Electrochemical Bromination of Enamides with Sodium Bromide

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Supporting Information

1. General informations

Electrochemical reactions were performed with IKA® ElectraSyn 2.0. All reactions were carried out using oven-dried glassware and magnetic stirring under air unless otherwise stated. When needed, reactions were heated with an oil bath. Column chromatographies were carried out using silica gel (40-63 µm) supplied by VWR or Merck PTLC on silica gel 60 F_{254}, 2 mm. Analytical thin layer chromatographies performed on pre-coated silica gel aluminum plates with F-254 indicator (from Merck) and visualized by UV light (254 nm) and/or chemical stained with a $KMnO_4$ solution.
^{1}H (300 MHz), ^{13}C (75.5 MHz), and ^{19}F (282.4 MHz) NMR spectra were recorded on a Bruker DXP 300 MHz spectrometer in $CDCl_3$ unless otherwise noted. Chemical shifts (δ) are quoted in ppm relative to the residual solvent peak of $CDCl_3$ (^{1}H: δ_H = 7.26 ppm and ^{13}C: δ_C = 77.16 ppm) or to the peak of an internal standard Tetramethylsilane (^{1}H: δ_H = 0.00 ppm) and relative to the internal standard $CFCl_3$ (^{19}F: δ_F = 0.0 ppm). Coupling constants (J) are quoted in Hz. The following abbreviations were used to show multiplicities: s = singlet, d = doublet, t = triplet, m = multiplet, q = quadruplet, p = pentuplet, dd = doublet of doublets, brs = broad singlet. High-resolution mass (HRMS) was carried out on a Waters LCP Premier XR spectrometer with a TOF analyzer. IR spectra were recorded on a PerkinElmer FT-IR Spectrum 100 (ATR), the wave numbers (ν) of recorded IR-signals (ATR) are quoted in cm^{-1}. Melting points were reported for new compounds, measured on a Stuart SMP3 melting point apparatus in open capillaries.

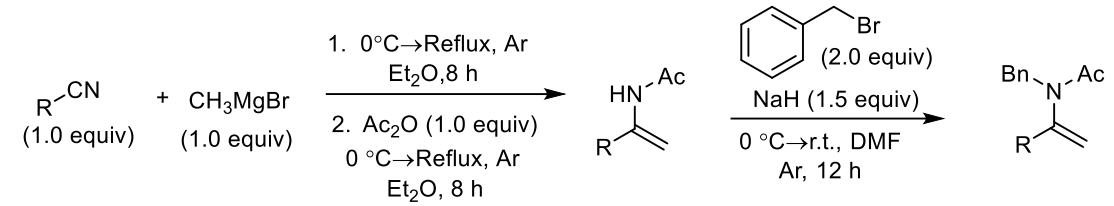
2. Materials

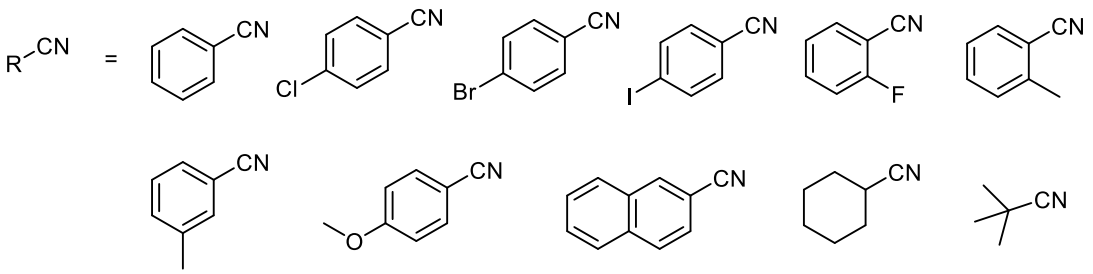
Anhydrous acetonitrile (MeCN), Acetone, *N*,*N*-Dimethylacetamide (DMA) and *N*,*N*-dimethylformamide (DMF) were purchased from Acros Organics (Solvents Extra Dry Over Molecular Sieve, AcroSeal®). Tetrahydrofuran (THF) was distilled over sodium/benzophenone prior to use. NaBr, NaCl, NaI, CuI, Cesium carbonate, p-Tolylacetylene, Mestranol, 1-Ethynylcyclohexene, all the boronic acids as as well bronic acid pinacol ester that were used in this paper, triethylamine, trimethylsilylacetylene, $Pd(dppf)Cl_2$, $Pd(PPh_3)_2Cl_2$ and $Pd(dppf)Cl_2{\cdot}CH_2Cl_2$ were purchased from Fisher Scientific, Sigma Aldrich, VWR and Fluka and were used without any purification steps.

3. Preparation of substrates

3.1 Procedures for the Synthesis of Starting Material Enamides

Method A:[1, 2]

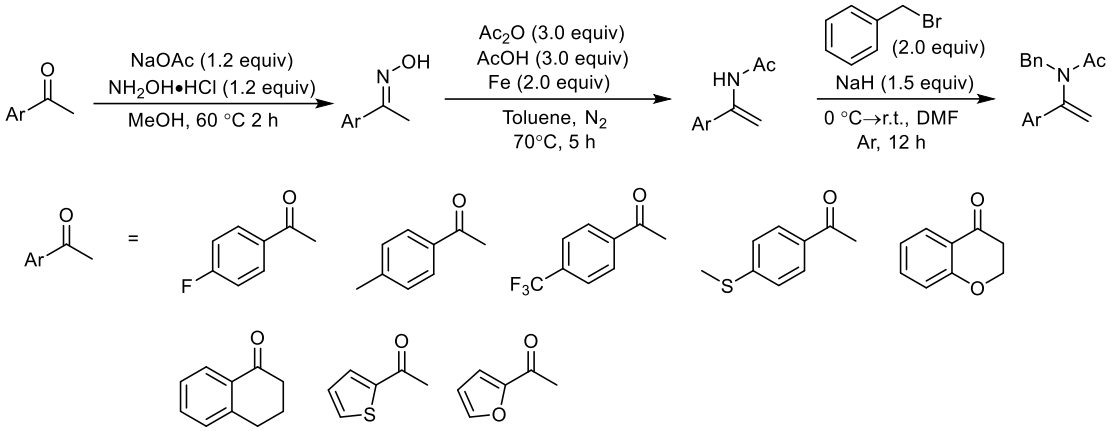




Synthetic procedure: (a) To a stirred solution of methylmagnesium bromide (17.0 mmol, 3.0 mol/L diethyl ether, 6.0 mL, 1.0 equiv.) in diethyl ether (50 mL, 0.34 M) at 0 °C a solution of the corresponding benzonitrile (17.0 mmol, 1.0 equiv.) in diethyl ether (20 mL, 0.85 M) was added dropwise during a period of 30 minutes. After complete addition the solution was refluxed for eight hours. Within a few hours a yellow precipitate was formed. After refluxing the reaction mixture was cooled to 0 °C, and a solution of acetic anhydride (17.0 mmol, 1.0 equiv.) in diethyl ether (20 mL, 0.85 M) was added carefully over 30 minutes. The reaction mixture was refluxed for eight hours. To the resulting suspension methanol was added at room temperature whilst stirring until all precipitates were dissolved (approximately 50 mL). The homogeneous solution was mixed with water/ethyl acetate (1:1, 100 mL). After phase separation the aqueous layer was extracted with ethyl acetate (3 × 50 mL). The combined organic layers were dried with $MgSO_4$, concentrated under reduced pressure and the crude product was purified by column chromatography over silica gel to give the pure product.

(b) 10 mmol (1.0 equiv.) of the N-acyl enamide was dissolved in 30 mL (0.33 M) dry DMF in a dry two-necked round-bottom flask under nitrogen. The solution was cooled to 0 °C. and 15 mmol sodium hydride (60% dispersion in mineral oil, 600 mg, 1.5 equiv.) was added in portions. The resulting suspension was stirred at the same temperature for 10 min. Then 20 mmol (3.42 g, 2.0 equiv.) of benzyl bromide was added dropwise and the final solution was continued to stir overnight at room temperature. The completion of the reaction was confirmed by checking TLC and the excess sodium hydride was quenched by adding 10 mL water at 0 °C. The organic layer was extracted with ethyl acetate (3 × 30 mL). The combined organic layers were washed by brine, dried over Na_2SO_4 and concentrated under reduced pressure. The crude product was purified by column chromatography over silica gel to give the pure product. (All manipulations were performed under argon using standard Schlenk techniques. Diethyl ether and toluene were distilled from sodium benzophenone ketyl under argon.)

Method B:[2, 3]



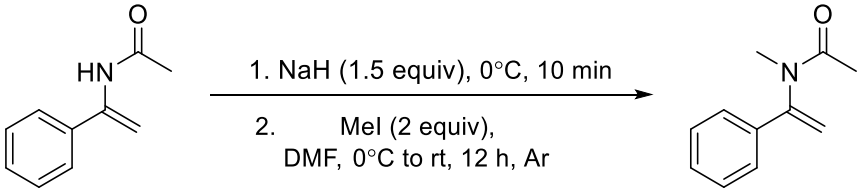
Synthetic procedure:

(a) A mixture of ketone (10 mmol, 1.0 equiv.), NaOAc (984 mg, 12 mmol, 1.2 equiv.) and hydroxylamine hydrochloride (834 mg, 12 mmol, 1.2 equiv.) in methanol (5 mL, 2.0 M) was stirred for 2 h at 60 °C. Water was added after cooling down to room temperature, then the mixture was extracted with ethyl acetate (2×50 mL). The combined organic layers was dried over $MgSO_4$ and concentrated under vaccum to afford the ketoxime which was used without further purification for the next step.

(b) To an oven-dried 50 mL two-neck round-bottom flask assembled with condenser was added the above ketoxime. The flask was vacuumed and back filled with N_2 for three times. Anhydrous toluene (20 mL, 0.5 M) was added followed by acetic anhydride (3.06 g, 30 mmol, 3.0 equiv.), acetic acid (1.80 g, 30 mmol, 3.0 equiv.) and iron powder (1.12 g, 20 mmol, 2.0 equiv.). The reaction flask was put into a 70 °C preheated oil bath and allowed to stir under nitrogen atmosphere. After the reaction completed and cooled to room temperature, ethyl acetate was added and the mixture was filtered through a short pad of celite. The solution was evaporated to get the crude enamide, which was directly purified by column chromatography.

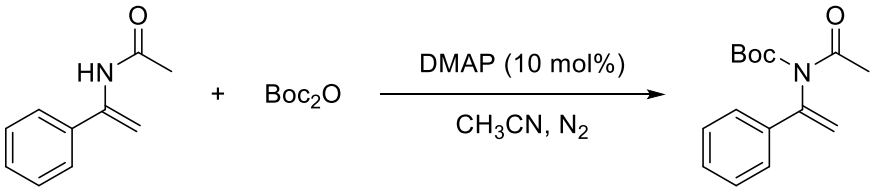
(c) N-acyl enamides (1.0 equiv.) were dissolved in dry DMF (0.33 M) in a dry two-necked round-bottom flask under nitrogen. The solution was cooled to 0 °C. and sodium hydride (60% dispersion in mineral oil, 1.5 equiv.) was added in portions. The resulting suspension was stirred at the same temperature for 10 min. Then Benzyl bromide (2.0 equiv.) was added dropwise and the final solution was continued to stir overnight at room temperature. The completion of the reaction was confirmed by checking TLC and the excess sodium hydride was quenched by adding 10 mL water at 0 °C. The mixture was extracted with ethyl acetate (3 × 50 mL). The combined organic layers were washed by brine and dried over Na_2SO_4 and concentrated under reduced pressure. The crude product was purified by column chromatography over silica gel to give the pure product.

Synthesis of N-methyl-N-(1-phenylvinyl)acetamide[2]



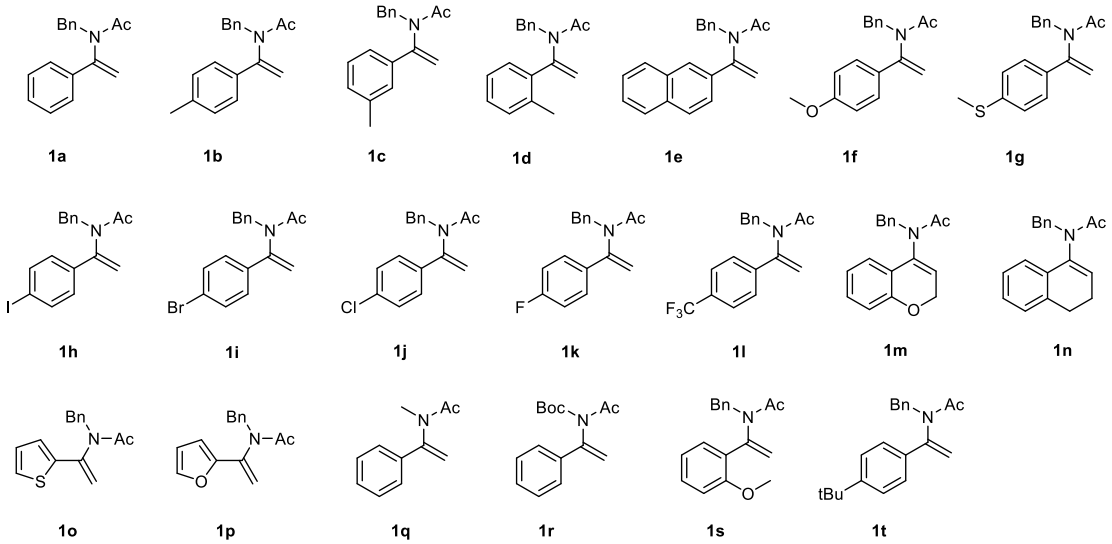
2.5 mmol (402.7 mg, 1.0 equiv.) of the N-(1-phenylvinyl)acetamide was dissolved in 7.5 mL dry DMF (0.33 M) in a dry two-necked round-bottom flask under nitrogen. The solution was cooled to 0 °C. and 3.75 mmol sodium hydride (60% dispersion in mineral oil, 150.0 mg, 1.5 equiv.) was added in portions. The resulting suspension was stirred at the same temperature for 10 min. Then 5.0 mmol (709.7 mg, 2.0 equiv.) Methyl iodide was added dropwise and the final solution was continued to stir overnight at room temperature. The completion of the reaction was confirmed by checking TLC and the excess of sodium hydride was quenched by adding 5 mL water at 0 °C. The mixture was extracted with ethyl acetate (3 × 20 mL). The combined organic layers were washed by brine and dried over Na_2SO_4 and concentrated under reduced pressure. The crude product was purified by column chromatography over silica gel to give the pure product.

Synthesis of tert-butyl acetyl(1-phenylvinyl)carbamate[4]



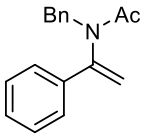
Synthetic procedure: 3.0 mmol (483.3 mg, 1.0 equiv.) N-acyl enamides and DMAP (10% mol, 36.7 mg) were dissolved in 9 mL CH_3CN (0.33 M) in a dry two-necked round-bottom flask under nitrogen. Then 4.5 mmol (981.5 mg, 1.5 equiv.) of Boc_2O was added in dropwise at room temperature. The completion of the reaction was confirmed by checking TLC and the reaction was quenched by adding 5 mL water. The mixture was extracted with ethyl acetate (3 × 20 mL). The combined organic layers were washed by brine and dried over Na_2SO_4 and concentrated under reduced pressure. The crude product was purified by column chromatography over silica gel to give the pure product.

3.2 Characterization of substrates



Scheme S1. Synthesized enamides

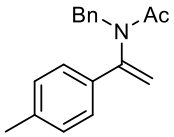
Enamides including **1a, 1b, 1c, 1d, 1e, 1f, 1g, 1h, 1i, 1j, 1k, 1l, 1m, 1n, 1o, 1p, 1q, 1r, 1s** are known compounds,[2, 5-8] **1t** is a known compounds but no characterization data were given in the previous literature.[9]



1a

N-benzyl-N-(1-phenylvinyl)acetamide (1a)

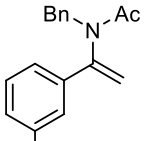
Following the procedure of method **A** (eluent: petroleum ether/ethyl acetate = 86:14), the desired product **1a** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.43 – 7.35 (m, 5H), 7.31 – 7.22 (m, 5H), 5.62 (s, 1H), 4.88 (s, 1H), 4.65 (s, 2H), 2.10 (s, 3H). The analytical data were consistent with the literature.[6]



1b

N-benzyl-N-(1-(p-tolyl)vinyl)acetamide (1b)

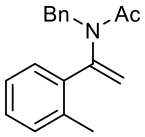
Following the procedure of method **B** (eluent: petroleum ether/ethyl acetate = 86:14), the desired product **1b** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.31 – 7.16 (m, 9H), 5.57 (s, 1H), 4.82 (s, 1H), 4.64 (s, 2H), 2.38 (s, 3H), 2.09 (s, 3H). The analytical data were consistent with the literature.[2]



1c

N-benzyl-N-(1-(m-tolyl)vinyl)acetamide (1c)

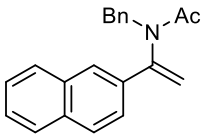
Following the procedure of method **A** (eluent: petroleum ether/ethyl acetate = 86:14), the desired product **1c** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.33 – 7.15 (m, 9H), 5.60 (s, 1H), 4.86 (s, 1H), 4.65 (s, 2H), 2.37 (s, 3H), 2.10 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 171.0, 146.7, 138.8, 137.8, 135.5, 130.1, 129.1, 129.0, 128.4, 127.4, 126.5, 123.1, 114.5, 50.0, 22.2, 21.6. **HRMS** (EI^+) m/z: [M] Calcd for $C_{18}H_{19}NO$: 265.1467, Found: 265.1466 (Δ = -0.13 ppm).



1d

N-benzyl-N-(1-(o-tolyl)vinyl)acetamide (1d)

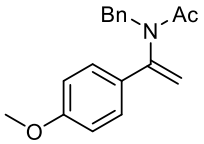
Following the procedure of method **A** (eluent: petroleum ether/ethyl acetate = 86:14), the desired product **1d** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.31 – 7.12 (m, 9H), 5.17 (s, 1H), 5.12 (s, 1H), 4.53 (s, 2H), 2.28 (s, 3H), 2.26 (s, 3H). The analytical data were consistent with the literature.[6]



1e

N-benzyl-N-(1-(naphthalen-2-yl)vinyl)acetamide (1e)

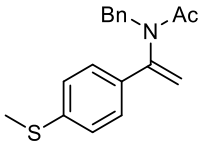
Following the procedure of method **A** (eluent: petroleum ether/ethyl acetate = 86:14), the desired product **1e** was obtained as a pale yellow solid; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.92 – 7.79 (m, 3H), 7.76 (d, *J* = 1.9 Hz, 1H), 7.62 – 7.48 (m, 3H), 7.35 – 7.21 (m, 5H), 5.77 (s, 1H), 4.99 (s, 1H), 4.75 (s, 2H), 2.14 (s, 3H). The analytical data were consistent with the literature.[6]



1f

N-benzyl-N-(1-(4-methoxyphenyl)vinyl)acetamide (1f)

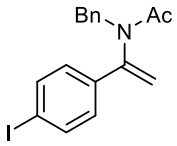
Following the procedure of method **A** (eluent: petroleum ether/ethyl acetate = 85:15), the desired product **1f** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.36 – 7.22 (m, 7H), 6.95 – 6.86 (m, 2H), 5.49 (s, 1H), 4.77 (s, 1H), 4.65 (s, 2H), 3.84 (s, 3H), 2.09 (s, 3H). The analytical data were consistent with the literature.[2]



1g

N-benzyl-N-(1-(4-(methylthio)phenyl)vinyl)acetamide (1g)

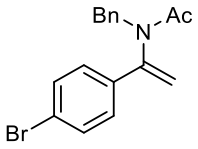
Following the procedure of method **B** (eluent: petroleum ether/ethyl acetate = 85:15), the desired product **1g** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.33 – 7.20 (m, 9H), 5.57 (s, 1H), 4.84 (s, 1H), 4.65 (s, 2H), 2.51 (s, 3H), 2.08 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.9, 146.1, 140.3, 137.7, 132.1, 129.1, 128.4, 127.5, 126.5, 126.3, 114.0, 49.9, 22.1, 15.5. **HRMS** (EI^+) m/z: [M] Calcd for $C_{18}H_{19}NOS$: 297.1187, Found: 297.1183 (Δ = -1.42 ppm). The ^{1}H NMR was consistent with the literature,[5] ^{13}C NMR and HRMS are new data.



1h

N-benzyl-N-(1-(4-iodophenyl)vinyl)acetamide (1h)

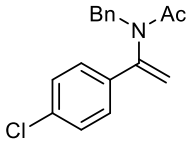
Following the procedure of method **A** (eluent: petroleum ether/ethyl acetate = 85:15), the desired product **1h** was obtained as a yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.76 – 7.67 (m, 2H), 7.33 – 7.18 (m, 5H), 7.15 – 7.06 (m, 2H), 5.62 (s, 1H), 4.91 (s, 1H), 4.64 (s, 2H), 2.07 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.8, 145.8, 138.2, 137.4, 135.2, 129.1, 128.5, 127.6, 127.6, 115.3, 95.2, 50.0, 22.1. **HRMS** (EI^+) m/z: [M] Calcd for $C_{17}H_{16}INO$: 377.0277, Found: 377.0292 (Δ = 4.11 ppm).The ^{1}H NMR was consistent with the literature,[5] ^{13}C NMR and HRMS are new data.



1i

N-benzyl-N-(1-(4-bromophenyl)vinyl)acetamide (1i)

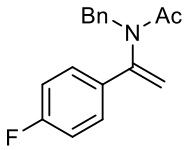
Following the procedure of method **A** (eluent: petroleum ether/ethyl acetate = 86:14), the desired product **1i** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.55 – 7.46 (m, 2H), 7.34 – 7.18 (m, 7H), 5.61 (s, 1H), 4.91 (s, 1H), 4.64 (s, 2H), 2.08 (s, 3H). The analytical data were consistent with the literature.[7]



1j

N-benzyl-N-(1-(4-chlorophenyl)vinyl)acetamide (1j)

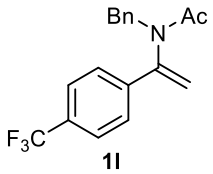
Following the procedure of method **A** (eluent: petroleum ether/ethyl acetate = 86:14), the desired product **1j** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.41 – 7.20 (m, 9H), 5.60 (d, *J* = 0.6 Hz, 1H), 4.91 (s, 1H), 4.64 (s, 2H), 2.08 (s, 3H). The analytical data were consistent with the literature.[6]



1k

N-benzyl-N-(1-(4-fluorophenyl)vinyl)acetamide (1k)

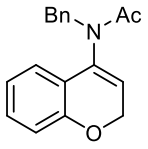
Following the procedure of method **B** (eluent: petroleum ether/ethyl acetate = 86:14), the desired product **1k** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.40 – 7.20 (m, 7H), 7.12 – 7.01 (m, 2H), 5.55 (s, 1H), 4.87 (s, 1H), 4.64 (s, 2H), 2.09 (s, 3H). **^{19}F{^{1}H} NMR** (282.4 MHz, $CDCl_3$) δ -112.5. The analytical data were consistent with the literature.[6]



1l

N-benzyl-N-(1-(4-(trifluoromethyl)phenyl)vinyl)acetamide (1l)

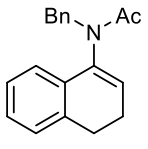
Following the procedure of method **B** (eluent: petroleum ether/ethyl acetate = 86:14), the desired product **1l** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.69 – 7.59 (m, 2H), 7.54 – 7.43 (m, 2H), 7.34 – 7.15 (m, 5H), 5.72 (s, 1H), 5.02 (s, 1H), 4.66 (s, 2H), 2.08 (s, 3H). **^{19}F{^{1}H} NMR** (282.4 MHz, $CDCl_3$) δ -63.3. The analytical data were consistent with the literature.[7]



1m

N-benzyl-N-(2H-chromen-4-yl)acetamide (1m)

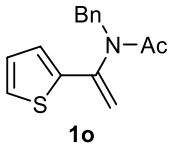
Following the procedure of method **B** (eluent: petroleum ether/ethyl acetate = 86:14), the desired product **1m** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.33 – 7.16 (m, 6H), 7.00 – 6.88 (m, 2H), 6.88 – 6.82 (m, 1H), 5.49 (d, *J* = 14.2 Hz, 1H), 5.29 (t, *J* = 3.9 Hz, 1H), 4.87 – 4.69 (m, 2H), 3.90 (d, *J* = 14.2 Hz, 1H), 2.05 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.8, 155.4, 137.6, 136.0, 130.6, 129.2, 128.5, 127.6, 122.6, 121.9, 121.4, 120.1, 116.6, 65.3, 50.2, 21.9. **HRMS** (EI^+) m/z: [M] Calcd for $C_{18}H_{17}NO_2$: 279.1259, Found: 279.1254 (Δ = -1.88 ppm).



1n

N-benzyl-N-(3,4-dihydronaphthalen-1-yl)acetamide (1n)

Following the procedure of method **B** (eluent: petroleum ether/ethyl acetate = 86:14), the desired product **1n** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.33 – 7.15 (m, 9H), 7.09 – 7.02 (m, 1H), 5.61 – 5.50 (m, 2H), 3.84 (d, *J* = 14.2 Hz, 1H), 2.81 – 2.72 (m, 2H), 2.41 – 2.14 (m, 2H), 2.02 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 171.3, 138.3, 138.0, 137.0, 131.4, 129.2, 128.8, 128.4, 128.3, 128.1, 127.4, 127.0, 122.0, 50.1, 27.3, 22.8, 21.8. **HRMS** (EI^+) m/z: [M] Calcd for $C_{19}H_{19}NO$: 277.1467, Found: 277.1468 (Δ = 0.65 ppm).

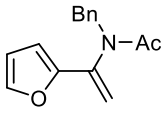


1o

N-benzyl-N-(1-(thiophen-2-yl)vinyl)acetamide (1o)

Following the procedure of method **B** (eluent: petroleum ether/ethyl acetate = 86:14), the desired product **1o** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.32 –

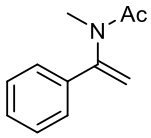
7.26 (m, 6H), 7.03 – 6.98 (m, 2H), 5.52 (s, 1H), 4.73 (s, 3H), 2.11 (s, 3H). The analytical data were consistent with the literature.[6]



1p

N-benzyl-N-(1-(furan-2-yl)vinyl)acetamide (1p)

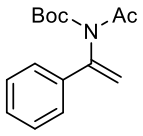
Following the procedure of method **B** (eluent: petroleum ether/ethyl acetate = 86:14), the desired product **1p** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.42 (d, *J* = 1.8 Hz, 1H), 7.33 – 7.22 (m, 5H), 6.41 (dd, *J* = 3.3, 1.8 Hz, 1H), 6.25 (d, *J* = 4.1 Hz, 1H), 5.64 (s, 1H), 4.79 (s, 1H), 4.72 (s, 2H), 2.07 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.8, 150.7, 143.8, 137.9, 137.8, 129.2, 128.4, 127.6, 113.0, 111.8, 108.5, 50.6, 21.8. **HRMS** (EI^+) m/z: [M] Calcd for $C_{15}H_{15}NO_2$: 241.1103, Found: 241.1114 (Δ = 4.50 ppm).



1q

N-methyl-N-(1-phenylvinyl)acetamide (1q)

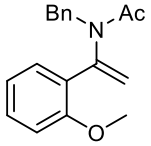
Following the procedure of synthesis of N-methyl-N-(1-phenylvinyl)acetamide in section 3.1 (eluent: petroleum ether/ethyl acetate = 85:15), the desired product **1q** was obtained as a pale yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.47 – 7.33 (m, 5H), 5.69 (s, 1H), 5.23 (s, 1H), 3.09 (s, 3H), 2.03 (s, 3H). The analytical data were consistent with the literature.[6]



1r

tert-butyl acetyl(1-phenylvinyl)carbamate (1r)

Following the procedure of synthesis of tert-butyl acetyl(1-phenylvinyl)carbamate in section 3.1 (eluent: petroleum ether/ethyl acetate = 90:10), the desired product **1r** was obtained as a white solid; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.40 – 7.27 (m, 5H), 5.78 (d, *J* = 0.8 Hz, 1H), 5.18 (d, *J* = 0.8 Hz, 1H), 2.58 (s, 3H), 1.29 (s, 9H). The analytical data were consistent with the literature.[6]

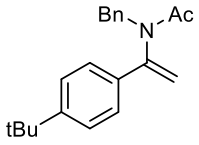


1s

N-benzyl-N-(1-(2-methoxyphenyl)vinyl)acetamide (1s)

Following the procedure of method **B** (eluent: petroleum ether/ethyl acetate = 87:13), the desired product **1s** was obtained as yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.42 – 7.15 (m, 7H),

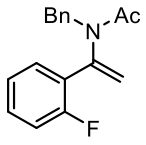
7.03 – 6.88 (m, 2H), 5.54 (s, 1H), 5.04 (s, 1H), 4.56 (s, 2H), 3.83 (s, 3H), 2.24 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 171.3, 157.8, 145.1, 138.1, 130.5, 130.4, 128.9, 128.3, 127.1, 125.0, 120.8, 117.8, 111.2, 55.6, 49.3, 22.5. The analytical data were consistent with the literature.[2]



1t

N-benzyl-N-(1-(4-(tert-butyl)phenyl)vinyl)acetamide (1t)

Following the procedure of method **B** (eluent: petroleum ether/ethyl acetate = 90:10), the desired product **1t** was obtained as yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.44 – 7.37 (m, 2H), 7.36 – 7.30 (m, 2H), 7.29 – 7.23 (m, 5H), 5.58 (s, 1H), 4.82 (s, 1H), 4.65 (s, 2H), 2.10 (s, 3H), 1.34 (s, 9H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.9, 152.6, 146.5, 137.9, 132.6, 129.1, 128.4, 127.4, 126.0, 125.7, 114.0, 49.8, 34.8, 31.4, 22.1. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{21}H_{26}NO$: 308.2014, Found: 308.2023 (Δ = 2.9 ppm).



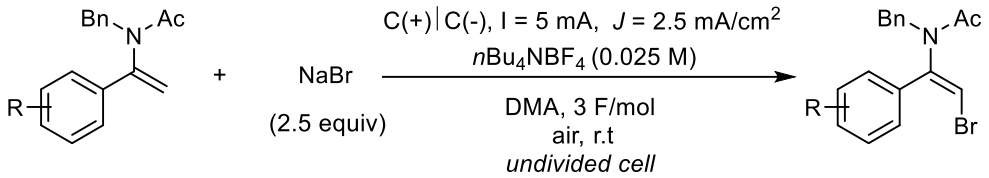
1u

N-benzyl-N-(1-(2-fluorophenyl)vinyl)acetamide (1u)

Following the procedure of method **B** (eluent: petroleum ether/ethyl acetate = 90:10), the desired product **1u** was obtained as yellow oil; **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.41 – 7.08 (m, 9H), 5.70 (d, *J* = 1.1 Hz, 1H), 5.13 (d, *J* = 1.8 Hz, 1H), 4.62 (s, 2H), 2.18 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.85, 160.81 (d, *J* = 251.7 Hz), 141.47 (d, *J* = 1.9 Hz), 137.47, 130.69 (d, *J* = 8.5 Hz), 129.18 (d, *J* = 2.5 Hz), 129.06, 128.41, 127.44, 124.59 (d, *J* = 3.9 Hz), 119.78 (d, *J* = 8.5 Hz), 116.74 (d, *J* = 22.8 Hz), 65.35, 49.64, 22.22. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{17}H_{17}NOF$: 270.1294, Found: 270.1295 (Δ = 0.4 ppm).

4. General Procedures

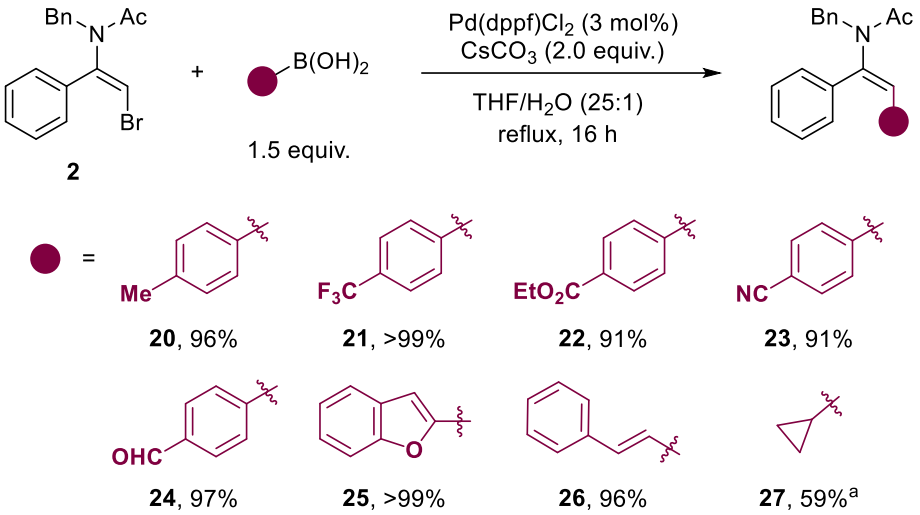
a. General procedure A for the synthesis of 2-19



NaBr (51.4 mg, 0.5 mmol, 2.5 equiv.) or NaCl (46.8 mg, 0.8 mmol, 4.0 equiv.), corresponding enamide (0.2 mmol, 1.0 equiv.), 4 mL of DMA were added to a 5 mL IKA undivided cell equipped with a graphite anode and cathode (IKA Graphite SK-50, 8 mm × 52 mm × 2 mm,

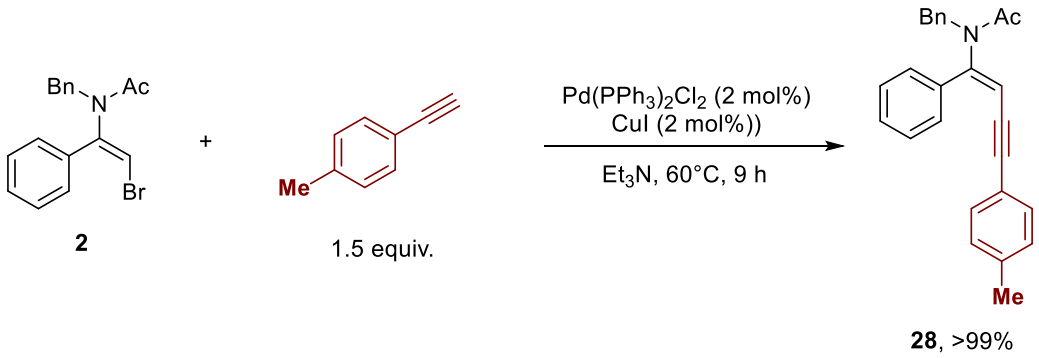
immersion length is 25 mm). The electrochemical reactor was operated under 5 mA, 3.0-5.0 F/mol (2.5 mA/cm^2) constant current mode at room temperature under magnetic stirring (800 rpm). When the desired amount of charge was passed, 10 mL of water was added and the mixture was extracted with ethyl acetate (3 × 10 mL). The combined organic layers were washed by brine and dried over Na_2SO_4 and concentrated under reduced pressure. The residue was finally purified by silica gel column chromatography and eluted with the appropriate solvent mixture to afford the products **2** to **19**.

b. General procedure B for Suzuki Cross-Couping reaction for the synthesis of 20-27

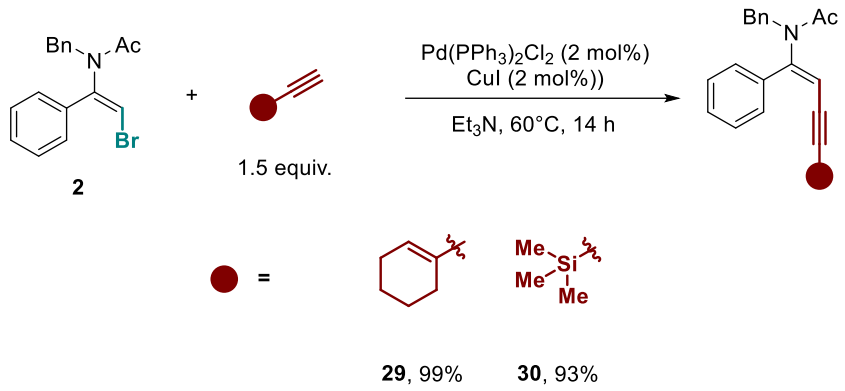


In a 5 mL tube equipped with a stir bar, product **2** (66.0 mg, 0.2 mmol, 1.0 equiv.), arylboronic acid (0.3 mmol, 1.5 equiv.), Cs_2CO_3 (131 mg, 0.4 mmol), and $Pd(dppf)Cl_2$ (4.4 mg, 3 mol%) were sequentially added. The mixture was pumped and refilled with argon three times before adding distilled THF/water (2.08 mL, 25/1, v/v). The resulting mixture was refluxed under argon 16 h, then cooled to room temperature. The reaction solution was diluted with EtOAc (20 mL), dried over anhydrous Na_2SO_4, filtered through cotton. Then, the organic phase was concentrated under reduced pressure and purified by silica gel column chromatography to provide products **20**-**26**. For the synthesis of **27**, a 0.1 mmol scale of reaction was performed, and instead of $Pd(dppf)Cl_2$, $Pd(dppf)Cl_2{\cdot}CH_2Cl_2$ was employed as catalyst.

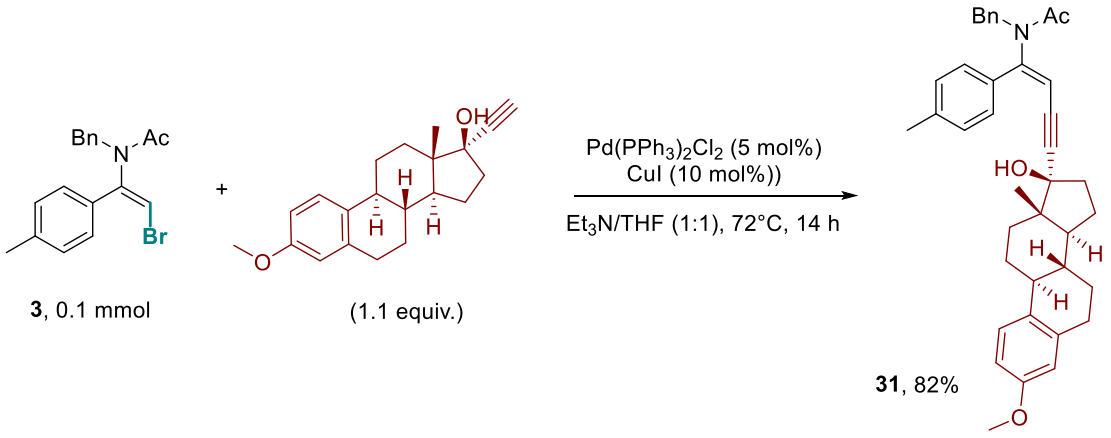
c. Procedure C for Sonogashira Cross-coupling reaction for the synthesis of 28-31.



In a 5 mL tube equipped with a stir bar, product **2** (69.7 mg, 0.211 mmol, 1.0 equiv.), 1-ethynyl-4-methylbenzene (0.317 mmol, 1.5 equiv.), $Pd(PPh_3)_2Cl_2$ (3.0 mg, 2 mol %), CuI (0.8 mg, 2 mol %), and 2 mL of Et_3N were added. The tube was sealed and purged with argon three times. The reaction mixture was stirred at 60 °C for 9 hours. After completion, the reaction mixture was evaporated under reduced pressure followed by purification of the residue through silica gel column chromatography (eluent: petroleum ether/ethyl acetate, gradient: 100:0 to 80:20) yielded the desired product desired product **28**.

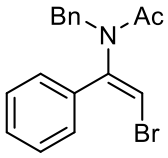


In a 5 mL tube equipped with a stir bar, product **2** (33 mg, 0.1 mmol, 1.0 equiv.), alkynes (0.15 mmol, 1.5 equiv.), $Pd(PPh_3)_2Cl_2$ (1.4 mg, 2 mol %), CuI (0.38 mg, 2 mol %), and 1 mL Et_3N were added. The tube was sealed and purged with argon three times. The reaction mixture was stirred at 60 °C for 14 hours. After completion, the reaction mixture was evaporated under reduced pressure followed by purification of the residue through silica gel column chromatography with appropriate eluent yielded the desired product **29** and **30.**

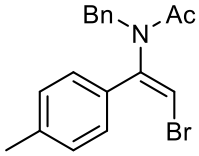


In a 5 mL tube equipped with a stir bar, product **3** (26 mg, 0.0755 mmol, 1.0 equiv.), Mestranol (25.8 mg, 0.0831 mmol, 1.1 equiv.), $Pd(PPh_3)_2Cl_2$ (2.7 mg, 5 mol %), CuI (1.44 mg, 10 mol %), 0.4 mL Et_3N and 0.4 mL THF were added. The tube was sealed and purged with argon three times. The reaction mixture was stirred at 72 °C. for 14 hours. After completion, the reaction mixture was evaporated under reduced pressure followed by purification of the residue through silica gel column chromatography (eluent: petroleum ether/ethyl acetate, gradient: 100:0 to 55:45). yielded the desired product **31**.

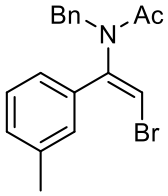
5. Characterization of products



(E)-N-benzyl-N-(2-bromo-1-phenylvinyl)acetamide (2) was synthesized from N-benzyl-N-(1-phenylvinyl)acetamide (**1a**) following general procedure **A** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 88:12). **2** was obtained as a colorless crystal (53.3 mg, 81% yield). R_f (in petroleum ether/ethyl acetate = 3:1): 0.53. mp: 95.6 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.61 – 7.51 (m, 2H), 7.48 – 7.39 (m, 3H), 7.34 – 7.24 (m, 3H), 7.22 – 7.15 (m, 2H), 6.10 (s, 1H), 4.50 (s, 2H), 2.22 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.5, 142.3, 137.0, 133.2, 129.8, 129.1, 128.7, 128.6, 127.7, 107.1, 49.4, 22.3. The (E)/(Z) configuration was determined by NOSEY. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{17}H_{17}NO^{79}Br$: 330.0494, Found: 330.0481 (Δ = - 3.9 ppm). **IR** (neat, cm^{-1}): ν 3067, 1655, 1382, 1255, 768, 698, 511.

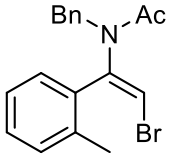


(E)-N-benzyl-N-(2-bromo-1-(p-tolyl)vinyl)acetamide (3) was synthesized from N-benzyl-N-(1-(p-tolyl)vinyl)acetamide following general procedure **A** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 88:12). **3** was obtained as a colorless crystal (37.8 mg, 65% yield). R_f (in petroleum ether/ethyl acetate = 3:1): 0.63. mp: 95.7 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.49 – 7.42 (m, 2H), 7.32 – 7.24 (m, 4H), 7.24 – 7.17 (m, 3H), 6.05 (s, 1H), 4.50 (s, 2H), 2.40 (s, 3H), 2.20 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.6, 142.3, 140.1, 137.1, 130.2, 129.4, 129.1, 129.0, 128.6, 127.6, 106.4, 49.3, 22.3, 21.5. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{18}H_{19}NO^{79}Br$: 344.0650, Found: 344.0656 (Δ = 1.7 ppm). **IR** (neat, cm^{-1}): ν 3073, 1650, 822, 763, 703, 517.

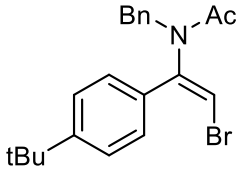


(E)-N-benzyl-N-(2-bromo-1-(m-tolyl)vinyl)acetamide (4) was synthesized from N-benzyl-N-(1-(m-tolyl)vinyl)acetamide following general procedure **A** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 86:14). **4** was obtained as a white solid (49.9 mg, 72% yield). R_f (in petroleum ether/ethyl acetate = 3:1): 0.44. mp: 79.2 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.42 – 7.24 (m, 7H), 7.23 – 7.17 (m, 2H), 6.08 (s, 1H), 4.50 (s, 2H), 2.39 (s, 3H), 2.22 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.6, 142.5, 138.5, 137.1, 133.2, 130.6, 129.3, 129.1, 128.6, 127.7, 126.4, 106.9, 49.4, 22.3, 21.6. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{18}H_{19}NO^{79}Br$: 344.0650, Found: 344.0652 (Δ = 0.6 ppm).

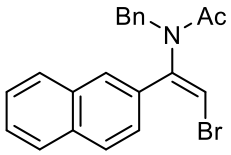
IR (neat, cm^{-1}): ν 3065, 1654, 1382, 1254, 772, 702.



(E)-N-benzyl-N-(2-bromo-1-(o-tolyl)vinyl)acetamide (5) was synthesized from N-benzyl-N-(1-(o-tolyl)vinyl)acetamide (**1d**) following general procedure **A** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 87:13). **5** was obtained as a white solid (58.4 mg, 85% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.48. mp: 87.6 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.38 – 7.19 (m, 7H), 7.18 – 7.10 (m, 2H), 6.31 (s, 1H), 4.44 (s, 2H), 2.39 (s, 3H), 2.21 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.5, 142.9, 137.6, 137.2, 133.2, 130.9, 129.6, 129.3, 128.5, 128.1, 127.4, 126.0, 107.7, 48.8, 22.4, 19.9. The (E)/(Z) configuration was determined by NOSEY. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{18}H_{19}NO^{79}Br$: 344.0650, Found: 344.0655 (Δ = 1.5 ppm). **IR** (neat, cm^{-1}): ν 3062, 2923, 1650, 985, 751, 724, 478.

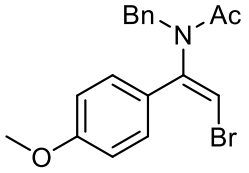


(E)-N-benzyl-N-(2-bromo-1-(4-(tert-butyl)phenyl)vinyl)acetamide (6) was synthesized from N-benzyl-N-(1-(4-(tert-butyl)phenyl)vinyl)acetamide **(1t)** following general procedure **A** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 88:12). **6** was obtained as a white solid (54.6 mg, 71% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.73. mp: 87.2 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.55 – 7.48 (m, 2H), 7.47 – 7.41 (m, 2H), 7.33 – 7.24 (m, 3H), 7.23 – 7.17 (m, 2H), 6.04 (s, 1H), 4.50 (s, 2H), 2.20 (s, 3H), 1.35 (s, 9H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.6, 153.2, 142.2, 137.2, 130.2, 129.2, 128.8, 128.6, 127.7, 125.7, 106.5, 49.5, 35.0, 31.3, 22.3. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{21}H_{25}NO^{79}Br$: 386.1120, Found: 386.1122 (Δ = 0.5 ppm). **IR** (neat, cm^{-1}): ν 3068, 2962, 1664, 1380, 839, 700, 545.

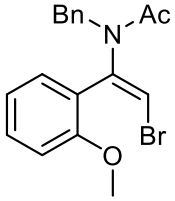


(E)-N-benzyl-N-(2-bromo-1-(naphthalen-2-yl)vinyl)acetamide (7) was synthesized from N-benzyl-N-(1-(naphthalen-2-yl)vinyl)acetamide (**1e**) following general procedure **A** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 88:12). **7** was obtained as a colorless oil (53.9 mg, 71% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.65. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 8.00 (d, *J* = 1.9 Hz, 1H), 7.93 – 7.83 (m, 3H), 7.64 (dd, *J* = 8.6, 1.8 Hz, 1H), 7.61 – 7.50 (m, 2H), 7.36 – 7.27 (m, 3H), 7.26 – 7.18 (m, 2H), 6.19 (s, 1H), 4.56 (s, 2H), 2.28 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.7, 142.5, 137.0, 133.7, 133.0, 130.7, 129.1, 129.1, 128.6, 128.6, 128.5, 127.9, 127.7, 127.5, 126.9, 125.8, 107.3, 49.6, 22.4. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{21}H_{19}NO^{79}Br$: 380.0650, Found:

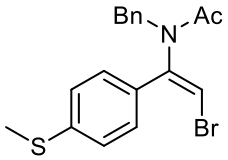
380.0652 (Δ = 0.5 ppm). **IR** (neat, cm^{-1}): ν 3061, 1656, 1380, 819, 729, 698, 478.



(E)-N-benzyl-N-(2-bromo-1-(4-methoxyphenyl)vinyl)acetamide (8) was synthesized from N-benzyl-N-(1-(4-methoxyphenyl)vinyl)acetamide (**1f**) following general procedure **A** and purified by Puriflash by dry loading (4 g, 7 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 50:50). **8** was obtained as a yellow oil (26.9 mg, 75% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.27. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.55 – 7.47 (m, 2H), 7.33 – 7.24 (m, 3H), 7.22 – 7.15 (m, 2H), 6.99 – 6.91 (m, 2H), 6.00 (s, 1H), 4.50 (s, 2H), 3.86 (s, 3H), 2.20 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.7, 160.6, 142.0, 137.1, 130.6, 129.1, 128.6, 127.7, 125.3, 114.1, 105.6, 55.5, 49.4, 22.3. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{18}H_{19}NO_2{}^{79}Br$: 360.0599, Found: 360.0605 (Δ = 1.7 ppm). **IR** (neat, cm^{-1}): ν 3067, 2933, 1657, 1509, 1250, 1175, 1028, 836, 700, 521.

