

leading and, in many ways, a bad book, and that the fact, advanced by Driver in its favour, that non-biologists like Koestler and Mead received it enthusiastically merely emphasizes the importance that the criticisms of its theses by other ethologists should reach as wide an audience as possible.

R. J. ANDREW

ULTRA-HIGH VACUA

The Physical Principles of Ultra-high Vacuum Systems and Equipment

By Norman W. Robinson. Pp. ix + 270. (Chapman and Hall: London, 1968.) 75s.

IN the "High Vacuum Series" of books edited by Dr L. Holland and published by Chapman and Hall, there has been possibly more overlap of material between the various volumes than is ideally desirable. Though this has been inevitable to some extent, it is welcome to see that this new volume in a useful series contains very largely new data not found in the previous works. A consequence of this is that Dr Robinson's book demands of the reader a fairly extensive preliminary knowledge of the theory and practice of the production and measurement of low pressures. It is therefore most suitable for the postgraduate student and the research scientist. Indeed, it can be regarded as indispensable reading for the growing number of investigators engaged on all kinds of experimental work involving a gaseous environment at pressures below 10^{-8} torr.

Dr Robinson was for many years head of the Vacuum Physics Research Laboratories of Mullards Ltd, at Salfords in Surrey. His book not only reflects the wide experience he has gained; it also contains records of several of his own original investigations and evinces an excellent command of the most relevant theoretical aspects of kinetic theory, gas discharge phenomena at very low pressures, and surface phenomena.

Dr Robinson, as the title of his book denotes, is essentially concerned with physical principles. In general, a beginner would not find here technical details about how to erect actual ultra-high vacuum systems. Presuming he had this "know-how" he would find most valuable information in the first two chapters on the performance, characteristics, correct use, calibration and problems associated with the use of devices for measuring both total and partial pressures in the ultra-high vacuum range, data on ion gauge pumping, getter-ion pumps, sorption pumping and the principles of cryogenic pumping. Chapter three is about mechanical appliances such as demountable and permanent seals, bakable plastics (for example, polyimide), bakable metal closure valves and means of imparting motion to a mechanism *in vacuo*. Chapter four is devoted to "mass spectrometry", with emphasis on principles, and includes magnetic deflexion instruments, cycloidal types, the omegatron, radio frequency and time-of-flight mass spectrometers, the quadrupole and monopole devices and the mass synchrotron. The following chapter is on the "Principles of Leak Detection". Chapter six, "Residual Gases in Ultra-high Vacuum Systems", is an excellent survey of the important theory and essential data on various relevant materials as also is the succeeding chapter seven on "Adsorption Phenomena". The final two chapters are about "Transfer of Gases at Ultra-high Vacuum" and "Degassing Phenomena and the Preparation of Clean Surfaces".

The style is sophisticated and cogent, the text is up to date and with references to selected books and papers up to 1966. Occasionally the author is insufficiently explicit: as one example, he gives an account of Kornelsen's work on the trapping of inert gases by tungsten on pages 45 and 46, but the uninitiated could not readily relate this to the graphical results on thermal desorption spectra described briefly on page 49.

J. YARWOOD

MASS SPECTROMETRY

The Mass Spectra of Organic Molecules

By J. H. Beynon, R. A. Saunders and A. E. Williams. Pp. ix + 510. (Elsevier: Amsterdam, London and New York, 1968.) 235s.

THE appearance of a book on mass spectrometry by such well known and accomplished practitioners in the field is a noteworthy occasion. Following the success of Beynon's earlier comprehensive text, published in 1960, a companion volume was obviously desirable by 1968. In the new work *The Mass Spectra of Organic Molecules*, the subject matter begins with a short but essential description of the machinery of mass spectrometry followed by a summary of types of ions and their formation. The main section of the book is devoted to a description of the fragmentation pathways of classes of organic compounds beginning with alkanes and ending with compounds containing the less commonly encountered elements of boron, phosphorus, and silicon. The final chapter contains examples of structure determination with the help of mass spectrometry and at the end of the book is a list of 547 references.

The reviewer's copy of the book was printed partly on glossy and partly on matt paper which, if general, is quite inexcusable in such an expensive book. Indeed, its high price will cause many potential private buyers to examine its usefulness very carefully. From the items discussed and the long list of references, it seems apparent that either the manuscript was essentially completed in 1965-6 or, incredibly, the authors have not read the chemical literature since then. Considering the book has been published in 1968 it is quite remarkable that there is only one reference to a publication in 1967 (to a book) and only about twelve references to works in 1966 (four of these to books). There have been many significant advances in mass spectrometry between 1965 and 1968 and, although there must be delay between the final preparation of a manuscript and its appearance in print, for such a book to be published two to three years out of date gives it a decided disadvantage over its more up to date, cheaper and equally extensive rivals.

There are some mistakes in the book such as describing covalent bonds of strength 10 eV. The section on rearrangement processes is inadequate and the reader is not cautioned about the effect of such processes or element mapping. It is also perhaps unfortunate that one of the prominent examples chosen for this section should be in fact erroneous. Appendix 1, an attempt to correlate commonly encountered m/e values with molecular structure, is presented with some warning as to its use, but it could well be extremely misleading to a novice in mass spectrometry and is of no use to the expert.

One sincerely hopes the authors are even now preparing an up to date version of what could be an extremely useful book.

R. A. W. JOHNSTONE

ORGANIC PHOTOCHEMISTRY

Preparative Organic Photochemistry

By Alexander Schönberg. In cooperation with Günther Otto Schenck and Otto-Albrecht Neumüller. Second completely revised edition of *Präparative Organische Photochemie* by A. Schönberg and G. O. Schenck. Pp. xxiv + 608. (Springer-Verlag: Berlin and New York, 1968.) 148 DM.; \$37.

DURING the decade which separates the two editions of this book organic photochemistry has expanded to such an extent that most of the references in the second edition, which includes those up to the end of 1965, are from this period. It is intended in the future that supplementary