NCI offers the correspondent tetrafluoroborate salts which are air-stable, non-pyrophoric precursors used in a variety of catalytic processes.

**Chemical Name:** 1,2-Bis(dicyclohexylphosphino)ethane  
**Product Name:** DCyPE  
**CAS No.:** 23743-26-2

**Chemical Name:** 1,3-Bis(dicyclohexylphosphino)propane  
**Product Name:** DCyPP  
**CAS No.:** 103099-52-1

**Chemical Name:** 1,4-Bis(dicyclohexylphosphino)butane  
**Product Name:** DCyPB  
**CAS No.:** 65038-36-0

**Chemical Name:** 1,4-Bis(di-tert-butylphosphino)butane  
**Product Name:** DtBPB  
**CAS No.:** 15011-89-0
Chemical Name: 1,2-Bis(dicyclopentylphosphino)ethane
Product Name: DCPPE
CAS No.: 111848-16-9

Chemical Name: 1,3-Bis(dicyclopentylphosphino)propane
Product Name: DCPPP
CAS No.: 149081-88-9

Chemical Name: 1,4-Bis(dicyclopentylphosphino)butane
Product Name: DCPPB
CAS No.: 163106-88-5

Application: Phosphine ligand for C-O coupling

Packing: Please ask representatives for details / glass bottle

Appearance: Crystalline solid

Storage & Handling: These derivatives are susceptible to air oxidation. They should be stored under an inert gas such as anhydrous nitrogen or argon. Please refer to Safety Data Sheet for detail.
Application of Bis(dialkylphosphino)alkanes

Carbonylation of Aryl Tosylates and Mesylates

\[
\begin{array}{c}
\text{OSO}_2R \\
\text{R'}
\end{array}
\begin{array}{c}
\text{R''OH}
\end{array}
\xrightarrow{\text{Pd(OAc)}_2/\text{DCyPP} \cdot 2\text{HBF}_4 / \text{K}_2\text{CO}_3}
\begin{array}{c}
\text{R'}
\end{array}
\begin{array}{c}
\text{OR''}
\end{array}
\]

Yield = 75-97%


Aminocarbonylation of Aryl Chlorides

\[
\begin{array}{c}
\text{Cl}
\end{array}
\begin{array}{c}
n-\text{Bu}
\end{array}
\xrightarrow{\text{Pd(OAc)}_2/\text{DCyPP} \cdot 2\text{HBF}_4 / \text{base}}
\begin{array}{c}
n-\text{Bu}
\end{array}
\begin{array}{c}
\text{N}
\end{array}

\]

Yield = 91%


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