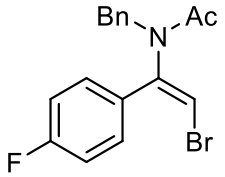


(E)-N-benzyl-N-(2-bromo-1-(2-methoxyphenyl)vinyl)acetamide (9) was synthesized from N-benzyl-N-(1-(2-methoxyphenyl)vinyl)acetamide (**1s**) following general procedure **A** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 88:12). **9** was obtained as a white solid (56.7 mg, 79% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.53. mp: 108.4 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.37 – 7.26 (m, 1H), 7.23 – 7.13 (m, 4H), 7.12 – 7.05 (m, 2H), 6.91 (td, *J* = 7.5, 1.1 Hz, 1H), 6.84 (dd, *J* = 8.4, 1.1 Hz, 1H), 6.11 (s, 1H), 4.38 (s, 2H), 3.71 (s, 3H), 2.24 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 171.1, 157.6, 142.0, 137.5, 132.5, 131.2, 128.7, 128.4, 127.3, 122.4, 120.4, 111.4, 108.3, 55.4, 48.7, 22.5. The (E)/(Z) configuration was determined by NOSEY. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{18}H_{19}NO_2{}^{79}Br$: 360.0599, Found: 360.0594 (Δ = - 1.4 ppm). **IR** (neat, cm^{-1}): ν 3047, 1649, 1387, 1274, 1025, 759, 697.

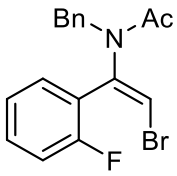


(E)-N-benzyl-N-(2-bromo-1-(4-(methylthio)phenyl)vinyl)acetamide (10) was synthesized from N-benzyl-N-(1-(4-(methylthio)phenyl)vinyl)acetamide (**1g**) following general procedure **A** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 87:13). **10** was obtained as a yellow solid (51.0 mg, 68% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.39. mp: 59.9 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.51 – 7.43 (m, 2H), 7.33 – 7.24 (m, 5H), 7.22 – 7.15 (m, 2H), 6.06 (s, 1H), 4.50 (s, 2H), 2.52 (s, 3H), 2.19 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.5, 141.8, 141.3, 136.9, 129.4, 129.3, 129.0,

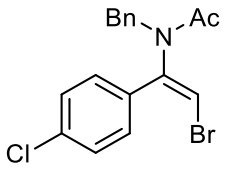
128.6, 127.7, 125.8, 106.5, 49.4, 22.3, 15.2. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{18}H_{19}NOS^{79}Br$: 376.0371, Found: 376.0368 (Δ = - 0.8 ppm). **IR** (neat, cm^{-1}): ν 3065, 2918, 1652, 1380, 701, 514.



(E)-N-benzyl-N-(2-bromo-1-(4-fluorophenyl)vinyl)acetamide (11) was synthesized from N-benzyl-N-(1-(4-fluorophenyl)vinyl)acetamide (**1k**) following general procedure **A** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 85:15). **11** was obtained as a colorless crystal (44.4 mg, 64% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.40. mp: 63.1 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.59 – 7.48 (m, 2H), 7.33 – 7.25 (m, 3H), 7.21 – 7.08 (m, 4H), 6.10 (s, 1H), 4.50 (s, 2H), 2.21 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.5, 163.3 (d, *J* = 251.2 Hz), 141.5, 136.9, 131.1 (d, *J* = 8.5 Hz), 129.3 (d, *J* = 3.6 Hz), 129.1, 128.7, 127.8, 115.9 (d, *J* = 22.0 Hz), 107.1, 49.4, 22.3. **^{19}F{^{1}H} NMR** (282.4 MHz, $CDCl_3$) δ -110.4. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{17}H_{16}NOF^{79}Br$: 348.0399, Found: 348.0405 (Δ = 1.7 ppm). **IR** (neat, cm^{-1}): ν 3063, 1657, 1598, 1505, 1225, 1160, 848, 525.

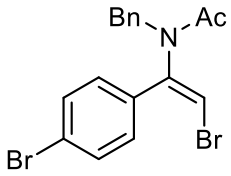


(E)-N-benzyl-N-(2-bromo-1-(2-fluorophenyl)vinyl)acetamide (12) was synthesized from N-benzyl-N-(1-(2-fluorophenyl)vinyl)acetamide (**1u**) following general procedure **A** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 87:13). **12** was obtained as a white solid (50.0 mg, 72% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.45. mp: 89.9 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.47 – 7.35 (m, 1H), 7.35 – 7.24 (m, 4H), 7.23 – 7.09 (m, 4H), 6.27 (s, 1H), 4.49 (s, 2H), 2.28 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.44, 160.10 (d, *J* = 251.4 Hz), 138.76, 136.94, 131.77 (d, *J* = 8.5 Hz), 131.49 (d, *J* = 3.0 Hz), 128.81, 128.55, 127.59, 124.30 (d, *J* = 3.6 Hz), 121.79 (d, *J* = 13.5 Hz), 116.53 (d, *J* = 21.7 Hz), 110.37, 49.09, 22.31 (d, *J* = 2.8 Hz). **^{19}F{^{1}H} NMR** (282.4 MHz, $CDCl_3$) δ -111.0. The (E)/(Z) configuration was determined by NOSEY. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{17}H_{16}NOF^{79}Br$: 348.0399, Found: 348.0394 (Δ = - 1.4 ppm). **IR** (neat, cm^{-1}): ν 3064, 1654, 1381, 766, 705, 502, 406.

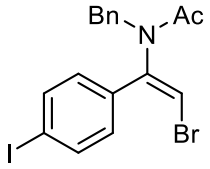


(E)-N-benzyl-N-(2-bromo-1-(4-chlorophenyl)vinyl)acetamide (13) was synthesized from N-benzyl-N-(1-(4-chlorophenyl)vinyl)acetamide (**1j**) following general procedure **A** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to

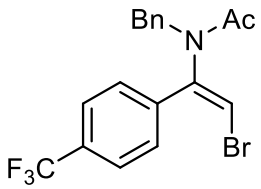
85:15). **13** was obtained as a colorless crystal (44.6 mg, 61% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.53. mp: 82.3 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.52 – 7.45 (m, 2H), 7.44 – 7.37 (m, 2H), 7.32 – 7.25 (m, 3H), 7.21 – 7.14 (m, 2H), 6.13 (s, 1H), 4.50 (s, 2H), 2.20 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.4, 141.4, 136.8, 135.7, 131.7, 130.4, 129.1, 129.0, 128.7, 127.8, 107.7, 49.5, 22.3. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{17}H_{16}NO^{35}Cl^{79}Br$: 364.0104, Found: 364.0096 (Δ = - 2.2 ppm). **IR** (neat, cm^{-1}): ν 2326, 1652, 1090, 833, 743, 514, 454.



(E)-N-benzyl-N-(2-bromo-1-(4-bromophenyl)vinyl)acetamide (14) was synthesized from N-benzyl-N-(1-(4-bromophenyl)vinyl)acetamide (**1i**) following general procedure **A** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 87:13). **14** was obtained as a white solid (54.9mg, 67% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.53. mp: 89.9 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.60 – 7.52 (m, 2H), 7.45 – 7.38 (m, 2H), 7.32 – 7.24 (m, 3H), 7.21 – 7.13 (m, 2H), 6.13 (s, 1H), 4.50 (s, 2H), 2.19 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.4, 141.4, 136.7, 132.2, 132.0, 130.6, 129.0, 128.6, 127.8, 124.0, 107.7, 49.4, 22.3. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{17}H_{16}NO^{79}Br_2$: 407.9599, Found: 407.9593 (Δ = - 1.5 ppm). **IR** (neat, cm^{-1}): ν 3069, 2914, 1652, 1378, 830, 699, 511.

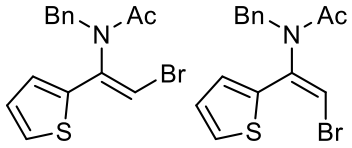


(E)-N-benzyl-N-(2-bromo-1-(4-iodophenyl)vinyl)acetamide (15) was synthesized from N-benzyl-N-(1-(4-iodophenyl)vinyl)acetamide (**1h**) following general procedure **A** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 85:15). **15** was obtained as a yellow solid (58.0 mg, 64% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.42. mp: 100.1 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.81 – 7.72 (m, 2H), 7.34 – 7.24 (m, 5H), 7.22 – 7.12 (m, 2H), 6.13 (s, 1H), 4.49 (s, 2H), 2.19 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.4, 141.6, 138.0, 136.7, 132.8, 130.6, 129.0, 128.6, 127.8, 107.8, 96.0, 49.4, 22.3. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{17}H_{16}NO^{79}BrI$: 455.9460, Found: 455.9458 (Δ = - 0.4 ppm). **IR** (neat, cm^{-1}): ν 3067, 1668, 1644, 1379, 1255, 828, 698, 510.



(E)-N-benzyl-N-(2-bromo-1-(4-(trifluoromethyl)phenyl)vinyl)acetamide (16) was synthesized from N-benzyl-N-(1-(4-(trifluoromethyl)phenyl)vinyl)acetamide (**1l**) following general procedure **A** and purified by Puriflash by dry loading (10 g, 15 mL/min, petroleum

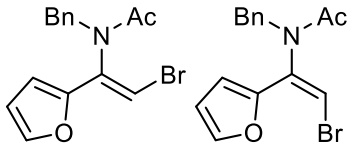
ether/ethyl acetate, gradient: 100:0 to 88:12). **16** was obtained as a white solid (48.5 mg, 61% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.44. mp: 81.8 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.75 – 7.58 (m, 4H), 7.39 – 7.24 (m, 3H), 7.22 – 7.12 (m, 2H), 6.23 (s, 1H), 4.51 (s, 2H), 2.22 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.37, 141.32, 137.04, 136.67, 131.61 (q, J = 32.9, 32.5 Hz), 129.47, 129.04, 128.72, 127.90, 125.77 (q, J = 3.9 Hz), 123.83 (q, J = 272.4 Hz), 109.01, 49.58, 22.29. **^{19}F{^{1}H} NMR** (282.4 MHz, $CDCl_3$) δ -63.4. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{18}H_{16}NOF_3{}^{79}Br$: 398.0367, Found: 398.0378 (Δ = 2.8 ppm). **IR** (neat, cm^{-1}): ν 3068, 2919, 1655, 1317, 1173, 1115, 1066, 845, 699, 512.



(Z)-N-benzyl-N-(2-bromo-1-(thiophen-2-yl)vinyl)acetamide (17') and **(E)-N-benzyl-N-(2-bromo-1-(thiophen-2-yl)vinyl)acetamide (17)** were synthesized from N-benzyl-N-(1-(thiophen-2-yl)vinyl)acetamide (**1o**) following general procedure **A** and purified by Puriflash by dry loading (10 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 89:11). **17'** and **17** were separated as single pure products with a 17:83 ratio.

17' was obtained as a colorless oil (8.7 mg, 13% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.58. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.34 – 7.27 (m, 3H), 7.26 – 7.20 (m, 3H), 6.94 (dd, J = 5.1, 3.7 Hz, 1H), 6.83 (dd, J = 3.7, 1.3 Hz, 1H), 6.72 (s, 1H), 4.96 (d, J = 14.0 Hz, 1H), 4.51 (d, J = 13.9 Hz, 1H), 2.09 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.1, 139.7, 139.6, 136.5, 130.4, 128.3, 128.0, 127.9, 127.0, 126.2, 106.6, 50.0, 21.9. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{15}H_{15}NOS^{79}Br$: 336.0058, Found: 336.0068 (Δ = 3.0 ppm). **IR** (neat, cm^{-1}): ν 3063, 2925, 1666, 1383, 1300, 701.

17 was obtained as a yellow solid (43.1 mg, 64% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.57. mp: 64.2 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.52 – 7.46 (m, 1H), 7.43 (dt, J = 3.8, 1.0 Hz, 1H), 7.37 – 7.21 (m, 5H), 7.14 – 7.07 (m, 1H), 5.93 (s, 1H), 4.87 – 4.51 (m, 2H), 2.07 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.6, 137.3, 137.2, 137.0, 129.4, 129.3, 128.7, 128.6, 127.9, 127.3, 106.8, 50.4, 21.8. The (E)/(Z) configuration was determined by NOSEY. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{15}H_{15}NOS^{79}Br$: 336.0058, Found: 336.0043 (Δ = - 4.1 ppm); [M+H+CH_3CN] Calcd for $C_{17}H_{18}N_2OS^{79}Br$: 377.0323, Found: 377.0306 (Δ = - 4.5 ppm). **IR** (neat, cm^{-1}): ν 3071, 1655, 1388, 725, 700, 507.

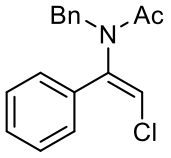


(Z)-N-benzyl-N-(2-bromo-1-(furan-2-yl)vinyl)acetamide (18') and **(E)-N-benzyl-N-(2-bromo-1-(furan-2-yl)vinyl)acetamide (18)** were synthesized from N-benzyl-N-(1-(furan-2-yl)vinyl)acetamide (**1p**) following general procedure **A** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 90:10). **18'** and **18** were separated as single pure products with a 25:75 ratio.

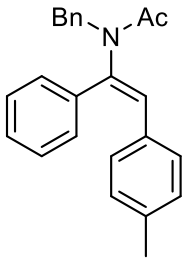
18' was obtained as a brown liquid (10.7 mg, 17 % yield). R_f (in petroleum ether/ethyl acetate

= 4:1): 0.52. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.39 – 7.36 (m, 1H), 7.35 – 7.28 (m, 2H), 7.25 – 7.19 (m, 3H), 6.88 (s, 1H), 6.29 (dd, *J* = 3.5, 1.8 Hz, 1H), 5.95 (dt, *J* = 3.4, 0.7 Hz, 1H), 4.78 (d, *J* = 13.9 Hz, 1H), 4.69 (d, *J* = 13.9 Hz, 1H), 2.02 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.3, 150.1, 143.9, 136.8, 136.3, 130.2, 128.3, 127.8, 111.8, 109.4, 107.1, 50.4, 21.7. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{15}H_{15}NO_2{}^{79}Br$: 320.0286, Found: 320.0275 (Δ = - 3.4 ppm); [M+H+CH_3CN] Calcd for $C_{17}H_{18}N_2O_2{}^{79}Br$: 361.0552, Found: 361.0547 (Δ = - 1.4 ppm).
IR (neat, cm^{-1}): ν 3031, 1729, 1388, 1229, 706.

18 was obtained as a brown liquid (33.0 mg, 52% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.51. mp: 59-60 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.43 (dd, *J* = 1.8, 0.8 Hz, 1H), 7.28 – 7.13 (m, 5H), 6.94 (dd, *J* = 3.6, 0.8 Hz, 1H), 6.45 (dd, *J* = 3.5, 1.8 Hz, 1H), 5.88 (s, 1H), 4.58 (s, 2H), 1.97 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.8, 147.9, 143.4, 137.3, 134.0, 129.3, 128.6, 127.7, 113.9, 112.0, 106.2, 50.7, 21.9. The (E)/(Z) configuration was determined by NOSEY. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{15}H_{15}NO_2{}^{79}Br$: 320.0286, Found: 320.0294 (Δ = 2.5 ppm); [M+H+CH_3CN] Calcd for $C_{17}H_{18}N_2O_2{}^{79}Br$: 361.0552, Found: 361.0563 (Δ = 3.0 ppm). **IR** (neat, cm^{-1}): ν 3065, 3031, 1662, 1386, 1307, 703, 591.

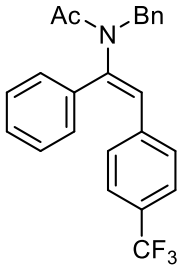


(E)-N-benzyl-N-(2-chloro-1-phenylvinyl)acetamide (19) was synthesized from N-benzyl-N-(1-phenylvinyl)acetamide (**1a**) following general procedure **A** and purified by Puriflash by dry loading (10 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 89:11). **19** was obtained as a white solid (32.0 mg, 56% yield). R_f (in petroleum ether/ethyl acetate = 4:1): 0.68. mp: 88.6 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.61 – 7.52 (m, 2H), 7.49 – 7.40 (m, 3H), 7.34 – 7.25 (m, 3H), 7.24 – 7.17 (m, 2H), 5.95 (s, 1H), 4.52 (s, 2H), 2.20 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.9, 140.3, 137.0, 132.3, 129.8, 129.1, 128.8, 128.8, 128.6, 127.7, 119.0, 49.6, 22.2. The (E)/(Z) configuration was determined by NOSEY. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{17}H_{17}NO^{35}Cl$: 286.0999, Found: 286.0988 (Δ = - 3.8 ppm). **IR** (neat, cm^{-1}): ν 3065, 1657, 1387, 1263, 772, 699, 513.

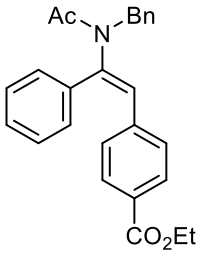


(E)-N-benzyl-N-(1-phenyl-2-(p-tolyl)vinyl)acetamide (20) was synthesized following general procedure **B** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 82:18). **20** was obtained as a yellow oil (65.9 mg, 96% yield). R_f (in petroleum ether/ethyl acetate = 5:1): 0.43. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.38 – 7.22 (m, 10H), 7.00 – 6.92 (m, 2H), 6.92 – 6.84 (m, 2H), 6.17 (s, 1H), 4.54 (s, 2H), 2.32 (s, 3H), 2.27 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 171.0, 138.5, 137.6, 137.5, 135.0, 132.3, 130.6, 129.5, 129.2, 129.1, 129.0, 128.8, 128.3, 127.3, 48.7, 22.5, 21.3. **HRMS** (ESI^+) m/z:

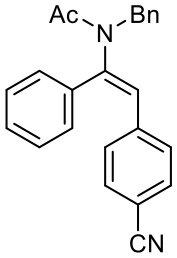
[M+H] Calcd for $C_{24}H_{24}NO$: 342.1858, Found: 342.1865 (Δ = 2.0 ppm). **IR** (neat, cm^{-1}): ν 3027, 2923, 1655, 1385, 699.



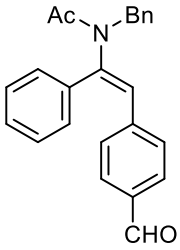
(E)-N-benzyl-N-(1-phenyl-2-(4-(trifluoromethyl)phenyl)vinyl)acetamide (21) was synthesized following general procedure **B** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 87:13). **21** was obtained as a colorless oil (80.0 mg, 100% yield). R_f (in petroleum ether/ethyl acetate = 5:1): 0.40. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.42 – 7.29 (m, 8H), 7.28 – 7.18 (m, 4H), 7.10 – 7.02 (m, 2H), 6.21 (s, 1H), 4.56 (s, 2H), 2.32 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.73, 141.54, 139.03 (q, *J* = 1.5 Hz), 137.32, 134.23, 129.65, 129.58, 129.39, 129.18, 129.14, 129.11, 128.77, 128.47, 127.55, 125.29 (q, *J* = 3.9 Hz), 124.05 (q, *J* = 272.1 Hz), 48.93, 22.58. **^{19}F{^{1}H} NMR** (282.4 MHz, $CDCl_3$) δ -63.2. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{24}H_{21}NOF_3$: 396.1575, Found: 396.1584 (Δ = 2.3 ppm). **IR** (neat, cm^{-1}): ν 2938, 1648, 1322, 1107, 1065, 699.



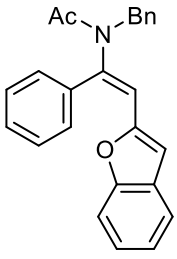
ethyl (E)-4-(2-(N-benzylacetamido)-2-phenylvinyl)benzoate (22) was synthesized following general procedure **B** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 85:15). **22** was obtained as a yellow oil (72.7 mg, 91% yield). R_f (in petroleum ether/ethyl acetate = 5:1): 0.19. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.77 – 7.67 (m, 2H), 7.31 – 7.07 (m, 10H), 6.98 – 6.89 (m, 2H), 6.14 (s, 1H), 4.47 (s, 2H), 4.24 (q, *J* = 7.1 Hz, 2H), 2.23 (s, 3H), 1.26 (t, *J* = 7.2 Hz, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.8, 166.2, 141.3, 139.9, 137.3, 134.3, 129.6, 129.5, 129.5, 129.3, 129.3, 129.1, 129.0, 129.0, 128.4, 127.5, 61.0, 48.9, 22.6, 14.4. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{26}H_{26}NO_3$: 400.1913, Found: 400.1918 (Δ = 1.2 ppm). **IR** (neat, cm^{-1}): ν 2980, 2248, 1713, 1655, 1269, 1101, 725, 697.



(E)-N-benzyl-N-(2-(4-cyanophenyl)-1-phenylvinyl)acetamide (23) was synthesized following general procedure **B** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 85:15). **23** was obtained as a white solid (64.4 mg, 91% yield). R_f (in petroleum ether/ethyl acetate = 5:1): 0.23. mp: 145.9 °C. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.44 – 7.26 (m, 8H), 7.26 – 7.15 (m, 4H), 7.07 – 7.00 (m, 2H), 6.19 (s, 1H), 4.55 (s, 2H), 2.30 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.6, 142.5, 140.1, 137.2, 133.9, 132.1, 129.9, 129.7, 129.5, 129.2, 129.0, 128.5, 128.1, 127.6, 118.7, 110.8, 49.0, 22.6. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{24}H_{21}N_2O$: 353.1654, Found: 353.1652 (Δ = - 0.6 ppm). **IR** (neat, cm^{-1}): ν 2223, 1648, 1384, 699, 564, 512.

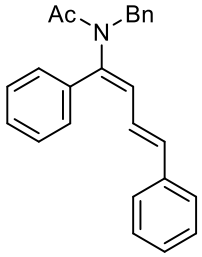


(E)-N-benzyl-N-(2-(4-formylphenyl)-1-phenylvinyl)acetamide (24) was synthesized following general procedure **B** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 85:15). **24** was obtained as a colorless oil (68.6 mg, 97% yield). R_f (in petroleum ether/ethyl acetate = 5:1): 0.39. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 9.90 (s, 1H), 7.70 – 7.60 (m, 2H), 7.42 – 7.17 (m, 10H), 7.14 – 7.07 (m, 2H), 6.24 (s, 1H), 4.56 (s, 2H), 2.32 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 191.5, 170.7, 142.2, 141.7, 137.2, 135.1, 134.2, 129.7, 129.7, 129.6, 129.1, 128.9, 128.4, 127.5, 49.0, 22.6. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{24}H_{22}NO_2$: 356.1651, Found: 356.1662 (Δ = 3.1 ppm). **IR** (neat, cm^{-1}): ν 3029, 2824, 1697, 1653, 1598, 1382, 697, 505.

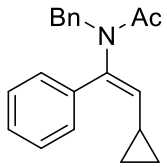


(E)-N-(2-(benzofuran-2-yl)-1-phenylvinyl)-N-benzylacetamide (25) was synthesized following general procedure **B** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 75:25). **25** was obtained as a yellow oil (74.0 mg, 100% yield). R_f (in petroleum ether/ethyl acetate = 5:1): 0.53. **^{1}H NMR** (300 MHz, $CDCl_3$)

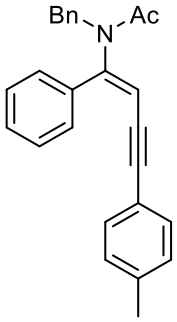
δ 7.37 – 7.24 (m, 6H), 7.23 – 6.99 (m, 8H), 6.26 (s, 1H), 6.06 (s, 1H), 4.46 (s, 2H), 2.21 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.8, 154.4, 151.9, 140.7, 137.3, 134.8, 129.7, 129.4, 128.9, 128.7, 128.5, 128.4, 127.5, 125.0, 123.1, 120.9, 118.2, 111.0, 106.9, 49.2, 22.6. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{25}H_{22}NO_2$: 368.1651, Found: 368.1654 (Δ = 0.8 ppm). **IR** (neat, cm^{-1}): ν 3030, 2931, 2245, 1655, 1381, 749, 696, 510.



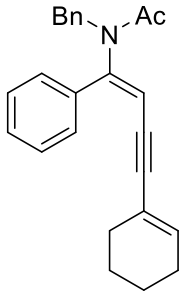
N-benzyl-N-((1E,3E)-1,4-diphenylbuta-1,3-dien-1-yl)acetamide (26) was synthesized following general procedure **B** and purified by Puriflash by dry loading (10 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 86:14). **26** was obtained as a yellow sticky oil (67.8 mg, 96% yield). R_f (in petroleum ether/ethyl acetate = 5:1): 0.40. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.49 – 7.16 (m, 15H), 6.99 (dd, *J* = 15.6, 11.3 Hz, 1H), 6.57 (d, *J* = 15.6 Hz, 1H), 6.07 (d, *J* = 11.2 Hz, 1H), 4.57 (s, 2H), 2.22 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 171.1, 139.9, 137.6, 136.8, 135.7, 135.3, 130.4, 129.3, 129.1, 129.0, 128.9, 128.7, 128.4, 128.1, 127.4, 126.6, 124.4, 49.7, 22.6. The (E)/(Z) configuration was determined by NOSEY. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{25}H_{24}NO$: 354.1858, Found: 354.1859 (Δ = 0.3 ppm). **IR** (neat, cm^{-1}): ν 3028, 2244, 1651, 1383, 697, 517.



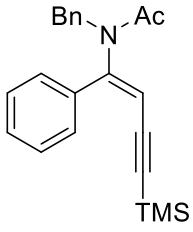
(E)-N-benzyl-N-(2-cyclopropyl-1-phenylvinyl)acetamide (27) was synthesized following general procedure **B** and purified by Puriflash by dry loading (10 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 84:16). **26** was obtained as a yellow colorless oil (17.1 mg, 59% yield). R_f (in petroleum ether/ethyl acetate = 6:1): 0.32. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.45 – 7.37 (m, 4H), 7.37 – 7.31 (m, 1H), 7.27 – 7.16 (m, 5H), 4.62 (d, *J* = 10.1 Hz, 1H), 4.49 (s, 2H), 2.18 (s, 3H), 1.71 – 1.61 (m, 1H), 0.80 – 0.70 (m, 2H), 0.35 – 0.25 (m, 2H). **^{13}C NMR** (101 MHz, $CDCl_3$) δ 171.2, 137.8, 137.2, 136.8, 135.5, 129.3, 128.8, 128.7, 128.4, 128.3, 127.3, 49.3, 22.3, 11.0, 7.9. **HRMS** (CI^+) m/z: [M+H] Calcd for $C_{20}H_{22}NO$: 292.17014, Found: 292.16936 (Δ = -2.67 ppm). **IR** (neat, cm^{-1}): ν 3003, 1651, 1388, 698, 515.



(E)-N-benzyl-N-(1-phenyl-4-(p-tolyl)but-1-en-3-yn-1-yl)acetamide (28) was synthesized following general procedure **C** and purified by Puriflash by dry loading (10 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 80:20). **27** was obtained as a colorless oil (77.6 mg, >99% yield). R_f (in petroleum ether/ethyl acetate = 5:1): 0.43. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.85 – 7.76 (m, 2H), 7.51 – 7.39 (m, 3H), 7.33 – 7.22 (m, 7H), 7.15 – 7.07 (m, 2H), 5.60 (s, 1H), 4.65 (s, 2H), 2.34 (s, 3H), 2.19 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 170.9, 147.7, 139.0, 137.3, 134.4, 131.4, 129.7, 129.3, 129.1, 128.6, 128.5, 128.3, 127.5, 119.8, 109.7, 96.4, 85.9, 50.3, 22.5, 21.6. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{26}H_{24}NO$: 366.1858, Found: 366.1863 (Δ = 1.4 ppm). **IR** (neat, cm^{-1}): ν 3028, 2923, 2191, 1658, 1383, 815, 695, 513.

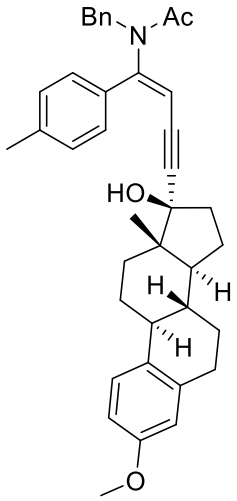


(E)-N-benzyl-N-(4-(cyclohex-1-en-1-yl)-1-phenylbut-1-en-3-yn-1-yl)acetamide (29) was synthesized following general procedure **C** and purified by Puriflash by dry loading (12 g, 15 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 83:17). **29** was obtained as a yellow oil (35.4 mg, >99% yield). R_f (in petroleum ether/ethyl acetate = 6:1): 0.29. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.77 – 7.70 (m, 2H), 7.45 – 7.35 (m, 3H), 7.33 – 7.19 (m, 5H), 6.13 – 6.06 (m, 1H), 5.49 (s, 1H), 4.61 (s, 2H), 2.14 (s, 3H), 2.13 – 2.07 (m, 4H), 1.68 – 1.51 (m, 4H). **^{13}C NMR** (101 MHz, $CDCl_3$) δ 171.1, 146.9, 137.3, 136.6, 134.4, 129.6, 129.1, 128.6, 128.5, 128.2, 127.5, 120.9, 110.2, 98.5, 84.0, 50.3, 28.7, 25.9, 22.4, 22.3, 21.5. **HRMS** (EI^+) m/z: [M] Calcd for $C_{25}H_{25}NO$: 355.19361, Found: 355.19305 (Δ = -1.59 ppm). **IR** (neat, cm^{-1}): ν 2927, 1654, 1381, 693.



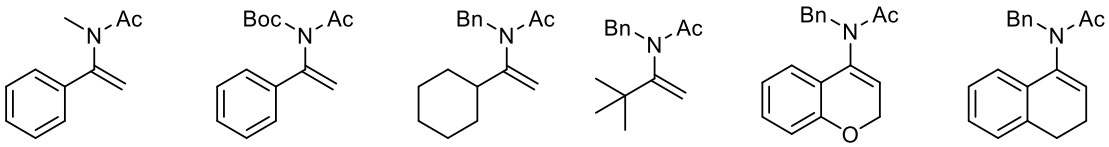
(E)-N-benzyl-N-(1-phenyl-4-(trimethylsilyl)but-1-en-3-yn-1-yl)acetamide (30) was synthesized following general procedure **C** and purified by Puriflash by dry loading (10 g, 15

mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 90:10). **30** was obtained as a yellow oil (32.3 mg, 93% yield). R_f (in petroleum ether/ethyl acetate = 6:1): 0.31. **^{1}H NMR** (400 MHz, $CDCl_3$) δ 7.62 – 7.54 (m, 2H), 7.27 – 7.20 (m, 3H), 7.15 – 7.07 (m, 3H), 7.07 – 7.02 (m, 2H), 5.23 (s, 1H), 4.44 (s, 2H), 1.97 (s, 3H), -0.00 (s, 9H). **^{13}C NMR** (101 MHz, $CDCl_3$) δ 170.9, 149.6, 137.3, 134.2, 130.0, 129.0, 128.6, 128.5, 128.4, 127.6, 109.3, 102.9, 101.5, 50.5, 22.5, -0.3. **HRMS** (EI^+) m/z: [M] Calcd for $C_{22}H_{25}NOSi$: 347.17054, Found: 347.16901 (Δ = -4.4 ppm). **IR** (neat, cm^{-1}): ν 2957, 2123, 1663, 1382, 838, 759, 696.



N-benzyl-N-((E)-4-((8R,9S,13S,14S,17S)-17-hydroxy-3-methoxy-13-methyl-7,8,9,11,12,13,14,15,16,17-decahydro-6H-cyclopenta[a]phenanthren-17-yl)-1-(p-tolyl)but-1-en-3-yn-1-yl)acetamide (31) was synthesized following general procedure **C** and purified by Puriflash by dry loading (4 g, 10 mL/min, petroleum ether/ethyl acetate, gradient: 100:0 to 55:45). **31** was obtained as a brown oil (33.9 mg, 82% yield). R_f (in petroleum ether/ethyl acetate = 6:1): 0.1. **^{1}H NMR** (300 MHz, $CDCl_3$) δ 7.47 (d, *J* = 8.3 Hz, 2H), 7.24 – 7.15 (m, 3H), 7.15 – 7.08 (m, 5H), 6.64 (dd, *J* = 8.6, 2.9 Hz, 1H), 6.56 (d, *J* = 3.0 Hz, 1H), 5.34 (s, 1H), 4.56 (d, *J* = 14.5 Hz, 1H), 4.46 (d, *J* = 14.5 Hz, 1H), 3.70 (s, 3H), 2.84 – 2.72 (m, 2H), 2.26 (s, 3H), 2.20 (m, 2H), 2.07 (s, 3H), 2.04 – 1.88 (m, 3H), 1.79 (m, 1H), 1.74 – 1.53 (m, 3H), 1.47 (m, 1H), 1.41 – 1.07 (m, 5H), 0.78 (s, 3H). **^{13}C NMR** (75.5 MHz, $CDCl_3$) δ 171.0, 157.6, 148.4, 140.0, 138.0, 137.4, 132.5, 131.6, 129.4, 128.9, 128.5, 128.2, 127.5, 126.4, 113.9, 111.6, 108.4, 99.3, 82.8, 80.7, 55.3, 50.4, 49.8, 47.8, 43.6, 39.5, 39.0, 33.1, 29.9, 27.4, 26.5, 23.0, 22.5, 21.5, 12.9. **HRMS** (ESI^+) m/z: [M+H] Calcd for $C_{39}H_{44}NO_3$: 574.3321, Found: 574.3312 (Δ = -1.6 ppm).

6. Reluctant substrates



7. CV Experiments

Cyclic voltammetry (CV) was implemented on an OrigaLys® OCF01A. The experiments were performed in a 150 mL five-neck conic electrochemical cell (**Figure S1**). CV curves were recorded using a three-electrode scheme under room temperature. The working electrode was a platinum electrode (d = 0.1 mm). A platinum wire served as an auxiliary electrode (d = 1 mm). A SCE (Saturated Calomel Electrode) was used as the reference electrode. The solutions were degassed by bubbling nitrogen in the mixture. CV experiments were performed under a nitrogen atmosphere at room temperature. The working electrode was polished before recording each CV curve. 15 mL of solution was utilized.

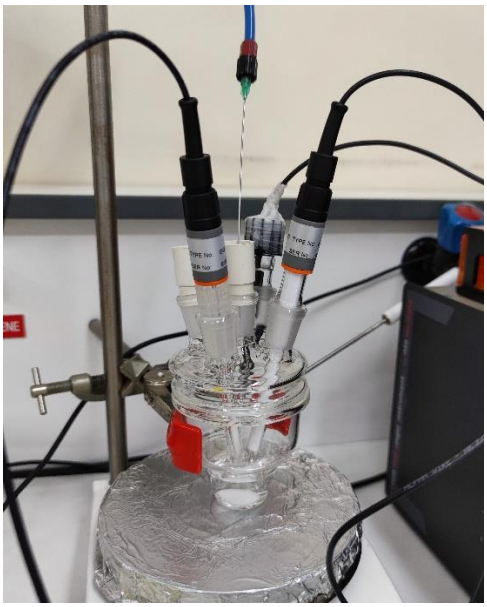


Figure S1. Cyclic voltammetry cell.

To gain insights into the reaction mechanism, CV measurements were conducted (**Figure S2**). NaBr showed two successive oxidative waves, while no oxidation of enamide **1a** (grey curve) was observed in the potential range studied (up to + 1.5 V). Moreover, the analysis of a mixture of NaBr and enamide demonstrated a similar profile without any increase of oxidative potential, meaning that there is no bromine mediation of a plausible enamide oidation.

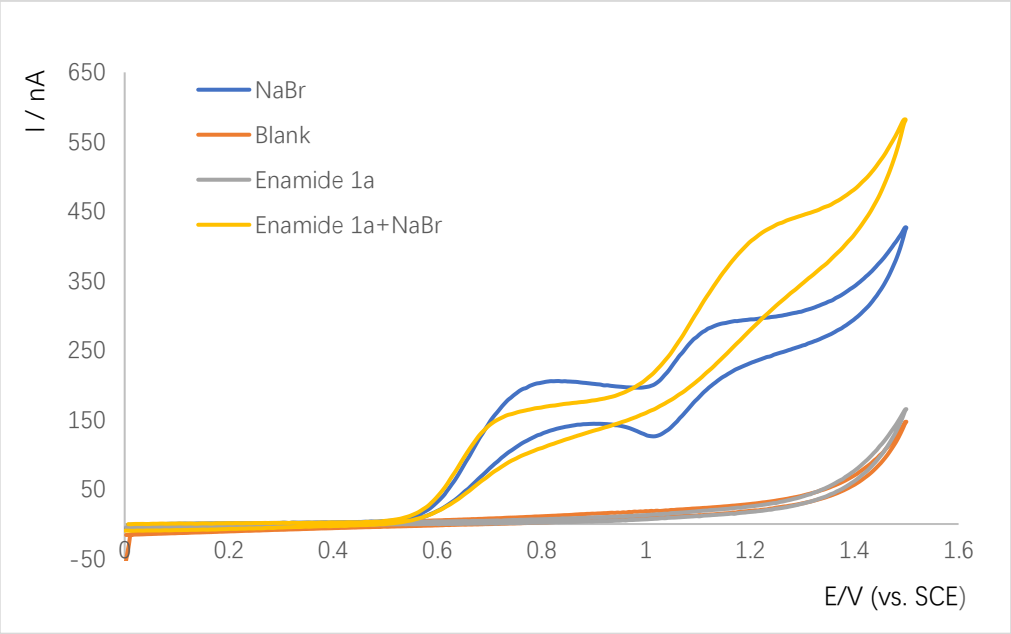
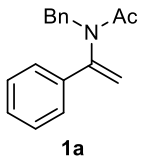


Figure S2. CV curve for a solution of 0.01 M NaBr/0.01M Enamide and 0.05 M nBu$_4$NBF$_4$ in DMA on a Pt working electrode (d = 0.1 mm), Pt wire (d = 1 mm) auxiliary electrode, SCE reference electrode under a scan rate of 0.1 V/s ranging from 0 V to 1.5 V in oxidation. Following IUPAC CV plotting convention.

8. References

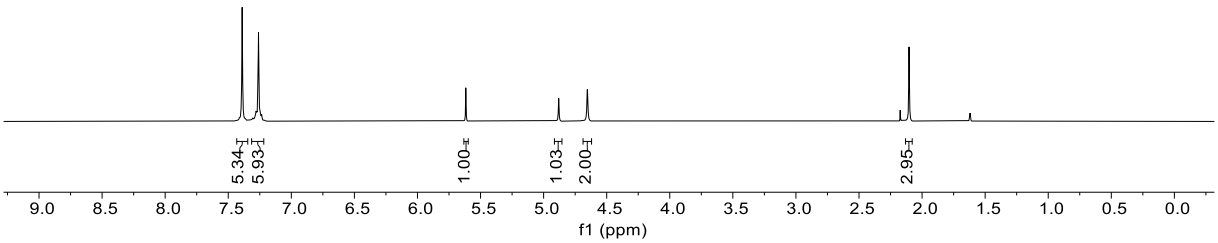
1. S. Enthaler, B. Hagemann, K. Junge, G. Erre and M. Beller, *Eur. J. Org. Chem.*, 2006, **2006**, 2912-2917.
2. S. Pankajakshan, Y.-H. Xu, J. K. Cheng, M. T. Low and T.-P. Loh, *Angew. Chem. Int. Ed.*, 2012, **51**, 5701-5705.
3. C. Feng and T.-P. Loh, *Chem. Sci.*, 2012, **3**, 3458-3462.
4. W. Yu, J. Chen, K. Gao, Z. Liu and Y. Zhang, *Org. Lett.*, 2014, **16**, 4870-4873.
5. X.-Y. Lu, J.-C. Wang, X.-M. Sun, M.-T. Gao, W.-J. Ying, M.-Y. Ge, Z.-H. Wei, Z. Liu and X.-K. Chen, *J. Org. Chem.*, 2023, **88**, 513-524.
6. X.-H. Chang, Z.-L. Wang, M. Zhao, C. Yang, J.-J. Li, W.-W. Ma and Y.-H. Xu, *Org. Lett.*, 2020, **22**, 1326-1330.
7. X. Li, K. Sun, W. Shen, Y. Zhang, M.-Z. Lu, X. Luo and H. Luo, *Org. Lett.*, 2021, **23**, 31-36.
8. S. Luan, T. Castanheiro and T. Poisson, *Org. Lett.*, 2023, **25**, 1678-1682.
9. T. Guan, J.-Y. Guo, Q.-H. Zhang, X.-W. Xu, X.-Y. Yu, Y. Zhang and K. Zhao, *Green Chem.*, 2022, **24**, 6524-6530.

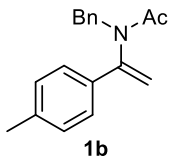
9. NMR spectra



1a

^{1}H NMR (300 MHz, $CDCl_3$)





1b

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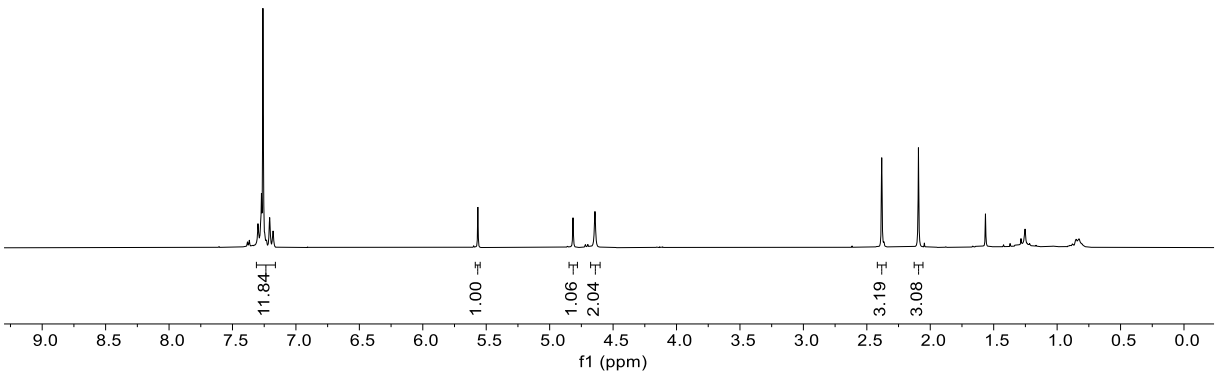

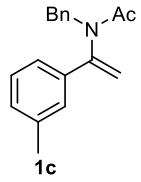

1c

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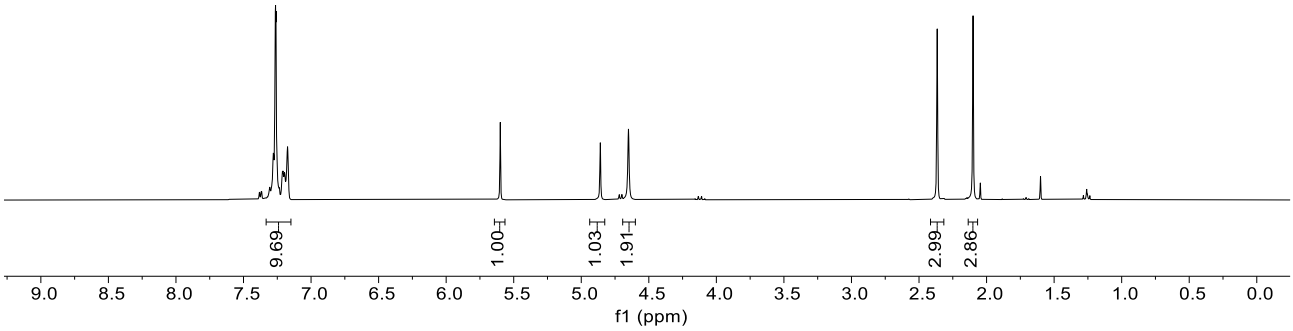
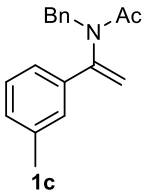
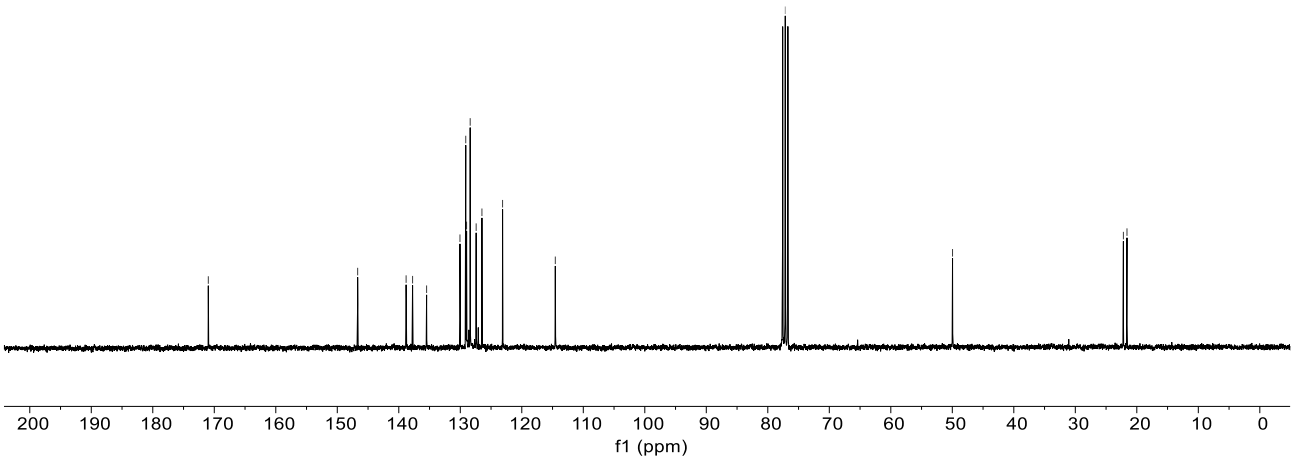
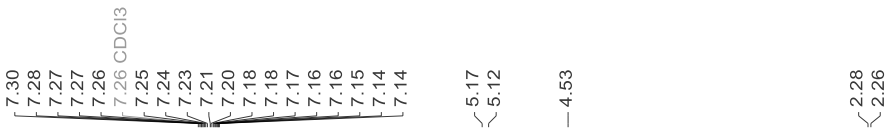


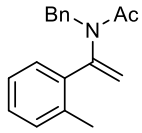


1c

^{13}C NMR (75.5 MHz, $CDCl_3$)







1d

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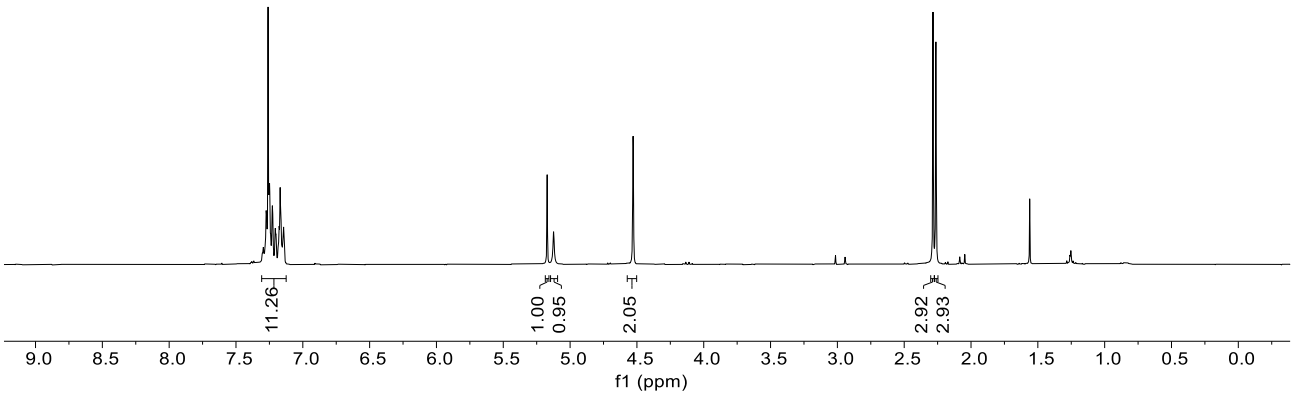

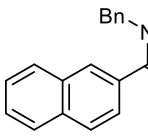

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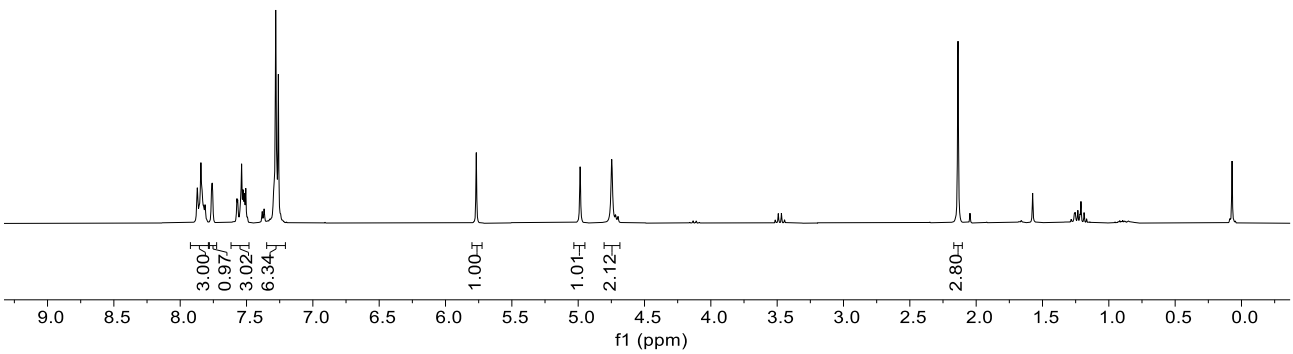

