For Uncoordinated Chemists

d- and f-Block Chemistry. By *Chris J. Jones.* Royal Society of Chemistry, Cambridge 2001. viii + 175 pp., softcover £ 9.95.—ISBN 0-85404-637-2

This book, which is intended for students at the undergraduate level (years 1 and 2), provides an introduction to the principles governing the chemistry of the d- and f-block elements. The emphasis of the material is clearly on the nature of the factors responsible for the formation of coordination compounds, which are treated in some detail. The reader should be familiar with some basic concepts of atomic structure and thermodynamics, although an understanding of group theory is not essential.

The material is arranged in seven chapters. Each chapter begins with a list of aims and concludes with a summary of the material presented. Furthermore, worked problems are presented within every chapter, and at the end of the chapter the reader has the opportunity to attempt a selection of problems on his/her own.

Chapter 1 provides an introduction and a taste of the material to be covered in more detail in the remaining chapters, discussing the origin and historical development of transition metal chemistry, from the classical work of Werner through to the discovery of organometallic compounds. The importance of understanding the principles governing the chemistry of compounds of the d- and f-block elements is already evident from their applications, including superconductors, catalysts, therapeutic uses, and diagnostic medicine.

Chapters 2 and 3 discuss the atomic structure and properties of the d- and f-block elements, describing the possible oxidation states and highlighting some important trends in the ionization energies and ionic radii within each series (a recurring theme in understanding the chemistry of the d- and f-block elements). Thermodynamic aspects of the formation of ionic binary compounds are discussed in relation to Born–Haber cycles and also by the application of the Born–Landé equation.

Chapters 4 and 5 introduce the reader to the coordination chemistry of transition metals, presenting the structures of commonly used acyclic and macrocyclic pro-ligands. Thermodynamic factors involved in the formation of coordination complexes of the d- and f-block elements are discussed: stepwise stability constants, electrode potentials, the chelate effect, and the macrocyclic effect.

Chapter 6 describes the theoretical models (crystal field theory, ligand field theory, and molecular orbital theory) employed to describe bonding in transition metal complexes. Several qualitative molecular orbital diagrams of the bonding in octahedral transition metal complexes are presented.

The final chapter, Chapter 7, describes the magnetism and electronic spectra of complexes of the d- and f-block elements. At the end of the book one finds a list of references for further reading, in-depth answers to the study problems, and a subject index.

The text is concisely written and clearly presented, and the author has taken every opportunity to reinforce the important concepts for the reader through the use of clear and well-constructed tables, figures, diagrams, and worked problems. Where the clarification of a basic concept requires more than just one sentence, or indeed a figure, the reader is referred to one of the many boxes within the text. Most readers will probably compare this book to several dealing with similar areas that have appeared in the *Oxford Chemistry Primers* series. However, in my opinion this text by Chris Jones complements rather than repeats the material covered in those volumes.

I encountered only a few minor typographical errors. With regard to the choice of subject matter I feel that a little more could have been included on the chemistry of the f-block elements. For example, a flow chart describing the procedures for the isolation and separation of the different lanthanide ions would have been informative. Nonetheless, Chris Jones has more than covered his brief in describing (in Chapters 2–7) the fundamental concepts and principles governing the chemistry of the d- and f-block elements, in little over one hundred pages! Furthermore, a collection of well-ordered references towards the end of the book invites the reader to pursue the topics further.

This concise text would be a worthwhile purchase for any undergraduate student embarking on an introductory course in transition metal chemistry.

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Reactions and Synthesis in Surfactant Systems. Edited by *John Texter.* (Series: Surfactant Science, Vol. 100.) Marcel Dekker, New York 2001. 888pp., hardcover $ 250.00.—ISBN 0-8247-0255-7

The appearance of Volume 100 in the *Surfactant Science* series leads one to expect something special. In fact, this is an unusually large work on reactions and synthesis in systems involving surface-active agents. It has long been known

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that under certain structural conditions surfactant molecules can combine to form associated species as a result of their amphiphilic character. Even at relatively low concentrations, spherical aggregates in the form of micelles or vesicles can occur, and these can act as microreactors which influence the activity or selectivity of many reactions. The book shows in an impressive way that recently gained knowledge about these microheterogeneous (colloidal) phases can lead to new applications. The large wealth of material is presented in 40 chapters, which range in character from reviews to research reports with experimental details. The 95 authors who have been enlisted for the work come from 12 different countries. To impose some order on the wide range of topics, at least in the list of contents, the chapters have been arranged in five parts, but these differ greatly in size and importance.

