Book Section

New Publications :

Proceedings — Symposium on "Recent Developments in Non-Ferrous metals Technology", Jamshedpur, 1968 ; Volume 2, 165 pages and Volume 3, 303 pages, published by the National Metallurgical Laboratory, Jamshedpur.

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Nuclear Reactions, by D. F. Jackson, published by Methuen and Co. Ltd., London, 1970, 262 pages, 65 sh.

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Canning Handbook on Electroplating, published by W. Canning & Co. Ltd., 21st. Ed., 1970, 896 pages, $ 7.25.

Chromium Chemicals, published by PPG Industries, Pittsburgh, 61 pages.

Water and Waste Treatment, published by Permutit Co., Paramus, N. J., U. S. A., 16 pages.

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Zinc-Nickel Alloy Electroplating for the Protection of High

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Solvent Extraction of Metals by A. K. De, S. M. Khopkar and R. A. Chalmers, published by Van Nostrand Reinhold Co., London, 1970, 288 pages, £ 6.

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Proceedings–Budapest "Corrosion Week", 41st Event of the European Federation of Corrosion, 1968, published by Budapest Academy of Sciences, 1084 pages, £ 15.

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Book Reviews

Fuel Cells: Modern Processes for the Electrochemical Production of Energy, by W. Vielstich, translated by D.J.G. Ives, published by Wiley-Interscience, New York, 1970, 500 pages, $25.

In recent years, certain battery systems have assumed importance because of their attractive possibilities of application in space travel. Fuel-cells is one such system which has been developed successfully of late and perfected on the fabrication part of it to meet all the technical requirements of the source of electrical power in a spaceship. In this book an attempt has been made to present a comprehensive account of research and development of various types of fuel cells.

The first two chapters serve as an introduction to the basic concepts of fuel cells and their chief characteristics. A brief description of various types of fuel cell and an approach to the study of the physicochemical phenomenon of these systems is made. In the III Chapter a summary of the results of fundamental research on the kinetics of electrode processes is given. In chapters IV and V, the physicochemical technological problems involved in the construction and operation of different types of complete cells are described and discussed. Chapters VI and VII deal with some electrochemical methods of potential importance for the conversion of heat and nuclear energy into electrical energy. Certain fundamental problems connected with the electrochemical methods of storing electrical energy are treated in chapter VIII. Separation of the isuotopes of hydrogen accompanying the electrolysis of aqueous solutions is described in Chapter IX. In the closing chapter, the whole field is briefly reviewed, and possibilities of future application of the new sources of energy are discussed.

The author has taken enough pains in widening the scope of this book while describing the physicochemical methods for the conversion of heat, nuclear energy and chemical energy in particular into electrical energy so that it serves the needs of not only electrochemists working on fuel cells but others interested in direct energy conversion

—B.K.B.

Lead and Lead Alloys—Properties and Technology, by W. Hofmann, published by Springer-Verlag, English Translation of Second Revised German Edition by LDA, London, 1970, 551 pages, DM 98.

This book is the English translation of the second revised edition of the German book 'Blei and Bleilegierungen'. Since the beginning of this century there had accumulated a large amount of literature concerning lead. There is hence a need for collecting and summing up the data, lest the scientist or industrial person dealing with the metal would face an almost insurmountable task of picking up a needle in a hay-stock. The book fulfils admirably this purpose.

Following a brief review on smelter production, the physical properties of lead are discussed. Scientists working in the fields of Physics, Chemistry and Metallurgy will find this small section very useful. In the second part are included a few tips for the preparation of lead microsection for structure examination, followed by a number of binary and ternary equilibrium diagrams involving lead. Metallurgists will appreciate the illustrations of microstructures of numerous lead alloys and their applications. The author then goes on to deal with the mechanical properties and corrosion resistance of lead. In the third part of the book are discussed melting and casting techniques for lead and various processing techniques. A lot of practical information is made available. Extensive bibliography on the subject is included at the end. The most interesting parts of the book are the chapters dealing with the use of lead as corrosion-resistant material, as storage battery plates, as bearings and in printing industry. There is no doubt that this is a leading reference book on lead, and as such, would be a useful addition to all libraries.

