

book reviews

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Atoms, Molecules, and Chemical Reactions: Chemistry from a Molecular Point of View

Sidney W. Benson, Stanford Research Institute. Addison-Wesley Publishing Co., Reading, Mass. 1970. ix + 196 pp. Figs. and tables. 23.5 × 16 cm. \$3.95.

This book is not an introductory text. The author's principle motive in writing this book was to provide high school teachers of chemistry and serious high school as well as beginning college students with a deeper view of the theoretical bases underlying modern chemistry.

The author assumes the reader has already had an exposure to the usual chemistry text and thus assumes wide latitude in re-exploring and re-integrating the material of chemistry from the point of view of the most basic aspects of atomic and molecular theory. For his intended audience the author has wisely and realistically developed theoretical principles, starting with classical physics and following through with an intuitive and semiquantitative treatment of atoms and molecules, within an algebraic framework. The results of the wave mechanical treatment of the hydrogen atom are presented with only a reference to the mathematical sophistication required to obtain them.

Briefly, the chapter coverage is as follows: 1. Introduction, a perspective on facts, laws, theories and a molecular view of matter; 2. Some Elementary Facts of Chemistry, a review of basic concepts, equations, stoichiometry, etc.; 3. Atoms, Electrons, and Nuclei, an excursion into

atomic structure; 4. Chemical Bonding; 5. States of Matter; 6. Rates of Chemical Reactions.

The text is characterized by well ordered and concise development of concepts and sequences. The author makes excellent use of models, theorems, and approximations to rationalize the behavior of electrons in atoms and molecules. Correlation of theory and observed properties and transformations of matter is emphasized. The range of examples spans odd-electron bonds to semiconductors and branching chain reactions. The choice of material is judicious. By design, the length of discussion per topic is minimized. Thus, the text requires careful reading and thoughtful contemplation to abstract its full value.

In contrast to the assets mentioned above, there are liabilities encountered, the most significant being the following. Chapter 4: in presenting and discussing the results of the wave mechanical treatment of the hydrogen atom, the terms "orbit" and "orbital motion of the electron" are used in connection with a wave function, thus implying a trajectory connotation rather than probabilistic interpretation; the distinction is made between a "spatial orbital," defined by the principle, angular momentum and magnetic quantum numbers and a simple "orbital," which is defined by the author in terms of the principle, angular momentum, magnetic and spin quantum numbers—the latter is used by the author in discussing covalent bonding, whereas the former is the interpretation used by most other introductory texts (students

will be confused by this point since it forms the basis for such phrases as "... six *p*-type orbitals..."); ligand binding to metal ions is categorized into chemical and physical (?) binding (question mark mine); hybridization as a model for shapes of molecules is omitted. Chapter 6: the term "non bonding orbital" is used, yet nowhere in the text is there a development of the concept of molecular orbitals via linear combinations of atomic orbitals.

In conclusion, this reviewer feels the assets of the text are not significantly compromised by the liabilities encountered. The text can be recommended as valuable not only to the intended audience but to every introductory chemistry instructor searching for different points of view. Personal classroom use of ideas obtained from the text has already been implemented.

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Chemistry for Medical Technologists

Wilma L. White, Marilyn M. Erickson, both of Barnes Hospital, St. Louis, Mo., and *Sue C. Stevens*, Washington University School of Medicine, St. Louis, Mo. The C. V. Mosby Company, St. Louis, 1970. xii + 710 pp. Figs. and tables. 18.2 × 26 cm. \$15.

This book has been rewritten, reorganized, and expanded, running approximately 300 pages longer than the second edition. This expansion has added a great deal to the book. (See *THIS JOURNAL* 36, 421 (1959) and 43, A918 (1966).) There are new chapters on acid-base metabolism, atomic absorption, hormones, radio immunoassay, chromatography, electrophoresis and immuno-electrophoresis, the AutoAnalyzer, and the Robot Chemist. These new chapters are complete enough for this type of text. They explain the basic techniques utilized, but not in the detail one would expect in a more comprehensive reference. There is more use of contributions by experts in their special areas than in the previous editions. There are reasonable lists of references (up to 1969) at the end of each chapter. The procedures are printed in bold type, and have large margins so that notes can be easily added. The list of needed reagents and equipment precede, and sample calculations follow each method. The chapter on quality control has been greatly expanded. It emphasizes basic distribution patterns, calculation of the standard deviation, and heavy usage of control charts. It does not include much material relating to hypothesis testing (less than one page of the twenty-four of this chapter) and none on discordant data treatment. Part I of the second edition, which consisted of four chapters dealing mainly with elementary chemistry, has been deleted. Some of the more important discussion formerly in these chapters has been included in an appendix. The reorganization of the remaining chapters around body function is most welcome, making the entire volume substantially easier to use.

(Continued on page A728)

Reviewed in this Issue

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| <i>Sidney W. Benson</i> , Atoms, Molecules, and Chemical Reactions: Chemistry from a Molecular Point of View | ...A727 |
| <i>Wilma L. White, Marilyn M. Erickson, and Sue C. Stevens</i> , Chemistry for Medical Technologists | ...A727 |
| <i>John H. Woodburn</i> , Opportunities in the Chemical Sciences | ...A728 |
| <i>John E. Amoore</i> , Molecular Basis of Odor | ...A728 |
| <i>Robert I. Gelb</i> , Elementary Quantitative Chemistry: A Laboratory Text and Manual | ...A728 |
| <i>Russell McCormach</i> , editor, Historical Studies in the Physical Sciences, Volume I | ...A730 |
| <i>A. J. B. Robertson</i> , Catalysis of Gas Reactions by Metals | ...A730 |
| <i>Ionel Haiduc</i> , The Chemistry of Inorganic Ring Systems. Parts I and II, Interscience Monographs on Chemistry | ...A730 |
| <i>Eugen Müller</i> , editor, Methoden der Organischen Chemie. Houben-Weyl. Band XIII/4. Metallorganische Verbindungen, Al, Ga, In, Tl | ...A732 |
| <i>Maurice Crosland</i> , The Society of Arcueil. A View of Science at the Time of Napoleon I | ...A732 |
| <i>James D. Morrison and Harry S. Mosher</i> , Asymmetric Organic Reactions | ...A732 |
| <i>George Odian</i> , Principles of Polymerization | ...A734 |
| <i>Ernest I. Becker and Minoru Tsutsui</i> , editors, Organometallic Reactions. Volume 1 | ...A734 |
| <i>Anthony M. Trozzolo</i> , editor, International Conference on Singlet Molecular Oxygen and Its Role in Environmental Sciences. Annals of the New York Academy of Sciences Vol. 171 | ...A735 |
| New Volumes in Continuing Series | ...A737 |