

useful to someone who is already familiar with the topic, nor argue the case in enough detail for the beginner to follow, and the choice of examples is questionable. Only two experimental spectra and one simulation are illustrated; none is identified and the most complicated shows a doublet of nitrogen triplets. There is a section on spin trapping, and reference is given to a database on nitroxyl spectra, but not to Fischer's general and comprehensive data in Landolt-Börnstein *Magnetic Properties of Free Radicals*, Fischer H (ed.), Springer: Berlin, 1965, 1980, 1990). There are also too many errors which should not have escaped the author and editors: confusion of Planck's constant h with magnetic field H , and of nuclear spin m_I with electron spin m_s , wrongly labeled energy levels, inconsistent symbolism, and misplaced terms in equations.

T. J. Wallington and O. J. Nielsen's chapter on the measurement of rate constants in the gas phase is much more detailed and gives block diagrams of the sometimes complex apparatus which is used. G. V. Buxton's chapter on the measurement of rate constants in the liquid phase emphasizes pulse radiolysis studies on aqueous systems. Nowhere, however, is there an analysis of the rate constants. There then follows a thorough account by E. Denisov of models for abstraction and addition reactions of free radicals. The various methods are examined critically, and illustrated with worked examples.

The ultimate fate of radicals is usually a radical-radical reaction leading to combination or disproportionation, and the various models which have been developed for analysing these processes are discussed in a chapter by Z. B. Alfassi. Elsewhere in the book, though not in this chapter, the unpaired electron on radicals is indicated on the formula, and I would have appreciated consistency: it is a distraction to have to check whether a missing hydrogen atom represents a radical or a clerical error in the formula.

The chapter by J. Gebicki and A. Marcinek on radical ions concentrates on the reactions of radical cations, but it is up to date and heavily referenced (eight times more so than the first chapter) and provides a good review of the present state of the subject.

O. Ito's chapter on free-radical polymerization provides a good critical review of the mechanism and kinetics of these centrally important reactions. This is followed by a survey by J. E. Chateaufort of reactions of free radicals in supercritical fluids (SCFs), which is a very useful field for studying SCF solvation and its effects. E. R. Bittner reviews quantum-mechanical numerical simulations of free-radical dynamics in solution, and N. Cohen gives a very readable account of the thermochemistry of organic radicals, emphasizing Benson's group additivity approach.

Accounts of the measurement of reduction potentials of inorganic radicals in water (D. M. Stanbury) and of the redox potentials of organic radicals (K. Daasbjerg, S. U. Pedersen and H. Lund), are accompanied by extensive tables of data.

G. Marston, P. S. Monks and R. P. Wayne's chapter on

the correlation between rate parameters and molecular properties concentrates on the gas-phase reactions of hydroxyl and nitrate radicals, which are important in atmospheric chemistry.

Z. B. Alfassi's second contribution concerns empirical correlational solvent effects in free-radical chemistry, and the book concludes with a useful chapter by C. Chatgililoglu and P. Renaud on recent developments in organic synthesis by radical reactions.

The overall result is something of a lucky dip. I would have preferred a firmer editorial hand and a more consistent approach, but it is well worth knowing what the book does contain: it might be just what you are looking for.

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Handbook of Copper Compounds and Applications

H. W. Richardson (ed.)

Marcel Dekker, New York, 1997

viii + 432 pages. \$175

ISBN 0-8247-8998-9

This is really a company book; half of the 15 chapters are written by employees of Phibro-Tech Inc.; the others emanate from universities and research institutes. Phibro-Tech is to be congratulated on giving its employees the time to document their experience.

No other book covers this ground in this depth; even Kirk-Othmer devotes only 15 pages to the applications of copper compounds. Sadly, for readers of this journal, the applications of organic copper compounds in catalysis is hardly mentioned and the basic reference work here, Wilkinson's *Comprehensive Organometallic Chemistry*, Vol. 2, is not mentioned at all. Heterogeneous catalysis by inorganic copper compounds is reviewed by David Dollimore, but from an academic rather than an industrial viewpoint.

The chapter on basic chemistry disappointed me. It does not mention the fact that anhydrous copper sulphate is colourless (known to all schoolchildren but, to my knowledge, still unexplained), nor does it mention the intriguing volatile anhydrous copper nitrate, the first anhydrous nitrate of a transition metal to be prepared.

