

Book Reviews

Synthetic Organic Photochemistry

edited by W. M. Horspool; published by Plenum, New York, 1984; 534 pp.; price, \$75

Many useful reviews of various aspects of organic photochemistry are available, but the need exists for books which deal specifically with the use of organic photoreactions in synthesis. The stated aim of this book is to introduce "newer and superior methods" of organic synthesis to chemists. Areas of current interest with synthetic potential have been selected and "where possible" the synthetic value of the reactions has been highlighted. Although this book is without doubt an important literature source for the topics selected, its value will depend to some extent on how well the above aim is fulfilled.

The book contains chapters on photoaddition and photocyclization of aromatic compounds, enone photochemical cycloaddition in organic synthesis, synthetic aspects of electron transfer reactions, phthalimide and its derivatives, photochemical addition reactions in the benzo[*b*]thiophene, benzo[*b*]furan and indole series, azirine photolysis and cycloaddition reactions, photoremovable protecting groups, photochemical synthesis of oxetans, and equipment and techniques.

Coverage of the literature, up to the period 1981 - 1983, is extensive, with a total of 1477 references. Such a coverage of all areas of synthetically useful organic photochemistry in one volume would be somewhat impracticable, hence the decision to opt for selectivity. Topics *not* included are, for example, electrocyclic reactions of olefins, hydrogen abstraction and cleavage reactions of ketones, free radical addition to alkenes, photoextrusion of small molecules, and singlet oxygen photo-oxygenations. The latter, in particular, seems a surprising omission from a text on synthetic organic photochemistry.

Treatment of the subject matter varies in style from chapter to chapter. This is shown, for example, by the difference in emphasis placed on the mechanism of the photoreaction or on its value in synthesis, and the extent to which product yields are quoted (infrequently or regularly). The approach adopted varies from a discussion centred more on the photoreactivity of the starting material to one in which the application to synthesis predominates.

This book does provide excellent reviews of various photochemical reactions. The first chapter reveals what to some readers may be a relatively new type of aromatic chemistry. This is followed by a fascinating account of the use of enone photoadditions in synthesis, mainly of natural products.

Study of the chapter on electron transfer reactions is likely to aid recognition of such reaction pathways and lead to an appreciation of these processes as synthetic routes. Elsewhere the non-photochemist may find much that surprises and is of interest.

The standard of presentation varies a little from chapter to chapter but it is generally very good and the text is illustrated with clear diagrams. Errors are infrequent, which testifies to careful editing.

Whilst the absence of some topics may disappoint, the book is nevertheless to be recommended for its excellent coverage of the subject matter.

J. HILL

Advances in Quantum Chemistry, Vol. 17

edited by J.-L. Calais; published by Academic Press, 1985; 344 pp.; price, £89.00

The series *Advances in Quantum Chemistry* began in 1964, and volumes have been published at approximately yearly intervals since that date. This volume continues the tradition of the series in that it is not confined to a single area but instead provides a set of reports on the current state of selected areas of quantum chemistry. The main part of the volume comprises two long chapters each of about 100 pages, the first dealing with some general problems in theoretical chemistry and the other with the theory of diatomic interactions. The remainder of the book (about one third of the total) comprises three short reviews on approaches to electron correlation in extended systems, the conductivity of certain conjugated polymers and the connection between the hamiltonian and liouvillian formalisms in the quantum theory of matter.

The first chapter, by G. LeRoy, starts with a general study of the electronic structure of molecules, in which an attempt is made to find a quantum mechanical interpretation of the Lewis and Linnett theories of chemical bonding. There then follows a section on the calculation of thermodynamic properties of molecules in which the concept of strain energy is developed and applied to substituted hydrocarbons. In the final section of this review certain aspects of 1,3-dipolar cycloadditions and cycle-chain isomerizations are considered, the emphasis being on the changes in geometry and electronic structure of the supermolecule along the reaction path rather than the energetics of the reaction.

The next chapter, by E. S. Kryachko and T. Koga, presents a comprehensive review of diatomic interaction theory. The authors' concern for completeness occasionally results in the inclusion of rather familiar work which is adequately covered in numerous other reviews of this topic — the simple coverage of the RKR method, for example, adds little to a review of