

studies; nevertheless, the present review is very valuable for specialists in solid-state physics and chemistry and also for crystallographers interested in surface crystallography.

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**Handbook on the physics and chemistry of the rare earths, Vol. 1: Metals.** Edited by K. A. GSCHNEIDER JR and L. EYRING. Pp. xxv + 894. Amsterdam: North-Holland, 1978. Price US \$146.25, Dfl 300.00.

This volume is the first of four which, together, will provide a complete survey of the properties of the rare-earth pure metals, alloys and compounds. There has been a considerable research programme on these materials over the last twenty years and it is certainly timely that a comprehensive review should now be produced. The title on the cover of the present volume offers the reader a Handbook but the expectant investigator, seeking a well ordered, tabulated set of data, will be disappointed. Instead, a series of attractive review articles will be found, written by acknowledged experts in the field, generally at a level which should be very acceptable both to postgraduate students and to a wide variety of research workers in the different disciplines of the physical sciences.

This first volume concentrates on the properties of the rare-earth elements although, inevitably, there are references to alloys and compounds. It begins with an article on atomic properties (the free atom) which is somewhat forbidding in the depth of the theoretical treatment and the extent of the mathematical formulae. This is also the longest article in the book. Most readers will leave this chapter for the experts and glance only occasionally at the tabulated data. The rest of the book is less mathematical and easier reading for the non-specialist in the field. There are articles on the purification and crystal growing of rare-earth metals, electronic band structure, low-temperature heat capacity (specific heat), magnetic and electrical properties, high-pressure effects and superconductivity. A separate article is devoted to cerium and two rather specialized chapters deal with the Kondo effect and diffusion topics. Each article has a very useful up-to-date bibliography.

This is hardly a book which research workers in general will consider purchasing for individual use. It is too long (almost 900 pages) to be acceptable as an introductory survey, which can be read in its entirety by physicists, chemists or metallurgists considering whether the rare-earth metals have features relevant to their own chosen fields of endeavour. Moreover, there is no logical and coherent development of the subject matter such as is to be found in the books by Taylor & Darby (1972) and by Coqblin (1977). Nor is it a book in which the enquiring student will easily discover the value for some particular quantity. Many of the significant numerical results are hidden in the text and

the index is not as helpful as might be expected. Thus under the index heading 'Debye Temperature: terbium' the reference given is to pages 401, 407, where indeed values of  $\theta_D$  may be found by careful perusal of the text. In fact, the Debye temperature will be found more clearly displayed in tables on pages 389 and 680. The index heading 'data for magnetic transitions' directs the reader to pages 734–738, with no cross reference to the tables on pages 415 and 515. There are, presumably, values for the critical fields which define the boundaries for the helical phases of the rare earths, but my own search of the volume has not yet revealed these. Equally frustrating are the inappropriate page titles for chapter 9, *Metals, alloys and compounds*; the article is in fact concerned with high pressure studies. However, despite these irritating defects, research workers from a variety of fields (say, for example, crystal growing, laser technology, superconductivity, magnetism, neutron scattering, electron microscopy, metallurgy) will find some interesting and useful review articles in this volume. Sadly, there seems little quantitative work reported in this book which might be of direct concern to the crystallographer.

The present volume appears to be something of an evangelical exercise and may be very helpful in bringing properties of the rare-earth metals to the attention of a wide range of physical scientists. It is more definitely oriented towards the general reader than was the outstanding earlier review edited by Elliott (1972), and will be a worthwhile addition to the departmental library.

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**Physics of superconductors (Topics in current physics, Vol. 15).** Edited by M. B. SALAMON. Pp. xii + 255. Berlin, Heidelberg, New York: Springer-Verlag, 1979. Price DM 59.00, ca US \$32.50.

This volume comes as a sequel to the recent publication concerned with the same field, under the title of 'Solid Electrolytes', issued in the series 'Topics in Applied Physics'. For those who enjoyed that descriptive approach [a review was published in *Acta Cryst.* (1978), A34, 640], this new volume, specifically on the physics of these materials, offers some more meaty theory on a wide range of currently developing aspects. EXAFS, neutron scattering, lattice dynamics, light scattering, magnetic resonance, phase tran-