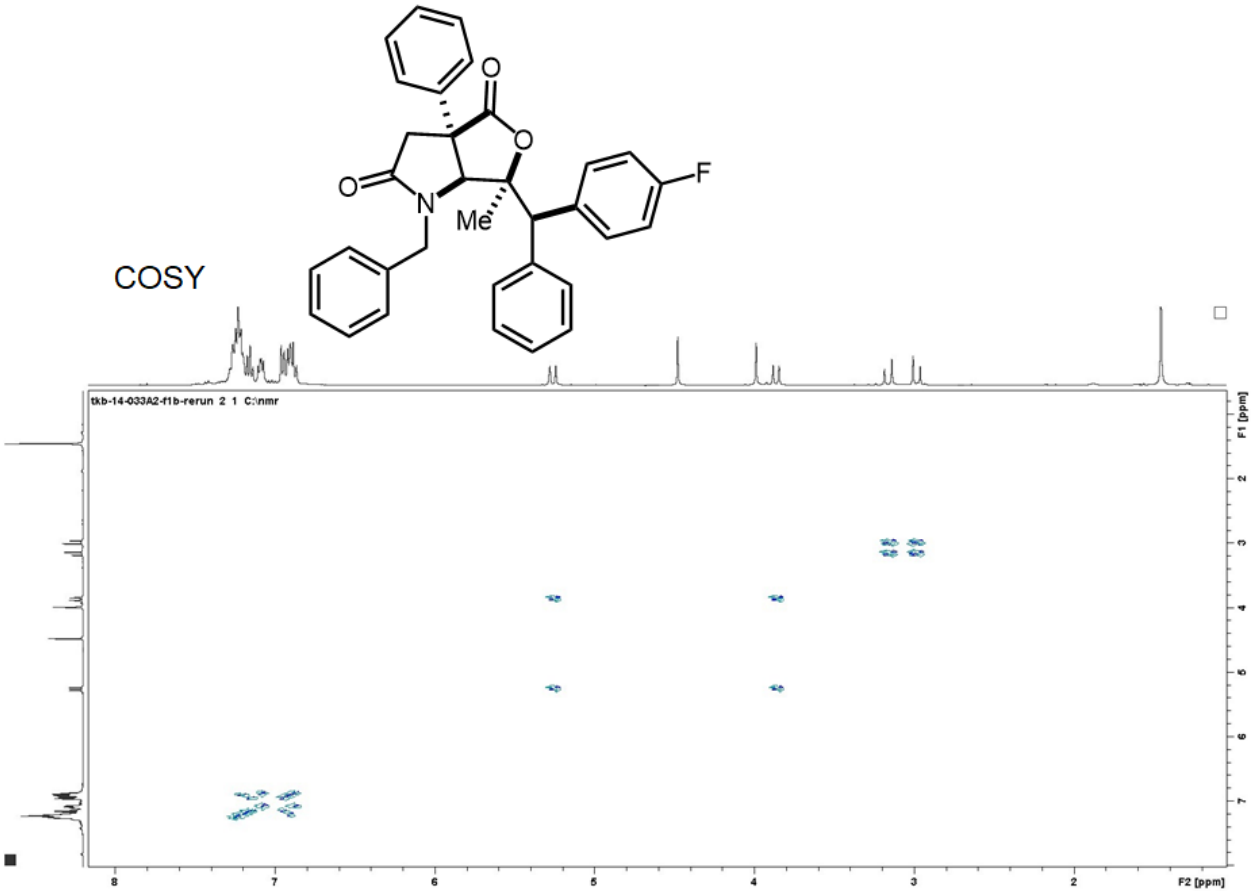
-120 [ppm]
[rel]
O
O
O
N
Me
F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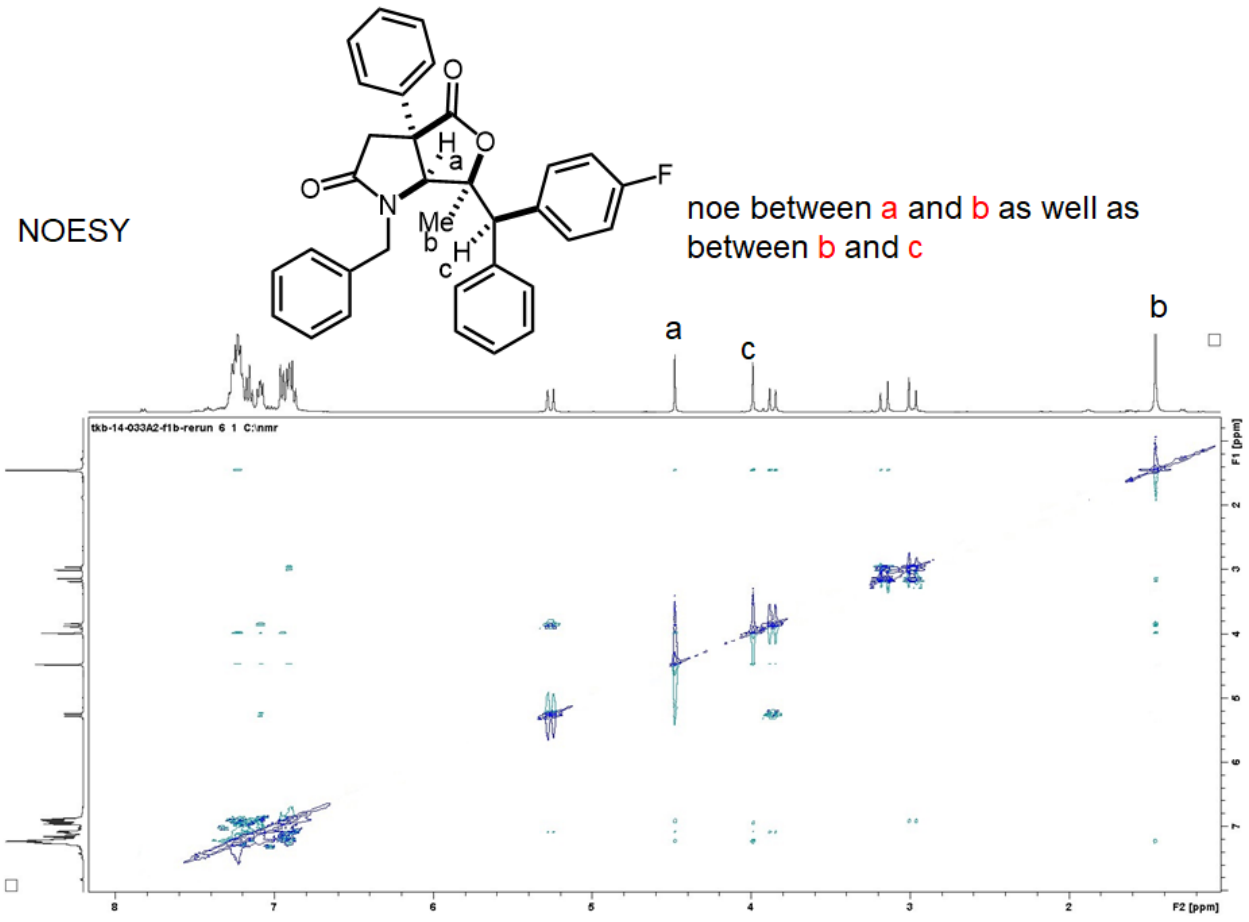
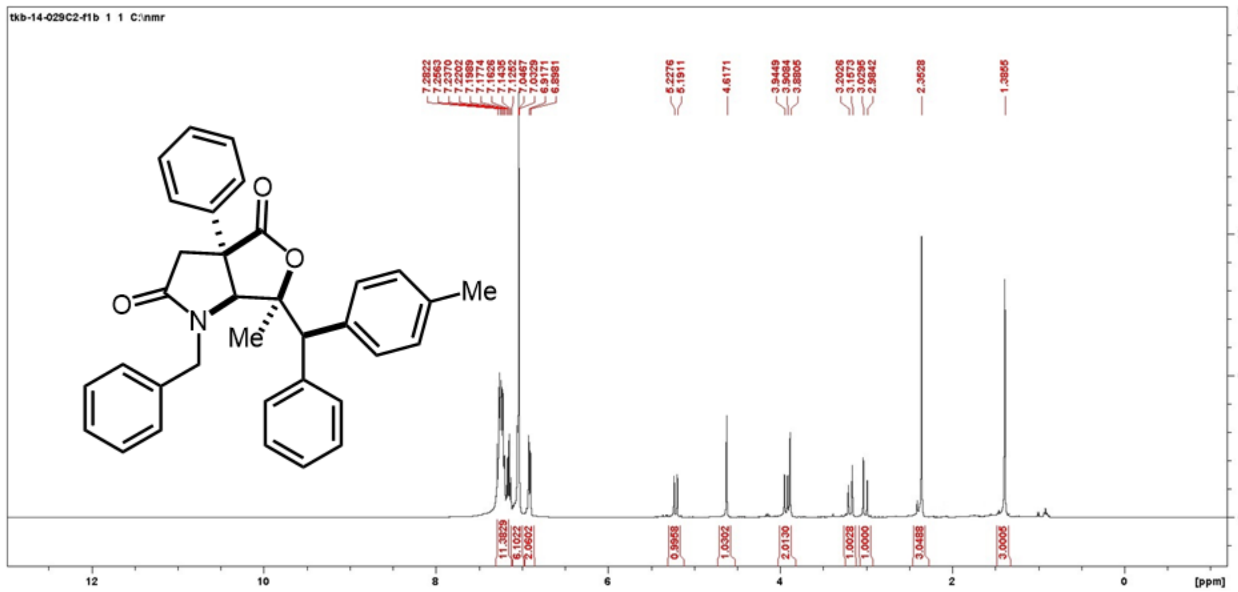
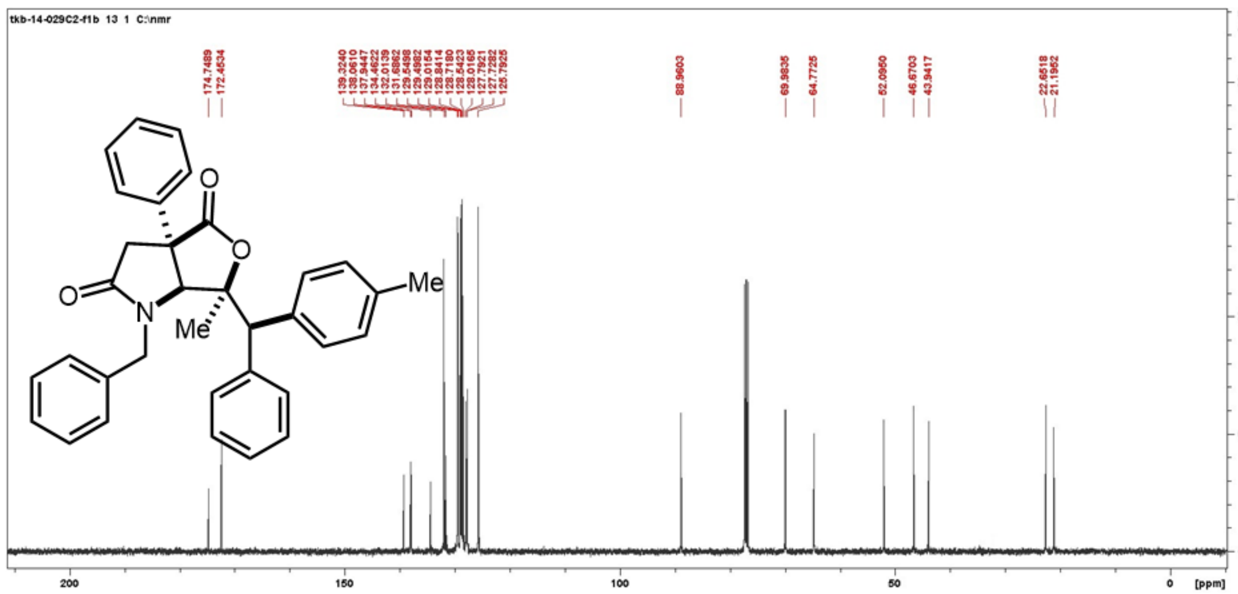
tkb-14-033A2-f1b-rerun 2 1 C13nmr
F1 [ppm]
F2 [ppm]
O
O
O
N
Me
F

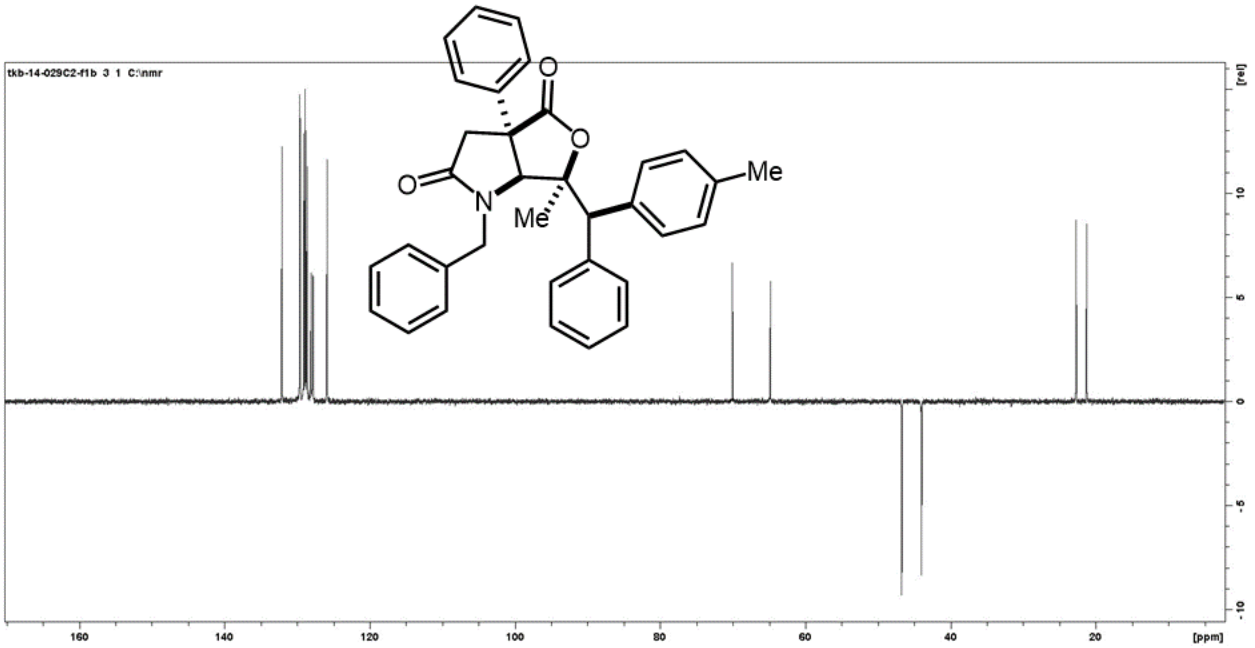


Compound 4z1

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Yellow oil. Yield = 218.2 mg, 87%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.29 – 7.03 (m, 17H), 6.91 (d, *J* = 7.4 Hz, 2H), 5.21 (d, *J* = 14.5 Hz, 1H), 4.62 (s, 1H), 3.97 – 3.86 (m, 2H), 3.16 (d, *J* = 17.5 Hz, 1H), 3.03 (d, *J* = 17.5 Hz, 1H), 2.35 (s, 3H), 1.39 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.7, 172.5, 139.3, 138.1, 137.9, 134.5, 132.0, 131.7, 129.5, 129.5, 129.0, 128.9, 128.7, 128.5, 128.0, 127.8, 127.7, 125.8, 89.0, 70.0, 64.8, 52.1, 46.7, 43.9, 22.7, 21.2. FTIR (KBr): 2994.1, 1763.4, 1669.4, 1608.2, 1511.1, 1431.8, 1414.7, 1344.9, 1298.4, 1135.3, 1031.8, 996.7, 706.4. **HRMS-EI^{+}** (*m/z*): calc for $C_{34}H_{31}NO_3$ $[M]^{+}$ 501.2304, found 501.2309.