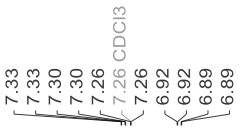

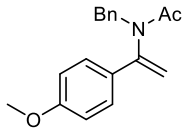

1f

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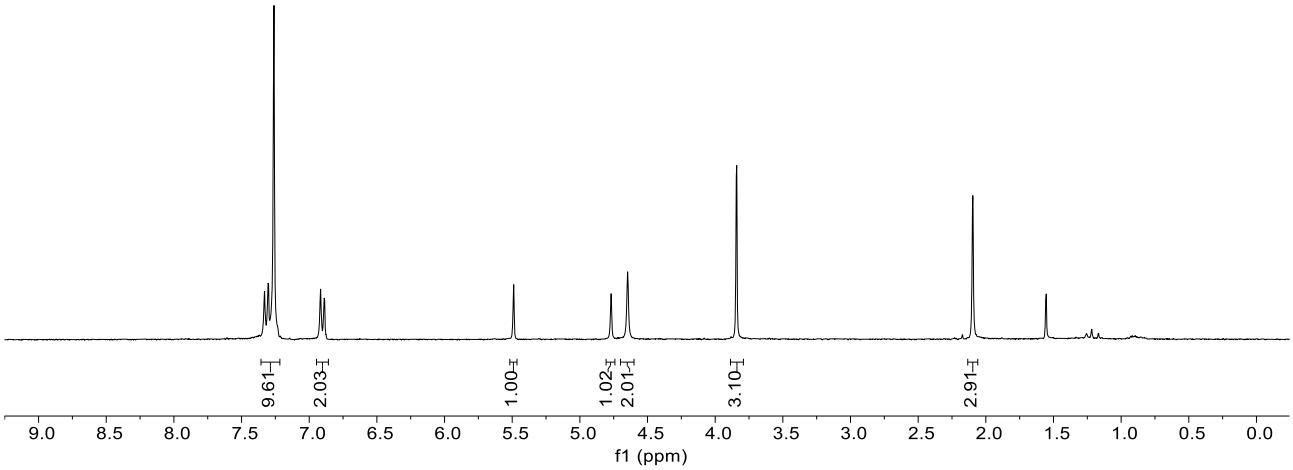
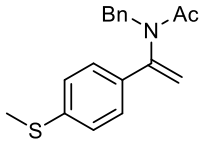
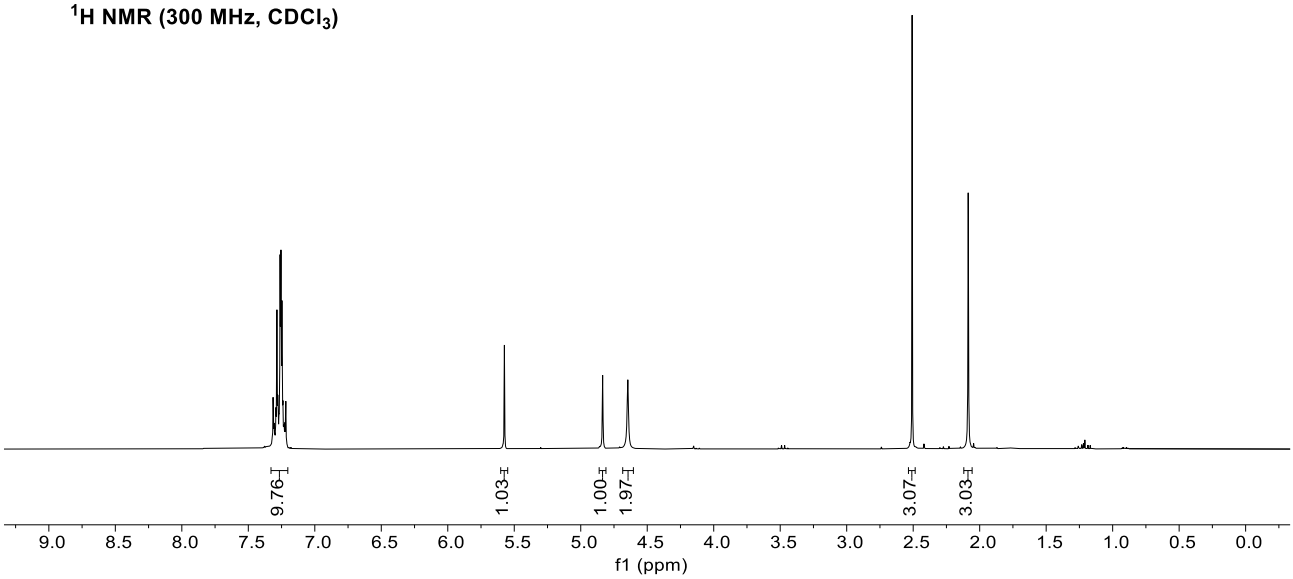
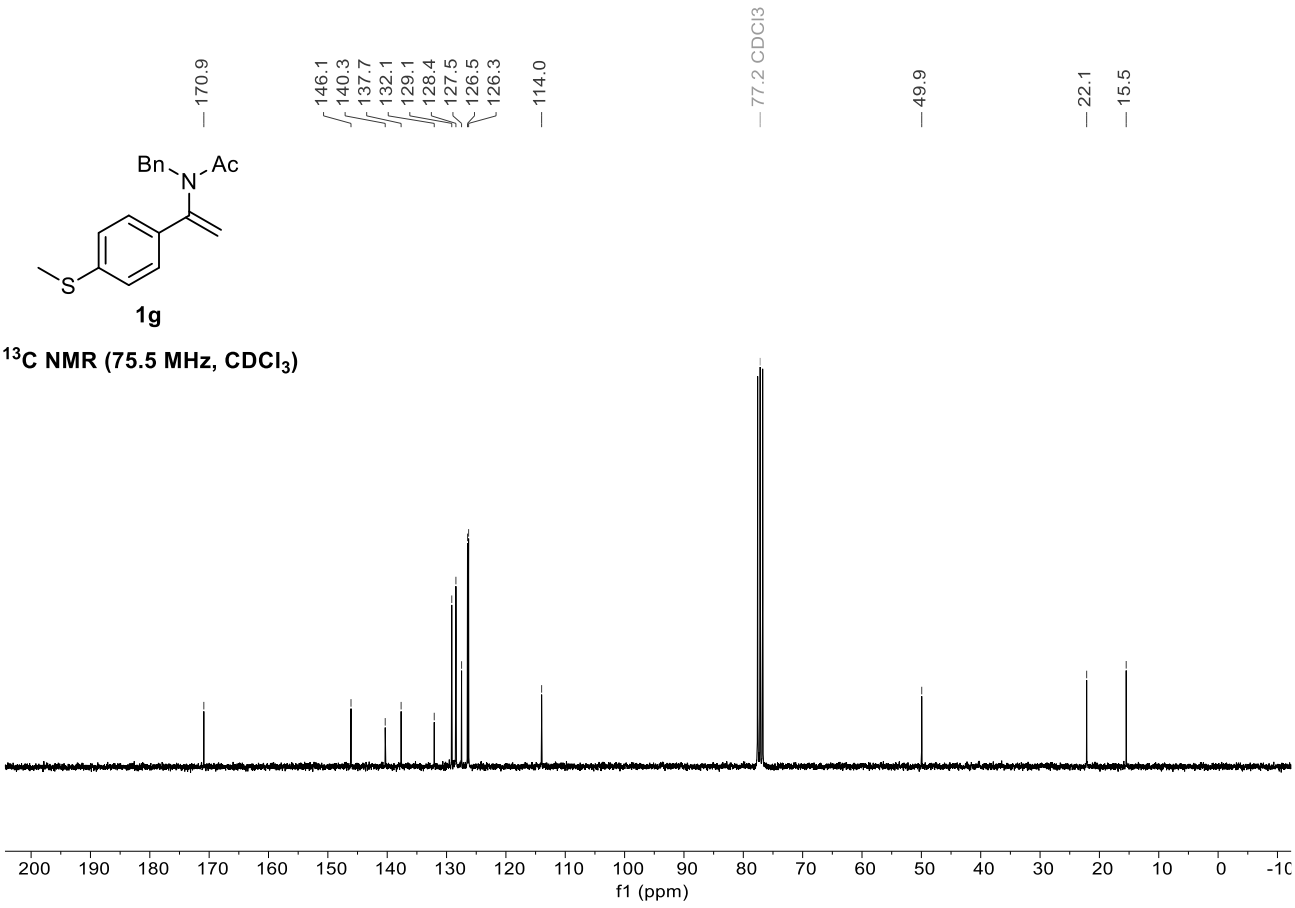




1g

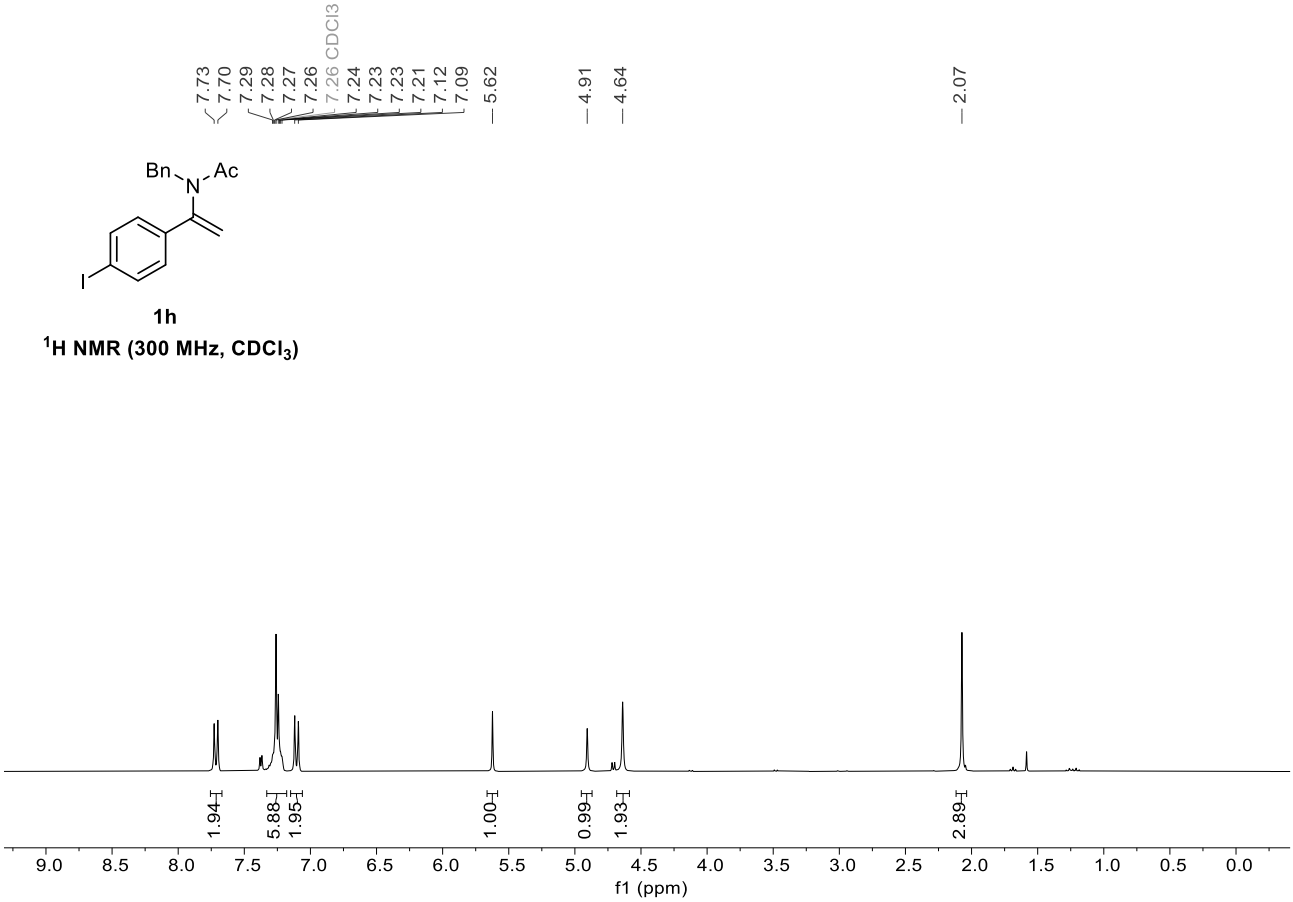
^{1}H NMR (300 MHz, $CDCl_3$)





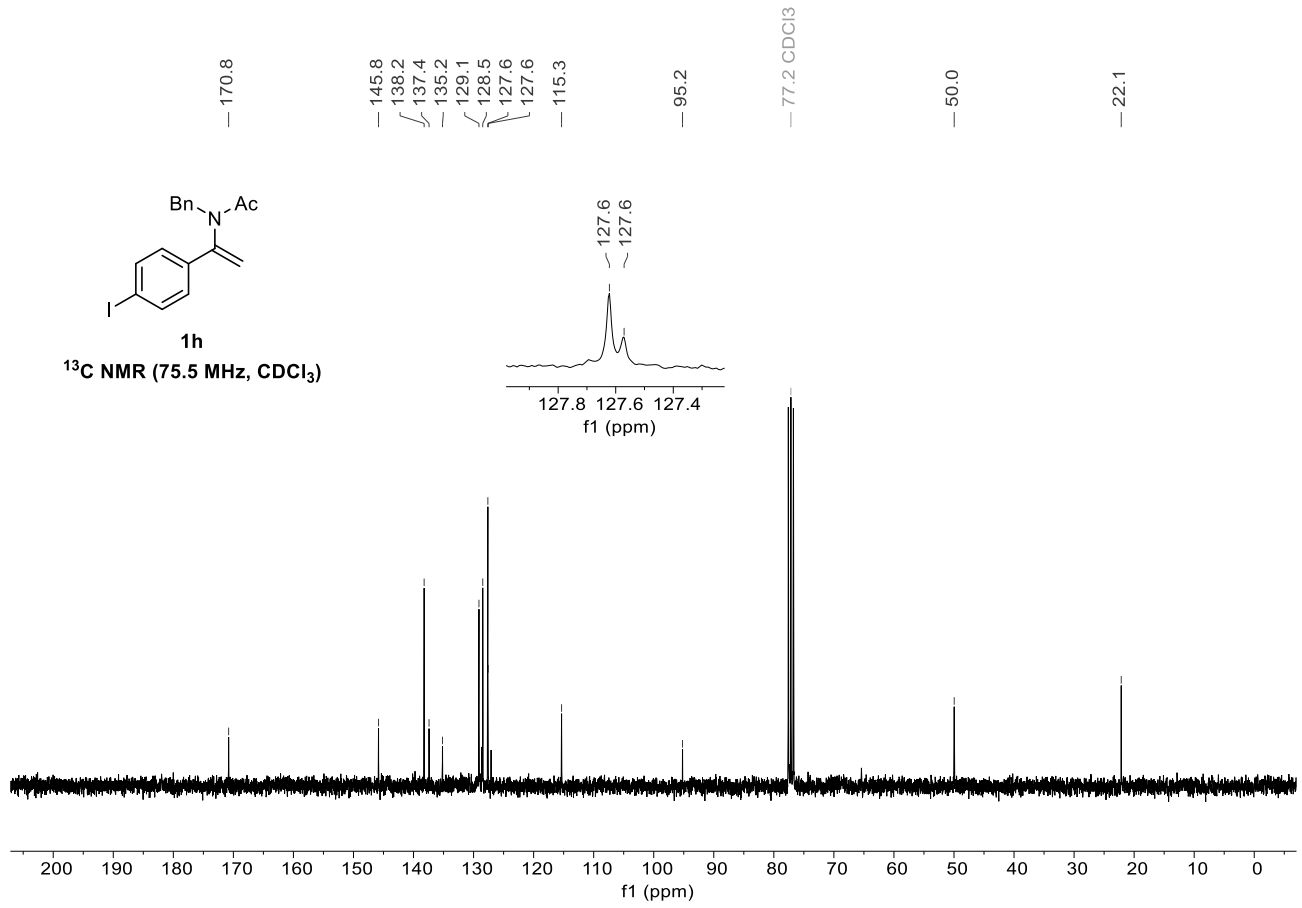
1g

^{13}C NMR (75.5 MHz, $CDCl_3$)



1h

^{1}H NMR (300 MHz, $CDCl_3$)



1h

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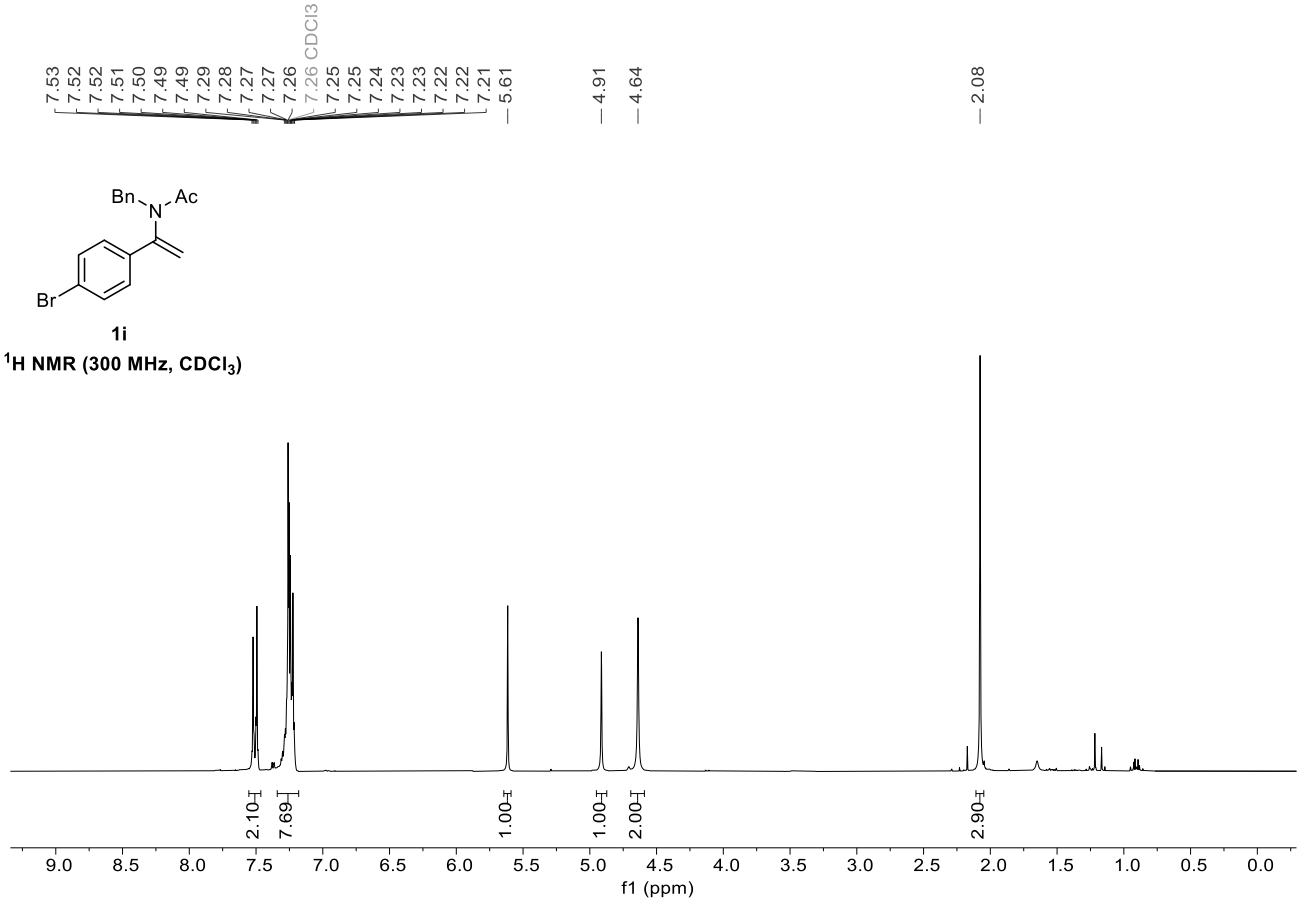
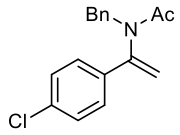


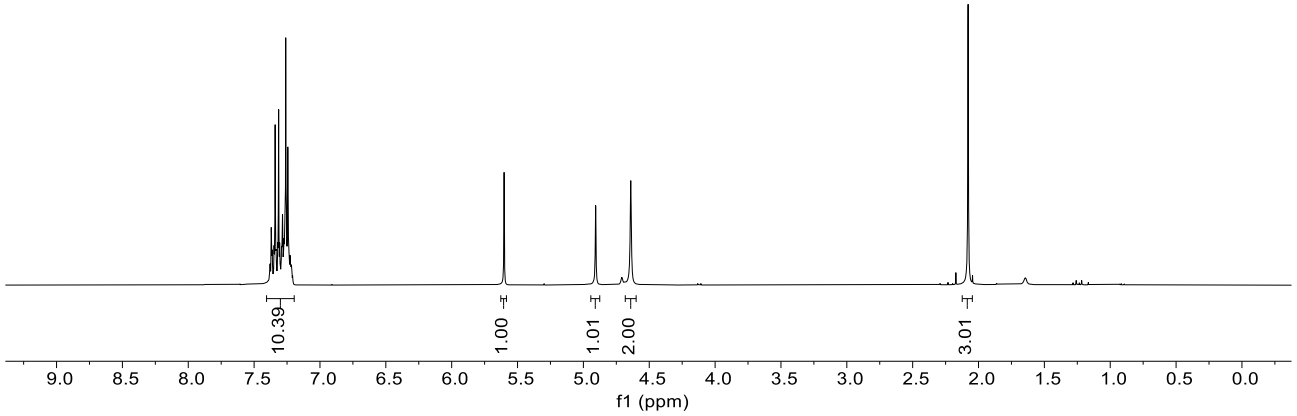
1i

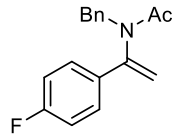
^{1}H NMR (300 MHz, $CDCl_3$)



1j

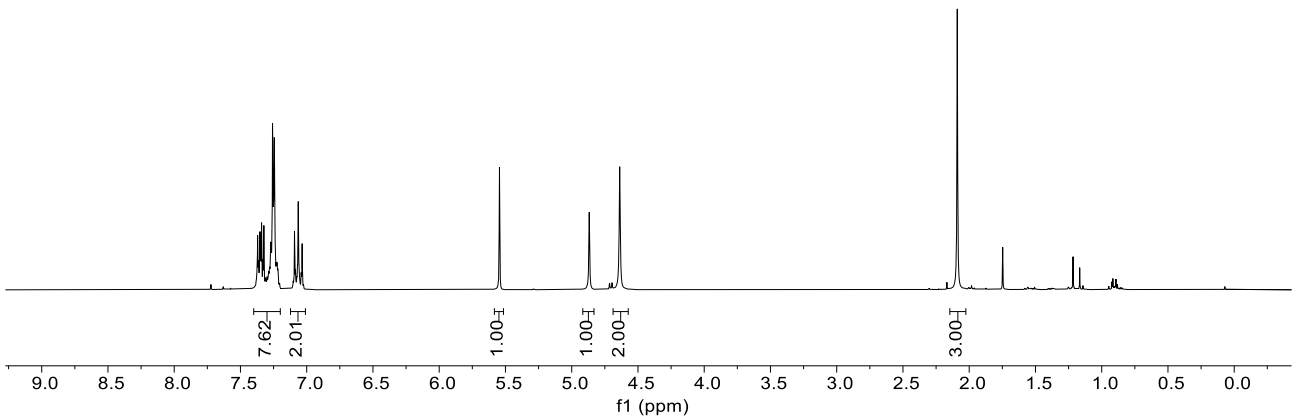
^{1}H NMR (300 MHz, $CDCl_3$)

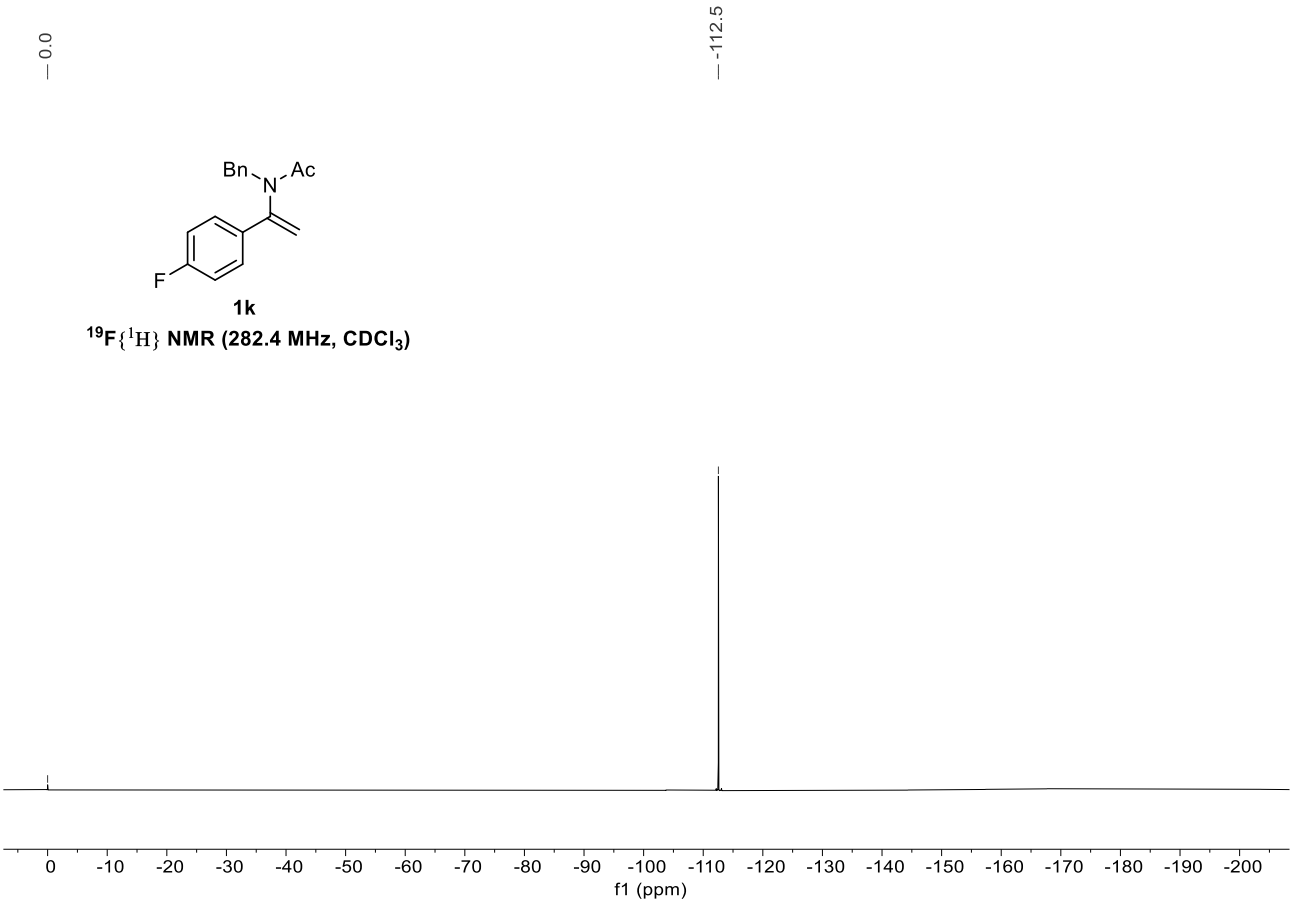




1k

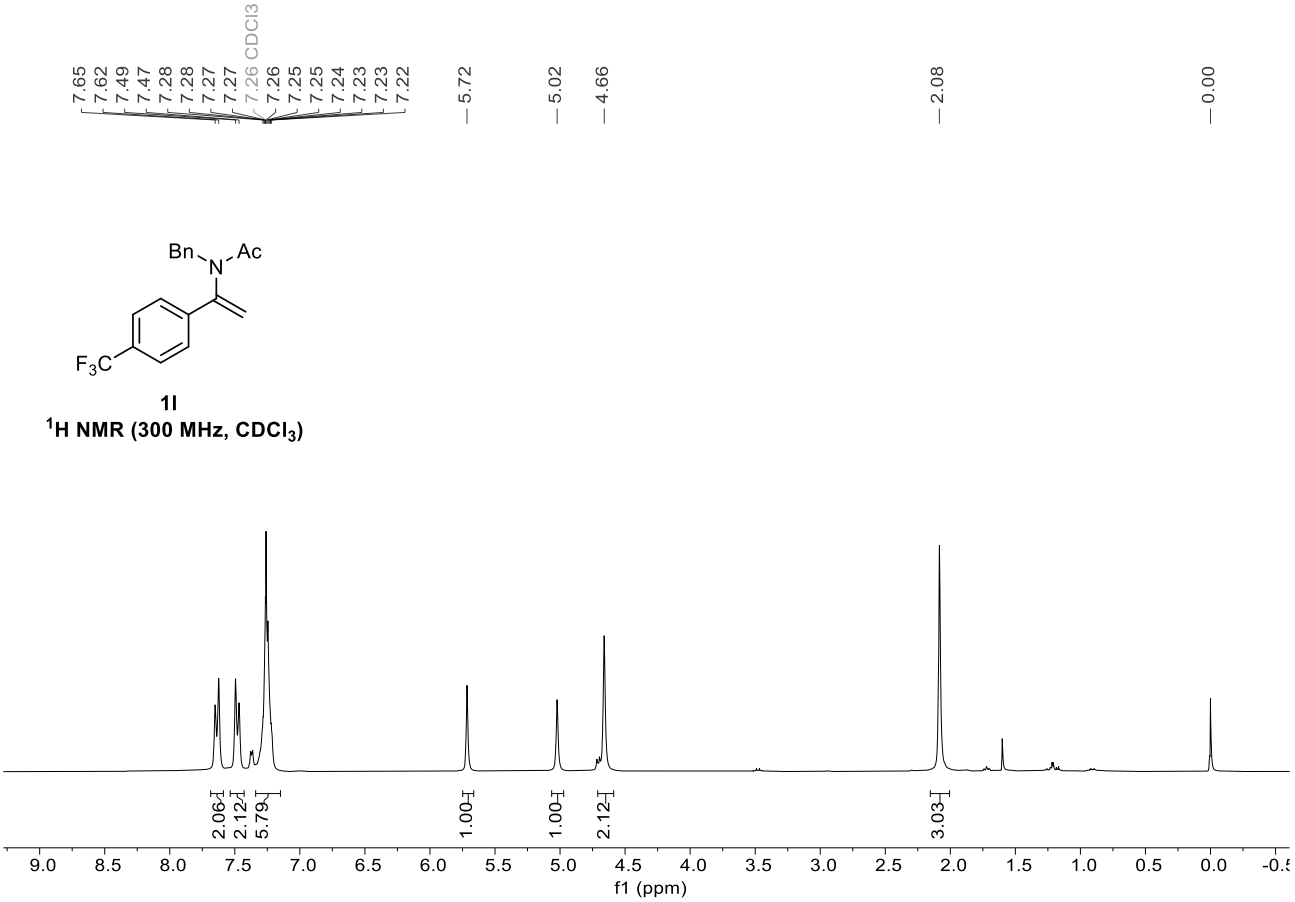
^{1}H NMR (300 MHz, $CDCl_3$)





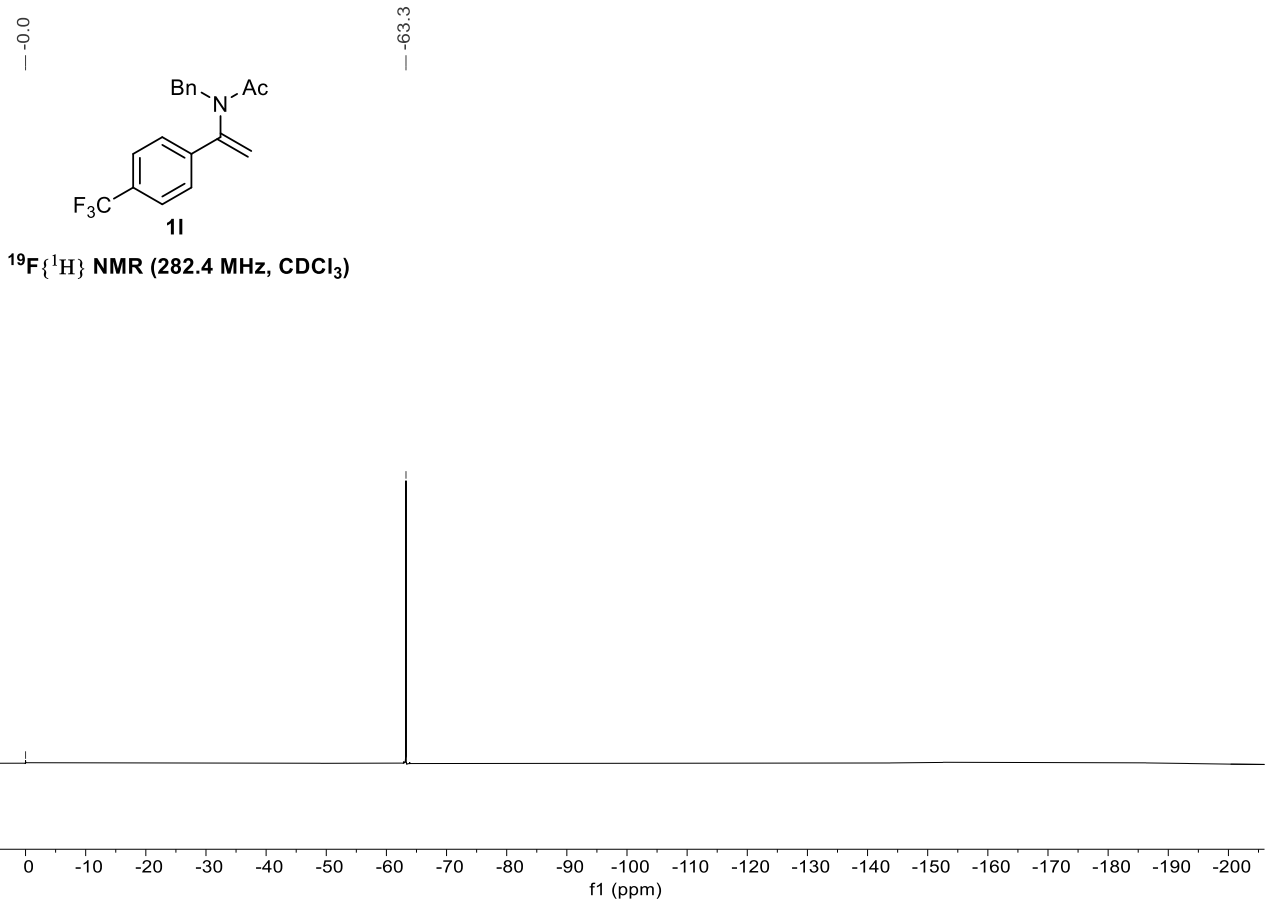
1k

$^{19}F\{^{1}H\}$ NMR (282.4 MHz, $CDCl_3$)

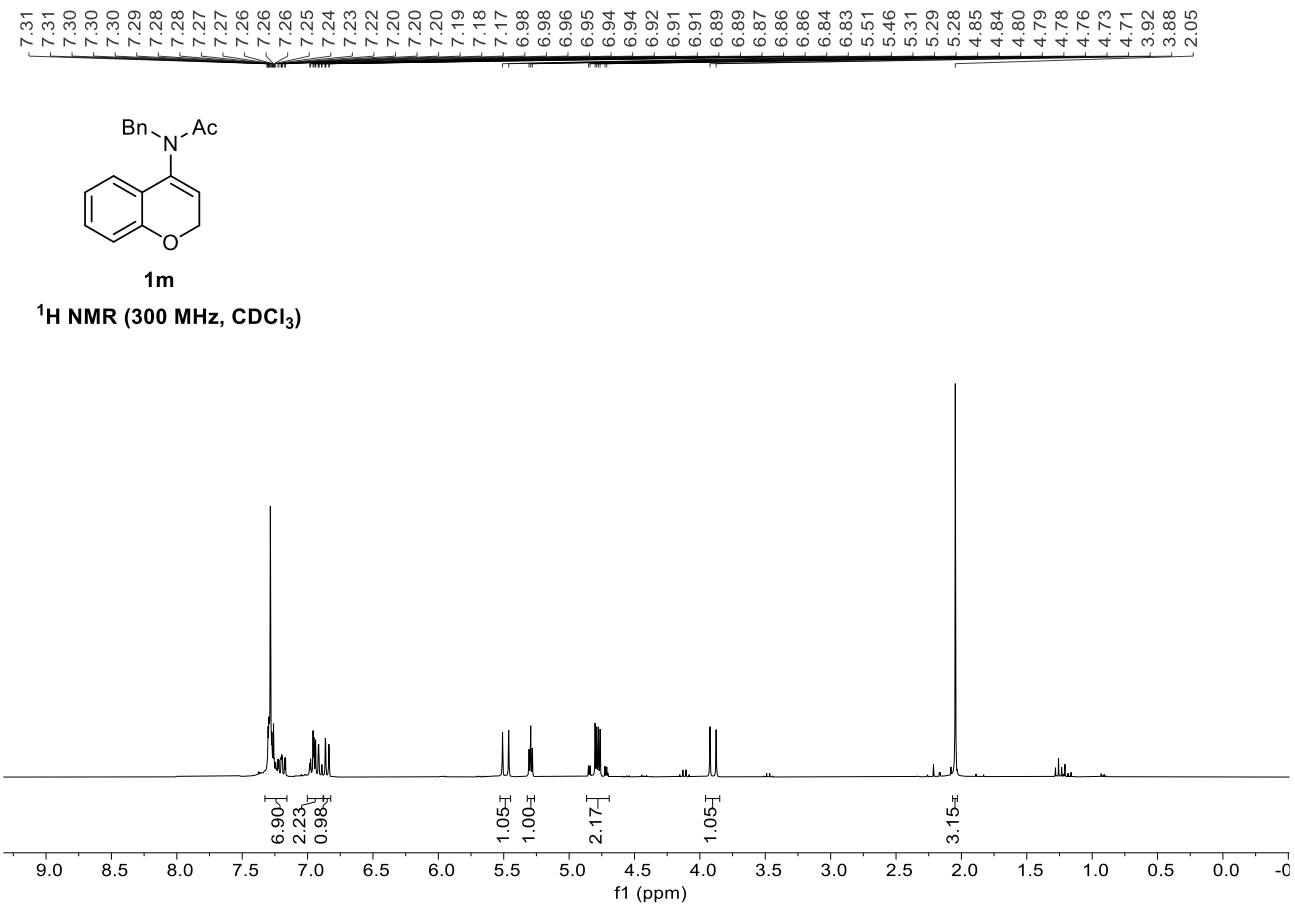


1l

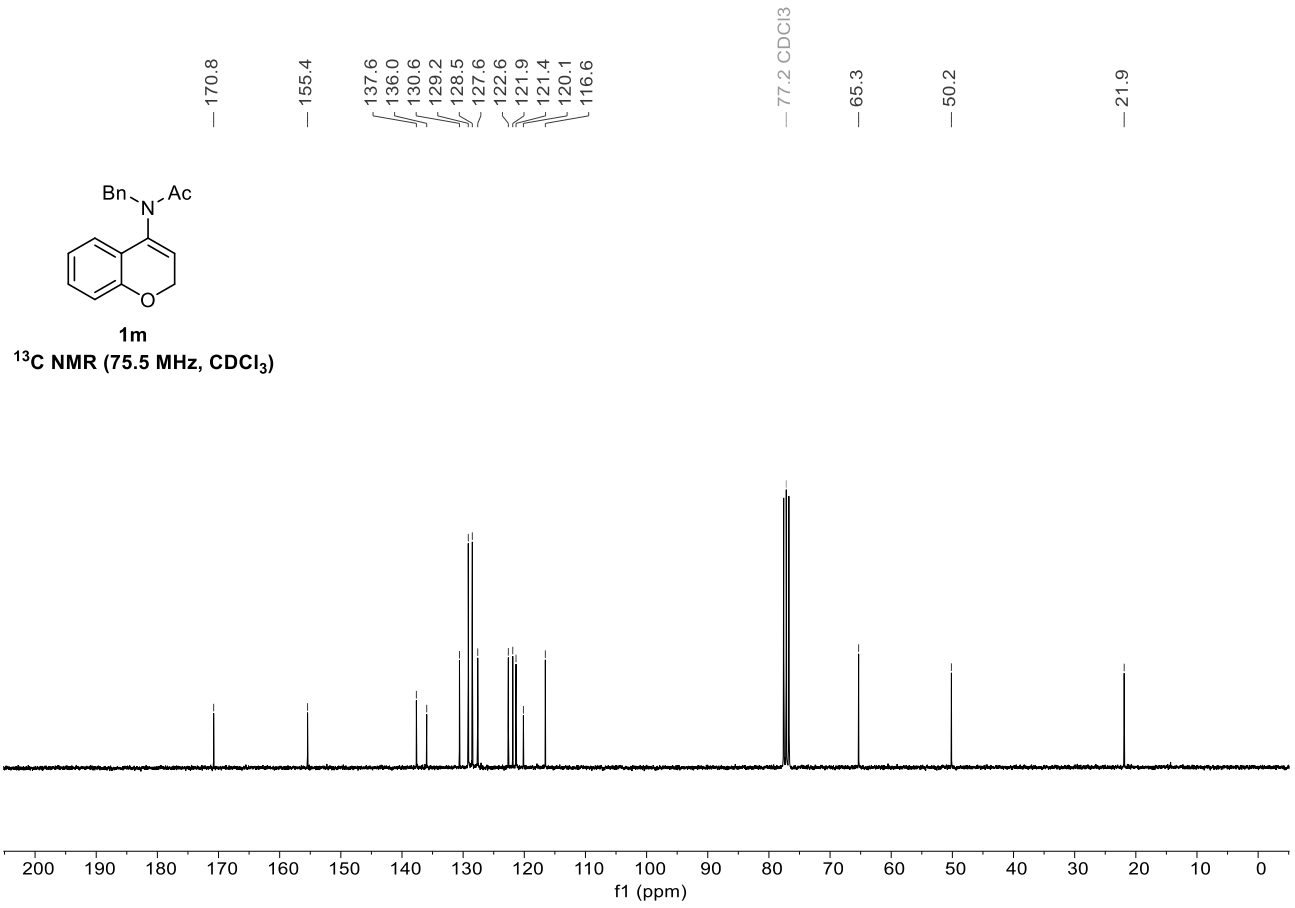
^{1}H NMR (300 MHz, $CDCl_3$)



$^{19}F\{^{1}H\}$ NMR (282.4 MHz, $CDCl_3$)

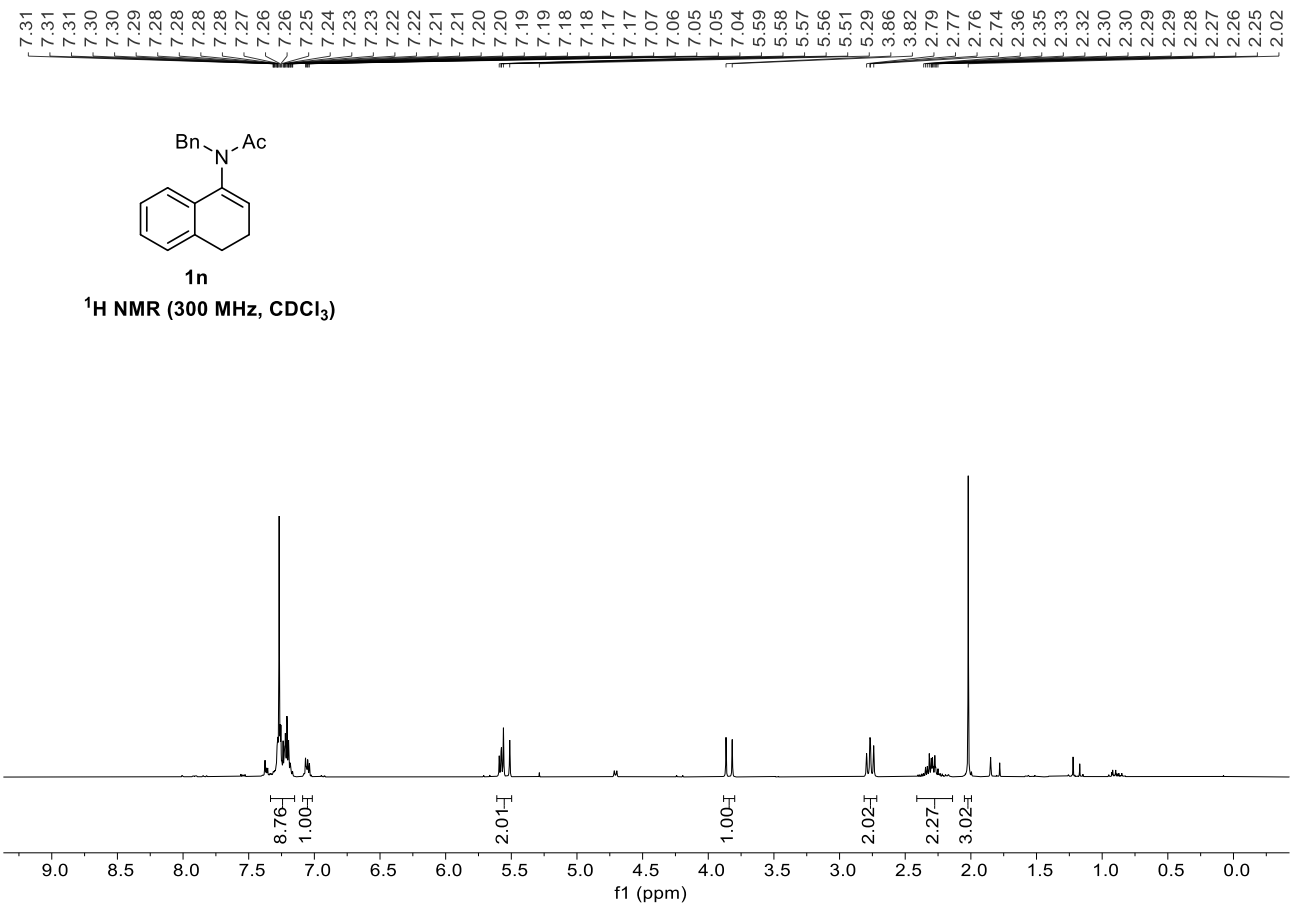


^{1}H NMR (300 MHz, $CDCl_3$)



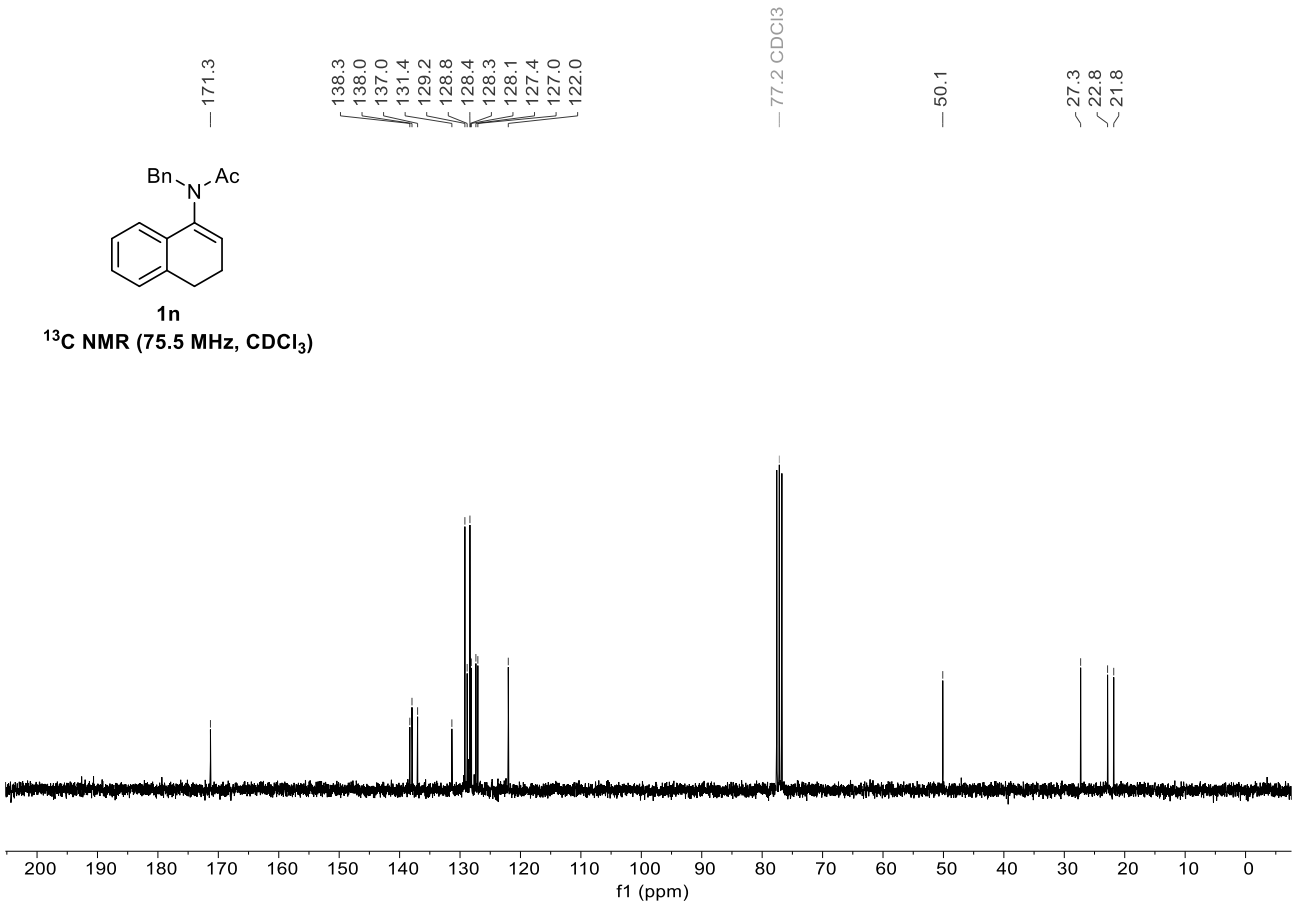
1m

^{13}C NMR (75.5 MHz, $CDCl_3$)



