

A Valuable Review of Ruthenium

The Chemistry of Ruthenium, Topics in Inorganic and General Chemistry 19

BY ELAINE A. SEDDON AND KENNETH R. SEDDON, Elsevier, Amsterdam and New York, 1984, 1374 pages, Dfl. 650.00 (approx. \$250)

The scope of this new monograph covers the co-ordination chemistry, organometallic chemistry, structural chemistry, spectroscopy, kinetics, electrochemistry and photochemistry of ruthenium, and particular emphasis is placed on synthesis and structures reflecting the approach of many modern inorganic chemists. The book deals with literature from 1804 to 1978 and updates the excellent account "The Chemistry of the Rarer Platinum Group Metals" by W. P. Griffith published in 1967. The need for such a work is reflected by the fact that Griffith's text contained 400 references whereas this volume has almost 4,000. It aims to cover the literature comprehensively.

In the introduction the scope and organisation of the book are defined and the history, extraction, properties and applications of ruthenium are dealt with briefly. The following chapter addresses the concept of oxidation state. The vagueness and inadequacies of formal oxidation state are discussed critically and a new scheme, the MLX concept for systemising descriptive inorganic chemistry, which has been developed by Drs. M. L. H. and J. C. Green at Oxford is defined and applied to ruthenium. The advantages and limitations of this scheme are described concisely. It is appropriate that oxidation states are discussed in some detail as the text is structured around this concept.

The chapters dealing with individual oxidation states of ruthenium are organised such that the reader may rapidly access details or references on a specific compound. Each section is subdivided into synthesis, simple properties, structure, spectroscopic properties, reactions and electrochemistry. The reader is also aided by the inclusion of classified tables which list the compounds and their salient physical properties. The discussion is concise and interesting with unusual features clearly highlighted and well presented.

In the chapter on ruthenium(III) the nature of ruthenium trichloride is discussed in sufficient detail to aid the synthetic inorganic chemist. Another highlight of this 180 page section is the critical discussion of the controversy surrounding the electronic structure of μ -pyrazine-bis[penta ammine ruthenium(I,II)] salts.

The mammoth task of clarifying the diverse chemistry of ruthenium(II) occupies 550 pages. The authors attempt to stress important areas such as penta ammine(dinitrogen)ruthenium(II) and 2,2'-bipyridine and 1,10-phenanthroline complexes of ruthenium(II). In the latter case there is a useful discussion of the different synthetic methods that have been employed. Relatively new areas such as carbene complexes are also described.

Recent reviews relating to the chapters on ruthenium carbonyl clusters and ruthenium nitrosyls have been published and sections in the book aim to complement these. The final chapter is devoted to the photophysics and photochemistry of $[\text{Ru}(\text{bipy})_3]^{2+}$ and related complexes, which is justified because of the importance of the photocatalytic decomposition of water. However, it was disappointing that the authors did not develop the topic of homogeneous catalysis more fully. It is difficult to gain an insight on the considerable research effort devoted to this field without reading the primary literature.

Although an extensive review on the organometallic chemistry has recently appeared (in *Comprehensive Organometallic Chemistry*, 1982), this authoritative and instructive review deals with the full chemistry of ruthenium and, overall, will provide valuable aid to synthetic inorganic chemists who wish to get an appreciation of ruthenium complexes. The organisation of the book is such that the text will form a valuable reference source. M.J.H.R.