—D.H.S. and K.I.V.

U.S. Department of Commerce and the National Science Foundation, Washington, D.C; by the Israel Program for Scientific Translations, Jerusalem, 1970: (1) Electro-deposition of Metals—Proceedings of the 10th Lithuanian Conference of Electrochemists, Vil'nyus, 1968, translated from Russian, 151 pages; (2) Electrocrystallization of Metals in an Ultrasonic Field, by A. P. Kapustin and A. N. Trofimov, edited by L. M. Belyaev, translated from Russian, 60 pages.

The Tenth Republican Conference on Electroplating was organized at Vil'nyus during December 1968 by the Institute of Chemistry and Chemical Technology of the Academy of Sciences of the Lithuanian SSR, together with the Section of Electroplating of the Lithuanian Chapter of the Mendeleev Chemists' Society. The Proceedings covering the 54 pages presented therein have been incorporated in the first publication, They serve admirably well the purpose, namely, to bring about an effective exchange between scientists and the industry. The topics spread over practically the entire range of deposition: metals—common—uncommon and precious, cermets, alloys, theoretical aspects, new types of baths, electroless, addition agents, bright plating, structure and properties of deposits, and economics.

The beneficial effects of ultrasonics in electrodeposition are well known, but there is need for a better understanding of the mechanism. The second book is meant to meet this, and covers studies relating to copper, nickel and zinc. The first Chapter is a review of the subject, and this is followed by the experimental methods in Chapter II. The results are presented and discussed in the next Chapter, and Chapter IV deals with the calculation of current distribution using the method of lines. The last Chapter outlines the effect of ultrasound on the quality of the electrodeposits. All aspects have been discussed: polarization, conductivity, current efficiency, current and metal distribution, structure of deposits, and properties of deposits—porosity, hardness, internal stress and adhesion. There is a useful bibliography with 72 references.

The publishers are to be congratulated in arranging the translation from Russian and getting out these two volumes. They will no doubt be of great interest to all those concerned with the theoretical and applied aspects of electrodeposition.

—T.L.R.

Nomenclature for Vitamin B_6 and Related Compounds—IUPAC-IUB Commission on Biochemical Nomenclature; International Union of Pure and Applied Chemistry, Information Bulletin Number 6 (September 1970), pp 4, Appendices on Tentative Nomenclature, Symbols, Units, and Standards; IUPAC Secretariat, Bank Court Chambers, 2/3 Pound Way, Cowley Centre, Oxford OX4 3YF, England Comments on the proposals contained in this Bulletin should reach

within eight months of this publication viz., before May 1971, Dr. W. E. Cohn (Secretary of this Commission), Biology Division, Oak Ridge National Laboratory, POB Y, Oak Ridge, Tennessee 37830, USA.

A regretable consequence of the earlier IUPAC recommendations (J. Am. Chem. Soc., 1960, 82, 5581) and of IUPAC-IUB (Biochem. J., 1967, 102, 15 and elsewhere) has been the use of the word 'pyridoxine' both as a generic term for substances of vitamin B_6 activity, and as the trivial name of a definite chemical compound. To obviate confusion, it is proposed that the term *vitamin* B_6 should be used as the generic descriptor for all 2-methylpyridine derivatives exhibiting qualitatively the biological activity of pyridoxine (as in vitamin B_6 deficiency, -activity,-antagonism etc) retaining the terms *pyridoxine*(or *pyridoxol*), *pyridoxal* and *pyridoxamine* for the alcohol, aldehyde and amine forms of the vitamin. The derivatives of the first two forms should be designated as *pyridoxyl*- and *pyridoxylidene*- compounds. The trivial names of the three forms of the vitamin and their 5'- phosphates are to be abbreviated as PN, PL, PM, and PNP, PLP, PMP, thus avoiding other varied styles in vogue. Further, Pxy- (having double bond) for pyridoxylidene group with a prefix of P for their phosphates (as in P-Pxy- and p-pxd) could be used with advantage in a chemical sequence. Isotopic replacements follow conventional notations in parenthesis. The commonly occuring metabolites of pyridoxal viz 3-hydroxy-5-hydroxymethyl-2-methyl-pyridine-4-carboxylic acid and the corresponding lactone are to be designated as 4-pyridoxic acid and 4-pyridoxolactone, and the less common products of oxidation at 5'-position, the aldehyde, carboxylic acid and lactone by the trivial names 'Isopyridoxal 5-yyridoxic acid and 5-pyridoxolactone (The reviewer feels these compounds could be advantageously designated uniformly as isopyridoxal, isopyridoxic acid and isopyridoxolactone). The printer's mistakes on page 3, col. 2, lines 24-5 be noted.