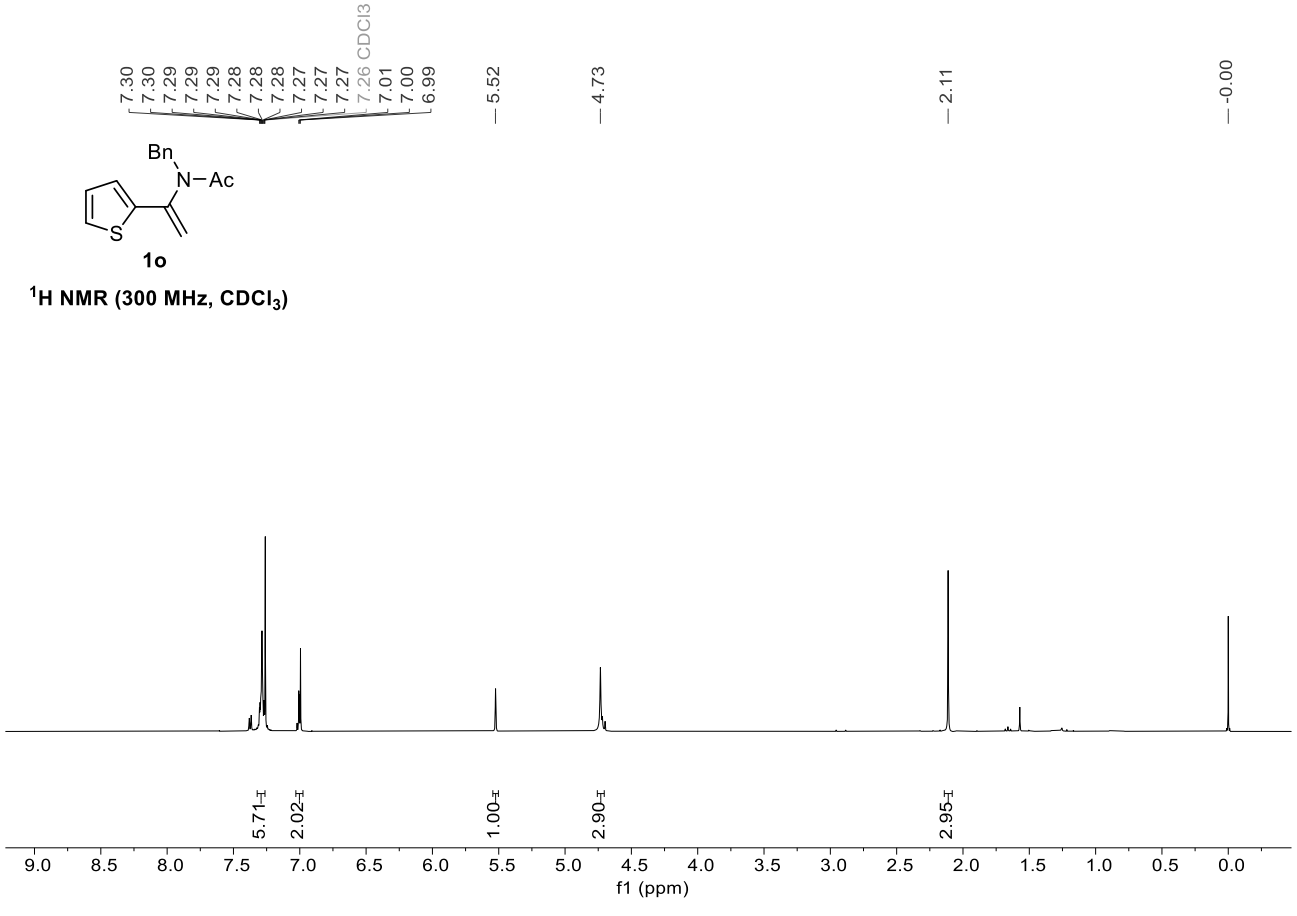
1n

^{1}H NMR (300 MHz, $CDCl_3$)



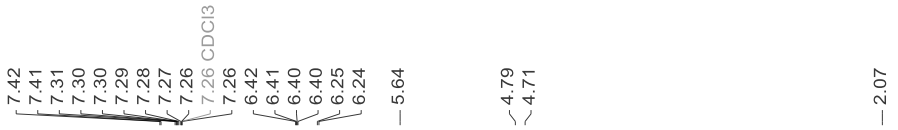
1n

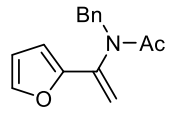
^{13}C NMR (75.5 MHz, $CDCl_3$)



1o

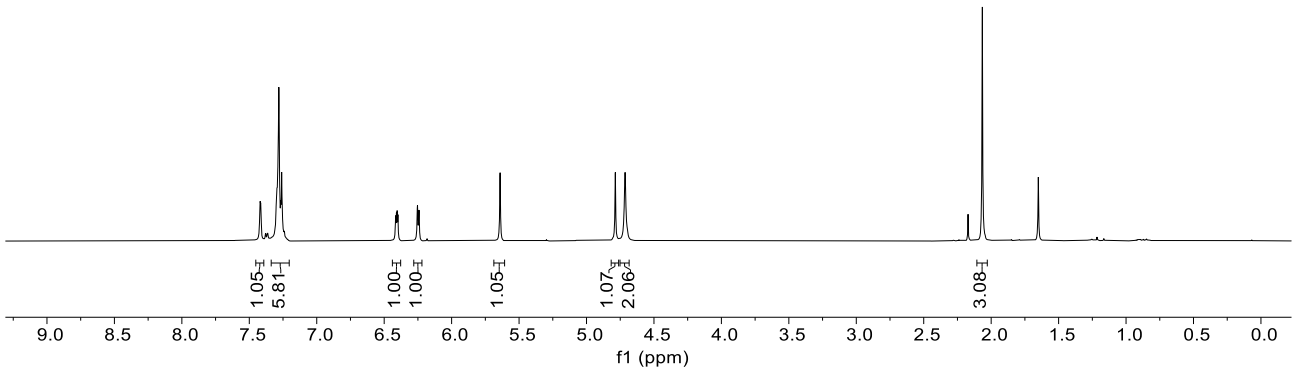
^{1}H NMR (300 MHz, $CDCl_3$)

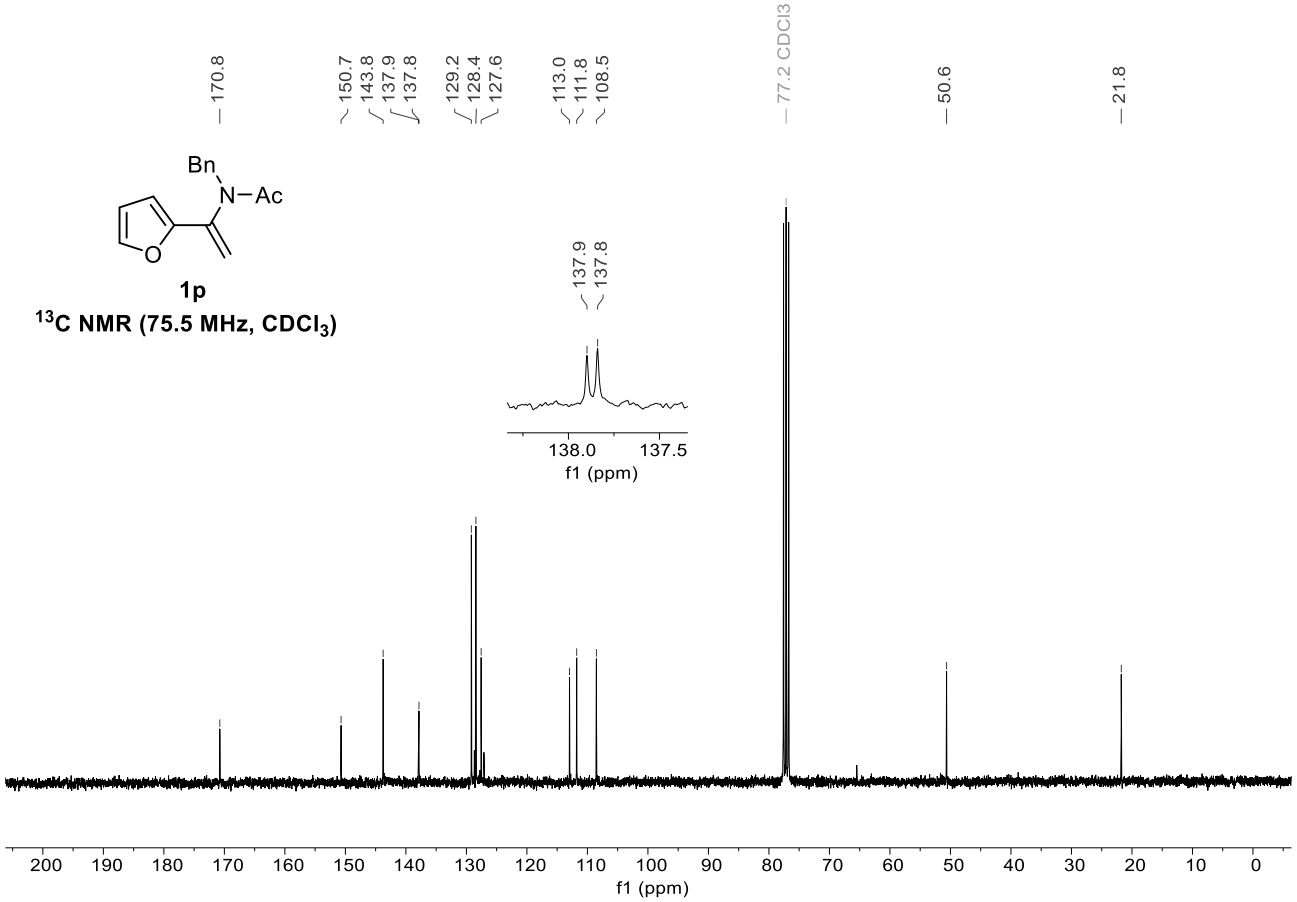




1p

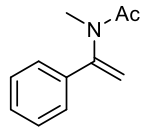
^{1}H NMR (300 MHz, $CDCl_3$)





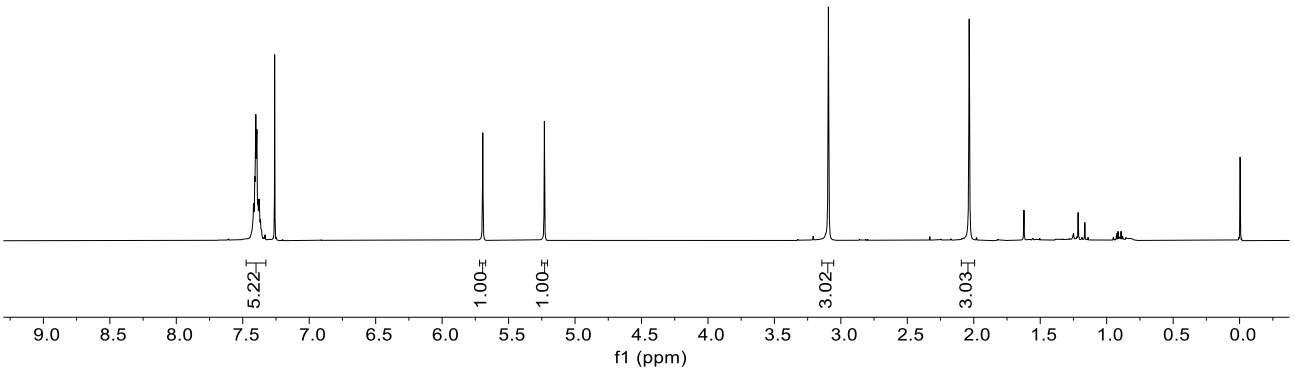
1p

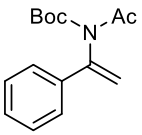
^{13}C NMR (75.5 MHz, $CDCl_3$)



1q

^{1}H NMR (300 MHz, $CDCl_3$)





1r

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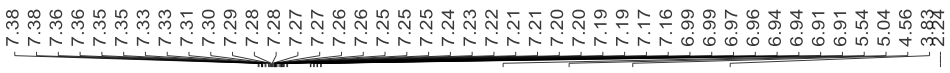

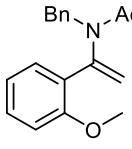

1s

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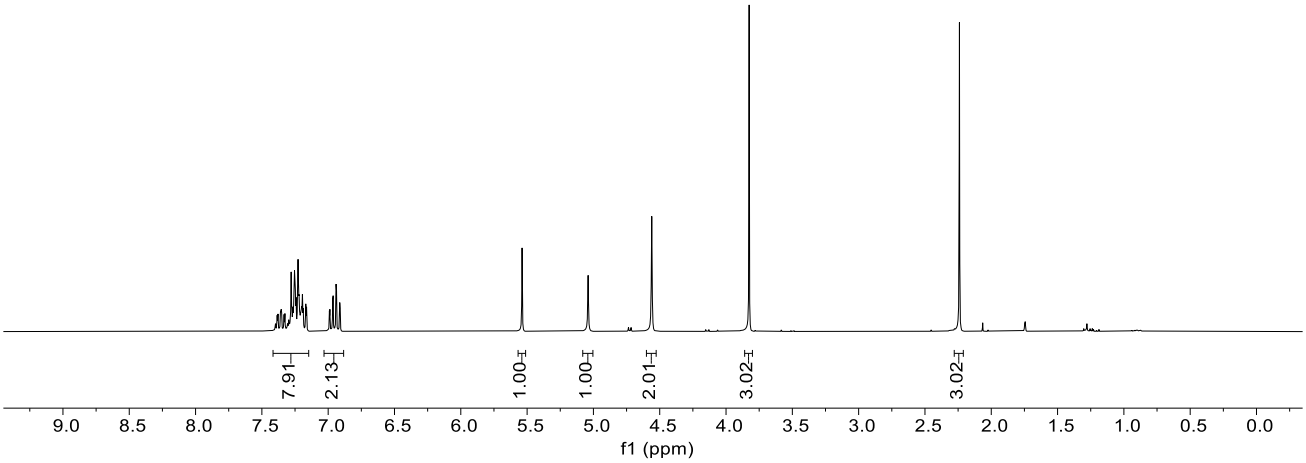
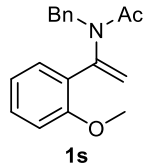
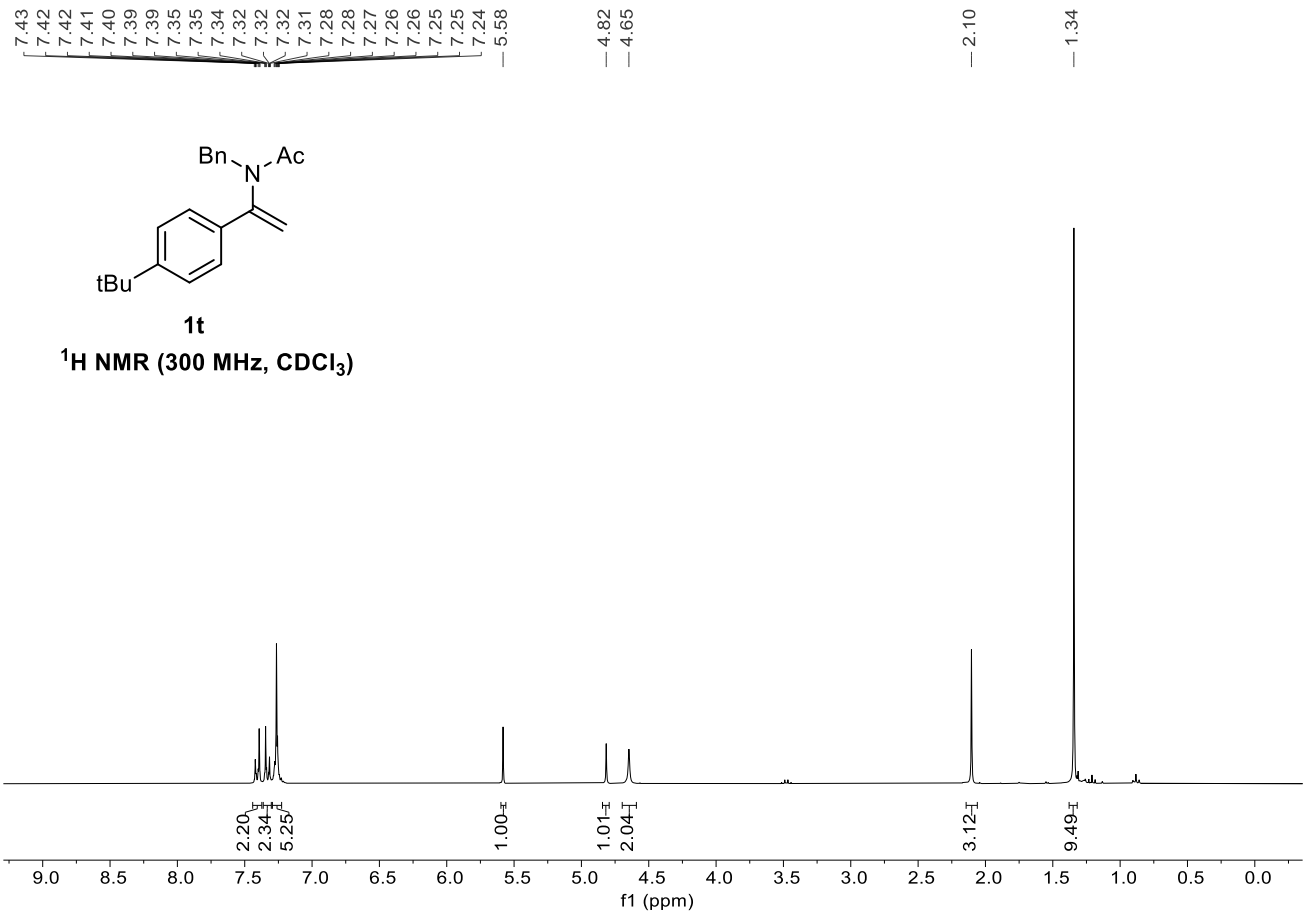




1s

^{13}C NMR (75.5 MHz, $CDCl_3$)



1t

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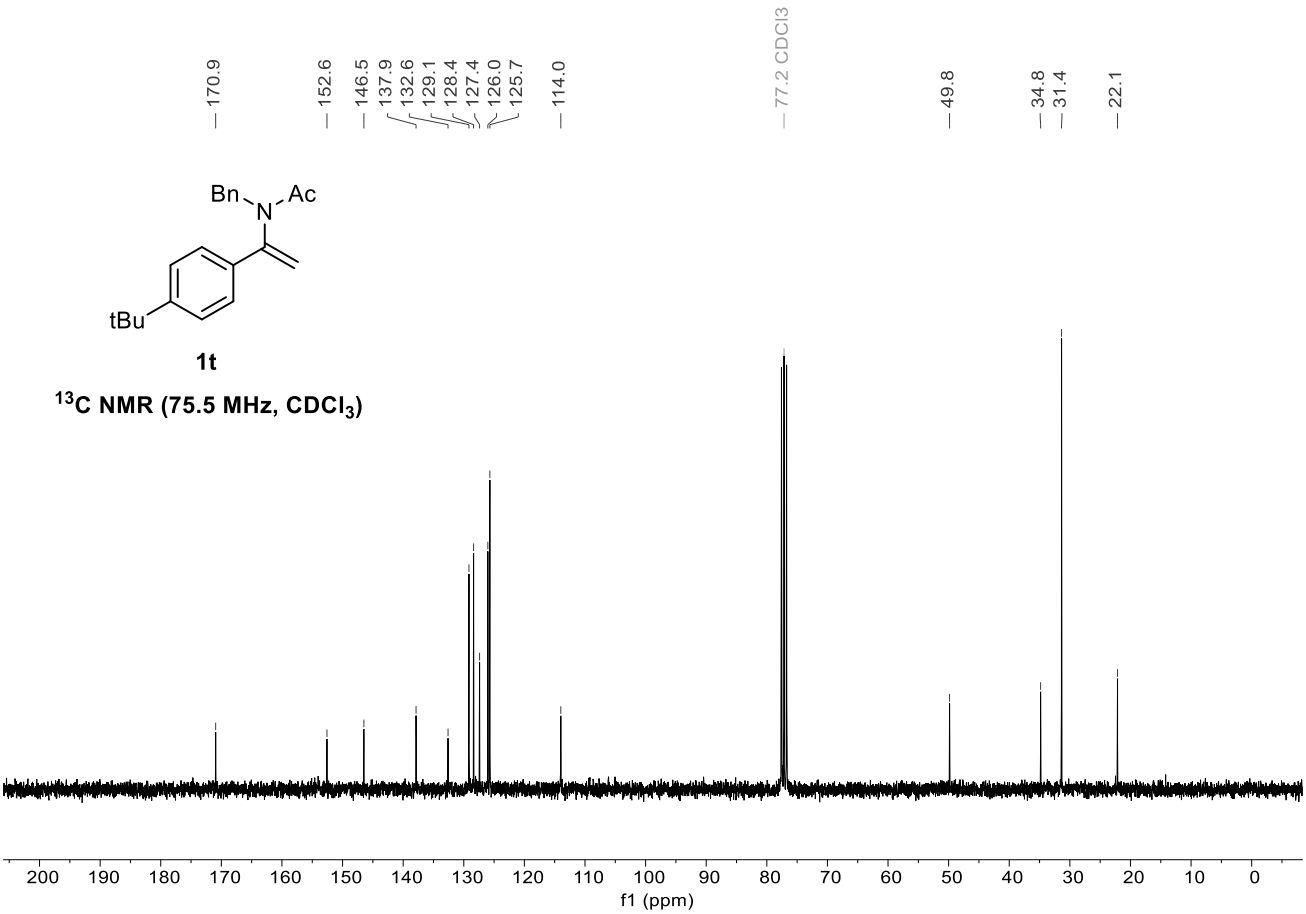
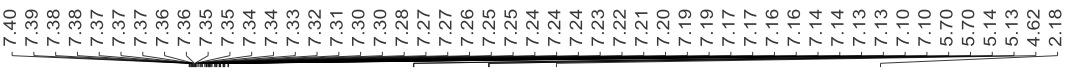
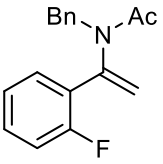


1t

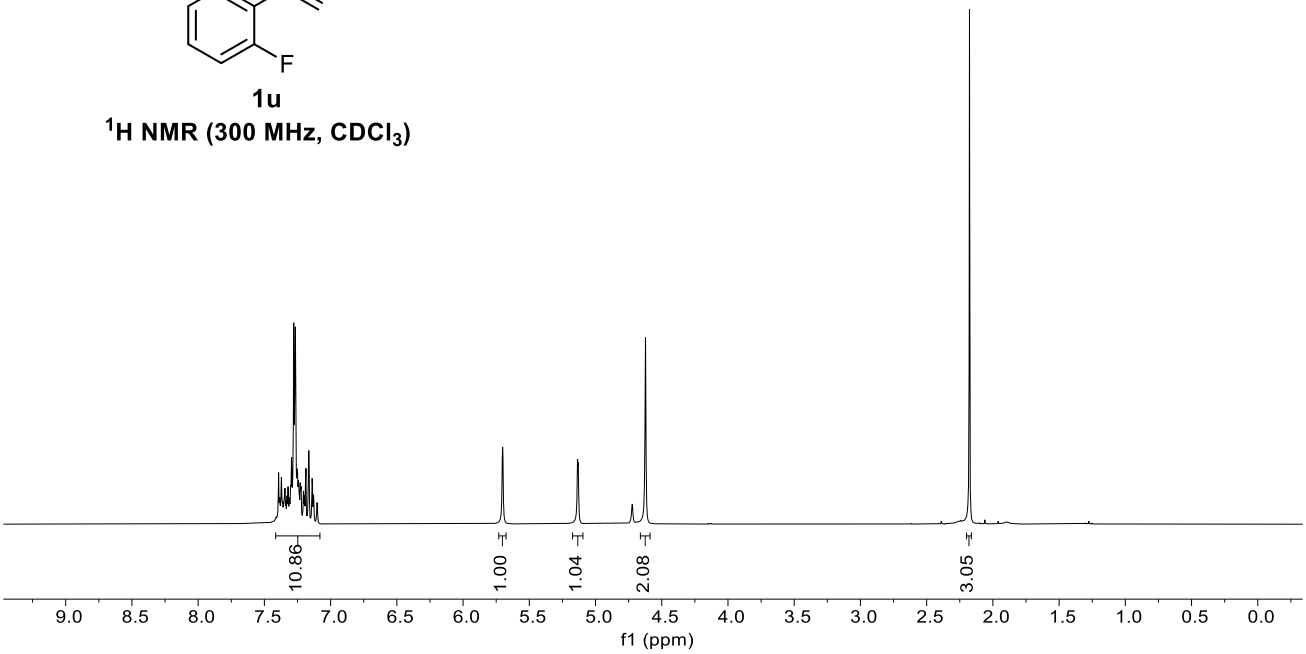
^{13}C NMR (75.5 MHz, $CDCl_3$)

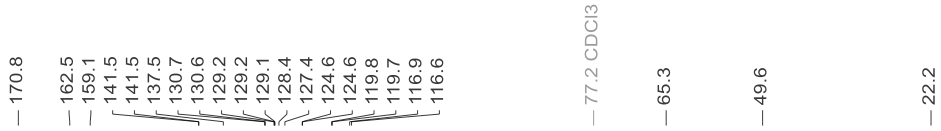


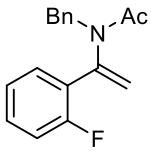


1u

^{1}H NMR (300 MHz, $CDCl_3$)

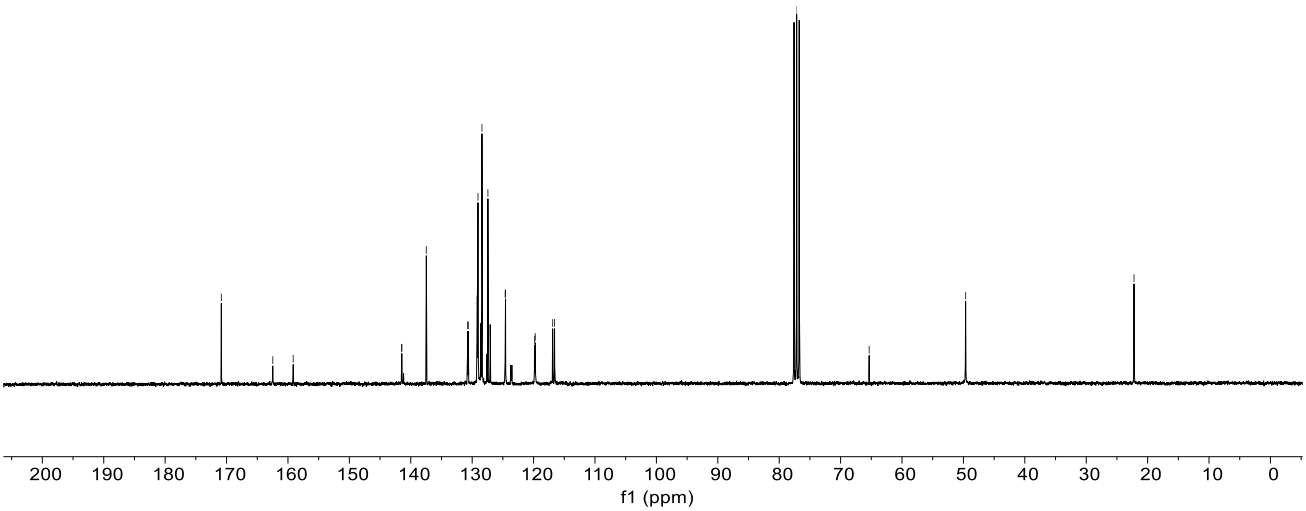


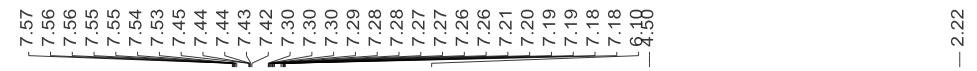


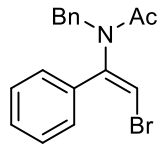


1u

^{13}C NMR (75.5 MHz, $CDCl_3$)

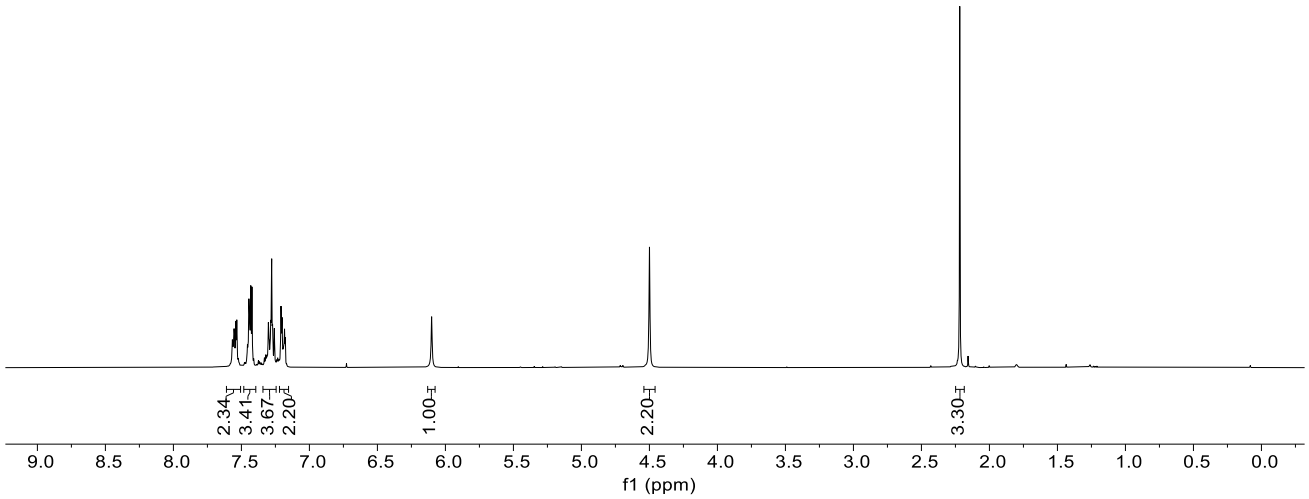


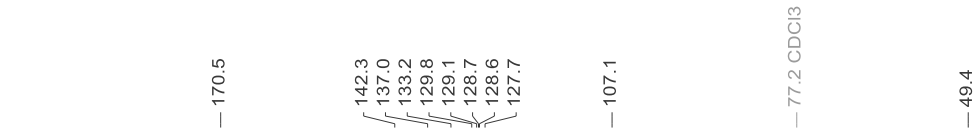


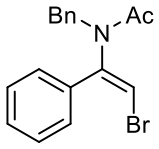


2

^{1}H NMR (300 MHz, $CDCl_3$)



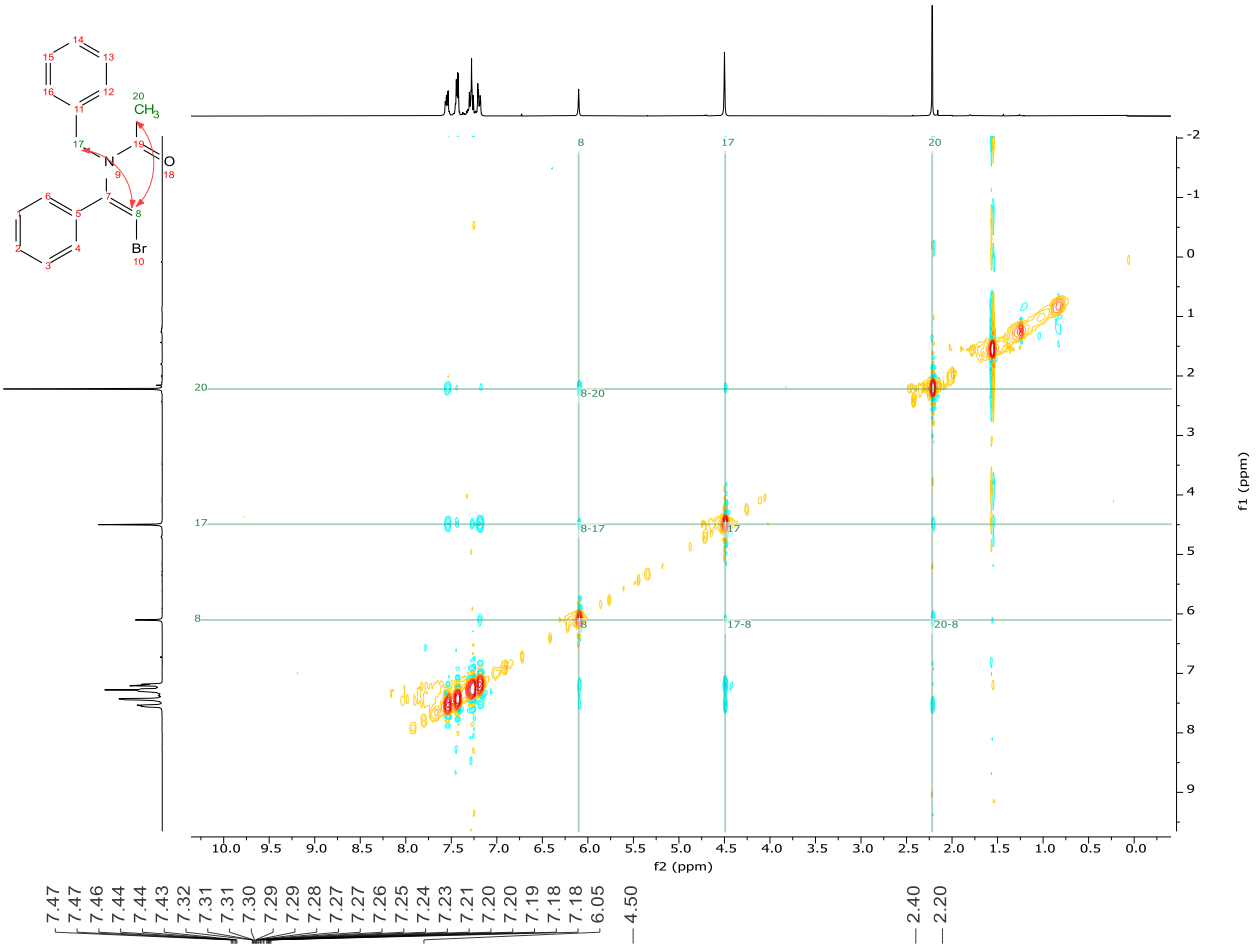


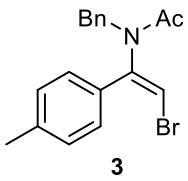


2

^{13}C NMR (75.5 MHz, $CDCl_3$)

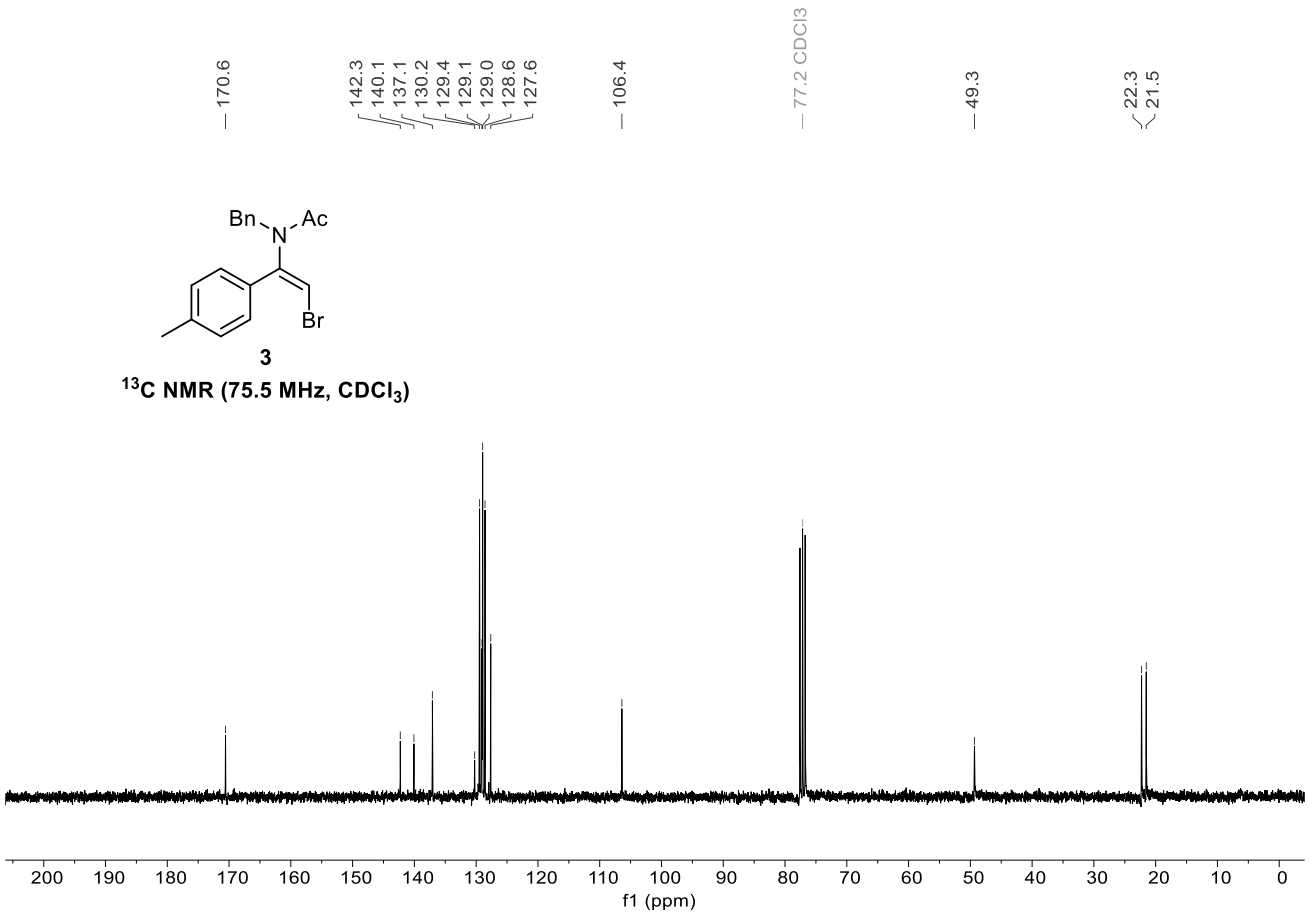
NOESY of product 2





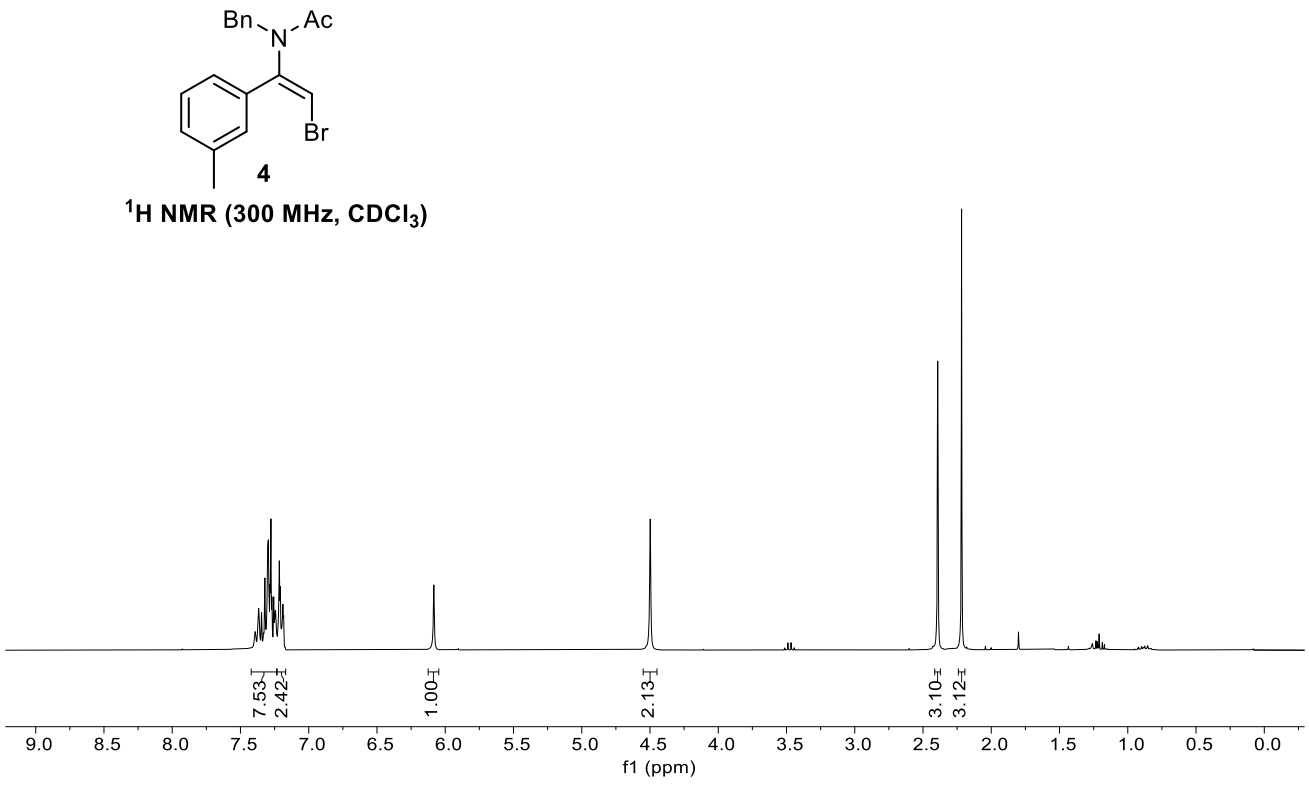
3

^{1}H NMR (300 MHz, $CDCl_3$)



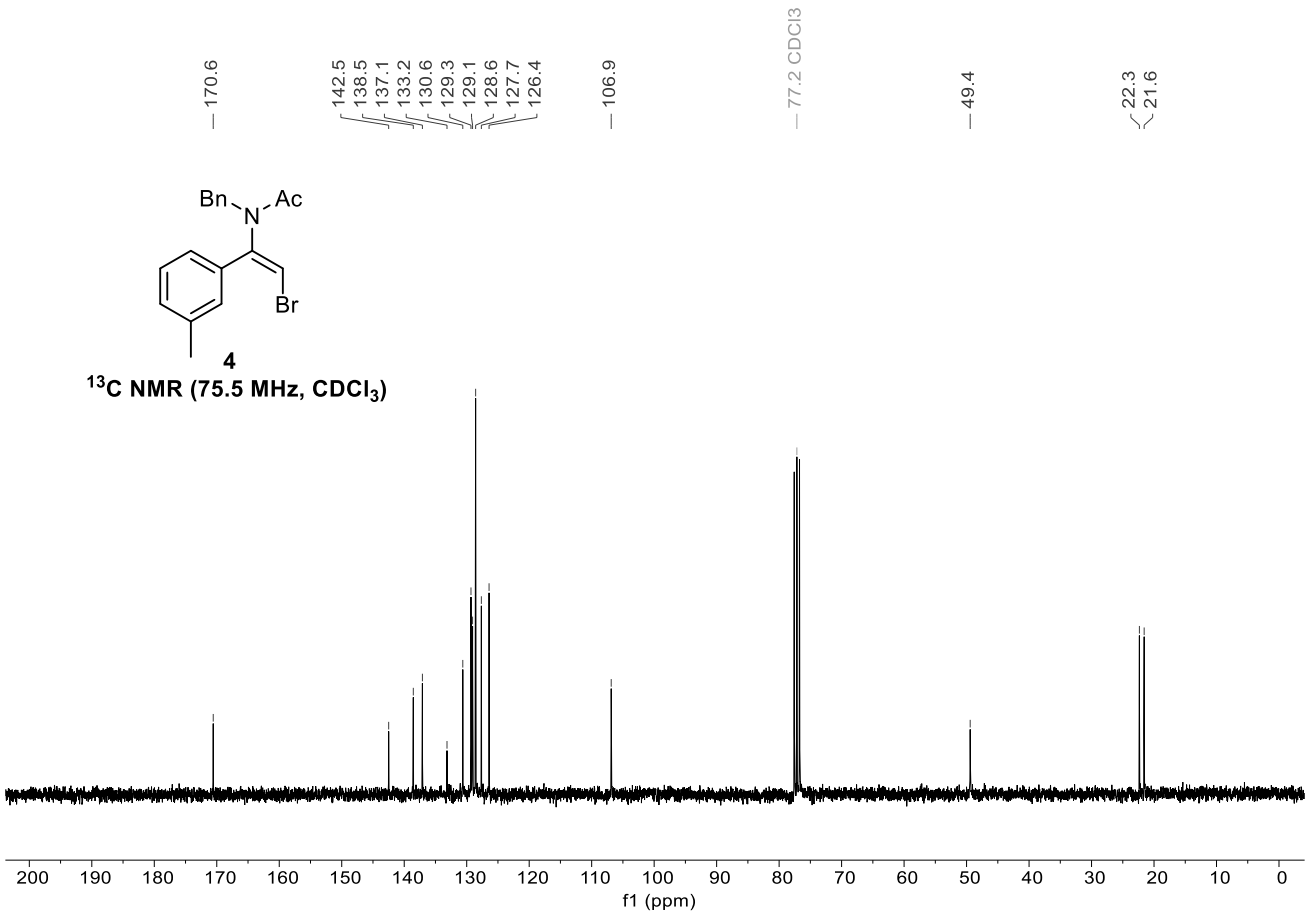
3

^{13}C NMR (75.5 MHz, $CDCl_3$)



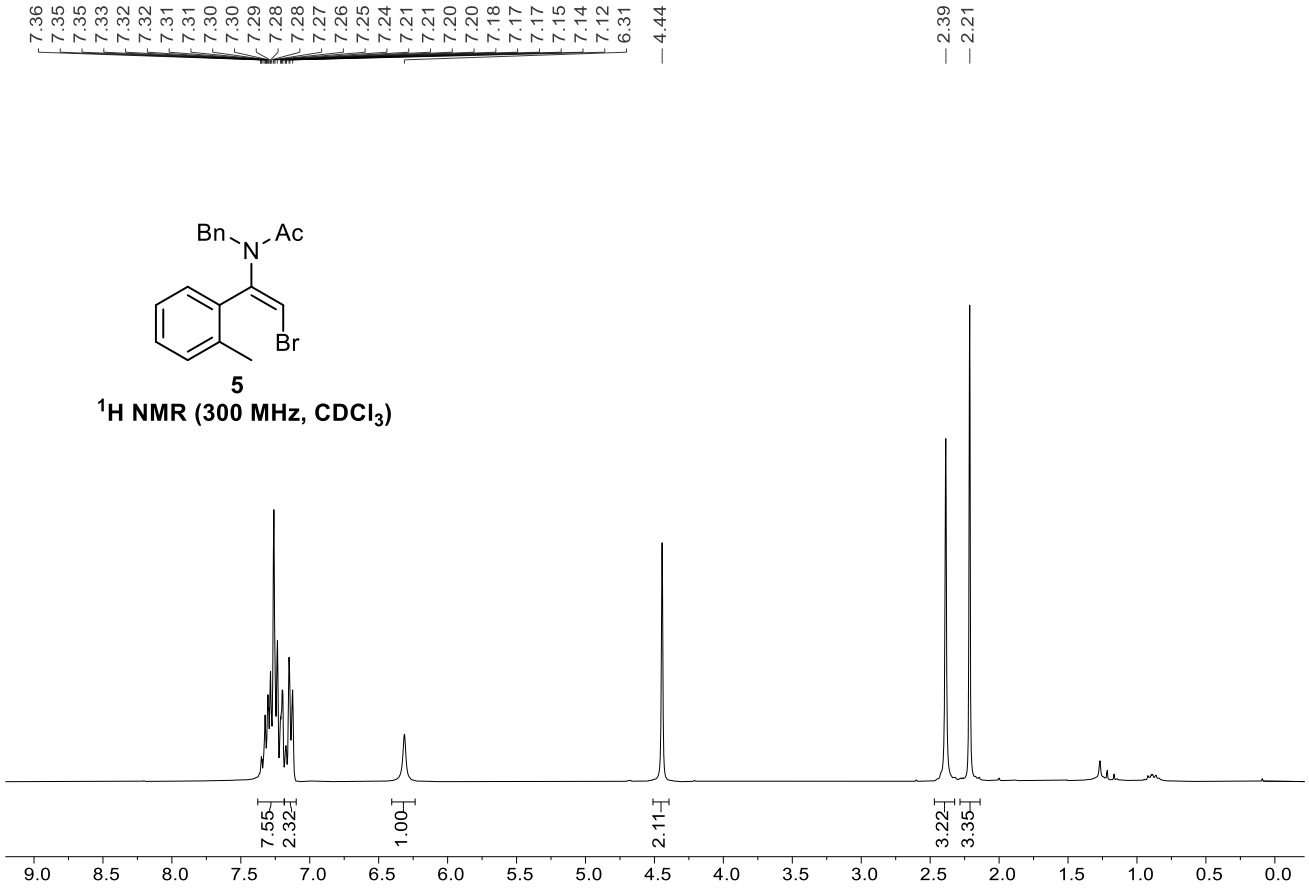
4

^{1}H NMR (300 MHz, $CDCl_3$)



