Supporting Information

An asymmetric vinylogous Mukaiyama-Michael reaction of α,β-unsaturated 2-acyl imidazoles catalyzed by chiral Sc(III)- or Er(III)-pybox complexes

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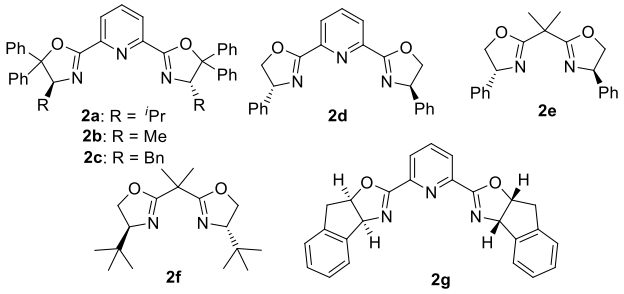
1. General. All reactions were carried out under an atmosphere of nitrogen in oven dried glassware with magnetic stirring. ^{1}H and ^{13}C NMR spectra were recorded on Jeol (500 MHz and 400 MHz) spectrometers in $CDCl_3$. Chemical shifts are reported in delta (δ) units, in parts per million (ppm). Tetramethylsilane and $CDCl_3$ were used as internal standard for ^{1}H and ^{13}C NMR respectively. Coupling constants were reported in Hz. Splitting patterns are designated as s for singlet; d for doublet; t for triplet; q for quartet; dd for doublet of doublet; m for multiplet. IR spectra were measured with PerkinElmer FT-IR Spectrum Two spectrometer. Mass spectrometric analysis was done on waters Q Tof Premier Micromass (ESI). Routine monitoring of reactions were performed using precoated silicagel TLC plates from E-Merck. All the chromatographic separations were carried out by using silica gel (Acme's, 100–200 mesh). Enantiomeric excess was determined by HPLC analysis on Daicel chiral columns using *iso*-propanol and *n*-hexane as eluent at 25ºC. Optical rotations were measured on a commercially available automatic polarimeter. Melting points were recorded on a digital melting point apparatus.

2. Materials:



Ligands **2a-c** were synthesized according to procedure known in literature.[1] Ligands **2d-g** were commercially available. α,β-unsaturated 2-acyl imidazoles were prepared according to literature known procedure.[2] Silyloxyfuran **3a** was commercially available and silyloxyfuran **3b** was prepared according to reported method.[3] HFIP (1, 1, 1, 3, 3, 3-Hexafluoro-2-propanol) and all the metal triflates were commercially available. Methyl cinnamate **11** was prepared according to literature known method.[4]

3. General procedure for asymmetric vinylogous Mukaiyama-Michael reaction and the details of scale-up of reaction:

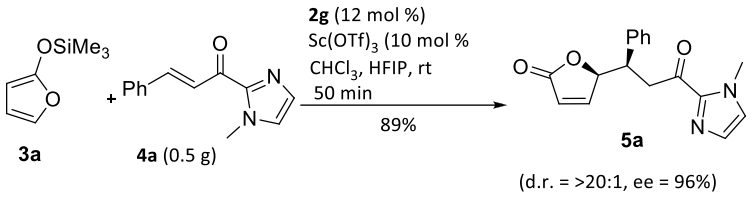
(a) General procedure for the reaction of **3a** with α,β-unsaturated 2-acyl imidazoles catalyzed by Sc(III)-**2g** complex.

A solution of a ligand **2g** (0.024 mmol) and $Sc(OTf)_3$ (0.02 mmol) in dry chloroform (2 mL) was stirred at room temperature for 3 hours under nitrogen atmosphere. α,β-Unsaturated 2-acyl imidazoles (0.20 mmol) were added and

the whole mixture was stirred for an additional 15 minute at rt. HFIP (0.20 mmol) was then added to the mixture and the resulting reaction mixture was again stirred for 15 minute at rt. Then silyloxyfuran **3a** (0.40 mmol) was added and the reaction mixture was allowed for stirring at room temperature until the completion of the reaction (monitored by TLC). The mixture was concentrated in vacuo and purified over silica gel by column chromatography (20-60% ethyl acetate in hexane) to afford the products.

Details of scale-up of reaction

Scheme S1 Scale-up of reaction.



General Procedure: A solution of a ligand **2g** (0.283 mmol) and Sc(OTf)$_3$ (0.236 mmol) in dry chloroform (12 mL) was stirred at room temperature for 3 hours under nitrogen atmosphere. α,β-Unsaturated 2-acyl imidazole **4a** (2.36 mmol) was added and the whole mixture was stirred for an additional 15 minute at rt. HFIP (2.36 mmol) was then added to the mixture and the resulting reaction mixture was again stirred for 15 minute at rt. Then silyloxyfuran **3a** (4.72 mmol) was added and the reaction mixture was allowed for stirring at room temperature for 50 min. The mixture was concentrated in vacuo and purified over silica gel by column chromatography (20-60% ethyl acetate in hexane) to afford the product **5a** in 89% yield with >20:1 *d.r.* and 96% *ee*.

(b) General procedure for the reaction of **3b** with α,β-unsaturated 2-acyl imidazoles catalyzed by Sc(III)-**2g** complex.

A solution of a ligand **2g** (0.024 mmol) and Sc(OTf)$_3$ (0.02 mmol) in dry chloroform (1.6 mL) was stirred at room temperature for 3 hours under nitrogen atmosphere. α,β-Unsaturated 2-acyl imidazoles (0.20 mmol) were added and the whole mixture was stirred for an additional 15 minute at rt. HFIP (0.20 mmol) was then added and the resulting mixture was again stirred for 15 minute more at rt. Then silyloxyfuran **3b** (0.30 mmol in 0.4 mL chloroform) was added and the reaction mixture was allowed for stirring at room temperature until the completion of the reaction (monitored by TLC). The mixture was concentrated in vacuo and purified over silica gel by column chromatography (20-60% ethyl acetate in hexane) to afford the products.

(c) General procedure for the reaction of **3a** with α,β-unsaturated 2-acyl imidazoles catalyzed by Er(III)-**2g** complex.

A solution of a ligand **2g** (0.024 mmol) and Er(OTf)$_3$ (0.02 mmol) in dry chloroform (2 mL) was stirred at room temperature for 3 hour under nitrogen atmosphere. α,β-Unsaturated 2-acyl imidazoles (0.20 mmol) were added and

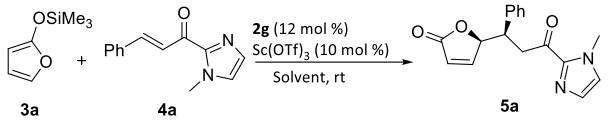
the whole mixture was stirred for an additional 15 minute at rt. 4Å molecular sieve (20 mg) was added and the mixture was cooled to -20 °C and stirred for 15 minute at same temperature. Then HFIP (0.20 mmol) was added and the resulting mixture was again allowed to stir for additional 15 minute at -20 °C. The silyloxyfuran **3a** (0.40 mmol) was added and the reaction mixture was allowed for stirring at -20 °C until the completion of the reaction (monitored by TLC). The mixture was concentrated in vacuo and purified over silica gel by column chromatography (20-60% ethyl acetate in hexane) to afford the products.

(d) General procedure for the reaction of **3b** with α,β-unsaturated 2-acyl imidazoles catalyzed by Er(III)-**2g** complex.

A solution of a ligand **2g** (0.024 mmol) and Er(OTf)$_3$ (0.02 mmol) in dry chloroform (1.6 mL) was stirred at room temperature for 3 hour under nitrogen atmosphere. α,β-Unsaturated 2-acyl imidazoles (0.20 mmol) was added and the whole mixture was stirred for an additional 15 minute at rt. 4Å molecular sieve (20 mg) was added and the mixture was cooled to -40 °C and stirred for 15 minute at same temperature. Then HFIP (0.20 mmol) was added and the resulting mixture was again allowed to stir for additional 15 minute. The silyloxyfuran **3b** (0.30 mmol in 0.4 mL chloroform) was added and the reaction mixture was allowed for stirring at -40 °C until the completion of the reaction (monitored by TLC). The mixture was concentrated in vacuo and purified over silica gel by column chromatography (20-60% ethyl acetate in hexane) to afford the products.

4. Optimization of vinylogous Mukaiyama-Michael reaction:

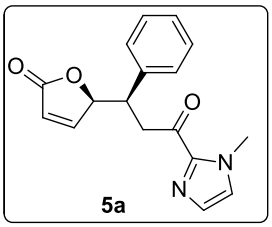
Table S1 Studies of reaction conditions[a,c]



Entry	Solvent	Time	Yield[b] (%)	ee[d] (%)
1	CH_2Cl_2	1 h	86	80
2	$CHCl_3$	1 h	86	91
3	DCE	1 h	85	91
4	THF	2 h	87	90
5	1,4-Dioxane	2 h	85	84
6	Toluene	10 h	68	52
7[e]	$CHCl_3$	45 min	90	88
8[f]	$CHCl_3$	2 h	86	89
9[g]	$CHCl_3$	1 h	85	91
10[h]	$CHCl_3$	45 min	90	96
11[h,i]	$CHCl_3$	25 min	84	81
12[h,i,j]	$CHCl_3$	45 min	83	85
13[h,i,k]	$CHCl_3$	1.5 h	82	86
14[h,i,k,l]	$CHCl_3$	1.5 h	88	91

[a] Reaction conditions: **4a** (0.1 mmol), **3a** (0.2 mmol), **2g** (0.012 mmol), Sc(OTf)$_3$ (0.01 mmol), Solvent (1.0 mL), rt. [b] Isolated yield. [c] dr in all cases is determined to be >20:1 from ^{1}H NMR of crude reaction mixture. [d] Determined by chiral HPLC. [e] 15 mol % catalyst loading. [f] 5 mol % catalyst loading. [g] Reaction at -5 ˚C. [h] 1 equiv. of HFIP. [i] **2g**-Er(OTf)$_3$ complex. [j] Reaction at 5 ˚C. [k] Reaction at -20 ˚C. [l] 4Å molecular sieve.

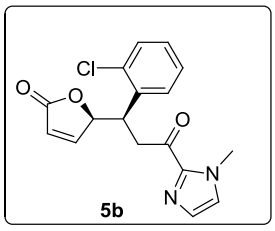
5. Characterization data of vinylogous Michael products 5 and 7:



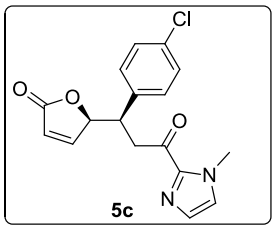
^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.26 – 7.16 (m, 6H), 7.06 (s, 1H), 6.93 (s, 1H), 5.97 (dd, *J* = 5.7, 1.7 Hz, 1H), 5.12 (d, *J* = 8.1 Hz, 1H), 3.83 (s, 3H), 3.72 – 3.63 (m, 2H), 3.55 (td, *J* = 8.2, 6.0 Hz, 1H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 189.78, 172.60, 155.16, 142.88, 138.81, 129.10, 128.93, 128.40, 127.78, 127.21, 122.30, 86.03, 45.03, 41.24, 36.18. IR (thin film): ν = 3110, 3031, 2924, 2854, 1756, 1677, 1600, 1411, 1291, 1160, 1102, 1086 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{17}H_{17}N_2O_3$ $[M+H]^+$: 297.1239. Found: 297.1239.

For Sc(III)-**2g:** The compound **5a** was isolated as white semisolid in 90% yield with >20:1 *d.r.* and 96% *ee*. $[\alpha]_D^{25}$ = + 72.7 (*c* 0.71, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate = 1.0 mL/min. t_R (major) = 36.77 min, t_R (minor) = 41.67 min.

For Er(III)-**2g:** The compound **5a** was isolated as white semisolid in 88% yield with >20:1 *d.r.* and 91% *ee*. $[\alpha]_D^{25}$ = + 54.3 (*c* 0.59, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate = 1.0 mL/min. t_R (major) = 37.66 min, t_R (minor) = 42.74 min.



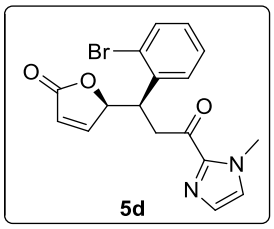
The compound **5b** was isolated as white semisolid in 91% yield with >20:1 *d.r.* and 92% *ee*. $[\alpha]_D^{25}$ = + 57.1 (*c* 0.72, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, Flow rate: 1.0 mL/min. t_R (major) = 27.94 min, t_R (minor) = 32.89 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.40 (d, *J* = 7.5 Hz, 1H), 7.33 (d, *J* = 7.8 Hz, 1H), 7.24 (d, *J* = 5.5 Hz, 1H), 7.21 – 7.17 (m, 1H), 7.13 (t, *J* = 7.2 Hz, 1H), 7.06 (s, 1H), 6.94 (s, 1H), 6.03 (d, *J* = 4.2 Hz, 1H), 5.17 (d, *J* = 6.4 Hz, 1H), 4.22 (d, *J* = 6.7 Hz, 1H), 3.84 (s, 3H), 3.63 (d, *J* = 6.1 Hz, 2H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 189.42, 172.58, 155.15, 142.68, 136.95, 134.16, 130.11, 129.31, 129.17, 128.84, 127.49, 127.25, 122.35, 85.32, 40.13, 39.65, 36.19. IR (thin film): ν = 3112, 2958, 2924, 1757, 1678, 1600, 1476, 1411, 1291, 1160, 1103, 1039 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{17}H_{16}ClN_2O_3$ $[M+H]^+$: 331.0849. Found: 331.0843.



^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.22 – 7.17 (m, 5H), 7.06 (s, 1H), 6.94 (s, 1H), 6.01 – 5.99 (m, 1H), 5.11 (d, *J* = 6.4 Hz, 1H), 3.84 (s, 3H), 3.68 (td, *J* = 10.3, 4.5 Hz, 1H), 3.61 – 3.54 (m, 2H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 189.44, 172.37, 154.63, 142.75, 137.28, 133.63, 129.85, 129.24, 129.07, 127.39, 122.70, 85.58, 44.18, 40.69, 36.20. IR (thin film): ν = 3112, 2924, 2853, 1757, 1677, 1599, 1493, 1411, 1244, 1160, 1095, 1036 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{17}H_{16}ClN_2O_3$ $[M+H]^+$: 331.0849. Found: 331.0844.

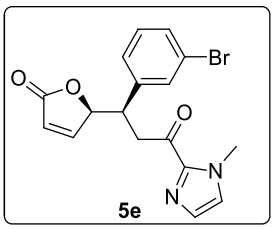
For Sc(III)-**2g:** The compound **5c** was isolated as white semisolid in 92% yield with >20:1 *d.r.* and 96% *ee*. $[\alpha]_D^{25}$ = + 80.3 (*c* 0.35, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (major) = 26.40min, t_R (minor) = 29.11 min.

For Er(III)-**2g:** The compound **5c** was isolated as white semisolid in 85% yield with >20:1 *d.r.* and 93% *ee*. The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (major) = 26.43min, t_R (minor) = 29.08 min.



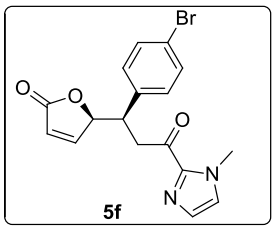
5d

The compound **5d** was isolated as white semisolid in 91% yield with >20:1 *d.r.* and 93% *ee*. $[\alpha]_D^{25}$ = + 48.8 (*c* 1.31, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (major) = 29.47 min, t_R (minor) = 34.13 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.52 (d, *J* = 7.8 Hz, 1H), 7.40 (d, *J* = 7.1 Hz, 1H), 7.27 – 7.20 (m, 2H), 7.13 – 6.98 (m, 2H), 6.94 (s, 1H), 6.04 (dd, *J* = 5.6, 1.7 Hz, 1H), 5.15 (d, *J* = 5.4 Hz, 1H), 4.23 (d, *J* = 6.5 Hz, 1H), 3.84 (s, 3H), 3.61 (d, *J* = 6.8 Hz, 2H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 189.35, 172.59, 155.17, 142.64, 138.63, 133.43, 129.34, 129.14, 128.13, 127.26, 125.03, 122.33, 85.42, 42.59, 39.72, 36.20. IR (thin film): ν = 3111, 2957, 2924, 2854, 1757, 1677, 1600, 1472, 1411, 1291, 1159, 1103, 1081 cm^{-1}. HRMS (ES+): mass calcd for $C_{17}H_{16}BrN_2O_3$ $[M+H]^+$: 375.0344. Found: 375.0341.



5e

The compound **5e** was isolated as white semisolid in 93% yield with >20:1 *d.r.* and 97% *ee*. $[\alpha]_D^{25}$ = + 63.2 (*c* 1.12, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (major) = 26.15 min, t_R (minor) = 29.90 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.39 (s, 1H), 7.32 (d, *J* = 7.9 Hz, 1H), 7.21 – 7.19 (m, 2H), 7.12 (t, *J* = 7.8 Hz, 1H), 7.07 (s, 1H), 6.95 (s, 1H), 6.01 (dd, *J* = 5.7, 1.7 Hz, 1H), 5.12 (d, *J* = 7.4 Hz, 1H), 3.85 (s, 3H), 3.68 – 3.54 (m, 3H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 189.26, 172.34, 154.66, 142.64, 141.25, 131.46, 130.99, 130.48, 129.17, 127.37, 127.22, 122.92, 122.68, 85.50, 44.43, 40.76, 36.22. IR (thin film): ν = 3112, 2958, 2925, 2854, 1756, 1677, 1596, 1476, 1411, 1291, 1160, 1097, 1036 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{17}H_{16}BrN_2O_3$ $[M+H]^+$: 375.0344. Found: 375.0340.



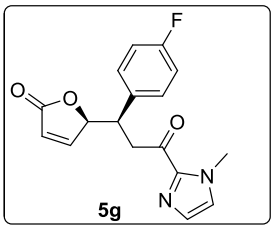
5f

^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.37 (d, *J* = 8.4 Hz, 2H), 7.20 (dd, *J* = 4.1, 1.2 Hz, 1H), 7.13 (d, *J* = 8.3 Hz, 2H), 7.07 (s, 1H), 6.95 (s, 1H), 6.01 (dd, *J* = 5.7, 1.8 Hz, 1H), 5.11 (d, *J* = 7.2 Hz, 1H), 3.85 (s, 3H), 3.67 (dd, *J* = 12.5, 5.9 Hz, 1H), 3.61 – 3.56 (m, 2H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 189.40, 172.34, 154.59, 142.71, 137.80, 132.07, 130.22, 129.16, 127.40, 122.76, 121.80, 85.52, 44.38, 40.75, 36.26. IR (thin film): *v* = 3110, 2924, 1757, 1676, 1600, 1489, 1411, 1243, 1160, 1102,

1074 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{17}H_{16}BrN_2O_3$ $[M+H]^+$: 375.0344. Found: 375.0346.

For Sc(III)-**2g:** The compound **5f** was isolated as white semisolid in 90% yield with >20:1 *d.r.* and 97% *ee*. $[\alpha]_D^{25}$ = + 78.8 (*c* 0.59, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (80:20) as eluent, Flow rate: 1.0 mL/min. t_R (major) = 57.19 min, t_R (minor) = 64.09 min.

For Er(III)-**2g:** The compound **5f** was isolated as white semisolid in 83% yield with >20:1 *d.r.* and 93% *ee*. The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (80:20) as eluent, Flow rate: 1.0 mL/min. t_R (major) = 58.64 min, t_R (minor) = 65.59 min.

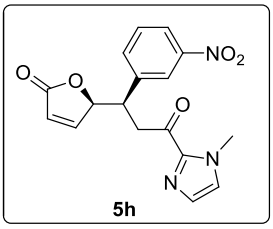


5g

^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.22 – 7.19 (m, 3H), 7.06 (s, 1H), 6.94 – 6.91 (m, 3H), 6.00 (dd, *J* = 5.7, 1.7 Hz, 1H), 5.11 (d, *J* = 7.0 Hz, 1H), 3.84 (s, 3H), 3.69 – 3.55 (m, 3H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 189.58, 172.45, 162.23 (d, $J_{C\text{-}F}$ = 246.3), 154.75, 142.80, 134.48, 130.06 (d, $J_{C\text{-}F}$ = 8), 129.22, 127.35, 122.63, 115.79 (d, $J_{C\text{-}F}$ = 21.4) , 85.79, 44.07, 40.93, 36.20. IR (thin film): ν = 3114, 2960, 2924, 1757, 1677, 1604, 1511, 1411, 1225, 1160, 1100, 1081 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{17}H_{16}FN_2O_3$ $[M+H]^+$: 315.1145. Found: 315.1149.

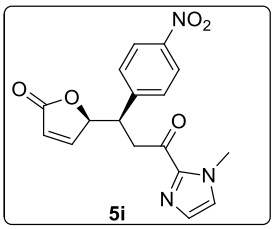
For Sc(III)-**2g:** The compound **5g** was isolated as white semisolid in 91% yield with >20:1 *d.r.* and 98% *ee*. $[\alpha]_D^{25}$ = + 68.9 (*c* 0.37, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, Flow rate 1.0 mL/min. t_R (major) = 27.23 min, t_R (minor) = 30.75 min.

For Er(III)-**2g:** The compound **5g** was isolated as white semisolid in 85% yield with >20:1 *d.r.* and 96% *ee*. The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, Flow rate 1.0 mL/min. t_R (major) = 27.48 min, t_R (minor) = 30.96 min.

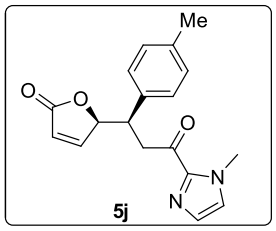


5h

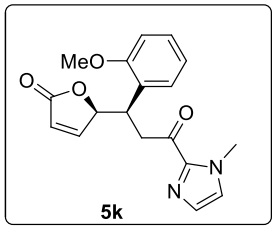
The compound **5h** was isolated as yellowish semisolid in 90% yield with >20:1 *d.r.* and 94% *ee*. $[\alpha]_D^{25}$ = + 55.6 (*c* 0.79, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (60:40) as eluent, flow rate: 1.0 mL/ min, t_R (major) = 52.62 min, t_R (minor) = 58.90 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 8.17 – 8.09 (m, 2H), 7.70 (d, *J* = 7.7 Hz, 1H), 7.50 (t, *J* = 7.9 Hz, 1H), 7.37 (dd, *J* = 5.7, 1.2 Hz, 1H), 7.14 (s, 1H), 7.03 (s, 1H), 6.10 (dd, *J* = 5.8, 2.0 Hz, 1H), 5.29 – 5.26 (m, 1H), 3.94 – 3.87 (m, 4H), 3.78 (dd, *J* = 17.6, 8.5 Hz, 1H), 3.67 (dd, *J* = 17.6, 5.7 Hz, 1H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 188.80, 175.51, 172.07, 154.01, 148.45, 142.36, 140.93, 135.04, 129.85, 129.29, 127.58, 123.29, 122.86, 84.98, 43.91, 39.92, 36.25. IR (thin film): ν = 3091, 2927, 1755, 1677, 1600, 1530, 1411, 1291, 1350, 1160, 1101, 1032 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{17}H_{16}N_3O_5$ $[M+H]^+$: 342.1090. Found: 342.1098.



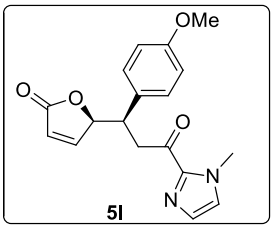
The compound **5i** was isolated as white solid in 91% yield with >20:1 *d.r.* and 94% *ee*. mp 146 – 148 °C; $[\alpha]_D^{25}$ = + 69.6 (*c* 0.6, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (60:40) as eluent, flow rate: 1.0 mL/min. t_R (major) = 32.76 min, t_R (minor) = 52.05 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 8.17 – 8.14 (m, 2H), 7.52 – 7.50 (m, 2H), 7.33 (dd, *J* = 5.7, 1.5 Hz, 1H), 7.13 (s, 1H), 7.03 (s, 1H), 6.10 (dd, *J* = 5.8, 2.0 Hz, 1H), 5.25 (dt, *J* = 6.3, 1.6 Hz, 1H), 3.92 – 3.85 (m, 4H), 3.80 (dd, *J* = 17.3, 8.8 Hz, 1H), 3.62 (dd, *J* = 17.2, 5.2 Hz, 1H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 188.83, 171.99, 153.94, 147.54, 146.35, 142.46, 129.62, 129.39, 127.64, 123.99, 123.26, 84.86, 44.13, 39.84, 36.22. IR (neat): ν = 3112, 2924, 1757, 1676, 1599, 1520, 1411, 1348, 1290, 1160, 1104, 1081 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{17}H_{16}N_3O_5$ $[M+H]^+$: 342.1090. Found: 342.1097.



The compound **5j** was isolated as white semisolid in 92% yield with >20:1 *d.r.* and 98% *ee*. $[\alpha]_D^{25}$ = + 79.5 (*c* 0.61, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (80:20) as eluent, flow rate: 1.0 mL/min. t_R (major) = 68.13 min, t_R (minor) = 73.52 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.23 (d, *J* = 5.0 Hz, 1H), 7.19 – 7.10 (m, 5H), 6.99 (s, 1H), 6.04 (dd, *J* = 5.6, 1.6 Hz, 1H), 5.16 (d, *J* = 8.2 Hz, 1H), 3.91 (s, 3H), 3.78 – 3.68 (m, 2H), 3.58 (dd, *J* = 14.2, 8.1 Hz, 1H), 2.30 (s, 3H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 189.92, 172.69, 155.28, 142.94, 137.45, 135.72, 129.63, 129.11, 128.25, 127.17, 122.25, 86.19, 44.72, 41.40, 36.21, 21.17. IR (thin film): ν = 3111, 2923, 1757, 1676, 1600, 1515, 1410, 1291, 1160, 1102, 1080 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{18}H_{19}N_2O_3$ $[M+H]^+$: 311.1396. Found: 311.1391.

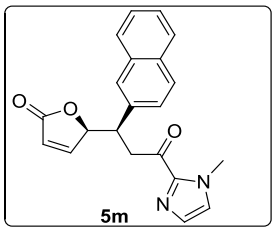


The compound **5k** was isolated as white semisolid in 89% yield with >20:1 *d.r.* and 98% *ee*. $[\alpha]_D^{25}$ = + 62.0 (*c* 0.92, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (major) = 48.55 min. t_R (minor) = 52.72 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.22 – 7.13 (m, 3H), 7.04 (s, 1H), 6.91 (s, 1H), 6.83 (dd, *J* = 16.2, 8.0 Hz, 2H), 5.95 (dd, *J* = 5.7, 1.8 Hz, 1H), 5.33 – 5.31 (m, 1H), 3.87 – 3.83 (m, 4H), 3.78 (s, 3H), 3.69 (d, *J* = 6.9 Hz, 2H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 190.45, 172.96, 157.26, 156.16, 143.09, 129.86, 129.02, 128.81, 127.24, 126.98, 121.54, 121.04, 111.11, 85.43, 55.60, 40.23, 40.12, 36.13. IR (thin film): ν = 2923, 1755, 1675, 1600, 1493, 1409, 1244, 1159, 1103, 1080, 1028 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{18}H_{19}N_2O_4$ $[M+H]^+$: 327.1345. Found: 327.1346.

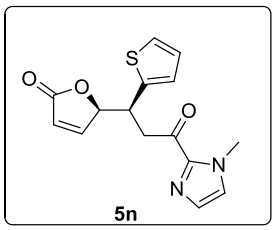


The compound **5l** was isolated as light yellow semisolid in 88% yield with >20:1 *d.r.* and 94% *ee*. $[\alpha]_D^{25}$ = + 81.2 (*c* 1.01, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralcel OJ-H column, *n*-hexane/2 propanol (60:40) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 16.90 min, t_R (major) = 33.11 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.19 – 7.14 (m, 3H), 7.09 (s, 1H), 6.95 (s, 1H), 6.77

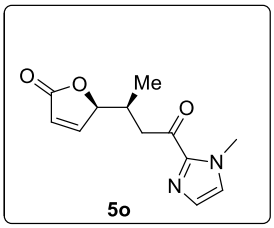
(d, *J* = 8.6 Hz, 2H), 5.97 (dd, *J* = 5.7, 1.8 Hz, 1H), 5.09 (d, *J* = 8.3 Hz, 1H), 3.85 (s, 3H), 3.70 (s, 3H), 3.64 (dd, *J* = 7.0, 4.9 Hz, 2H), 3.50 (dd, *J* = 14.2, 8.2 Hz, 1H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 189.69, 172.66, 159.12, 155.27, 142.64, 130.62, 129.43, 128.71, 127.20, 122.28, 114.34, 86.24, 55.36, 44.42, 41.54, 36.32. IR (thin film): ν = 3112, 2924, 2852, 1755, 1677, 1611, 1514, 1410, 1290, 1251, 1161, 1102, 1080, 1031cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{18}H_{19}N_2O_4$ $[M+H]^+$: 327.1345. Found: 327.1340.



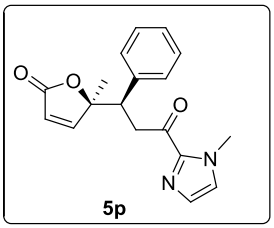
The compound **5m** was isolated as white semisolid in 92% yield with >20:1 *d.r.* and 95% *ee*. mp 126 – 128 °C; $[\alpha]_D^{25}$ = + 87.8 (*c* 0.66, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IB-3 column, *n*-hexane/2-propanol (80:20) as eluent, flow rate: 1.0 mL/min. t_R (major) = 22.17 min, t_R (minor) = 27.50 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.75 – 7.71 (m, 4H), 7.40 – 7.36 (m, 3H), 7.19 – 7.16 (m, 1H), 7.07 (s, 1H), 6.91 (s, 1H), 5.98 (dd, *J* = 5.7, 1.7 Hz, 1H), 5.22 (d, *J* = 7.9 Hz, 1H), 3.87 – 3.82 (m, 4H), 3.77 – 3.67 (m, 2H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 189.71, 172.58, 155.16, 142.85, 136.33, 133.51, 132.95, 129.06, 128.77, 128.00, 127.78, 127.31, 127.25, 126.48, 126.40, 126.23, 122.38, 86.08, 45.31, 41.41, 36.23. IR (thin film): ν = 2959, 2926, 1754, 1676, 1600, 1508, 1411, 1290, 1160, 1101, 1080, 1033 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{21}H_{19}N_2O_3$ $[M+H]^+$: 347.1396. Found: 347.1390.



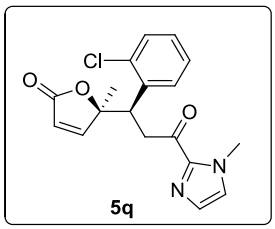
The compound **5n** was isolated as brown semisolid in 90% yield with >20:1 *d.r.* and 93% *ee*. $[\alpha]_D^{25}$ = + 106.7 (*c* 0.25, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (major) = 44.36 min, t_R (minor) = 51.55 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.28 (d, *J* = 5.1 Hz, 1H), 7.10 (d, *J* = 4.4 Hz, 1H), 7.07 (s, 1H), 6.96 (s, 1H), 6.90 (s, 1H), 6.86 (s, 1H), 6.00 (d, *J* = 4.5 Hz, 1H), 5.14 (d, *J* = 7.1 Hz, 1H), 3.96 – 3.87 (m, 4H), 3.73 – 3.62 (m, 2H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 189.18, 172.34, 154.65, 142.83, 141.14, 129.31, 127.38, 127.12, 126.08, 124.68, 122.65, 85.46, 42.21, 40.00, 36.18. IR (thin film): ν = 3102, 2922, 1756, 1675, 1600, 1410, 1292, 1156, 1102, 1080, 1019 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{15}H_{15}N_2O_3S$ $[M+H]^+$: 303.0803. Found: 303.0804.



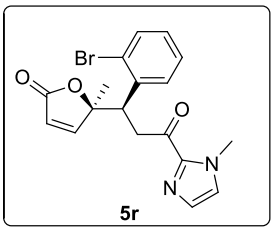
The compound **5o** was isolated as colorless semisolid in 92% yield with >20:1 *d.r.* and 92% *ee*. $[\alpha]_D^{25}$ = + 75.9 (*c* 0.66, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (85:15) as eluent, flow rate: 1.0 mL/min. t_R (major) = 105.09 min, t_R (minor) = 117.62 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.46 (d, *J* = 5.7 Hz, 1H), 7.06 (s, 1H), 6.98 (s, 1H), 6.07 (dd, *J* = 5.7, 1.2 Hz, 1H), 4.98 (d, *J* = 1.2 Hz, 1H), 3.93 (s, 3H), 3.20 – 3.15 (m, 1H), 3.07 – 3.02 (m, 1H), 2.66 – 2.58 (m, 1H), 0.98 (dd, *J* = 6.9, 0.7 Hz, 3H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 190.89, 172.82, 154.64, 143.03, 129.25, 127.37, 122.70, 86.49, 41.30, 36.29, 32.88, 15.84. IR (thin film): ν = 3109, 2966, 1751, 1674, 1460, 1408, 1291, 1163, 1096, 1019 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{12}H_{15}N_2O_3$ $[M+H]^+$: 235.1083. Found: 235.1082.



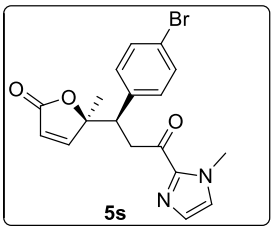
The compound **5p** was isolated as white solid in 91% yield with >20:1 *d.r.* and 93% *ee*. mp 102 – 104 °C; $[\alpha]_D^{25}$ = + 4.4 (*c* 0.45, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 25.82 min, t_R (major) = 36.60 min. ^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.30 (d, *J* = 5.7 Hz, 1H), 7.27 – 7.15 (m, 5H), 7.04 (s, 1H), 6.91 (s, 1H), 5.93 (d, *J* = 5.6 Hz, 1H), 3.78 (s, 3H), 3.75 – 3.62 (m, 2H), 3.40 (dd, *J* = 16.5, 4.1 Hz, 1H), 1.30 (s, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 190.03, 172.30, 160.59, 142.88, 138.72, 129.57, 129.22, 128.52, 127.56, 127.19, 120.91, 90.40, 47.87, 39.69, 36.14, 22.04. IR (neat): ν = 3115, 3026, 2924, 1747, 1681, 1601, 1494, 1454, 1414, 1293, 1279, 1219, 1104, 1045 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{18}H_{19}N_2O_3$ $[M+H]^+$: 311.1396. Found: 311.1399.



The compound **5q** was isolated white solid in 92% yield with >20:1 *d.r.* and 90% *ee*. mp 164 – 166 °C; $[\alpha]_D^{25}$ = – 8.4 (*c* 0.44, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 22.01 min, t_R (major) = 24.87 min. ^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.59 (dd, *J* = 7.8, 1.6 Hz, 1H), 7.46 (d, *J* = 5.6 Hz, 1H), 7.36 (dd, *J* = 7.9, 1.4 Hz, 1H), 7.28 – 7.15 (m, 2H), 7.09 (d, *J* = 0.8 Hz, 1H), 6.97 (s, 1H), 6.04 (d, *J* = 5.6 Hz, 1H), 4.47 (dd, *J* = 8.5, 5.4 Hz, 1H), 3.86 (s, 3H), 3.58 (dd, *J* = 17.5, 8.5 Hz, 1H), 3.44 (dd, *J* = 17.5, 5.4 Hz, 1H), 1.35 (s, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 189.73, 172.37, 160.70, 142.70, 136.88, 135.07, 130.47, 129.56, 129.33, 128.66, 127.44, 127.25, 121.01, 90.37, 41.72, 40.09, 36.16, 22.35. IR (neat): ν = 3112, 2982, 1751, 1680, 1475, 1410, 1287, 1236, 1102, 1035 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{18}H_{18}ClN_2O_3$ $[M+H]^+$: 345.1006. Found: 345.1003.



The compound **5r** was isolated as white solid in 90% yield with >20:1 *d.r.* and 86% *ee*. mp 148 – 150 °C; $[\alpha]_D^{25}$ = + 13.1 (*c* 0.75, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 23.19 min, t_R (major) = 26.09 min. ^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.55 (d, *J* = 7.7 Hz, 1H), 7.49 (d, *J* = 8.0 Hz, 1H), 7.41 (d, *J* = 5.5 Hz, 1H), 7.28 – 6.99 (m, 3H), 6.91 (s, 1H), 5.97 (d, *J* = 5.5 Hz, 1H), 4.40 (dd, *J* = 7.7, 5.8 Hz, 1H), 3.80 (s, 3H), 3.46 (dd, *J* = 17.3, 8.1 Hz, 1H), 3.38 (dd, *J* = 17.3, 5.5 Hz, 1H), 1.29 (s, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 189.72, 172.37, 160.74, 142.69, 138.63, 132.93, 130.65, 129.35, 128.98, 128.10, 127.24, 126.27, 121.00, 90.40, 44.65, 40.32, 36.16, 22.50. IR (neat): ν = 3110, 2983, 2932, 1753, 1676, 1603, 1471, 1409, 1287, 1254, 1147, 1101, 1023 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{18}H_{18}BrN_2O_3$ $[M+H]^+$: 389.0501. Found: 389.0501.

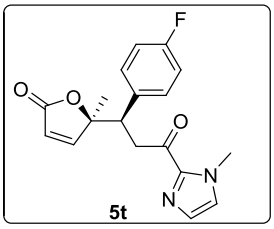


^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.43 – 7.39 (m, 2H), 7.38 (d, *J* = 5.6 Hz, 1H), 7.23 – 7.19 (m, 2H), 7.10 (d, *J* = 0.9 Hz, 1H), 6.98 (s, 1H), 6.02 (d, *J* = 5.6 Hz, 1H), 3.86 (s, 3H), 3.76 – 3.66 (m, 2H), 3.36 (dd, *J* = 15.1, 2.5 Hz, 1H), 1.35 (s, 3H). ^{13}C

NMR (100 MHz, CHLOROFORM-D) δ 189.70, 172.10, 160.07, 142.74, 137.78, 131.66, 131.33, 129.36, 127.38, 121.62, 121.34, 90.00, 47.27, 39.60, 36.20, 22.50. IR (neat): ν = 3128, 3111, 3075, 2976, 2929, 1749, 1679, 1600, 1490, 1413, 1282, 1146, 1100, 1012 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{18}H_{18}BrN_2O_3$ $[M+H]^+$: 389.0501. Found: 389.0502.

For Sc(III)-**2g:** The compound **5s** was isolated as light yellow semisolid in 92% yield with >20:1 *d.r.* and 93% *ee*. mp 174 – 176 °C; $[\alpha]_D^{25}$ = – 5.6 (*c* 1.08, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 22.20 min, t_R (major) = 27.39 min.

For Er(III)-**2g:** The compound **5s** was isolated as light yellow semisolid in 85% yield with >20:1 *d.r.* and 87% *ee*. mp 174 – 176 °C; The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 22.26 min, t_R (major) = 27.42 min.

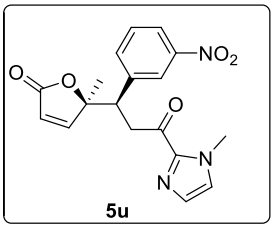


5t

^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.38 (d, *J* = 5.6 Hz, 1H), 7.31 – 7.25 (m, 2H), 7.10 (d, *J* = 0.6 Hz, 1H), 6.99 – 6.95 (m, 3H), 6.01 (d, *J* = 5.6 Hz, 1H), 3.86 (s, 3H), 3.76 – 3.68 (m, 2H), 3.38 (dt, *J* = 13.6, 8.4 Hz, 1H), 1.35 (s, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 189.89, 172.18, 163.41, 160.22, 142.81, 134.43, 131.16 (d, $J_{C\text{-}F}$ = 7.9 Hz), 129.34, 127.33, 121.25, 115.41 (d, $J_{C\text{-}F}$ = 21.2 Hz), 90.24, 47.06, 39.84, 36.18, 22.46. IR (neat): ν = 3131, 3117, 3075, 2980, 2929, 1743, 1683, 1604, 1511, 1416, 1335, 1239, 1222, 1108, 1044 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{18}H_{18}FN_2O_3$ $[M+H]^+$: 329.1301. Found: 329.1307.

For Sc(III)-**2g:** The compound **5t** was isolated as white solid in 93% yield with >20:1 *d.r.* and 93% *ee*. mp 165 – 167 °C; $[\alpha]_D^{25}$ = + 14.9 (*c* 0.71, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 20.29 min, t_R (major) = 27.13 min.

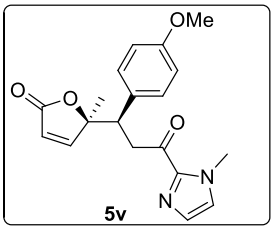
For Er(III)-**2g:** The compound **5t** was isolated as white solid in 88% yield with >20:1 *d.r.* and 83% *ee*. mp 165 – 167 °C; $[\alpha]_D^{25}$ = + 6.4 (*c* 0.70, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 20.25 min, t_R (major) = 26.92 min.



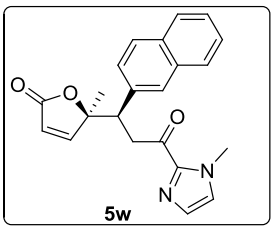
5u

The compound **5u** was isolated as white solid in 91% yield with >20:1 *d.r.* and 94% *ee*. mp 134 – 136 °C; $[\alpha]_D^{25}$ = + 16.4 (*c* 1.73, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralcel AD-H column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (major) = 10.49 min, t_R (minor) = 13.81 min. ^{1}H NMR (400 MHz, CHLOROFORM-D) δ 8.15 – 8.09 (m, 2H), 7.78 (d, *J* = 7.8 Hz, 1H), 7.50 (t, *J* = 8.0 Hz, 1H), 7.45 (d, *J* = 5.6 Hz, 1H), 7.11 (d, *J* = 0.7 Hz, 1H), 7.00 (s,

1H), 6.06 (d, *J* = 5.6 Hz, 1H), 3.90 – 3.86 (m, 4H), 3.72 (dd, *J* = 17.5, 9.2 Hz, 1H), 3.44 (dd, *J* = 17.5, 4.7 Hz, 1H), 1.38 (s, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 189.13, 171.76, 159.42, 148.11, 142.51, 140.99, 135.91, 129.65, 129.55, 127.59, 124.57, 122.78, 121.89, 89.61, 47.34, 39.68, 36.20, 23.17. IR (neat): ν = 3088, 3927, 1756, 1676, 1529, 1409, 1348, 1281, 1154, 1102, 1032 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{18}H_{18}N_3O_5$ $[M+H]^+$: 356.1246. Found: 356.1248.



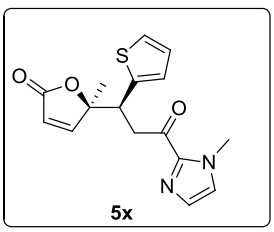
The compound **5v** was isolated as white semisolid in 88% yield with >20:1 *d.r.* and 90% *ee*. $[\alpha]_D^{25}$ = + 6.5 (*c* 0.78, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (60:40) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 24.17 min, t_R (major) = 50.41 min. ^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.36 (d, *J* = 5.6 Hz, 1H), 7.22 (d, *J* = 8.6 Hz, 2H), 7.09 (s, 1H), 6.96 (s, 1H), 6.80 (d, *J* = 8.5 Hz, 2H), 5.98 (d, *J* = 5.6 Hz, 1H), 3.84 (s, 3H), 3.77 – 3.64 (m, 5H), 3.40 (dd, *J* = 16.6, 4.2 Hz, 1H), 1.36 (s, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 190.13, 172.37, 160.67, 158.86, 142.89, 130.60, 130.54, 129.17, 127.19, 120.88, 113.83, 90.64, 55.28, 47.13, 39.76, 36.16, 21.95. IR (thin film): ν = 3110, 2928, 2853, 1755, 1676, 1611, 1513, 1463, 1410, 1293, 1249, 1180, 1104, 1033 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{19}H_{21}N_2O_4$ $[M+H]^+$: 341.1501. Found: 341.1503



^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.81 – 7.78 (m, 4H), 7.51 – 7.44 (m, 3H), 7.40 (d, *J* = 5.6 Hz, 1H), 7.11 (d, *J* = 0.8 Hz, 1H), 6.95 (s, 1H), 6.03 (d, *J* = 5.6 Hz, 1H), 3.96 – 3.87 (m, 2H), 3.82 (s, 3H), 3.52 (dd, *J* = 14.9, 2.2 Hz, 1H), 1.41 (s, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 189.99, 172.35, 160.63, 142.90, 136.36, 133.28, 132.82, 129.28, 128.41, 128.26, 128.05, 127.70, 127.26, 126.25, 126.09, 121.02, 90.55, 48.00, 39.75, 36.15, 22.20. IR (neat): ν = 3057, 2981, 2931, 1754, 1675, 1600, 1508, 1409, 1279, 1155, 1104, 1078 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{22}H_{21}N_2O_3$ $[M+H]^+$: 361.1552. Found: 361.1556.

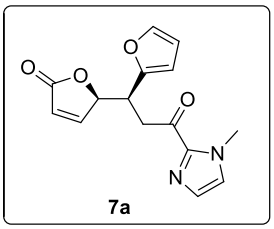
For Sc(III)-**2g:** The compound **5w** was isolated as white solid in 90% yield with >20:1 *d.r.* and 92% *ee*. mp 168 – 170 °C; $[\alpha]_D^{25}$ = + 139.0 (*c* 0.52, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 33.57 min, t_R (major) = 40.77 min.

For Er(III)-**2g:** The compound **5w** was isolated as white solid in 80% yield with >20:1 *d.r.* and 80% *ee*. mp 168 – 170 °C; The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 33.55 min, t_R (major) = 40.70 min.

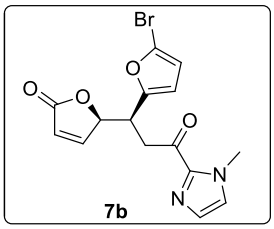


The compound **5x** was isolated as white solid in 91% yield with >20:1 *d.r.* and 92% *ee*. mp 113 – 115 °C; $[\alpha]_D^{25}$ = + 33.1 (*c* 0.97, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 32.57 min, t_R (major) = 47.53 min.

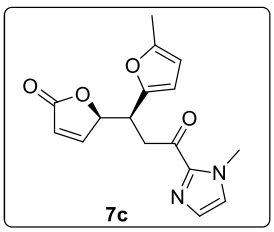
^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.42 (d, *J* = 5.6 Hz, 1H), 7.17 (dd, *J* = 5.1, 1.1 Hz, 1H), 7.12 (d, *J* = 0.9 Hz, 1H), 7.00 (s, 1H), 6.97 (dd, *J* = 3.5, 0.8 Hz, 1H), 6.92 (dd, *J* = 5.1, 3.5 Hz, 1H), 6.01 (d, *J* = 5.6 Hz, 1H), 4.03 (dd, *J* = 9.4, 4.6 Hz, 1H), 3.89 (s, 3H), 3.78 (dd, *J* = 17.2, 9.4 Hz, 1H), 3.49 (dd, *J* = 17.2, 4.6 Hz, 1H), 1.48 (s, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 189.35, 172.07, 160.15, 142.80, 141.31, 129.34, 127.30, 127.07, 126.92, 124.83, 121.13, 89.94, 43.34, 41.15, 36.19, 21.58. IR (neat): ν = 3108, 2982, 2931, 1756, 1675, 1602, 1510, 1409, 1277, 1243, 1154, 1104, 1080 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{16}H_{17}N_2O_3S$ $[M+H]^+$: 317.0960. Found: 317.0964.



The compound **7a** was isolated as brown semisolid in 90% yield with >20:1 *d.r.* and 94% *ee*. $[\alpha]_D^{25}$ = + 127.8 (*c* 1.01, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (major) = 40.40 min, t_R (minor) = 46.42 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.40 (d, *J* = 5.7 Hz, 1H), 7.31 (d, *J* = 1.2 Hz, 1H), 7.14 (s, 1H), 7.03 (s, 1H), 6.27 (dd, *J* = 2.8, 1.9 Hz, 1H), 6.21 (d, *J* = 3.1 Hz, 1H), 6.07 (dd, *J* = 5.7, 1.8 Hz, 1H), 5.22 (d, *J* = 7.1 Hz, 1H), 3.95 (s, 3H), 3.85 – 3.75 (m, 2H), 3.62 (dd, *J* = 16.8, 5.2 Hz, 1H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 189.36, 172.43, 154.85, 152.00, 142.84, 142.16, 129.39, 127.38, 122.29, 110.57, 107.87, 84.19, 39.00, 38.42, 36.19. IR (thin film): ν = 3314, 2923, 2853, 1756, 1676, 1600, 1505, 1411, 1291, 1160, 1103, 1083, 1014 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{15}H_{15}N_2O_4$ $[M+H]^+$: 287.1032. Found: 287.1037.

