Book Review

Edited by NINA HALL

The new chemistry

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This very novel book consists of an introduction followed by 17 chapters with a total of 32 authors. The short introduction by the Nobel Laureate R. Hoffman probably reflects his interest in poetry. I doubt if any chemist could claim familiarity with all the topics covered in this book; they range from organic, inorganic and physical chemistry to biochemistry. A number of the chapters are devoted to material appropriate for undergraduate chemistry students and, in general, the historical development of the topics sets the background for the recent advances; some even include small, but clear, photographs of the prime chemists involved, e.g. Pauling and Mendeleev. Undoubtedly, postgraduates would find many of the chapters stimulating, including 'The Inorganic Chemistry of Life', though it makes assumptions about one's background knowledge.

Chapter 1 on 'The Search for New Elements' gives a very good perspective view of the subject, including nuclear reactors. The section on the role of microwaves and ultrasonics in chemical synthesis is well illustrated: e.g. the formation of propyl benzoate is some 40-fold faster using microwave heating in a Teflon vessel than by a conventional reflux procedure. The time factor in synthetic experiments is of extreme importance in relation to studies of drug metabolism by incorporating a site or sites labelled with short half-life radioactive atoms. Many ceramic materials undergo transformation at high temperatures (>1200 °C); when this is carried out using microwaves the material is heated from its centre rather than its surface, with interesting results.

Organometallic chemistry features in Chapter 4 on 'Novel Energy Sources' where ultrasonic-induced reactions have been employed in the synthesis of metal carbonyls, and their alkynyl and cyclopentadienyl derivatives. In addition, Chapters 8, 9 and 10, which are devoted to complex organic syntheses, include β-hydride elimination from Pd(II) reaction intermediates, the role of Pd(0) complexes in the formation of carbon–carbon bonds and the use of tributyltin hydride in organic synthesis.

Chapter 5 on 'What, Why and When is a Metal' is quite outstanding, both historically and in relation to high-temperature superconducting materials. Almost 30 years ago it was discovered that a 1:1 complex of tetrathiafulvalene and tetracyanoquinodimethane possesses metal-like electrical conductivity. Although *trans*-polyethyne is an electrical conductor, it is only after exposure to an oxidizing agent, such as iodine, that its conductivity becomes 'metallic'. The story concerned with the possibility of dihydrogen becoming metallic at very high pressure (3×10 atm) makes interesting reading.

Chapter 7 on 'Surface Chemistry' includes excellent illustrations of tribology, i.e. friction, sliding, lubrication and wear of surfaces in contact with each other. Other chapters deal in a most interesting way with subjects such as the storage of electrical energy and the development of semiconductor materials. The final chapter on 'Chemistry in Society' deals with the social impact of industrial chemical processes, and includes legislation introduced over many years to limit gaseous and other toxic by-products.

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