

BOOK REVIEW

Porphyrins and Metalloporphyrins, Editor K.M. Smith, Elsevier, Amsterdam, 1975, pp. 910, Price Dfl. 275.00 (U.S. \$ 112.25).

In 1964 Falk's monograph "Porphyrins and Metalloporphyrins" was published and was soon to become a bible for the field. The enormous growth in this subject is reflected in the size (almost 1000 pages) of this new book published 10 years later. There is little doubt that the field now has a new bible and we are indebted to Kevin Smith for bringing out this edition.

The book is divided into eight sections, namely: Section A: General and Synthetic Aspects, containing "General features of the structure and chemistry of porphyrin compounds" (Kevin M. Smith), "Synthesis and preparation of porphyrin compounds" (Kevin M. Smith); Section B: Biological Aspects, containing "Biosynthesis of porphyrins, chlorins, and corrins" (A.R. Battersby and E. McDonald), "Heme cleavage: biological systems and chemical analogs" (Pádraig O'Carra); Section C: Coordination Chemistry of Metalloporphyrins, containing "Static coordination chemistry of metalloporphyrins" (J.W. Buchler), "Dynamic coordination chemistry of metalloporphyrins" (Peter Hambright), "Metalloporphyrins with unusual geometry" (Minoru Tsutsui and Glenn A. Taylor); Section D: Determination of Molecular Structure, containing "Stereochemistry of porphyrins and metalloporphyrins" (J.L. Hoard), "Mass spectrometry of porphyrins and metalloporphyrins" (Kevin M. Smith), "Nuclear magnetic resonance spectroscopy of porphyrins and metalloporphyrins" (Hugo Scheer and Joseph J. Katz), "Vibrational spectroscopy of porphyrins and metalloporphyrins" (Hans Bürger); Section E: Elucidation of Electronic Structure, containing "Mössbauer spectroscopy and magnetochemistry of metalloporphyrins" (Peter Hambright and Alan J. Bearden), "Electron paramagnetic resonance spectroscopy of porphyrins and metalloporphyrins" (J. Subramanian); Section F: Chemical Reactivity, containing "Reversible reactions of porphyrins and metalloporphyrins and electrochemistry" (Jürgen-Hinrich Fuhrhop), "Irreversible reactions at the porphyrin periphery (excluding photochemistry)" (Jürgen-Hinrich Fuhrhop), "Photochemistry of porphyrins and metalloporphyrins" (Frederick R. Hopf and David G. Whitten), "Photochemistry of porphyrins in membranes and photosynthesis" (David Mauzerall and Felix T. Hong); Section G: Structural Analogs of Porphyrins, containing "Structural analogs of porphyrins" (A.W. Johnson); Section H: Laboratory Models, containing "Laboratory methods" (Jürgen-Hinrich Fuhrhop and Kevin M. Smith). The overall presentation is excellent and appropriate both for neophyte in the field and for the expert who will use the text as a source of information. It does not, in general, delve very deeply into some of the more esoteric aspects of the electronic structure of metalloporphyrins. The many thousands of references ensure comprehensive coverage of most aspects of this field.

It is not feasible in the available space to indicate all the material covered, but only to highlight some of the areas. Some 150 pages deal with the syn-

thesis, biosynthesis, structure, chemical reactivity (including products of Heme cleavage), photoreactivity and physical properties of a very broad range of porphyrins and their derivatives. Buchler, in discussing the static coordination chemistry, emphasizes in a very useful manner the range of different types of complexes formed by the various metals in their various oxidation states. He discusses such issues as the reactivity of the axial ligands, the σ and π characteristics of the metal porphyrin bond and the stability of the complex towards dimetallation. There is included here a superficial treatment of the electronic spectra of the metalloporphyrins but unfortunately the book lacks a detailed treatment of this topic. An appendix does, however, list electronic spectroscopic data. Tsutsui compliments this chapter with one dealing with more unusual kinds of complexes including "sitting atop" and binuclear systems etc. Hambright presents an interesting discussion of some of the dynamics aspects of the field including rates, mechanisms and also thermodynamic aspects of metal incorporation, extrusion, hydrolysis, axial substitution and dimerization. With a lifetime of experience on the topic, Hoard presents an incisive account of the structural aspects of the metalloporphyrins and illustrates how small changes in structural parameters can enhance our chemical understanding. He also includes a discussion of our current appreciation of the structural aspects involved in the cooperativity of oxygen binding to hemoglobin. A very detailed analysis of the NMR properties of the porphyrins (Sheer and Katz) is followed by two rather short chapters dealing with infrared spectroscopy and also with Mössbauer spectroscopy and magneto chemistry. One suspects that a future edition of this book will have a much more detailed account of these techniques, especially Mössbauer spectroscopy, which in recent years has been shown to be extremely useful in deducing some of the more subtle features in iron porphyrins. Fuhrhop presents two chapters dealing with reversible and irreversible reactions with special emphasis on redox characteristics, both at the metal and at the porphyrin ligand. These are of special value to those interested in electron transfer pathways in living systems. Hopf and Whitten present a wealth of material on the luminescent and photochemical properties of the porphyrins, an area which is likely to become even more intensively studied in the future. This chapter is complimented nicely by the Mauzerall and Hong chapter emphasising photochemistry in membranes with particular emphasis on photosynthesis. Whilst this chapter deals primarily with chlorophyll, it does present an interesting discussion on the use of bilayer lipid membranes with species other than chlorophylls as a means of photo generation of electrical power.

Falk's original book had a section concerning laboratory methods and this has been retained and expanded for this version. Some 100 pages deal in very considerable detail with the preparation, purification and analysis of a wide range of porphyrin derivatives.

In summary then, no self-respecting porphyrin chemist can fail to have this volume on his library shelf, perhaps with a chain attached to it to prevent it from straying.

The Editor's Desk