

BOOK REVIEWS

Substitution Reactions

Comprehensive Kinetics. Volume 12: *Electrophilic Substitution at a Saturated Carbon Atom*. Edited by C. H. Bamford and C. F. H. Tipper. Pp. xiii + 256. (Elsevier: Amsterdam, London and New York, 1972.) Dfl. 90; \$28.25.

UNLIKE earlier editions of this series, this volume is the work of a single author whose name is noticeably absent from the hard cover, from the dust cover and from the title page. Two pages inside the latter we are informed that "all chapters in this volume have been written by M. H. Abraham, Department of Chemistry, University of Surrey". With due respect to the editors, whose names are apparent where that of the author is not, this is not good enough, particularly as the author deserves due credit for an excellent book.

The volume contains a brief three-chapter introduction to the types of mechanism which have been encountered and to a revised system for their nomenclature. There follows a more detailed discussion of each type of reaction, including reactions which proceed by the S_E1 mechanism, mercury for mercury exchange reactions, other metal for metal exchange reactions, the acidolysis of organomercury compounds, halogenolysis of organometallic compounds, other electrophilic substitution reactions of organometallic compounds, and electrophilic substitution reactions of allyl-metal compounds. In the final chapter Dr Abraham draws together the information from the earlier chapters in order to show in the broader sense how constitutional effects in the variety of substrates, reagents, and solvents dictate the course of reaction.

Dr Abraham is noted for his detailed and careful studies on the kinetics and thermodynamics of organometallic reactions and for his physicochemical approach to calculation of the thermodynamics of both initial and transition states in such reactions. The same careful consideration has clearly been given here, not only in the selection of topics, but also in his treatment of them. Rather than the relative rate coefficients which are so often quoted in such a work, Dr Abraham quotes absolute rate coefficients throughout. This alone helps to make the volume a very useful

reference source. But the way in which he handles the sometimes contentious mechanistic arguments, for example, with regard to the S_E1 reactions and the detailed mechanism of the mercury for mercury exchange, is sensible and helpful.

That much of the discussion involves mercury and the main group metals is a consequence of the large amount of detailed mechanistic work that has been carried out in that field, for Dr Abraham rightly omits discussion of mechanisms that have been based solely on preparative studies. There is some discussion of electrophilic substitution in transition metal alkyls but it is here perhaps that the discussion might have been extended. For example, detailed discussion of the reaction of gold(I) alkyls with mercury(II) species is included because it has been claimed that attack of mercury occurred at the saturated carbon. Discussion of related reactions of mercury(II) species and of other electrophiles with similar d^{10} and d^8 coordinatively unsaturated complexes, for which no such claim has been made, is not included.

The volume is well set out with many useful tables of data and with more than 300 references. M. D. JOHNSON

Magnetic Cooling Manual

Principles and Application of Magnetic Cooling. By R. P. Hudson. Pp. xvi + 230. (North-Holland: Amsterdam and London, 1972.) Dfl. 60; \$19.

THE author has produced this book in response to an invitation to provide a "shop manual" on magnetic cooling for the uninitiated. In his foreword he suggests that the book should be of most use to the undergraduate embarking upon specialized studies or the research student entering the field of cryogenics.

After a brief historical introduction there is a short chapter dealing with the principles of magnetic cooling. Here the ideas and relationships relevant to an understanding of the cooling process are generally well presented, although some readers may not like the system adopted for identifying equations. The next chapter, on paramagnetism, occupies approximately one quarter of the book. It opens with a consideration of

the ideal case of free ions and continues with a comprehensive discussion of real paramagnets in which departures from free-ion behaviour are brought out. Under the heading "Experimental Procedure" the author then deals with some of the techniques and equipment used in magnetic cooling. The emphasis is largely on the study of the paramagnet itself and little mention is made of the problems encountered when paramagnetic salts are used as cooling agents. A useful companion chapter gives detailed coverage of the properties of some of the more important salts used in the production and measurement of low temperatures. It also contains a table summarizing the properties of a more extensive list of paramagnets. The last chapter occupies about one fifth of the book and deals with the interesting topics of nuclear orientation and nuclear cooling. Finally, a set of appendices and a list of almost 300 references are provided.

This is a well-written book which can be recommended to newcomers to the field of magnetic cooling. The text is well supplied with numerical examples which indicate typical values of parameters commonly encountered. Theories under consideration are carefully evaluated and summarized and the comprehensive referencing enables a more detailed study of the subject to be carried out. It is worth noting that, because much of the original literature on magnetic cooling does not employ SI units, it was decided to retain the older gaussian units for this volume. In conclusion, this is a generally useful book but it is somewhat expensive. Moreover, from the title the reader might reasonably expect to find rather fuller coverage of the applications of magnetic cooling than is actually given.

P. LYNAM

Organic Chemistry

Weygand/Hilgetag Preparative Organic Chemistry. Edited by H. Hilgetag and A. Martini. Pp. xxv + 1181. (John Wiley: New York and London, February 1973.) £21.25.

THIS large and costly volume is a translation of the fourth edition of *Organisch-chemische Experimentierkunst* which developed from Weygand's