

## Different elements to chemistry

Jon McCleverty

### **Inorganic Chemistry: Principles of Structure and Reactivity, 3rd Edn.**

By James E. Huheey.

Harper & Row: 1984. Pp.936. Hbk \$37.50; pbk £11.50.

### **Chemistry of the Elements.**

By N.N. Greenwood and A. Earnshaw.

Pergamon: 1984. Pp.1,542. Hbk £75, \$120; pbk £19.50, \$34.95.

### **Structural Inorganic Chemistry, 5th Edn.**

By A.F. Wells.

Clarendon: 1984. Pp.1,382. £75, \$98.

OF THE three books reviewed here, two are, to most inorganic chemists, old friends (Huheey and Wells), and one is a keenly anticipated newcomer. The books by Huheey (now in its third edition) and Greenwood and Earnshaw are intended as student texts, whilst that by Wells (a fifth edition) is primarily a work of scholarship and reference directed at one aspect of inorganic chemistry — the structure of crystals and solids of all types.

I have always been an admirer of Huheey's account of the principles of structure and reactivity in inorganic chemistry, largely because, like my students, I found it immensely readable and a nicely presented package of material for the core of the first two years of an undergraduate course. Typically North American in its approach, combining a distinct flavour of the physical chemist's view of chemistry, nonetheless it advances inorganic chemistry within a topic approach which makes the consumption of a wide range of facts both appetizing and digestible.

The early chapters deal with atomic structure, bonding models, chemical forces, acid-base chemistry and chemical behaviour in aqueous and non-aqueous media. It is gratifying to see a chapter on solid-state chemistry, although perhaps rather small in the light of the rapid growth of interest in the subject. Later chapters are concerned with coordination chemistry in all its aspects, organo-transition metal chemistry (including ritual obeisance to homogeneous catalysis) and bioinorganic chemistry. There are three chapters covering some descriptive chemistry of the d- and f-block metals, and of the halogens and rare gases. This is an improvement over the earlier editions, although there are, inevitably, still quite significant gaps. To some extent, however, the omissions are partly catered for in the excellent chapter on periodicity. The appendices contain a wealth of physical data, and discussions of nomenclature and of group theoretical symbolism and symmetry (although this is not used specifically in the text).

Greenwood and Earnshaw provide a wholly different menu of inorganic chemistry, returning in a sense to a factual presentation based on single elements or groups of elements following the periodic table. Thus the s- and p-block elements take up most of the first half of the book, and transition metals, reported by vertical groups, the second half. The only time that topics are discussed is at the beginning — the origin of the elements, isotopes and atomic weights, and chemical periodicity and the periodic table — and later with an account of coordination chemistry which precedes discussion of the transition metals.

Within each chapter, the properties of the elements and their compounds are discussed systematically, and aspects of solid state, organometallic and bioinorganic chemistry are referred to at the appropriate point. An unusual and unexpected feature is the inclusion in the chapter on carbon of a major discussion of metal carbonyl and hydrocarbon chemistry, particularly from the structure and bonding point of view. But by far the most interesting and novel feature of this book is the liberal presentation of facts and figures on the uses and potentially useful properties of inorganic compounds, information which is almost totally absent from any other major texts in this subject area. The danger of including such material is, of course, that it may rapidly become out of date, but that problem apart this is a fresh approach to the furthering of the relevance of inorganic chemistry which is to be welcomed enthusiastically.

It is not helpful to say which of the two books one might choose as the basis for a course of inorganic chemistry at the tertiary level. Huheey is certainly appropriate for the first two years of a British undergraduate curriculum, and I suspect that students would prefer it initially as a more helpful study guide. However, Greenwood and Earnshaw's book unquestionably contains more chemical information, and course instructors will be immensely grateful to the Leeds chemists for having reminded us all that facts are facts, whereas theories often reflect passing fashions and fancies.

Wells's *Structural Inorganic Chemistry* cannot be realistically regarded as a student text, although senior undergraduates will undoubtedly use it for reference. It seeks to present the structural basis of inorganic chemistry for chemists, and it succeeds. It is a little bit like an Irish stew — everything is included, cooked in a special and uniform way, making up a rather fine and nourishing dish.

The book is divided into two parts, the first of which deals with a number of general topics, including the properties of polyhedra, the nature of symmetry and repeating patterns, the way in which spheres of varying sizes pack together, and bonding in molecules and crystals. The second, longer part describes the structural

chemistry of the elements, based on the groups of the periodic table. Here oxides, hydroxides, aquo species, sulphides and halides receive considerable attention, but there are also chapters dealing with metal carbonyls, carbides and alkyls, the coordination chemistry of the later transition metals, and metals and alloys. The text is usefully referenced and there are formula and subject indexes.

In a subject as vast as structural inorganic chemistry, encompassed in some 1,400 pages of text, there are bound to be some topics which receive only cursory treatment. However, this is likely to worry only the crystallographer rather than the broader congregation of chemists, and the author is to be congratulated on assembling such an amount of useful information in such an accessible form. □

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## Organic affairs

John Mann

### **Advanced Organic Chemistry, Part A, 2nd Edn: Structure and Mechanisms.**

By Francis A. Carey and Richard J. Sundberg.

Plenum: 1984. Pp.726. Hbk \$59.50, £56.53; pbk \$16.95, £16.19.

### **Organic Chemistry.**

By G. Marc Loudon.

Addison-Wesley: 1984. Pp.1,451. \$39.95, £39.

### **The Third Dimension in Organic Chemistry.**

By Alan Bassindale.

Wiley: 1984. Pp.242. Pbk £7.95, \$17.95.

### **Spectral Problems in Organic Chemistry.**

By R. Davis and C.H.J. Wells.

Chapman & Hall/Methuen: 1984. Pp.121. Pbk £5, \$10.95.

LIKE Shakespeare's *Henry IV*, *Advanced Organic Chemistry* by Carey and Sundberg comes in two parts. Last year (*Nature* 308, 136; 1984) I extolled the virtues of the second edition of Part B, which is concerned with the methodology of organic synthesis. Part A deals with structure and mechanisms and, like its companion volume, is aimed at the advanced undergraduate or novice graduate student.

The style is modern, and both molecular orbital theory and the frontier orbital approach are used to good effect. There is a lot of physical organic information pertaining to the various reaction types, and other highlights include chapters on stereochemical principles and conformational analysis, concerted reactions and photochemistry. The numerous problems provided are well-chosen, and many contain data taken from the research literature.

Overall, the book complements Part B