and plants can affect their stability and toxicity to insects, animals, and humans.

A considerable overlap of information in papers dealing with the use of synergists is a reflection of their importance in the understanding of the oxidations of toxicants. Types of insecticide synergists and their effects on oxidations are described in detail. Methylene dioxyphenyl compounds are common inhibitors of biological oxidations. Their inhibition depends on 1,3-benzodioxolium ion and its ring substituents. This ion, formed by hydride ion transfer, can either compete with substrate for the binding site or acylate some other microsomal component. These compounds interfere with the formation of percupryl-oxygen complex in tyrosinase, but similar interaction with ferrous ion of cytochrome P-450 is not known. R. L. Metcalf suggests that new insecticides that either lack the site for oxidase attack or contain a synergistic group should be designed. Model oxidations, followed by information on species differences in oxidations, should then be used in developing new selective pesticides and oxidation inhibitors.

Insecticide residues in animals and humans can modify responses to insecticides and drugs. DDT with other organochlorine insecticides and their nontoxic metabolites and analogs can induce microsomal oxidases, thus accelerating the metabolism of insecticides and drugs present in the body. The presence of chemicals in the environment can either minimize or increase insecticide storage and poisoning, depending on whether the chemicals stimulate or inhibit microsomal oxidases.

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Measuring Plasmas

Plasma Diagnostics. W. LOCHTE-HOLTGREVEN, Ed. North-Holland, Amsterdam; Interscience (Wiley), New York, 1968. xviii + 930 pp., illus. $38.50.

The phrase "plasma diagnostics" has come to mean plasma measurements, formerly made to investigate atomic properties or basic collective phenomena but now performed to determine the behavior of plasma systems for some programmatic end, notably in research on controlled thermonuclear reactions. This field began with electric (Langmuir) probe measurements of low-pressure discharges and the spectroscopy of atmospheric-pressure arcs. The German school of spectroscopists has been preeminent in the latter discipline, and the present collection has as its nucleus review articles by eight members and alumni of Lochte-Holtgreven's institute at Kiel University. Much of the emphasis of the book is therefore on dense, near-equilibrium plasmas at moderate temperatures.

The first seven chapters comprise a comprehensive discussion of quantitative spectroscopy, including up-to-date discussions of vacuum-ultraviolet (R. Lincke) and soft x-ray spectroscopy (P. Bogen), and one is led naturally to compare this book with the earlier book on plasma spectroscopy by H. Griem (McGraw-Hill, 1964). The chapters on the radiation formulation (J. Richter) and line broadening (G. Traving), evaluation of plasma parameters (W. Lochte-Holtgreven and Zwicker), as well as the more topical material on shorter wavelengths, in the present volume comprise an equally authoritative treatment, with greater orientation toward laboratory work. The treatment of classical electric probes, by L. Schott, includes the latest developments of this subject.

The remaining half of the book is largely concerned with techniques of more recent origin. H. Hermansdorfer, in his chapter on microwave techniques, has chosen to present a concise summary of a subject which has already been treated at length by Heald and Wharton [*Plasma Diagnostics with Microwaves* (Wiley, 1965)]. The material of Huddlestone and Leonard's *Plasma Diagnostic Techniques* (Academic Press, 1965) is also somewhat paralleled in the present treatment. However, there is valuable new material on laser methods by H. J. Kunze, including the powerful scattering technique, and for the first time in English we have review material on plasma measurements by extracted particles (H. W. Drawin). This reviewer was particularly interested in the discussion of Zeeman and optical-Faraday-rotation (as well as material-probe) measurements of magnetic fields (W. Botticher) and far-infrared measurements of bremsstrahlung continua in the otherwise classical treatment of optically thick plasmas by H. Zwicker. Also new to most plasma physicists are Lochte-Holtgreven's material on the quantitative aspects of photography and R. L. F. Boyd's discussion of the use of Langmuir probes on space craft.

The authors have conscientiously provided the bibliographies that are of great importance to the users of such compilations as this.

