

Supporting Information

Rh-Catalyzed Ring-Opening Coupling of Cyclic Vinyl Ethers with Organometallic Reagents

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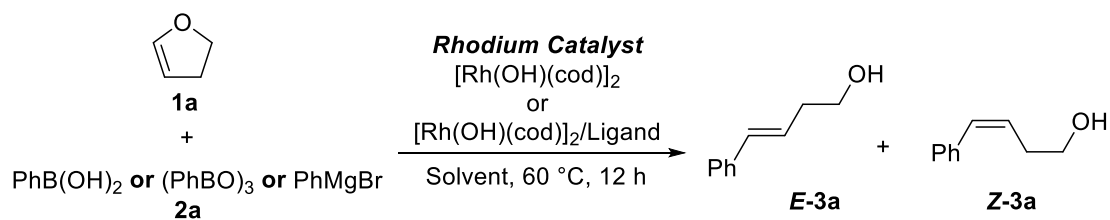
1. General information

All air-sensitive manipulations were carried out with standard Schlenk techniques under nitrogen or argon. NMR spectra were recorded on Bruker AVANCE AV-400 spectrometer (400 MHz for ^1H , 101 MHz for ^{13}C) or Bruker AVANCE AV-300 spectrometer (300 MHz for ^1H , 75 MHz for ^{13}C). Chemical shifts were reported in δ (ppm) referenced to the residual solvent peak of CDCl_3 (δ 7.26) for ^1H NMR and CDCl_3 (δ 77.0) for ^{13}C NMR, the residual solvent peak of $\text{DMSO-}d_6$ (δ 2.50) for ^1H NMR and $\text{DMSO-}d_6$ (δ 40.0) for ^{13}C NMR. Multiplicity was indicated as follows: s (singlet), d (doublet), t (triplet), q (quartet), m (multiplet), br (broad). Coupling constants were reported in Hertz (Hz). High resolution mass spectra (HRMS) were obtained on Waters XEVO G2-S TOF (ESI). For thin layer chromatography (TLC), Yantai pre-coated TLC plates (HSGF 254) were used, and compounds were visualized with a UV light at 254 nm. Further visualization was achieved by staining with KMnO_4 followed by heating. Column chromatography separations were performed on silica gel (300–400 mesh). Unless otherwise noted, all commercialized reagents were used as received without further purification.

2. Materials

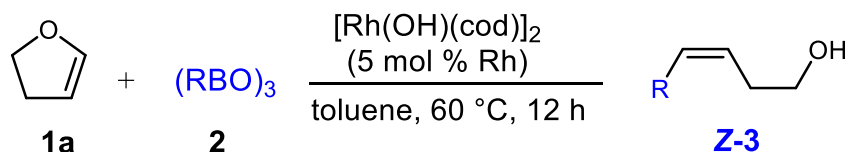
Toluene, 1,4-dioxane, THF, EtOAc, *t*BuOH and EtOH were purchased from commercial supplier and degassed with N_2 before use. Purified water was deoxygenated by bubbling with argon before use. $[\text{Rh}(\text{OH})(\text{cod})]_2$ was prepared according to the reported procedures^[1]. 2,3-Dihydrofuran and benzofuran were purchased from Energy Chemical. All the organoboronic acids and Grignard reagents were purchased from commercial suppliers.

3. A general procedure for Table 1



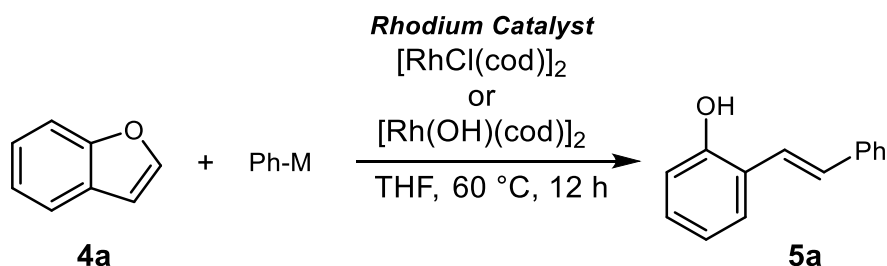
The synthesis of E-3a and Z-3a: Rhodium catalyst (5.0 μmol , 5 mol% Rh), **1a** (14.0 mg, 0.20 mmol) and **2a** (0.30 mmol) were placed in an oven-dried Schlenk tube under nitrogen. Solvent (1.0 mL) was added and the resulting mixture was stirred at 60 $^\circ\text{C}$ for 12 h. Upon completion, the reaction mixture was diluted with EtOAc (5 mL) and water (3 mL). The layers were separated and the aqueous layer was extracted again with EtOAc for two more times (5 mL \times 2). The combined organic layers were then concentrated in vacuo, and the residue was purified by silica gel chromatography eluting with petroleum ether/EtOAc to give **E-3a** and **Z-3a**.

4. Procedures for Scheme 2



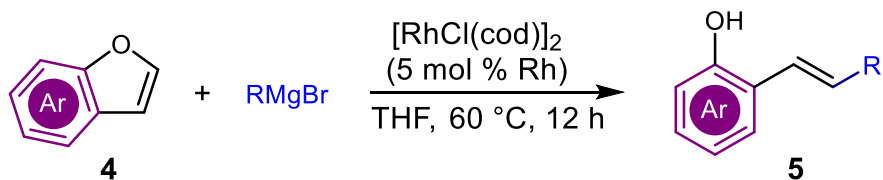
The synthesis of Z-3: $[\text{Rh(OH)(cod)}]_2$ (2.3 mg, 5.0 μmol , 5 mol% Rh), **1a** (14.0 mg, 0.20 mmol) and **2** (0.10 mmol) were placed in an oven-dried Schlenk tube (25 mL) under nitrogen. Anhydrous toluene (1.0 mL) was added and the resulting mixture was stirred at 60 $^\circ\text{C}$ for 12 h. Upon completion, the reaction mixture was diluted with EtOAc (5 mL) and water (3 mL). The layers were separated and the aqueous layer was extracted again with EtOAc for two more times (5 mL \times 2). The combined organic layers were then concentrated in vacuo, and the residue was purified by silica gel chromatography eluting with petroleum ether/EtOAc to give **Z-3**.

5. A general procedure for Table 2



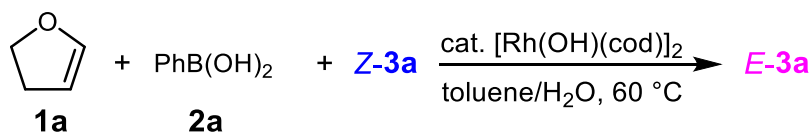
The synthesis of 5a: Rhodium catalysts (5.0 μ mol, 5 mol% Rh), **4a** (23.6 mg, 0.20 mmol) and **Ph-M** (0.40 mmol) were placed in an oven-dried Schlenk tube under nitrogen. THF (1.0 mL) was added and the resulting mixture was stirred at 60 °C for 12 h. Upon completion, the reaction mixture was diluted with EtOAc (5 mL) and water (3 mL). The layers were separated and the aqueous layer was extracted again with EtOAc for two more times (5 mL \times 2). The combined organic layers was then concentrated in vacuo, and the residue was purified by silica gel chromatography eluting with petroleum ether/EtOAc to give **5a**.

6. Procedures for Scheme 3



The synthesis of 5: [RhCl(cod)]₂ (2.5 mg, 5.0 μ mol, 5 mol% Rh), **4** (0.20 mmol) and **RMgBr** (0.40 mmol) were placed in an oven-dried Schlenk tube under nitrogen. THF (1.0 mL) was added and the resulting mixture was stirred at 60 °C for 12 h. Upon completion, the reaction mixture was diluted with EtOAc (5 mL) and water (3 mL). The layers were separated and the aqueous layer was extracted again with EtOAc for two more times (5 mL \times 2). The combined organic layers was then concentrated in vacuo, and the residue was purified by silica gel chromatography eluting with petroleum ether/EtOAc to give **5**.

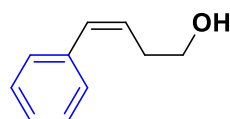
7. Procedures for Scheme 4



The isomerization from Z-3a to E-3a: [Rh(OH)(cod)]₂ (2.3 mg, 5.0 μmol, 5 mol% Rh), **1a** (14.0 mg, 0.20 mmol), **2a** (36.6 mg, 0.30 mmol) and **Z-3a** (14.8 mg, 0.10 mmol) were placed in an oven-dried Schlenk tube (25 mL) under nitrogen. PhMe (1.0 mL) and H₂O (6 mmol, 30 equiv) were added and the resulting mixture was stirred at 60 °C for 12 h. Upon completion, the reaction mixture was diluted with EtOAc (5 mL) and water (3 mL). The layers were separated and the aqueous layer was extracted again with EtOAc for two more times (5 mL × 2). The combined organic layers were then concentrated in vacuo, and the residue was purified by silica gel chromatography eluting with petroleum ether/EtOAc to give **E-3a**.

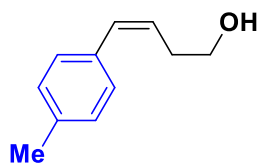
8. Characterization of the products

(Z)-4-phenylbut-3-en-1-ol (Z-3a)



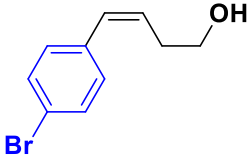
Colorless oil, 25.5 mg at 0.20 mmol scale, 86% yield. ¹H NMR (300 MHz, CDCl₃) δ 7.39 – 7.23 (m, 5H), 6.62 (dt, *J* = 11.7, 1.9 Hz, 1H), 5.72 (dt, *J* = 11.7, 7.4 Hz, 1H), 3.78 (t, *J* = 6.5 Hz, 2H), 2.65 (qd, *J* = 6.5, 1.8 Hz, 2H). ¹³C NMR (75 MHz, CDCl₃) δ 137.3, 131.8, 128.9, 128.4, 126.9, 62.6, 32.1. HRMS-ESI (*m/z*): calcd for C₁₀H₁₃O⁺ [M+H]⁺ 149.0961, found 149.0965.

(Z)-4-(*p*-tolyl)but-3-en-1-ol (Z-3b)

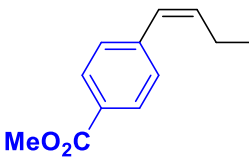


Colorless oil, 29.5 mg at 0.20 mmol scale, 91% yield. ¹H NMR (400 MHz, CDCl₃) δ 7.21 (d, *J* = 8.1 Hz, 2H), 7.15 (d, *J* = 8.0 Hz, 2H), 6.55 (dt, *J* = 11.6, 1.9 Hz, 1H), 5.64 (dt, *J* = 11.6, 7.3 Hz, 1H), 3.75 (t, *J* = 6.5 Hz, 2H), 2.62 (qd, *J* = 6.6, 1.8 Hz, 2H), 2.35 (s, 3H). ¹³C NMR (75 MHz, CDCl₃) δ 136.7, 134.4, 131.7, 129.1, 128.8, 127.6, 62.7, 32.2, 21.3. HRMS-ESI (*m/z*): calcd for C₁₁H₁₅O⁺ [M+H]⁺ 163.1117, found 163.1136.

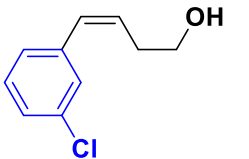
(Z)-4-(4-bromophenyl)but-3-en-1-ol (Z-3c)

 Yellowish oil, 41.8 mg at 0.20 mmol scale, 92% yield. ¹H NMR (400 MHz, CDCl₃) δ 7.46 – 7.43 (m, 2H), 7.18 – 7.16 (m, 2H), 6.50 (dt, *J* = 11.7, 1.9 Hz, 1H), 5.73 (dt, *J* = 11.7, 7.4 Hz, 1H), 3.75 (t, *J* = 6.4 Hz, 2H), 2.57 (qd, *J* = 6.5, 1.9 Hz, 2H). ¹³C NMR (75 MHz, CDCl₃) δ 136.2, 131.5, 130.6, 130.5, 129.3, 120.8, 62.5, 32.0. HRMS-ESI (*m/z*): calcd for C₁₀H₁₂⁷⁹BrO⁺ [M+H]⁺ 227.0066, found 227.0080.

