

Chloronitrosylbis(triphenylphosphine)ruthenium(0): a Ruthenium Analogue of Vaska's Compound

By M. H. B. STIDDARD* and R. E. TOWNSEND

(Chemistry Department, University College, 20 Gordon Street, London, W.C.1)

Summary The ruthenium complex $\text{RuNO}(\text{Ph}_3\text{P})_2\text{Cl}$ has been synthesised and some of its reactions have been investigated.

Of all known oxidative-addition reactions, none have received more attention than those involving the iridium(I) complex $\text{IrCO}(\text{Ph}_3\text{P})_2\text{Cl}$ (frequently referred to as Vaska's compound). According to the well authenticated formalism in carbonyl chemistry of replacing a CO group by NO^+ , it follows that a structurally analogous d^8 complex of ruthenium(0), $\text{RuNO}(\text{Ph}_3\text{P})_2\text{Cl}$ should exist and undergo a range of oxidative additions.

Emerald-green crystals of this material may be prepared by reduction of the complex $\text{RuNO}(\text{Ph}_3\text{P})_2\text{Cl}_3$ ¹ with zinc dust in boiling benzene. The product reacts extremely readily

with oxygen to give the adduct $\text{RuNO}(\text{Ph}_3\text{P})_2\text{O}_2\text{Cl}$, recently described by Laing and Roper.² This latter adduct reacts further with sulphur dioxide to give the orange sulphato-complex $\text{RuNO}(\text{Ph}_3\text{P})_2\text{SO}_4\text{Cl}$, which may be obtained also by reaction of oxygen with a solution of the bright red sulphur dioxide adduct $\text{RuNO}(\text{Ph}_3\text{P})_2\text{SO}_2\text{Cl}$. Reaction of $\text{RuNO}(\text{Ph}_3\text{P})_2\text{Cl}$ with carbon monoxide yields the expected product $\text{RuNO}(\text{Ph}_3\text{P})_2\text{COCl}$.²

A solution of $\text{RuNO}(\text{Ph}_3\text{P})_2\text{Cl}$ in benzene absorbs hydrogen slowly, although the expected dihydride has not been isolated. However, a number of other oxidative addition products formed by reaction, for example, with CH_3I , HCl , Cl_2 , Br_2 , I_2 , HgCl_2 , and HgBr_2 may be isolated readily in a pure state.

(Received, September 30th, 1969; Com. 1482.)

¹ M. B. Fairy and R. J. Irving, *J. Chem. Soc. (A)*, 1966, 475.

² K. R. Laing and W. R. Roper, *Chem. Comm.*, 1968, 1556.