REVIEWS

Introduction to Theoretical Physical Chemistry. By Dr. Sidney Golden. (Addison-Wesley Publishing Co., Inc., Massachusetts, U.S.A.), 1961. Pp. xi + 307. Price $ 10.75.

The book deals with the basic theoretical analysis of thermodynamics, statistical mechanics and quantum mechanics. The object of the book is to enable the student to understand the mathematical interpretation of the empirical facts that are basic to each discipline and develop in him an appreciation of the abstract concepts of the processes involved. The first 87 pages deal with classical thermodynamics including the laws of thermodynamics, thermodynamics of dilute solutions, conditions of thermodynamic equilibrium and solution theory. Statistical thermodynamics is dealt with, in the next 100 pages. The Maxwell-Boltzmann method is applied in detail for the ideal gas systems and the application of the Fermi-Dirac statistics and the Bose-Einstein statistics to ideal gas systems are also dealt with in this section. Statistical Thermodynamic version of Debye-Huckel theory, Debye's theory of specific heats and Bragg-William theory of order-disorder in solids have been well presented in this part. The next 100 pages are devoted to survey of wave mechanics dealing with stationary solutions of Schroedinger's equation, non-classical behaviour, algebraic methods for stationary states and finally, non-stationary states. In these chapters one could have expected some important topics like the treatment of the hydrogen atom and a detailed discussion on electron spin. Considerations of space might have come in the way of inclusion of these topics.

A student of Physical Chemistry generally thinks of application of the abstract ideas to numerical problems. But in the volume under review the author is more concerned with the verification of equations and the application of the abstract ideas to hypothetical systems. The interest and the understanding of the subject could have been greatly enhanced if the author had worked out a few numerical examples. The book as a whole could be useful to a graduate student who has a good mathematical background. It has a great appeal to one who is above average and has natural inclination towards mathematical development of the subject. Appendices dealing with some of the mathematical derivations would have been very helpful.

M. R. A.

Practical Physical Chemistry. By Arthur M. James. (Published by J. and A. Churchill Ltd., London), 1961. Pp. i-xiv + 339. Price 45 *sh.*

The frontiers of chemistry have moved a long way in the last few decades and they are moving even more rapidly to-day. It has become extremely important to reorient our training programme of the young aspirants in colleges and universities. It is needless to emphasise that if the students are not given an opportunity to become familiar with a variety of modern developments and new techniques, they will be handicapped in their later career as chemists. The difficulty of selection of experiments for practical training increases with time because of the phenomenal accumulation of literature on newer methods employing new apparatus and techniques which is expanding at an explosive rate. Commercial instrument manufacturers have developed so many new and improved gadgets and are flooding the scientific market and it has become extremely difficult to give any preferential selection. Any serious effort to inculcate these modern developments in the instructional courses is a welcome feature.

The book under review which the author modestly calls as 'a Laboratory Manual of Physical Chemistry' illustrates the principles of physical chemistry and gives a good guidance to train the students in experimentation and helps to develop familiarity with apparatus and to encourage the young aspirant in his ability to do research. Over 160 experiments have been designed under 11 units starting from Chapters 5-15. The first chapter provides a very useful account of "Errors and the Mathematical Treatment of Results". This is followed by three chapters on Instrumentation of all kinds to be found in a modern Chemical Laboratory. The book is complete with Bibliography, Tables of some Physico-chemical Constants, List of Principal Symbols, Index and Logarithmic Tables. Although modern techniques such as Chromatography, Electrophoresis, Ion Exchange, Complexometry are illustrated, Tracer

techniques and gadgets making use of semi-conductors, thermistors, etc., could have found a place in the treatment.

This manual will receive appreciation from the student community and the teacher as well as those who are interested in the training and research programme in the field of chemistry.

A. R. V.

Introductory Organic Quantum Chemistry. By Georg Karagounis. Translated and edited by F. C. Nachod. (Academic Press, New York); 1962. Pp. 204. Price $ 6.50.