The applications covered are mostly biological — fungicides, bactericides, algicides, wood preservatives, underwater antifouling and nutritional additives for plants and animals. Manufacture of copper compounds and recovery of copper from wastes are well described.

The editor does not expect any new large-volume markets for copper compounds to emerge, but does look forward to measurable and sustained growth in his industry.

There are a few spelling errors (Bemberg, cathode,

Lalande, algicide), and I disliked the left-justification of all equations and structural formulae, but overall this is a reasonably well-produced book which fills a gap.

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Lanthanides: Chemistry and Use in Organic Synthesis Topics in Organometallic Chemistry, Vol. 2

S. Kobayashi (ed.)

Springer-Verlag, Berlin, 1999

307 pages. £69

ISBN 3-540-64526-8

The use of lanthanides as catalysts and reagents in organic synthesis has moved on rapidly since the publication of Imamoto's book *Lanthanides in Organic Synthesis* in 1994, and so another book in the area is well justified. This is Volume 2 of the series *Topics in Organometallic Chemistry*, and is edited by Shu Kobayashi, who has made major contributions to the area of lanthanide Lewis acid catalysis in the last decade. The stated aim of the book is to give the reader an overview of recent developments in the area; these developments have been so rapid that many of the topics in the present volume do not appear in Imamoto's book.

The opening chapter, by Reiner Anwender, introduces the principles of organolanthanide chemistry; this review will be of particular use to organic chemists unfamiliar with the vagaries of organolanthanide chemistry. Readers who have seen the opening chapter of *Topics in Current Chemistry Vol. 179* (by Anwender and Herrmann) may spot some similarities!

Kobayashi has contributed two chapters on lanthanide triflates in catalysis. The first reviews a wide range of Lewis-acid-catalysed C–C bond formations, including reactions in aqueous solution, some examples of highly enantioselective reactions, and re-use of the catalysts. A separate chapter reviews recent work (mainly by Kobayashi) on the use of polymer-supported lanthanide triflates which should lead to simpler work-up procedures.

One of the most spectacular successes in enantioselective catalysis by lanthanide complexes is the heterometallic alkali-metal lanthanide tris(binaphtholate)s prepared by Shibasaki. The present volume contains a chapter by Shibasaki telling the story of these remarkable catalysts from the first application (the nitroaldol reaction in 1992), before the catalysts had been characterized, through the structural characterization of the complexes, to the more recent (1998) application to the Diels–Alder reaction. There have been significant advances since the publication of a review by Shibasaki in *Angewandte Chemie* in 1997.

Two chapters describe aspects of the one-electron reduction chemistry of lanthanide(II) complexes. SmI_2 (Kagan's reagent) was introduced over 20 years ago and has become an important and very versatile one-electron reducing agent in organic synthesis. Kagan and Namy review the influence of solvents and additives on the reactions mediated by SmI_2 , a topic which, despite all that has been written on SmI_2 , had not been reviewed previously. Ketone reduction is an important aspect of lanthanide(II) chemistry and a chapter by Hou and Wakatsuki describes recent advances in the area, including isolation of complexes containing ketyl and ketone dianion ligands, which give mechanistic insight into the course of important reactions such as pinacol couplings.

Metallocene complexes of the lanthanides are perhaps best known for their catalysis of polymerization reactions. Stereospecific polymerization of olefins, methacrylates and lactones by these complexes is reviewed in a chapter by Yasuda. The use of metallocenes in synthesis of small molecules—hydrogenation, hydrosilylation and cyclization—is reviewed in a chapter by Molander. A common theme through both these chapters is the role of ancillary ligands in achieving the desired selectivity in synthetic reactions.

The book achieves its aim of giving an update of recent developments in the rapidly expanding area of lanthanides in organic synthesis. However, it should not be seen as a comprehensive account of this area, as well-established procedures such as the use of cerium(IV) in oxidation and the applications of organocerium reagents are absent. It will be of most value to researchers who already know something of the area and are looking for an update on the latest developments.

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Alkene Metathesis in Organic Synthesis Topics in Organometallic Chemistry, Vol. 1

A. Fürstner (ed.)

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The aim of the *Topics in Organometallic Chemistry* series is to present critical overviews of research in organometallic chemistry which is influencing organic synthesis, pharmaceutical research, natural products chemistry and biology, catalysis, polymer research and materials science. Each volume covers one topic. The target audience is academic and industrial chemists of graduate level and above. The volumes are written for both the specialist and non-specialist.

The term 'metathesis' derives from the Greek