Mathematics

Introduction to the Theory of Integration. T. H. Hildebrandt. Academic Press, New York. 1963. x + 385 pp. Illus. $14.

The author has put into the form of a textbook of some 400 pages lectures that he has delivered during a period of more than 25 years. The lectures assume familiarity with what was, roughly, the theory of functions of one real variable prior to this century. Hildebrandt has not followed the present trend in textbooks at this level, which in his opinion overlook the concrete basic ideas. His attitude is the sort that a person of his generation might well be expected to have. It is not clear whether the best students, those who now imbibe set theory with their mother's milk, will be satisfied to wait until they reach page 140 for a brief account of this topic, an account that probably contains much less than they already know and which they could have used in the earlier part. On the other hand, for the general run of beginning graduate students—a group which seems to diminish each year in comparison with the best students—there is much to be said for helping them to consolidate their knowledge before exposing them to the wealth of ideas, and the high level of sophistication, of most of contemporary mathematics.

It is therefore certainly no criticism of the book to say that the greater part is devoted to matters of very secondary interest today. That is the author's intention, and it is probably good for the student. As the text is presented, there are no surprises, the reader is never asked to fly before he can walk, and he always knows where he stands. There is not even any attempt to indulge in little side excursions to stimulate additional interest, for this would only serve to disconcert all but the most gifted readers. However, one wonders how many students will be willing to persevere without some added inducements, and probably the book needs to depend largely on a teacher's wit and sparkling eye, as the lectures themselves doubtless did for more than 25 years.

Occasionally, the book brings the reader to the boundary of present knowledge, a point from which he can embark on new research, a trial of skill that could lead to a good master's thesis, or which he can use as a point of departure in preparing for further study.

L. C. YOUNG
Department of Mathematics, University of Wisconsin

Geometry

Foundations of Differential Geometry. vol. 1. Shoshichi Kobayashi and Katsumi Nomizu. Interscience (Wiley), New York, 1963. xii + 329 pp. Illus. $15.

This is the first volume of a two-volume work intended by the authors to provide a systematic introduction to the field as well as to serve as a reference book. However, the book is by no means elementary; it requires considerable mathematical maturity and more than a passing acquaintance with such concepts as vector spaces and matrix algebras, Lie groups and algebras, topological and group spaces, and others.

Chapter 1 is largely concerned with basic concepts and techniques (differentiable manifolds, tangent spaces, derivations and differential forms, tensor fields, Lie groups, and fiber bundles), and it contains numerous illustrations of general concepts. In particular, the early development of fundamental properties of the group of isometries of a metric space has, in addition to its mathematical interest, considerable value in helping the less mature reader appreciate the power and the beauty of the subject. Throughout the book the authors employ and expect the reader to become familiar with the several computational techniques that are common in differential geometry.

Ehresmann's connection theory is developed in chapter 2 and applied to linear, affine, and Riemannian connections in chapters 3 and 4. Chapter 5 contains introductory material on Riemannian curvature, while chapter 6 is largely concerned with transformations that preserve either an affine connection or a Riemannian metric. These chapters, which are rich in geometric content, present both classical and modern results. Brief as it is, the book contains much basic material on normal coordinates, convex neighborhoods, distance, geodesics, parallelism, completeness, holonomy groups, flat connections, and infinitesimal isometries. The last 45 pages contain seven appendixes, which cover topics not in the mainstream, and 11 brief notes, partly historical and partly supplementing the main text. The reader who is prepared to undertake a study in depth of modern differential geometry will find this book a very valuable addition to the literature.

HARRY LEVY
Department of Mathematics, University of Illinois

Nuclear Chemistry

Technique of Inorganic Chemistry. H. B. Jonassen and A. Weissenberger, Eds. vol. 2, *Nuclear Chemistry*. Noah R. Johnson, Eugene Eichler, and G. Davis O'Kelley. Interscience (Wiley), New York, 1963. xiv + 202 pp. Illus. $8.

