for the mathematically mature engineer. In its field, it is a superb job and is certain to achieve a high place in the technical-scientific literature.

POLYTECHNIC INSTITUTE OF BROOKLYN
BROOKLYN, NEW YORK WARREN L. MCCABE

---

**Lehrbuch der Elektrochemie.** By DR. GUSTAV KORTÜM, Professor und Direktor des Instituts für Physikalische Chemie an der Universität Tübingen. Verlag Chemie, G.m.b.H., 17a Weinheim/Bergstr., Pappalallee 3, Germany. 1957. xix + 564 pp. 18 × 24.5 cm. Price, DM 35.80.

The overwhelmingly favorable reviews which greeted the first German edition of Dr. Kortüm's Lehrbuch and the subsequent English edition (Kortüm-Bockris) will no doubt be repeated for this new and completely reworked second German edition. The contents and manner of presentation of the two previous editions have, for the most part, been carried over into the new work, although the chapter on electrochemistry of gases has been understandably eliminated. The remainder of the subject matter has been rewritten to include new developments in electrochemistry up to the latter part of 1956. The author is unusually thorough in his treatment of theory, to the extent that the book may be more properly referred to as an "advanced treatise," rather than a textbook. The combination of *thorough* coverage of the field and *thorough* treatment of theory makes the book particularly useful for advanced students and researchers, but for this very reason the author's intent that the book will also be useful to beginners has not been realized—this despite the fact that the discussions are in general very clearly presented. It is simply that practically no undergraduate, and very few graduate, students in chemistry will properly understand many of the terms (as, for example, "div grad $\psi$") which are used in the derivations.

Some smaller points worthy of mention: The footnotes, as well as the numerous sidelights included in small type, should be read with at least as much attention as is given to the rest of the text, as these contain some of the most interesting and informative material presented. One entire chapter is devoted to a fairly complete treatment of the modern theory of acids and bases; it could be argued that this does not properly belong in a textbook of electrochemistry. A final point, but an important one to most American readers, is that the author's composition reads and translates very easily, much more so than the average article in the German literature.

DEFENSE RESEARCH LABORATORY
THE UNIVERSITY OF TEXAS RAY M. HURD
AUSTIN, TEXAS

---

**Progress in Nuclear Physics.** Volume 6. Editor, O. R. FRISCH, O.B.E., F.R.S., Cavendish Laboratory, Cambridge. Pergamon Press Inc., 122 East 55th Street, New York 22, N. Y. 1957. vii + 297 pp. 16 × 25.5 cm. Price, $14.00.

In reviewing a book of this nature it would be quite useful to know *a priori* the nature of the reading public the Editor had in mind, for then one would be in a better position to judge whether in his opinion the authors had aimed their level of presentation correctly. It seems a reasonable surmise to presume that it is not aimed at the expert but that its purpose is to acquaint knowledgable scientists with general progress in the field of its title and the discussion shall be based on this supposition. The answer to the question then is yes and no, and this is almost to be expected in such a volume in which there appear nine separate articles, each by a different author or authors. The subjects covered and their authors are in order of appearance: "Isotope Separation by Multistage Methods," T. F. Johns; "Nuclear Models," R. J. Eden; "Nuclear Moments and Spins," K. F. Smith; "The Spectroscopy of Mesonic Atoms," M. B. Stearns; "The Masses of Atoms of A > 40," H. E. Duckworth; "Electromagnetic Enrichment of Stable Isotopes," M. L. Smith; "Fission Recoil and its Effects," G. N. Walton; "Masses of Atoms of A < 40," J. Mattauch and F. Everling; "Parity Non-Conservation in Weak Interactions," O. B. Frisch and T. H. R. Skyrme. Each of the articles is followed by what appears to be a fairly complete set of references in the field and several of them, namely those on the masses of the atoms and nuclear moments, contain complete and useful tables relevant to the subject matter.

Generally speaking there appears to be to this reviewer a rather conspicuous failure in the presentation of theoretical material. This is a lack of a simple physical picture or model which would make new ideas or concepts much more digestible. A particularly outstanding example of this appears in the last article on Parity Non-Conservation. In this article the pioneer experiment of Madame Wu and her collaborators in demonstrating the non-conservation of parity is presented in a manner in which it appears the non-conservation of parity in this experiment rests upon a specific model of the neutrino; this is just not so. In further attempting an elucidation of the two neutrino theory of Lee and Yang, the author sticks to a quite formal presentation; this theory can be made much more transparent by a discussion of several limiting cases which are quite simple and physical. However, considering the rapid developments in this field of quite recent origin, the authors appear to have done a commendable job generally speaking.

