hol; α-naphthylurethan, m. p. 65.6–66.3°; mono ester with 3-nitrophthalic anhydride, m. p. 165.3–166.4°. Somewhat better results were obtained with cobaltous oxide as catalyst.

Benzyl alcohol gave toluene (49%) and β-phenylethyl alcohol (26%); α-naphthylurethan, m. p. 117.5–118.5°. Distillation of the alcohol from molten potassium hydroxide gave an 86% yield of styrene, identified through its dibromide.

Isopropyl alcohol gave 11% of a mixture of *n*-butyl and isobutyl alcohol; the former was identified by its infrared spectrum and the latter by its phenylurethan, m. p. 84.6–85.5°. *n*-Propyl alcohol reacted slowly at 180° to give a mixture of butyl, isobutyl, isoamyl and *n*-amyl alcohols, identified by their infrared absorption spectra.

U. S. BUREAU OF MINES
PITTSBURGH 13, PA.
DEPARTMENT OF CHEMISTRY IRVING WENDER
THE UNIVERSITY OF PITTSBURGH ROBERT LEVINE
PITTSBURGH, PA. MILTON ORCHIN

RECEIVED OCTOBER 10, 1949

NEW BOOKS

Radioactive Indicators. Their Application in Biochemistry, Animal Physiology, and Pathology. By GEORGE HEVESY, Institute for Research in Organic Chemistry, University of Stockholm, Sweden; Institute for Theoretical Physics, University of Copenhagen, Denmark. Interscience Publishers, Inc., 215 Fourth Avenue, New York 3, N. Y., 1948. xvi + 556 pp. Illustrated. 16 × 24 cm. Price, $10.00.

Thirty-six years ago the first paper on the use of radioactive indicators was published by Paneth and Hevesy. They first determined the solubility of some lead compounds and for several years were the only research workers applying this new tool. Ten years later, in 1923, Hevesy reported the first biological application of radioactive indicators: a study of the absorption and translocation of lead in plants. The present book is the most recent of a long series of publications by this pioneer in applied radiochemistry.

Chemists not primarily concerned with life science research will find little of direct interest in this book since it is a reference book written as a very extensive review article of the applications of radioactive indicators in biochemistry, animal physiology and pathology.

The first three chapters cover the production, availability and measurement of radioactive tracers. These chapters and the next two on atomic interchange and applications in chemical analysis do not fall within the province of the author's major interests and suffer as a consequence thereof. They represent an uncritical compilation of some of the literature and include such items as a copy of the 1947 catalog and price list of radioisotopes available from the U. S. A. E. C. Three long tables showing the decay of Na^{24}, K^{42} and P^{32} also seem unnecessary in a book of this type. The remaining eighty per cent. of the book is a substantial contribution to the literature of radioactive indicators, representing as it does a review of thirteen years of intensive work by many investigators in a very active field of research.

This section follows a logical pattern, starting with the general considerations of absorption, distribution and excretion of more than twenty-five elements, as simple inorganic species, in the whole animal organism. This is followed by a discussion of the problems associated with the transport of ions and compounds across the many types of membranes in living systems. Metabolic studies, including intermediary metabolism, are treated next. This section closes with a survey of the new information obtained from radioactive indicator studies of the special organs; the skeleton and red cells. The shortcomings of radioactive indicators in biology treated in the final chapter provide a timely warning for overenthusiastic readers.

Throughout the book many of the data from the original articles are reproduced in tables and graphs and detailed references are given. A Segre chart is included in an attached envelope in the back of the book. The author index and subject index are both excellent as they should be for this type of reference book.

Since the use of radioactive indicators in the fields of biochemistry, animal physiology and pathology is increasing so rapidly, Hevesy's "Radioactive Indicators" may be the last complete review of these fields. It will serve well as a point of departure for subsequent reviews of the accumulating knowledge, during the next few years.

JOHN W. IRVINE, JR.

Chemistry of Specific, Selective and Sensitive Reactions. By FRITZ FEIGL, Eng., Dr. Sc., Laboratory of Mineral Products, Ministry of Agriculture, Rio de Janeiro, Brazil; formerly Professor of Analytical and Inorganic Chemistry at the University of Vienna. Translated by Ralph E. Oesper, Professor of Chemistry, University of Cincinnati, Ohio. Academic Press, Inc., New York, N. Y., 1949. xiv + 740 pp. 15 × 23 cm. Price $13.50.