This book is an English translation of the German text bearing the title, "Einfuhrung in die electronen theori Organischer Verbindungen". The German title is much nearer a correct description of the contents of this volume.

The plan of the book is commendable in its brevity, lucidity and organisation of the chapters—building up from the fundamentals of the Planck's constant, the Bohr atomic model, the Schroedinger equation, the covalent bond, the V.B. and the M.O. methods followed by chapters dealing with their application in determining or interpreting molecular properties like dipole moment, molar refraction, magnetic susceptibility and chemical equilibria. There is even a short chapter on Nuclear magnetic resonance spectroscopy and chemical constitution, in its simplest version. The longest chapters, of 24 and 21 pages, deal with colour, chemical constitution and mesomerism ; and chemical reactivity from the view-point of electronic theory. Of the two, the former presents with much clarity the influence of quantum mechanical approach in interpreting electronic absorptions of organic molecules, especially dyes. The rest of the book is hardly distinguishable from any other standard text dealing with Valency, Molecular structure or electronic aspects of the chemical bond.

The language in translation from the German original seems to suffer by bad construction in many parts, for instance on page 122, one finds a statement, "The measured total molar susceptibility is the sum of the always present diamagnetic susceptibility and the possibly occurring paramagnetism". At times one even encounters contradictory statements like, "This goes so far that triphenylamine can no longer add HCl" (page 135) while on page 171, it says, "Triphenylamine has the ability to form salt which would require addition of a proton to the lone electron pair". Similarly, read out of context the following sentence on page 132 would seem odd, "The carboxylic group becomes even more positive by the dissociation of the proton", while one infers from the context that the more positive the carboxylic carbon, the more easily it loses the proton. A number of printing mistakes are obvious even on a cursory survey. The penta-covalent Nitrogen on page 125 is an incorrect representation of the amine oxide form.

The Claisen rearrangement cited as an example of electrophilic rearrangement (page 185) is not too happy a choice since it has not thus far been demonstrated decisively to be electrophilic.

The book lists many useful references at appropriate places and many of these are to quite recent publications—as recent as 1961. A list of books for further study is also incorporated at the end of the book.

There is a suggestion in the book to replace the term bathochromic with bathychromic in describing red shifts in spectra. The latter term is closer to the meaning of "colour deepening" depth being denoted by *bathy*. The reviewer is inclined to agree with and underscore this suggestion.

The extensive literature references and the clarity of the ideas expressed in this book would commend the book highly to beginners of electronic theory of organic chemistry. It would be a useful adjunct to any general monograph on Valency and Molecular structure.

B. S. THYAGARAJAN.

The Physical Chemistry of Metallurgical Processes. By A. K. Biswas and G. R. Bashforth. (Chapman and Hall, London), 1962 Pp. 336. Price 50 *sh.* net.

Despite all the scientific advances in the metal industry and technology, metal production today still maintains its touch of 'art'. Also there is a growing realisation that any proper understanding of the 'art' involves a thorough appreciation and knowledge of the physical chemistry and thermodynamic principles of the processes. Dispersed as these work and data are in numerous journals, the authors have ably attempted in this book to bring under one cover the various background principles and their application to metal production processes of significance and utility to not only to the operator on the furnace floor but also to the student and researcher in production metallurgy.

The book has been conveniently divided into 19 chapters and an appendix.

Developing the subjects of physical chemistry and thermodynamics gradually the authors open

out the first few chapters with the several well-known basic principles, laws of transformation of energy in a system, concept of equilibrium, affinity, and maximum work. Following on they discuss in some detail ideal and non-ideal solutions, the 'free energy' of a system, and the Heat theorem and the velocity of a reaction, diffusion and catalysis.

The science of mutual transformation of chemical and electrical energies are discussed under the caption 'electrochemistry' in a separate chapter.

The phase rule, the determination of Heat capacity, enthalpy, free energy, the measurement of activity, vapour pressure, dissociation pressures, are discussed next in some detail.

