

ential crystallization and chromatography to resolve enantiomers are also covered. Other chapters describe the use of enantiopure building blocks in the construction of the optically pure final compound and the radio-synthesis of compounds such as ^{14}C -labelled clozapine and fluvastatin for use in elucidating their fate *in vivo*.

The book finishes with a chapter on perhaps some of the most contentious topics in the pharmaceutical industry today: process validation; good manufacturing practice; and the road to the overall goal of process and development chemistry, which is the attainment of government approval to manufacture a drug.

The text is richly illustrated throughout with practical examples and case studies based on the author's own experience of many years in the pharmaceutical industry, although there are only a few examples involving organometallic compounds. The author writes lucidly with a clear enthusiasm for the subject. This book opens up the area between medicinal and industrial chemistry and should appeal to any chemist with a fundamental interest in pharmaceutical development.

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Current Drugs Ltd, London

Chemistry of the Elements, 2nd edn
N. N. Greenwood and A. Earnshaw
Butterworth-Heinemann, Oxford, 1997
340 pages. £35.00 (paperback)
ISBN 0-7506-3365-4

This reviewer has to admit at the outset that 'Greenwood and Earnshaw' is one of his favourite, full-scale, inorganic texts. In my hands, the first edition proved wide-ranging, up-to-date and user-friendly enough for 'chalk-face' activity with undergraduates, and yet it was still a sufficiently impressive resource to be used in lecture preparation. So I liked it. It should then be said that the second edition continues the good work of the first, without a dramatic increase of size, and should be acquired by all serious chemistry undergraduates and graduate students (and inorganic chemistry staff). I think it is good value for money. I do not think the book is aimed at the populist undergraduate market; although it is well presented, no colour is used and the form of the diagrams is pretty basic (although clear). It may not appeal greatly to the CD ROM-, soundbite-oriented student as it is fairly traditional in style, and indeed it neither comes with nor makes any reference to, use of student-centred material. However, it is still excellent and (praise indeed?) a 1950–1960s student would probably think it an essential possession. I hope our 1990s students also come to this view; I shall do my best to help.

Readers of *Applied Organometallic Chemistry* will

want to know more of the book's treatment of the organometallic area. As might be expected, it is done in a traditional Periodic Group manner, with one overview chapter oriented to the transition elements. Page coverage is distributed as follows: Group 1 (5), Group 2 (9), Group 3 excluding B (11), Group 4 (6 + 10), Group 5 (8). Transition metals receive similar cover to the earlier Groups (1, 4, 3, 3), with greater detail being reserved for the heavier elements: Group 7 (8), Group 8 (9), Group 9 (5), Group 10 (6 pages).

As an introduction to organometallic chemistry for undergraduates in a general programme of chemistry, this book is very good. Students carrying out an organometallic project will need more detailed source material. Postgraduates in organometallic chemistry will need it as a 'grammar' of the subject. The industrial processes are generally covered, but as it is not the purpose of this work to act as an encyclopaedia, treatments are brief.

So, all chemists should buy this new edition, and use it.

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Applications of Organometallic Compounds

Iwao Omae
Wiley, Chichester, 1998
vii + 518 pages. £85
ISBN 0 471 97604 0

Iwao Omae will be known to organometallic chemists for his books on *Organometallic Intramolecular-Coordination Compounds* (Elsevier, 1986) and *Organotin Chemistry* (Elsevier, 1989). The present book is based on reviews of the organic compounds of 20 metals which appeared in *Kagaku Kogyo (Chemical Industry)* between 1990 and 1996.

The book is wider in scope than the title suggests. After a short introductory section, and a chapter on the history of organometallic chemistry, each of the remaining 20 chapters covers one specific metal. A description of the extraction of the metal from the ore is followed by an account of the preparation, structures and properties of its organometallic compounds. The chapter then ends with a survey of the applications of these compounds in organic synthesis and in medicine, agriculture and industry.

