Rh-Catalyzed Asymmetric Addition of Trifluoroborates to Sulfonylketimines

\[ \begin{align*}
R^1 & = 4\text{-MeC}_6\text{H}_4 (\text{Ts}), 4\text{-O}_2\text{NC}_6\text{H}_4 (\text{Ns}) \\
R^2 & = \text{Ar} \\
R^3 & = \text{Alk} \\
R^4 & = \text{Ar, alkenyl} \\
\end{align*} \]

Selected examples:

- Ts
  - 98% ee
  - 84% yield
- Ns
  - 95% ee
  - 71% yield
- OMe
  - 95% ee
  - 80% yield

Typical deprotection of the addition products:

- Ts
  - 95% ee
  - 89% yield

Significance: Easily accessible potassium organotrifluoroborates undergo a rhodium-catalyzed asymmetric addition to both N-tosyl and N-nosyl ketimines. The use of a chiral bicyclooctadiene-based ligand allows high enantiomeric excess in the product formation.

Comment: In the case of nosyl groups, the addition products can easily be deprotected using thiophenolpotassium carbonate, retaining the enantiomeric purity. For related applications of dienic ligands, see: K. Okamoto, T. Hayashi, V. H. Rawal Org. Lett. 2008, 10, 4387.