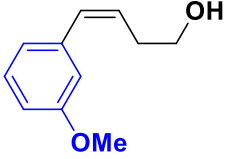
(Z)-4-(4-hydroxybut-1-en-1-yl)phenyl acetate (Z-3d)

 Yellowish oil, 33.8 mg at 0.20 mmol scale, 82% yield. ¹H NMR (400 MHz, Chloroform-*d*) δ 8.00 (d, *J* = 8.4 Hz, 2H), 7.37 (d, *J* = 8.2 Hz, 2H), 6.60 (dt, *J* = 11.7, 1.9 Hz, 1H), 5.81 (dt, *J* = 11.7, 7.4 Hz, 1H), 3.92 (s, 3H), 3.81 – 3.74 (m, 2H), 2.62 (qd, *J* = 6.5, 1.8 Hz, 2H). ¹³C NMR (101 MHz, CDCl₃) δ 167.1, 142.0, 130.9, 130.7, 129.7, 128.8, 128.5, 62.5, 52.2, 32.2. HRMS-ESI (*m/z*): calcd for C₁₂H₁₅O₃⁺ [M+H]⁺ 207.1016, found 207.1021.

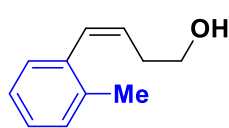
(Z)-4-(3-chlorophenyl)but-3-en-1-ol (Z-3e)

 Yellowish oil, 28.1 mg at 0.20 mmol scale, 77% yield. ¹H NMR (300 MHz, CDCl₃) δ 7.31 – 7.27 (m, 2H), 7.24 – 7.18 (m, 2H), 7.09 (d, *J* = 8.0 Hz, 1H), 6.54 (dt, *J* = 11.7, 1.9 Hz, 1H), 5.77 (dt, *J* = 11.7, 7.4 Hz, 1H), 3.78 (t, *J* = 6.4 Hz, 2H), 2.61 (qd, *J* = 6.5, 1.8 Hz, 2H). ¹³C NMR (101 MHz, CDCl₃) δ 139.1, 134.2, 130.4, 129.9, 129.6, 128.8, 127.0, 62.5, 32.1. HRMS-ESI (*m/z*): calcd for C₁₀H₁₁ClO⁺ [M+K]⁺ 221.0130, found 221.0111.

(Z)-4-(3-methoxyphenyl)but-3-en-1-ol (Z-3f)

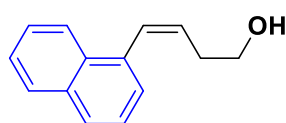
 Colorless oil, 30.6 mg at 0.20 mmol scale, 86% yield. ¹H NMR (300 MHz, CDCl₃) δ 7.28 – 7.23 (m, 1H), 6.91 – 6.77 (m, 3H), 6.57 (d, *J* = 11.7 Hz, 1H), 5.70 (dt, *J* = 11.7, 7.3 Hz, 1H), 3.82 (s, 3H), 3.76 (t, *J* = 6.4 Hz, 2H), 2.63 (qd, *J* = 6.6, 1.8 Hz, 2H). ¹³C NMR (75 MHz, CDCl₃) δ 159.6, 138.7, 131.7, 129.3, 128.7, 121.4, 114.5, 112.4, 62.6, 55.4, 32.2. HRMS-ESI (*m/z*): calcd for C₁₁H₁₅O₂⁺ [M+H]⁺ 179.1067, found 179.1069.

(Z)-4-(o-tolyl)but-3-en-1-ol (Z-3g)



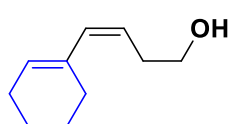
Colorless oil, 30.1 mg at 0.20 mmol scale, 93% yield. ¹H NMR (300 MHz, CDCl₃) δ 7.22 – 7.15 (m, 4H), 6.61 (dt, *J* = 11.4, 1.8 Hz, 1H), 5.75 (dt, *J* = 11.4, 7.4 Hz, 1H), 3.69 (t, *J* = 6.5 Hz, 2H), 2.45 (qd, *J* = 6.6, 1.7 Hz, 2H), 2.26 (s, 3H). ¹³C NMR (75 MHz, CDCl₃) δ 136.4, 136.4, 131.1, 130.0, 129.1, 128.2, 127.2, 125.5, 62.6, 32.0, 20.0. HRMS-ESI (*m/z*): calcd for C₁₁H₁₄ONa⁺ [M+Na]⁺ 185.0937, found 185.0931.

(Z)-4-(naphthalen-1-yl)but-3-en-1-ol (Z-3h)



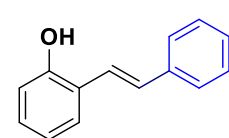
Yellowish oil, 36.8 mg at 0.20 mmol scale, 93% yield. ¹H NMR (300 MHz, CDCl₃) δ 8.00 – 7.97 (m, 1H), 7.87 – 7.76 (m, 2H), 7.51 – 7.36 (m, 4H), 7.06 (d, *J* = 11.4 Hz, 1H), 5.98 (dt, *J* = 11.4, 7.4 Hz, 1H), 3.69 (t, *J* = 6.5 Hz, 2H), 2.44 (qd, *J* = 6.6, 1.7 Hz, 2H). ¹³C NMR (75 MHz, CDCl₃) δ 134.4, 133.6, 132.0, 130.1, 130.1, 128.5, 127.6, 126.5, 126.1, 125.9, 125.4, 125.0, 62.6, 32.3. HRMS-ESI (*m/z*): calcd for C₁₄H₁₅O⁺ [M+H]⁺ 199.1117, found 199.1128.

(Z)-4-(cyclohex-1-en-1-yl)but-3-en-1-ol (Z-3i)



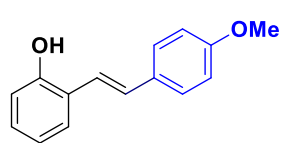
Yellowish oil, 25.3 mg at 0.20 mmol scale, 83% yield. ¹H NMR (400 MHz, CDCl₃) δ 5.92 – 5.88 (m, 1H), 5.66 – 5.65 (m, 1H), 5.26 (dt, *J* = 11.8, 7.5 Hz, 1H), 3.66 (t, *J* = 6.5 Hz, 2H), 2.53 (qd, *J* = 6.6, 1.7 Hz, 2H), 2.16 – 2.07 (m, 4H), 1.65 – 1.54 (m, 5H). ¹³C NMR (101 MHz, CDCl₃) δ 135.3, 134.9, 128.2, 124.5, 62.9, 32.5, 29.1, 25.7, 23.0, 22.2. HRMS-ESI (*m/z*): calcd for C₁₀H₁₇O⁺ [M+H]⁺ 153.1274, found 153.1287.

(E)-2-styrylphenol (5a)



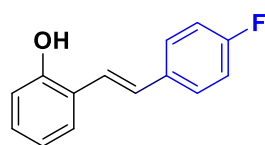
Pale yellow solid, 33.4 mg at 0.20 mmol scale, 85% yield. ¹H NMR (400 MHz, CDCl₃) δ 7.56 – 7.54 (m, 3H), 7.41 – 7.36 (m, 3H), 7.30 – 7.27 (m, 1H), 7.19 – 7.12 (m, 2H), 7.00 – 6.95 (m, 1H), 6.83 – 6.81 (m, 1H), 5.10 (s, 1H). ¹³C NMR (101 MHz, CDCl₃) δ 153.1, 137.7, 130.3, 128.8, 127.7, 127.4, 126.7, 124.8, 123.1, 121.3, 116.1. HRMS-ESI (*m/z*): calcd for C₁₄H₁₂ONa⁺ [M+Na]⁺ 219.0780, found 219.0796.

(E)-2-(4-methoxystyryl)phenol (5b)



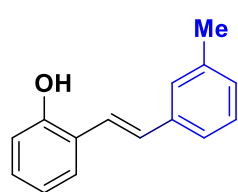
Yellow brown solid, 39.8 mg at 0.20 mmol scale, 88% yield. ^1H NMR (300 MHz, CDCl_3) δ 7.52 – 7.46 (m, 3H), 7.20 – 6.79 (m, 7H), 5.03 (s, 1H), 3.84 (s, 3H). ^{13}C NMR (75 MHz, CDCl_3) δ 159.4, 152.9, 130.5, 129.9, 128.4, 127.9, 127.2, 125.1, 121.3, 120.9, 116.0, 114.2, 55.5. HRMS-ESI (m/z): calcd for $\text{C}_{15}\text{H}_{15}\text{O}_2^+$ $[\text{M}+\text{H}]^+$ 227.1067, found 227.1077.

(E)-2-(4-fluorostyryl)phenol (5c)



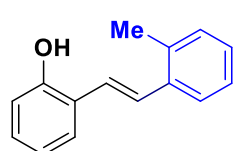
White solid, 35.1mg at 0.20 mmol scale, 82% yield. ^1H NMR (300 MHz, CDCl_3) δ 7.47 – 7.41 (m, 3H), 7.21 – 7.20 (m, 1H), 7.12 – 6.87 (m, 5H), 6.76 – 6.73 (m, 1H), 4.97 (s, 1H). ^{13}C NMR (75 MHz, CDCl_3) δ 162.4 (d, $J = 245.6$ Hz), 153.1, 133.9 (d, $J = 3.3$ Hz), 129.0, 128.8, 128.1 (d, $J = 7.9$ Hz), 127.3, 124.7, 122.9 (d, $J = 2.4$ Hz), 121.3, 116.0 (d, $J = 14.2$ Hz), 115.6. ^{19}F NMR (282 MHz, CDCl_3) δ -114.33. HRMS-ESI (m/z): calcd for $\text{C}_{14}\text{H}_{12}\text{FO}^+$ $[\text{M}+\text{H}]^+$ 215.0867, found 215.0885.

(E)-2-(3-methylstyryl)phenol (5d)



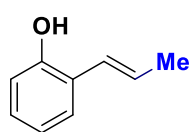
Pale yellow solid, 40.0 mg at 0.20 mmol scale, 95% yield. ^1H NMR (300 MHz, CDCl_3) δ 7.58 – 7.54 (m, 1H), 7.42 – 7.37 (m, 3H), 7.31 – 7.28 (m, 1H), 7.21 – 7.10 (m, 3H), 7.01 – 6.96 (m, 1H), 6.85 – 6.82 (m, 1H), 5.11 (s, 1H), 2.41 (s, 3H). ^{13}C NMR (75 MHz, CDCl_3) δ 153.0, 138.3, 137.6, 130.4, 128.7, 128.7, 128.6, 127.3, 124.9, 123.9, 122.8, 121.3, 116.0, 21.6. HRMS-ESI (m/z): calcd for $\text{C}_{15}\text{H}_{15}\text{O}^+$ $[\text{M}+\text{H}]^+$ 211.1117, found 211.1128.

(E)-2-(2-methylstyryl)phenol (5e)



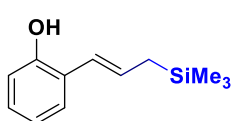
Yellow brown solid, 37.0 mg at 0.20 mmol scale, 88% yield. ^1H NMR (300 MHz, CDCl_3) δ 7.65 – 7.62 (m, 1H), 7.55 – 7.52 (m, 1H), 7.38 – 7.33 (m, 1H), 7.27 – 7.14 (m, 5H), 7.00 – 6.95 (m, 1H), 6.84 – 6.81 (m, 1H), 4.98 (s, 1H), 2.43 (s, 3H). ^{13}C NMR (75 MHz, CDCl_3) δ 153.1, 136.7, 135.9, 130.5, 128.8, 128.4, 127.7, 127.6, 126.3, 125.6, 125.1, 124.4, 121.3, 116.1, 20.1. HRMS-ESI (m/z): calcd for $\text{C}_{15}\text{H}_{15}\text{O}^+$ $[\text{M}+\text{H}]^+$ 211.1117, found 211.1126.