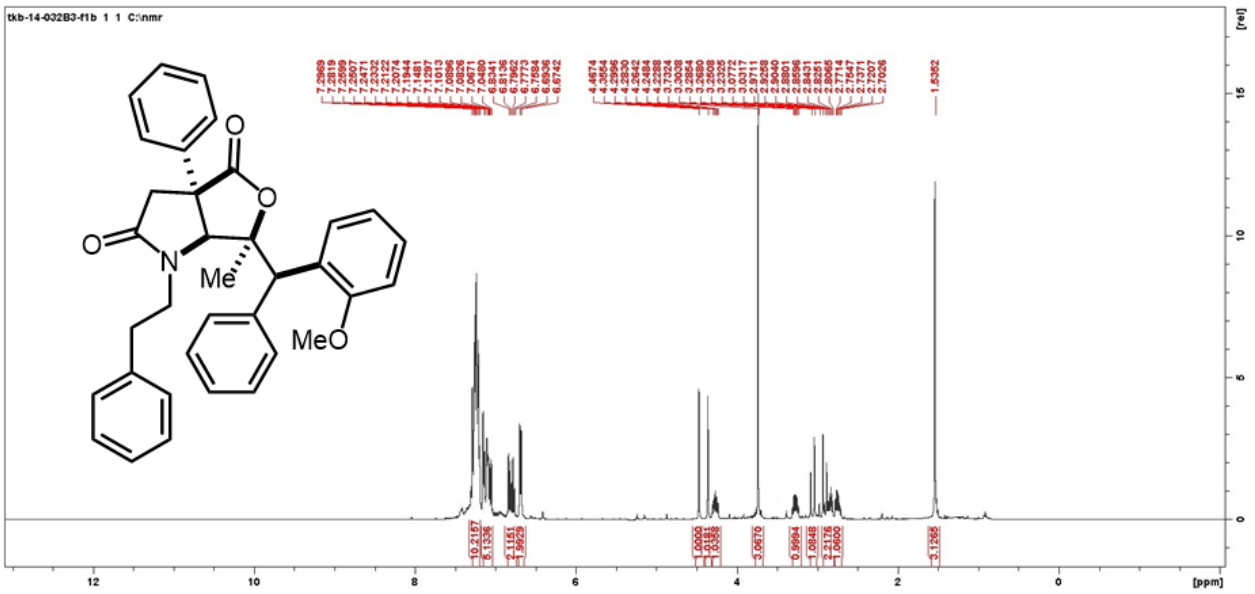






Compound 4z2

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (70:30). Amorphous solid. Yield = 175.3 mg, 66%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.30 – 7.04 (m, 15H), 6.83 – 6.76 (m, 2H), 6.68 (dd, *J* = 7.7, 1.9 Hz, 2H), 4.47 (s, 1H), 4.36 (s, 1H), 4.26 (ddd, *J* = 14.2, 8.3, 6.2 Hz, 1H), 3.73 (s, 3H), 3.27 (dt, *J* = 14.3, 7.4 Hz, 1H), 3.03 (d, *J* = 18.3 Hz, 1H), 2.95 – 2.79 (m, 2H), 2.74 (dt, *J* = 13.8, 7.3 Hz, 1H), 1.54 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.9, 172.3, 158.7, 139.4, 137.7, 136.7, 133.9, 129.9, 129.6, 128.9, 128.9, 128.6, 128.4, 127.9, 127.6, 126.6, 125.7, 121.9, 121.1, 111.2, 89.6, 70.6, 60.8, 55.7, 52.5, 43.9, 43.3, 33.1, 22.3. FTIR (KBr): 3020.0, 2834.3, 1724.9, 1646.3, 1474.3, 1452.8, 1361.9, 1342.0, 1205.6, 1140.2, 1077.7, 996.4, 766.2. **HRMS-EI^{+}** (*m/z*): calc for $C_{35}H_{33}NO_4$ $[M]^{+}$ 531.2410, found 531.2417.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Me
MeO
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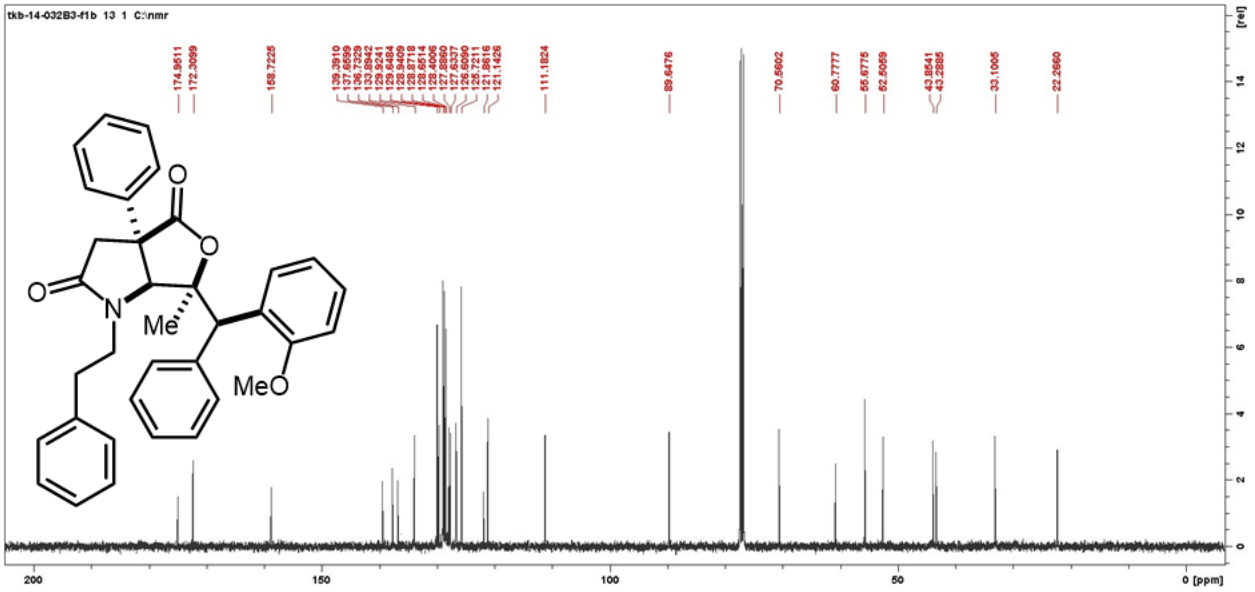
[rel]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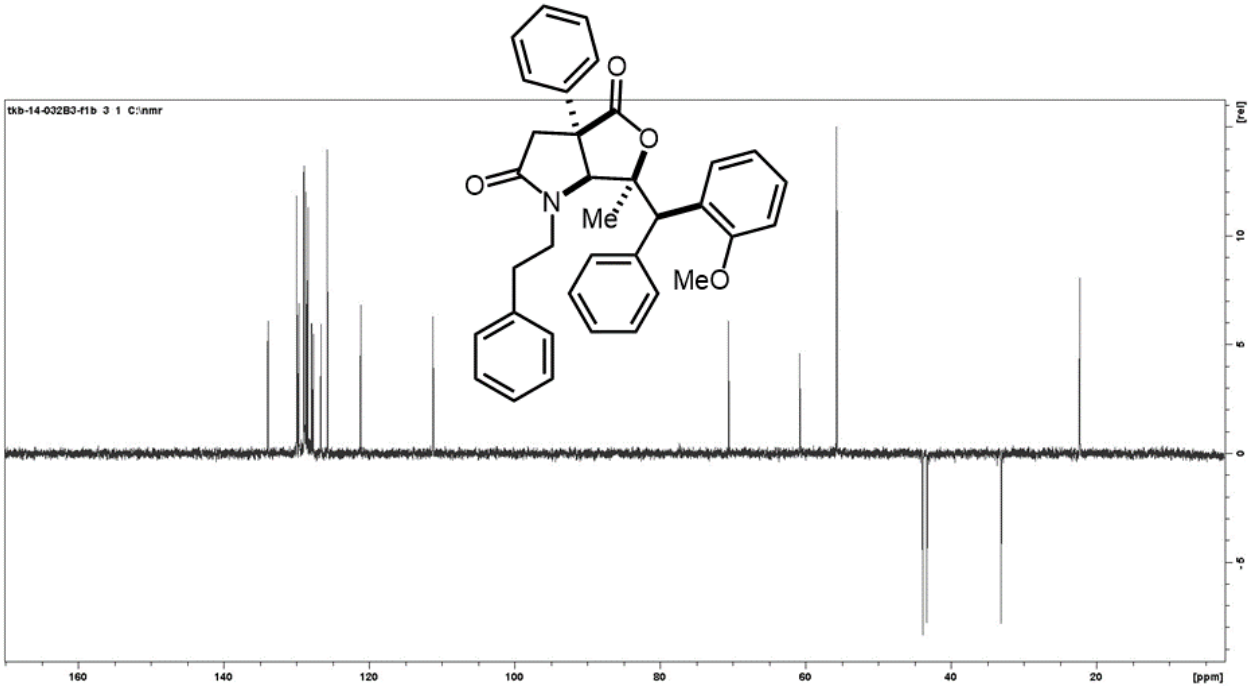
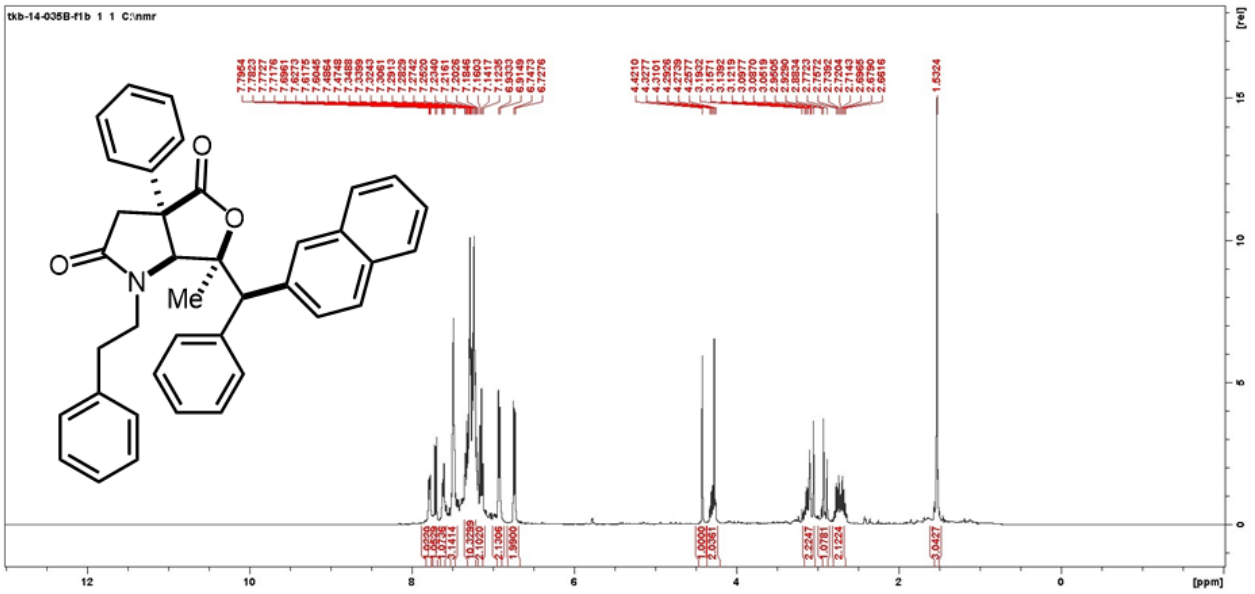
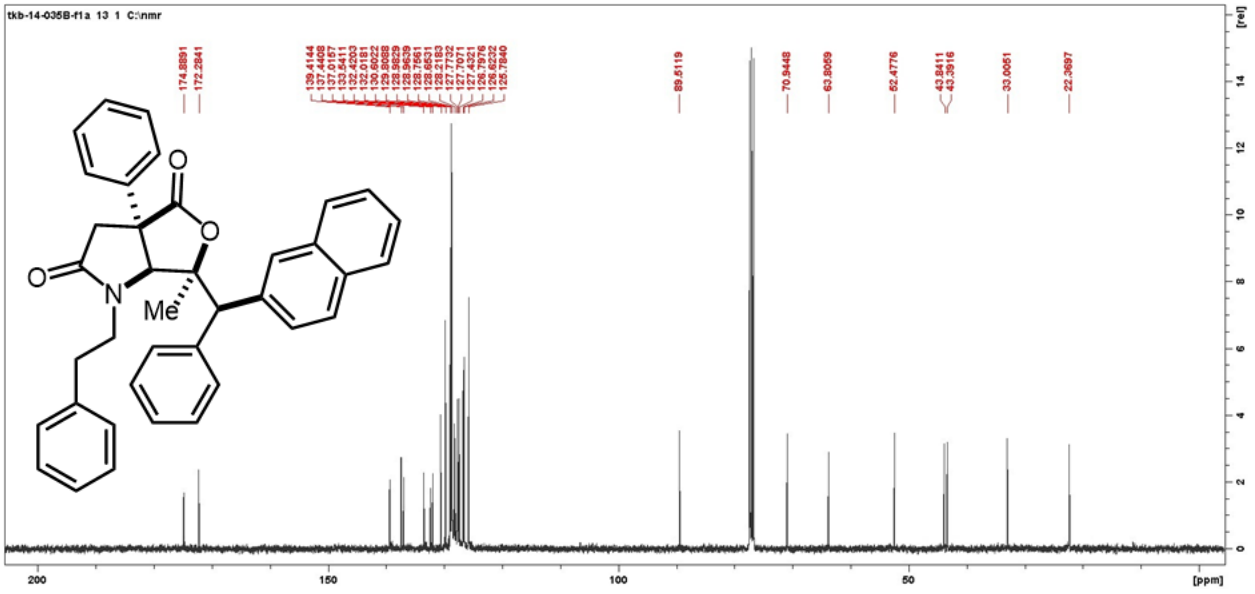
[rel]



Compound 4z3

Prepared in 0.50 mmol scale using **General Procedure A.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (75:25). Amorphous solid. Yield = 151.7 mg, 55%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.80 – 7.76 (m, 1H), 7.71 (d, *J* = 8.6 Hz, 1H), 7.65 – 7.55 (m, 4H), 7.22 – 6.96 (m, 12H), 6.92 (d, *J* = 7.4 Hz, 2H), 6.74 (d, *J* = 7.9 Hz, 2H), 4.42 (s, 1H), 4.36 – 4.24 (m, 2H), 3.22 – 3.03 (m, 2H), 2.91 (d, *J* = 18.2 Hz, 1H), 2.72 (ddt, *J* = 30.7, 13.9, 7.4 Hz, 2H), 1.53 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 174.9, 172.3, 139.4, 137.4, 137.0, 133.5, 132.4, 132.0, 130.6, 129.8, 128.9, 128.7, 128.6, 128.2, 127.8, 127.7, 127.4, 126.8, 126.6, 125.8, 89.5, 70.9, 63.8, 52.5, 43.8, 43.4, 33.0, 22.4. **HRMS-EI^{+}** (*m/z*): calc for $C_{38}H_{33}NO_3$ $[M]^{+}$ 551.2460, found 551.2466.


tkb-14-035B-f1b 1 1 C13nmr
Me
[ppm]
[rel]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Me
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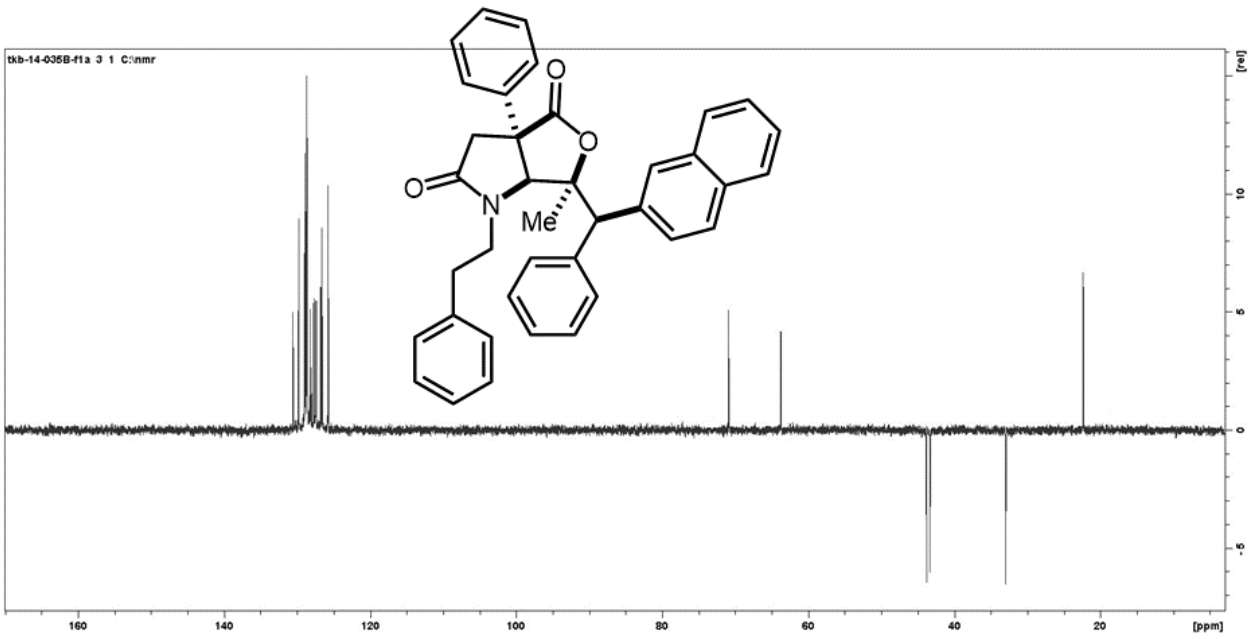
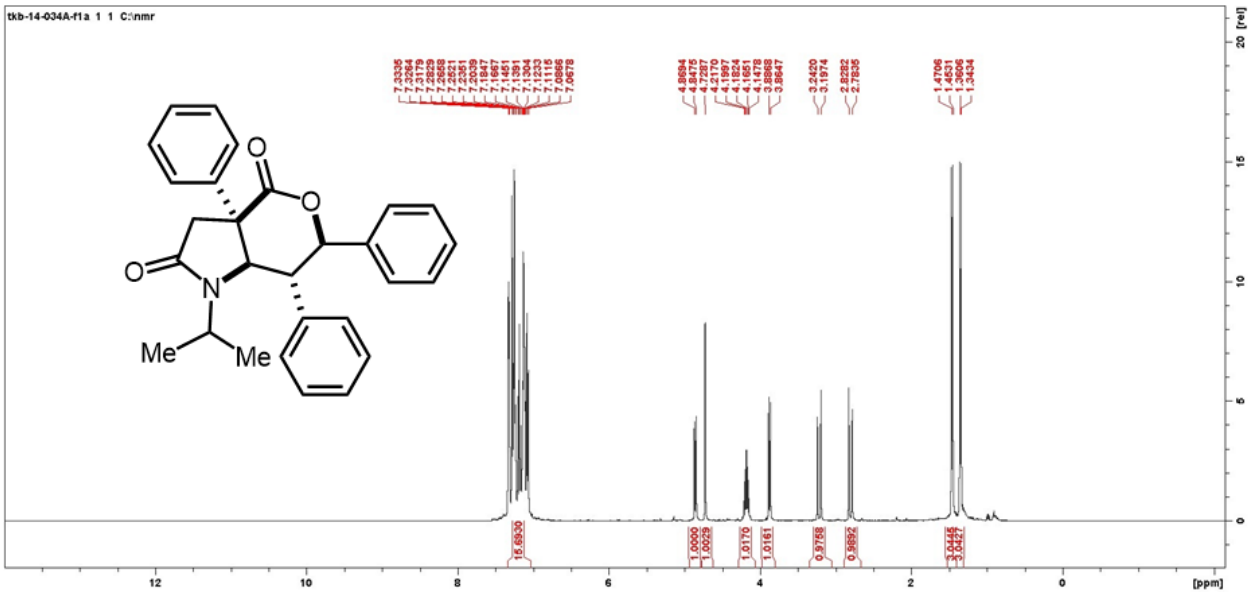
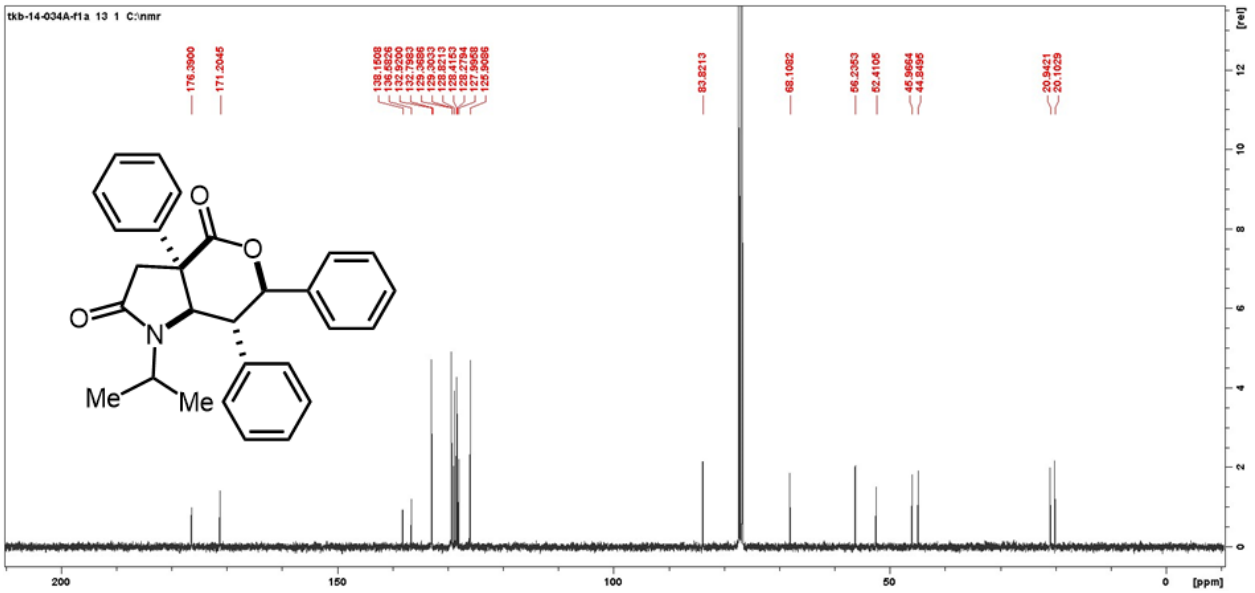

tkb-14-035B-f1a 3 1 C:\nmr
O
O
O
N
Me
160
140
120
100
80
60
40
20
[ppm]

Cobalt-catalyzed arylation (Scheme 3 Results)

Compound 5a

Prepared in 0.50 mmol scale using **General Procedure B.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Yellowish oil. Yield = 159.6 mg, 75%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 – 7.04 (m, 15H), 4.86 (dd, *J* = 8.9, 1.2 Hz, 1H), 4.73 (d, *J* = 1.2 Hz, 1H), 4.18 (hept, *J* = 6.9 Hz, 1H), 3.88 (d, *J* = 8.8 Hz, 1H), 3.22 (d, *J* = 17.8 Hz, 1H), 2.81 (d, *J* = 17.9 Hz, 1H), 1.46 (d, *J* = 7.0 Hz, 3H), 1.35 (d, *J* = 6.9 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 176.4, 171.2, 138.2, 136.6, 132.9, 132.8, 129.4, 129.3, 128.8, 128.4, 128.3, 128.0, 125.9, 83.8, 68.1, 56.2, 52.4, 46.0, 44.8, 20.9, 20.1. **HRMS-EI^{+}** (*m/z*): calc for $C_{28}H_{27}NO_3$ $[M]^{+}$ 425.1991, found 425.1996.

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132.9000
132.7983
129.3686
129.3033
128.8713
128.4415
128.2794
127.9958
125.5086
83.8213
68.1082
56.2353
52.4105
45.9684
44.8496
20.9421
20.1029
Me
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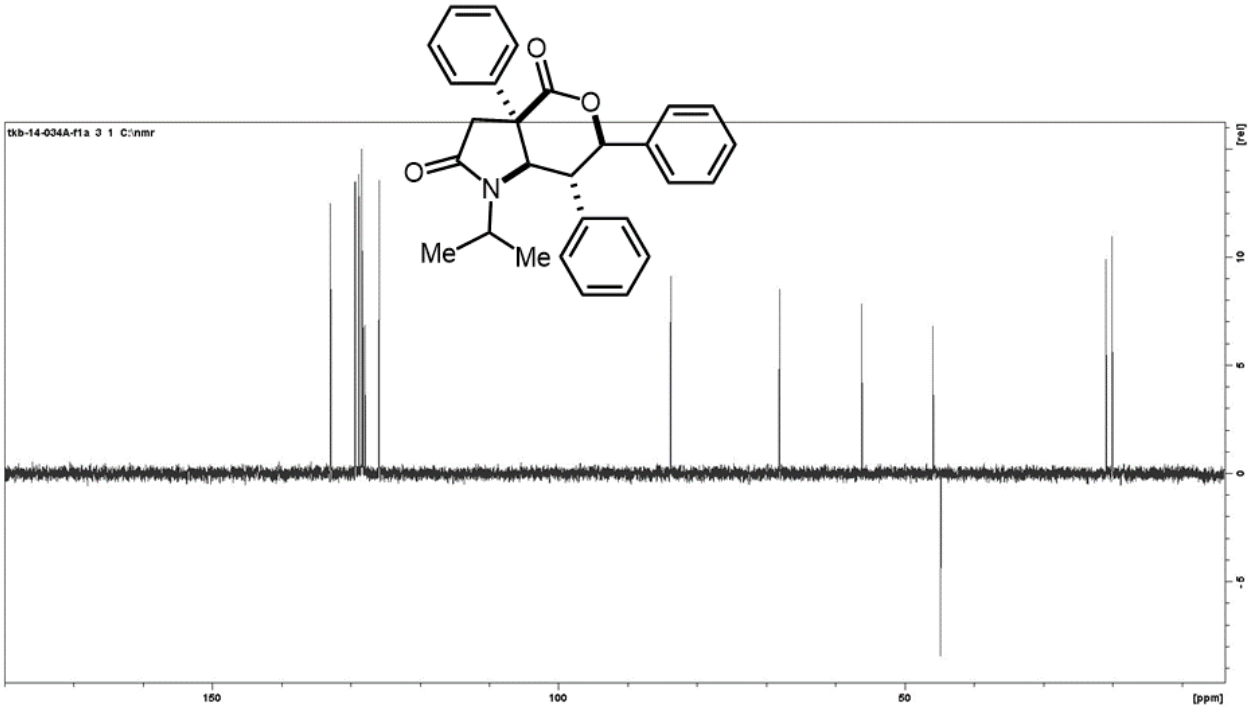
[ppm]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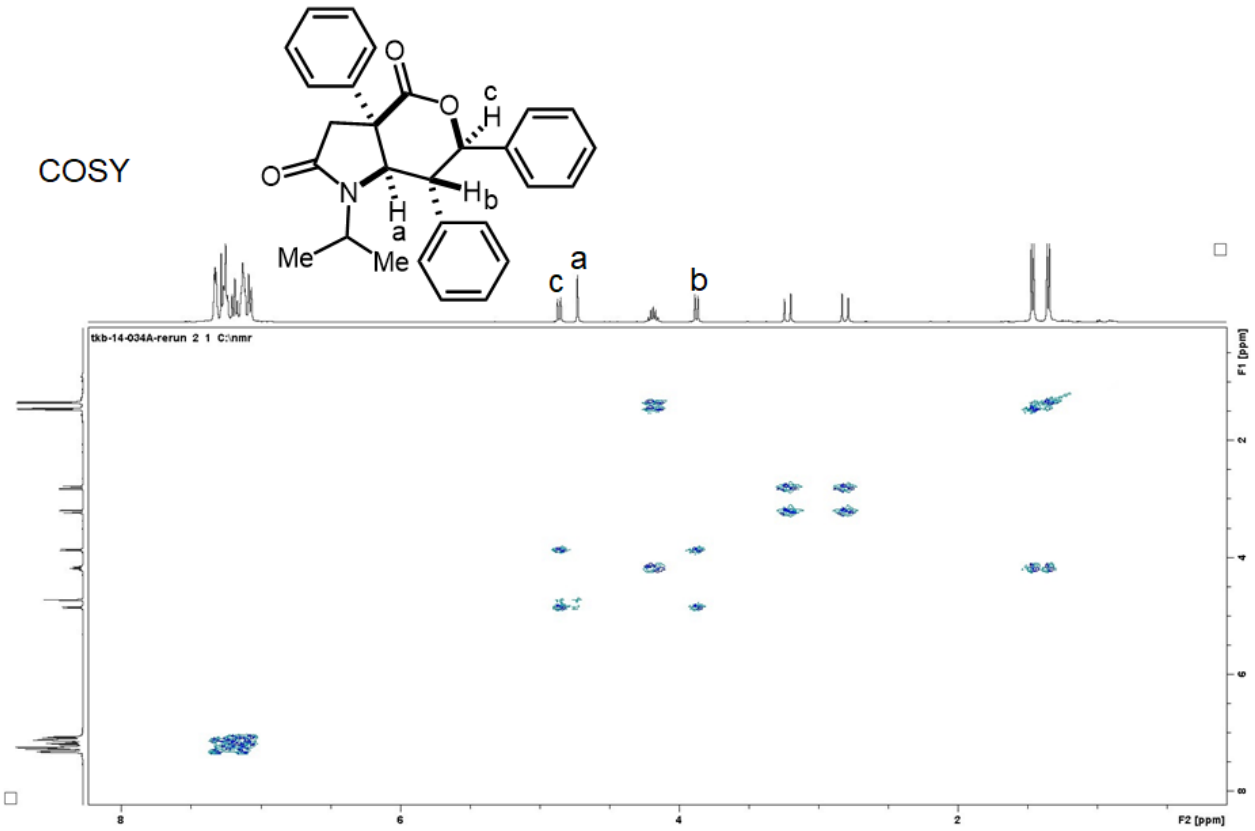
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H
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Me
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a
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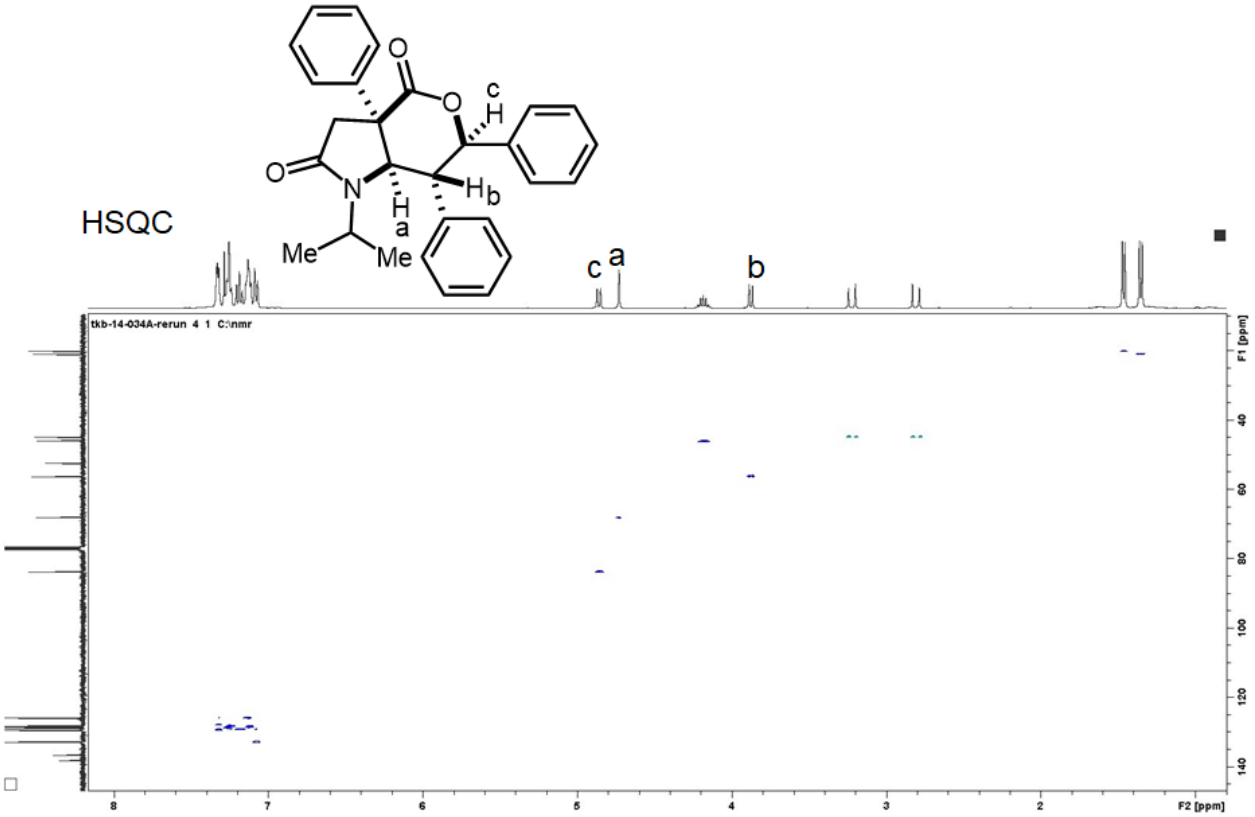
F1 [ppm]
F2 [ppm]

