

Book Reviews

Works intended for notice in this column should be sent direct to the Editor (P. P. Ewald, Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn 1, N.Y., U.S.A.). As far as practicable books will be reviewed in a country different from that of publication.

Handbuch der Physik: Encyclopaedia of Physics. Band 7, Teil 1. Kristallphysik. Edited by S. FLÜGGE. Pp. vii+687 with 321 figs. Berlin, Göttingen, Heidelberg: Springer. 1955. Price DM. 122.50.

This volume forms part of an *Encyclopaedia of Physics*, whose general arrangement and scope will be familiar to users of earlier *Handbücher*. Articles are presented in German by H. Jagodzinski on crystallography (103 pages), by G. Leibfried on the lattice theory of mechanical and thermal properties of crystals (221 pages) and by A. Seeger on the theory of defects in crystals (283 pages). There is also an article in English on the specific heats of solids by M. Blackman (58 pages) which to some degree overlaps, though it greatly extends, part of the article by Leibfried.

Subject indices and tables of contents are given in both German and English.

Like all encyclopaedias, the present volume occasionally gives an impression of over-condensation. In treating a group of studies insufficient stress is sometimes laid on the most actively growing parts, though these often require relatively more space to describe usefully than more static parts in the same group. Whilst this policy prolongs the effective life of an encyclopaedia, it tends to produce a text more suitable for reference than for inspiration. Another difficulty which arises from the nature of this encyclopaedia is that closely related branches of science are treated in widely separated volumes. For example, the section on crystallography adequately deals with many of the classical geometrical and physical considerations about crystal lattices, but it does not include any extensive survey of special examples which would demonstrate some of the peculiarities of crystal packing in real crystals, examples such as pseudo-symmetrical structures and partly randomized structures. Again, in the space provided in the present volume, considerations of crystal chemistry about relationships between bond types and crystal types are only described in a brief introductory manner.

The sections on lattice theory in relation to thermal properties of crystals and the accompanying article on specific heats of solids provide a clear and cogent account of the mathematical analysis of lattice potential energy and lattice vibrations, for the most general cases. Certain extensions of theory to important peculiarities which are of practical interest are omitted. For example,

the vibrational behaviour of layer lattices such as graphite or cadmium iodide is not discussed; changes in vibrational spectra on proceeding to crystals of very small size (powders) might also have been briefly treated.

The sections on lattice defects in solids give a valuable and quite clear account of a field in which advances have been particularly rapid in recent years. Such advances are, however, still very uneven and this imposes a certain unevenness of treatment. For metal crystals, various types of cooperative defects have been explored much more fully in relation to the mechanical behaviour of the crystals than is the case for ionic or molecular lattices. In this connexion the author rightly mentions the crystallographic interest of boundary walls between domains of cooperative interaction, as in ferromagnetism, ferroelectricity, antiferromagnetism, and order-disorder, but without attempting any kind of survey.

Experimental methods of studying isolated defects in ionic crystals and in certain molecular crystals have for long been substantially different from those available for metals. Diffusion studies with radio-tracers are bringing the kind of information available for metallic and non-metallic crystals into closer overlap. At the present time, however, the experimental foundations in studying crystal defects still broadly indicate practical, and to some extent theoretical, advantages in segregating the discussion of metals from all other kinds of crystals. Defects in metals are best discussed in close connexion with other properties of metal crystals, which are, however, dealt with in other volumes of this encyclopaedia.

With these reservations, the present volume will certainly prove a valuable addition to library collections dealing with the solid state. From the comments made in this review it should be clear that each of the sections of this book presents an authoritative and quite a full survey of the better established parts of the subject. Bibliographies are good and the individual references appear to be selected with judgment. Certain deficiencies of content and of arrangement can be pointed out in those parts where growing pains are prominent, but such difficulties are almost inevitable at the present time in attempting an encyclopaedia of the solid state.

The authors and publishers are to be congratulated on a valuable publication.

A. R. UBBELOHDE

*Department of Chemical Engineering
Imperial College
London S. W. 7, England*