

ingly important. The aim of the book is to provide a brief summary, with emphasis on practical aspects. Much of the information is presented by means of numerous schemes and tables. Mechanistic aspects are, on the whole, considered to be outside the scope of the work.

The organisation of the volume is such that a two page introduction, giving references to reviews, is followed by a second chapter dealing with general properties of the lanthanide elements (3 pages). Chapter 3 is entitled 'The Use of Lanthanide Metals in Synthesis', and deals with the topic in terms of the principal elements involved, namely cerium (2 pages), samarium (6 pages), ytterbium (3 pages), and alloys and activated metals (2 pages). Chapter 4 deals with lanthanide(II) complexes, including the preparation of the appropriate (Sm, Eu and Yb) reagents (3 pages); reduction of organic functional groups by samarium(II) iodide (17 pages); samarium(II) iodide-promoted C–C bond-forming reactions (22 pages); organic reactions with dicyclopentadienylsamarium(II) and bis(pentamethylcyclopentadienyl)samarium(II) (3 pages).

Chapter 5 is devoted to the chemistry of lanthanide(III) complexes, and has sections on carbonyl reductions promoted by lanthanide(III) reagents (10 pages), olefin hydrogenation catalysed by lanthanide(III) complexes (1 page), reductions of other functional groups (2 pages), C–C bond-forming reactions (33 pages), and miscellaneous functional group transformations promoted by lanthanide(III) salts (4 pages).

The final chapter is devoted to reactions of lanthanide(IV) complexes. Although in the introduction it is indicated that the elements in question are Ce, Pr, Nd, Tb and Dy, this is a somewhat doubtful proposition. Indeed, the chapter is essentially concerned with the role of various Ce compounds. The topics considered are oxidations of hydrocarbons (5 pages), oxidations of oxygen functionalities (13 pages), and the oxidation of functionalities involving nitrogen (2 pages), sulfur (2 pages), and other heteroatoms (1/2 page). Finally, in this chapter, oxidation of metal complexes, e.g. of $[\text{Fe}(\mu\text{-C}_4\text{H}_4)(\text{CO})_3]$, is considered (14 pages).

Each chapter has appropriate references (including a few for 1993). The book ends with an index of compounds and methods (6 pages).

All in all, this volume is a very welcome addition to the "Best Synthetic Methods" series.

Michael F. Lappert
*School of Chemistry and
Molecular Sciences
University of Sussex
Brighton BN1 9QJ
UK*

Gmelin–Durrer Metallurgy of Iron Vol 11 practice of Steelmaking 5 Continuous Casting

H. Hiebler (ed.) (Institut für Eisenhüttenkunde, Montanuniversität Leoben) Springer, Berlin, 1992. Vol 11a xiv + 355 pages Text, Vol 11b vi + 452 pages Illustrations (not available separately) DM 4500 ISBN 3-540-93654-8

This is the final volume in the fourth totally revised edition of the *Gmelin–Durrer Metallurgy of Iron* which now forms a supplement to the *Gmelin Handbook of Inorganic Chemistry System No. 59 Iron*. Volumes 1 and 2 cover general principles and iron ore; Volumes 3 and 4 blast furnace operation; Volumes 5 and 6 the theory and Volumes 7–11 the practice of steelmaking. Volume 12, already published, brings together the topics of the previous volumes and discusses the future of iron- and steel-making. As in the other volumes in the series the text and diagrams are bound separately so volumes 11a and 11b have to be read side-by-side.

Gmelin–Durrer is interdisciplinary in two senses. It spans the traditional disciplines of chemistry and metallurgy and it emphasises the coherence between theory, concentrated in universities and research institutes, and practice, concentrated in heavy industry. The volumes therefore serve as an important reference for academics and graduate students on the one hand, and technical and production managers on the other. Their strength lies in the skilful way in which theory and practice are interleaved and the rigorous scientific basis for modern industrial technology is shown. The authors, H.G. Baumann (Mannesmann Demag AG, Duisberg), G. Holleis and K. Schwaha (Voest-Alpine-Industrieanlagenbau GmbH, Linz) and M. Wolf (Wolftechnology, Zürich) have summarised both published material from the usual iron- and steel-making journals and conference abstracts, and numerous unpublished communications from their contacts in industry. There are 3250 references and 695 graphs and technical drawings.