HSQC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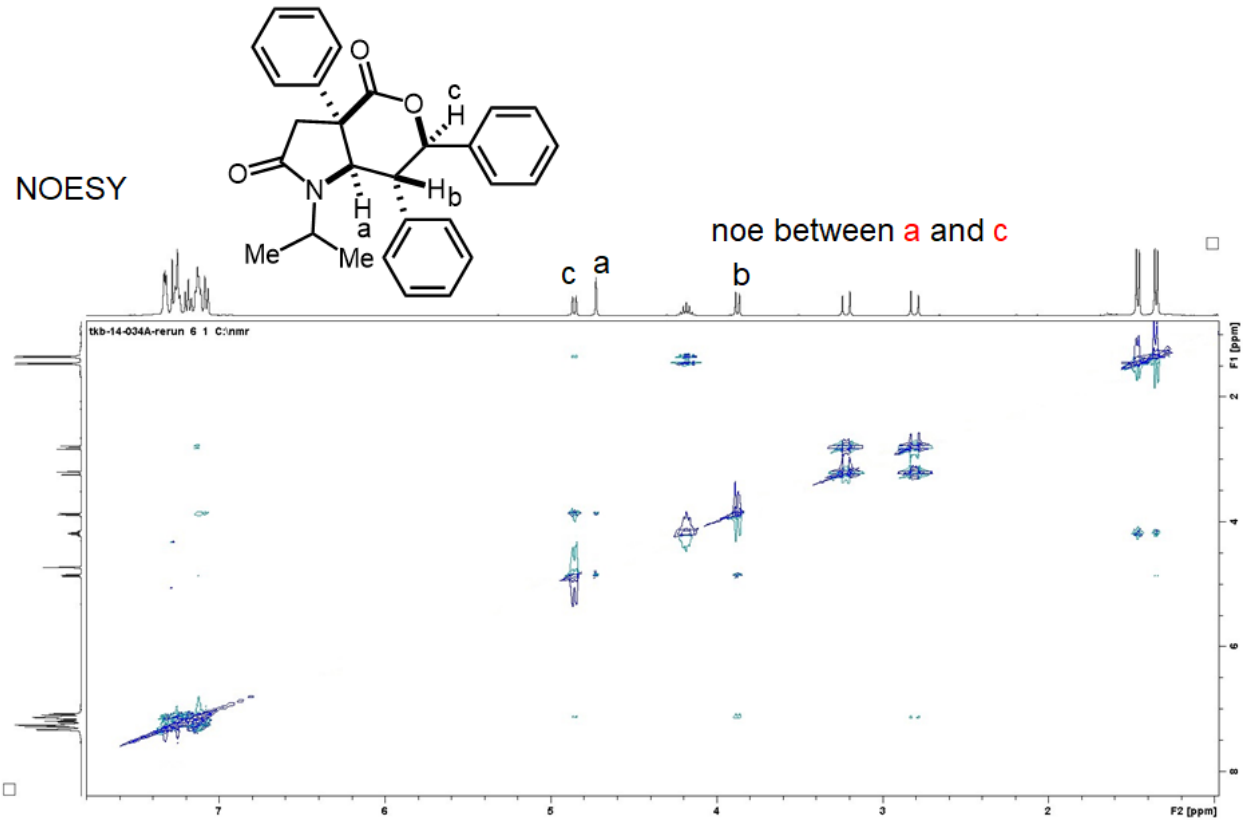
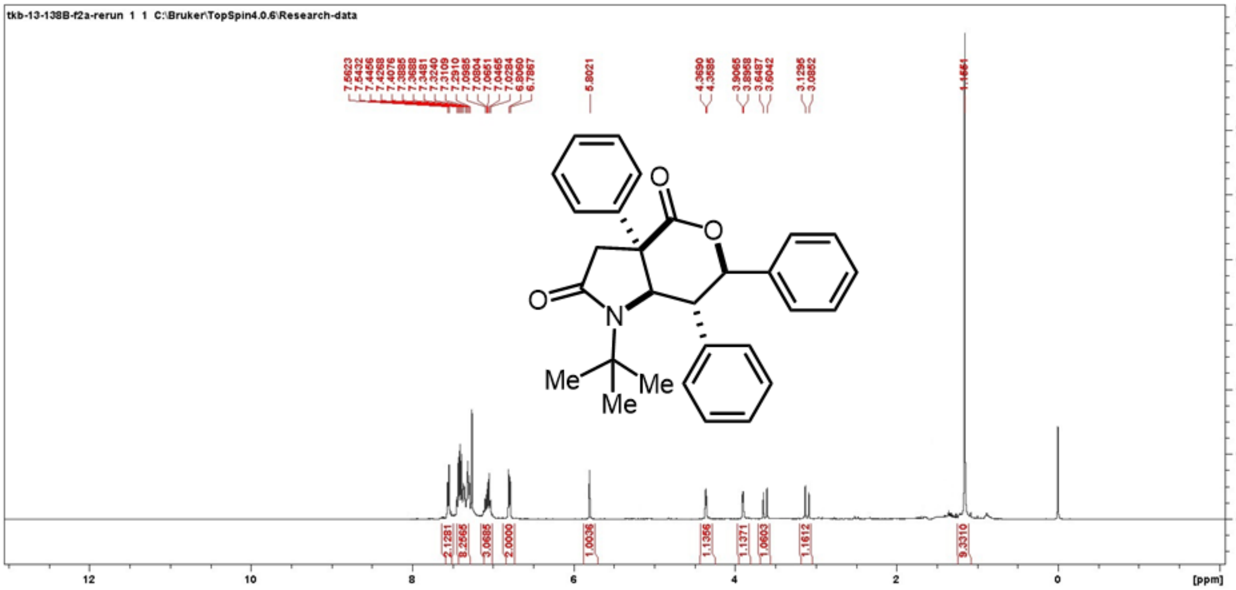
F1 [ppm]
F2 [ppm]



Compound 5b

Prepared in 0.50 mmol scale using **General Procedure B.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (70:30). Yellowish oil. Yield = 173.6 mg, 79%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.55 (d, *J* = 7.6 Hz, 2H), 7.47 – 7.24 (m, 9H), 7.06 (dt, *J* = 14.6, 6.7 Hz, 3H), 6.80 (d, *J* = 7.4 Hz, 2H), 5.80 (s, 1H), 4.36 (d, *J* = 4.3 Hz, 1H), 3.90 (d, *J* = 4.4 Hz, 1H), 3.63 (d, *J* = 17.8 Hz, 1H), 3.11 (d, *J* = 17.8 Hz, 1H), 1.16 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 173.4, 172.6, 143.7, 136.2, 133.6, 131.5, 129.6, 129.1, 128.8, 128.6, 128.2, 127.6, 126.3, 124.7, 79.5, 70.0, 61.2, 55.6, 51.4, 45.1, 27.7. **HRMS-EI^{+}** (*m/z*): calc for $C_{29}H_{29}NO_3$ $[M]^{+}$ 439.2147, found 439.2152.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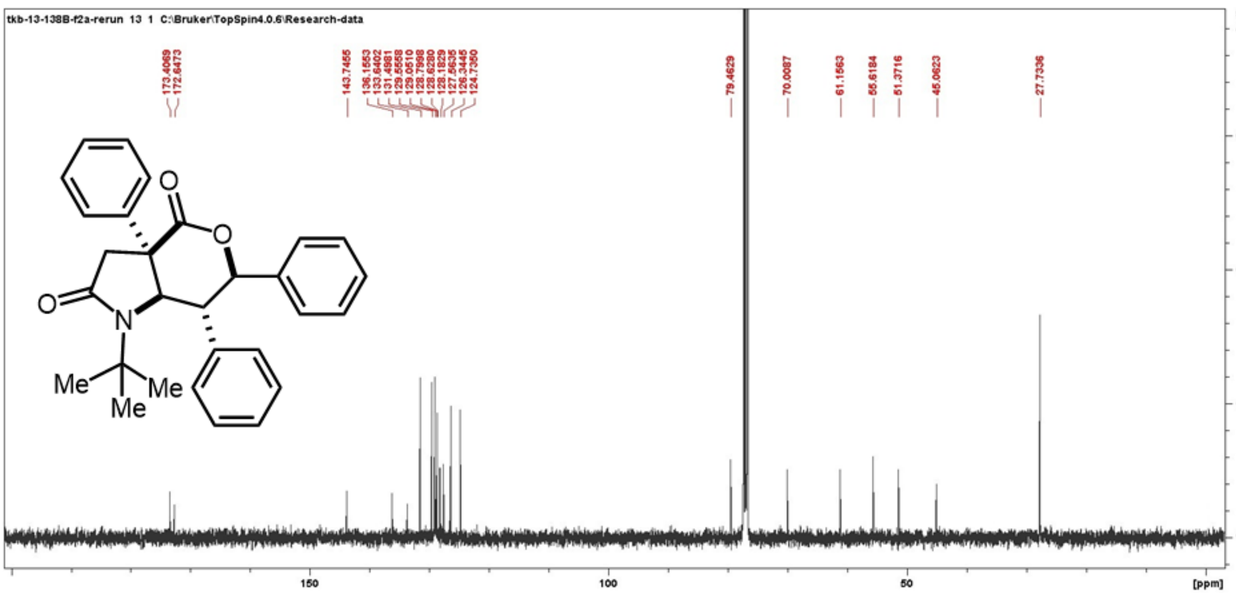
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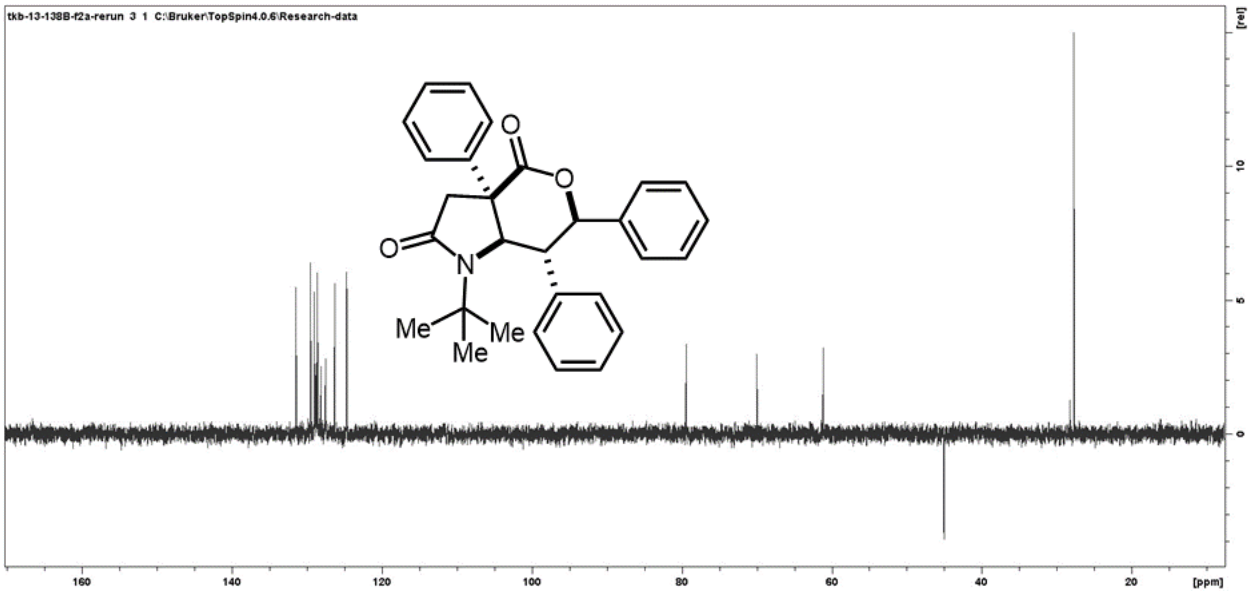
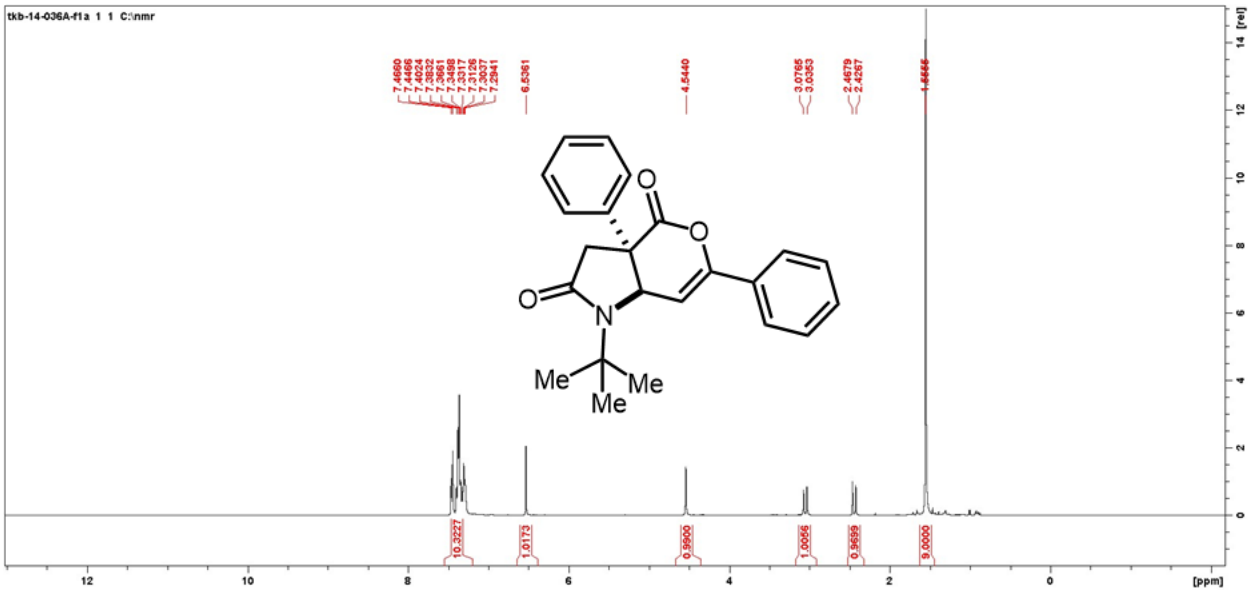
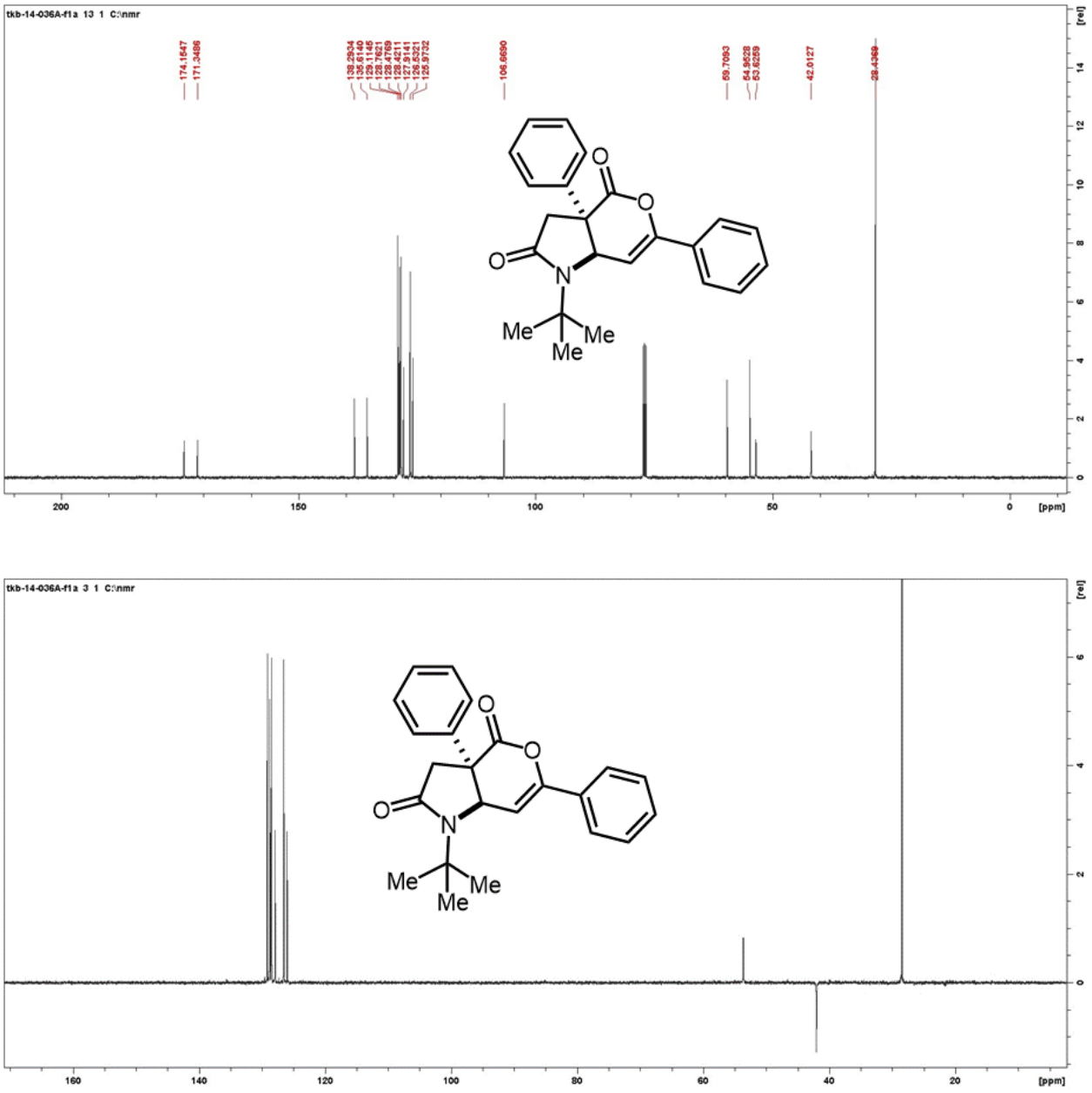


Compound **9** (shown below) was obtained as a β-hydride elimination side product when **Procedure A** was used.

^{1}H NMR (400 MHz, CDCl3) δ 7.46 – 7.29 (m, 10H), 6.54 (s, 1H), 4.54 (s, 1H), 3.06 (d, J = 16.5 Hz, 1H), 2.45 (d, J = 16.5 Hz, 1H), 1.56 (s, 9H). ^{13}C NMR (101 MHz, CDCl3) δ 174.2, 171.3, 138.3, 135.6, 129.1, 128.8, 128.4, 127.9, 126.5, 125.9, 106.7, 59.7, 55.0, 53.6, 42.0, 28.4.

