Instrumentation

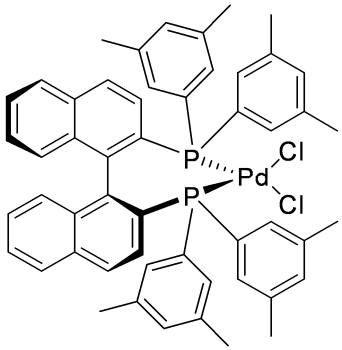
The ^{31}P NMR spectra used to follow the titration were recorded on a Varian Mercury Plus 500 (^{1}H NMR at 500 MHz, ^{31}P NMR at 236 MHz). The FT-IR and FT-FIR spectra were recorded on a Perkin Elmer Spectrum 400 FT-IR/FT-FIR Spectrometer. The Raman spectra were recorded on a Perkin Elmer Raman Station 400F Raman Spectrometer.

Chemicals

$PdCl_2(CH_3CN)_2$, PdI_2, $PdBr_2$, $Pd(NO_3)_2$, *(R)*- and *(S)*-BINAP, *(S)*-tol-BINAP and *(S)*-xylyl-BINAP were obtained from Strem, DL-Trp was obtained from Merck, $Pd(OAc)_2$, D- and L-Trp, DL-His, DL-Phe, DL-4-NO_2-Phe and all organic solvents employed were obtained from Acros. DL-Val was obtained from Fluka. DL-4-MeO-Phe, DL-4-Br-Phe, DL-4-Cl-Phe and DL-4-F-Phe were obtained from Peptech. Water was doubly distilled. The acylated α-amino acids were synthesized according to literature procedures and spectroscopic data correspond with those reported.[1]

All buffers solutions were prepared using NaH_2PO_4, obtained from Merck at a concentration of 100 mM and subsequent addition of HCl (aq) or NaOH (aq). The pH was measured using a Hanna Instruments pH 213 Microprocessor pH meter.

$PdCl_2$(*(S)*-xylyl-BINAP)$_2$



In a Schlenk tube under nitrogen, 100 mg (0.16 mmol) *(S)*-xylyl-BINAP and 40 mg (0.16 mmol) cis-$PdCl_2(CH_3CN)_2$ were dissolved in 10 mL dichloromethane. The solution was stirred overnight and the solvent was evaporated *in vacuo*. The crude product was triturated with ether and dried in a vacuum oven overnight at 40 °C, yielding $PdCl_2$(*(S)*-xylyl-BINAP (106 mg, 83 %) as a yellow solid. $[\alpha]_D^{20}$ = -502.0 ° (c 1.00, $CHCl_3$); ^{1}H NMR (200 MHz, $CDCl_3$) δ 7.66 – 7.53 (m, 2H), 7.46 (d, *J* = 9.7 Hz, 3H), 7.32 (d, *J* = 7.0 Hz, 2H), 7.08 (d, *J* = 7.3 Hz, 3H), 6.56 (d, *J* = 8.6 Hz, 1H), 6.36 (s, 1H), 2.32 (s, 6H), 1.86 (s, 6H). ^{13}C NMR (50 MHz, $CDCl_3$) δ 137.5, 137.4, 137.3, 137.2, 134.0, 133.4, 133.1, 133.0, 132.9, 132.9, 132.8, 132.8, 130.5, 129.7, 128.8, 128.6, 128.5, 127.9, 127.6, 127.0, 126.5, 105.0, 21.9, 21.3. ^{31}P NMR (80 MHz, $CDCl_3$) δ 30.1. MS (ES) m/z: 876.8 (M^+-Cl). Anal. Calcd for $C_{52}H_{48}P_2Cl_2Pd$: C, 68.47; H, 5.30; Found: C, 68.08 H, 5.30.

Extraction experiments and chemical analysis

All extraction experiments were carried out in 1.5 mL screw capped vials. In a standard experiment, a prepared palladium complex host was employed. For *in situ* experiments, the palladium precursor was stirred overnight with 1.1 eq of the phosphine ligand and the organic solvent was diluted to [host] = 1.0 mM. Part of the solution was evaporated to dryness and the residue was characterized by ^{31}P-NMR. Full conversion to the palladium-phosphine complex was observed.

In a standard experiment, a 1.0 mM solution of the host in the organic phase was combined with a 2.0 mM solution of the substrate in the aqueous phase in equivolumous amounts (0.40 mL). Reactions were performed *in duplo* and a blank extraction ([host] = 0.0 mM) was performed concurrently to determine the physical partition of the substrate. The two phase systems were stirred overnight at 6 °C and subsequently allowed to settle for at least 30 min. The aqueous phase was analyzed by RP-HPLC, using Shimadzu CC-20AD pumps, a Crownpak CR(+) chiral column (Daicel, Japan) equipped with a guard column or a Chirobiotic T column (Astec, USA) and a SPD-M20A diode array detector. A calibration curve was prepared in the concentration range employed for the determination of the distribution. Error margins were typically 0.5-2.0 %. A flow rate of 0.5 mL/min of perchloric acid solution (pH = 1.0, 1.5 or 2.0) was used as a mobile phase for the Crownpak column. A flow rate of 0.24 mL/min of water (containing 0.0136 v-% TEAA buffer) and MeOH 0.06 mL/min was used as a mobile phase for the Chirobiotic T column. Extensive attempts towards the resolution of Cys on both columns did not result in a successful separation.

Titration experiments followed by spectroscopy

Extractions were carried out as indicated above with the aqueous phase at pH = 7.0. The equivolumous amounts of the liquid phases of the extraction were increased to V = 0.6 mL. DCM was used in UV-Vis and CD spectroscopy experiments. In the ^{31}P-NMR titrations, $CDCl_3$ was used as solvent. $CDCl_3$ gave extraction results which compared well with those in $CHCl_3$. After extraction of [substrate] = 10.0 mM with dcm as the organic phase, the organic layer was evaporated to dryness. The product obtained was characterized by FTIR and Raman spectroscopy.

Reference List

1. M. Calmes, J. Daunis, R. Jacquier, and J. Verducci, *Tetrahedron*, 1987**, 43**, 2285.