Supporting Information for:

O-Acetyl Oximes as Transformable Directing Groups for Pd-Catalyzed C–H Bond Functionalization

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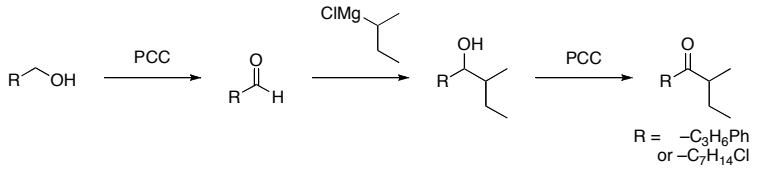
I. General Procedures

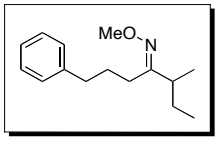
NMR spectra were obtained on a Varian Inova 500 (499.90 MHz for ^{1}H; 125.70 MHz for ^{13}C), a Varian Inova 400 (399.96 MHz for ^{1}H; 100.57 MHz for ^{13}C), or a Varian MR400 (399.54 or 400.52 MHz for ^{1}H; 100.71 MHz for ^{13}C; 376.88 MHz for ^{19}F) spectrometer. ^{1}H and ^{13}C NMR chemical shifts are reported in parts per million (ppm) relative to TMS, with the residual solvent peak used as an internal reference. Multiplicities are reported as follows: singlet (s), doublet (d), doublet of doublets (dd), doublet of doublets of doublets (ddd), doublet of doublets of doublets of doublets (dddd), triplet (t), quartet (q), quintet (quin), sextet (sext), doublet of triplets (dt), triplet of doublets (td), quartet of triplets (qt), multiplet (m), and broad resonance (br). IR spectra were obtained on a Perkin-Elmer Spectrum BX FT-IR spectrometer. Melting points were determined with a Mel-Temp 3.0, a Laboratory Devices Inc, USA instrument, and are uncorrected. HRMS data were obtained on a Micromass AutoSpec Ultima Magnetic Sector mass spectrometer. Gas chromatography was carried out on a Shimadzu 17A using a Restek Rtx®-5 (Crossbond 5% diphenyl – 95% dimethyl polysiloxane; 15 m, 0.25 mm ID, 0.25 μm df) column.

II. Materials and Methods

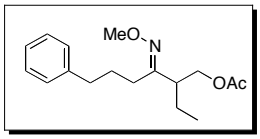
All commercial reagents and solvents were used as received without further purification. $Pd(OAc)_2$ and $PhI(OAc)_2$ were obtained from Pressure Chemical and TCI America, respectively. Ac_2O was obtained from EMD Chemicals, and all other solvents were obtained from Fisher Chemical. Flash chromatography was performed on EM Science silica gel 60 (0.040-0.063 mm particle size, 230-400 mesh) and thin layer chromatography was performed on Merck TLC plates pre-coated with silica gel 60 F254. Ketone **6** and the ketone used to prepare oxime substrate **S3** were prepared by the sequential oxidation of a commercial alcohol to an aldehyde, treatment with *sec*-butyl Grignard, and oxidation of the resulting alcohol to the ketone (below). The parent ketone of oxime **S2** was prepared by further treatment of the alkyl chloride parent ketone of **S3** with potassium phthalimide.



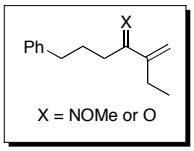
III. Synthesis and Characterization of Molecules in Equations 1–3



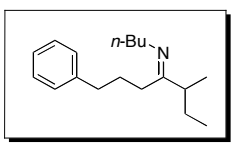
Oxime ether **1.** Ketone **6** (500 mg, 2.45 mmol, 1 equiv) was combined with NH_2OMe•HCl (256 mg, 2.94 mmol, 1.2 equiv) in pyridine (1.06 mL) in a 20 mL scintillation vial. The vial was sealed with a Teflon-lined cap and heated to 80 °C for 15 min. The reaction mixture was then diluted with EtOAc (5 mL) and washed with 20% aqueous AcOH (5 x 5 mL) to remove pyridine. The organic layer was then neutralized with aqueous $NaHCO_3$, washed with brine, dried over MgSO4, and concentrated to yield methyl oxime **1** as a colorless oil consisting of ~1.6:1 ratio of major and minor E/Z isomers (556 mg, 97% yield). Major Isomer: ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.29 (m, 2H), 7.21–7.19 (multiple peaks, 3H), 3.813 (s, 3H), 2.66 (m, 2H), 2.30–2.14 (multiple peaks, 3H), 1.92–1.79 (multiple peaks, 2H), 1.50 (m, 1H), 1.36 (m, 1H), 1.05 (d, J = 6.8 Hz, 3H), 0.872 (t, J = 7.2 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 164.13, 141.94, 128.35, 128.27, 125.80, 61.01, 40.71, 36.37, 27.92, 27.06, 26.43, 17.88, 11.92. Minor Isomer (distinct resonances): ^{1}H NMR (400 MHz, $CDCl_3$): δ 3.809 (s, 3H), 3.08 (m, 1H), 1.02 (d, J = 7.2 Hz, 3H), 0.867 (t, J = 7.2 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 163.63, 142.22, 128.43, 125.72, 61.03, 35.77, 34.17, 29.97, 28.53, 26.54, 16.74, 12.15. IR (thin film, mixture of E/Z isomers): 2962, 2935, 1454 cm^{-1}. HRMS electrospray (m/z): $[M+H]^+$ calcd for $C_{15}H_{24}NO$ (mixed isomers), 234.1858; found, 234.1866.



β-Acetoxy oxime ether 2. Methyl oxime **1** (14.6 mg, 0.050 mmol, 1 equiv) was combined with $Pd(OAc)_2$ (0.6 mg, 0.0025 mmol, 0.05 equiv) and $PhI(OAc)_2$ (32.2 mg, 0.100 mmol, 2 equiv) in $AcOH/Ac_2O$ (1:1, 416 μL) in a 4 mL scintillation vial. The vial was sealed with a Teflon-lined cap and heated to 100 °C for 12 h to afford **2** as a plae yellow oil (64% calibrated GC yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.28 (m, 2H), 7.21–7.17 (multiple peaks, 3H), 4.11 (m, 2H), 3.81 (s, 3H), 2.64 (t, J = 7.6 Hz, 2H), 2.48 (quin, J = 7.2 Hz, 1H), 2.31–2.15 (multiple peaks, 2H), 2.02 (s, 3H), 1.81 (m, 2H), 1.52 (m, 2H), 0.89 (t, J = 7.6 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 170.92, 159.89, 141.77, 128.32, 128.30, 125.85, 65.18, 61.30, 45.01, 36.16, 27.40, 27.32, 22.34, 20.90, 11.31. IR (thin film): 2963, 2936, 1740 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{17}H_{25}NO_3$, 314.1732; found, 314.1731.

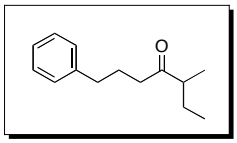


Elimination Products 3 and 4. β-Acetoxylated oxime ether **2** (12.7 mg, 0.0436 mmol, 1 equiv) was dissolved in 0.5 M HCl/CH_2Cl_2 (436 μL) in a 4 mL scintillation vial. The vial was sealed with a Teflon-lined cap and heated to 70 °C for 3 h. Reaction solvent was removed by rotary evaporator and crude residue was analyzed by ^{1}H NMR. Elimination was identifed by the presence of two sets of olefin peaks (see NMR spectrum). Integration of these peaks relative to an internal standard ($PhNO_2$) indicates a total of 41% yield of elimination products .



Butyl imine 5. Ketone **6** (250 mg, 1.22 mmol, 1 equiv) was combined with *n*-butylamine (2.42 mL, 24.48 mmol, 20 equiv), *p*-TsOH monohydrate (4.6 mg, 0.0244 mmol, 0.02 equiv), and 4 Å molecular sieves (2 g) in toluene (1.9 mL) in a 20 mL scintillation vial. The

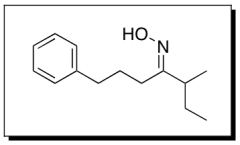
vial was sealed with a Teflon-lined cap and heated to 110 °C for 16 h. Solid $NaHCO_3$ was added (30 mg); reaction was then diluted with hexanes, filtered through celite, and concentrated to afford imine **5** as a yellow oil consisting of ~3:1 ratio of major to minor E/Z isomers (300 mg, 95% yield). Major Isomer: ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.31–7.17 (multiple peaks, 5H), 3.25 (t, *J* = 7.2 Hz, 2H), 2.64 (t, *J* = 7.6 Hz, 2H), 2.26–2.15 (multiple peaks, 3H), 1.75 (m, 2H), 1.60–1.55 (multiple peaks, 2H), 1.44–1.24 (multiple peaks, 4H), 1.02 (d, *J* = 6.8 Hz, 3H), 0.90 (t, *J* = 7.2 Hz, 3H), 0.84 (t, *J* = 7.4 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 175.71, 141.55, 128.37, 128.34, 125.98, 50.44, 45.56, 36.29, 33.33, 29.45, 28.41, 27.48, 20.66, 18.22, 14.02, 12.08. Minor Isomer (distinct resonances): ^{1}H NMR (400 MHz, $CDCl_3$): δ 3.34 (t, *J* = 7.2 Hz, 2H), 2.79 (m, 1H), 1.89 (m, 2H), 0.98 (d, *J* = 7.0 Hz, 3H), 0.93 (t, *J* = 7.4 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 175.29, 142.64, 128.46, 128.18, 125.57, 49.65, 36.44, 35.95, 33.48, 33.04, 29.03, 27.09, 20.70, 17.43, 12.27. IR (thin film, mixture of E/Z isomers): 2959, 2930, 2872, 1711, 1657 cm^{-1}. HRMS electrospray (m/z): $[M+H]^+$ calcd for $C_{18}H_{30}N$ (mixture of E/Z isomers), 260.2378; found, 260.2380.



