

the same subject matter. Even a topologist might enjoy reading Markushevich's chapter on Riemann surfaces in which he develops the general theory of such surfaces by using topological tools.

After a descriptive and historical introduction, the author discusses mainly fundamental notions of the theory in the first three chapters. Complex numbers and operations on them, point-sets in the plane, complex functions, differentiation, and integration are considered, and geometrical interpretations as well as hydromechanical interpretations are given. The third chapter also contains ramifications of Cauchy's theorem. A very nice proof of Cauchy's integral theorem is given in Chapter 5. The author discusses Cauchy's integral formula, Liouville's theorem, Morera's theorem, Weierstrass' theorem, the Poisson integral, and Schwartz' formula in Chapter 6. The remaining four chapters cover in detail—and again with various examples—Laurent series, isolated singularities, entire and meromorphic functions, residues and their applications, the principle of the argument, analytic functions, Riemann surfaces, elliptic functions, and the Christoffel-Schwartz formula.

This book represents indeed a welcome addition to the library of any mathematician, physicist, or engineer who is interested in the theory of analytic functions and its many beautiful applications.

Atomic Spectra and the Vector Model. (2nd ed.). By Chris Candler. 412 pp. Van Nostrand, Princeton, N. J., 1964. \$18.50. Reviewed by William F. Meggers, National Bureau of Standards.

After the lapse of a quarter century since the publication of a major treatise on atomic spectra, the present decade has already produced at least five, viz., *Quantum Theory of Atomic Spectra* by J. C. Slater in 1960 (reviewed in *Physics Today*, May 1961, p. 40); *Atomic and Molecular Spectroscopy* by M. A. El'yashevich in 1962; *Atomic Spectra* by H. G. Kuhn in 1962 (reviewed in *Physics Today*, December 1962, p. 64); *Optical Spectra of Atoms* by S. E. Frish in 1963;

and *Atomic Spectra and the Vector Model* by Chris Candler in 1964.

The last is a complete revision of a two-volume first edition published in 1937. In both editions Candler has omitted the heavy mathematics of quantum mechanics and striven to hang the immensely complicated facts of atomic spectra on the easily comprehended vector model. For justification, he quotes the following letter from Michael Faraday to Clerk Maxwell: "There is one thing I would be glad to ask you. When a mathematician engaged in investigating physical actions and results has arrived at his own conclusions, may they not be expressed in common language as fully, clearly, and definitely as in mathematical formulae? If so, would it not be a great boon to such as we to express them so—translating them out of their hieroglyphics that we also might work upon them by experiment." Furthermore, a dozen physicists and probably a hundred chemists use the spectrograph for every one who is interested in the theory of atomic energy states. In particular, a spectrochemist wishing to make rational choices of analysis lines requires experimental information primarily concerning wavelengths (or wavenumbers), relative intensities, quantum numbers, and observed excitation energies.

Candler's *Atomic Spectra and the Vector Model* gives relatively few of these data but it is almost unique in explaining their importance and where they can be found. All phases of atomic spectroscopy, from Absorption Spectra to Zeeman Effect (except Stark Effect), are presented in twenty chapters, each ending with a brief bibliography and selected references, frequently to first announcements, but also including some dated 1964. This second edition, like the first, contains a profusion of figures and tables, but eight photographic plates that aptly illustrated the first have been omitted from the second. This omission of photographed spectra is regretted, in view of what Confucius is reputed to have said about a picture.

This volume includes five appendixes: 1. Natural Atomic Units (in mks and Atomic Units); 2. General Bibliography; 3. Rydberg Term Table

(recomputed with the modern value of the Rydberg constant); 4. Grotrian Diagrams; and 5. Tables of Protonic Nuclei, Neutronic Nuclei and Deuteron Nuclei; it ends with a 10-page general index. Among the appendixes, simplified Grotrian diagrams of 82 spectra characteristic of 72 chemical elements (excluding lanthanons and actinons) are original and unique; they give the wavelengths of intense radiations arising mainly from transitions of one excited electron to the ground (or to a metastable) level of the atom or ion.

Candler's pragmatic account of atomic spectra will certainly appeal to all applied spectroscopists and to students who are frightened by quantum mechanics.

Physical Chemistry (2nd ed.). By E. A. Moelwyn-Hughes. 1334 pp. (Pergamon, Oxford) Macmillan, New York, 1964. \$12.50.

Reviewed by Victor W. Bolie, Autometrics Division, North American Aviation.

It is unfortunate that so many textbooks in physical chemistry are amateurish in mathematics and thus hazy in theoretical foundation. An exception is this well-written, comprehensive text which presumes the reader is fluent in applied mathematics through the level of partial differential equations and boundary-value problems.

The result is a carefully woven net of rigorous, but modestly bounded, theory around which the host of experimental facts of physical chemistry are fitted. The few typographical errors remaining in the new edition (e.g., the axis labels in the illustration on page 81, and the designation of gram instead of gram-mole on page 99) are trivial and do not detract from the concise style of presentation.

The book begins with the mathematical and experimental foundations of molecular kinetics and the quantum theory and then goes on to a discussion of periodicity and radioactivity, thermodynamics, intermolecular energy, partition functions, light dispersion and absorption, triatomic molecules, and the Raman effect. The various states of matter, including the crystalline, gaseous, metallic, liquid,