tives of lithium, magnesium, silicon, germanium and tin with difluorine in the review by Hutchinson and Sandford in the same volume also should not be overlooked. What a pity, though, that these authors did not include any information on radiolabelling of organic substrates with $[^{18}F]F_2$ or further encourage the use of F_2 as a selective fluorinating agent by providing concise *practical* advice for beginners on how to procure, manipulate safely, and dispose of the element in a laboratory setting.

Overall, the reviews in both volumes are up-to-date, well written and presented, and replete with references. Inevitably typographical errors exist but 'real' chemical errors are rare and will not mislead alert readers. Obvious chances to provide cross references between reviews have not been taken.

Each volume is reasonably priced by today's standards and represents a valuable addition to *Topics in Current Chemistry*, a series which all good chemistry libraries ought to collect. Organofluorine pundits surely will strive to afford both volumes for their personal use or to persuade their institutions/companies to hold copies. Importantly, these books are a good source of information for those who teach organic chemistry at college or university level but whose lectures do not yet reflect the importance of fluoro-organic chemistry in everyday life and the wealth of scholarship involved. Consultation of the review by Hutchinson and Sandford in Volume 193 is a 'must' for those still propagating the myth that direct fluorination of organic substrates is not a synthetically useful reaction.

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PII S0022-328X(98)00602-0

Advanced Practical Inorganic and Metallorganic Chemistry, R.J. Errington, Blackie, Chapman and Hall, London, 1997, pp. 228, £24.99, ISBN 0 7514 0225 7

All supervisors of students beginning research on the synthesis and characterisation of organometallic compounds will be familiar with the questions which this book seeks to answer. Most people find that there is a gigantic step between undergraduate practical chemistry where experiments are well-tried (and students' inexperience or incompetence can usually be blamed when they do not work) and experiments which have never been done before. Since research in inorganic and organometallic chemistry is usually undertaken by groups of students and post-doctoral assistants working together, the step between undergraduate practical work and research is usually made with the assistance of co-workers who are more experienced. As John Errington acknowledges in his opening chapter, there is no better way of learning the many tricks that turn an unsuccessful synthesis into a successful one.

However, not all inexperienced research workers have colleagues to help them and those who do may find there is a limit to the extent to which they can pester others. Moreover, know-how is lost when experienced workers leave as is inevitable and necessary in university laboratories. These are the considerations which have led to this book. The style is informal: the reader is addressed as 'you' and the writer does not hesitate to express personal opinions, e.g. 'I think…' or 'we use…' Abbreviations such as 'don't' or 'postdoc' are freely used. Books of this kind, for beginners in research, have been written before, but times change, new equipment, techniques and starting materials become available, and university research budgets become ever tighter. A book which takes account of present-day conditions is especially valuable.

The range of topics covered can be seen from the chapter headings: preliminaries (the laboratory, literature, keeping records, safety), bench-top techniques, glove boxes, high vacuum lines, solvents and reagents, reactions in solution, reaction work-up (isolation, purification and storage) reactions between a solid and a gas, reactions between solids, product characterisation (spectroscopic techniques, mass spectrometry, microanalysis and molecular weight determination, growing crystals for X-ray diffraction), special techniques (electrochemical techniques, thermal analysis, high pressure reactions, sonication, microwave heating, special solvents, matrix isolation, metal vapour syntheses) and preparation of starting materials. This last chapter provides references to the places in *Inorganic Syntheses* where preparations of many substances used in inorganic or organometallic chemistry are described. There are five appendices which contain valuable tabulated information on health and safety, deoxygenation columns, solvents, NMR solvents (including spectra of common impurities!) and gases. Some of what is included is common sense but it is immensely valuable to have it written down. How many students think through an experiment before they begin it, keep accurate and legible records, or lose valuable samples by careless manipulation?