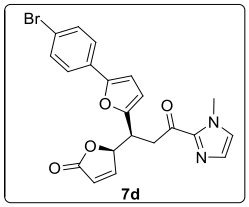


The compound **7b** was isolated as light brown semisolid in 91% yield with >20:1 *d.r.* and 95% *ee*. $[\alpha]_D^{25}$ + 102.0 (*c* 2.04, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (major) = 27.55 min, t_R (minor) = 35.92 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.45 (dd, *J* = 5.8, 1.3 Hz, 1H), 7.13 (s, 1H), 7.04 (s, 1H), 6.21 (d, *J* = 3.2 Hz, 1H), 6.18 (d, *J* = 3.2 Hz, 1H), 6.09 (dd, *J* = 5.7, 1.9 Hz, 1H), 5.22 (d, *J* = 6.9 Hz, 1H), 3.96 (s, 3H), 3.82 (dd, *J* = 13.8, 7.0 Hz, 1H), 3.70 (dd, *J* = 17.3, 8.0 Hz, 1H), 3.59 (dd, *J* = 17.4, 5.9 Hz, 1H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 188.94, 172.23, 154.46, 154.09, 142.63, 129.39, 127.49, 122.55, 121.15, 112.29, 110.88, 83.68, 38.39, 38.34, 36.20. IR (thin film): ν = 3113, 2923, 1758, 1676, 1505, 1411, 1291, 1158, 1122, 1080 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{15}H_{14}BrN_2O_4$ $[M+H]^+$: 365.0137. Found: 365.0134.

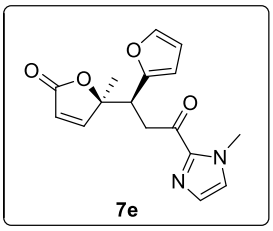


The compound **7c** was isolated as brown semisolid in 92% yield with >20:1 *d.r.* and 95% *ee*. $[\alpha]_D^{25}$ = + 115.2 (*c* 0.4, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (major) = 32.23 min, t_R (minor) = 41.06 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.42 (dd, *J* = 5.7, 1.1 Hz, 1H), 7.13 (s, 1H), 7.02 (s, 1H), 6.07 – 6.06 (m, 2H), 5.83 (d, *J* = 1.9 Hz, 1H), 5.19 (d, *J* = 7.1 Hz, 1H), 3.96 (s, 3H), 3.76 – 3.70 (m, 2H), 3.64 – 3.58 (m, 1H), 2.21 (s, 3H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 189.55,

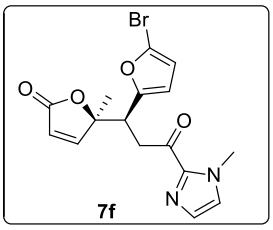
172.54, 155.15, 151.81, 150.11, 142.91, 129.31, 127.30, 122.11, 108.52, 106.40, 84.38, 39.14, 38.52, 36.20, 13.62. IR (thin film): ν = 3109, 2922, 1757, 1676, 1562, 1411, 1291, 1158, 1102, 1082, 1024. cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{16}H_{17}N_2O_4$ $[M+H]^+$: 301.1188. Found: 301.1189.



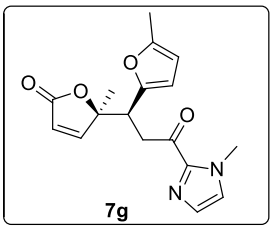
The compound **7d** was isolated as brown solid in 91% yield with >20:1 *d.r.* and 91% *ee*. mp 146 – 148 °C; $[\alpha]_D^{25}$ = + 76.7 (*c* 0.61, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (60:40) as eluent, flow rate: 1.0 mL/min. t_R (major) = 22.58 min, t_R (minor) = 25.86 min. ^{1}H NMR (500 MHz, CHLOROFORM-D) δ 7.48 – 7.42 (m, 5H), 7.15 (s, 1H), 7.04 (s, 1H), 6.53 (d, *J* = 3.3 Hz, 1H), 6.31 (d, *J* = 3.3 Hz, 1H), 6.10 (dd, *J* = 5.7, 1.8 Hz, 1H), 5.28 (d, *J* = 6.9 Hz, 1H), 3.96 – 3.90 (m, 4H), 3.83 (dd, *J* = 17.1, 8.2 Hz, 1H), 3.64 (dd, *J* = 17.1, 5.6 Hz, 1H). ^{13}C NMR (125 MHz, CHLOROFORM-D) δ 189.23, 172.34, 154.55, 152.58, 151.98, 142.83, 131.94, 129.54, 129.50, 127.50, 125.24, 122.57, 121.27, 110.29, 106.54, 84.03, 38.65, 38.53, 36.23. IR (thin film): ν = 3113, 2923, 1757, 1676, 1541, 1478, 1408, 1290, 1158, 1102, 1073, 1024 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{21}H_{18}BrN_2O_4$ $[M+H]^+$: 441.0450. Found: 441.0457.



The compound **7e** was isolated as yellow solid in 90% yield with 13:1 *d.r.* and 92% *ee*. mp 105 – 107 °C; $[\alpha]_D^{25}$ = + 91.0 (*c* 0.49, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 37.99 min, t_R (major) = 43.90 min. ^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.45 (d, *J* = 5.7 Hz, 1H), 7.32 (d, *J* = 1.1 Hz, 1H), 7.14 (d, *J* = 0.6 Hz, 1H), 7.02 (s, 1H), 6.29 – 6.22 (m, 2H), 6.00 (d, *J* = 5.7 Hz, 1H), 3.92 – 3.85 (m, 4H), 3.80 (dd, *J* = 9.8, 3.8 Hz, 1H), 3.50 (dd, *J* = 16.9, 3.8 Hz, 1H), 1.44 (s, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 189.40, 172.09, 160.48, 152.54, 142.84, 142.02, 129.33, 127.33, 120.57, 110.61, 108.37, 89.51, 42.03, 37.91, 36.23, 20.68. IR (neat): ν = 3109, 2919, 2849, 1759, 1677, 1604, 1559, 1411, 1284, 1109, 1024 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{16}H_{17}N_2O_4$ $[M+H]^+$: 301.1188. Found: 301.1180.



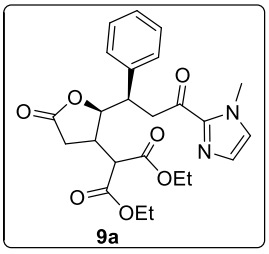
The compound **7f** was isolated as light yellow semisolid in 93% yield with 6:1 *d.r.* and 90% *ee*. $[\alpha]_D^{25}$ = + 68.1 (*c* 0.84, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 21.75 min, t_R (major) = 27.57 min. ^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.47 (d, *J* = 5.7 Hz, 1H), 7.14 (d, *J* = 0.7 Hz, 1H), 7.03 (s, 1H), 6.21 (dd, *J* = 12.9, 3.3 Hz, 2H), 6.02 (d, *J* = 5.7 Hz, 1H), 3.93 (s, 3H), 3.83 – 3.76 (m, 2H), 3.53 – 3.45(m, 1H), 1.45 (s, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 189.00, 171.92, 160.07, 154.65, 142.67, 129.39, 127.45, 120.97, 120.85, 112.37, 111.31, 89.12, 42.04, 37.66, 36.25, 20.89. IR (thin film): ν = 3113, 2956, 2926, 2854, 1760, 1677, 1603, 1500, 1412, 1208, 1124, 1015 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{16}H_{16}BrN_2O_4$ $[M+H]^+$: 379.0293. Found: 379.0293.



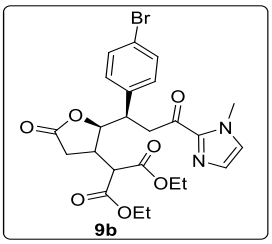
The compound **7g** was isolated as white semisolid in 91% yield with 9:1 *d.r.* and 82% *ee*. $[\alpha]_D^{25}$ = + 22.1 (*c* 0.28, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 25.71 min, t_R (major) = 34.22 min. ^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.48 (d, *J* = 5.6 Hz, 1H), 7.14 (s, 1H), 7.01 (s, 1H), 6.07 (d, *J* = 3.0 Hz, 1H), 6.00 (d, *J* = 5.7 Hz, 1H), 5.84 (d, *J* = 3.0 Hz, 1H), 3.93 (s, 3H), 3.85 (dd, *J* = 17.1, 9.6 Hz, 1H), 3.72 (dd, *J* = 9.6, 4.2 Hz, 1H), 3.49 (dd, *J* = 17.2, 4.4 Hz, 1H), 2.22 (s, 3H), 1.43 (s, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 189.56, 172.22, 160.88, 151.67, 150.62, 142.91, 129.25, 127.27, 120.31, 109.03, 106.45, 89.62, 42.07, 37.86, 36.25, 20.41, 13.73. IR (thin film): ν = 3109, 2919, 2849, 1759, 1677, 1604, 1559, 1411, 1284, 1109, 1024 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{17}H_{19}N_2O_4$ $[M+H]^+$: 315.1345. Found: 315.1342.

6. General procedure and characterization of 9:

To a solution of diethylmalonate (1.0 mmol) in dry THF (2 mL) at 0 °C, NaH (1.0 mmol) was added. The mixture was allowed to stir for 30 min. Then, a solution of **5** (0.2 mmol) in dry THF (1.0 mL) and TMSCl (0.6 mmol) were added. The resulting reaction mixture was stirred for 1.5 h at 0 °C. It was then quenched with saturated NH_4Cl (4.0 mL) and extracted with EtOAc (3x12 mL). The mixture was dried over Na_2SO_4 and concentrated in vacuo and purified over silica gel by column chromatography (20-60% ethyl acetate in hexane) to afford the products.

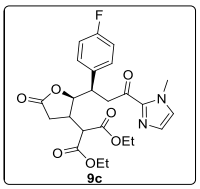


The compound **9a** was isolated as colorless semisolid in 75% yield with >20:1 *d.r.* and 92% *ee*. $[\alpha]_D^{25}$ = - 4.4 (*c* 0.98, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IA-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 13.54 min, t_R (major) = 24.26 min. ^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.26 – 7.17 (m, 5H), 7.05 (s, 1H), 6.92 (s, 1H), 4.53 (dd, *J* = 7.6, 3.7 Hz, 1H), 4.10 – 4.05 (m, 2H), 4.03 – 3.91 (m, 2H), 3.84 (s, 3H), 3.67 – 3.56 (m, 3H), 2.96 (d, *J* = 6.8 Hz, 1H), 2.85 – 2.79 (m, 1H), 2.52 – 2.39 (m, 2H), 1.16 (t, *J* = 7.1 Hz, 3H), 1.10 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 190.13, 175.38, 167.47, 167.41, 143.08, 138.78, 129.19, 129.11, 128.73, 127.85, 127.15, 84.79, 62.04, 53.65, 45.42, 41.21, 37.62, 36.20, 32.03, 14.08, 14.00. IR (thin film): ν = 2983, 1783, 1729, 1677, 1454, 1412, 1369, 1267, 1179, 1155, 1027 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{24}H_{29}N_2O_7$ $[M+H]^+$: 457.1975. Found: 457.1975.



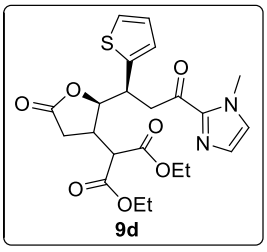
The compound **9b** was isolated as colorless semisolid in 61% yield with 10:1 *d.r.* and 97% *ee*. $[\alpha]_D^{25}$ = - 3.8 (*c* 0.66, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IA-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 20.00 min, t_R (major) = 34.53 min. ^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.39 – 7.36 (m, 2H), 7.17 – 7.12 (m, 2H), 7.05 (s, 1H), 6.93 (s, 1H), 4.51 (dd, *J* = 7.4, 3.6 Hz, 1H), 4.12 – 4.07 (m, 2H), 4.03 – 3.95 (m, 2H), 3.84 (s, 3H), 3.59 (d, *J* = 2.3 Hz, 3H), 3.08 (d, *J* = 6.9 Hz, 1H), 2.83 – 2.77 (m, 1H), 2.52 (dd, *J* = 18.5, 9.2 Hz, 1H),

2.42 (dd, *J* = 18.5, 4.6 Hz, 1H), 1.17 – 1.11 (m, 6H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 189.74, 175.21, 167.42, 167.33, 142.87, 137.96, 132.19, 130.45, 129.28, 127.34, 121.80, 84.47, 62.21, 62.18, 53.82, 44.70, 40.69, 37.39, 36.26, 32.09, 14.09, 14.02. IR (thin film): ν = 2959, 2925, 2854, 1783, 1730, 1677, 1489, 1413, 1369, 1291, 1178, 1157, 1074, 1028 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{24}H_{28}BrN_2O_7$ $[M+H]^+$: 535.1080. Found: 535.1081.



9c

The compound **9c** was isolated as colorless semisolid in 63% yield with 20:1 *d.r.* and 90% *ee*. $[\alpha]_D^{25}$ = + 4.1 (*c* 0.60, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IA-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 15.16 min, t_R (major) = 24.81 min. ^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.32 – 7.27 (m, 2H), 7.12 (s, 1H), 7.03 – 6.99 (m, 3H), 4.60 – 4.53 (m, 1H), 4.15 (dd, *J* = 7.1, 1.9 Hz, 2H), 4.07 (dd, *J* = 12.4, 7.1 Hz, 2H), 3.91 (s, 3H), 3.70 – 3.62 (m, 3H), 3.09 (d, *J* = 6.9 Hz, 1H), 2.90 – 2.83 (m, 1H), 2.56 (dd, *J* = 18.5, 9.0 Hz, 1H), 2.49 (dd, *J* = 18.5, 5.0 Hz, 1H), 1.23 (t, *J* = 7.1 Hz, 3H), 1.18 (t, *J* = 7.1 Hz, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 189.84, 175.26, 167.43, 167.37, 162.25 (d, J_{C-F} = 246.5 Hz), 142.84, 134.58, 134.55, 130.29 (d, J_{C-F} = 7.9 Hz), 129.13, 127.28, 116.01 (d, J_{C-F} = 21.2 Hz), 84.67, 62.15, 53.71, 44.57, 41.05, 37.44, 36.28, 32.05, 14.08, 14.01. IR (thin film): ν = 2925, 2854, 1782, 1729, 1677, 1605, 1511, 1411, 1369, 1291, 1224, 1159, 1095, 1027 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{24}H_{28}FN_2O_7$ $[M+H]^+$: 475.1881. Found: 475.1880.



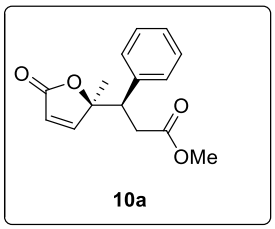
9d

The compound **9d** was isolated as colorless semisolid in 71% yield with 15:1 *d.r.* and 96% *ee*. $[\alpha]_D^{25}$ = + 6.8 (*c* 1.21, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IA-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 1.0 mL/min. t_R (minor) = 15.00 min, t_R (major) = 26.83 min. ^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.20 (dd, *J* = 5.1, 1.0 Hz, 1H), 7.12 (s, 1H), 7.00 (d, *J* = 3.8 Hz, 2H), 6.95 (dd, *J* = 5.1, 3.4 Hz, 1H), 4.60 (dd, *J* = 7.3, 3.4 Hz, 1H), 4.18 – 4.09 (m, 4H), 4.03 (d, *J* = 7.2 Hz, 1H), 3.93 (s, 3H), 3.69 (d, *J* = 7.0 Hz, 2H), 3.16 (d, *J* = 6.7 Hz, 1H), 3.01 – 2.95 (m, 1H), 2.48 (dd, *J* = 18.5, 4.6 Hz, 1H), 2.40 (dd, *J* = 18.5, 9.3 Hz, 1H), 1.24 – 1.19 (m, 6H). ^{13}C NMR (100MHz, CHLOROFORM-D) δ 189.38, 175.43, 167.51, 142.87, 141.06, 129.29, 127.44, 127.29, 126.52, 125.14, 84.32, 62.14, 62.12, 53.83, 42.03, 40.63, 37.38, 36.26, 32.00, 14.08, 14.04. IR (thin film): ν = 3111, 2983, 2918, 2850, 1783, 1729, 1678, 1465, 1412, 1370, 1266, 1178, 1095, 1016 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{22}H_{27}N_2O_7S$ $[M+H]^+$: 463.1539. Found: 463.1531.

7. General procedure and characterization of 10:

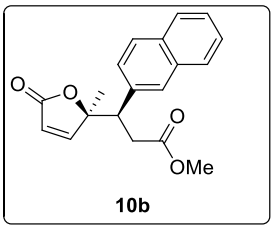
To a solution of compound **5** (0.15 mmol) in dry CH_3CN (1.5 ml) at 35 °C, was added 4Å molecular sieve (50 mg) and MeOTf (0.19 mmol) under N_2 atmosphere. After stirring for 5 hours at 35 °C, MeOH (375 μL) and DBU (0.19

mmol) was added. The resulting mixture was allowed to stir for 30 min at 35 °C and the reaction mixture was purified purified over silica gel by column chromatography (10-30% ethyl acetate in hexane) to afford the products.



10a

The compound **10a** was isolated as colorless semisolid in 75% yield and 92% *ee*. $[\alpha]_D^{25}$ = - 52.9 (*c* 0.73, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 0.8 mL/min. t_R (minor) = 17.303 min, t_R (major) = 20.785 min. ^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.30 (d, *J* = 5.7 Hz, 1H), 7.27 – 7.20 (m, 5H), 5.99 (d, *J* = 5.7 Hz, 1H), 3.47 (s, 3H), 3.41 – 3.37 (m, 1H), 2.66 – 2.63 (m, 2H), 1.23 (s, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 172.34, 172.27, 160.58, 138.36, 129.33, 128.71, 127.85, 120.88, 90.03, 51.94, 48.67, 35.33, 22.37. IR (thin film): ν = 3087, 2952, 2921, 2850, 1753, 1738, 1602, 1494, 1454, 1436, 1376, 1292, 1264, 1168, 1103 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{15}H_{17}O_4$ $[M+H]^+$: 261.1127. Found: 261.1129.

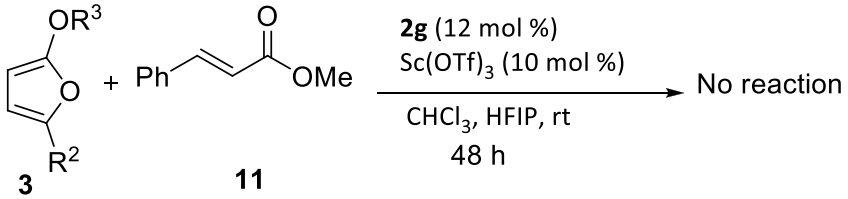


10b

The compound **10b** was isolated as colorless semisolid in 82% yield and 80% *ee*. $[\alpha]_D^{25}$ = - 71.1 (*c* 0.40, $CHCl_3$). The enantiomeric ratio was determined by chiral HPLC using Daicel Chiralpak IC-3 column, *n*-hexane/2-propanol (70:30) as eluent, flow rate: 0.8 mL/min. t_R (minor) = 18.980 min, t_R (major) = 23.516 min. ^{1}H NMR (400 MHz, CHLOROFORM-D) δ 7.85 – 7.81 (m, 3H), 7.75 (s, 1H), 7.50 – 7.45 (m, 3H), 7.41 (dd, *J* = 5.7, 1.0 Hz, 1H), 6.09 (d, *J* = 5.7 Hz, 1H), 3.65 – 3.61 (m, 1H), 3.51 (s, 3H), 2.81 – 2.79 (m, 2H), 1.32 (s, 3H). ^{13}C NMR (100 MHz, CHLOROFORM-D) δ 172.41, 172.27, 160.64, 135.96, 133.37, 132.97, 128.52, 128.38, 128.08, 127.77, 127.12, 126.42, 126.28, 121.00, 90.19, 51.99, 48.79, 35.42, 22.56. IR (neat): ν = 2923, 2852, 1759, 1738, 1600, 1508, 1436, 1285, 1168, 1103 cm^{-1}. HRMS (ES+): Exact mass calcd for $C_{19}H_{18}NaO_4$ $[M+Na]^+$: 333.1103. Found: 333.1107.

8. General procedure for the treatment of methyl cinnamate 11 with silyloxyfurans 3a-b:

Scheme S2 Treatment of methyl cinnamate **11** with silyloxyfurans **3a-b.**



3 **11**

3a: R^2 = H, R^3 = $SiMe_3$
3b: R^2 = Me, R^3 = Si^iPr_3

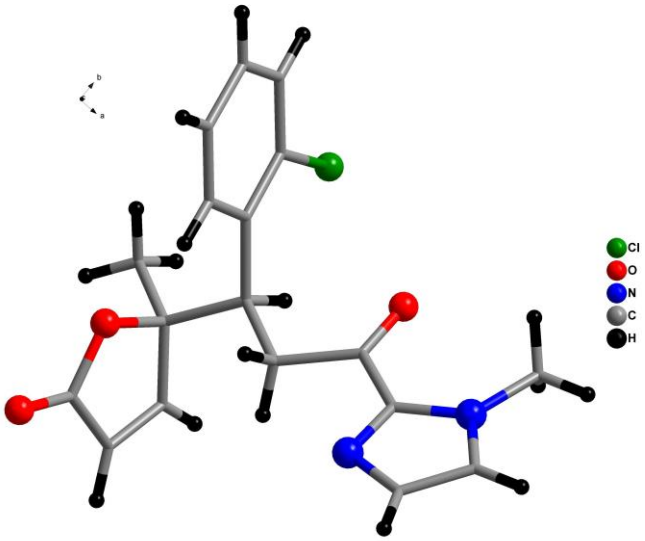
(a) General procedure for the reaction of **3a** with methyl cinnamate **11** catalyzed by Sc(III)-**2g** complex.

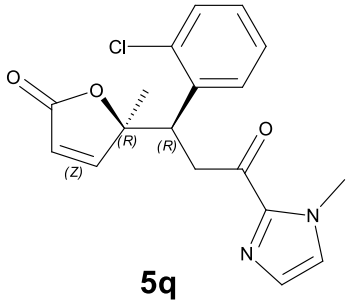
A solution of a ligand **2g** (0.024 mmol) and Sc(OTf)$_3$ (0.02 mmol) in dry chloroform (1.8 mL) was stirred at room temperature for 3 hours under nitrogen atmosphere. Methyl cinnamate **11** (0.20 mmol in 0.2 mL) was added and the whole mixture was stirred for an additional 15 minute at rt. HFIP (0.20 mmol) was then added to the mixture and the resulting reaction mixture was again stirred for 15 minute at rt. Then silyloxyfuran **3a** (0.40 mmol) was added and the reaction mixture was allowed for stirring at room temperature for 48 hours. No product formation was observed.

(b) General procedure for the reaction of **3b** with methyl cinnamate **11** catalyzed by Sc(III)-**2g** complex.

A solution of a ligand **2g** (0.024 mmol) and Sc(OTf)$_3$ (0.02 mmol) in dry chloroform (1.6 mL) was stirred at room temperature for 3 hours under nitrogen atmosphere. Methyl cinnamate **11** (0.20 mmol 0.2) was added and the whole mixture was stirred for an additional 15 minute at rt. HFIP (0.20 mmol) was then added and the resulting mixture was again stirred for 15 minute more at rt. Then silyloxyfuran **3b** (0.30 mmol in 0.3 mL chloroform) was added and the reaction mixture was allowed for stirring at room temperature for 48 hours. No product formation was observed.

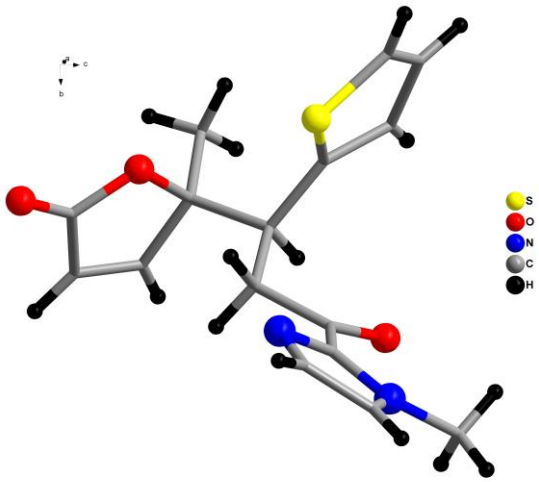
9. X-ray crystal structures of 5q, 5x and 7d:

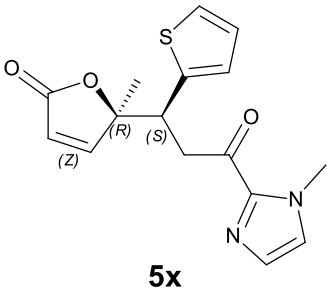




5q

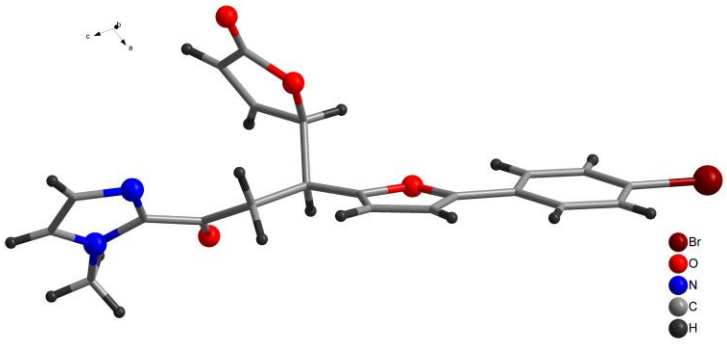
5q (CCDC 1526457)

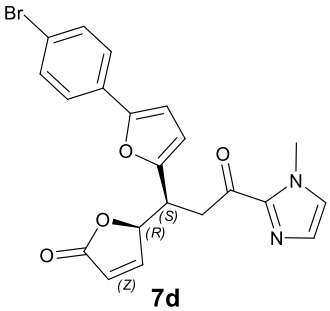




5x

5x (CCDC 1526458)





7d

7d (CCDC 1526459)

10. Crystallographic Data and Pertinent Refinement Parameters of 5q, 5x and 7d:

Parameters	**5q**	**5x**	**7d**
Empirical formula	$C_{18}H_{17}ClN_2O_3$	$C_{16}H_{16}N_2O_3S$	$C_{21}H_{17}BrN_2O_4$
Formula weight	344.79	316.37	441.27
Temperature	100	100	100
Crystal system, space group	Orthorhombic, $P2_12_12_1$	Orthorhombic, $P2_12_12_1$	Monoclinic, $P2_1$
Unit cell dimensions (Å , deg)	a = 10.8555(4) b = 12.1442(5) c = 12.5528(5) α = 90 β = 90 γ = 90	a = 7.683(5) b = 10.196(5) c = 19.340(5) α = 90 β = 90 γ = 90	a = 12.610(5) b = 5.974(5) c = 12.888(5) α = 90 β = 106.487(5) γ = 90
Volume/Å^3	1654.85(11)	1515.0(13)	931.0(9)
Z, ρ_c g/cm^3	4, 1.384	4, 1.387	2, 1.574
Absorption coefficient	0.250 mm^{-1}	0.228 mm^{-1}	2.239 mm^{-1}
F(000)	720.0	664.0	448.0
Crystal size (mm^3)	0.02 × 0.02 × 0.02	0.02 × 0.02 × 0.02	0.02 × 0.02 × 0.02
2θ range for data collection (deg)	4.96 to 56.628	4.212 to 50.09	5.34 to 50.234
Limiting indices	-14 ≤ h ≤ 14, -16 ≤ k ≤ 16 -16 ≤ l ≤ 16	-9 ≤ h ≤ 9 -12 ≤ k ≤ 12 -22 ≤ l ≤ 22	-15 ≤ h ≤ 15 -7 ≤ k ≤ 7 -15 ≤ l ≤ 15
Reflections collected	25291	12101	10915
Completeness to θ (%)	100	100	100
Data / restraints / paraparameters	4126/0/219	2671/1/196	3246/1/254
Goodness-of-fit on F^2	1.053	1.030	1.037
Final R indices [I >2σ(I)]	R_1 = 0.0349 wR_2 = 0.0765	R_1 = 0.0635 wR_2 = 0.1796	R_1 = 0.0242 wR_2 = 0.0551
R indices (all data)	R_1 = 0.0415 wR_2 = 0.0789	R_1 = 0.0671 wR_2 = 0.1839	R_1 = 0.0273 wR_2 = 0.0560
Largest diff. peak and hole (e·Å^{-3})	0.23/-0.22	1.46/-0.66	0.25/-0.26
Flack parameter	0.00(2)	0.08(3)	0.076(5)

11. Proposed transition state

It is proposed that the two-point coordination of α,β-unsaturated 2-acyl imidazole with catalyst {**2g**/Sc(OTf)$_3$} takes place to give a octahedral complex (Fig. S1). The attack of silyloxy furan takes place from the sterically less demanding *Re* face as *Si* face is hindered by the aryl group of the ligand, leading to the formation of product with (*R, R)* configuration.

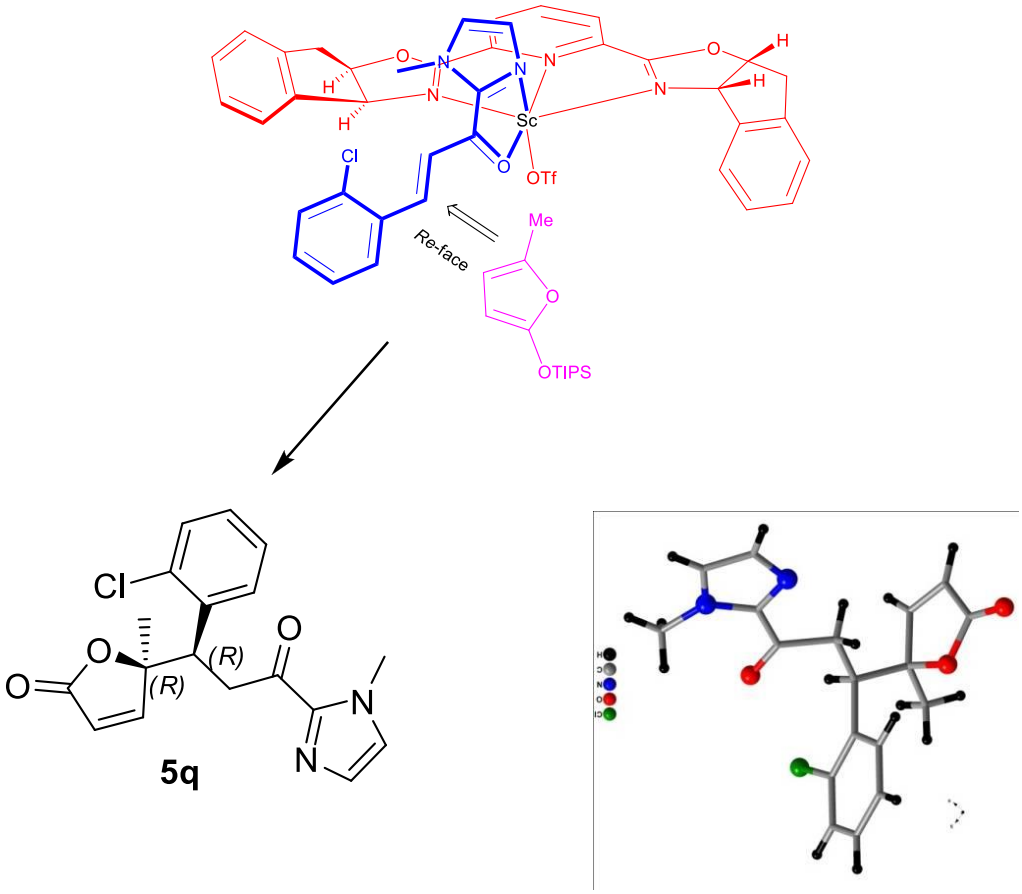


Fig. S1 Proposed transition state. **5q**

12. References:

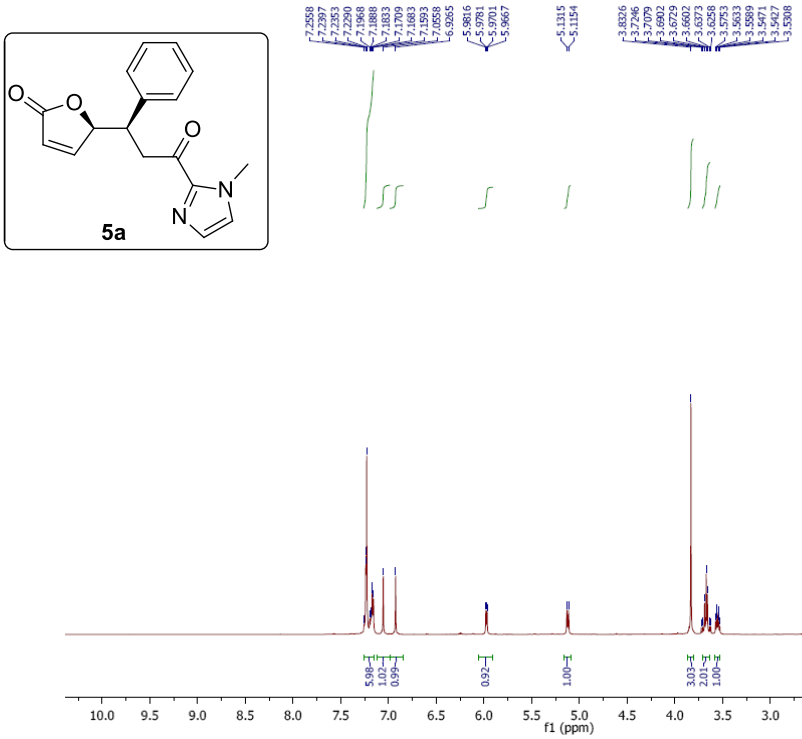
1. (a) S. K. Ginotra and V. K. Singh, *Tetrahedron*, 2006, **62**, 3573; (b) S. K. Ginotra and V. K. Singh, *Org. Biomol. Chem.*, 2006, **4**, 4370; (c) G. Sekar, A. DattaGupta and V. K. Singh, *J. Org. Chem.*, 1998, **63**, 2961.

2. (a) M. C. Myers, A. R. Bharadwaj, B. C. Milgram and K. A. Scheidt, *J. Am. Chem. Soc.*, 2005, **127**, 14675; (b) D. A. Evans, K. R. Fandrick and H.-J. Song, *J. Am. Chem. Soc.*, 2005, **127**, 8942; (c) C. Allais, F. Liéby-Muller, T. Constantieux and J. Rodrigueza, *Adv. Synth. Catal.*, 2012, **354**, 2537; (d) S. Drissi-Amraoui, M. S. T. Morin, C. Crévisy, O. Baslé, R. M. de Figueiredo, M. Mauduit, J.-M. Campagne, *Angew. Chem. Int. Ed.*, 2015, **54**, 11830.

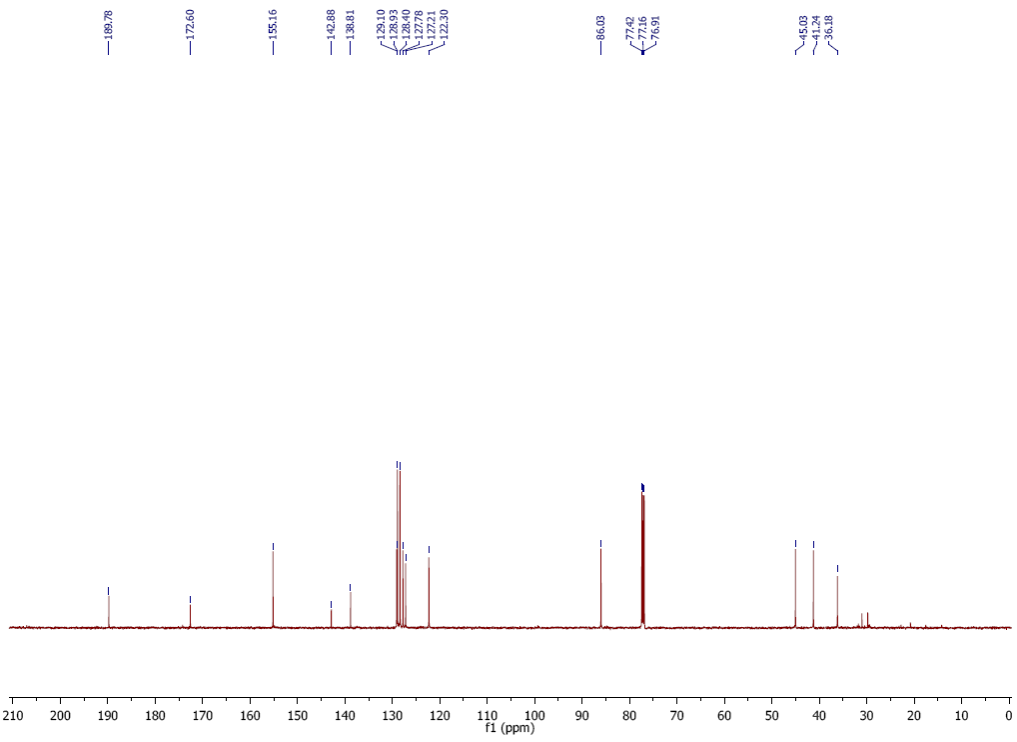
3. A. Manabe, R. Matsumoto and T. Shinada, *Synlett*, 2015, **26**, 1710.

4. T. Mineno and H. Kansui, *Chem. Pharm. Bull.* 2006, **54**, 918.

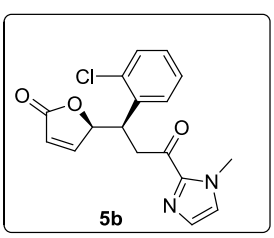
13. NMR spectra:

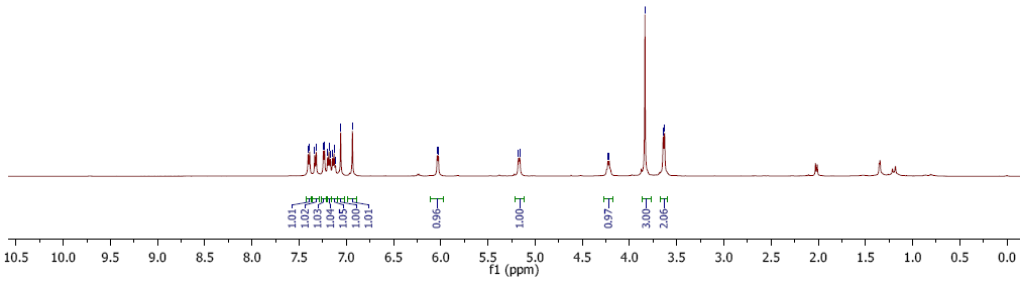


500 MHz ^{1}H NMR spectra of compound **5a** in $CDCl_3$

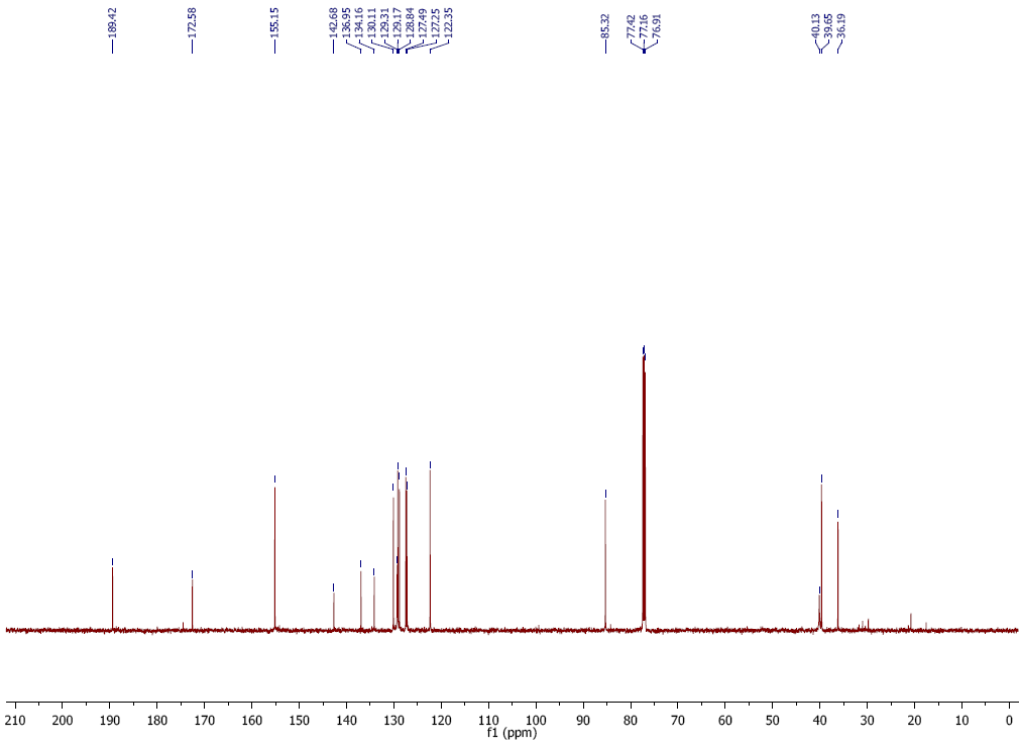


125 MHz ^{13}C NMR spectra of compound **5a** in $CDCl_3$

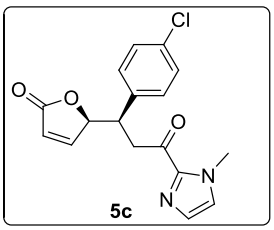




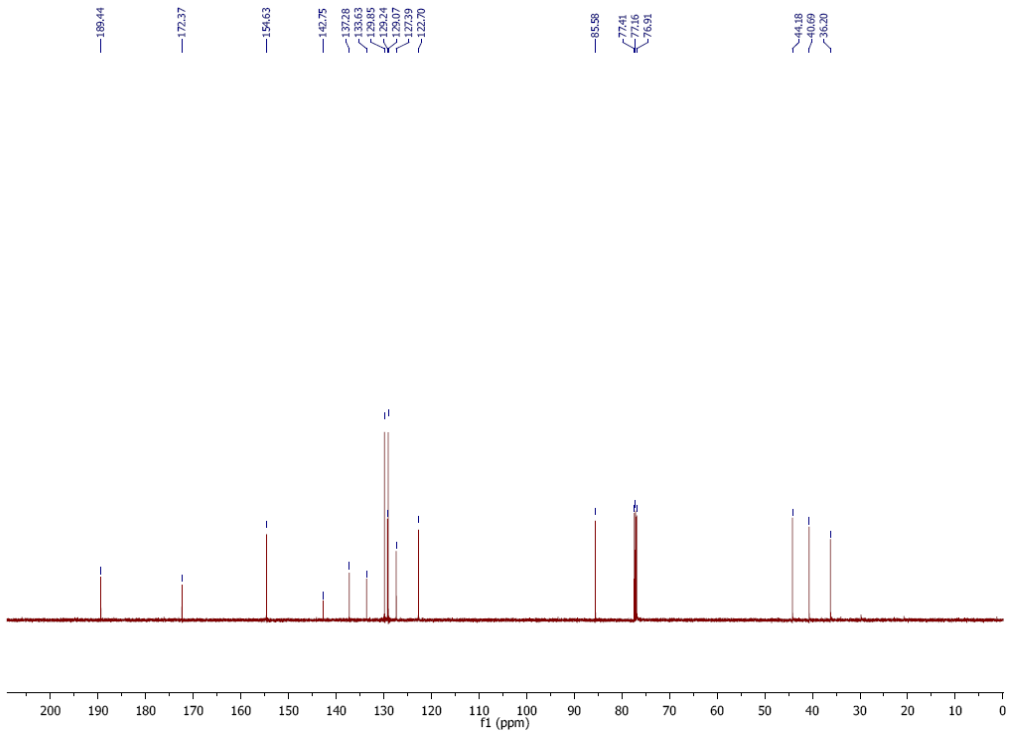
500 MHz ^{1}H NMR spectra of compound **5b** in $CDCl_3$



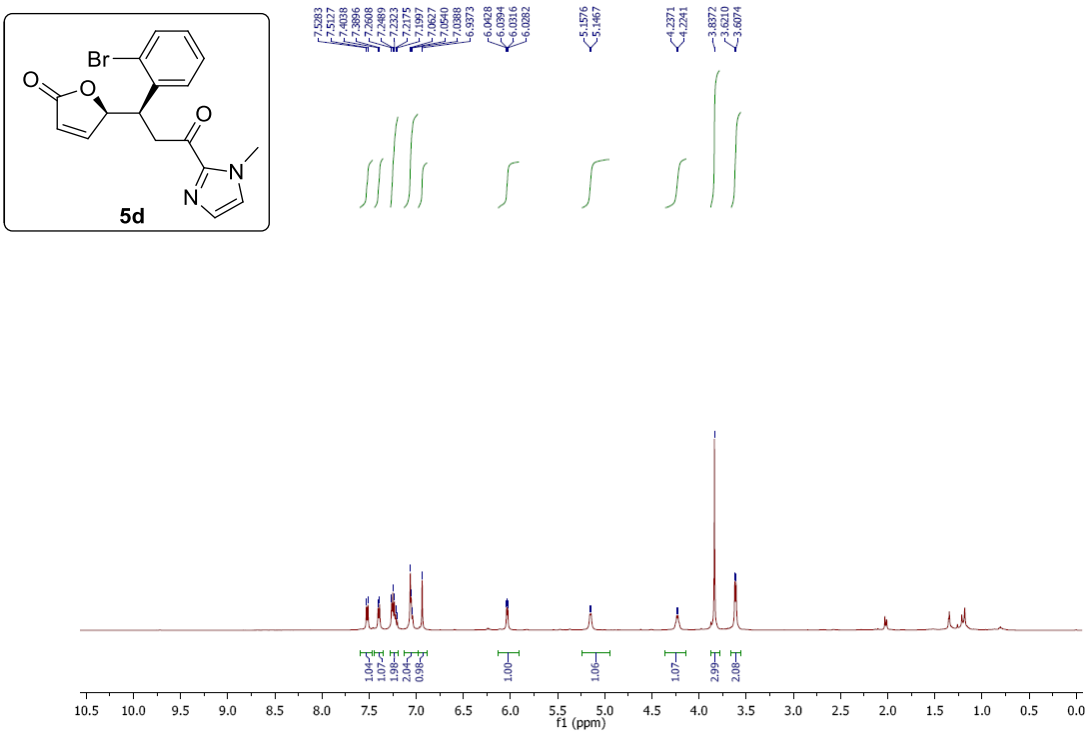
125 MHz ^{13}C NMR spectra of compound **5b** in $CDCl_3$



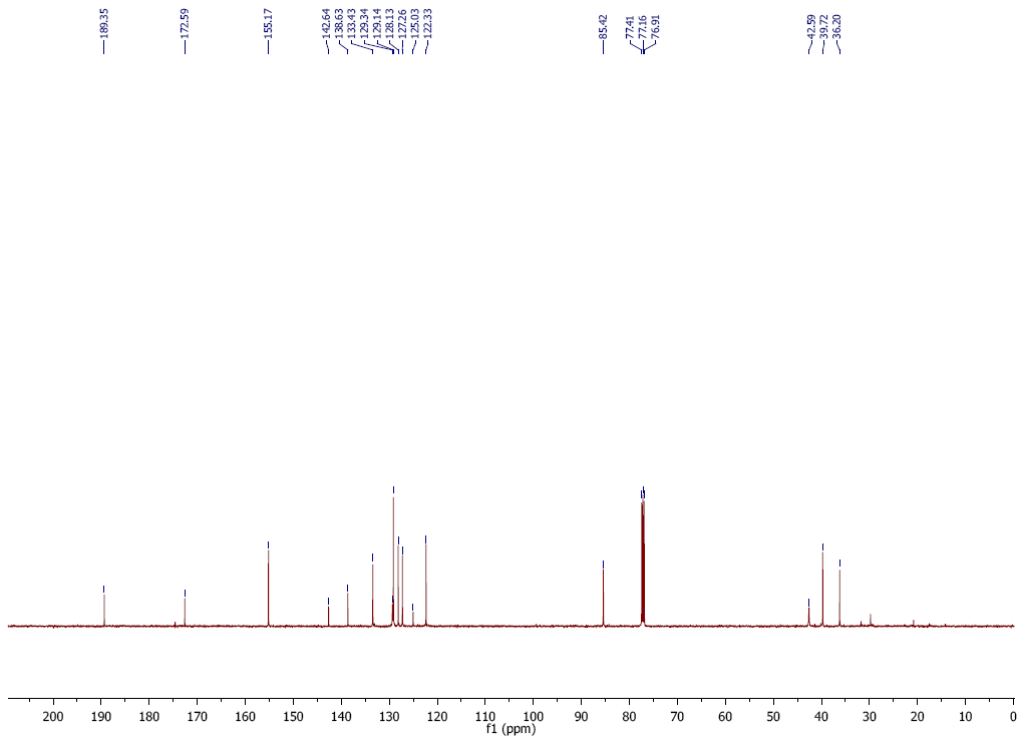
500 MHz ^{1}H NMR spectra of compound **5c** in $CDCl_3$



