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The new world of phospha-organometallic chemistry

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The past few years have seen the development of a rich new area of organometallic chemistry in which phosphorus atoms have replaced CH-fragments in the more familiar unsaturated organic ligands. There is now an extensive range of phospha-organometallic compounds containing phospha-alkynes, phospha-alkenes, phospha-dienes, phospha-allyls, phosphacyclobutadienes, phosphacyclopentadienyls and phospha-arenes as well as tetraphosphacubanes and tetraphospha-barrelenes. The area has recently been reviewed in the book *Phosphorus: The Carbon Copy* by K B Dillon, F Mathey and J F Nixon (Wiley, 1998). This work discusses the key role of the phospha-alkyne, Bu^tCP in the generation of a wide variety of novel phospha-organometallic compounds containing 1,3-diphosphacyclobutadiene, 1,2,4-triphosphacyclopentadienyl, 1,3-diphosphacyclopenta-dienyl, 1,3,5-triphosphabenzene, and 1,3,5,7-tetraphosphabarrelene ring systems. Examples will be drawn from main group, transition metal, lanthanide and actinide elements. Sandwich, half-sandwich and triple decker sandwich compounds will be presented and discussed, as well as the synthetic utility of the technique of metal vapour synthesis. An additional feature of the phospha-organometallic compounds not available to conventional organometallic compounds, is their potential as ligands in view of the availability of the P-lone pair electrons and this aspect will also be covered.