This book should be read by all undergraduate project students and new graduate students working on inorganic or organometallic chemistry, Even the most experienced researchers will find tips for improving their techniques and much useful advice. There can be quibbles about what has been included and what left out but these are minor. The index could be improved. John Errington says somewhere that the successful researchers are those who enjoy making and isolating new compounds. His own enthusiasm is beyond ques-

tion and it comes through in every chapter. Let us hope that he is still going strong when this excellent book itself gets out of date and a new edition is required.

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PII S0022-328X(98)00612-3

Synthesis of Organometallic Compounds A Practical Guide, S. Komiya (Ed), Wiley, Chichester, 1997, pp. 442, £65 hbk, ISBN 0471 97070 0, £29.95 pbk, ISBN 0471 97195 2

This book consists of four introductory chapters by the editor covering the fundamentals of organometallic compounds, ligands, and the manipulation of air-sensitive compounds, and 13 chapters by other Japanese authors on the organometallic compounds of groups 3-12, 1, 2, 13 and 14 of the Periodic Table. The chapters on specific groups have a common pattern consisting of a general account of the synthesis of organometallic compounds followed by procedures and practical details for the syntheses of individual compounds.

The preface states that 'This textbook is intended for undergraduate students starting organometallic chemistry and researchers who want to use organometallic compounds, but are not professionals in organometallic chemistry'. It may be that the teaching of chemistry at university level is structured differently in Japan but I am not sure that this book, which undoubtedly contains a lot of useful information, fits very well into the pattern in many European or North American universities. The introductory chapters describe some of the jargon of organometallic chemistry, e.g. the 18-electron rule, agostic interactions, *trans*-effect and -influence, fluxionality, oxidative addition, reductive elimination and insertion, in an admirably concise way but with a breathlessness that could overwhelm many undergraduates. A wide knowledge of general chemistry (e.g. HSAB, Taft σ^*, stability constants) together with a good grounding in inorganic chemistry and an even stronger one in organic chemistry, are assumed. The chapter on experimental methods is illustrated with simple diagrams but I am not sure that the techniques described could be made to work with really air- and moisture-sensitive materials without a good deal of further help from practitioners or more detailed texts. Similar points can be made about the group-by-group chapters. The summaries of the organometallic chemistry of the groups are fine, but are the syntheses of individual compounds, many of them quite tricky to manipulate, really adequate? The details of techniques are fuller than those commonly given in research papers but they are not as comprehensive as those in *Inorganic Syntheses* and there are no diagrams in these chapters. The references seem to be reasonably complete. The transition metal groups have been covered in greater detail than the main groups but in both sections the selection of individual compounds seems rather arbitrary. Are they intended to be the most important (with greatest potential for development by researchers), examples for students (which work reliably in inexperienced hands) or simply those with which the authors are most familiar?

Perhaps the readers most likely to find this book useful are those with first hand research experience, especially in organic chemistry, who wish to use organometallic compounds as synthons. They will find the detailed accounts of the reactions of organometallic compounds with organic substrates useful and have the laboratory experience and skills to benefit from the sections covering experimental methods.

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PII S0022-328X(98)00613-5

Molecular Symmetry and Group Theory, R.L. Carter, John Wiley, New York, 1998, pp. 299 + x, £17.99 (paperback), ISBN O 471 14955 1

For all the power of symmetry arguments, how best to introduce molecular symmetry and group theory is still a teasing problem to which no universal answer has been found. Many chemical texts now include group theory, but usually so briefly as to be of little help to the novice. Primers specifically devoted to group theory certainly exist—Cotton's *Chemical Applications of Group Theory* is an admirable example—but, whether for reasons of logical development, mathematical satisfaction or over-elaboration, presentation, or scope, none seems to this reviewer to provide the ideal treatment.

Now comes a new challenger. In a clearly written style Robert Carter aims to show the evolution of the ideas underpinning symmetry and group theory and to demonstrate the pivotal role of these ideas in relation to chemical problems of structure, bonding and spectroscopy. The core of the subject matter is presented in the first four chapters entitled, respectively, Fundamental Concepts, Representations of Groups, Techniques and Relationships for Chemical Applications, and Symmetry and Chemical Bonding; these span nearly half