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Book reviews

Thermochemical Data of Elements and Compounds

B. Binnewies and E. Milke
Wiley–VCH Weinheim, 1999
928 pages. £170
ISBN 3-527-29775-8

This work is a complication of thermochemical data, mainly for inorganic compounds. There are entries for a number of organic compounds, but very limited coverage of organometallic compounds. There are approximately 3600 entries, consisting of $\Delta H°$ and $S°$ values at a single temperature, usually 298 K, along with, for the majority of entries, C_p data either at the same temperature or expressed as a temperature-dependent polynomial, so that $\Delta H°$ and $S°$ for elements and compounds, as well as heats of reaction and equilibrium constants, can be calculated for other temperatures. Many of the compounds have separate entries for the solid, liquid and gas phases.

The order is strictly alphabetical, starting with Ag(s); all compounds with one silver atom come before those containing two silver atoms. A 30-page index maintains the alphabetical order, but alongside each entry, if appropriate, is the molecular formula written in the conventional way.

The data have not been obtained directly from the primary literature, but rely entirely on six secondary sources, including the *JANAF Thermochemical Tables* 3rd Edn, American Institute of Physics, New York, 1986. (Note the 4th Edn of the JANAF Tables became available in 1998.). The most recent of these has a 1992 date. Estimates of errors are not given and there is no discussion of reliability of the data; in fact there are only four pages of explanation, which include the equations needed to calculate thermodynamic values at different temperatures. The rest of the book is devoted to the data, which are presented in a compact, well-laid-out format.

This book will provide a convenient source of data for laboratories involved in synthesis of inorganic and organometallic compounds although, for the latter, data on the organometallic compounds as opposed to their precursors will mainly have to be drawn from other sources. The price will largely confine this volume to libraries.

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Biocatalysts for Fine Chemicals Synthesis

S. M. Roberts (ed.)
John Wiley & Sons, Ltd., Chichester, 1999
civ + 728 pages. £250
ISBN 0-471-97901-5

Biotransformation, an application of microbial biotechnology in which enzymes are used to catalyse enantio- and regio-specific reactions, is well established in industry for the production of a diverse range of compounds such as organic solvents, antibiotics and vitamins. Less well known is the application of this technology to the production of fine chemicals, but biotransformation is ideally suited to this field because of the demand for safer, more environmentally friendly and low-cost alternatives to conventional reagents and catalysts, and for the need of experimentally simpler methods.

Biocatalysts for Fine Chemicals Synthesis is a compendium of the best protocols for enzyme-catalysed syntheses, which were originally published from 1992 to 1997 in loose-leaf format by the same publisher. It is divided into four main chapters covering hydrolysis and esterification reactions, reduction reactions, oxidation reactions and carbon–carbon bond-forming reactions. Each chapter is further divided into modules (45 in total) describing a specific type of chemical conversion. Each module includes an introduction to the reaction, a reaction scheme, the materials and methods it requires, a comparative assessment of the procedure by the authors of each module, and references and spectroscopic data where appropriate. One module covers the hydrolysis and esterification of organometallic substrates with specific reference to tributyltin and α-hydroxystannates. The book is prefaced by a chapter by the editor on the state of the art in 1996, which highlights the changes which have arisen in the application of biotransformations since 1992. The final chapter presents case studies with protocols which are intended to illustrate how biotransformations can be used for the production of specific non-racemic chiral compounds for application as either synthetic building blocks or target molecules.

The use of enzymes, whole cells or cell extracts in the catalysis of a broad range of chemical conversions has expanded markedly over the past decade. All the reagents required are available from commercial sources and all the reactions presented in this compendium can easily be carried out on a laboratory scale. Given the simplicity, high enantiomer-specific yield and low cost of biotransformations, this form of catalysis is certain to be applied to an even greater range of reactions in the future, some of which will successfully be scaled up for industrial use. This book presents detailed reaction

schemes in a hands-on style and, despite the price and slightly dated introductory chapter, should appeal to researchers wishing to learn more about biotransformations and to those wishing to explore the possibilities of applying this technology to their own research.

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Uses of Inorganic Chemistry in Medicine

N. P. Farrell (ed.)
Royal Society of Chemistry, Cambridge, 1999
xii + 160 pages. £59.50
ISBN 0-85404-444-2

Traditionally, medicinal chemistry researchers have experienced some difficulty in adapting their thinking to embracing the role of metal ions in pharmaceuticals. This is partly because synthetic chemistry of old was based upon organic bonds, and partly because the concept of lability of metal–ligand bonding was difficult to grasp. Over the last two decades there has been much progress in this area: several books have appeared, and pharmaceutical research companies have recruited specialists in the area of metallocomplexes.

This book, edited by N. P. Farrell, is a contribution to this progress, and contains nine chapters addressing such topics as the biomedical uses of lithium, gold complexes for treating cancer and HIV, nitric oxide in physiology and medicine, therapeutic uses of manganese, vanadium in its role of a possible insulin modifier, platinum-based anticancer drugs, and the role of iron and copper in controlling oxidation damage. The authors are all well experienced in the field and give balanced overviews which make useful reading.

Progress in these areas is best made using an interdisciplinary approach, blending the most modern research techniques in chemistry with those of biology and pharmacology. This book contains selected case studies addressing topics such as those listed. The most important chemical factors are researched in order to enlighten our knowledge of the mechanistics, pharmacokinetics and tissue distribution features. Traditional factors which need to be built into any structure–activity relationship include coordination number, the geometry of the complex, the type of ligand involved, and whether the species are kinetically inert or labile.

To someone who has been in the field for several years, this book will bring the readers up-to-date in terms of progress in these various topics. Particularly valuable contributions are those concerning platinum-based anticancer agents, and it is fascinating and intriguing to see that more and more details have emerged over the last 30 years concerning the target sites for cisplatin after it has lost its two chloride ligands. Diagrams are produced which can be useful in instructing new researchers in the field concerning the exact sites of nucleophilic attack upon DNA, RNA and proteins. The more recent replacement of the two chloride leaving groups by cyclobutane dicarboxylic acid (CBDCA) is described in detail, and how it enhances, by two orders of magnitude, resistance to aquation replacing the leaving group. This is one of the rare instances in this book where chemical speciation is implicated although not mentioned by name.

This exciting area of research has continued to involve novel trinuclear platinum compounds, which have now entered the first phase of clinical trials and are designed to have a spectrum of clinical activity that is complementary to the parent cisplatin drugs.

This is an excellent volume for inspiring research students with enthusiasm for relating different aspects of inorganic chemistry to medicine. I cannot see it being prescribed as a first-choice textbook in the area, but it will be cited as useful support reading and copies should be available in libraries and in research laboratories. I imagine that pharmaceutical researchers from industry will use it to become familiar with the new terminology more closely associated with metals in medicine. The authors have put much effort into simplifying their accounts and rendering them reader-friendly, and are to be congratulated.

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Colloid–Polymer Interactions (From Fundamentals to Practice)

Paul L. Dubin and Raymond S. Farinato (eds)
John Wiley and Sons, Chichester, 1999
x + 417 pages. £74.50
ISBN 0-471-24316-7

This book is a comprehensive study of colloid–polymer interactions involving the ways polymer chains may behave at the interface. It takes the form of a series of chapters, well written by invited authors, although it must be emphasized that this is not just a collection of research articles since there is a good integration of cross-referencing throughout the volume. The editors provide an excellent preface and set the goals to be achieved by the book: firstly, to present in a non-specialist manner practical technologies that are based on colloid–polymer interactions; secondly, to put into clearer focus the models used to organize and rationalize observations; thirdly, to provide technologists and

