BOOK REVIEWS

Chemical Kinetics

Comprehensive Chemical Kinetics. Edited by C. H. Bamford and C. F. H. Tipper. Vol. 4. *Decomposition of Inorganic and Organometallic Compounds.* Pp. xii+272. Dfl. 87.50; \$27.25. Vol. 5. *Decomposition of Isomerization of Organic Compounds.* Pp. xvi+779. Dfl. 210; \$65.75. Vol. 6. *Reactions of Non-Metallic Inorganic Compounds.* Pp. xv+517. Dfl. 150; \$47. Vol. 7. *Reactions of Metallic Salts and Complexes, and Organometallic Compounds.* Pp. xv+615. Dfl. 180; \$56.25. Vol. 13. *Reactions of Aromatic Compounds.* Pp. xi+508. Dfl. 160; \$47. (Elsevier: Amsterdam, London and New York, 1972.)

THESE latest volumes in this now well-established series are able to get down to a critical study of individual chemical reactions and to discuss the parameters which are responsible for the control of the rates of elementary steps and hence mechanism. The theories and techniques have been introduced in the first three volumes so that only in occasional cases are the basic concepts elaborated.

Homogeneous decomposition reactions are discussed under four main compound headings—hydrides; oxides and sulphides; halides and derivatives; metal alkyls, aryls, carbonyls and nitrosyls. In the main, the reactions dealt with involve only one reactant and occur in the gas phase. For each reaction considered, the relevant literature has been abstracted, often with appropriate experimental graphs and figures which make the volume an excellent source of quantitative information. A wide selection of decomposition methods are described such as thermal, photolytic, photosensitization, radiolytic and electrical discharge.

Individual sections of volume 5 cover hydrocarbons; halogen compounds; aldehydes and ketones; other oxygenated organic compounds; nitrogen compounds and sulphur compounds. In view of the very considerable importance of hydrocarbon decomposition and of the extensive literature on the subject it has been possible to discuss mechanisms in general in a comparative fashion, thus

providing a very useful survey. In a similar fashion the aldehyde and ketone interest has enabled general discussion particularly of the photo-induced decomposition as well as thermal and other methods. In other sections, the greater complexity of the molecules leads to more individual treatment while the short section on sulphur compounds reveals a field that has been less well studied so that fairly broad coverage is given.

In volume 6, the reader finds splendid studies of many of the well-established reactions of small, relatively simple molecules, although often this does not lead to definitive understanding of the detailed kinetics but reveals aspects of still greater complexity. For the more complex reactions involving ionic species, it is often possible only to state the known facts with little further comment.

The first part of volume 7 deals with group transfer or substitution reactions for inert complexes and metal organic compounds and a discussion of mechanisms and kinetics precedes a more detailed examination of information available on a series of metals and ligands related to molecular orbitals and crystal field theory. The principal part considers oxidation-reduction processes between different oxidation states of the same metal element; between complexes of different metals and between covalent compounds and metal ions. This latter section accounts for almost half the book. A final section deals with coupled and induced chain reactions. A discussion of typical mechanisms leads on to specific examples involving chromium, arsenic, iron, copper, tin, and manganese.

There are only three chapters in volume 13, of which the first occupies about 80 per cent of the text and covers in very considerable detail the kinetics of electrophilic substitution reactions—nitration, hydroxylation, sulphonation, halogenation, alkylation, acylation, hydrogen exchange and protonation. The remaining two chapters deal with nucleophilic substitutions and aromatic rearrangements respectively. Specifically excluded are reactions of attacking atoms and free radicals which are to

form the basis for future volumes. As has already been said for others in the series, this is a mine of collected data in the form of rate constants and activation energies for the many reactions and reaction types and will be valued for its reference content as well as for the general theoretical discussions.

These first of the detailed volumes in the series will be of immense value to specialists in their selected areas as up-to-date surveys and will appeal to the more general reader as providing compact compilation of important areas of study. The impressive presentation of tabular material and copious references will ensure that they are constantly consulted. The series is well produced, clearly illustrated and, although not inexpensive, represents good value.

J. C. ROBB

Magnetic field distribution in superconducting lead. The magnetic structure is made visible by evaporating small ferromagnetic particles onto the surface of the lead. Reproduced by permission of Drs H. Träuble and U. Essman, of the Max-Planck-Institut, from *Electron Optics and Electron Microscopy*, by P. W. Hawkes. (Taylor and Francis, London, 1972.)