NEW BOOKS

The Discovery of the Elements. Collected Reprints of a Series of Articles Published in the *Journal of Chemical Education*. By MARY ELVIRA WEEKS, Assistant Professor of Chemistry at the University of Kansas. Illustrations Collected by F. B. Dains, Professor of Chemistry at the University of Kansas. Mack Printing Company, Easton, Pennsylvania, 1933. iii + 363 pp. Illustrated. 15.5 × 23.5 cm. Price, $2.00.

The reviewer will have to confess that when the separate chapters of this interesting book appeared, each one with exasperating monthly intervals, he felt as did the old lady who said she liked to read the dictionary "because it changed the subject so often." In other words, he lost the perspective, not being able to see the forest for the trees.

Now all that is changed! One cannot help admiring the skilful execution of the author in arranging the sequence so that we are led on and on with pleasant anticipation, to the very end.

We read from the Foreword:

> "The story of the disclosure, one by one, of the chemical elements has never been told as a connected narrative.... It is hoped therefore that these chapters may not only render tribute to the honored men and women who helped to reveal the hidden chemical elements but that they may also serve to acquaint chemists and others with these great achievements."

Just at this time, when the last two of the supposed ninety-two elements are being revealed, it is indeed most appropriate that this record—"never before told as a connected narrative"—should be given to the world.

Again from the Foreword: "The task of selecting and eliminating material has been pleasant but difficult."

Difficulties there must have been, but these also could not have been resolved except by the (unmentioned) labor of consulting and accurately reporting somewhat more than a thousand given references to original literature, from Greek, Latin and almost all the languages of modern Europe. It is noticeable also that the large collection of photographs has been made with great care under the able supervision of Dr. Dains. To make the book still more complete, there is added a chronological table covering the period from 1627 to 1931, containing 271 items. There is also a full index.

The work is far from being a mere compilation. On the contrary, the author has introduced into the search for the elements, and into the personal history of the discoverers, frequent dramatic incidents; and has not hesitated to make apparent by anecdotes and illustrations the contrasts between the living conditions of different investigators, as it may be, financial, educational or temperamental. One sees, for instance, without the author pointing out the fact, the difference between the contemporaries, Cavendish "largest depositor in the Bank of England," painfully diffident (p. 31) and Scheele, that seventh child in a Pomeranian family of eleven, a "family not as rich in worldly goods as in children" apprenticed at fourteen to an apothecary (p. 44) brilliant, modest, yet genial.

It is a great pleasure to recommend this new book to all who are interested in the history of chemistry; and all of us will be grateful to Dr. Weeks and to Dr. Dains and their many associates and contributors at the University of Kansas, and elsewhere, for this product of great labor, a book which we may consult on topics the sources of which would be otherwise obscure or even inaccessible, a book which is at once a love story without sex and a detective story with a thousand and one plots—perhaps a modern Arabian Nights.

ARTHUR J. HOPKINS

Positive Korpuskularstrahlen. (Positive Rays,) By H. POSE and R. WIERL. Eucken-Wolf, "Hand und Jahrbuch der chemischen Physik," Band 6, Abschnitt III. Akademische Verlagsgesellschaft m. b. H., Markgrafenstrasse 6, Leipzig C 1, Germany, 1933. 284 pp. 201 figs. 17.5 × 25 cm. Price, RM. 28.

This is a small part of a very ambitious undertaking and if the following volumes are of the same quality as this one, the whole will represent a quite unique and monumental addition to the physico-chemical literature.

The book is divided into two parts: the α-rays are treated by Pose (160 pp.) and "Kanalstrahlen" or positive rays were started by Wierl and completed by Hengstenberg and Wolf. The first section of the article by Pose is devoted to the properties and measurement of α-particles. It includes descriptions of the methods used and results obtained in the study of the origin, charge, mass, velocity, range and scattering of α-particles and ionization phenomena caused by them; it is concluded by a detailed discussion of the methods of counting of α-particles. The second section deals with the elastic collisions of α-particles and atomic nuclei, including a very brief description of the quantum mechanical treatment of the subject. The last section is devoted to the inelastic collisions of α-particles and nuclei, atomic disintegration coupled with emission of protons occupying most of the space but short paragraphs being devoted to the emission of neutrons and of γ-rays.

The second part of the book includes chapters on the production and identification of positive rays, in particular their electric and magnetic deflection. A chapter is devoted to the mass spectrographs, that of Aston being described in considerable detail. The last chapter deals with the interaction of rays and matter, their scattering and diffraction, disintegration of nuclei and various types of ionization produced by positive rays.

Throughout the book, descriptions of experimental technique alternate with the up-to-date discussion of results obtained and the whole is very well illustrated with excellent diagrams. The literature references are carried up to and partially include 1933. As is usual with the German handbooks, preference is given to German work

whenever possible and of course considerable duplication with the already existing German handbooks of physics is unavoidable. Nevertheless the book is so well written and contains so much valuable information in readily accessible form that the reviewer has no hesitation in recommending it.

