

diazo compounds *in situ* which decompose carbenically to products^{2b} is frequently of limited preparative value. The yields may be poor, the system must be aprotic,^{2b} and the hydrocarbons may be difficult to separate from the solvent, particularly in small-scale experiments.⁷ It has been found that pyrolysis of dry salts of *p*-tosylhydrazones at reduced pressures (100–760 mm.) in distillation equipment is often of real advantage in effecting their carbenic decomposition to intramolecular products. At appropriate pressures and thermolytic

(7) (a) Metal alcoholates may cause complication in that the alcohols generated in formation of salts of the *p*-tosylhydrazones can lead to cationic decomposition of the intermediate diazo compounds. *N*-Methylpyrrolidone as a solvent when using metal alcoholates as bases frequently allows decomposition of the *p*-tosylhydrazones to intermediate alkyl *p*-tolylsulfonates which are saponified or transesterified to alcohols. (b) Similar observations have been made by J. W. Wilt and C. A. Schneider, *Chem. Ind.* (London), 865 (1963).

temperatures, the diazo compounds formed *in situ* decompose in the liquid and/or gaseous states to give products in good yields. The techniques are simple, rapid, free of many complications, and adaptable to small-scale experimentation. The method has been satisfactorily extended to injection in gas chromatographs of salts of tosylhydrazones as a dry powder or in suspension in a hydrocarbon; thermolysis is subsequently effected in a clean, heated injector unit and the products are separated, analyzed, and collected by usual techniques.

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Book Reviews

Spectra-Structure Correlation. By JOHN P. PHILLIPS, Department of Chemistry, University of Louisville, Louisville, Ky. Academic Press, Inc., 111 Fifth Ave., New York 3, N. Y. 1964. ix + 172 pp. 16 × 26 cm. Price, \$6.00.

As stated by the author in his preface, "The principal novelty of this book is its attempt to present a balanced survey of the data of absorption spectroscopy for organic compounds in all regions of the spectrum from far ultraviolet to far infrared." I believe that this is an excellent idea and it is indeed astonishing that until 1964 nobody seems to have undertaken the writing of a book of this type. The other surprising fact about this book is that it is so short. There is the other great merit of the author: he recognized the fact that, where analytical or other diagnostic work in spectroscopy is concerned, only relatively few correlations can be used for actual structure determination, the great majority of available data having little more than fingerprint value.

The reader whom this book will interest is clearly the chemist who uses the spectra as a tool, not the theoretically minded spectroscopist. It covers the spectra from 175 m μ to 35 μ , the range which is readily accessible to commercial instruments. The book is written in a vigorous personal style; nowhere does it become dull as so many other scientific books do.

The extreme brevity of the text (at places it is almost telegraphic) has not only advantages. Certain concepts such as the oscillator strength or "the cross-sectional area of the absorbing species" are literally parachuted into the text. On page 3, the inexperienced reader may get the impression that sodium chloride prisms can be used in the 16–18 μ area. On page 11, one may be led to believe that cumulative systems have stretching bands above 2000 cm.⁻¹ only. On page 12, symmetric and asymmetric bending frequencies are mentioned in relation with nonlinear XY₂-type molecules while there is only one bending (scissoring) vibration in this case. The out-of-plane bending vibrations of olefins are really treated too shortly (p. 40).

Even at such places, however, the work remains highly informative. Even though many things are not explained, almost every thing is at least mentioned, and good entries to the literature are given. On pages 13 to 19, a highly useful list of books and review papers is given. Many of the latter are not widely known. Only the absence of a somewhat larger number of "old" references in the text may be regretted. Concerning units, it would have been good, in the reviewer's opinion, to give both μ (or m μ) and cm.⁻¹ in characterizing the spectral location of bands. This may be cumbersome, but it is probably the only satisfactory solution in the present confused situation. It is somewhat unpleasant to be given the spectral location of a fundamental in cm.⁻¹ but that of its overtones in μ .

Summing up, it is rather nice to have spectral information for most typical organic compounds in only 160 pages covering the ultraviolet-visible, the near infrared, and the infrared, and even part of the far ultraviolet and the far infrared. I think that Dr. Phillips succeeded in writing something that will be useful for many. It may even encourage someone to write a book which will cover n.m.r. as well.

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The Cyanine Dyes and Related Compounds. By FRANCES M. HAMER, Formerly Research Chemist, Kodak Ltd., London, and Honorary Lecturer, Imperial College of Science and Technology, London. John Wiley and Sons, Inc., 605 Third Ave., New York, N. Y. 1964. xxxvi + 790 pp. 16 × 23.5 cm. Price, \$45.00.

A considerable body of work dealing with the cyanine and related dyes, including hundreds if not thousands of patent specifications, has issued over the years, particularly during the last three decades.

The cyanines are of special interest for several reasons. More than most dyes, they lend themselves to almost limitless structural variation, as a result of which they present by far the most diverse assemblage of absorption spectra (and hence of colors) of any known dye series. They are polymethine dyes, and in the sym-

metrical benzothiazole series $A=C(-C=C)_n-A$, where A represents the appropriate forms of the benzothiazole ring, dyes have been prepared where $n = 0, 1, 2, 3, 4, 5,$ and 6 . Since each successive increase in n has the effect of shifting the absorption maximum by about 100 m μ toward longer wave lengths, the extraordinary range of absorptions of this one series can be imagined.

On the practical side, the cyanines, with certain exceptions, are generally too fugitive to be useful in the dyeing of textiles, but happily this deficiency is balanced by their outstanding usefulness as color sensitizers in photography. For this purpose they are dyes of choice, and it is not too much to say that the elaborate edifice of photography could not exist without them in anything like the form in which we know it today.

The appearance of the present volume, the first to deal exclusively with these dyes, has accordingly been awaited with great interest, not only by the relatively small number of chemists actively working in the field but by the many others who would welcome an opportunity to become familiar with the main features of the