

Bis(triphenylphosphine)platinum(0)

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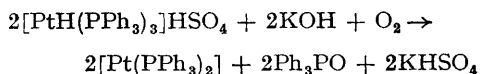
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In their work on zerovalent platinum derivatives, Malatesta and Cariello pointed out¹ that these compounds dissociate easily in solution, and suggested the existence of a compound such as

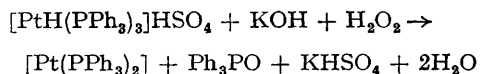
[Pt(PPh₃)₂] to explain the dissociation of [Pt(PPh₃)₃]. The same intermediate was suggested later² to account for the rate of exchange of the acetylene part of [Pt(PPh₃)₂L], where L is acetylenic.

The compound bistriphenylphosphineplatinum(0) has now been isolated in several ways.

- (1) Potassium hydroxide in alcohol is slowly added to an alcoholic solution of [PtH(PPh₃)₃]HSO₄ through which a stream of oxygen is passing.

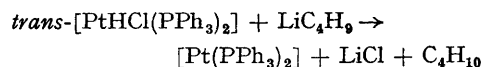
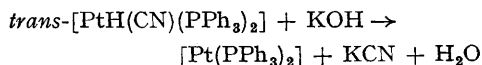


- (2) A stoichiometric amount of hydrogen peroxide and KOH in alcohol are slowly added to an alcoholic solution of [PtH(PPh₃)₃]HSO₄.



The yield in this case is 60%.

- (3) The following reactions also give the desired product, in lower yields.



In the latter case, the stoichiometric amount of butyl-lithium is essential, and the reaction must be carried out under nitrogen.

[Pt(PPh₃)₂] is a yellow compound, m.p. 157—160°, stable for a few hours in the solid state, but unstable in solution, where it seems to dissociate (M, found 464 in benzene, 395 in acetone; calc. 719). It behaves as an unsaturated compound, for example, [Pt(PPh₃)₂] + L → [Pt(PPh₃)₂L] (L = PPh₃, CO, PhC≡CPh, Ph-CH=CH-Ph) and in some reactions it shows a carbene-like reactivity: [Pt(PPh₃)₂] + CH₃I → [Pt(PPh₃)₂CH₃I]. However, it does not catalyse the hydrogenation or the isomerisation of olefins and seems to be a very poor catalyst for the dimerisation or polymerisation of butadiene.

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¹ L. Malatesta and C. Cariello, *J. Chem. Soc.*, 1958, 2323.

² A. D. Allen and D. C. Cook, *Canad. J. Chem.*, 1964, 42, 1063.