An Efficient and Versatile Dipeptide-based Chiral Phosphine
— Novel Nucleophilic Organocatalyst —

Advantages

- High nucleophilicity
- Remarkable stability
- Demonstrated applicability in asymmetric cycloadditions
- Inducing excellent enantioselectivity

A remarkably effective, versatile and practical catalyst (T2937) for the [3+2] and [4+2] cycloadditions was developed by Lu et al. The [3+2] cycloaddition of alkyl or aryl-imines with allenolate proceeded remarkably fast in the presence of T2937, affording the products in good to excellent yields, and with nearly perfect enantioselectivities.1) T2937 was also found to be highly efficient for the asymmetric synthesis of highly functionalized cyclopentenes2) and 3-spirocyclohexene-2-oxindoles.3) Notably, T2937 is a catalyst of great practical value, and it is stable in the air at room temperature.

Typical Procedure1):

To a flame-dried round bottom flask with a magnetic stirring bar under N2 at room temperature was added imine (0.1 mmol), T2937 (3.6 mg, 0.005 mmol) and 5Å molecular sieves (60 mg), followed by the addition of anhydrous Et2O (1 mL). The reaction mixture was cooled to 0 °C in an ice-bath, allenolate (22 µL, 0.15 mmol) was then added, and the mixture was stirred at 0 °C for 30 minutes. The reaction mixture was then filtered (to remove molecular sieves) and concentrated under reduced pressure. The residue was purified by column chromatography on silica gel to afford the cycloaddition product as a colorless oil.

T2937

T2937 (O-TBDPS-D-Thr-N-Boc-L-tert-Leu-Diphenylphosphine)