Next follows the discussion in detail of some of the important Metallurgical equilibria, like gas metal reactions, equilibrium in the Blast furnace, carburization and decarburization equilibrium and slag-metal equilibria. The deleterious significance of gases in steel and their removal are dealt with next.

Data of practical significance to production metallurgy are furnished under the captions Reduction and Oxidation, and a detailed discussion on the role, significance and importance of slags in reduction metallurgy in the last chapter.

The text in the book under review has been very well complimented with a large number of graphs and tables, and in its present form will prove itself to be a very useful reference to the serious student of and practical operator in production metallurgy.

A. A. KRISHNAN.

The Science of Flames and Furnaces, 2nd Edition. By M. W. Thring. (Chapman and Hall Ltd., London W.C. 2); 1962. Pp. 625. Price 80 *sh.*

When Professor Thring's book, *The Science of Flames and Furnaces* was first published in 1952 it filled a serious gap that existed between theory and practice of furnace design. In the present second edition, the text has been substantially revised and extended to cover latest developments. The general arrangement of the chapters, however, remains unaltered.

The book is divided into the following seven chapters: (1) The Function of a Furnace, (2) The thermodynamics of Furnace Heating, (3) The Liberation of Heat by Combustion, (4) Heat Transfer, (5) The Aerodynamics of Hot Systems, (6) The Science of Furnace Construction, (7) The Application of Scientific Methods to Furnaces.

At the end of each of the last four chapters useful summaries have been provided which help in recapitulation of the vast data presented. There is a useful table of conversion factors. Author index and subject index have also been provided.

The book is extremely well written and authoritative as one should expect from Prof. Thring who is an accepted authority on the subject and who is so well known for his extensive researches in the field of flames and furnaces. However, it is rather disappointing from the standard point of chemical engineers inasmuch as sufficient justice has not been done to furnaces used in the chemical industry. Perhaps we could expect a separate book on the subject of Furnaces for the Chemical Industry from the author.

The book is very useful to furnace designers, furnace operators and research workers in the field of flames and furnaces and everyone in this category is recommended to have a personal copy of the book. The book should find a place in every scientific and technological library.

N. R. KULOOR.

Mineral Metabolism—An Advanced Treatise, Volume I. Part A and B. (*Principles, Processes and Systems.*) Edited by C. L. Coniar and Felix Bronur. (Academic Press Inc., New York-3, N.Y.), 1960-61. Part A: Pp. xv + 416. Price $ 12.00; Part B: Pp. xv + 538. Price $ 14.50.

Since the publication by Stahl in 1939 his monumental work on mineral metabolism this is the first time a comprehensive treatise on mineral metabolism has appeared. In this gap of two decades there had been tremendous development in the understanding of the role of minerals in intermediary metabolism. Newer techniques in the isotopes and their applications in biology and medicine have added a tremendous wealth of knowledge. These have been reviewed in the book by leaders in the field. In Part A, the first five chapters are devoted to a discussion on various physical and mathematical aspects of homeostasis. In Chapter 6, the general aspects of ion transport and the electrical and energetic interrelationships are discussed. A general review on body fluid dynamics is given in Chapter 7.

The last three chapters on intestinal absorption and excretion, renal excretory mechanism and extrarenal regulation with special reference to sweat are of special interest to biochemists, physiologists and clinicians.

Part B presents various aspects of mineral metabolism with particular emphasis on: (1) hormonal control of mineral metabolism, (2) the composition and kinetics of mineral turnover in connective tissue, bone and teeth, (3) the role of metal ions in enzyme reaction.

It is noteworthy that this volume is a remarkable compilation of various aspects of modern concepts and role of metabolism of various ions. Both Parts A and B of Volume I are well edited and have very little editorial error. The editors and the authors of the various articles deserve our compliments for the lucid way the articles have been written and organised. The bibliographies are quite extensive and up-to-date. This volume will be of immense value to everyone interested in metabolism and particularly to the specialist as a reference book. This reviewer highly recommends this book to serve as a reference text for advanced students in biological sciences.

