



Fig. 3 The activities of reduced Pd-Pt oxides for the hydrogenation of 1-pentene in methanol (O) and for the hydrogenation of nitrobenzene in methanol (+), and of Pd-Pt alloys for propane hydrogenolysis (Δ) and for methane-deuterium exchange (●)

rates are relative to the rate expected if there were a linear relation between activity and atomic composition. In the case of propane hydrogenolysis, the maximum enhancement also occurs at about 15 atomic per cent platinum, although rates of methane exchange are generally less than predicted assuming additive behaviour of the two metals, a fact not explicitly commented on by McKee and Norton. The rate of hydrogenation of 2-methylbut-3-en-2-ol is a maximum at about 20 atomic per cent platinum, and we therefore conclude that this composition possesses some properties which maximise catalytic activity.

Although we cannot yet claim to have established a coherent body of satisfactory observations on our reduced oxide catalysts, far less to have understood their meaning fully, we nevertheless feel confident that we can, by continuing this line of investigation arrive, in due course, at some generalisations which should have considerable predictive value.

References

- 1 G. C. Bond and D. E. Webster, *Platinum Metals Rev.*, 1965, 9, 12
- 2 D. W. McKee and F. J. Norton, *J. Catalysis*, 1964, 3, 252

The Vapour Phase Deposition of Rhodium

Interest in the vapour phase deposition of the platinum metals has been hindered by the difficulty of establishing the most suitable volatile compounds of these metals on which to base a reliable process. For applications where electrodeposition or other methods of coating cannot be employed, or can be used only with considerable difficulty, a vapour phase technique would present considerable potentialities, and a paper by Hemert, Spendlove and Sievers (*J. Electrochem. Soc.*, 1965, 112, (11), 1123) is of value in this connection.

These workers found that certain fluor-carbon-β-diketonate metal chelates are not only highly volatile but are thermally stable and are readily reduced to metal at atmo-

spheric pressure at temperatures as low as 250°C.

Thin films of copper, nickel and rhodium were produced in a simple apparatus in which two different temperatures could be maintained simultaneously in different sections. The gaseous chelate was transported by a stream of hydrogen to the reduction zone, where it was reduced to metal.

The deposits obtained adhered very well to the glass tubes on which they were formed, even though the tubes had not been specially cleaned or etched. They were all mirror-like on both surfaces, and all were electrically conductive. They were ductile and when scraped from the substrate could be folded without fracture.