

Realm of pericyclic reactions

C. W. Bird

Organic Reactions and Orbital Symmetry. By T.L. Gilchrist and R.C. Storr. Second edition. Pp.311. (Cambridge University Press: Cambridge, 1979.) Hardback £25; paperback £8.50.

THE application of the concept of conservation of orbital symmetry in concerted reactions has had a profound effect upon the development of organic chemistry since its independent enunciation in 1965 by the late R. B. Woodward and R. Hoffmann, and H. C. Longuet-Higgins and E. W. Abrahamson. Not only did the concept facilitate the rationalisation of much knowledge, but more importantly it proved to have considerable predictive capability. The first edition of this book in 1972 provided a timely exposition of the rapidly expanding area, following hard upon the heels of the proselytising 'little blue book' of Woodward and Hoffmann with its peremptory claim "Violations. There are none!".

The reader of this most welcome second edition will search in vain for the dénouement usually visited upon such seeming arrogance by Murphy's Law. He will, however, find a lucid account of the

theoretical origins and multifarious applications of this concept. A resumé of the chapter headings provides a guide to the topics covered: classification and investigation of reaction mechanisms (20 pages); theory of concerted reactions (23); electrocyclic reactions (26); cycloadditions: introduction (36); cycloadditions and eliminations involving six electrons (57); other cycloadditions (69); and sigmatropic rearrangements and related reactions (63). While providing in a largely non-mathematical form accounts of the various alternative approaches to the underlying theory, stress is now placed upon the particular merits of the frontier molecular orbital approach. However, as might be expected of practising experimental chemists, the authors have emphasised throughout the synthetic applications of these pericyclic reactions. They have also succeeded admirably in their intention of providing a perceptive up-to-date introduction to the subject rather than an exhaustive survey, although extensive references to other books, review articles and original papers are provided for those requiring further information.

Like its predecessor this book provides an excellent introduction to the realm of pericyclic reactions, and can be unhesitatingly recommended to both neophyte and pedagogue. □

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Laser speckle

T.S. McKechnie

Laser Speckle and Applications in Optics. By M. Françon. Pp.161. (Academic: New York, London and San Francisco, 1979.) \$16.

THIS book gives a concise, well ordered account of the origin and nature of speckle and of how it can be applied usefully. There are many illustrations in the book (158 in total), and with an absence of all but the most trivial mathematics, it makes pleasant and comfortable reading. The book has ten chapters, each broken into about six sections.

Chapter 1 begins by considering the image of a point source, and from this very humble starting point it progresses to deduce the image of many point sources, that is, a speckle pattern. Chapters 2 to 5 consider the effects of changing some of the variables which govern the speckle patterns. In addition to many more, consideration is given to such things as changing the plane of observation of the speckle pattern and changing the orientation and wavelength of the illumination. To one who might regard speckle patterns as being random and

ungoverned by sensible laws, the results outlined in these chapters will come as a pleasant surprise. There are many ways in which speckle patterns behave simply and predictably, and the author has brought this out very clearly. The material comprising these chapters forms a basis for the applications which are dealt with in the remaining chapters.

Image processing is considered in chapter 6 and, along with several others, techniques are described for extracting the difference between two images, as are techniques for coding and decoding images. Chapter 7 is concerned with the study of displacement and deformation using speckle patterns. Chapter 8 concerns speckle in astronomy and the elegant method of Labeyrie for gaining diffraction limited performance from the largest telescopes. Chapter 9 deals with the measurement of surface roughness and Chapter 10 deals with various other applications of speckle patterns which do not fall within the previous categories.

The book presents a simple concise account of the subject. Researchers will find it very useful as a book for first reference; and, for those who wish to go deeper into the subject, an extensive list of references is given. □

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