Of the remaining articles, those by Duckworth and by Smith are outstanding for their clarity and comprehensiveness. Unfortunately it appears to me that the rest suffer by comparison. This appears to be principally a failure in emphasis. Eden attempts to cover the vast field of Nuclear Models in 26 pages, while 30 pages are devoted (and rather poorly) to the certainly much more specialized and narrow field of the Spectroscopy of Mesonic Atoms. Of the two Eden appears to have done the better job though he demands much on the part of the reader.

The volume is excellently printed in large and easy-to-read type. One can, however, seriously question whether the content is at all commensurate with the (quite high) price, particularly if comparison is made with other volumes of a similar nature.

DEPARTMENT OF PHYSICS AND ASTRONOMY
UNIVERSITY OF ROCHESTER M. F. KAPLON
ROCHESTER 20, N. Y.

---

**Trace Analysis.** Papers presented at a Symposium on Trace Analysis held at the New York Academy of Medicine, New York, N. Y. November 2, 3, 4, 1955. Edited by JOHN H. YOE, M.S., M.A., Ph.D., Professor of Chemistry and Director, JOHN LEE PRATT, Trace Analysis Laboratory, University of Virginia, and HENRY J. KOCH, JR., A.B., M.D., Sloan-Kettering Institute for Cancer Research, New York, N. Y. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1957. xiii + 672 pp. 15.5 × 23.5 cm. Price, $12.00.

"The importance of the trace constituents of animate and inanimate matter has been increasingly demonstrated as methods for their detection and quantitation have been developed." "It is the purpose of this book to acquaint the biologist, the physiologist, and the chemist, interested in the trace constituents of matter, with the new as well as the established techniques which are available for their analysis." So stated Dr. Koch in sounding the keynote of the Symposium on Trace Analysis of which this book is the record. Drs. Yoe and Koch are to be doubly commended: in the organization of an interesting symposium in which such outstanding leaders in the field of analytical chemistry participated, and in editing the symposium proceedings to produce this interesting and useful volume.

The table of contents which reads like an analytical chemistry honor roll includes Chromatography and Electrochromatography by H. H. Strain, Ion Exchange by K. A. Kraus, Extraction by L. C. Craig, Chemical Microscopy by W. C. McCrone, Spot Tests by F. Feigl and P. W. West, Colorimetry by M. G. Mellon, Fluorometry by C. E. White, Flame Spectrometry by B. L. Vallee, Potentiometry by N. N. Furman, Coulometry by L. B. Rogers, Polarography and Voltammetry by P. Delahay, Amperometry by C. N. Reilley, Emission Spectrochemical Analysis by L. W. Strock, Spectrochemical Determination of Trace Elements in Biological Materials by R. L. Mitchell, Gamma-Ray Spectroscopy by H. W. Koch, Mass Spectroscopy by M. Ingraham, X-Ray Spectroscopy by T. Hall, X-Ray Micrography by A. Engström, Neutron-Activation Analysis by

A. A. Smales, Microbiological Techniques for Inorganic Ions by E. E. Snell, Instrumentation and Interactions of Beta Particles with Matter by E. H. Müller, Trace Element Sensitivity (comparison of Methods) by W. W. Meinke, and Separation, Concentration, and Contamination by R. E. Thiers.

Each of the chapters contains a general exposition of the principles and general applicability of the particular field and, in most cases, includes material of specific interest in trace analysis.

A number of participants refer to the not too sharply defined "trace level" in terms which reflect the advances in analytical methods. "A trace," which signifies an amount just within the limit of detection, naturally will undergo changes in meaning as the sensitivity of the method improves. Currently, quantities below a microgram are considered as traces. In favorable cases, $10^{-10}$ to $10^{-12}$ g./ml. of certain elements may be determined by neutron-activation analysis, $10^{-8}$–$10^{-9}$ g./ml. by sensitive color reactions. A thorough analysis of a sample $4.5 \times 10^{-12}$ cm.$^3$ can be obtained using X-ray micrography. Millimicrogram quantities of many simple substances can be determined to 1% by means of coulometry. The meaning of "trace level" might be sufficiently altered by the time the next trace analysis symposium convenes so that only submillimicrogram quantities would qualify.

In a work of this kind, readers are bound to be somewhat disappointed in chapters dealing with areas familiar to them. The nature of the symposium required each of the speakers to review much material that was obtainable previously. It is safe to say, however, that very few readers will be sufficiently familiar with all of the fields discussed so as not to derive benefit from this book. This reviewer can recommend it not only to those interested in the trace constituents of matter but to all who are interested in analytical chemistry. The book should provide a useful frame of reference for a stimulating course in analytical chemistry or analytical seminar.