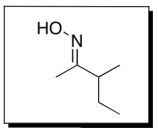
Ketone 6. Ketone **6** was synthesized as described in the Materials and Methods section. Additionally, **6** was formed as the major product from the reaction depicted in equation 2. From reaction of imine **5**: Imine **5** (10 mg, 0.0385 mmol, 1 equiv) was combined with $Pd(OAc)_2$ (0.4 mg, 0.0019 mmol, 0.05 equiv) and $PhI(OAc)_2$ (24.8 mg, 0.077 mmol, 2 equiv) in $AcOH/Ac_2O$ (1:1, 320 μL) in a 4 mL scintillation vial. The vial was sealed with a Teflon-lined cap and heated to 100 °C for 45 to afford ketone **6** as the major product observable by GC (39% calibrated GC yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.28 (m, 2H), 7.21–7.17 (multiple peaks, 3H), 2.62 (t, *J* = 7.4 Hz, 2H), 2.46–2.38 (multiple peaks, 3H), 1.91 (quin, *J* = 7.4 Hz, 2H), 1.66 (sept, *J* = 7.4 Hz, 1H), 1.36 (sept, *J* = 7.4 Hz, 1H), 1.04 (d, *J* = 7.0 Hz, 3H), 0.86 (t, *J* = 7.4 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 214.59, 141.72, 128.43, 128.33, 125.87, 47.85, 40.31, 35.14, 25.90, 25.08, 15.90, 11.69. IR (thin film, mixture of E/Z isomers): 2964, 2933, 2876, 1707 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $C_{14}H_{20}O$ (mixture of E/Z isomers), 227.1412; found, 227.1411.

IV. Synthesis and Characterization of Oxime Substrates

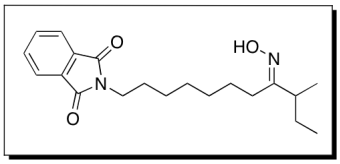
General Procedure: Ketone (1 equiv) and NH_2OH•HCl (1.35 equiv) were combined in pyridine (0.385 mL/mmol ketone) in a scintillation vial. The vial was sealed with a Teflon-lined cap, and the mixture was heated to 80 °C for 15 min or until the starting material had disappeared (as determined by TLC) after which time an aqueous layer was observable in the reaction mixture. The reaction mixture was diluted by 5-fold with EtOAc or Et_2O and washed with 20% aqueous AcOH (5 x equal volume to the organic layer) to remove pyridine. The organic layer was then neutralized with aqueous $NaHCO_3$, washed with brine, dried over $MgSO_4$, and concentrated to yield the oxime. Where noted, the oximes were obtained as mixtures of E and Z stereoisomers. In these cases, the ratio is reported based on ^{1}H NMR integration. In all cases, complete ^{1}H and ^{13}C NMR data are reported for the major isomer. In addition, all of the distinct resonances associated with the minor isomer are reported for both the ^{1}H and ^{13}C NMR spectra (many of the peaks for the minor isomer are coincidentally overlapping with those of the major isomer).



Oxime 7. The general procedure was followed utilizing ketone **6** (4.68 g, 22.9 mmol). The product was obtained as a pale yellow oil consisting of a ~3.3:1 mixture of major and minor oxime stereoisomers (4.99 g, 99% yield). Major Isomer: ^{1}H NMR (400 MHz, $CDCl_3$): δ 8.05 (br s, 1H), 7.28 (m, 2H), 7.21–7.18 (multiple peaks, 3H), 2.68 (t, *J* = 7.6 Hz, 2H), 2.37–2.21 (multiple peaks, 3H), 1.88 (m, 2H), 1.52 (m, 1H), 1.37 (m, 1H), 1.06 (d, *J* = 7.2 Hz, 3H), 0.87 (t, *J* = 7.6 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 164.43, 141.90, 128.35, 128.26, 125.78, 40.55, 36.33, 27.51, 26.96, 26.46, 17.61, 11.81. Minor Isomer (distinct resonances): ^{1}H NMR (400 MHz, $CDCl_3$): δ 3.21 (sextet, *J* = 7.2 Hz, 1H), 2.18 (m, 2H), 1.04 (d, *J* = 7.2 Hz, 3H), 0.88 (t, *J* = 7.2 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 163.95, 141.91, 128.41, 125.74, 35.55, 33.36, 29.67, 27.56, 26.40, 16.51, 12.13. IR (thin film, mixture of E/Z isomers): 3251, 2962, 2931, 2874, 1453 cm^{-1}. HRMS electrospray (m/z): $[M+H]^+$ calcd for $C_{14}H_{22}NO$ (mixture of E/Z isomers), 220.1701; found, 220.1698.

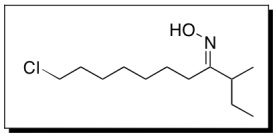


Oxime S1. The general procedure was followed utilizing 3-methyl-2-pentanone (2.00 g, 20.0 mmol). The product was obtained as a colorless oil consisting of an ~8:1 mixture of major and minor oxime stereoisomers (1.90 g, 83% yield). Major Isomer: ^{1}H NMR (400 MHz, $CDCl_3$): δ 8.20 (br s, 1H), 2.28 (sext, *J* = 7.2 Hz, 1H), 1.81 (s, 3H), 1.52 (m, 1H), 1.40 (m, 1H), 1.07 (d, *J* = 7.2 Hz, 3H), 0.86 (t, *J* = 7.6 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 161.97, 41.20, 26.80, 17.49, 11.76, 10.36. Minor Isomer (distinct resonances): ^{1}H NMR (400 MHz, $CDCl_3$): δ 3.30 (m, 1H), 1.78 (s, 3H), 1.03 (d, *J* = 6.8 Hz, 3H), 0.89 (t, *J* = 7.4 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 32.53, 26.46, 16.60, 15.32, 11.93. IR (thin film, mixture of E/Z isomers): 3230, 2963, 2932, 2876, 1460 cm^{-1}. HRMS electron impact (m/z): $[M]^+$ calcd for $C_6H_{13}NO$ (mixture of E/Z isomers), 115.0997; found, 115.1001.

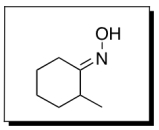


Oxime S2. The general procedure was followed utilizing 2-(9-methyl-8-oxoundecyl)isoindoline-1,3-dione (4.00 g, 12.1 mmol). The product was obtained

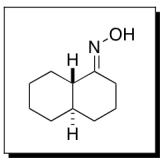
as a pale yellow solid consisting of a ~3.4:1 mixture of major and minor oxime stereoisomers (3.68 g, 88% yield, mp = 39–43 °C). Major Isomer: ^{1}H NMR (400 MHz, $CDCl_3$): δ 8.90 (br s, 1H), 7.76 (dd, *J* = 5.6, 3.2 Hz, 2H), 7.68 (dd, *J* = 5.6, 3.2 Hz, 2H), 3.65 (t, *J* = 7.6 Hz, 2H), 2.28–2.18 (multiple peaks, 3H), 1.65 (m, 2H), 1.57–1.45 (multiple peaks, 3H), 1.33 (br s, 7H), 1.04 (d, *J* = 7.2 Hz, 3H), 0.85 (t, *J* = 7.2 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 168.41, 164.76, 133.77, 132.10, 123.09, 40.48, 37.96, 29.98, 28.80, 28.48, 26.98, 26.68, 26.59, 25.82, 17.60, 11.77. Minor Isomer (distinct resonances): ^{1}H NMR (400 MHz, $CDCl_3$): δ 3.18 (sext, *J* = 7.2 Hz, 1H), 2.09 (m, 2H), 1.02 (d, *J* = 7.2, 3H), 0.86 (t, *J* = 7.2 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 164.19, 33.27, 29.30, 28.85, 28.45, 26.59, 26.40, 26.02, 16.53, 12.10. IR (KBr, mixture of E/Z isomers): 3252, 2931, 2858, 1768, 1716, 1394 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{20}H_{28}N_2O_3$ (mixture of E/Z isomers), 367.1998; found, 367.2007.



Oxime S3. The general procedure was followed utilizing 11-chloro-3-methylundecan-4-one (2.11 g, 9.64 mmol). The product was obtained as a colorless oil consisting of a ~6:1 mixture of major and minor oxime stereoisomers (612 mg, 27% yield). Major Isomer: ^{1}H NMR (400 MHz, $CDCl_3$): δ 3.53 (t, *J* = 6.8 Hz, 2H), 2.29–2.22 (multiple peaks, 3H), 1.77 (quin, *J* = 6.8 Hz, 2H), 1.62–1.50 (multiple peaks, 3H), 1.48–1.31 (multiple peaks, 7H), 1.07 (d, *J* = 6.8 Hz, 3H), 0.88 (*J* = 7.6 Hz, 3H). Exchangeable proton (OH) was not observed. ^{13}C{^{1}H} NMR ($CDCl_3$): δ 165.12, 45.10, 40.55, 32.57, 29.99, 28.54, 27.03, 26.74, 26.57, 25.86, 17.67, 11.83. Minor Isomer (distinct resonances): ^{1}H NMR (400 MHz, $CDCl_3$): δ 3.21 (sext, *J* = 7.2 Hz, 1H), 2.13 (m, 2H), 1.05 (d, *J* = 7.2 Hz, 3H), 0.89 (t, *J* = 7.6 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 33.36, 30.05, 29.35, 28.65, 26.77, 26.47, 26.12, 12.15. IR (thin film, mixture of E/Z isomers): 3250, 2961, 2931, 2858, 1457 cm^{-1}. HRMS electrospray (m/z): $[M+H]^+$ calcd for $C_{12}H_{25}ClNO$ (mixture of E/Z isomers), 234.1625; found, 234.1624.

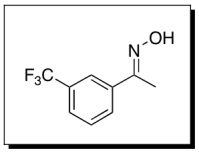


Oxime S4. The general procedure was followed utilizing 2-methylcyclohexanone (1.35 g, 12.0 mmol). The product was obtained as a pale yellow oil consisting of a ~5:1 mixture of major and minor oxime stereoisomers (1.37 g, 90% yield). Major Isomer: ^{1}H NMR (500 MHz, $CDCl_3$): δ 8.82 (br s, 1H), 3.09 (m, 1H), 2.31 (m, 1H), 1.94–1.84 (multiple peaks, 2H), 1.78 (m, 2H), 1.48 (m, 2H), 1.31 (m, 1H), 1.12 (d, *J* = 7.0 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 163.49, 37.16, 35.57, 26.02, 24.67, 23.82, 16.82. Minor Isomer (distinct resonances): ^{1}H NMR (500 MHz, $CDCl_3$): δ 9.12 (br s, 1H), 3.58 (m, 1H), 2.22 (m, 2H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 31.57, 28.27, 26.63, 20.33, 16.21. IR (thin film, mixture of E/Z isomers): 3270, 2963, 2927, 2856, 1444 cm^{-1}. HRMS electron impact (m/z): $[M]^+$ calcd for $C_7H_{13}NO$ (mixture of E/Z isomers), 127.0997; found, 127.1001.

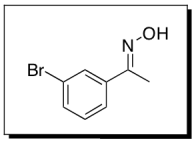


Oxime S5. The general procedure was followed utilizing *trans*-1-decalone (4.58 g, 30.1 mmol). The product was obtained as a white fluffy solid consisting of a single oxime isomer (4.77 g, 95% yield, mp = 157–158 °C). ^{1}H NMR (500 MHz, $CDCl_3$): δ 3.42 (dddd, *J* = 13.8, 4.4, 2.7, 2.0 Hz, 1H), 1.94 (m, 1H), 1.88 (m, 1H), 1.82–1.74 (multiple peaks, 2H), 1.72–1.67 (multiple peaks, 3H), 1.61 (td, *J* = 13.8, 5.0 Hz, 1H), 1.43 (qt, *J* = 13.0, 4.0 Hz, 1H), 1.35–1.16 (multiple peaks, 5H), 1.08 (m, 1H).

