Book Reviews

The Chemistry of Heterocycles. By T. Eicher, S. Hauptmann. Thieme: Stuttgart, 1995, 504 pp, hardback. DM 148. ISBN 3-13-100521-1. paperback DM 84. ISBN 3-13-100511-4.

Any author tackling the enormous field that is heterocyclic chemistry has a major dilemma to resolve - does he attempt to be comprehensive (in which case he sets himself an enormous task, and in any case that niche is already occupied by other established works and series), does he attempt the other extreme of a very slim volume suitable for students who have an introductory module of heterocyclic chemistry to study, or does he try to position himself in the middle ground, with a broad coverage text suitable for those advanced students, professionals and researchers who need a survey of core information in reasonable detail. This book falls squarely into the latter category and matches this market very well.

The book opens with a brief but valuable survey of the systematic nomenclature of heterocyclic compounds, and then follow six chapters dealing with different ring sizes of heterocycle, ascending from three- to seven-membered rings and then larger rings. Within each chapter the systems are ordered according to heteroatom type, with single heteroatom rings followed by two heteroatom systems, etc. Each heterocycle is followed by its benzo-derivatives, if significant, and then (partially) reduced versions. A criterion of 'latest possible classification' is used for systems containing two or more fused heterocycles. There are bound to be pros and cons, and illogical features, to any system of classification, but I found this arrangement workable. The description of each heterocycle is also systematically organised, and contains structure, physical and spectroscopic properties, chemical properties and reactions, syntheses, important derivatives, and (in a welcome departure from the format of some traditional texts) their use as reagents, auxiliaries, etc., in organic synthesis. The emphasis of the information about each heterocycle is definitely reactions and synthesis, which is clearly focused towards the bench-top user of heterocyclic chemistry, and I welcome this approach. I found the material to provide a good coverage and to be commendably up-to-date, as judged in particular from my detailed reading of the five-membered ring chapter, with a good listing of original literature references, some as recent as 1993, as leads for further reading. There is a good balance between classical and modern heterocyclic chemistry and applications.

The text is translated from the German original, but I did not find that this showed in the style. In fact, the balance of text to structures and reaction schemes is commendably biased towards the latter; absorbing material visually, with appropriate commentary, is much the most effective method for information transfer in organic chemistry. To continue the visual theme, the production values of this volume are high, with very clear presentation of chemical structures and reaction schemes, stereochemistry, orbitals and mechanisms (i.e. 'curly arrows), and very few errors. The use in places of bars to represent non-bonded electron pairs is idiosyncratic to the British reader, but no more than that.

The book is not cheap, but that is no great surprise nowadays unless one is looking at mass market first year undergraduate texts. It is nevertheless a well-produced quality volume that provides excellent value for money, and I wholeheartedly recommend it to all practising and aspiring heterocyclic chemists.

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Diazo Chemistry II. By H. Zollinger. VCH: Weinheim, 1995, 522 pp, hardback. DM 198. ISBN 3-527-29222-5.

This volume is the continuation of Diazo Chemistry I, which contains the chemistry of aromatic diazo compounds, and it also continues its tradition of excellence. The two books are closely related, but at the same time they are independent so that it is possible to read one of the books without frequent consultation of the other. Most of the contents concerns aliphatic diazo compounds, but the Author realized that the correlations with inorganic diazonium salts and the complexes of transition metal salts with organic diazo ligands and dinitrogen justify a comparative discussion. The volume consists of ten chapters and a short epilogue. The first chapter is related to a historical introduction starting from the early experiments of Piria (1848) of nitrosation of aliphatic amines, through the isolation of the first aliphatic diazo compound (Curtius 1883), the more recent inorganic diazo compounds and the complexes of transition metal salts with diazo compounds and dinitrogen as ligands (1964-5) till to the experimental evidence (1985) of the simplest

diazonium salts, HN2+, in nitrosation of ammonia. Nomenclature and general references complete this chapter. General methods for the preparation of alkane, alkene and alkyne diazo compounds are extensively reported in the Chapter two, even if the Author strongly recommends "to search the literature for a well-described synthesis of that specific diazo compound, not to study the general literature on aliphatic diazo compounds and to adopt a good method described for a slightly different compound". Ten types of diazo alkane syntheses are particularly discussed: the diazotization of amines, the cleavage of *N*-nitrosoamides, reactions of carbonyl derivatives, diazotransfer from sulfonyl azides, addition of carbonyl derivatives or alkenes to diazo compounds and cleavage of suitable aliphatic diazo compounds. Chapter three briefly presents well-defined fundamentals on inorganic diazo compounds and metal complexes with dinitrogen as the ligand and the relationships with organic diazo and diazonium compounds. Chapter four has outstanding value: it is an excellent description of the kinetics and mechanism of aliphatic diazotization, with also some discussion of the carcinogenic properties of nitrosoamines. Chapter five describes the structure of aliphatic diazo compounds (mainly from NMR spectroscopy), the theoretical investigations and the isoelectronic relation with a variety of other molecules and anions. Chapter six is a comprehensive review of reactions of aliphatic diazo and diazonium compounds, which do not involve initial dediazoniation; it mainly concerns 1,3-dipolar cycloadditions in synthetic, mechanistic, regio- and stereoselective aspects. It is not only for friendship that the book has been dedicated to Rolf Huisgen, the highest expression of the research in 1,3-dipolar cycloadditions. Chapter seven provides clear insight into the complex pathway and product patterns associated with didiazoniation reactions involving diazonium ion intermediates. The Author emphasizes the fact that "there are too many ambiguities in mechanistic interpretation of experimental results in deamination studies". Chapter eight provides design and operating guidance for dediazoniation reactions involving carbene and carbenoid intermediates. It is organized around an introduction to general carbene chemistry, the formation of carbenes by dediazoniation of diazo alkanes and the main reactions of carbenes and carbenoids. Subsequent chapters (nine and ten) concern miscellaneous reactions and metal complexes of diazonium and diazo compounds. The short epilogue has not the purpose to give a summary from Peter Griess' isolation of the first diazo compound (1958) to the recent metal complexes containing diazo ligands, but that to show that "the development of knowledge in diazo chemistry is a fine example of the way by which chemists developed their part of science after the pioneering era". The volume is clearly written, the strengths and limitations of the synthetic methods and the mechanistic interpretations are presented so that even the novice can evaluate their appropriateness to understand the questions at hand and the literature was checked systematically until the end of 1994. The book is a valuable addition to a functional library of organic and organometallic chemistry.

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