B. K. BACHHAWAT.

Elements of Indian Stratigraphy. By S. K. Borooah. (Published by Dattsons, Nagpur), 1962. Pp. 207. Price Rs. 8·25.

According to the author, this book is intended to be a compendium of Indian Stratigraphy, and to some extent, this objective has been achieved. The main features of the various stratigraphical systems have been described in sufficient detail to be useful for University students of the B.Sc. standard. The printing of the book, however, leaves much to be desired. There are numerous typographical errors, the most serious from the point of view of the student being the mis-spelling of names of fossils. The text-figures (both outlines and lettering) are very poor. Page numbers have not been noted against several entries in the Index.

C. S. P.

Blood Vessels and Lymphatics. By D. I. Abramson. (Academic Press Inc., New York-3, N.Y.), 1962. Pp. xx + 812, Price $ 26.00.

The book *Blood Vessels and Lymphatics* edited by David I. Abramson and published by Academic Press is a well-edited succinct summary of the present knowledge of the vascular systems and the lymphatics. There have been very little overlapping information in the sections in spite of there being 52 contributors, some of whom, contribute to more than one aspect of the subject. The book is more didactic than discursive, some of the chapters being all too brief. A number of pictures, as seen by the electron microscope, have been added to make the text more illuminating. The chapters on micro-circulation would be a little confusing to the uninitiated reader. In the chapters on the special vascular beds, the question of coronary circulation has been discussed well, but the statistical aspect of what artery is affected most under Indian conditions, as we in India would require, is yet to be known; how anæmic and hypopietic conditions contribute towards the coronary thrombotic conditions is also discussed only vaguely. Whereas vascular beds of musculatures—striped or unstriped—have been fully gone into; yet the question of special musculature of the heart under active conditions of varying degrees as assessed by clinical conditions—fibrillary or other—leaves the problems unsolved. The *pituitary* and *thyroid* circulations are indeed well discussed. Renal hepatic and lineal circulations have been dealt with in detail and one learns a great deal from the material presented. Collagenases and the pathological conditions—the so-called collagen diseases—like L.E., etc., bring forth vividly the available knowledge on circulatory disturbances affecting the collagens. Pathological conditions of the venous system have been discussed rather perfunctorily and the bacteriological aspects of the question has not been taken up at all. The discussion on the lymphatics system are some of the best chapters of the book, and for the first time we see the physiology of the lymphatic system presented so ably. However, whereas photographs of the lymphatic obstructions unilaterally, etc., are presented, there is no indication of protozoal infections giving rise to lymphatic obstruction, and the sequelæ following thereon are not even touched upon, especially obstruction by *Wuchernia bancrofti*—which plagues half the world.

The book is printed on extremely good paper with no errors. The price of the book indicates that it can only be purchased by specialised libraries catering to advanced students.

C. V. NATARAJAN.

Fish in Nutrition. Edited by E. Heen and R. Kreuzer. (Fishing News Books Ltd., Ludgate House, London E.C. 4), 1962. Pp. xxiii + 447. Price £ 6.6 *sh.*

The present volume is the outcome of an FAO Conference on "Fish in Nutrition" held in Washington in September 1961. The Conference was attended by about three hundred participants from many countries. 71 papers submitted

by 166 experts from 24 nations together with brief accounts of discussions are published in this volume. The Conference, among other things, focussed world attention on the importance of fish as a source of protein in human diets especially in countries where protein malnutrition is widely prevalent. The publication consists of five parts, (*i*) The role of fish in world nutrition; (*ii*) Chemical components of fish and their changes under treatment, (*iii*) Contribution of fish and fish products to National diets, (*iv*) Fish and fishery products in animal nutrition and (*v*) Demand for fish as human food and possibilities for increased consumption.

