

BOOK REVIEWS

Algebraic Terms

A Handbook of Terms Used in Algebra and Analysis. Compiled by A. G. Howson. Pp. ix+238. (Cambridge University: London, September 1972.) £4 cloth; £1.60 paper.

THIS is, indeed, an unusual mathematical book. The reason for its appearance is that degree students of mathematics are often daunted by the mass of definitions and theorems with which they must familiarize themselves. Here they will find succinct explanations of the terms and the symbolism which they are likely to meet in their university courses. The author has avoided a dull alphabetical dictionary by choosing an order and division of sections corresponding to the way in which mathematics can be developed. There are numerous notes and examples interspersed with the text which make the treatment easy to read. Moreover, one gets the impression of the unity of mathematics from the ordering of the contents.

I think that the handbook will be found most useful by students of mathematics to general degree level. Not only will it be extremely useful for revision purposes, but the selection of the main definitions and theorems enables the reader to obtain a bird's eye view of the subject. This is very useful to students of average ability who sometimes cannot see the wood for the trees.

The book is divided into thirty-eight sections with titles like "sets and functions", "homomorphisms and quotient algebras", "fields and polynomials", "categories and functors", "improper integrals" and "measure and Lebesgue integration". Appendix I contains some seventeen pages of "named" theorems and properties, in alphabetical order. Appendix II summarizes alphabets used in mathematics. This is followed by an eight-page index of symbols and a detailed index extending to twelve pages.

I do not think that the professional mathematician will find the handbook an excellent source of reference, not because of any inaccuracy but because of the impossibility of treating in depth the whole field of algebra and analysis in a single book. The undergraduate, however, should find it extremely useful—there seems little doubt that many

students in the future will be grateful to the author for his painstaking task in producing this handbook.

T. J. WILLMORE

Jahn-Teller Effects

The Jahn-Teller Effect in Molecules and Crystals. By R. Englman. Pp. xx+350. (Wiley: New York and London, April 1972.) £8.

THE author's aim in writing this book was to describe how the Jahn-Teller effect operates in various systems rather than to describe the systems in which the Jahn-Teller effect operates. The properties of electronically degenerate systems are derived from a set of rules which largely replace the original formulation of the effect itself. The result is a book which discusses both molecules and crystals containing magnetic centres and one which throughout spreads into both physics and chemistry.

The book begins with a discussion of the Born-Oppenheimer and adiabatic approximations and the corrections needed when Jahn-Teller effects are present. The next chapter deals with idealized vibronic systems which have mathematical solutions and this is followed by an analysis of more realistic distorted systems. Then an analysis of the Jahn-Teller effect in extended systems is given and the influence of fluctuations on relaxation mechanisms is discussed. The final chapter provides the background to the more common physical systems showing Jahn-Teller effects. The very extensive appendices of more than 60 pages contain a wealth of theoretical information needed in calculations and also of experimental data. In particular, parameters are given for over 200 systems in which Jahn-Teller effects are known to operate.

The author's approach is certainly unlike others on the Jahn-Teller effect. It is likely to prove very difficult to understand for a research worker without a working knowledge of the subject and some of the original articles are probably easier to understand. Those of us already acquainted with a few of the intricacies of the effect, however, will have found a book containing all the important data for a large number of

systems. In addition, the author's unification of the subject is very stimulating.

C. A. BATES

Nine Transition Metals

The Early Transition Metals. By D. L. Kepert. Pp. x+499. (Academic: New York and London, June 1972.) £8; \$25.

THIS book presents a detailed account of the chemistry of the transition metals Ti, Zr, Hf; V, Nb, Ta; Cr, Mo and W. A chapter is devoted to each group, following an introductory discussion of high coordination numbers, metal-metal bonding, and isopoly- and heteropolyanions, all distinctive features of compounds formed by these elements. Most of the topics are described comprehensively, some 2,500 references being cited. The organization of this large quantity of information is good and the text is generally clear, concise, and well illustrated, with relatively few errors and inconsistencies.

Although the first two sections of chapter 1 contain much valuable information of general interest, they are disappointing. The discussion of high coordination numbers and metal-metal bonding is far too general for the space allotted, resulting in a rather sketchy and disjointed account. However, the last section of this chapter is succinct, and presents difficult material on isopoly- and heteropolyanions in an unusually clear and stimulating manner. The selection of material clearly reflects the author's own research interests, and to this extent the book does not present a balanced view of the chemistry of the early transition metals. Organometallic chemistry receives but scant acknowledgment; Zeigler-Natta catalysis, for example, is "covered" in two pages. Nevertheless, this approach can be justified since much of the omitted material is described elsewhere, whereas the wealth of detail provided on the preparation, properties, and structures of these metals in oxidation states greater than II is not.

The level of presentation, price, and selection of material will preclude this book from general undergraduate use. But it is strongly recommended to research chemists and librarians as a valuable source of factual information on the chemistry of these nine transition metals.

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