

BOOK REVIEWS

Phase Transformation

Metallography of Phase Transformations. By G. A. Chadwick. Pp. ix+302. (Butterworth: London, August 1972.) £6 cased; £4 paperback.

As the title indicates, the author of this book has concentrated on the microstructural features of phase transformation, and quantitative theories of kinetics or crystallography are not developed in detail. In three chapters, he gives rather sketchy background descriptions of liquid and solid structures, equilibrium diagrams, and grain shapes, whilst the four principal chapters are entitled solid-liquid and solid-solid "interactions" and "transformations"; the latter distinction is rather obscure. A feature of the book is the inclusion of over 250 micrographs, most of which are well chosen. However, it is irritating to find several examples of repeated reproduction of virtually identical microstructures. In this and other ways, the book gives evidence of having been prepared too hastily.

The liquid-solid chapters (melting is not discussed, so "solid-liquid" seems perverse) are undoubtedly the best; the author is writing about his own speciality, and qualitative descriptions of atomic processes in solidification are readily related to microstructure. In particular, there is an illuminating and up-to-date description of eutectic morphologies. Much of the discussion of solid state transformations should also be helpful, but the beginning student is warned that there are some misleading descriptions and diagrams. The background chapters are not very successful; existing texts cover the subjects with greater authority, and there are occasional serious mistakes such as an incorrect drawing of the primitive unit cell of the bcc structure, and an erroneous statement about the stacking of close-packed layers. A muddled explanation of Miller-Bravais notation culminates in the conclusion that "if one followed the lattice translations given by the integers 1120 one would arrive at the position 0030"!

The idea of basing an introduction to phase transformations on an apprecia-

tion of non-equilibrium microstructures has much to commend it; unfortunately, a good plan has been marred by faulty execution. Although this book may be useful for first year students, it cannot be recommended without reservation. The quality of the micrographs is adequate but not outstanding, and the book (at least in the hardback version) seems unduly expensive.

J. W. CHRISTIAN

Ion Pairs

Ions and Ion Pairs in Organic Reactions. Edited by M. Szwarc. Pp. ix+399. (Wiley: New York and London, May 1972.) £7.10.

ION-PAIRS manifest themselves through a variety of phenomena and their importance has become apparent to researchers with correspondingly diverse interests. This book provides a mechanism and a stimulus for cross-communication between specialists and I welcome it.

The treatment of the subject has been divided into two parts. This first volume deals with the physical methods used to study quantitative aspects of ion-pairs while the second will cover their roles in chemical reactions. The division is sensible and this volume is self-contained. Nonetheless, I would hope to see a high proportion of book-pairs on my colleagues' shelves in due course.

The first chapter is a survey by the editor of the concept of ion-pairs and their physical properties, and is a good introduction to what follows. In chapter 2 Kebarle discusses ions in the gas phase. Those whose experience of ions has been limited to the liquid phase could find stimulation here. Smid reviews spectrophotometric studies of ion-pair equilibria in chapter 3. This technique provides very clear information about ion-pair equilibria in many cases, and of course is of much wider applicability than, for example, electron spin resonance. Infrared and Raman studies are discussed by Edgell in the

next chapter. These are the least exploited of the techniques discussed and there seems to be ample scope for further experiments and for theorizing about their results.

The remainder of the book, fractionally over half, deals with magnetic resonance studies. Sharp and Symons give a comprehensive survey of electron spin resonance work. This is a good account for anyone new to the field, for the level of interpretation is qualitative, while established workers will find the extensive tabulations of data useful. Nuclear magnetic resonance studies of the carbon-lithium bond in organometallic compounds are covered by McKeever. The character of this bond ranges all the way from ionic to covalent, so that in addition to its own intrinsic interest and value the material in this chapter may well provide further points for "when is an ion-pair a complex?" debates. De Boer and Sommerdijk describe nuclear magnetic resonance studies of alkali radical ion-pairs. One advantage of nuclear magnetic resonance over electron spin resonance is that it gives directly the signs of the hyperfine coupling constants. Breadth and balance of the coverage of nuclear magnetic resonance studies are provided by an appendix on the application to study solvation, contributed by the editor. In the last chapter Sommerdijk and de Boer review the theory of the analysis of magnetic resonance observations. The discussion on electronic structure calculations collects together material which is inconveniently scattered in the literature.

In spite of the number of different authors this book hangs together well. Each contributor seems to have been well aware of the material being covered by his colleagues. This may reflect the energy and enthusiasm of the editor, whose touch is evident in a variety of footnotes which, for me at any rate, added further life to the book. This is a contemporary book at a contemporary price. I have enjoyed reading it and I shall continue to use it. I look forward to the appearance of the second volume.

N. M. ATHERTON