

## Preliminary communication

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### TRIPHENYLGOLDZINC

P.W.J. DE GRAAF, J. BOERSMA and G.J.M. VAN DER KERK

*Laboratory for Organic Chemistry, State University, Utrecht (The Netherlands)*

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### Summary

Triphenylgoldzinc has been prepared by treatment of diphenylzinc with either  $\text{AuCl}_3$  or  $\text{Au}(\text{CO})\text{Cl}$ ; it is thought to have a dimeric structure containing phenyl bridges between Zn and Au atoms.

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Some new ways of synthesizing arylgold compounds have recently been reported. Liddle and Parkin [1] prepared mono-, di- and tri-arylgold(III) compounds from arylmercury or arylcadmium compounds and gold trichloride and Braunstein [2] obtained monoarylgold(III) salts from aryl hydrazines. Nesmeyanov et al. [3] have described some new organogold compounds containing the ferrocenyl moiety.

We have found that the reaction of diphenylzinc with gold trichloride affords an orange-red compound which analyses correctly for  $(\text{C}_6\text{H}_5)_3\text{AuZn}$  and which is a remarkably thermally stable compound. We propose structure I for the compound on the basis of the following considerations:

(a) Cryoscopy showed the compound to be dimeric in benzene at various concentrations.

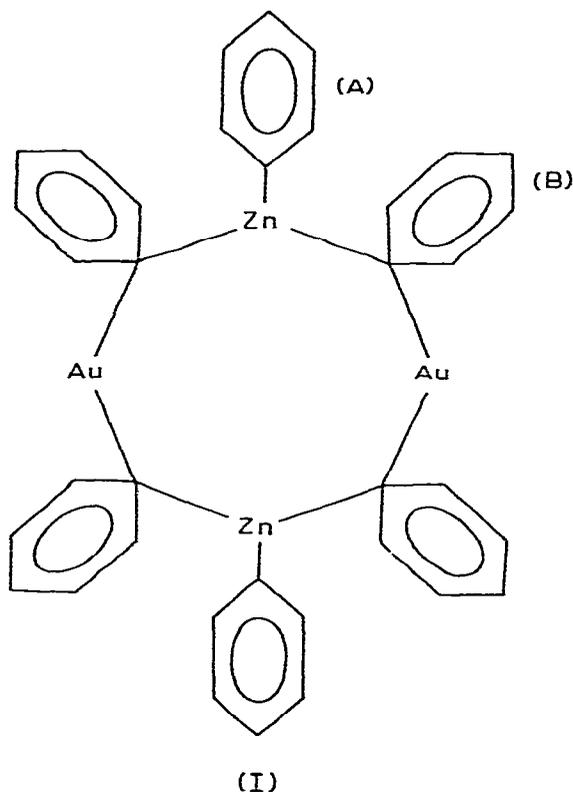
(b)  $^1\text{H}$  NMR spectroscopy\* at room temperature in  $\text{CS}_2$ \*\* proved the existence of two kinds of phenyl groups in a 1/2 ratio, A at 7.42 ppm (singlet) and B at 8.20 ppm (*ortho* H atoms, multiplet) and 7.84 ppm (other H atoms, multiplet), respectively. Below  $-25^\circ$  the signal of A is split while the signals of B are not, suggesting for A the possible presence of two different conformations.

(c) In the proton noise-decoupled  $^{13}\text{C}$  NMR spectrum one can distinguish one set of 4 signals which is almost identical with that given by pure diphenylzinc, and which thus belongs to phenyl groups exclusively bound to zinc (A), and a second set of 4 signals which must be assigned to the bridging phenyl groups B. The intensity of the latter set is about twice the intensity of the former.

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\*All chemical shifts are  $\delta$  values relative to TMS.

\*\*Under our experimental conditions  $\text{CS}_2$  does not react with either diphenylzinc or triphenylgoldzinc.



(d) Compound I clearly contains gold in the monovalent state. In fact oxidative addition of iodomethane furnishes a greenish compound, the constitution of which is at present under investigation.

The same compound I was obtained starting from  $\text{Au}(\text{CO})\text{Cl}$  and a three-fold excess of diphenylzinc. When this reaction was carried out using a 1/1 ratio of the reactants a cream-coloured compound II was isolated which analysed correctly for  $(\text{C}_6\text{H}_5)_2\text{AuZnCl}$ . The  $^{13}\text{C}$  NMR spectrum in  $\text{CS}_2$  shows only 4 signals at positions corresponding to those assigned to the bridging phenyl groups in I. Presumably II has a structure somewhat similar to I in which the phenyl groups attached exclusively to zinc (A) are replaced by chlorine.

In structure I the zinc is coordinatively unsaturated. It is likely that in compound II coordinative saturation of the zinc will be achieved by means of two-fold zinc-chlorine coordination. Unfortunately, the insolubility of II in benzene prevented a cryoscopic molecular weight determination.

There is one remarkable difference in chemical behaviour between I and II: the orange-coloured compound I is extremely sensitive to moisture, whereas the cream-coloured compound II is rather stable in air. This may be attributed to the absence of ordinary zinc-carbon bonds in II. The bridging phenyls are obviously less sensitive to hydrolysis.

Bridging phenyl groups as we postulate are not unusual for the coinage metals. Van Koten et al. [4, 5] found these to occur in arylcopper and arylsilver compounds, and Andrianov [6] gives an example in a related ferrocenylgold compound.

Compounds of the types I and II can also be obtained from substituted diarylzinc compounds; e.g. ditolylzinc gives similar reactions. We are at present extending this series further.

### Acknowledgement

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