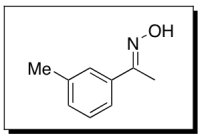
Exchangeable proton (OH) was not observed. $^{13}C\{^{1}H\}$ NMR ($CDCl_3$): δ 162.22, 47.63, 44.20, 34.26, 33.59, 26.63, 25.95, 25.90, 25.33, 24.77. IR (KBr): 3226, 2161, 2923, 2847, 1439 cm^{-1}. HRMS electrospray (m/z): $[M]^+$ calcd for $C_{10}H_{17}NO$, 167.1310; found, 167.1310.



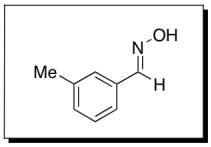
Oxime S6. The general procedure was followed utilizing 3'-(trifluoromethyl)acetophenone (759 mg, 4.03 mmol). The product was obtained as a white solid consisting of a single oxime isomer (789 mg, 96% yield, mp = 58–60 °C). ^{1}H NMR (500 MHz, $CDCl_3$): δ 9.41 (s, 1H), 7.89 (s, 1H), 7.82 (d, *J* = 8.0 Hz, 1H), 7.64 (d, *J* = 8.0 Hz, 1H), 7.51 (t, *J* = 8.0 Hz, 1H), 2.33 (s, 3H). $^{13}C\{^{1}H\}$ NMR ($CDCl_3$): δ 155.09, 137.27, 130.99 (q, *J* = 32.7 Hz), 129.24 (q, *J* = 1.1 Hz), 129.02, 125.83 (q, *J* = 3.8 Hz), 123.94 (q, *J* = 272.5 Hz), 122.95 (q, *J* = 3.8 Hz), 12.22. ^{19}F NMR ($CDCl_3$): δ –62.8. IR (KBr): 3256, 3086, 2924, 1465 cm^{-1}. HRMS electrospray (m/z): $[M+H]^+$ calcd for $C_9H_8F_3NO$, 204.0636; found, 204.0636.



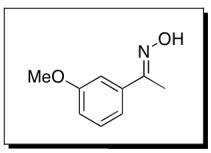
Oxime S7. The general procedure was followed utilizing 3'-bromoacetophenone (2.99 g, 15.0 mmol). The product was obtained as a white solid consisting of a single oxime isomer (3.17 g, 99% yield, mp = 92–93 °C). ^{1}H NMR (500 MHz, $CDCl_3$): δ 8.69 (s, 1H), 7.77 (t, *J* = 1.7 Hz, 1H), 7.56 (m, 1H), 7.51 (ddd, *J* = 7.8, 1.7, 1.0 Hz, 1H), 7.257 (t, *J* = 7.8 Hz, 1H), 2.28 (s, 3H). $^{13}C\{^{1}H\}$ NMR ($CDCl_3$): δ 154.98, 138.42, 132.19, 130.00, 129.16, 124.61, 122.68, 12.27. IR (KBr): 3239, 2912, 1418 cm^{-1}. HRMS electron impact (m/z): $[M]^+$ calcd for C_8H_8BrNO 212.9789; found, 212.9790.



Oxime S8. The general procedure was followed utilizing 3'-methylacetophenone (2.01 g, 15.0 mmol). The product was obtained as a white solid consisting of a single oxime isomer (1.71 g, 76% yield, mp = 51–52 °C). ^{1}H NMR (500 MHz, $CDCl_3$): δ 8.09 (s, 1H), 7.45 (br s, 1H), 7.42 (br d, *J* = 8 Hz, 1H), 7.27 (t, *J* =8 Hz, 1H), 7.19 (br d, *J* = 8 Hz, 1H), 2.38 (s, 3H), 2.28 (s, 3H). $^{13}C\{^{1}H\}$ NMR ($CDCl_3$): δ 156.15, 138.12, 136.44, 130.00, 128.39, 126.70, 123.21, 21.44, 12.44. IR (KBr): 3215, 2041, 2920, 1490, 1456 cm^{-1}. HRMS electron impact (m/z): $[M]^+$ calcd for $C_9H_{11}NO$, 149.0841; found, 149.0837.

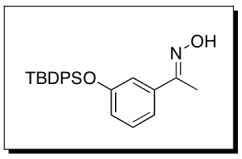


Oxime S9. The general procedure was followed utilizing *m*-tolualdehyde (1.80 g, 15.0 mmol). The product was obtained as a pale yellow solid consisting of a single oxime isomer (1.88 g, 93% yield, mp = 51–53 °C). ^{1}H NMR (500 MHz, $CDCl_3$): δ 8.13 (s, 1H), 8.08 (s, 1H), 7.41 (br s, 1H), 7.38 (br d, *J* = 7.6 Hz, 1H), 7.28 (t, *J* = 7.6 Hz, 1H), 7.21 (br d, *J* = 7.6 Hz, 1H), 2.38 (s, 3H). $^{13}C\{^{1}H\}$ NMR ($CDCl_3$): δ 150.47, 138.49, 131.76, 130.90, 128.66, 127.53, 124.30, 21.28. IR (KBr): 3167, 3087, 2986, 2872, 2777, 1492, 1477 cm^{-1}. HRMS electron impact (m/z): $[M]^+$ calcd for $CHNO$, 135.0684; found, 135.0679.

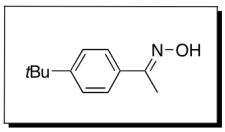


Oxime S10. The general procedure was followed utilizing 3'-methoxyacetophenone (2.25 g, 15.0 mmol). The product was obtained as a colorless oil consisting of a single oxime isomer (2.26 g, 91% yield). ^{1}H NMR (500 MHz, DMSO): δ 11.21 (s, 1H), 7.30 (t, *J* = 8.1 Hz, 1H),

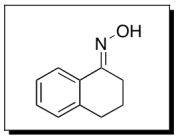
7.21 (m, 1H), 7.18 (m, 1H), 6.94 (ddd, J = 8.1, 2.4, 1.0 Hz, 1H), 3.77 (s, 3H), 2.14 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 159.62, 156.02, 137.90, 129.48, 118.61, 115.09, 111.31, 55.29, 12.26. IR (thin film): 3228, 2938, 2836, 1578, 1427 cm^{-1}. HRMS electron impact (m/z): $[M]^+$ calcd for $C_9H_{11}NO_2$, 165.0790; found, 165.0790.



Oxime S11. The general procedure was followed utilizing TBDPS-protected 3'-hydroxyacetophenone (4.39 g, 11.7 mmol). The product was obtained as a white solid consisting of a single oxime isomer (4.30 g, 94% yield, mp = 89–93 °C). ^1H NMR (400 MHz, $CDCl_3$): δ 8.55 (br s, 1H), 7.75–7.72 (multiple peaks, 4H), 7.46–7.36 (multiple peaks, 6H), 7.16 (dt, J = 8.0, 1.2 Hz, 1H), 7.08–7.04 (multiple peaks, 2H), 6.72 (ddd, J = 8.0, 2.4, 1.2 Hz, 1H), 2.09 (s, 3H), 1.13 (s, 9H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 155.77, 155.65, 137.70, 135.51, 132.76, 129.94, 129.18, 127.80, 120.44, 118.69, 117.68, 26.53, 19.47, 12.02. IR (KBr): 3214, 3070, 2934, 2859, 1580, 1427 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $C_{24}H_{27}NO_2Si$, 412.1709; found, 412.1699.



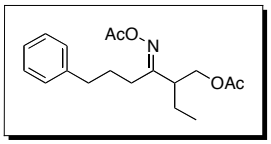
Oxime S12. The general procedure was followed utilizing 4'-*tert*-butylacetophenone (3.00 g, 17.0 mmol). The product was obtained as a white solid consisting of a single oxime isomer (3.20 g, 98% yield, mp = 100–101 °C). ^1H NMR (500 MHz, $CDCl_3$): δ 7.81 (s, 1H), 7.57 (d, J = 6.8 Hz, 2H), 7.40 (d, J = 6.8 Hz, 2H), 2.28 (s, 3H), 1.33 (s, 9H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 155.83, 152.43, 133.66, 125.75, 125.44, 34.67, 31.20, 12.18. IR (KBr): 3243, 2965, 1457 cm^{-1}. HRMS electrospray (m/z): $[M+H]^+$ calcd for $C_{12}H_{18}NO$, 192.1388; found, 192.1381.



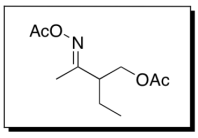
Oxime S13. The general procedure was followed utilizing α-tetralone (2.00 g, 13.7 mmol). The product was obtained as a red-brown solid consisting of a single oxime isomer (1.99 g, 90% yield, mp = 95–96 °C). ^1H NMR (400 MHz, $CDCl_3$): δ 8.06 (br s, 1H), 7.89 (dd, J = 7.4, 1.2 Hz, 1H), 7.27 (ddd, J = 7.4, 7.4, 1.2 Hz, 1H), 7.23–7.14 (multiple peaks, 2H), 2.82 (t, J = 6.7 Hz, 2H), 2.77 (t, J =5.3 Hz, 2H), 1.88 (m, 2H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 155.38, 139.81, 130.40, 129.21, 128.66, 126.47, 124.02, 29.78, 23.84, 21.27. IR (KBr): 3194, 3063, 2935, 1486, 1450 cm^{-1}. HRMS electron impact (m/z): $[M]^+$ calcd for $C_{10}H_{11}NO$, 161.0841; found, 161.0835.

V. Synthesis and Characterization of Acetoxylated Products

General Procedure: The oxime substrate was dissolved in 1:1 AcOH/Ac_2O in a loosely capped 20 mL scintillation vial or a larger pressure vessel. This solution was stirred at room temperature for 2 h. $Pd(OAc)_2$ and $PhI(OAc)_2$ were added, and the reaction vessel was sealed with a Teflon-lined cap or a Teflon bushing. The reaction was then heated at 80 or 100 °C for 12 h (unless otherwise noted). The resulting mixture was filtered through glass wool, diluted with EtOAc (2 x volume of reaction solvent), and washed several times with equal volumes of saturated $NaHCO_3$ until the aqueous solution was no longer acidic. The organic layer was then washed with brine, dried over $MgSO_4$, and concentrated to give the crude product, which was purified by chromatography on silica gel. Where noted, the oximes were obtained as mixtures of E and Z stereoisomers. In these cases, the ratio is reported based on ^1H NMR integration. In all cases, complete ^1H and ^{13}C NMR data are reported for the major isomer. In addition, all of the distinct resonances associated with the minor isomer are shown for both the ^1H and ^{13}C NMR spectra (many of the peaks for the minor isomer are coincident with those of the major isomer). All other characterization (HRMS, IR, melting point) was carried out on a mixture of the oxime E/Z isomers.