There has been some updating of the articles, but this could have been more thorough and there are few references later than 1994. Thus, for example, although there is extensive referencing to Wilkinson, Stone and Abel's first edition of *Comprehensive Organometallic Chemistry* (Pergamon, 1982) there is none to the second edition (Elsevier, 1995) which has two volumes devoted to organometallics in synthesis. Again, some books which I would regard as classics are not mentioned, such as

Wakefield's *The Chemistry of Organolithium Compounds*, Kharasch and Reinmuth's *Grignard Reactions of Non-metallic Substances*, Neumann's *The Organic Chemistry of Tin*, Sawyer's *Organotin Compounds*, Lesbre, Mazerolles and Satgé's *The Organic Compounds of Germanium*, and Shapiro and Frey's *The Organic Compounds of Lead*.

The manuscript deserved better in-house editing to remove infelicities in the English and in the spelling of authors' names. A sentence such as 'Moreover, as a common sense on the organometallic compounds, generally, these compounds are largely liable' should not have got through into print, nor should names such as Busen (Bunsen), Wurts (Wurtz), Flankland (Frankland), Paluling (Pauling), Fryrs (Frye), Coats (Coates) and Kearly (Kealy).

For western chemists, the most valuable features of this book are likely to be two-fold. First, it gives a good account of the industrial application of organometallics in, for example, Ziegler and Ziegler-Natta chemistry, PVC stabilization, anti-knock behaviour, silicone polymers and anti-cancer drugs. Second, it gives a good coverage of the general Japanese literature of organometallic chemistry, including patents, which tends to be inaccessible to non-Japanese authors.

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Reductions by the Aluminio- and Borohydrides in Organic Synthesis

J. Seyden-Penne

2nd edn. Wiley, Chichester, 1997

xiv + 224 pages. £60

ISBN 0-471-19036-5

This book is an update from the first edition, which was published in 1991. In the first edition there was an attempt at comprehensive coverage of the topic, but in the second edition any such attempt has been forced to be abandoned. Nevertheless, this second edition is packed with information, cites around 1200 references, and provides a very useful source for anyone contemplating a complex hydride reduction.

The book is organized into five chapters, followed by 11 pages of synoptic tables, then the references and a subject index.

Chapter 1 introduces the most commonly used reagents, indicates their stability and solubility characteristics and briefly describes their main applications. Chapters 2–5 present the reduction of the main functional groups, with reference to features of selectivity and compatibility.

Chapter 2 deals with cleavage of carbon–heteroatom

single bonds (halides, sulphonates, epoxides, alcohols, ethers, ammonium salts etc).

Chapter 3, the largest chapter with over 100 pages, deals with reduction of double bonds (other than C=C bonds). The bulk of the chapter (85 pages) concerns reductions of carbonyl compounds, including sections on different kinds of carbonyl compounds, asymmetric reductions and regioselectivity of the reduction of α/β -unsaturated derivatives. The chapter also covers imines, enamines, nitrogen heterocycles and oximes/hydrazones.

Chapter 4 deals with reduction of triple bonds and Chapter 5 with other derivatives (nitro compounds, azides, organometallics, and sulphur, phosphorus, silicon and boron compounds).

The entry point for many will be the synoptic tables. Here it is possible to look up a class of compound and choose a precursor substrate; the table will provide a list of reagents for the transformation and section references indicating where the reactions are discussed. The appropriate sections in Chapters 2–5 will provide the detailed discussion of those reactions and Chapter 1 will give an outline of the characteristics of the chosen reagent. Thus, the book is ideal for identifying the most useful references for any given reduction.

Because it is so densely packed with information, the text is somewhat difficult to read. This is almost unavoidable if the coverage is to remain so full and the book so short (220 pages), and the difficulty is easily outweighed by the value of the work as a source of reference and information.

This book is an imperative purchase for all chemical libraries and for any individuals who make regular use of complex hydride reductions.

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The Organic Chem Lab Survival Manual

James W. Zubrick

4th edn. Wiley-Interscience, New York, 1997

382 pages. £17.99

ISBN 0-471-12948-8

This book updates the third edition, reflecting some of the more recent changes in laboratory practice. In particular, the use of microscale laboratory equipment has been expanded further in this edition. Other influences such as the Internet, and elementary directions on how to access information from networks, are suggested.

The book is presented in 36 chapters; they are broadly grouped into key areas, namely safety, information recording and retrieval, basic equipment, standard techniques, and instrumentation in the laboratory. Two final chapters cover some basic theory.