Ruthenium Catalyzed Asymmetric Reduction of Isoxazolium Salts:
Access to Optically Active Δ^4-Isoxazolines

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I. HPLC spectra of (+)-Δ^4-isoazolines (3)

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\text{HPLC (Diacel OD-H column, Hexane:IPA = 96:4, detection wavelength: } \lambda = 254 \text{ nm, flow rate = 1 mL/min): } t_1 = 5.94 \text{ min, } t_2 = 7.22 \text{ min; } [\alpha]_D^{25} = +58.80^\circ (c = 0.99, CHCl_3).
\]
HPLC (Diacel OD-H column, Hexane:IPA = 98:2, detection wavelength: λ = 254 nm, flow rate = 1 mL/min): $t_1 = 15.98$ min, $t_2 = 21.04$ min; $[\alpha]_D^{26} = +19.55^\circ$ (c = 0.99, CHCl₃).
HPLC (Diacel OD-H column, Hexane:IPA = 98:2, detection wavelength: λ = 254 nm, flow rate = 1 mL/min): $t_1 = 14.72$ min, $t_2 = 18.56$ min; $[\alpha]_D^{25} = +58.77^\circ$ (c = 1.02, CHCl$_3$).
HPLC (Diacel IC column, Hexane:IPA = 97:3, detection wavelength: λ = 254 nm, flow rate = 1 mL/min): t₁ = 8.34 min, t₂ = 9.34 min; [α]₀²⁵ = +53.77° (c = 1.01, CHCl₃).
HPLC (Diacel AD-H column, Hexane:IPA = 97:3, detection wavelength: λ = 254 nm, flow rate = 1 mL/min): $t_1 = 9.05$ min, $t_2 = 10.41$ min; $[\alpha]_D^{22} = +19.95^\circ$ (c = 1.01, CHCl₃).
HPLC (Diacel IC column, Hexane:IPA = 97:3, detection wavelength: $\lambda = 254$ nm, flow rate = 1 mL/min): $t_1 = 11.98$ min, $t_2 = 14.25$ min; $[\alpha]_D^{23} = +39.93^\circ$ (c = 0.99, CHCl$_3$).
HPLC (Diacel OD-H column, Hexane:IPA = 98:2, detection wavelength: $\lambda = 254$ nm, flow rate = 1 mL/min): $t_1 = 17.47$ min, $t_2 = 21.52$ min; $[\alpha]_D^{21} = +59.24^\circ$ (c = 1.01, CHCl$_3$).
HPLC (Diacel AD-H column, Hexane:IPA = 97:3, detection wavelength: \( \lambda = 254 \) nm, flow rate = 1 mL/min): \( t_1 = 9.33 \) min, \( t_2 = 10.64 \) min; \([\alpha]_D^{23} = +59.75^\circ \) (c = 1.00, CHCl\(_3\)).
HPLC (Diacel OJ column, Hexane:IPA = 98:2, detection wavelength: $\lambda = 254$ nm, flow rate = 1 mL/min): $t_1 = 13.66$ min, $t_2 = 18.55$ min; $[\alpha]_D^{22} = +39.28^\circ$ (c = 1.01, CHCl$_3$).
HPLC (Diacel OJ column, Hexane:IPA = 99:1, detection wavelength: λ = 254 nm, flow rate = 1 mL/min): t₁ = 10.60 min, t₂ = 18.00 min; [α]D²⁵ = +45.74° (c = 1.02, CHCl₃).
HPLC (Diacel OD-H column, Hexane:IPA = 98:2, detection wavelength: \( \lambda = 254 \) nm, flow rate = 1 mL/min): \( t_1 = 9.34 \) min, \( t_2 = 12.24 \) min; \([\alpha]_D^{20} = +67.69^\circ \) (c = 1.00, CHCl₃).
HPLC (Diacel OD-H column, Hexane:IPA = 98:2, detection wavelength: $\lambda = 254$ nm, flow rate = 1 mL/min): $t_1 = 11.42$ min, $t_2 = 15.82$ min; $[\alpha]_{D}^{23} = +51.90^\circ$ (c = 1.01, CHCl$_3$).
HPLC (Diacel AD-H column, Hexane:IPA = 96:4, detection wavelength: λ = 254 nm, flow rate = 1 mL/min): t₁ = 7.36 min, t₂ = 8.88 min; [α]D25 = +56.52° (c = 1.01, CHCl₃).
III. NMR Spectra of 2 and 3

2a

NMR Spectra of 2 and 3
SI-19
SI-20