Book Reviews

Catalysis of Organic Reactions by Supported Inorganic Reagents. By J. H. Clark. VCH: Weinheim, 1994, 126 pp., hardback. £ 46. DM 115. ISBN 1-56081-507-8.

Over the last years, the use of solid inorganic supports by organic chemists has been quickly growing and now numerous reviews are covering this area.

The book is concerned with genuine catalysts (entire supported reagent recyclable): the author states himself that this is not a comprehensive guide to supported reagents and their application as catalysts. But it focussed on the more important examples with significant emphasis to prompt chemists to develop new, more efficient and cleaner processes according to novel international environmental legislation.

The book which contains 120 pages is devided into six parts with a subject index guide at the end. The references are at the end of each chapter but the list is far from exhaustive. Chapters one and two deal with an overview related to supported reagents (types, preparation, use, characterisation by several physical techniques – titration, IR/FT IR, TGA and DSC, NMR, XRD, SEM). Catalysis by solid acids is covered in chapter three: after the various and successfull well-known applications of zeolites acidity, the author describes the use of new materials as pillared clays and extra-large pore molecular sieves. Several reactions catalyzed by these materials are developed: Friedel–Crafts alkylation and acylation in presence of clays, pillared clays zeolites, supported Zn(II) reagents – for example clayzic–, isomerization and rearrangements, elimination, addition and miscellaneous typically acid-catalyzed reactions. These novel techniques can advantageously compete with the conventional homogenous or liquid–liquid phase acid catalysis which use very corrosive reagents, generating acidic waste stream or needing large volume of neutralizing bases.

Chapter four outlines the catalysis by solid bases as alumina-based supported reagents, silica-based bases, metal oxide bases: the great basicity of KF/Al_2O_3 is discussed. So, Michael reactions, condensation, isomerisation, rearrangement, hydrogenation, dehydrogenation, elimination and other reactions of sulfur compounds are reported.

The book goes on with chapter five devoted to oxidation catalyzed by supported reagents: types of oxidation catalysts and reactions concerning alkanes, alkenes, aromatics, alcohols and other substrates including lactones, amines, catechols as well as inorganic molecules (NO, NH_3, H_2S). The last part includes other reactions catalyzed by supported reagents (Diels–Alder reaction, halogenation, nitration, hydrogenation, polymerization and oligomerization).

In conclusion, this book is informative and demonstrates the formidable potential of catalysis by supported reagents which appears as an exciting new area of chemistry. I can recommend it to specialists or researchers not in this field.

Actually, microwave activation of reactions on inorganic solid supports offers many advantages owing to the cumulative effects of these two methodologies.

F. Texier-Boullet, Université de Rennes, France.

Heterocyclic Chemistry. By J. A. Joule, K. Mills, G. F. Smith. Chapman & Hall: London, 1994, 516 pp., paperback. £ 19.99. ISBN 0-412-41340-X.

It is 17 years since the second edition of this work appeared in 1978, and much has occurred in heterocyclic chemistry since then. The original authors, reinforced by the addition of Dr. Mills have completely rewritten their text and have produced what can be characterized as a very sound and readable account of the fundamentals of heteroaromatic chemistry.

The overall arrangement of the work retains its classical treatment which commences with the heteroaromatic six-membered mono- and bicyclic rings, proceeds to the corresponding heteroaromatic five-membered rings and deals in the final chapter very briefly with non-aromatic derivatives of 5- and 6-membered rings and with 3- and 4-membered rings. This classic arrangement has much to commend it.

The whole work commences with three "general" chapters, dealing successively with structure, reactivity and synthesis of aromatic heterocycles; in these chapters the main principles are enunciated and similarities and differences emphasized. There are six further summarizing

chapters spaced throughout the book, in each case preceding the specialist chapters on the relevant ring systems. These six chapters deal successively with the typical reactivity of (i) pyridines, quinolines, and isoquinolines, (ii) pyrylium and benzopyrylium ions, pyrones and benzopyrones, (iii) pyridazine, pyrimidine and pyrazine, (iv) pyrroles, thiophenes and furans, (v) indoles, beno[b]thiophenes, benzo[b]furans, isoindoles, benzo[c]thiophenes and isobenzofurans, (vi) 1,3- and 1,2-azoles.

