

A REAPPRAISAL OF THE NATURE OF THE PRODUCT FROM THE REACTION OF BIS(METHYLCYCLOPENTADIENYL)TIN(II) WITH TUNGSTEN(CYCLOPENTADIENYL) (TRICARBONYL) HYDRIDE

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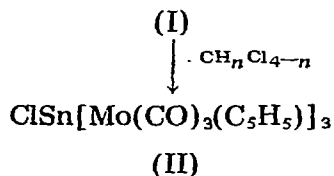
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Summary

The nature of the product obtained from the title reaction has been reexamined, and identified as $\text{ClSn}[\text{W}(\text{CO})_3(\text{C}_5\text{H}_5)]_3$.

In a previous paper [1] we reported the exothermic reaction between bis(methylcyclopentadienyl)tin(II) and the tungsten hydride $\text{HW}(\text{CO})_3(\text{C}_5\text{H}_5)$, and formulated the product as the tetravalent tin species $\{\text{Sn}[\text{W}(\text{CO})_3(\text{C}_5\text{H}_5)]_2\}_n$. Somewhat later [2], on the basis of mass spectral and molecular weight data, the material did indeed appear to be a true transitional metal derivative of bivalent tin, a type of tin(II) derivative which seems to be curiously elusive. In the light of other work which has since appeared in this area, we have examined our product in greater detail and now present a considered rationalisation of the data.

The reaction of dicyclopentadienyln(II) with pentacarbonylmanganese hydride follows a rather complex path, and yields ultimately the tin–tin bonded hydrido complex $\text{H}[(\text{CO})_5\text{Mn}]_2\text{Sn}–\text{Sn}[\text{Mn}(\text{CO})_5]_2\text{H}$, which was characterised by X-ray crystallography [3]. However, Hoff and Connolly [4] have shown that the reaction of dicyclopentadienyln(II) with the molybdenum hydride, $\text{HMo}(\text{CO})_3(\text{C}_5\text{H}_5)$ affords the tris(metallo-substituted)tin hydride (I), which on treatment with chlorinated hydrocarbons is converted into the corresponding tris(metallo-substituted)tin chloride (II):



A total analysis of our product afforded the following data: Found: C, 24.9; H, 1.7; Cl, 2.9; Sn, 9.5; W, 48.2%. The compound is therefore not as first thought of composition $\text{Sn}[\text{W}(\text{CO})_3(\text{C}_5\text{H}_5)_2]$. The analytical data do, however, agree rather favourably with those for the tungsten analogue of compound II (calculated for $\text{ClSn}[\text{W}(\text{CO})_3(\text{C}_5\text{H}_5)]_3$: C, 25.0; H, 1.3; Cl, 3.1; Sn, 10.3; W, 47.8%). Fortuitously, the expected analytical figures for carbon, hydrogen and tungsten for both formulations are the same within experimental error! Thus, it would appear that the title reaction follows a similar course to that in the molybdenum system studied by Hoff and Connolly, and that the chlorine was introduced into the compound during extraction with methylene chloride. Further, our molecular weight datum (1007 by osmometry in chloroform) is satisfactory for the formulation $\text{ClSn}[\text{W}(\text{CO})_3(\text{C}_5\text{H}_5)]_3$ (1153), whilst the mass spectroscopic data is not inconsistent with either.

References

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