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Asymmetric Synthesis of α-Amino Acids by Organocatalytic Biomimetic Transamination


Organcatalytic Transamination for the Synthesis of α-Amino Acids

Significance: Asymmetric metal-free transformation is one of the most useful and environmentally friendly techniques for the synthesis of chiral organic compounds. The authors describe a powerful method for the synthesis of α-amino acid derivatives catalyzed by novel chiral phase-transfer catalysts.

Comment: This organocatalytic enantioselective transformation of α-keto esters with benzyl amines smoothly provides the corresponding α-amino acid derivatives in moderate yields with good enantioselectivities.

Selected examples:

\[
\begin{align*}
R = & \text{Bu} & \text{OH}_2 & \text{NH}_2 & \text{O}_2N & (1.5 \text{ equiv}) \\
\text{Ar} = & 3,4,5-\text{F}_3\text{C}_6\text{H}_2 & X = 2,4,6-\text{Me}_3\text{C}_6\text{H}_2\text{CO}_2 \\
\text{catalyst} & & & \\
\text{R}_\text{O}_\text{t} & - & \text{Bu} & \text{O}_\text{NHBz} & \text{Ar} & X^- \\
\text{65% yield, 88% ee} \\
\end{align*}
\]

1. catalyst (5 mol%) 4 Å MS, mesitylene 10 °C to r.t., 16–72 h
2. 1 N HCl, THF, 0 °C, 1 h
3. Et₃N (2.0 equiv) BzCl (2.0 equiv) 0 °C, 30 min

Selected examples:

\[
\begin{align*}
R = & \text{Bu} & \text{OH}_2 & \text{NH}_2 & \text{O}_2N & (1.5 \text{ equiv}) \\
\text{Ar} = & 3,4,5-\text{F}_3\text{C}_6\text{H}_2 & X = 2,4,6-\text{Me}_3\text{C}_6\text{H}_2\text{CO}_2 \\
\text{catalyst} & & & \\
\text{R}_\text{O}_\text{t} & - & \text{Bu} & \text{O}_\text{NHBz} & \text{Ar} & X^- \\
\text{40% yield, 86% ee} \\
\end{align*}
\]

1. catalyst (5 mol%) 4 Å MS, mesitylene 10 °C to r.t., 16–72 h
2. 1 N HCl, THF, 0 °C, 1 h
3. Et₃N (2.0 equiv) BzCl (2.0 equiv) 0 °C, 30 min

Selected examples:

\[
\begin{align*}
\text{BH}_4^- & \text{O}_\text{Bu} & \text{NH}_2 & \text{O}_2N & (1.5 \text{ equiv}) \\
\text{Ar} = & 3,4,5-\text{F}_3\text{C}_6\text{H}_2 & X = 2,4,6-\text{Me}_3\text{C}_6\text{H}_2\text{CO}_2 \\
\text{catalyst} & & & \\
\text{R}_\text{O}_\text{t} & - & \text{Bu} & \text{O}_\text{NHBz} & \text{Ar} & X^- \\
\text{40% yield, 80% ee} \\
\end{align*}
\]

1. catalyst (5 mol%) 4 Å MS, mesitylene 10 °C to r.t., 16–72 h
2. 1 N HCl, THF, 0 °C, 1 h
3. Et₃N (2.0 equiv) BzCl (2.0 equiv) 0 °C, 30 min

Selected examples: