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Book Reviews *

Principles and Applications of Asymmetric Synthesis. G.-Q. Lin, Y.-M. Li, and A. S. C. Chan. Wiley−Interscience: New York. 2001. 532 pp. £70.50. ISBN: 0-471040027-0.

There are many books on asymmetric synthesis but this work, by authors from the Hong Kong Technical University, is one of the most useful and comprehensive. After an initial introduction, chapters include alkylation of carbonyl compounds, aldol and related reactions, oxidations, reductions, cyclisation reactions, synthesis of natural products, and miscellaneous asymmetric syntheses (including enzyme reactions). Coverage of the literature is mainly to 1998 with some references to 1999.

The chapters provide well-produced summaries from the view of the synthetic chemist with occasional mechanistic interpretations when required. Lots of tables and schemes allow comparison of different reagents/ligands and so forth, but I would have liked to see important issues such as solvent effects given more emphasis. In fact on many reaction equations the solvent is not given.

The early chapters concentrate on auxiliary-based methodology, whereas the later chapters dwell much more on catalytic methods of interest to the industrial chemist. The excellent chapter on reduction methods focuses on asymmetric hydrogenation and allows a comparison of different methods, metals, ligands, and so forth. Subjects such as catalyst turnover number and frequency are rarely mentioned, however. The important issue of mass-transfer effects on scale-up of catalytic hydrogenation processes is also not included.

For the industrial chemist, there are brief mentions of industrial processes using asymmetric reduction, but details are not given, and the reader is referred to the original literature. In contrast, in the chapter on application of asymmetric reactions in the synthesis of natural products, 28 pages are devoted to the total synthesis of Taxol. A separate chapter on applications of asymmetric reactions to industrial processes would have nicely complemented the total synthesis chapter.

With a subject of such magnitude, it must be difficult to decide what to leave out, and there are subjects such as asymmetric phase-transfer catalysis and asymmetric transfer reduction which are only briefly touched upon.

The advantages of a book where the authors write all the chapters, compared to a work where an editor collates chapters by individual authors, are the consistency of writing and a uniformity which makes for easy reading. This is perhaps more important in a text which will be used in teaching, as this one certainly will.

The book is well-produced with only the occasional typo. The index (seven pages) is rather short and not very useful for such a comprehensive subject, and I found the contents pages more useful for finding out what I needed.

In summary, the volume is recommended reading for all chemists in process R&D involved in the design of processes for the manufacture of chiral molecules.

OP0200367

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Patent Strategy for Researchers and Research Managers, 2nd Edition. By H. Jackson Knight. Wiley & Sons Ltd.: Chichester. 2001. 220 pp. $105. ISBN: 0-471-49260-4.

Scientists entering industry for the first time will soon encounter a strange universe that operates in parallel to their own. In this strange world, those who seem to do no work are named on the publications, while the workers are often omitted. The objective of these disclosures seems to be to disclose as little as possible, while territorial claim-staking outweighs the description and solution of complex scientific issues. The language in which they are written appears to resemble English, but on closer inspection employs bewilderingly convoluted syntax and terminology foreign to the ear and eye. The predominant life form to be found in this world is a curious being known as the patent attorney. This is the strange world of intellectual property, and the disclosures are known as patents.

Those who are new to this world, as well as those who have picked up enough of the trade language to converse usefully with patent attorneys, will welcome the second edition of this book. Here Knight guides researchers and their managers through the basics of patent law, stopping along the way to shed light on various aspects of the endeavor while offering comments and observations drawn from his experiences.

Chapter one covers the basics of intellectual property, detailing pertinent aspects of the patenting process, comparing and contrasting practices in different nations, and touching on various recent patent law treaties and their implications. Following a brief chapter on patent value that corrects some common misperceptions concerning patents, a lengthy and useful chapter on strategic considerations follows, invoking a military model to illustrate analogous aspects of legal warfare for intellectual property. In this chapter different scenarios are played out for situations involving single patents, patent families, licenses, and adverse patents.

Several chapters that follow handle various topics in no particular order, dealing with incorporation of patent possibilities when designing and conducting research (Chapter 4), determination of freedom to operate (Chapter 5), and recommendations for dealing with professionals in the

*Unsigned book reviews are by the Editor.

intellectual property field (Chapter 6). Two final chapters deal with filing, disclosure, and post-filing actions.

