
 BOOK REVIEWS

Quantum Chemistry. An Introduction. By WALTER KAUFMANN, Department of Chemistry, Princeton University. Academic Press Inc., 111 Fifth Avenue, New York 3, N.Y. 1957. xii + 744 pp. 16 × 23.5 cm. Price, \$12.00.

In the chemist's effort to "understand" the atom and the molecule he has grasped at certain features of the approximate treatments of quantum mechanics such as resonance, ionic character and hybridization, and with a non-scientific tender-mindedness (W. James) set them up as realities and absolutes. One of the many fine aspects of the new quantum chemistry text by Professor Kaufmann is his carefully spelled-out warning of the dangers of such attitudes.

His text is intermediate in its level of difficulty between the two other texts with the same title.^{1,2} It is divided into five parts: Mathematical Introduction (140 pages); General Principles of Quantum Mechanics (110 pages); Atomic Systems (100 pages); Molecular Systems (140 pages); Non-Stationary States (200 pages). The mathematical introduction, written at a level well within the grasp of most chemists, is outstanding. His discussion of vibrating strings vibrating drum heads and pressure oscillations in gas chambers will give the student a vivid description of the states of a single particle. Degeneracy and hybridization are skillfully described in these same terms. For those who wish a smaller dose of mathematics, the author has indicated which sections may be eliminated without serious loss. The remaining sections are of uniformly high standard.

There are a few oversights. While the helium atom is extensively discussed, the author does not mention the work of Chandrasekhar and Herzberg (1955) which considerably reduces the level of uncertainty in the helium calculation. His very short treatment of group theory, and his neglect of crystalline field theory are regrettable. It is recognized that some topics must be omitted, but these are of great importance in that they transcend approximation. His judgment of free-electron theory (p. 680) appears a little harsh in view of its success. The only misprint noted was in the ionization energy of water on page 516.

The reviewer ventures to predict that the text will be widely adopted.

(1) H. Eyring, J. Walter and G. E. Kimball, "Quantum Chemistry." John Wiley and Sons, Inc., New York, N. Y., 1944.

(2) K. S. Pitzer, "Quantum Chemistry," Prentice-Hall, New York, N. Y., 1953.

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Annual Review of Nuclear Science. Volume 6. By JAMES G. BECKERLEY, Editor, Schlumberger Well Surveying Corporation, MARTIN D. KAMEN, Associate Editor, Washington University Medical School, and LEONARD I. SCHIFF, Associate Editor, Stanford University. Annual Reviews, Inc., Grant Avenue, Palo Alto, California, 1956. v + 471 pp. 16 × 23 cm. Price, \$7.00.

The 1956 volume of the Annual Review of Nuclear Science is clearly up to the standards established by its predecessors. Considering the intensity of effort expended in the areas encompassed by "Nuclear Science," we are indeed fortunate that this series exists.

Of the thirteen articles in the present volume, two should be of direct interest to chemists.

Under the title of "Generalized Acidity in Radio-chemical Separations," Horne, Coryell and Goldring present an interesting and lucid discussion of the role of acidity as a rather generalized concept in inorganic equilibria. Their discussion includes not only the classic field of aqueous solutions, but also goes into solvent extraction, ion exchange, non-aqueous solvents and liquid salt systems.

Taube's contribution on "Applications of Oxygen Isotopes in Chemical Studies" pays primary attention to homogeneous solutions. This very logically constructed

article is concerned first with the exchange of oxygen between the solvent water, and oxygen containing anions and cations; it then goes on to a discussion of the point of cleavage in hydrolytic reactions of both organic and inorganic species; and then proceeds to a fascinating review of which oxygen goes where in oxidation-reduction reactions involving oxygens. The article is indeed an outstanding description of the insight that we have gained into chemical phenomena in aqueous solutions through the use of isotopes.

Four other articles are of less immediate interest, but concern areas of investigation whose importance for chemistry can only increase with time. Included among these are a discussion of the mass and nuclear size effects in the "Isotope Shift in Atomic Spectra" by Mack and Arroe; a review of "Recent Advances in Low Level Counting Techniques" by Anderson and Hayes; a very thorough survey of "Nuclear Radiation Effects in Solids" by Brooks; and a critical discussion by Davidson, Loeb and Young of "Nuclear Reactors for Electric Power Generators." The fields discussed in the latter two articles in particular contain many interesting and technologically important chemical problems.

Of the seven remaining articles, two are in the area of radiobiology: papers published during 1955 on "Cellular Radiobiology" are reviewed by Gray; and O'Brien covers the field of "Vertebrate Radiobiology: Embryology." The latter article is somewhat the more informative to the uninitiated.

Three of the remaining five articles, "The Masses of Light Nuclides" by Mattauch, Waldmann, Bieri and Everling; "Properties of Medium-Weight Nuclei" by Way, Kundu, McGinnis and van Lieshout; and "The Excitation of Nuclei by Charged Particles" by Heydenburg and Temmer; are important contributions to our knowledge of the stationary states of nuclei.

The final two articles by Sarabhai and Nerurkar, and Wolfenstein, are concerned with "Time Variations of Primary Cosmic Rays" and the theoretical formalism employed in discussion of "Polarization of Fast Neutrons," respectively.

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Medizin und Chemie. Abhandlungen aus den Medizinisch-Chemischen Forschungsstätten der Farbenfabriken Bayer Aktiengesellschaft. Band V. FRITZ MIETZSCH, Editor and Director, Farbenfabriken Bayer Aktiengesellschaft, Werk Wuppertal-Elberfeld. Verlag Chemie, G.m.b.H., Pappelallee 3, Weinheim/Bergstr., Germany. 1956. 535 pp. 16 × 24 cm. Price, DM 30.-.

This book is a continuation of four volumes of "Medizin und Chemie" published by I. G. Farben before World War II. Its aim is to acquaint its readers with scientific problems presently under investigation at the Bayer Works and it is planned to publish one such volume every one to two years, alternating with the Pharmaceutical Department of Farbwerke Hoechst. This present volume contains about 40 contributions of which a large number emphasize chemotherapy. Some papers are of interest to the chemists, like Klarer's work on Sulfonamides, Chemistry and Pharmacology of Homologous Morphinanes, the development of "Resochin" and the Chemotherapy of Schistosomiasis. Many other contributions have apparently been written for the special purpose of being included in this volume and, therefore, lack the refreshing originality of publications for a scientific journal. "Medizin und Chemie" might appeal more to doctors than to chemists, who would probably prefer broad reviews written by specialists or a collection of Bayer's original publications. The reviewer cannot agree with some of the opinions expressed in the book. For example the statement that PAS and Isoniazide were not biologically screened before 1946 and 1950, respectively, because they