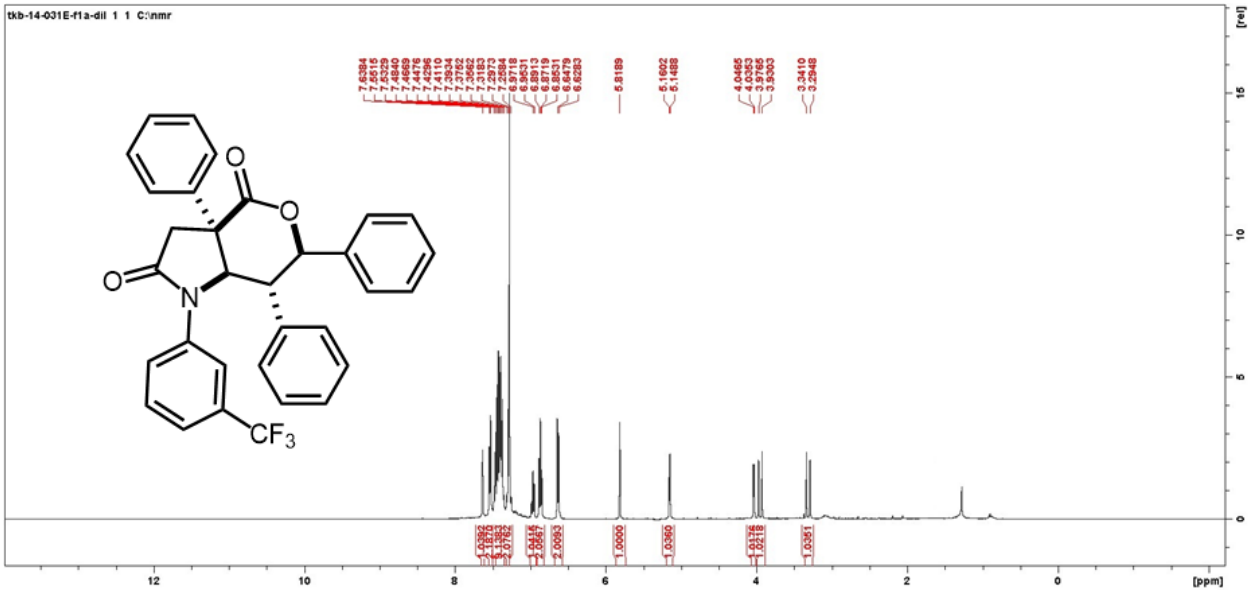


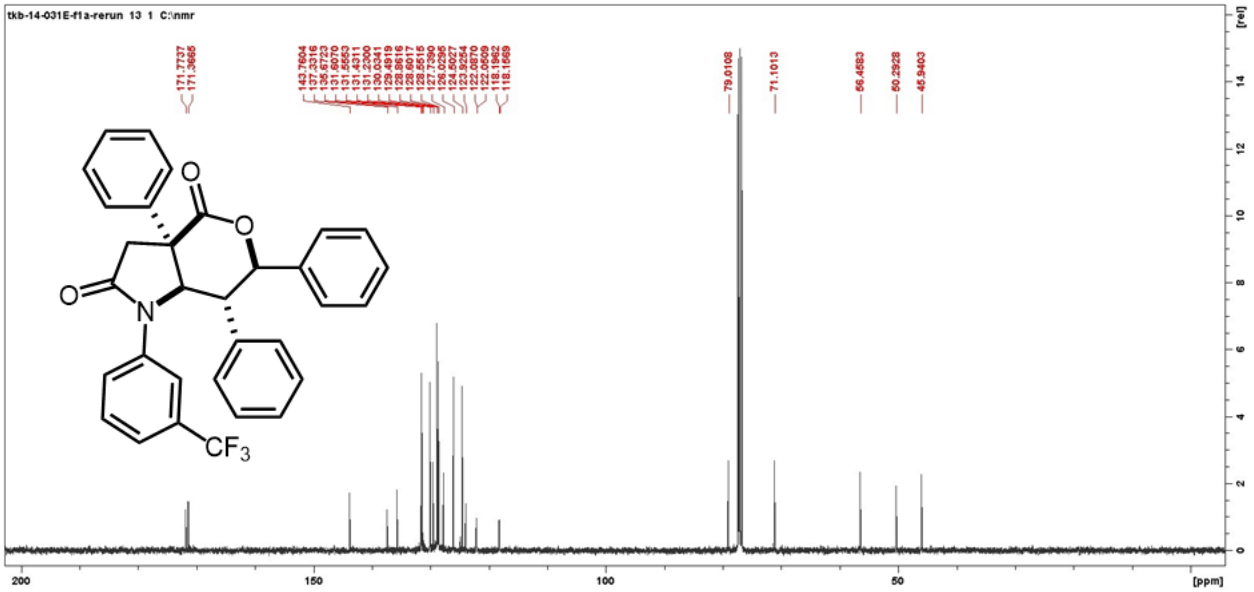


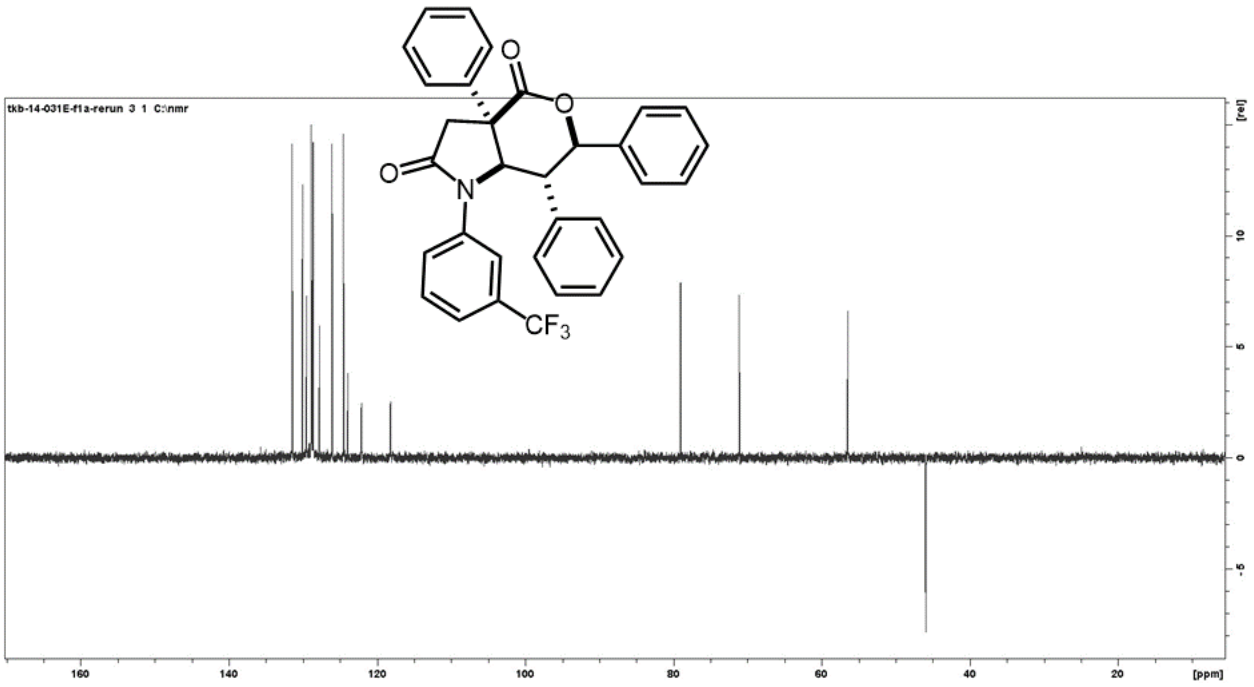
Compound 5c

Prepared in 0.50 mmol scale using **General Procedure B.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (75:25). Yellowish oil. Yield = 168.8 mg, 64%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65 (s, 1H), 7.58 – 7.50 (m, 2H), 7.50 – 7.34 (m, 8H), 7.34 – 7.22 (m, 3H), 6.97 (t, J = 7.4 Hz, 1H), 6.87 (t, J = 7.6 Hz, 2H), 6.64 (d, J = 7.6 Hz, 2H), 5.83 (s, 1H), 5.17 (d, J = 4.5 Hz, 1H), 4.05 (d, J = 4.5 Hz, 1H), 3.95 (d, J = 17.5 Hz, 1H), 3.33 (d, J = 17.5 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.8, 171.4, 143.8, 137.3, 135.7, 131.6, 131.4, 130.0, 129.5,

128.9, 128.8, 128.6, 127.7, 126.0, 124.5, 123.9, 122.1, 122.0, 118.2, 118.2, 79.0, 71.1, 56.5, 50.3, 45.9. **HRMS-EI$^+$** (*m/z*): calc for $C_{32}H_{24}F_3NO_3$ $[M]^+$ 527.1708, found 527.1712.



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^{19}F NMR


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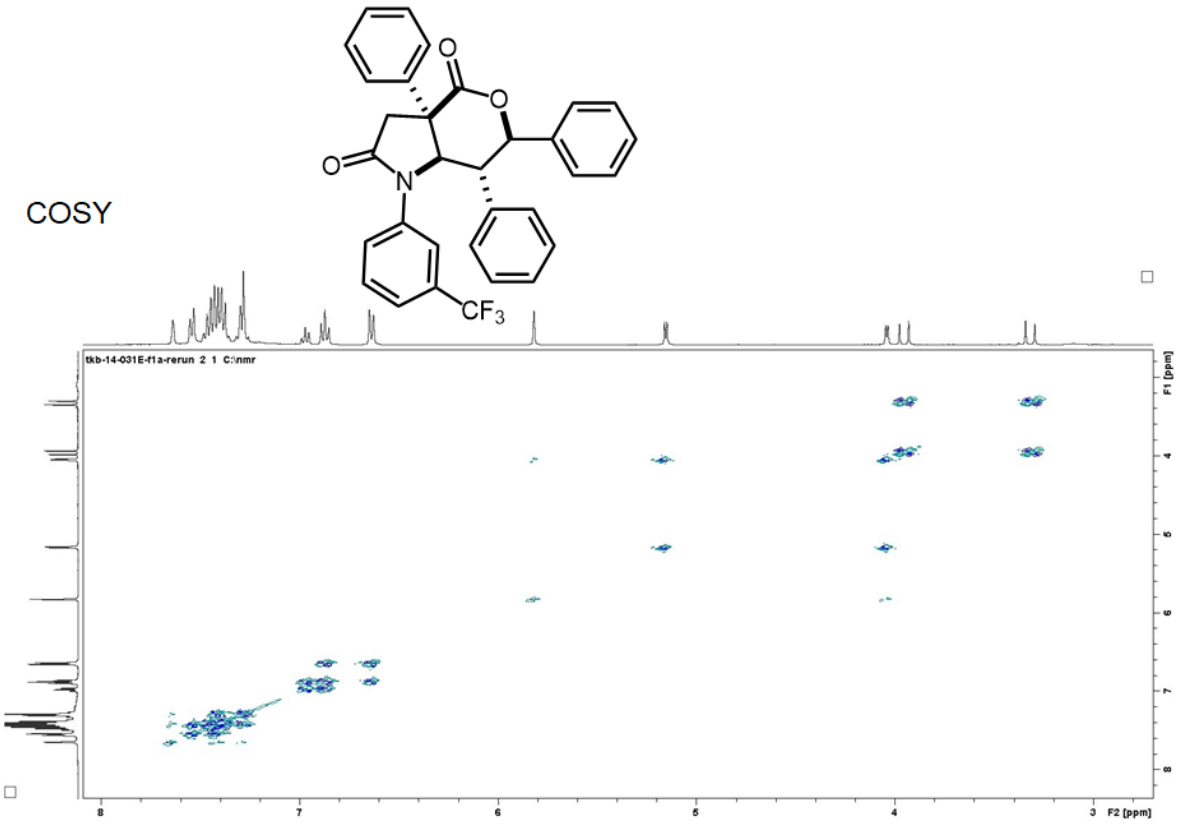
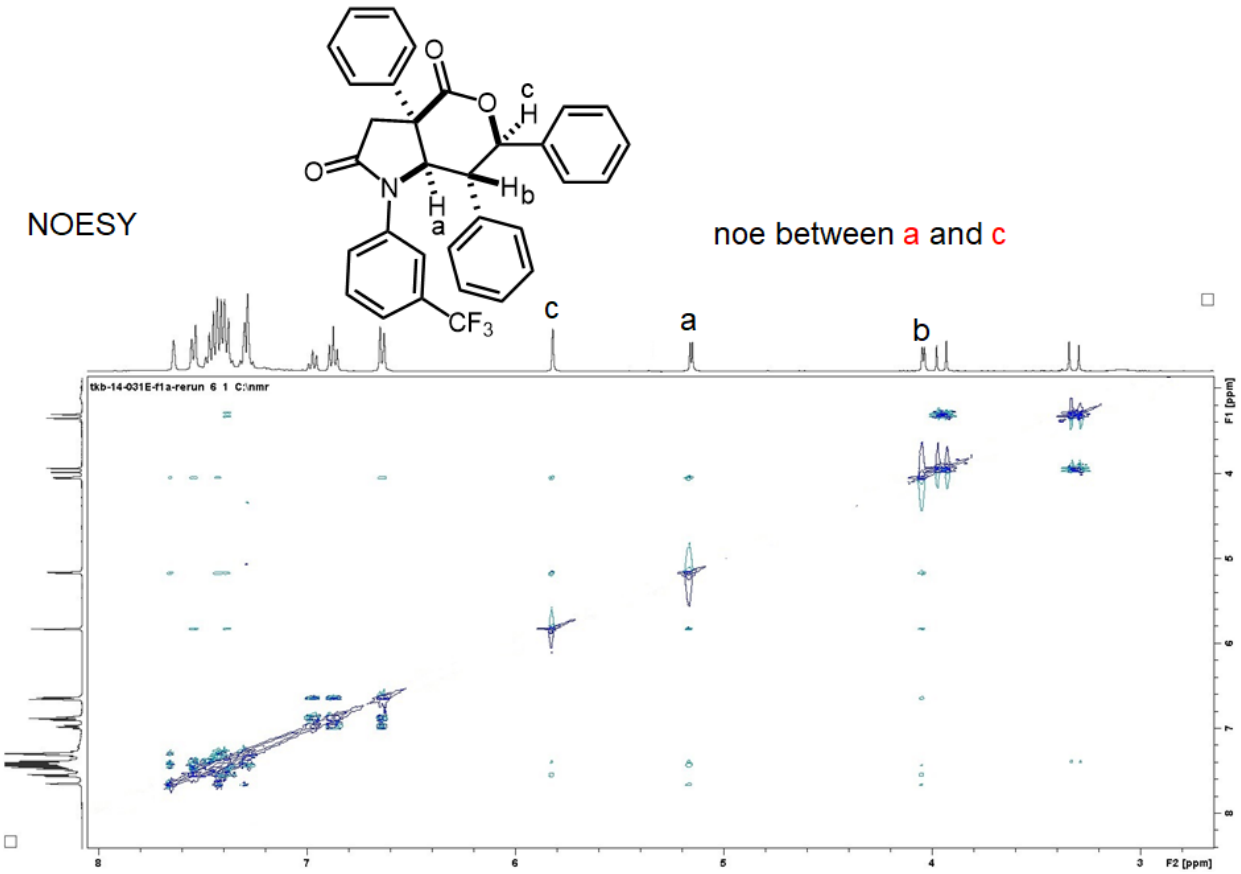
COSY



NOESY

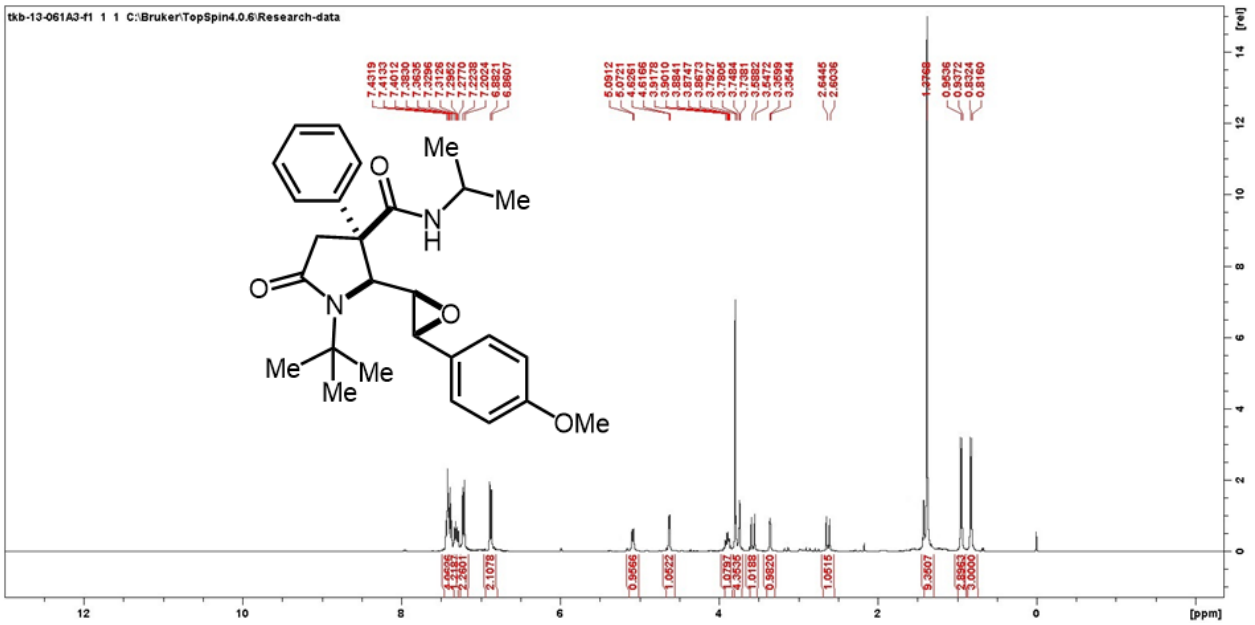
noe between a and c

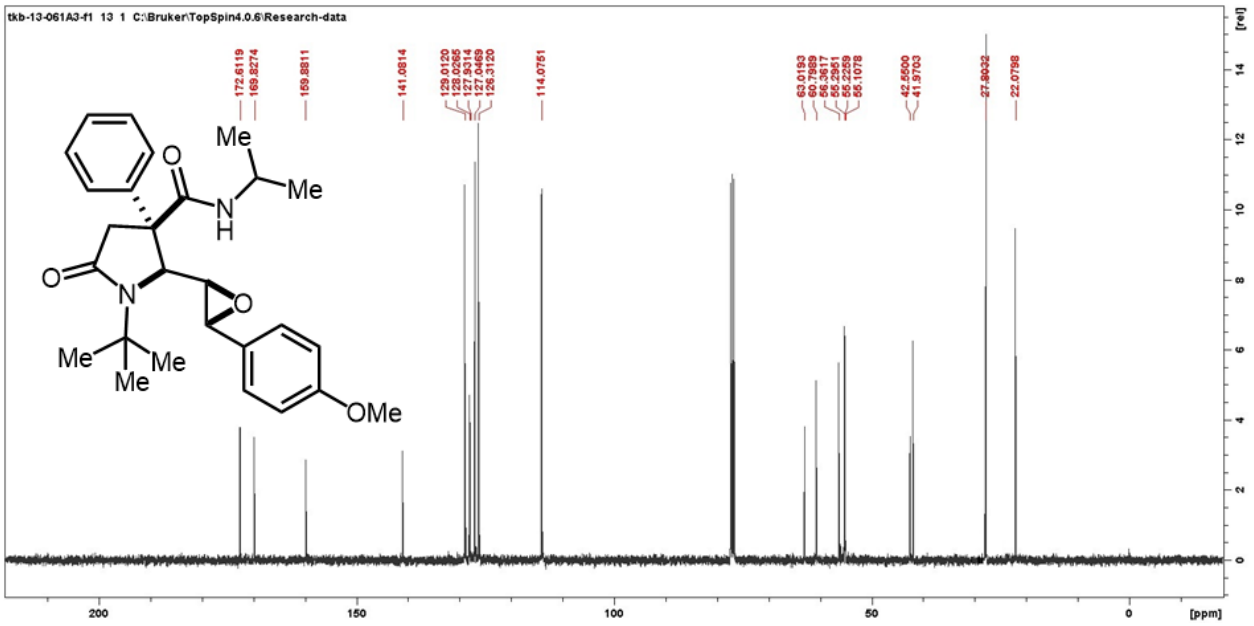


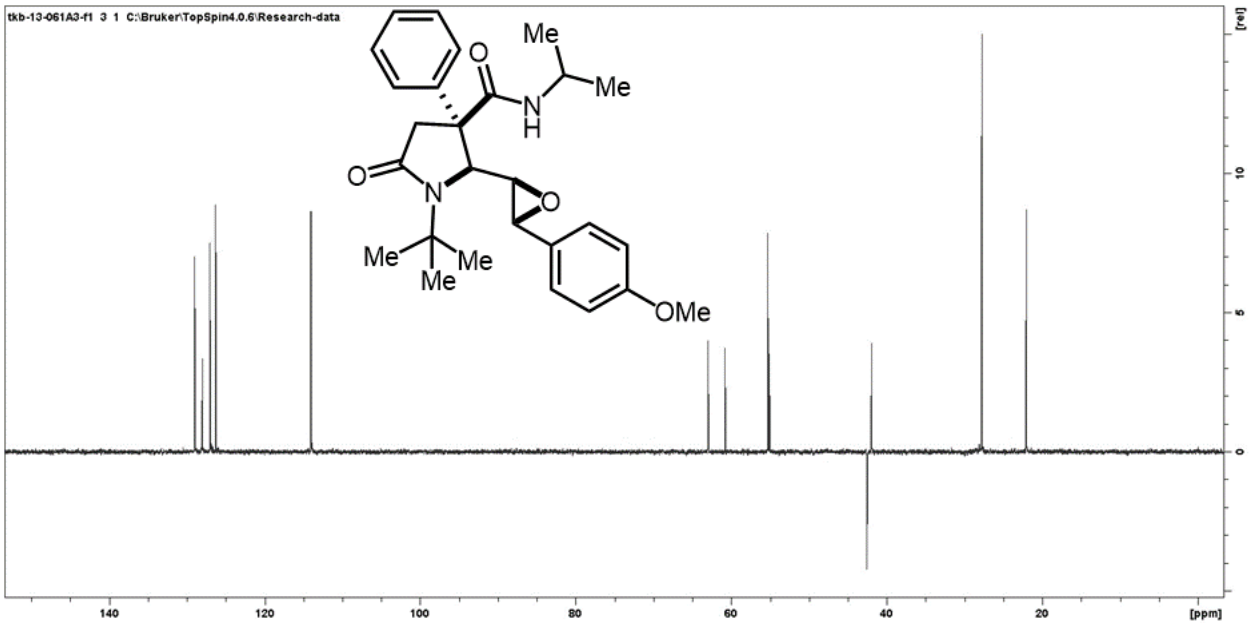
Deconstructive epoxy-amidation (Scheme 4 results)

Compound 6a

Prepared in 0.5 mmol scale using **General Procedure C.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (15:85). Oily substance. Yield = 200.5 mg, 89%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.43 – 7.22 (m, 5H), 7.21 (d, *J* = 8.4 Hz, 2H), 6.87 (d, *J* = 8.4 Hz, 2H), 5.08 (d, *J* = 7.7 Hz, 1H), 4.62 (d, *J* = 3.9 Hz, 1H), 3.96 – 3.83 (m, 1H), 3.79 – 3.73 (m, 4H), 3.57 (d, *J* = 16.4 Hz, 1H), 3.35 (dd, *J* = 4.0, 2.1 Hz, 1H), 2.62 (d, *J* = 16.4 Hz, 1H), 1.38 (s, 9H), 0.95 (d, *J* = 6.6 Hz, 3H), 0.82 (d, *J* = 6.6 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.6, 169.8, 159.9, 141.1, 129.0, 128.0, 127.0, 126.3, 114.1, 63.0, 60.8, 56.4, 55.3, 55.2, 55.1, 42.6, 42.0, 27.8, 22.1. **HRMS-EI^{+}** (*m/z*): calc for $C_{27}H_{34}N_2O_4$ $[M]^{+}$ 450.2519, found 450.2526.