Perhaps few books have been written under greater hardships and handicaps than this one. The author began the laborious task of collecting and preparing material long before World War II but this was all lost during his flight from Europe and he had to make a new start after getting relocated in Brazil. The manuscript was written in German and translated into English by Professor R. E. Oesper, to whom the author pays especial thanks for his technical advice, patience ("even with last minute changes"), and deep understanding of the aims of the work. The "earmarks" of a translation, so often evident in English translations of technical books, are pleasingly missing and the reviewer found no serious typographical errors while reading the book from cover to cover.

The contents of the book and the method of presentation were chosen with three groups of readers in mind: (1) "those who wish to know the chemical basis of many modern analytical procedures," (2) "those who are actively engaged in research in analytical chemistry or in related fields," and (3) "those interested in experimental chemistry as a part of science which is still a fertile field for the trained and alert investigator." This was indeed an ambitious undertaking and no one is better qualified for such a task than Fritz Feigl who for more than a quarter of a century has made outstanding contributions to the

chemistry of specific, selective and sensitive reactions. He is the originator of modern spot test analysis to which he and his students have added many new and novel techniques in the field of qualitative and quantitative analysis.

The book contains twelve chapters which deal with the following topics: General comments on the analytical usefulness of chemical reactions (Chapter I, 5 pages); characterization of chemical tests and the role of reaction conditions (Chapter II, 16 pages); complex and coördinating compounds (Chapter III, 44 pages); masking and demasking of reactions (Chapter IV, 42 pages); enhancement of reactivity of compounds and reaction systems (Chapter V, 57 pages); effect of certain atomic groupings on the specific and selective activity of compounds in inorganic analysis (Chapter VI, 202 pages) and in organic analysis (Chapter VII, 13 pages); regularities and anomalies in the solution of materials in indifferent solvents (Chapter VIII, 28 pages); influence of size and weighting effects on solubility and salt-forming ability (Chapter IX, 21 pages); surface effects in analytical chemistry (Chapter X, 180 pages); genetic formation of materials and topochemical reactions (Chapter XI, 58 pages); and analytical uses of fluorescence effects and photochemical reactions (Chapter XII, 23 pages).

Hundreds of references to the original literature are given throughout the book as well as many previously unpublished observations by the author and his co-workers. A valuable feature of the book is the many suggestions for future research problems. There is hardly a page from which one does not glean valued suggestions for future work. Another feature of the book is the large number of critical remarks (frequently given as footnotes in smaller type) pertinent to the subject. The reviewer regrets that most of the footnotes were not incorporated in the main text; reading would have been much easier because of less frequent interruption. A hasty count revealed that 190 pages have a footnote, some fairly long, and that about 40 pages have two or more footnotes. This is not intended as a serious criticism but only a suggestion for a future edition; indeed, some readers may prefer the frequent use of footnotes in a work of this type.

The book has both an author and a subject index, many useful tables (29), and makes liberal use of structural formulas. Printing, paper and binding are good.

Dr. Feigl deserves congratulations and much praise for making such a noteworthy contribution to the "chemistry of specific, selective and sensitive reactions."

JOHN H. YOE

BOOKS RECEIVED

October 10, 1949–November 10, 1949

M. A. BRAVAIS. "On the Systems Formed by Points Regularly Distributed on a Plane or in Space." Translated by Amos J. Shaler. Published by the Crystallographic Society of America. Printed by the Book Concern, Hancock, Michigan. 1949. 113 pp. $3.40 (members), $3.90 (non-members).

JOHN W. COPENHAVER AND MAURICE H. BIGELOW. "Acetylene and Carbon Monoxide Chemistry." Reinhold Publishing Corporation, 330 West 42nd St., New York, N. Y. 1949. 357 pp. $10.00.

R. LEMBERG AND J. W. LEGGE. "Hematin Compounds and Bile Pigments." Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. 1949. 749 pp. $15.00.

PETER PRINGSHEIM. "Fluorescence and Phosphorescence." Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. 1949. 794 pp. $15.00.

WILLIAM E. SIRI. "Isotopic Tracers and Nuclear Radiations with Applications to Biology and Medicine." McGraw-Hill Book Co., Inc., 332 West 42nd St., New York, N. Y. 1949. 653 pp. $12.50.

A. E. VAN ARKEL. "Molecules and Crystals." Translated by J. C. Swallow. Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. 1949. 234 pp. $3.85.