

# Hexaphosphaferrocene $[\text{Fe}(\eta^5\text{-P}_3\text{C}_2t\text{Bu}_2)_2]$ as a Connecting Moiety in Oligomeric and Polymeric Compounds

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*Z. Naturforsch.* **2009**, *64b*, 1429 – 1437; received October 8, 2009

*Dedicated to Professor Hubert Schmidbaur on the occasion of his 75<sup>th</sup> birthday*

The hexaphosphaferrocene complex  $[\text{Fe}(\eta^5\text{-P}_3\text{C}_2t\text{Bu}_2)_2]$  (**1**) derived from the corresponding 1,2,4-triphosphopholyl anion reacts with  $\text{CuX}$  ( $\text{X} = \text{Cl}, \text{Br}, \text{I}$ ) in a 1 : 1 stoichiometry to give the isostructural, one-dimensional polymeric compounds  $[\{\text{Cu}(\mu_3\text{-X})\}_4\{\text{Fe}(\mu, \eta^5:\eta^1\text{-P}_3\text{C}_2t\text{Bu}_2)_2\}_2]_n$  ( $\text{X} = \text{Cl}$  (**2**),  $\text{Br}$  (**3**),  $\text{I}$  (**4**)), which display a unique sinusoidal  $(\text{CuX})_n$  ladder structure. In the reaction with  $\text{CuI}$  a second one-dimensional polymeric compound  $[\{\text{Cu}_3(\mu\text{-I})(\mu_3\text{-I})_2\}(\text{CH}_3\text{CN})\{\text{Fe}(\mu, \eta^5:\eta^1\text{-P}_3\text{C}_2t\text{Bu}_2)(\mu_3, \eta^5:\eta^1\text{-P}_3\text{C}_2t\text{Bu}_2)\}_n]$  (**5**) is formed. The reaction of **1** with  $\text{CuX}$  ( $\text{X} = \text{Cl}, \text{Br}, \text{I}$ ) in a 1 : 2 stoichiometric ratio leads only in the case of  $\text{CuCl}$  to the formation of the new, oligomeric compound  $[\{\text{Cu}(\mu_3\text{-Cl})\}_4(\text{CH}_3\text{CN})_2\{\text{Fe}(\mu, \eta^5:\eta^1\text{-P}_3\text{C}_2t\text{Bu}_2)_2\}_2]$  (**6**), whereas in the case of  $\text{CuBr}$  and  $\text{CuI}$  the polymeric compounds **3** and **5** were isolated. The reaction of **1** with  $\text{Ag}[\text{Al}\{\text{OC}(\text{CF}_3)_3\}_4]$  in a 1 : 1 stoichiometric ratio results in the formation of  $[\text{Ag}\{\text{Fe}(\mu, \eta^5:\eta^1\text{-P}_3\text{C}_2t\text{Bu}_2)_2\}][\text{Al}\{\text{OC}(\text{CF}_3)_3\}_4]$  (**7**), which shows dynamic behaviour in solution.

*Key words:* Copper Halides, Phosphaferrocene Complexes, Phospholyl Ligands, Self Organisation, Silver Complexes