oxides, many of which exist as defect or distorted structures. These are illustrated by a large number of diagrams, often in terms of arrays of linked polyhedra which, for the non-specialist, demand a good deal of careful study! Much attention is naturally given to three-dimensional structures and to superconducting cuprates, but one can also find reduced-dimensional arrangements such as pillared, ladder, lamellar and tunnel structures of varied compositions. The amount of detailed information available here reflects the great recent advances in X-ray crystallography and high-resolution electron microscopy.

Section 2 (94 pages) deals with properties and phenomena, and provides a very clear insight into the attractions which these compounds hold, not only for chemists but also for physicists, materials scientists and engineers generally. Here we find a vast range of electronic and magnetic properties, including insulating, semiconducting, metallic and superconducting behaviour as well as dia-, para-, superpara-, ferro-, antiferro- and ferri-magnetic, ferroelectric, giant magnetoresistance and electro-optic (but not non-linear optical) properties. These often show marked dependence on temperature and pressure. Many technological applications can take advantage of this rich behaviour, some examples being data storage devices, magnets, dielectric materials, fast ion conductors, catalysts and sensors.

Finally, there is a section devoted to synthesis. Besides high-temperature methods for bulk materials, some account is given of sol–gel and other low-temperature solution methods (so-called *chemie douce*), chemical vapour transport (but not chemical vapour deposition) and molecular beam epitaxy. For organometallic chemists, this excellent account of properties and applications could sharpen their perception of transition-metal oxides and enthuse them to develop new applicable metalorganic precursors for these valuable materials.

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Fundamentals of General, Organic and Biological Chemistry

John R. Holum
6th edition. John Wiley, New York, 1998
800 pages. £23.95
ISBN 0-471-17574-9

This book is aimed at North American students taking Life Sciences at University and assumes little prior knowledge of chemistry. It is one of a number of texts written by Dr Holum which are clearly successful in the States, and is the sixth edition since its original publication in 1978. With the changes to GCSE and A-levels in the English and Welsh educational systems and the greater proportion of young adults entering university, such textbooks become more relevant to chemistry courses for students in the Life Sciences in British Universities.

The text is written in a colloquial style and addresses the student directly. The first chapter is an introduction to the methods of science and to the basic ideas of measurement which should all be familiar to British students. It is lavishly illustrated, as is the rest of the book, and ends in a chapter summary followed by review exercises. There are worked examples throughout the book which usefully analyse the problem for the student before providing the solution. The margins contain further explanations or extensions of materials discussed in the body of the text. Most of these seem useful but some add very little to the text or appear to expect the reader to lack a grasp of the English language. Special topics, now called Interaction Units, are dotted about in an effort to show the student the relevance of chemistry to their main interest. The sequence of material is, from a traditional viewpoint, often unusual; the mole, for example, is introduced in Chapter 5 after a discussion of electron configuration in Chapter 3. The physical chemistry needed in a one-year course for biologists is all adequately covered and the student can readily find topics of interest, for example dialysis and the bloodstream in Chapter 7, which connect the chemistry in a meaningful way to biological problems.

The organic chemistry has been reduced in this edition but a completely adequate cover is provided. The author is clearly familiar with the problems that students have when starting this subject and although he initially uses square planar formulae he illustrates very well how these can confuse the students into formulating non-existent isomers. A problem with trying to be relevant does arise here, however, in that numerous biologically important molecules are drawn without any stereochemistry being shown. For example, the formula of cholesterol drawn in this way (p. 343) thus fails to indicate the importance of the unique three-dimensional structure of the molecule. The representations of glucose and fructose (p. 429) are meaningless, as is the aside in the margin. Since these are only being used as examples of compounds with carbonyl and hydroxyl groups, giving the correct stereochemical structure would surely not confuse the student. The arrow 'mechanisms' in this chapter are also incorrect and the 'arrows' would be better removed to leave just the equilibria. The carbohydrates are, in fact, later described with their correct stereochemistry but the steroids remain as unresolved isomers.

The last four chapters are biochemical. There are a number of appendices explaining mathematical concepts, providing nomenclature rules for inorganic compounds, giving three organic mechanisms with the correct 'arrows', and providing answers for the exercises in the text. There is a substantial index, which includes mad cow disease!

