

H₂ Activation at Copper for the Synthesis of Hydride Complexes

Alicia Aloisi, E. Nicolas, J.-C Berthet, Pierre Thuéry, T. Cantat

► **To cite this version:**

Alicia Aloisi, E. Nicolas, J.-C Berthet, Pierre Thuéry, T. Cantat. H₂ Activation at Copper for the Synthesis of Hydride Complexes. EuCHEMS XXII, Jul 2017, Amsterdam, Netherlands. cea-02342081

HAL Id: cea-02342081

<https://hal-cea.archives-ouvertes.fr/cea-02342081>

Submitted on 31 Oct 2019

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

H₂ Activation at Copper for the Synthesis of Hydride Complexes^[1]

Aloisi, A.; Nicolas, E.; Berthet, J.-C.; Thuéry, P.; and Cantat, T.

LCMCE, NIMBE, CEA, CNRS, Université Paris-Saclay, France

As hydrogen can be a green reductant, the hydrogenation of organic compounds is a key reaction both in industry and for fundamental knowledge. Copper(I) catalysts have been widely used to activate H₂ in particular with the aim of C=O bond hydrogenation.^[2] Even if mechanistic studies always point out the importance of copper hydride complexes either as active catalysts or intermediates, only a few were fully characterized.^[3] To sort out this dualism and in order to further understand copper-catalyzed C=O bond hydrogenation, we sought to synthesize copper(I) hydride complexes with molecular H₂.

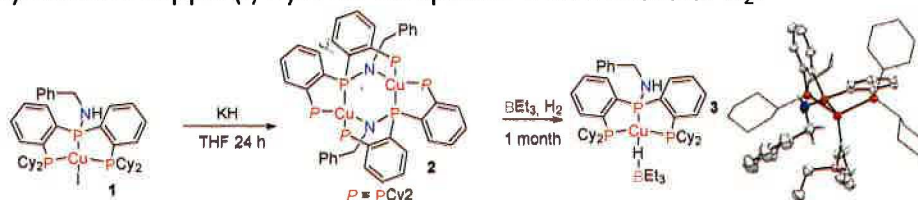


Figure 1: H₂ activation by copper complexes

We report here the synthesis and the characterization of several copper(I) complexes coordinated by a new tris(phosphino)-amine ligand where the benzylamine pendant arm has been introduced to favor metal-ligand cooperativity for H₂ heterolytic cleavage.^[4] Coordination of this ligand on copper iodide led to the precursor **1** which affords, upon deprotonation, dimer **2**. Complex was proved to activate H₂ to lead to a trimetallic copper hydride species. Importantly, H₂ activation by **2** in the presence of a Lewis acid led to a monomeric copper hydride stabilized by triethylborane. (Figure 1)

[1] Aloisi A., Nicolas E., Berthet J.C., Thuéry P., Cantat T., Manuscript in preparation

[2] Deutsch C., Krause N., Chem. Rev., 108 (2008) 2916

[3] Jordan A. J., Lalic G., Sadighi J. P., Chem. Rev., 116 (2016) 8318

[4] Dub P. A., Gordon J. C. Dalton Trans., 45 (2016) 6756

E-mail: alicia.aloisi@cea.fr

<http://iramis.cea.fr/Pisp/thibault.cantat/>