

Book Reviews

Inorganic Syntheses

Volume 29

Russell N Grimes (ed)

Wiley-Interscience, New York, 1992

427 pages. \$82.50

ISBN 0 471 54470 1

In 1933 a group of inorganic chemists at an American Chemical Society meeting in Chicago conceived the idea of a series of volumes giving 'detailed and tested methods for the synthesis of inorganic compounds'. Six years later these ideas came to fruition with the publication of Volume 1 of *Inorganic Syntheses*. The range of compounds covered in this original volume now appears very modest, because the scope of inorganic chemistry has rapidly widened beyond its traditional boundaries in recent years. The original board of editors made the decision that every experimental procedure would be independently checked in another laboratory before being accepted for publication. This rule has been strictly observed in subsequent volumes and continue to be one of the major strengths of the series; also, each procedure carries detailed warnings of any known hazards associated with the preparation.

Volume 29 is produced to the high standard we have come to expect for this series. The range of chosen topics would have staggered our colleagues of the 1930s; besides a well-balanced coverage of Main Group and coordination compounds, the syntheses of many organometallics and clusters are included. Furthermore, the title of the series does not prevent the inclusion of experimental details for making pentamethylcyclopentadiene and several 'organic' superconductors—their addition simply serves to emphasize the breadth of interest of the modern inorganic chemist.

As a teacher as well as a researcher, I find that *Inorganic Syntheses* provides a useful source of information on compounds which are of interest to undergraduate students. Thus, descriptions for making KrF_2 , XeF_2 and XeF_4 are welcome; the dehydration of metal chloride hydrates using $(\text{CH}_3)_3\text{SiCl}$ will be included in Year I lectures; hexasolvates of metal dichlorides with such weakly donating solvents as nitromethane, ethanol, acetone and methyl cyanide may enter our laboratory classwork; the synthesis of silenes and of metal halides such as CrF_5 , NbCl_3 and NbCl_4 will interest our final-year students. Whilst appreciating that this use of *Inorganic Syntheses* was not quite that anticipated at its conception, it does show how useful this series can be, even to the non-research chemist. I strongly recommend that colleagues urge their libraries to purchase this, and subsequent, volumes of *Inorganic Syntheses*.

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Ylides and imines of phosphorus

A. William Johnson

Wiley, New York, 1993

614 pages: £74

ISBN 0 471 5221 71

This is A. William Johnson's second monograph on ylide chemistry, and has been prompted by the development of this field since the first was published in 1966. It has two stated aims: firstly to provide a basis for further original research and secondly to allow chemists to become familiar with the state of phosphorus ylide and imine chemistry today.

The work moves through an introductory chapter into a theoretical description of the bonding in ylides and their properties and preparation, followed by chapters on the reactions of phosphonium ylides including the Wittig reaction and its modifications. The later sections deal with other phosphorus ylides and finally transition-metal complexes with ylides.

The book is well presented, giving easy access to information, with clear structures and equations. Each chapter ends with a chronological list of reviews on that topic and an extensive list of references (over 3150 selected references in total). This format allows the book to be 'dipped into' for information on a specific aspect of the subject as well as providing a thorough overview, thus achieving its stated aims.

In summary, this is a book that should prove valuable to both new and established workers in phosphorus ylide and imine chemistry and has much to recommend it.

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Introductory Chemistry for the Environmental Sciences

R. M. Harrison, S. J. de Mara, S. Rapsomanikis and W. R. Johnston

Cambridge Environmental Chemistry Series 4

Cambridge University Press, 1991

363 pages: Soft cover \$29.95

ISBN 0 521 27639 X

This is an undergraduate text aimed primarily at students studying environmental sciences or ecology and it is intended to give such students the necessary background to the chemical principles required to understand today's environmental issues. Starting at a basic level, the authors introduce the student to atomic structure and the nature of chemical bonds before

leading on to states of matter and their properties. After this introductory chapter, there follow chapters covering physical chemistry, the chemistry of the elements and analytical chemistry. The final chapter is given over to a series of case studies which take principles discussed in earlier chapters and develop them with reference to specific chemical processes within the environment. Whilst the coverage of the chemistry is concise and subjects are introduced quickly and efficiently the depth which is reached, particularly in physical chemistry, may prove daunting to the non-chemist at whom this volume is aimed. Having said that, the abundance of questions at the end of each chapter should allow readers to check their understanding of the material. Solutions to these problems would have been helpful, however.

Of most potential use to the chemist, for whom this book is of some interest, is the final chapter of case studies. Covering areas such as air chemistry, fresh and sea waters, soils and marine sediments, a number of subjects are discussed which would allow chemistry students to identify where their knowledge can be applied.

On the whole this is a well written book useful to both student and teacher and, with the reservation that some students may find some of the material requires further explanation, can be recommended to anyone embarking on a course in environmental chemistry. As one book in a series it could be part of a comprehensive coverage of the subject. Unfortunately, the information given about the rest of the series is sketchy so it is difficult to envisage where the volume sits in relation to its companions.

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Inorganic Materials

Dermot O'Hare and Duncan W. Bruce (Eds)
Wiley, Chichester, 1992
558 pages: £58.00
ISBN 0 471 92889 5

This is a timely treatise which will be of great use to the inorganic materials community. There are nine distinct chapters with different authors for each, with a very

good balance of topics ranging from electronics materials to clays to biominerals.

Chapter 1 deals with molecular inorganic superconductors such as TTF, TCNQ and a variety of sophisticated analogues such as $[M(dmit)_2]$. It gives a helpful guideline to the structural and electronic criteria required to form a conducting molecular system, together with a full characterization of $[M(dmit)_2]$ systems, including band structure.

Chapter 2 is on molecular magnetic inorganic materials and gives the fundamental equations as well as descriptions of magnetic chain compounds, and magnetic long-range ordering of molecular compounds.

Chapter 3 elucidates the concepts of non-linear optics and gives examples of organometallic and coordination compounds displaying nonlinear properties. A number of unrelated materials are grouped together in Chapter 4, which deals with intercalation compounds. Extensive tables are given with numerous examples of the different types of layered compounds with their layer charge and guest species, and in some cases interlayer spacings. The tables are supported by clear diagrams showing structural features of a selected number of these compounds. This chapter is particularly comprehensive.

Chapter 5, on biogenic inorganic materials, describes in fascinating detail the various types of biominerals and how they are formed; it is accompanied by clear descriptions of crystal morphologies.

The traditional area of clay chemistry is described in Chapter 6, which includes novel pillared clays together with numerous examples of clay-catalysed organic reactions.

Chapter 7 addresses conductive polymers, whereas Chapter 8 deals with the more unusual metal-containing liquid crystals, leading on to a description of metallophthalocyanines and metalloporphyrins.

The final chapter is on electronic materials and methods for their crystal growth together with descriptions of the precursors used to synthesize them; the necessary requirements of a precursor are exemplified, providing a basis for this topic area.

This is a clearly written and very readable book which gives a good overview of the subject. I highly recommend it for both final year undergraduates and postgraduate levels.

KATHERINE HUDDERSMAN