Supporting Information
Catalytic Asymmetric Epoxidation of Aliphatic Enones using Tartrate-derived Magnesium Alkoxides
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Conditions for Enantiomeric Purity Determination for Epoxyketones derived by Di-tert-buty1 Tartrate mediated Epoxidation

(3R,4S)-1-(3-Butyl-oxiranyl)-ethanone 2a

\[ \alpha_D +45.3 \text{ (c 1.06 in CHCl}_3) \]; The absolute configuration was derived from that observed for trans-(3R,4S)-epoxynonan-2-one based on the assumption of a uniform reaction mechanism. Analysis by chiral phase GC indicated R\(_R\) (3S, 4R) 9.84 min and R\(_L\) (3R, 4S) 10.41 min, heptakis(2,6-di-O-methyl-3-O-pentyl)-\(\beta\)-cyclodextrin, 100 °C isothermal, indicated 91% ee.

(3R,4S)-1-(3-Pentyl-oxiranyl)-ethanone 2b

\[ \alpha_D +43.9 \text{ (c 1.14 in CHCl}_3) \] \(\text{lit.}^1 [\alpha_D^\text{25} - 38.7, \text{ (c 0.75 in CHCl}_3)\), 91 % ee]. The absolute configuration was determined by comparing the measured optical rotation with the reported one for trans-(3S,4R)-epoxy-nonan-2-one. Analysis by chiral phase GC indicated R\(_R\) (3S, 4R) 11.59 min and R\(_L\) (3R, 4S) 12.16 min, heptakis(2,6-di-O-methyl-3-O-pentyl)-\(\beta\)-cyclodextrin, 110 °C isothermal, indicated 93% ee.

Preparation of (3R,4S)-1-(3-Hexyl-oxiranyl)-ethanone 2c

\[ \alpha_D +34.8, \text{ (c 1.01 in CHCl}_3) \]. The absolute configuration was derived from trans-(3R,4S)-epoxy nonan-2-one based on the assumption of a uniform reaction mechanism. Analysis by chiral phase GC R\(_R\) (3S, 4R) 12.74 min and R\(_L\) (3R, 4S) 13.17, heptakis(2,6-di-O-methyl-3-O-pentyl)-\(\beta\)-cyclodextrin, 120 °C isothermal, indicated 92% ee.

Preparation of (3R,4S)-1-(3-methyl-oxiranyl)-propan-1-one 2d

\[ \alpha_D +43.6 \text{ (c 0.55 in CHCl}_3) \]. Analysis by chiral phase GC R\(_R\) (3S, 4R) 7.9 min and R\(_L\) (3R, 4S) 8.5 min, heptakis(2,6-di-O-methyl-3-O-pentyl)-\(\beta\)-cyclodextrin, 74 °C isothermal, indicated 77% ee.

Preparation of (3R,4S)-1-[3-(3,5-Dibromo-phenyl)-oxiranyl]-ethanone 2e

Mpt 78-82 °C, ee 80%. \[ \alpha_D -73.1 \text{ (c 1.01 in CHCl}_3) \]. Enantiomeric excess was determined by chiral stationary phase HPLC analysis (DAICEL CHIRALPAK AD, \(i\)-PrOH-hexane=5:95, flow rate 1 ml/min, 7.55 min (3R,4S) isomer and 11.58 min (3S,4R) isomer detection at 210 nm, indicated 81% ee. The absolute configuration was determined from the X-ray structure. The crystal used for the X-ray analysis was reanalysed by HPLC, and confirmed to be the major enantiomer.