Part 1 is devoted to the synthesis and transformations of amphiphiles. In addition to a survey of industrial syntheses there are chapters on special topics, such as detergents which are able to act in supercritical phases. The synthesis of labile amphiphiles for the organ-targeted transport of pharmaceutical agents is also discussed.

Part 2 is concerned with chemistry in isotropic phases and mesophases, and in view of the title of the book this part can be regarded as the central core. Its opening chapters describe the current state of knowledge about the control of reactivity in aqueous aggregates of amphiphilic systems, with emphasis on the role of microemulsions as reaction media. Much attention is devoted to electroorganic syntheses in the presence of amphiphiles. As well as progress reports on reactions and syntheses in emulsions and microemulsions using liquid or supercritical carbon dioxide, and on micellar autocatalysis, there are some very practically oriented contributions, for example on the use of amphiphiles for fast and efficient detoxification of military materials.

Part 3 deals with aspects of polymerization chemistry, which can be improved in many ways by the presence of amphiphilic systems. For example, it is possible to produce stable macro- or microemulsions as systems in which lattices with adjustable uniform particle sizes can be synthesized. There are articles on polymerization in various types of amphiphilic aggregates, and on the polymerization of unsaturated amphiphiles in the aggregated state. The resulting macromolecules often have the same shape and size as the original aggregates, and retain their properties. The related method involving the polymerization of adsorbed ("admicellar") monolayers or double layers can be used to modify certain types of surfaces through the formation of a practically monomolecular film.

Part 4, "Particle Precipitation", deals with a highly topical theme, as the method can be used to produce nanomaterials with special magnetic, electronic, or photoelectronic properties. The four chapters, some quite long, provide an overview of methods for forming organic and inorganic nanoparticles and also for incorporating them into amphiphilic double layers.

Lastly, Part 5 includes a discussion of morphological problems involved in forming supramolecular amphiphilic aggregates. Several chapters describe the use of amphiphiles and their aggregates as templates for constructing mesoporous materials. Such molecular sieves with regular porous structures may be used to complement the zeolites which have a smaller pore size.

Looking at the book as a whole, the topics covered relate well to each other, but the individual chapters have almost the nature of independent essays. The unusually large index (56 pp.) provides a quick way of finding the topics and information one is seeking. The wealth of aspects covered, the interdisciplinary character, and not least the good mixture of established knowledge and new developments, will ensure interest to a wide readership. In his preface the editor addresses the book to industrial chemists, university researchers, and students. However, only fairly advanced students will be able to benefit from this substantial work. Its structure makes it unsuitable as a student textbook, but some of the chapters may be useful for teaching purposes, for example, as a basis for seminars. There are relatively few printing errors, but on page 13 sarcosine, although correctly described, is shown wrongly in the formula.

To summarize, I can recommend this as an excellent book which fills a gap in the market and certainly justifies its place as the 100th volume of the series.

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New Advances in Analytical Chemistry, Vol. I + II. Edited by *Atta-ur-Rahman.* Harwood Academic Publishers, Amsterdam 2000. xxi + 1245 pp., softcover $ 240.00—ISBN 90-5823-031-7

Anyone who expects from its title that *New Advances in Analytical Chemistry*, edited by Atta-ur-Rahman of the University of Karachi, Pakistan, should be a new textbook on analytical chemistry will soon be disappointed on taking a closer look into the contents. Instead, it is an extensive monograph consisting of two independent parts. The first part consists of 16 articles on current topics in NMR and ESR spectroscopy, the second part of 11 chapters on modern mass spectrometry as well as two additional chapters on selected aspects of NQR spectroscopy and capillary electrophoresis.

All the chapters deal with separate topics, and there is the strong impression of a collection of review articles with limited coherence. In general, this type of book is very useful for the scientist who would like to gain information on a particular analytical technique at an advanced level. From the viewpoint of clarity, however, it is difficult to understand why the chapters on NQR spectroscopy and capillary electrophoresis were included here. It would have been much more useful to incorporate these chapters into similar monographs on other general topics which might be planned for the future.

The editor has taken on the challenge of imposing a degree of consistency on a monograph of more than 1200 pages with almost 30 groups of authors. Fortunately, a brief subject index for each of the two parts has been provided by the editor. This allows one to search for keywords within each part of the book. On the other hand, the layout of the text

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