Gmelin–Durrer Metallurgy of Iron. Volume 9. Practice of Steelmaking 3; edited by H. Trenkler (Institut für Eisenhüttenkunde, Montanuniversität Loeben, Austria) and W. Krieger (Voest-Alpine AG, Linz, Austria), Springer, Berlin, 1988, Vol. 9a Text; xix + 346 pages. Vol 9b, Illustrations, English and German Subject Index: 300 pages. ISBN 3-540-93558-4, DM2800, Not available separately.

Volume 9 of the Gmelin–Durrer Metallurgy of Iron is another in the comprehensive supplement to the Gmelin Handbook of Inorganic Chemistry System No 59 'Iron'. The first volume of the supplement appeared in 1964 and the present one covers literature up to 1986.

Modern steelmaking is a brutal process. It is accomplished in very large batches (up to 300 tonnes) by very rapid, exothermic reactions (tap to tap times may be only 40 minutes or so). Nevertheless, specifications are extremely closely defined; it may be necessary to produce batch after batch of strictly consistent composition, or it may be necessary to vary the composition in a closely controlled way to meet the requirements of various orders. In particular, levels of non-metallic elements, especially carbon, oxygen, phosphorus, sulfur, and nitrogen, with a high affinity for iron must be known and adjusted. This makes enormous demands on the techniques available for analysis and requires an extremely detailed understanding of the chemistry involved in the steelmaking process. Modern advances have been made possible by the advent of computers for fast processing of analytical data and adjustment of process parameters such as blow times and lance heights. Chemists have long judged whether steel is ready for tapping by the appearance of the flame; now the operator is more likely to make his judgement by data displayed on his computer screen.

The present volume shows clearly the enormous amount of recent literature. It deals with secondary steelmaking (the treatment of steel outside the melting unit), remelting processes, and automatic control of steelmaking processes. The first of these subjects has extensive sections on ladles (by W. Schlager) on deoxidation, desulfurisation (by M. Mayrhofer), dephosphorisation (by W. Egger and H. Presslinger), inert gas purging, vacuum degassing, and decarburisation of high chromium steel (by W. and G. Holzgruber), The importance of these processes has grown enormously in the last 20 years (production of low carbon high chromium steel has increased by a factor of 3) following the development of more powerful pumps and of new plants for production of tonne quantities of gases such as argon. Vacuum arc remelting processes are covered by W. and G. Holzgruber, electroslag remelting by H. Jäger and electron beam melting by G. Scharf. The final section on automatic control (by M. Gfrerer, G. Bock, G. Kollert, and K. Hohendahl) deals with basic oxygen steelmaking (covered fully in volume 7) and electric arc processes (covered in volume 8).

This book is far more than a routine reference work. The authors have skilfully and concisely expounded their subject to show the underlying physical principles, the reasons for the development of new technologies, and the excitement of modern steelmaking. The production of the book is excellent, but the separation of the text and diagrams into two volumes makes some inconvenience for the reader. The price will ensure that there are few privately owned copies, and many library desks leave little room for two open volumes as well as the users' own papers.

School of Chemistry and Molecular Sciences,
University of Sussex, Brighton BN1 9QJ (Great Britain)

J. David Smith