Book Reviews

Physical Chemistry. Walter J. Moore. New York: Prentice-Hall, 1950. 592 pp. $5.00.

The first six chapters of this text, "designed for students in the sciences and in engineering" and possibly "useful to chemists in industry who desire a review of the subject," are devoted to a classical formulation of the fundamentals of thermodynamic theory and its application to gases, chemical equilibria, phase transformations, phase equilibria, and solutions. Included in the treatment are such topics as the proof of the lever rule, the calculation of the entropy of mixing of ideal gases, and the effect of hydrostatic pressure on vapor pressure. This is followed by individual chapters on the kinetic theory of gases, on atomistics, on nuclear physics, and on the ideas of wave mechanics. Then a chapter treats theoretical methods (e.g., the valence-bond and the molecular orbital approach) of interpreting molecular structure as well as some experimental tools providing elucidation of the constitution of molecules. A short chapter considers the Boltzmann distribution, the evaluation of partition functions and the calculation of thermodynamic quantities of chemical interest. The next two chapters deal with the results of the application of x-ray diffraction methods to crystals and liquids and a brief, qualitative discussion of modern theory of condensed phases. The final three chapters treat electrochemistry, surface chemistry, and chemical kinetics with a presentation of modern reaction rate theory.

The scope of the treatment is generally intermediate between that of the usual elementary physical chemistry text and the specialized treatise of use to the theoretical chemist. Excellence of organization, illustration, and typography are evident. A generally lucid and precise manner of presentation employed by the author enlivens the reading. Interest is further heightened by injections of paragraphs of historical significance. Occasional footnotes bear reference to research papers and sources of specific information. Chapter lists of references to treatises, monographs, and other books, as well as to informative or review articles, may encourage the student to further independent study. A generous number of stimulating problems is provided.

To present a comprehensive and varied physicochemical "smörgåsbord" in a single, conveniently sized volume requires some concessions. To provide space for emphasis of structural chemistry, the author severely minimized the discussion of topics such as ionic equilibria, titration curves, determinations of molecular weights, fractionation, and thermochemistry. Continuity and development of theoretical considerations with mathematical exactness were achieved at some sacrifice of the presentation of the experimental aspects of the subject. The treatment of electron diffraction of gases includes the derivation and some applications of the Wierl equation; there is a 13-page discussion of x-ray diffraction of crystals, including even Fourier syntheses—yet the reviewer could find no mention of the application of neutron diffraction to structural problems. For details of mathematical apparatus, the reader is referred to standard texts.

The success of the book as an elementary text can perhaps best be judged by student response. Although considerably more material than can be presented or digested in a two-semester, elementary course is provided, judicious selection will provide a basis for a nourishing menu. The volume should prove of especially great utility to chemists and graduate students who desire a concisely yet clearly presented review of modern physical chemistry.

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Principles and Practice of Spectrochemical Analysis. Norman H. Nachtrieb. New York: McGraw-Hill, 1950. 324 pp. $4.50.

The first part of this book is a very skillful condensation of the background information in the varied domains of physics, chemistry, and common sense which are of interest to chemists performing or learning quantitative (and qualitative) emission spectrographic analysis. Professor Nachtrieb has included, in 70 pages of lean and carefully considered prose, all the main features of refraction and diffraction, applicable to spectrographs, as well as many interesting details. The effects of varying parameters are usually described in words and diagrams, although these are supplemented by basic formulas.

In a few cases, a more detailed mathematical derivation is given. Thus, the section on concave gratings not only gives a fairly rigorous derivation of the Rowland circle, but also includes the mathematical justification for spacing grating rulings equally along a chord of the trace of a concave grating in the horizontal plane. The latter is a rare item in textbooks. The chapters on the "Photographic Process" and "Evaluation of Photometric Data" are clear and uncluttered, and mention several advances in these fields which, although some are ten or more years old, have for the most part been greeted by a conspiracy of silence in recent texts in English. This is particularly true of the Seidel (Sampson-Baker) function, which gives an emulsion calibration curve that is linear over most of the measureable transmittance range.

One or two ambiguities in the discussion of the effects of intermittency and reciprocity failure might have been avoided if the connections between density, intensity, exposure time, and the Schwarzschild coefficient p had been presented in some form such as the Ahrens-Eggert three-dimensional model. Certain paragraphs in this discussion might leave the reader with the impression that intensity-