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Book reviews

The Heavier d-Block Metals: Aspects of Inorganic and Coordination Chemistry Oxford Chemistry Primers No. 73

C. E. Housecroft
Oxford University Press, Oxford, 1999
96 pages. £5.99
ISBN 0-19-850103-X

Catherine Housecroft's latest addition to the *Oxford Primer Series* (OPS) is a timely replacement for Cotton and Hart's *The Heavy Transition Elements*, now over 20 years old, and is designed to complement both Winter's d-*Block Chemistry* (OPS No. 27) and her own *Metal–Metal Bonded Carbonyl Dimers and Clusters* (OPS No. 44).

The book is divided into sections covering aspects of periodicity, aqueous ion chemistry, structure of coordination complexes, magnetic and electronic properties, multiply bonded complexes, and finally has two chapters devoted to high-valent clusters and polyoxometallates. After a brief introduction, each chapter surveys the behaviour of the elements by group, with an excellent selection of examples ranging from the classical to the exotic. Many key issues in coordination chemistry are addressed and a variety of applications discussed, but much of the focus is on individual aspects of chemistry.

The principal weakness of this text lies in the chapter on electronic structure and magnetism. While the concise format of these primers precludes in-depth discussion, this chapter is quite disappointing. Four pages are devoted to the usual material, found also in Winter's book, on crystal field splittings and the magnetic behaviour of square-planar compared with tetrahedral nickel complexes. Curiously, in this context, no explanation is given for the absence of tetrahedral complexes of palladium and platinum, for example. Equally, the discussion of Kotani diagrams makes no reference to the importance of T ground terms and the existence of low-lying excited states. In this respect Nicholl's classic *Complexes and First-row Transition Elements* (David Nicholls, MacMillan 1975) is rather more sophisticated. The two pages on spectroscopy are also extremely elementary, with no mention of term symbols or of any of the effects which give rise to fine structure or complexity in the spectra of these complexes.

Another quibble is that redox behaviour of the metal ions in solution is only described in terms of Latimer diagrams. Whilst these are essential for making quantitative statements, the visual impact of the Frost diagram is far more effective for illustrating pH- or ligand-dependent behaviour.

As with all the primers, the tight budget means that less attention is devoted to the details of typography and layout. Some of the typefaces are inconsistent and the kerning of characters is left to the vagaries of the typesetting software, making the book less easy on the eye than one would like. The chemical diagrams, some of which are unnecessarily large or are repeated several times with minor differences (e.g. the octahedral core halide clusters), also leave much to be desired: there are clumsy spacings between bonds, odd misalignments of bonds and atoms, and confusing overlaps of the foreground and background, — minor individual points which cumulatively detract from the 'look' and 'feel' of the book.

In summary, therefore, this volume provides a good introduction to the descriptive chemistry of these varied and fascinating elements, but dwells unduly on the examples while not really capturing the broad sweep of the subject. Theory is not its strong point. Hence it should be recommended as an optional supplementary text for intermediate-level students of inorganic chemistry.

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Basic Solid State Chemistry

Anthony R. West
2nd edn. John Wiley and Sons, Chichester, 1999
xvi + 480 pages. £24.95
ISBN 0-471-98756-5 (pbk)

This book is the second edition of the excellent text first published in 1984. It provides a well-rounded view of solid-state science and will find widespread appeal to undergraduate and postgraduate students in chemistry, materials science and condensed-matter physics. It is well produced with clear line diagrams and is extremely easy to read. Separate sections can be read in isolation from others, without prior knowledge.

The first three chapters cover structural aspects of solid-state chemistry, from crystal structures, through bonding in crystals, to diffraction techniques. These chapters have been revised to include a description of fullerenes and graphite. Chapter 3 details crystallography and diffraction techniques primarily based on X-rays, but some coverage of neutron and electron diffraction is included at the end of the chapter. The author has not pulled away from presenting a mathematical description of structure factors. However, his style and care in presenting the material allows the reader to follow his arguments with clarity. Occasionally the style of presentation becomes semi-empirical: where this is the case, the author has gone to the trouble of specifically pointing it out and giving references to more advanced texts.

Chapter 4 details a wide variety of microscopy (optical, electron), spectroscopy (IR, Raman, UV/Vis, NMR, ESR, XRF, EXAFS, XPS, UPS, AES, Mössbauer) and thermal analysis (TG, DTA, DSC) techniques. The author gives a flavour of each of the techniques, and indicates the