Ruthenium(II)-Catalyzed Asymmetric Transfer Hydrogenation Reaction

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\begin{align*}
\text{Ru(II) catalyst (S/C = 500–2000)} & \quad \text{HCO}_2\text{H–Et}_3\text{N (5:2 or 3:2; 0.5 mL)} \\
\text{PhCl (1 M), 40–60 °C} & \quad 12–20 \text{ h} (1 \text{ mmol}) \\
\end{align*}
\]

S/C = substrate to catalyst molar ratio

Selected examples:

L1 (S/C = 1000)

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\begin{align*}
\text{HCO}_2\text{H–Et}_3\text{N (3:2)} \\
\text{PhCl, 60 °C, 20 h} \\
\end{align*}
\]

96% yield 64% ee dr = 99:1 after one recrystallization

Comment: Transfer hydrogenation (TH) reactions are milder and safer alternatives to metal-on-carbon-based hydrogenation reactions. Although the scope is usually limited to the reduction of carbonyls, TH avoids the use of highly pressurized systems. These reported ruthenium-based transfer hydrogenation catalysts are notable achievements in this field.

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