

A Phosphanyl-Phosphagallene that Functions as a Frustrated Lewis Pair

Joey Feld,^a Daniel W. N. Wilson,^b Jose. M. Goicoechea^{*a}

^aDepartment of Chemistry, Chemistry Research Laboratory, University of Oxford, Oxford, United Kingdom

joey.feld@chem.ox.ac.uk

Multiple bonds are common in compounds featuring elements such as carbon, nitrogen, oxygen and boron. By contrast, heavier p-block elements form weaker multiple bonds, partly due to the ineffective $p_{\pi}-p_{\pi}$ orbital overlap, resulting in significantly different reactivity to that of their lighter counterparts.

We present the first example of a gallium–phosphorus double bond. Similar to the synthesis of main group imides from the reaction of low valent group 13 species and sterically encumbered organic azides,^[1] our phosphagallene synthesis exploits the decarbonylation of phosphaketenes with the addition of a suitable nucleophile.^[2] In this case, upon the addition of Ga(NacNac) (NacNac = HC[C(Me)N(2,6-*i*Pr₂C₆H₃)₂P]), CO was displaced from [P]PCO ([P] = (H₂C)₂[N(2,6-*i*Pr₂C₆H₃)₂P]) to form a phosphanyl phosphagallene species.

In this presentation, the reactivity of this phosphanyl phosphagallene towards a number of small molecule substrates such as H₂, CO₂, silanes and amines will be discussed.

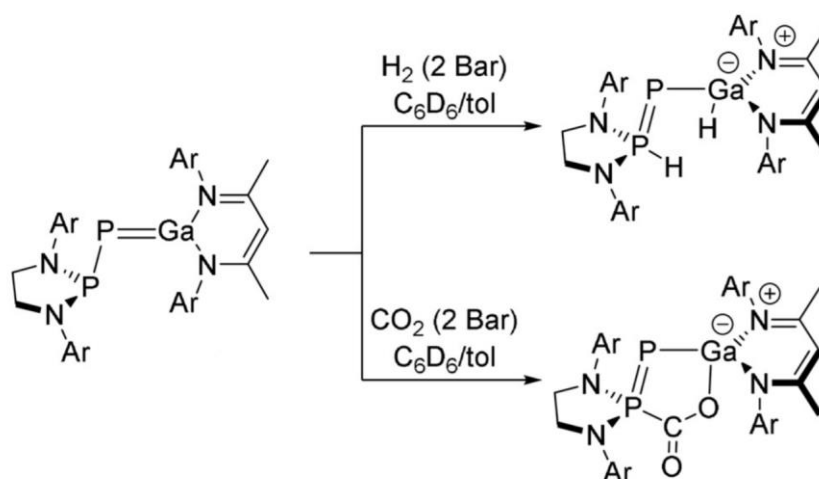


Figure 1: H₂ and CO₂ activation of a phosphanyl phosphagallene.

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[3] J. Possart, W. Uhl, *Organometallics*, **2018**, *37*, 1314–1323.