

hydrogen atom and spin. In the final part of the book the methods of quantum theory, statistical physics and relativity are used to describe and explain a broad spectrum of physical phenomena. The examples are well chosen to give an overview of modern physics as well as to provide opportunities to extend calculational techniques. For example, the discussion of electromagnetic transitions and selection rules also provides a derivation of

time dependent perturbation theory, and the calculations of specific heats of phonons and electrons provide an introduction to Bose and Fermi-Dirac statistics. This last part introduces the reader to atomic and molecular physics, solid state, nuclear physics and elementary particles. The latter topic is treated in more detail than the others and ends with a discussion of quarks, colour and charm.

This book is exciting to read, yet

designed for instruction and as a course text. There are many good examples at the end of each chapter. It is one of the best introductory textbooks to modern physics which I have seen and it deserves to be widely used. □

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Analytical chemistry

T.S. West

Analytical Chemistry. By D.J. Pietrzyk and C.W. Frank. Second edition. Pp.700. (Academic: New York and London, 1979.) \$16.50.

A DETAILED examination of the text of this book shows that in many respects it is rather like the legendary 'curate's egg'. At first sight there are many excellent features of planning and intention such as material on sampling, choice of analytical method, literature on analytical chemistry, units, standards, preliminary operations, and so on; but, unfortunately, these are vitiated by lack of penetration into the subject or by a loose approach. So, what looks promising when one first looks at the list of contents, turns out to be little more than a run-of-the-mill treatment. In the sense that

there are references to the edicts or regulations of bodies such as the FDA, EPA, APHA, ASTM, and so on, which is, of course, perfectly appropriate for the student mass market in the USA, the book is nevertheless a US national rather than an international publication.

It is considerably less welcome, however, to find the use of the 'Formality concept' predominating in the book and, even though lip service is paid to SI, it has to be said that 0.1F H_3PO_4 is more inconsistent and confusing than continued use of 'ml', 'litre', and so on, which are, at least, still in common use throughout the world. It is also noticeable that principal references are made almost exclusively to American papers and books and, indeed, that there are very few references to the original literature throughout the text. Students who use this text are consequently likely to receive little training or introduction to a concept which the authors apparently value highly. According to page 18: "The literature of analytical chemistry, as in any other scientific area, is the life blood. The books provide the newcomer with the

required background while the journals provide a vehicle for critical discussion about the old and the new." Yet on the very next page one of the leading international journals is incorrectly given.

The subject matter is treated fairly fundamentally and goes into the conventional techniques of gravimetry, titrimetry (given as "volumetry"), fairly well. The treatment of optical procedures such as flame spectrometry (still showing detailed diagrams of a total consumption burner), atomic absorption and fluorescence spectroscopy is so rudimentary that it is almost without value: similarly polarography. The separation section on ion exchange and chromatography is more satisfactory; but the solvent extraction chapter, which includes a solitary incomplete reference, is also lacking in penetration.

This is not a book that I would recommend with any degree of confidence.

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Solid-state chemistry

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Structure and Bonding in Solid State Chemistry. By M.F.C. Ladd. Pp.326. (Wiley: New York and Chichester, UK, 1979.) £16.50.

THIS is a welcome book on solid-state chemistry, for I am sure that the subject gets short treatment in most chemistry courses. The difficulty faced by an author in this field is to decide what to include and what to omit. The subject cannot be taught without reference to gas phase molecular structure and to chemical bonding theory but these are topics adequately covered in other monographs. If this background material is omitted then I suppose that there is the danger that the book will either be rather thin or will have to include detail which is too specialised for an undergraduate text.

Dr Ladd has chosen to include a substantial amount of background material on basic quantum mechanics and the theory of the covalent bond (over 70 pages in all). He also includes 10 pages of appendices covering the thermodynamics of electrolyte solutions, required, as far as I can see, only for brief discussion of the solubility of ionic compounds. My own inclination would have been to direct the reader to other books for these topics because I think it diverts attention from the main direction of the text.

Chapter 1 is titled "Preamble" and gives an introduction to the structure of solids. In contrast to my view expressed above I found this section surprisingly thin on the experimental and theoretical aspects of diffraction. For example, I found no reference to neutron diffraction and its relevance to the position of hydrogen atoms in solids. The book would certainly not be adequate to cover the material necessary for undergraduate chemistry teaching of diffraction.

Chapter 2 covers ionic crystals comprehensively, reflecting one of Dr Ladd's research interests. There is a short section

on colour centres. Chapter 3 deals with covalent compounds but only one page out of seventy deals with covalent solids directly (diamond, for example), the rest being used for the background material already referred to.

Chapter 4 is titled "Van der Waals' Compounds" and contains a brief description of intermolecular forces and their relevance to inert gas solids, organic molecular solids and donor-acceptor complexes. Chapter 5 covers metallic compounds and contains an elementary treatment of band theory; the free-electron model, Brillouin zones and Bloch theory. Each chapter presents a set of problems and solutions are given at the end of the book.

In summary, I feel that the balance of the book is not ideal but it should still be very useful reading for students of chemistry and chemical physics. □

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