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Preliminary communication

Synthesis and reactivity of *o*-diphenylphosphinobenzyldimethylsilane

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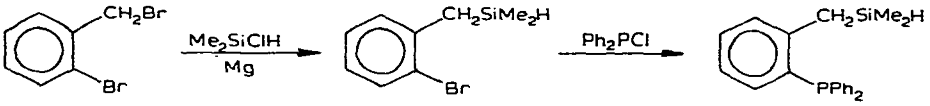
In view of the considerable current interest in compounds containing silicon–transition metal bonds, we report the synthesis and reactivity of a new type of organometallic ligand containing both phosphorus and silicon as coordinating atoms which provides a new type of ligand for use in the field of chelated organometallic compounds of transition metals.

The ligand *o*-diphenylphosphinobenzyldimethylsilane, *o*-$Ph_2PC_6H_4 \cdot CH_2SiMe_2H$ (I), has been prepared from *o*-bromobenzyl bromide according to the equations:

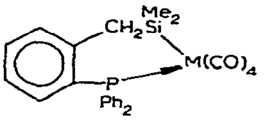


(I)

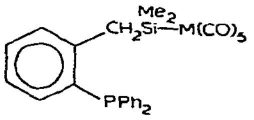
The ligand (I) is a heavy liquid (b.p. 180°/0.1 mm), and is converted into the corresponding phosphine oxide, *o*-$Ph_2P(O) \cdot C_6H_4 \cdot CH_2 \cdot SiMe_2H$ (m.p. 189–190°) on exposure to the atmosphere. Both the ligand and its oxide were characterised by elemental analysis and IR spectra.

The reaction between ligand (I) and manganese carbonyl proceeds at 50° in benzene to give a light yellow crystalline solid which can be formulated as (A) on the basis of IR data and elemental analyses. Structures (B) and (C) can be eliminated on comparison with IR data of known compounds[5–7]. The reaction takes place under milder conditions, than those previously used for forming silicon–manganese compounds[1–4].

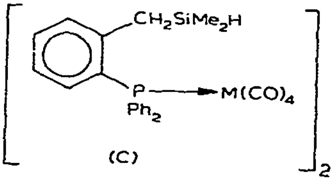
The reaction with $Re_2(CO)_{10}$ in benzene proceeds only at about 150° and gives an off-white complex (m.p. 169–171°). (The need to use high temperatures is general for all the reactions between triorganosilanes and $Re_2(CO)_{10}$.) The complex is of type (B), in which no coordination by the phosphorus atom is involved. Its IR spectrum consists of



(A)



(B)



(C)

(M=Mn or Re)

three C—O stretching bands located at lower wave number than those reported for the Me_3Si or Ph_3Si analogues[4,5]. No Si—H stretching vibration can be detected.

The C—O stretching vibrations of the *cis* complex (V) consist of four relatively strong bands and one weak band. The latter could presumably be due to impurity (see Table 1). There is no Si—H stretching absorption. The *trans* complex (VI) reported by Berry and MacDiarmid gives only two bands[5]. In view of these results, it seems likely that complex (VII), reported by Schrieke and West[6], has the silyl and the phosphine groups in *cis* positions.

TABLE 1

INFRARED DATA OF SOME METAL CARBONYL COMPLEXES

(II)	*o*-$Ph_2P\cdot C_6H_4\cdot CH_2\cdot SiMe_2Re(CO)_5$	2060m,	2010m,	1960s
(III)	$Me_3SiMn(CO)_5$ [a]	2094	2000	1993
(IV)	$Ph_3SiMn(CO)_5$ [b]	2098	2030	2003
(V)	*o*-$Ph_2P\cdot C_6H_4\cdot CH_2\cdot SiMe_2Mn(CO)_4$	2050m	2018vs	1980(sh)w
		1958s	1920s	
(VI)	*trans*-$Me_3SiMn(CO)_4PF_3$ [a]	2074vw	1990vs	
(VII)	$Ph_3SiMn(CO)_4PPh_3$ [b]	2047	1990	1950
		1910		

[a] ref. 5; [b] ref. 6.

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