This is a short and up-to-date introduction to nuclear chemistry. Since the techniques and data of this hybrid discipline, which bridges chemistry and nuclear physics, are rapidly evolving and changing, a concise text of this sort is very welcome. The authors are well-known nuclear chemists at the Oak Ridge National Laboratory, and they therefore present first-hand knowledge of the more technical aspects of the field.

The presentation of the theoretical background follows the standard pattern of the more comprehensive textbooks. The authors discuss radioactive decay and then give a short account of its theory, including a discussion of decay schemes. In each case, references to modern review articles or to more extensive monographic treatments (like the *Source Material for Radiochemistry*) are given. The next chapter deals with the interaction of radiations with matter, including a short account of biological effects. The energetics and mechanisms of nuclear reactions are an essential introduction to the production of radionuclides. For this purpose the bombardment facilities of nuclear chain reactors have become the most widely used tools. Most of the chemistry proper in *Nuclear Chemistry* consists of separation techniques that have some specific aspects on the tracer-level different from ordinary macroscopic

chemistry. The most recent methods are adequately sketched and cited. Almost half of the book is devoted to the detection and measurement of nuclear radiation. The conventional detectors and the information retrieval systems connected with them as well as the more modern techniques—organic scintillation detectors and solid state devices—are well treated. Low-level counting methods are mentioned as well as the problems posed by absolute assay measurements. Finally, source mounting techniques are considered.

This well-written text will be most useful to any student confronted by the problem of applying the techniques of this field to chemical problems. It gives a competent survey of all the essential facts he must know.

E. SCHUMACHER
Anorganisch-Chemisches Institut, Universität Zürich

Cloud Microphysics

The Physics of Rainclouds. N. H. Fletcher. Cambridge University Press, New York, 1962. 386 pp. Illus. $11.50.

Fletcher's book went to press a decade and a half after the current explosive growth of cloud physics was triggered, in August 1946, by Schaefer's accidental discovery of the way in which supercooled clouds undergo freezing near −40°C. That the bulk of what we now know about the anatomy and physiology of natural clouds has been learned during the last decade and a half is indicated by the fact that in Fletcher's comprehensive bibliography of about 550 references some 85 percent of the papers listed were published after 1946. Much of the effort behind that recent expansion in the work on cloud physics was stimulated by the hope that man might learn to control, or at least to modify, natural precipitation processes. In this book Fletcher documents the strides taken in pursuing that intriguing goal.

Greater progress has been made in understanding the microphysics of clouds than in elucidating the gross dynamics and kinematics of cloud motions. Hence Fletcher addresses himself chiefly to summarizing the present state of cloud microphysics. P. Squires contributes an introductory chapter in which he sketches the broad outlines of cloud dynamics, but initial attacks on that mathematically forbidding subject are only currently being undertaken in studies on numerical models in which high-speed computers are used. Thus, perhaps another decade must pass before a really adequate treatment of cloud dynamics can be given in a book of this type.

The Physics of Rainclouds is a competent review of what is now known about cloud microphysics and precipitation processes. Because marked progress in understanding the mechanisms of nucleation of both condensation and ice-formation has been one of the most significant advances of recent years, and because Fletcher has been a leading contributor in this area, it is not surprising that topics in nucleation comprise roughly two-fifths of the book, and a very valuable two-fifths indeed. Two chapters sum up the state of the art of cloud modification, with strong supporting discussions of the production and properties of silver iodide nuclei and of ice-crystal growth. The author wisely eschews any attempt to summarize the field of cloud electrification and justifiably leaves the field of radar meteorology to other recently published works; but one might ask if, in a book on rainclouds, he should not have dealt more extensively with details of the growth of precipitation particles. Perhaps that minor objection could be better phrased by suggesting that another title, such as "Microphysics of Clouds," might be more appropriate for this very useful work.

The book was intended not only as "a useful reference volume for workers in the various branches of cloud physics" but also as an "up-to-date introduction to cloud physics for physicists and meteorologists new to the subject." It seems to me that Fletcher achieved both those aims.