(E)-2-(prop-1-en-1-yl)phenol (5f)



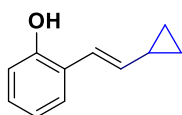
Yellowish oil, 24.4 mg at 0.20 mmol scale, 91% yield. ^1H NMR (400 MHz, $\text{DMSO-}d_6$) δ 9.45 (s, 1H), 7.33 – 7.30 (m, 1H), 7.01 – 6.97 (m, 1H), 6.79 – 6.70 (m, 2H), 6.61 – 6.57 (m, 1H), 6.24 – 6.15 (m, 1H), 1.84 – 1.82 (m, 3H). ^{13}C NMR (101 MHz, $\text{DMSO-}d_6$) δ 154.0, 127.6, 126.1, 126.0, 124.6, 124.2, 119.0, 115.5, 18.7. HRMS-ESI (m/z): calcd for $\text{C}_9\text{H}_{11}\text{O}^+$ [M+H] $^+$ 135.0804, found 135.0805.

(E)-2-(3-(trimethylsilyl)prop-1-en-1-yl)phenol (5g)



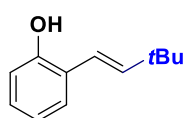
Yellowish oil, 34.2 mg at 0.20 mmol scale, 84% yield. ^1H NMR (400 MHz, CDCl_3) δ 7.28 – 7.26 (m, 1H), 7.08 (td, $J = 7.8$ Hz, 1.6 Hz, 1H), 6.90 – 6.78 (m, 2H), 6.40 – 6.36 (m, 1H), 6.24 – 6.16 (m, 1H), 4.94 (s, 1H), 1.71 (dd, $J = 8.2$ Hz, 1.2 Hz, 2H), -0.06 (s, 9H). ^{13}C NMR (75 MHz, CDCl_3) δ 152.4, 130.7, 127.6, 127.2, 125.8, 122.4, 121.0, 115.7, 24.5, -1.7. HRMS-ESI (m/z): calcd for $\text{C}_{12}\text{H}_{19}\text{OSi}^+$ [M+H] $^+$ 207.1200, found 207.1186.

(E)-2-(2-cyclopropylvinyl)phenol (5h)



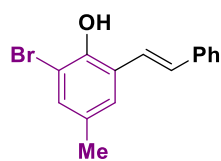
Brown oil, 27.9 mg at 0.20 mmol scale, 87% yield. ^1H NMR (300 MHz, CDCl_3) δ 7.31 – 7.28 (m, 1H), 7.10 (td, $J = 7.7$ Hz, 1.7 Hz, 1H), 6.92 – 6.87 (m, 1H), 6.82 – 6.79 (m, 1H), 6.66 (d, $J = 15.8$ Hz, 1H), 5.72 (dd, $J = 15.8$ Hz, 9.0 Hz, 1H), 4.94 (s, 1H), 1.69 – 1.57 (m, 1H), 0.89 – 0.83 (m, 2H), 0.57 – 0.52 (m, 2H). ^{13}C NMR (75 MHz, CDCl_3) δ 152.3, 137.7, 127.9, 127.2, 125.1, 121.5, 121.0, 115.8, 15.1, 7.5. HRMS-ESI (m/z): calcd for $\text{C}_{11}\text{H}_{13}\text{O}^+$ [M+H] $^+$ 161.0961, found 161.0976.

(E)-2-(3,3-dimethylbut-1-en-1-yl)phenol (5i)



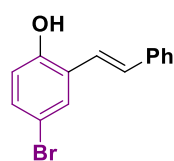
Yellowish oil, 17.6 mg at 0.20 mmol scale, 50% yield. ^1H NMR (300 MHz, CDCl_3) δ 7.32 (d, $J = 7.7$ Hz, 1H), 7.10 (d, $J = 7.9$ Hz, 1H), 6.89 (d, $J = 7.7$ Hz, 1H), 6.79 (d, $J = 8.1$ Hz, 1H), 6.49 (d, $J = 16.2$ Hz, 1H), 6.22 (d, $J = 16.3$ Hz, 1H), 4.94 (s, 1H), 1.14 (s, 9H). ^{13}C NMR (75 MHz, CDCl_3) δ 152.6, 144.5, 128.1, 127.4, 125.2, 121.0, 118.8, 115.8, 33.9, 29.7. HRMS-ESI (m/z): calcd for $\text{C}_{12}\text{H}_{16}\text{ONa}^+$ [M+Na] $^+$ 199.1093, found 199.1107.

(E)-2-bromo-4-methyl-6-styrylphenol (5j)



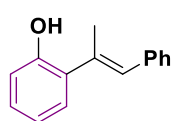
White solid, 49.2 mg at 0.20 mmol scale, 85% yield. ^1H NMR (400 MHz, CDCl_3) δ 7.54 (d, $J = 7.3$ Hz, 2H), 7.41 – 7.25 (m, 5H), 7.20 – 7.13 (m, 2H), 5.62 (s, 1H), 2.30 (s, 3H). ^{13}C NMR (101 MHz, CDCl_3) δ 147.5, 137.6, 131.2, 130.4, 128.8, 127.8, 126.84, 126.78, 125.4, 123.1, 111.0, 20.5. HRMS-ESI (m/z): calcd for $\text{C}_{15}\text{H}_{14}^{79}\text{BrO}^+$ $[\text{M}+\text{H}]^+$ 289.0223, found 289.0235.

(E)-4-bromo-2-styrylphenol (5k)



Orange yellow solid, 51.7 mg at 0.20 mmol scale, 94% yield. ^1H NMR (300 MHz, CDCl_3) δ 7.65 (d, $J = 2.4$ Hz, 1H), 7.55 – 7.52 (m, 2H), 7.40 – 7.21 (m, 5H), 7.10 (d, $J = 16.4$ Hz, 1H), 6.69 (d, $J = 8.6$ Hz, 1H), 5.19 (s, 1H). ^{13}C NMR (101 MHz, CDCl_3) δ 152.2, 137.2, 131.3, 131.2, 129.7, 128.8, 128.1, 127.0, 126.8, 121.7, 117.7, 113.4. HRMS-ESI (m/z): calcd for $\text{C}_{14}\text{H}_{11}^{79}\text{BrONa}^+$ $[\text{M}+\text{Na}]^+$ 296.9885, found 296.9906.

(E)-2-(1-phenylprop-1-en-2-yl)phenol (5l)

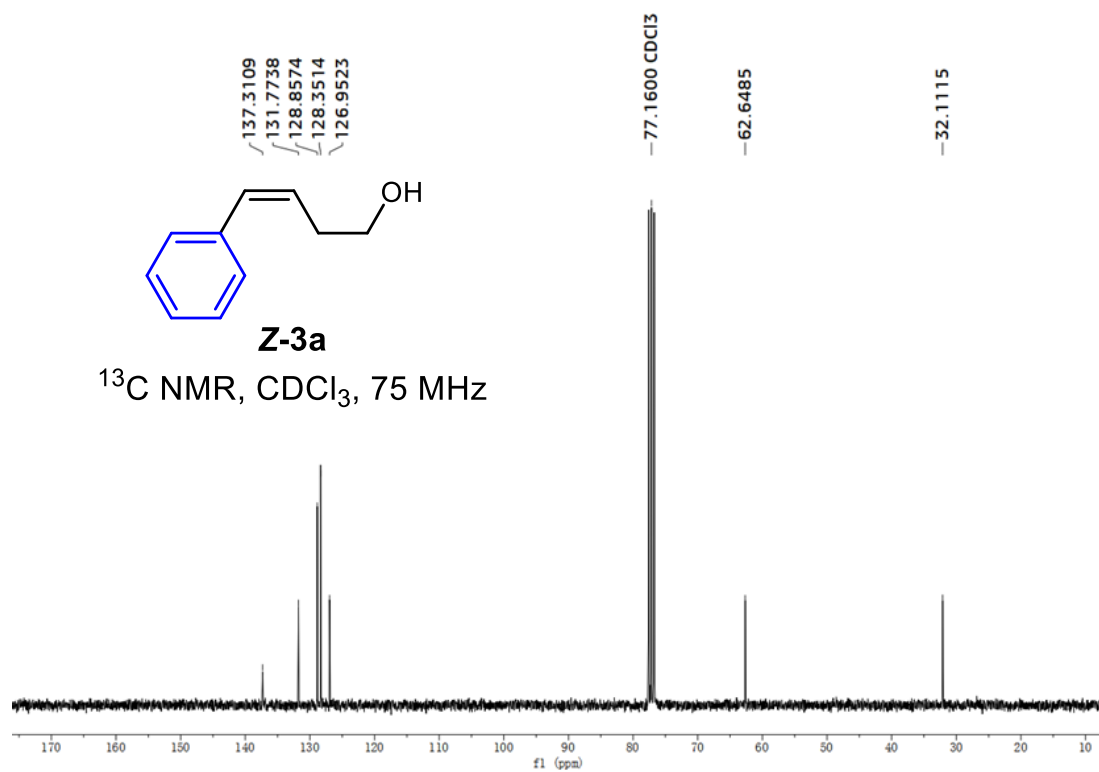
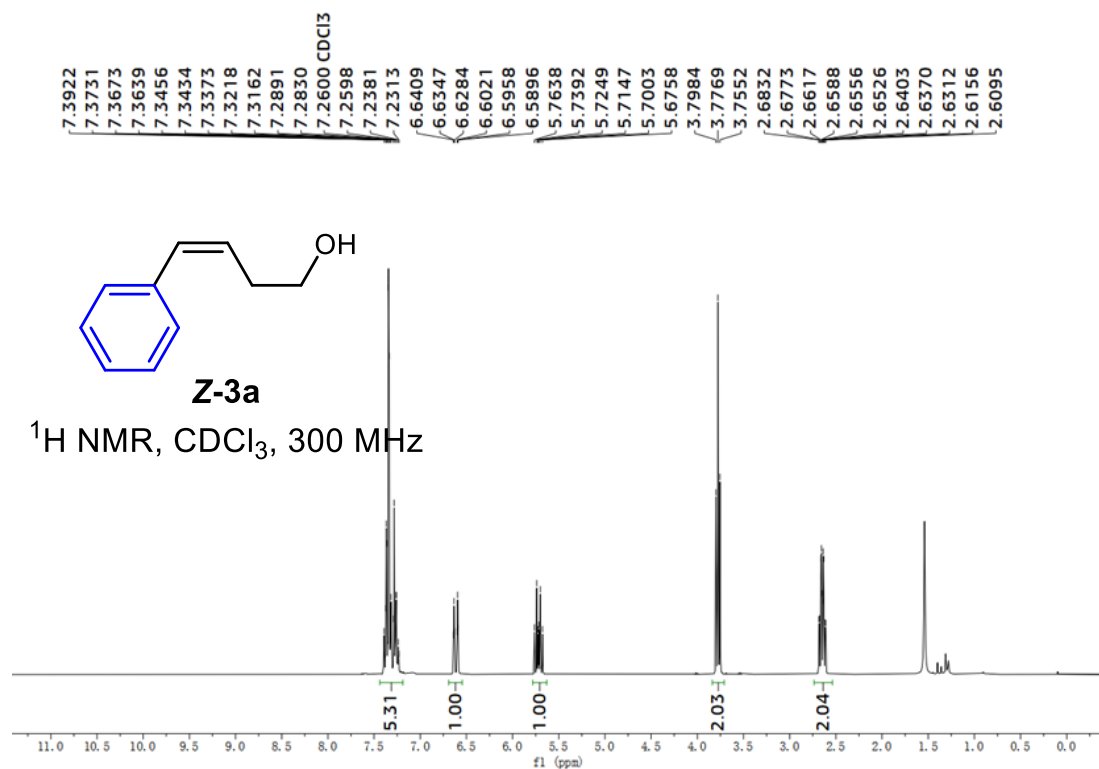


