

Book Review

Introduction to Molecular Photochemistry, by C. H. J. Wells; published by Chapman and Hall, London, and Barnes and Noble, New York, October 1972; pp. xii + 146; Price: £ 1.70.

This little book, produced in limp binding, is written primarily to present the principles of molecular photochemistry in a form suitable for undergraduate students new to photochemistry and electronic spectroscopy. The introductory chapter describes briefly the properties of electromagnetic radiation and the relationship between absorption spectra and photochemistry. The second chapter develops the concepts of electronic transitions and absorption spectra, and the third discusses electronically excited states and their properties. The fourth chapter deals with the kinetics of intramolecular and intermolecular processes originating from excited molecules, and concludes the "physical chemistry" part which altogether comprises 87 pages. The last two chapters (52 pp.) deal with "organic photochemistry".

I found no serious fault with the book, considered as an introductory text. Two general points worth noting: first, almost no mention is made of inorganic photochemical reactions, and although this reflects the enormous amount of research on organic photochemistry during the last decades, it could leave the student with the impression that photochemical reactions are restricted to compounds of carbon. Secondly, among the list of recommended textbooks one dealing specifically with fluorescence and phosphorescence might have been included.

The organic photochemical reactions are dealt with in a systematic manner which simplifies the assimilation of the wealth of reactions of this type now known. Thus Chapter 5 deals with reactions of excited states under the headings Photo-reduction, Photodimerisation, Photo-addition, Photo-oxidation, and Photorearrangement. Chapter 6 covers Photofragmentation and related reactions in various types of compound.

There are some minor criticisms. Thus cm^{-1} is still recommended as a unit of wave number, although cm is no longer a preferred metric unit, and in electronic spectroscopy the values in this unit are inconveniently large. For these reasons, μm^{-1} is better. A diagram—by no means self-explanatory—is given of the benzene orbitals but no explanation is given in the text. Data (p. 41) given to support the contention that the relative rate of intersystem crossing is greater for small values of ΔE (S_1-T_1) are misleading. For example, benzophenone is quoted as an example of low ΔE for which intersystem crossing efficiency is unity. In fact this is due to

the nature of the lowest excited singlet state. Inclusion of dyestuffs (for example fluorescein) in the table would certainly not have supported the contention because many of them have very much smaller values of ΔE and yet high fluorescence efficiency. The method of dealing with the kinetics could in some cases be confusing or misleading. For example, it is stated that the rate constant for intersystem crossing indicates whether the molecule is likely to react in the triplet state. In fact it is the value of triplet formation efficiency that is directly relevant.

In spite of these and other minor criticisms the book is strongly recommended as an introduction to the photochemistry of complex molecules.

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