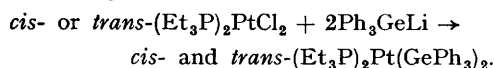


Metal-Metal Bond Formation: Trimethylsilyl- and Trimethylgermyl-platinum(II) Complexes

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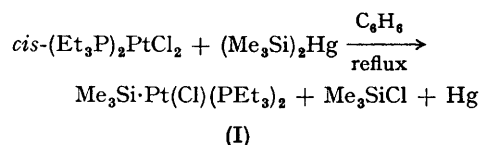
THE methods available for establishing metal-metal bonds between organo-derivatives of the Group IV elements and transition metals of Groups VIII and I are restricted to reactions illustrated by,^{1,2}



More versatile procedures are available for those transition metals which form reactive alkali-metal derivatives [such as $\text{Mn(CO)}_5\text{Na}^3$ and $\text{C}_6\text{H}_5\text{Fe(CO)}_2\text{Na}^4$] or reactive hydrides.⁵

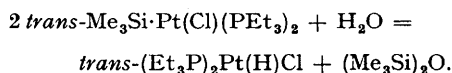
For comparative reactivity and spectroscopic studies we required a method of forming $\text{Me}_3\text{M-Pt}$ and $\text{Me}_3\text{M-Au}$ bonds ($\text{M} = \text{Si, Ge}$) where the alkali-metal derivatives, Me_3MLi or Me_3MK are, as yet, unknown. We find that bistrimethylsilylmercury^{6,7} and bistrimethylgermylmercury are convenient sources of $\text{Me}_3\text{Si-}$ and $\text{Me}_3\text{Ge-}$ groups for the preparation of trimethylsilyl and trimethylgermyl complexes of platinum(II). Equimolar ratios of *cis*-bistriethylphosphineplatinum(II) chloride and $(\text{Me}_3\text{Si})_2\text{Hg}$ give an almost quantitative yield of the complex (I).

The use of 2 mols of bistrimethylsilylmercury failed to substitute both Pt-Cl bonds, and the resulting deep green reaction mixtures afforded only low yields of (I). Bistrimethylgermylmercury,



a yellow sublimable, air-sensitive solid, prepared from bromotrimethylgermane and sodium amalgam, reacts similarly with *cis*- $(\text{Et}_3\text{P})_2\text{PtCl}_2$ to give $\text{Me}_3\text{Ge-Pt(Cl)(PEt}_3)_2$ (II).

Both (I) and (II) are low-melting (48° and 35° respectively) pale yellow crystalline solids, and their proton magnetic resonance spectra indicate a *trans*-configuration of groups in solution. Spin-spin coupling between the Me_3M protons and the ^{195}Pt nucleus ($I = \frac{1}{2}$, 34% abundant) was observed with $J(^1\text{H-}^{195}\text{Pt}) = 24.6$ and 20.0 c./sec. for (I) and (II) respectively. Among the reactions of these complexes which have been studied, that with water provides the greatest contrast; whereas the trimethylgermyl complex (II) is stable in aqueous diglyme, the trimethylsilyl complex (I) is hydrolysed too rapidly for its rate to be followed by p.m.r.



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