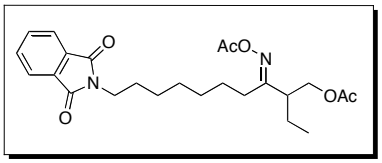


Acetoxylated Product 9. The general procedure was followed utilizing substrate **7** (2.00 g, 9.12 mmol, 1 equiv), $Pd(OAc)_2$ (102 mg, 0.456 mmol, 0.05 equiv), $PhI(OAc)_2$ (6.06 g, 18.2 mmol, 2 equiv), AcOH (38 mL), and Ac_2O (38 mL), with heating at 100 °C. Product **9** was obtained as a pale yellow oil consisting of a ~3:1 mixture of major and minor oxime stereoisomers (1.44 g, 49% yield, R_f = 0.20 in 80% hexanes/20% EtOAc). Major Isomer: ^1H NMR (500 MHz, $CDCl_3$): δ 7.30 (m, 2H), 7.22–7.17 (multiple peaks, 3H), 4.21 (dd, *J* = 11.2, 5.6 Hz, 1H), 4.12 (dd, *J* = 11.2, 8.3 Hz, 1H), 2.70–2.66 (multiple peaks, 3H), 2.32 (t, *J* = 8.3 Hz, 2H), 2.09 (s, 3H), 2.01 (s, 3H), 1.88–1.82 (multiple peaks, 2H), 1.62–1.53 (multiple peaks, 2H), 0.92 (t, *J* = 7.3 Hz, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 170.70, 168.88, 168.64, 140.94, 128.40, 128.30, 126.09, 64.39, 45.51, 35.85, 27.84, 27.43, 22.15, 20.77, 19.60, 11.39. Minor Isomer (distinct resonances): ^1H NMR (500 MHz, $CDCl_3$): δ 3.32 (m, 1H), 2.17 (s, 3H), 1.99 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 128.36, 125.88, 64.04, 41.43, 35.40, 31.25, 27.58, 21.77, 19.68, 11.89. IR (thin film, mixture of E/Z isomers): 2966, 1740 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{18}H_{25}NO_4$ (mixture of E/Z isomers), 342.1681; found, 342.1674.

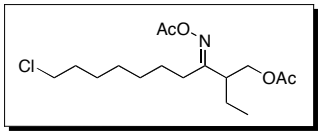


Acetoxylated Product S14. The general procedure was followed utilizing substrate **S1** (1.90 g, 16.5 mmol, 1 equiv), $Pd(OAc)_2$ (185 mg, 0.825 mmol, 0.05 equiv), $PhI(OAc)_2$ (7.97 g, 24.75 mmol, 1.5 equiv), AcOH (60 mL), and Ac_2O (60 mL), with heating at 100 °C. Product **S14** was obtained as a pale yellow oil consisting of an ~11:1 mixture of major and minor oxime stereoisomers (2.17 g, 61% yield, R_f = 0.28 in 70% hexanes/30% EtOAc). Major Isomer: ^1H NMR (500 MHz, $CDCl_3$): δ 4.22–4.06 (multiple peaks, 2H), 2.76 (dddd, *J* = 7.9, 7.9, 6.2, 6.2 Hz, 1H), 2.17 (s, 3H), 2.03 (s, 3H), 1.92 (s, 3H), 1.64–1.47 (multiple peaks, 2H), 0.92 (t, *J* = 7.6 Hz, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 170.79, 168.68, 166.00, 64.14, 45.97, 21.73, 20.80, 19.68, 12.39, 11.33. Minor Isomer (distinct resonances): ^1H NMR (500 MHz, $CDCl_3$): δ 3.54 (m, 1H), 2.15 (s, 3H),

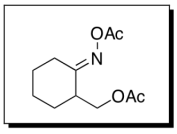
2.03 (s, 3H), 1.98 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 63.94, 40.17, 21.51, 19.57, 16.31, 11.58. IR (thin film, mixture of E/Z isomers): 2967, 2938, 2880, 1739, 1366 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{10}H_{17}NO_4$ (mixture of E/Z isomers), 238.1055; found, 238.1059.



Acetoxylated Product S15. The general procedure was followed utilizing substrate **S2** (325 mg, 0.944 mmol, 1 equiv), $Pd(OAc)_2$ (10.6 mg, 0.047 mmol, 0.05 equiv), $PhI(OAc)_2$ (608 mg, 1.89 mmol, 2 equiv), AcOH (3.9 mL), and Ac_2O (3.9 mL), with heating at 100 °C. Product **S15** was obtained as an orange oil consisting of a ~3.6:1 mixture of major and minor oxime stereoisomers (272 mg, 65% yield, R_f = 0.29 in 65% hexanes/35% EtOAc). Major Isomer: ^1H NMR (400 MHz, $CDCl_3$): δ 7.79 (dd, *J* = 5.6, 3.2 Hz, 2H), 7.67 (dd, *J* = 5.6, 3.2 Hz, 2H), 4.17 (dd, *J* = 11.2, 6.0 Hz, 1H), 4.17 (dd, *J* = 11.2, 8.0 Hz, 1H), 3.63 (t, *J* = 7.2 Hz, 2H), 2.64 (dddd, *J* = 7.6, 7.6, 6.4, 6.4 Hz, 1H), 2.31–2.18 (multiple peaks, 2H), 2.12 (s, 3H), 1.98 (s, 3H), 1.67–1.42 (multiple peaks, 6H), 1.31 (br s, 6H), 0.883 (t, *J* = 7.6 Hz, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 170.62, 168.98, 168.70, 168.27, 133.77, 131.97, 123.00, 64.38, 45.39, 37.73, 29.62, 28.53, 28.41, 28.34, 26.47, 25.78, 22.16, 20.71, 19.66, 11.32. Minor Isomer (distinct resonances): ^1H NMR (400 MHz, $CDCl_3$): δ 3.31 (dddd, *J* = 8.8, 8.8, 6.2, 6.2 Hz, 1H), 2.15 (s, 3H), 2.04 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 170.56, 168.48, 168.32, 133.72, 64.02, 41.42, 37.78, 31.84, 29.22, 28.73, 26.57, 25.88, 21.75, 20.69, 19.62. IR (thin film, mixture of E/Z isomers): 2934, 2860, 1766, 1742, 1708 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{24}H_{32}N_2O_6$ (mixture of E/Z isomers), 467.2158; found, 467.2163.

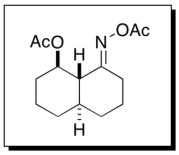


Acetoxylated Product S16. The general procedure was followed utilizing substrate **S3** (500 mg, 1.80 mmol, 1 equiv), $Pd(OAc)_2$ (20.2 mg, 0.090 mmol, 0.05 equiv), $PhI(OAc)_2$ (1.16 g, 3.60 mmol, 2 equiv), AcOH (7.5 mL), and Ac_2O (7.5 mL), with heating at 100 °C. Product **S16** was obtained as a pale yellow oil consisting of a ~3:1 mixture of major and minor oxime stereoisomers (330 mg, 48% yield, R_f = 0.27 in 77% hexanes/23% EtOAc). Major Isomer: ^1H NMR (500 MHz, $CDCl_3$): δ 4.22 (dd, *J* = 11.2, 5.9 Hz, 1H), 4.17 (dd, *J* = 11.2, 8.1 Hz, 1H), 3.53 (t, *J* = 6.8 Hz, 2H), 2.69 (m, 1H), 2.35–2.26 (multiple peaks, 2H), 2.18 (s, 3H), 2.03 (s, 3H), 1.80–1.73 (multiple peaks, 2H), 1.65–1.57 (multiple peaks, 2H), 1.55–1.48 (multiple peaks, 2H), 1.47–1.40 (multiple peaks, 2H), 1.40–1.32 (multiple peaks, 4H), 0.94 (t, *J* = 7.3 Hz, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 170.78, 168.98, 168.93, 64.53, 45.55, 45.00, 32.46, 29.75, 28.57, 28.41, 26.64, 25.88, 22.34, 20.86, 19.81, 11.45. Minor Isomer (distinct resonances): ^1H NMR (500 MHz, $CDCl_3$): δ 3.32 (dddd, *J* = 8.8, 6.1 Hz, 1H), 2.16 (s, 3H), 2.03 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 64.17, 49.98, 45.06, 41.56, 31.93, 29.31, 26.71, 25.98, 21.91, 20.83, 19.74, 11.98. IR (thin film, mixture of E/Z isomers): 2934, 2859, 1741 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{16}H_{28}ClNO_4$ (mixture of E/Z isomers), 356.1605; found, 356.1610.

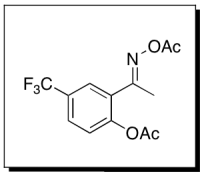


Acetoxylated Product S17. The general procedure was followed utilizing substrate **S4** (150 mg, 1.18 mmol, 1 equiv), $Pd(OAc)_2$ (13.2 mg, 0.059 mmol, 0.05 equiv), $PhI(OAc)_2$ (570 mg, 1.77

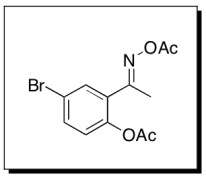
mmol, 1.5 equiv), AcOH (4.9 mL), and Ac_2O (4.9 mL), with heating at 100 °C. Product **S17** was obtained as a pale orange oil consisting of a ~4:1 mixture of major and minor oxime stereoisomers (177 mg, 66% yield, R_f = 0.21 (major) and 0.29 (minor) in 72% hexanes/28% EtOAc). Major Isomer: ^{1}H NMR (500 MHz, $CDCl_3$): δ 4.49 (dd, *J* = 11.0, 6.6 Hz, 1H), 4.13 (dd, *J* = 11.0, 7.3 Hz, 1H), 2.79–2.72 (multiple peaks, 2H), 2.34 (ddd, *J* = 13.9, 9.0, 4.6 Hz, 1H), 2.16 (s, 3H), 2.05 (s, 3H), 1.98 (m, 1H), 1.74–1.53 (multiple peaks, 5H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 170.93, 169.27, 167.57, 63.92, 41.40, 29.89, 25.92, 25.63, 23.19, 20.87, 19.77. Minor Isomer (distinct resonances): ^{1}H NMR (500 MHz, $CDCl_3$): δ 4.26–4.18 (multiple peaks, 2H), 3.76 (br m, 1H), 2.59 (br d, *J* = 15.0 Hz, 1H), 2.14 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 170.72, 168.61, 167.83, 63.05, 34.25, 27.05, 26.34, 20.79, 20.69, 19.56. IR (thin film, mixture of E/Z isomers): 2939, 2863, 1762, 1736 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{11}H_{17}NO_4$ (mixture of E/Z isomers), 250.1055; found, 250.1044.