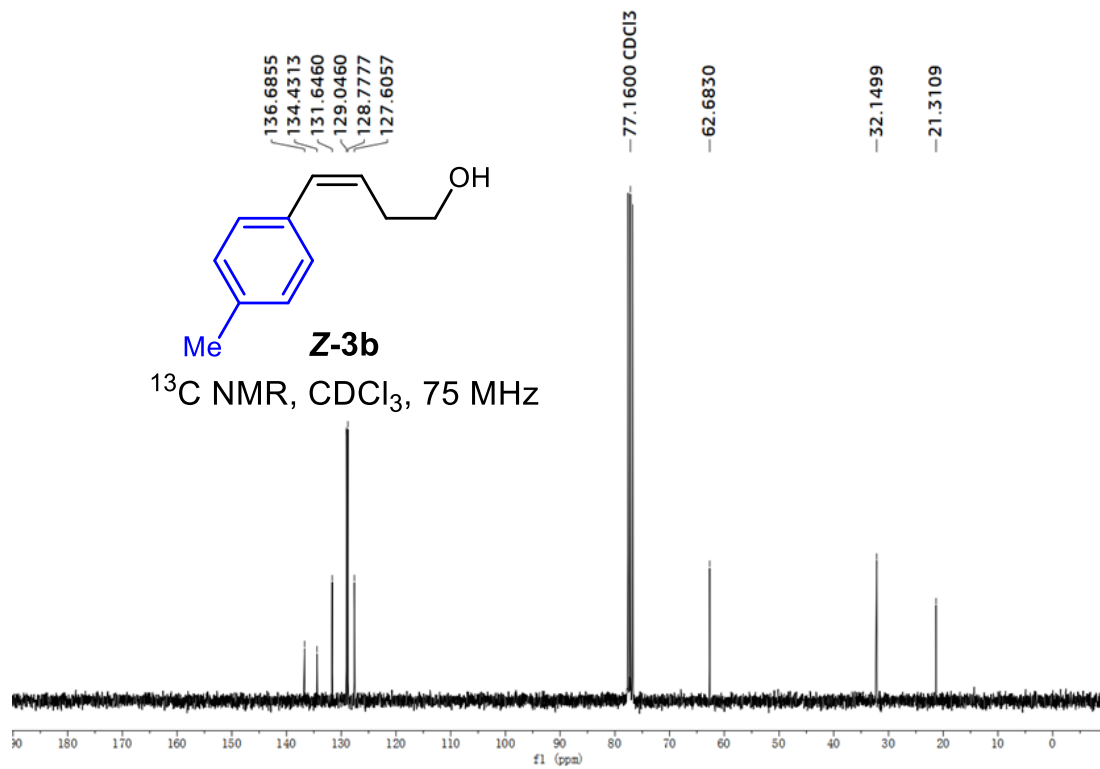
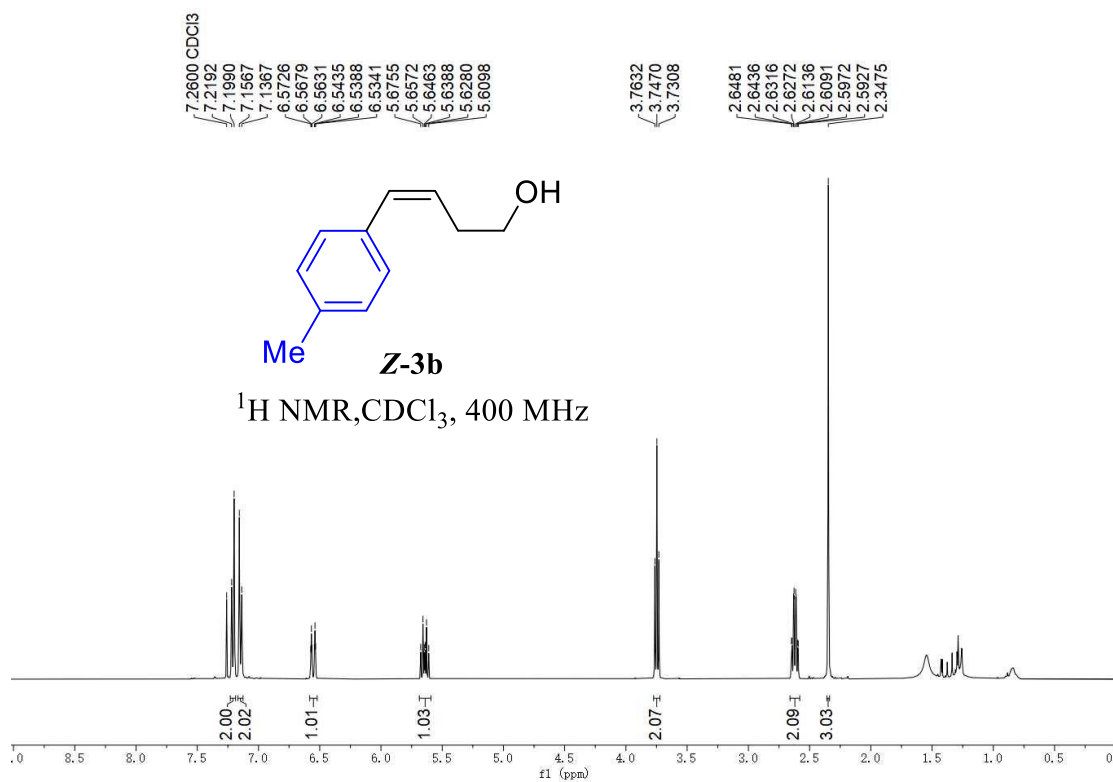
Yellowish solid, 40.4 mg at 0.20 mmol scale, 96% yield. ^1H NMR (400 MHz, CDCl_3) δ 9.43 (s, 1H), 7.39 – 7.38 (m, 4H), 7.26 – 7.22 (m, 1H), 7.18 – 7.09 (m, 2H), 6.86 – 6.77 (m, 2H), 6.50 (s, 1H), 2.19 (d, $J = 1.3$ Hz, 3H). ^{13}C NMR (101 MHz, CDCl_3) δ 154.4, 137.8, 137.6, 132.3, 129.2, 128.9, 128.4, 128.22, 128.16, 126.4, 119.0, 115.6, 18.8. HRMS-ESI (m/z): calcd for $\text{C}_{15}\text{H}_{14}\text{OK}^+$ $[\text{M}+\text{K}]^+$ 249.0676, found 249.0678.

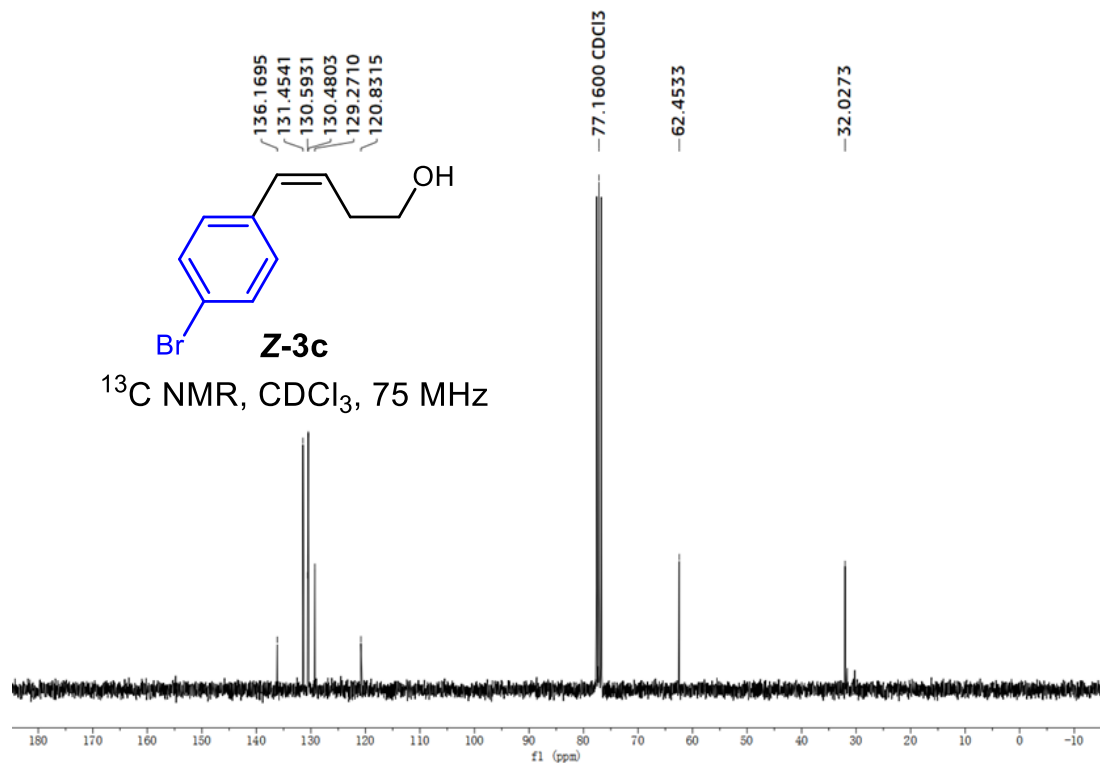
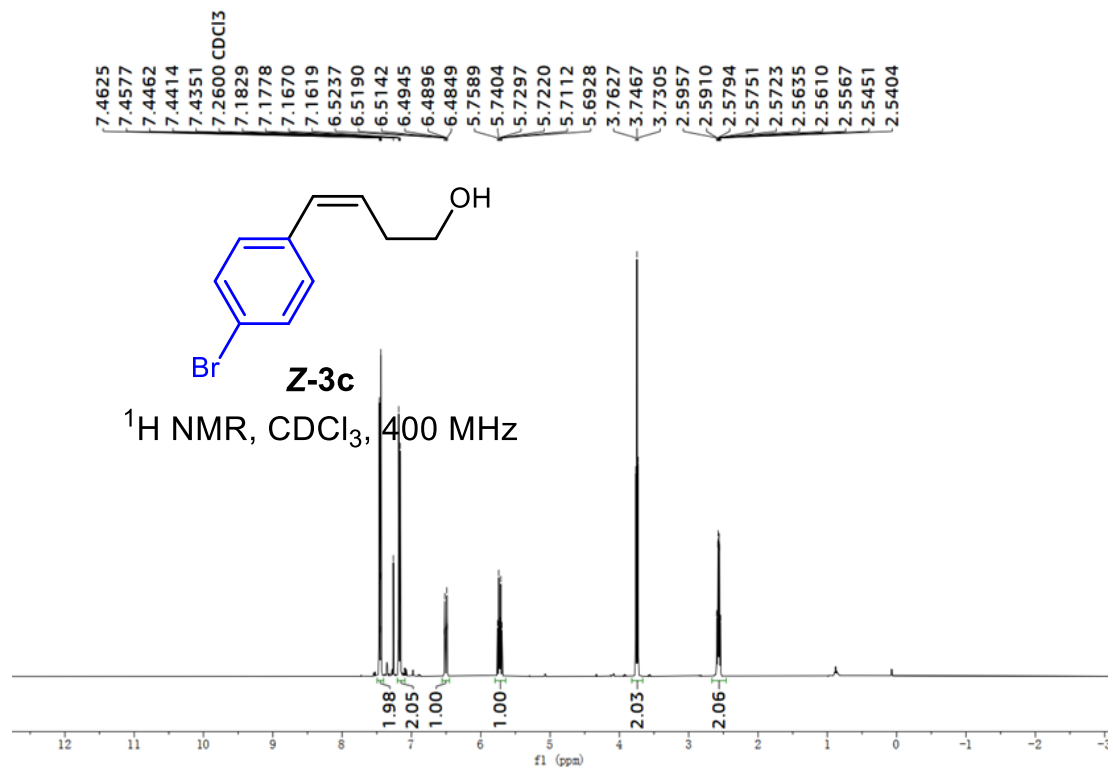
9. References

