

PL-02

Building Blocks for Organophosphorus Compounds made from PH₃

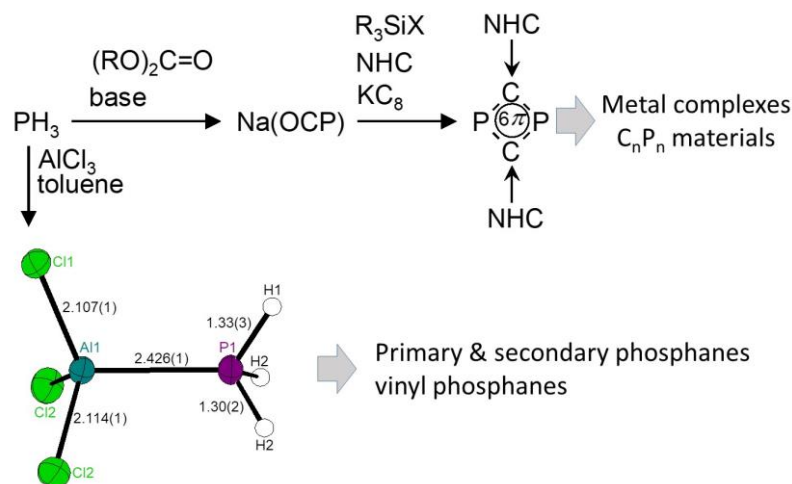
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Although toxic and difficult to handle on the laboratory scale, PH₃ remains one of the most valuable sources of phosphorus. Under basic conditions, PH₃ reacts with organic carbonates affording Na(OCP) which is a highly valuable building block. Specifically, novel heterocycle of composition (NHC)₂C₂P₂ can be made which are best described as adducts between an N-heterocyclic carbene (NHC) and a C₂P₂ ring which contains an aromatic 6π electron system. These molecules again building block for a variety of organophosphorus compounds with unusual electronic structures.[1]



90 years ago, the reaction between PH₃ and solid AlCl₃ was reported to give a compound of composition Cl₃Al-PH₃. However, this adduct was described as thermally unstable yielding intractable yellow-orange substances.[2] A reinvestigation of this reaction shows that a suspension of AlCl₃ in toluene readily takes up PH₃ to give clear solutions of Cl₃Al-PH₃ of up to 4 M concentrations which are stable for weeks. The adduct Cl₃Al-PH₃ is a superb reagent and building block for a variety of organophosphorus compounds notably primary phosphanes and vinyl phosphanes such as H₂C=CH-PH₂.

[1] Z. Li, X. Chen, L. Liu, M. Scharnhölz, H. Grützmacher, *Angew. Chem. Int. Ed.*, **2020**, 59, 4288-4293.

[2] R. Höltje, F. Meyer, *Z. anorg. Allg. Chem.*, **1931**, 197, 93-102.