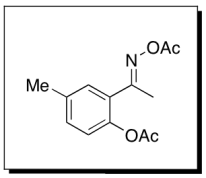
Acetoxylated Product S18. The general procedure was followed utilizing substrate **S5** (1.32 g, 7.87 mmol, 1 equiv), $Pd(OAc)_2$ (88.3 mg, 0.394 mmol, 0.05 equiv), $PhI(OAc)_2$ (7.60 g, 23.6 mmol, 3 equiv), AcOH (33 mL), and Ac_2O (33 mL), with heating at 100 °C. Product **S18** was obtained as a pale orange waxy solid consisting of a single oxime isomer (922 mg, 44% yield, R_f = 0.25 in 77% hexanes/23% EtOAc, mp = 69–74 °C). ^{1}H NMR (400 MHz, $CDCl_3$): δ 5.14 (ddd, *J* = 10.9, 10.9, 4.7 Hz, 1H), 3.32 (br d, *J* = 13.1 Hz, 1H), 2.14 (s, 3H), 2.02 (s, 3H), 1.96–1.65 (multiple peaks, 6H), 1.52–1.22 (multiple peaks, 6H), 1.10 (m, 1H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 170.45, 166.25, 69.92, 52.20, 43.66, 33.08, 33.00, 31.53, 27.41, 25.87, 23.02, 21.20, 19.98. Two ^{13}C resonances are coincidentally overlapping. IR (KBr): 2939, 2863, 1760, 1742, 1637, 1448 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{14}H_{21}NO_4$, 290.1368; found, 290.1379.



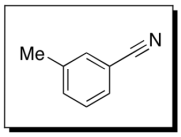
Acetoxylated Product S19. The general procedure was followed utilizing substrate **S6** (250 mg, 1.23 mmol, 1 equiv), $Pd(OAc)_2$ (27.6 mg, 0.123 mmol, 0.10 equiv), $PhI(OAc)_2$ (792 mg, 2.46 mmol, 2 equiv), AcOH (5.1 mL), and Ac_2O (5.1 mL), with heating at 80 °C for 24 h. Product **S19** was obtained as a pale yellow oil consisting of a ~16:1 mixture of major and minor oxime stereoisomers (227 mg, 61% yield, R_f = 0.21 in 80% hexanes/20% EtOAc). The minor isomer was assigned as a stereoisomer (not a regioisomer) by analogy to compounds **S21** and **S23** (in the current paper) as well as based on the previously reported analogous reactions of oxime ether[1] and 2-phenylpyridine-based substrates.[2] Major Isomer: ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.73 (d, *J* = 2.0 Hz, 1H), 7.69 (dd, *J* = 8.4, 2.0 Hz, 1H), 7.30 (d, *J* = 8.4 Hz, 1H), 2.34 (s, 3H), 2.33 (s, 3H), 2.24 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 168.72, 168.02, 160.63, 150.63 (q, *J* = 1.1 Hz), 129.45, 128.45 (q, *J* = 33.4 Hz), 127.81 (q, *J* = 3.5 Hz), 126.95 (q, *J* = 3.5 Hz), 124.05, 123.39 (q, *J* = 272.4 Hz), 21.01, 19.57, 16.57. ^{19}F NMR ($CDCl_3$): δ –62.41. Minor Isomer (distinct resonances): ^{1}H NMR (400 MHz, $CDCl_3$): δ 2.39 (s, 3H), 2.04 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 128.62, 126.36, 21.85, 19.36. IR (thin film, mixture of E/Z isomers): 3075, 2940, 1766 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{13}H_{12}F_3NO_4$ (mixture of E/Z isomers), 326.0616; found, 326.0614.



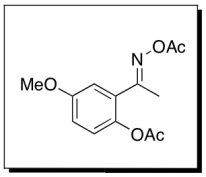
Acetoxylated Product S20. The general procedure was followed utilizing substrate **S7** (1.50 g, 7.01 mmol, 1 equiv), $Pd(OAc)_2$ (78.7 mg, 0.351 mmol, 0.05 equiv), $PhI(OAc)_2$ (2.48 g, 7.71 mmol, 1.1 equiv), AcOH (29 mL), and Ac_2O (29 mL), with heating at 80 °C. Product **S20** was obtained as a pale yellow oil consisting of a ~12:1 mixture of major and minor oxime stereoisomers (1.89 g, 86% yield, R_f = 0.29 in 77% hexanes/23% EtOAc). The minor isomer was assigned as a stereoisomer (not a regioisomer) by analogy to compounds **S21** and **S23** (in the current paper) as well as based on the previously reported analogous reactions of oxime ether[1] and 2-phenylpyridine-based substrates.[2] Major Isomer: ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.61 (d, *J* = 2.8 Hz, 1H), 7.54 (dd, *J* = 8.6, 2.8 Hz, 1H), 7.04 (d, *J* = 8.6 Hz, 1H), 2.30 (app. s, 6H), 2.24 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 168.90, 168.06, 160.49, 147.13, 133.68, 132.31, 130.41, 124.96, 119.00, 20.97, 19.57, 16.48. Minor Isomer (distinct resonances): 2.31 (s, 3H), 2.22 (s, 3H), 1.98 (s, 3H). IR (thin film, mixture of E/Z isomers): 2932, 1762 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{12}H_{12}BrNO_4$ (mixture of E/Z isomers), 335.9847; found, 335.9847.



Acetoxylated Product S21. The general procedure was followed utilizing substrate **S8** (800 mg, 5.36 mmol, 1 equiv), $Pd(OAc)_2$ (60.2 mg, 0.268 mmol, 0.05 equiv), $PhI(OAc)_2$ (1.90 g, 5.90 mmol, 1.1 equiv), AcOH (22 mL), and Ac_2O (22 mL), with heating at 80 °C. Product **S21** was obtained as a pale orange waxy solid consisting of an ~8:1 mixture of major and minor oxime stereoisomers (962 mg, 72% yield, R_f = 0.24 in 77% hexanes/23% EtOAc, mp = 57–65 °C). The minor isomer was assigned as a stereoisomer (not a regioisomer) on the basis of the fact that hydrolysis led to a single ketone product **S30**. Major Isomer: ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.27 (s, 1H), 7.22 (d, *J* = 8.0 Hz, 1H), 7.02 (d, *J* = 8.0 Hz, 1H), 2.36 (s, 3H), 2.30 (s, 3H), 2.29 (s, 3H), 2.23 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 169.53, 168.45, 161.89, 145.88, 135.87, 131.48, 130.01, 128.23, 122.96, 21.08, 20.79, 19.71, 16.67. Minor Isomer (distinct resonances): 2.38 (s, 3H), 2.22 (s, 3H), 1.99 (s, 3H). IR (KBr, mixture of E/Z isomers): 2942 1758 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{13}H_{15}NO_4$ (mixture of E/Z isomers), 272.0899; found, 272.0892.

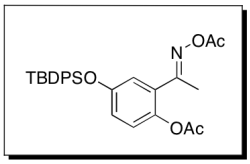


Benzonitrile Product S22. The general procedure was followed utilizing substrate **S9** (30 mg, 0.222 mmol, 1 equiv), $Pd(OAc)_2$ (2.5 mg, 0.011 mmol, 0.05 equiv), $PhI(OAc)_2$ (78.7 mg 0.244 mmol, 1.1 equiv), AcOH (920 μL), and Ac_2O (920 μL), with heating at 80 °C for 4 h. The calibrated GC yield (77%) was obtained by comparing to an authentic sample of commercially available **S22.**

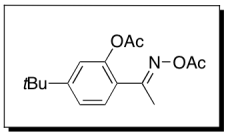


Acetoxylated Product S23. The general procedure was followed utilizing substrate **S10** (1.50 g, 9.08 mmol, 1 equiv), $Pd(OAc)_2$ (102 mg, 0.454 mmol, 0.05 equiv), $PhI(OAc)_2$ (3.22 g, 9.99 mmol, 1.1 equiv), AcOH (38 mL), and Ac_2O (38 mL), with heating at 80 °C for 4 h. Product **S23** was obtained as an orange oil consisting of a ~20:1 mixture of major and minor oxime stereoisomers (1.78 g, 74% yield, R_f = 0.23 in 70% hexanes/30% EtOAc). The minor isomer was assigned as a stereoisomer (not a regioisomer) on the basis of the fact that hydrolysis led to a single ketone product. Major Isomer:

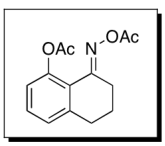
^{1}H NMR (400 MHz, $CDCl_3$): δ 7.04 (d, *J* = 8.8 Hz, 1H), 6.97–6.92 (multiple peaks, 2H), 3.80 (s, 3H), 2.30 (s, 3H), 2.28 (s, 3H), 2.23 (s, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 169.70, 168.36, 161.58, 157.12, 141.50, 129.27, 124.07, 115.97, 114.59, 55.70, 20.98, 19.66, 16.58. Minor Isomer (distinct resonances): ^{1}H NMR (400 MHz, $CDCl_3$): δ 3.83 (s, 3H), 2.31 (s, 3H), 2.20 (s, 3H), 1.97 (s, 3 3H). IR (thin film, mixture of E/Z isomers): 2938, 1760 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{13}H_{15}NO_5$ (mixture of E/Z isomers), 288.0848; found, 288.0851.



Acetoxylated Product S24. The general procedure was followed utilizing substrate **S11** (200 mg, 0.513 mmol, 1 equiv), $Pd(OAc)_2$ (5.8 mg, 0.026 mmol, 0.05 equiv), $PhI(OAc)_2$ (182 mg, 0.564 mmol, 1.1 equiv), AcOH (2.1 mL), and Ac_2O (2.1 mL), with heating at 80 °C for 10 h. Product **S24** was obtained as pale yellow viscous oil consisting of a ~19:1 mixture of major and minor oxime stereoisomers (198 mg, 79% yield, R_f = 0.25 in 80% hexanes/20% EtOAc). The minor isomer was assigned as a stereoisomer (not a regioisomer) by analogy to compounds **S21** and **S23** (in the current paper). Major Isomer: ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.70–7.68 (multiple peaks, 4H), 7.45–7.35 (multiple peaks, 6H), 6.82–6.80 (multiple peaks, 2H), 6.72 (dd, *J* = 8.8, 2.8 Hz, 1H), 2.23 (s, 3H), 2.18 (s, 3H), 2.07 (s, 3H), 1.10 (s, 9H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 169.74, 168.40, 161.18, 153.15, 141.55, 135.46, 132.26, 130.09, 128,94, 127.90, 123.78, 121.49, 120.21, 26.41, 21.00, 19.66, 19.39, 16.24. Minor Isomer (distinct resonances): ^{1}H NMR (400 MHz, $CDCl_3$): δ 2.15 (s, 3H), 2.04 (s, 3H), 1.92 (s, 3H), 1.11 (s, 9H). IR (thin film, mixture of E/Z isomers): 3074, 2933, 2859, 1765 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{28}H_{31}NO_5Si$ (mixture of E/Z isomers), 512.1869; found, 512.1865.



