

Title: Synthesis and catalytic properties of ferrocenophane phosphines

Author: Karel Škoch

Institution: Faculty of Science, Charles University in Prague, Department of Inorganic Chemistry

Supervisor: prof. RNDr. Petr Štěpnička, Ph.D.

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Abstract: This Thesis describes the preparation of five sterically and electronically different ferrocene phosphines, (*R*)-1,1'-[1-(diarylphosphino)propan-1,3-diyl]ferrocenes (*R*)-**1a-e**, and a study into their coordination and catalytic properties. The key precursor of the phosphine synthesis, chiral alcohol (*R*)-**2**, was prepared according to the procedure described in the literature. Alcohol (*R*)-**2** was converted with retention of configuration to diarylphosphines (*R*)-**1a-e** in one-step reaction with trimethylsilylchloride and sodium iodide and then with the corresponding diarylphosphine. Phosphines **1a-e** were characterized by NMR and MS methods. For the basic representative **1a** the following palladium(II) complexes were prepared: [PdCl(L^{NC})(**1a**)] (**10**, L^{NC} = 2-[(dimethylamino)methyl]phenyl-*C*^{1,N}) and *trans*-[PdCl₂(**1a**)₂] (**9a**). In addition, the isomeric complex *cis*-[PdCl₂(**1a**)₂] (**9b**) was isolated from the reaction mixture after catalytic tests in asymmetric allylic alkylation. Monocrystals suitable for X-ray diffraction analysis were grown for all these complexes and the results of structure determination are presented. Phosphines (*R*)-**1a-e** were tested in two mechanistically different reactions. As organocatalysts they were used in aza-Morita-Baylis-Hillman reaction. The best results were achieved with phosphine **1a** (enantioselectivity up to 97% but low chemoselectivity). In Pd-catalyzed asymmetric allylic alkylation, the electron rich phosphine **1e** performed best achieving 98% yield and 50 % ee.