JAMES E. MCDONALD
Institute of Atmospheric Physics, University of Arizona

New Books

Mathematics, Physical Sciences, and Engineering

Practical Mathematics for Chemists. F. H. C. Kelly. Butterworth, Washington, D.C., 1963. 156 pp. Illus. $3.95.

Programmed Supplements for General Chemistry. vol. 2. Gordon M. Barrow, Malcolm E. Kenney, Jean D. Lassila, Robert L. Litle, and Warren E. Thompson. Benjamin, New York, 1963. 159 pp. Illus. Paper, $3.95.

Progress in Astronautics and Aeronautics. vol. 11, *Power Systems for Space Flight*. A selection of technical papers, based mainly on a conference (Santa Monica, Calif.), September 1962. Morris A. Zipkin and Russell N. Edwards, Eds. Academic Press, New York, 1963. 959 pp. Illus. $13.50.

Rheology of Emulsions. Proceedings of a symposium held by the British Society of Rheology (Harrogate), October 1962. P. Sherman, Ed. Pergamon, London; Macmillan, New York, 1963. 154 pp. Illus. $7.50.

Semiconductor Particle Detectors. J. M. Taylor. Butterworth, Washington, D.C., 1963. 194 pp. Illus. $8.25.

The Spores and Pollen of the Potomac Group of Maryland. Gilbert J. Brenner. Department of Geology, Mines, and Water Resources, Baltimore, Md., 1963. 237 pp. Illus. Paper, $2.50; cloth, $3.50.

Statistical Astronomy. Robert J. Trumpler and Harold F. Weaver. Dover, New York (© 1953), 1963. 666 pp. Illus. Paper, $3.

Tables for Testing Significance in a 2 × 2 Contingency Table. Compiled by D. J. Finney, R. Latscha, B. M. Bennett, and P. Hsu. Cambridge Univ. Press, New York, 1963. 109 pp. Illus. Paper, $3.25.

Tables of Series, Products, and Integrals. I. M. Ryshik and I. S. Gradstein. Plenum Press, New York, ed. 2, 1963. 464 pp. Illus. $15.

Technique of Inorganic Chemistry. vols. 1 (276 pp., $9.50) and 3 (353 pp., $11.50). Hans B. Jonassen and Arnold Weissberger, Eds. Interscience (Wiley), New York, 1963. Illus.

Theoretical Evaluation of Chemical Propellants. Roger Lawrence Wilkins. Prentice-Hall, Englewood Cliffs, N.J., 1963. 479 pp. Illus. $15.

Thin-Layer Chromatography. Kurt Randerath. Translated by D. D. Libman. Verlag Chemie, Weinheim, Germany; Academic Press, New York, 1963. 264 pp. Illus. $8.

Treatise on Analytical Chemistry. pt. 1, *Theory and Practice*. vol. 4, section D-1, *Magnetic Field Methods of Analysis*; section D-2, *Electrical Methods of Analysis*. I. M. Kolthoff and Philip J. Elving, Eds. Interscience (Wiley), New York, 1963. 981 pp. Illus. $25.

The Two-Nucleon Interaction. Michael J. Moravcsik. Oxford Univ. Press, New York, 1963. 164 pp. Illus. Paper, $2.90.

Ultrahigh Vacuum. And its applications. Richard W. Roberts and Thomas A. Vanderslice. Prentice-Hall, Englewood Cliffs, N.J., 1963. 219 pp. Illus. $12.

Vacuum Technology. Andrew Guthrie. Wiley, New York, 1963. 544 pp. Illus. $12.50.

Variational Principles in the Theory of Collisions. Yu. N. Demkov. Translated from the Russian edition (Moscow 1959) by N. Kemmer. Pergamon, London; Macmillan, New York, 1963. 167 pp. Illus. $6.50.

X-Ray Studies of Materials. A. Guinier and D. L. Dexter. Interscience (Wiley), New York, 1963. 166 pp. Illus. $6.75.