Book Reviews

pH Measurements, Their Theory and Practice. Victor Gold. Methuen, London; Wiley, New York, 1956. 125 pp. $2.25.

According to the foreword, this little book is "intended for non-specialists, and its object is not only to describe the basic experimental techniques for the measurement of *p*H, but also to help towards a better understanding of the correct significance of the measurements and the limitations of the concept of *p*H." A detailed description of experimental procedures was not possible in the limited space at the author's disposal. The second purpose is, however, admirably fulfilled.

The practical *p*H scale is a compromise between the desire to retain a well-established, convenient experimental method and the desire to allow some theoretical significance to be attached to the results. The lack of exact fundamental meaning is the cause of most of the dissatisfaction with the modern scale. It is hoped that the sections on interpretation of *p*H measurements in aqueous solutions and in mixed solvents will help to dispel the widespread confusion and misunderstanding that have surrounded this subject in the past. They are written with clarity and capability.

In my opinion, however, the author has emphasized a difference between American and British standard practice that does not exist. It is true that the National Bureau of Standards has chosen $-\log [H^+]f_{H^+}$ as the formal definition of the standard value (pH_S), whereas the British standard regards this unit as $-\log [H^+]f_{\pm(1:1)}$. However, the convention on which all of the numerical values of pH_S are based identifies f_{H^+} with $f_{\pm(1:1)}$ for a "typical" strong electrolyte. The author states (page 39): "Although these two points of view appear to be quite different, they do, in fact, lead to the adoption of the same value for the *p*H of the 0.05*M* solution of potassium hydrogen phthalate." This could hardly be otherwise, for both standard methods adopt the numerical values assigned to this buffer solution by Hamer, Pinching, and Acree.

In a little more than 100 pages, this book covers a remarkable amount of material. The nine chapters include a treatment of the theory and role of *p*H in proton-transfer equilibria and in kinetics, theory of galvanic cells, electromotive force and optical measurements, and definitions and interpretation of *p*H in aqueous and nonaqueous media.

In spite of its wide scope, the discussion is rigorous and unmarred by oversimplification, except possibly in the omission of the important effect of indicator charge type on the *p*H measurement by optical means. The index of mathematical symbols is a worthy feature. References to the literature are few in number and generally inadequate. Nevertheless, this volume speaks with competence and authority and should prove useful to student and research worker alike.

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Allgemeine Meereskunde. Eine Einführung in die Ozeanographie. Günter Dietrich and Kurt Kalle. Borntraeger, Berlin, 1957. 492 pp. Illus. DM. 56.

The publication of a new professional book in their field is always a major event for oceanographers. Despite the recent deluge of popular books about the sea, there have been few scholarly attempts since publication of *The Oceans,* 15 years ago, to summarize the present status of fact and theory in marine science. No post-World War II textbook has been designed to replace *The Oceans,* since none attempts so broad a treatment. Instead, there have been numerous specialized discussions of the various individual branches of oceanography. Thus, marine geology has been discussed in Shepard's *Submarine Geology* and Kuenen's *Marine Geology*; marine chemistry, in Kalle's *Der Stoffhaushalt des Meeres* and Harvey's *The Chemistry and Fertility of Sea Waters*; physical oceanography, in Proudman's *Dynamical Oceanography* and Shuleikin's *Fizika Moria*; and marine biology in a number of books, including Hardy's *The Open Sea,* Marshall's *Aspects of Deep Sea Biology,* and Zenkevich's *Fauna i Biologicheskaia Produktivnost' Moria.*

Allgemeine Meereskunde represents a return to the more general treatment. Indeed, the general arrangement of topics is very reminiscent of *The Oceans,* although biological and geological problems are given less emphasis.

The major topics discussed are the geomorphology of the sea floor, physical and chemical properties of sea water, oceanographic instruments and methods of measurement, heat budget, distribution of temperature, salinity and density, geochemistry and biochemistry of the ocean, theory of ocean currents, surface and internal waves, tides, and regional oceanography. In each section the organization is highly systematic, making the book easy to use as a reference. Although the treatment of most topics is traditional, many results of research published prior to 1955 have been included. The selection of examples leans heavily on the works of the authors and their associates, but the examples are always pertinent and instructive.

The long section on chemical processes was written by Kalle, and I believe that it is the best summary of chemical oceanography available today. The section on regional oceanography is one of the first attempts since *The Oceans* to summarize the present knowledge of the circulation and distribution of properties in the world ocean. Although I am distressed by the omission of Montgomery's isentropic analysis in favor of the *Kernschicht* method of Wüst and Defant and by the inclusion of an outdated interpretation of the meridional circulation in the equatorial Pacific, I feel that the general treatment is both instructive and provocative.

The field of oceanography has so broadened during the last 15 years that it is increasingly difficult to compress its basic facts and ideas within the covers of a single, convenient volume. This well-printed and clearly written book is, in many ways, the best general oceanographic textbook available today. It serves as another reminder that the oceanographer must have a command of German (as well as of Russian) to keep up with the latest developments in his field.

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Heterocylic Compounds. vol. 6, *Six-Membered Heterocycles Containing Two Hetero Atoms and Their Benzoderivatives.* Robert C. Elderfield, Ed. Wiley, New York, 1957. 753 pp. $20.

This sixth volume of *Heterocyclic Compounds* has 14 chapters which summarize the chemistry of certain six-membered heterocyclic ring systems. The scope of the material is shown by the following specific chapters: "Monocyclic dioxanes" (59 pages) by C. B. Kremer