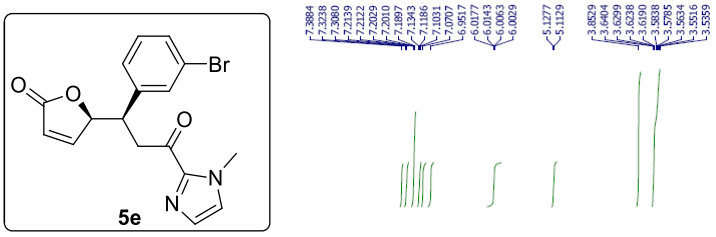
125 MHz ^{13}C NMR spectra of compound **5c** in $CDCl_3$

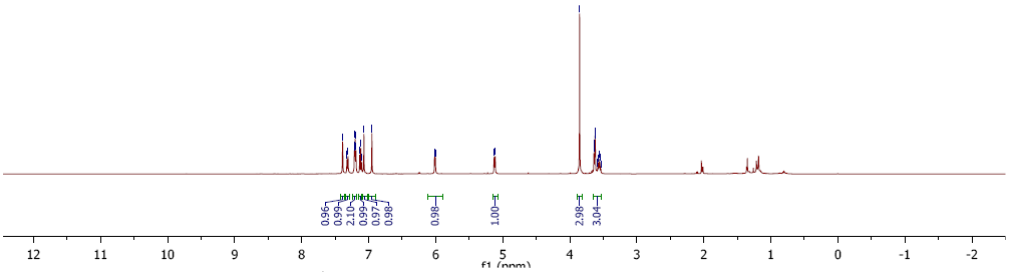


500 MHz ^{1}H NMR spectra of compound **5d** in $CDCl_3$

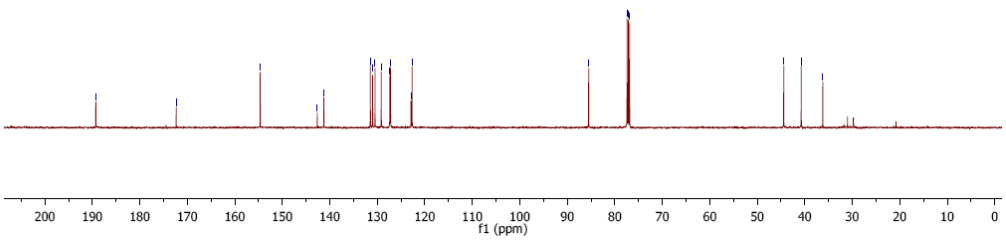


125 MHz ^{13}C NMR spectra of compound **5d** in $CDCl_3$

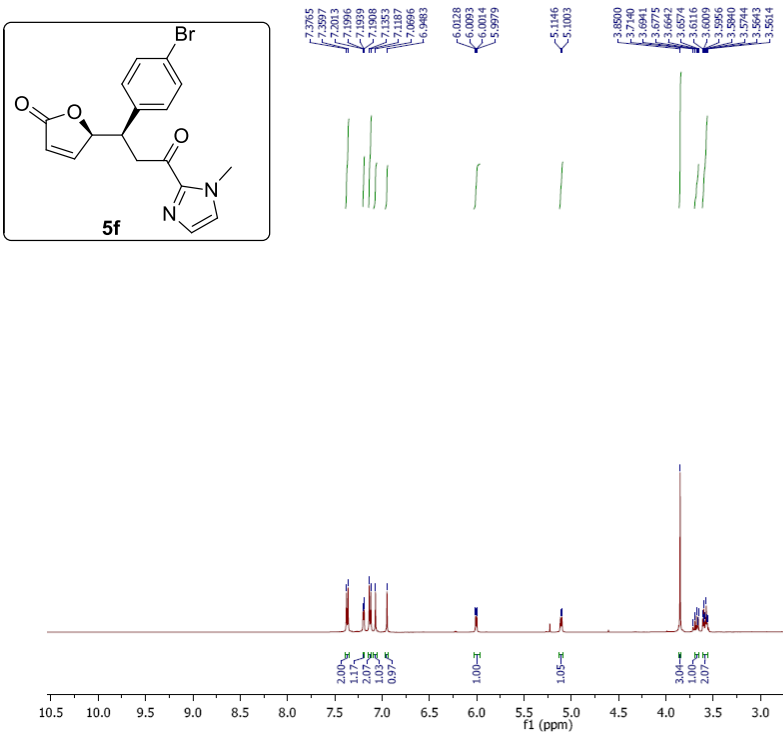




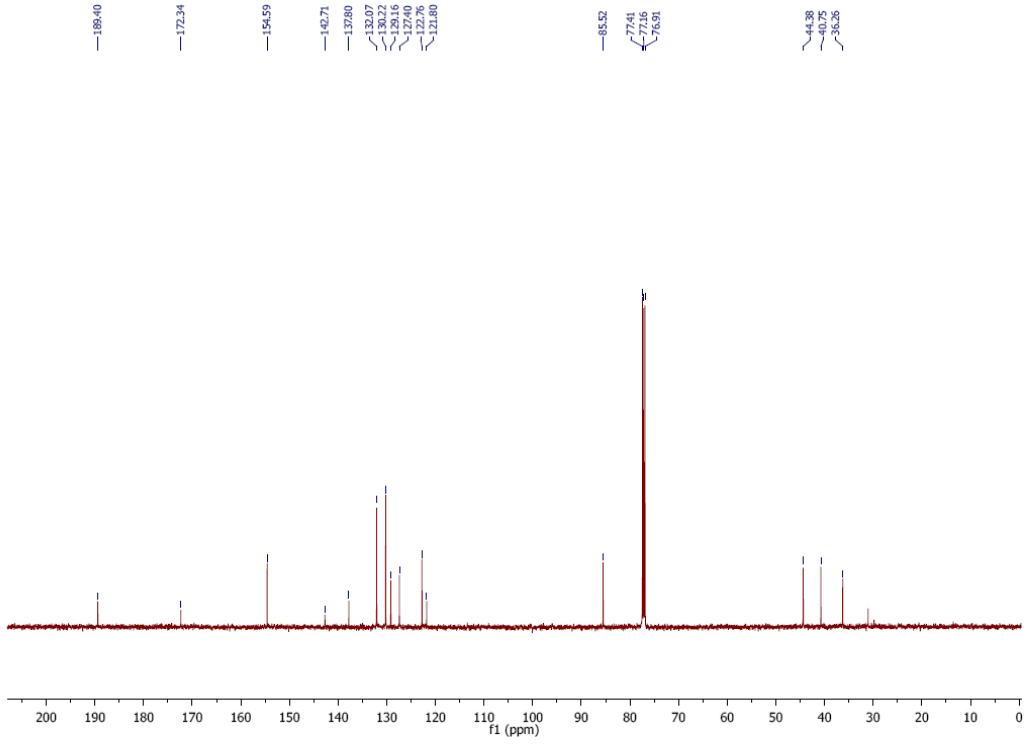
500 MHz ^{1}H NMR spectra of compound **5e** in $CDCl_3$



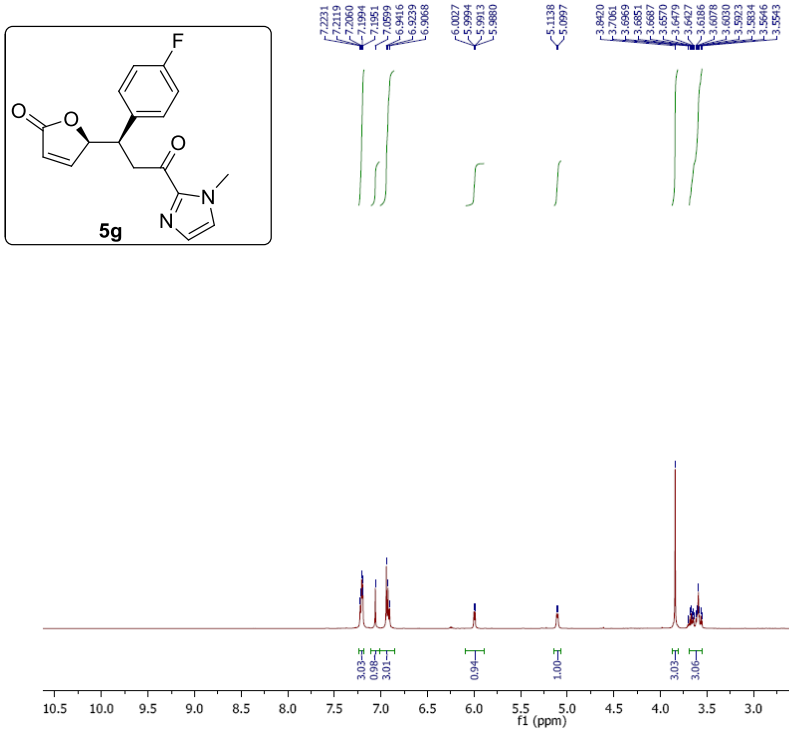
125 MHz ^{13}C NMR spectra of compound **5e** in $CDCl_3$



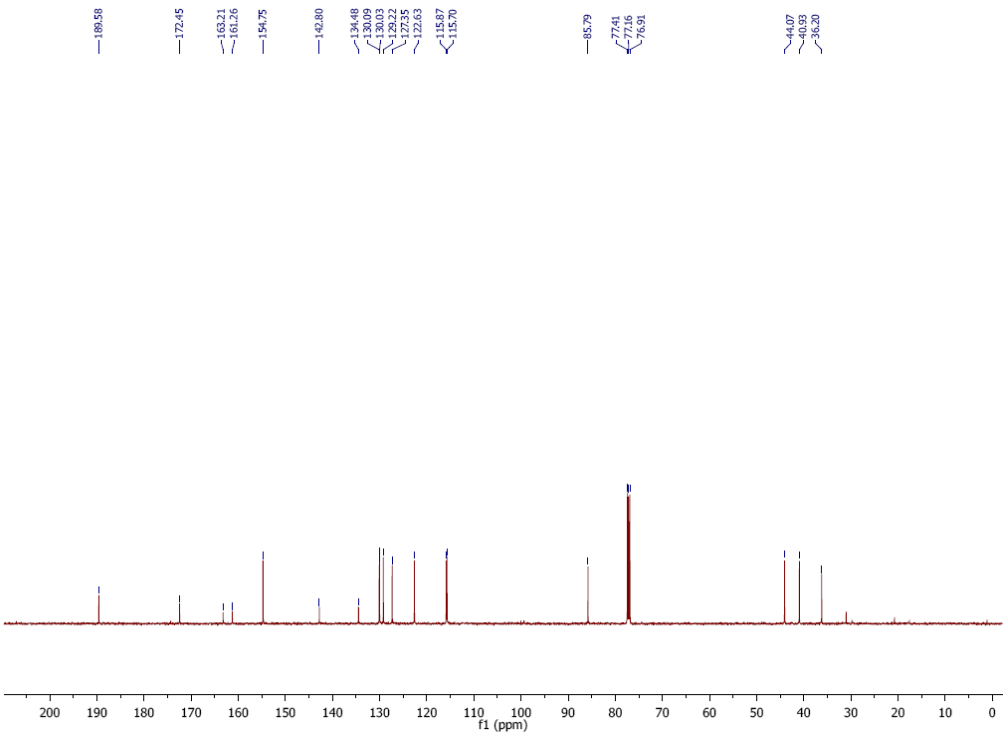
500 MHz ^{1}H NMR spectra of compound **5f** in $CDCl_3$



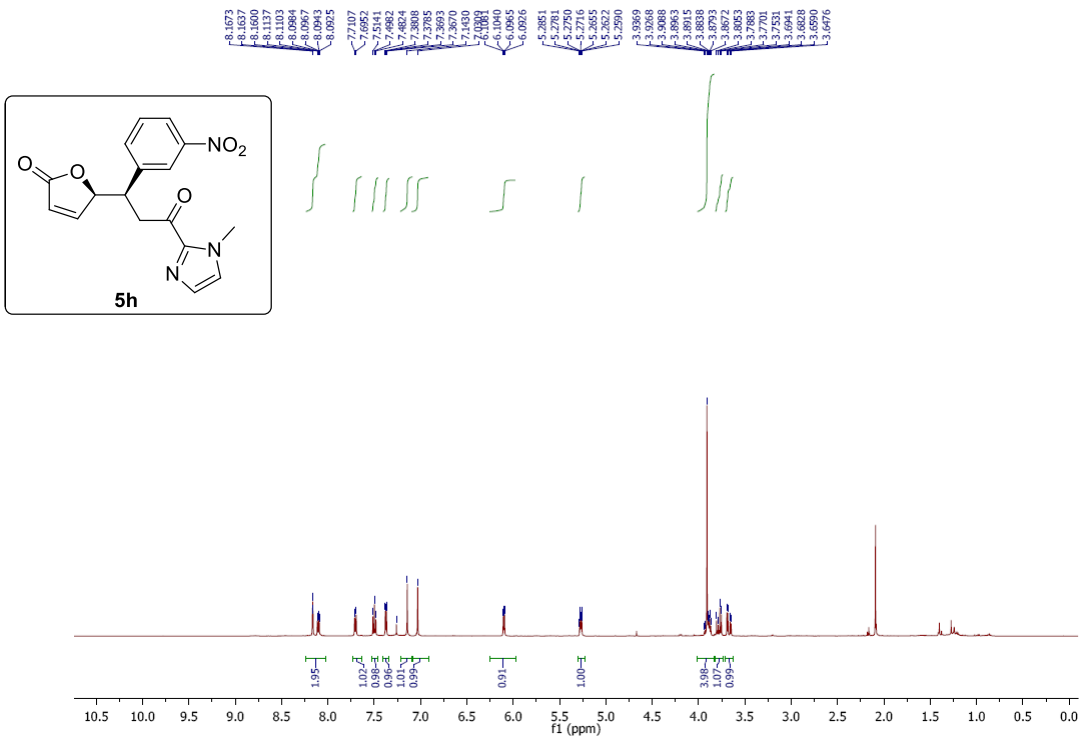
125 MHz ^{13}C NMR spectra of compound **5f** in $CDCl_3$



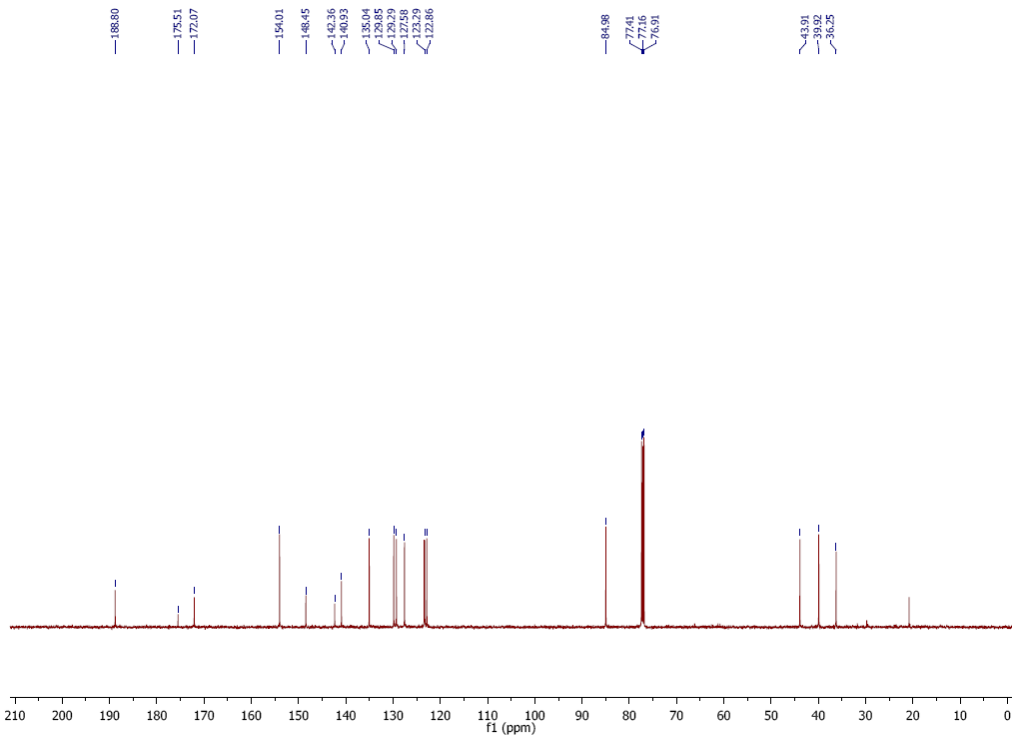
500 MHz ^{1}H NMR spectra of compound **5g** in $CDCl_3$



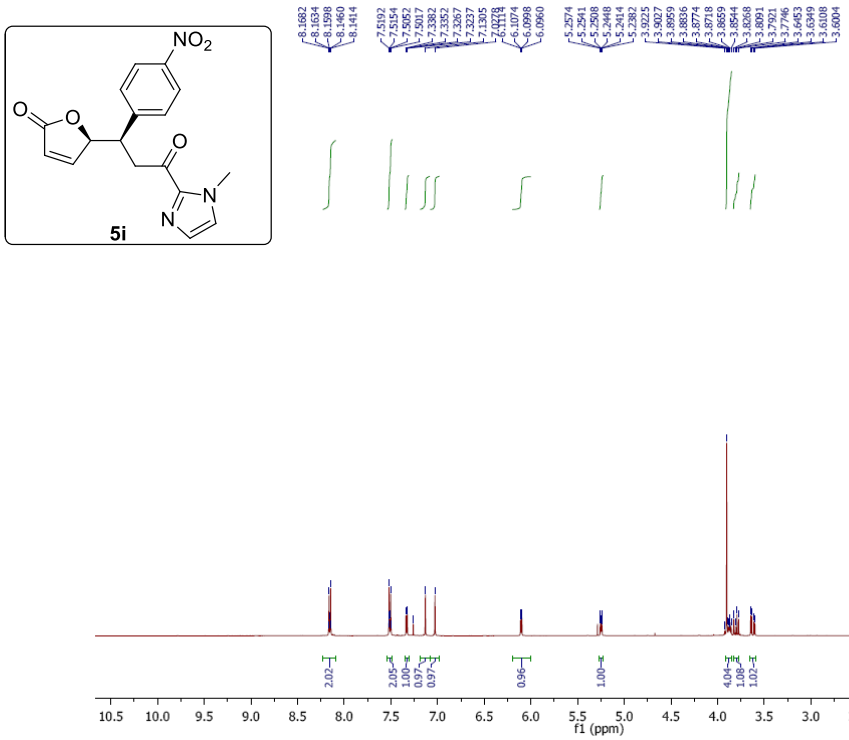
125 MHz ^{13}C NMR spectra of compound **5g** in $CDCl_3$



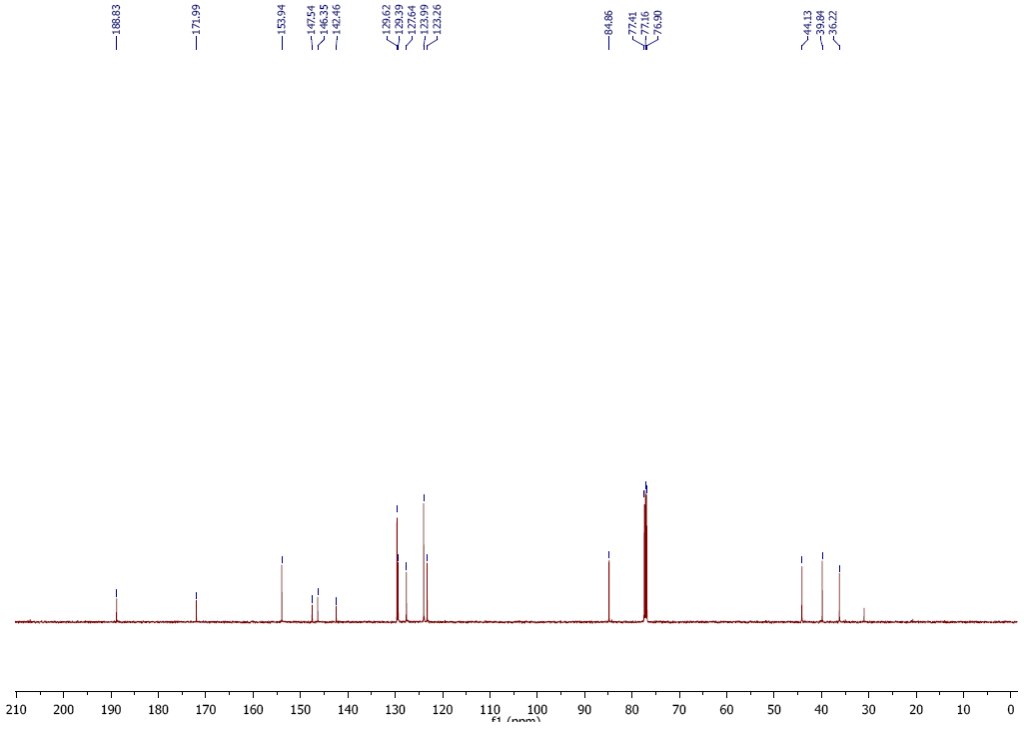
500 MHz ^{1}H NMR spectra of compound **5h** in $CDCl_3$



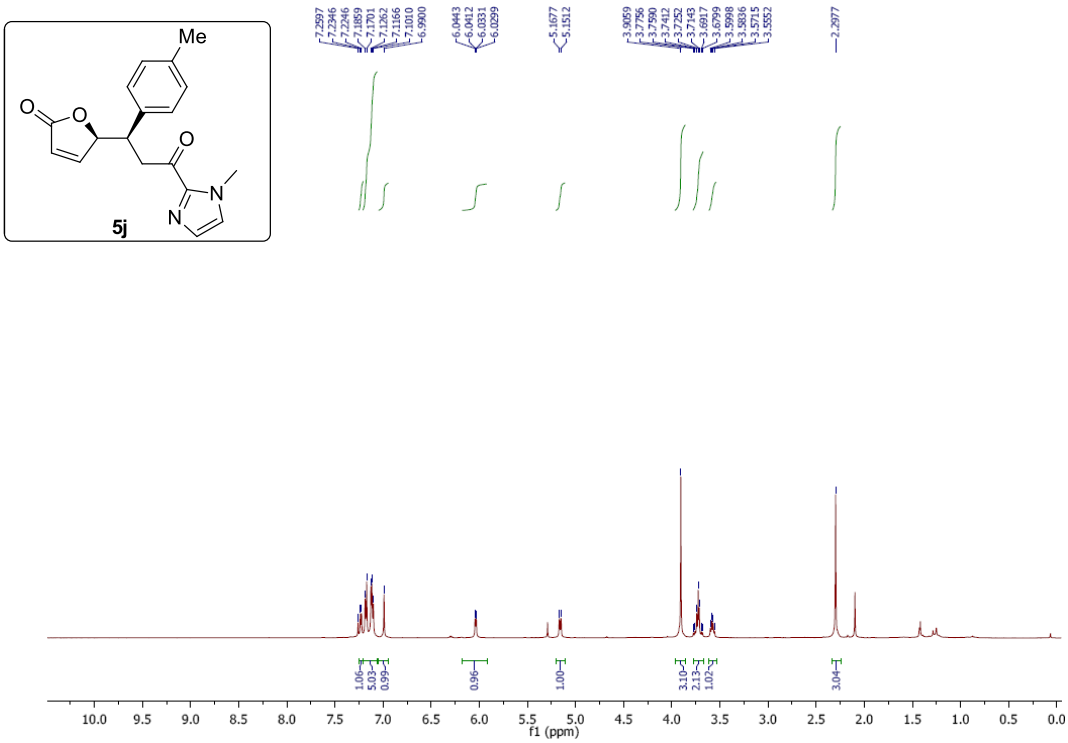
125 MHz ^{13}C NMR spectra of compound **5h** in $CDCl_3$



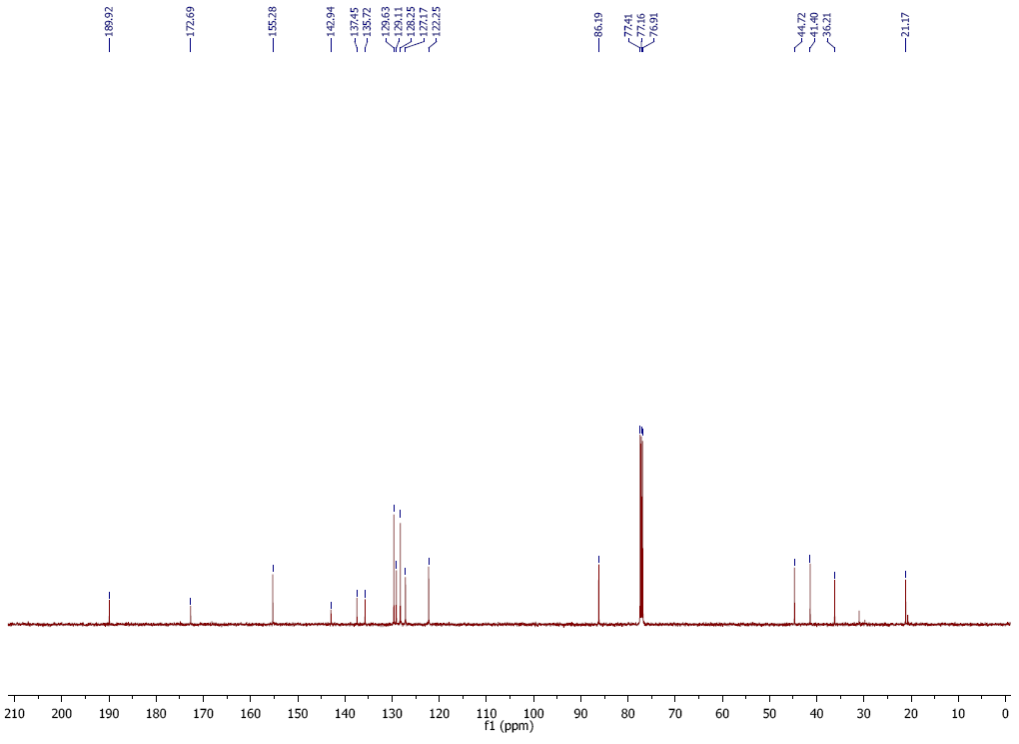
500 MHz ^{1}H NMR spectra of compound **5i** in $CDCl_3$



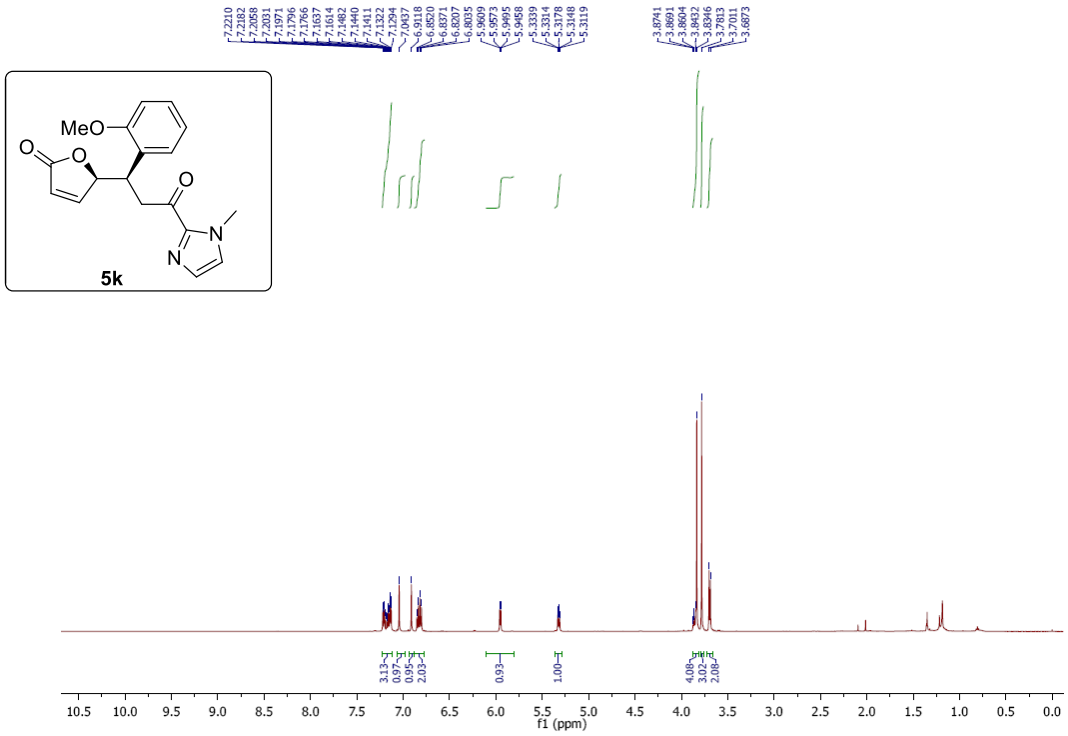
125 MHz ^{13}C NMR spectra of compound **5i** in $CDCl_3$



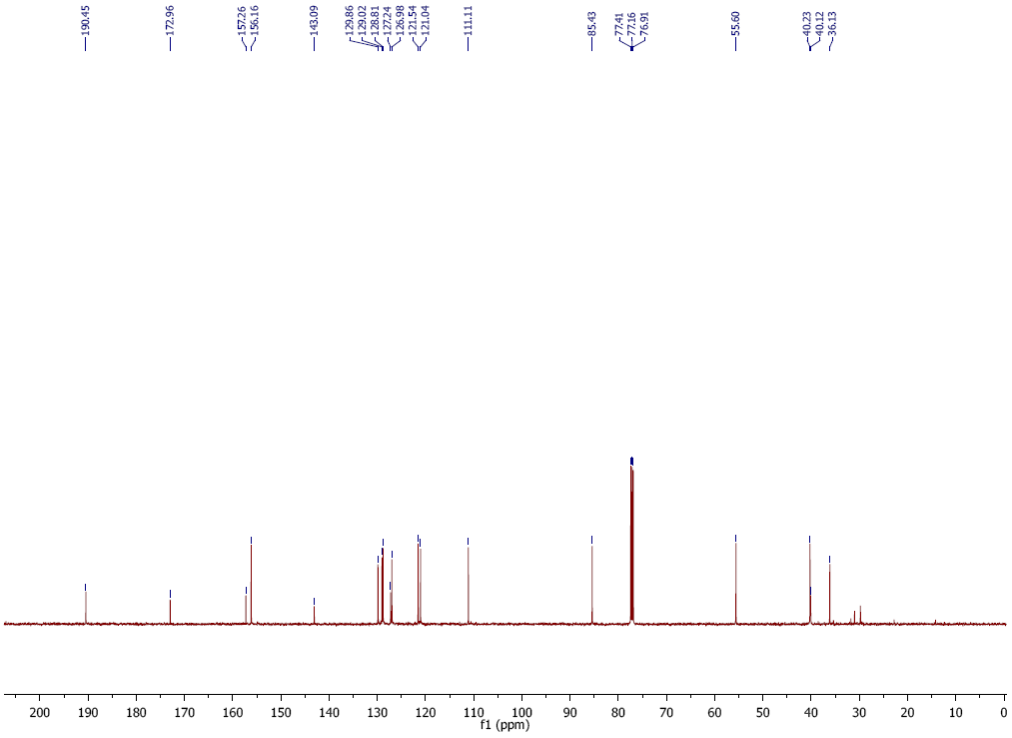
500 MHz ^{1}H NMR spectra of compound **5j** in $CDCl_3$



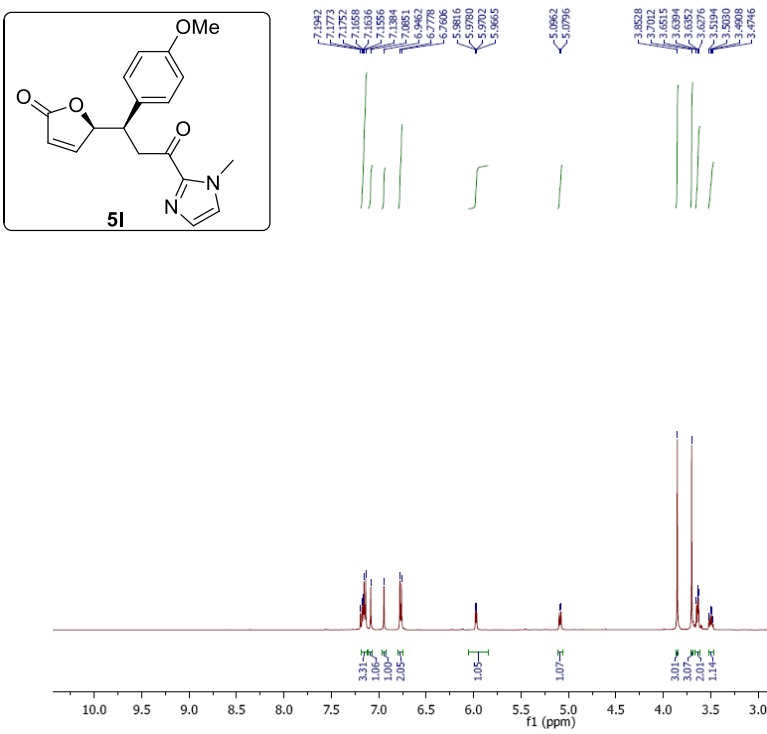
125 MHz ^{13}C NMR spectra of compound **5j** in $CDCl_3$



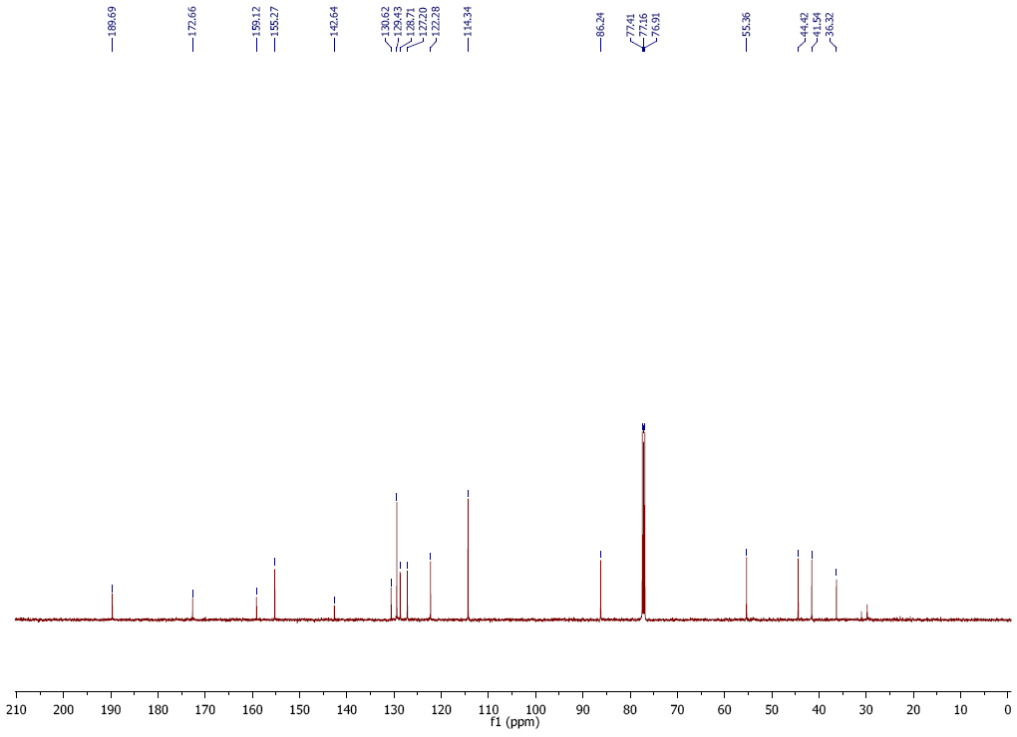
500 MHz ^{1}H NMR spectra of compound **5k** in $CDCl_3$



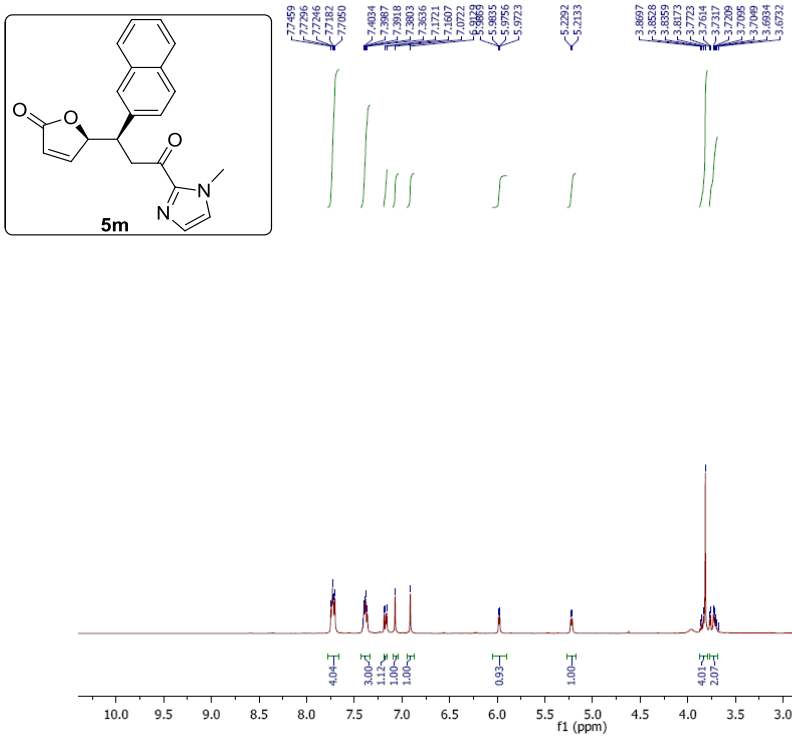
125 MHz ^{13}C NMR spectra of compound **5k** in $CDCl_3$



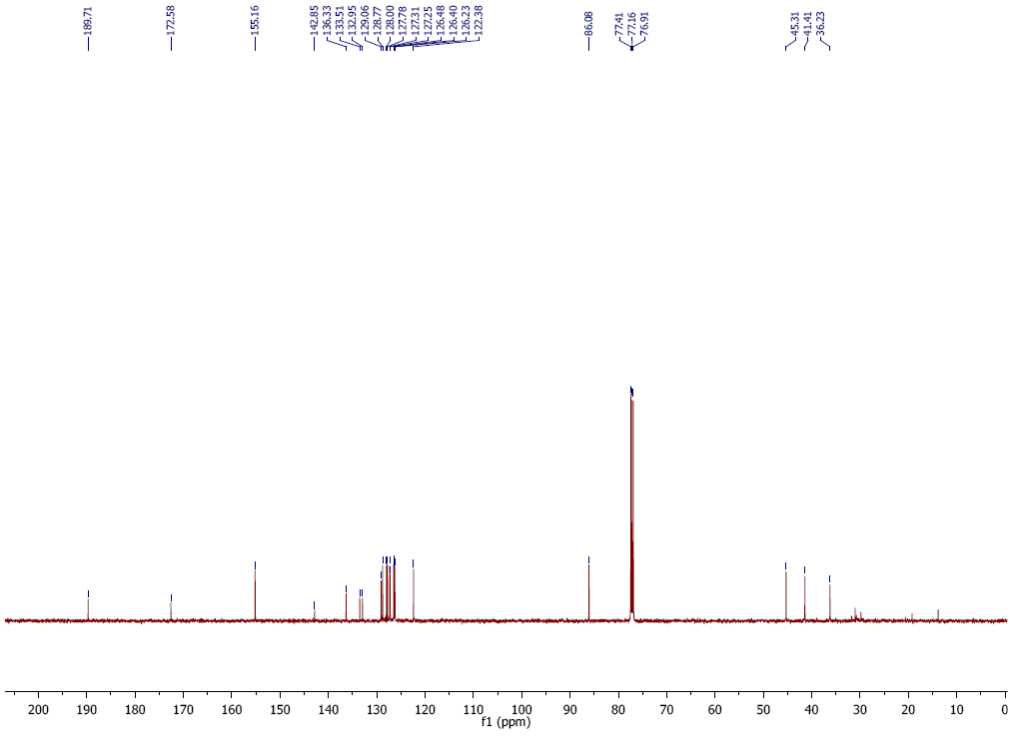
500 MHz ^{1}H NMR spectra of compound **5l** in $CDCl_3$



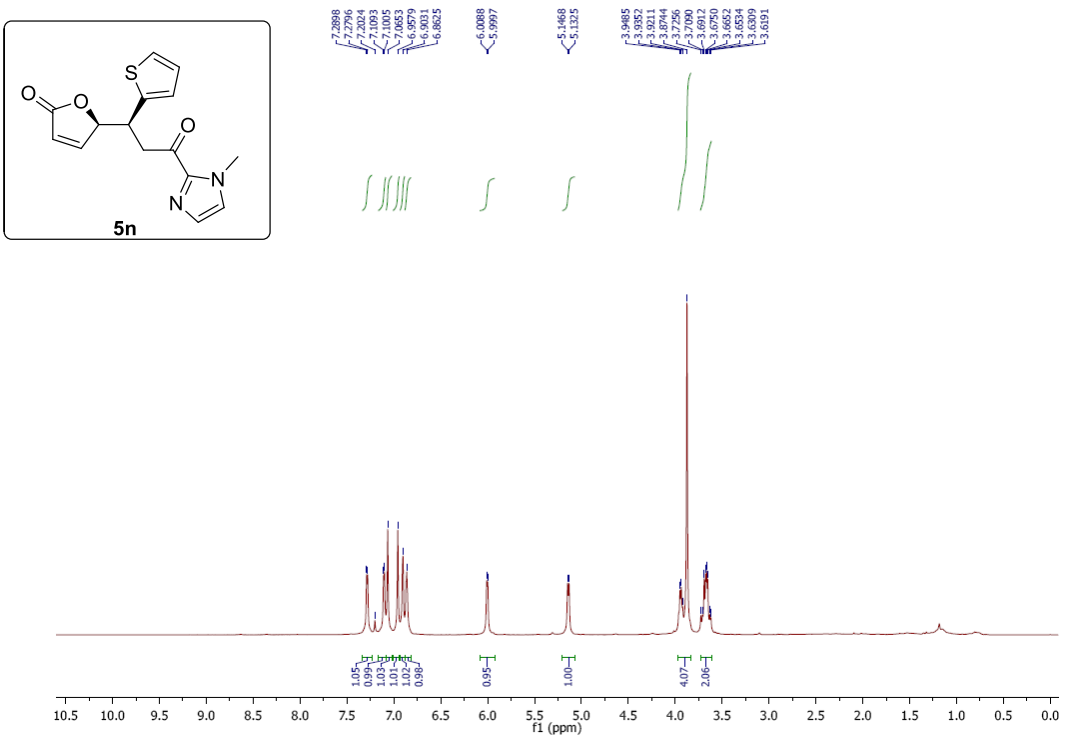
125 MHz ^{13}C NMR spectra of compound **5l** in $CDCl_3$



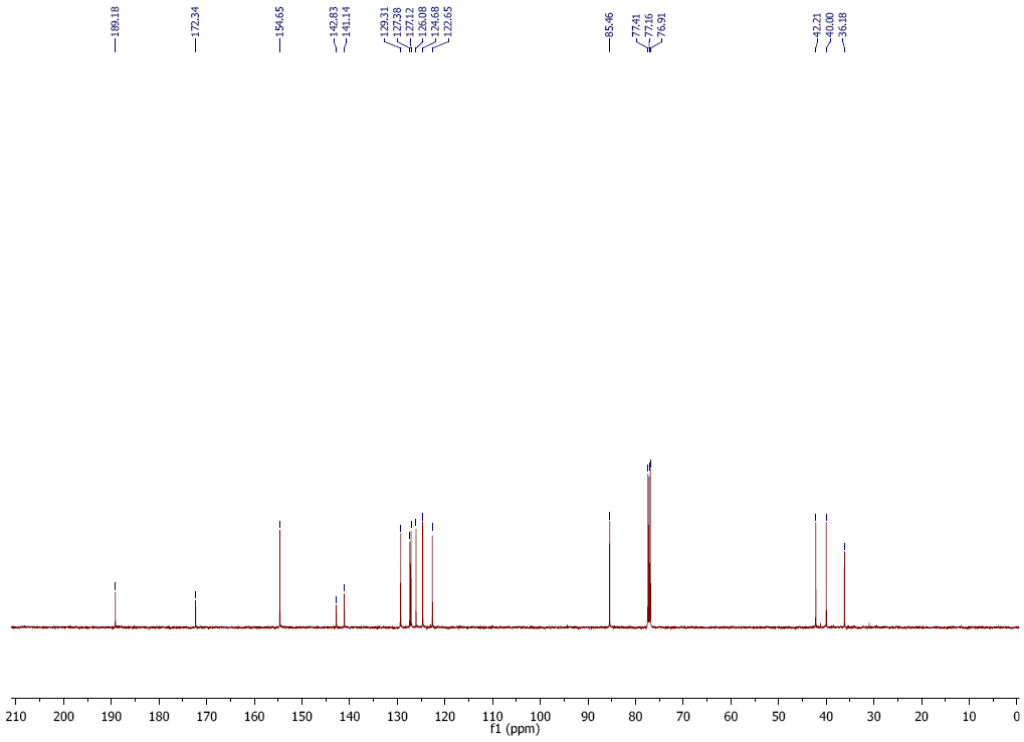
500 MHz ^{1}H NMR spectra of compound **5m** in $CDCl_3$



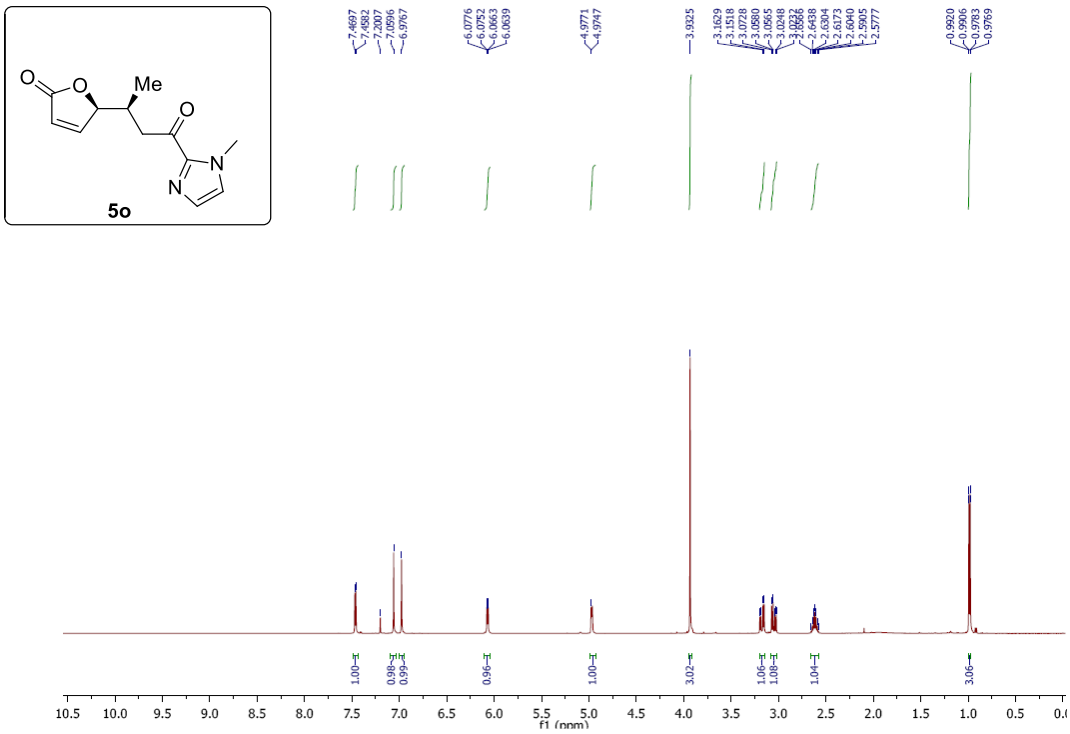
125 MHz ^{13}C NMR spectra of compound **5m** in $CDCl_3$



