Bis(triphenylstannyl)mercury

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THERE is considerable current interest in compounds containing Si–Hg and Ge–Hg bonds (see, for example, ref. 1), but no compound containing an Sn–Hg bond has previously been described. Heating of triethylstannane with benzylmercury at 100°, which by analogy with reactions involving trialkyl-silanes or -germanes might have been expected to give compounds containing Sn–Hg bonds, in fact gave only mercury, ethane, and hexaethyldistannane.[2]

Having failed to make bis(triphenylstannyl)-mercury from bromotriphenylstannane and sodium amalgam (a method which works well for the preparation of some silicon– and germanium–mercury compounds), we then succeeded in obtaining it by an approach which has not previously been applied to the preparation of compounds containing bonds from mercury to other metals. This involved reaction of triphenylstannane with di[bis(trimethylsilyl)amido]mercury in 2:1 mole ratio at room temperature: hexamethyldisilazane was quantitatively evolved, leaving pure bis(triphenylstannyl)mercury as a bright yellow solid:

$$2Ph_3SnH + Hg[N(SiMe_3)_2]_2 \rightarrow Hg(SnPh_3)_2 + 2(Me_3Si)_2NH$$

The solid is stable for several months at room temperature in the dark, but decomposes in daylight. It is much less stable than the known $(R_3Si)_2Hg$ or $(R_3Ge)_2Hg$ compounds, and is completely decomposed in less than 5 min. in a sealed tube at 100°. It dissolves in benzene and tetrahydrofuran, and slightly in n-hexane, and is even less stable in solution. Thus the half-life for the decomposition in tetrahydrofuran in the dark at 15° is *ca.* 7 min. (The reaction is approximately first-order, with an activation energy of 11 ± 4 kcal./mole, which may be a measure of the bond dissociation energy.) The solutions are very sensitive to light, and exposure of a benzene solution, contained in a glass ampoule, to the light of a sunlit laboratory caused *ca.* 50% decomposition in 30 sec. Mercury and hexaphenyldistannane are formed quantitatively in all the decompositions.

These products are also formed when the mercurial is treated in the dark with diethyl ether, methanol, moist benzene, or with ethylene dibromide in benzene. (No ethylene is produced in the last case.) Treatment with bromine in benzene gives mainly bromotriphenylstannane, along with some dibromodiphenylstannane and hexaphenyldistannane, but the bromotriphenylstannane could come from initially formed hexaphenyldistannane.

We have been unable to demonstrate that triphenylstannyl radicals are formed in the decompositions of bis(triphenylstannyl)mercury. No detectable isomerization of *cis*-1-deuteriohex-1-ene occurred when the mercurial was thermally or photolytically decomposed to mercury and hexaphenyldistannane in this olefin, which is known to undergo isomerization in presence of tri-n-butylstannyl radicals.[3]

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