

Book Review

***Direct Synthesis of Coordination and Organometallic Compounds*, Edited by A.D. Garnovskii and B.I. Kharissov, Elsevier Science, Lausanne, 1999. ISBN 0-444-72000-6; GB£97.29, DM310.63, US\$177.5, Euro158.82.**

This text would make a valuable addition to the library of any department that has an interest in less conventional synthetic inorganic methods, or advanced aspects of co-ordination chemistry. A range of, often ignored but generally easily used, synthetic strategies are presented in well-edited chapters that read easily, and contain good summarising tables of examples. The chapters all follow the same format, and each author includes individual experimental case studies that give an excellent 'nuts-and-bolts' description of examples of each reaction type. The only exception from this is the lengthy theoretical description of the technique given at the beginning of chapters two and three. The other two chapters would benefit from this treatment.

The first chapter covers cryosynthesis, namely co-condensation of a metal and an inorganic or organic vapour over 10–543 K temperature ranges. Much attention is paid to microscale matrix-isolation syntheses, and micro- and macro-scale experiments are juxtaposed. Whilst this allows for easy comparisons between the techniques, the distinction between isolable and thermally unstable complexes that have been synthesised is not always obvious. The unusual high temperature macroscale metal particle/aerosol ligand syntheses of metal β -diketonate complexes are also covered. Since the field of cryosyntheses is now relatively large, the chapter does suffer from a limited treatment of recent North American and European research. However, the coverage of less readily accessible literature makes interesting reading.

Chapter two describes electrochemical synthesis as a preparative method, and carefully summarises the concepts behind the technique, and its advantages — including the cost of electrons. The issues of scale-up, such as the limitations of maximum cell current and the use of cell membranes, are well explained. The diagrams of different cell set-ups are suitably informative. The chapter also contains good tables and some inter-

esting synthetic details, although unfortunately, the first experimental example of this 'clean, mild technique' produces an impure product as judged by CHN elemental analysis. The extensive coverage of chelate complex chemistry includes a good example of template synthesis and an interesting discussion of competitive co-ordination, whilst the limitations for π -ligand systems are noted.

In chapter three the kinetics of dissolution of metal oxides and of metal particles in solvents or solutions are given a thorough theoretical treatment. The chapter then unfolds into an interesting treatise on an unusual and elegant method for generation of new synthetic inorganic architectures, unconstrained by predefined co-ordination geometries. Techniques such as these must surely be investigated in the search for control of supramolecular structures from defined inorganic building blocks.

Chapter four is concerned with mechanosynthesis and the differences between statically and mechanically activated solid systems. The industrial importance of tribochemical reactions to friction and lubricant technologies is highlighted but the details of relevant research are only briefly discussed. In contrast to the other chapters, the technique is presented to the reader as something of a black art, and the material covers some rather unusual synthetic examples, including a mechanical synthesis of copper complexes using bronze as part of the friction pair. I was surprised not to see the tribosynthesis of metallocenes mentioned in this text.

Overall the book suffers a poor account of Western European and North American research, since the coverage of this is far from up-to-date. However, this is compensated for by the spread of examples and excellent treatises on previously inaccessible research from some countries of the former Soviet Union.

Polly L. Arnold
School of Chemistry
University of Nottingham
Nottingham
NG7 2RD, UK
E-mail: polly.arnold@nott.ac.uk