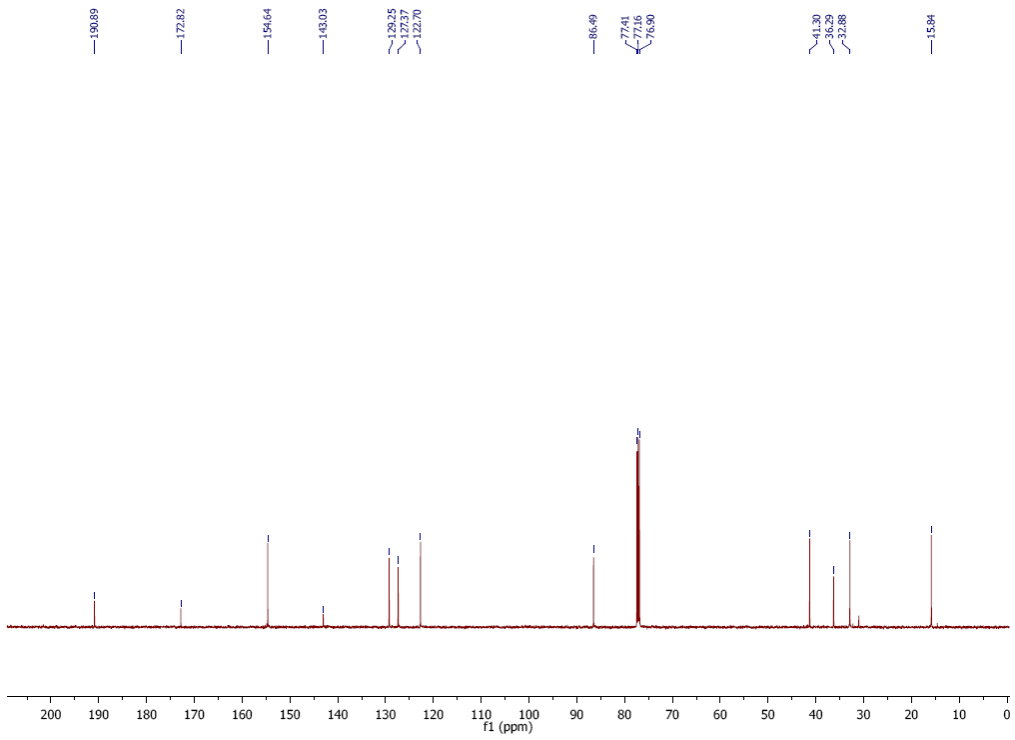
500 MHz ^{1}H NMR spectra of compound **5n** in $CDCl_3$



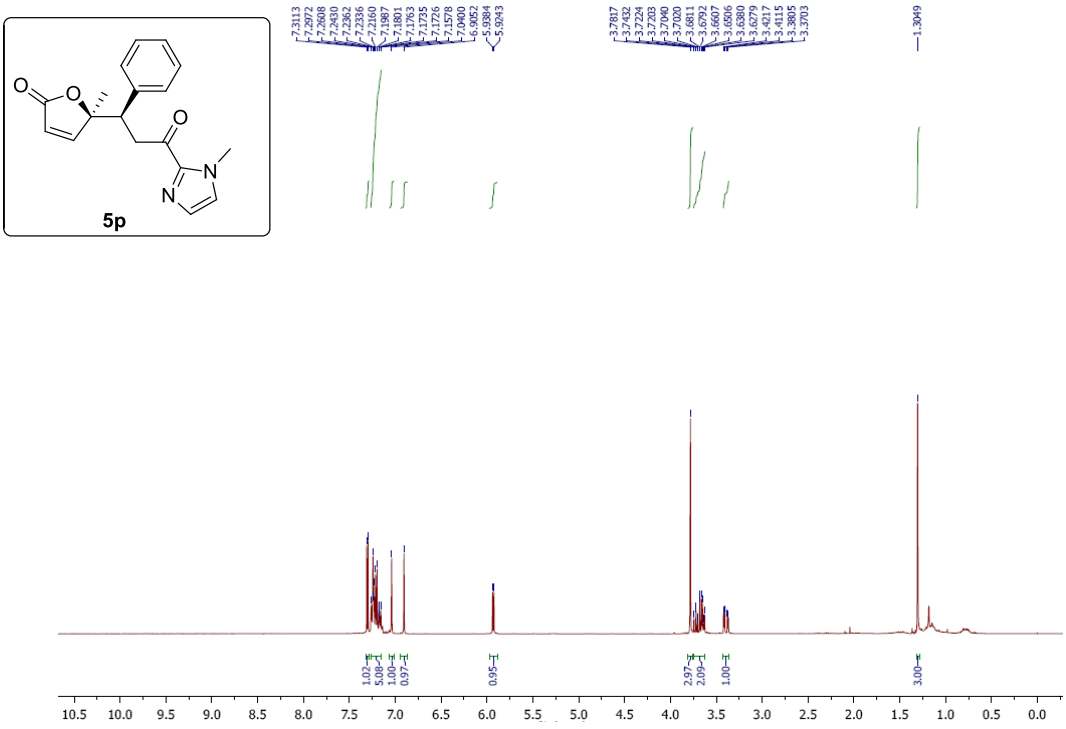
125 MHz ^{13}C NMR spectra of compound **5n** in $CDCl_3$



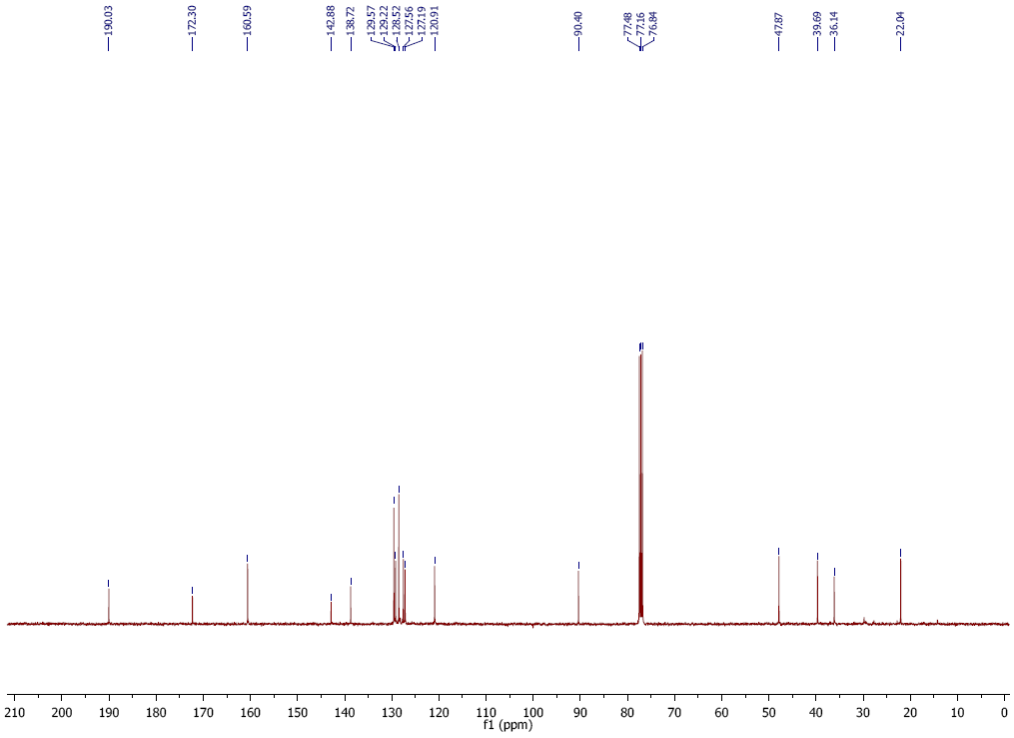
500 MHz ^{1}H NMR spectra of compound **5o** in $CDCl_3$



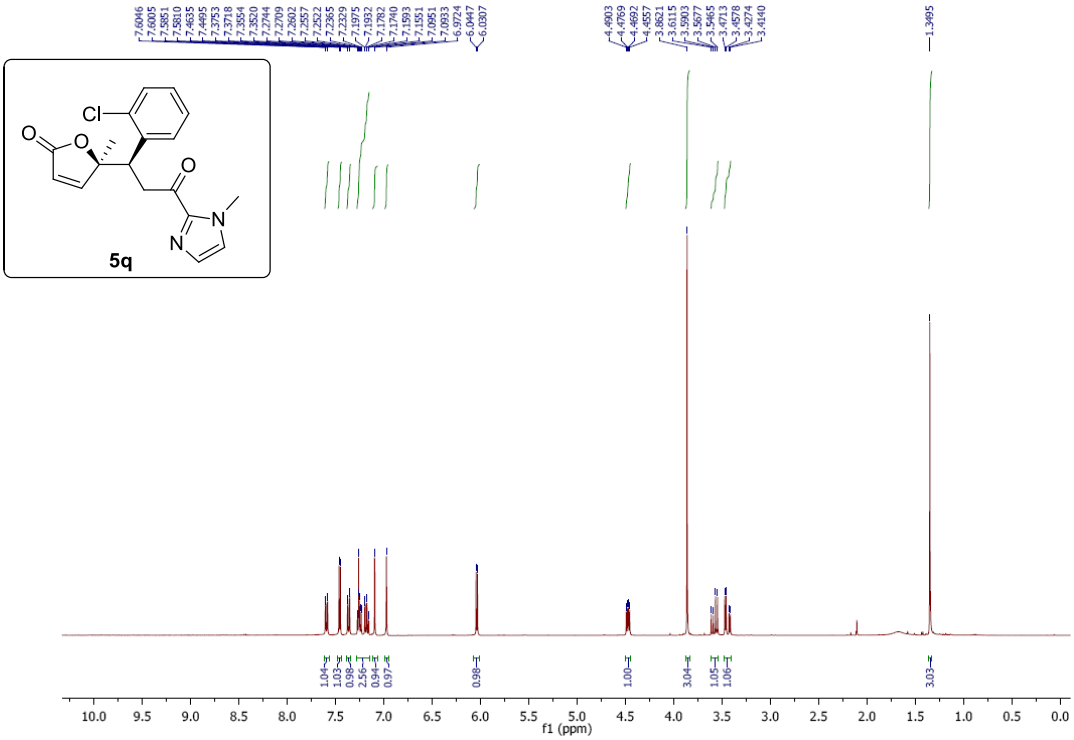
125 MHz ^{13}C NMR spectra of compound **5o** in $CDCl_3$



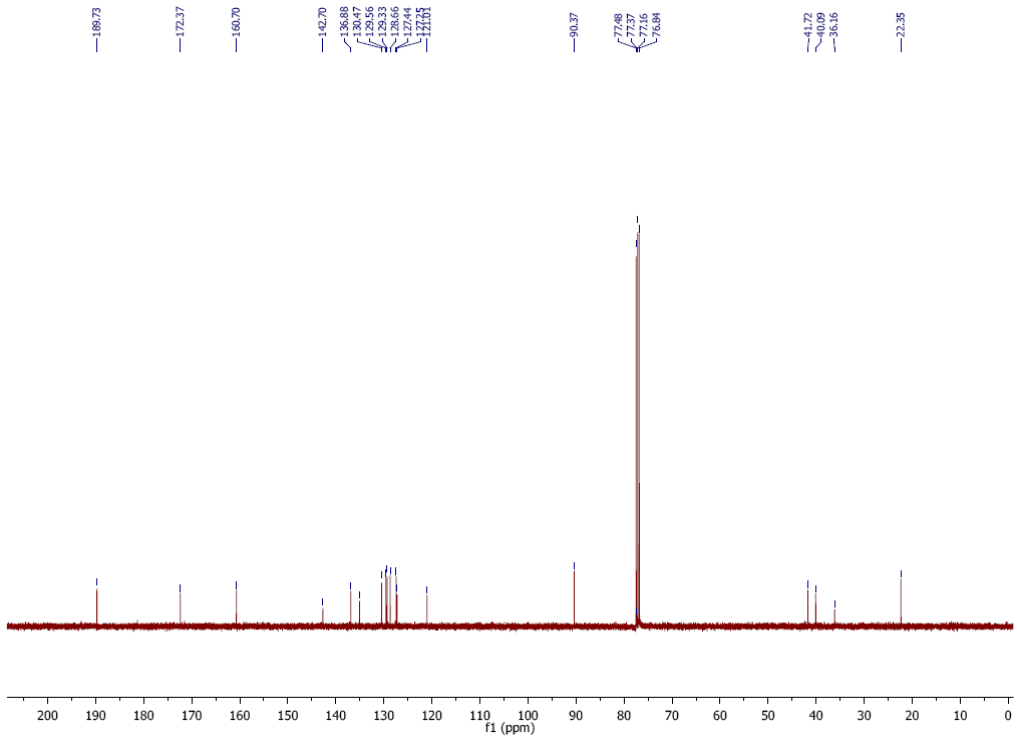
400 MHz ^{1}H NMR spectra of compound **5p** in $CDCl_3$



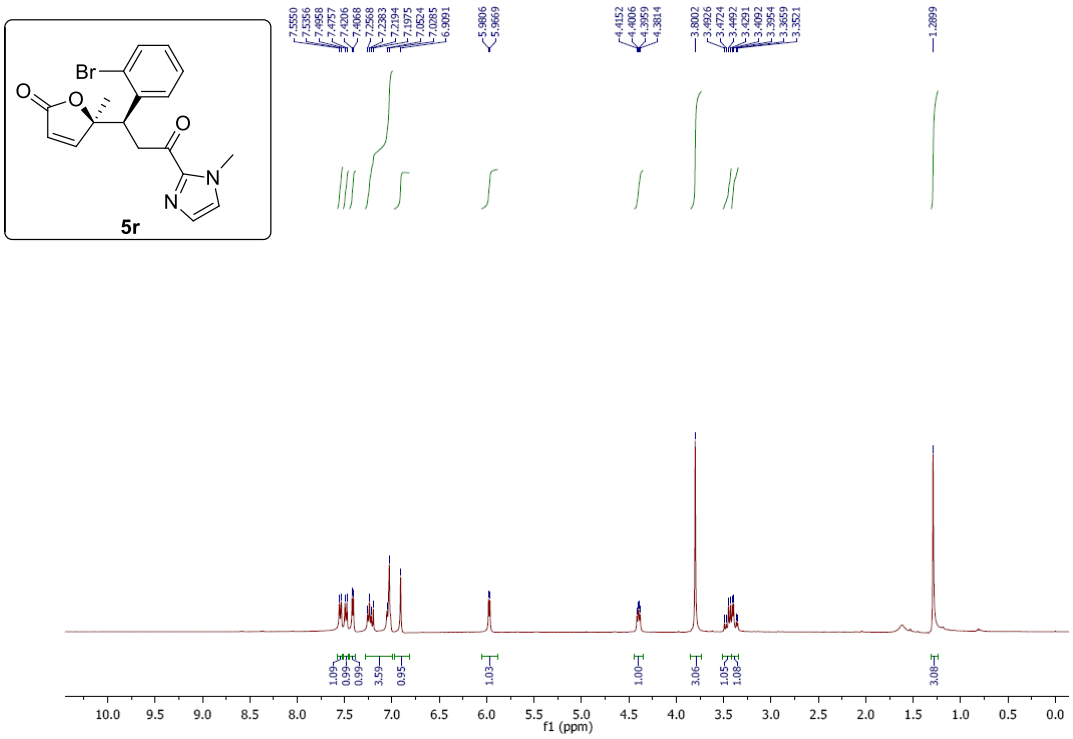
100 MHz ^{13}C NMR spectra of compound **5p** in $CDCl_3$



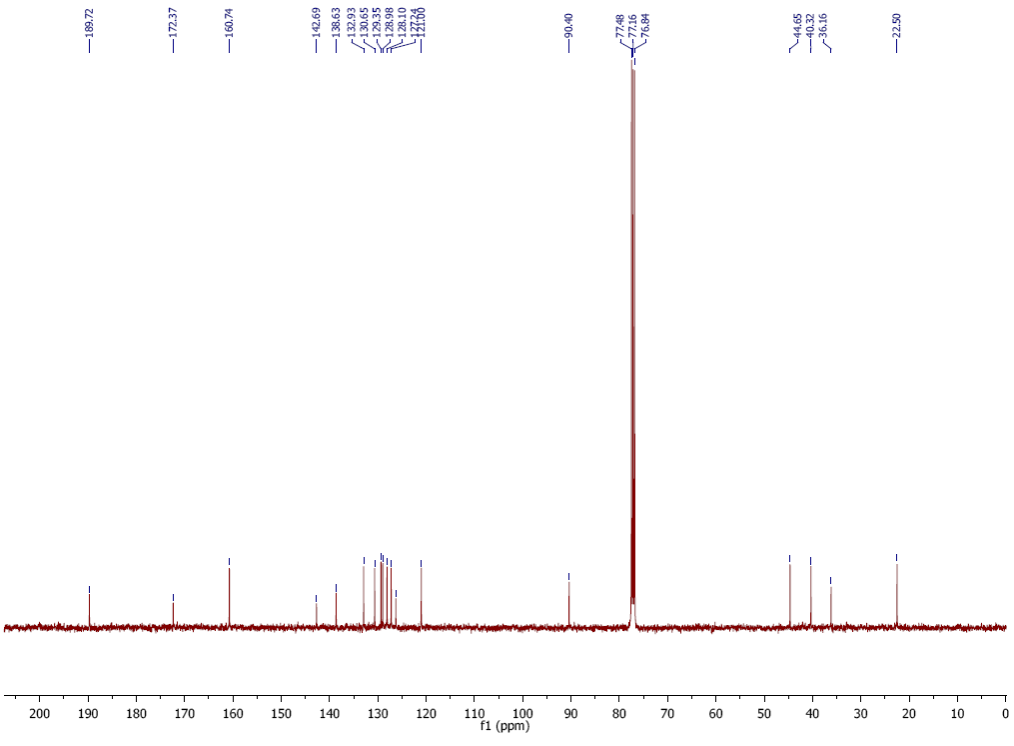
400 MHz ^{1}H NMR spectra of compound **5q** in $CDCl_3$



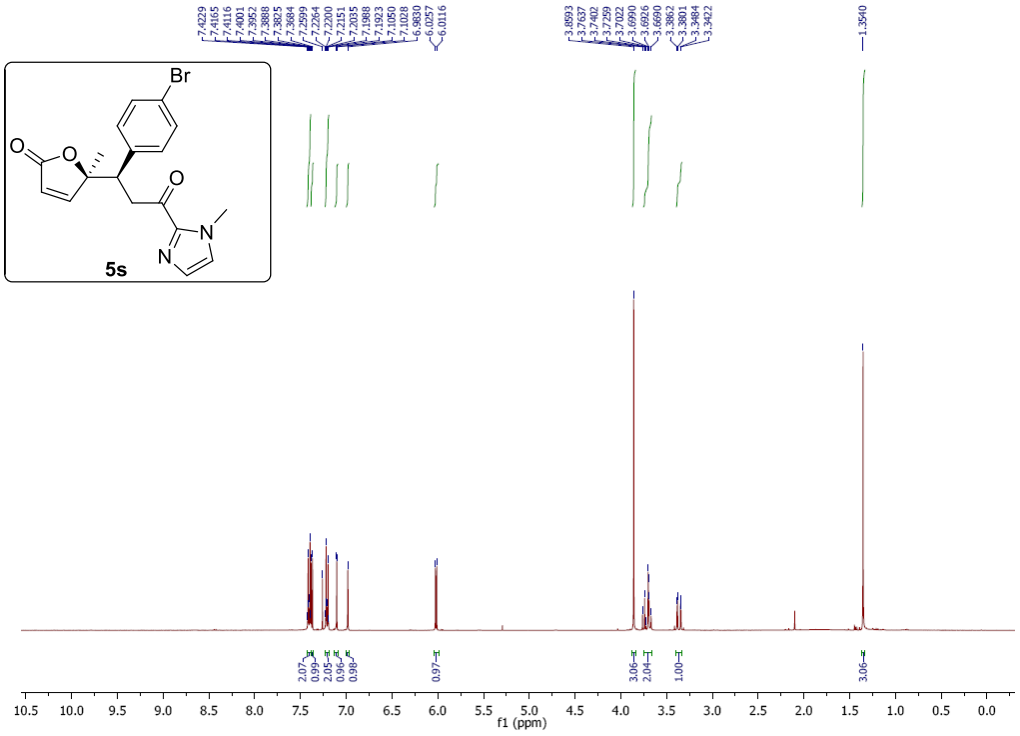
100 MHz ^{13}C NMR spectra of compound **5q** in $CDCl_3$



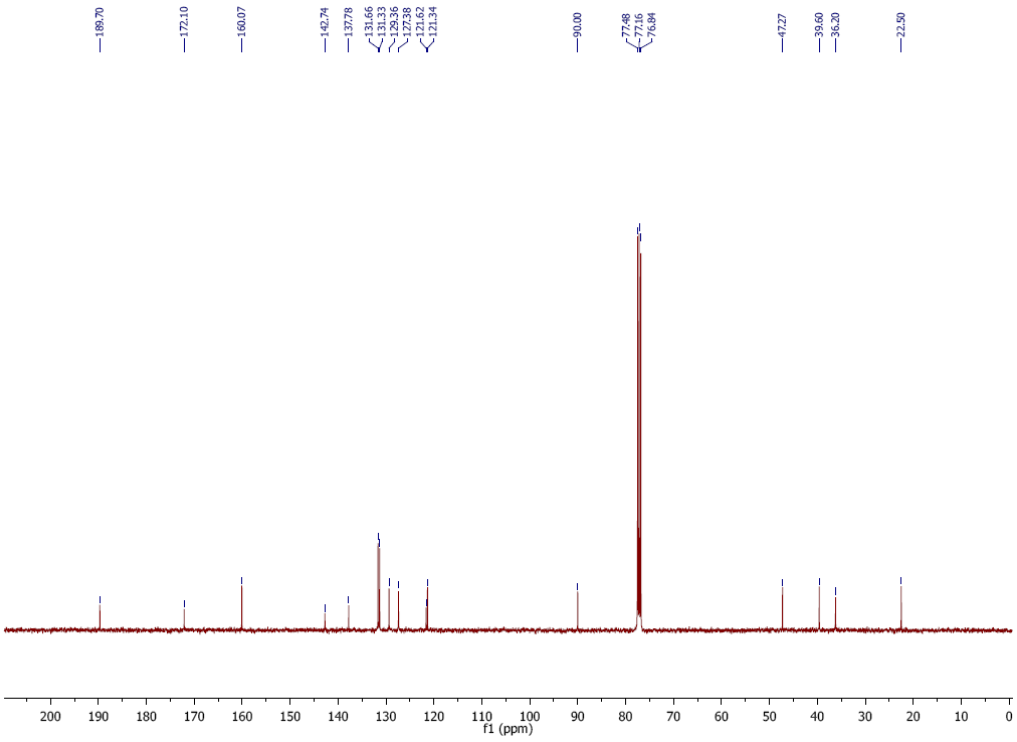
400 MHz ^{1}H NMR spectra of compound **5r** in $CDCl_3$



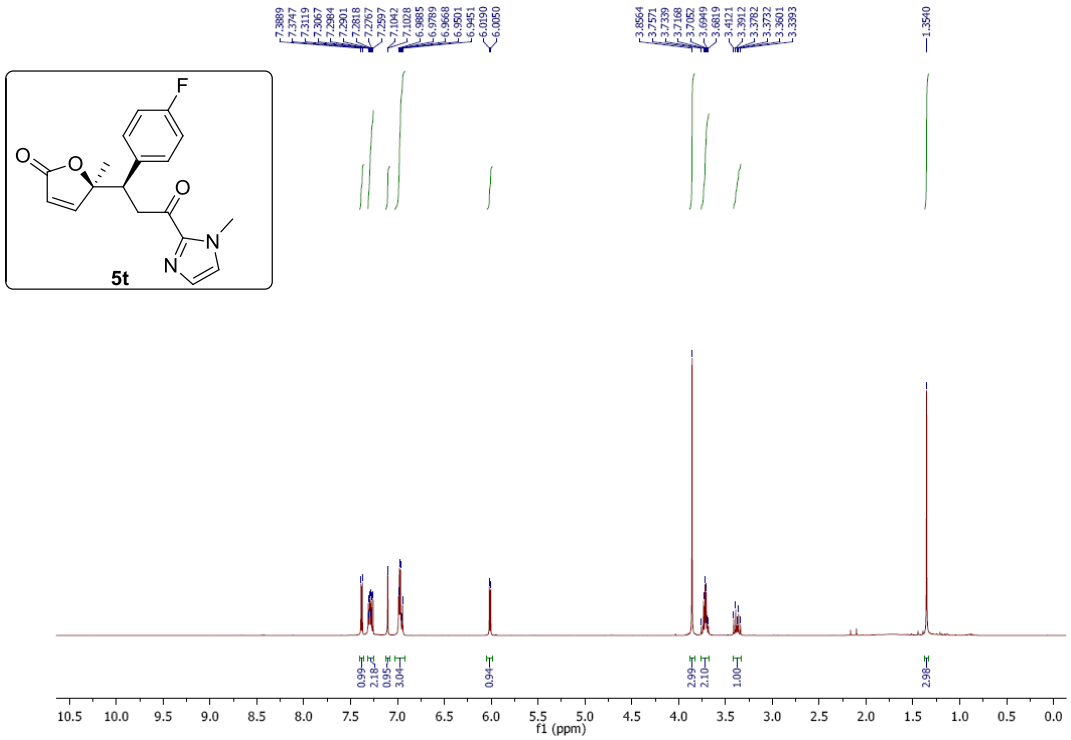
100 MHz ^{13}C NMR spectra of compound **5r** in $CDCl_3$



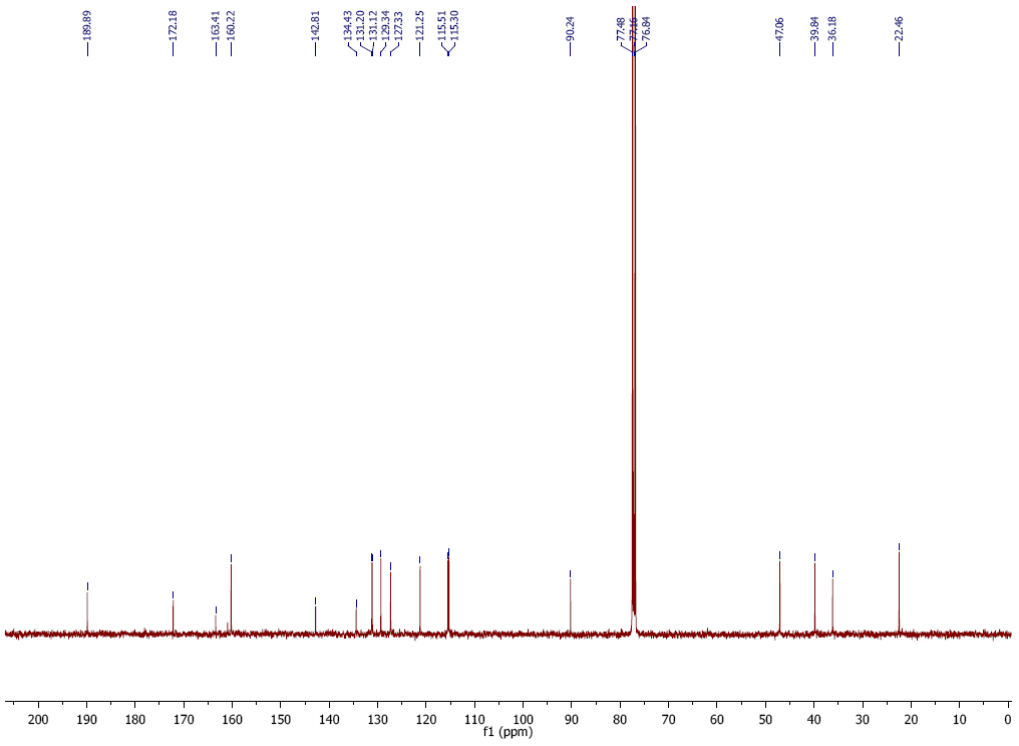
400 MHz ^{1}H NMR spectra of compound **5s** in $CDCl_3$



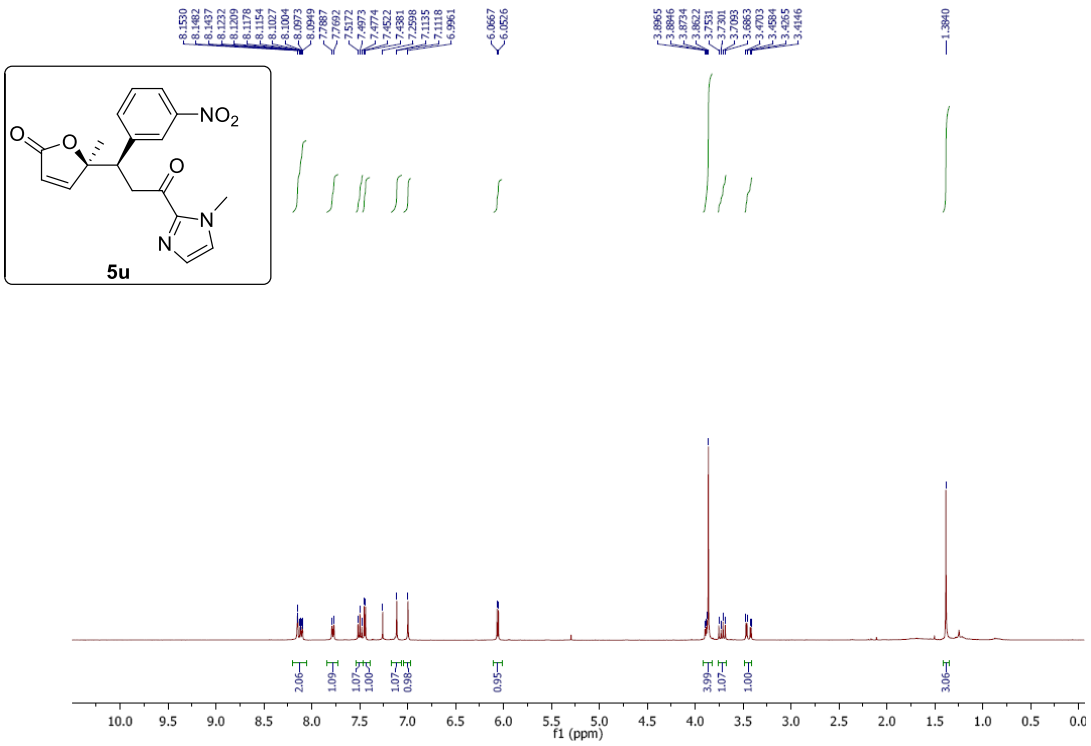
100 MHz ^{13}C NMR spectra of compound **5s** in $CDCl_3$



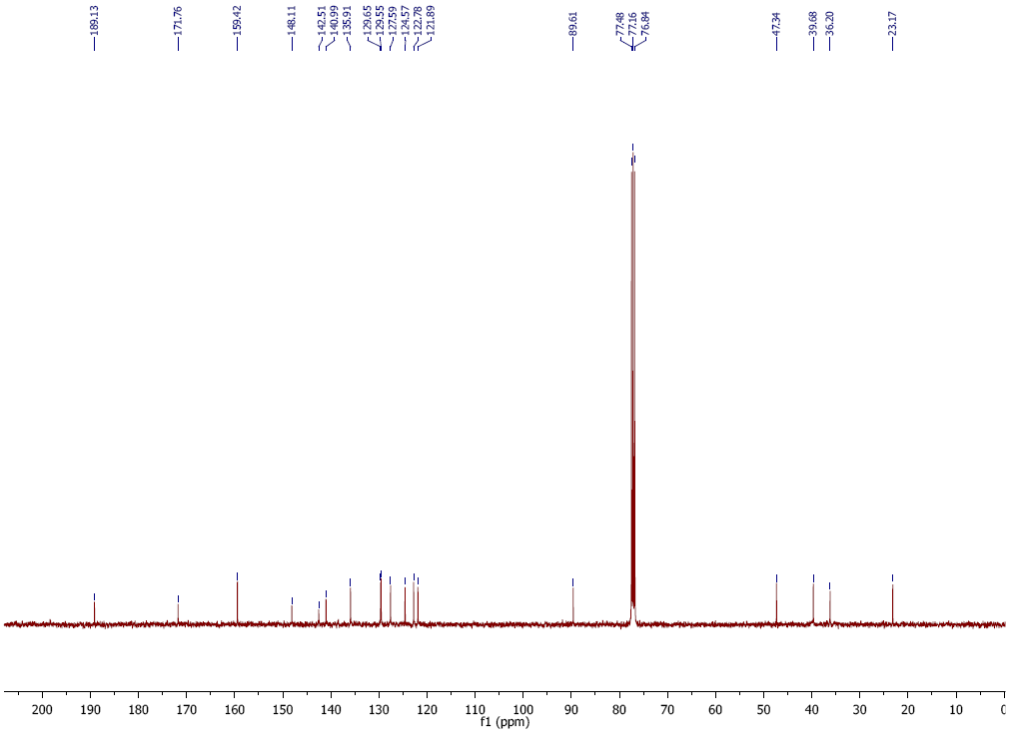
400 MHz ^{1}H NMR spectra of compound **5t** in $CDCl_3$



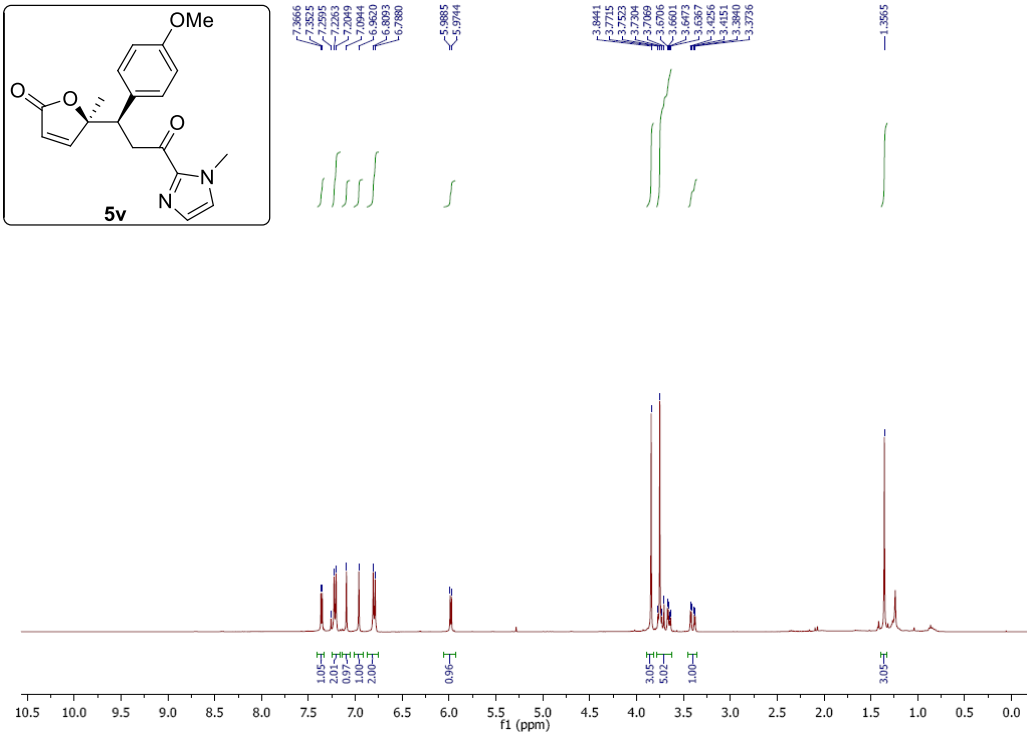
100 MHz ^{13}C NMR spectra of compound **5t** in $CDCl_3$



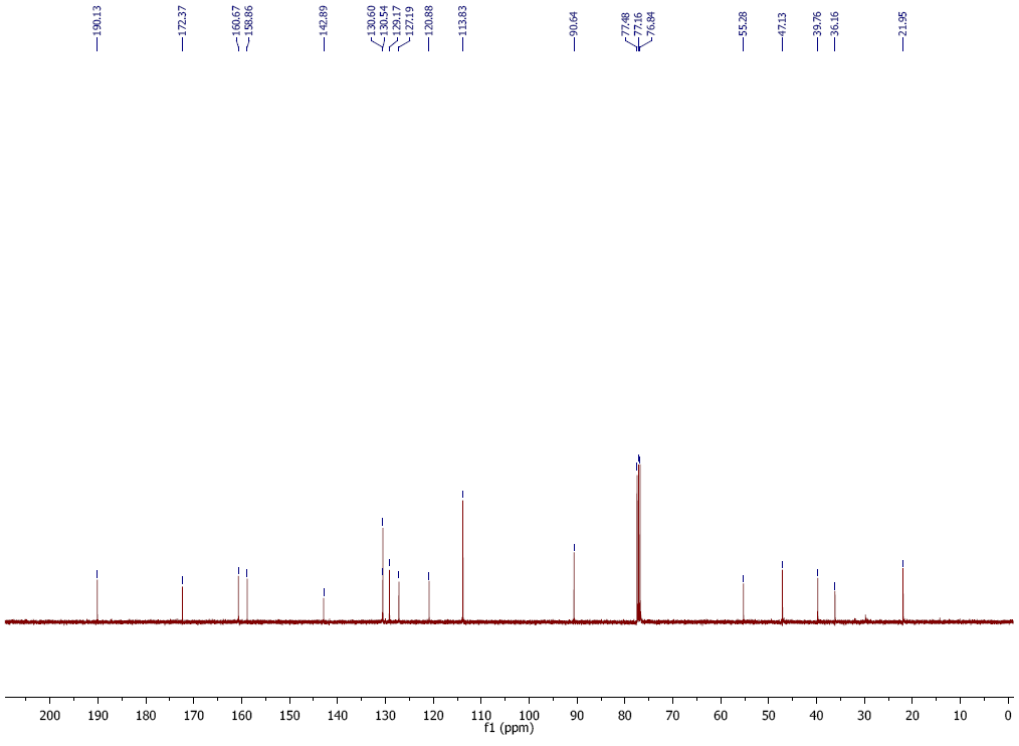
400 MHz ^{1}H NMR spectra of compound **5u** in $CDCl_3$



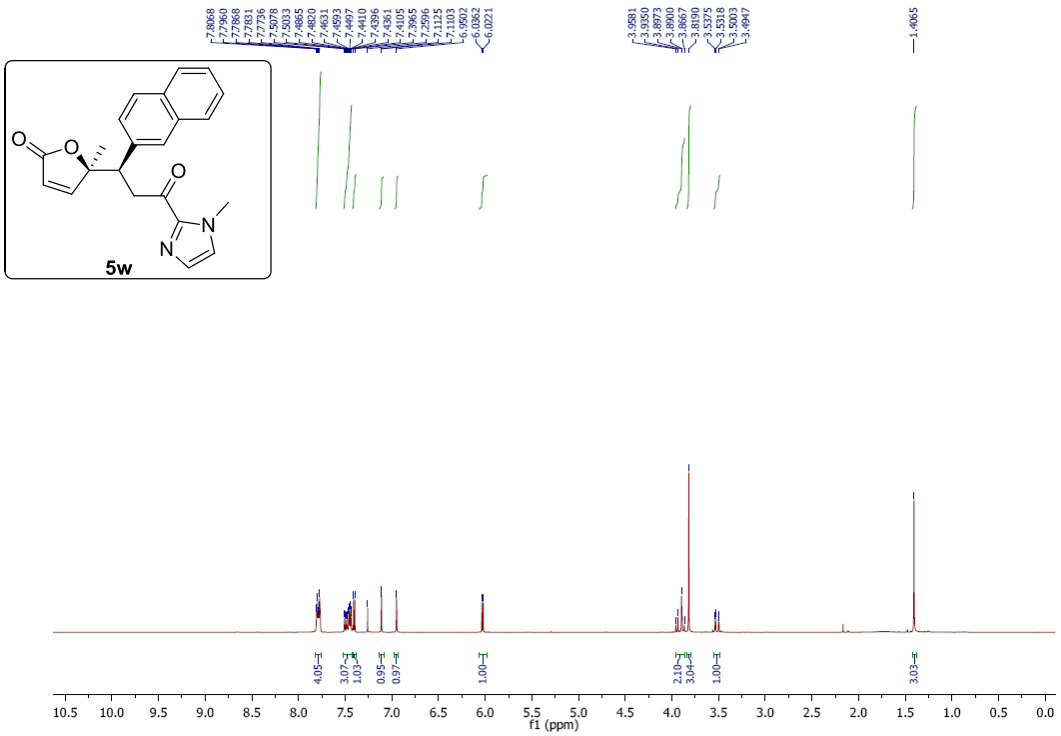
100 MHz ^{13}C NMR spectra of compound **5u** in $CDCl_3$



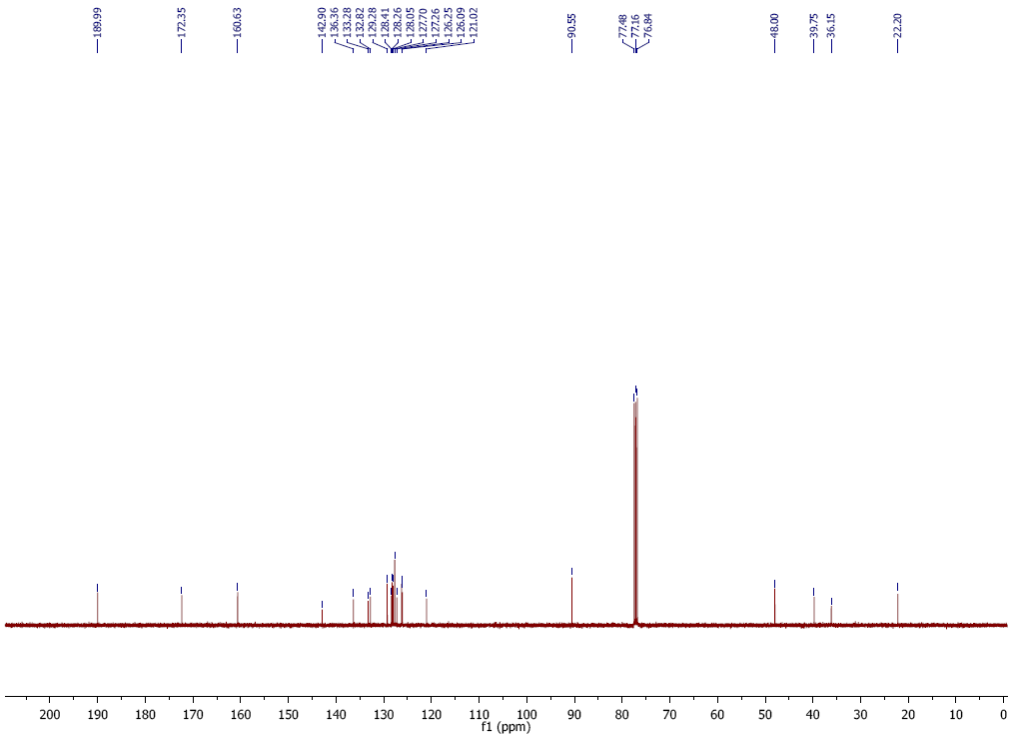
400 MHz ^{1}H NMR spectra of compound **5v** in $CDCl_3$



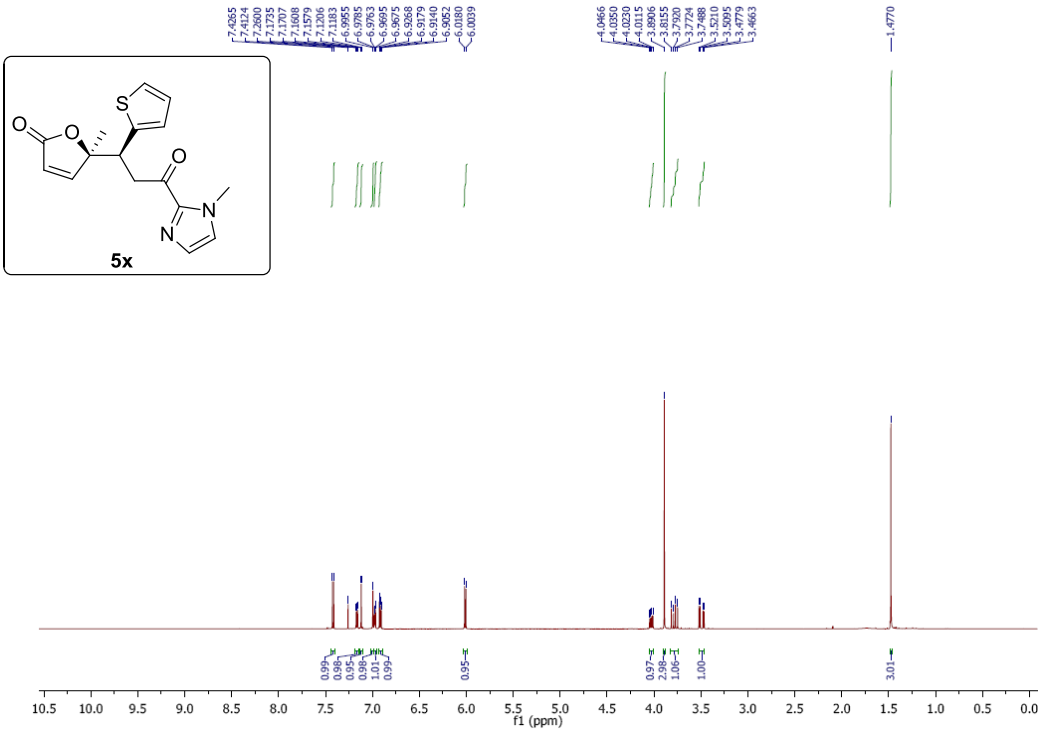
100 MHz ^{13}C NMR spectra of compound **5v** in $CDCl_3$



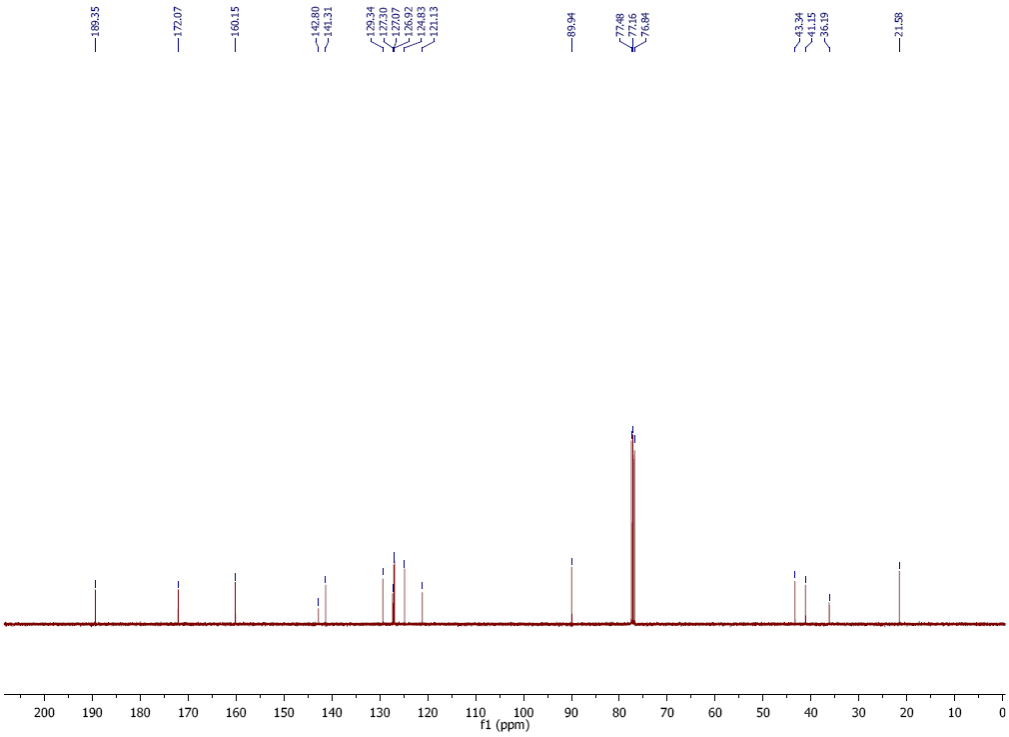
400 MHz ^{1}H NMR spectra of compound **5w** in $CDCl_3$



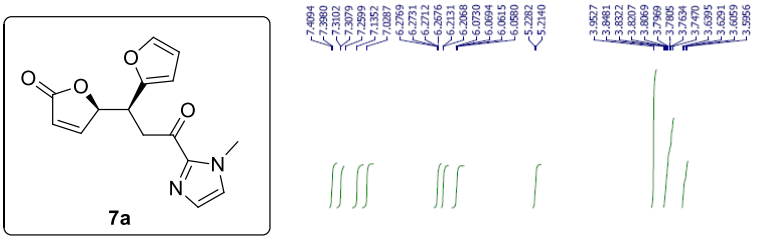
100 MHz ^{13}C NMR spectra of compound **5w** in $CDCl_3$