.. P. L. N. R.

Canning Handbook on Electroplating, published by W. Canning & Company Ltd, Brimingham, U. K., 21st revised edition, 1970, 885 pages, through Canning Mitra Phoenix Limited, Bombay.

This handbook on electroplatting is the 21st edition of its predecessors, first one having been published in 1889. The subject matter In this edition follows the same pattern in the previous one. The text has been fully revised to incorporate the latest developments in polishing and electroplating. Details of automatic plants and Cannings latest models with programmed plating systems have been included.

The book consists of 33 chapters. Polishing of materials for bright plating, polishing equipments and methods are described in the first five chapters. The section on electroplating consists of 25 chapters. Electroplating equipments, layout, cleaning, pickling,chemical cleaning etc. are dealt in detail. Individual plating processes like copper, nickel, zinc, etc. are described with all details. Precious metal plating like gold, silver, rhodium, palladium, etc. are included in separate chapters. Plating on plastics, anodising, are some of the special topics. The hand book covers analytical control of the plating and cleaning solutions, treatment of the effluent, lacquering, bronzing and safety precautions in a plating shop. The chapter on principles of electroplating has been enlarged to include current electrochemical theory. In the chapter on copper plating the publishers have included pyrophosphate copper bath and high levelling bright acid copper bath (with chloride ions). Electroless nickel plating process has been added in the chapter on nickel plating

In general, more detailed information has been included on the various plating processes than in the previous edition. A significant change in this edition is change over to metric system while expressing concentrations in various solution formulations. Like its predecessors, this volume is clearly printed and illustrated and include an index. Useful tables and electroplating data are given The hand book has been written in a comprehensive manner covering the entire field of electrodeposition and can be recommended to the chemists and engineers. It is an invaluable companion to the practical plater and electrochemist.

—S. K.

Metal Finishing Guidebook Directory 1970,published by Metals and Plastics Publications, Inc., Westwood, N. J., U. S. A., 38th Annual Ed., 900 pages; published as part of an annual subscription to

the monthly Journal "Metal Finishing" — $ 15. Guidebook issue $ 2.50.

The Guidebook published by the well known Journal "Metal Finishing" has maintained the excellent traditions of the past, with some useful additions. Indeed this is a good service being rendered from year to year.

The volume is divided into several sections. (1) Government finishing specifications. (2) Mechanical surface preparation. (3) Chemical surface preparation. (4) Plating solutions. (5) Control - analysis - testing. (6) Special plating procedures. (7) Special surface treatments. (8) Organic finishing. (2) Finishing plant engineering. (10) Tables and data sheets. (11) Directory and (12) Comprehensive index.

Preparatory procedures are important, and adequate attention has been paid to them. As in the precious editions, plating solutions have been covered in great detail; precious metals and alloy plating are included. Particular mention may be made of topics like electrocoating and plant engineering. There is a fund of information in this publication, which is a "must" on the bookshelves of electrochemists, metallurgists, technologists and industrial finishers.

—T. L. R.

Electrodeposition and Radiation Curing of Coatings, by M. W. Ramney, published by Noyes Data Corporation, Park Ridge, N. J., U.S.A., 1970, 170 pages, $ 35.

The technique of applying coatings by electrodeposition, also known as electrocoating or electropainting, is of recent origin. But it has made much headway in view of the many advantages. Electron beam curing is more recent, and has yet to reach the level of standard industrial practice.

This publication gives the details relating to both the processes drawn from U. S. Patents. The matter has been presented in a comprehensive manner, with a large number of illustrations: equipment, techniques and formulations. Information of this type is not readily available in literature. Noyes Data Corporation have published several valuable volumes, and the present one will add to the list. The price is high from Indian standards. The book is strongly recommended as a useful reference to keep in touch with these two new and elegant tools in the field of industrial finishing.

—T. L. R.

Carbohydrate Nomenclature I

Organic Chemistry Division :

Commission on Nomenclature of Organic Chemistry and IUPAC-IUB Commission on Biochemical Nomenclature, Tentative Rules (1969), International Union of Pure and Applied Chemistry Bulletin No. 7 (September 1970), pp. 70 + viii, Appendices on Tentative Nomenclature, Symbols, Units and Standards, IUPAC Secretariate, Bank Court Chambers, 2 3 Pound Way, Cowley Centre, Oxford, OX 4 3YF, England. (Comments on the Proposals herein should be sent within eight months of this publication, viz. before May 1971. to Prof. P. E. Nerkade (Netherlands) and Prof. O. Hoffmann—O tenholf (Wien).

The rules proposed are forty in number and deal with acyclic and cyclic forms of monosaccharides and their simple derivatives. Oligosaccharides are also dealt with briefly. These are additional to the Definitive Rules for Nomenclature of Organic Chemistry (Sections A and B 1957 [2nd Edition, 1966]; Section C. 1965-published by Butterworths London for IUPAC). Undoubtedly further rules will have to be promulgated to embrace the growing needs in the areas of polysaccharides, heterocyclic derivatives, conformational problems and others. Only a few of these rules are referred to below. The basis for naming and numbering of monosaccharide or its derivative is the structure of the parent monosaccharide represented in the Fisher projection and then its cyclic forms and derivatives. Conventional representations, anomeric prefix, sequence rule symbols R or S when appropriate, are included. If, in naming a derivative a choice of parent monosaccharide is possible, the selection of parent is made according to alphabetical order of the first cited configurational prefix of a systematic name (Rule, Carb-8). In general, the usual trivial names are retained (the term glycerose for glyceraldehyde is not recommended). The systematic name stems from the trivial, e. g., *D-galact*-hexos: from D-galactose. An acyclic monosaccharide containing more than four contiguous asymmetric carbon atoms is named by adding

two or more prefixes, together indicating the configurations at all the asymmetric carbon atoms, to the stem name, as in for example, *D-glycero-D-gluco*-Heptose,

—P.L.N.R.

Basic Physical and Chemical Data, with Mathematical Tables, by L. S. Kothari and C. N. R. Rao (Ed), published by Affiliated East-West Press, Pvt. Ltd., New Delhi, 1970, 98 pages, Rs. 1.80.

This book presents basic physical and chemical data relevant to the science curricula in our colleges. A special feature is that it contains some additional information not generally found in similar tables. This includes a section on units, another on the earth and our universe covering g, H and dip values at university towns in India along with their geographical coordinates. Many of the sub-sections on nuclear, atomic and molecular properties as well as gross properties of substances are also new. The usual mathematical tables are also included. Despite the amount of information given, it is gratifying to note that the editors have managed to retain the price at a very low figure. The publication will be extremely useful to undergraduate and post-graduate students.

—H.M.

A Handbook of Chemistry and Physics, edited and compiled by M. V. George, J. Mahanty, P. T. Narasimhan and C.N.R. Rao, published by Affiliated East-West Press Pvt. Ltd, New Delhi, 2nd revised ed., 1970, 367 pages, Rs. 15.

