

Preliminary communication

Reversible addition of molecular hydrogen and conjugated dienes to Co^{I} complexes with 2,2'-bipyridine and 1,10-phenanthroline

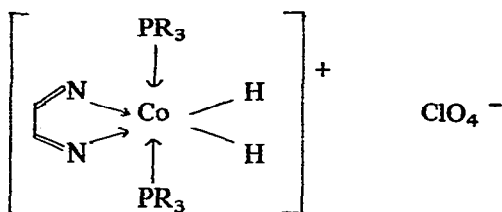
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In a previous paper¹ we reported the synthesis of stable σ -alkyl and π -allyl derivatives of Co^{III} with 2,2'-bipyridine (Bipy) and 1,10-phenanthroline (Phen) and suggested the existence of unstable hydridic cobalt compounds. We now report the synthesis and reactivity of series of new hydride complexes of Co^{III} and diene complexes of Co^{I} with Bipy and Phen, stabilized by tertiary phosphines.

When Co^{I} derivatives such as $[\text{Co}(\text{Chel})_3]^+ \text{ClO}_4^-$ (Chel = Bipy or Phen)² are treated with molecular hydrogen in the presence of PR_3 at room temperature and atmospheric pressure, crystalline yellow-orange compounds of suggested structure (I) can be isolated.



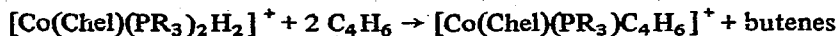
(PR_3 = triethyl-, tri-*n*-propyl-, tri-*n*-butyl- and diethylphenyl-phosphine)

Elemental analysis and magnetic measurements are in agreement with the assigned formulae. NMR confirms the presence of two equivalent atoms of hydrogen (τ 32.4, $J(\text{HP})$ 65 cps). Models favour the *trans* position of the phosphines.

The reported reactions are reversible; in fact, with an excess of chelating ligand, molecular hydrogen is evolved and $[\text{Co}(\text{Chel})_3] \text{ClO}_4$ is reformed.

In the presence of PR_3 and under similar conditions, $[\text{Co}(\text{Chel})_3]^+$ complexes also react with butadiene and isoprene, giving deep red crystalline complexes $[\text{Co}(\text{Chel})(\text{PR}_3)\text{diene}] \text{ClO}_4$ (II). These reactions are reversible in the presence of an excess of Bipy or Phen. Even in excess of PR_3 in atmosphere of hydrogen the π -bonded diene is displaced and (I) is formed.

The inverse reaction I \rightarrow II can also be brought about by treating (I) with butadiene in excess, according to the following scheme:



Complexes (I) can therefore be considered as potential catalysts for the hydrogenation of conjugated dienes to alkenes

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REFERENCES

- 1 G. Mestroni, A. Camus and E. Mestroni, *J. Organometal. Chem.*, 24 (1970) 775.
- 2 B. Martin, W.R. McWhinnie and G.M. Waing, *J. Inorg. Nucl. Chem.*, 23 (1961) 207 and refs. therein; N. Maki, H. Yamagamu and H. Itatani, *J. Amer. Chem. Soc.*, 86 (1964) 514.

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