Acetoxylated Product 12. The general procedure was followed utilizing substrate **S12** (1.91 g, 10.0 mmol, 1 equiv), $Pd(OAc)_2$ (112 mg, 0.500 mmol, 0.05 equiv), $PhI(OAc)_2$ (3.22 g, 10.0 mmol, 1 equiv), AcOH (42 mL), and Ac_2O (42 mL), with heating at 80 °C. Product **12** was obtained as a pale orange solid consisting of an ~11:1 mixture of major and minor oxime stereoisomers (2.32 g, 80% yield, R_f = 0.29 in 77% hexanes/23% EtOAc, mp = 43–51 °C). Major Isomer: ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.41 (d, *J* = 8.1 Hz, 1H), 7.29 (dd, *J* = 8.1, 2.0 Hz, 1H), 7.11 (d, *J* = 2.0 Hz, 1H), 2.312 (s, 3H), 2.310 (s, 3H), 2.23 (s, 3H), 1.31 (s, 9H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 169.56, 168.46, 161.50, 154.96, 147.87, 129.12, 125.55, 123.14, 120.35, 34.84, 31.01, 21.14, 19.71, 16.37. Minor Isomer (distinct resonances): ^{1}H NMR (500 MHz, $CDCl_3$): δ 2.30 (s, 3H), 2.22 (s, 3H), 2.01 (s, 3H), 1.34 (s, 9H). IR (KBr, mixture of E/Z isomers): 2961, 1772 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{16}H_{21}NO_4$ (mixture of E/Z isomers), 314.1368; found, 314.1362.

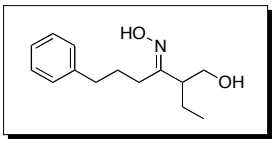


Acetoxylated Product S25. The general procedure was followed utilizing substrate **S13** (1.5 g, 9.30 mmol, 1 equiv), $Pd(OAc)_2$ (104 mg, 0.465 mmol, 0.05 equiv), $PhI(OAc)_2$ (3.30 g, 10.2 mmol, 1.1 equiv), AcOH (39 mL), and Ac_2O (39 mL), with heating at 80 °C. Product **S25** was obtained as a tan powder consisting of a single oxime isomer (1.34 g, 55% yield, R_f = 0.26 in 77% hexanes/23% EtOAc, mp = 127–128 °C). ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.33 (t, *J* = 7.8 Hz, 1H), 7.10 (dd, *J* = 7.8,

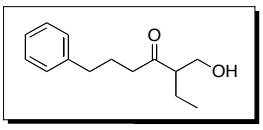
1.2 Hz, 1H), 6.96 (dd, *J* = 8.2, 1.2 Hz, 1H), 2.88 (t, *J* = 6.4 Hz, 2H), 2.78 (t, *J* = 6.4 Hz, 2H), 2.40 (s, 3H), 2.19 (s, 3H), 1.84 (m, 2H). $^{13}C\{^{1}H\}$ NMR ($CDCl_3$): δ 170.58, 167.58, 160.15, 148.92, 143.67, 130.84, 126.48, 122.39, 122.15, 30.31, 26.15, 21.37, 20.78, 19.65. IR (KBr): 2942, 1764 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{14}H_{15}NO_4$, 284.0899; found, 284.0898.

VI. Synthesis and Characterization of β- and *ortho*-Hydroxy Ketones

General Procedure For One Pot Deprotection: To a solution of the *O*-acetyl oxime in MeOH (0.46 mL/mmol oxime) in a loosely capped scintillation vial at room temperature was added finely ground K_2CO_3 (0.15 equiv every 2 h over the course of 6 h, 0.45 equiv total). $NaHSO_3$ (3.5 equiv) and H_2O (equal amount as MeOH) were then added, and the vial was sealed with a Teflon-lined cap and heated at 80 °C for 3 h.[3] The reaction mixture was concentrated by rotary evaporation to remove methanol. The remaining primarily aqueous reaction mixture was diluted with $CHCl_3$ (4 x volume of reaction solvent) and rinsed briefly with 1 *M* HCl (2 x volume of reaction solvent). The layers were separated, and the aqueous layer was extracted several times with $CHCl_3$. The combined organic extracts were neutralized with aqueous $NaHCO_3$, washed once with brine, dried over $MgSO_4$, filtered through a plug of silica, and concentrated to afford the β-hydroxyketone.

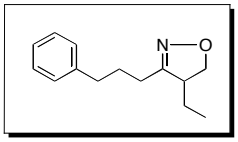


β-Hydroxyoxime 10. To a solution of acetyl oxime **9** (170 mg, 0.532 mmol, 1 equiv) in MeOH (1.16 mL) in a loosely capped scintillation vial at room temperature was added finely ground K_2CO_3 (11 mg, 0.0798 mmol, 0.15 equiv). After stirring at room temperature for 12 h, the MeOH was removed by rotary evaporation, and the crude product was purified by column chromatography to yield the unprotected β-hydroxy oxime **10** as pale yellow solid consisting of a 4:1 mixture of major and minor oxime isomers (113.4 mg, 91% yield, R_f = 0.27 and 0.19 in 60% hexanes/40% EtOAc, mp = 68–74 °C). Major Isomer: ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.95 (br s, 1H), 7.28 (m, 2H), 7.20–7.17 (multiple peaks, 3H), 3.70 (m, 2H), 2.67 (t, *J* = 7.8 Hz, 2H), 2.48 (m, 1H), 2.31–2.19 (multiple peaks, 2H), 1.87 (m, 2H), 1.53 (quint, *J* = 7.4 Hz, 2H), 0.91 (t, *J* = 7.4 Hz, 3H). One exchangeable proton (OH) is not observed. ^{13}C{^{1}H} NMR ($CDCl_3$): δ 163.56, 141.71, 128.36, 128.33, 125.89, 62.76, 47.74, 36.16, 27.30, 27.26, 22.13, 11.77. Minor Isomer: ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.28 (m, 2H), 7.20–7.16 (multiple peaks, 3H), 3.74 (dd, *J* = 10.8, 5.6 Hz, 1H), 3.67 (dd, *J* = 10.8, 8.4 Hz, 1H), 3.27 (dddd, *J* = 8.4, 8.4, 6.2, 6.2 Hz, 1H), 2.67 (t, *J* = 7.6 Hz, 2H), 2.22 (td, *J* = 7.4, 4.1 Hz, 2H), 1.90 (m, 2H), 1.52 (m, 2H), 0.92 (t, *J* = 7.4 Hz, 3H). Both exchangeable protons (OH) are not observed. ^{13}C{^{1}H} NMR ($CDCl_3$): δ 161.82, 141.87, 128.42, 128.32, 125.82, 63.72, 43.29, 35.47, 30.97, 27.54, 21.02, 12.22. IR (KBr, mixture of E/Z isomers): 3203, 2963, 2923, 1496, 1453 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{14}H_{21}NO_2$ (mixture of E/Z isomers), 258.1470; found, 258.1471.

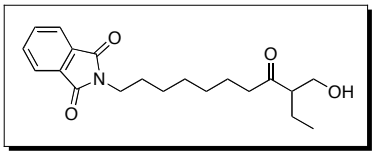


β-Hydroxyketone 11. From Free Oxime:[3] Oxime **10** (150 mg, 0.637 mmol, 1 equiv) was combined with $NaHSO_3$ (232.2 mg, 2.231 mmol, 3.5 equiv) in EtOH/H_2O (1:1, 1.28 mL) in a scintillation vial. The vial was sealed with a Teflon-lined cap and heated to 80 °C for 3 h. The resulting solution was concentrated by rotary evaporation to remove ethanol. The remaining primarily aqueous reaction mixture was diluted with $CHCl_3$ (8 mL), and rinsed briefly with 1 *M* HCl (5 mL). The layers were separated, and the aqueous layer was extracted several times with $CHCl_3$. The combined organic extracts were neutralized with aqueous $NaHCO_3$, washed once with brine, dried over $MgSO_4$, filtered through Celite, and concentrated to afford **11** as a colorless oil (113 mg, 80% yield). From acetyl oxime: The one pot deprotection

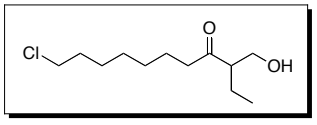
procedure was followed utilizing **9** (50 mg, 0.156 mmol), to yield **11** as a colorless oil (28 mg, 80% yield) contaminated with ~3% of the corresponding isoxazoline. ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.28 (m, 2H), 7.21–7.17 (multiple peaks, 3H), 3.78 (m, 1H), 3.69 (m, 1H), 2.65–2.57 (multiple peaks, 3H), 2.51 (td, *J* = 7.0, 2.0, 2H), 2.03 (br t, *J* = 5.9 Hz, 1H), 1.93 (quin, *J* = 7.4 Hz, 2H), 1.69–1.46 (multiple peaks, 2H), 0.91 (t, *J* = 7.4 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 214.70, 141.55, 128.43, 128.37, 125.94, 62.44, 55.00, 41.98, 35.03, 24.78, 21.28, 11.78. IR (thin film): 3423, 2926 cm^{-1}. HRMS electrospray (m/z): [M+Na]$^+$ calcd for $NaC_{14}H_{20}O_2$, 243.1361; found, 243.1360.



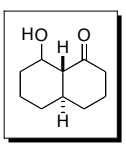
Isoxazoline S26. To confirm the identity of the contaminant in the one-pot deprotection of **9**, isoxazoline **S26** was isolated as a colorless oil (R_f = 0.47 in 80% hexanes/20% EtOAc) and characterized as follows: ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.28 (m, 2H), 7.21–7.18 (multiple peaks, 3H), 4.33 (dd, *J* = 10.0, 8.0 Hz, 1H), 3.98 (dd, *J* = 8.0, 8.0 Hz, 1H), 3.10 (m, 1H), 2.74–2.63 (multiple peaks, 2H), 2.42 (m, 1H), 2.22 (ddd, *J* = 14.8, 8.8, 6.0 Hz, 1H), 2.00–1.88 (multiple peaks, 2H), 1.65 (m, 1H), 1.40 (m, 1H), 0.91 (t, *J* = 8.0 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 161.21, 141.46, 128.45, 128.38, 125.96, 72.70, 51.26, 35.32, 27.66, 25.56, 23.34, 11.43. IR (thin film): 2962, 2932, 2864 cm^{-1}. HRMS electrospray (m/z): [M+H]$^+$ calcd for $C_{14}H_{20}NO$, 218.1545; found, 218.1546.