The present work, by four well-known professors of I I. T. Kanpur, represents a departure from the useful type of handbooks. The editors have tried to make this serve not merely as a source-book of properties of substances, reference data and mathematical tables, but also as an instructional tool A considerable portion of the volume has therefore been devoted to basic concepts, precise definitions, glossary of terms etc, choosen from the classical and modern fields of physics and chemistry. The seven broad sections into which the book is divided are on mathematics, basic concepts of general physics and chemistry, which includes a bibliography of some standard books, table of reference data and specific properties of substances, atomic and molecular structure and properties inorganic and analytical chemistry, organic chemistry and some miscellaneous topics. The enthusiastic reception to the book is evident from the appearance of a second edition which contains some additional information, and also includes an enlarged section on computers. However, it is unfortunate that the price has been raised from Rs. 8 to Rs. 15. Even at this price the book is a good bargain, and is strongly recommended to all students and teachers of physics and Chemistry.

—H. M.

"Brains Trust" Cathodic Protection, Technical and Research Bulletin, Chamber of Shipping of the United Kingdom, 1970, 33 pages; through British Joint Corrosion Group, London,

A joint "Brains Trust" session on Cathodic Protection was held at London during December 1969 by the Chamber of Shipping of the U.K. and the British Joint Corrosion Group. The proceedings are covered here in question and answer form, and relate to a wide range of the problem of cathodic protection with special reference to marine corrosion. Galvanic anode and impressed current system are compared. The case histories put forward and the suggested remedies offer valuable clues while applying cathodic protection under marine conditions. This short brochure will no doubt be of interest to all those concerned with cathodic protection for the prevention of marine corrosion.

—T.L.R.

Proceedings of the Third International Congress on Metallic Corrosion, Vol. 1, 2, 3 and 4, edited by Ya. M. Kolotyrkin *et al*, published by Mir publishers, Moscow, 1969. Vol. I, 568 pages; Vol. II, 600 pages; Vol. III, 436 pages; and Vol. IV, 563 pages, $ 38.50. English edition distributed by Swets and Zeitlinger, N.V., Lisse, The Netherlands.

These four volumes, with a total of over 2000 pages, present the proceedings of the Third International Congress on Metallic Corrosion held at Moscow in May 1966. The importance of corrosion research and the world-wide interest in the outcome of mutual discussions in the subject is evident from the number of papers presented from all parts

of the world—nearly 240 of them, which is almost twice as many as the combined number for the First and Second Congress together. The corrosion field is so vast and varied. So much so, an individual scientist can hardly dream of being a master of all facets of corrosion. The reviewer is no exception to this, and he pleads his inability to touch upon the scientific contents of the papers However, the papers are all from stalwarts in the respective fields. In addition to the Introductory Section containing the Plenary lectures, there are 11 sections, spread over the 4 volumes. Section I deals with the aqueous corrosion of metals, while Section II is essentially on the passivity and anodic behaviour of metals. These two sections are given in Vol. I, containing 57 papers in all. Section III deals with the hydrogen embrittlement of steels and the corrosion inhibition in general, Section IV is on the Stress Corrosion Cracking of Ferrous and nonferrous alloys, and Section V concerns the corrosion of underground structures. These three sections constitute the subject matter of Vol. 2. This is followed by Section VI dealing with corrosion under marine and water environments, Section VII dealing with corrosion protection by paints and varnishes and Section VIII dealing with electrodeposition, plating and other metallic coatings for corrosion protection. These are included in Vol. 3. Oxidation, Scaling and high-temperature corrosion problems are in Section IX, while corrosion in boilers and heat-exchangers using high-temperature water and superheated steam is given in Section X. Atmospheric and gaseous environmental corrosion is dealt with in the last Section. These three sections are compiled in Vol. 4 of the series

For many of the papers, the discussions on them during the conference have been introduced at the end of the particular paper. This is an important feature and the editorial board is to be congratulated for the same. The printing has been excellent, and the reproductions are satisfactory. Some of the papers have their bibliography printed in Russian: it could have been better for the non-Russian readers if they were given in English, since many of the Russian materials are now available in English translations.

A comprehensive publication of this type dealing with all aspects of corrosion should be a welcome addition to all research laboratories and institutions: indeed, it would also be an eye-opener to the economic aspects of industries faced with the problem of corrosion and as such, it would be a useful addition to the libraries of all agencies dealing with metals and alloys.

—K. I. V.

Protecting Steel with Zinc Dust Paints, published by ZDA, London, 1970, 40 pages; through Indian Lead Zinc nformation Centre, Calcutta.