G. B. KISTIAKOWSKY

Elektrophorese, Elektroosmose, Elektrodialyse, in Flüssigkeiten. (Electrophoresis, Electroosmosis, and Electrodialysis in Liquids.) By P. H. PRAUSNITZ and J. REITSTÖTTER. Verlag von Theodor Steinkopff, Residenzstrasse 32, Dresden-Blasewitz, Germany, 1931. xii + 307 pp. 54 figs. 15 × 22.5 cm. Price, RM. 16.65; bound, RM. 18.

Few subjects in physical chemistry are so confused and undeveloped in theory while at the same time finding innumerable practical applications as is the field of electrokinetics. Prausnitz and Reitstötter are the first to bring together much of the available practical information on cataphoresis, electroosmosis, electrodialysis and their technical applications. Their monograph is primarily useful for its very numerous (verified) references, especially to the patent literature of ten leading countries, with brief summaries of the contents of such patents.

No attempt is made at a sustained development of theory or a consistent point of view. The monograph is essentially a comprehensive compilation of the mass of heterogeneous, more or less related, material; and the compilers, who formerly worked with Graf Schwerin, have earned the thanks of all those interested in this field.

JAMES W. MCBAIN

Atomspektren. (Atom Spectra.) By H. KUHN, Oxford. Eucken-Wolf, "Hand- und Jahrbuch der chemischen Physik," Band 9, Abschnitt I. Akademische Verlagsgesellschaft m. b. H., Markgrafenstrasse 6, Leipzig C 1, Germany, 1934. vi + 266 pp. 78 figs. 17.5 × 25 cm. Price, RM. 24.50; bound, RM. 26.

This work is remarkable for the ease with which the impedimenta of details and symbols are disposed of. Even amidst specific items, Dr. Kuhn has achieved a continuity and an easy orientation which many will admire and be grateful for.

The treatment of atomic spectra is the traditional one if "traditional" may be said of a field which has arrived only within the last few years at the order revealed here. The vector model is employed in close relation to the Correspondence Principle. In addition, pertinent aspects of the wave-mechanics are included and here, happily, the literal adherence to the vector model is challenged. Aside from the central discussion on energy levels and spectral series in the visible, ultraviolet and x-ray regions, the following matters have received attention: spectroscopic methods; hyperfine structure and its relation to nuclear moments and isotopes; external influences such as density and pressure on the breadth of spectral lines; crystal spectra in the visible and ultraviolet regions.

The text is supplemented by many drawings and tables. Data such as term assignments, the numerical magnitudes of the terms, ionization potentials are in separate tables for each group of the Periodic System. The natural comparisons which arise will be of especial value to chemists as thereby the commonly known chemical relationships acquire a deeper significance.

However, the reviewer deplores the complete neglect of group theory in this volume as well as in all others dealing with spectral data. The theory of groups, including the representation theory, is of such generality and runs so broadly through chemistry as well as atomic, molecular and crystal spectra that it is not to be ignored. Rather, we find here as elsewhere the exclusive tendency to import new models with their yearly improvements. This tendency exaggerates in the reviewer's opinion the permanence of these scaffoldings in physics and chemistry. It is curious that group theory which offers an adequate formulation for a concept such as substitution isomerism may ultimately be accepted by chemists by way of the structure of spectra.

SIMON FREED

Thermodynamika. (Thermodynamics.) By M. DE HAAS, Hoogleeraar aan de Technische Hoogeschool te Delft. Second edition, P. Noordhoff, N. V., Groningen, Holland, 1933. xvi + 419 pp. 16 × 23.5 cm.

The first quarter of this book, written for the use of students in engineering schools, is devoted to the first law of thermodynamics and its application to chemical processes and heat engines. The next part is concerned with the second law and the entropy function. The major portion of the text (Part III, pp. 183–411) deals with the applications of the two fundamental laws under the headings: systems with two degrees of freedom, homogeneous and heterogeneous systems of one, two and more components, chemical reactions in ideal gases and in dilute solutions, heat theorem of Nernst, electrochemistry, steam tables and diagrams, combustion engines, steam engines, steam turbines and refrigerators.

The author has succeeded in giving, in one volume, an excellent presentation of the fundamentals of thermodynamics as they apply to the different branches of engineering, in contrast with the practice followed in this country of producing texts written for only one class of students. As a result of the far-going specialization which is becoming more and more pronounced as time goes on, there has developed a most regrettable confusion of names and symbols used for the various thermodynamic functions. Under the auspices of the International Institute on Refrigeration, an attempt is being made to bring about a normalization of symbols and names. Following the recommendations proposed by an international commission headed by Professor Keesom of Leiden University, the author has discarded the notations of Gibbs, used in the previous edition, and has adopted those proposed by the commission. It remains to be seen whether the new system, which is also used in Professor Verschaffelt's recent book on Thermostatics [reviewed in THIS JOURNAL **55**, 5065 (1933)], will come into general use.