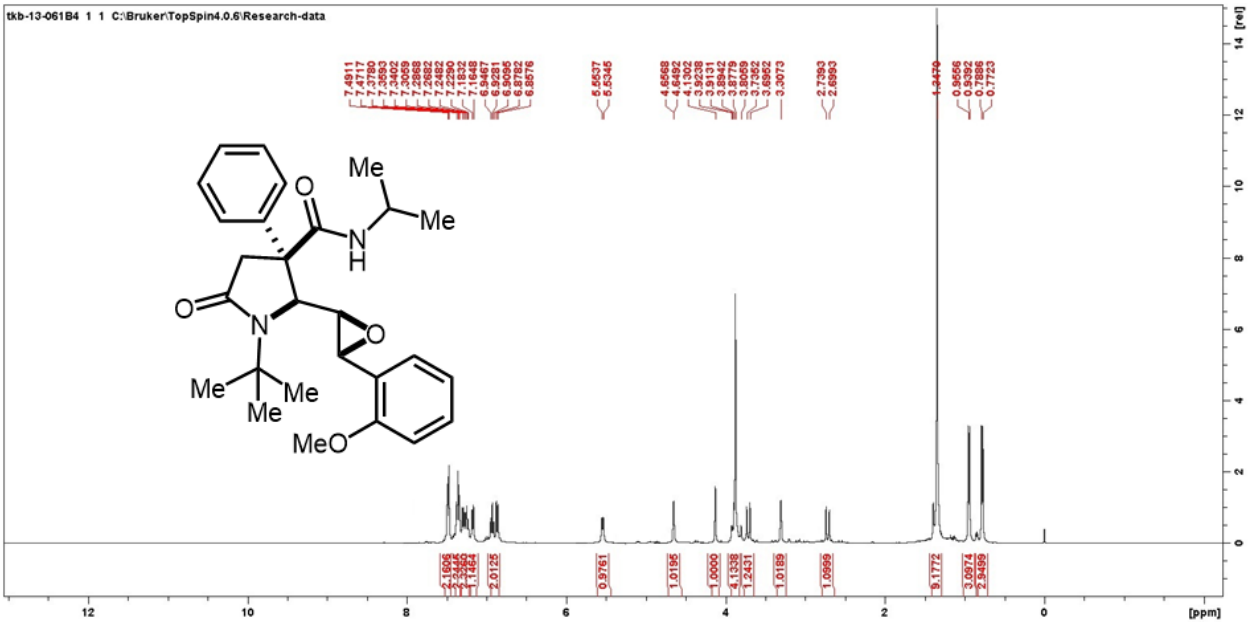


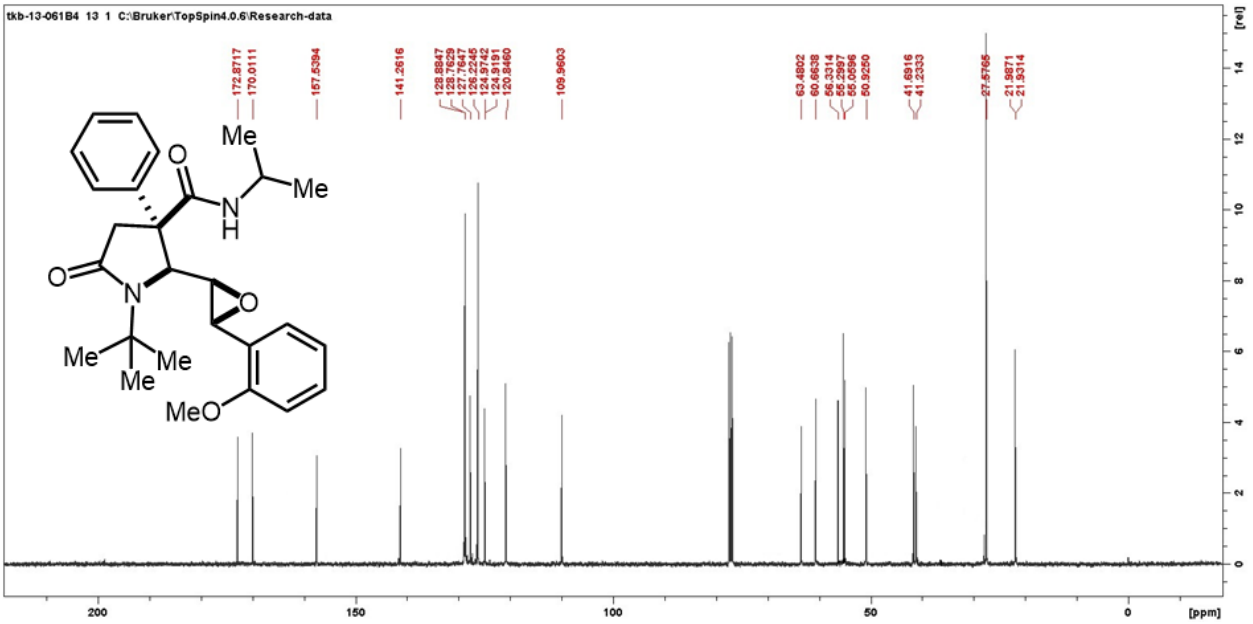


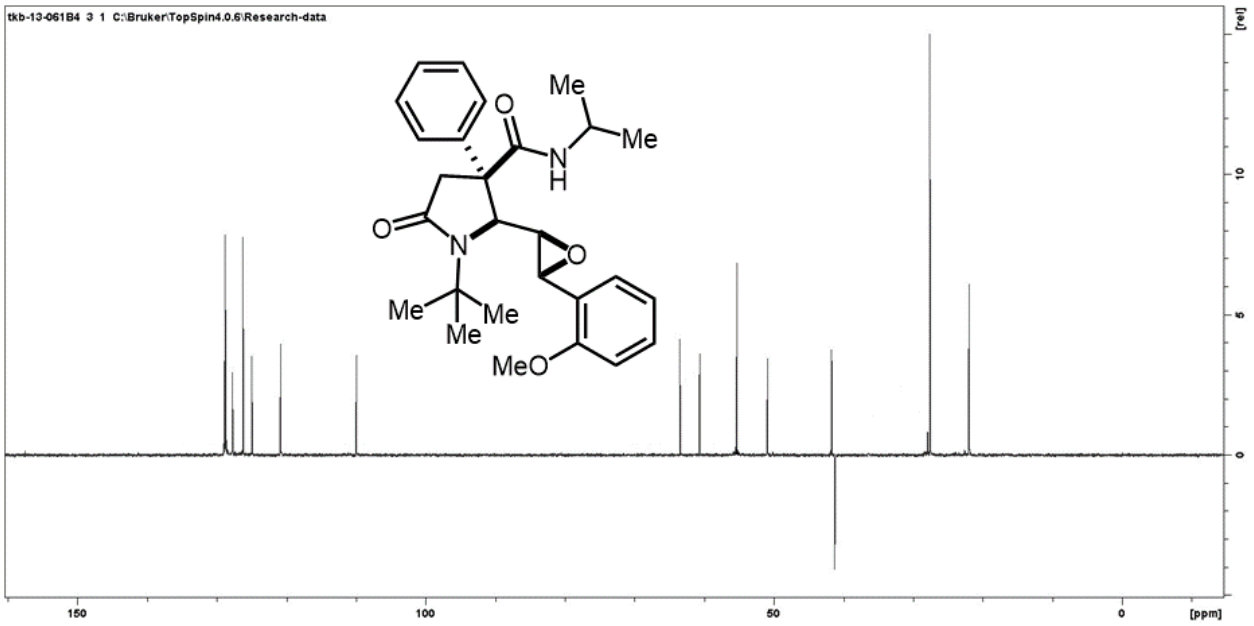
Compound 6b

Prepared in 0.5 mmol scale using **General Procedure C.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (15:85). Oily substance. Yield = 193.7 mg, 86%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.48 (d, J = 7.9 Hz, 2H), 7.44 – 7.21 (m, 4H), 7.17 (d, J = 7.5 Hz, 1H), 6.95 – 6.86 (m, 2H), 5.54 (d, J = 7.9 Hz, 1H), 4.65 (d, J = 3.6 Hz, 1H), 4.13 (d, J = 2.1 Hz, 1H), 3.95 – 3.78 (m, 4H), 3.72 (d, J = 16.0 Hz, 1H), 3.31 (t, J = 2.8 Hz, 1H), 2.72 (d, J = 16.0 Hz, 1H),

1.35 (s, 9H), 0.95 (d, J = 6.6 Hz, 3H), 0.78 (d, J = 6.6 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.9, 170.0, 157.5, 141.3, 128.9, 128.8, 127.8, 126.2, 125.0, 124.9, 120.9, 110.0, 63.5, 60.7, 56.3, 55.3, 55.1, 50.9, 41.7, 41.2, 27.6, 22.0, 21.9. **HRMS-EI$^+$** (*m/z*): calc for $C_{27}H_{34}N_2O_4$ $[M]^+$ 450.2519, found 450.2526.

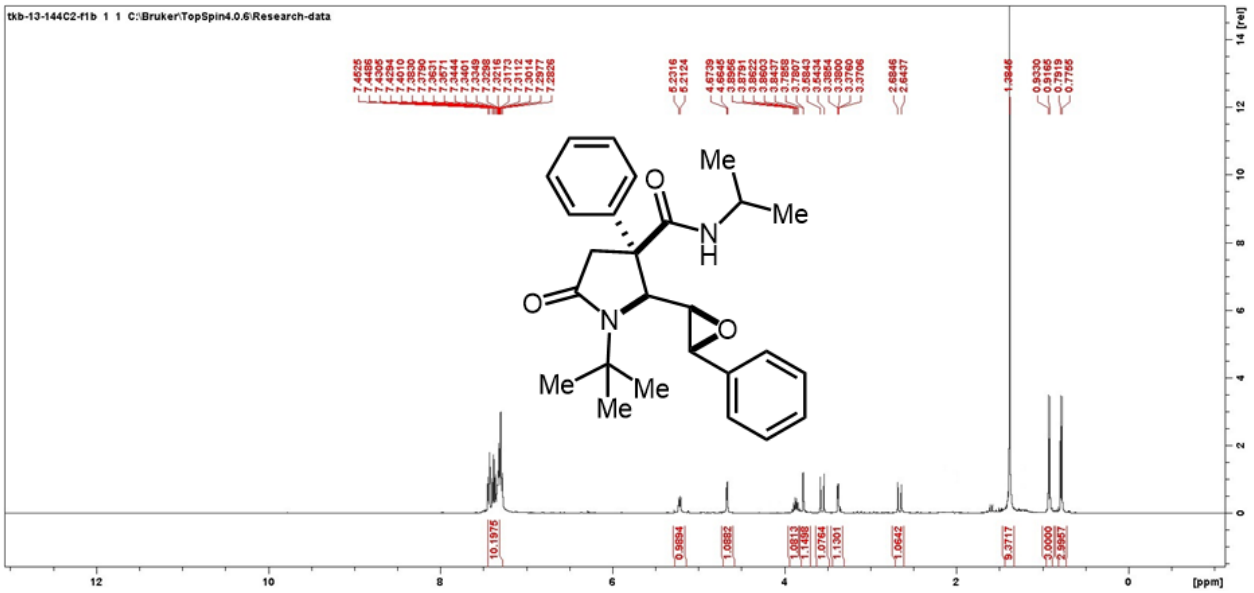


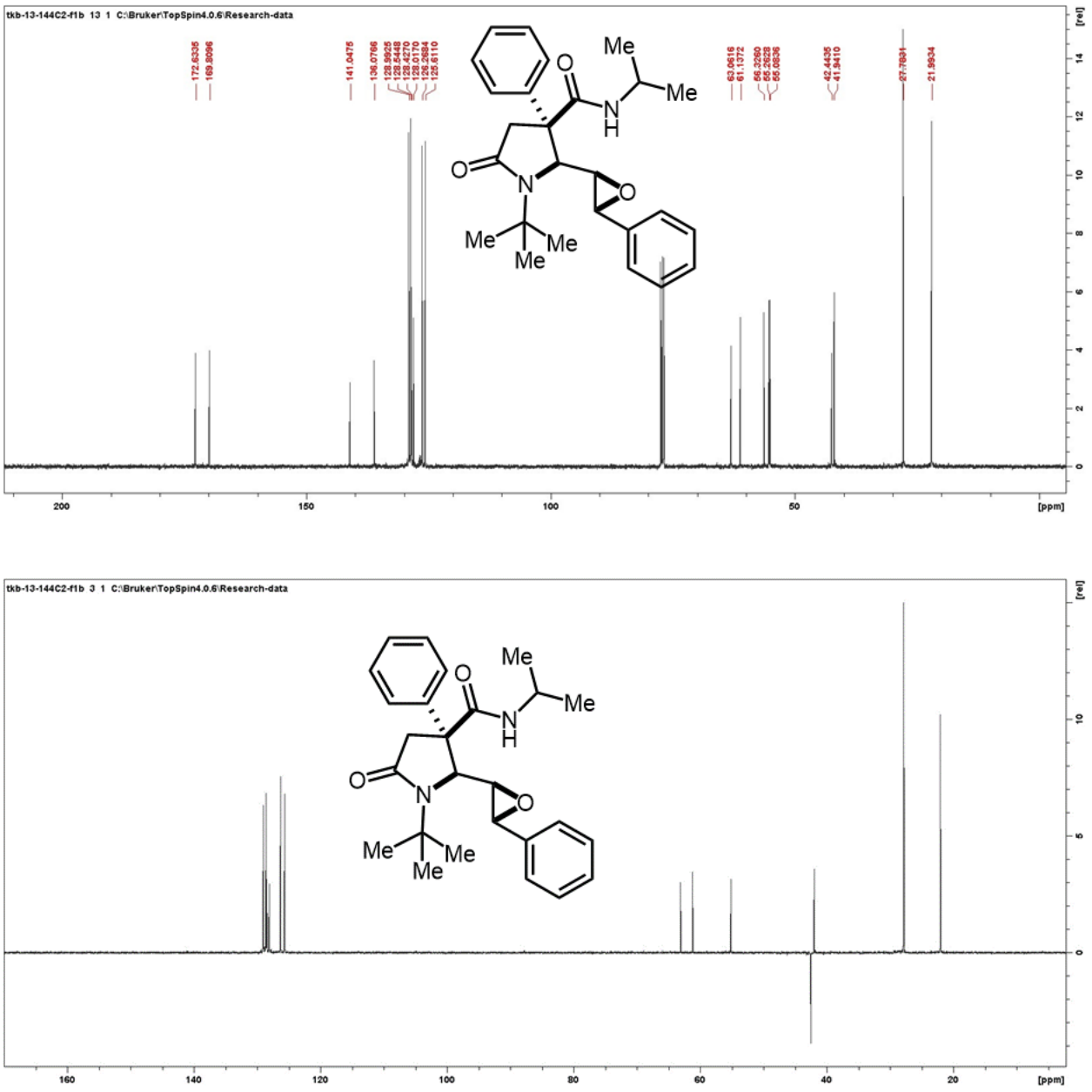




Compound 6c

Prepared in 0.5 mmol scale using **General Procedure C.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Yield = 189.1 mg, 90%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.45 – 7.29 (m, 10H), 5.22 (d, *J* = 7.7 Hz, 1H), 4.67 (d, *J* = 3.8 Hz, 1H), 3.86 (ddd, *J* = 13.1, 7.8, 6.6 Hz, 1H), 3.78 (d, *J* = 2.2 Hz, 1H), 3.56 (d, *J* = 16.4 Hz, 1H), 3.38 (dd, *J* = 3.8, 2.1 Hz, 1H), 2.66 (d, *J* = 16.3 Hz, 1H), 1.38 (s, 9H), 0.92 (d, *J* = 6.5 Hz, 3H), 0.78 (d, *J* = 6.5 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.6, 169.8, 141.0, 136.1, 129.0, 128.6, 128.4, 128.0, 126.3, 125.6, 63.1, 61.1, 56.3, 55.3, 55.1, 42.4, 41.9, 27.8, 22.0. **HRMS-EI$^+$** (*m/z*): calc for $C_{26}H_{32}N_2O_3$ $[M]^+$ 420.2413, found 420.2418.

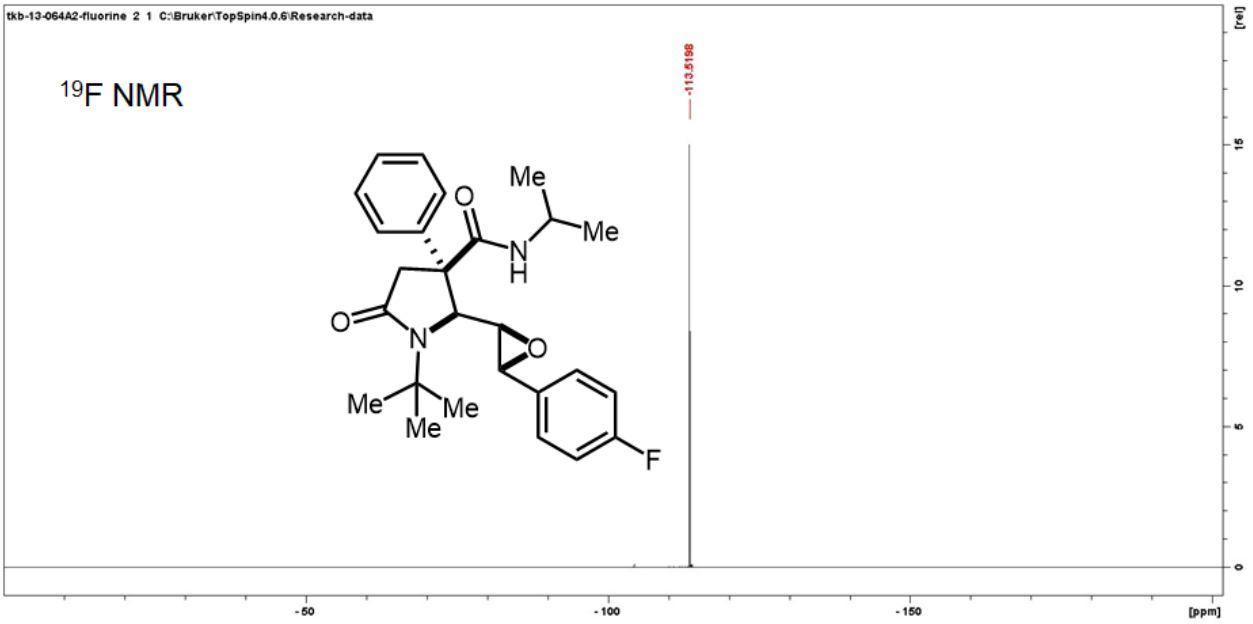


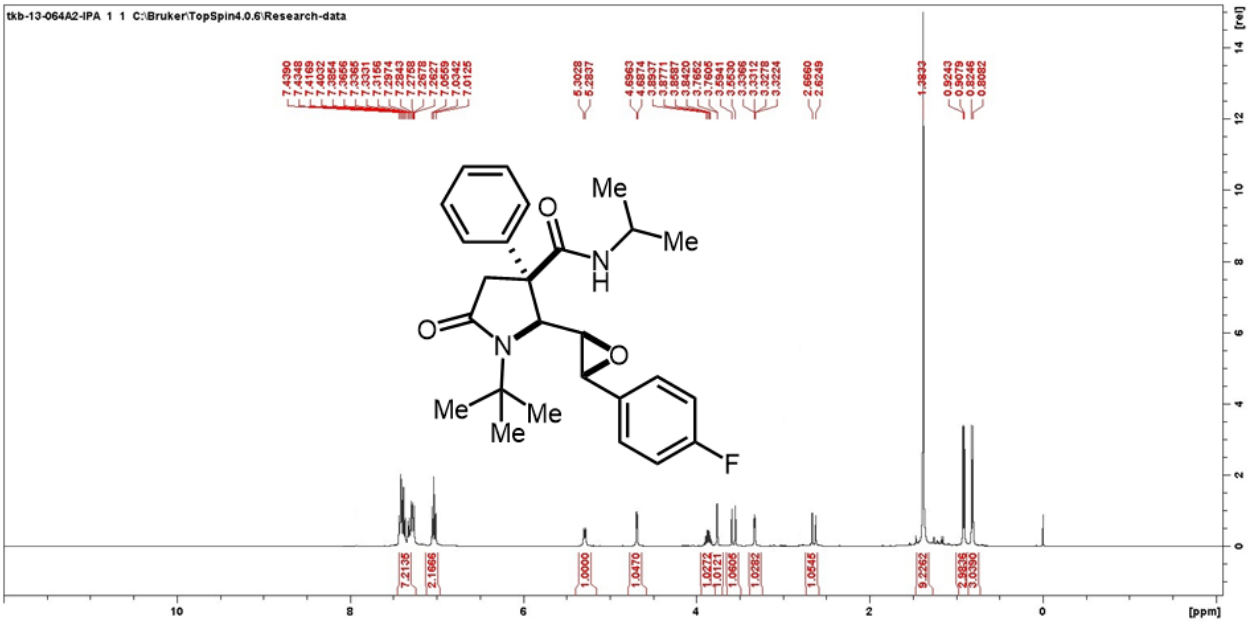


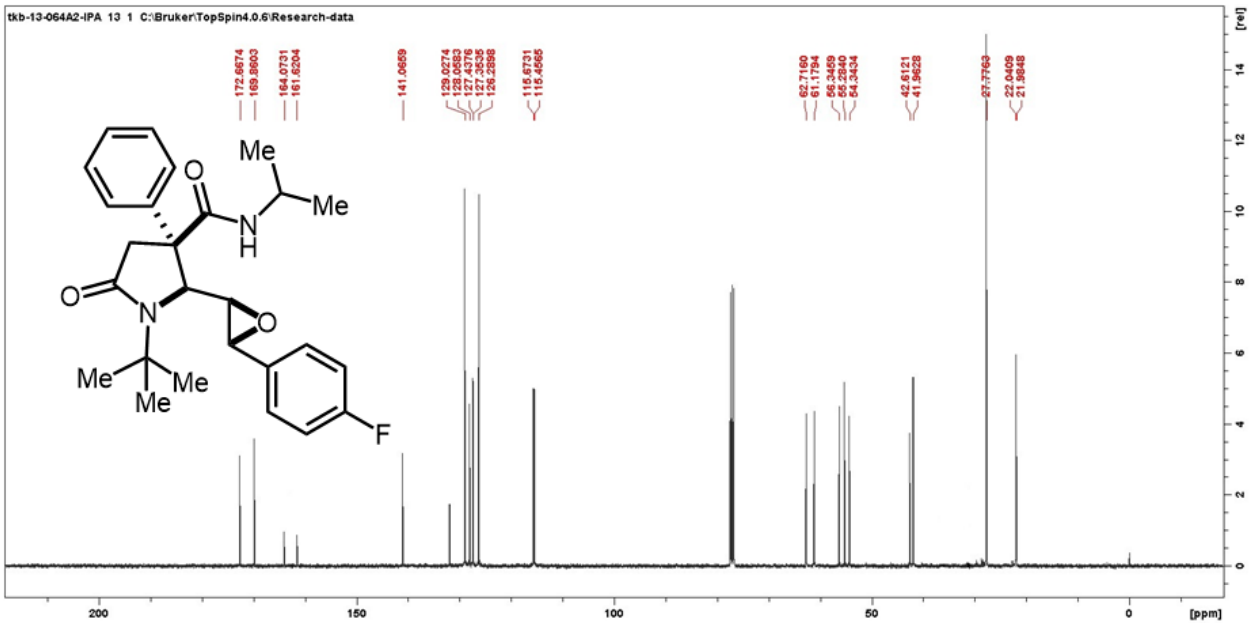
Compound 6d

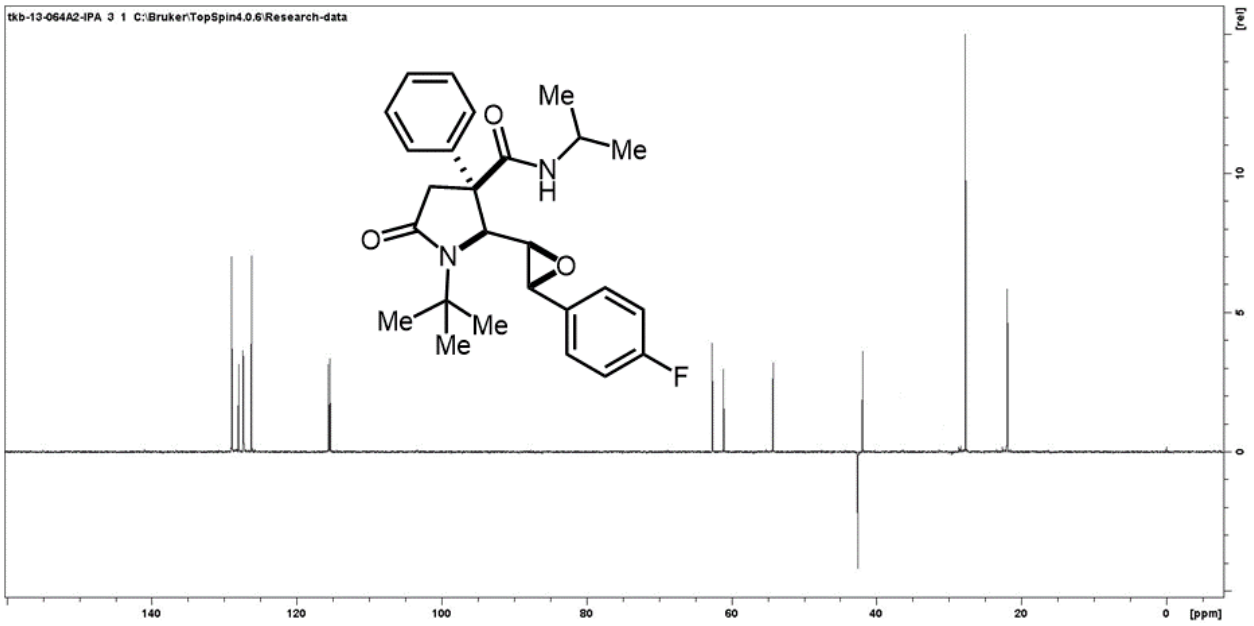
Prepared in 0.25 mmol scale using **General Procedure C.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (25:75). Oily substance. Yield = 99.8 mg, 91%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.44 – 7.26 (m, 7H), 7.05 – 7.01 (m, 2H), 5.29 (d, J = 7.7 Hz, 1H), 4.69 (d, J = 3.6 Hz, 1H), 3.87 (dp, J = 7.7, 6.5 Hz, 1H), 3.76 (d, J = 2.2 Hz, 1H), 3.57 (d, J = 16.4 Hz, 1H), 3.33 (dd, J = 3.6, 2.1 Hz, 1H), 2.65 (d, J = 16.4 Hz, 1H), 1.38 (s, 9H), 0.92 (d, J = 6.6 Hz, 3H),

0.82 (d, J = 6.5 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.7, 169.9, 164.1, 161.6, 141.1, 132.0, 132.0, 129.0, 128.1, 127.4, 127.4, 126.3, 115.7, 115.5, 62.7, 61.2, 56.4, 55.3, 54.4, 42.6, 42.0, 27.8, 22.0, 22.0. **HRMS-EI$^+$** (*m/z*): calc for $C_{26}H_{31}FN_2O_3$ $[M]^+$ 450.2519, found 450.2526.





