

Semi hydrogenation of alkynes by a novel bimetallic rhodium(I) complex

P. Jurt¹, T. L. Gianetti¹, A. Fedorov¹, S. Gauthier², H. Grützmacher^{1*}

¹ETH Zurich, ²Universite Rennes 1

Catalytic semi hydrogenation of alkynes to alkenes is an important process in both academia and industry. Developed in the 50's, Lindlar's catalyst (Pd/CaCO₃/Pb(OAc)₂/quinoline) still remains a privileged system for Z-selective semi hydrogenation reactions. However, the system utilizes a toxic lead additive. Further drawbacks are narrow substrate scope, over hydrogenation to alkenes, Z/E isomerization and double bond migration reactions.^[1]

Herein, we report a new bimetallic complex **2** bearing a [Rh(I)]₂-moiety. The stabilization of the rhodium-rhodium bond, while leaving two reactive rhodium centers, was achieved by a tailored ligand with olefin/alkyne sites to anchor the two metal centers. The complex **2** was shown to be active in semi hydrogenation of alkynes under very mild conditions. In order to optimize the stability and activity of the complex, high throughput ligand- and substrate screening was performed, leading to a catalyst system able to perform semi hydrogenation reactions with up to 94 % alkene selectivity.

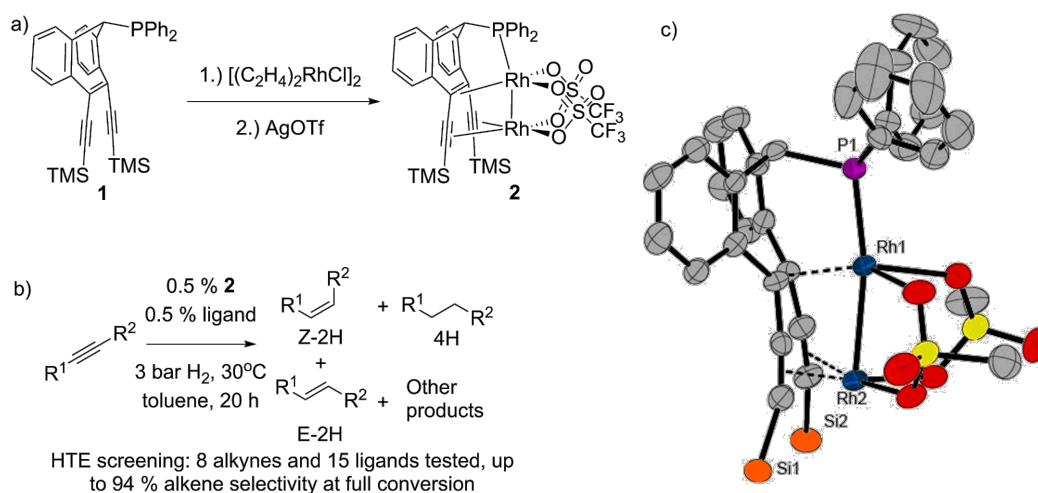


Figure 1. a) Synthesis of a dirhodium complex **2**, b) Conditions for semi hydrogenation reactions, c) crystal structure of **2**. Methyl groups and fluorine atoms omitted for clarity.

[1] A. Fedorov, H. Liu, H. Lo, C. Copéret, *J. Am. Chem. Soc.* **2016**, *138*, 16502.