This publication contains 10 papers on zinc dust paints presented at a Seminar arranged by the Zinc Development Association. It is needless to stress the importance of these paints in the field of corrosion prevention. It has been pointed in the Foreword that "over 50,000 tons of zinc dust are now used in paints every year throughout the word-enough to coat more than 100 million square feet (10 million square meters) of steel surface". The contributions cover applications in shipbuilding, structural steelwork, railways and other areas. This is a useful volume in paint technology.

—T. L. R.

American Cynamid Co., Wayne, N. J: (1) Mining Chemicals Handbook-Mineral Dressing Notes, No. 26, 101 pages plus tables; (2) Chemistry of Mineral-Dressing Notes No, 23. (revision), 1968, 54 pages; (3) Cyanamid Flocculants for the mining Industry. 1967, 20 pages.

These 3 publications issued by American Cyanamid, who are operating in several countries, are of great use in mineral dressing. The handbook contains 13 chapters, including flotation bibliography and 5 tables. Many of the reagents are, of course, proprietary.

The paper on cyanidation covers the fundamentals: zinc, copper and iron, as well as arsenic and antimony sulphide minerals. There are several tables, figures and the bibliography The treatment of the matter is excellent The last one on flocculants deals with their preparation, feeding and testing methods, and commercial applications.

—T. L. R.

Nomenclature of Inorganic Boron Compounds:

Inorganic Chemistry Division Commission on Nomenclature of

Inorganic Chemistry. International Union of Pure and Applied Chemistry Information Bulletin No. 8 (September 1970). Appendices on Tentative Nomenclature, Symbols, Units, and Standards, IUPAC Secretariate Bank Court Chembers, 2/3 Pound Way, Cowley Centre, Oxford OX4 3YF, England, Comments on these proposals should be sent, within eight months of this publication, viz., before May 1971, to Prof. R. M. Adams, to Geneva College, Beaver Falls, Penn. 15010, USA.

Boron chemistry poses unusual nomenclature problems. Structures of many boron compounds cannot be represented by the traditional method of lines for electron pairs since the connections are not ordinary electron-pair bonds. With boron each atom can contribute only three electrons to its total of six or seven connections and the interatomic bonding in it is strongly directional, accompanied by *clustering by triangles*. Elemental boron may be regarded as composed of closepacked icosahedra of atoms each of which connected to five others in the same icosahedron and to one or two in another icosahedron. The nomenclature problem is complicated further by *formation of many molecular hydrides*. In neutral hybrides the open edge of the 'fragments of an icosahedrod' are generally held together by *bridge hydrogen atoms*. Then there are also *unusual fusions*. It is possible to explain the bonding in these cases as being due to localized *three centre bonds* (i.e., an electron pair being shared by three atoms). These and other features from the basis of the proposed eight sets of Rules : (1) General (2) Boron hydrides (3) Borane derivatives ( ) Boron radicals (5) Ions related to boron hydrides (6) Inorganic boron heterocycles (7) Boranes with skeletal replacement, and (8) Addition compounds. Some general observations only could be made here. The number of hydrogen atoms in boranes is indicated by enclosing the appropriate Arabic numeral in parenthesis directly following the name, as e.g. B_5H_9 Pentaborane(9). These names are based on molecular formulae rather than structures. This numeral way be dropped where no ambiguity results, The two classes of polyboranes and their derivatives with closed and non-closed structures are distinguished by designating the former by the italicised prefix *close* (for a known *close*-compound) and *nido* (structures 'very close to closed structure'). For numbering purposes the open baron frame works are viewed as plane projections from opposite the open portion of the frame work in boranes. In closed boron frameworks, the boron atoms are numbered in sequential planes perpendicular to the longest highest-order symmentry axis. The atoms in each plane are numbered clockwise from a reference plane through this symmetry axis. When a close structure is completed by a metal atom, numbering is simplified by considering the metal atom to be part of the cage. The Rules ars supported by 23 figures indicating the numbering and position of carbon atoms.

—P. L. N. R.