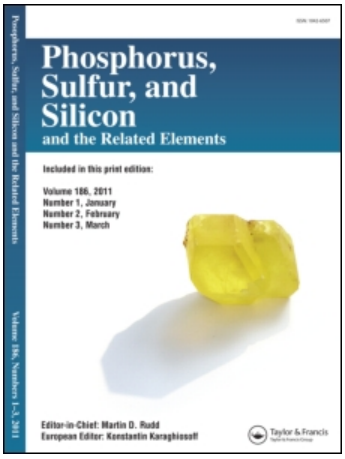

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Reactivity of a New Phosphinidene Iron Complex

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Reactivity of a New Phosphinidene Iron Complex

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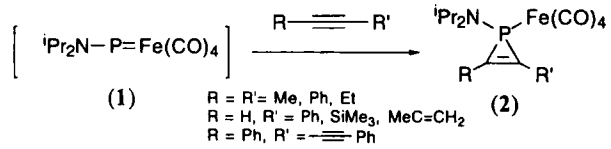
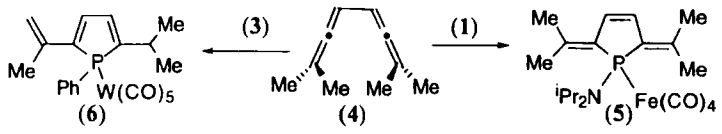
A decade ago, King [1] postulated the low temperature formation of the transient phosphinidene $Fe(CO)_4$ complex **1** from the reaction between $^iPr_2NPCl_2$ and $Na_2Fe(CO)_4$ to account for the observed formation of several iron clusters. The chemistry of **1** was not further explored. We were attracted to **1** because of its suggested ease of formation. For comparison, the well established transient phosphinidene complex PhP-$W(CO)_5$ (**3**) is generated via cheletropic elimination from 7-phosphanorbornadiene precursor at temperatures above 50°C. We confirmed the presence of transient **1** via trapping experiments with acetylene derivatives that yielded in all cases phosphirenes **2** in fair to good yield.



There are also limitations to the reactivity of the phosphinidene $Fe(CO)_4$ complex **1** as neither olefins nor conjugated olefins give addition products when they have either electron donating or electron withdrawing substituents. An exception to this behavior is tetramethyldiallene which shows a remarkable difference in product formation when reacted with **3** and **1**.



Phospholene **5** may result from [1+2] addition of Fe-complex **1** to one of the allene units of **4** followed by a rearrangement of the initially formed vinylphosphirane. In contrast, reaction with W-complex **3** yields phosphole **6** via a more complex process.

References

[1] R.B. King *J. Am. Chem. Soc.*, **109**, 7764 (1987).