

will give results about 6% higher than the one adopted by the U.S.P. in 1958. While this could be an isolated oversight, it casts doubt on the thoroughness of the preparation of the Third Edition and on the authenticity that the book might be assumed to have—particularly for pharmaceutical analysts.

The chapter on vitamin E fails to mention any official method, and the one given for pharmaceuticals differs from those in the N.F. and U.S.P. The chapter concerns itself mostly with food and feed applications. Even so, it covers so many methods in so many applications that it is lacking in detail.

The chapters on the other vitamins are about equally divided as to whether they take cognizance of an official method.

This edition could be of value to pharmaceutical analysts as a guide to the many modifications that are possible for specific problems. However, it should be supported by reference to official methods, where they are applicable, and to the original literature, where more complete detail is usually given.

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*Chemical Principles in Calculations of Ionic Equilibria.* By EMIL J. MARGOLIS. The Macmillan Co., 866 Third Ave., New York, N. Y. 10022, 1966. xi + 482 pp. 15.5 × 24 cm. Price \$7.95 cloth-bound; \$3.95 paperbound.

Although teachers of physical pharmacy and pharmaceutical analysis can assume that their students have been exposed to the principles and calculations of ionic equilibria, review and expansion of the subject matter are usually desirable and necessary. This book can be recommended for that purpose as either a source of self study assignments or for class room use.

The first chapter reviews in a classical fashion simple mathematical operations. Chapter 2 defines components and units of concentration. Each of the remaining six chapters is divided into three sections: a discussion of theoretical principles; a collection of appropriate interpretative problems with solutions; an extensive collection of supplementary problems. Chapter 3 deals with protolytic equilibria and complex-ion formation. Included are treatments of the hydrolysis of salts, buffers, ionization of polyprotic acids, titration curves, and indicator selection. Brønsted-Lowry concepts are used in the discussion of hydrolysis and ionization. Approximate equations, used for the calculation of species distribution and concentration are derived. Although exact equations are not presented, limitations of the approximate equations are discussed. Here, as with the remaining chapters, interpretative exercises are presented to cover a wide range of situations. Step-wise solutions of the problems are given with extensive helpful commentary on both the chemical and mathematical aspects of the situation. Solid-liquid precipitations and solubilizations are the topics of chapter 4. Emphasis here is placed on the application of  $K_{sp}$  principles to inorganic qualitative analysis. Of particular interest is the treatment of simultaneously occurring equilibria as for example the solubilization of weak acids, bases, and ampholytes by pH adjustment or complex formation.

Liquid-liquid partitioning behavior and extraction are briefly reviewed in chapter 5. Chapter 6 covers, in an elementary manner, activities, activity coefficients, ionic strength, and the Debye-Hückel equation. The interpretative problems provide useful and illuminating practical illustrations of activity considerations. Principles and applications of electrochemistry are reviewed in chapters 7 and 8. Voltaic and electrolytic cells are discussed and illustrated, standard electrodes are defined and explained. A descriptive elementary treatment of free energy, enthalpy, and entropy is presented as a prelude to the introduction of the Nernst equation. Potential diagrams, redox titrations, and redox indicators are also covered.

In general, the book covers principles and calculations at a level somewhat higher than the usual general chemistry treatment. The author's long experience as a teacher in the area is reflected by his anticipating and emphasizing aspects of ionic equilibria which are usually poorly understood by the average student.

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*Applied Infrared Spectroscopy.* Edited by DAVID N. KENDALL. Reinhold Publishing Corp., New York, N. Y. 10022, 1966. xv + 560 pp. 15.5 × 23.5 cm. Price \$23.

The 18 chapters of this volume provide a survey of the state of the art of infrared spectroscopy. Applications are described in eight of the chapters. These include descriptions of the use of infrared spectrometry by organic chemists at the bench and for studies on polymers, inorganics, the structure of coal, and essential oils and related products. Expositions on the use of infrared in the industrial laboratory, in pharmaceutical research and development, and in government regulatory agencies are provided. Techniques are covered in the remaining chapters, which include an introduction to infrared theory, practical hints on technique, a description of instrumentation, general and microsample handling techniques, microtechniques using miniaturized diamond optics, a scheme for qualitative interpretation of spectra, and chapters on attenuated total reflectance and the use of computers in spectroscopy.

Since the book is the product of a collaboration among 21 authors and co-authors, it is not unexpected that the chapters are uneven in quality and that there is considerable overlap in material covered. Detailed descriptions of the use of Beer's law in quantitative analysis are given in chapter 2, "Survey of Practical Information," chapter 6, "Infrared on the Chemist's Bench," and chapter 8, "Application of Infrared Spectroscopy to Polymers." Similarly, a description of the literature and spectra collections available is provided in three of the chapters. The relative lack of cross-referencing among the chapters is wasteful of space; however, there is a didactic advantage in having each chapter complete in itself.

Chapters on "Infrared in the Regulatory Agencies" by Carol and Hayden of FDA and "Pharmaceutical Applications of Infrared Spectroscopy" by Johnson, Rinehart, and Graham are of most immediate interest to pharmaceutical scientists, but notable also are the fascinating chapter on "The Use of Computers in Spectroscopy" by Savitzky and