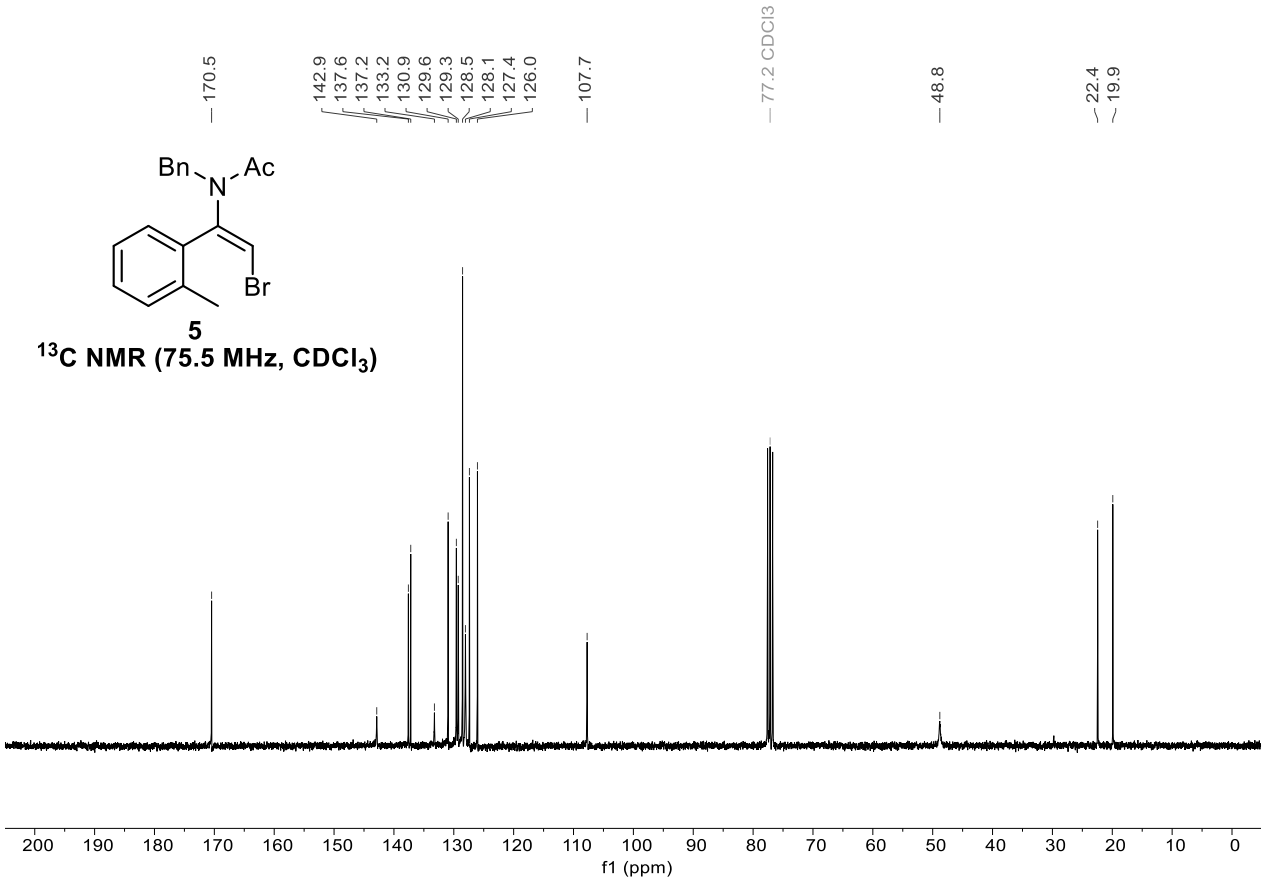
4

^{13}C NMR (75.5 MHz, $CDCl_3$)



5

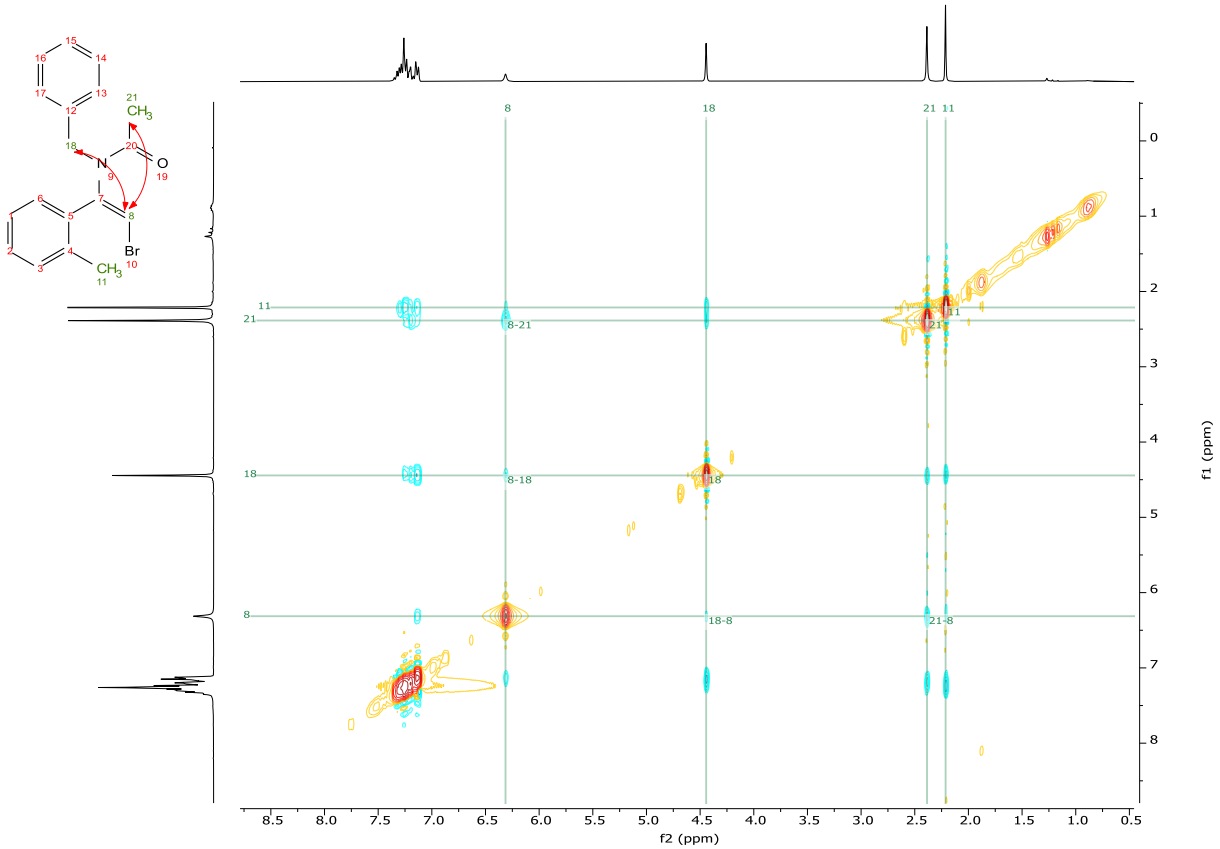
^{1}H NMR (300 MHz, $CDCl_3$)

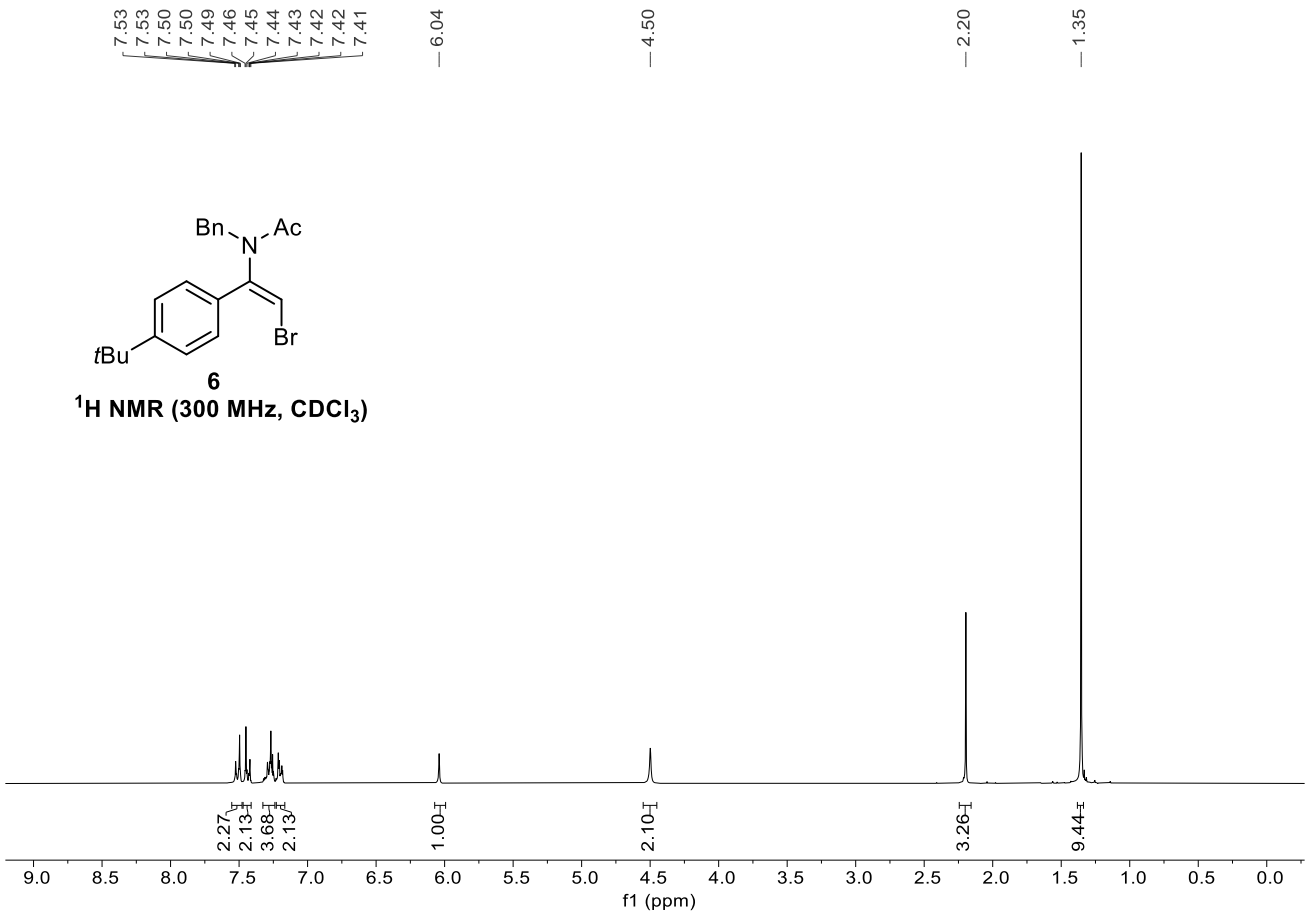


5

^{13}C NMR (75.5 MHz, $CDCl_3$)

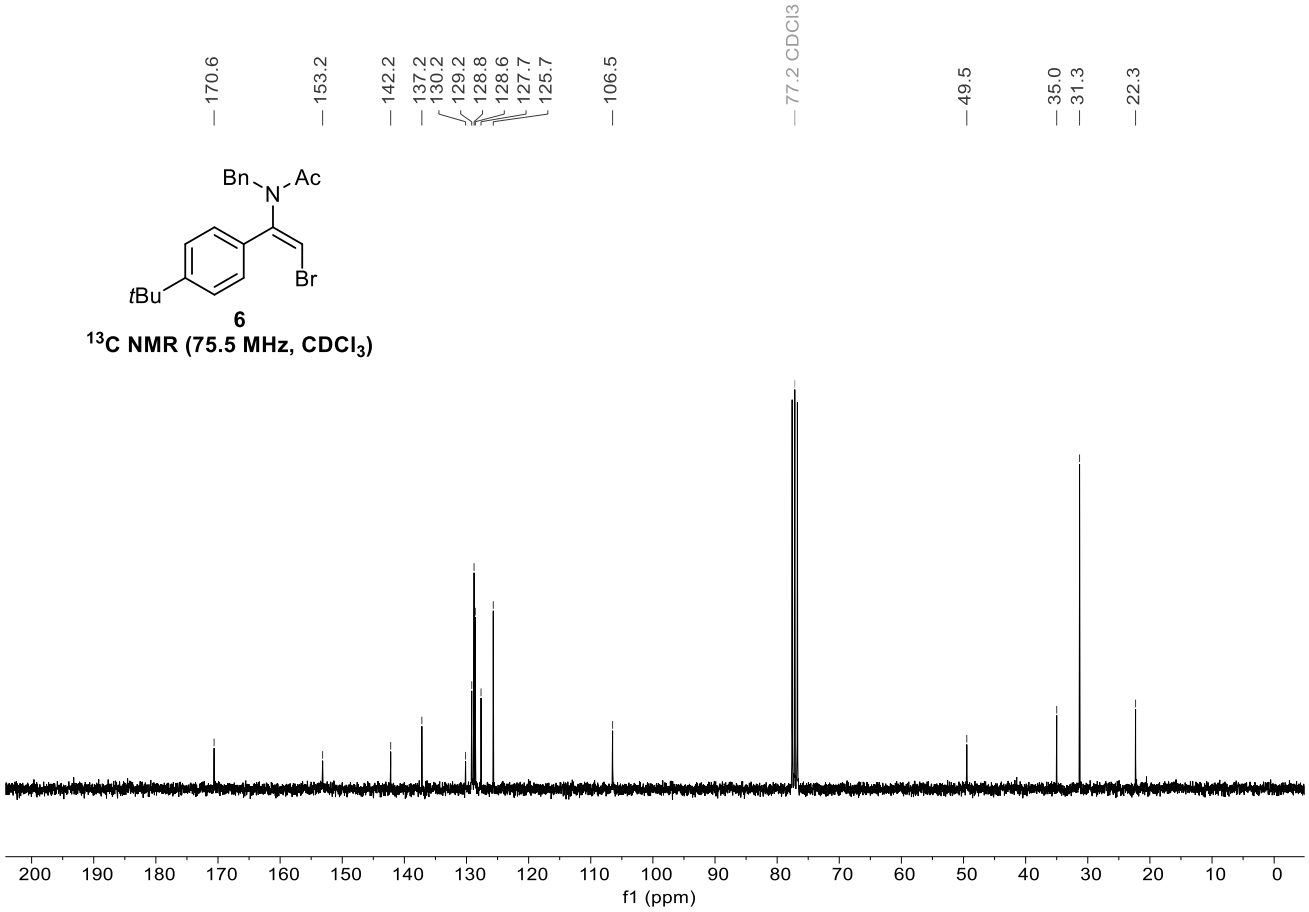
NOESY of product 5





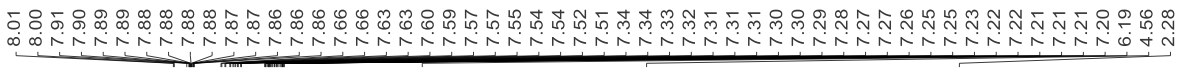
6

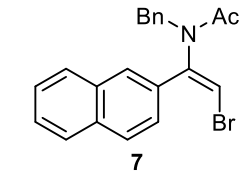
^{1}H NMR (300 MHz, $CDCl_3$)



6

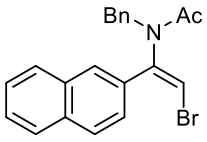
^{13}C NMR (75.5 MHz, $CDCl_3$)





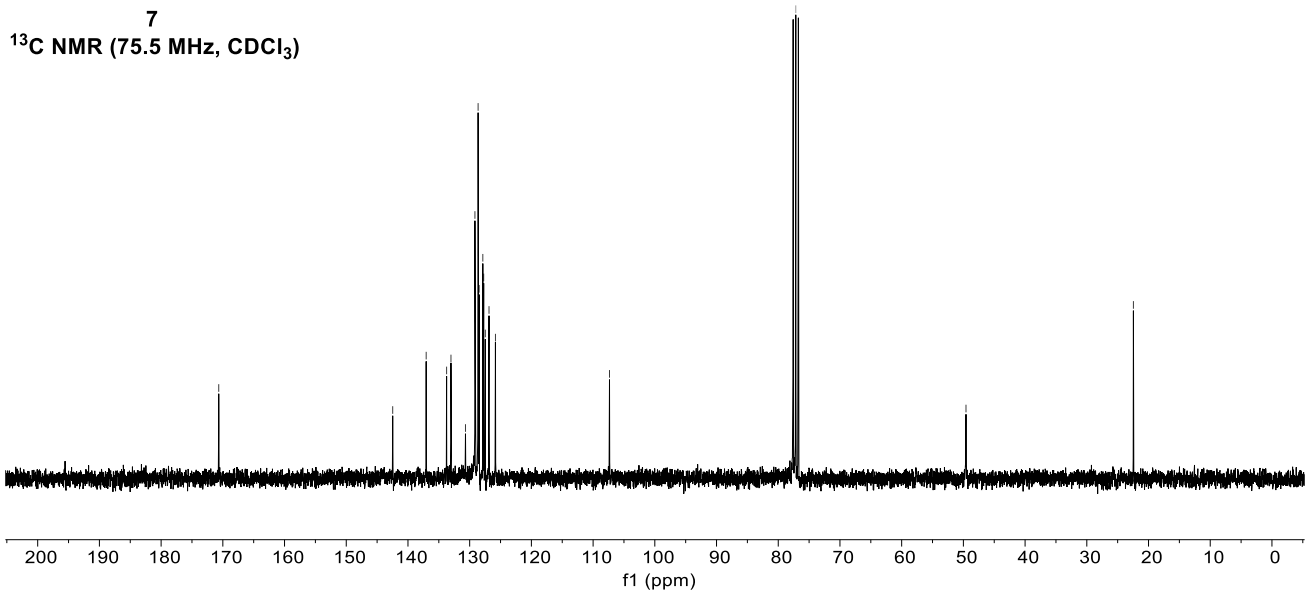
7

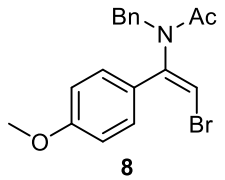
^{1}H NMR (300 MHz, $CDCl_3$)



7

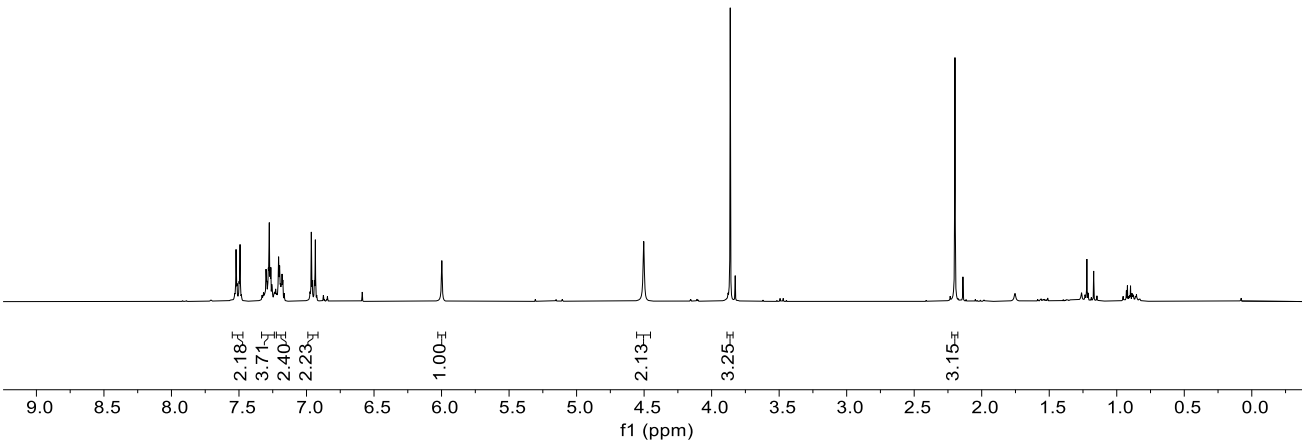
^{13}C NMR (75.5 MHz, $CDCl_3$)

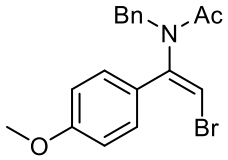




8

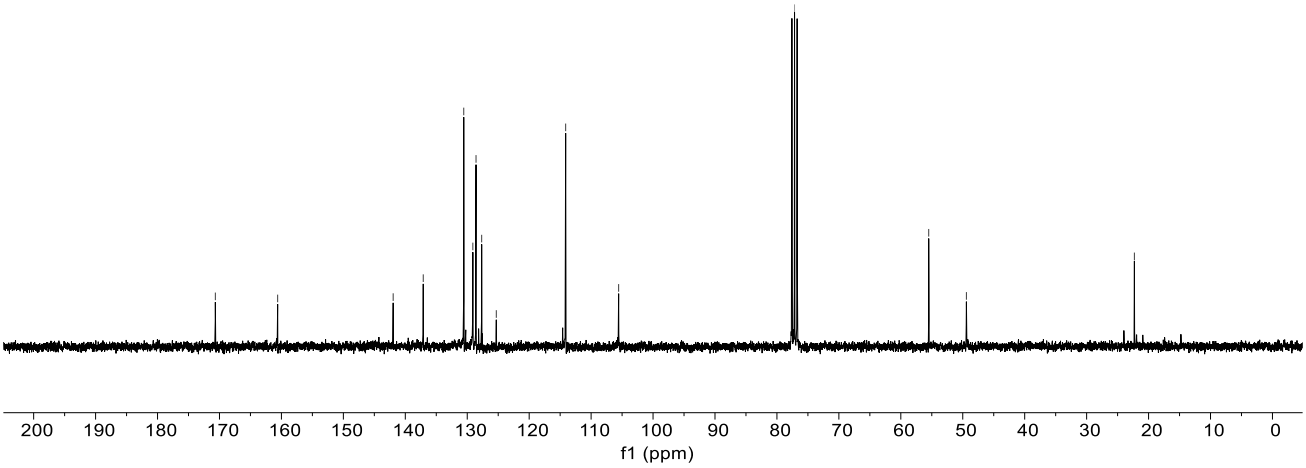
^{1}H NMR (300 MHz, $CDCl_3$)

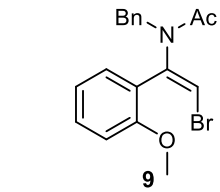




8

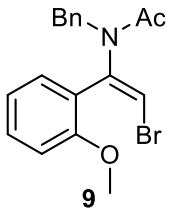
^{13}C NMR (75.5 MHz, $CDCl_3$)





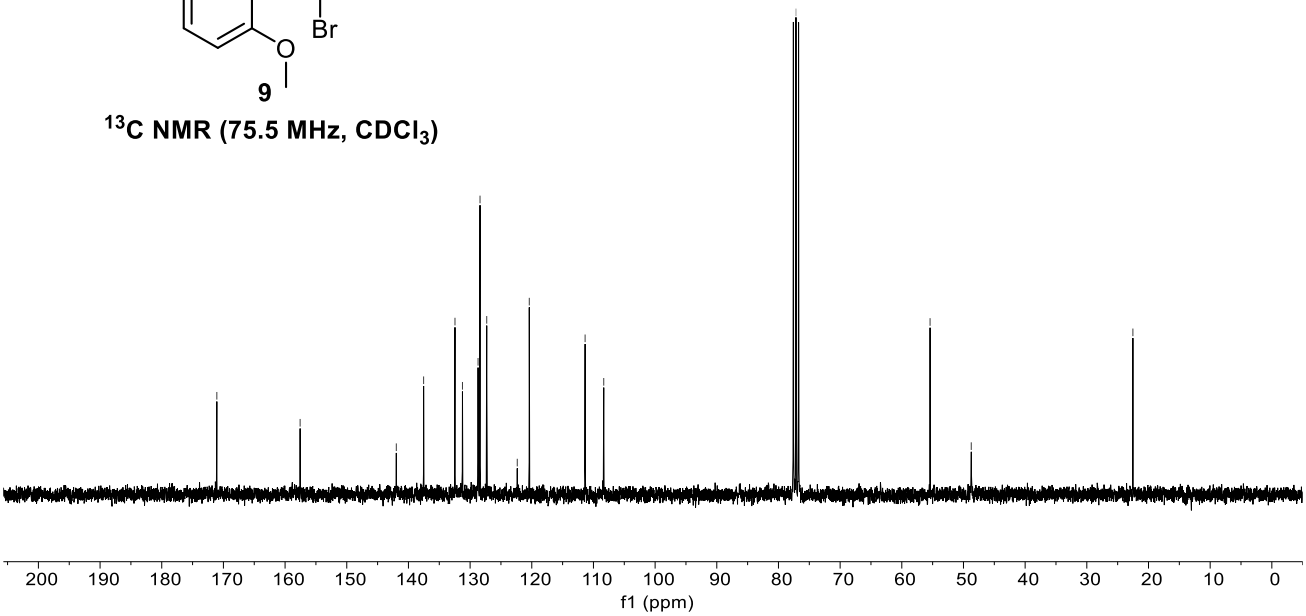
9

^{1}H NMR (300 MHz, $CDCl_3$)

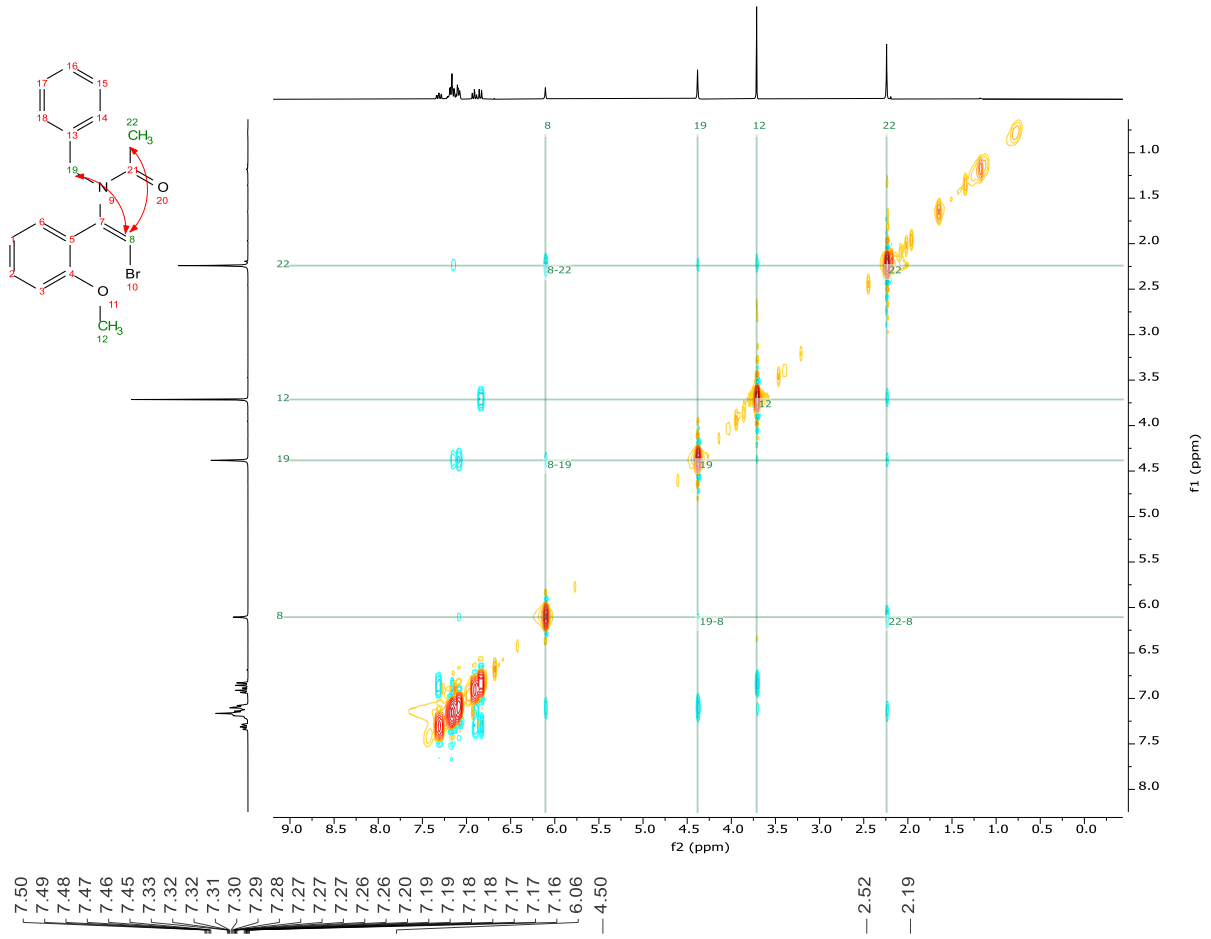


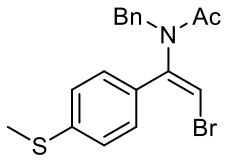
9

^{13}C NMR (75.5 MHz, $CDCl_3$)



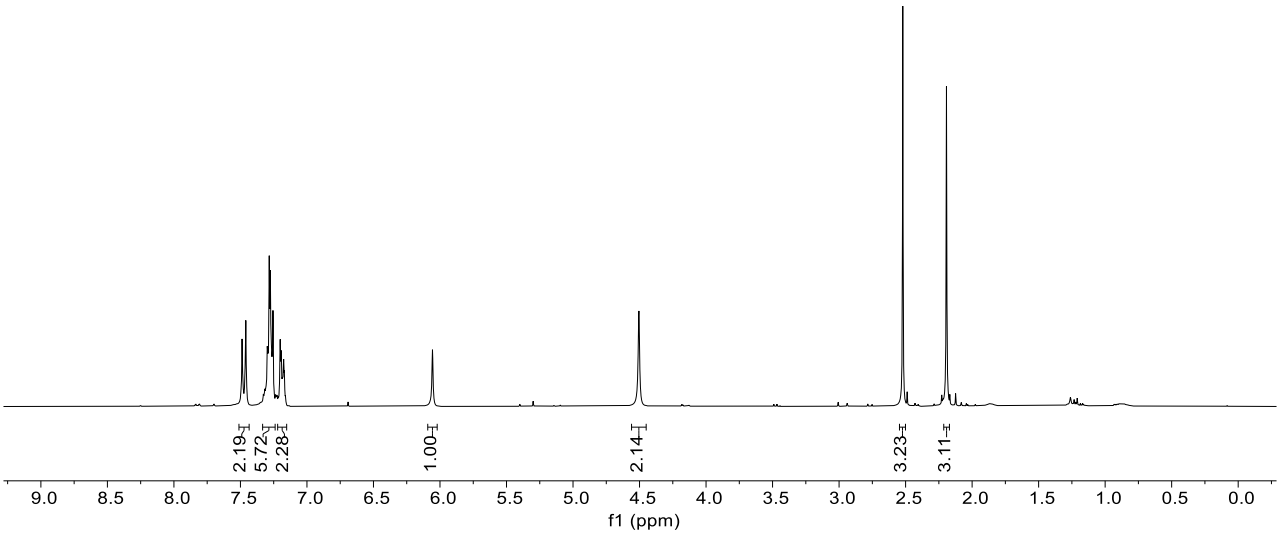
NOESY of product 9

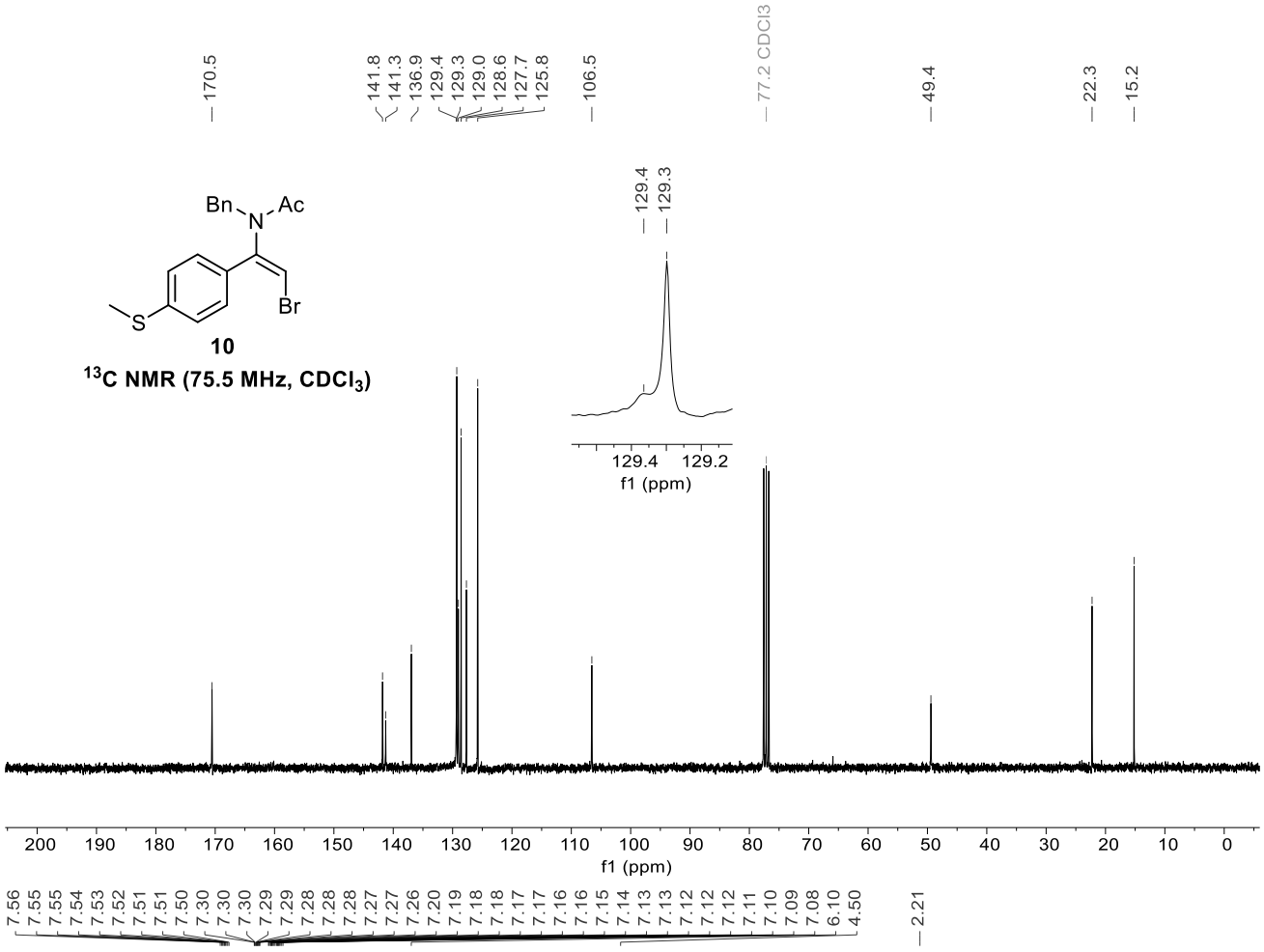




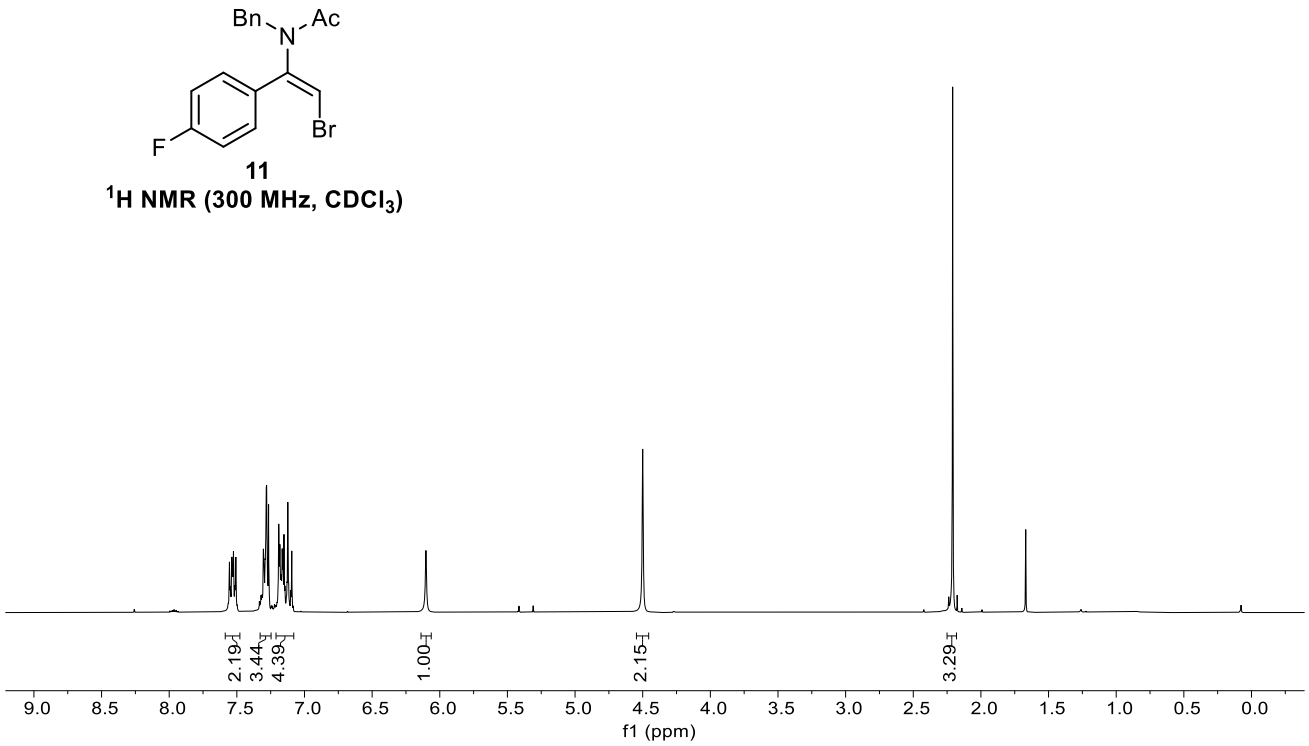
10

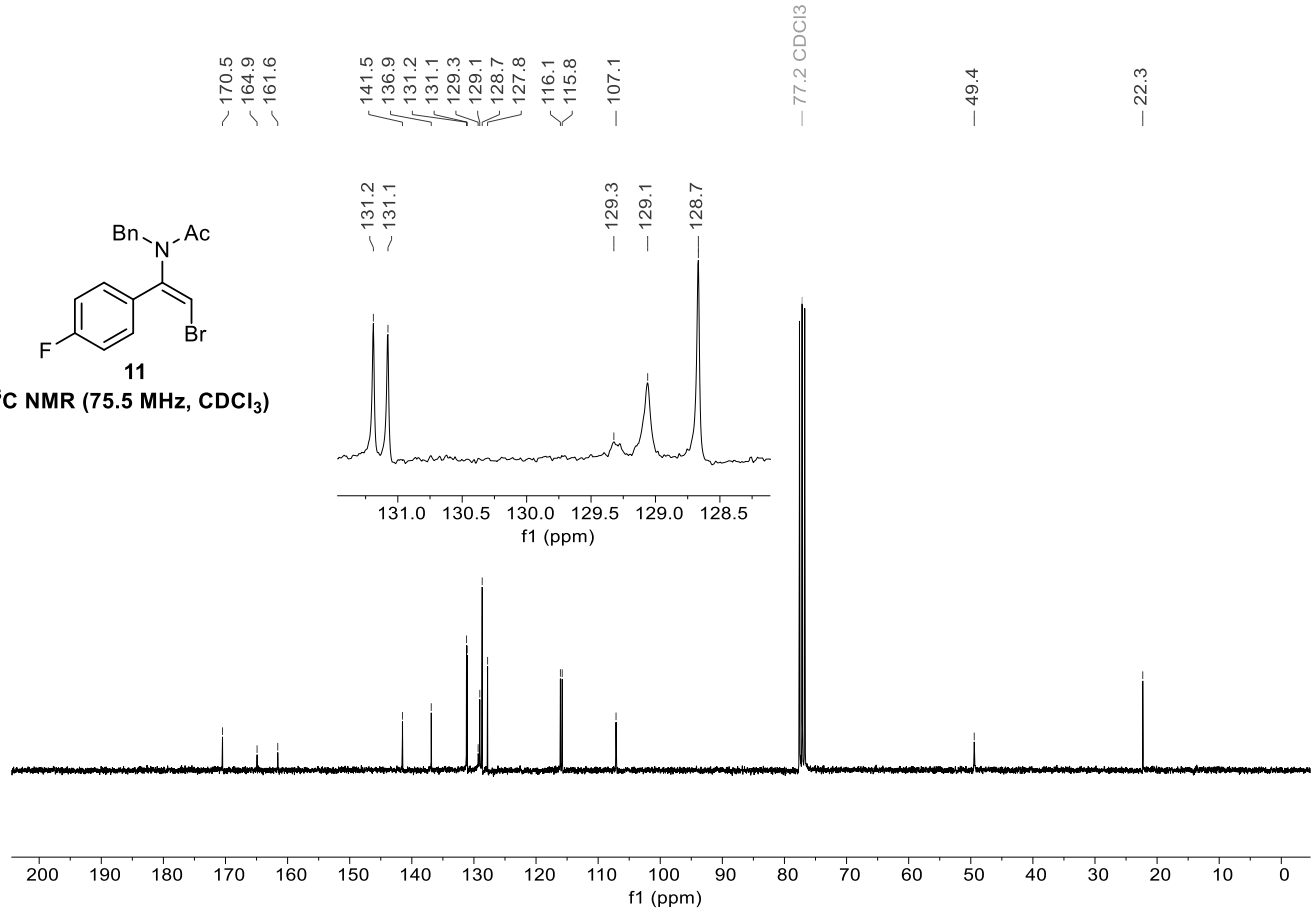
^{1}H NMR (300 MHz, $CDCl_3$)




170.5
141.8
141.3
136.9
129.4
129.3
129.0
128.6
127.7
125.8
106.5
77.2 CDCl3
49.4
22.3
15.2
Bn
N
Ac
Br
S
10
13C NMR (75.5 MHz, CDCl3)
129.4
129.3
129.4
129.2
f1 (ppm)
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
f1 (ppm)

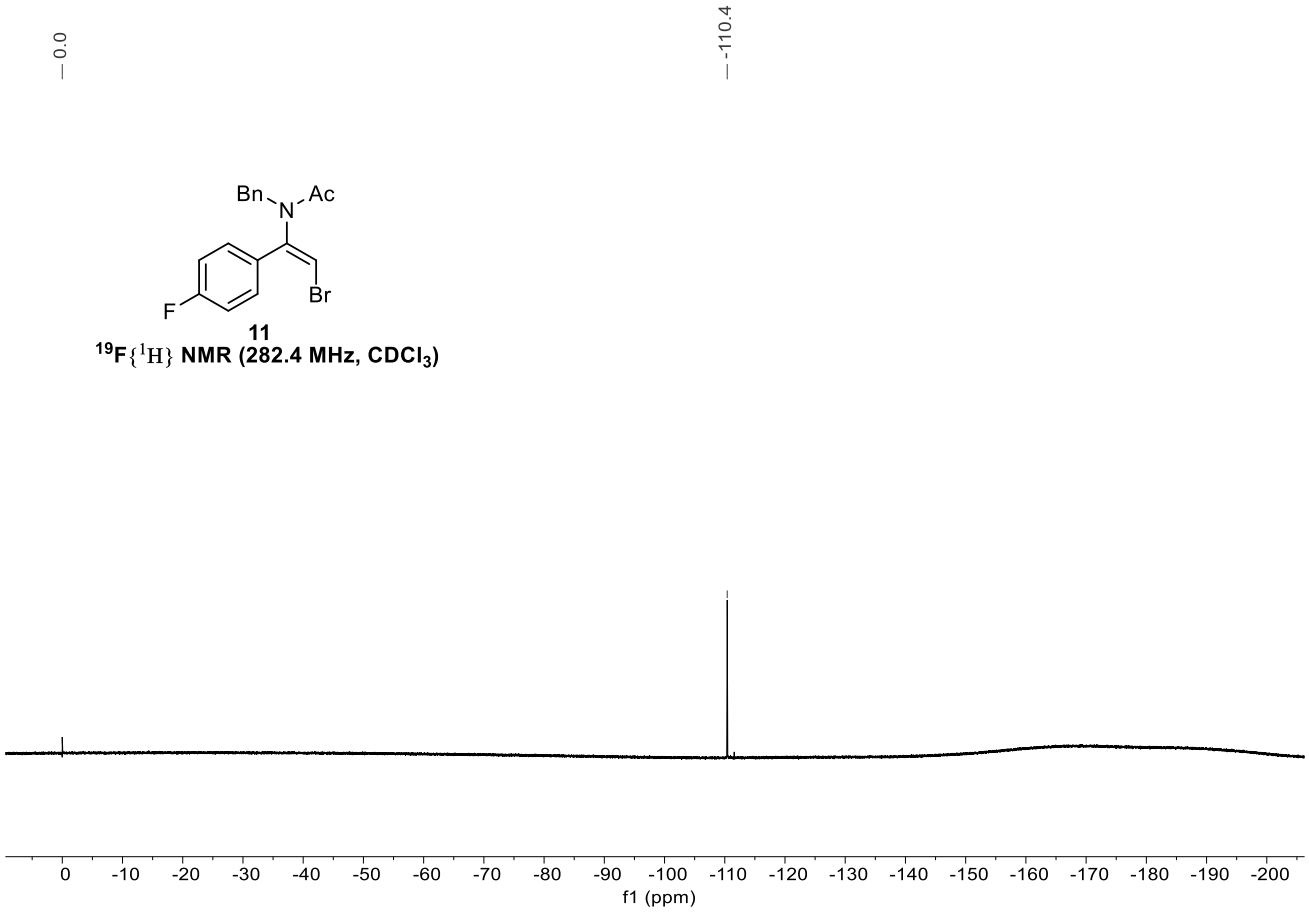
7.56
7.55
7.55
7.54
7.53
7.52
7.51
7.51
7.50
7.30
7.30
7.30
7.29
7.29
7.28
7.28
7.28
7.27
7.27
7.26
7.20
7.19
7.18
7.18
7.17
7.17
7.16
7.16
7.15
7.14
7.13
7.13
7.12
7.12
7.12
7.11
7.10
7.09
7.08
6.10
4.50
2.21


Bn
N
Ac
Br
F
11
1H NMR (300 MHz, CDCl3)
2.19
3.44
4.39
1.00
2.15
3.29
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)



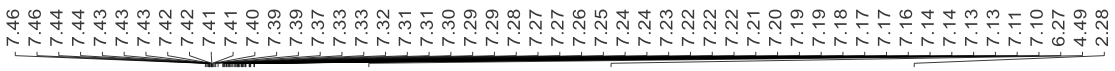
11

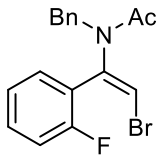
^{13}C NMR (75.5 MHz, $CDCl_3$)



11

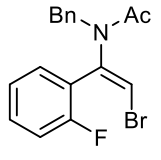
^{19}F{^{1}H} NMR (282.4 MHz, $CDCl_3$)





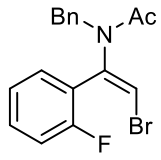
12

^{1}H NMR (300 MHz, $CDCl_3$)



12

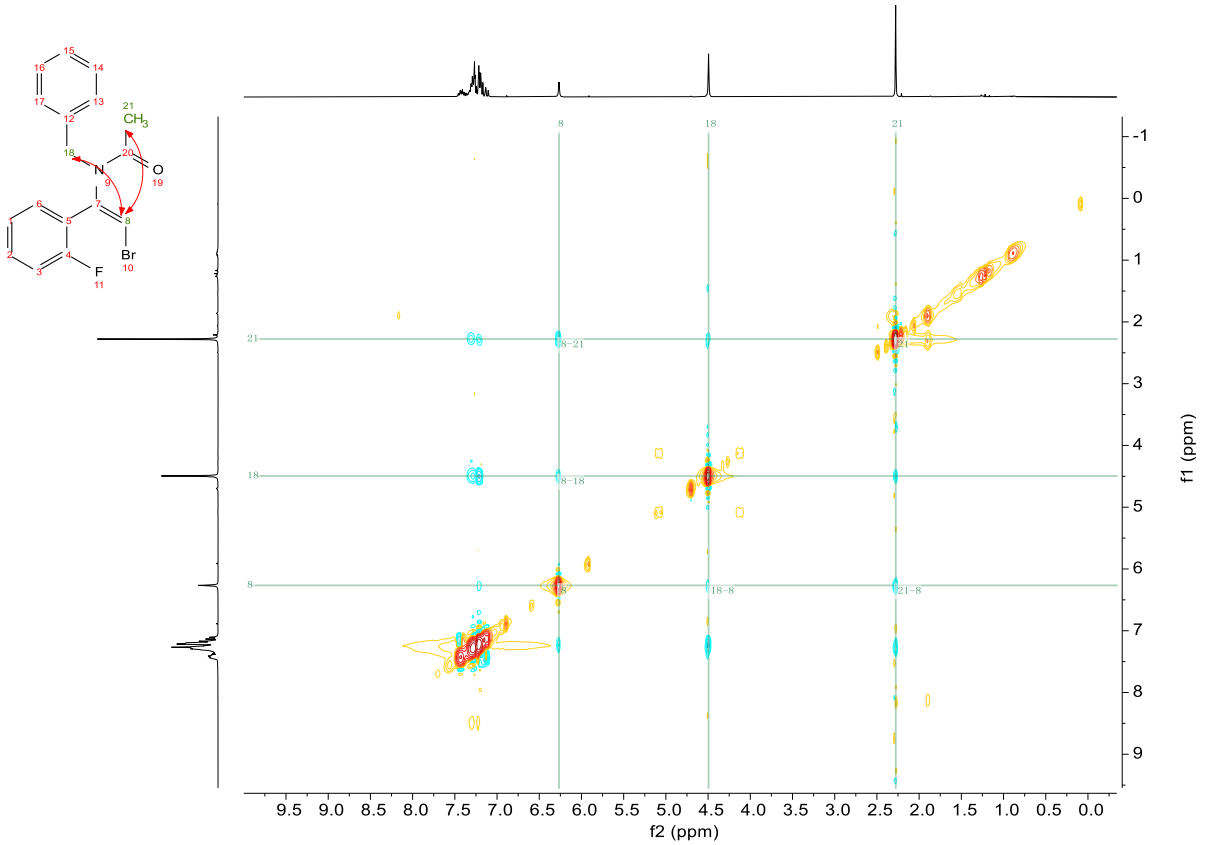
^{13}C NMR (75.5 MHz, $CDCl_3$)

