Book news

1. Book review

● *Key to aluminium alloys.* Dusseldorf, Aluminium-Verlag, 1982. 232 pp.

Reviewer: R. Paton

Manual searching for standards and equivalent standards worldwide is an onerous task that most metallurgists undertake as part of their daily workload. Thus, it is pleasing to see a publication such as this, which will ameliorate problems in the cross-referencing of alloys. It is even more pleasing to note that the book is concerned with non-ferrous alloys, which have tended to be a little neglected in the standards and trade-name fields.

The largest part of the book (Section 7) is taken up with the national standards of 21 major industrialized countries, including a section on the South African Bureau of Standards (SABS). Useful examples are given of how to use the Key. For example, if the designation and composition of an aluminium alloy to SABS specification are known, then a comparable standard designation (if any) in a different country can be quickly found.

Other useful chapters are 'Quick comparison of alloy designations in international use' (Section 2) and 'Trade names and designations' (Section 3). Cross-referencing between the various sections is mastered fairly quickly. However, the size of the print in some of the tables is certainly not for the myopic reader.

Overall, this useful little volume should find a place on the bookshelves of most people actively involved in the aluminium alloy industry, and stands up well in comparison with its ferrous counterparts, e.g. *Stahlschlussel* and *World Wide Guide to Equivalent Irons and Steels.* One wonders, however, whether books like these will be loaded into metals data banks in the not-too-distant future so that computer-aided searching on standards and their equivalents will be an everyday activity in metals information.

2. New book

● *Principles and applications to process metallurgy. Part I*, by G. M. Ritcey. Amsterdam, Elsevier, 1983. 350 pp. Dfl. 195.00.

This is the companion volume to *Solvent Extraction Part II* (1979). Together, the books fill the gap between the research on solvent extraction for metals recovery and the implementation of this knowledge into a final operating process, by providing detailed coverage of the basic and applied aspects of solvent extraction in metallurgical processes. Part I provides an insight into the basic theory, chemistry, and practice of the process. This includes the chemistry and other aspects of the extractants, diluents, and modifiers, and their interactions in the solvent-extraction process as applied to the extractive metallurgy of metals. Physical aspects of the dispersion and coalescence of phases, and how these interact with kinetics, mass transfer, and equipment design are considered. The resultant implications and requirements of these various aspects are demonstrated in the solvent loss and resulting environmental problems. Analytical methods, applicable largely to process control, for the determination of various components of solvent systems are treated in some detail. Numerous tables, graphs, flowsheets, and literature references make this extensive two-part publication a valuable reference source, textbook, and working tool.

3. Mintek report

The following report is available free of charge from the Council for Mineral Technology, Private Bag X3015, Randburg, 2125 South Africa.

● **Report M116**

Abrasive and impactive wear of high-chromium cast-iron grinding balls.

The volume theory of ball wear ascribes ball consumption in grinding mills only to impactive wear, whereas the surface theory ascribes it only to abrasive wear, and ball-wear data are often in good agreement with either or both of these theories.

In this report, it is emphasized that balls in large industrial ball mills are subject to mechanisms of both impactive and abrasive wear, and a 'generalized' theory of ball wear that superposes the two wear mechanisms is formulated.

Detailed comparisons are made between the wear as measured for six different grades of chromium-white iron balls and the wear predicted by use of a formula derived from the generalized theory. Considered from the point of view of this theory, the data relating to ball wear yield new information, namely the relative proportions of abrasive and impactive wear. This new information represents the response of balls of a given type to both these wear mechanisms.

The calculations show that, as the size of a ball decreases, the component of abrasive wear increases considerably. This is in agreement with the general finding that smaller balls in a mill give a finer grind.

The chemical composition and metallographic structure of the balls are analysed in an attempt to relate these factors to their wear characteristics during milling. The chromium-to-carbon ratio of the balls is shown to play a predominant role.