Elving and Kolthoff's Chemical Analysis Series

Amperometric Titrations. John T. Stock. Interscience (Wiley), New York, 1965. xiv + 730 pp. Illus. $25.

This volume, 20th of a series of monographs edited by P. J. Elving and I. M. Kolthoff under the general title "Chemical Analysis," represents a noteworthy addition to the series as well as to the literature of analytical chemistry. The amperometric titration method derives from two different sources, the *polarometric* titration of Heyrovsky and Berezicky (1929) using the dropping mercury electrode as the indicator electrode, and the *dead-stop* titration of Foulk and Bawden (1926) using two polarized platinum electrodes. Kolthoff, in 1939, introduced the term *amperometric* to replace *polarometric*, and in 1954, *bi-amperometric* to replace *dead-stop*.

Stock has done a masterful job in tracing clearly the historical development of the field, and in pointing out the interrelationships between these methods and other closely related ones. He introduces a new term, *bipotentiometric titration*, to describe constant-current titration with two indicator electrodes. Alternating current techniques as applied to end-point detection are included, but high-frequency titrimetry is logically excluded because it involves no electrodes in contact with solution.

The book is divided into three major parts. The first part (10 chapters) includes the history, principles, theoretical aspects, descriptions of various indicator electrodes, reference electrodes, titration cells, and electrical circuitry. The second (20 chapters), entitled "Combination Reactions," includes a description of acid-base, precipitation, and complexation and condensation reactions, using both inorganic and organic systems. The final part (14 chapters) is devoted to oxidation-reduction reactions. The many titrations involving iron(III)-iron(II) or halogen-halide systems are grouped to include reactions with many other couples. The minority of systems not thus included are handled separately.

This book shows evidence of careful and thorough preparation. It covers a vast number of literature references up through late 1963, and thus may be regarded as a comprehensive and authoritative review. It includes not only a discussion of principles, theory, and apparatus, but detailed practical procedures are given for selected determinations.

The price of the monograph may discourage individual purchasers. It is highly recommended, however, for those who frequently use the method and for technical libraries. It is truly the definitive work in its field, and it promises to be the standard reference source for years to come.

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Physics for the Layman: Two Paperbacks

Contemporary Physics. David Park. Harcourt, Brace, and World, New York, 1964. 185 pp. Paper, $2.45.

Electrons and Waves. John R. Pierce. Doubleday, Garden City, N.Y., 1964. xiv + 226 pp. Illus. Paper, $1.25.

These new contributions to the growing collection of paperback science books, written at an elementary level, represent two very different ways of presenting science to the layman. In the first, *Contemporary Physics*, David Park attempts to interest the intelligent reader who would not ordinarily wade through the technicalities of a science book. He succeeds admirably in showing how our present picture of the physical world has evolved, with many exciting moments of doubt and controversy. The difficult task of achieving this without relying upon mathematical equations, so powerful to the physicist but so unfamiliar to the layman, has been accomplished by a selection of the most important arguments and a careful verbal exposition of the logic of their development.

In the first few chapters Park describes the state of physics at the beginning of the 20th century, when fields were one thing and matter was another. The evolution of the concept of a field is traced from Maxwell's equations for electromagnetic radiation, through the forced synthesis with the particle idea in Einstein's explanation of the photoelectric effect, to the eventual description of the matter field by Schrödinger's equation. The picture of nature as a complicated set of interacting fields permeates the remainder of the book and gives it unity. The gravitational field and the fields associated with the many elementary particles, bringing with them a host of unanswered questions that occupy the minds of scientists today, are discussed in other chapters. Two new experimental techniques, the laser and the Mössbauer effect, which permit measurements of very small but very important effects like the gravitational red shift, are treated in chapters in which the author applies some of the principles that he has discussed earlier. Park's chapter on cooperative phenomena in atomic and nuclear physics treats another frontier of contemporary physics: the surprising behavior exhibited by even apparently simple many-body systems like cold helium.

Electronics and Waves, by John Pierce, is a new volume in the Science Study Series, which was originated to provide supplementary reading for high school students in the Physical Science Study Committee's course in physics. The book is a self-contained introduction to electronics and communication. The background necessary to understand the devices and techniques of modern communications, however, ranges far and wide over topics in physics and mathematics. Each of these topics is developed to the extent needed in the book, starting from a very elementary level. As the author says of this method of exploring science—"To know a part of science or technology well is to know something of the whole."

In the first chapters Pierce deals with the laws of motion and electromagnetic fields. A discussion of wave phenomena then precedes a chapter entitled "Maxwell's wonderful equations." All of these discussions are liberally illustrated with excellent line drawings and descriptions of devices that demonstrate the principles under discussion. The most interesting chapters to a reader who is attracted by the book's title will be the last ones on antennas, electron devices like the klystron, and communication theory, but on his way there he will have learned about a great number of things, from matter waves to betatrons.

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