Book Reviews

Polarography: Methods and Techniques

Modern Polarographic Methods. Helmut Schmidt and Mark von Stackelberg. Translated from the German edition (1962) by R. E. W. Maddison. Academic Press, New York, 1963. viii + 99 pp. Illus. $5.50.

Alternating Current Polarography and Tensammetry. B. Breyer and H. H. Bauer. Interscience (Wiley), New York, 1963. xx + 288 pp. Illus. $12.

No exhaustive monographs on polarography have been published since 1952. New developments, including theory, instrumentation, and applications are currently being published at a rate that certainly discourages a broad yet thorough treatment. Relatively short books, such as these two, are a logical and welcome approach, and they serve a definite purpose.

In less than 100 pages, Schmidt and von Stackelberg describe the salient and distinguishing features of eight polarographic methods as well as several additional varients and combinations of methods. The reader must have a good understanding of conventional polarography if he is to assimilate the brief and concise descriptions, but the authors very successfully relay the important, basic details of each method with clarity and directness. Liberal use is made of block diagrams of equipment and graphs showing the relationships between current, voltage frequency, and the like.

The controlled voltage methods that are described include differential and derivative techniques, strobe polarography (current measurements during a selected time interval of each mercury drop's growth), oscillographic or rapid voltage sweep methods, polarography with superimposed sine or square wave voltages, and pulse methods in which the controlled voltage is applied during very short time intervals. The controlled current methods include oscillographic polarography according to Heyrovsky and Forejt and radio-frequency polarography as developed by Barker. The description of each method covers measured signals for typical electrode reactions and the equipment used as well as consideration of the advantages, shortcomings, and probable limits of sensitivity. Theory is presented in a qualitative manner, with only occasional use of equations.

Although no obvious errors were made in translating the German text, difficulties in word choice are occasionally apparent, and the overall style is not flowing. But these are minor points that do not seriously detract from the otherwise lucid descriptions and discussions.

The monograph by Breyer and Bauer is a thorough, quantitative treatment of the polarographic method which is based on the combination of a small sine wave voltage and the usual direct polarizing voltage. In addition, the use of square wave voltages is briefly discussed as well as the recently developed second-harmonic alternating-current polarography. In its several forms, a-c polarography is of interest because it provides a means for studying electrode reaction kinetics, mechanisms, and adsorption-desorption processes at electrodes. It is also a versatile tool for chemical analysis. The presentation of theory, instrumentation, and analytical applications in this volume will fill many needs.

In the introduction the authors provide an interesting historical sketch of the study and interpretation of the response of electrodes to alternating voltages, early observations which brought out many properties of electrode-solution interfaces that are still active research subjects.

One chapter covers the theory of the magnitude and of the phase angle of the alternating current that is observed in a-c methods. This logical, easily followed development is a suitable introduction to the subject for those experienced in conventional polarography. In their recapitulation of the theory the authors make good use of the many derivations in the literature. Significant terms and quantities are discussed at length, and several errors in past publications are also noted. The chapter concludes with a qualitative treatment of *tensammetry*, a term proposed by the authors for the effects observed when adsorption-desorption occurs on electrodes. Kinetics of electrode processes are introduced in this chapter, but the discussion of mechanisms is deferred until the final chapter.

Practical aspects of the method are covered in chapters on instrumentation and analytical applications. The latter chapter is a valuable survey of experimental results obtained with the electrode reactions of the ions of 41 elements. Some data on electrode reaction kinetics are included. Adsorption, oxidation, and reduction of organic compounds at mercury electrodes are summarized in a similar way. This compilation will be a most useful reference and guide to the literature up to 1960.

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Physical Anthropology

The Human Species. An introduction to physical anthropology. Frederick S. Hulse. Random House, New York, 1963. xxii + 504 pp. Illus. $7.95.

In 1943, upon the death of Aleš Hrdlička, founder of the *American Journal of Physical Anthropology* and of the American Association of Physical Anthropologists, a youthful generation took over and, with the vigor of liberation, began to express itself about the evolution and nature of man. Thus began what has been termed "the new physical anthropology," one of the tendencies of which has been to disregard the past and think mainly of the present. So now, 20 years later, a member of this generation has written a textbook that summarizes the resulting point of view. Understandably, the book contains not a single mention of Hrdlička and relatively few references (about 20 percent) to publications prior to 1940.

Hrdlička is used here to give perspective on *The Human Species* simply because his name and his views are