

but this loses much of its value by the unsystematic way in which the papers are listed. A very wide range of test methods is covered, and there will be few topics on which guidance cannot be found.

There will undoubtedly be a call, in due course, for second editions of these and other volumes in the series. When these are being considered, it would be well to consider anew the purpose they are designed to serve. When the series was conceived (and indeed during the repeated childbirths of successive volumes), the aim was to cover the requirements of the City and Guilds paint technology courses. There have been major changes in the educational pattern for paint technology since then, and the process of change is still taking place; it is likely that a rather different manner of treatment will best meet the changed circumstances. One would like to know whether the series is aimed at the technician or the technologist, for they have different needs, and whether there is sufficient scientific background material.

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## ASPECTS OF TITANIUM CHEMISTRY

### The Organic Chemistry of Titanium

By Raoul Feld and Peter L. Cowe. Pp. viii + 213. (London: Butterworth and Co. (Publishers), Ltd., 1965.) 52s. 6d.

It is estimated that the number of scientific publications doubles every 15 years. Quite clearly the modern chemist must grow to rely more and more on good review articles and review texts if he is to keep abreast of developments within his subject or even within his branch of the subject. This book has been planned as a comprehensive review of the chemistry of organic titanium compounds. Its value will consequently be a function of the success with which the literature has been covered and assessed critically.

The coverage of the literature is certainly impressive. The title of the volume could be more informative, since "organic titanium compound" is taken to include all titanium compounds of which carbon is a constituent, not merely those in which it is the ligand atom. Thus, apart from the obvious interest of the book to workers in organo-metallic chemistry, the chapters on alkoxides, halide complexes and low valent titanium compounds will be welcomed by inorganic chemists. It is regrettable, however, that the authors have not been more critical; much of the text reports rather than reviews the contents of the literature. To quote three examples from several, the status of *bis(cyclopentadienyl) titanium* was in question when the book was written (the situation is now much clearer), yet the reader is given no indication of this fact. Also, it is likely that the concept of oxidation number is of doubtful value for compounds such as *tris(2,2' bipyridyl) titanium* which are too readily accepted at their face value in Chapter 9. The diagram on page 7 would probably have been better omitted.

The book has three particularly strong features. The coverage of the vast patent literature is laudable. The authors have managed to filter out the more optimistic claims and report only those patents which substantiate their conclusions with at least a minimum of chemical or physical data. Since a certain proportion of the work in the field of titanium chemistry in the future may consist of more detailed examination of known compounds, the excellent tabulations of these compounds together with their physical properties are likely to place many future workers in the authors' debt. Predictably the uses of titanium compounds have been emphasized. The chapters on titanium co-polymers and Ziegler catalysts are among the strongest in the book. It was the more surprising therefore to search in vain for an assessment of titanium tetrachloride as a catalyst for the Friedel-Crafts reaction.

The book should find a place in most chemical libraries. The price is not excessive by present-day standards.

Misprints are few and are confined almost exclusively to equations and formulae. The failure to report authors' initials in the references may give rise to some minor irritation, but both author and subject indexes appear to be comprehensive and accurate.

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## STEROID RESEARCH

### Methods in Hormone Research

Vol. 5. Steroidal Activity in Experimental Animals and Man, Part C. Edited by Ralph I. Dorfman. Pp. xiii + 342. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd., 1966.) 104s.

EVER since the synthesis of norethisterone (17 $\alpha$ -ethynyl-17 $\beta$ -hydroxyestr-4-en-3-one), a search has been made for other useful progestational agents. Miyake and Rooks make a valuable contribution to this volume with a well presented review of those progestational steroids which have become available during the past few years. Data are provided showing the influence of nearly every substitutional site in steroids on the physiological activity of these progestational materials.

The chapter on anti-gonadotrophic steroids by Dorfman and Kincl is also a useful contribution. It deals mainly with the relationships between the structure and activity of those steroids which inhibit the biosynthesis, and sometimes the release, of gonadotrophins. The authors point out that work involving the parabiotic rat technique has certain limitations, and does not allow selective measuring of the inhibition of follicular stimulating hormone in the rat—if indeed there is any selective differentiation from luteinizing hormone to be measured. The introduction to this chapter unfortunately gives the impression that anti-gonadotrophins operate mainly at the pituitary rather than the hypothalamic level. Nevertheless, valuable data on the inhibition relationship are included. This sort of work and that of Miyake and Rooks with the progestational steroids prove that the combination of organic chemists, endocrinologists and physiologists is extremely powerful. Success in dealing with the problems of over-population will surely only be obtained by more work of this kind.

Other chapters in the book provide useful information on the effect of steroids on the central nervous system, the treatment of human malignancies with steroids, and the relative potencies of androgens. The editor is to be congratulated for supplying once again a valuable reference book. It is an excellent addition to the earlier volumes of the series.

D. EXLEY

## SECONDARY METABOLISM

### The Biosynthesis of Natural Products

An Introduction to Secondary Metabolism. By John D. Bu'lock. Pp. x + 149. (Maidenhead: McGraw-Hill Publishing Company, Ltd., 1965.) 28s.

THIS book meets a need which has been increasingly felt by scientists interested in natural products. The title is somewhat misleading in that the book is not concerned with the main metabolic pathways by which amino-acids, fats, and carbohydrates are synthesized in the cell or broken down. Its subject, which has been of special interest to the organic chemist and less so to the biochemist, is the formation of a great variety of compounds such as terpenes, alkaloids, antibiotics, and a variety of other substances, chiefly by green plants or fungi. In this field of science enzyme methods have been little used, and investigations are increasingly based on the use of putative labelled precursors in whole cells or whole organisms. In this secondary metabolism, the substances concerned are