Overall, the work serves as a useful introduction to intellectual property and brings out many interesting facets likely to be unknown to the researcher or the manager. Knight appears particularly effective when describing the human element, helping researchers understand the attitudes and objectives of patent attorneys, which frequently seem to be at odds with those of the researcher but are usually aligned with the company's best interests. The chapter on researching with intellectual property in mind reveals an understandable if unfortunate distance of perspective and accomplishes little beyond introducing the concept. More discussion on the subtle and not-so-subtle differences between peer-reviewed publication and patents would be especially useful for both researchers and managers, as the underlying assumptions in this area can usually be counted on to generate friction.

One limitation of any book attempting to broach this topic is the wide swath of research going on in intellectual property-driven enterprises. Knight draws from his own experience in the polymer and plastics field, where process patents are key, but has less to say in other areas of research involving intellectual property such as pharmaceuticals or flavors and fragrances. Each of these arenas places a different emphasis on patents, from full and complete reliance on them to their complete avoidance. A spectrum of possibilities permitted by the triple considerations of publications, patents, and trade secrets could be illustrative of the different business situations encountered and perhaps find broader value among more researchers and managers.

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OP0255377

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Dust Explosion Prevention and Detection: A Practical Guide. Edited by John Barton. Institute of Chemical Engineers: Rugby, UK. 2002. 366 pp. £90. ISBN 0-85295-410-7.

The Institute of Chemical Engineers in the United Kingdom publishes a number of guides, which are compiled by experts in the field. The latest is a complete revision of the older three-part work, dating from 1985 to 1992, which has been updated to include current best practice and new regulations.

The recommendations presented in the guide provide a basis for best practice in explosion prevention and for protection of plant and processes where dust explosions could occur. The work is aimed at those involved in design and operation of plant and thus will mostly be of interest to chemical engineers. Chemists, however, are strongly encouraged to read early chapters on determination of dust ignitability, flammability, and explosibility characteristics, control of ignition and inerting. The later chapters on explosion containment, explosion suppression, and explosion venting will be of lesser interest to chemists.

This is—as with all books in this series—an outstanding guide, the emphasis being on practicality and on the selection of an appropriate basis of safety. To assist in this assessment, logic diagrams at the end of each chapter are provided.

Six appendices are provided, the first describing incidents, most of which relate to nonchemical (e.g., food, electronics, mining) industries. The others cover legislation (U.K.), descriptions of explosibility apparatus, dust fires, and explosion speed calculations and venting.

A copy of this volume should be in the library of all companies handling solids which can give rise to dusts with the potential for dust explosion.

OP020041A

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Pharmaceutical Substances: Syntheses, Patents Applications, 4th Edition. (2 Volumes). A. Kleeman, J. Engels, B. Kutscher, and D. Reichert. Georg Thieme Verlag: Stuttgart. 2001. 2521 pp. 599 Euros. ISBN: 3-13-558404-6.

It does not seem so long since the 3rd edition of "Kleeman and Engel" appeared and was reviewed in the journal. In fact this edition was such a success that within 18 months it was sold out. I am not surprised—this unique work provides a vast amount of information, particularly useful to the organic process chemist, on synthetic routes to pharmaceuticals. The drugs could be on the market, in development, or even ones that, for various reasons, failed in development.

The authors have taken the opportunity to add a further 100 entries, making a total of 2267 active pharmaceutical ingredients, and this has meant that the original single volume work has had to be split into a more manageable two volumes. For example, the new entries include the Cox-2 inhibitors Celabrex and Vioxx.

For those who have not come across this compendium, each entry for the drug contains information on INN name, generic names, Chemical Abstract name, CAS registry number, EINECS number, formula and MW, and acute toxicity data. Synthetic routes are given with references to the literature (mostly patents), followed by dosage forms, trade names, and the year of introduction. The patent coverage is extensive and includes the original patents along with patents for alternative processes from the originator and generic companies.

The indices cover more than 300 pages and include trade names, intermediate (formula and CAS number given along with all drug syntheses which use it), enzymes, microrganisms and so forth, and chemical substance class index.

No fine chemical or pharmaceutical manufacture can afford to be without this outstanding compilation. My third edition has been very well used, and the fourth edition will be even better. Large companies should buy several copies!

Highly recommended!

