

Platinum and Palladium Chemistry

The Chemistry of Platinum and Palladium; with Particular Reference to Complexes of the Elements BY F. R. HARTLEY, Applied Science Publishers Ltd, London, 1973, 544 pp. £14.

Since the publication in 1967 of W. P. Griffith's book *The Chemistry of the Rarer Platinum Metals*, investigators in this field have been awaiting a similar volume on platinum and palladium. The need was only partially met in 1971 by P. M. Maitlis' *The Organic Chemistry of Palladium*, but now an extensive survey of the chemistry of both metals has become available.

Dr Hartley has ably undertaken the onerous challenge of sifting and sorting the large amount of information that has been published, especially in recent years, on platinum and palladium. His book's extensive documentation gives some idea of the size of the task. In all, over 2,600 references are cited in the text and an inspection of these suggests that the literature has been thoroughly searched up to about mid-1971. However, Dr Hartley does not claim that the coverage is entirely comprehensive, especially in the later chapters on organometallics, but in these instances the reader is referred to detailed reviews on particular topics. This has left more space for discussion of important points.

The opening chapters contain a résumé of the occurrence, extraction, properties and uses of platinum and palladium and a general survey of their oxidation states and the stereochemistries of their complexes. Descriptions of the preparations, structures and reactions of the compounds are divided according to the oxidation states of the metals. A single chapter suffices for the zero and +4 states, but there are six on the divalent state. The material for each state is classified according to the position in the periodic table of the donor atoms bound directly to the metal.

There follows a discussion of the mechanism of the reactions, mainly relating to platinum complexes because their slower reaction rates make them easier to study. The reactions

are considered from the point of view of the entering ligand, the leaving ligand, the substrate, the non-labile ligands with particular reference to their *cis* and *trans* effects, and the solvent.

The organometallic chemistry is dealt with separately, as the oxidation state of the metal is of less importance than the nature of the ligand. The material is divided into three chapters on metal-carbon σ -bonded compounds, olefin and acetylene compounds and finally π -allylic compounds. Complexes containing the cyanide, isocyanide, carbonyl and π -cyclopentadienyl ligands are considered at appropriate places in earlier chapters.

As suggested in the subtitle, the emphasis has been placed on the complexes of the metals rather than on the traditional inorganic compounds. The treatment throughout is comparative, indicating the similarities and differences between the respective chemistries of platinum and palladium.

A commendable feature is a section describing in detail the preparation and properties of those complexes most commonly used as starting materials for further experiments. A second section, valuable both to newcomers and established workers in this field, is a compilation of published information on the structures of compounds of the two metals.

Two disappointing sections in the book are those in the first chapter on the extraction procedures and the uses of the two metals. The information given on the former is somewhat out of date and less than half a page is devoted to the latter, although admittedly homogeneous catalysis is dealt with in some detail in later chapters.

Overall the book is very welcome. It is nicely presented and will be of considerable help to those working with the platinum metals.

C. W. B.