β-Hydroxyketone S27. The one pot deprotection procedure was followed utilizing **S15** (50 mg, 0.112 mmol), to yield **S27** as a colorless oil (31 mg, 79% yield) contaminated with ~5% of the corresponding isoxazoline. ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.82 (dd, *J* = 5.5, 3.0 Hz, 2H), 7.69 (dd, *J* = 5.5, 3.0 Hz, 2H), 3.76 (br t, *J* = 7.5 Hz, 1H), 3.69–3.60 (multiple peaks, 3H), 2.61 (m, 1H), 2.46 (t, *J* = 7.5 Hz, 2H), 2.16 (m, 1H), 1.66–1.46 (multiple peaks, 6H), 1.32–1.23 (multiple peaks, 6H), 0.90 (t, *J* = 7.5 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 215.06, 168.46, 133.84, 132.14, 123.14, 62.44, 54.93, 42.76, 37.92, 28.96, 28.85, 28.45, 26.58, 23.21, 21.30, 11.81. IR (thin film): 3472, 2932, 2858, 1770, 1702 cm^{-1} HRMS electrospray (m/z): [M+Na]$^+$ calcd for $NaC_{20}H_{27}NO_4$, 368.1838; found, 368.1826.

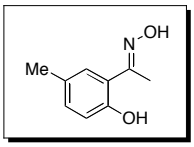


β-Hydroxyketone S28. The one pot deprotection procedure was followed utilizing **S16** (50 mg, 0.159 mmol), to yield **S28** as a colorless oil (21 mg, 56% yield) contaminated with ~5% of the corresponding isoxazoline. ^{1}H NMR (400 MHz, $CDCl_3$): δ 3.80 (dd, *J* = 10.8, 7.6 Hz, 1H), 3.70 (dd, *J* = 11.2, 4.0 Hz, 1H), 3.52 (t, *J* = 6.8 Hz, 2H), 2.63 (dddd, *J* = 7.2, 7.2, 7.2, 4.0 Hz, 1H), 2.49 (td, *J* = 7.2, 1.2 Hz, 2H), 2.30–2.20 (br s, 1H), 1.76 (quin, *J* = 6.8 Hz, 2H), 1.69–1.49 (multiple peaks, 4H), 1.42 (m, 2H), 1.36–1.26 (multiple peaks, 4H), 0.92 (t, *J* = 7.3 Hz, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 215.05, 62.45, 54.94, 45.07, 42.78, 32.51, 29.00, 28.67, 26.66, 23.21, 21.31, 11.82. IR (thin film): 3412, 2932, 2857, 1703 cm^{-1} HRMS electrospray (m/z): [M+Na]$^+$ calcd for $NaC_{12}H_{23}O_2Cl$, 257.1284; found, 257.1278.

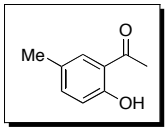


β-Hydroxyketone S29. The one pot deprotection procedure was followed utilizing **S18** (300 mg, 1.122 mmol), to yield **S29** as a white solid (157 mg, 83% yield, mp = 43–44 °C). ^{1}H NMR (400 MHz,

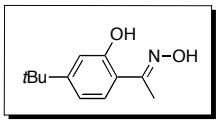
$CDCl_3$): δ 3.81 (m, 1H), 3.61 (d, *J* = 2.0, 1H), 2.42–2.27 (multiple peaks, 2H), 2.06 (m, 1H), 1.98 (m, 2H), 1.84–1.61 (multiple peaks, 4H), 1.46 (m, 2H), 1.29 (m, 2H), 1.18 (m, 1H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 214.82, 69.15, 61.79, 42.82, 41.90, 33.50, 32.68, 32.04, 26.09, 23.35. IR (KBr): 3446, 2927, 2862, 1701 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{10}H_{16}O_2$ 191.1048; found, 191.1045.



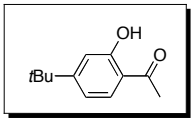
***ortho*-Hydroxyoxime S30.** To a solution of acetyl oxime **S21** (100 mg, 0.402 mmol, 1 equiv) in MeOH (870 μL) in a loosely capped scintillation vial was added finely ground K_2CO_3 (8.3 mg, 0.060 mmol, 0.15 equiv). After stirring at room temperature for 0.5 h, the MeOH was removed by rotary evaporation, and the crude reaction mixture was diluted with CH_2Cl_2 (4 mL) and neutralized with dilute aqueous AcOH. The organic layer was concentrated to afford **S30** as a white solid (62 mg, 93% yield, mp = 136–138 °C). ^1H NMR (400 MHz, $CDCl_3$): δ 10.91 (s, 1H), 7.22 (s, 1H), 7.14 (br s, 1H), 7.07 (dd, *J* = 8.4, 2.0 Hz, 1H), 6.87 (d, *J* = 8.4 Hz, 1H), 2.35 (s, 3H), 2.30 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 159.68, 155.32, 131.53, 128.10, 127.86, 118.06, 117.05, 20.64, 10.78. IR (KBr): 3335, 2918, 2861, 1636, 1504 cm^{-1}. HRMS electrospray (m/z): $[M]^+$ calcd for $C_9H_{11}NO_2$ 165.0790; found, 165.0790.



***ortho*-Hydroxyketone S31.** Oxime **S30** (50 mg, 0.303 mmol, 1 equiv) was combined with $NaHSO_3$ (110.3 mg, 1.06 mmol, 3.5 equiv) in EtOH/H_2O (1:1, 380 μL) in a scintillation vial.[3] The vial was sealed with a Teflon-lined cap and heated to 90 °C for 12 h. The reaction mixture was concentrated by rotary evaporation to remove ethanol. The remaining primarily aqueous reaction mixture was diluted with $CHCl_3$ (1.5 mL) and rinsed briefly with 1 *M* HCl (~1 mL). The layers were separated and the aqueous layer was extracted several times with $CHCl_3$. The combined organic extracts were neutralized with aqueous $NaHCO_3$, washed once with brine, dried over $MgSO_4$, and concentrated to afford **S31** as a white solid (42 mg, 91% yield). The spectroscopic data for **S31** matched those reported in the literature.[4]



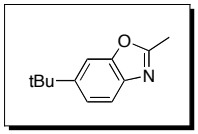
***ortho*-Hydroxyoxime 13.** To a solution of acetyl oxime **12** (400 mg, 1.373 mmol, 1 equiv) in MeOH (3 mL) in a loosely capped scintillation vial was added finely ground K_2CO_3 (29 mg, 0.206 mmol, 0.15 equiv). After stirring at room temperature for 1 h, the MeOH was removed by rotary evaporation. The crude product was purified by column chromatography to afford **13** as a pale yellow solid (276 mg, 97% yield, R_f = 0.8 in 65% hexanes/35% EtOAc, mp = 82–92 °C). ^1H NMR (500 MHz, $CDCl_3$): δ 7.37 (d, *J* = 8.3 Hz, 1H), 7.01 (d, *J* = 2.0 Hz, 1H), 6.94 (dd, *J* = 8.3, 2.0 Hz, 1H), 2.35 (s, 3H), 1.31 (s, 9H). Extremely broad OH peaks were visible in the baseline. $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 159.43, 157.22, 154.80, 127.29, 116.51, 115.77, 114.31, 34.71, 31.03, 10.74. IR (KBr): 3380, 2956, 2869, 1563 cm^{-1}. HRMS electron impact (m/z): $[M]^+$ calcd for $C_{12}H_{17}NO_2$, 207.1259; found, 207.1255.



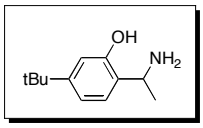
***ortho*-Hydroxyketone 14.** Oxime **13** (50 mg, 0.241 mmol, 1 equiv) was combined with $NaHSO_3$ (87.8 mg, 0.844 mmol, 3.5 equiv) in EtOH/H_2O (1:1, 300 μL) in a scintillation vial.[3]

The vial was sealed with a Teflon-lined cap and heated to 90 °C for 13 h. The reaction mixture was concentrated by rotary evaporation to remove ethanol. The remaining primarily aqueous reaction mixture was diluted with Et_2O (1.5 mL) and rinsed briefly with 1 *M* HCl (~1 mL). The layers were separated and the aqueous layer was extracted several times with Et_2O. The combined organic extracts were neutralized with aqueous $NaHCO_3$, washed once with brine, dried over $MgSO_4$, and filtered through a plug of silica to afford **14** as a colorless oil (42 mg, 91% yield). ^{1}H NMR (400 MHz, $CDCl_3$): δ 12.25 (s, 1H), 7.66 (d, *J* = 8.2 Hz, 1H), 6.99 (d, *J* = 2.0 Hz, 1H), 6.94 (dd, *J* = 8.2, 2.0, 1H), 2.60 (s, 3H), 1.31 (s, 9H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 203.79, 162.31, 161.05, 130.37, 117.40, 116.62, 115.02, 35.31, 30.76, 26.46. IR (thin film): 3249, 2964, 1639 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{12}H_{16}O_2$, 193.1229; found, 193.1221.

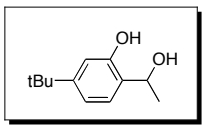
VII. Synthesis and Characterization of Remaining Compounds in Schemes 2 and 3



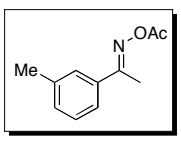
Oxazoline 15. Oxime **13** (41 mg, 0.198 mmol, 1 equiv), *p*-TsOH monohydrate (3.8 mg, 0.0198 mmol, 0.1 equiv), and $ZnCl_2$ (31.1 mg, 0.228 mmol, 1.15 equiv) were dissolved in MeCN (1 mL), and the resulting solution was heated to 90 °C for 5 h.[5] The reaction mixture was concentrated by rotary evaporation, and the crude product was taken up in Et_2O, washed with aqueous $NaHCO_3$ and brine, dried over $MgSO_4$, and concentrated to afford **15** as a colorless oil (23 mg, 56% yield, R_f = 0.38 in 80% hexanes/20% EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.55 (d, *J* = 8.4 Hz, 1H), 7.49 (d, *J* = 1.7 Hz, 1H), 7.35 (dd, *J* = 8.4, 1.7 Hz, 1H), 2.61 (s, 3H), 1.37 (s, 9H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 163.52, 151.20, 148.43, 139.08, 121.63, 118.43, 106.90, 35.01, 31.68, 14.49. IR (thin film): 3224, 3062, 2959, 1614 cm^{-1}. HRMS electrospray (m/z): $[M+H]^+$ calcd for $C_{12}H_{15}NO$ 190.1232; found, 190.1226.