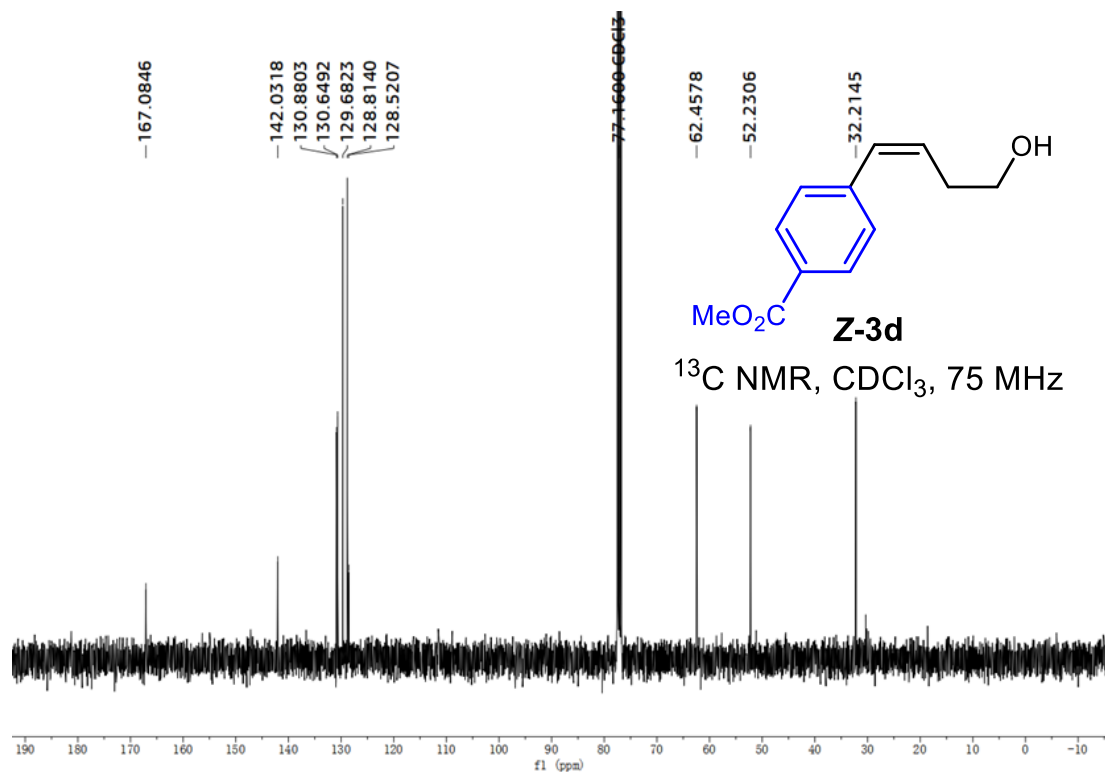
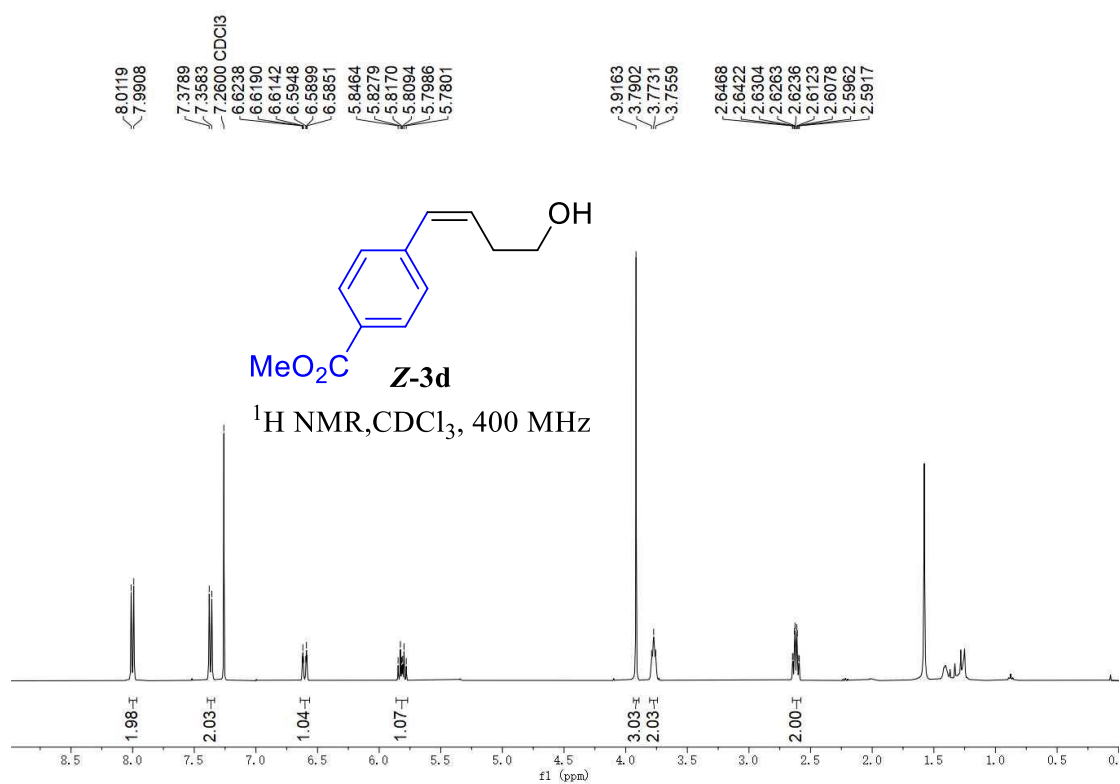
[1] R. Uson, L. A. Oro and J. A. Cabeza, *Inorganic Syntheses*. 1985, **23**, 126.

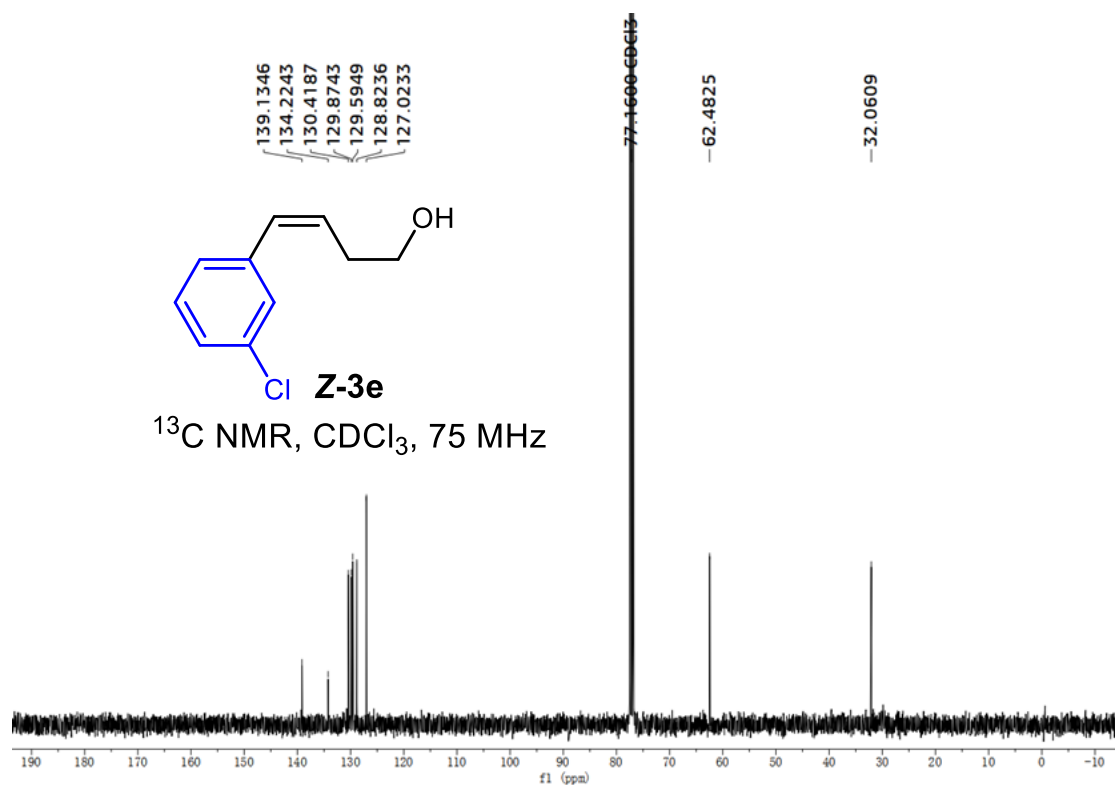
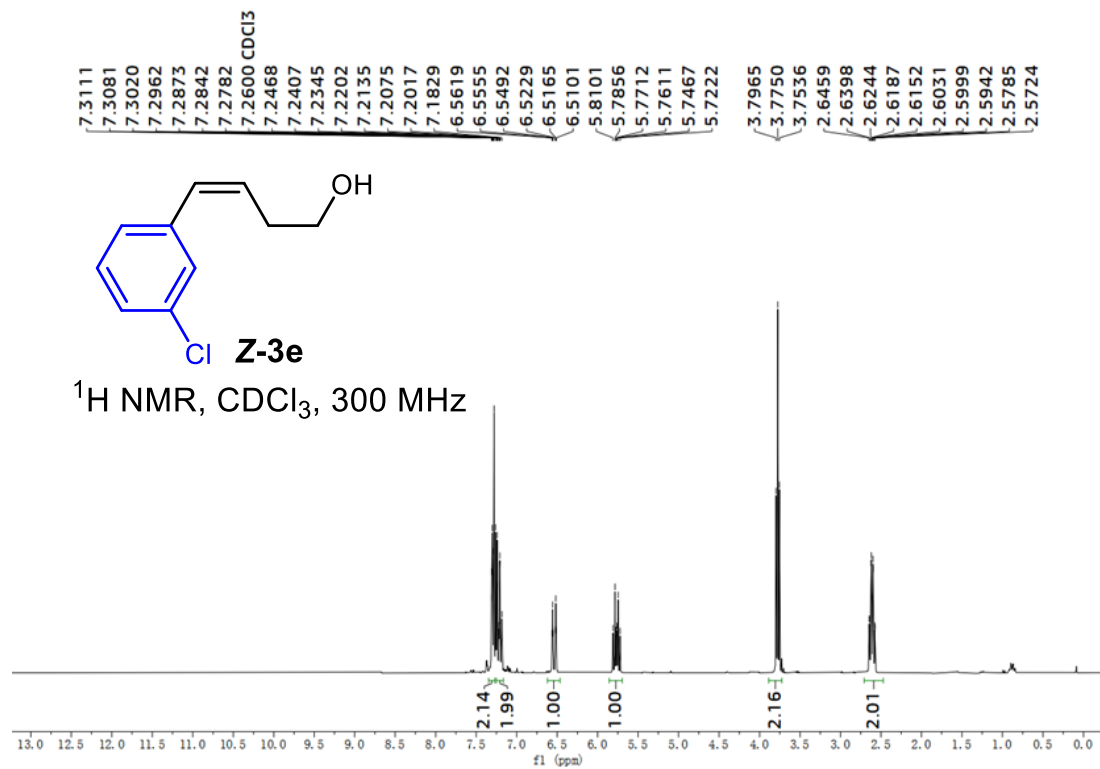
10. NMR spectra of products