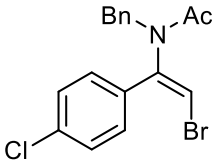


12

$^{19}F\{^{1}H\}$ NMR (282.4 MHz, $CDCl_3$)

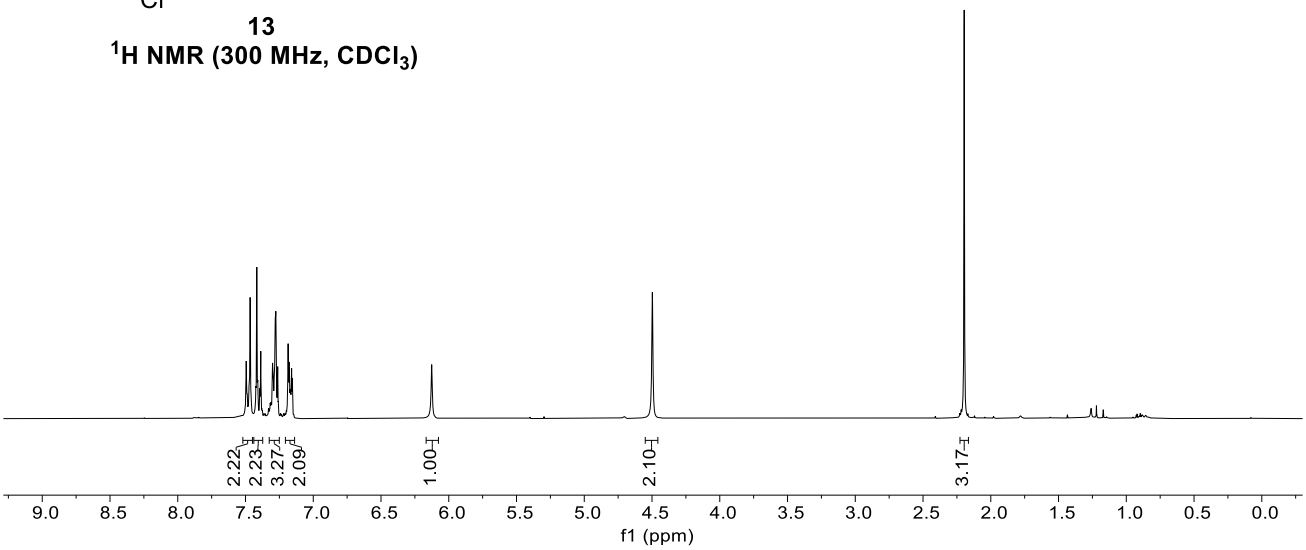
NOESY of product 12

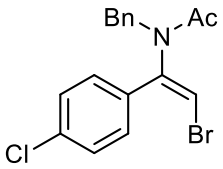




13

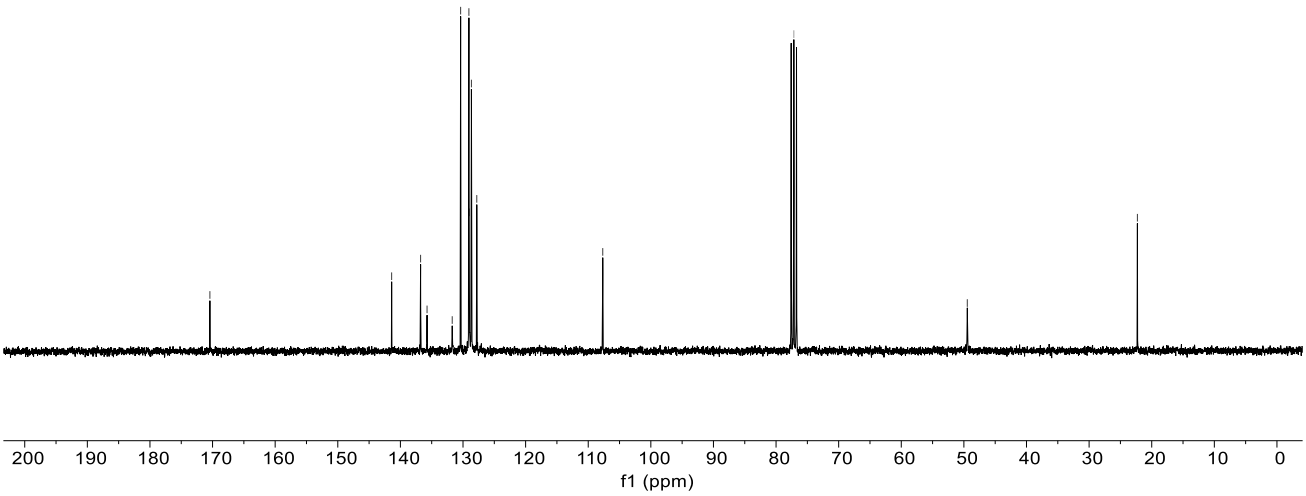
^{1}H NMR (300 MHz, $CDCl_3$)

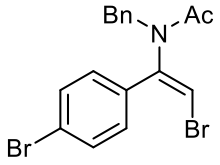




13

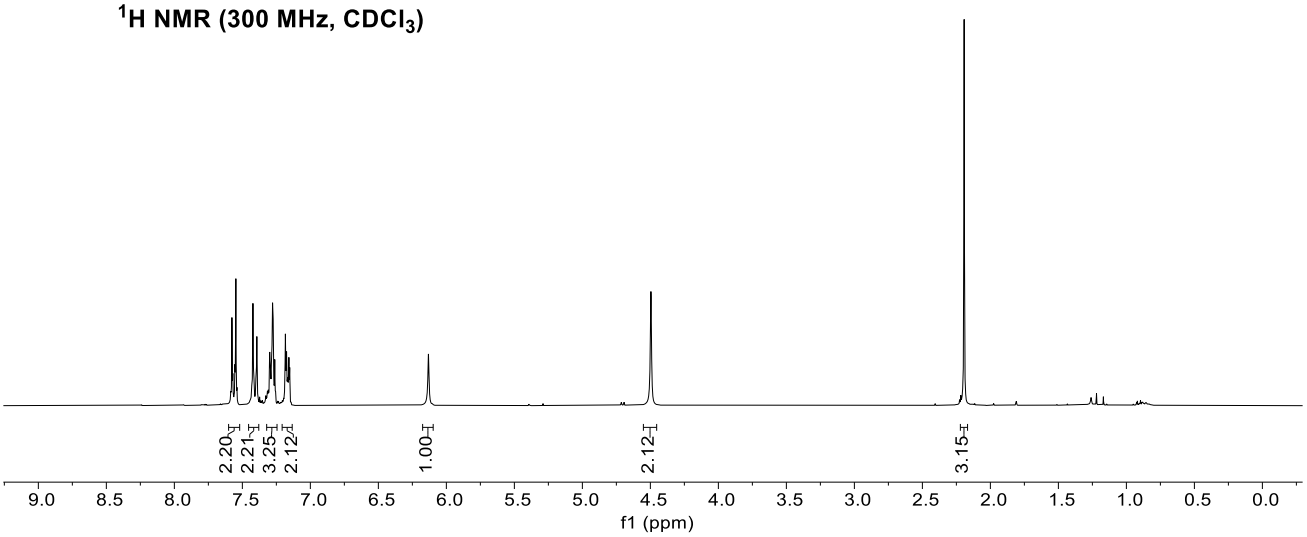
^{13}C NMR (75.5 MHz, $CDCl_3$)

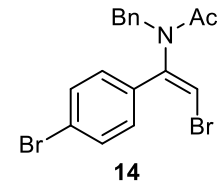




14

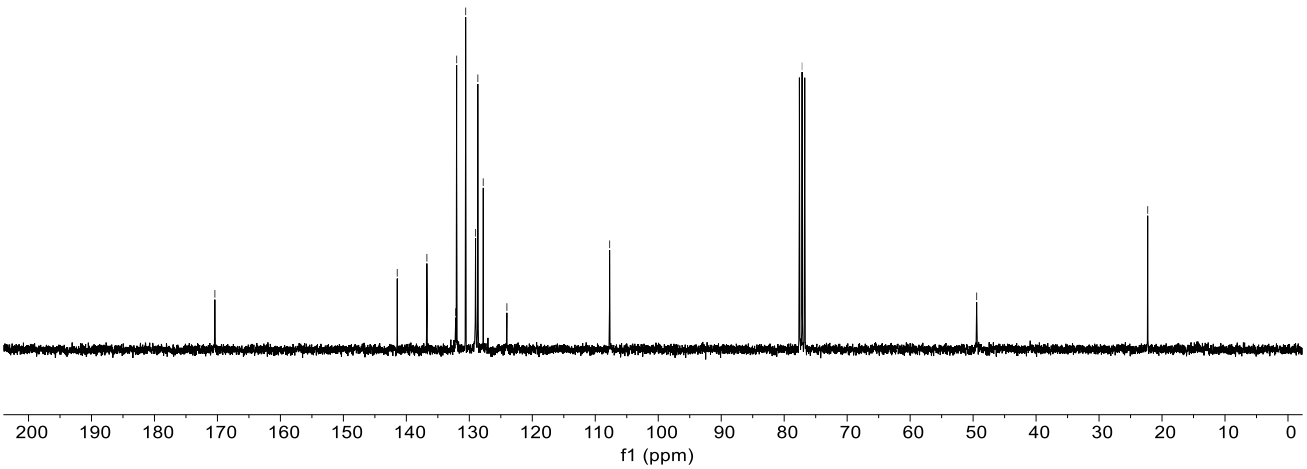
^{1}H NMR (300 MHz, $CDCl_3$)

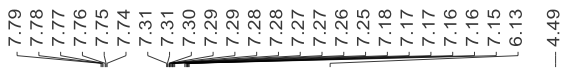


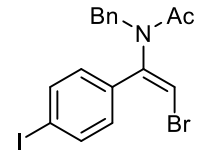


14

^{13}C NMR (75.5 MHz, $CDCl_3$)

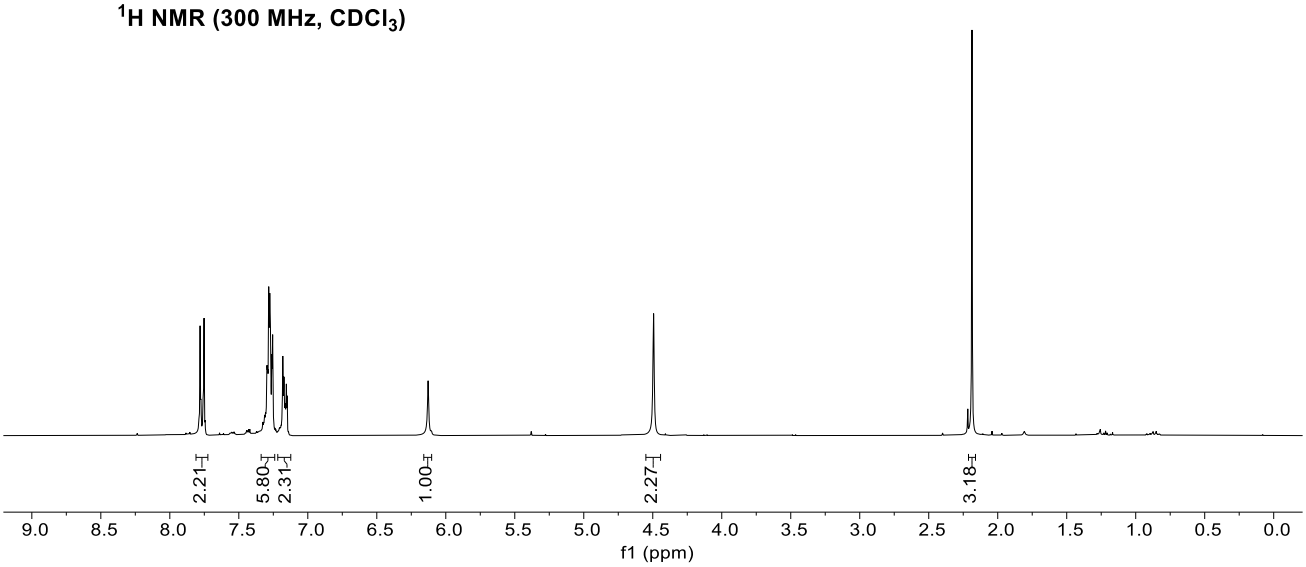


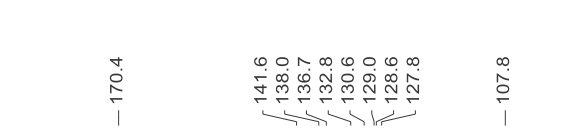


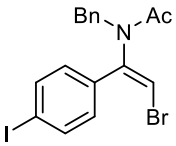


15

^{1}H NMR (300 MHz, $CDCl_3$)

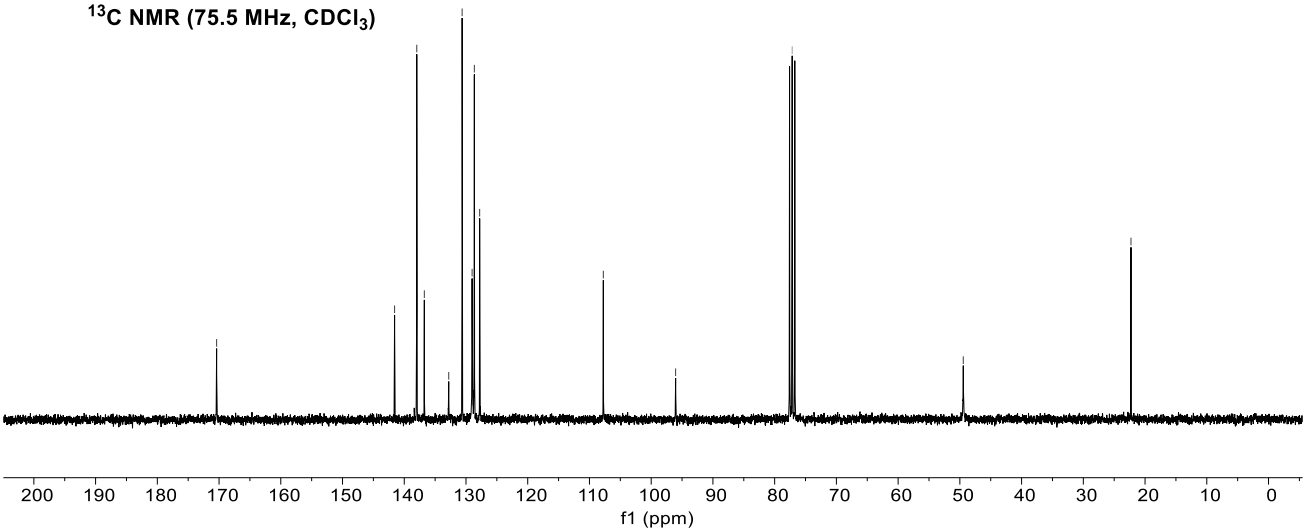


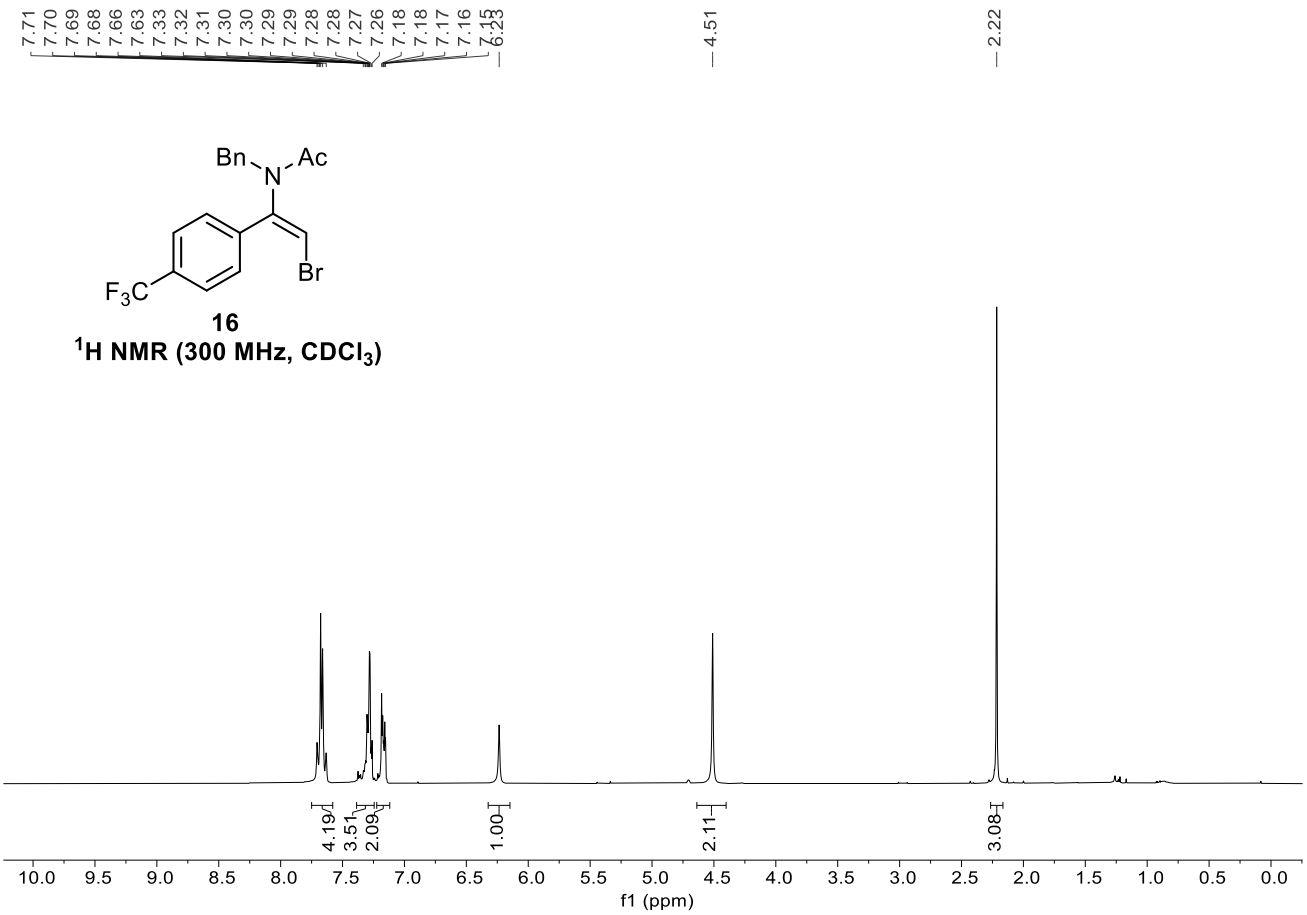




15

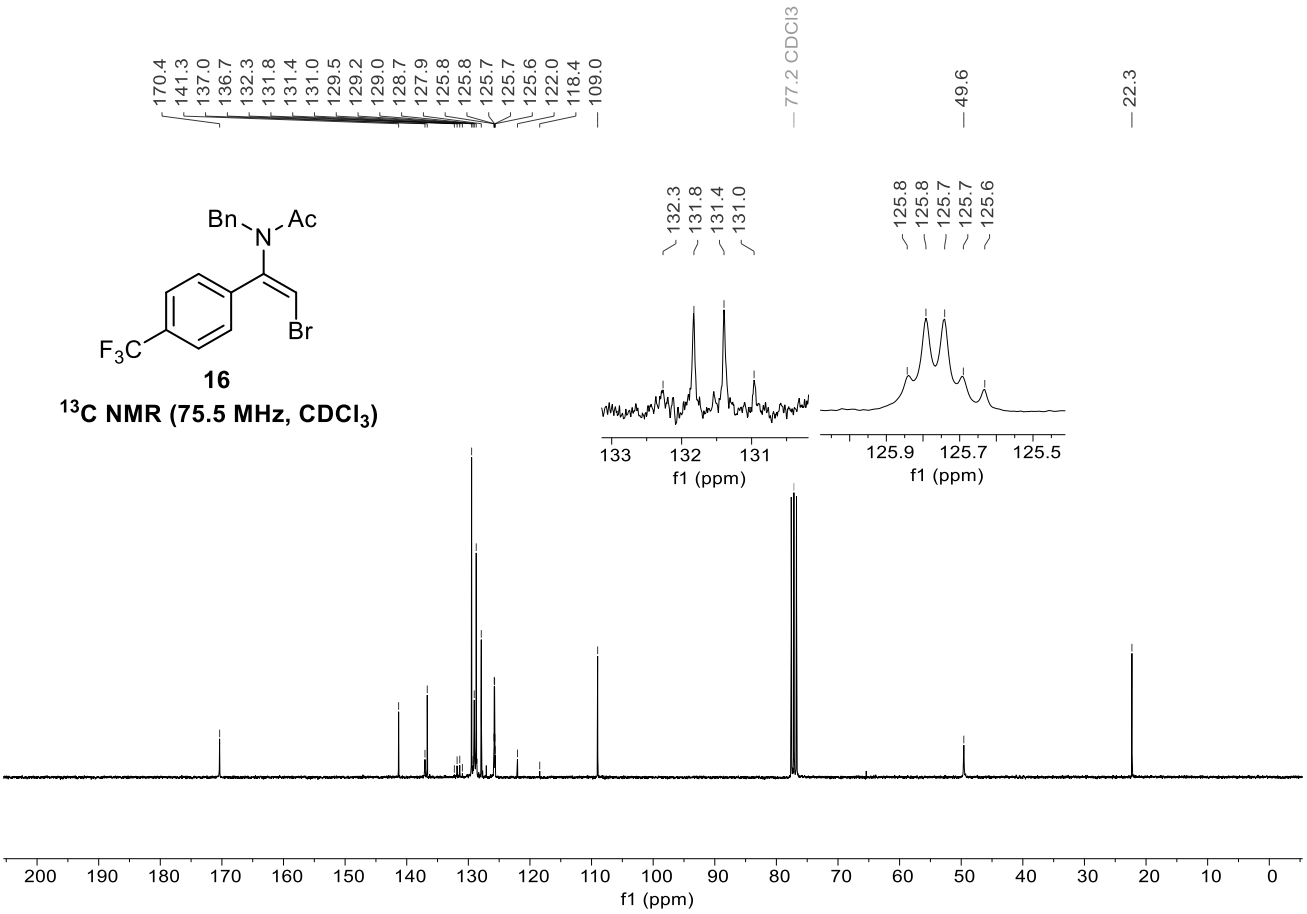
^{13}C NMR (75.5 MHz, $CDCl_3$)





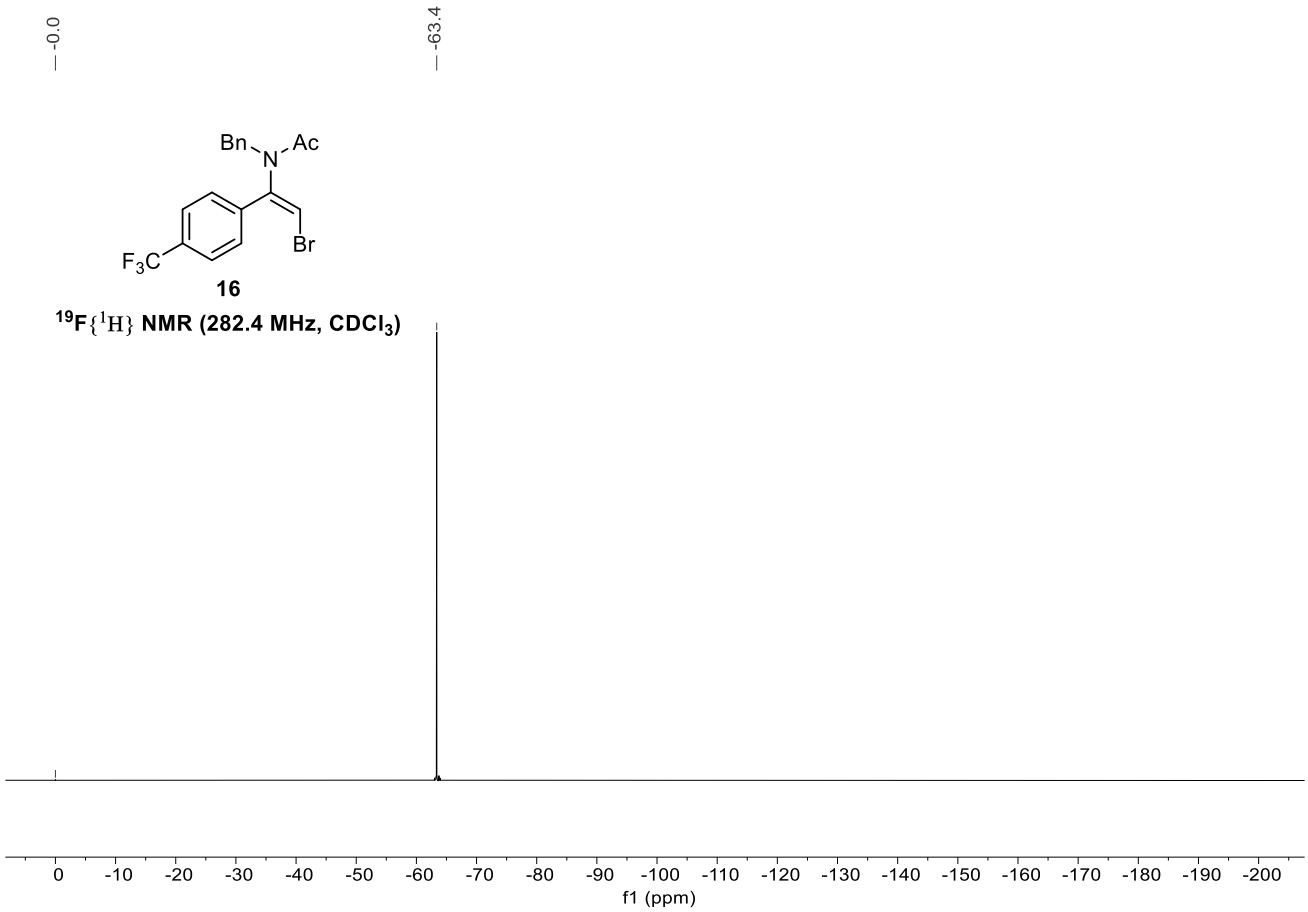
16

^{1}H NMR (300 MHz, $CDCl_3$)



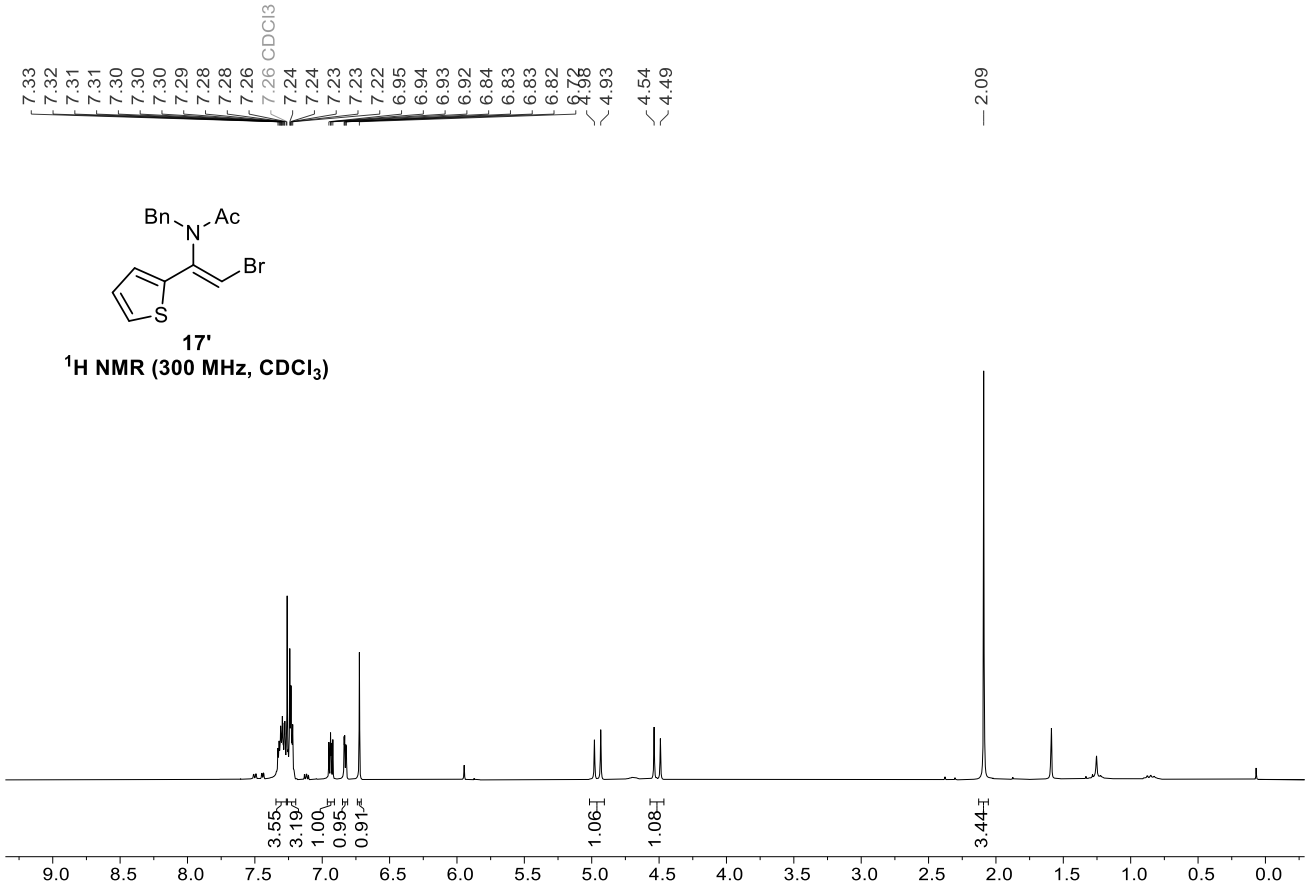
16

^{13}C NMR (75.5 MHz, $CDCl_3$)



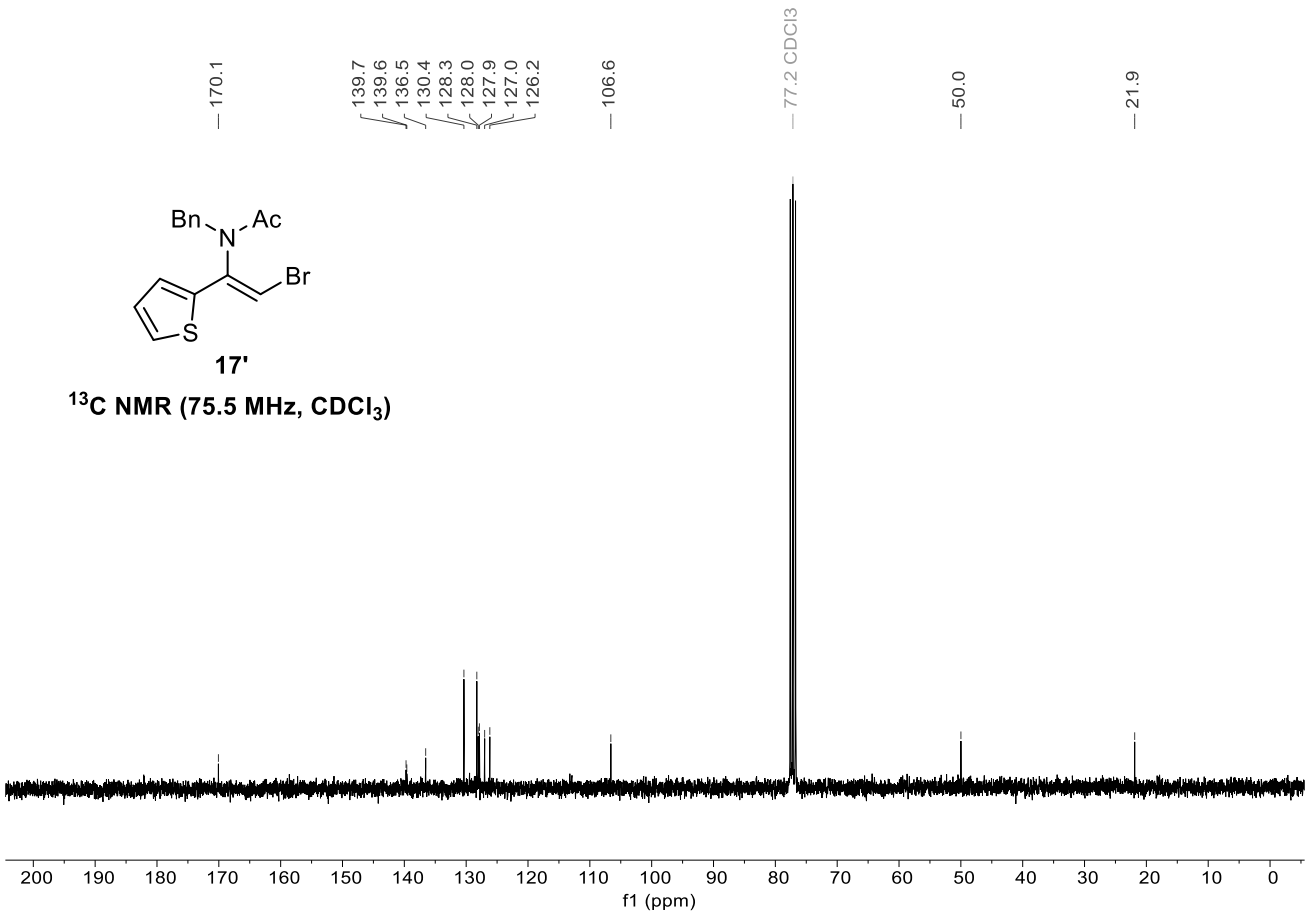
16

$^{19}F\{^{1}H\}$ NMR (282.4 MHz, $CDCl_3$)



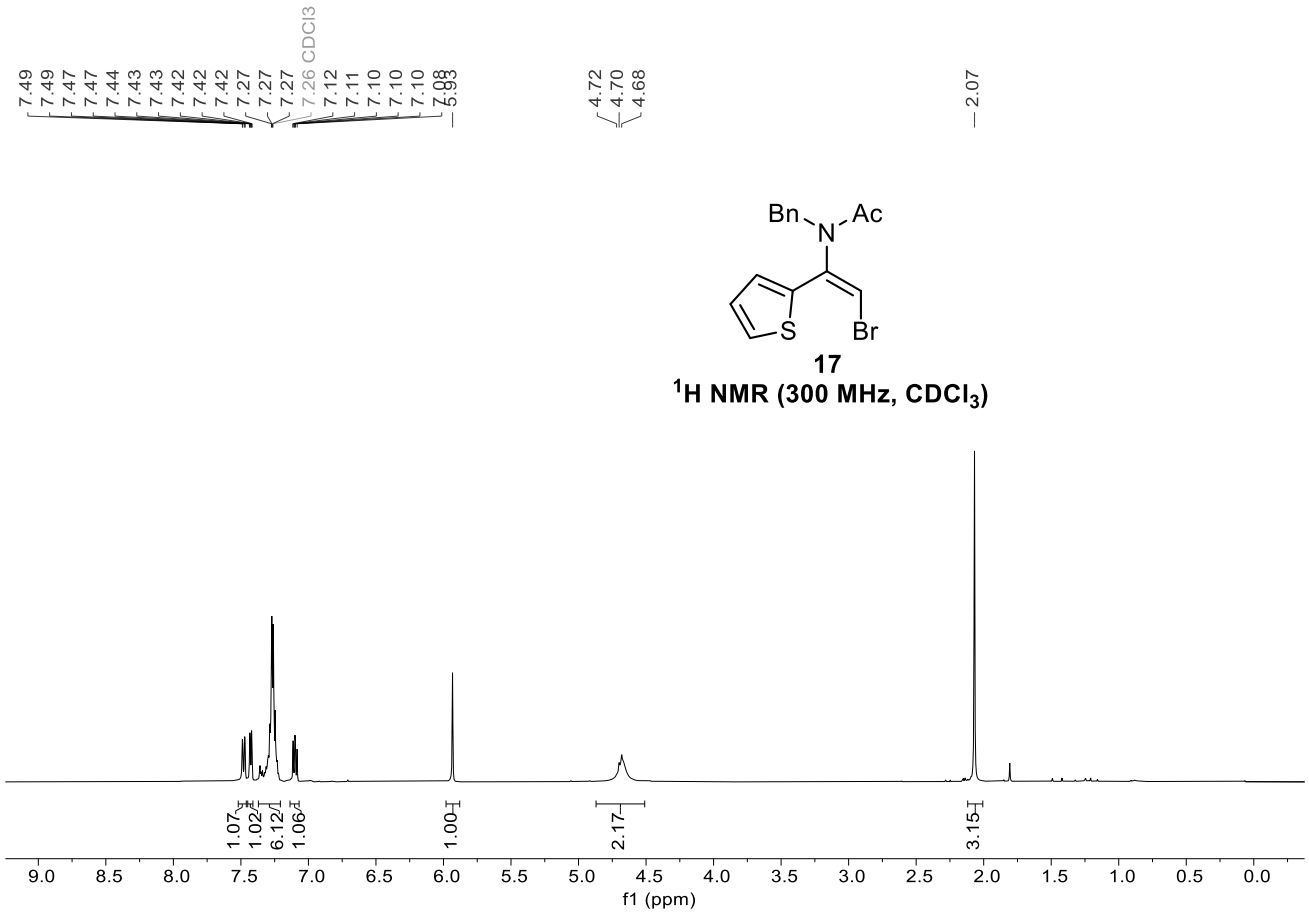
17'

^{1}H NMR (300 MHz, $CDCl_3$)



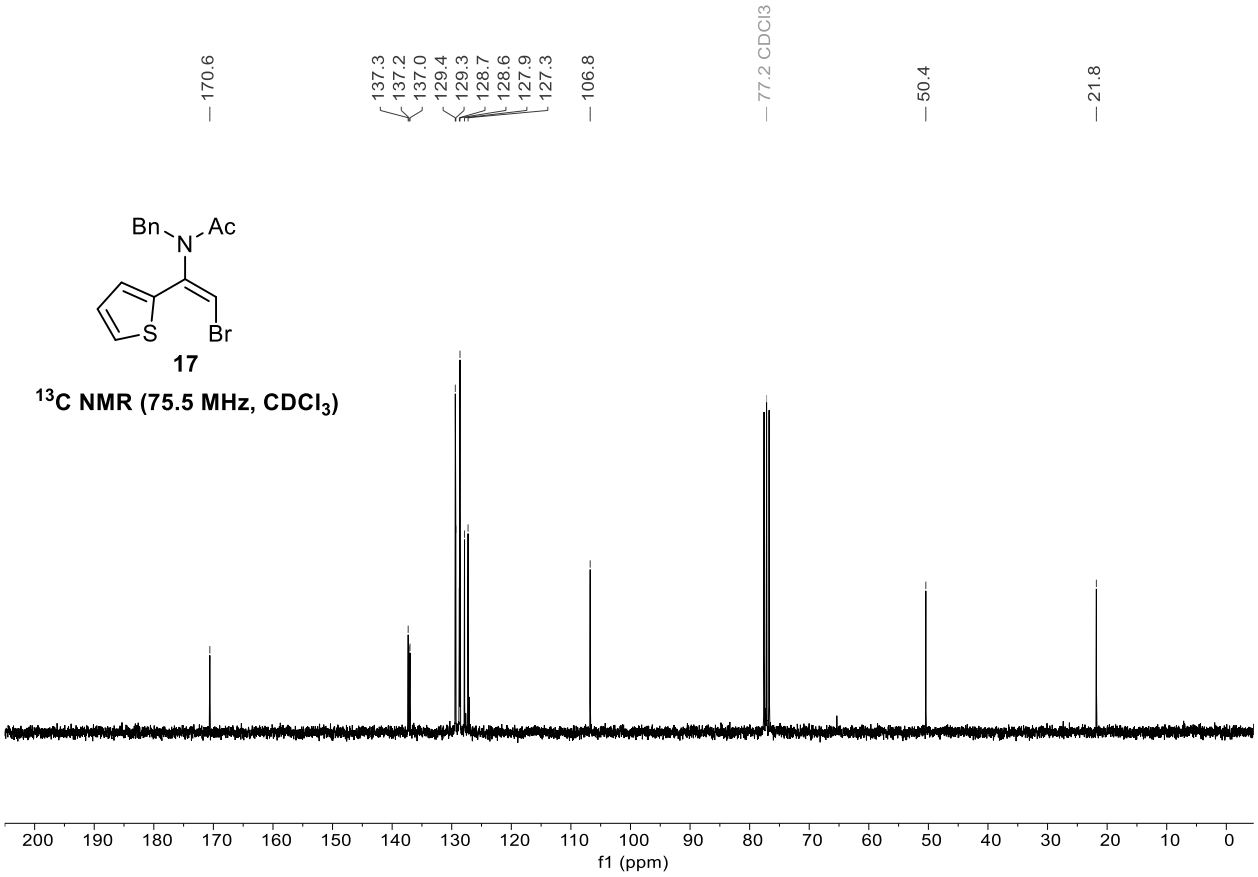
17'

^{13}C NMR (75.5 MHz, $CDCl_3$)



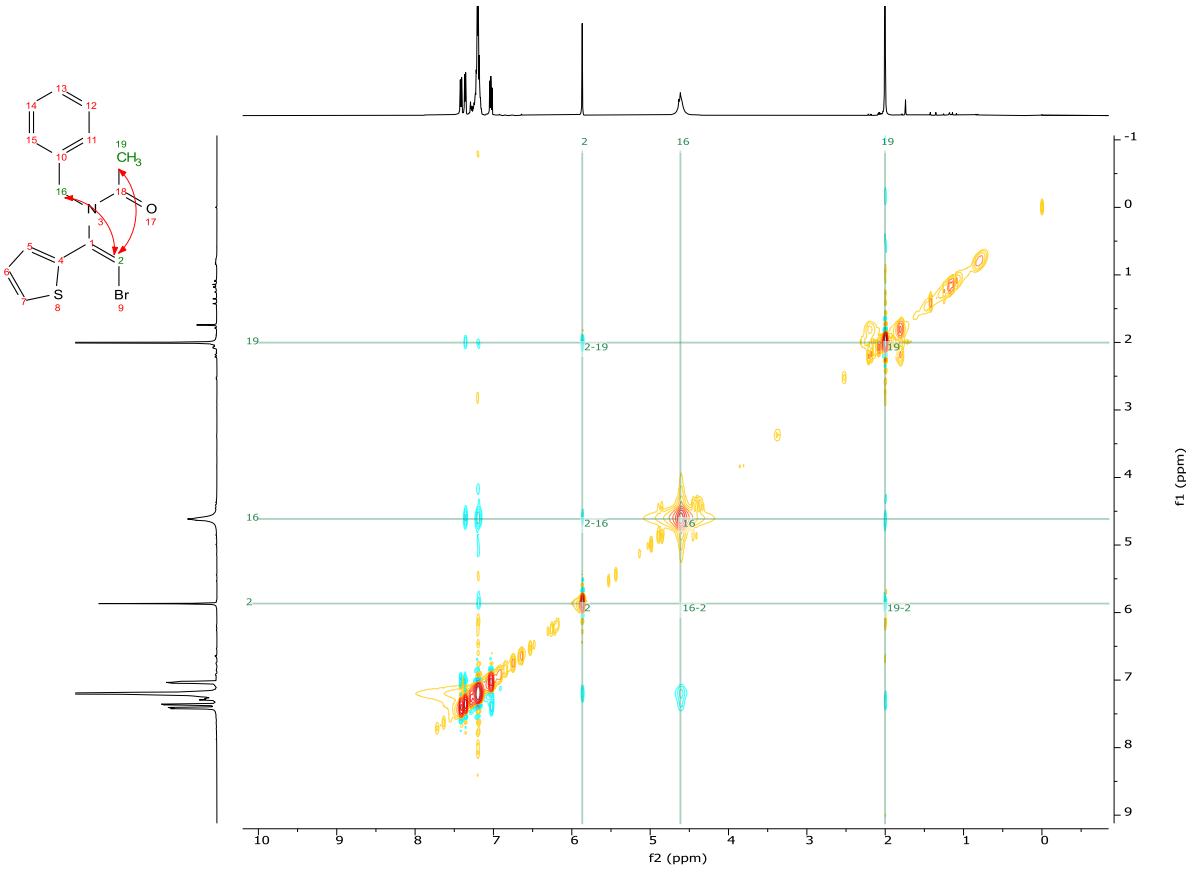
17

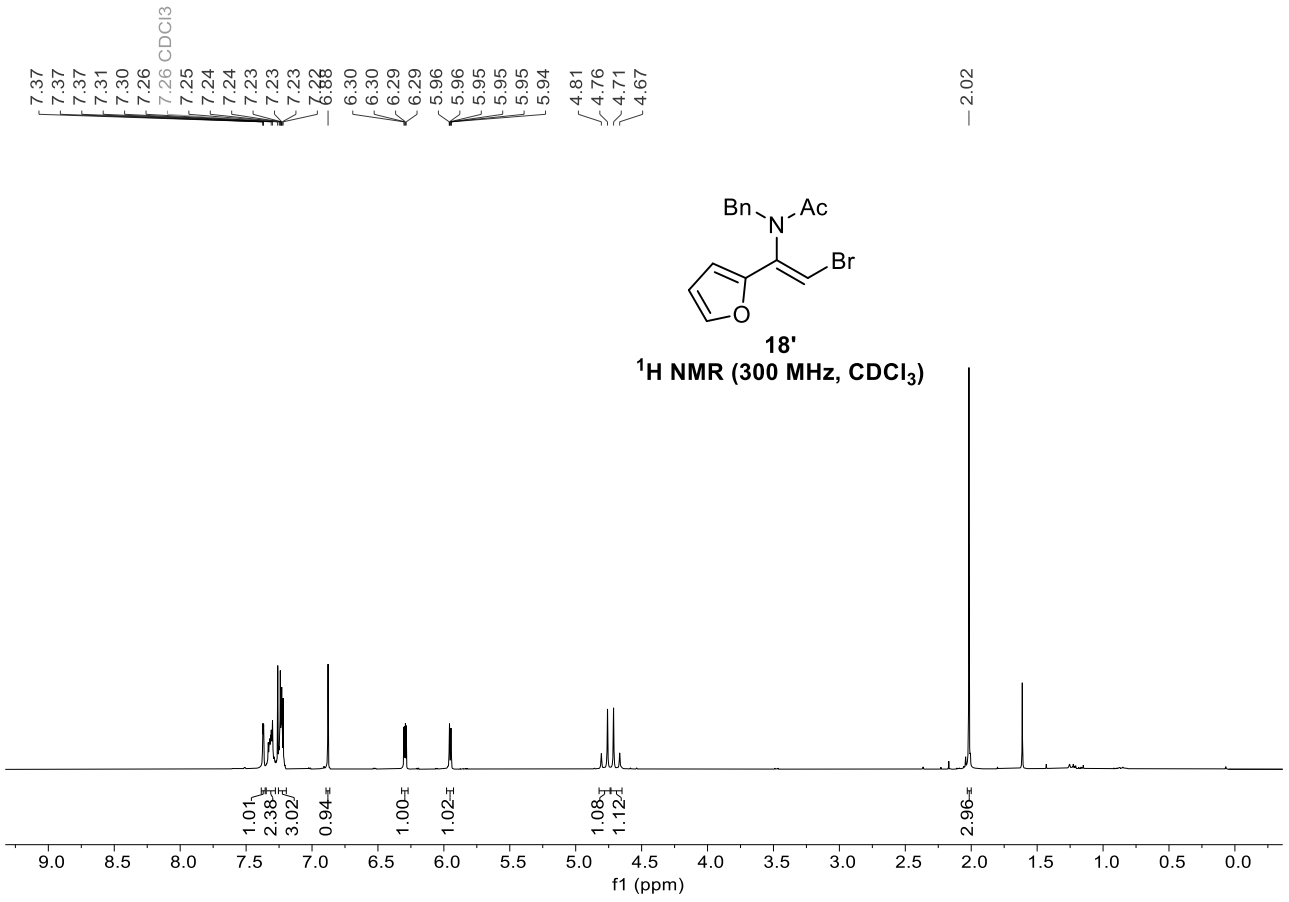
^{1}H NMR (300 MHz, $CDCl_3$)



^{13}C NMR (75.5 MHz, $CDCl_3$)

