# Synthesis of *trans*-Platinum(II) Complexes by Photochemical Isomerization

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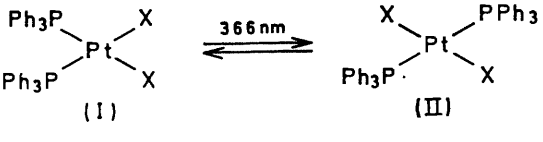
*Summary* The *trans*-isomers of dihalogenobis(triphenylphosphine)platinum(II) complexes, difficult to obtain by other methods, are readily synthesized by photochemical isomerization of the *cis*-complexes: this method can also be applied to other platinum(II) complexes.

CONVENTIONAL methods of synthesis of dihalogenobis($R_3P$)-platinum(II) complexes yield only the *cis*-isomer in the case of R = Ph.[1] A recently published preparation of a *trans*-isomer (II; X = Cl) involves a laborious route which, in our hands, gives a poor yield.[2] We now report a very simple method of preparation of (II; X = Cl or Br) by photochemical isomerization[3] (equation 1) of the readily available[1] *cis*-complexes, (I).



(1)

*cis*-Pt$(Ph_3P)_2Cl_2$, prepared by a modified version of the method of Grinberg and Razumova,[3,4] was irradiated in $CHCl_3$ with a 200 w Hanovia Type S lamp at 366 nm for 4 hr. The resulting bright yellow solution was, by electronic absorption spectroscopy, approximately 60% *trans*-(II) and 40% *cis*-(I). Vacuum evaporation gave a residue which was extracted with benzene producing a yellow solution and a white solid. Evaporation of the yellow solution followed by addition of methanol gave a precipitate which was crystallized from benzene to yield *trans*-Pt$(Ph_3P)_2Cl_2$, (42%), m.p. 306—309° (lit.[2] 307—310°), with far-i.r. and Raman bands characteristic of ν(Pt–Cl) in a *trans*-dichloroplatinum(II) complex.[4,5]

T.l.c. demonstrated that the same method could be used to prepare (II; X = Br). The comparison sample of (II; X = Br) was prepared by treatment of (II; X = Cl) with a solution of LiBr.

Irradiation of *cis*-Pt(pyridine)$_2$Cl$_2$ yielded the *trans*-isomer in *ca.* 80% yield, and when *cis*-Pt(isoquinoline)$_2$Cl$_2$ was irradiated, the previously unknown *trans*-Pt(isoquinoline)$_2$Cl$_2$ was identified as the photoproduct by spectral methods.

The solvent and the wavelength of irradiation are critical factors in this method. The photochemical steady state for (I) ⇌ (II) is highly dependent on solvent.[4,6] Non-polar solvents favour formation of the *trans*-isomer. If unfiltered light is used for irradiation, higher energy wavelengths cause decomposition of the *cis*-complex.[4,6] Use of the 366 nm line in the mercury emission spectrum eliminates side reactions and pure isomerization has been demonstrated.[4]

We thank the National Science Foundation for financial assistance.

(*Received, November 3rd*, 1969; *Com.* 1663.)

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