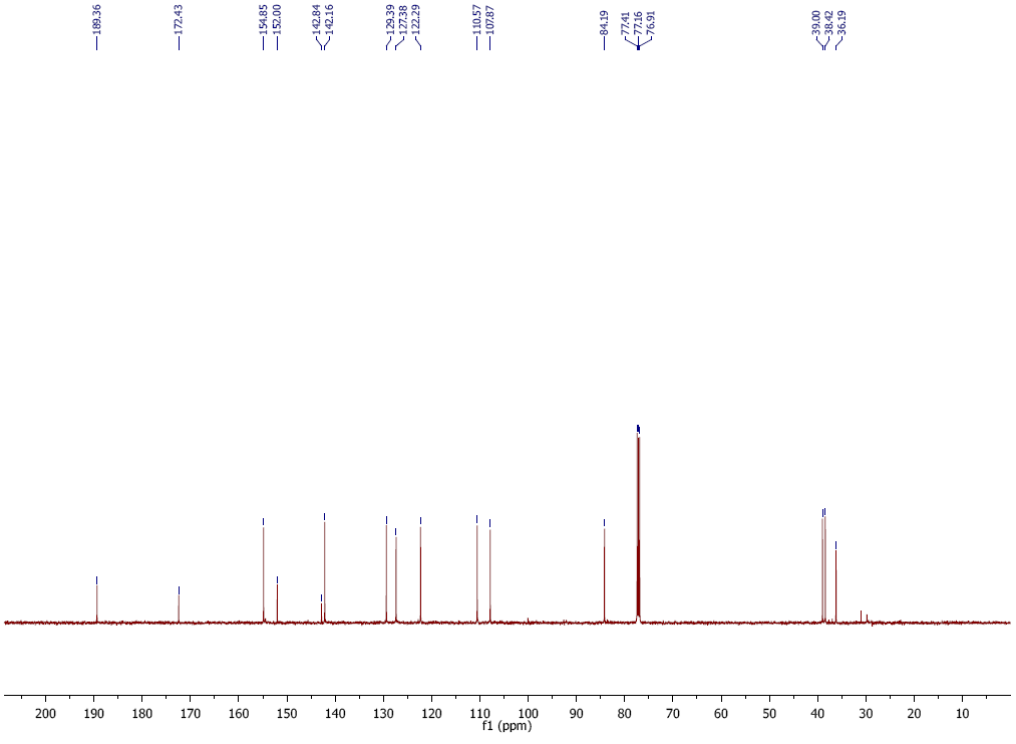
400 MHz ^{1}H NMR spectra of compound **5x** in $CDCl_3$



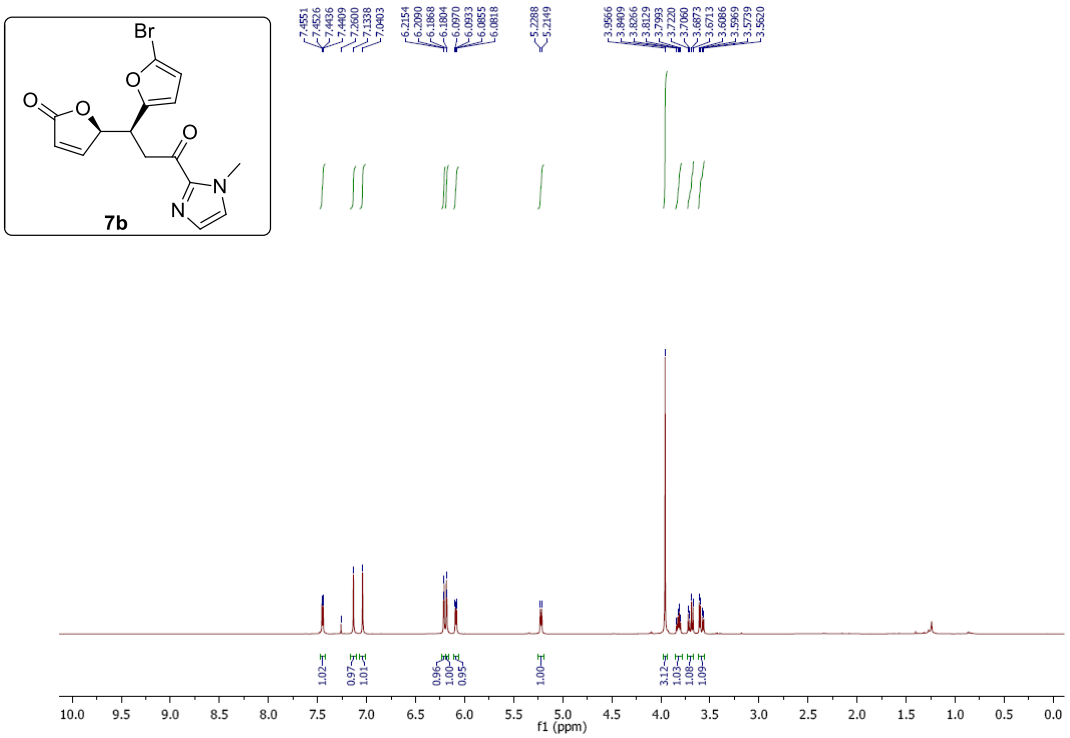
100 MHz ^{13}C NMR spectra of compound **5x** in $CDCl_3$



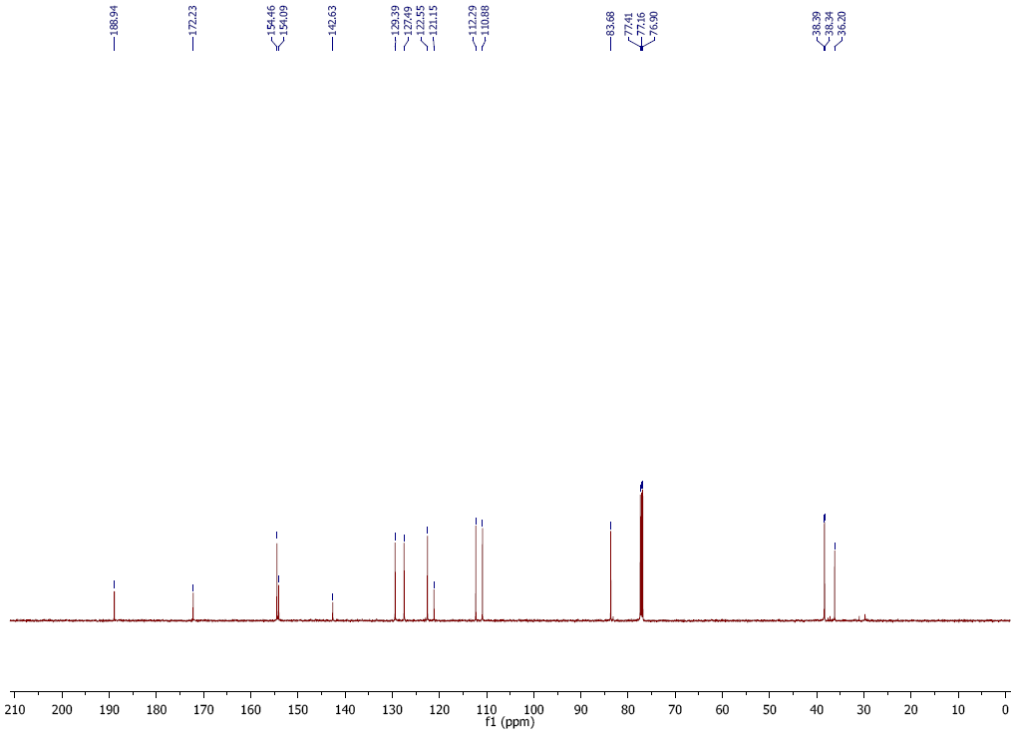
500 MHz ^{1}H NMR spectra of compound **7a** in $CDCl_3$



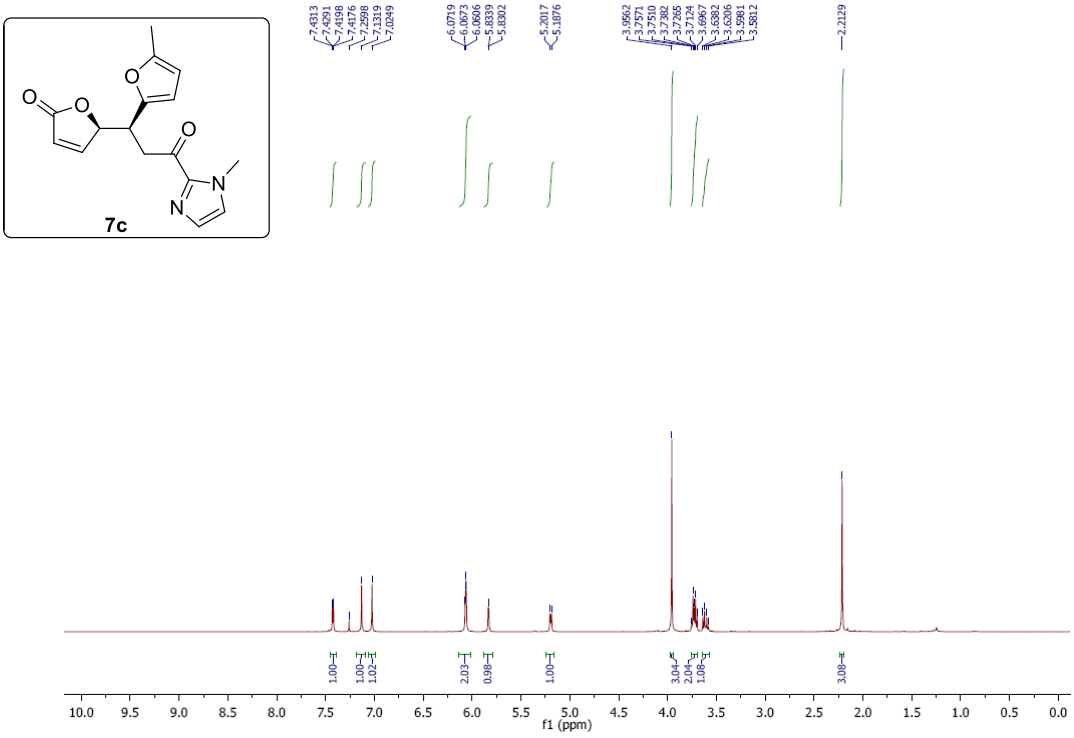
125 MHz ^{13}C NMR spectra of compound **7a** in $CDCl_3$



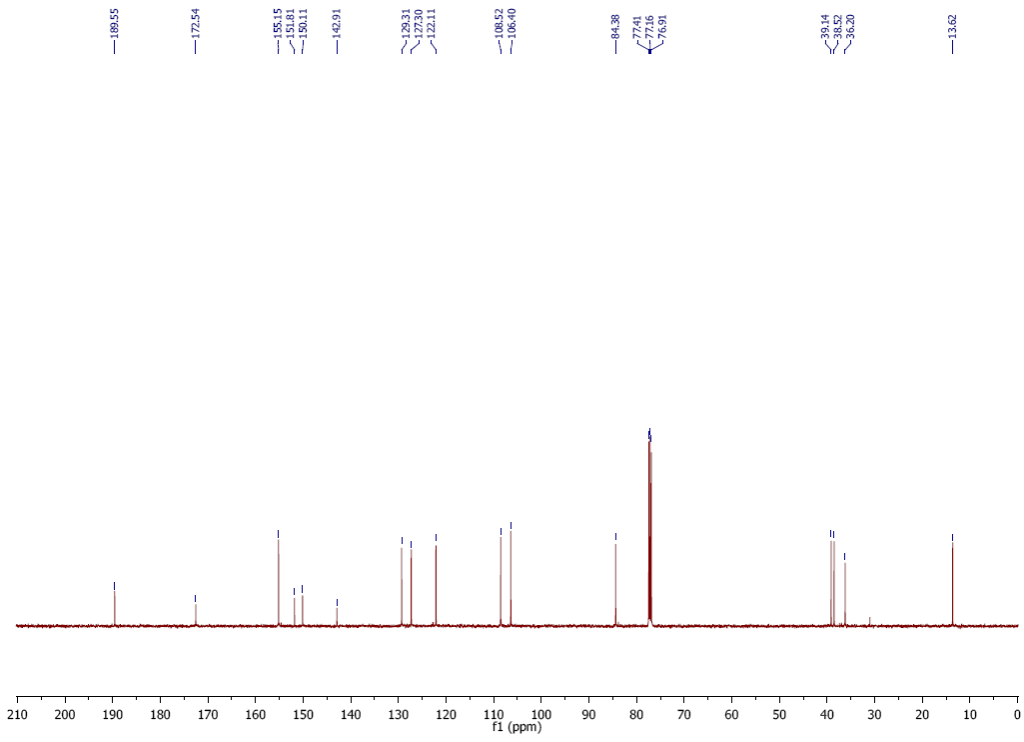
500 MHz ^{1}H NMR spectra of compound **7b** in $CDCl_3$



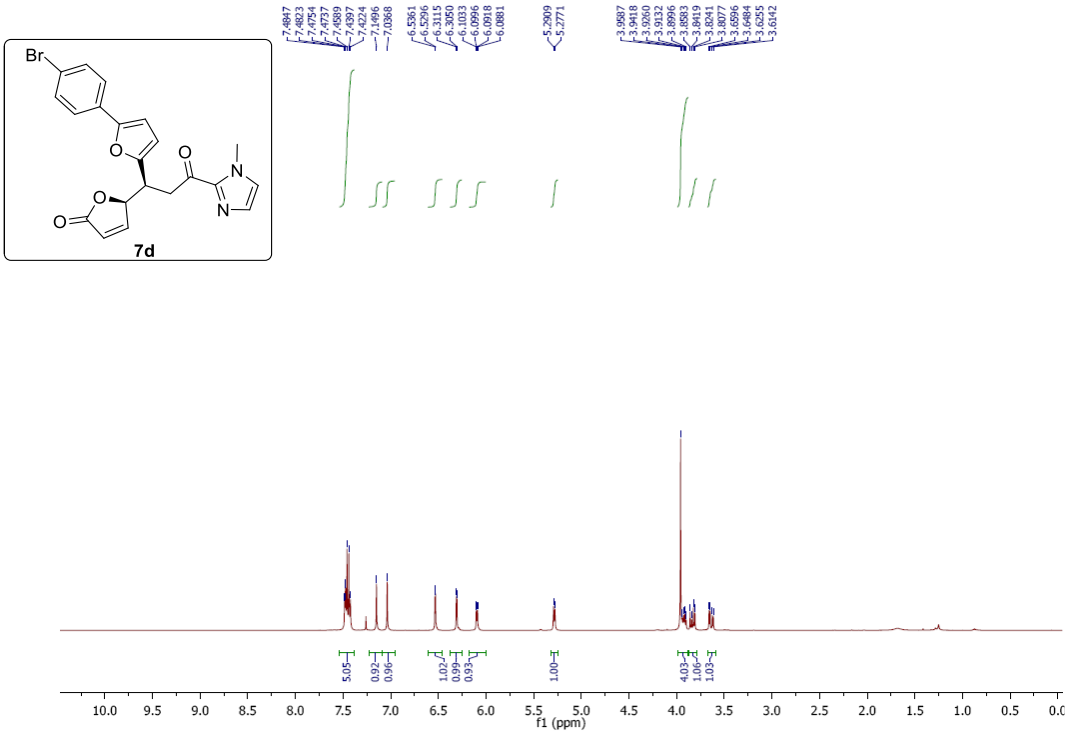
125 MHz ^{13}C NMR spectra of compound **7b** in $CDCl_3$



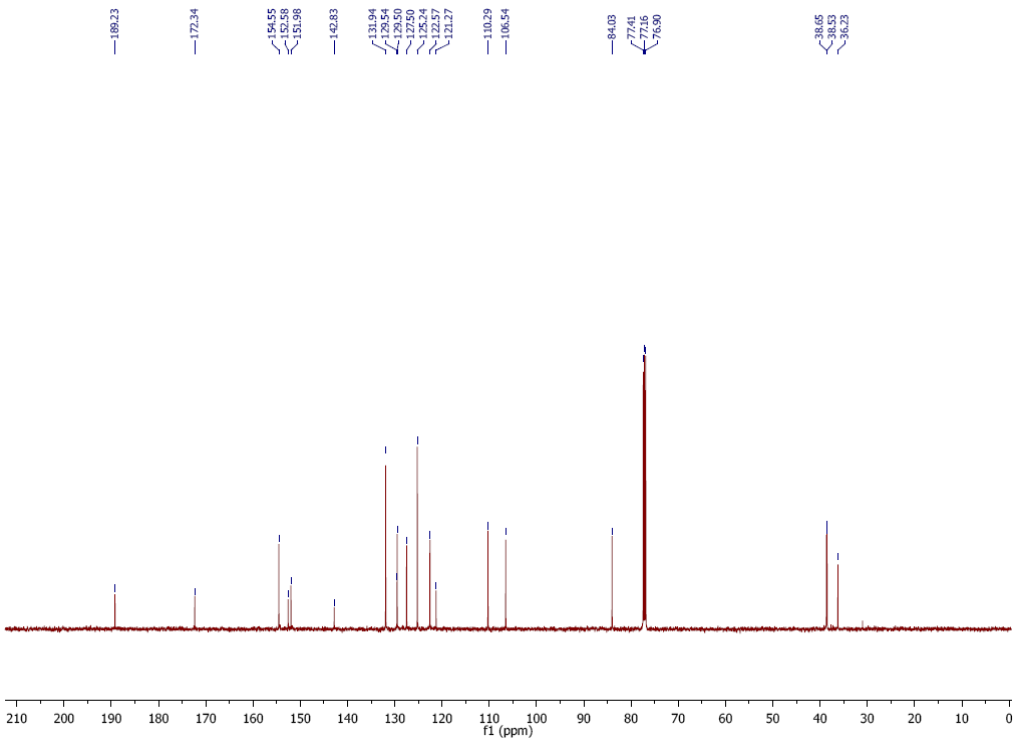
500 MHz ^{1}H NMR spectra of compound **7c** in $CDCl_3$



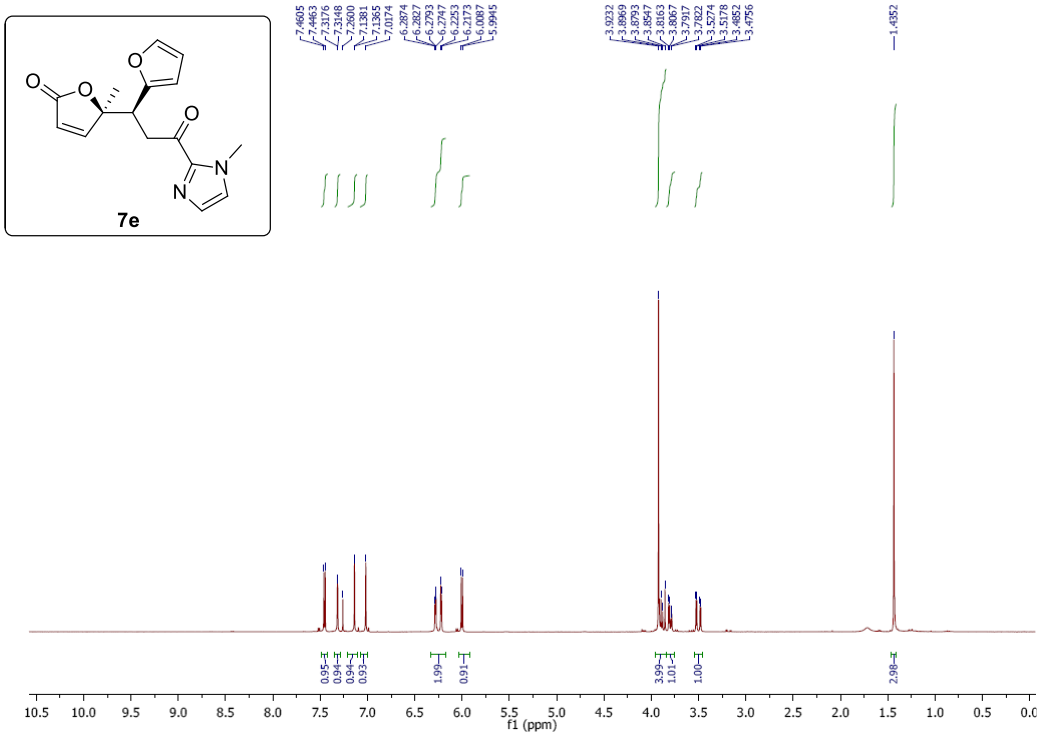
125 MHz ^{13}C NMR spectra of compound **7c** in $CDCl_3$



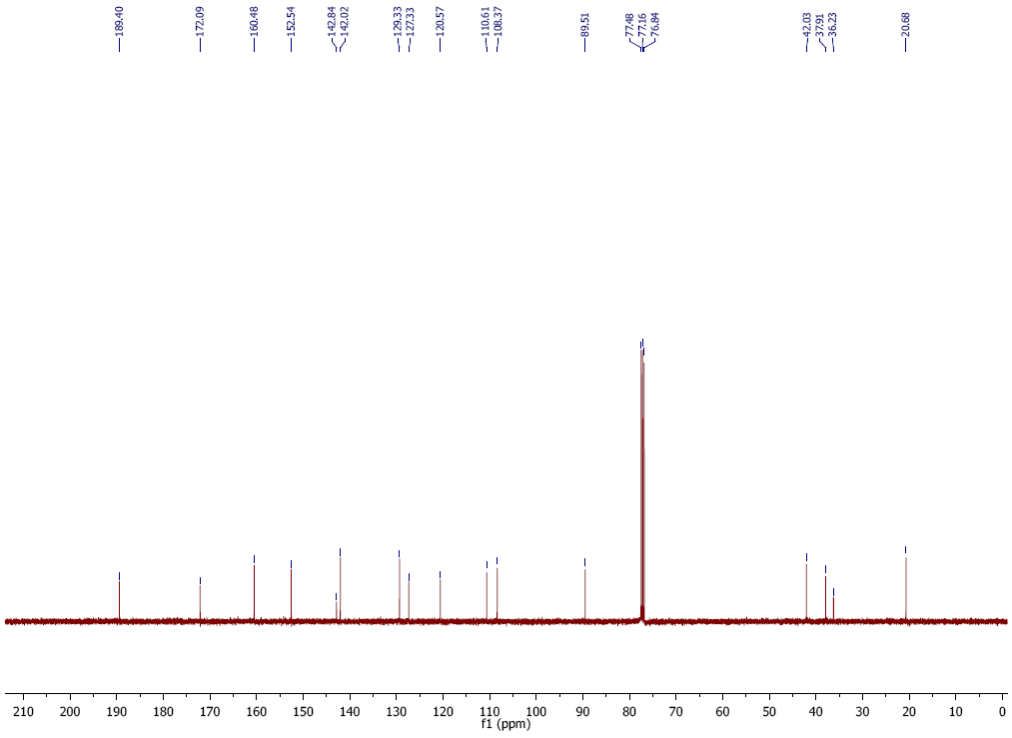
500 MHz ^{1}H NMR spectra of compound **7d** in $CDCl_3$



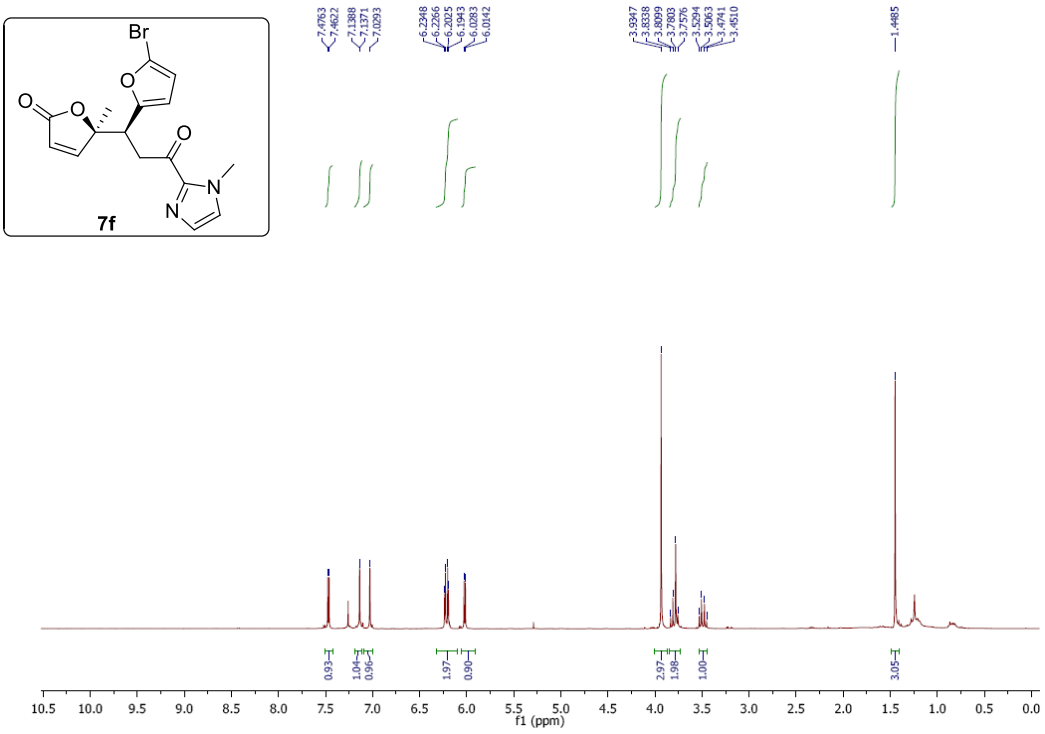
125 MHz ^{13}C NMR spectra of compound **7d** in $CDCl_3$



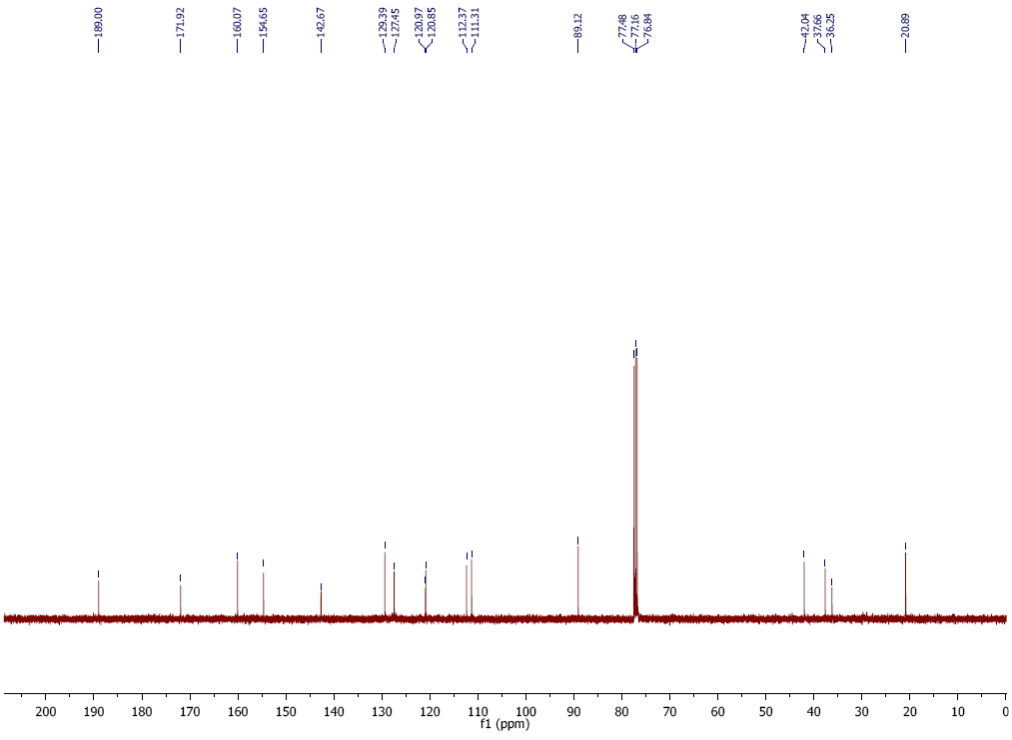
400 MHz ^{1}H NMR spectra of compound **7e** in $CDCl_3$



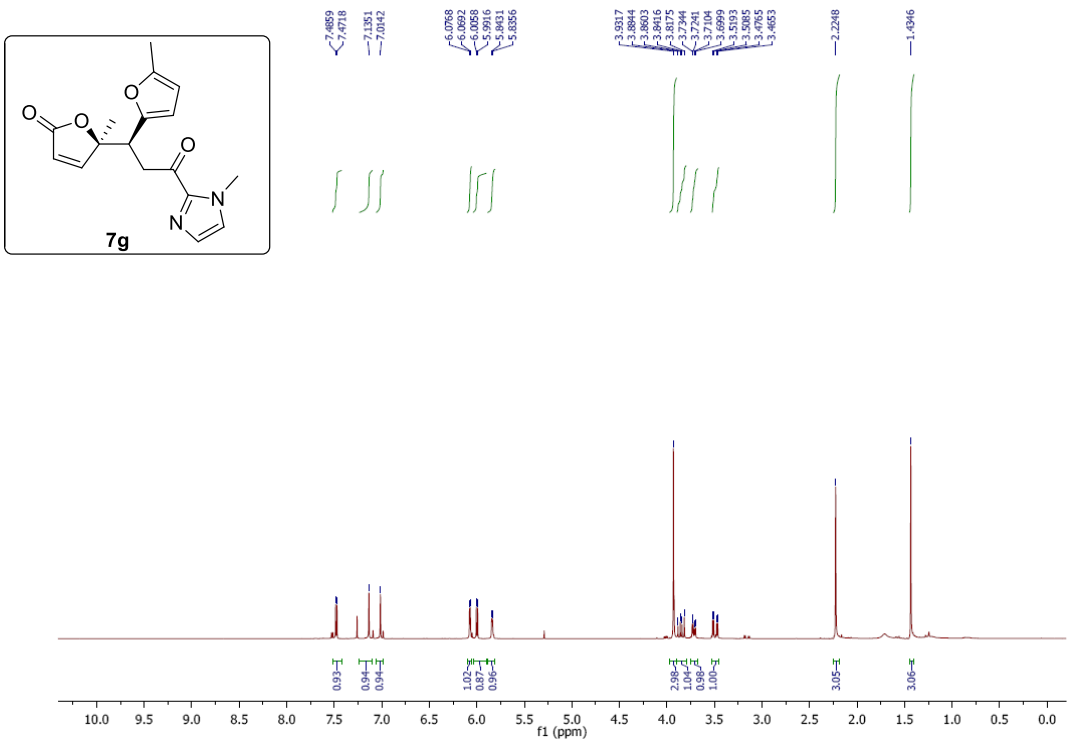
100 MHz ^{13}C NMR spectra of compound **7e** in $CDCl_3$



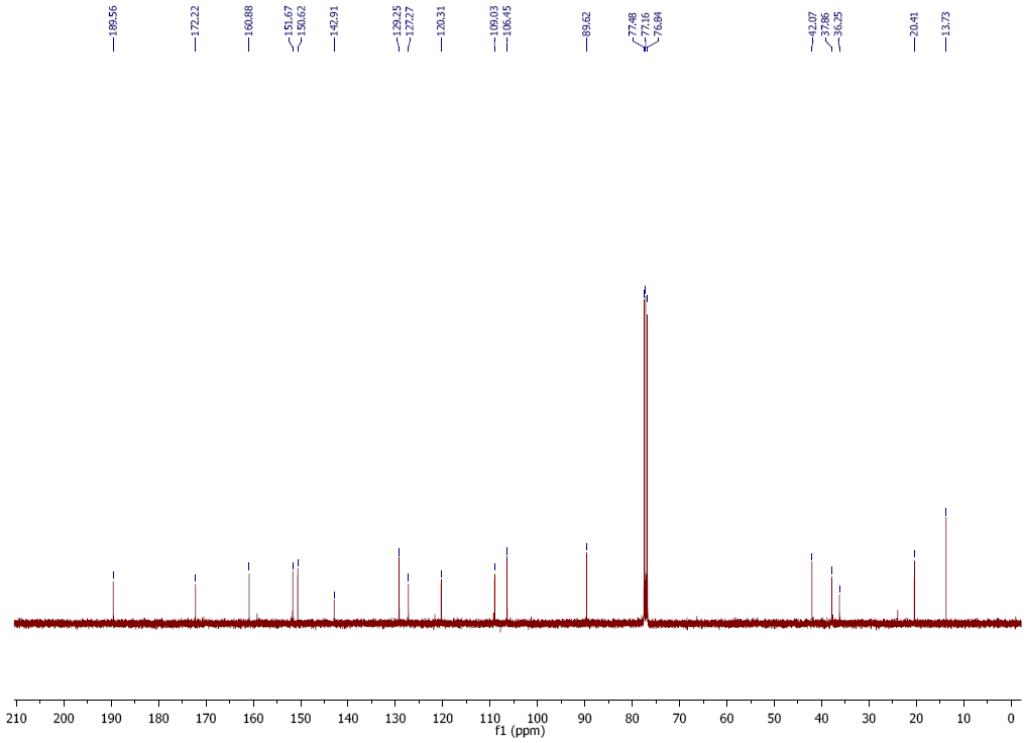
400 MHz ^{1}H NMR spectra of compound **7f** in $CDCl_3$



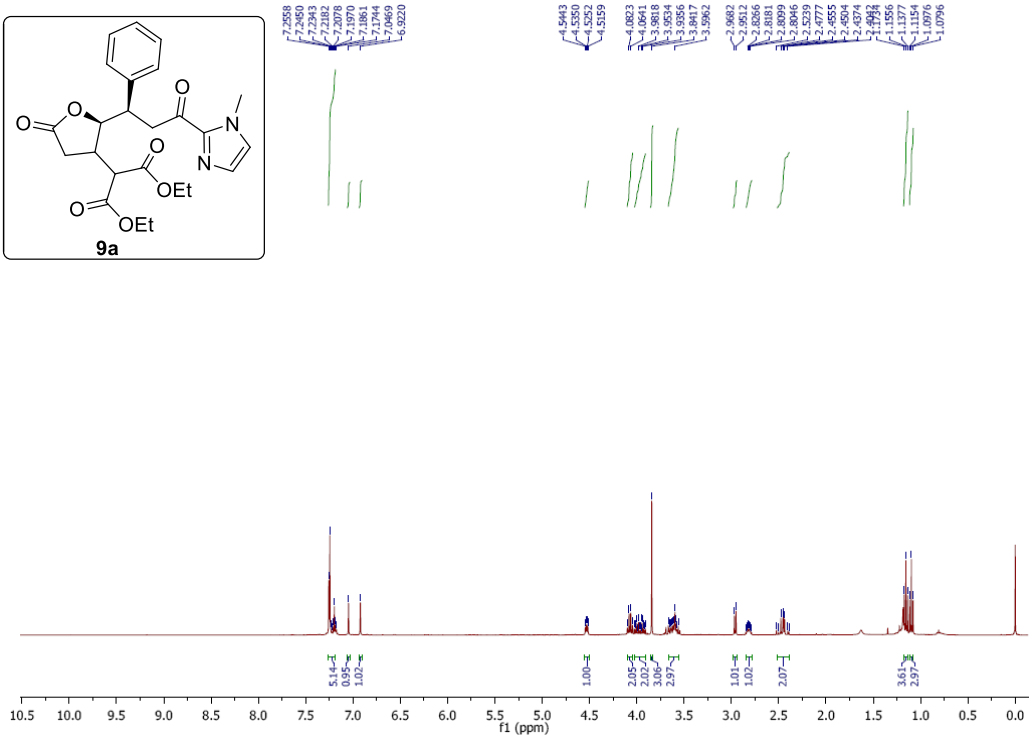
100 MHz ^{13}C NMR spectra of compound **7f** in $CDCl_3$



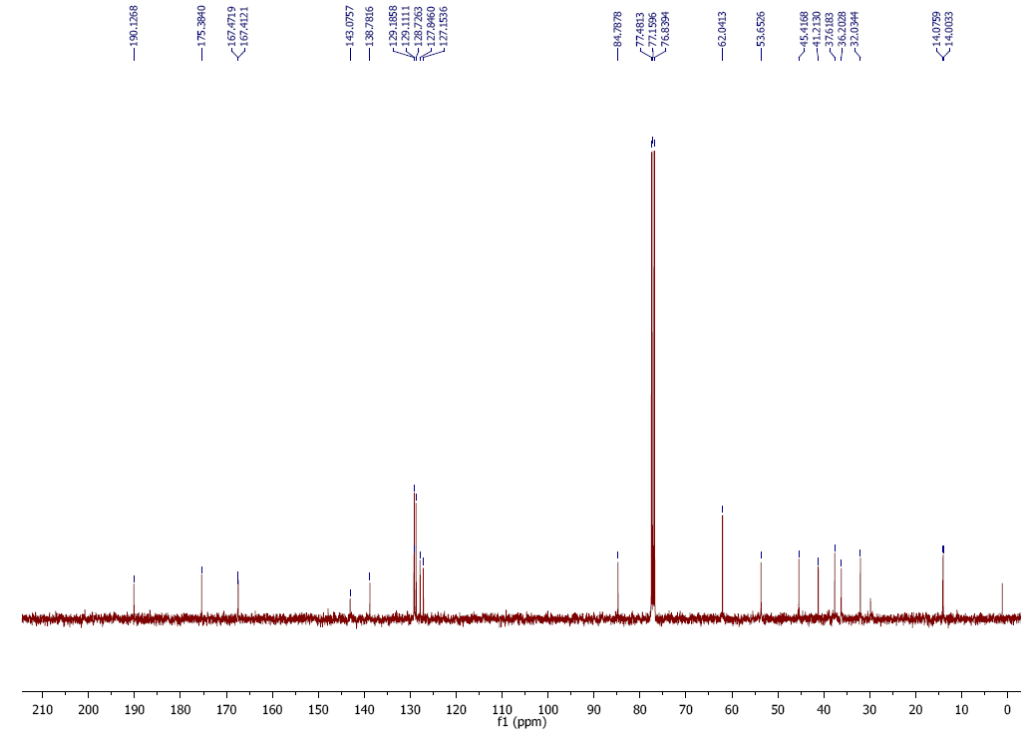
400 MHz ^{1}H NMR spectra of compound **7g** in $CDCl_3$



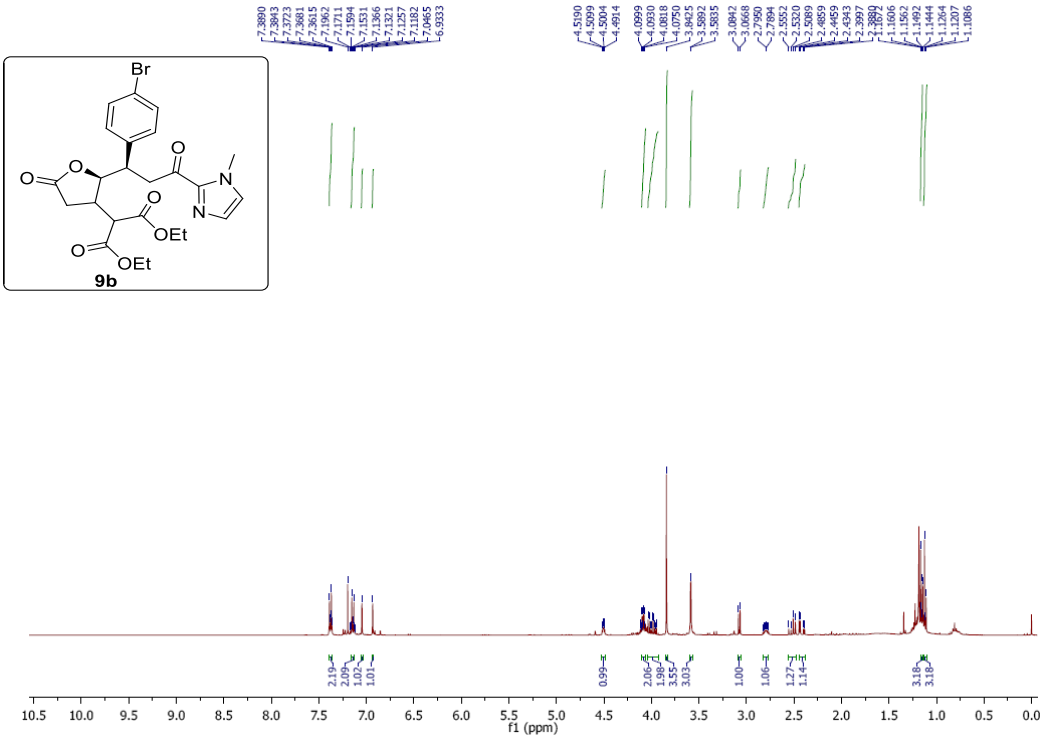
100 MHz ^{13}C NMR spectra of compound **7g** in $CDCl_3$



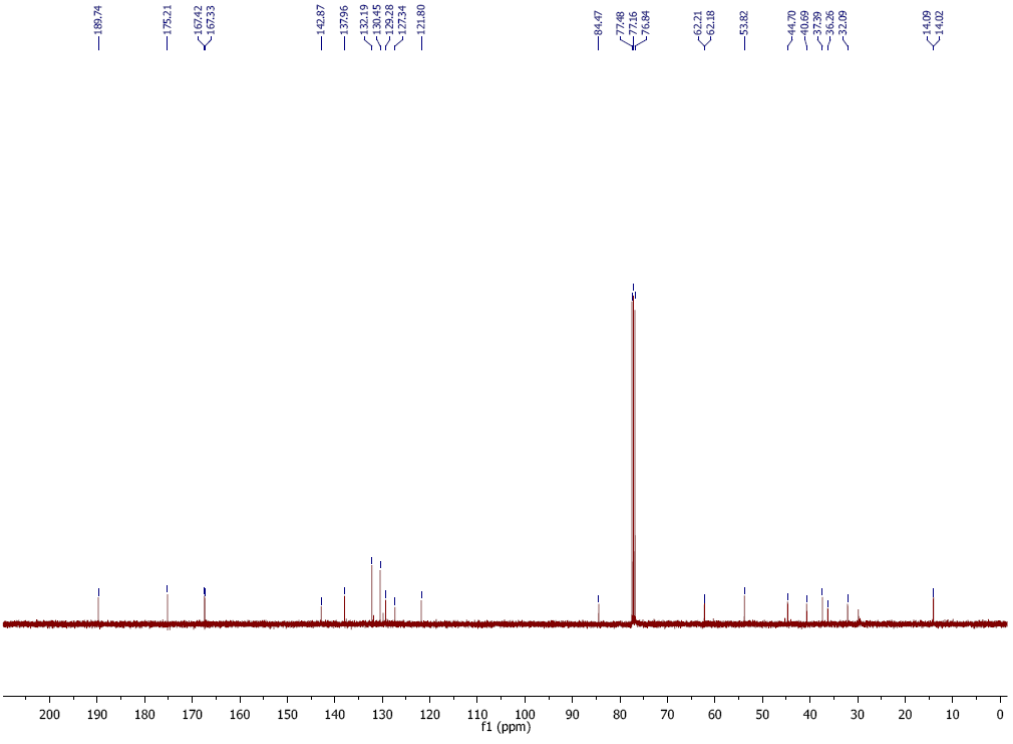
400 MHz ^{1}H NMR spectra of compound **9a** in $CDCl_3$



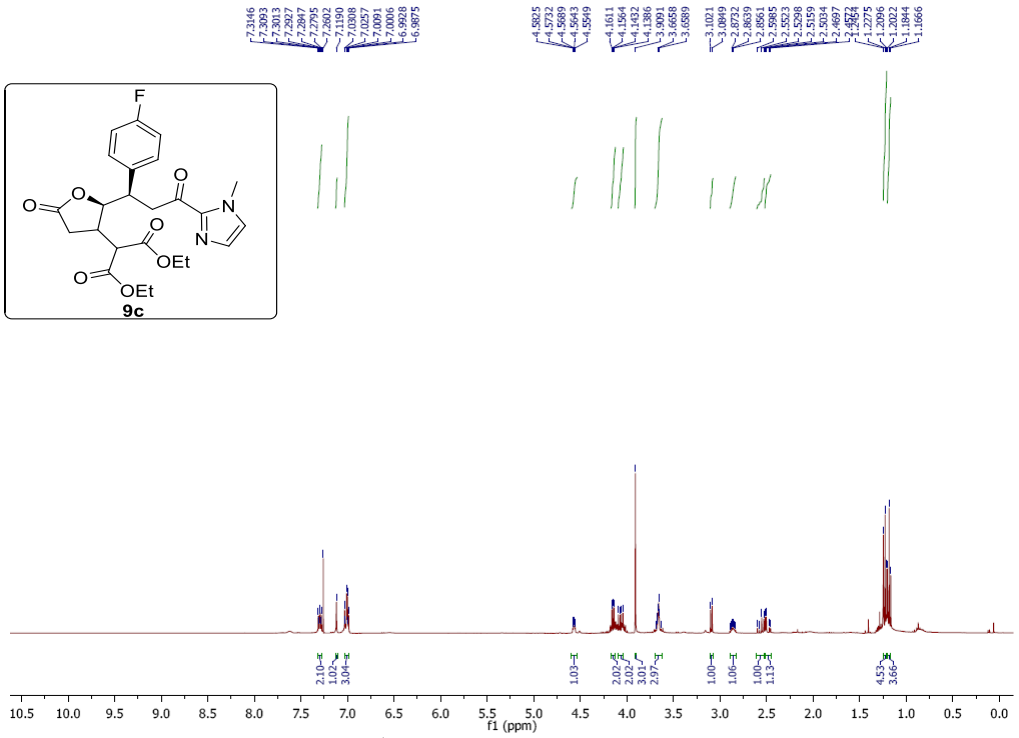
100 MHz ^{13}C NMR spectra of compound **9a** in $CDCl_3$



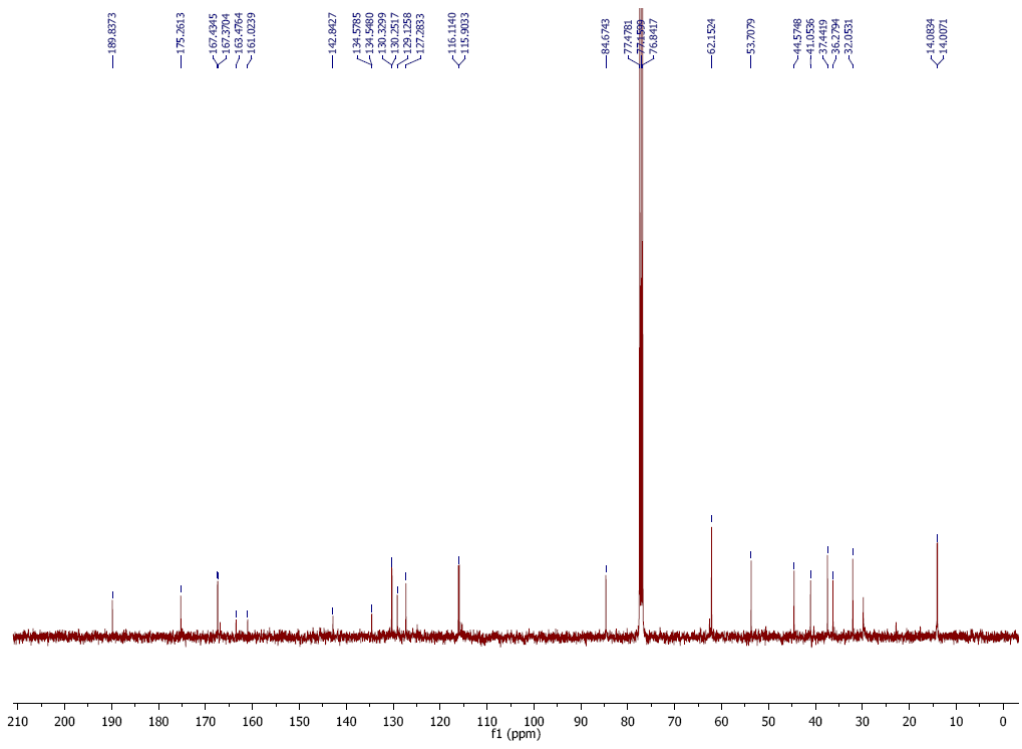
400 MHz ^{1}H NMR spectra of compound **9b** in $CDCl_3$