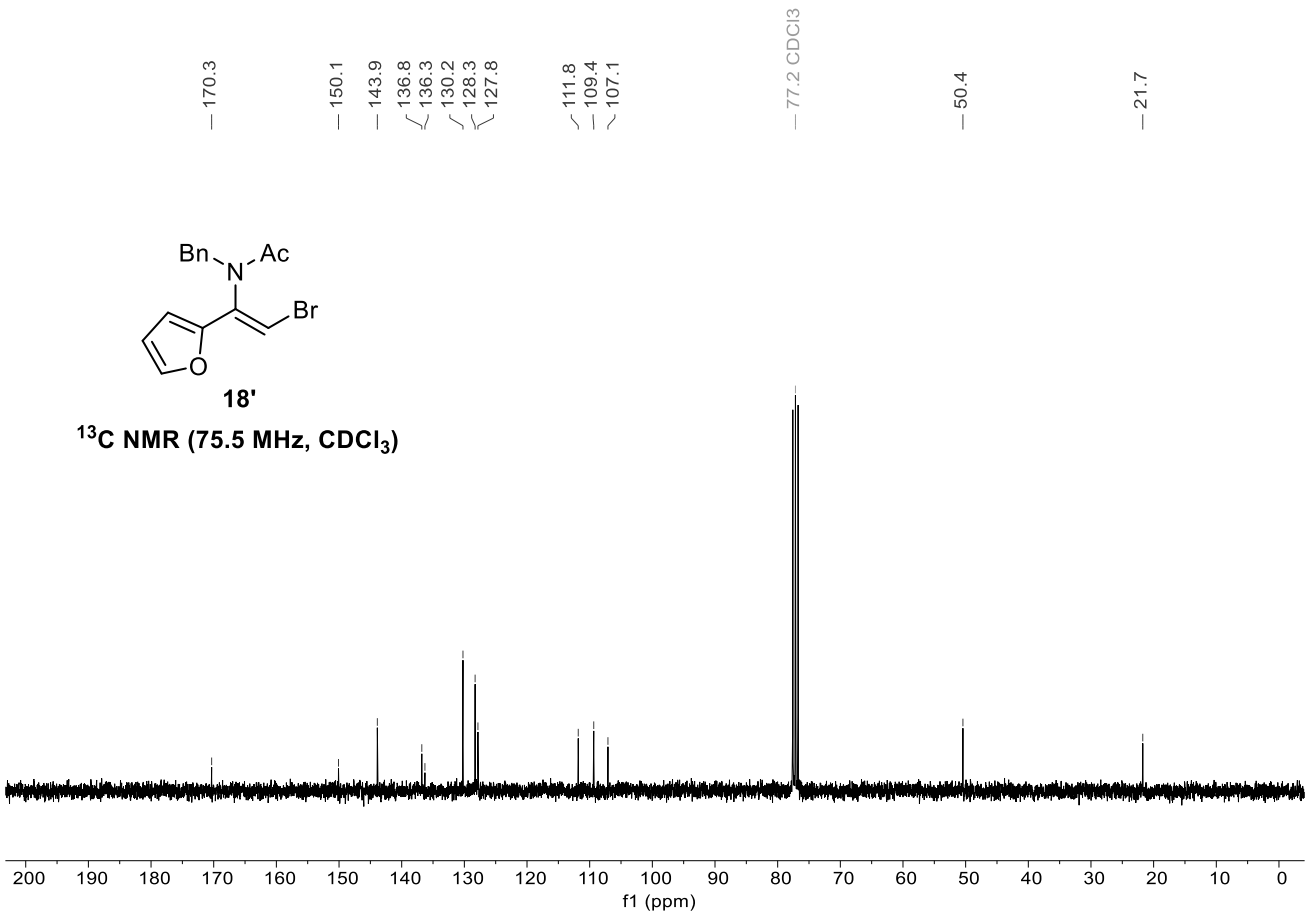
NOESY of product 17





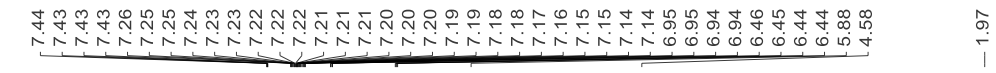
18'

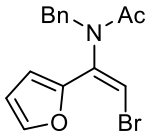
^{1}H NMR (300 MHz, $CDCl_3$)



18'

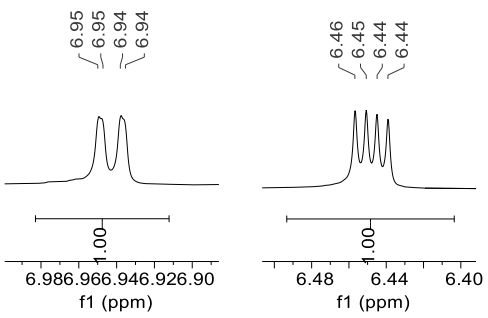
^{13}C NMR (75.5 MHz, $CDCl_3$)

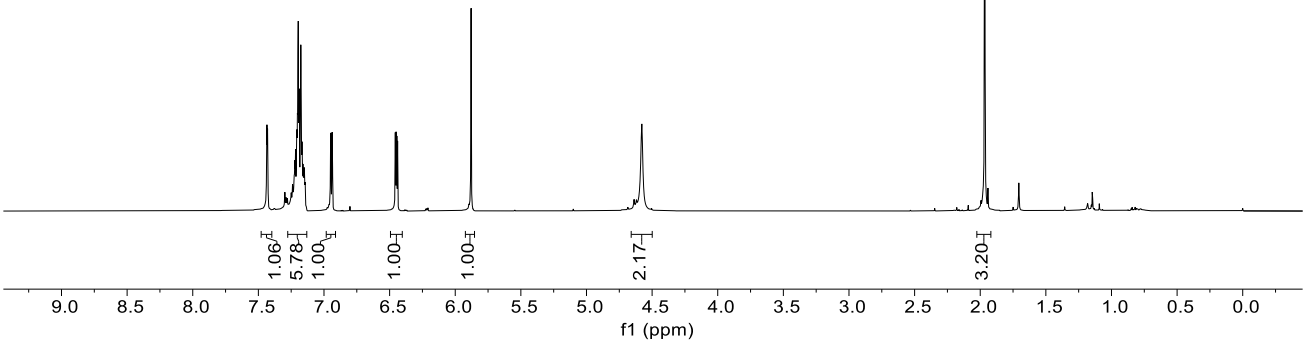


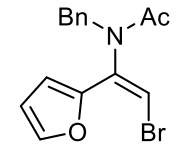


18

^{1}H NMR (300 MHz, $CDCl_3$)

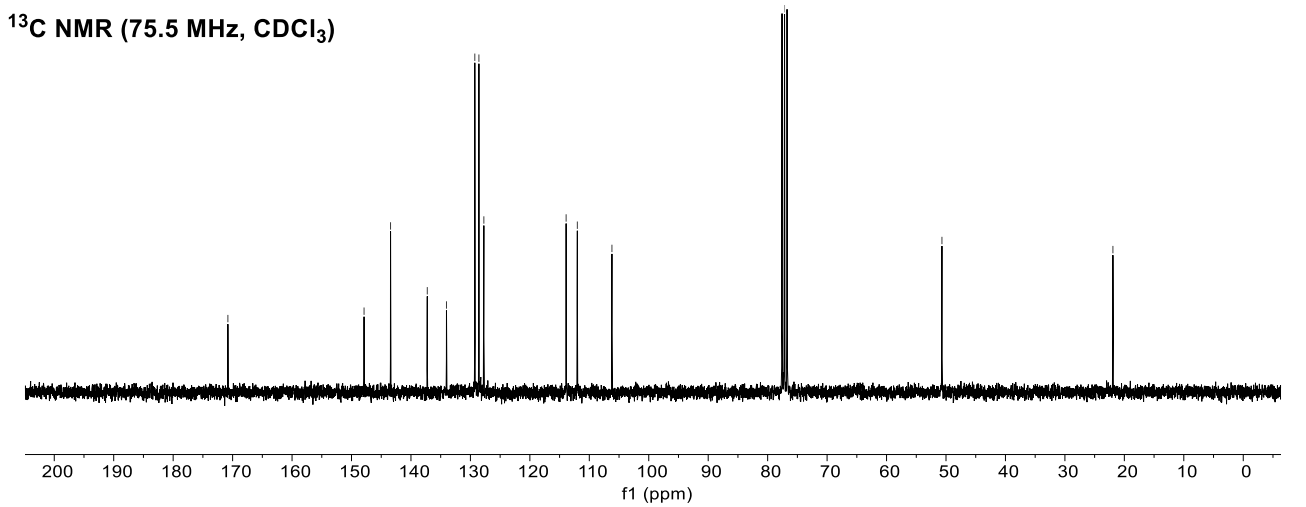




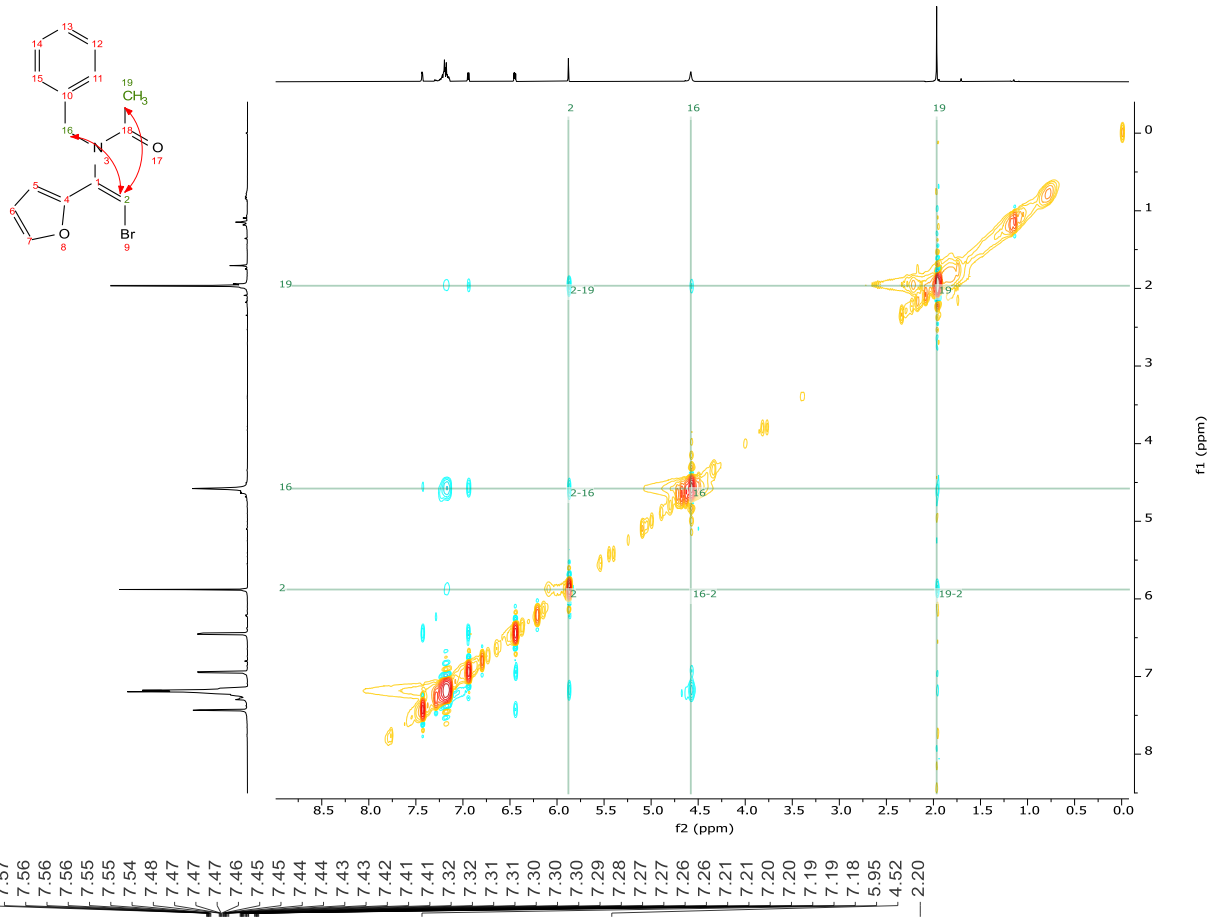


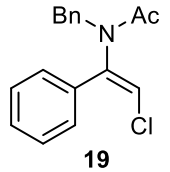
18

^{13}C NMR (75.5 MHz, $CDCl_3$)



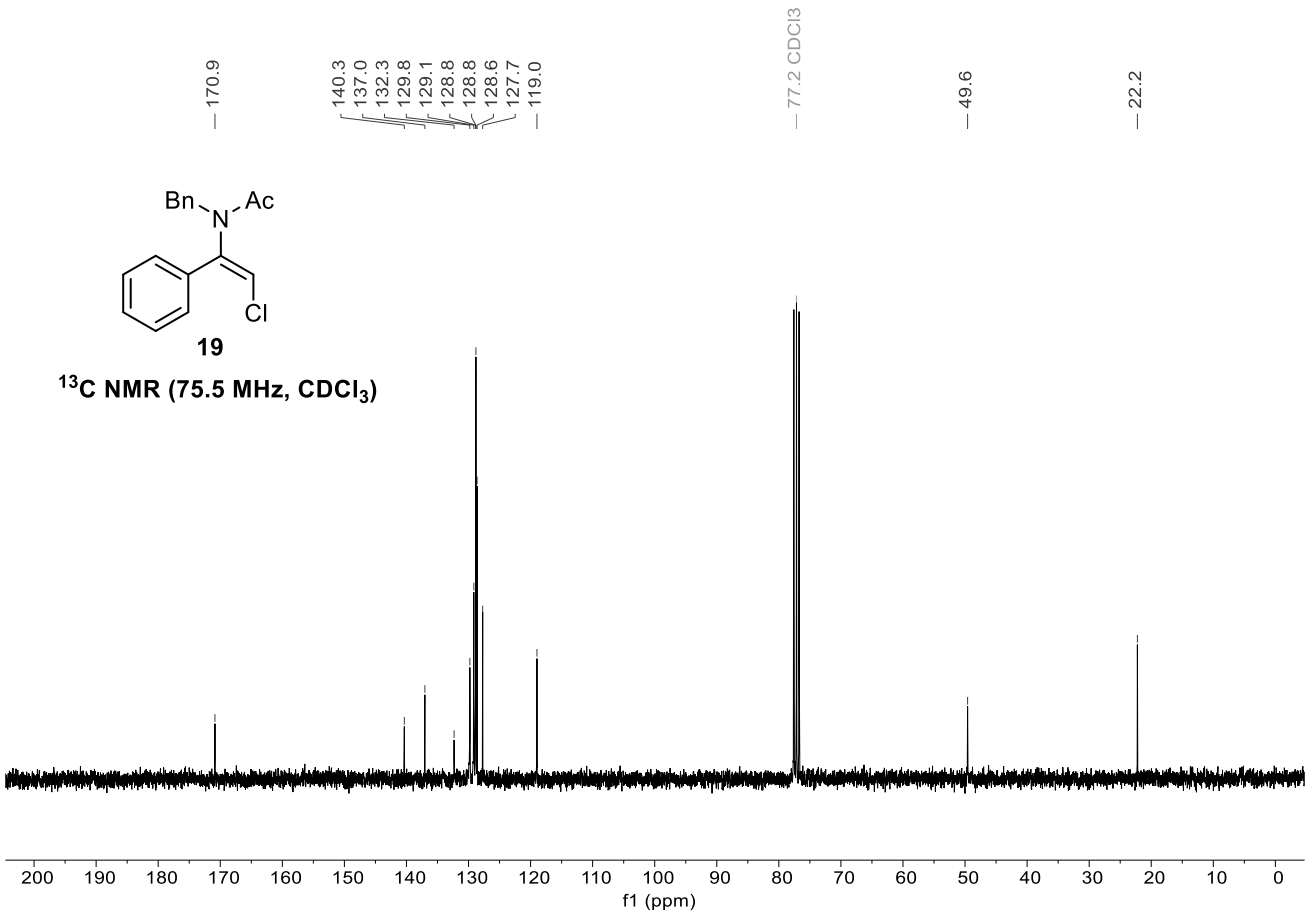
NOESY of product 18



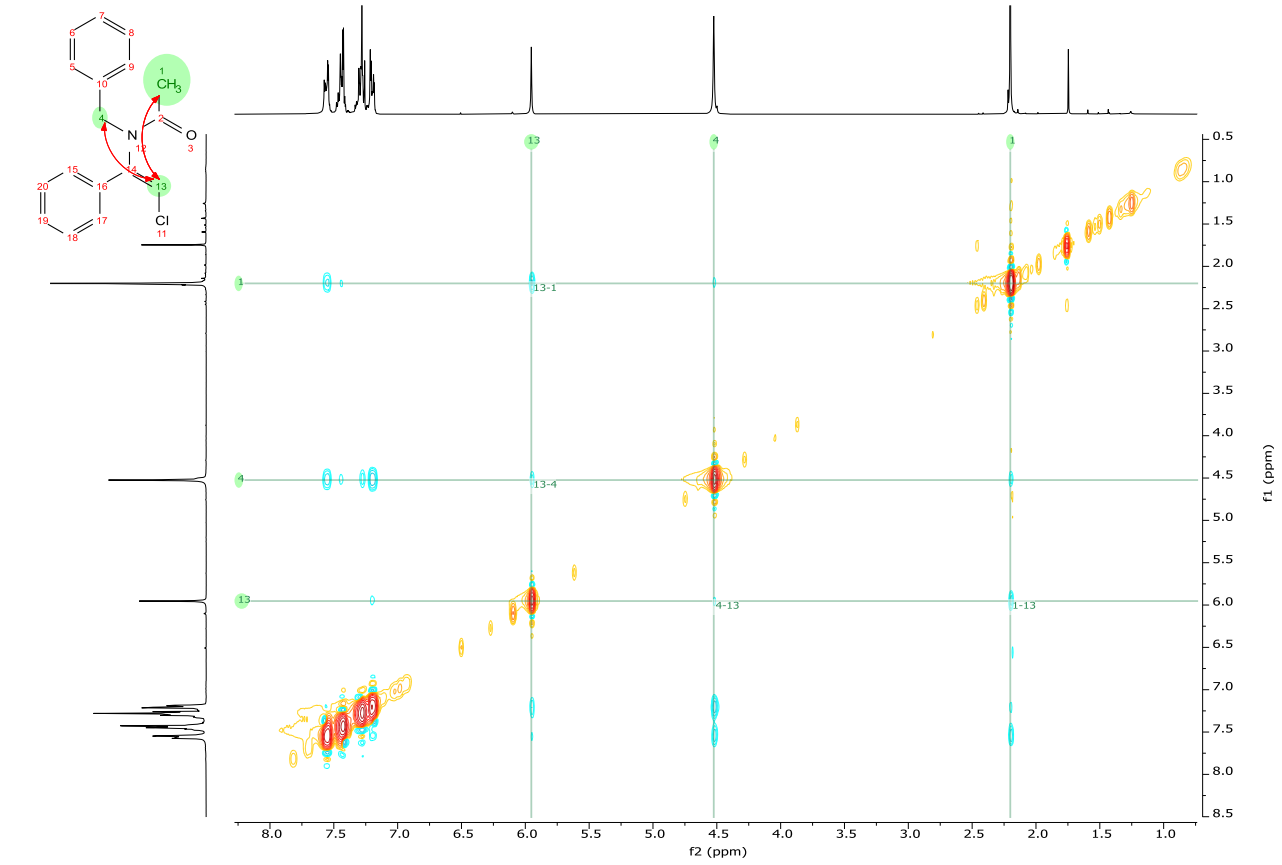


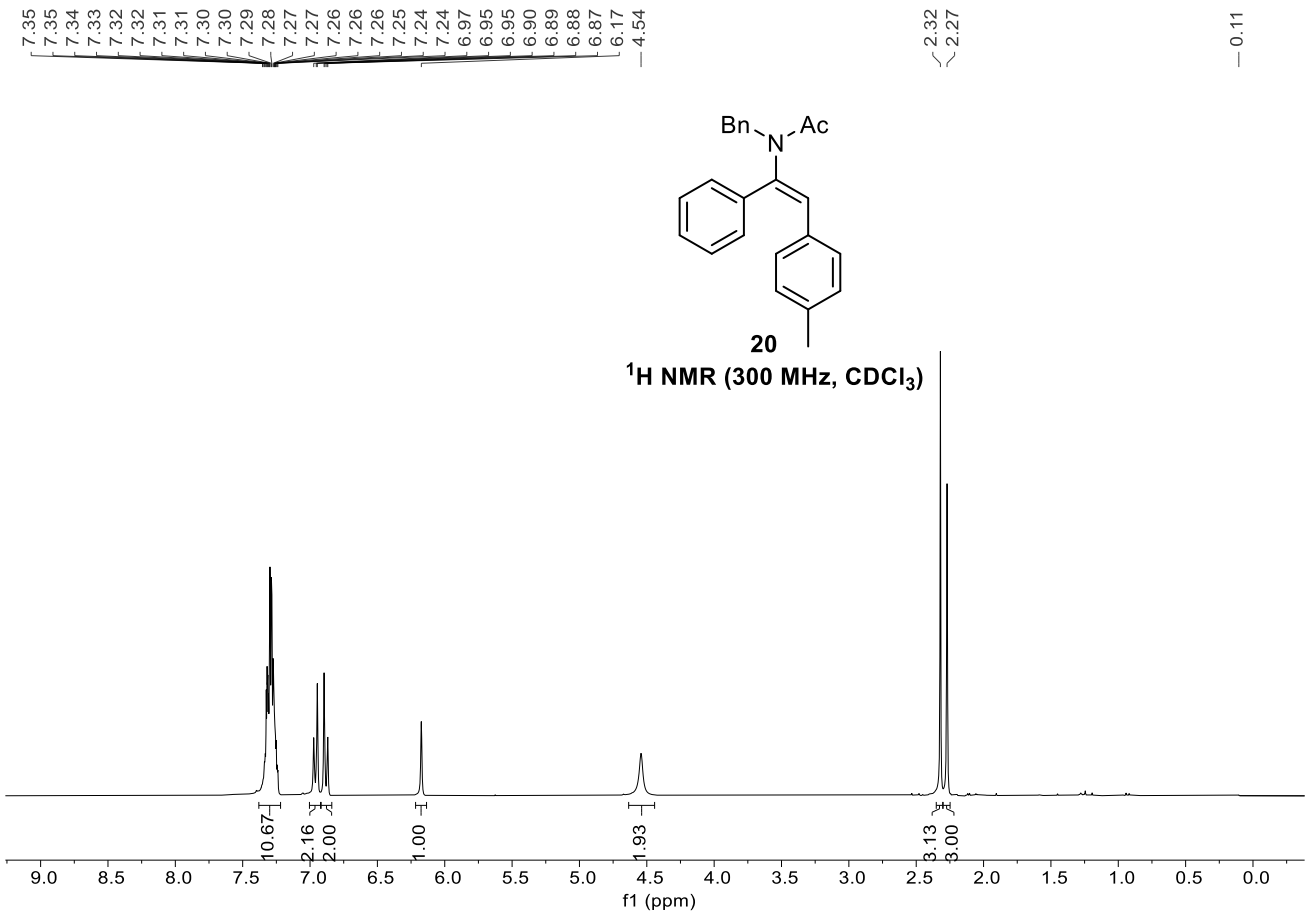
19

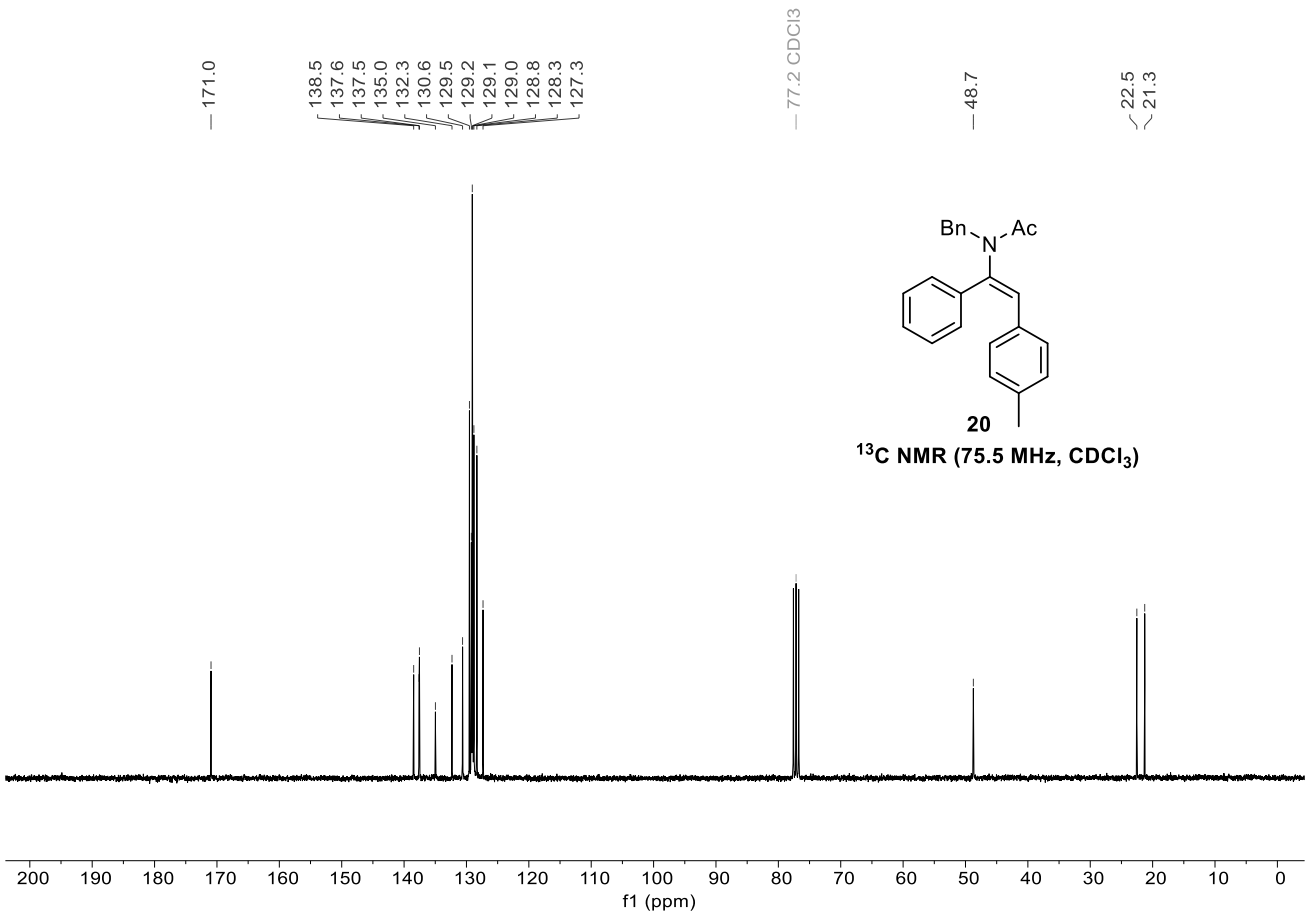
^{1}H NMR (300 MHz, $CDCl_3$)

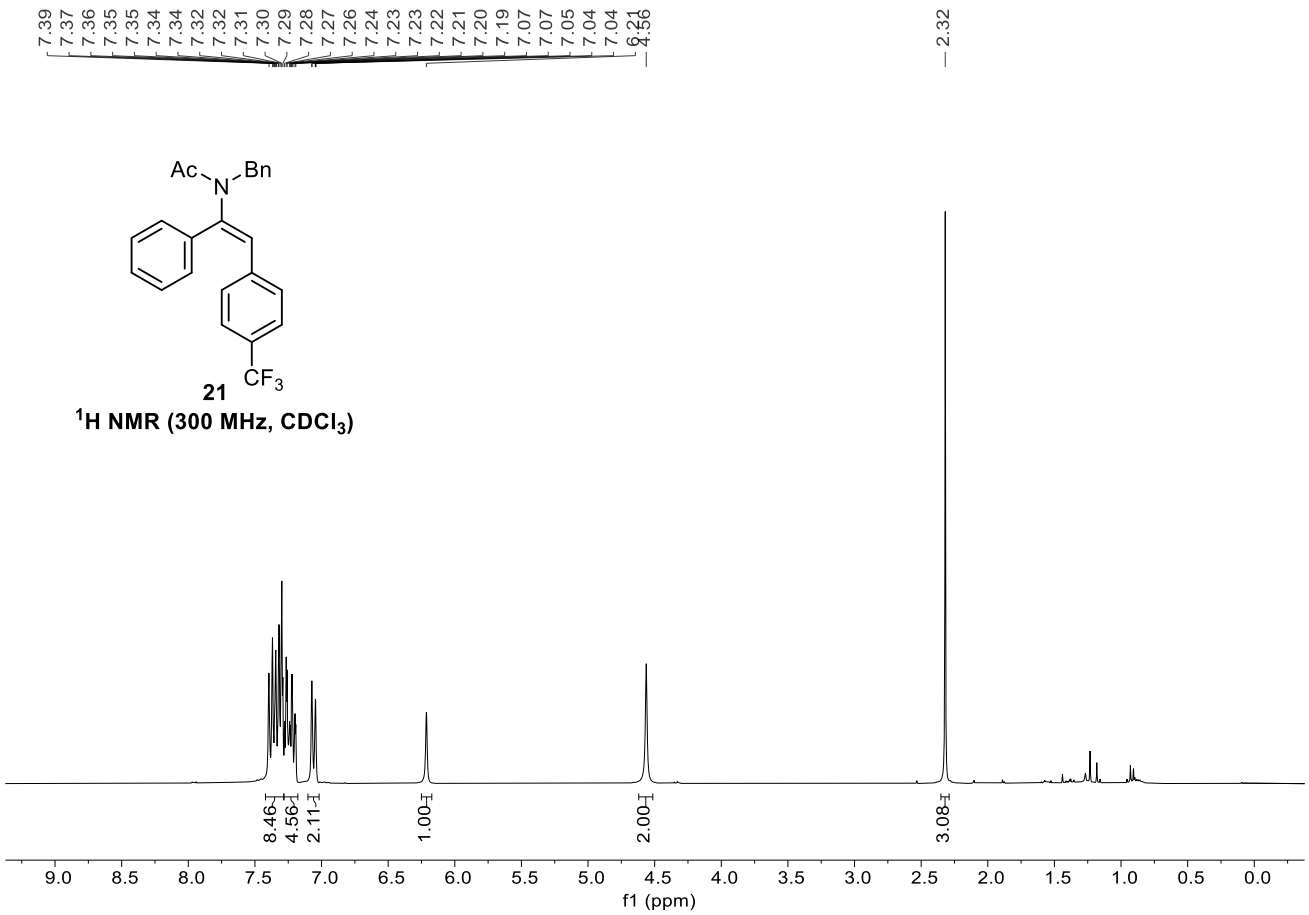


NOESY of product 19



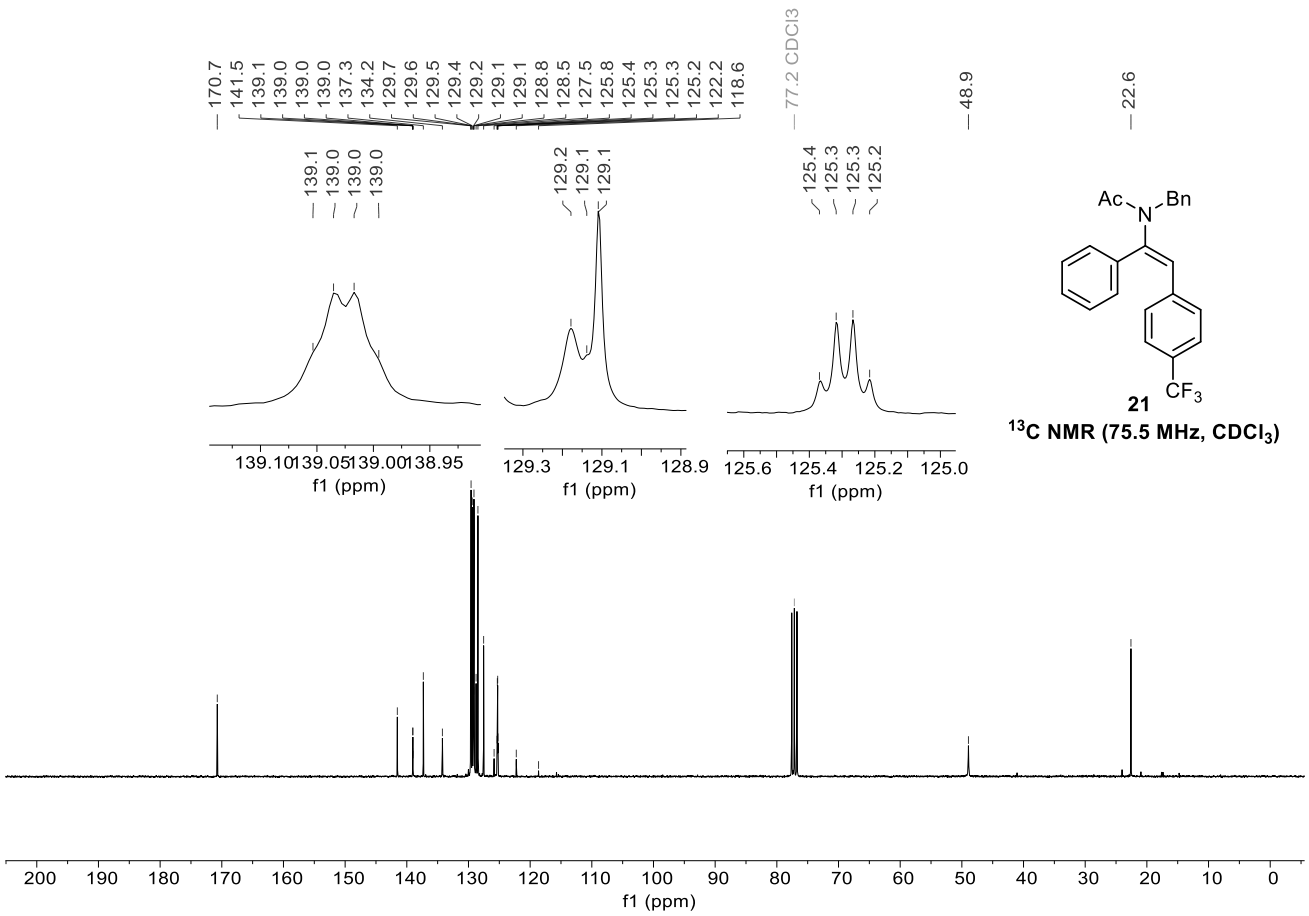

7.35
7.35
7.34
7.33
7.32
7.32
7.31
7.31
7.30
7.30
7.29
7.28
7.27
7.27
7.26
7.26
7.26
7.25
7.24
7.24
6.97
6.95
6.95
6.90
6.89
6.88
6.87
6.17
4.54
2.32
2.27
0.11
Bn
N
Ac
20
1H NMR (300 MHz, CDCl3)
10.67
2.16
2.00
1.00
1.93
3.13
3.00
f1 (ppm)


171.0
138.5
137.6
137.5
135.0
132.3
130.6
129.5
129.2
129.1
129.0
128.8
128.3
127.3
77.2 CDCl3
48.7
22.5
21.3
Bn
N
Ac
20
13C NMR (75.5 MHz, CDCl3)
f1 (ppm)



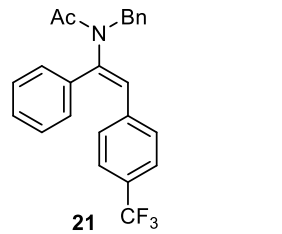
21

^{1}H NMR (300 MHz, $CDCl_3$)



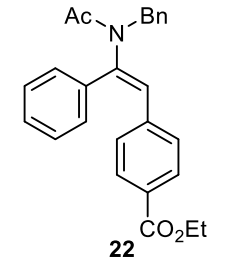
21

^{13}C NMR (75.5 MHz, $CDCl_3$)



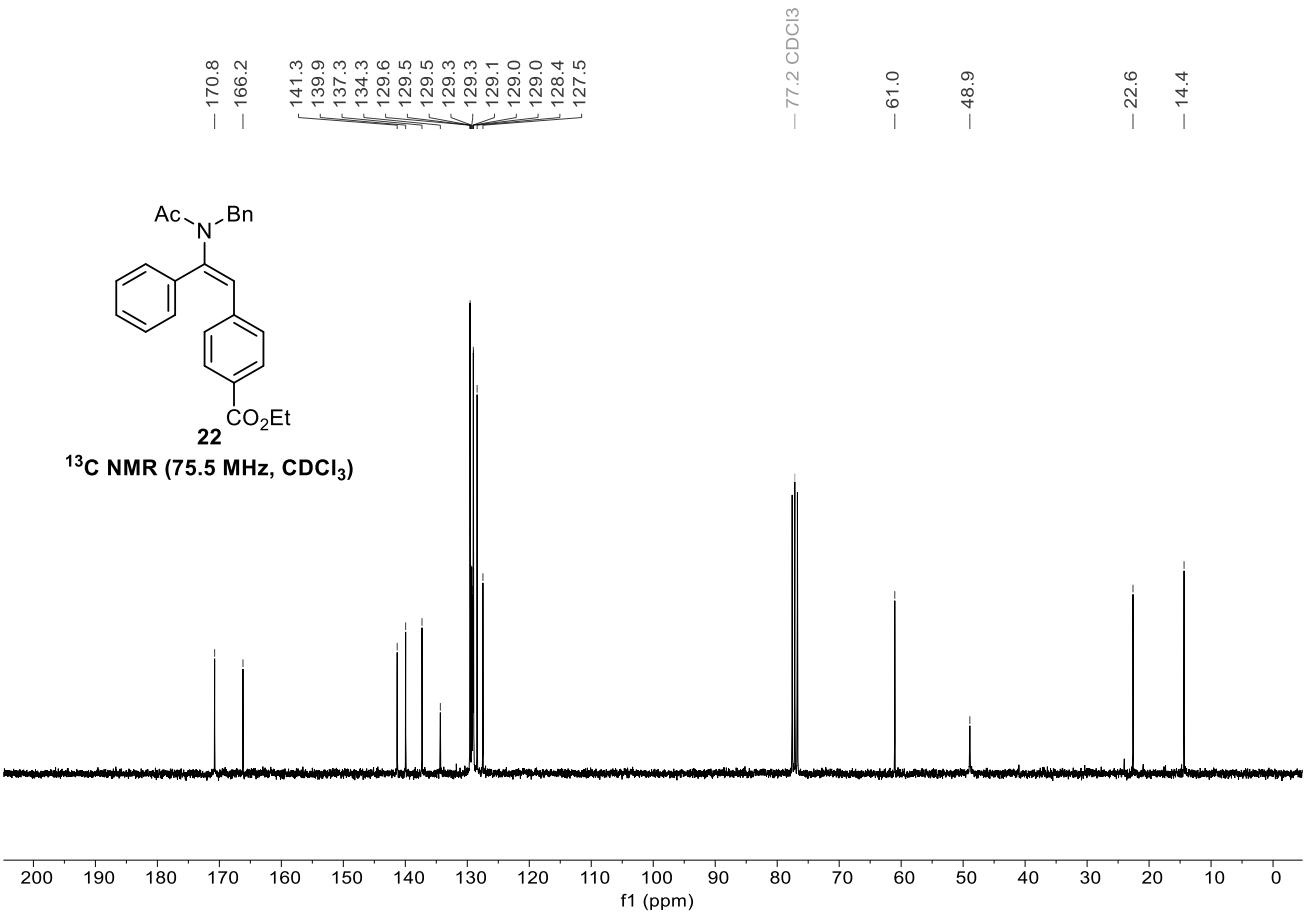
21

$^{19}F\{^{1}H\}$ NMR (282.4 MHz, $CDCl_3$)



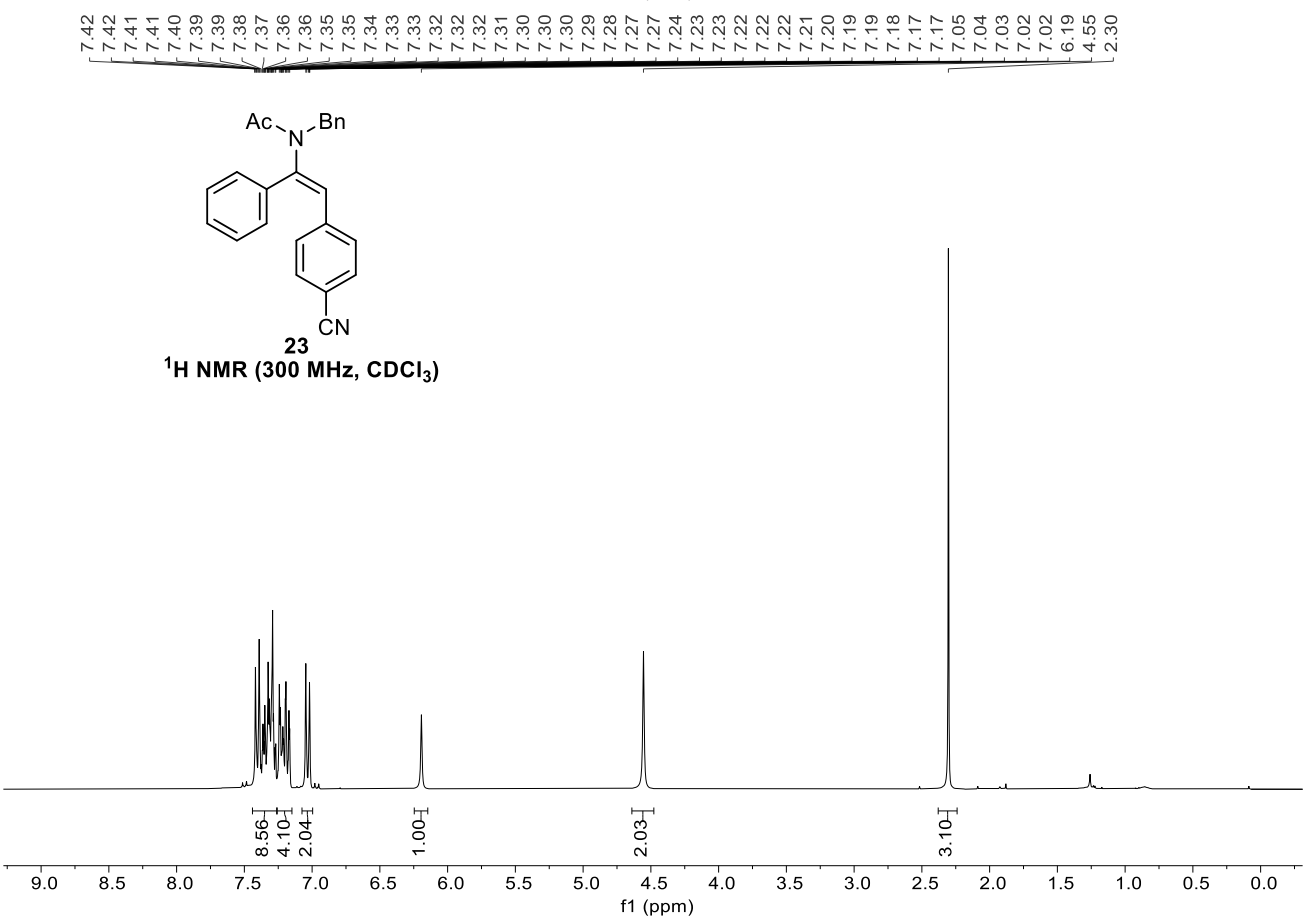
22

^{1}H NMR (300 MHz, $CDCl_3$)



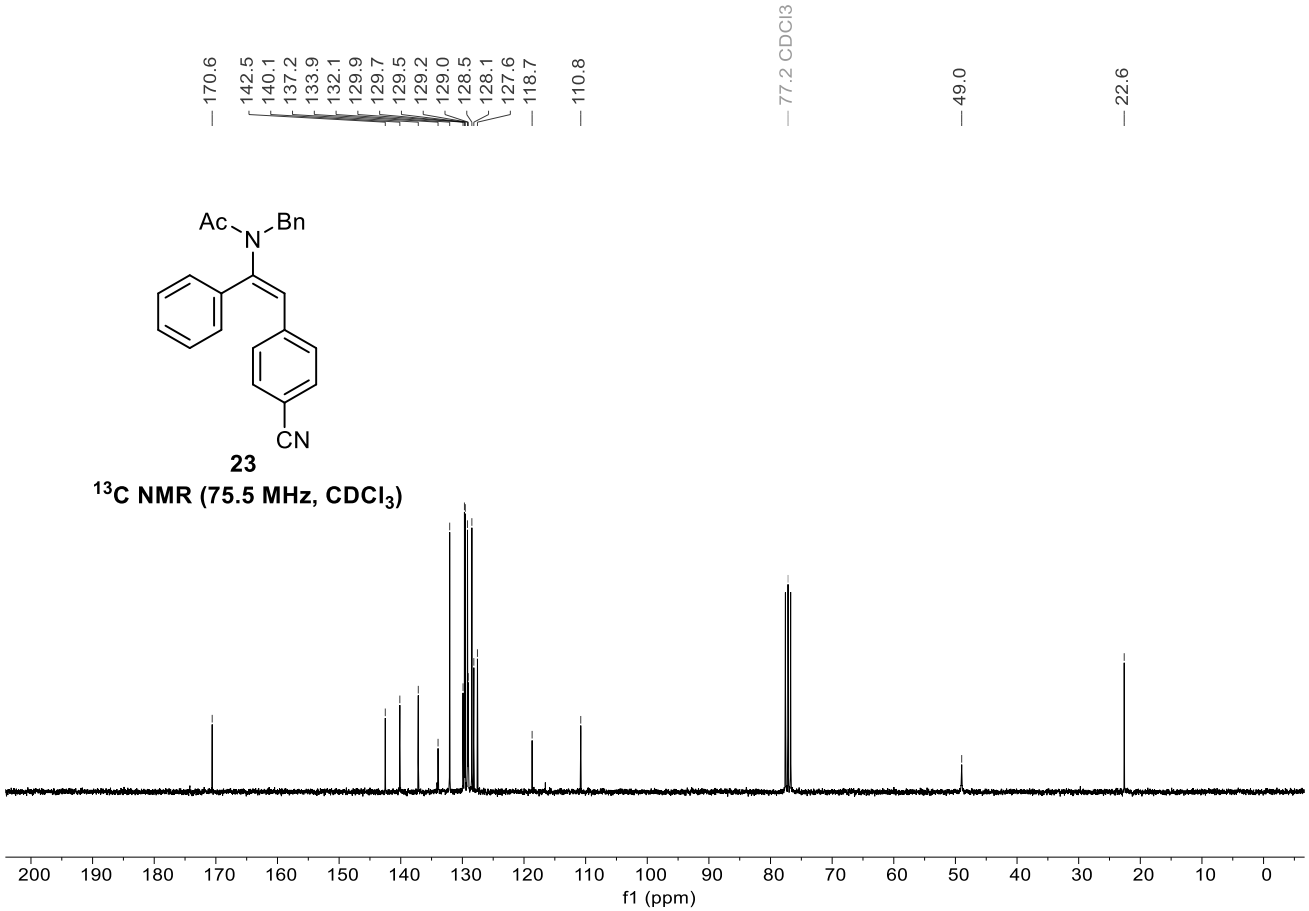
22

^{13}C NMR (75.5 MHz, $CDCl_3$)



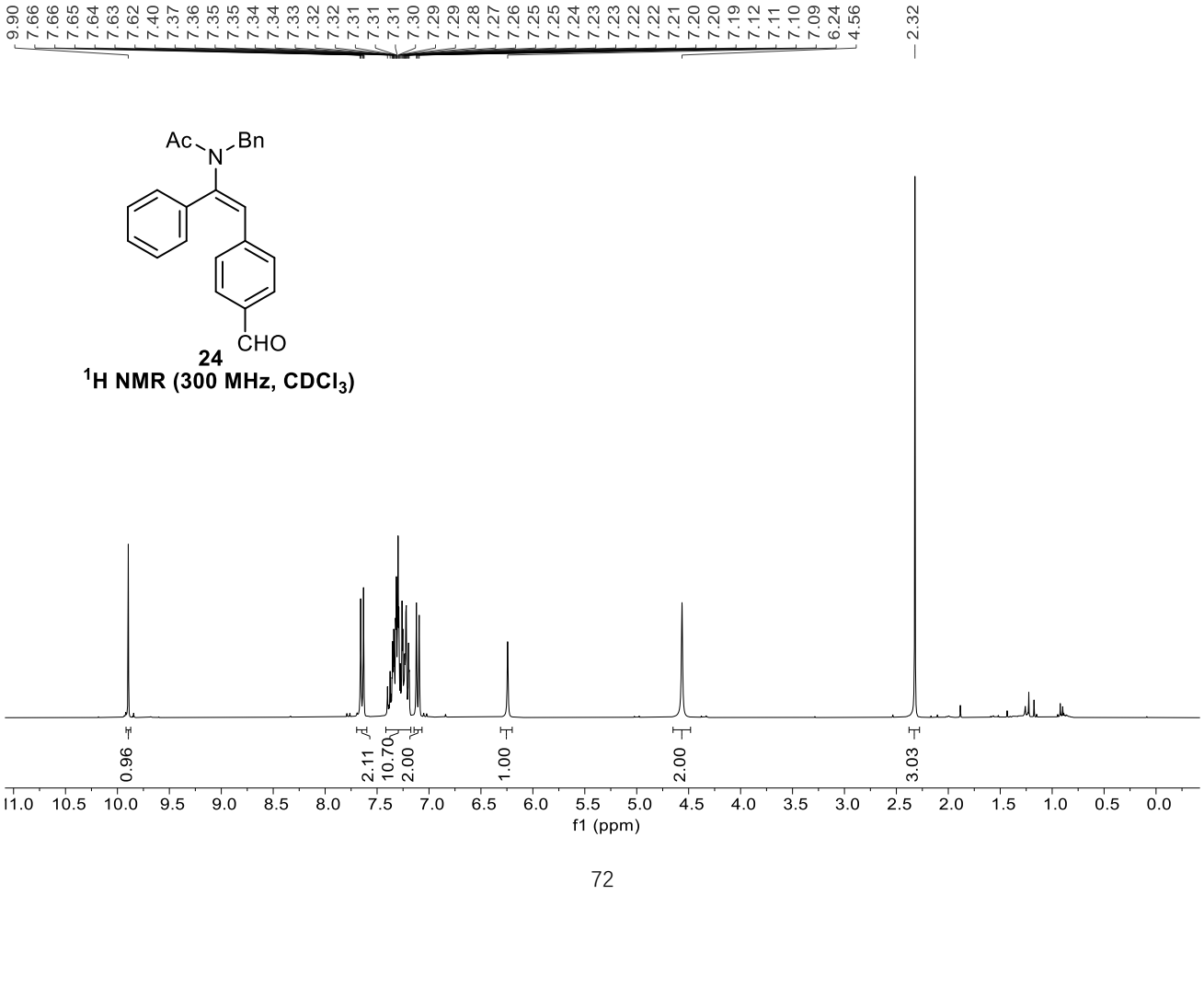
23

^{1}H NMR (300 MHz, $CDCl_3$)



