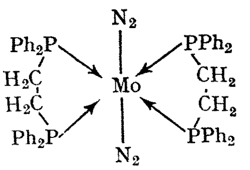
A *trans*-Dinitrogen Complex of Molybdenum

By M. HIDAI, K. TOMINARI, Y. UCHIDA, and A. MISONO*
(*Department of Industrial Chemistry, University of Tokyo, Hongo, Tokyo*)

Summary A *trans*-dinitrogen complex of molybdenum was prepared by the use of 1,2-bisdiphenylphosphinoethane.

RESULTS of the elemental analysis and thermal decomposition of a molybdenum–nitrogen complex reported previously[1] were in accord with the formula $MoN_2(PPh_3)_2 \cdot PhMe$.

No nitrogen complex was obtained by the reduction of molybdenum(III) acetylacetonate with tri-isobutylaluminium in the presence of other phosphines such as tri-n-butylphosphine, ethyldiphenylphosphine, and tri-*p*-tolylphosphine under a nitrogen atmosphere. However, when 1,2-bisdiphenylphosphinoethane (diphos) was used, an orange-yellow crystalline complex containing nitrogen was obtained. The complex was fairly air-stable and soluble in toluene, but insoluble in petroleum. Its elemental analysis was in accord with the formula $Mo(diphos)_2(N_2)_2$. Thermal decomposition occurred *in vacuo* above *ca.* 150° with evolution of 90% of the theoretical amount of nitrogen gas based on the above formula. Several examples of dinitrogen complexes have recently been reported and the nitrogen molecules are considered to be located *cis* to each other since their i.r. spectra show two strong absorptions at *ca.* 2100 cm.$^{-1}$ assignable to the co-ordinated N–N stretching vibrations.[2] The i.r. spectrum of this complex showed, however, a very weak absorption at 2020 cm.$^{-1}$ and a very strong absorption at 1970 cm.$^{-1}$, indicating a *trans*-configuration of the nitrogen molecules. From these results, it may be reasonable to conclude that this complex is *trans*-$[Mo(diphos)_2(N_2)_2]$ (I), the first example of *trans*-dinitrogen complexes.



(I)

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[2] H. A. Scheidegger, J. N. Armor, and H. Taube, *J. Amer. Chem. Soc.*, 1968, **90**, 3265; L. A. P. Kane-Maguire, P. S. Sheridan, F. Basolo, and P. G. Pearson, *ibid.*, p. 5295.