As a criticism, it might be stated that there is an almost complete absence of numerical problems, worked out in the body of the text. Without such exercises it is difficult, particularly for beginners, to acquire a proper understanding and familiarity with the subject. By including

an appendix in which the necessary tables and fundamental data, together with a sufficient number of problems and topics to be worked out by the students, are brought together, the author would undoubtedly enhance the usefulness of this clearly written text.

H. S. VAN KLOOSTER

Laboratory Manual of Colloid Chemistry. By HARRY N. HOLMES, Professor of Chemistry in Oberlin College. Third edition, rewritten and reset. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, 1934. xvii + 229 pp. 60 figs. 15.5 × 24 cm. Price, $3.25.

Introductory Colloid Chemistry. By HARRY N. HOLMES, Professor of Chemistry at Oberlin College. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, 1934. xiv + 198 pp. 34 figs. 15.5 × 24 cm. Price, $2.50.

Professor Harry N. Holmes' well-known Laboratory Manual of Colloid Chemistry is now in its third edition. The second edition appeared in 1928 and was twice the size of that of 1922. The new edition, rewritten and reset throughout, contains much new material but it has been held to the same number of pages. When one examines the individual topics to see how this was done it is no surprise that the author was impelled to publish a new supplementary volume entitled Introductory Colloid Chemistry.

Many industrial chemists, to whom the kind of information given in these volumes is invaluable, will not discard their copy of the previous edition and will wish to buy the new volume in spite of some overlapping in the treatment of the same topics.

The manual is really a comprehensive guide. It contains brief directions for 240 experiments often annotated with the author's comments. Then again each general topic is introduced by concise statements of the most important relevant information. Thirdly, the manual is invaluable for its copious references. These are contained in numerous footnotes and indications in the text with a selected list at the end of each of the twenty chapters and a general bibliography at the end. A chapter on catalysis has been inserted.

The Introductory Colloid Chemistry is a self-contained, brief, general survey likewise well furnished with references to fuller information on any particular topic. Almost any page of either book conveys to the reader a vivid impression of the author's ripe experience and first hand knowledge.

JAMES W. MCBAIN

Die Metallseifen. (Metallic Soaps.) By Dr. HANS JULIUS BRAUN. Verlag von Otto Spamer, Heinrichstrasse 9, Leipzig C 1, Germany, 1932. viii + 83 pp. 15 × 23 cm. Price, Rmk. 7; bound, Rmk. 8.50.

It is characteristic of the tremendous ramifications of chemistry that important information may accumulate and be applied in a dozen or more large industries without much of it finding mention in such journals as this, or in those of the London or German Chemical Societies. It is often difficult to know where to turn when such information is sought. Hence the necessity for the production of special monographs such as this brief one on metallic soaps. The authors have drawn upon all available sources in the international literature, private communications, patents and, where necessary, special experiments of their own.

They describe the technically important properties as well as the methods of preparation of these substances and materials. The general introduction is largely devoted to a useful collection of the solubility data of metallic soaps. Those of sodium, potassium and ammonium are, of course, excluded. The special part describes in turn all the soaps (including naphthenates, abietates, etc.) of each of 35 metals. For most of these, technical uses are mentioned.

JAMES W. MCBAIN

BOOKS RECEIVED

June 15, 1934–July 15, 1934

JOSEPH SCUDDER CHAMBERLAIN. "A Textbook of Organic Chemistry." Third edition, revised. P. Blakiston's Son & Co., Inc., 1012 Walnut St., Philadelphia, Pa. 873 pp.

FRITZ EPHRAIM. "Anorganische Chemie. Ein Lehrbuch zum Weiterstudium und zum Handgebrauch." Fifth revised and enlarged edition. Verlag von Theodor Steinkopff, Residenzstrasse 32, Dresden-Blasewitz, Germany. 841 pp. RM. 18.

GEORG JAHN. "Der Zündvorgang in Gasgemischen." Verlag von R. Oldenbourg, Schliessbach 31, München 1, Germany. 69 pp. RM. 6.

GERHART JANDER and OTTO PFUNDT. "Leitfähigkeitstitrationen und Leitfähigkeitsmessungen. Visuelle und akustische Methoden." Second, revised edition. Ferdinand Enke Verlag, Hasenbergsteige 3, Stuttgart-W, Germany. 88 pp.

LEONARD B. LOEB. "The Kinetic Theory of Gases." Second Edition. McGraw-Hill Book Co., Inc., 330 West 42d St., New York. 687 pp. $6.00.

F. MUHLERT. "Der Kohlenstickstoff." Verlag von Wilhelm Knapp, Halle (Saale), Germany. 165 pp. RM. 13.50; bound, RM. 14.75.

FRITZ ROSENDAHL. "Steinkohlenteer." Verlag von Theodor Steinkopff, Residenzstrasse 32, Dresden-Blasewitz, Germany. 194 pp. RM. 13; bound, RM. 14.