A major change from the earlier editions is that original references are now given throughout the text. These include many review references. The authors have made this change in the hope that it will improve the relevance of the book to post-graduate teaching and to research workers and I believe that this will certainly be the case. The references seem to have been chosen well.

The authors have also added for the first time sets of exercises with solutions given in an appendix at the end of the book. These should be very helpful when this text is used in a teaching mode.

This book has obviously been prepared with loving care. It contains very few errors. (Not that it is perfect: I did find the odd error both typographical and of interpretation, but he/she who never made an error never made anything and I only wish that my own work would contain so few errors as this). The authors show considerable familiarity with the modern literature of heterocyclic chemistry: as examples, the vignettes on spectroscopy are very much up to date and a lot of the recent excellent heterocyclic chemistry involving silicon, tin and boron derivatives is included.

Above all, this is an interesting book to read. The style flows and the authors keep the attention of the reader. I believe it will be of very considerable use and wish it well.

A. R. Katritzky, University of Florida, USA.

Sulfur Reagents in Organic Synthesis. By P. Metzner and A. Thuillier. Academic Press: London, 1994, 200 pp., hardback. £ 50.00. ISBN 0-12-690770-6.

The latest in the series best synthetic methods, this book provides a comprehensive review on the use of organosulfur reagents in organic synthesis. The book is devided into three main chapters covering the preparation of organosulfur compounds and organosulfur compounds as intermediates in organic synthesis and there is a wealth of information within these chapters. The first chapter deals with preparation of organosulfur compounds and whilst most areas are covered admirably, simple alkylation of thiols seems to be missing. It would be useful to include alkylation of S^{2-} using the recently introduced combination Na_2S/Al_2O_3. The Mitsunobu reaction is also covered as a method for converting ROH into RSH but use of ZIRAM reagent [$Zn(SC(=S)NMe_2)$] is not included. I appreciate the difficulty in having to be selective but for a book that describes itself as 'best synthetic methods' this example should be included. The second main chapter covers all the standard functional group interconversions mediated by sulfur reagents including the Barton reaction, Swern oxidation, fluorination using DAST and many others but it also includes a few less well known reactions like the deracemisation of a terpene thiolester. The largest section is devoted to the use of organosulfur compounds as intermediates in organic synthesis and here most reactions that you are likely to need are described. From the Ramberg–Bäckland reaction to epoxidations using sulfur ylides, all are included. This chapter is well organised and divided into sections according the transformations accomplished: formation of C-C, formation of C=C formation of 3 membered rings and pericyclic reactions. It was pleasing to see some of the latest modifications described for some of the processes e.g. the use of sulfide, alcohol and strong acid for the formation of sulfonium salts, the latest methods in epoxidation using sulfur ylides, and the isolation of episulfones to mention but a few.

The minor criticisms above should not detract from the comprehensive overview the authors have provided. Not only are all the standard methods in organosulfur chemistry discussed but also a few more esoteric ones so there is something for both the novice and the more experienced practioner.

Sulfur plays a prominent role in industries as diverse as the petrochemicals industry and the food industry. Within organic synthesis sulfur also plays a prominent role and this book amply illustrates that. This book is a must for all libraries and is strongly recommended for those occasional users of sulfur reagents who want to get the most up to date developments in the subject.

V. K. Aggarwal, University of Sheffield, England.

Book reviews are generally by invitation. Publishers should send books to Dr Ray J. Boucher, Book Review Editor, Synthesis Editorial Office, Georg Thieme Verlag, Rüdigerstrasse 14, D-70469 Stuttgart, Germany.