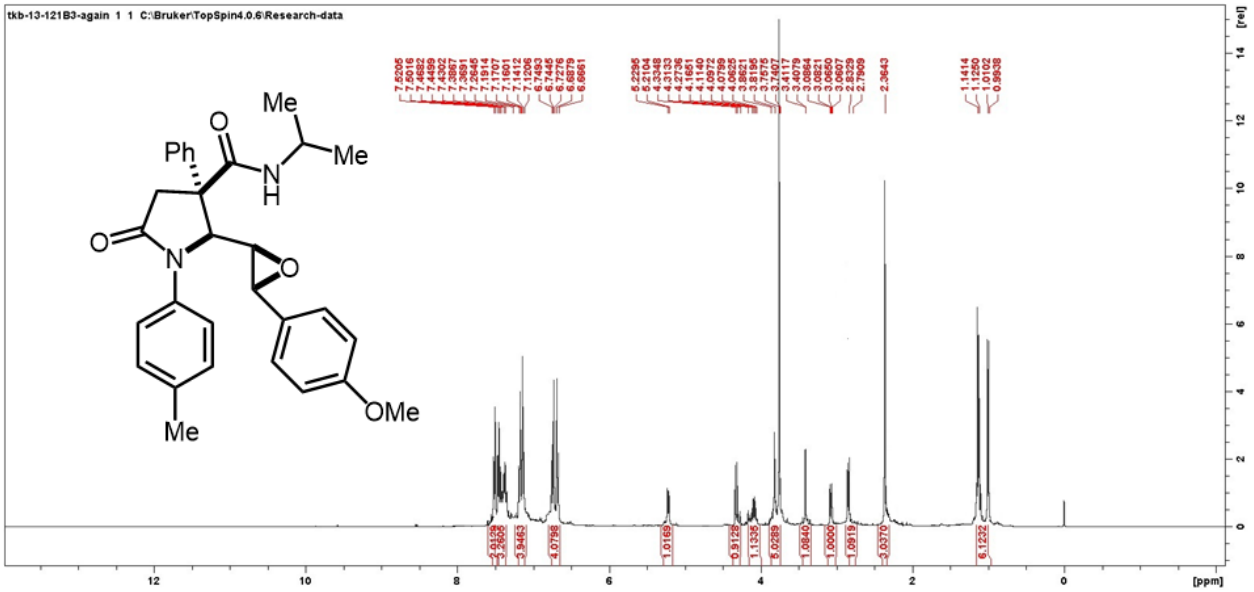


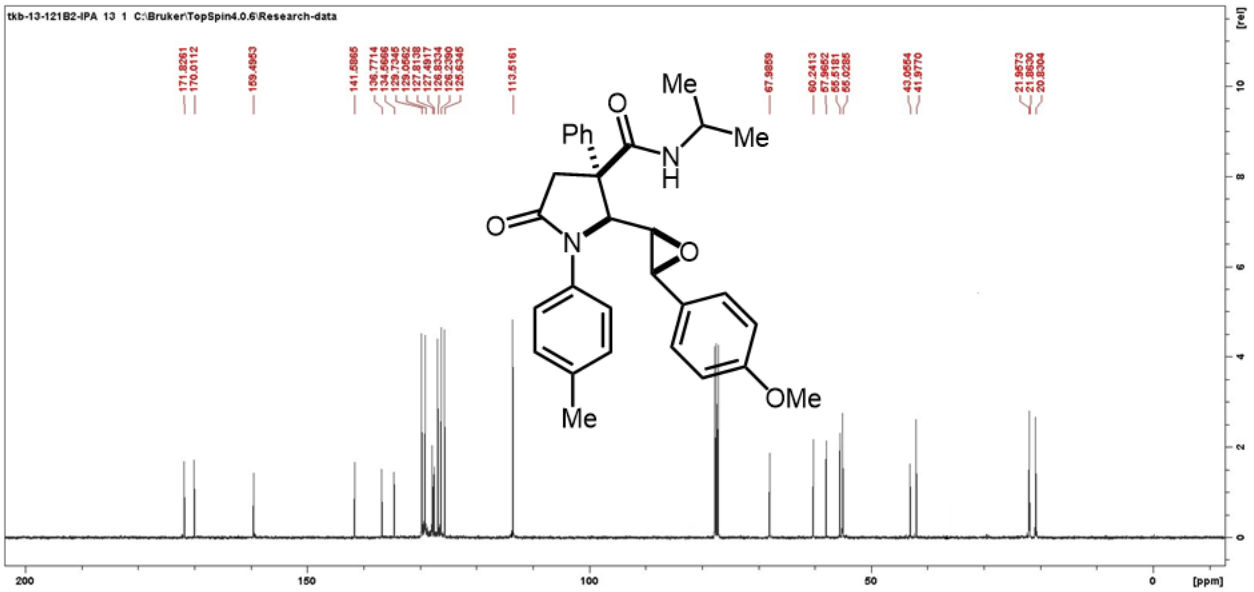


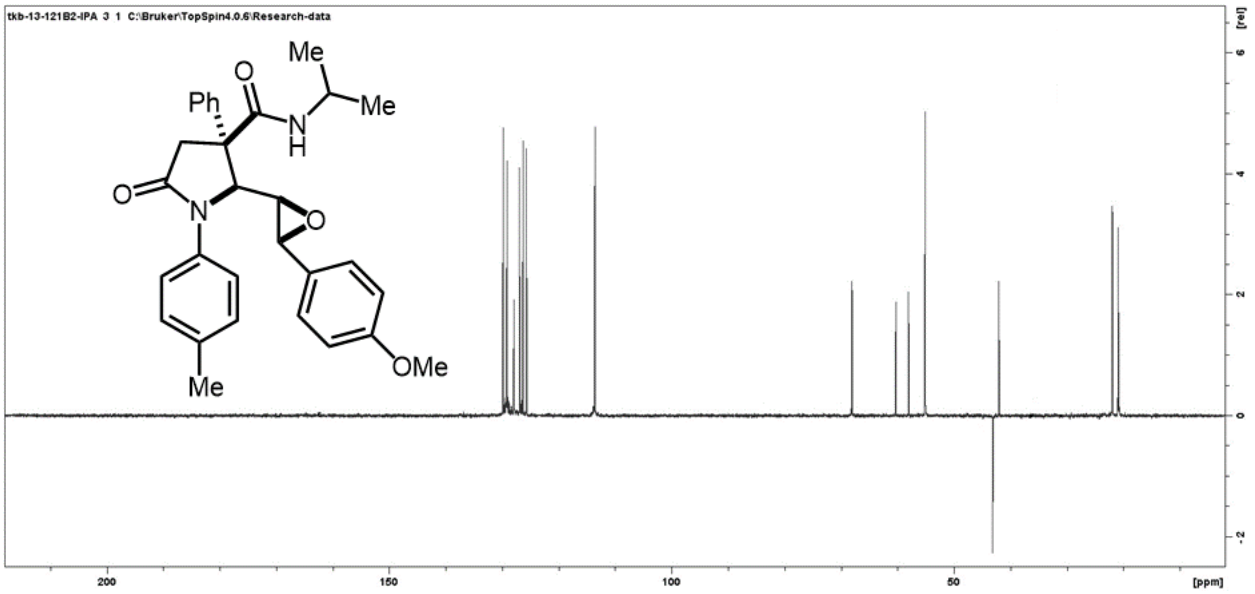
Compound 6e

Prepared in 0.25 mmol scale using **General Procedure C.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (40:60). Oily substance. Yield = 113.7 mg, 94%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.52 – 7.36 (m, 5H), 7.19 – 7.12 (m, 4H), 6.75 – 6.67 (m, 4H), 5.21 (d, J = 7.8 Hz, 1H), 4.31 (d, J = 8.1 Hz, 1H), 4.08 (dq, J = 13.4, 6.6 Hz, 1H), 3.86 – 3.75 (m, 5H), 3.47 (d, J = 2.0 Hz, 1H), 2.83 (d, J = 16.8 Hz, 1H), 2.79 (d, J = 16.8 Hz, 1H), 2.36 (s, 3H), 1.12 (d, J = 6.6 Hz, 3H), 1.00 (d, J = 6.6 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 171.8, 170.0, 159.5,

141.6, 136.8, 134.6, 129.7, 129.1, 127.8, 127.5, 126.8, 126.2, 125.6, 113.5, 68.0, 60.3, 58.0, 55.5, 55.0, 43.1, 42.0, 22.0, 21.9, 20.8. **HRMS-EI**$^{+}$ (*m/z*): calc for $C_{30}H_{32}N_2O_4$ $[M]^{+}$ 484.2362, found 484.2368.

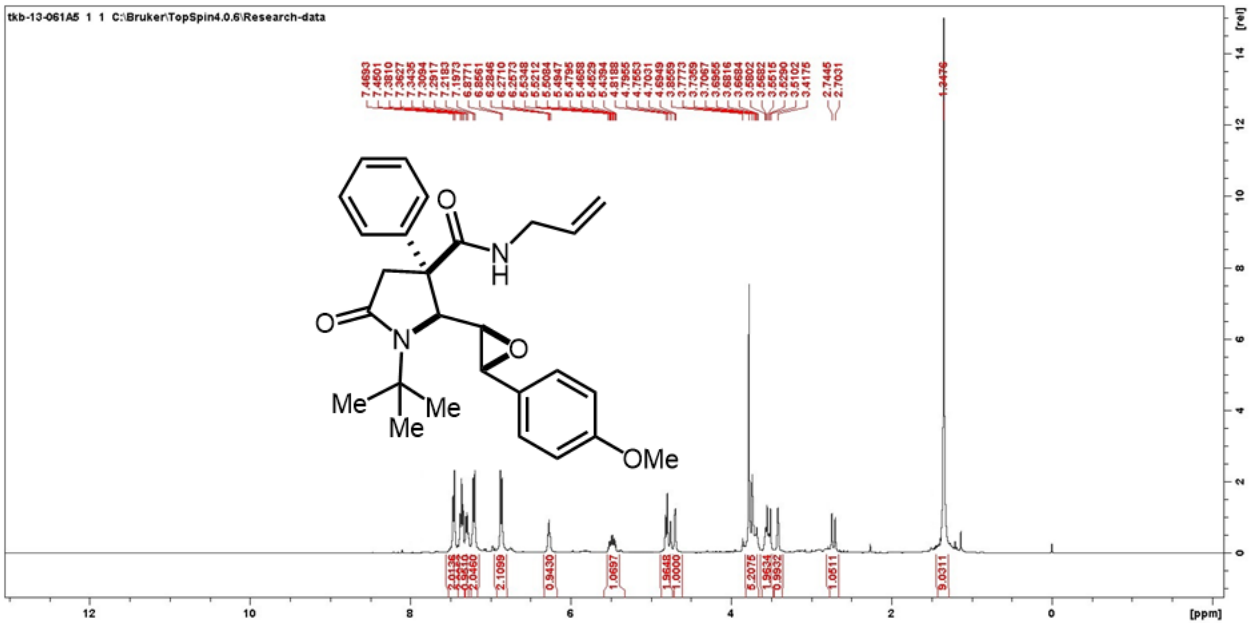






Compound 6f

Prepared in 0.25 mmol scale using **General Procedure C.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Oily substance. Yield = 96.4 mg, 86%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.46 (d, *J* = 7.7 Hz, 2H), 7.36 (t, *J* = 7.6 Hz, 2H), 7.29 (t, *J* = 7.2 Hz, 1H), 7.21 (d, *J* = 8.4 Hz, 2H), 6.87 (d, *J* = 8.5 Hz, 2H), 6.27 (t, *J* = 5.9 Hz, 1H), 5.49 (ddt, *J* = 16.2, 10.7, 5.5 Hz, 1H), 4.80 (s, 1H), 4.70 (d, *J* = 3.9 Hz, 1H), 3.78 (s, 3H), 3.71 (dd, *J* = 19.0, 4.2 Hz, 2H), 3.54 (dd, *J* = 16.5, 6.9 Hz, 2H), 3.42 (t, *J* = 2.9 Hz, 1H), 2.72 (d, *J* = 16.5 Hz, 1H), 1.35 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.7, 170.7, 159.8, 141.0, 133.7, 128.9, 127.9, 127.9, 127.1, 126.3, 115.9, 114.0, 63.1, 60.6, 56.3, 55.2, 55.1, 55.0, 42.1, 27.7. **HRMS-EI^{+}** (*m/z*): calc for $C_{27}H_{32}N_2O_4$ $[M]^{+}$ 448.2362, found 448.2366.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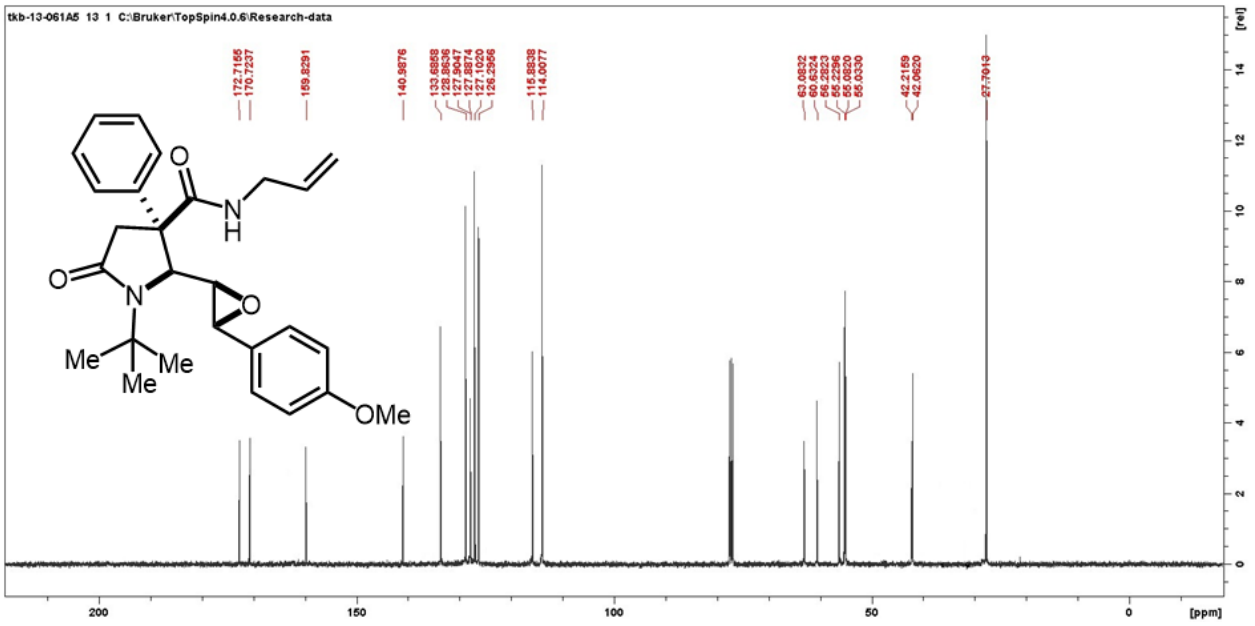
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H
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Me
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Me
OMe
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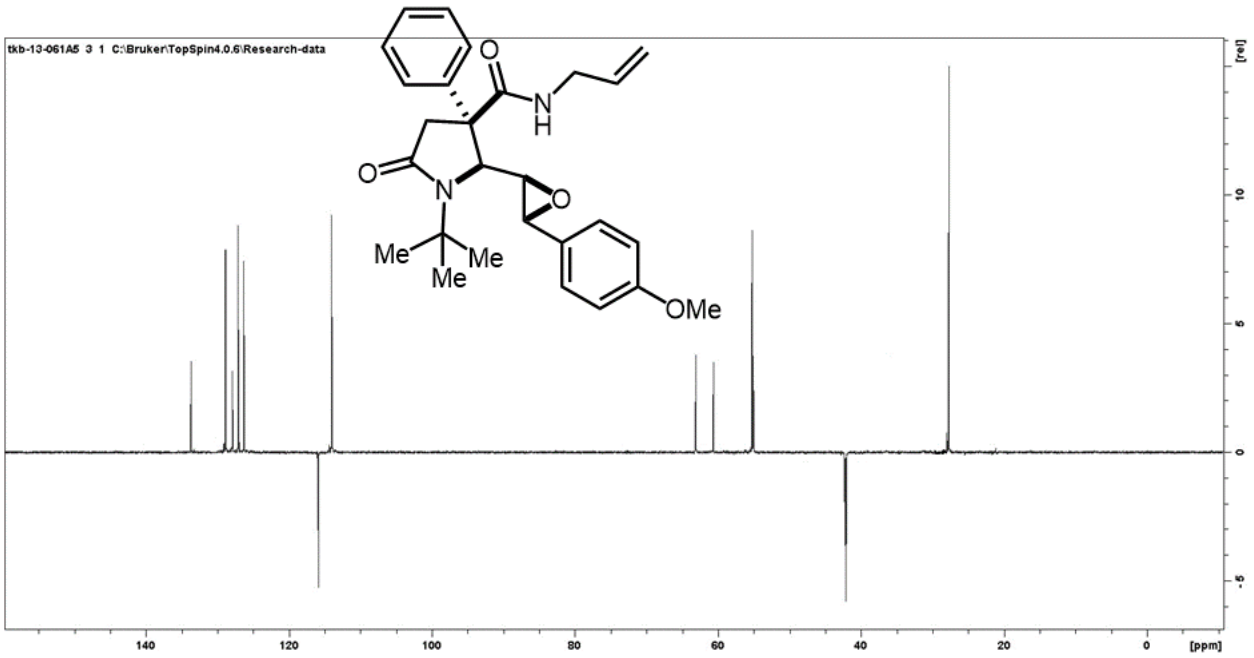
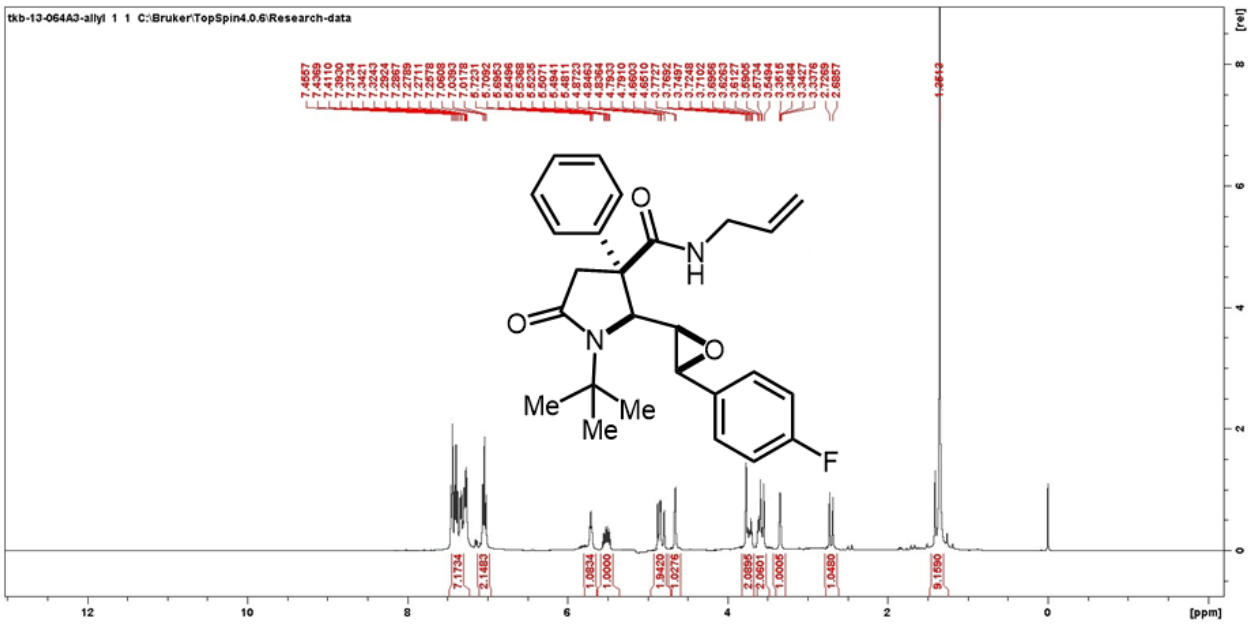