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Polymers

Advances in Macromolecular Chemistry. Vol. 1. WALLACE M. PASIKA, Ed. Academic Press, New York, 1968. x + 434 pp., illus. $16.50.

The editor of this volume states that the intent of the series is "to become a medium both for reviewing the forefront of macromolecular research and for providing informative reviews on more established aspects of macromolecular chemistry." The reviews—"Ferrocene polymers," "Popcorn polymerizations," "Electron acceptors as initiators of charge-transfer polymerizations," "Non-Newtonian viscosity and the macromolecule," "Solid state polymerization," and "Polysulphones: organic and physical chemistry"—meet one or the other of these criteria. The articles on ferrocene polymers and polysulphones are truly outstanding in scope, depth, and authoritativeness. In the long-overdue review of ferrocene polymers the author has not only covered the literature on polymeric metallocene materials but has also detailed goals, shortcomings, and accomplishments in such a way as to encourage future research. In the article on polysulphones, we find for the first time a comprehensive discussion of the organic and physical chemistry of both aliphatic and aromatic polysulphones, with coverage of polymerization, structure, and physical and chemical properties. Unfortunately, the high standards of these two reviews are not maintained throughout the volume. The breadth of the review of ferrocene polymers contrasts sharply with the narrow scope of the review of popcorn polymerization, in which developments since 1963 are covered in 12 pages. The articles on polysulphone and solid state polymerization present a similar contrast; whereas the polysulphone review deals with developments in the field over the last eight years—the time period since the last major review of

the subject—the review of solid state polymerization covers material which has been the subject of numerous reviews dating from 1961 through 1967, with not enough new material or interpretation to justify another review.

In spite of the excellence of the two articles discussed previously, the book remains a collection of reviews of highly specialized topics and as such must be regarded as a volume suitable for a library but not normally worth a permanent place on the individual's bookshelf.

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Monitored Solar Activity

The Proton Flare Project. (The July 1966 Event.) A. C. STICKLAND, Ed. M.I.T. Press, Cambridge, Mass., 1969. xiv + 514 pp., illus. $19.50. Annals of the IQSY, vol. 3.

The Proton Flare Project of 1966 was a magnificent example of the kind of international cooperation this small planet must have. A large solar flare which injects energetic protons into interplanetary space is the most energetic impulsive phenomenon in the solar system, yet we have little understanding of the details of the physical processes involved. As part of the International Years of the Quiet Sun 1964–1965 an attempt was made to choose a single proton flare and to marshal all possible observational attention upon it. Observations of a flare and its surrounding active region can be obtained in many different ways, including several new techniques of the space age. No single laboratory has more than a small fraction of the necessary instruments, and observatories in many parts of the world are required for continuous coverage.

At the chosen time in 1966 solar activity was increasing after the minimum of the 11-year sunspot cycle, but had not yet reached a level at which flares might occur so frequently as to confuse the interpretation of effects to be attributed to a single flare. For the Proton Flare Project an elaborate rapid international communication system was established. Solar active regions were carefully monitored, and when a particular region reached a pregnant configuration on 5 July 1966 a warning was sent to all stations so that detailed observations could begin before the possible flare. The sun cooperated by producing a large proton flare just after midnight on 7 July 1966. This book describes the resulting cooperative efforts by more than 100 workers at 54 institutions in 18 nations. It must be said that we still do not understand the mechanism of a solar flare, but the present effort is a significant step toward this goal. Everyone interested in flares from the viewpoint either of fundamental processes or of practical applications such as effects on astronauts, supersonic plane passengers, and terrestrial communications will want to be familiar with this book.

I recommend that the book be read in the following sequence: first, the general summary by P. Simon and Z. Svestka; second, the specialized summaries on the development and activity of the active region by V. Banin *et al.*, on energetic particles by S. M. Krimigis, and on low-energy particle effects in the ionosphere by W. Dieminger. One can then pick from among the 60 detailed technical papers to suit one's own interest and needs.

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