

which a particular reviewer would disagree; some fundamental points, such as the definition of **D** and **E**, are given rather cavalier treatment. In dealing with thermo-electricity, Kelvin's treatment is still given although a reference to Onsager would now be more appropriate. D.c. and a.c. circuits are given a good deal less attention than they deserve to-day, and some quite important matters are dealt with either only in the examples following each chapter (Kelvin double bridge, Thévenin's theorem) or not at all (a.c. potentiometer). There is a certain unpredictability about the way in which references are given, and leading references for further reading are rather sketchy.

The rationalized M.K.S. system is used throughout and it is pleasing to note that the authors do not make a fuss about this; indeed, units are scarcely mentioned until the last chapter. This is quite a salutary lesson for students of physics, although no doubt engineers have practical reasons for worrying about units.

I have the highest opinion of this new treatise, and consider that the authors have achieved a major work of selection, compression and exposition.

G. O. JONES

SOLID-STATE SCIENCE FOR THE ENGINEER

The Science of Engineering Materials
 Edited by J. E. Goldman. Pp. xv + 528. (New York : John Wiley and Sons, Inc. ; London : Chapman and Hall, Ltd., 1957.) 96s. net.

SHOULD an engineer need to know why the materials with which he works behave as they do? Or should he just accept their properties in the form of factual data from which to determine the use of those materials? Some such knowledge is essential for even the elementary understanding of some of the more modern engineering devices. Also any striking developments in materials are likely to come from worrying about what the atoms are doing.

The universities are waking up to the ever-increasing need for some solid-state physics to be introduced as part of the discipline in an engineering education, and some have already gone some way in this matter. The burning question is: How much can be put into a course? How much will the student be able to comprehend without letting his intake of other engineering subjects suffer?

This book is a collection of papers presented at a recent conference in the United States at which this topic was the theme. The papers, by a number of leaders in their own fields, dealt with aspects of solid-state science, including recent technical developments, which might well be considered to have a proper place in a university engineering curriculum. It is very ambitious in its scope, the amount of subject-matter presented calling for more time than could be spared in any normal three- or four-year course. Also some of the topics would be of interest only to the specialist engineer.

The first four chapters deal with the basic features of solid-state science—putting the reader in the picture for later chapters—and survey a wide field far too briefly to give a fair picture of the large amount of ground covered.

The Bohr theory of the atom, the Schrödinger wave mechanical equation for the hydrogen atom,

the electronic structure of the atoms, the Periodic Table and the nature of the chemical bond are given in only 22 pages. The explanation of the intrinsic properties—elasticity, specific heat, conductivity, etc.—in terms of solid-state theory follows. The last of these four chapters shows how crystal imperfections account for diffusion in solids, semiconductors, etc.

The next six chapters are of fairly general interest, covering many points of physical metallurgy. Crystal structures, phase diagrams and elastic properties are explained in terms of the electron theory. Three of the chapters are devoted to dislocations, the interpretation of mechanical properties in terms of them, and the experimental evidence for their existence. A footnote refers to the more recent works of Dash and Hirsch which have demonstrated much more conclusively the existence of dislocations, and is evidence of up-to-date editing before publication.

The next chapter, on surface phenomena, is a mixed bag containing all-too-brief sections on friction and adhesion, adsorption and catalysis, corrosion and electron emission.

The remaining chapters are of a more descriptive nature and deal with specialized topics, but are sufficiently comprehensive to enable a non-specialist to become acquainted with them. These topics are magnetism, semiconductors, cement, glass and high polymers.

It will amply repay anyone wishing to plan a course on materials in an engineering curriculum to study this book, particularly the first half of it, as any topic dealt with in that part is worthy of consideration in such a course.

K. J. PASCOE

THE HEAVIEST ELEMENTS

The Chemistry of the Actinide Elements
 By Joseph J. Katz and Glenn T. Seaborg. Pp. xv + 508. (London : Methuen and Co., Ltd. ; New York : John Wiley and Sons, Inc., 1957.) 63s. net.

THIS book is an authoritative and up-to-date account of the chemistry of the elements from actinium (No. 89) to nobelium (No. 102). It is the first time that the whole field has been reviewed by the same authors, and the present ones are uniquely well qualified for the task. There are individual chapters on the occurrence, purification and chemistry of each element from actinium to curium, a chapter on the transcurium elements and a summary chapter. The only similar book previously available was Volume 14A of the National Nuclear Energy Series, published in 1954, which covered all the actinide elements then known in a series of review articles by different authors. Many sections have been expanded in the present book—for example, those on the geochemistry and extraction metallurgy of uranium and thorium and the section on magnetic properties. Three new elements have been added to the list and much new material has become available, including the large amount declassified and published in the proceedings of the International Conference at Geneva in 1955. All this has been incorporated in a shorter book by the omission of chapters on α - and fission-measurements and on optical properties, and by a less detailed discussion of much of the older literature. Concentration of the authorship has meant that this book gains greatly in coherence and in readability; the style is more that of a text-book than that of an exhaustive review, though the coverage is, in fact, excellent.