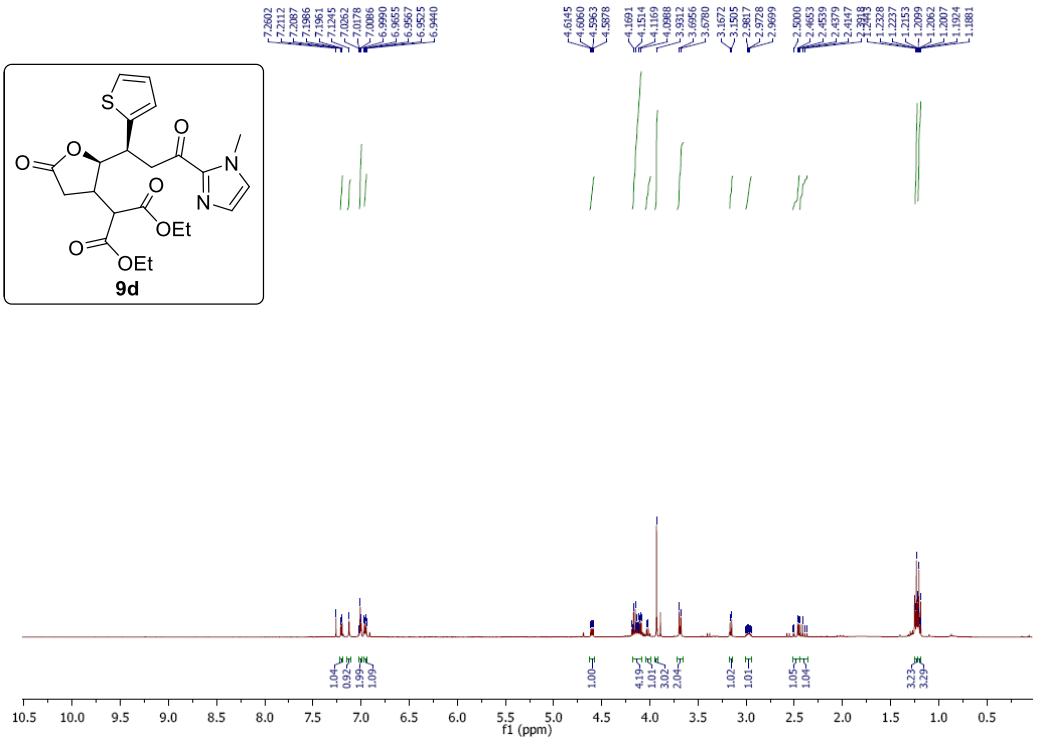
100 MHz ^{13}C NMR spectra of compound **9b** in $CDCl_3$



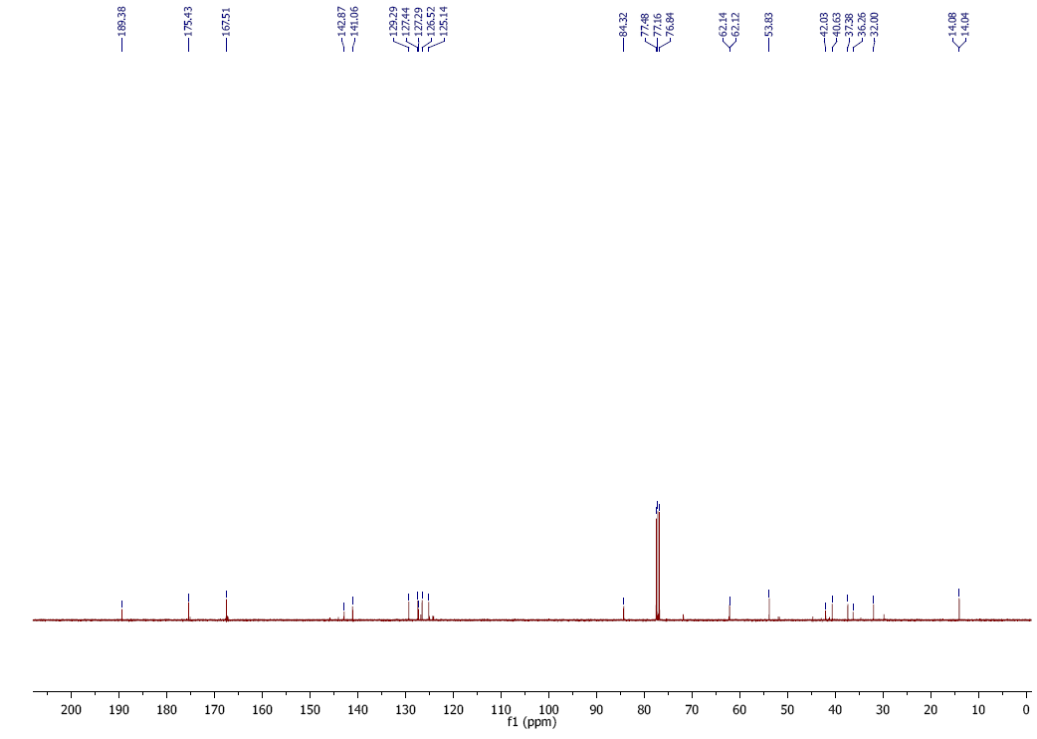
400 MHz ^{1}H NMR spectra of compound **9c** in $CDCl_3$



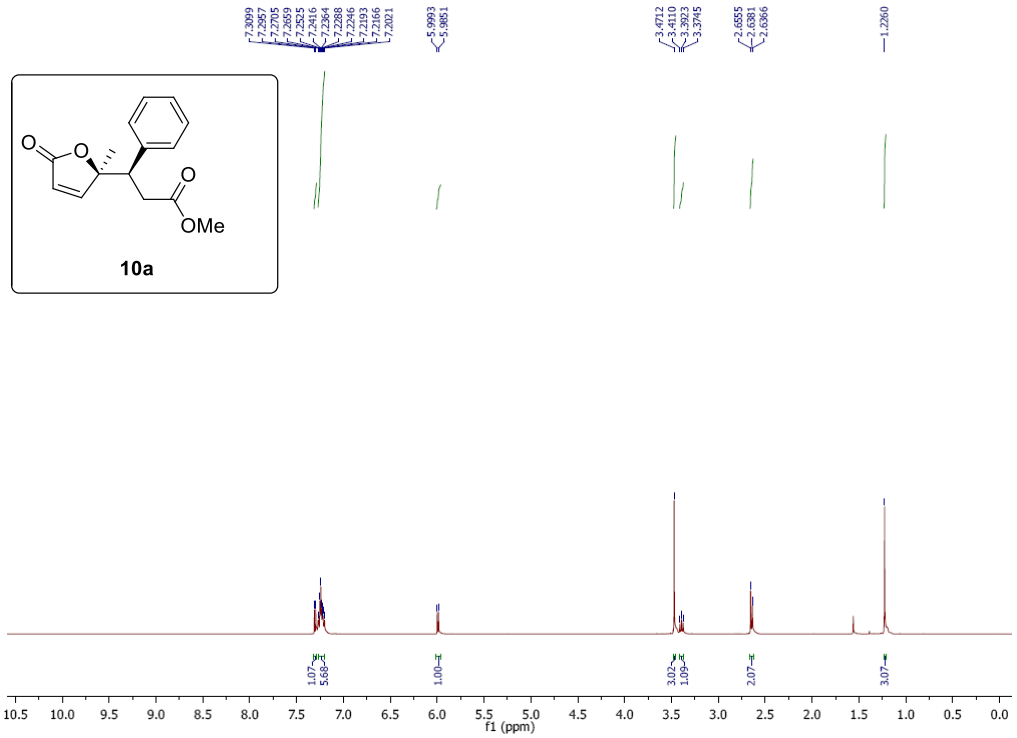
100 MHz ^{13}C NMR spectra of compound **9c** in $CDCl_3$



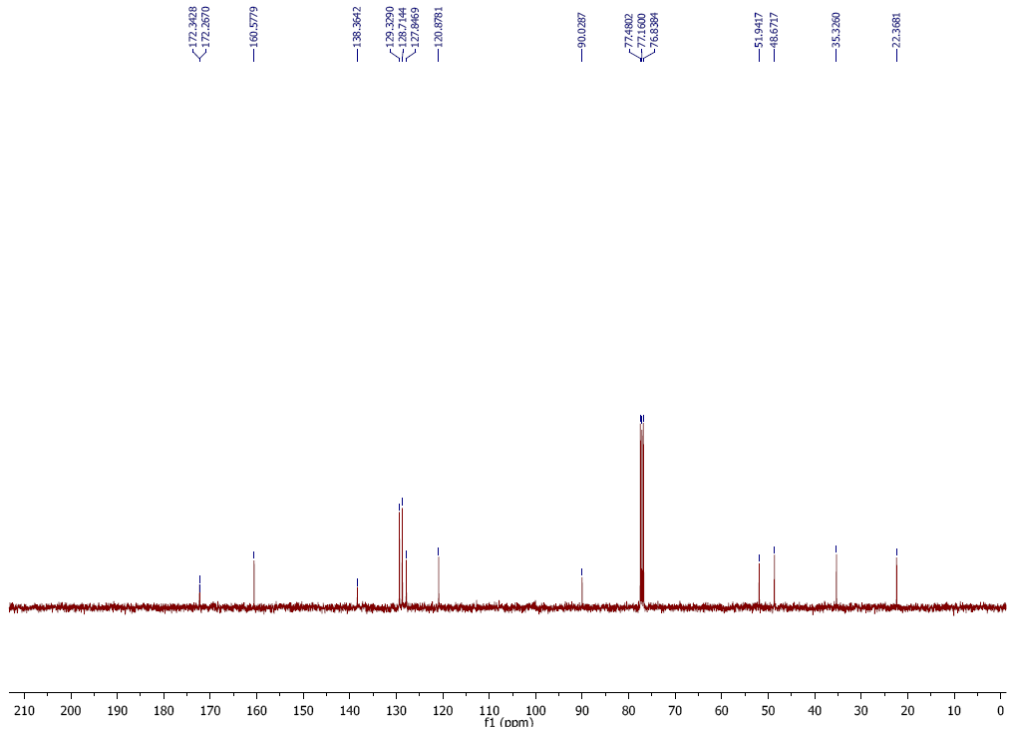
400 MHz ^{1}H NMR spectra of compound **9d** in $CDCl_3$



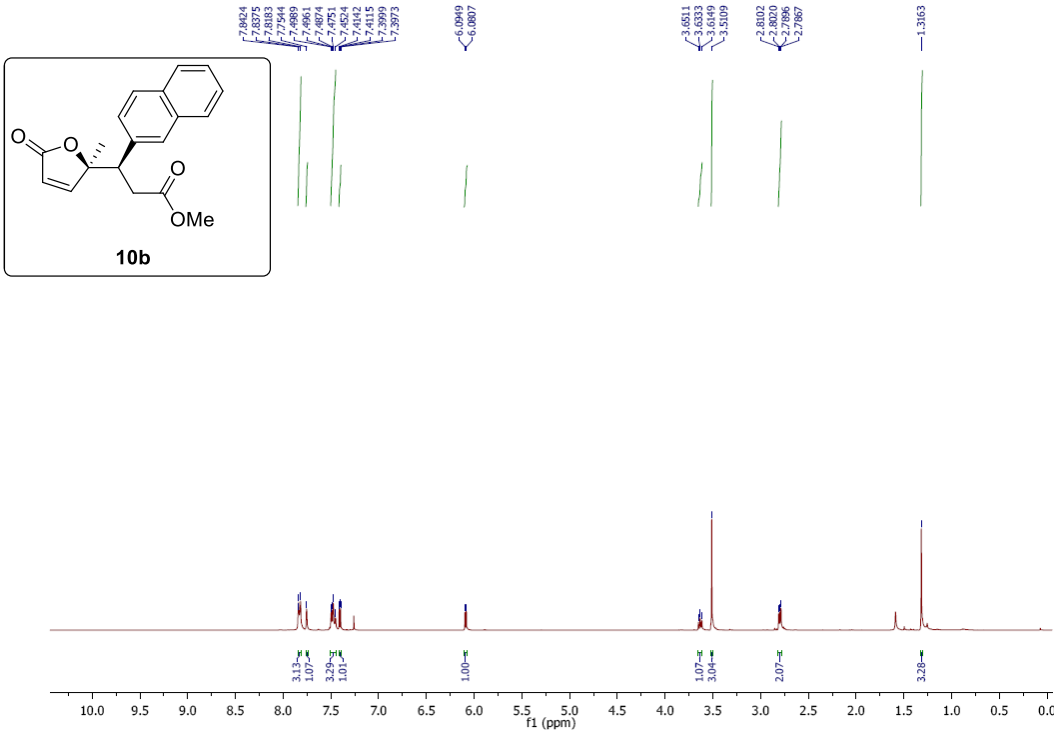
100 MHz ^{13}C NMR spectra of compound **9d** in $CDCl_3$



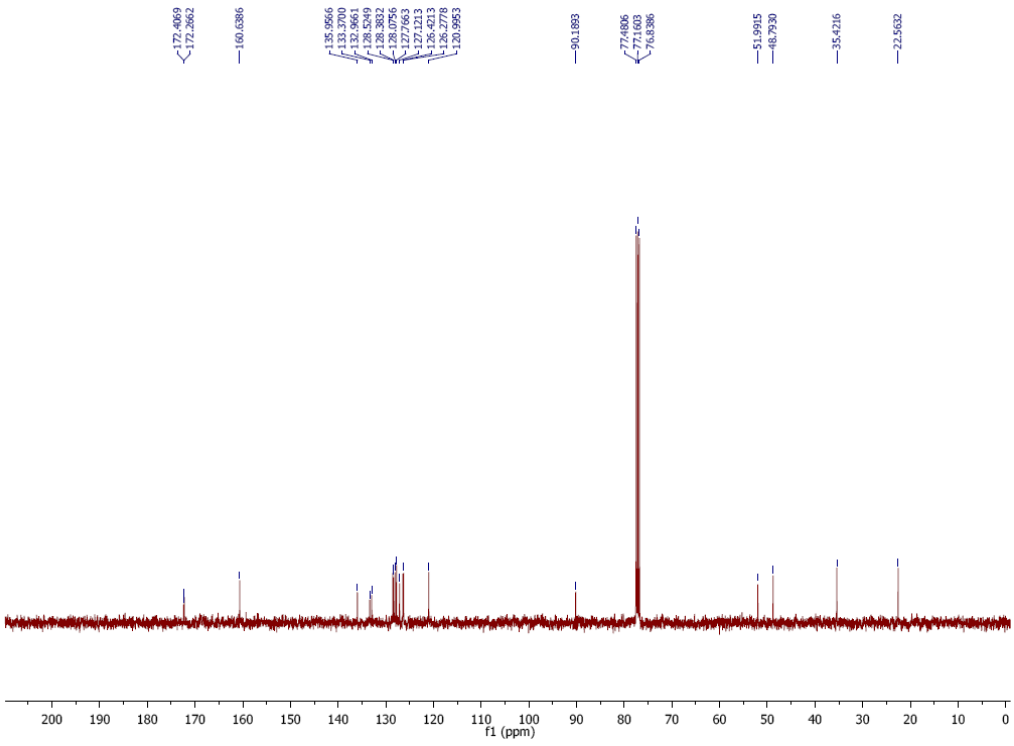
400 MHz ^{1}H NMR spectra of compound **10a** in $CDCl_3$



100 MHz ^{13}C NMR spectra of compound **10a** in $CDCl_3$

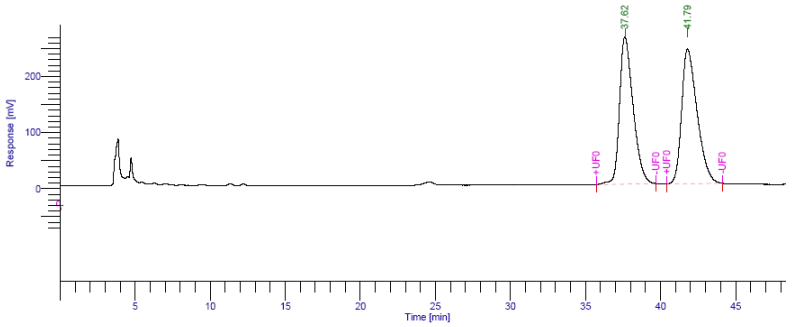


400 MHz ^{1}H NMR spectra of compound **10b** in $CDCl_3$



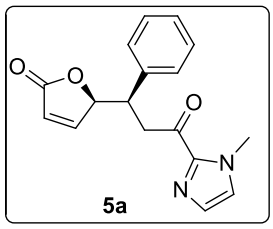
100 MHz ^{13}C NMR spectra of compound **10b** in $CDCl_3$

14. HPLC graph:

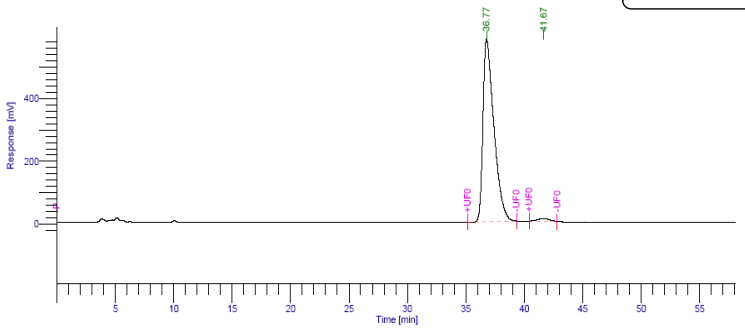


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		37.617	16518540.94	263012.66	48.95	48.95
2		41.793	17225906.92	240608.52	51.05	51.05
			33744447.86	503621.18	100.00	100.00



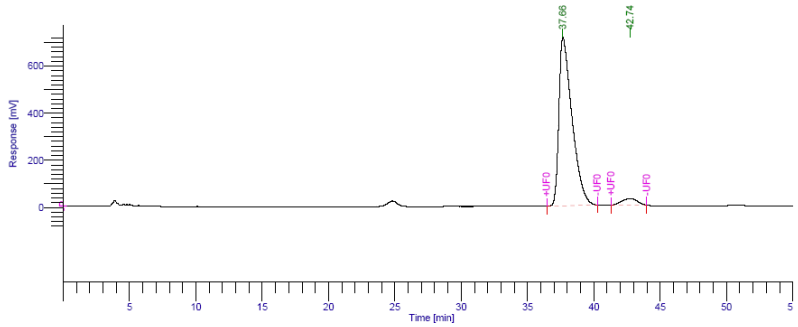
HPLC graph of racemic **5a**



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		36.770	37725445.80	581640.33	98.23	98.23
2		41.673	679262.74	9308.27	1.77	1.77
			38404708.53	590948.60	100.00	100.00

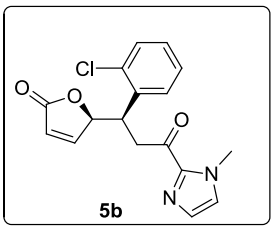
HPLC graph of enantioenriched **5a** [For Sc(III)-**2g**]

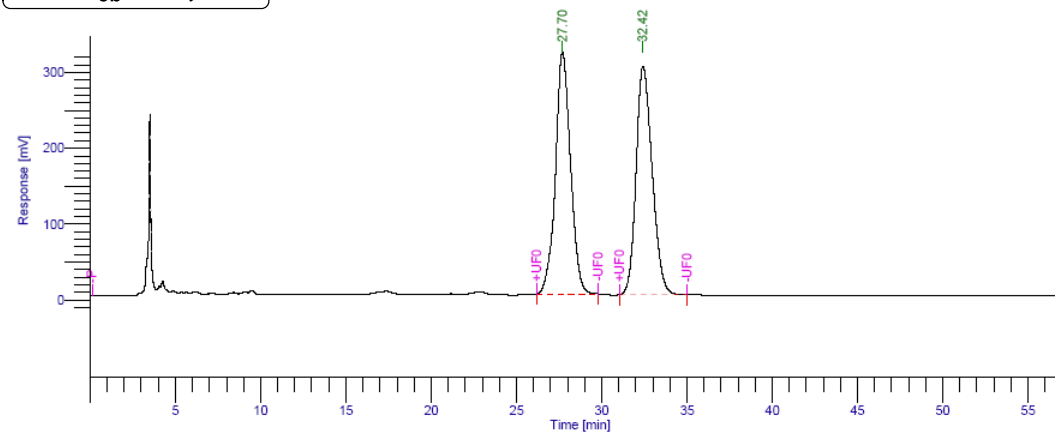


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		37.665	49200961.82	716972.69	95.52	95.52
2		42.740	2305226.72	28412.05	4.48	4.48
			51506188.54	745384.74	100.00	100.00

HPLC graph of enantioenriched **5a** [For Er(III)-**2g**]

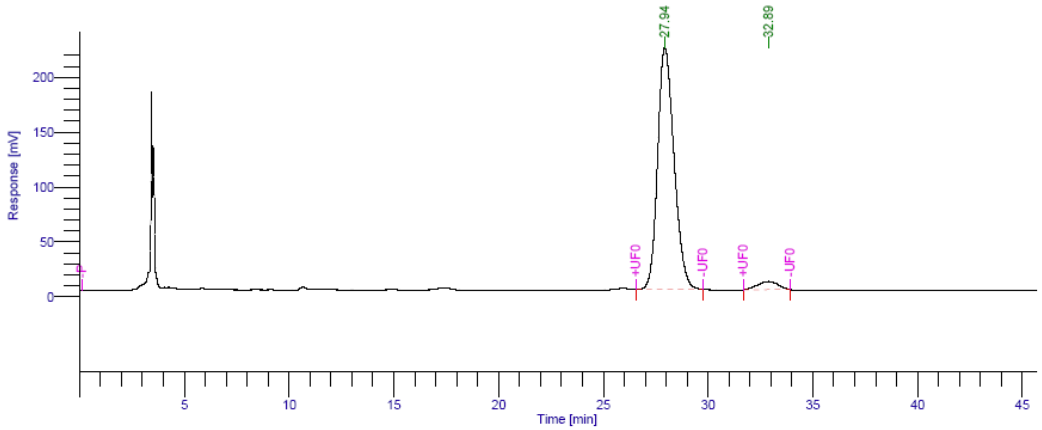




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		27.695	19557162.28	318863.27	49.75	49.75
2		32.420	19749996.92	301527.46	50.25	50.25
			39307159.19	620390.73	100.00	100.00

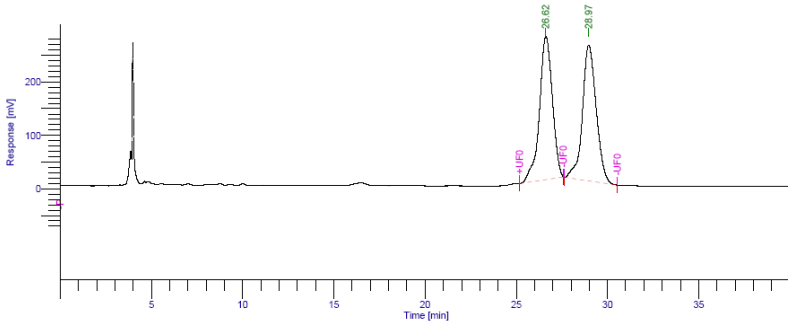
HPLC graph of racemic **5b**



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		27.938	12028897.36	220599.41	95.92	95.92
2		32.887	511833.30	7513.73	4.08	4.08
			12540730.66	228113.14	100.00	100.00

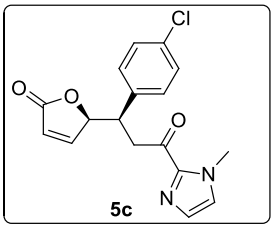
HPLC graph of enantioenriched **5b**

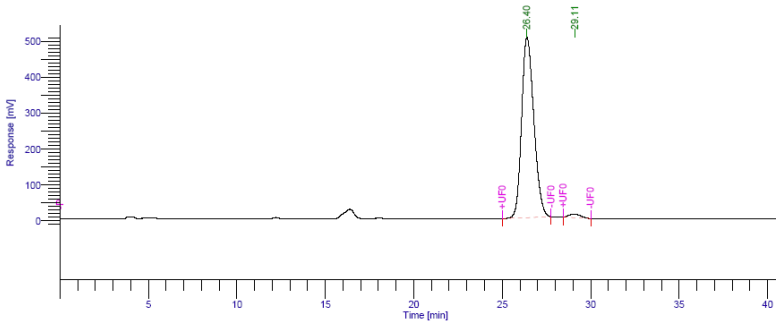


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		26.618	13210135.98	268165.22	49.76	49.76
2		28.970	13338416.70	254179.08	50.24	50.24
			26548552.68	522344.31	100.00	100.00

HPLC graph of racemic **5c**

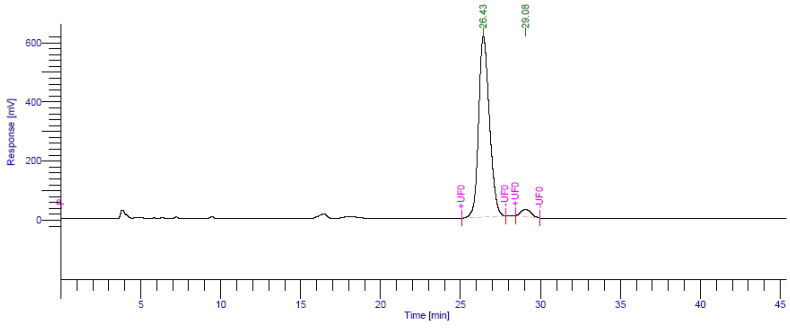




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		26.402	24211424.72	503298.21	98.17	98.17
2		29.107	451988.82	10398.75	1.83	1.83
			24663413.54	513696.96	100.00	100.00

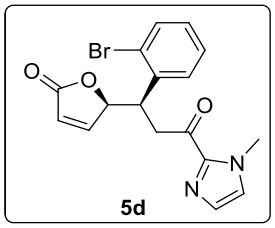
HPLC graph of enantioenriched **5c** [For Sc(III)-**2g**]

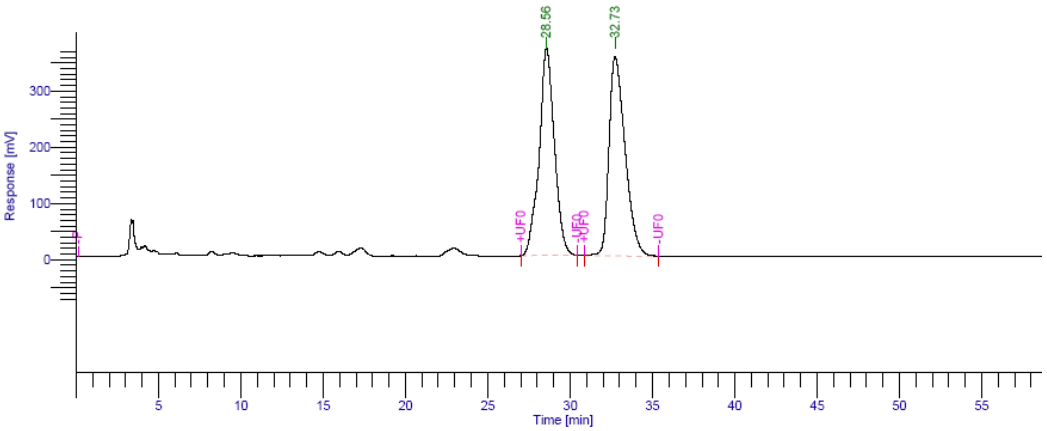


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		26.427	28697587.85	612493.44	96.46	96.46
2		29.083	1054131.33	24837.32	3.54	3.54
			29751719.18	637330.75	100.00	100.00

HPLC graph of enantioenriched **5c** [For Er(III)-**2g**]

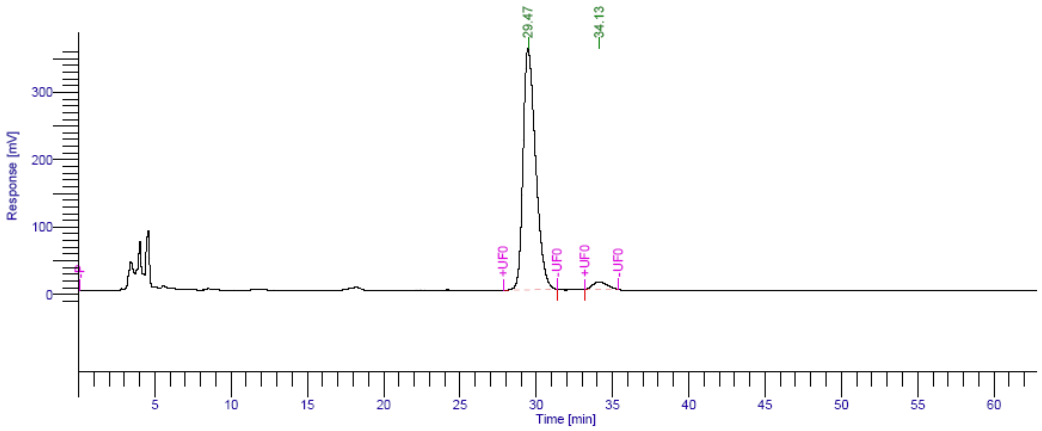




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		28.560	23840193.35	368963.88	49.75	49.75
2		32.733	24082610.71	354583.69	50.25	50.25
			47922804.05	723547.57	100.00	100.00

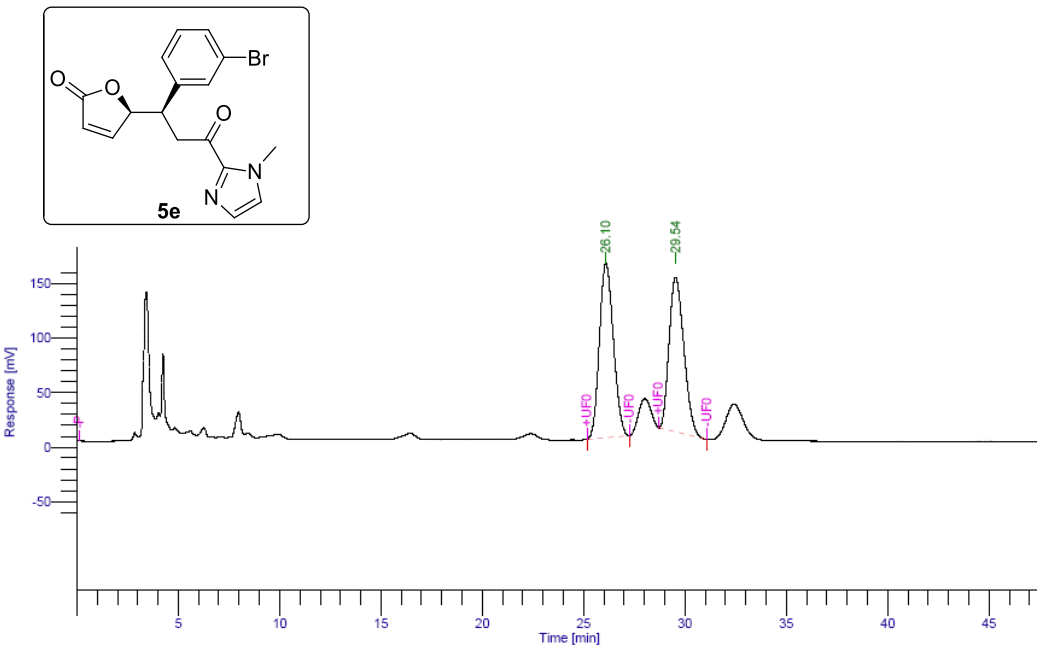
HPLC graph of racemic **5d**



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		29.468	20424758.81	358791.14	96.45	96.45
2		34.133	751794.43	11029.20	3.55	3.55
			21176553.24	369820.34	100.00	100.00

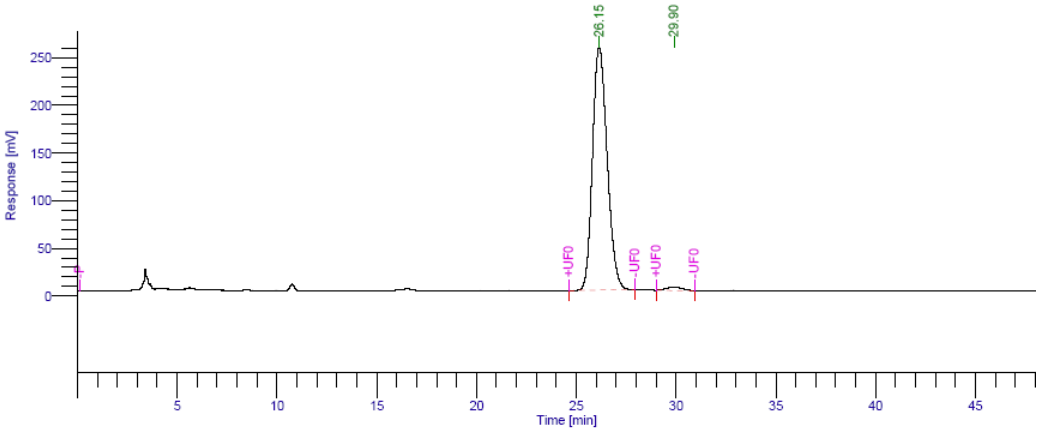
HPLC graph of enantioenriched **5d**



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		26.098	7661002.42	160126.12	51.56	51.56
2		29.543	7197054.51	141890.48	48.44	48.44
			14858056.93	302016.60	100.00	100.00

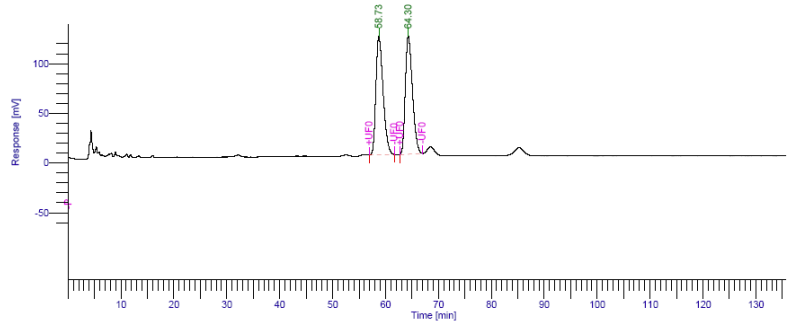
HPLC graph of racemic **5e**



DEFAULT REPORT

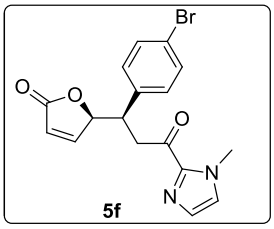
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		26.145	12983125.63	254732.79	98.51	98.51
2		29.897	196096.22	3757.99	1.49	1.49
			13179221.85	258490.78	100.00	100.00

HPLC graph of enantioenriched **5e**

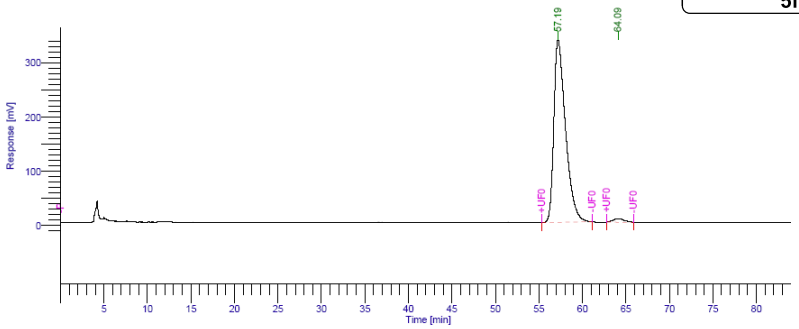


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		58.730	11265337.14	119069.11	50.48	50.48
2		64.302	11051954.70	118910.06	49.52	49.52
			22317291.83	237979.17	100.00	100.00



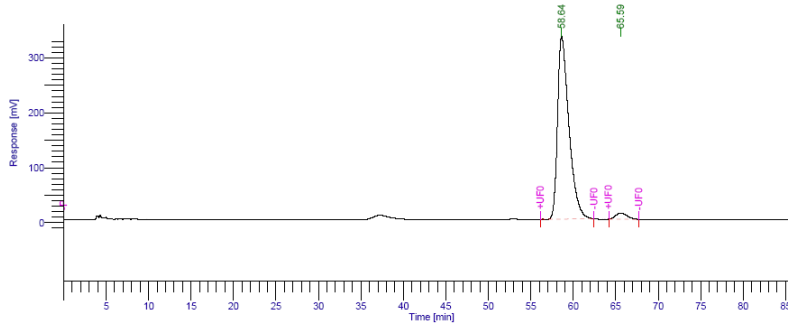
HPLC graph of racemic **5f**



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		57.193	31350402.94	337106.68	98.30	98.30
2		64.088	542567.26	6012.91	1.70	1.70
			31892970.20	343119.59	100.00	100.00

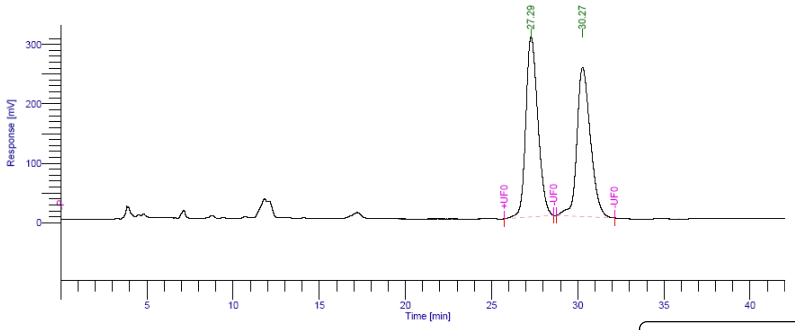
HPLC graph of enantioenriched **5f** [For Sc(III)-**2g**]



DEFAULT REPORT

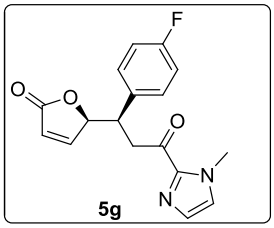
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		58.635	30934838.74	332784.72	96.69	96.69
2		65.595	1058266.04	11006.25	3.31	3.31
			31993104.78	343790.97	100.00	100.00

HPLC graph of enantioenriched **5f** [For Er(III)-**2g**]

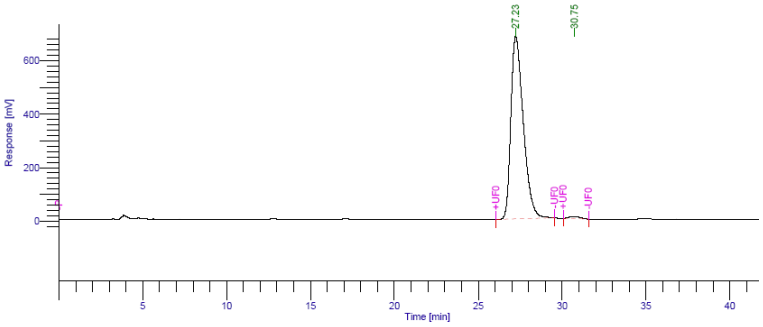


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		27.287	14707062.13	302756.46	51.81	51.81
2		30.275	13679726.86	251354.04	48.19	48.19
			28386788.99	554110.49	100.00	100.00



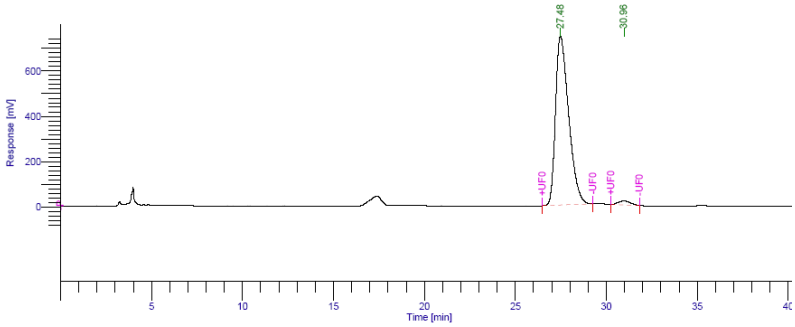
HPLC graph of racemic **5g**



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		27.232	35124179.86	683124.21	98.93	98.93
2		30.747	379973.39	8312.66	1.07	1.07
			35504153.25	691436.87	100.00	100.00

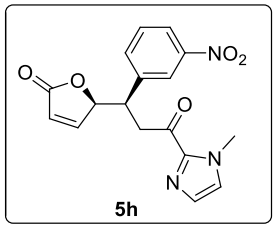
HPLC graph of enantioenriched **5g** [For Sc(III)-**2g**]

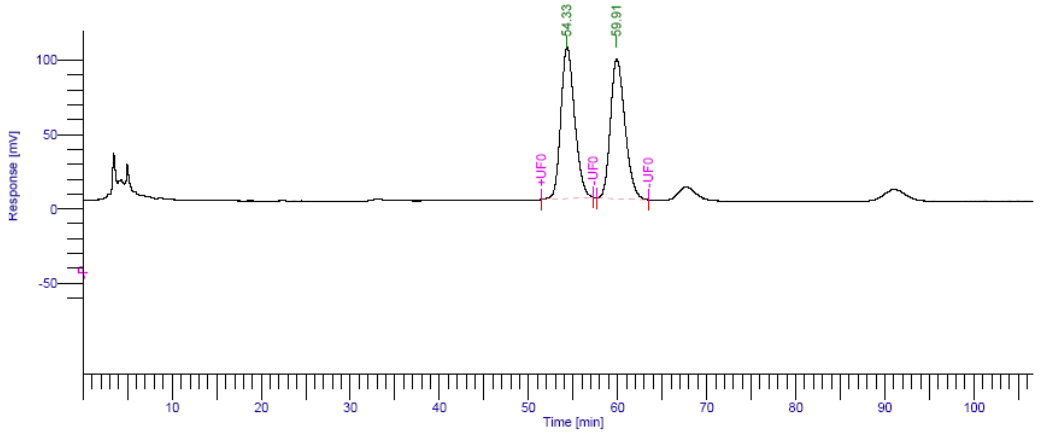


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		27.477	37273760.22	743434.71	97.92	97.92
2		30.962	793203.18	17329.41	2.08	2.08
			38066963.40	760764.12	100.00	100.00

HPLC graph of enantioenriched **5g** [For Er(III)-**2g**]

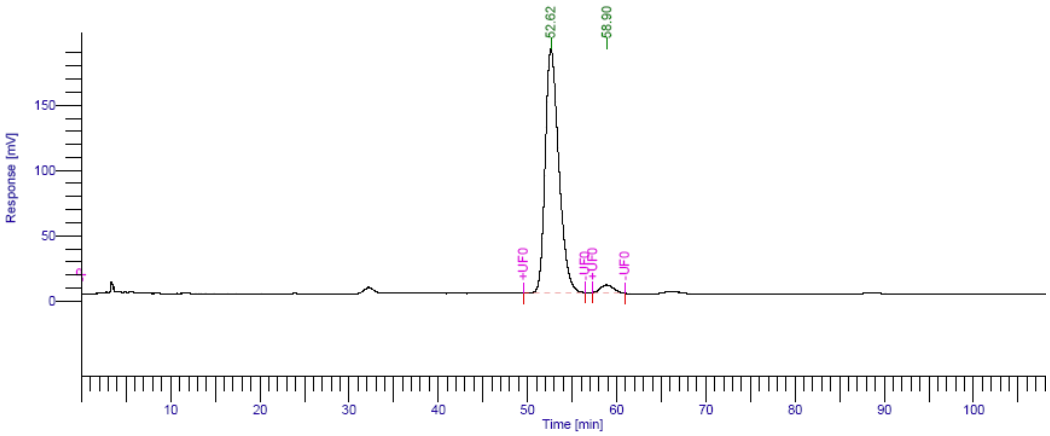




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		54.328	10960571.05	102091.62	50.68	50.68
2		59.905	10668298.14	94173.15	49.32	49.32
			21628869.20	196264.77	100.00	100.00

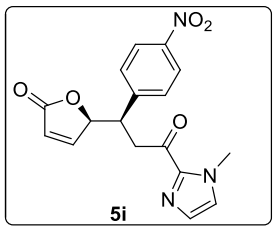
HPLC graph of racemic **5h**

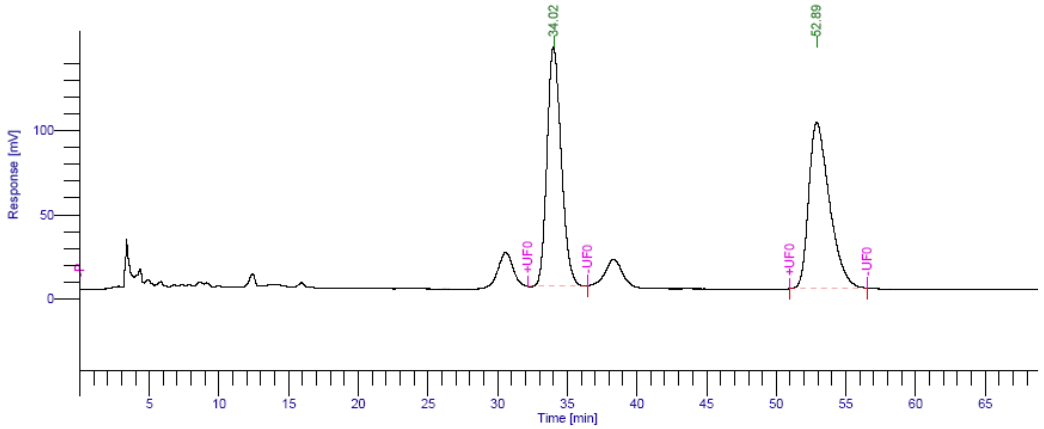


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		52.622	19761879.32	187000.40	96.98	96.98
2		58.898	614482.49	6068.84	3.02	3.02
			20376361.81	193069.23	100.00	100.00

HPLC graph of enantioenriched **5h**

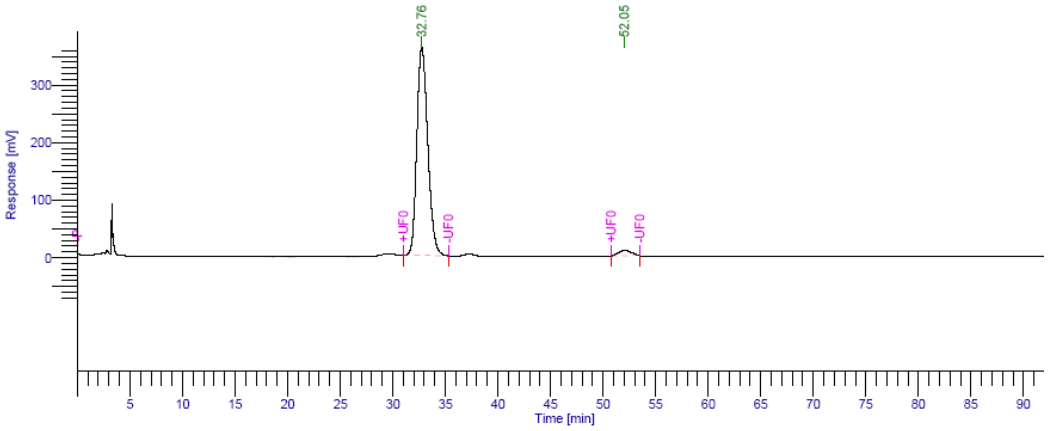




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		34.015	10086081.05	142146.20	49.65	49.65
2		52.892	10226420.26	98585.46	50.35	50.35
			20312501.31	240731.66	100.00	100.00

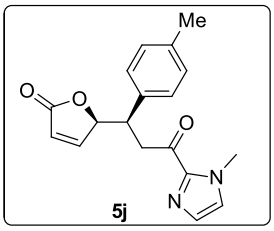
HPLC graph of racemic **5i**

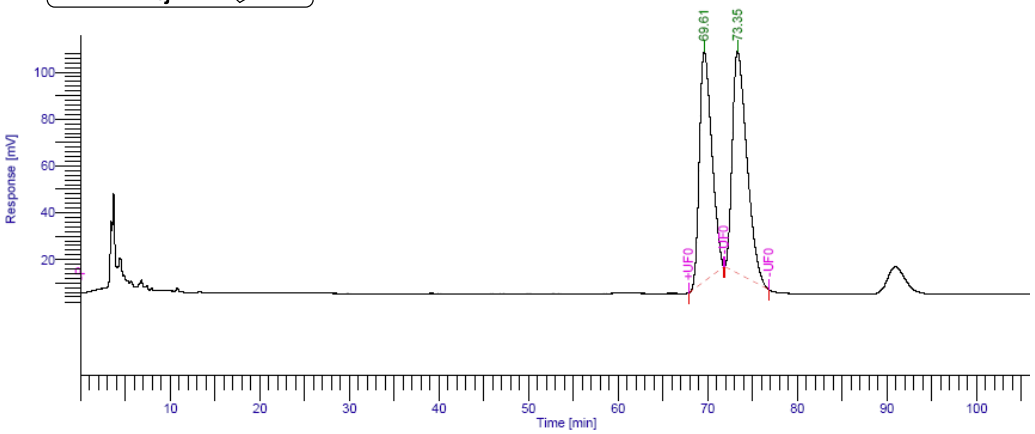


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		32.760	26176082.55	362160.92	97.14	97.14
2		52.047	771613.80	8929.78	2.86	2.86
			26947696.35	371090.70	100.00	100.00

