Journal of Photochemistry, 6 (1976/77) 305 - 307

Book Reviews

International Review of Science. Physical Chemistry; Ser. 2, Vol. 9; *Chemical Kinetics*, edited by D. R. Herschbach, published by Butterworths, London & Boston, 1976; 330 pp.; price £ 13.45.

Many photochemists are kineticists, or at least use the tools of kinetics, and on these grounds alone this book could be commended to the photochemical community. In the event, however, much of the material is concerned directly with photochemistry, and the volume will be a really valuable addition to any photochemist's library.

The work contains seven review articles, and, as in earlier volumes of Series One and Two, they are authoritatively written by world experts.

J. Troe (Lausanne) writes about Unimolecular Reactions, the emphasis being on statistical models for such processes. A section is devoted to specifically photochemical unimolecular reactions.

Ion-molecule collision phenomena are discussed by B. H. Mahan (Berkeley). Mahan reviews recent accomplishments in elastic, inelastic and reactive scattering and in theoretical studies (on the H^+-H_2, $HeH-H_2$ and Ar^+-H_2 systems). He then goes on to discuss correlation diagrams and the sequential impulse model of direct reactions.

Ion chemistry is also the topic of the article by E. E. Ferguson (Boulder) entitled 'Ion Chemistry of Planetary Atmospheres'. The ion chemistry of the F, E and D regions is discussed in turn, and a balanced and broad view is presented which puts several apparent conflicts in the experimental data into perspective. Photochemistry plays a dominant role in ion production in the atmosphere, and may also possible be important in loss processes (as, for example, in the photodetachment of negative ions).

The theme of atmospheric chemistry is continued by M. B. McElroy (Harvard) in his 'Chemical Processes in the Solar System: A Kinetic Perspective'. McElroy discusses the carbon and nitrogen cycles on Earth, and then considers in detail the atmospheric ozone-layer and explores the question of man-induced changes in stratospheric ozone concentration (*e.g.* by SSTs, 'Freons', etc). The atmospheres of Mars, Venus and Jupiter are also examined in some depth and attention is drawn to current problems of interpretation.

There are two articles in the book devoted to liquid phase chemiluminescence. The first is by L. R. Faulkner (Illinois) on Electron Transfer processes. The phenomenon of redox excitation, and the mechanisms for excitation, are discussed fully, and there follows an analysis of process efficiencies. Emission efficiencies (ratio of output photons to redox events) approaching 0.1 have been observed; the actual excitation yields of the redox reactions may sometimes be near unity. A section of the paper is devoted to experimental techniques. T. Wilson (Harvard) reviews chemiluminescence excited by

the thermal cleavage of dioxetanes. Wilson regards this process and redox excitation as the two prototype models of liquid phase chemiluminescence. The experimental procedures used in the study of dioxetane chemiluminescence are discussed in some detail. A relatively short section on the thermochemistry and spectroscopy of the dioxetanes is followed by a tabulation of results and a lucid examination of the reactivity of dioxetanes.

The remaining review is by G. G. Hammes (Cornell) on 'Kinetic Investigation of Enzyme Catalysis'. Hammes starts by considering the steady state kinetics of enzyme systems, and then goes on to demonstrate the greater information that can be obtained about elementary processes from a study of transient kinetics (rapid mixing or temperature jump). Ribonuclease A is used to exemplify in detail the types of techniques used and results obtained.

R. P. W.

Creation and Detection of the Excited State, Vol. 4, edited by W. R. Ware, published by Marcel Dekker, New York, 1976; 336 pp.; price: Sfr. 130.00.

This volume is the fourth in a series intended to present detailed information upon experimental techniques for both the production and detection of excited molecules. The aim is to provide an investigator new to a particular aspect of the field with sufficient experimental details to enable him to establish the technique within his own laboratory.

The first two chapters consider the measurement of laser powers and intensities by both chemical and physical methods. J. N. Demas discusses the fundamentals of chemical actinometry, and presents detailed information upon the use of such systems with a variety of laser sources, possible inaccuracies being carefully considered. Most experimentalists will share his hope (and the manufacturer's claim) that physical means of detection which are both accurately calibrated and stable with time will soon achieve the reliability and reproducibility of chemical methods. E. D. West, in a brief chapter concerned with some details of physical methods of laser power measurements, describes the construction and operation of an N.B.S. basic standard calorimeter, and discusses potential sources of error in standardization procedures. A warning is given regarding the validity of the claims of the manufacturers of laser power and energy meters that the calibrations of thier products are traceable to N.B.S. standards; the user is strongly advised to check precisely how this is done.

A further section is concerned with the detection of photolytically produced gas phase radicals by spin trapping, a method by which relatively stable spin adducts, formed by reaction of the radical with compounds containing nitroso or nitrone functional groups, are detected by E.S.R. The author, E. G. Janzen, concentrates almost entirely on describing results and assigning spectra obtained from a large number of successful experiments. This serves admirably to illustrate the utility of the method, but, although the relative merits of experimental variants on the technique are presented