Compound 6g

Prepared in 0.25 mmol scale using **General Procedure C.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Oily substance. Yield = 94.9 mg, 87%, 95:5 dr. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.46 – 7.26 (m, 7H), 7.04 (t, *J* = 8.6 Hz, 2H), 5.71 (t, *J* = 6.0 Hz, 1H), 5.52 (ddt, *J* = 16.2, 10.7, 5.5 Hz, 1H), 4.86 (dd, *J* = 10.2, 1.6 Hz, 1H), 4.81 (dd, *J* = 17.0, 1.6 Hz, 1H), 4.66 (d, *J* = 3.9 Hz, 1H), 3.77 (d, *J* = 2.1 Hz, 1H), 3.72 (td, *J* = 8.6, 7.4, 4.8 Hz, 1H), 3.65 – 3.53 (m, 2H), 3.34 (dd, *J* = 3.9, 2.1 Hz, 1H), 2.71 (d, *J* = 16.5 Hz, 1H), 1.35 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 172.6, 170.7, 164.1, 161.7, 140.7, 133.5, 131.9, 131.8, 129.1, 128.2, 127.6, 127.5, 126.4, 116.3, 115.7, 115.5, 63.1, 61.0, 56.4, 55.3, 54.7, 42.3, 42.2, 27.8. **HRMS-EI^{+}** (*m/z*): calc for $C_{26}H_{29}FN_2O_3$ $[M]^{+}$ 436.2162, found 436.2169.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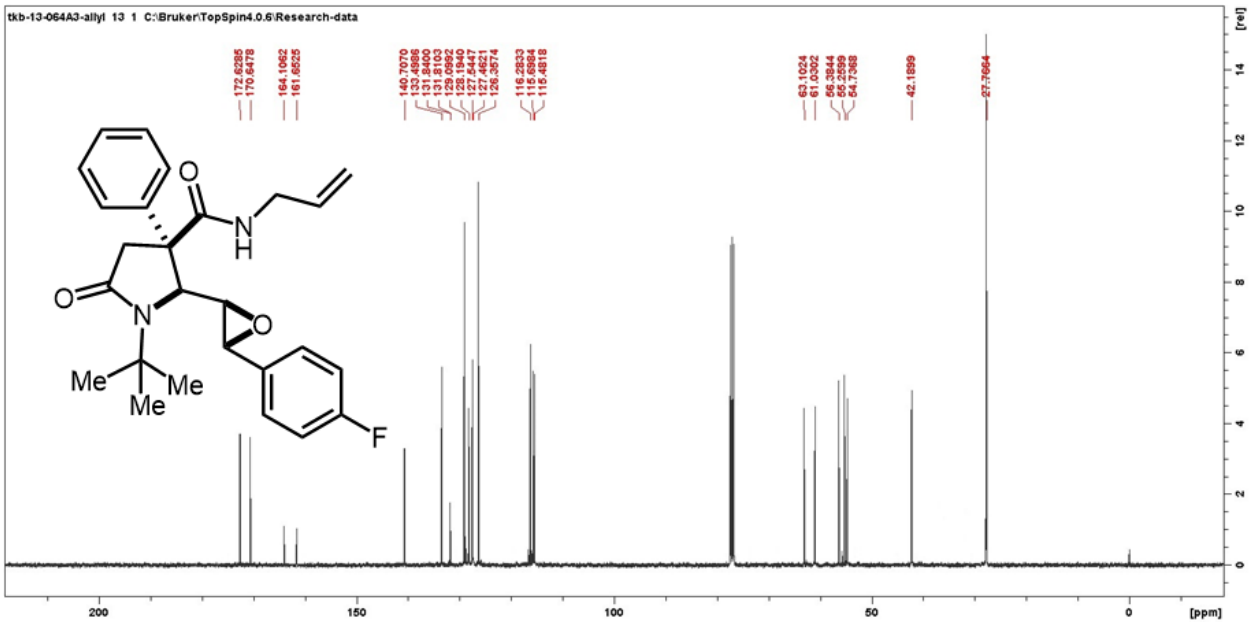
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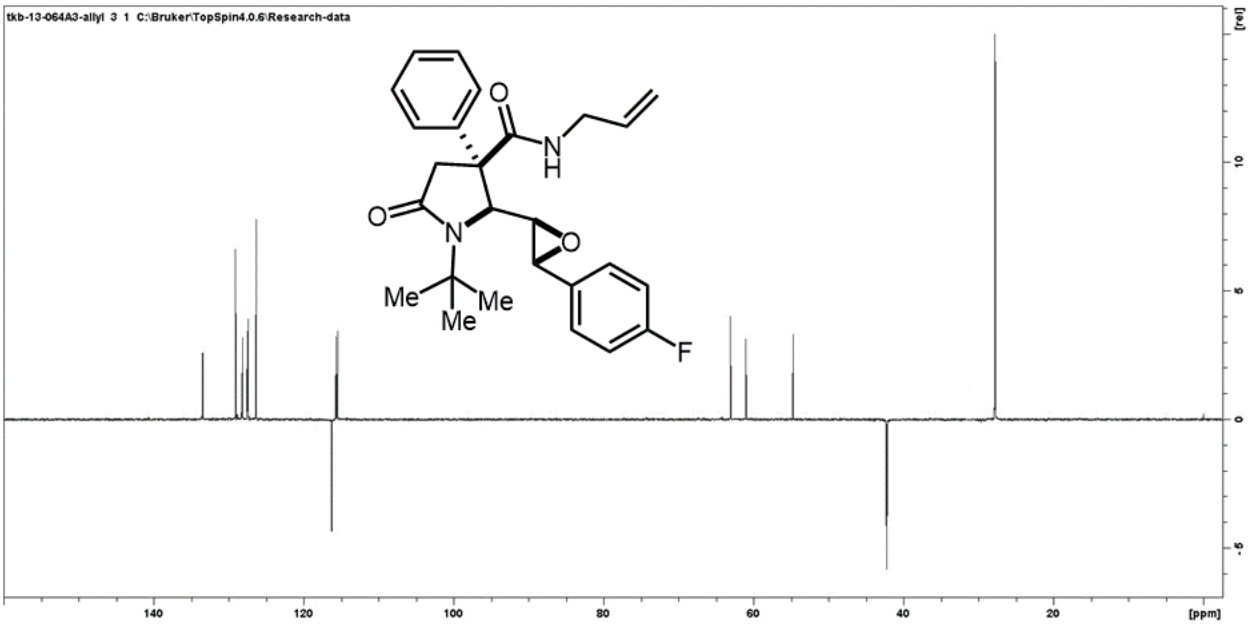
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60
40
20
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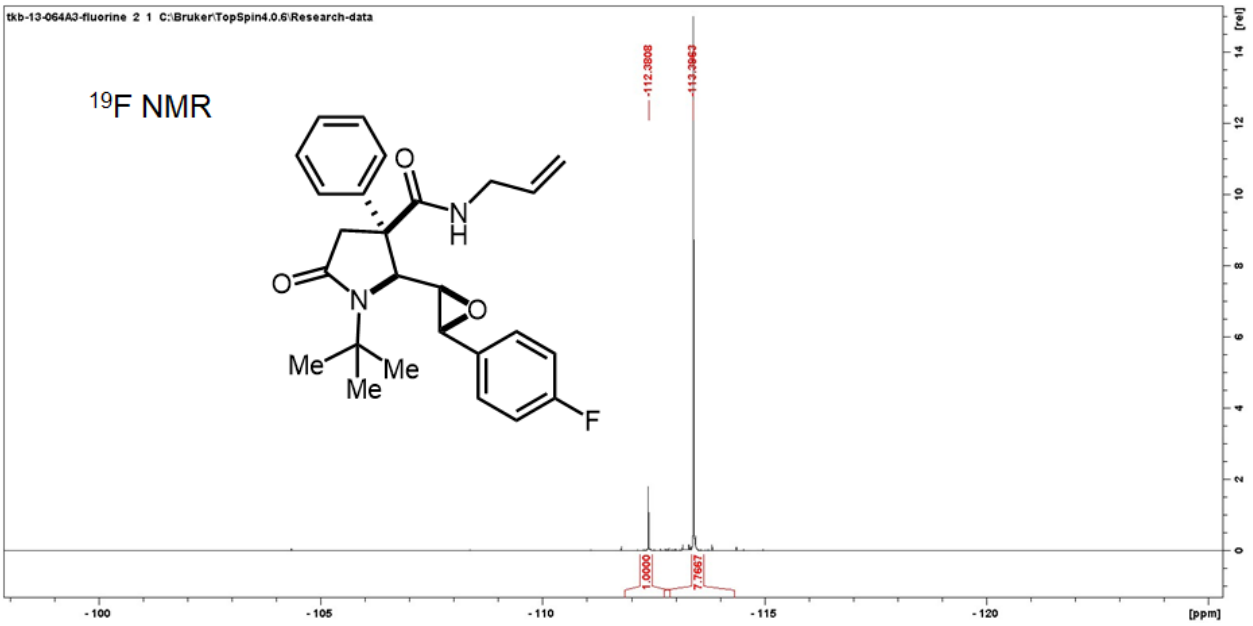
tkb-13-064A3-fluorine 2 1 C:\Bruker\TopSpin4.0.6\Research-data
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Me
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F
[rel]
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10
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6
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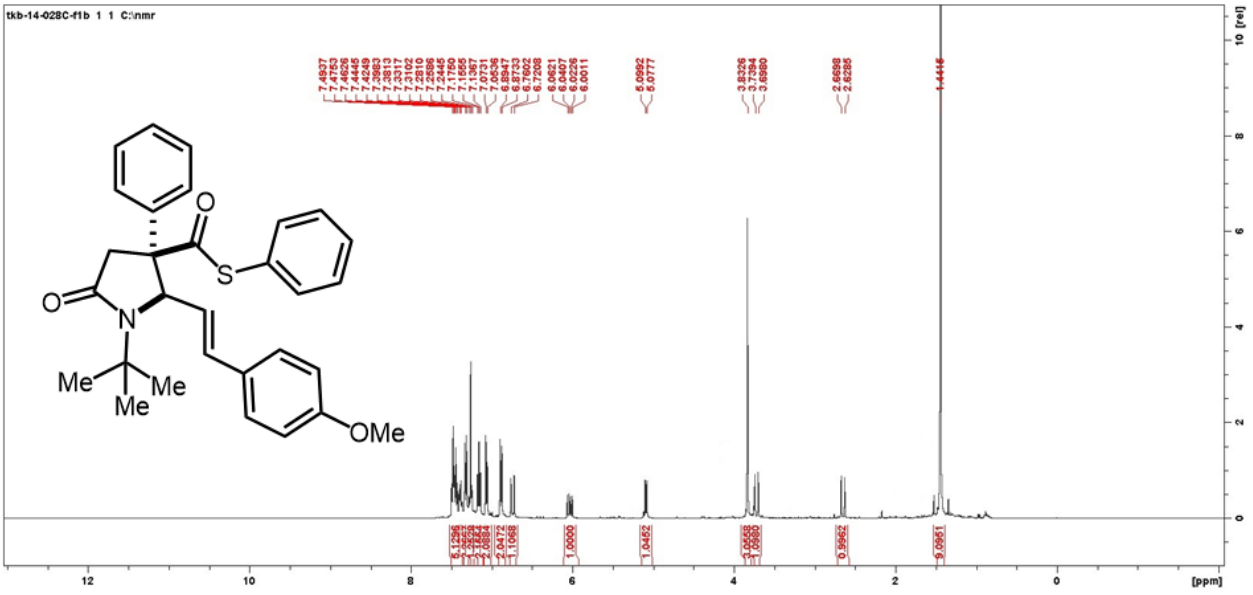
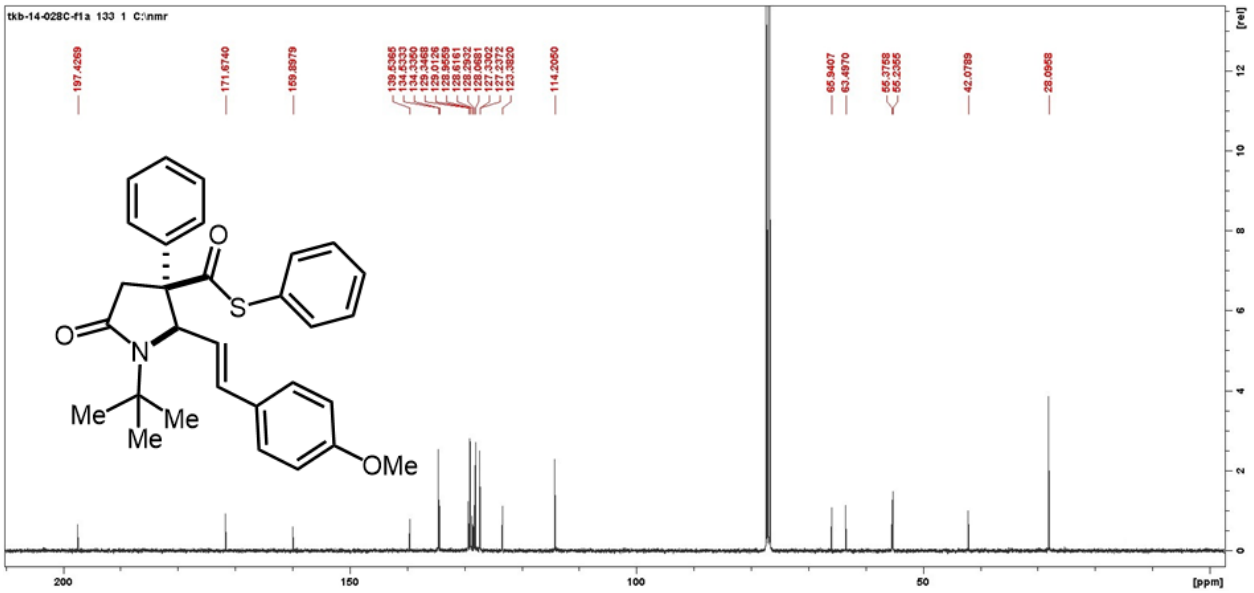
2
0
-100
-105
-110
-115
-120
[ppm]

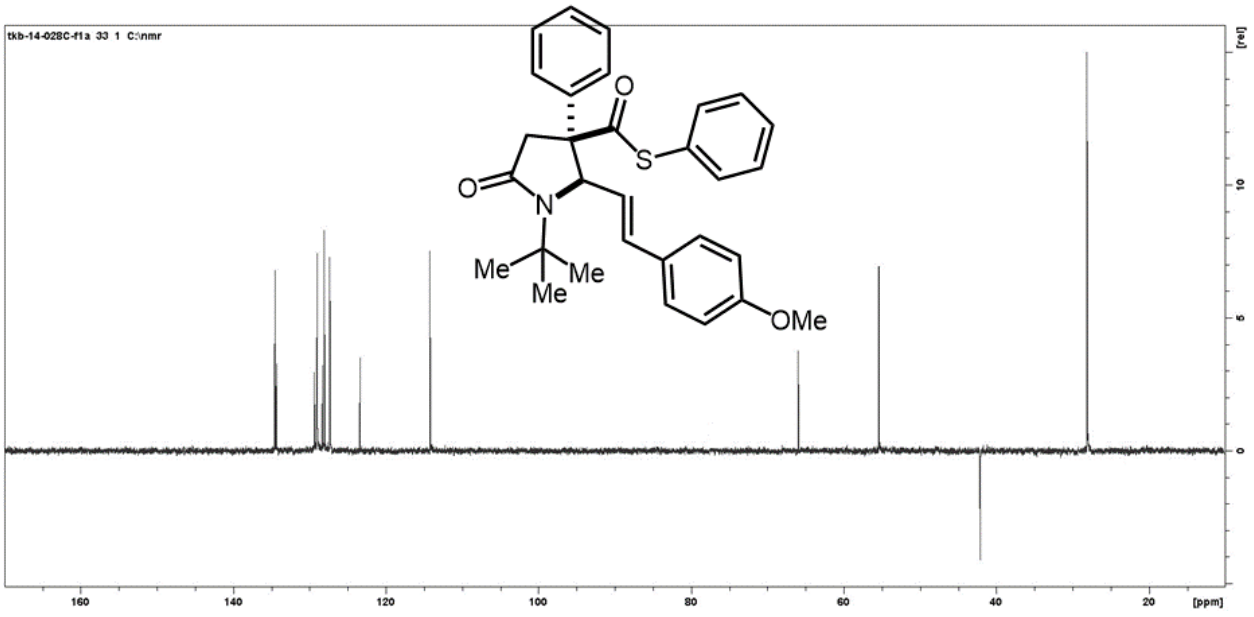
Deconstructive thioesterification (Scheme 5 results)

Compound 7a

Prepared in 0.5 mmol scale using **General Procedure D.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Oily substance. Yield = 221.0 mg, 91%. ^{1}H NMR (400 MHz, CDCl3) δ 7.54 – 7.20 (m, 8H), 7.16 (t, J = 7.6 Hz, 2H), 7.06 (d, J = 7.5 Hz, 2H), 6.88 (d, J = 8.5 Hz, 2H), 6.74 (d, J = 15.8 Hz, 1H), 6.03 (dd, J = 15.8, 8.6 Hz, 1H), 5.09 (d, J = 8.6 Hz, 1H), 3.83 (s, 3H), 3.71 (d, J = 16.5 Hz, 1H), 2.65 (d, J = 16.5 Hz, 1H), 1.44 (s, 9H). ^{13}C NMR (101 MHz, CDCl3) δ 197.4, 171.7, 159.9, 139.5, 134.5, 134.3, 129.3, 129.0, 128.6, 128.3, 128.1, 127.3, 127.2, 123.4, 114.2, 65.9, 63.5, 55.4, 55.2, 42.1, 28.1. **HRMS-EI^{+}** (*m/z*): calc for $C_{30}H_{31}NO_3S$ $[M]^{+}$ 485.2025, found 485.2032.





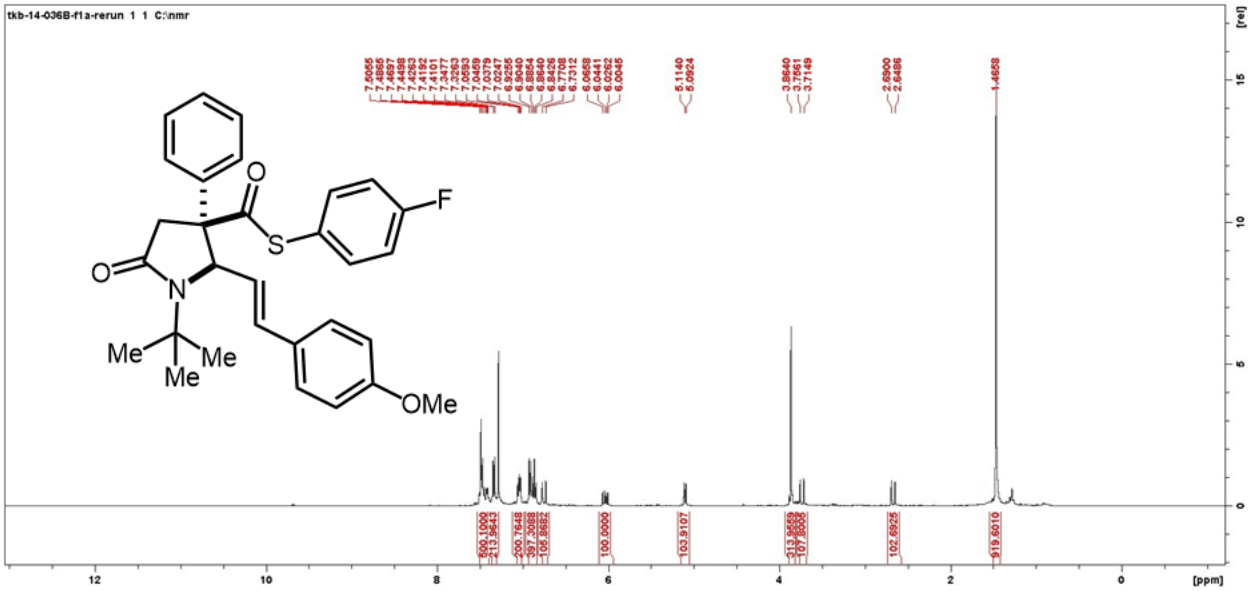


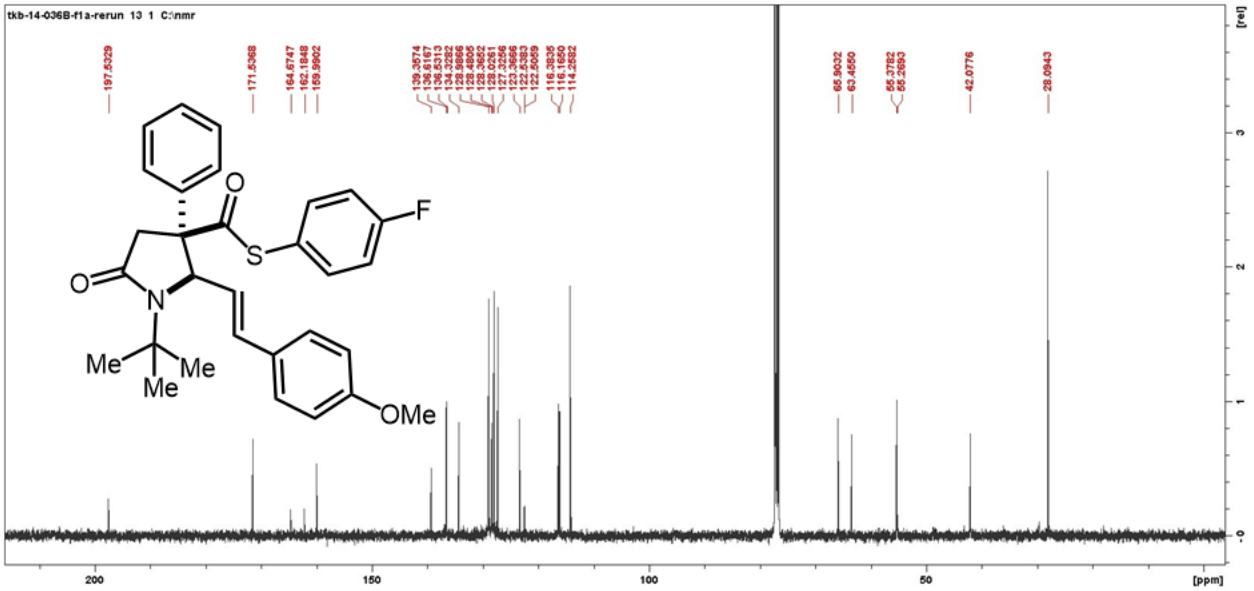
Compound 7b

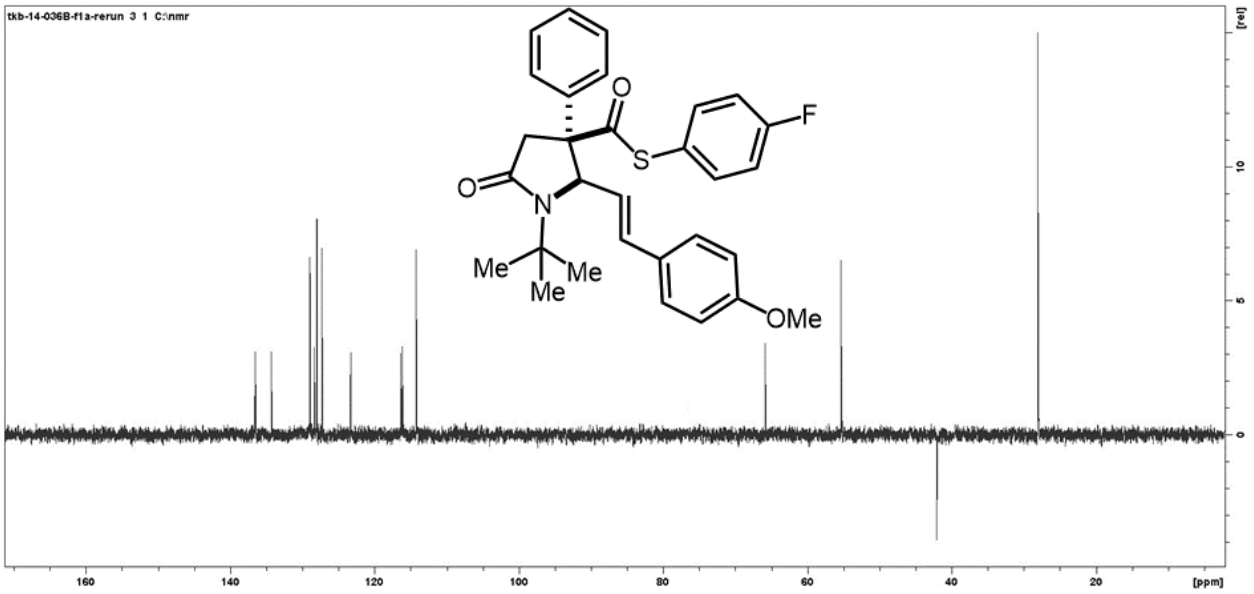
Prepared in 0.5 mmol scale using **General Procedure D.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Amorphous solid. Yield = 219.1 mg, 87%. ^{1}H NMR (400 MHz, CDCl3) δ 7.50 – 7.41 (m, 5H), 7.34 (d, J = 8.4 Hz, 2H), 7.14 – 7.00 (m, 2H), 7.04 – 6.82 (m, 4H), 6.75 (d, J = 15.8 Hz, 1H), 6.04 (dd, J = 15.8, 8.7 Hz, 1H), 5.12 (d, J = 8.7 Hz, 1H), 3.86 (s, 3H), 3.73 (d, J = 16.5 Hz, 1H), 2.67 (d, J = 16.5 Hz, 1H), 1.47 (s, 9H). ^{13}C NMR (101 MHz, CDCl3) δ 197.5, 171.5, 164.7, 162.2, 160.0, 139.4, 136.6, 136.5, 134.3, 129.0, 128.5,

128.4, 128.0, 127.3, 123.4, 122.5, 122.5, 116.4, 116.2, 114.3, 65.9, 63.5, 55.4, 55.3, 42.1, 28.1.

