

## Plasma Physics

**The Particle Kinetics of Plasmas.** I. P. SHKAROFSKY, T. W. JOHNSTON, and M. P. BACHYNSKI. Addison-Wesley, Reading, Mass., 1966. 528 pp., illus. \$17.50.

In this excellent book the authors have done a thorough job of organizing the various theories of plasma kinetics and placing them in an order that shows the range of applicability of each theory. The book contains sufficient details of derivations to make it useful both as a teaching and as a reference text. Its only drawback for teaching is the lack of problems, and this is offset by the completeness of those subjects that the authors have chosen to treat. There is more material than could be covered in a graduate course on plasma physics, which must deal with other subjects as well, but adjustment can be made readily by omitting whole chapters.

Chapter 1 is a general review, together with a schematic outline of the various theories, techniques, and ranges of applicability. Chapter 2 is a brief derivation of the moment equations, starting from the Boltzmann equation, together with a discussion of the collision integrals and the Boltzmann transport equation. Chapter 3 is a treatment of the expansion of the electron distribution function into spherical harmonics following the work of Lorentz. This is a good reference chapter, but could be omitted in a course on plasma physics.

The Maxwellian and Druvesteynian distribution functions are derived in chapter 4, and the Boltzmann equation is used to study the conductivity and mobility in the weak-electric field limit. The authors treat electron cyclotron resonance here, using a collision frequency different from that normally used. This chapter, and chapter 5, which considers elastic collisions and cross sections, could also be omitted from a course in plasma physics.

The next two chapters treat the problem of bremsstrahlung, high-frequency conductivity, and the Fokker-Planck equation. The presentation is clear, and the material is vital to the field of plasma physics. These chapters would be extremely valuable in a course on plasma physics.

A collection of various transport properties of plasmas, together with results of computation and experiment, are covered in chapter 8. It is a useful reference section. The last two chapters include the conventional develop-

ment of the plasma fluid equations in the magnetohydrodynamic approximation and in the double adiabatic or Chew-Goldberger Low approximation. The particle-orbit theory attached to the last chapter looks like an afterthought and could have been omitted without damage to the book.

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## Polarography

**Principles of Polarography.** JAROSLAV HEYROVSKY and JAROSLAV KUŠTA. Translated from the Czech edition (Prague, 1962) by Jiri Volke. Czechoslovak Academy of Sciences, Prague; Academic Press, New York, 1966. 581 pp., illus. \$19.50.

No one is better qualified to write authoritatively on polarography than Jaroslav Heyrovsky, who in 1959 received the Nobel Prize in Chemistry for his invention of the subject and for his penetrating investigations of its many facets during more than 40 years. Thus this volume provides the unique opportunity to view polarography as its inventor sees it.

As implied by the title, the treatment is limited to the fundamental framework of polarography, and the book does not include practical analytical procedures or more than hints about other applications. This is in keeping with its intended role as an advanced textbook rather than a reference monograph. Although neither details of circuitry nor commercially available instruments are described, the essential principles of various types of polarographic techniques are well presented. In addition to all of the more classical aspects of polarography, there are discussions of such up-to-date matters as adsorption effects, kinetic and catalytic currents, and irreversible electrode processes.

The exposition is lucid, right to the point, and highly informative. The discussions are supported by many polarograms and other pertinent illustrations, and the coverage of the original literature is thorough. Polarographic experts should be pleased to see what they know presented so well, and the neophyte could not make a better choice than this book for his first introduction to polarography.

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## Plant Disease

**Viruses of Plants.** Proceedings of an international conference, Wageningen, Netherlands, July 1965. A. B. BEEMSTER and JEANNE DIJKSTRA, Eds. North-Holland, Amsterdam; Interscience (Wiley), New York, 1966. 350 pp., illus. \$12.75.

The conference whose proceedings are reviewed here was the latest of a series that has been devoted largely to potato virus diseases. This conference has gone a step further than its predecessors and is a general consideration of plant viruses and virus diseases.

The book reflects the general trends, problems, and shortcomings of current research in plant virology. Our knowledge of the viruses themselves and of the diseases they elicit is expanding rapidly. Expanded technology and the general availability of expensive equipment, such as the ultracentrifuge and the electron microscope, have allowed the isolation and characterization of viruses to become almost commonplace. The gel diffusion technique has made serology acceptable to plant virologists, and the relationships between viruses and their associated proteins are being actively studied. However, progress has been much slower in our understanding of the multiplication of plant viruses, the subcellular basis for symptomatology, and the effects of the virus on host metabolism. The lack of progress is largely a function of the complex nature of the virus-host systems available for study: bioassays are not sensitive enough, control over the time of infection of all but the first few cells in an inoculated leaf is poor, and the early (and most interesting) changes that take place in the small number of initially infected cells in a leaf must be measured against the background of an overwhelming number of uninfected cells. One may contrast this situation with animal and bacterial virology, where these problems are largely nonexistent and from which most of our knowledge of the fundamentals of virus multiplication have come. (Descriptions of some elegant studies on the details of the multiplication of RNA bacterial viruses may be found in the paper in this volume by Weissmann and his collaborators.)

Nevertheless, this book gives examples of the considerable ingenuity which has enabled plant virologists to learn some of the early events that take place in a virus-infected cell. For example, Siegel has pioneered in the inactivation of the infection center with