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF ARIZONA HENRY FREISER
TUCSON, ARIZ.

---

**Nouveau Traité de Chimie Minérale. Volume III. Groupe Ia: Rubidium-Césium-Francium. Groupe Ib: Généralités-Cuivre-Argent-Or.** PAUL PASCAL, Membre de l'Institut, Professeur Honoraire à la Sorbonne. Masson et Cie., 120, Boulevard Saint-Germain, Paris 6e, France. 1957. xii + 838 pp. 17.5 × 26 cm. Price, Broché 6.900 fr., Cartonne toile, 6.900 fr.

This is the third publication in a nineteen volume series. Volumes I and X have already appeared, and the series is expected to be completed by 1960. The contributors to Volume III are R. Hackspill (rubidium and cesium), M. Perey (francium), J. Isabay (copper), R. Collongues (silver) and P. Hagenmuller (gold). P. Pascal provides a brief general discussion of the elements of Group Ib.

The substantial advances in theoretical chemistry, especially in the understanding of atoms and molecules, which have come about during the last twenty years have prompted Professor Pascal and his collaborators to undertake the complete revision of the first edition of twelve volumes published in 1931. In spite of the decision to eliminate most of the discussion of industrial aspects of inorganic chemistry, the new work will be considerably larger than the original. Another notable change is the presentation of the elements in the order of the Mendeleeff Periodic Table leading to the inclusion of the coinage metals following the alkali metals in the present volume. In the previous scheme they appeared with the rare earths and mercury. Since, however, the chemistry of each element is given a more or less independent treatment, the advantage of this modification is not apparent.

The really significant feature of the new treatise is the stated purpose of the edition—to use the modern theories of inorganic chemistry to organize and classify the details of the chemistry of the elements and their compounds. Otherwise the objective remains the same as the first treatise—to present a readable account of inorganic chemistry accompanied by a selected bibliography and to avoid the mere compilation of data.

These aims have not been uniformly achieved in Volume III. The brief authoritative chapter on francium by its discoverer, Marguerite Perey, contains forty references (fourteen of them the author's own work) which range from Mendeleeff to 1956. It is a pity that the chapter on rubidium and cesium could not have been included in a volume with potassium. (The seven pages devoted to the hydrides deal mostly with sodium and potassium hydrides.) The gradation in properties of the elements in this group is largely dependent on the progressive increase in ionic radius. The opportunity to apply this unifying principle is lost. There is essentially no discussion of the structural features of the compounds. The nomenclature employed in the chapter and indeed throughout the volume is unsystematic and inconsistent. The archaic term protoxide is used for $M_2O$, the formulas $M_2O_4$ and $MO_2$ are used, and the compounds are called tetroxides or peroxides. The latter name is also used for $M_2O_2$, but more frequently the term bioxide is employed. No explanation is offered for the compounds $M_2O_3$ which are named trioxides.

In spite of this, the author succeeds in giving an interesting account. A wealth of detail is presented on methods of isolation of the elements from natural sources.

Throughout the volume one is continually impressed by the great appreciation of the authors for the historical development of the chemistry of these elements. In some instances they appear to be rather overwhelmed by it. Frequently the earlier work up to the beginning of the twentieth century is given in great detail while more recent contributions are given scant treatment. This is most noticeable in the chapter on copper where in not a few cases the researches of the last twenty years are dismissed in the text with "see also." Rarely does one find a critical evaluation in controversial issues such as the existence of cuprous hydroxide, cuprous fluoride or the polymorphism of gold. There appears to be an occasional reluctance to apply the modern ideas of ionic and molecular structure. Thus, while it is stated at the beginning of the section on trivalent gold that $Au^{3+}$ most likely always tetracoördinated, there is no attempt to rationalize such formulas as $NOCl{\cdot}AuCl_3$, $RAuCl$, etc., on this basis. The organization of the subject matter tends to some measure to discourage the use of correlative principles. Sulfides and salts of oxyacids of sulfur are described in one section, selenides and salts of oxyacids of selenium in another. This kind of arrangement makes it relatively easy to find whatever information is available on a particular compound. It is perhaps a concession to the tendency to provide a complete reference book, but it does make comparisons of similar compounds rather awkward.

The treatise has a special appeal to the French readers since specific information about the collections of many of the provincial libraries is provided—a most thoughtful service. The publication, however, will be welcomed by all inorganic chemists throughout the world. Nowhere would be found a more readable summary of the early work on the chemistry of the elements. Should the treatment of the more recent papers in some cases be lacking, there is an excellent bibliography conveniently arranged and extending to late 1955.

The printing is excellent, the binding of good quality.

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF CONNECTICUT ROLAND WARD
STORRS, CONN.