Modern Approach

Physical Chemistry. Eric Hutchinson. Saunders, Philadelphia, 1962. x + 647 pp. Illus. $10.

Physical Chemistry, by Eric Hutchinson, is one of several textbooks, published in the last two or three years, that reflect the more rigorous and mathematically sophisticated approach now emphasized in modern undergraduate courses in physical chemistry. Two curriculum changes have resulted in better prepared students: the more thorough treatment of calculus and differential equations now required during the freshman and sophomore years in many schools and the inclusion in modern courses in general chemistry of a more thorough treatment of such subjects as thermodynamics and kinetics, which, just a decade ago, were considered to be a part of courses in physical chemistry.

In the first chapter Hutchinson deals ambitiously with the general principles of the first and second laws of thermodynamics, the thermodynamic state functions, closed and open systems, and the chemical potential as a criterion of chemical equilibrium. In the following several chapters these concepts are utilized for gaseous and liquid systems and for homogeneous and heterogeneous equilibri. (The crystalline state is treated in chapter 17, following chapters on elementary wave mechanics and methods for determining molecular structure and configuration.) The treatment of electrochemistry, in chapters 7 and 8, is followed by a chapter on homogeneous kinetics. In chapters 10 through 13 the author gives a much more thorough treatment of surface energies and of colloidal and macromolecular systems than is normally encountered in textbooks at this level. In the last chapter (18), he develops and applies the principles of statistical mechanics to thermodynamics and kinetics. Problems are included at the end of each chapter; although some other current texts provide more problems, Hutchinson's selections are well designed and include many excellent "thought" problems and derivations.

Recommendations of the International Union of Pure and Applied Chemistry's Commission on Physico-Chemical Symbols and Terminology have been followed, for the most part, with respect to nomenclature and signs in thermodynamics and electrochemistry. This usage is admirable in that it will encourage the adoption of these conventions (in particular, of the symbol G for the Gibbs function) by American chemists. However, different usage in other texts and in the American chemical literature will cause many students to be confused by the use of F for the Hemholtz free energy and of A for the affinity of the reaction. Electrode potentials are used rather than oxidation or reduction potentials. (The table of standard electrode potentials is particularly confusing, though, in that the electrode half-reactions are all given as oxidation processes.)

This book is clearly written, and many modern experimental techniques are discussed, although very few numerical examples are worked out in the text. Definitions and concepts are treated in a rigorous manner, and basic principles of classical physical chemistry are emphasized. It should prove to be an excellent text, particularly for undergraduate courses in physical chemistry that follow a modern course in general chemistry which goes beyond the traditional introductory course.

ROBERT L. STRONG
Department of Chemistry, Rensselaer Polytechnic Institute

Mineral Nutrition

Mineral Salts Absorption in Plants. J. F. Sutcliffe. Pergamon, New York, 1962. x + 194 pp. Illus. $6.

This concise monograph, in the author's words, "is an attempt to summarize present knowledge and ideas for the benefit of students and research workers in the field of mineral nutrition." That formidable task is made all the more difficult in that the treatment appears to be designed for use by relative tyros as well as by advanced students. An effort to serve such a wide audience within a short treatise may be expected to result in compromise, and the result, in this instance, is that the descriptive and phenomenological sections of the book are considerably stronger and more satisfactory than the theoretical ones. Thus, the chapters dealing respectively with factors that affect salt absorption, the structural aspects of salt absorption in cells, the salt relations of vascular plants, the soil as a source of mineral salts, and salt tolerance bring together a considerable body of factual information previously available only piecemeal in scattered publications.

The descriptive material is justifiably selected from the large body of work in the field to best exemplify the topics discussed, and short reading lists, at the end of each chapter, together with the references cited for the entire text provide the reader a diversified introduction to the literature.

The theoretical and speculative chapters that deal with the mechanisms of ion transport, on the one hand, and with the relation of salt absorption to metabolism, on the other, may provide too little for the neophyte and not enough for the experienced investigator. Thus, a survey of the phenomena that influence the distribution of ions in physical systems (diffusion, mass flow, ion exchange, Donnan distribution, adsorption) is largely a formal restatement of the laws which describe the systems; as such, they provide little in the way of understanding for the beginner and undue repetition for the initiate. Historical and contemporary theories of transport are duly presented; although the classical pros and cons are listed with respect to these theories, no case is made for choosing the more likely possibilities or for discarding the several time-worn untenable hypotheses that warrant rejection for more basic reasons than those noted.

Several misprints or inadvertencies in text and legends occasionally cause confusion—for example, the presentation of the Freundlich adsorption expression without an exponential component (page 36); the allusion to protoplasmic nonfree space where sap is meant in the legend of figure 35a; and the description of the Na to K ratio as being higher, rather than lower, in the vacuole than in the environment (page 101). However, a matter of greater importance is the inconvenience caused by an aspect of the book's production: the diacritic symbols used in the legends of the figures frequently vary sufficiently in size (dashed lines) or in intensity from the symbols used in the figures to cause difficulty in ready comprehension of the figure. Withal, the book is agreeably laid out and easy to read, and the historical aphorisms at the head of each chapter add spice.

GEORGE G. LATIES
Department of Botany and Plant Biochemistry, University of California, Los Angeles