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PRELIMINARY COMMUNICATION

SOME NEW COMPOUNDS CONTAINING PLATINUM–SILICON BONDS

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The reactions of silicon hydridres with low-valent and zero-valent transition metal complexes have previously been used to prepare compounds containing M–Si bonds in which M is Mn[1], Fe[1], Co[2], Ni[1], Mo[1], Ru[3], Rh[4], Re[1], and Ir[5]. We have now used this reaction to prepare some interesting complexes containing either two silicon atoms or one silicon and one hydrogen atom attached to platinum(II).

The silicon hydrides, Cl_3SiH, Ph_2SiH_2, and $(XC_6H_4)_3SiH$ ($X = F$ or CF_3), in several-fold excess, were refluxed with the complex $[Pt(PPh_3)_4]$ or $[Pt(diphos)_2]$ (diphos = $Ph_2PCH_2CH_2PPh_2$), to give the products listed in Table 1. (No reaction occurred when triphenylsilane was used). The products were characterized by infrared spectroscopy and elemental analysis, and by molecular weight determination except in the cases of the insoluble complexes (I) and (II).

The complex (VII) does not react further with an excess of the hydride $(m\text{-}CF_3C_6H_4)_3SiH$, but does react with trichlorosilane with displacement of the triarylsilyl group as well as the hydrogen atom, and formation of a disilyl derivative:

$$[PtH\{Si(C_6H_4CF_3\text{-}m)_3\}(PPh_3)_2] + 2Cl_3SiH \rightarrow [Pt(SiCl_3)_2(PPh_3)_2] + [(m\text{-}CF_3C_6H_4)_3Si]_2 + H_2$$

The triarylsilyl group is also cleaved from platinum by one mole of hydrogen chloride in benzene:

$$[PtH\{Si(C_6H_4CF_3\text{-}m)_3\}(PPh_3)_2] + HCl \rightarrow trans\text{-}[PtHCl(PPh_3)_2] + (m\text{-}CF_3C_6H_4)_3SiH$$

TABLE 1

PRODUCTS OBTAINED BY REFLUXING Cl_3SiH, Ph_2SiH_2 AND $(XC_6H_4)_3SiH$ WITH $[Pt(PPh_3)_4]$ OR $[Pt(diphos)_2]$

No.	Compound	m.p. (°C)	Characteristic frequency[a] (cm^{-1})	Assignment
I	$[Pt(SiCl_3)_2(PPh_3)_2]$	210–212(dec.)	554	ν(Si–Cl)
II	$[Pt(SiCl_3)_2(diphos)]$	>330	553	ν(Si–Cl)
III	$[Pt(SiHPh_2)_2(diphos)]$	222–224(dec.)	2048, 2076	ν(Si–H)
IV	$[PtH\{Si(C_6H_4F\text{-}p)_3\}(PPh_3)_2]$	131–133(dec.)	2096	ν(Pt–H)
V	$[PtH\{Si(C_6H_4F\text{-}m)_3\}(PPh_3)_2]$	134–137(dec.)	2091	ν(Pt–H)
VI	$[PtH\{Si(C_6H_4CF_3\text{-}p)_3\}(PPh_3)_2]$	154–156(dec.)	2105	ν(Pt–H)
VII	$[PtH\{Si(C_6H_4CF_3\text{-}m)_3\}(PPh_3)_2]$	145–146(dec.)	2048	ν(Pt–H)

[a] Studied as mulls in nujol.

Complex (III) reacts with one mole of bromine in benzene to give the complex $[Pt(SiBrPh_2)_2(diphos)]$, m.p. 258–262 (dec.), and the latter reacts with methyl lithium in ether–benzene to give the complex $[Pt(SiMePh_2)_2(diphos)]$ ★. These reactions are the first examples of replacements at a silicon atom attached to platinum without cleavage of the Pt–Si bond.

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★ Previously obtained from $[PtCl_2(diphos)]$ and $LiSiMePh_2$ (J. Chatt, C. Eaborn, and S. Ibekwe, unpublished work).