BOOK REVIEWS

Recipes for Synthesis

Survey of Organic Syntheses. By Calvin A. Buehler and Donald E. Pearson. Pp. ix + 1166. (Wiley-Interscience: New York and London, February 1971.) £13.

In this book, which is somewhat misleadingly titled, the organic reactions are classified by their products. There are sixteen ways of making acetylenes, forty-two of making alcohols and sixty-seven of making ketones. Thus, reactions are catalogued first by the product, then by the general nature of the reaction and finally by the starting materials. For example, ketones are made by oxidation reduction, Friedel-Crafts reactions and so on, and within the section on oxidation are methods starting from alcohols, acyloins, glycols, amines, epoxides, etc. So, for those wanting to know how to convert one functional group to another, this book is excellent value. It is packed with useful and often out of the way information about the choice of reagent, solvent, temperature and other variables. The compilation is well documented by about five thousand references to original literature and reviews, and by briefly described experimental details of several examples of each reaction type.

The book is essentially an aid to the practising organic chemist—it is not a particularly readable or stylish book; it is little help in the strategy of synthesis, and the occasional discussion of mechanism is not always reliable. Its main value is that it is complementary to the Fiesers' book on reagents: whereas that is organized by what reagents can do, this is organized by what they produce. Also, while the Fiesers' book more or less ignores such reagents as aqueous alkali and acid, this book does include the many reactions for which they are used. There are, of course, omissions—it would be a remarkable and unwieldy book if there were not—but serious ones are few. Most of the well known name reactions are here, and newer reagents up to 1968 are well represented. A curious feature of this type of book, and a reflexion on the nature of everyday synthetic chemistry, is that the original papers to which reference is made are, on the whole, evenly spread over the past thirty years. It is unusual to find a currently useful scientific book with so many references to work done in the 1950s and 1940s.

The index is poor if you want to find out about reagents—no entry for sodium borohydride, for example—just as the index of the Fiesers' book is poor if you want to find out about reactions. Now that we have both books, these omissions are comparatively unimportant. Another defect of this book, but not of the Fiesers', is that some of the structural diagrams are so badly drawn that it is difficult to take them in at a glance. Also they are not free from errors and ambiguities. With patience, though, they are not usually misleading.

It is a formidable achievement for the authors to have gathered so many references together and to have provided so useful a compendium of synthetic methods.

IAN FLEMING

Reaction Mechanisms

Inorganic Reaction Mechanisms. Edited by John O. Edwards. (Progress in Inorganic Chemistry, Vol. 13.) Pp. vii + 350. (Wiley-Interscience: New York and London, January 1971.) £7.50.

THIS book reports progress in (certain) inorganic reactions, with information on mechanisms and structure, and consists of six reviews: on the formation, structure, and reactions of binuclear complexes of cobalt; fast metal complex reactions; redox chemistry of peroxides; replacement as a prerequisite of redox processes; non-bridging ligands in electron-transfer reactions; and the intimate mechanism of replacement in d^8 square-planar complexes. The book maintains the standard of the series, although the coverage is more limited than the title suggests. Since half of the first article treats μ -peroxo and μ -superoxo complexes as well as redox reactions, two-fifths of the book is concerned with these topics. There is very little main-group element chemistry as such. There may be a case for applying the Trades Descriptions Act to the labelling of chemistry books.

The topics are treated critically and comprehensively, particularly the first, with 466 references. The second begins with a survey of cation solvation studies and includes useful compilations (with interpretation) of metal ion complexation reactions. The third treats haemin and catalase, as well as peroxo acids. The fourth includes substrates drawn from organic and non-metal chemistry. The fifth demonstrates linear free-energy relationships in electron transfer reactions of complexes. The author

of the last article, after referring to recent reviews, discusses mechanisms and recent results, with half of his 139 references dealing (as he points out) with data published within the past four years (from 1968). The articles conclude with a useful summary; chapter 1 includes a brief comparison of the bridged dicobalt complexes with similar ones of other metals.

The reviewing of expensive books of reviews prompts the question whether they have to take this form. More and more reviews (as fields of research burgeon and multiply) are by-passing the review journals and appearing in hard back series, which may be scattered around the library, classified under "Adv. . . ." or "Ann. Rep. . . ." or "Progr. . . ." or "Rev. . . ." (or where the devil have they put *Chem. Soc. Spec. Per. Repts.* in XYZ?) so that the material may be difficult to find. Other casualties of this process are promptness of publication and, frequently, good editing. (This book is not too bad in this respect, but does have, for example, "apparati", p. 205, and "horizontal row of the Periodic Table", p. 217). Some review articles one reads would clearly have benefited from critical appraisal, as by referees, before reaching their final form. As to cost, who will give us a consumers', as opposed to a publishers', cost-benefit analysis? One wonders whether more extensive use of review journals, with paperback off-prints, would not be more efficient and economical for chemist and library alike.

J. MASON

Crystal Fields

Multiplets of Transition-Metal Ions in Crystals. By Satoru Sugano, Yukito Tanabe and Hiroshi Kamimura. (Pure and Applied Physics, Vol. 33.) Pp. xi + 331. (Academic: New York and London, October 1970.) £8.15.

THIS is an advanced book which sets out the principles of crystal field theory and develops many aspects of it in considerable detail. The reader is assumed to be familiar with the fundamentals of quantum mechanics as well as with the theory and nomenclature of atomic spectroscopy. The authors state that the book may be used as a text for first year graduate students; this may well be possible for students of physics, but few chemistry students would have sufficient background knowledge to use such a text at this stage (the authors themselves are physicists).

The formulation of the subject is