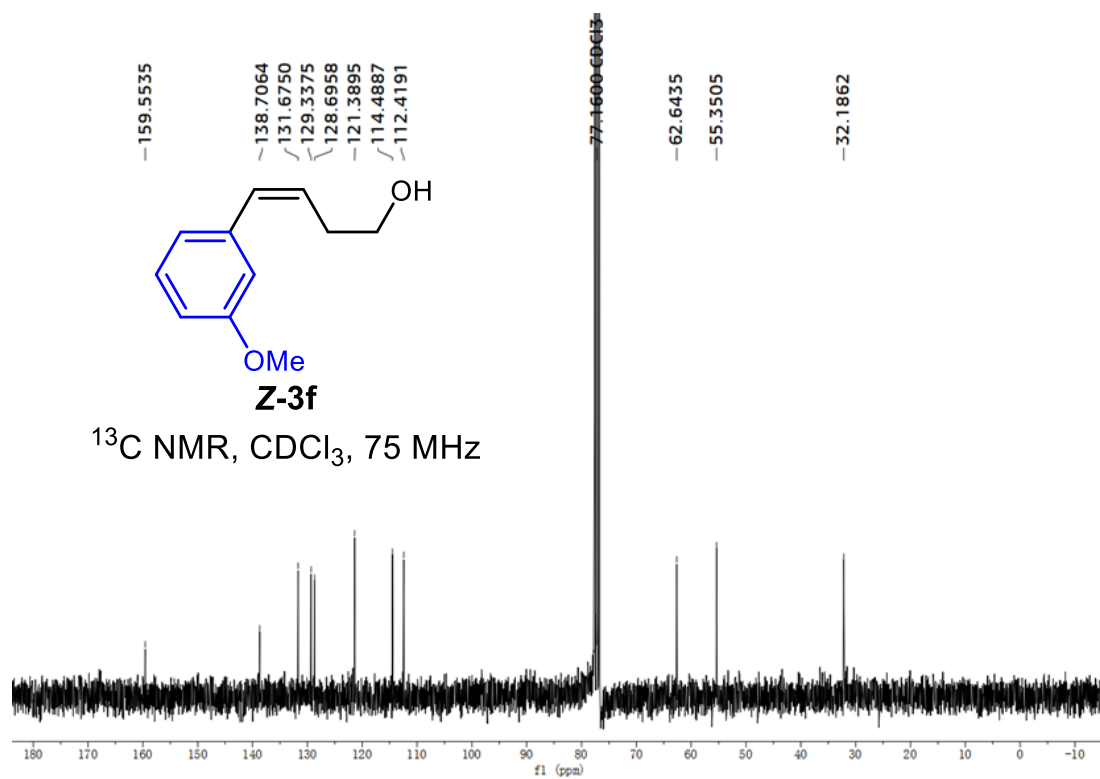
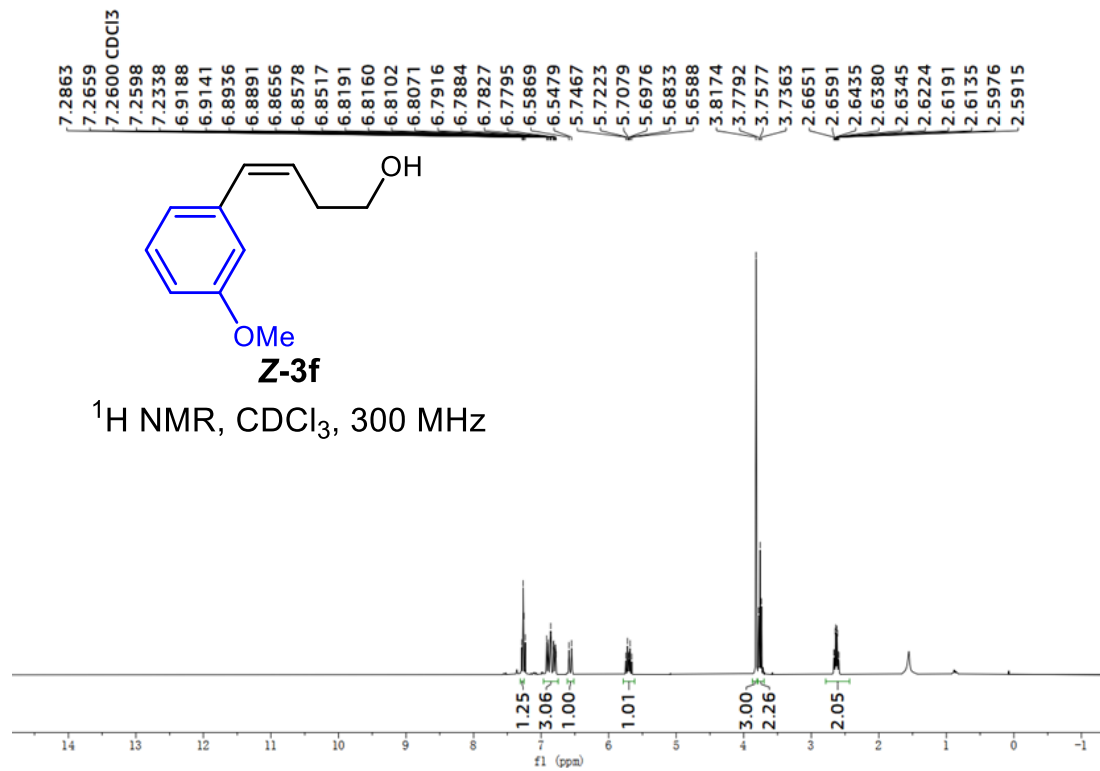


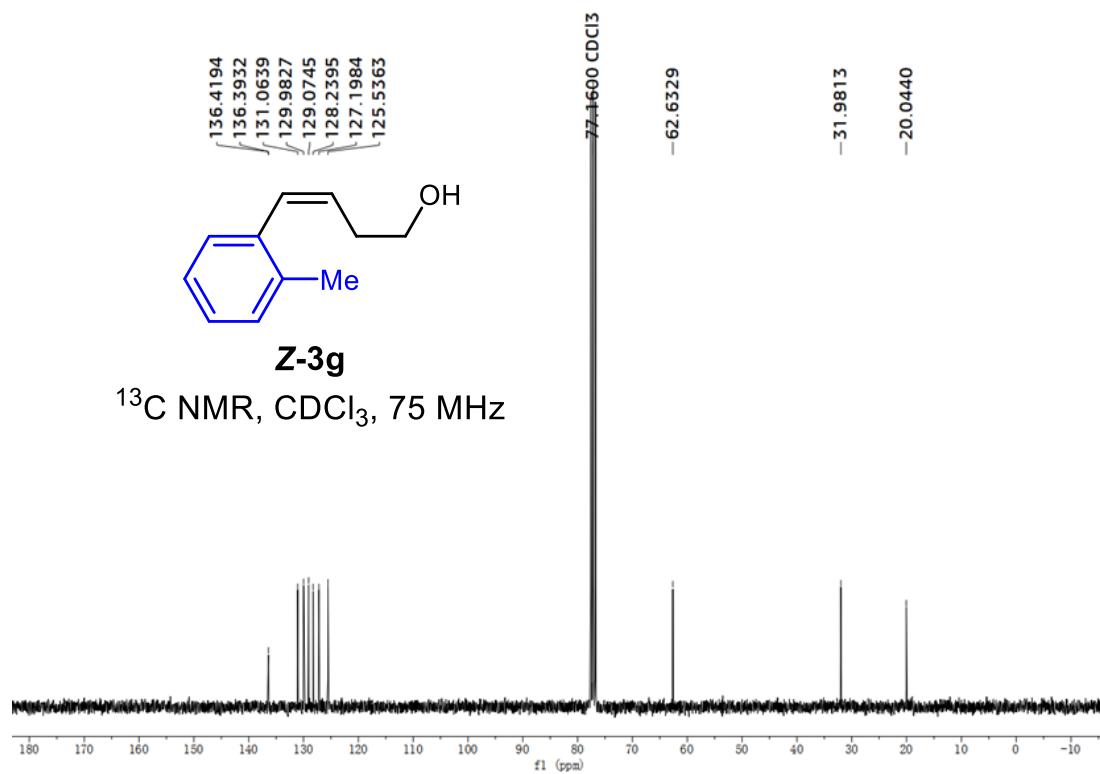
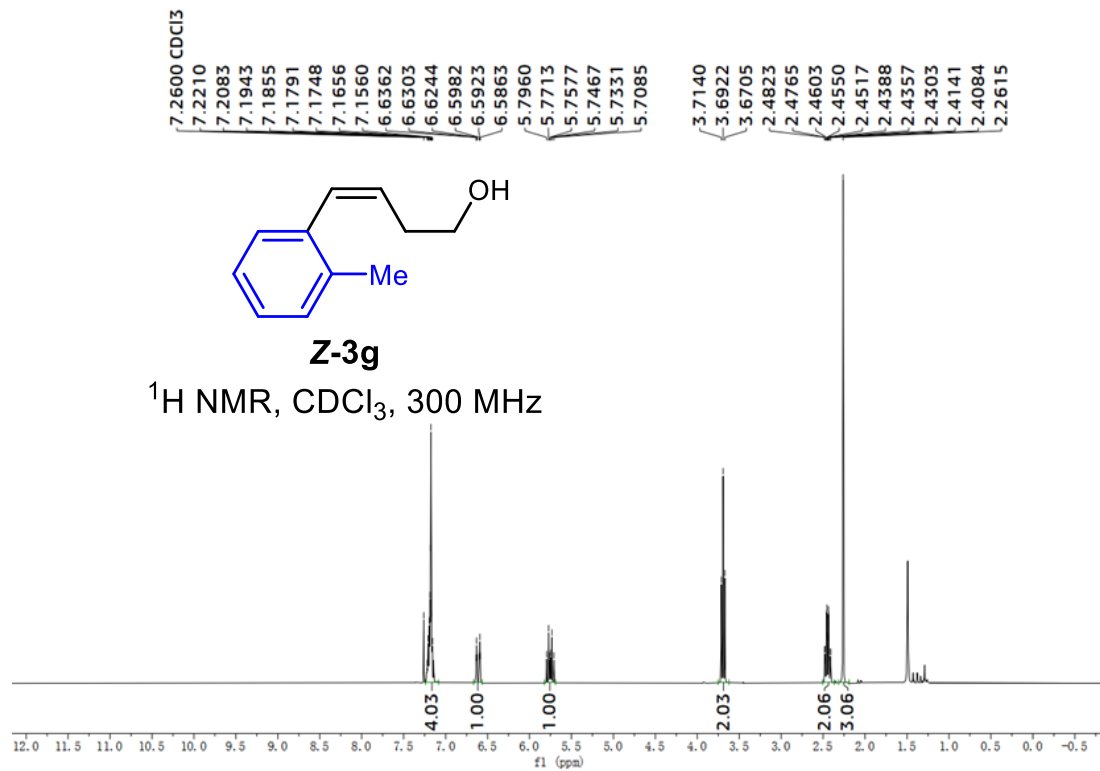


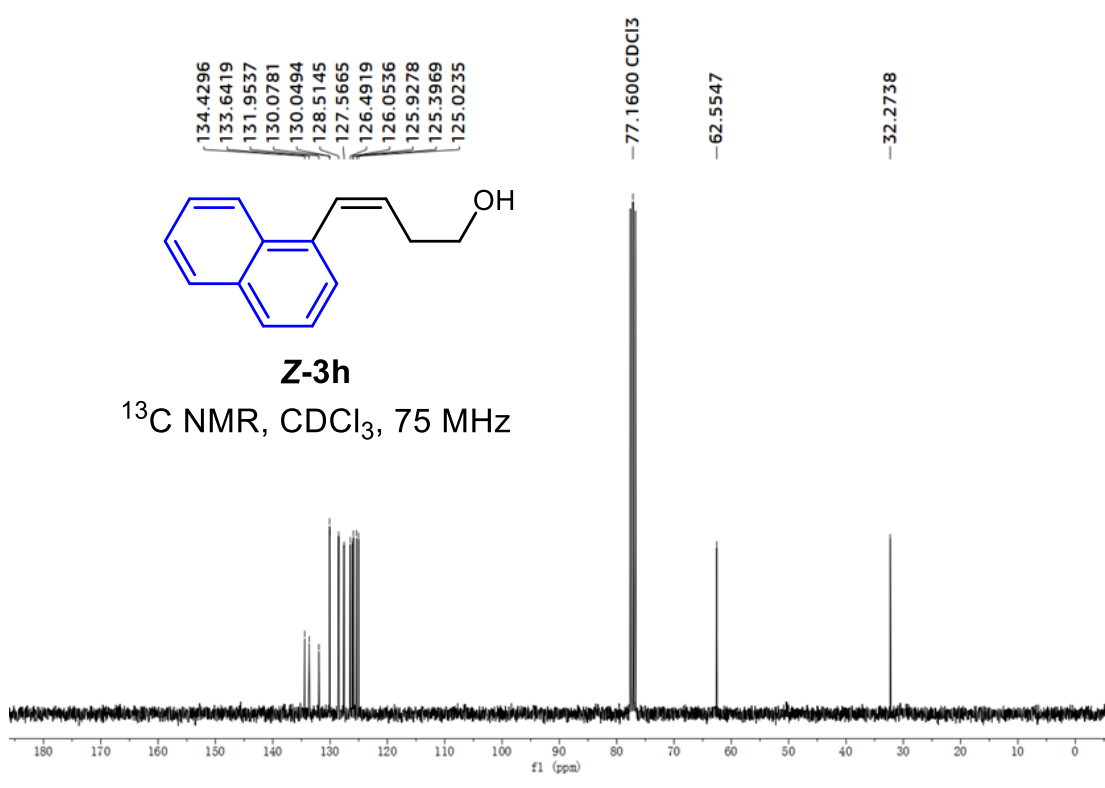
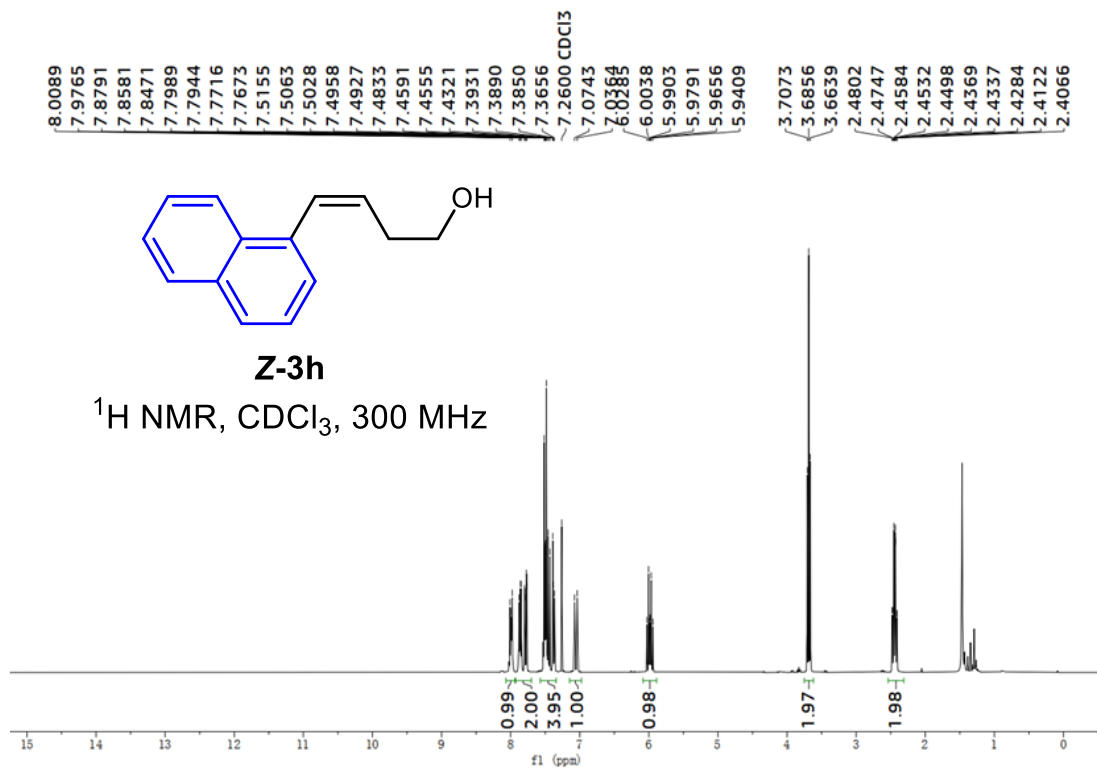