HPLC graph of enantioenriched **5i**

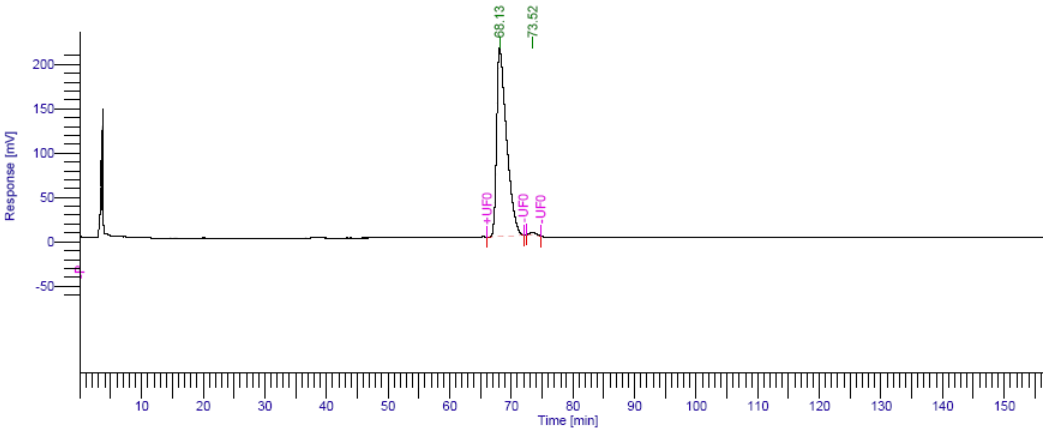




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		69.610	9380965.66	98166.02	46.74	46.74
2		73.350	10691518.62	94835.18	53.26	53.26
			20072484.29	193001.20	100.00	100.00

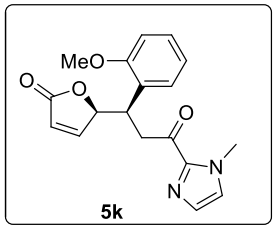
HPLC graph of racemic **5j**

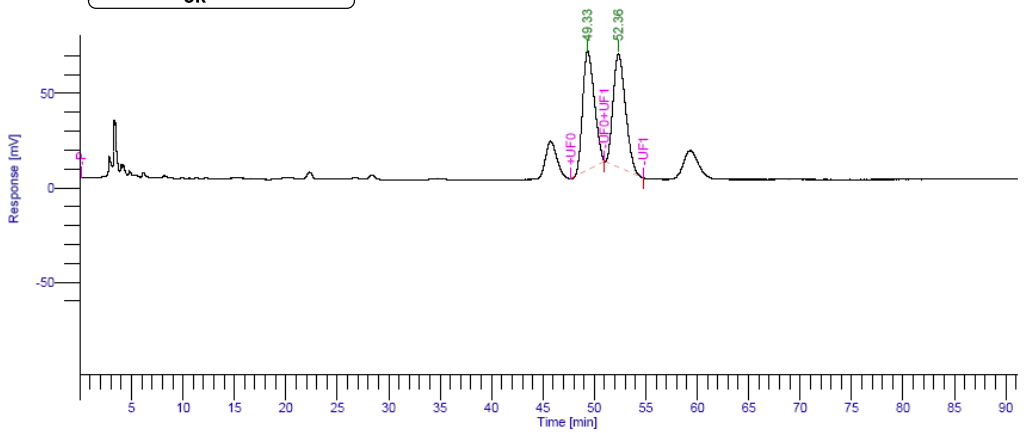


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		68.125	23729511.42	212848.94	98.96	98.96
2		73.517	249564.73	3126.37	1.04	1.04
			23979076.15	215975.31	100.00	100.00

HPLC graph of enantioenriched **5j**

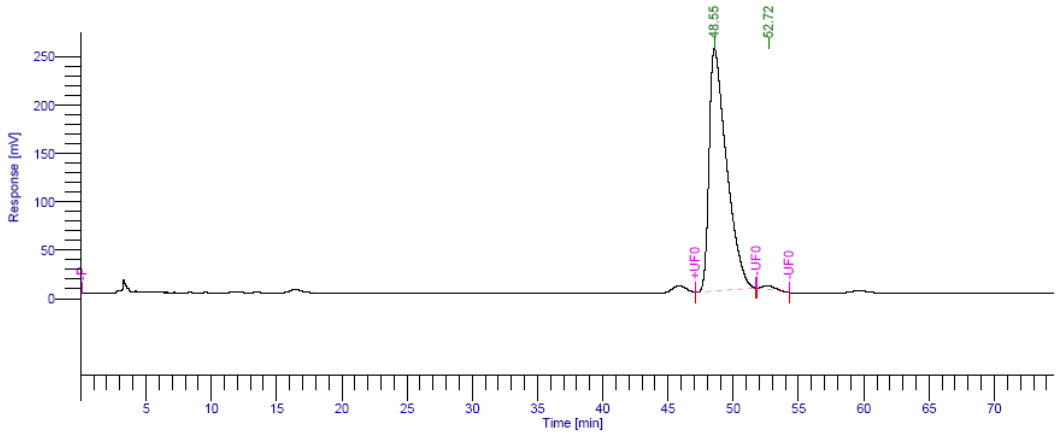




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		49.333	4929610.34	62957.52	49.59	49.59
2		52.360	5011969.19	60025.84	50.41	50.41
			9941579.52	122983.37	100.00	100.00

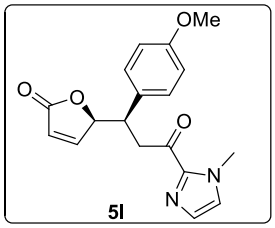
HPLC graph of racemic **5k**

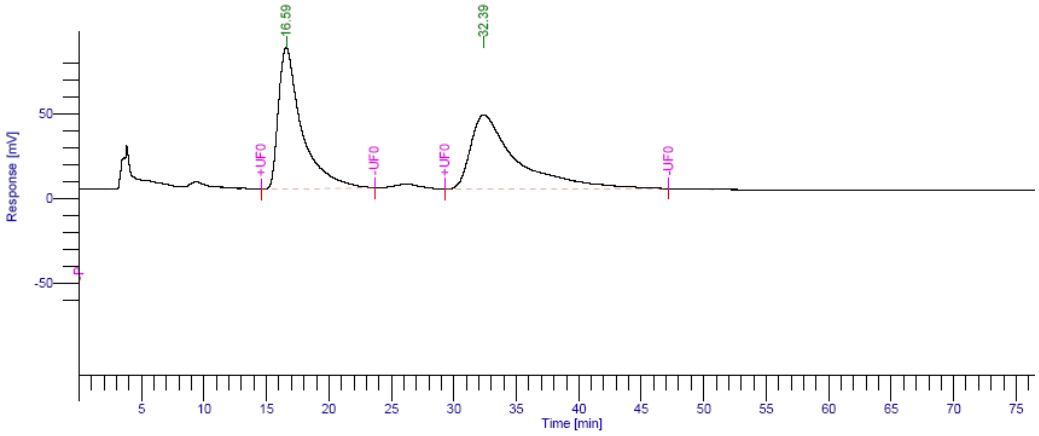


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		48.552	23299092.64	251258.06	98.90	98.90
2		52.722	260257.34	3841.36	1.10	1.10
			23559349.98	255099.42	100.00	100.00

HPLC graph of enantioenriched **5k**

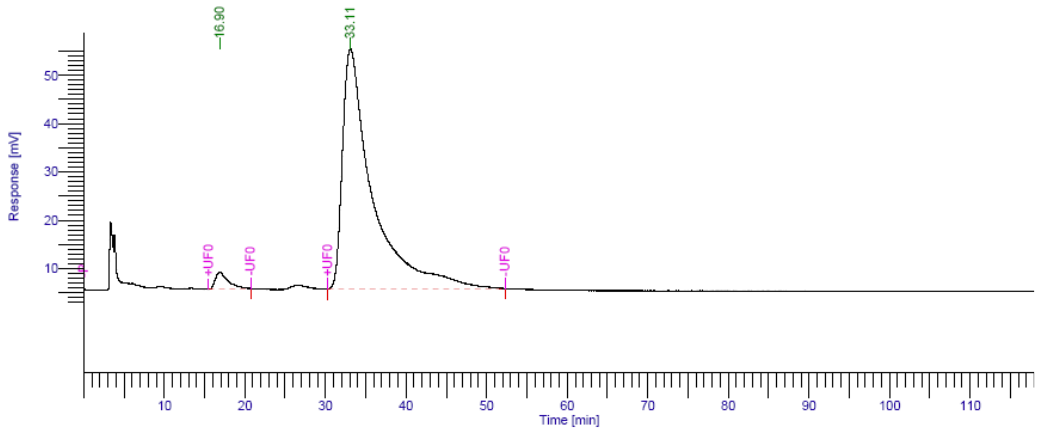




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		16.588	10860882.99	83677.58	49.24	49.24
2		32.393	11196666.18	43707.95	50.76	50.76
			22057549.17	127385.53	100.00	100.00

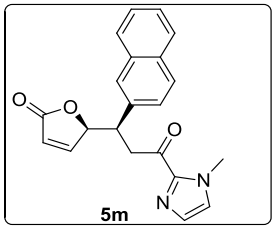
HPLC graph of racemic **5l**

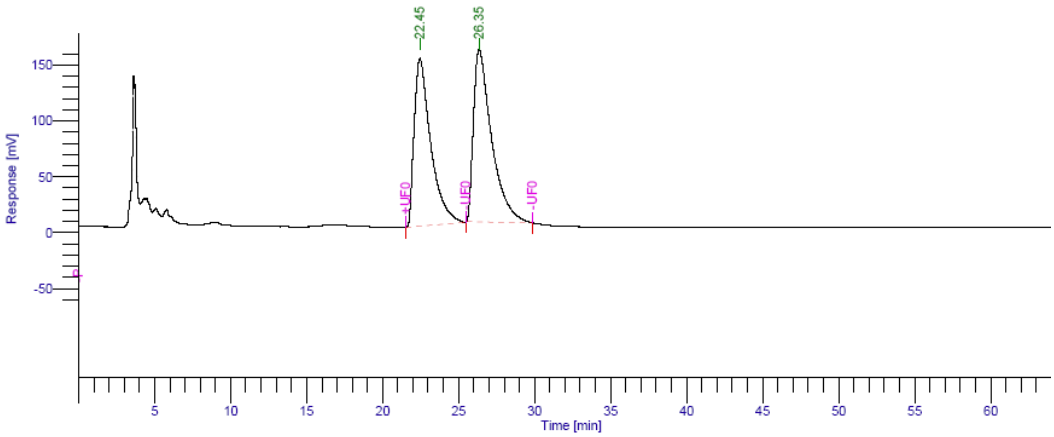


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		16.895	381619.08	3558.13	2.89	2.89
2		33.107	12819761.44	49744.89	97.11	97.11
			13201380.51	53303.02	100.00	100.00

HPLC graph of enantioenriched **5l**

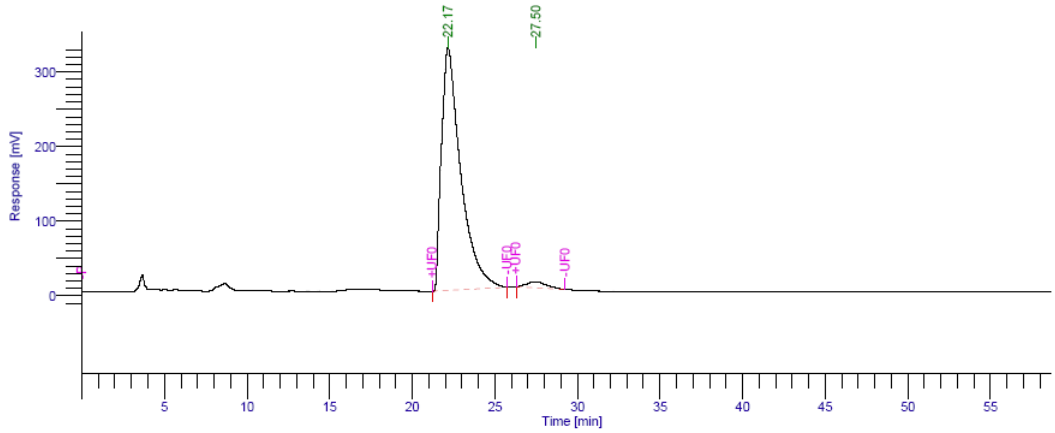




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		22.450	11328949.38	150107.00	47.05	47.05
2		26.353	12751543.70	154299.56	52.95	52.95
			24080493.09	304406.56	100.00	100.00

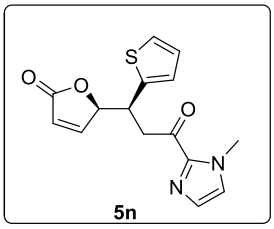
HPLC graph of racemic **5m**



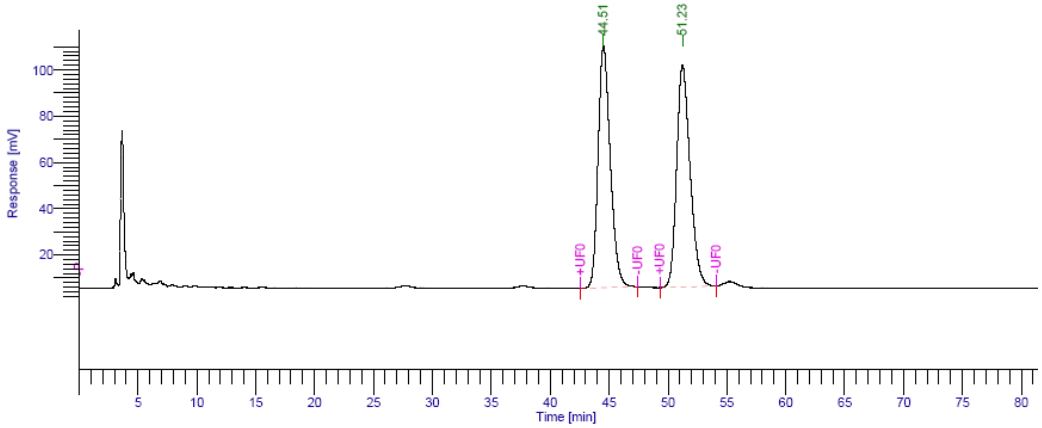
DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		22.168	26386210.87	325359.90	97.44	97.44
2		27.497	692270.05	8156.57	2.56	2.56
			27078480.92	333516.47	100.00	100.00

HPLC graph of enantioenriched **5m**



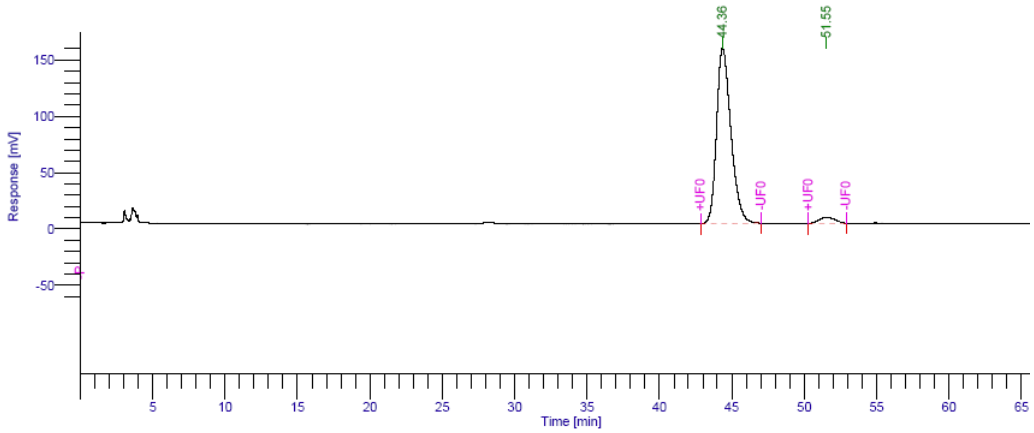
5n



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		44.513	7525370.60	104525.41	49.80	49.80
2		51.225	7586354.40	95837.38	50.20	50.20
			15111725.00	200362.79	100.00	100.00

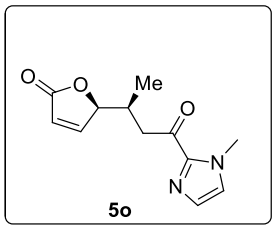
HPLC graph of racemic **5n**



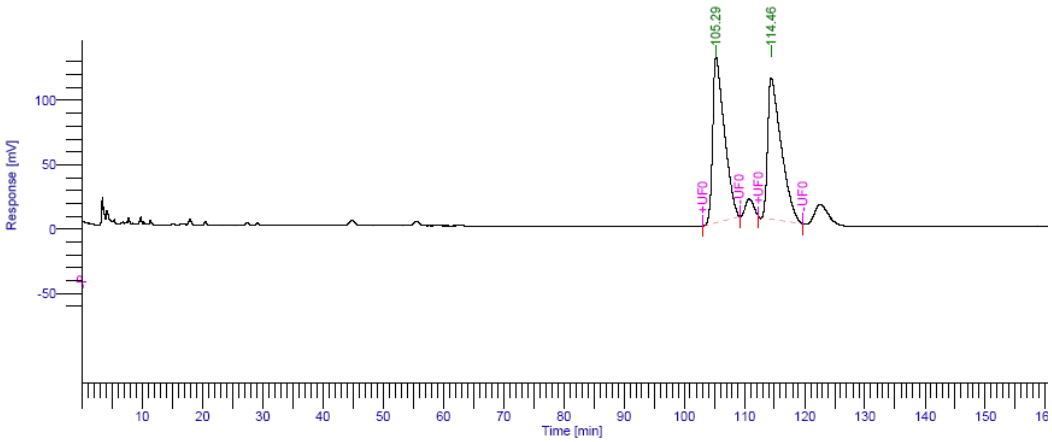
DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		44.362	10710211.84	155677.27	96.39	96.39
2		51.553	400844.74	5254.74	3.61	3.61
			11111056.58	160932.01	100.00	100.00

HPLC graph of enantioenriched **5n**



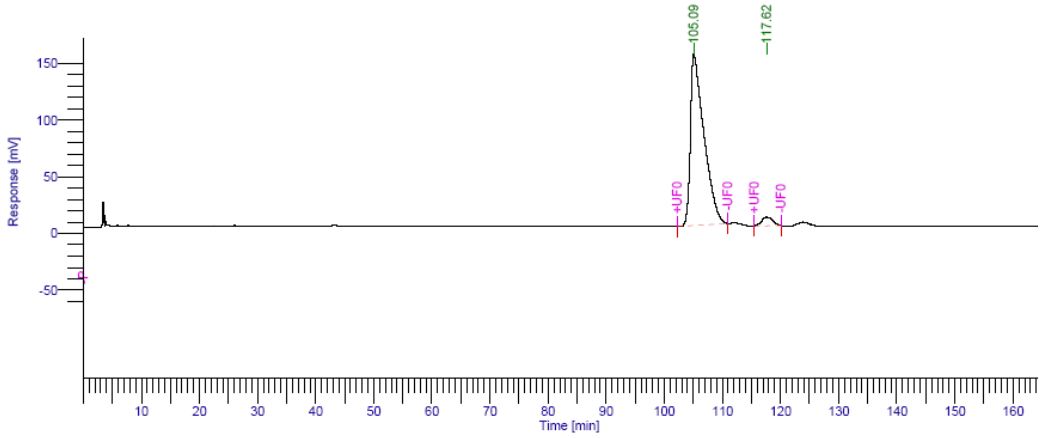
5o



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		105.290	17334745.27	129201.27	50.26	50.26
2		114.458	17152583.98	109869.29	49.74	49.74
			34487329.25	239070.56	100.00	100.00

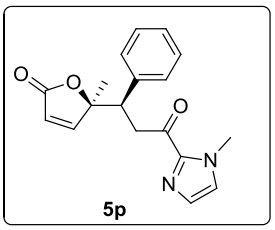
HPLC graph of racemic **5o**

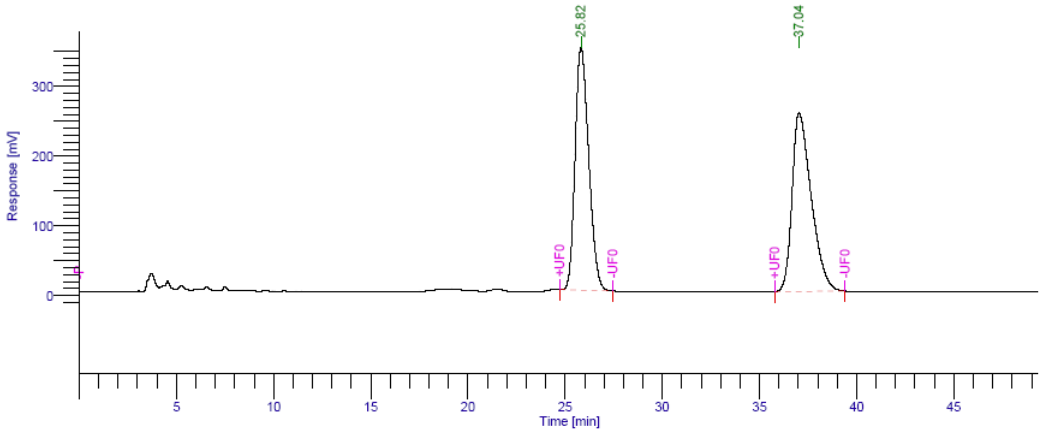


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		105.085	24394342.13	151352.93	96.07	96.07
2		117.615	998442.86	7581.02	3.93	3.93
			25392784.99	158933.95	100.00	100.00

HPLC graph of enantioenriched **5o**

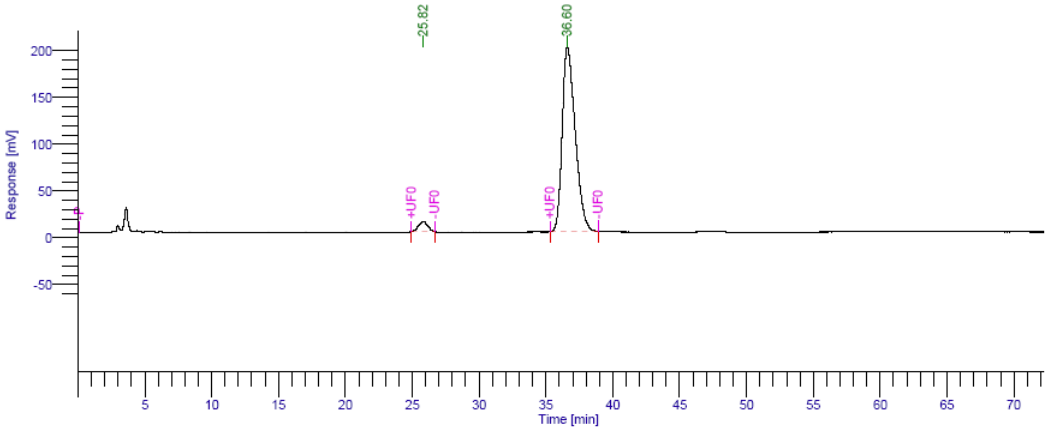




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		25.822	16945073.29	348095.20	49.17	49.17
2		37.040	17518511.43	256411.07	50.83	50.83
			34463584.72	604506.27	100.00	100.00

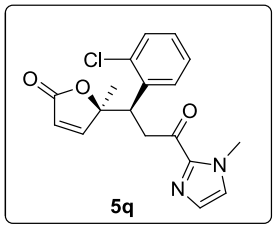
HPLC graph of racemic **5p**

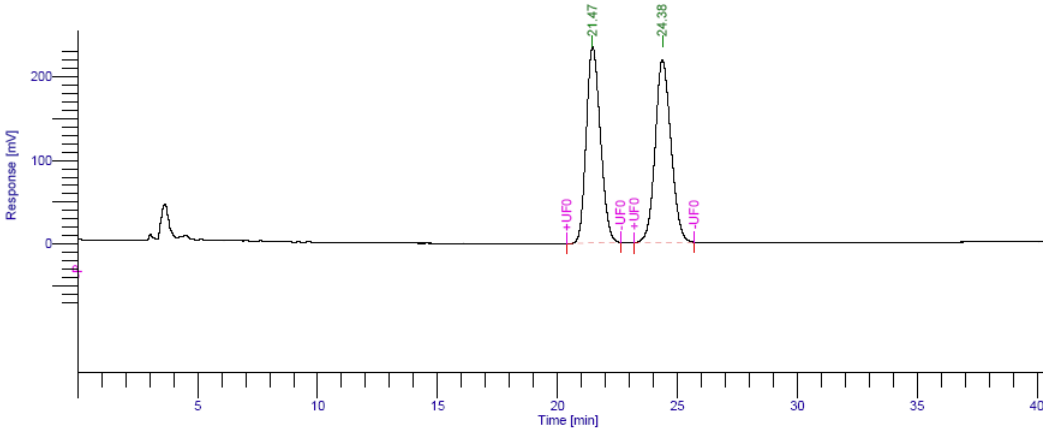


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		25.822	516431.09	10552.27	3.72	3.72
2		36.600	13353171.40	197630.65	96.28	96.28
			13869602.49	208182.91	100.00	100.00

HPLC graph of enantioenriched **5p**

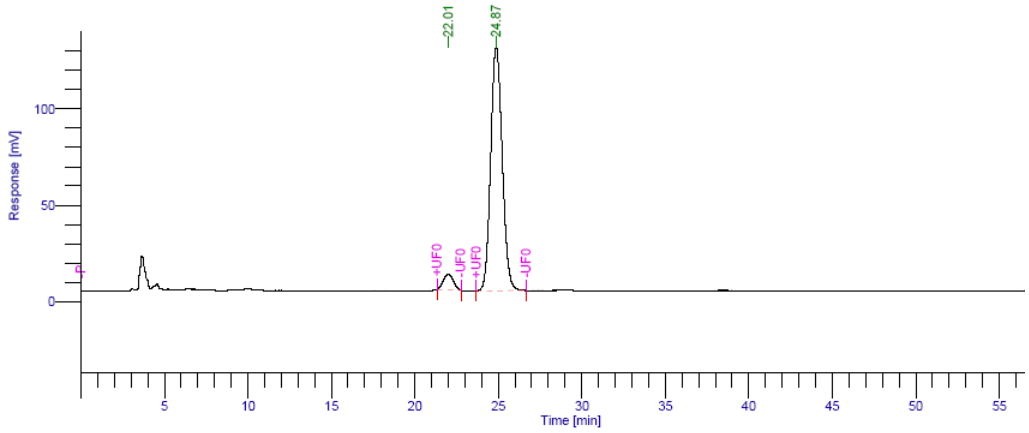




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		21.468	9624689.31	234787.01	49.00	49.00
2		24.377	10017465.58	218723.87	51.00	51.00
			19642154.89	453510.89	100.00	100.00

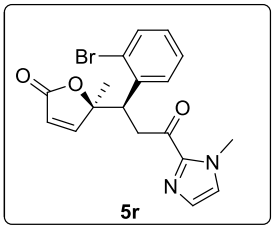
HPLC graph of racemic **5q**



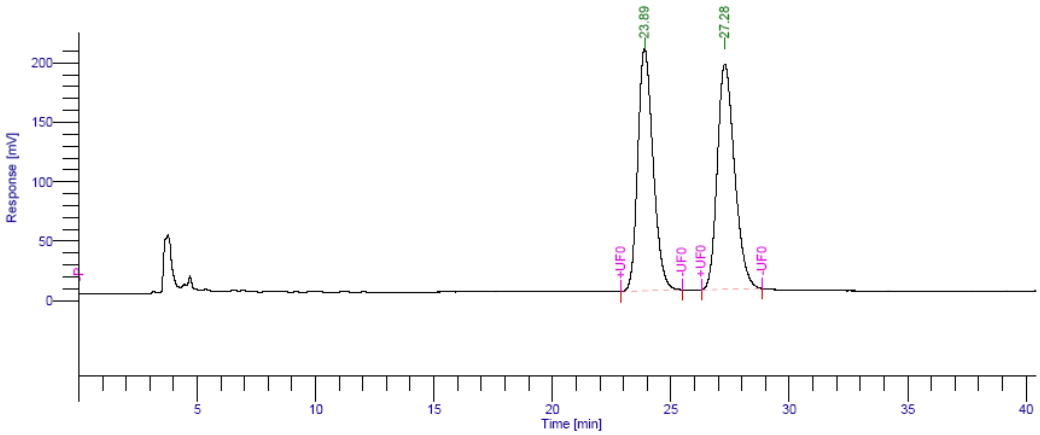
DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		22.013	331550.22	7990.44	5.19	5.19
2		24.873	6055564.85	126124.12	94.81	94.81
			6387115.07	134114.56	100.00	100.00

HPLC graph of enantioenriched **5q**



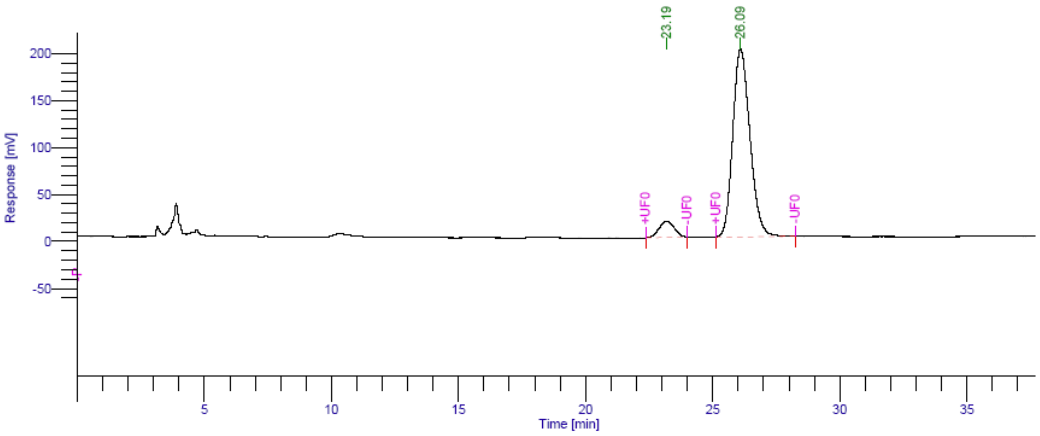
5r



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		23.887	9137308.02	203790.88	48.68	48.68
2		27.282	9632253.05	189631.91	51.32	51.32
			18769561.07	393422.78	100.00	100.00

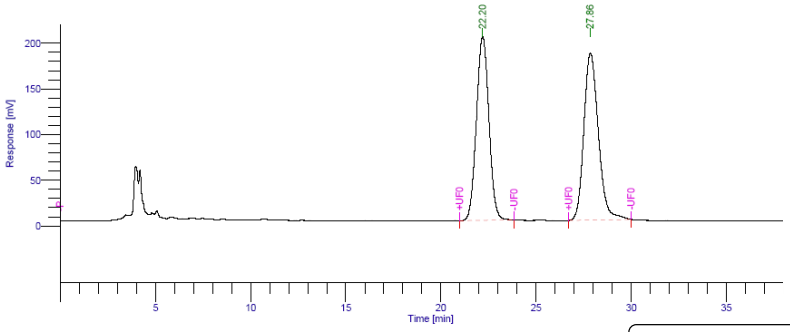
HPLC graph of racemic **5r**



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		23.190	712405.23	17161.97	7.05	7.05
2		26.093	9388430.80	200367.46	92.95	92.95
			10100836.02	217529.44	100.00	100.00

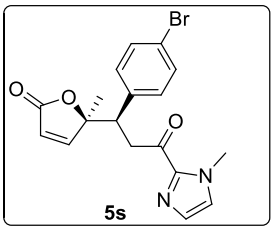
HPLC graph of enantioenriched **5r**

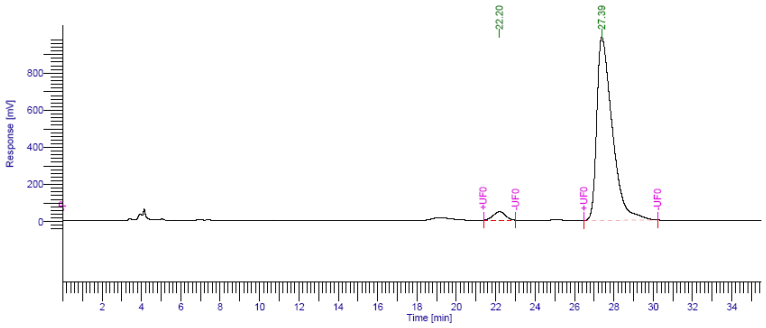


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		22.198	9206422.41	201272.34	48.75	48.75
2		27.858	9679108.58	183036.77	51.25	51.25
			18885530.99	384309.11	100.00	100.00

HPLC graph of racemic **5s**

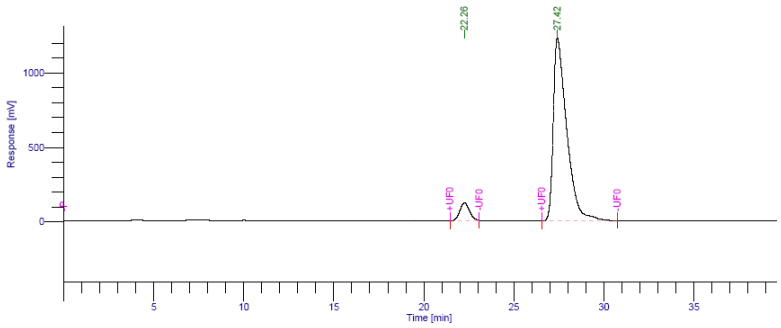




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		22.200	1949124.34	45640.79	3.50	3.50
2		27.393	53693908.17	986416.10	96.50	96.50
			55643032.51	1.03e+06	100.00	100.00

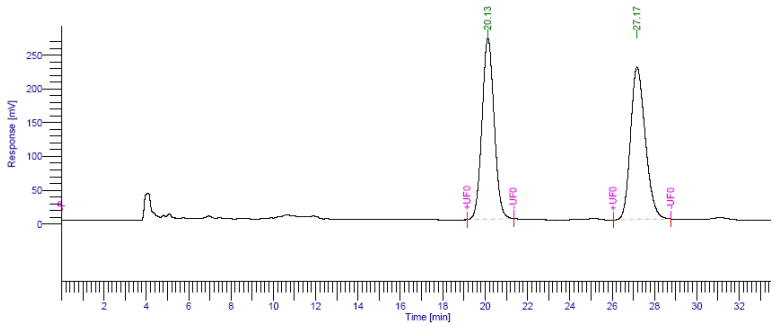
HPLC graph of enantioenriched **5s** [For Sc(III)-**2g**]



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		22.257	4388640.36	118662.38	6.46	6.46
2		27.418	63558872.73	1.23e+06	93.54	93.54
			67947513.09	1.35e+06	100.00	100.00

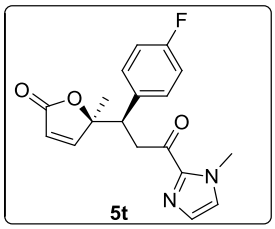
HPLC graph of enantioenriched **5s** [For Er(III)-**2g**]

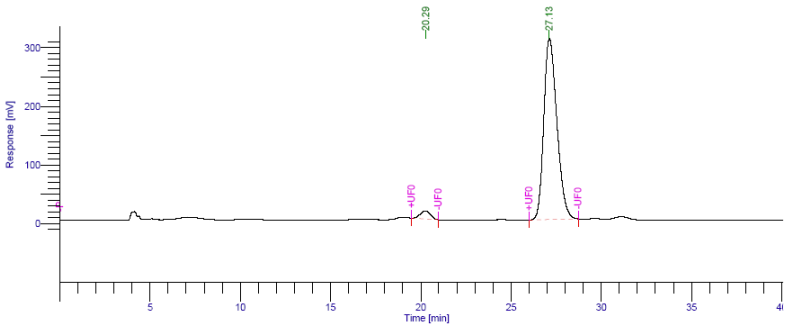


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		20.132	10651293.58	268370.34	49.33	49.33
2		27.173	10941169.04	225714.48	50.67	50.67
			21592462.62	494084.82	100.00	100.00

HPLC graph of racemic **5t**

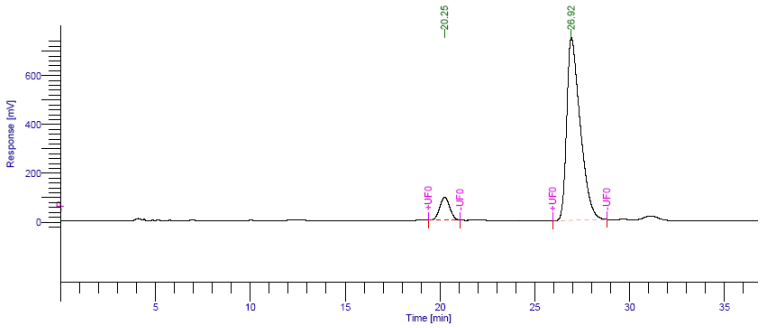




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		20.293	538930.73	13527.15	3.35	3.35
2		27.128	15548187.55	309240.85	96.65	96.65
			16087118.28	322768.00	100.00	100.00

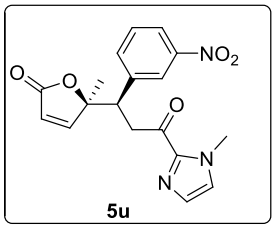
HPLC graph of enantioenriched **5t** [For Sc(III)-**2g**]

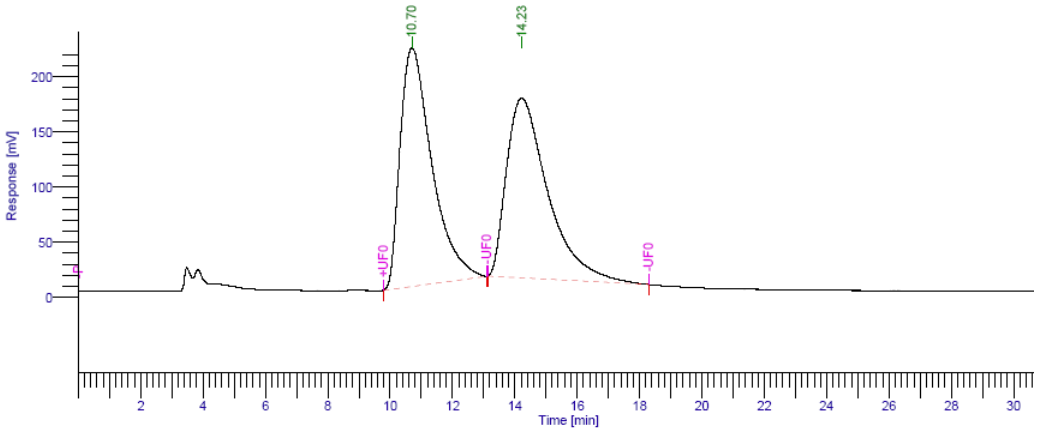


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		20.253	3422082.21	93265.40	8.48	8.48
2		26.923	36939872.38	748928.64	91.52	91.52
			40361954.59	842194.04	100.00	100.00

HPLC graph of enantioenriched **5t** [For Er(III)-**2g**]

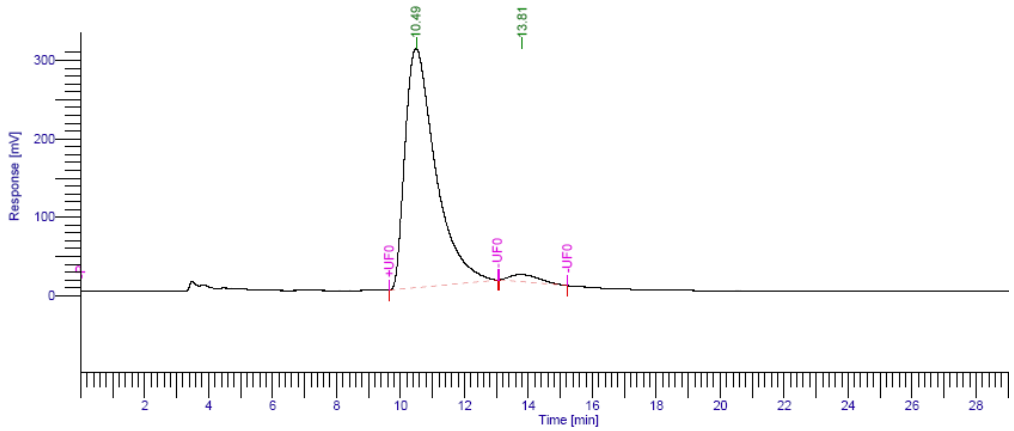




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		10.698	15295218.36	216430.48	50.46	50.46
2		14.228	15018484.58	162944.78	49.54	49.54
			30313702.94	379375.27	100.00	100.00

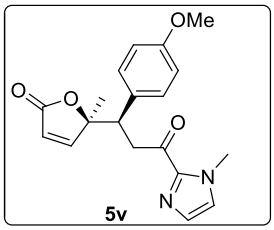
HPLC graph of racemic **5u**

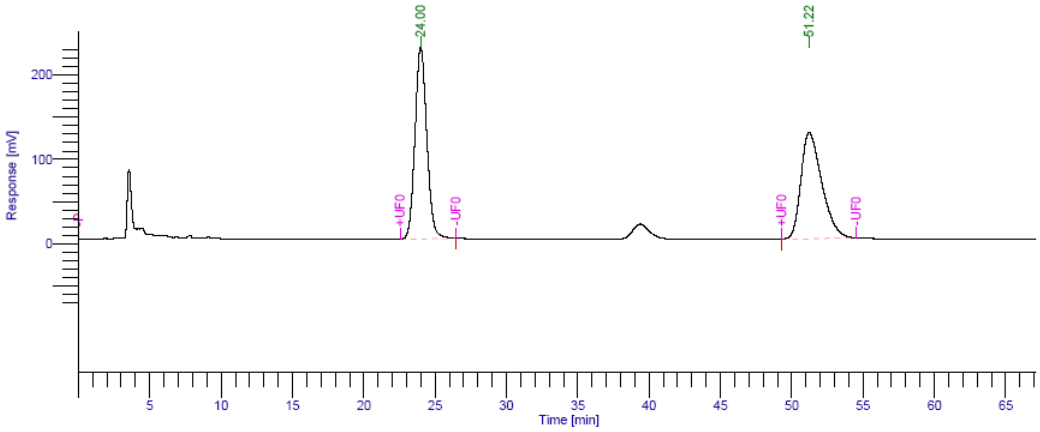


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		10.488	20230265.75	305409.56	97.17	97.17
2		13.813	588594.08	9322.57	2.83	2.83
			20818859.84	314732.13	100.00	100.00

HPLC graph of enantioenriched **5u**

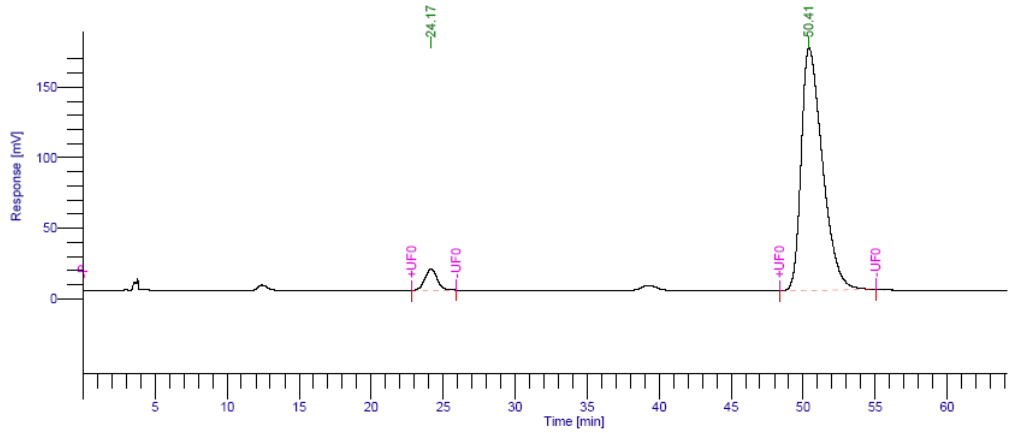




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		23.995	13091789.34	227495.60	50.54	50.54
2		51.217	12809541.77	126028.93	49.46	49.46
			25901331.11	353524.53	100.00	100.00

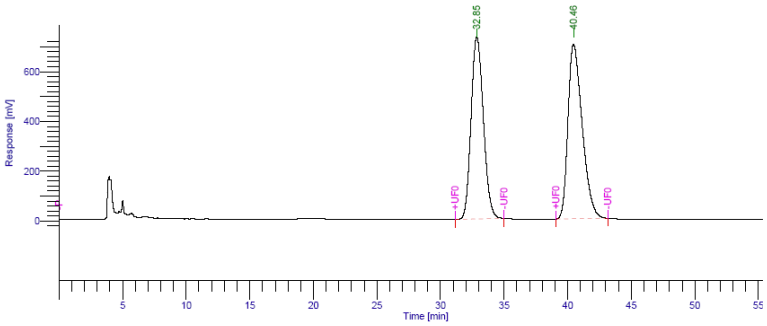
HPLC graph of racemic **5v**



DEFAULT REPORT

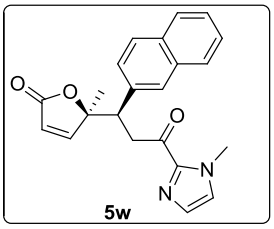
Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		24.173	924226.29	15221.18	4.98	4.98
2		50.412	17632412.50	172129.15	95.02	95.02
			18556638.78	187350.33	100.00	100.00

HPLC graph of enantioenriched **5v**

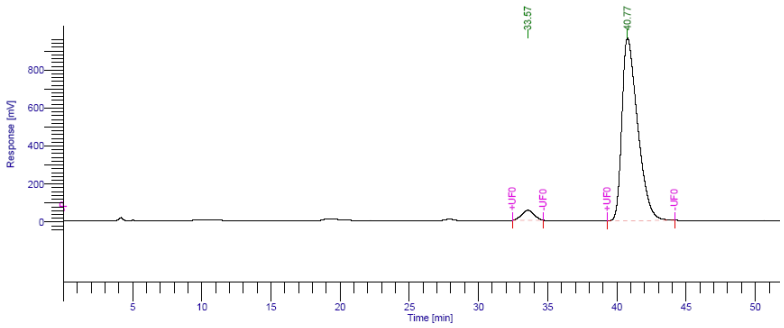


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		32.853	49240756.69	732043.76	47.41	47.41
2		40.458	54613427.20	702714.61	52.59	52.59
			1.04e+08	1.43e+06	100.00	100.00



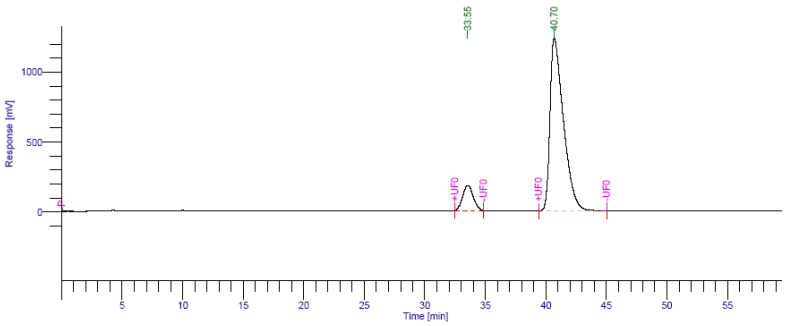
HPLC graph of racemic **5w**



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		33.573	3311653.61	52844.69	4.19	4.19
2		40.768	75809422.35	962548.41	95.81	95.81
			79121075.96	1.02e+06	100.00	100.00

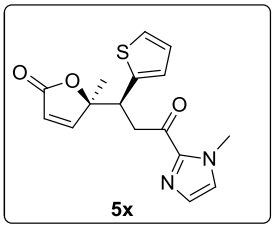
HPLC graph of enantioenriched **5w** [For Sc(III)-**2g**]



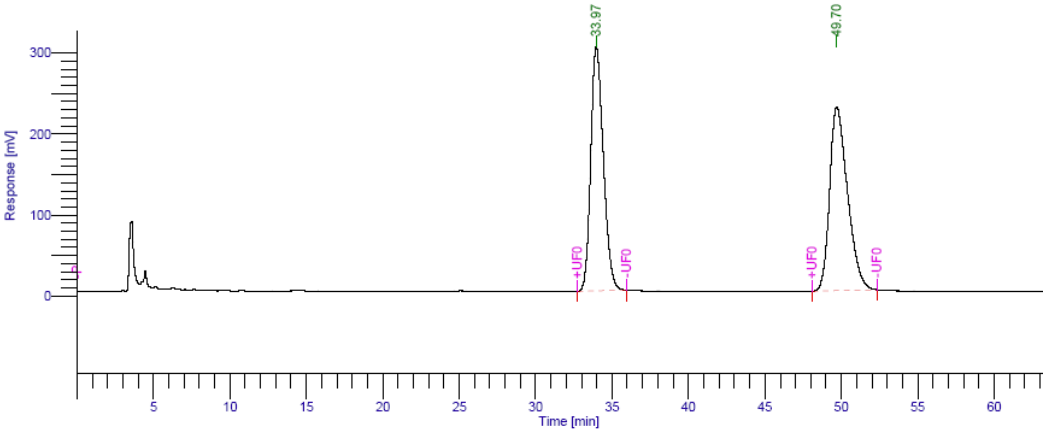
DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		33.550	10813400.02	178852.36	10.18	10.18
2		40.697	95443425.44	1.24e+06	89.82	89.82
			1.06e+08	1.41e+06	100.00	100.00