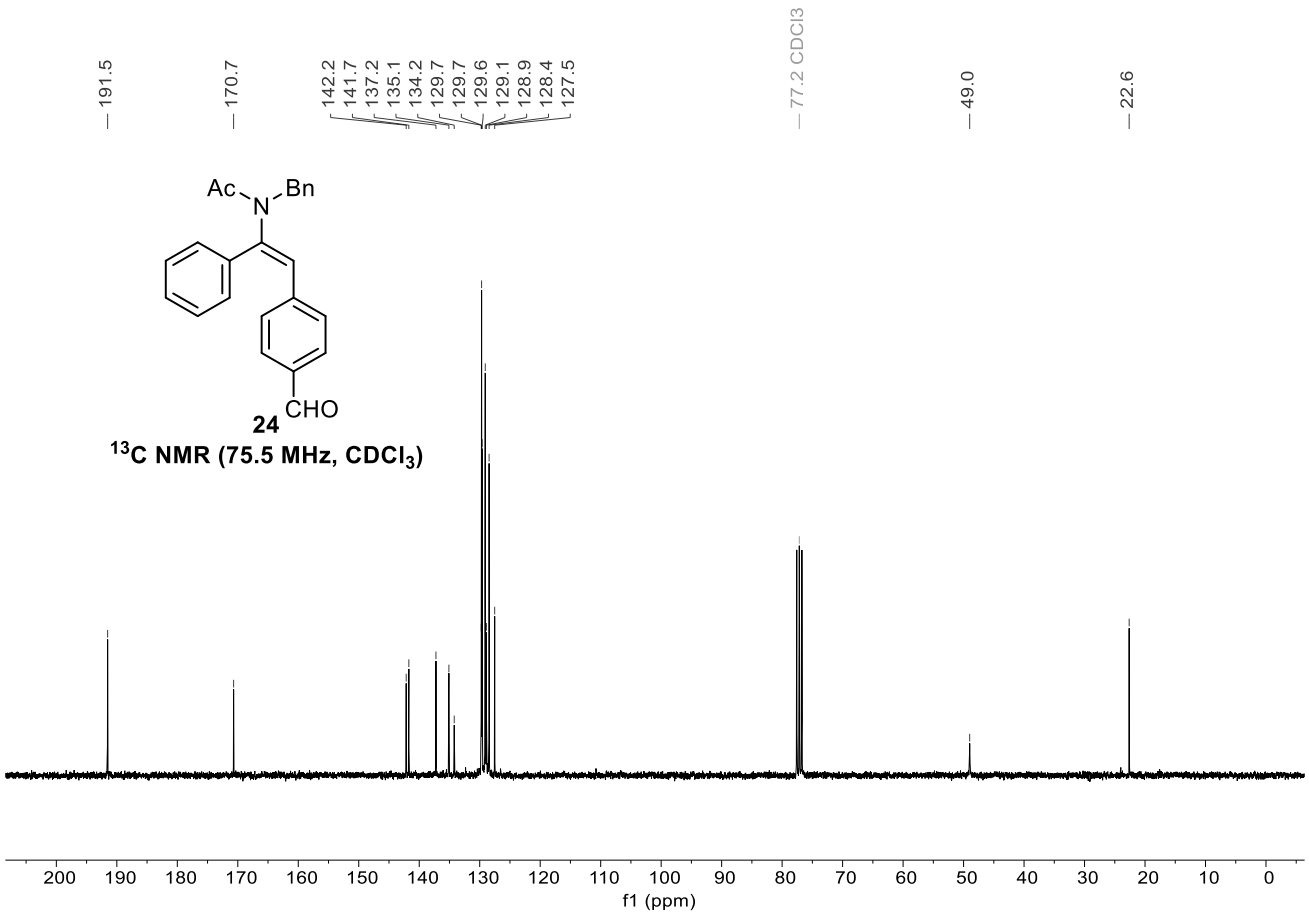
23

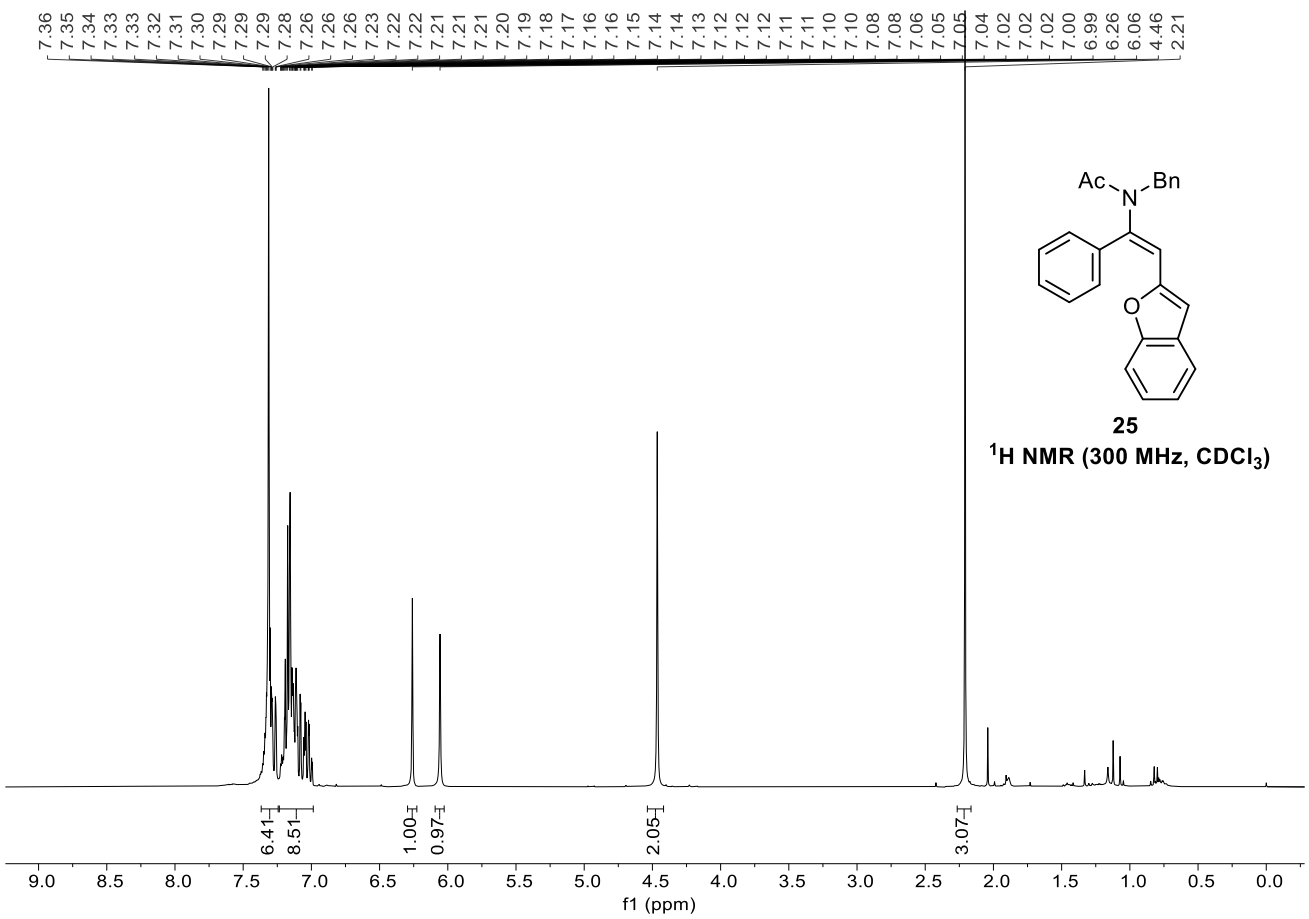
^{13}C NMR (75.5 MHz, $CDCl_3$)

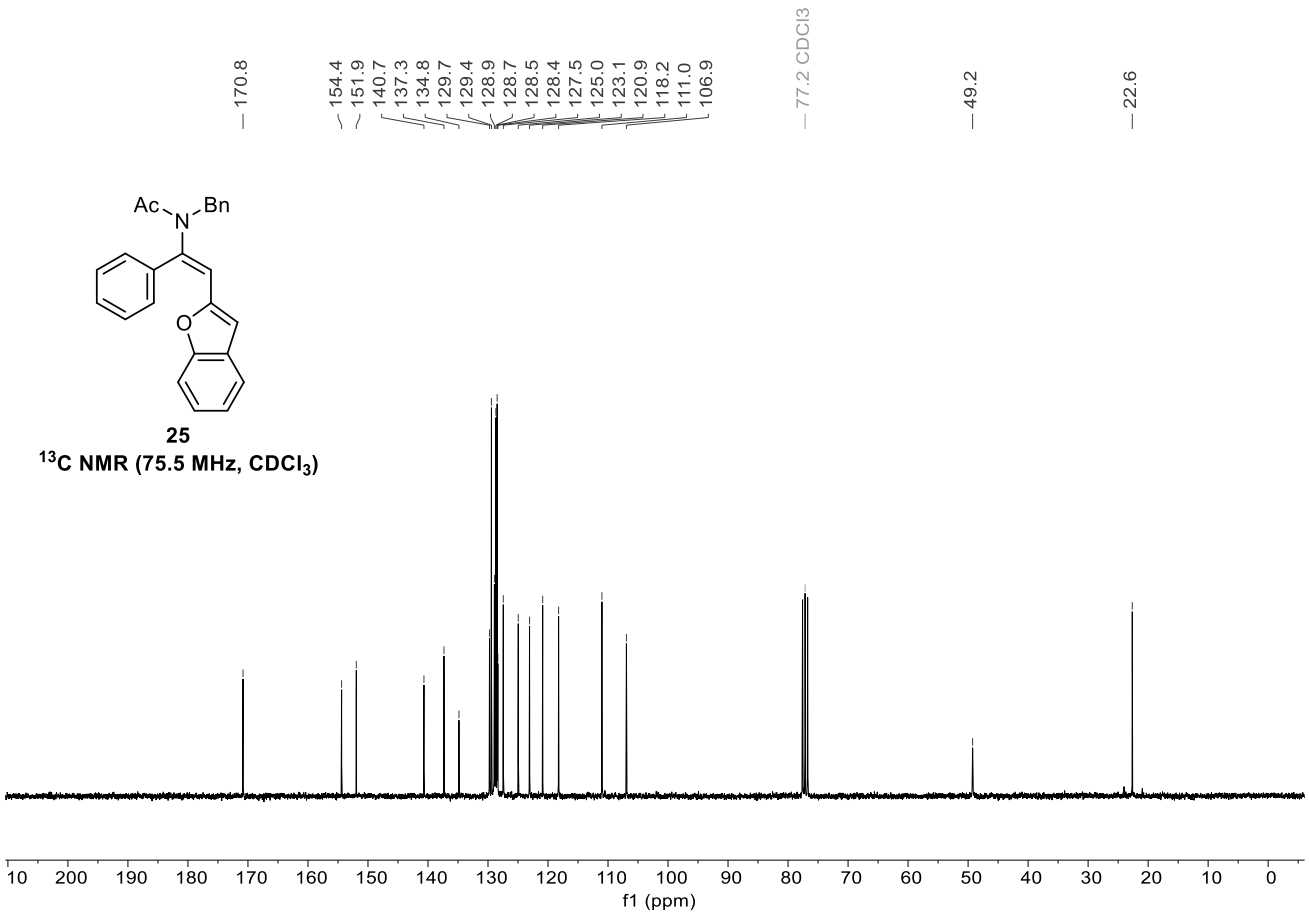


24

^{1}H NMR (300 MHz, $CDCl_3$)

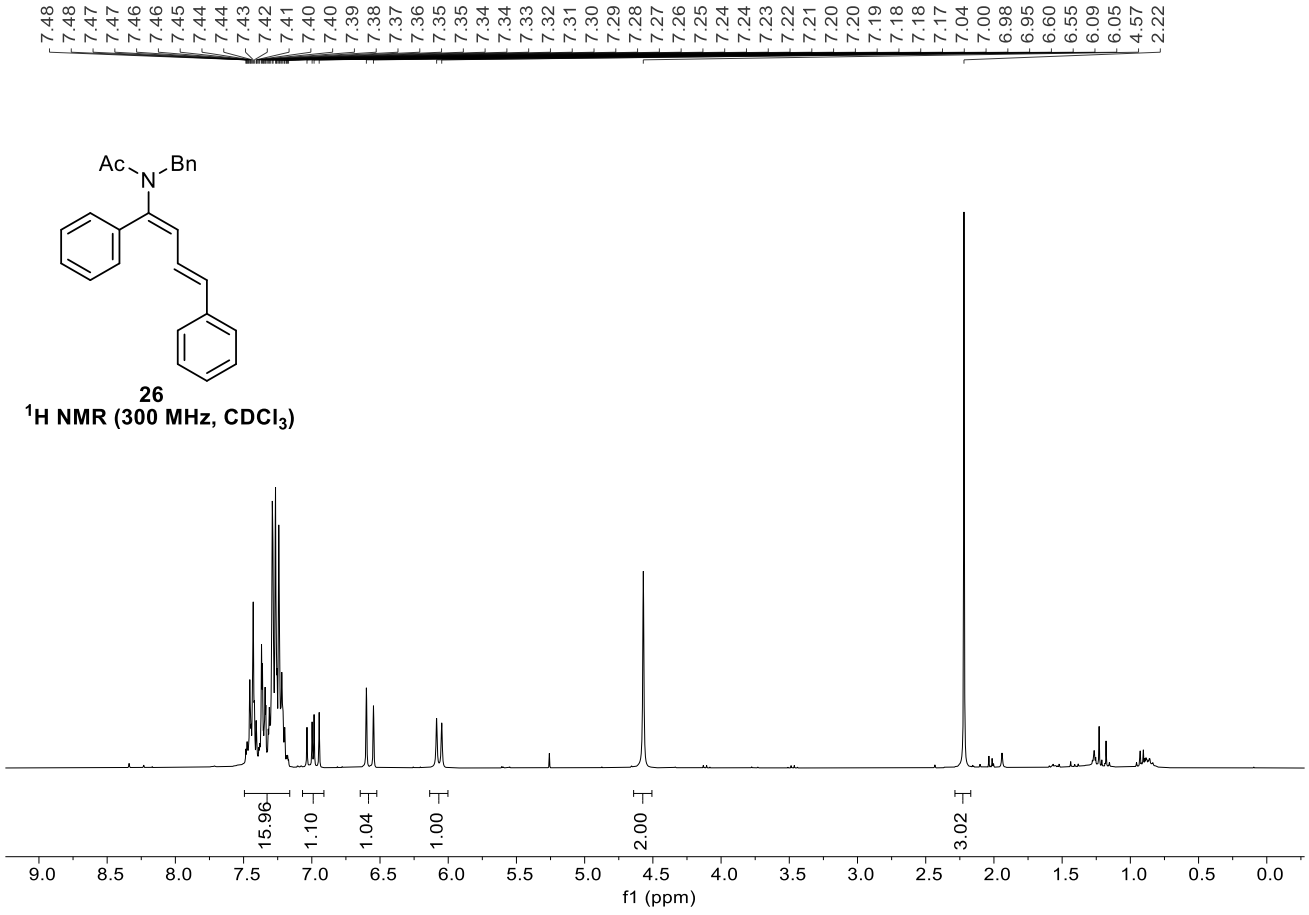

191.5
170.7
142.2
141.7
137.2
135.1
134.2
129.7
129.7
129.6
129.1
128.9
128.4
127.5
77.2 CDCl3
49.0
22.6
Ac
N
Bn
CHO
24
13C NMR (75.5 MHz, CDCl3)
f1 (ppm)


7.36
7.35
7.34
7.33
7.33
7.32
7.31
7.30
7.29
7.29
7.29
7.28
7.26
7.26
7.26
7.23
7.22
7.22
7.21
7.21
7.21
7.20
7.19
7.18
7.17
7.16
7.16
7.15
7.14
7.14
7.13
7.12
7.12
7.12
7.11
7.11
7.10
7.10
7.08
7.08
7.06
7.05
7.05
7.04
7.02
7.02
7.02
7.00
6.99
6.26
6.06
4.46
2.21
Ac
N
Bn
O
25
1H NMR (300 MHz, CDCl3)
6.41
8.51
1.00
0.97
2.05
3.07
f1 (ppm)



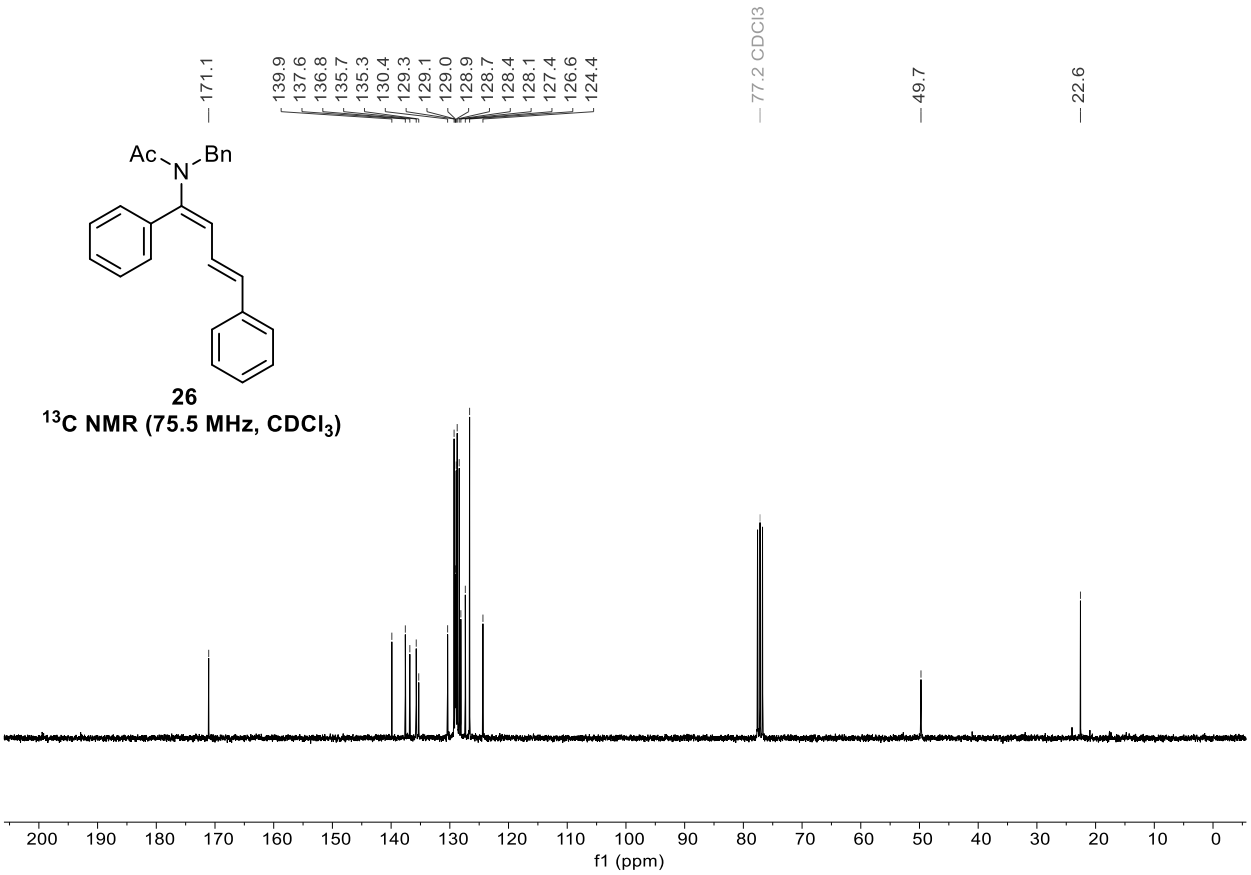
25

^{13}C NMR (75.5 MHz, $CDCl_3$)



26

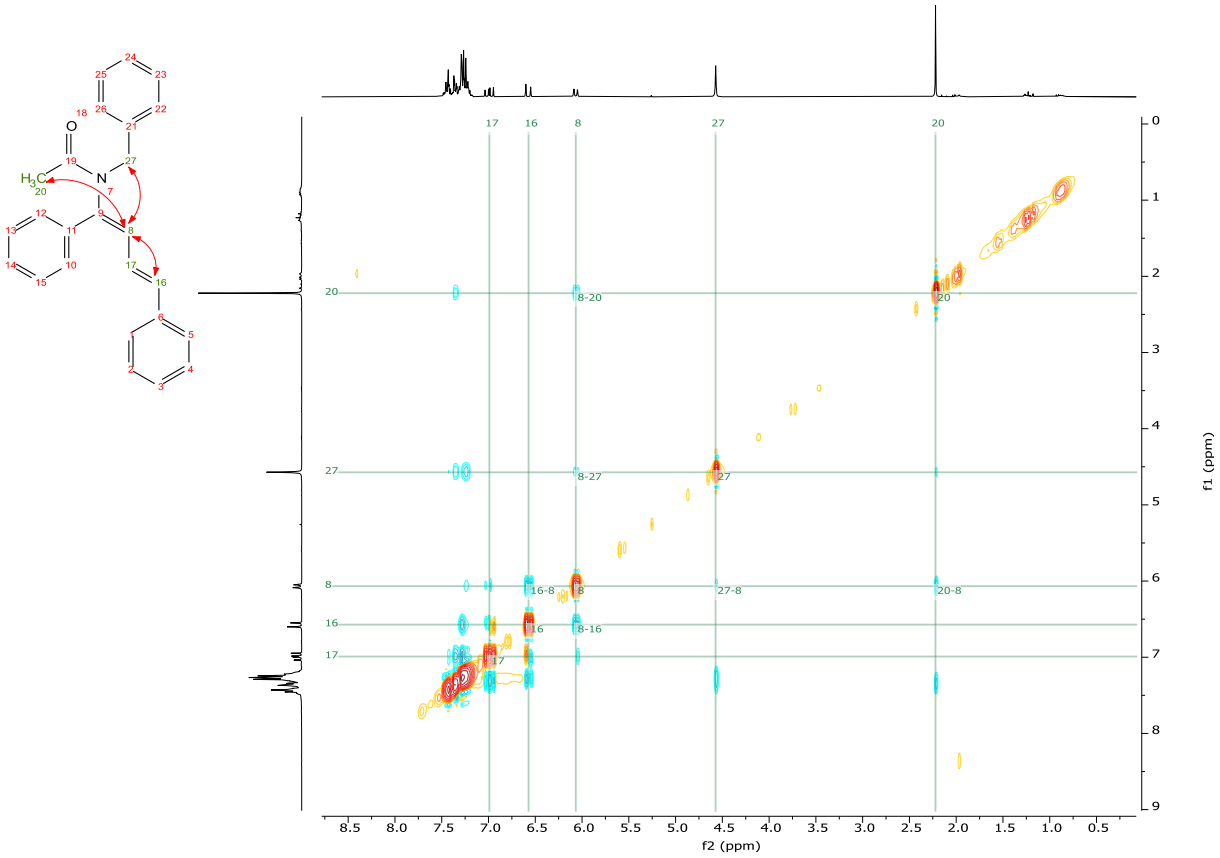
^{1}H NMR (300 MHz, $CDCl_3$)

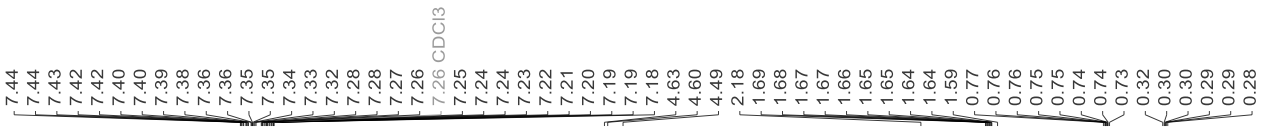


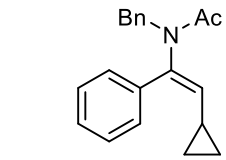
26

^{13}C NMR (75.5 MHz, $CDCl_3$)

NOESY of product 26

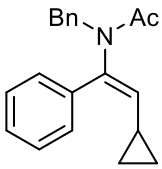






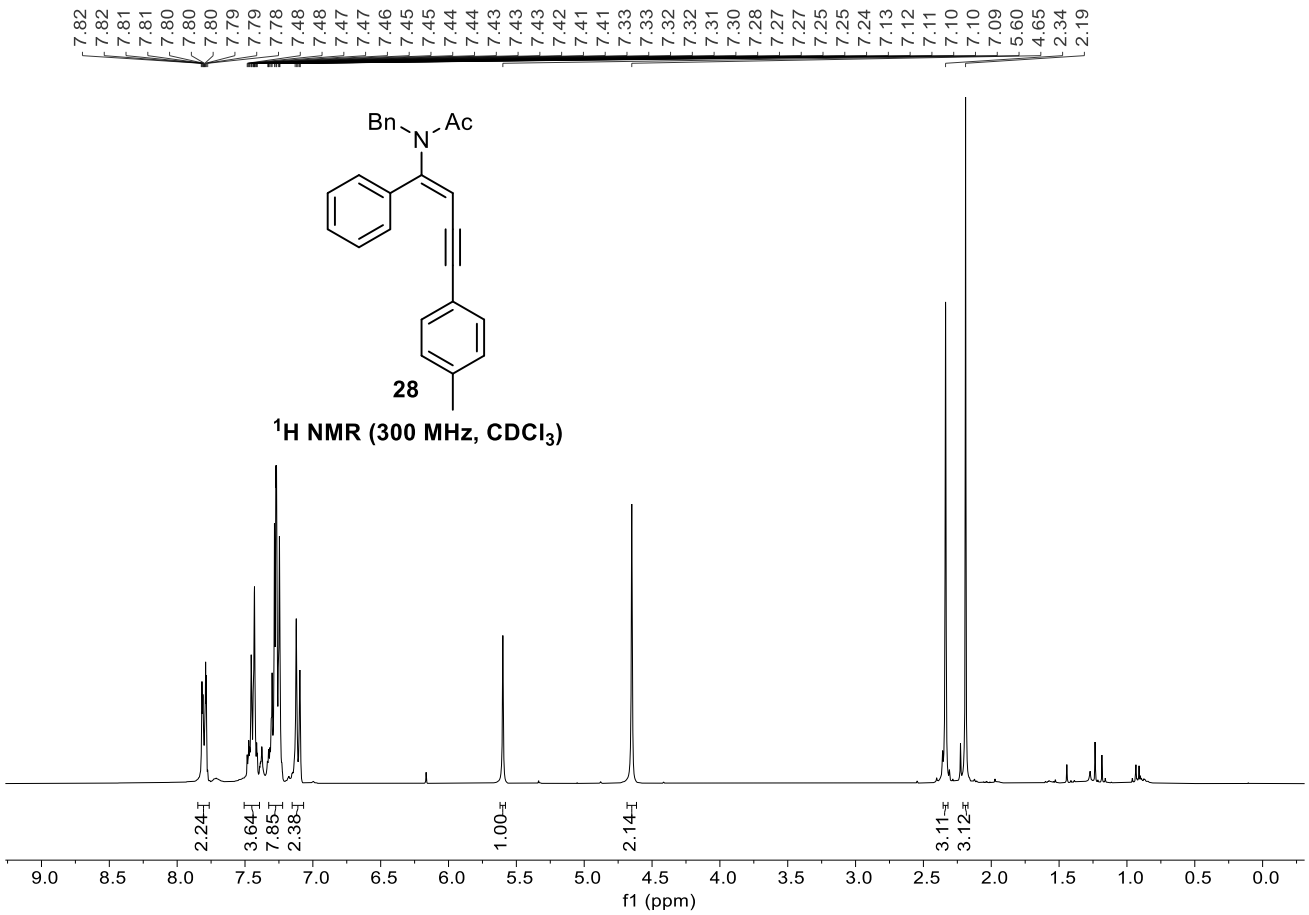
27

^{1}H NMR (400 MHz, $CDCl_3$)

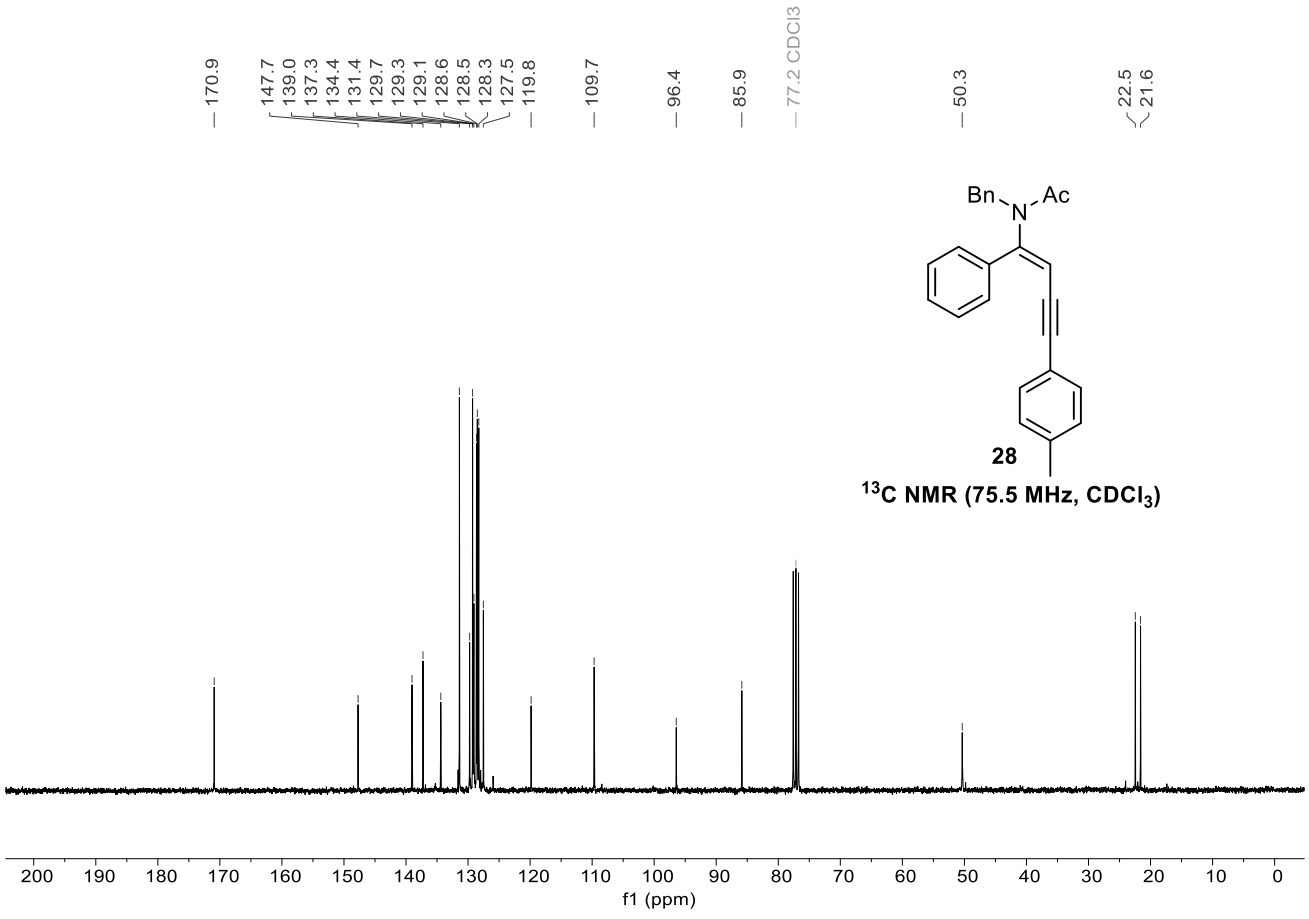


27

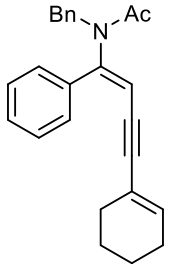
^{13}C NMR (101 MHz, $CDCl_3$)



^{1}H NMR (300 MHz, $CDCl_3$)

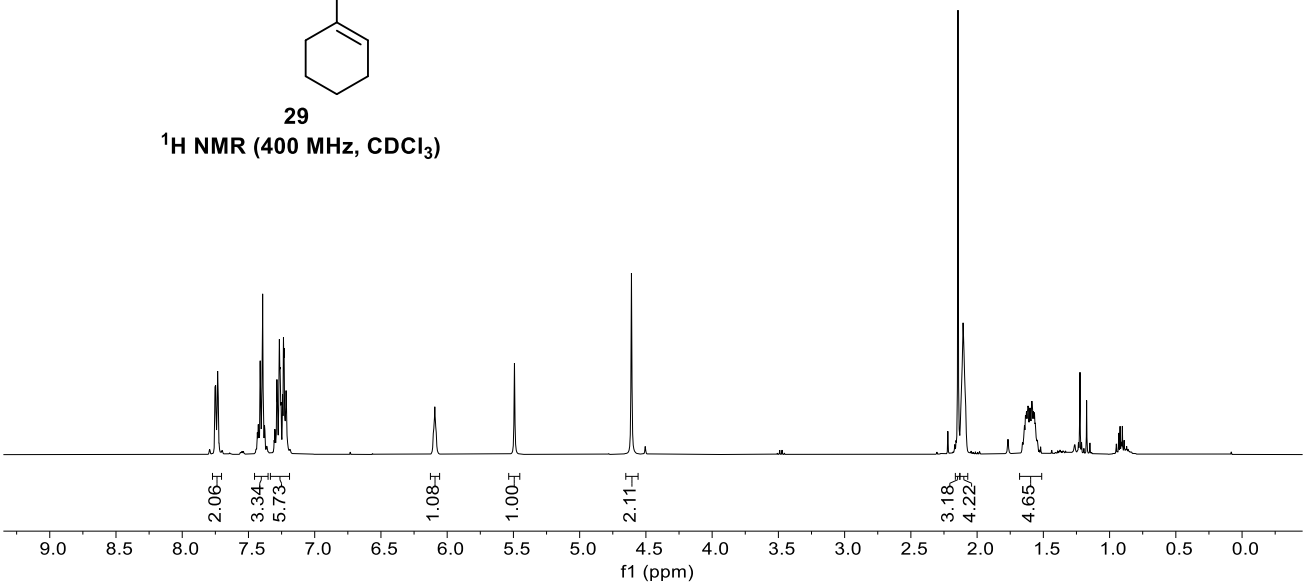


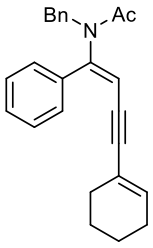
^{13}C NMR (75.5 MHz, $CDCl_3$)



29

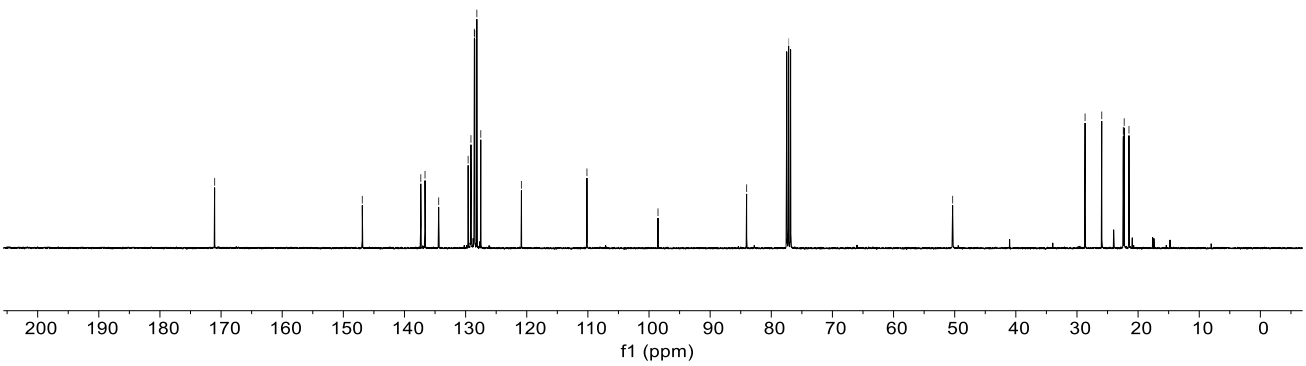
^{1}H NMR (400 MHz, $CDCl_3$)

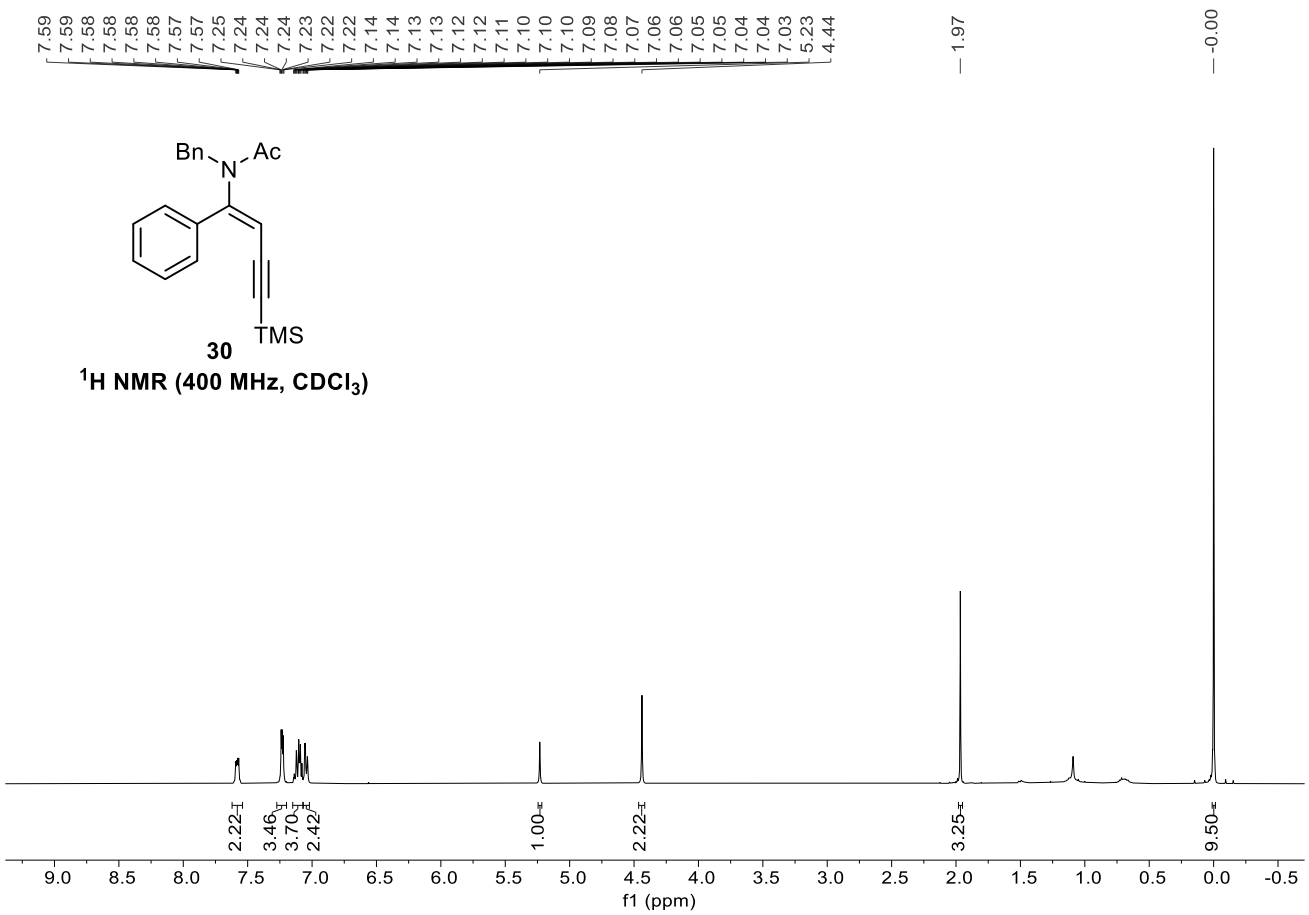




29

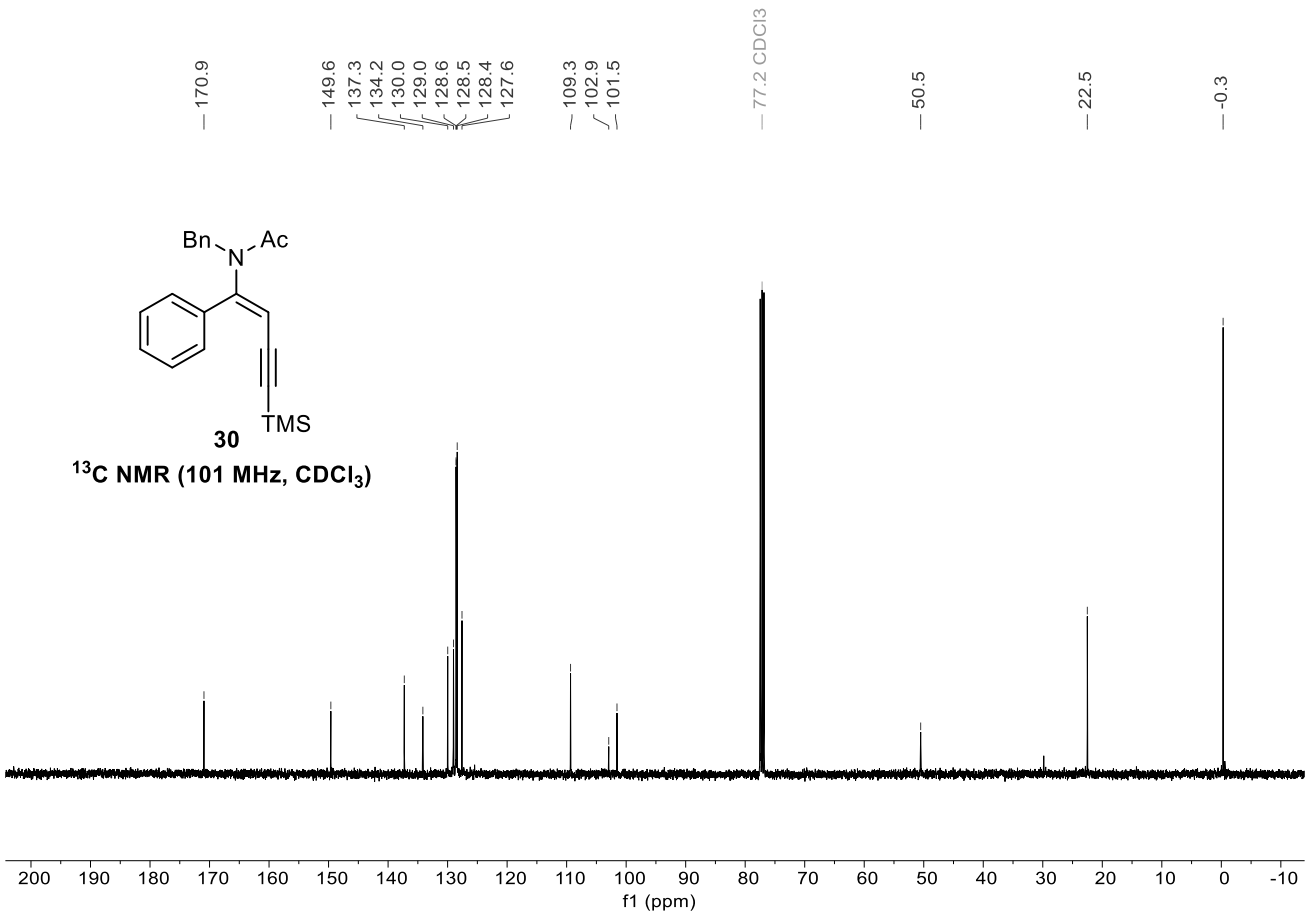
^{13}C NMR (101 MHz, $CDCl_3$)





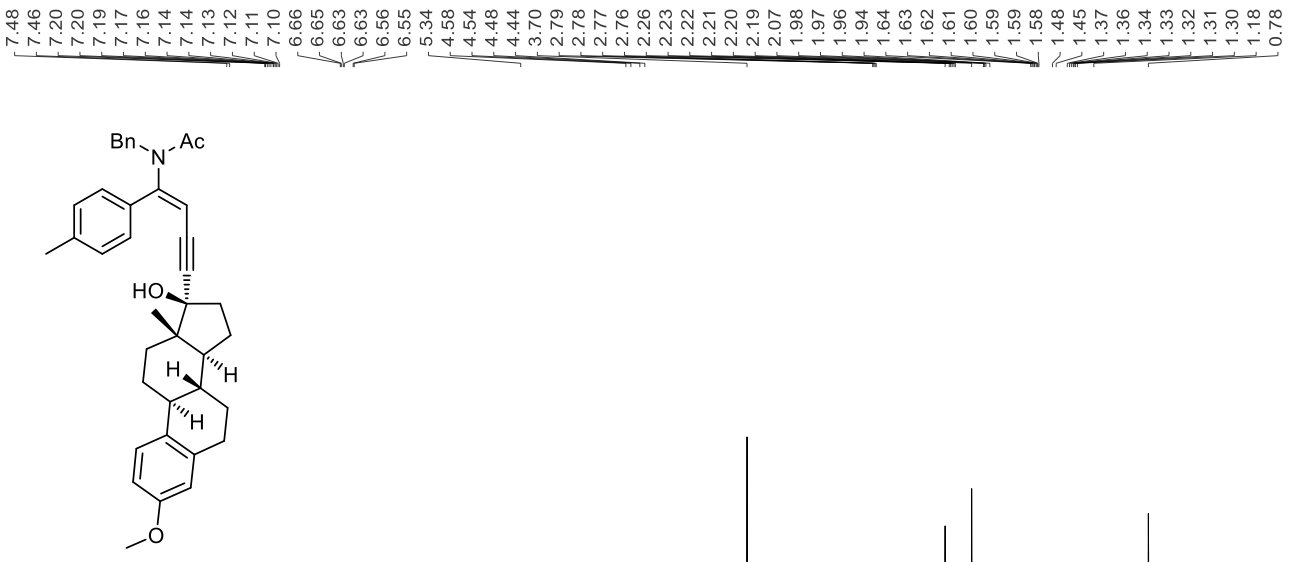
30

^{1}H NMR (400 MHz, $CDCl_3$)



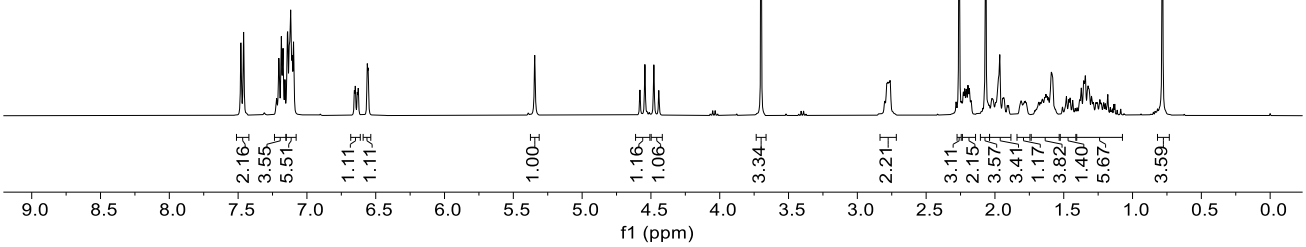
30

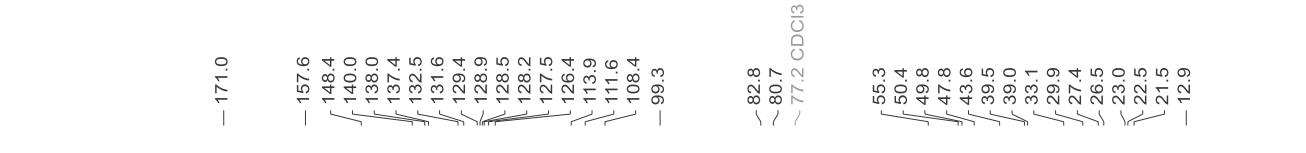
^{13}C NMR (101 MHz, $CDCl_3$)

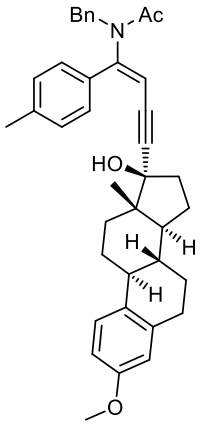


31

^{1}H NMR (400 MHz, $CDCl_3$)







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^{13}C NMR (101 MHz, $CDCl_3$)