BOOK REVIEWS

Atomic Interactions

Interatomic Potentials. By Ian M. Torrens. Pp. xiii+247. (Academic: New York and London, November 1972.) $14.

THIS book attempts to explain the basic principles behind the construction of interatomic potentials for use in problems of atom–atom interactions in matter in the gaseous, liquid and solid states. It is written at a level such that students who have had an elementary course in quantum mechanics can understand all the physical principles that are introduced. The presentation of the material is good, but the emphasis on understanding the physics is sometimes at the expense of the mathematics. Formulae are occasionally produced without adequate explanation, but this is probably justified in order to keep the text at an elementary level. After an introductory chapter on interatomic forces, the Hartree–Fock and Thomas–Fermi–Dirac (TFD) models of the atom are summarized and application of the TFD method of atom–atom potentials discussed. Empirical potentials such as the Lennard–Jones, Born–Mayer and Morse potentials are described and numerous applications in liquid and solid state physics are treated. The author admits that the book has a bias towards solid state problems, and indeed, the relevant chapters also seem to have a better list of general references that can be followed up by people who wish to delve more deeply into the subject. The two chapters dealing with atomic collision theory and atomic scattering experiments seem more sketchy by comparison. It is surprising that here there are no references to other books which treat these subjects at a more advanced level, for instance *The Theory of Intermolecular Forces* by Margenau and Kestner or *Electronic and Ionic Impact Phenomena,* volume 3, by Massey. Nevertheless, on the whole, the book achieves its purpose and it is useful to have a book which draws together information on atom–atom interactions derived from a wide range of physical situations. It is emphasized that whereas for atoms in a solid it is important to have a potential correct in the region of equilibrium separation, atom–atom scattering processes are more sensitive to the potential at large interatomic distances. It is surely true, as the author states, that in the past certain empirical potentials have become too readily accepted and believed and that not enough work has been done to examine the sensitivity of the observable quantities to changes in these potentials.

The price, nearly £6, is such that although these days it may be counted as normal, I think a research student in this field who might find it a useful book to possess could well be deterred from purchasing it.

G. PEACH

Descriptive Chemistry

Oxidation and Reduction of Organic Compounds. By Kenneth L. Rinehart. Pp. xii+148. (Prentice-Hall: Englewood Cliffs, New Jersey, January 1973.) $9.45.

THIS small book is one of the Prentice-Hall series *Foundations of Modern Organic Chemistry.* The contents of eight to ten such volumes are recommended for the coverage of a one year undergraduate course, so the publishers must hope that impecunious students can be persuaded to buy several small books instead of a single comprehensive textbook at about three times the above price.

Oxidation and reduction account for about one third of the reactions of organic chemistry. Consequently this volume is little more than a scissors-and-paste extract of well known concise specialist texts; indeed these are listed as reading references. Out of its 144 pages of reading matter no fewer than fifteen comprise problems for students. These are good and searching, but from the text itself no more than mediocre answers could be given even by verbatim copying. The space accorded to each listed oxidizing or reducing agent is so limited that the treatment is superficial and occasionally tendentiously misleading. Thus we read "Phenols . . . are especially susceptible to autoxidation. . . . The ease of oxidation of phenols allows of their use where antioxidants are needed as scavengers of radicals to prevent chain reactions". In fact monohydric phenols, including the best antioxidants, are not easily autoxidized.

Advisably for undergraduates, the author has stressed laboratory reactions rather than mechanisms, but by omitting even rudimentary explanations he has obscured some significant features of experimental organic chemistry, such as the preferential *cis* or *trans* reductions of olefins.

Apart from the fact that it does mention most modern reagents the book resembles a brief text of some 50 years ago when organic chemistry was a descriptive subject to be memorized but not understood.

W. A. WATERS

Acid Solutions

Reaction Mechanisms in Sulphuric Acid and other Strong Acid Solutions. By M. Liler. Pp. xiii+350. (Academic: New York and London, October 1971.) £6; $17.50.

THIS book is a timely addition to the literature of both organic and inorganic chemistry, representing the first comprehensive account of the chemistry of solutions in sulphuric acid, although sulphuric acid and sulphuric acid–water mixtures have been the object of study as solvents and reaction media for almost seventy years since the time of the pioneering work of Hantzsch in the early 1900s.

The first chapter reviews the physical properties of sulphuric acid and sulphuric acid–water mixtures and the second chapter deals with acidity function measurements on these systems. This is followed by chapters on protonation and complex ionizations in sulphuric acid media. The final chapter, which constitutes almost half the book, is a detailed account of reaction mechanisms in sulphuric acid solutions.

The book is a most useful source of information on all aspects of the chemistry of sulphuric acid solutions and the coverage of the literature appears to be quite complete up to 1969. The second part of the title of the book is, however, misleading as it does not in fact treat other acid media at all extensively or comprehensively. The author states that the important super-acid media such as HSO_3F-SbF_5 which have been extensively used in recent years by organic chemists studying protonation and carbonium ion formation are outside the scope of the book.

In short the book is a most useful source of reference for anyone seeking information on the physical properties of sulphuric acid and sulphuric acid–water mixtures and the numerous applications of these media as solvents for reactions, primarily organic reactions.

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