Amine 16. Oxime **13** (60 mg, 0.289 mmol, 1 equiv) was combined with 2 drops of conc. HCl and 10 wt % Pd/C (31 mg, 0.0289 mmol Pd, 0.1 equiv) in MeOH (1.5 mL). A H_2 balloon was attached to the reaction vessel, and the reaction was stirred at 25 °C for 12 h.[6] Solid $NaHCO_3$ (30 mg, 0.360 mmol, 1.2 equiv) was added, and the reaction mixture was then filtered through glass wool and concentrated. The crude product was taken up in CH_2Cl_2, filtered through Celite, and concentrated to yield **16** as a tan crystalline solid (56 mg, 100% yield, mp = 123–128 °C). ^{1}H NMR (500 MHz, CD_3OD): δ 7.18 (d, *J* = 7.8 Hz, 1H), 6.95–6.93 (multiple peaks, 2H), 4.56 (q, *J* = 7.0 Hz, 1H), 1.63 (d, *J* = 7.0 Hz, 3H), 1.29 (s, 9H). Exchangeable protons (OH and NH_2) are not observed. ^{13}C{^{1}H} NMR (CD_3OD): δ 156.04, 155.06, 128.09, 122.22, 118.01, 113.80, 48.70, 35.44, 31.62, 18.92. IR (KBr): 3229, 3034, 2964 cm^{-1}. HRMS electrospray (m/z): $[M+H]^+$ calcd for $C_{12}H_{20}NO$ 194.1545; found, 194.1544.

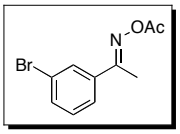


Alcohol 17. Ketone **14** (42.7 mg, 0.222 mmol, 1 equiv) and $NaBH_4$ (12.6 mg, 0.333 mmol, 1.5 equiv) were stirred in MeOH (340 μL) at 25 °C for 3.5 h.[7] The reaction mixture was concentrated by rotary evaporation, and the crude residue was taken up in Et_2O (2.5 mL) and washed with 2 *M* HCl (400 μL). The aqueous layer was extracted with Et_2O (5 x 500 μL). The combined organic layers were washed with water (2 x 500 μL), dried over $MgSO_4$, and concentrated to afford **17** as a pale yellow wax (38.6 mg, 90% yield). ^{1}H NMR (500 MHz, CD_3OD): δ 7.17 (d, *J* = 8.0 Hz, 1H), 6.85 (dd, *J* = 8.0, 2 Hz, 1H), 6.80 (d, *J* = 2 Hz, 1H), 5.09 (q, *J* = 6.5 Hz, 1H), 1.42 (d, *J* = 6.5 Hz, 3H), 1.27 (s, 9H). Exchangeable protons (OH) are not observed. ^{13}C{^{1}H} NMR (CD_3OD): δ 155.04, 152.35, 129.85, 126.49, 117.43, 113.47, 67.03, 35.16, 31.78, 24.11. IR (KBr): 3417, 2965, 2904, 2868 cm^{-1}. HRMS electron impact (m/z): $[M]^+$ calcd for $C_{12}H_{18}O_2$, 194.1307; found, 194.1311.

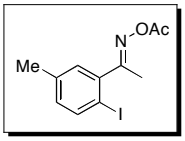


Acetyl Oxime 18. Oxime **S8** (500 mg, 3.35 mmol) was stirred at room temperature in $AcOH/Ac_2O$ (1:1, 7.2 mL) for 3 h. The reaction mixture was diluted with EtOAc (50 mL) and quenched with aqueous $NaHCO_3$. The organic layer was washed with brine (10 mL), dried over

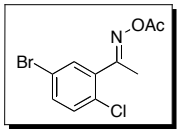
$MgSO_4$, and concentrated to yield **18** as a white crystalline solid (635 mg, 99% yield, mp 41–43 °C). ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.58 (m, 1H), 7.51 (m, 1H), 7.31–7.24 (multiple peaks, 2H), 2.38 (s, 3H), 2.37 (s, 3H), 2.27 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 168.85, 162.57, 128.19, 134.69, 131.25, 128.34, 127.42, 124.08, 21.27, 19.74, 14.38. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{11}H_{13}NO_2$ 214.0844; found, 214.0844.



Acetyl Oxime 19. Oxime **S7** (1.00 g, 4.67 mmol) was stirred at room temperature in AcOH/Ac_2O (1:1, 10 mL) for 3 h. The reaction mixture was diluted with EtOAc (65 mL) and quenched with aqueous $NaHCO_3$. The organic layer was washed with brine (1 x 25 mL), dried over $MgSO_4$, and concentrated to yield **19** as a white crystalline solid (1.18 g, 99% yield, mp 31–34 °C). ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.89 (t, J = 2 Hz, 1H), 7.67 (ddd, J = 7.8, 2, 1.0 Hz, 1H), 7.57 (ddd, J = 7.8, 2, 1.0 Hz, 1H), 7.28 (t, J = 7.8 Hz, 1H), 2.36 (s, 3H), 2.27 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 168.59, 161.09, 136.79, 133.46, 130.03, 129.87, 125.54, 122.69, 19.72, 14.29. IR (KBr): 3068, 1769 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{10}H_{10}BrNO_2$, 277.9793; found, 277.9784.

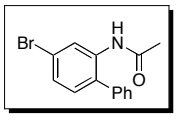


Iodinated Product 20. Acetyl oxime **18** (100 mg, 0.523 mmol, 1 equiv), *N*-iodosuccinimide (235 mg, 1.046 mmol, 2 equiv), $Pd(OAc)_2$ (5.9 mg, 0.0261 mmol, 5 mol %), AcOH (8 mL), and Ac_2O (2.8 mL) were combined in a 20 mL scintillation vial, and the vial was sealed with a Teflon-lined cap. The reaction was heated to 110 °C for 12 h. The resulting mixture was filtered through glass wool and concentrated to give the crude product, which was purified by chromatography on silica gel to yield iodinated product **20** as a pale yellow oil consisting of a single oxime isomer (77 mg, 46% yield, R_f = 0.19 in 90% hexanes/10% EtOAc). ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.71 (d, J = 8.0 Hz, 1H), 7.10 (d, J = 1.8 Hz, 1H), 6.91 (m, 1H), 2.34 (s, 3H), 2.30 (s, 3H), 2.26 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 168.70, 166.37, 140.87, 139.28, 138.40, 131.60, 130.42, 90.72, 20.78, 19.79, 18.41. IR (thin film): 2923, 1762 cm^{-1}. HRMS electrospray (m/z): $[M+Na]^+$ calcd for $NaC_{11}H_{12}INO_2$, 339.9811; found, 339.9800.



Chlorinated Product 21. Acetyl oxime **19** (105 mg, 0.410 mmol, 1 equiv), *N*-chlorosuccinimide (104 mg, 0.820 mmol, 2 equiv), $Pd(OAc)_2$ (4.6 mg, 0.0205 mmol, 5 mol %), AcOH (8.0 mL), and Ac_2O (3.0 mL) were combined in a 20 mL scintillation vial, and the vial was sealed with a Teflon-lined cap. The reaction was heated to 100 °C for 22 h. The resulting mixture was filtered through glass wool, diluted with EtOAc (30 mL), and washed several times with saturated $NaHCO_3$, until the aqueous solution was no longer acidic. The organic layer was then washed with brine, dried over $MgSO_4$, and concentrated to give the crude material, which was purified by chromatography on silica gel to yield chlorinated product **21** as a pale yellow solid consisting of an ~3:1 mixture of major:minor oxime E/Z isomers (85 mg, 71% yield, R_f = 0.36, 0.30 in 84% hexanes/16%EtOAc, mp of major isomer = 80–83 °C). The minor isomer was assigned as a stereoisomer (not a regioisomer) by analysis of the splitting pattern in the aromatic region of the ^{1}H NMR spectrum. Major Isomer: ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.53 (d, J = 2.4 Hz, 1H), 7.47 (dd, J = 8.5, 2.4 Hz, 1H), 7.28 (d, J = 8.5 Hz, 1H), 2.36 (s, 3H), 2.26 (s, 3H). $^{13}C\{^1H\}$ NMR ($CDCl_3$): δ 168.24, 162.70, 136.80, 133.66,

133.04, 131.49, 131.36, 120.59, 19.61, 17.65. Minor Isomer: ^{1}H NMR (500 MHz, $CDCl_3$): δ 7.46 (dd, *J* = 8.6, 2.4 Hz, 1H), 7.31 (d, *J* = 8.6 Hz, 1H), 7.25 (d, *J* = 2.4 Hz, 1H), 2.33 (s, 3H), 2.00 (s, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 168.05, 160.39, 136.00, 133.152, 131.12, 129.95, 129.42, 120.44, 21.37, 19.36. IR (thin film, major isomer): 2936, 1783, 1768 cm^{-1}. HRMS electrospray (m/z): [M+Na]$^{+}$ calcd for $NaC_{10}H_9ClNO_2$ (major isomer) 311.9403; found, 311.9397.



Rearranged Acetanilide 22. Acetyl oxime **19** (200 mg, 0.754 mmol, 1 equiv), AgOAc (138 mg, 0.829 mmol, 1.1 equiv), $Pd(OAc)_2$ (8.5 mg, 0.038 mmol, 0.05 equiv), iodobenzene (227 μL, 2.037 mmol, 2.7 equiv), and trifluoroacetic acid (750 μL) were combined in a 4 mL scintillation vial, and the vial was sealed with a Teflon-lined cap.[8] The reaction was heated to 100 °C for 6 h, then concentrated. The resulting crude reaction mixture was purified by column chromatography to yield **22** as a pale yellow solid (111.7 mg, 51% yield, R_f = 0.29 in 70% hexanes/30% EtOAc, mp = 111–114 °C). Compound **22** was also prepared from *N*-(3-bromophenyl)acetamide using the same arylating conditions to confirm the identity of **22**.[6] ^{1}H NMR (500 MHz, $CDCl_3$): δ 8.55 (br s, 1H), 7.50 (t, *J* = 7.5 Hz, 2H), 7.44 (m, 1H), 7.35–7.29 (multiple peaks, 3H), 7.10 (m, 2H), 2.02 (s, 3H). ^{13}C{^{1}H} NMR ($CDCl_3$): δ 168.10, 137.08, 135.86, 131.15, 130.58, 129.29, 129.06, 128.36, 127.21, 124.00, 122.09, 24.62. IR (KBr): 3262, 3027, 2796, 1658 cm^{-1}. HRMS electrospray (m/z): [M+Na]$^{+}$ calcd for $NaC_{14}H_{12}BrNO$, 312.0000; found, 311.9990.

VIII. References

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