OP0200423

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Sittig's Handbook of Toxic and Hazardous Chemicals and Carcinogens, 4th Edition. R. P. Pohanish. Noyes/William Andrew Publishing: Norwich, New York. 2002. 2608 pp. $495. ISBN: 0-8155-1459-X.

The fourth edition of the classic reference book now includes data on 1500 heavily used and regulated chemical substances. For each chosen substance—and some would question the choice of the 1500 inorganic and organic compounds—the following data are listed; CAS number, molecular formula (but no diagramatic structural formula), synonyms (occasionally in Spanish and even in Polish), regulatory ID numbers (DOT, RTECS, EINECS, RCRA, and EEC), exposure levels, chemical incompatibilities (but not as good as Bretherick), air and water standards, monitoring methods (although not in enough detail to carry out without further reference), routes of exposure, symptoms and biological effects (both short and long term), first aid medical advice and protection methods, storage and shipping information, fire response and extinguisher selection information, disposal methods and environmental restriction, and much more.

The new edition is double the size of the previous edition and is the reference work of choice when compiling data sheets. The information is easy to locate with the chemicals being arranged in alphabetical order of common name. Appendices include a synonym index (some of the names are rather obscure, such as hexyl hydride for hexane!), lists of oxidising materials (including ammonium chloride!), a carcinogen index (180 entries), a glossary, and a reference number cross index.

The reference book is valuable for data about inorganics, simple organic compounds, pesticides, and simple drug substances but has little information on more complex compounds. Thus, chloropropionic acid (or its corresponding acid chloride) that are important chemicals used in the manufacture of phenoxy herbicides are not listed. The focus is on "regulated" chemicals, and thus the book is aimed at safety, health, and environmental specialists, rather than practicing chemists.

Nevertheless, this is an excellent source of information on basic chemicals.

OP020043V

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Scale-up in Chemical Engineering. By Marko Zlokarnik. Wiley−VCH: Verlag, Germany. 2002. 219 pp. 109 euro. ISBN 3-527-30266-2.

Dimensional analysis and its application is the subject of Marko Zlokarnik's book entitled *Scale-up in Chemical Engineering*. This book is intended to fill the gap in a field which the author admits has "gained only modest acceptance in chemical engineering". Dimensional analysis is useful in finding dimensionless mathematical groups to describe the behavior of a chemical/physical system. However, theoretical or experimental data are still required to determine how the dimensionless groups are related. Readers from academia and industry alike who are engaged in describing multivariate datasets should find utility in this book.

Zlokarnik does an effective job presenting the process by which dimensional analysis is applied to physical problems in chemical engineering science. Methodology to the approach is covered in the first seven chapters, while the remainder of the book covers a broad range of chemical engineering examples.

The derivation of the relationship between flow in smooth pipes (i.e., the classic example relating Reynolds number with friction factor) is presented in Chapter 3 to illustrate the value of dimensionless analysis. Chapters 4 through 7 provide more details on how to apply the approach to scale-up, with many examples taken from the literature. Cited references, predominantly from sources in English or German, are listed at the end of the book on pages 211−215 and include titles.

Chapter 8 is dedicated to the treatment of variable physical properties using dimensional analysis with examples from fluid mechanics with Newtonian and non-Newtonian fluids. Describing viscosity gradients induced by thermal gradients or changes in shear rate with non-Newtonian fluid flow are some of the examples covered.

Chapter 10 discusses typical problems and mistakes in the use of dimensional analysis approaches with pertinent examples taken from stirring and mixing technology, and it provides a nice review procedure for ensuring the correct approach is used. Additional mixing examples are discussed in Chapter 11 such as characterizing and optimizing conditions for achieving homogenization in liquid mixtures.

An abundance of good examples from fluid flow, mixing, heat transfer, reaction engineering, and the "living World" are presented in Chapters 12−15. Highly complex scale-up problems, however, like those in semi-batch crystallization and precipitation processes were not explicitly covered.

In general, some basic knowledge of matrices may prove helpful in following the approach presented in the early chapters. Those not interested in the principles of dimensional analysis and the process for applying it per se should still find utility in the examples presented with descriptions of variables (and dimensionless groups) for many common scale-up problems encountered in Chemical Engineering. In general, Zlokarnik's book is an excellent addition to the libraries of engineers involved in analyzing experimental data for the purpose of scaling up chemical processes.

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