HPLC graph of enantioenriched **5w** [For Er(III)-**2g**]



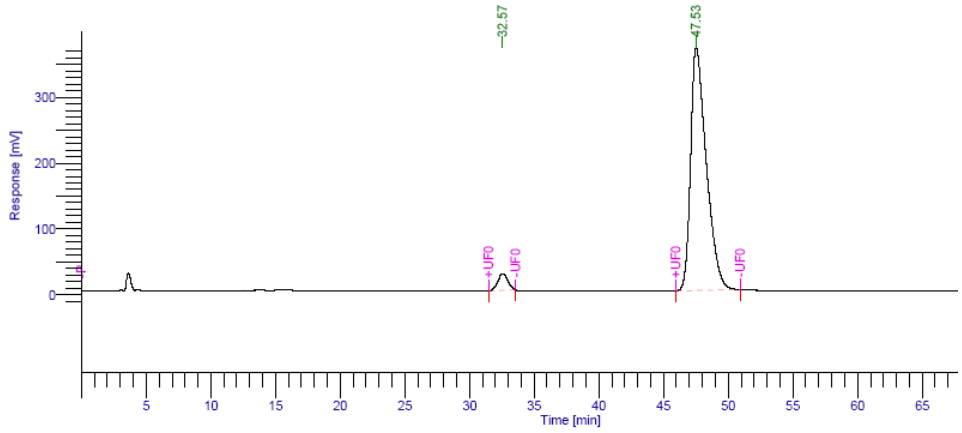
5x



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		33.968	17311010.47	301399.36	48.33	48.33
2		49.698	18511018.38	227251.85	51.67	51.67
			35822028.85	528651.22	100.00	100.00

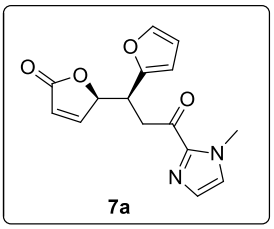
HPLC graph of racemic **5x**

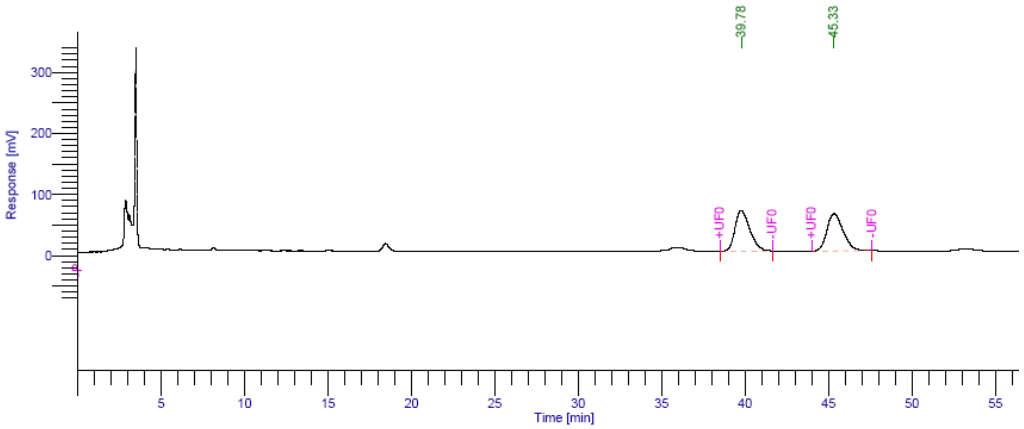


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		32.570	1354653.48	25278.35	4.17	4.17
2		47.527	31142496.73	369863.55	95.83	95.83
			32497150.21	395141.90	100.00	100.00

HPLC graph of enantioenriched **5x**

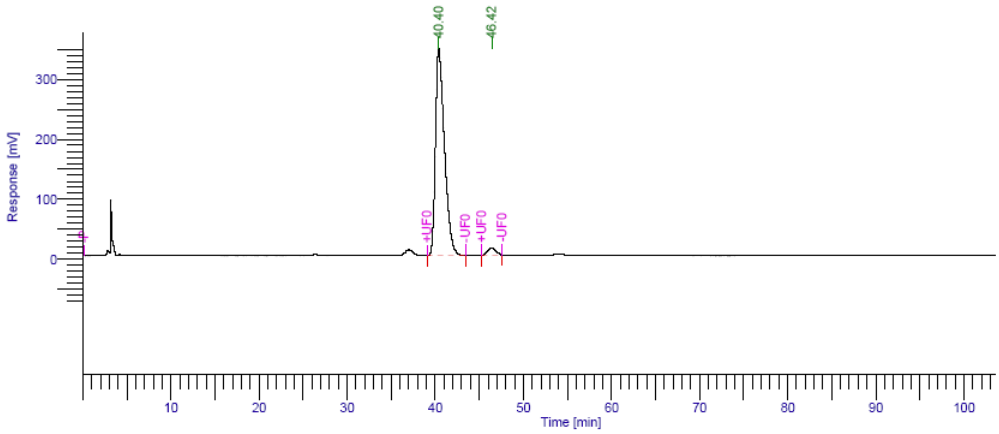




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		39.782	4111273.96	66199.40	49.98	49.98
2		45.330	4114349.13	61108.14	50.02	50.02
			8225623.09	127307.54	100.00	100.00

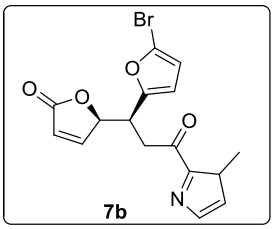
HPLC graph of racemic **7a**

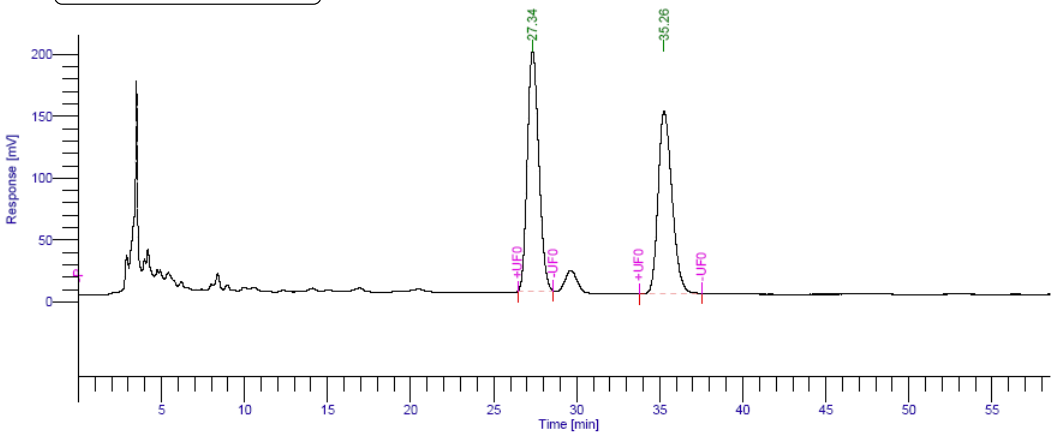


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		40.398	24447559.10	345700.92	96.90	96.90
2		46.417	780859.83	11789.09	3.10	3.10
			25228418.93	357490.01	100.00	100.00

HPLC graph of enantioenriched **7a**

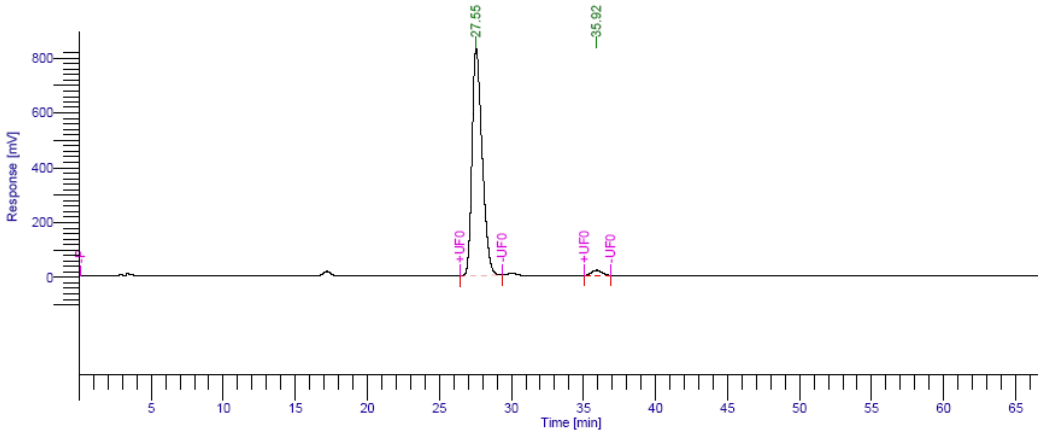




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		27.343	9301450.20	194060.52	52.01	52.01
2		35.263	8583018.10	147405.72	47.99	47.99
			17884468.30	341466.24	100.00	100.00

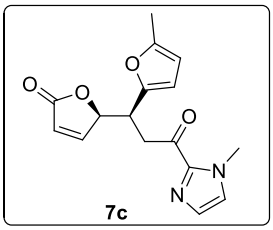
HPLC graph of racemic **7b**

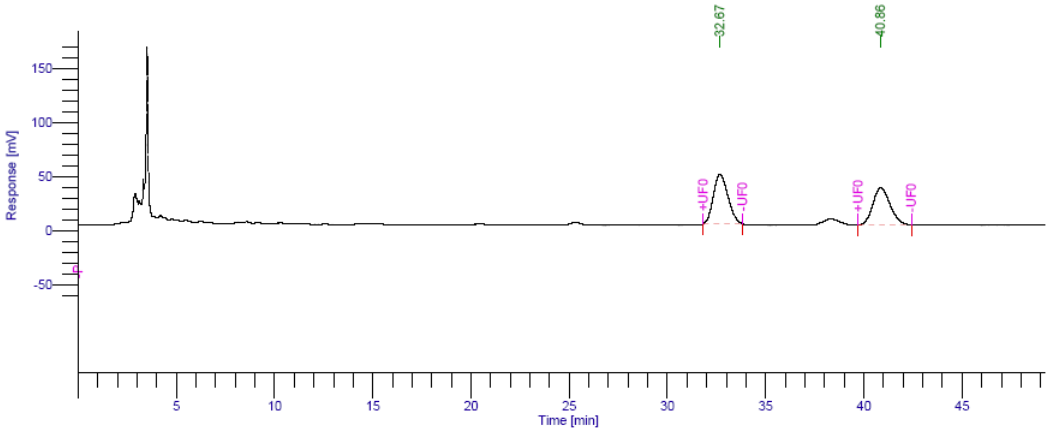


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		27.553	40475941.53	831421.54	97.51	97.51
2		35.925	1034852.09	19479.29	2.49	2.49
			41510793.61	850900.84	100.00	100.00

HPLC graph of enantioenriched **7b**

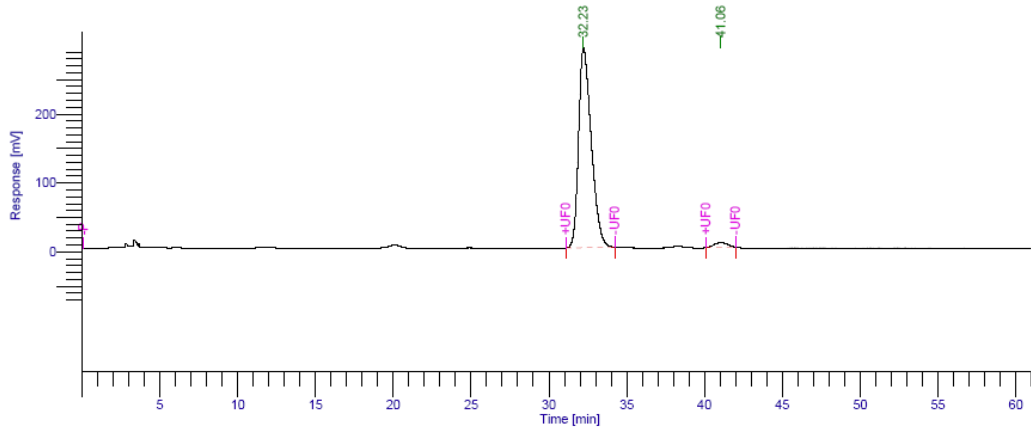




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		32.673	2361115.72	45854.13	52.96	52.96
2		40.858	2097079.79	34083.29	47.04	47.04
			4458195.52	79937.42	100.00	100.00

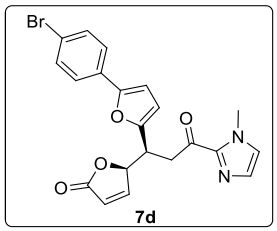
HPLC graph of racemic **7c**

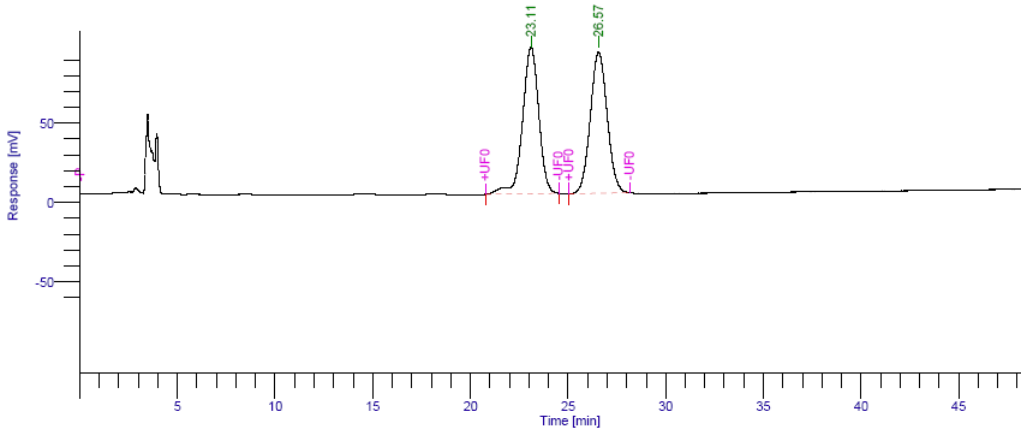


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		32.230	16449341.40	290300.68	97.46	97.46
2		41.055	429209.39	7346.03	2.54	2.54
			16878550.80	297646.71	100.00	100.00

HPLC graph of enantioenriched **7c**

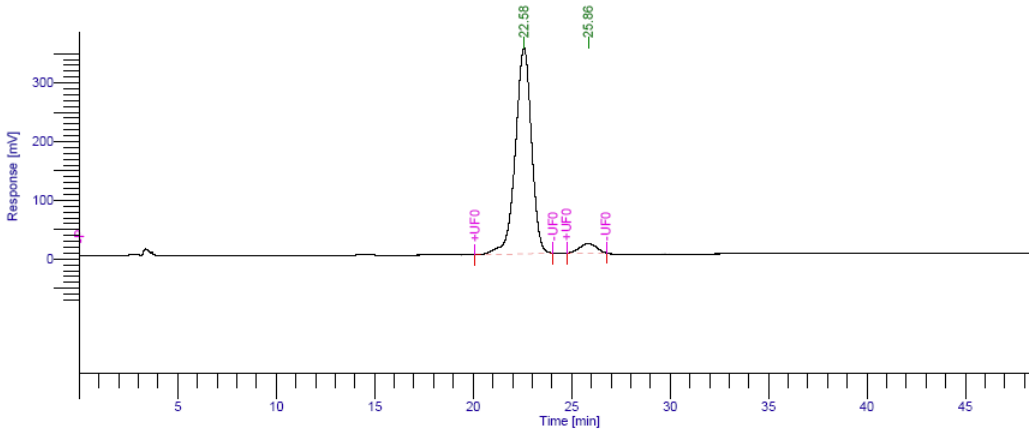




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		23.107	5332788.62	92503.73	49.91	49.91
2		26.567	5351339.55	89039.89	50.09	50.09
			10684128.17	181543.62	100.00	100.00

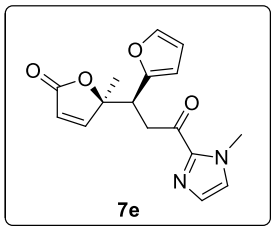
HPLC graph of racemic **7d**

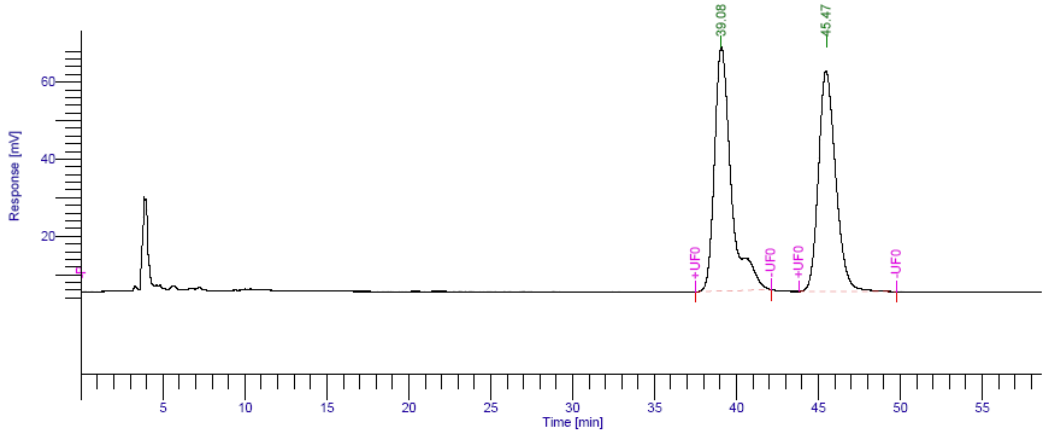


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		22.583	19997117.65	350888.03	95.32	95.32
2		25.855	981396.83	16533.30	4.68	4.68
			20978514.48	367421.33	100.00	100.00

HPLC graph of enantioenriched **7d**

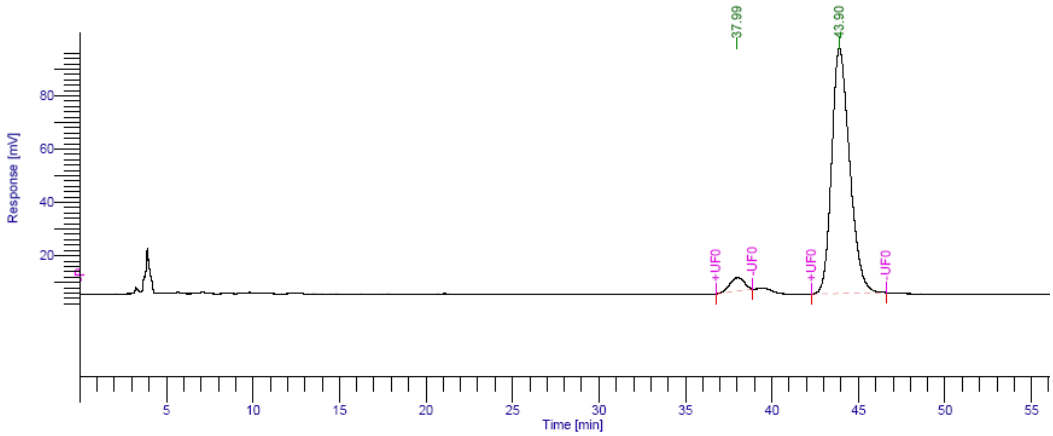




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		39.075	4504560.25	63403.17	51.83	51.83
2		45.472	4186099.36	57350.15	48.17	48.17
			8690659.61	120753.32	100.00	100.00

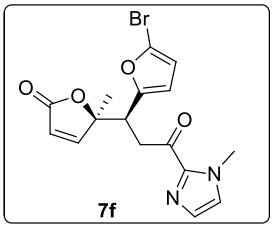
HPLC graph of racemic **7e**

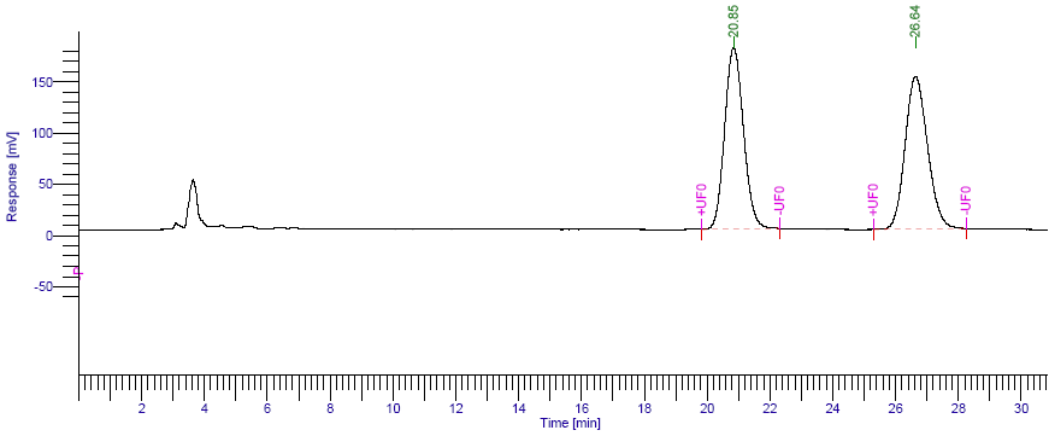


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		37.988	286042.90	5044.25	4.12	4.12
2		43.895	6657156.08	91977.84	95.88	95.88
			6943198.98	97022.09	100.00	100.00

HPLC graph of enantioenriched **7e**

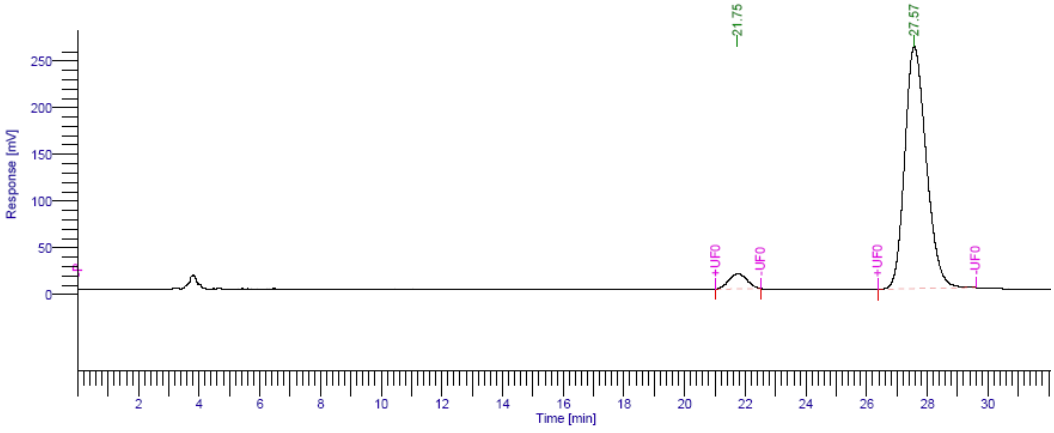




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		20.848	7379862.64	176959.80	50.01	50.01
2		26.635	7375889.36	148884.07	49.99	49.99
			14755752.00	325843.87	100.00	100.00

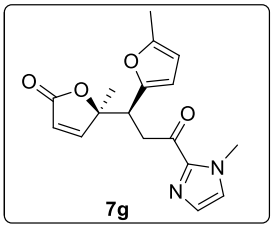
HPLC graph of racemic **7f**

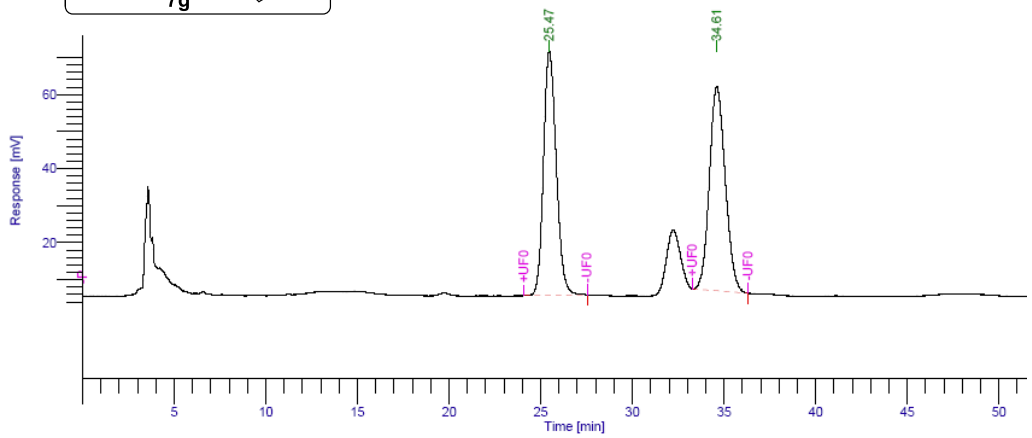


DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		21.748	660569.63	16016.50	4.93	4.93
2		27.572	12749641.12	259586.95	95.07	95.07
			13410210.75	275603.45	100.00	100.00

HPLC graph of enantioenriched **7f**

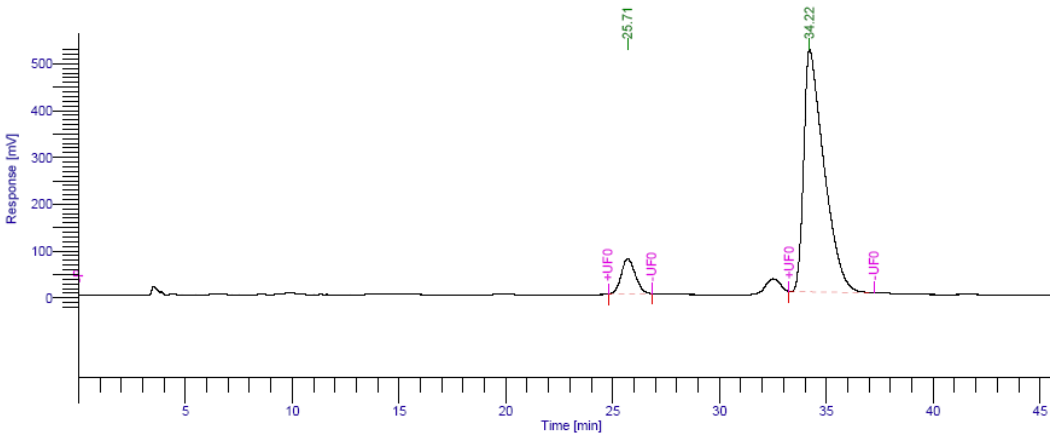




DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		25.468	3184918.55	65884.16	48.93	48.93
2		34.612	3324271.75	55170.82	51.07	51.07
			6509190.30	121054.97	100.00	100.00

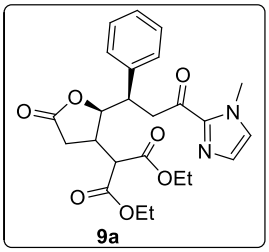
HPLC graph of racemic **7g**



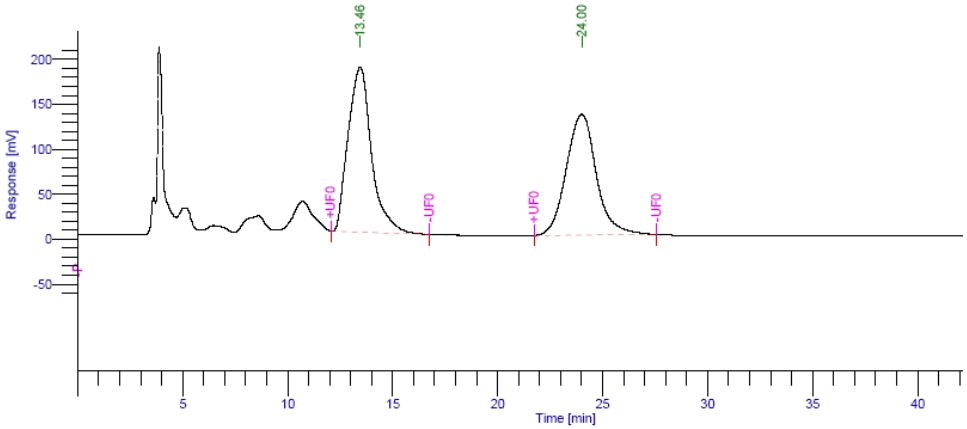
DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		25.705	3445042.69	75532.04	9.17	9.17
2		34.218	34112832.16	518016.40	90.83	90.83
			37557874.85	593548.44	100.00	100.00

HPLC graph of enantioenriched **7g**



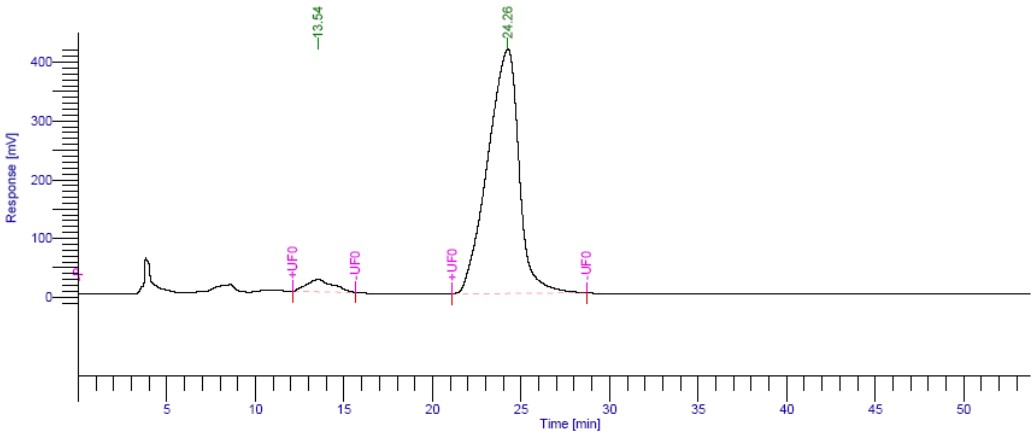
9a



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		13.457	14209649.00	183478.19	51.51	51.51
2		24.002	13374703.56	134550.18	48.49	48.49
			27584352.56	318028.37	100.00	100.00

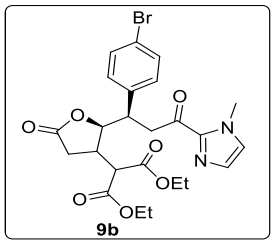
HPLC graph of racemic **9a**



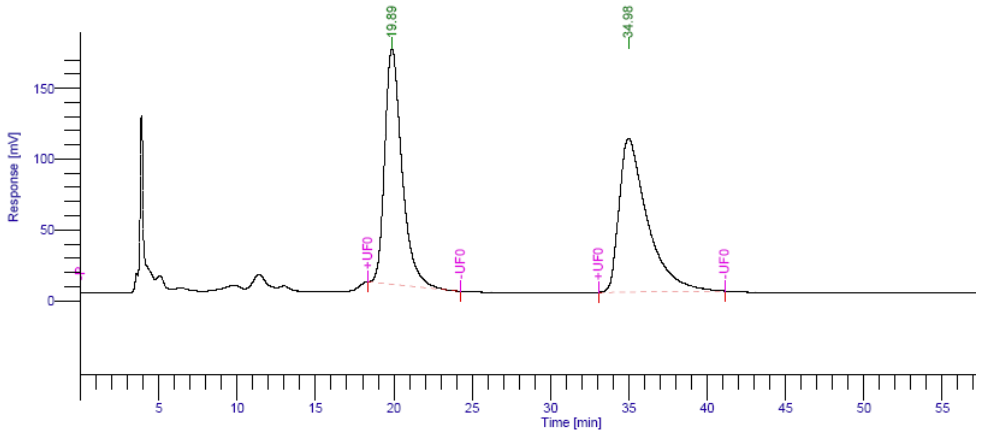
DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		13.538	2196090.80	21266.28	4.13	4.13
2		24.258	50930356.30	416285.44	95.87	95.87
			53126447.11	437551.72	100.00	100.00

HPLC graph of enantioenriched **9a**



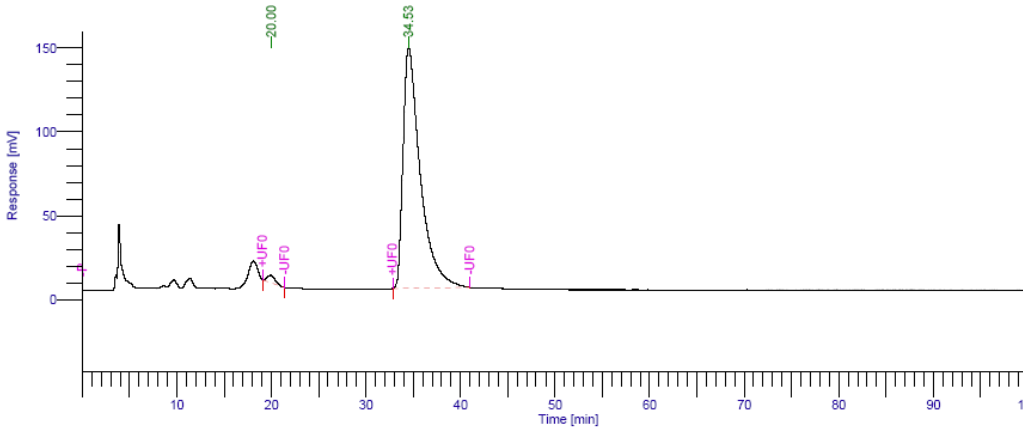
9b



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		19.893	12705860.78	166471.84	48.30	48.30
2		34.978	13599723.21	108607.13	51.70	51.70
			26305583.99	275078.97	100.00	100.00

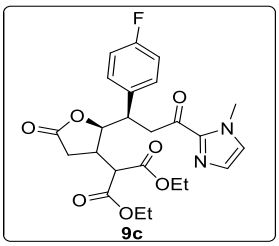
HPLC graph of racemic **9b**



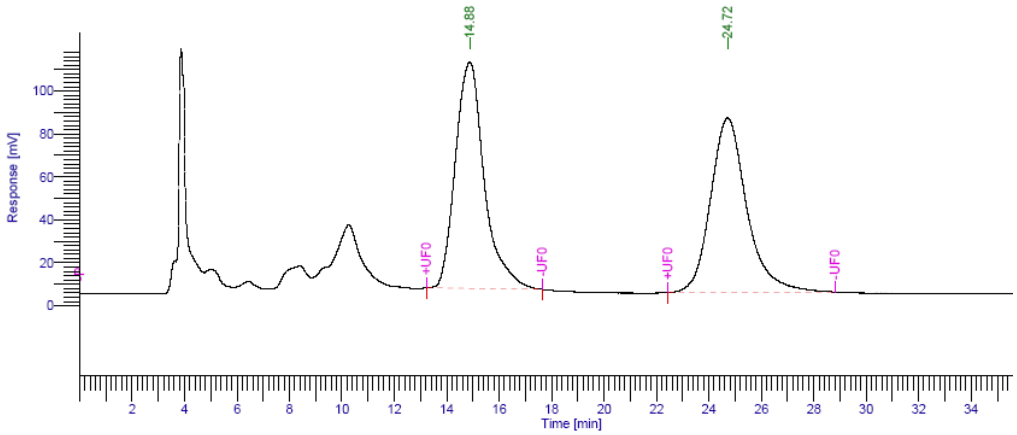
DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		20.005	247817.92	4414.09	1.35	1.35
2		34.528	18132707.74	143338.36	98.65	98.65
			18380525.66	147752.45	100.00	100.00

HPLC graph of enantioenriched **9b**



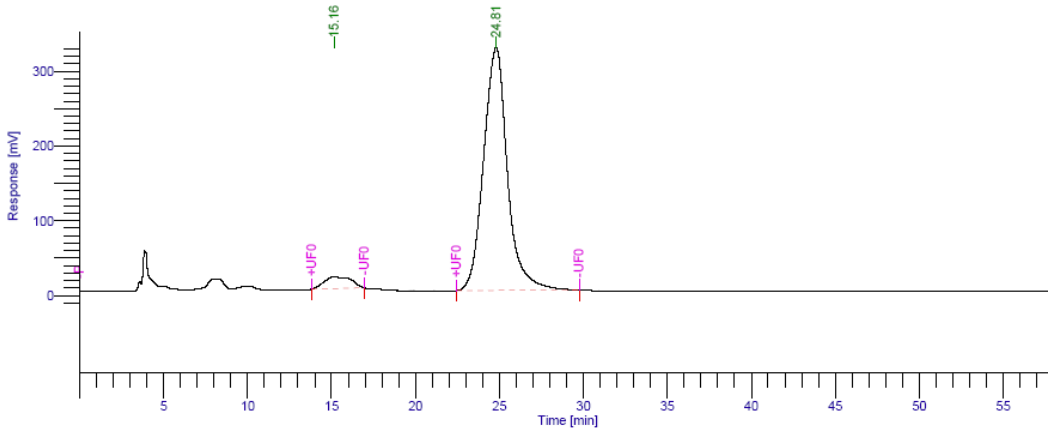
9c



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		14.880	8052983.77	105341.81	50.79	50.79
2		24.723	7801573.42	81333.48	49.21	49.21
			15854557.19	186675.29	100.00	100.00

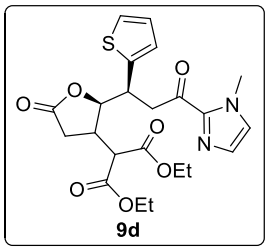
HPLC graph of racemic **9c**



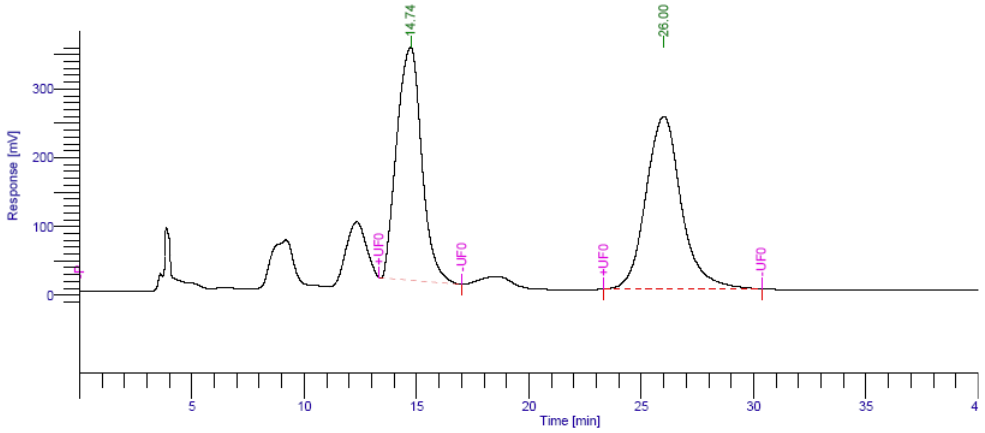
DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		15.162	1743215.69	15595.71	5.16	5.16
2		24.808	32015476.69	324694.89	94.84	94.84
			33758692.38	340290.60	100.00	100.00

HPLC graph of enantioenriched **9c**



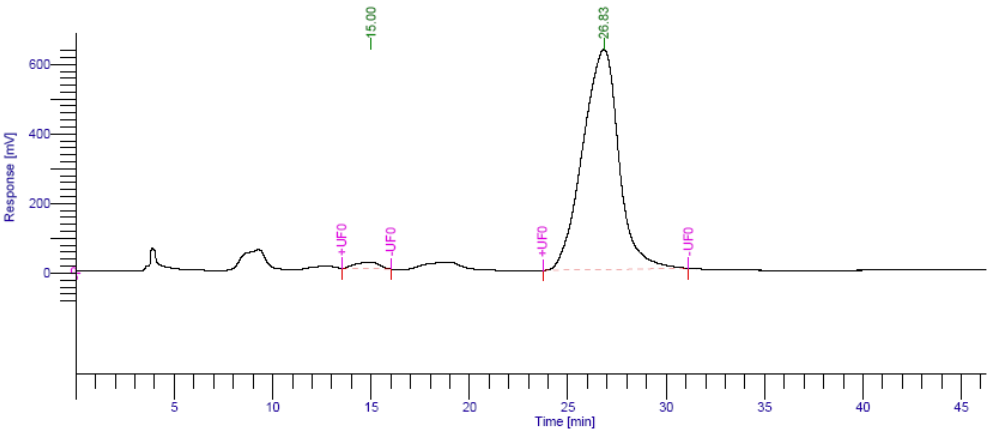
9d



DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		14.737	26094516.26	339366.20	48.78	48.78
2		25.995	27402266.68	250807.56	51.22	51.22
			53496782.94	590173.75	100.00	100.00

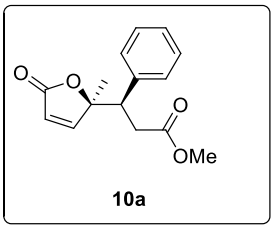
HPLC graph of racemic **9d**



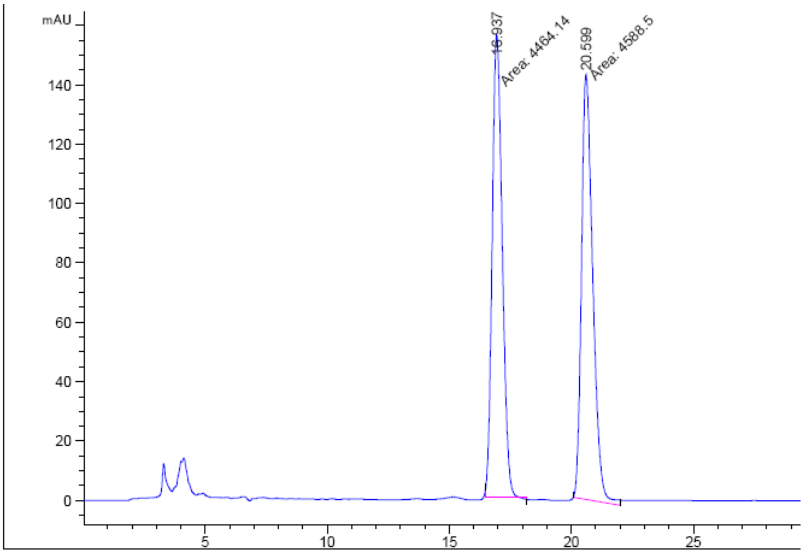
DEFAULT REPORT

Peak #	Component Name	Time [min]	Area [uV*sec]	Height [uV]	Area [%]	Norm. Area [%]
1		15.003	1622410.53	19512.49	1.97	1.97
2		26.830	80653235.87	633918.85	98.03	98.03
			82275646.40	653431.34	100.00	100.00

HPLC graph of enantioenriched **9d**



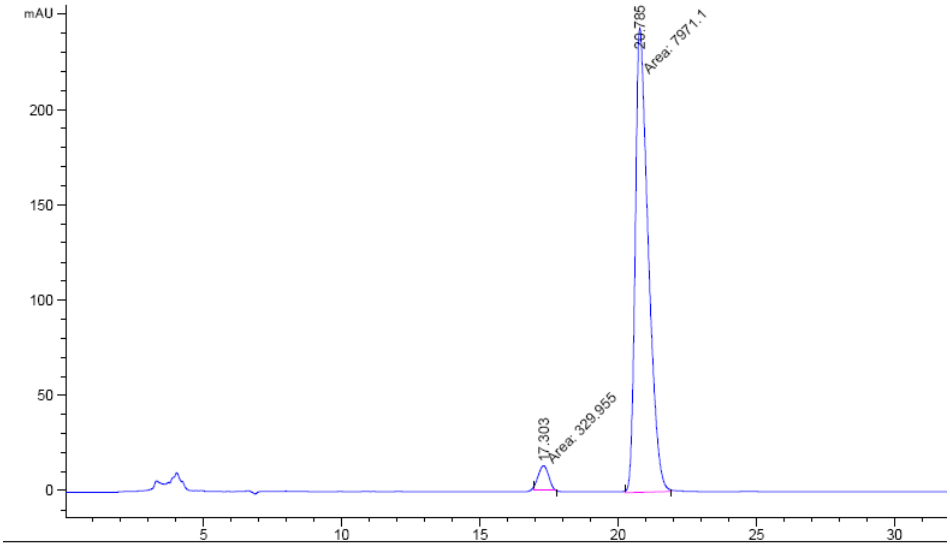
10a



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	16.937	MM	0.4771	4464.14355	155.93954	49.3132
2	20.599	MM	0.5342	4588.49561	143.15416	50.6868

*** End of Report ***

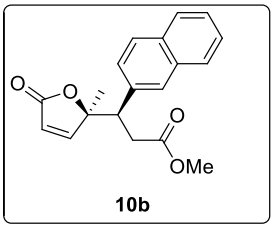
HPLC graph of racemic **10a**



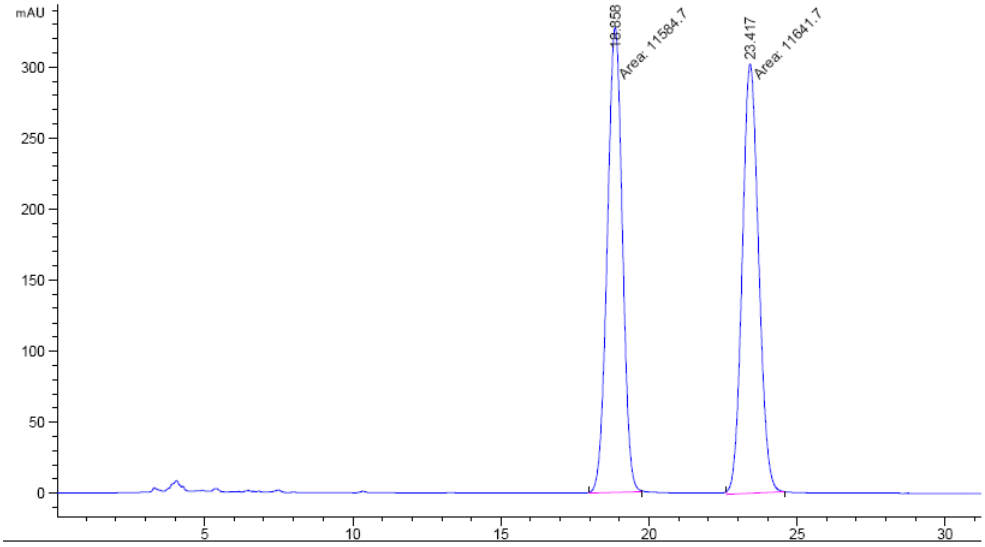
Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	17.303	MM	0.4322	329.95493	12.72283	3.9749
2	20.785	MM	0.5457	7971.10156	243.44409	96.0251

*** End of Report ***

HPLC graph of enantioenriched **10a**



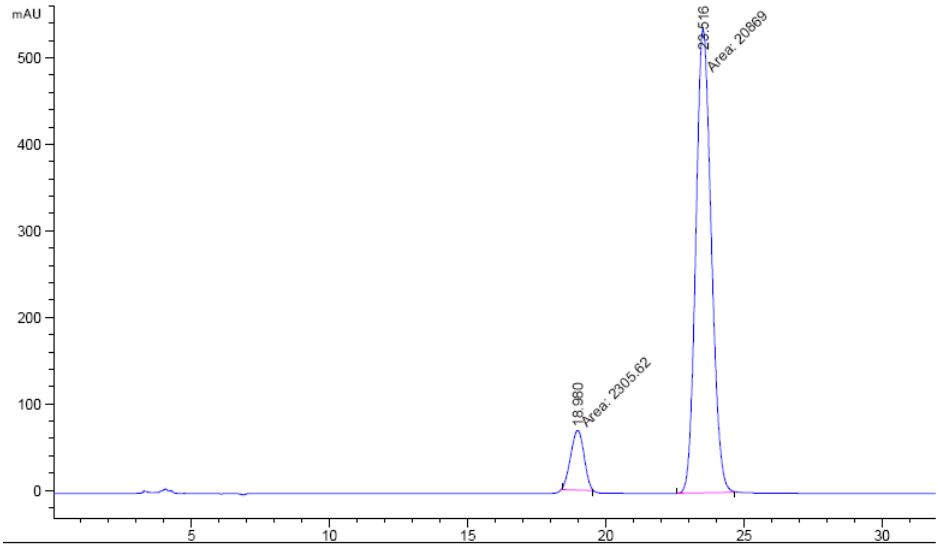
10b



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	18.858	MM	0.5901	1.15847e4	327.19064	49.8773
2	23.417	MM	0.6421	1.16417e4	302.17889	50.1227

*** End of Report ***

HPLC graph of racemic **10b**



Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	18.980	MM	0.5562	2305.61694	69.08710	9.9489
2	23.516	MM	0.6482	2.08690e4	536.58826	90.0511

*** End of Report ***

HPLC graph of enantioenriched **10b**