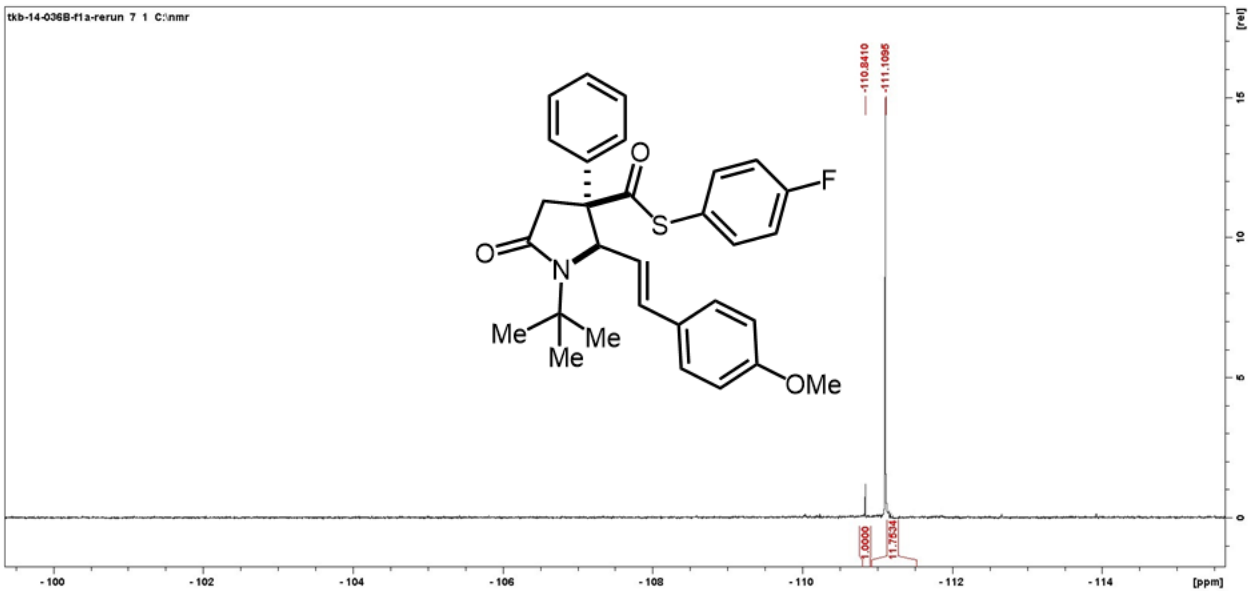
HRMS-EI^{+} (*m/z*): calc for $C_{30}H_{30}FNO_3S$ $[M]^{+}$ 503.1930, found 503.1933.







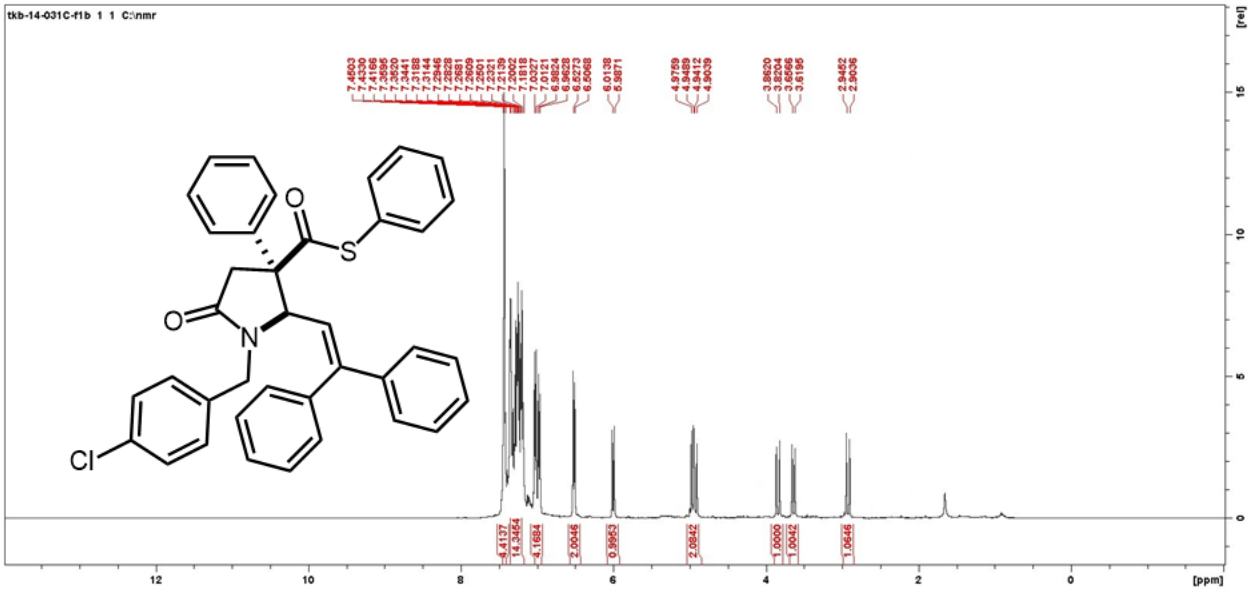
^{19}F NMR

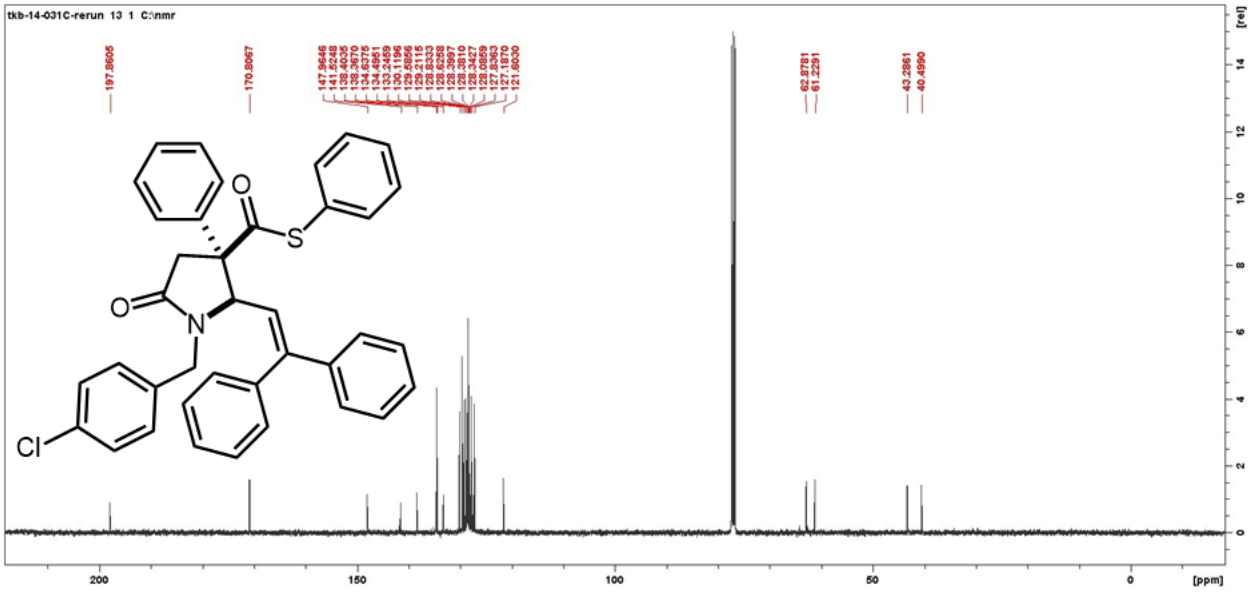


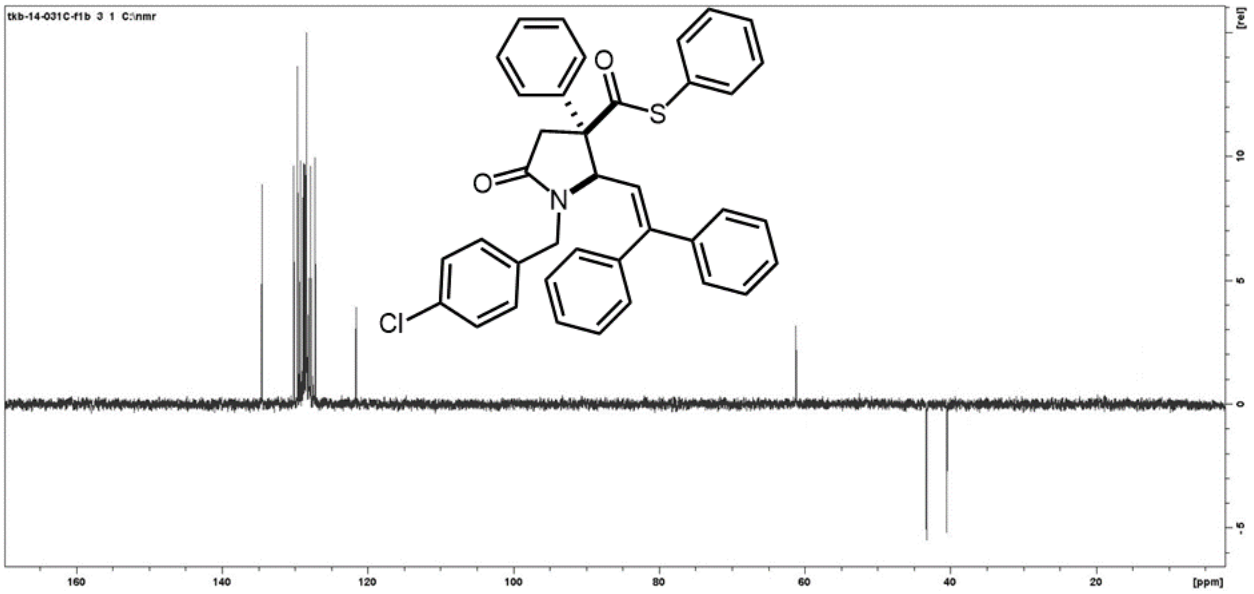
Compound 7c

Prepared in 0.5 mmol scale using **General Procedure D.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (70:30). Greenish yellow oil. Yield = 258.1 mg, 86%. ^{1}H NMR (400 MHz, CDCl3) δ 7.45 – 7.18 (m, 14H), 7.03 – 6.96 (m, 4H), 6.52 (d, J = 8.1 Hz, 2H), 6.00 (d, J = 10.7 Hz, 1H), 4.94 (dd, J = 16.1, 12.8 Hz, 2H), 3.84 (d, J = 16.6 Hz, 1H), 3.64 (d, J = 14.8 Hz, 1H), 2.92 (d, J = 16.6 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 197.9, 170.8, 147.9, 141.5, 138.4, 138.4, 134.7, 134.6, 134.5, 133.2, 130.1, 129.6, 129.4, 129.2, 129.0, 128.8, 128.7, 128.6, 128.5,

128.4, 128.3, 128.1, 127.8, 127.5, 127.4, 127.2, 121.6, 62.9, 61.2, 43.3, 40.5. **HRMS-EI$^+$** (*m/z*): calc for $C_{38}H_{30}ClNO_2S$ $[M]^+$ 599.1686, found 599.1690.

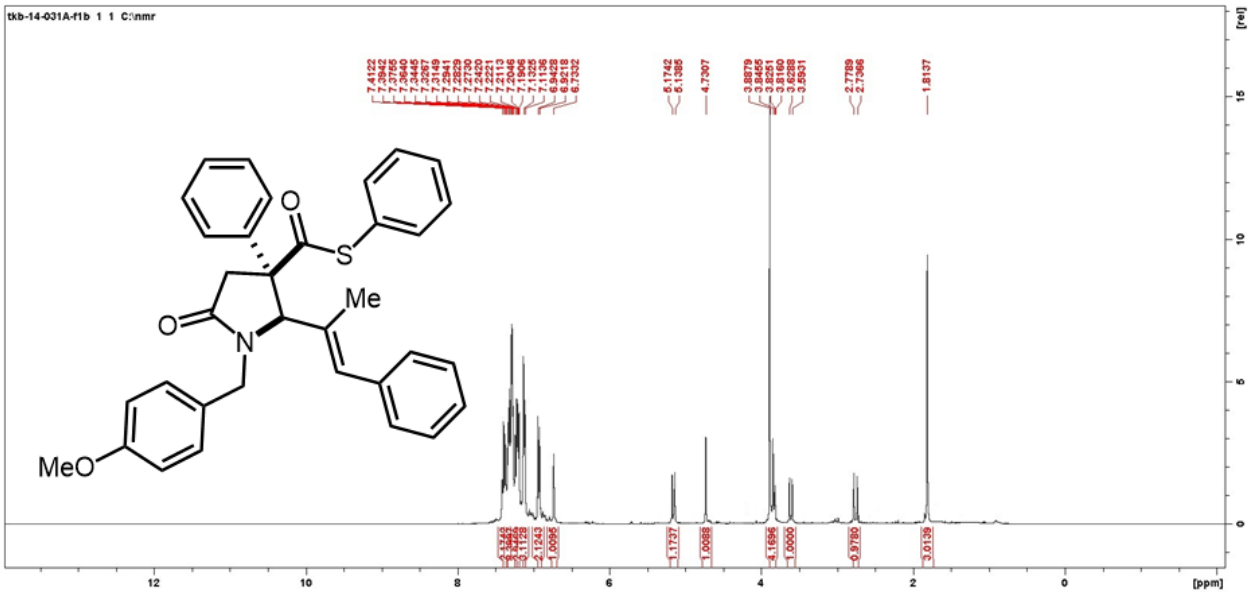






Compound 7d

Prepared in 0.5 mmol scale using **General Procedure D.** Purification: Flash chromatography on silica eluting with hexane/EtOAc (50:50). Amorphous solid. Yield = 237.5 mg, 89%. ^{1}H NMR (400 MHz, CDCl3) δ 7.41 – 7.19 (m, 17H), 6.94 – 6.91 (m, 2H), 6.73 (s, 1H), 5.14 (d, J = 13.5 Hz, 1H), 4.73 (s, 1H), 3.89 – 3.82 (m, 4H), 3.61 (d, J = 14.3 Hz, 1H), 2.75 (d, J = 14.3 Hz, 1H), 1.81 (s, 3H). ^{13}C NMR (101 MHz, CDCl3) δ 197.8, 171.5, 159.5, 140.4, 136.4, 134.7, 134.6, 134.3, 132.9, 130.6, 130.1, 129.9, 129.8, 129.4, 129.1, 129.0, 128.9, 128.8, 128.33, 128.2, 128.1, 127.6, 127.5, 127.4, 127.0, 126.2, 114.1, 70.8, 62.7, 55.4, 44.1, 42.7, 21.0. **HRMS-EI^{+}** (*m/z*): calc for $C_{34}H_{31}NO_3S$ $[M]^{+}$ 533.2025, found 533.2028.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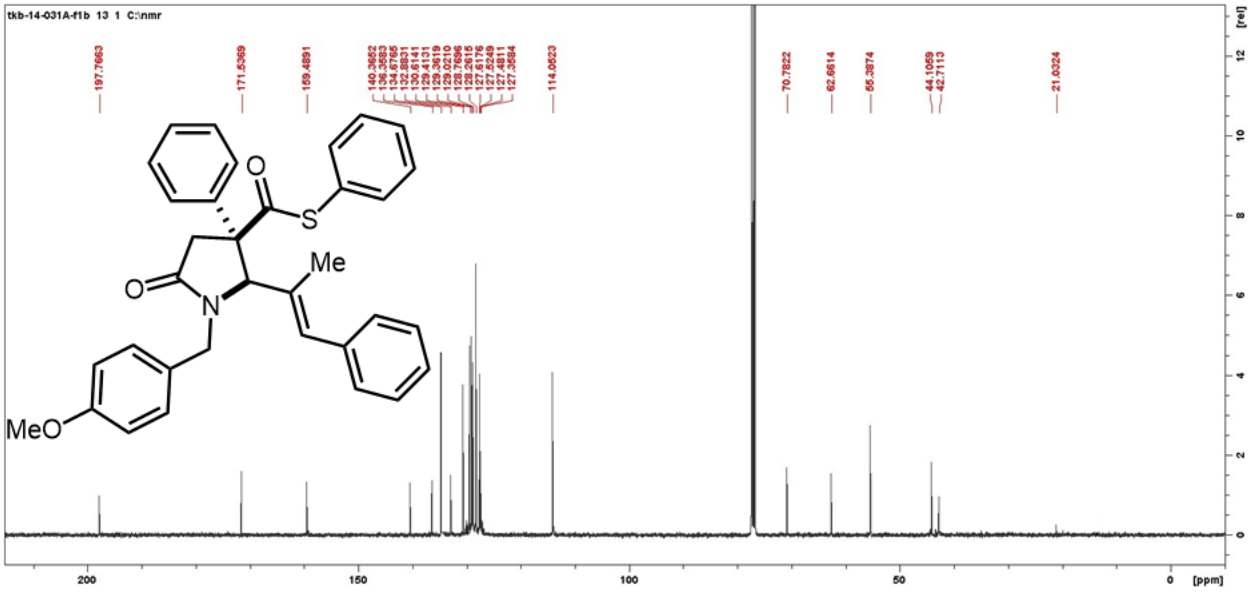
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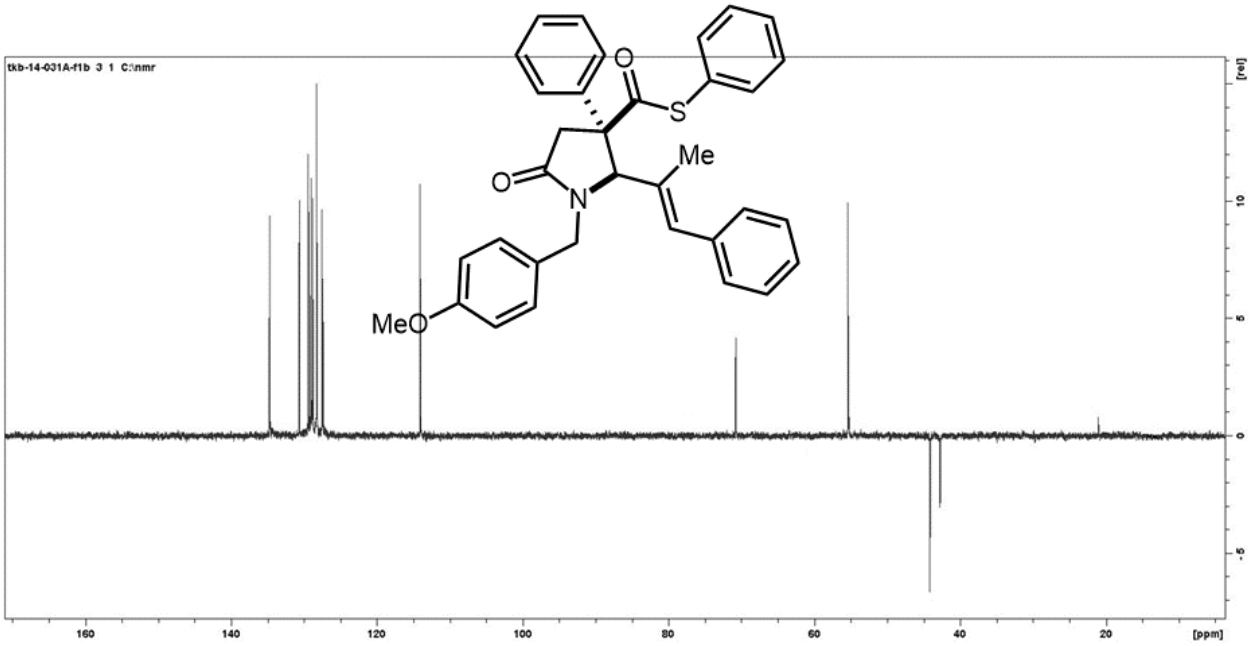

References

1. T. K. Beng, M. Rodriguez, and C. Borg, *RSC Adv.* 2022, **12**, 17617–17620

2. T. K. Beng, C. Borg, and M. Rodriguez, *RSC Adv.* 2022, **12**, 28685-28691