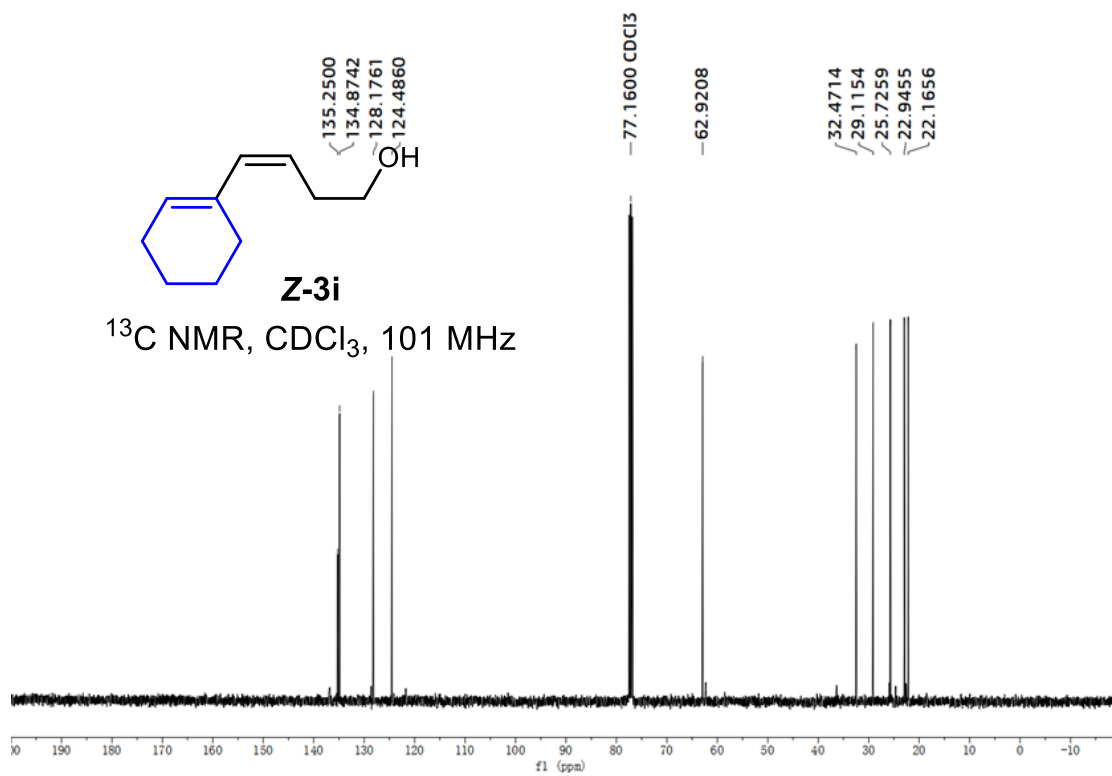
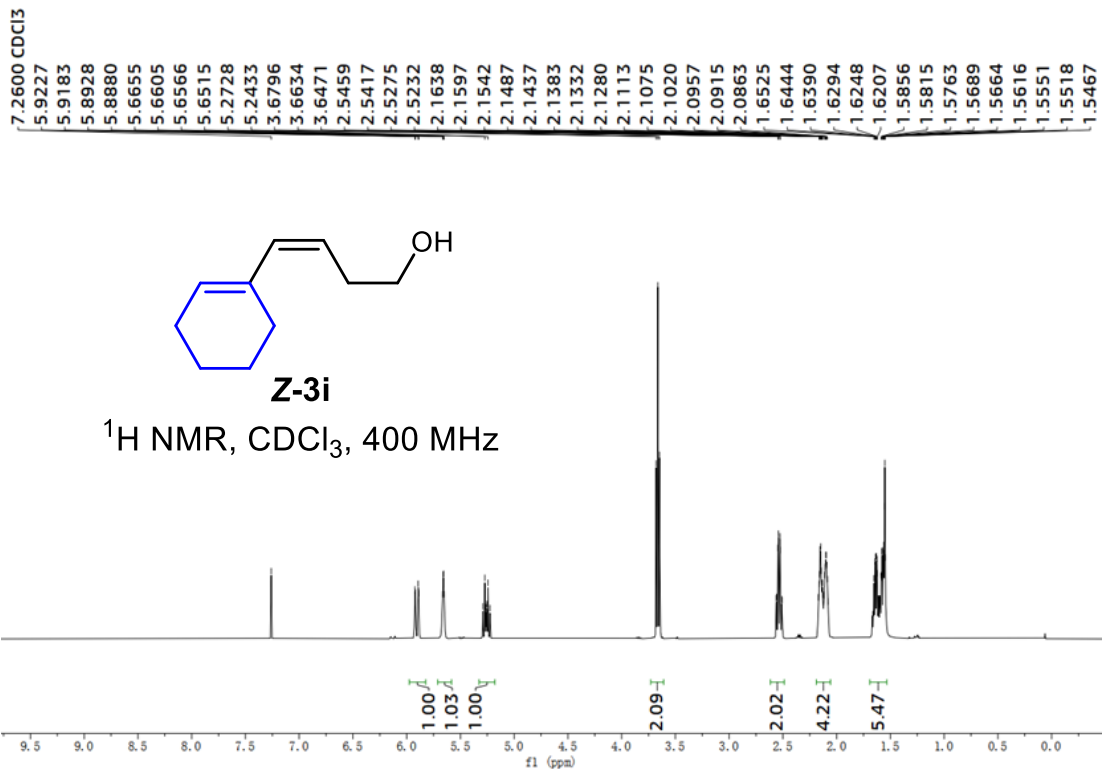


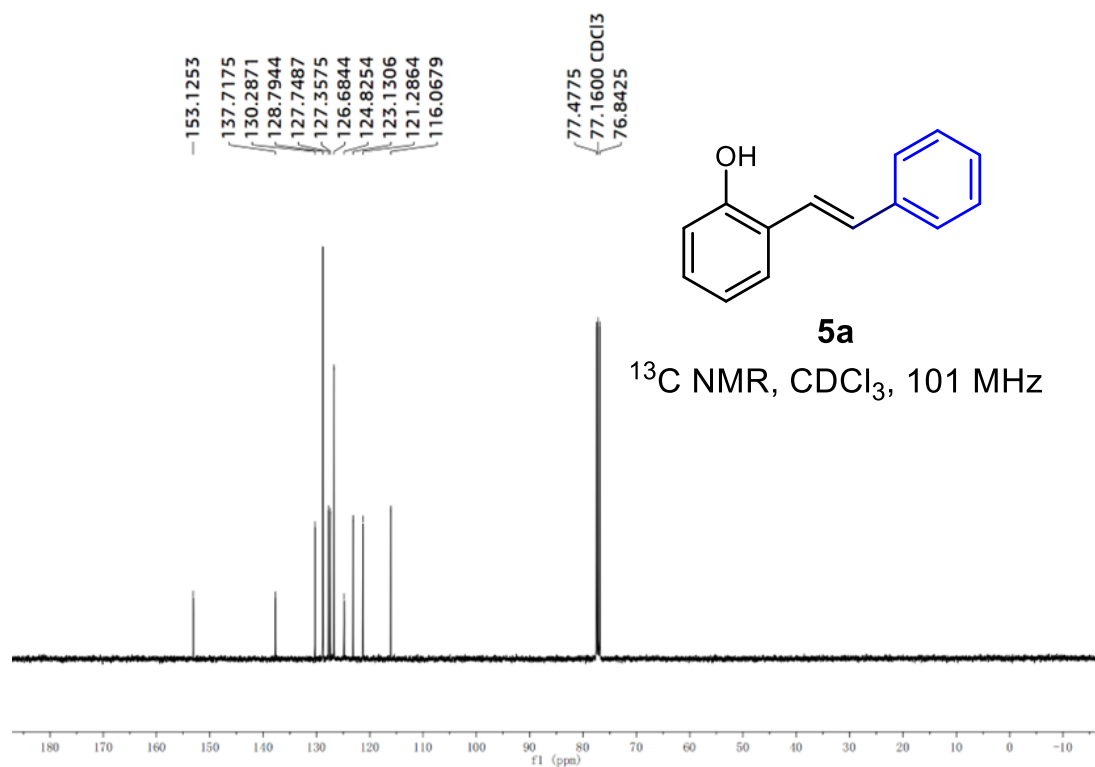
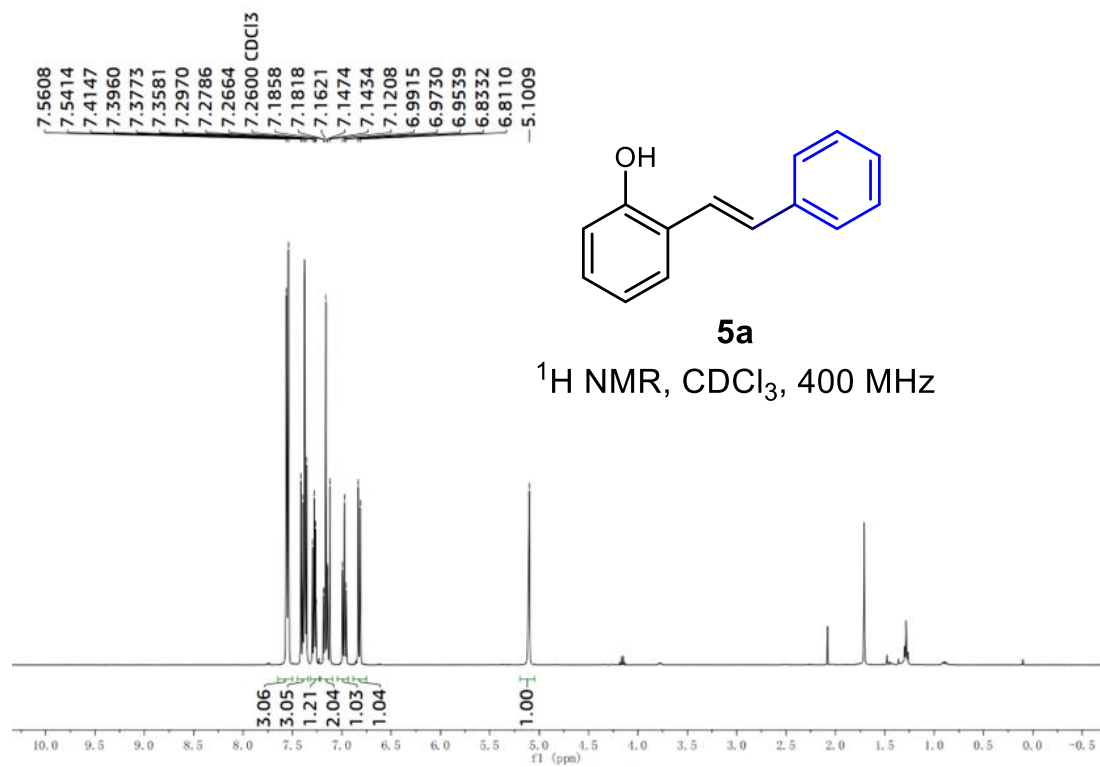