The volume begins with a section describing the development of the continuous casting of steel. The second section covers the engineering of casters: this comprises an account of capacity planning and design criteria in which quantitative relations from chemical engineering are applied to the analysis of stresses and deformations, cooling and strand support. There is also a full account with many diagrams of plant layout and a brief discussion of integrated process automation. The next section covers the design and subsystems of continuous bow-type casters. The complex continuous casting plant is broken down into its components and each is discussed in turn with copious technical drawings. Continuous casting operation is covered next with subsections on pouring systems, mold operation, strand

guide and discharge, and operation and maintenance procedures. The interrelation between theory and practice is again shown in the section on the metallurgy of continuous casting. A detailed account of the solidification process, the properties of steel at the solidification temperature, and solidification structure and segregation leads to discussion of the process aspects of castability and an extensive section on surface and internal defects and non-metallic inclusions. The section concludes with discussion of quality control and product properties. The final part of the book covers the automation of casting plants including subsections on data acquisition, procedures for process optimisation and coordination and diagnosis systems.

Scholarly comprehensive books such as these are expensive to produce and their high price means that they will be bought mainly by libraries of research institutes and large manufacturing companies. Steel-making remains a major industrial activity on a world-wide scale and these volumes show the enormous intellectual and practical activity which continues to go into its development.

J.D. Smith

*School of Chemistry and Molecular Sciences
Brighton BN1 9QJ
UK*

Chemistry of Iron

J. Silver (ed.) Chapman and Hall, London, 1993, xi + 306 pages £69.
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This book is one of a series dealing with the chemistry of individual elements or groups of elements. It aims to provide both an introduction to all aspects of iron chemistry for graduates in chemistry, biochemistry, physics, geology, materials science, metallurgy and biology, and at the same time a general reference for initial pointers into the scientific literature, outlining what has been achieved and identifying future targets. These aims are ambitious. To achieve them the contributors must understand the interdisciplinary areas at the periphery of chemistry and have first hand knowledge of the core subject they are seeking to introduce. Though it is difficult to make even judgments across the broad range of science covered in a book such as this, my impression is that some chapters are considerably more successful than others.

The first chapter, clearly and concisely written by J. Silver, introduces the principal themes of the book. It provides the information one finds in standard chemical texts and draws attention to the extraordinary wide

range of formal oxidation states, from $-2(d^{10})$ to $6(d^2)$ shown by iron compounds. The second chapter by F.J. Berry covers the industrial chemistry of iron. It is not easy to see who this is intended for: a metallurgy graduate would find it superficial and out of date, and a chemistry graduate wishing to learn about modern ferrous process metallurgy would not want to start here. The picture of a blast furnace is taken from a 1961 text (information about modern facilities is readily available in the scientific literature) and there should surely be a picture of a top-blown basic oxygen converter rather than one illustrating the Bessemer process which was phased out in the 1960s. Apart from a useful reference to corrosion there is little literature on the industrial chemistry of iron to follow up. The next chapter on the inorganic chemistry of iron by E. Sinn is also unsatisfactory. There is a reasonable summary of solid state chemistry, with a coda on spin equilibria, but otherwise little about the aqueous or coordination chemistry of iron. At one point the text lurches without explanation from unsophisticated crystal field theory (fine as an introduction for non-chemistry graduates) to a Hamiltonian involving angular momentum operators.

From then onwards the book improves. There is a long and well written chapter by P.L. Pauson on organo-iron compounds. This would indeed provide a good introduction to the field for graduates from a discipline other than chemistry or for third year chemistry undergraduates. The references are copious and recent. A short chapter on Mössbauer spectroscopy by B.W. Fitzsimmons also seems to be concise and well-conceived.

The remainder of the book is on the bioinorganic chemistry of iron and here the contributors have managed to provide accounts of interdisciplinary areas where biologists can learn from chemists and chemists from biologists. There are chapters on biological iron by G.J. Leigh (wrongly shown throughout the book as J.G. Leigh), G.R. Moore and M.T. Wilson, on models for iron biomolecules by A.K. Powell, and iron chelators of chemical significance by R.C. Hider and S. Singh. The reader is left in no doubt about the importance of iron in living organisms and about the excitement associated with the study of it. Among the topics discussed are the biochemical mechanisms and genetic controls for the uptake, transport and storage of iron, its role in oxygen transport and electron transfer and the use of chelating agents in the treatment of diseases associated with malfunctioning biochemical control mechanisms which allow iron-catalysed free radical generating reactions to occur.

The editor's aims are thus achieved with respect to organometallic chemistry and the chemistry and biochemistry of iron. In these areas the writing is authoritative and well researched. The reviews of areas where