

Stabilization of Highly Reactive Group 13-15 Species by Cyclic Alkyl(amino) Carbenes

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Isolation of compounds containing low valent main-group elements are important because they can mimic the properties of transition metals. In addition to the studies on such closed-shell compounds, another strong interest has come up with strategies to synthesize stable radicals containing p-block elements. All of these systems can only be isolated by use of sophisticated synthetic techniques. The isolation of these compounds has been made possible by the use of cyclic (alkyl)(amino)carbenes (cAACs) as ligands which possess strong σ donating as well as π -accepting properties.¹ Uses of cAACs made it possible to isolate some compounds which were otherwise difficult or impossible to achieve by any other conventional methods. As for example, a versatile reagent [lithium phosphinidene; {cAACPLi(THF)₂}]₂ for introducing phosphorus atoms into organic and inorganic substrates was stabilized by cAAC.² Further applications of the phosphorus transfer reagent have allowed the synthesis a P₂Si system as well as silylene–phosphinidene.³ A variety of stable p-block element radicals particularly those involving aluminium and silicon have been isolated which are stabilized by cAACs.⁴ A silicon dihydride species and an elusive silicon difluoride species were also isolated in the molecular form of (cAAC[•])₂SiH₂ and (cAAC[•])₂SiF₂. In addition, cAAC-stabilized Si₂H₂, a higher analogue of acetylene has been isolated.⁵

References:

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