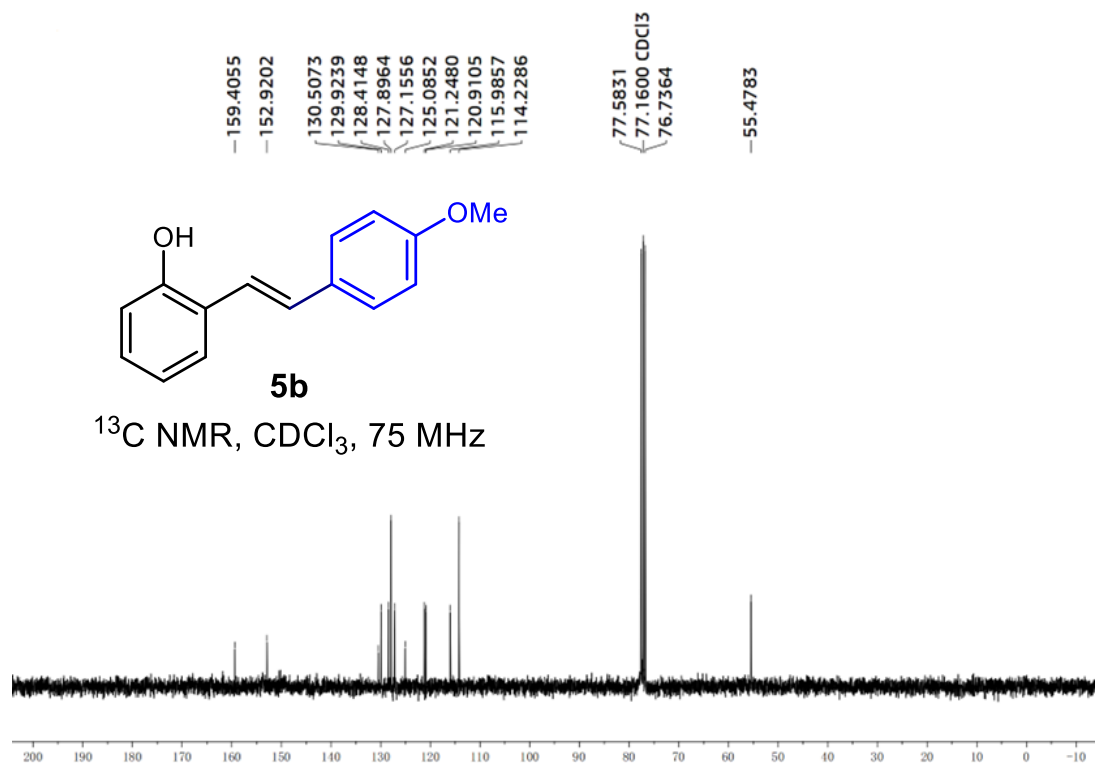
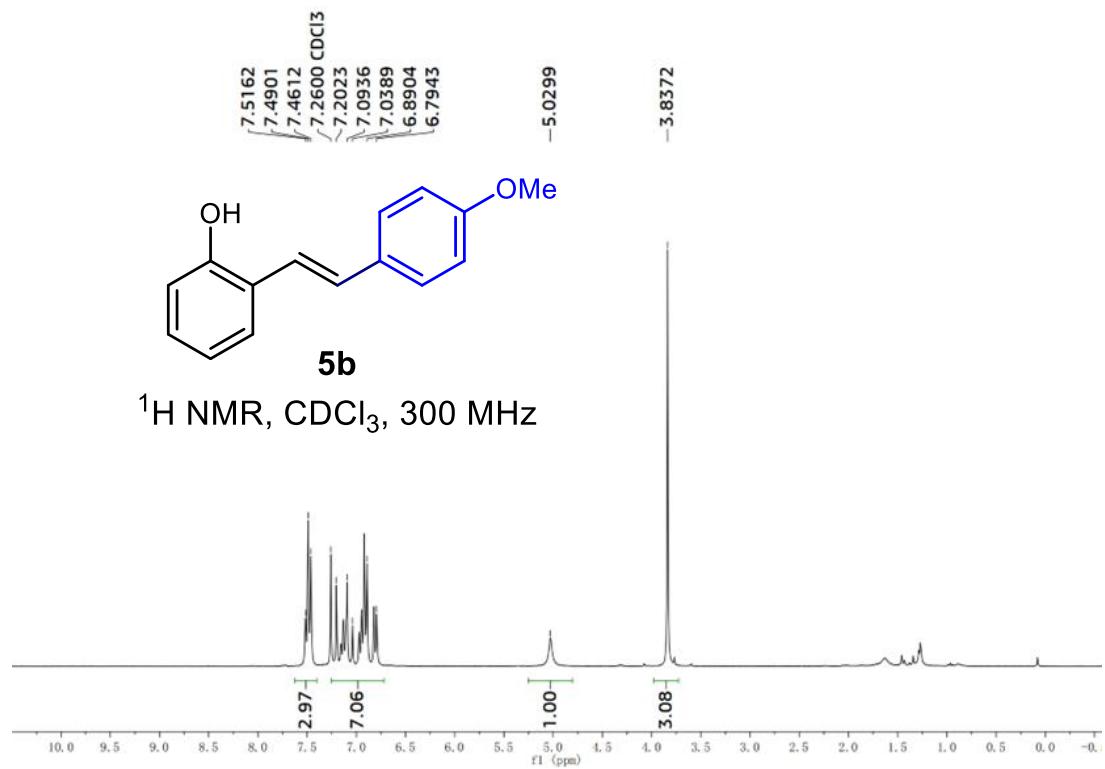


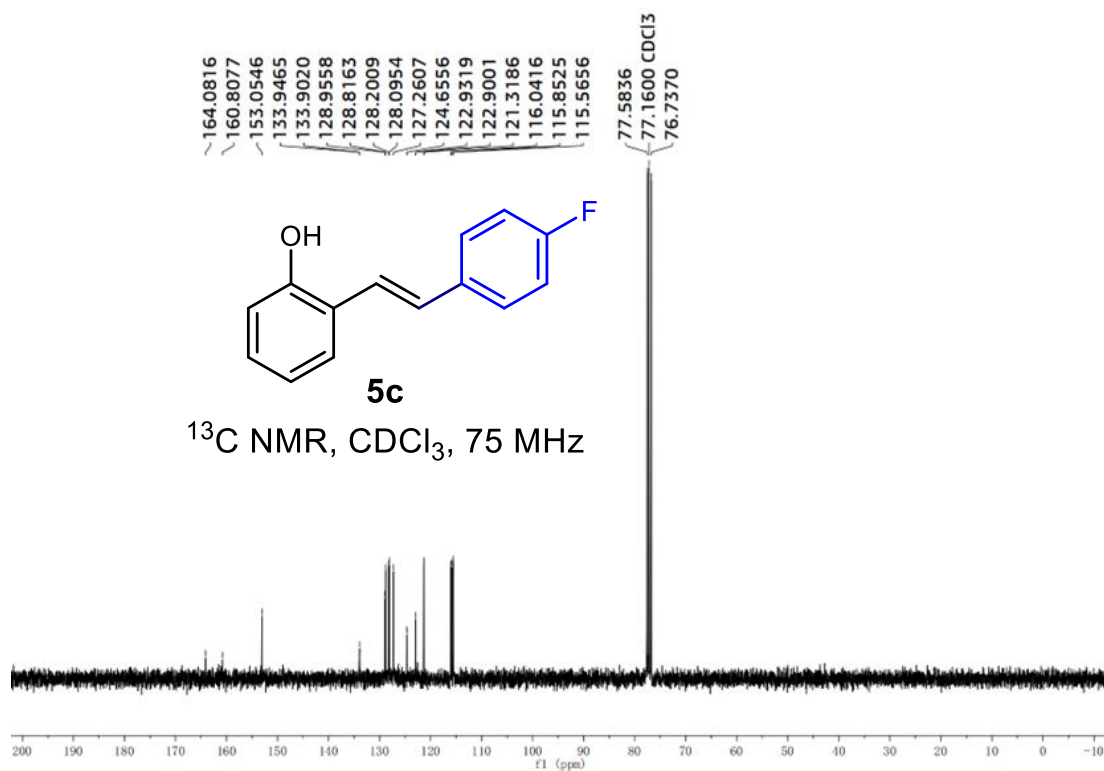
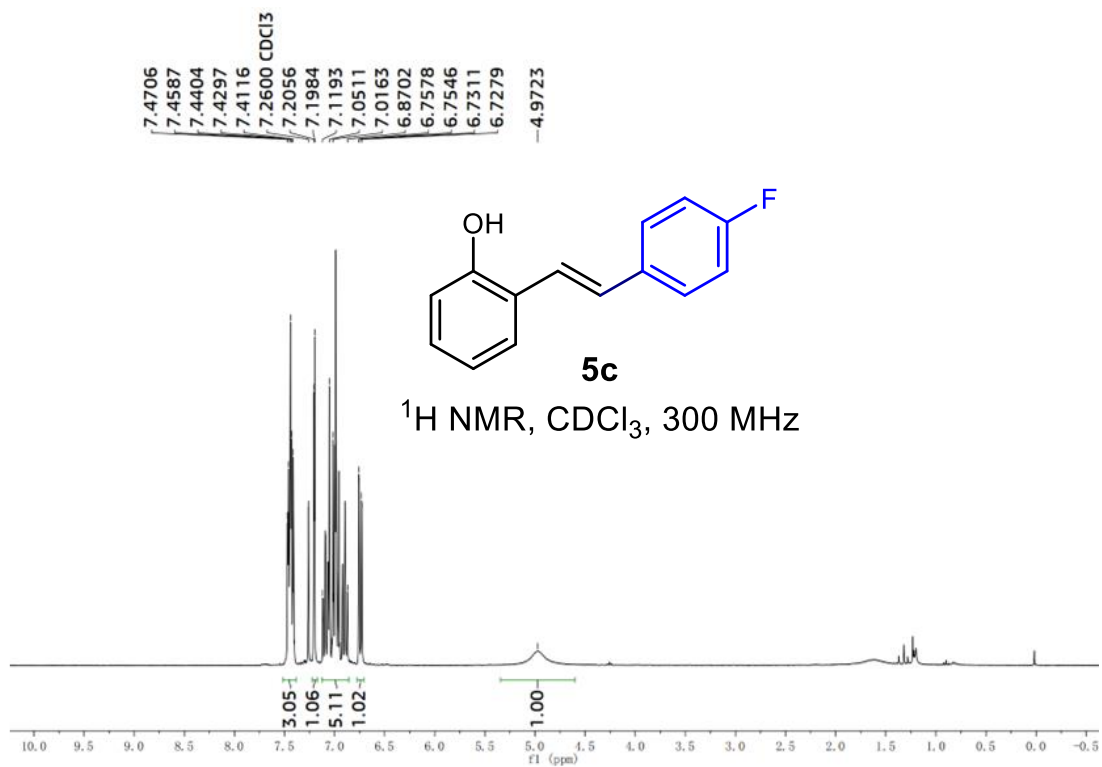


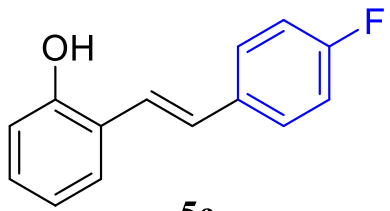












5c

^{19}F NMR, CDCl_3 , 282 MHz

