

Inorganic Reactions and Structure. By EDWIN S. GOULD, Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn 2, New York. Henry Holt and Company, 383 Madison Avenue, New York 17, N. Y. 1955. viii + 470 pp. 16 × 24 cm. Price, \$6.50.

The chemistry curriculum in most colleges has undergone during the past quarter century a gradual metamorphosis. The subject is now largely presented as the development and application of theoretical principles. The descriptive material which remains is used mainly as a fortification of these principles. We teachers are strongly tempted to treat casually the more mysterious facts of nature and to emphasize the phenomena which lend themselves to ready explanation on the basis of theory. While this change in approach to the subject is not on the whole undesirable, it has led to a rather serious deficiency in the student's factual knowledge of the chemical reactions of the elements and compounds. The author of this book has been keenly aware of this lack in the training of chemists.

One of the two main objectives of this book is to rectify this situation in the field of inorganic chemistry. It is intended as a text for a course to be given to students in the latter part of their undergraduate training or to graduate students who have had no inorganic chemistry other than that normally included in introductory courses. The other purpose of the author is to acquaint the student with the applicability and limitations of modern structural theory. The level of the presentation is for those who have had courses in qualitative and quantitative analysis but have only average background in college mathematics and physics.

Rather more than half of the text is devoted to the presentation of theoretical matter and physical background. The subjects include atomic structure, energy levels, valence bond, bond energies, covalent bond lengths, electronegativities, ionic crystals, stereochemistry and acid-base theory. There are also chapters on X-ray studies, the use of magnetic susceptibility, dipole moments and molecular spectra in structural studies, nuclear chemistry, and nomenclature in inorganic chemistry. Interspersed throughout these discussions are chapters dealing with the chemical properties of representative elements. The author's reason for arranging the topics in this way is to avoid overdoses of either theoretical or descriptive material, but it is suggested that the order of presentation could be changed without serious consequences.

Suggestions for supplementary reading are given at the end of each chapter. About 80% of the suggestions are page references to standard treatises or other text books. Most of the other references are to review articles. A set of questions is also provided with each chapter. The author warns the student that full benefit from the text is to be achieved only by working the problems. A table of approximate oxidation potentials and a table giving some numerical constants of the elements are included as appendices.

The impression gained on reading this book is that the author has covered the theoretical parts adequately but has not come through with a satisfactory treatment of chemical reactions. In too many instances it is assumed that the student is already familiar with the methods of preparation of compounds and with their properties, or he is referred to more advanced works. The reactions which are discussed in detail are mostly those which can be "explained" as nucleophilic reactions. The structural features of compounds are often discussed without any indication of how the compounds may be prepared. Too often, the reader is confronted with paragraphs dealing with several ideas each expressed in the baldest form. In this way, the author has been able to cover a great many phenomena in a few lines but the result is more an outline for study than material to study.

The sets of questions accompanying each chapter are in general well stated and provocative. Some of them are in the nature of puzzles which may be of doubtful value. Many of the questions are concerned with analytical separations. It is unlikely that the average student would be able to answer many of the questions on inorganic preparations without recourse to sources other than the text. Not a few of the questions dealing with applications of theory require that the student use equations which have not been derived.

The effectiveness of the text in accomplishing its purpose is somewhat diminished by the grammatical style adopted by its author. Sentences are run together, and parenthetical statements abound. The text has not been very carefully edited. The shape of an ion is described on p. 150 as "a round-based truncated pair. . . which is joined to another pair-shaped atom." On p. 79 the wrong formula is given for acetic anhydride in an equation which is not balanced and does not give the correct products. All of the figures are line drawings in which the perspective is not always clear. A line is missing from the figures for $\text{Be}(\text{C}_2\text{O}_4)_2^{-2}$ and for graphite. The figure representing the structure of diamond is not very useful.

The complete absence of reference other than the supplementary reading list is, according to the author, justified because students at this level have little inclination to consult the original literature. It would have been a great convenience, however, to many teachers to have been supplied with this information. It is not always easy, for instance, to distinguish reaction mechanisms given in the text which have been supported by experimental work and those which merely appear reasonable to the author.

In spite of these shortcomings, the book should prove a useful addition to textbook literature. It furnishes an outline for study which touches on most of the important phenomena of inorganic chemistry.

UNIVERSITY OF CONNECTICUT
STORR, CONNECTICUT

ROLAND WARD

BOOKS RECEIVED

September 10, 1955—October 10, 1955

WILLIAM BAND. "An Introduction to Quantum Statistics." D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York 3, N. Y. 1955. 342 pp. \$6.00.

ULRICH DEHLINGER. "Theoretische Metallkunde." Vol. 13. Springer-Verlag, Reichpietschufer 20, Berlin W 35 (West-Berlin), Germany. 1955. 250 pp. Ganzleinen DM 27.—

JESSE P. GREENSTEIN AND ALEXANDER HADDOW (edited by). "Advances in Cancer Research." Volume III. Academic Press, Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1955. 369 pp. \$8.50.

ERNST A. HAUSER. "Silicic Science. A Review of the Colloid Scientific Properties and Phenomena Exhibited by Matter Composed Essentially of the Element Silicon." D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York 3, N. Y. 1955. 188 pp. \$12.50.

I. PRIGOGINE. "Introduction to Thermodynamics of Irreversible Processes." Charles C. Thomas, Publisher, 301-327 East Lawrence Avenue, Springfield, Illinois. 1955. 115 pp. \$4.75.

G. K. ROLLEFSON, Editor, and R. E. POWELL, Associate Editor. "Annual Review of Physical Chemistry." Volume 6. Annual Reviews, Inc., Stanford, California. 1955. 515 pp. \$7.00 (U.S.A.); \$7.50 (elsewhere).

M. CANNON SNEED AND ROBERT C. BRATED, Editors. "Comprehensive Inorganic Chemistry." Volume IV. Part I. "Zinc, Cadmium, and Mercury." By Howard M. Cyr and The Editors. Part II. "Scandium, Yttrium, and the Lanthanide Series." By Thomas D. O'Brien and The Editors. D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. 1955. 193 pp. \$5.00.

A. F. TROTMAN-DICKENSON. "Gas Kinetics. An Introduction to the Kinetics of Homogeneous Gas Reactions." Academic Press, Inc., Publishers, 125 East 23rd Street, New York 10, N. Y. 1955. 322 pp. \$8.00.

L. ZECHMEISTER, Editor. "Progress in the Chemistry of Organic Natural Products." (Fortschritte der Chemie organischer Naturstoffe). Volume XII. Springer-Verlag, Mölkerbastei 5, Wien 1, Austria. 1955. 550 pp. \$19.00; Ganzleinen, \$19.80.