Altogether, this text provides a comprehensive coverage of the chemistry likely to be taught to biology students in a first-year course at university. It provides material found in A-level courses and is thus valuable for

reminding students of points that they had forgotten or helping them with material they had not understood. It is a text which should find an expanding market in British universities.

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Inorganic Syntheses, Volume 32

Marcetta Y. Darensbourg, (Editor in Chief)
John Wiley & Sons, New York, 1998
xxiii + 331 pages. £51.95
ISBN 0-471-24921-1

Inorganic Syntheses is a well-established series, which provides for organometallic and inorganic chemists a source book of syntheses which have been corroborated in independent laboratories. This volume is dedicated to the late Sir Geoffrey Wilkinson, Nobel Laureate, who was for many years one of the International Associates of *Inorganic Syntheses.* As the dedication rightly states, 'His monumental contributions to inorganic and organometallic chemistry, and in particular his emphasis on the importance of synthetic chemistry, will long be remembered.'

The Editor in Chief, Marcetta Darensbourg, has emphasized the importance of ligand design in coordination chemistry in this volume. Therefore, Chapter 1 describes the syntheses on a large scale of water-soluble phosphines. The water solubility of these phosphines has been induced either by the introduction of sulphonic acid groups or substituents capable of forming strong hydrogen bonds.

Chapter 2 describes the synthesis of compounds which have been developed as models for the co-ordination environments of metalloenzymes. The biomimetic ligand syntheses which are included focus specifically on models for the common metal-binding amino-acid residues histidine (imidazoles), cysteine (thiolates) and methionine (thioethers). Derivatives of the pyrazolylborates, which are very widely used in such studies, are described, and their use in the development of isolated metal sites with sterically bulky ligands is stressed in the context of small-molecule activation.

The biological theme is continued in Chapter 3; an alternative synthesis of cisplatin, which is now widely used as an anticancer chemotherapeutic agent, is described, as well as the syntheses of complexes with labile ligands, which have proved to be such effective synthons in coordination and organometallic chemistry.

Chapter 4 is devoted to the syntheses of Main-Group and transition-metal cluster compounds, and includes the description of synthetic procedures for borazine derivatives, transition-metal complexes of the lacunary heteropolytungstate $[P_2W_{17}O_{16}]^{10-}$, metal carbonyl cluster anions, (e.g. $[Os_3(CO)_{11}]^{2-}$), heterometallic cluster compounds of platinum and ruthenium, and high-nuclearity hydrido-decaruthenium clusters.

Finally, Chapter 5 describes the syntheses of Main-Group and transition-metal hydrides: six-coordinate silicon hydrides, manganese carbonyl hydrides and phosphine hydrides of iridium in oxidation states III and V are discussed.

Althogether the Editor has brought together a collection of syntheses which provide a useful starting point for new excursions into inorganic and organometallic chemistry. I am sure Geoff Wilkinson would have approved whole-heartedly.

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Microcluster Physics
Springer Series in Materials Science, Vol. 20

S. Sugano and H. Koizumi
2nd edition, Springer-Verlag, Berlin, 1998
xii + 236 pages. £49.50
ISBN 3-540-63974-8

This book is about the physics of elemental particles containing some ten to a thousand atoms, and is a second, completely revised edition of Professor Suganos earlier book on the same subject which was originally published in 1991 as the 20th volume in Springers *Materials Science Series.* That earlier edition was based on lectures given to graduate students (significantly, mainly in physics), and covered a new field that was experiencing very rapid growth. Continuing considerable interest in the area is reflected by the length of this volume (50 longer than the original) and by the similar increase in the number of papers cited (there are 253 references in this new edition). Professor Sugano originally focused his attention on particles containing some ten to a thousand atoms because that is the range within which properties change most markedly, from those of small molecules to those characteristic of fragments of bulk materials. Larger particles containing from 10^3 to 10^5 atoms, which the authors refer to as 'fine particles', have properties that differ from those of bulk materials, but the differences can usually be attributed to their greater proportion of surface atoms and to surface irregularities. It is Professor Suganos thesis that microclusters as defined here show quantum-mechanical properties, notably electronic energy levels, that depend upon their shape, like those of molecules.

An introductory chapter defines and explores the characteristics of microclusters, placing them in context between fine particles and small molecules, and noting the normal polyhedral shapes and shell periodicity of microclusters. Later chapters deal with their dynamics — whether they are more realistically regarded as like solids