In the first part, five papers dealing with fisheries resources, production and utilisation in relation to human and animal nutrition are presented. Certain problems such as potential fisheries resources of the sea, and practicability of increasing the fish production in tropical and sub-tropical regions using improved methods of fish production have been discussed. The second part contains 28 papers under the three heads, (*i*) Proteins and general composition; (*ii*) Lipids and vitamins and (*iii*) Influence of processing. The third part contains 17 papers concerning various aspects of the contribution of fish and fish products to National diets with particular reference to fish proteins and lipids. The role of fish and fish products in the treatment and prevention of protein malnutrition in children has also been discussed. Part four contains 14 papers covering various aspects of the contribution of fish and fishery products in animal nutrition. The importance of fish products as a source of nutrients in the diets of poultry, pigs and ruminants has been stressed. The fifth and concluding part contains 7 papers relating to technological developments in different countries in the production and consumption of fish flour as human food.

The proceedings of the Conference represent, for the first time, an attempt to bring before the world the various means of increasing fish production and its preservation and utilisation to meet the growing protein needs of the developing countries. Great credit is due to FAO for organizing this Conference and for having brought out a highly authoritative publication dealing with various aspects of fish in human nutrition. The get-up of the book is excellent. This volume can be highly recommended as an authentic source book and reference manual to research workers in the field of fisheries, food technology and nutrition. M. SWAMINATHAN.

Elementary Zoology. By M. A. Moghe. (Macmillan and Co., Madras-2), 1962. Pp. viii +311. Price Rs. 6·50.

This publication primarily intended for Pre-University, Pre-Degree and Higher Secondary students commences with some biological considerations and deals with the cell, as a general unit of organization using Amœba as an example. The various tissues are described. It is followed by a detailed description of the Frog to elucidate the fundamentals of form and structure and functions of a living organism.

Classification of animals of the major phyla to elucidate the patterns of organisation is illustrated by using a few type forms like Hydra, the Earthworm and the Cockroach.

The language is simple and the illustrations are from books and memoirs of well-known zoologists.

One wonders whether the description of Mitosis should not have been a little more accurate.

The index does not appear to have been checked well, as for example, zooid on page 311.

Despite these minor blemishes, the book should be of use for the primary purpose for which it is intended.

P. A. R.

Books Received

Modern World Series—No. 2: *Progress in Science*, pp. 63; No. 3: *Research and Discovery*, pp. 103. (British Information Service, Chanakyapuri, New Delhi-21), 1962. Price (not given).

Royal Institute of Chemistry Monograph No. 6—*Principles of Titrimetric Analysis.* By E. E. Aynsley and A. B. Littlewood. (Royal Institute of Chemistry, London W.C. 1), 1962. Pp. 42. Price 4 *sh.* 6 *d.*

The Manufacture of Iron and Steel (Vol. 4)—*The Mechanical Treatment of Steel.* By G. R. Bashforth. (Chapman and Hall, London W.C. 2), 1962. Pp. viii + 276. Price 45 *sh.*

Chemie Im Dienst Der Archaologie Bautechnik Denkmalpflege. By J. A. Hedvall. (Akademiforlaget, Gumperts, Goteborg), 1962. Pp. x + 229. Price (not given).

Bats. By G. M. Allen. (Dover Publications, Inc., 180, Varick Street, New York 14, N.Y.), 1962. Pp. x +368. Price $ 2.00.

Fluid Dynamics. By G. H. A. Cole. (Methuen's Monographs, Methuen and Co. Ltd., 36 Essex Street, London W.C. 2), 1962. Pp. xiii + 238. Price 25 *sh.*

Vaucheriaceæ. By G. S. Venkataraman. (Indian Council of Agricultural Research, New Delhi), 1961. Pp. v + 112. Price (not given).

International Series of Monographs on Nuclear Energy-Reactor Safegaurds. (Pergamon Press, Headington Hill Hall, Oxford); 1962. Pp. ix + 390. Price 80 *sh.*

Advances in X-Ray Analysis (Vol. 5). Edited by W. M. Mueller. (Plenum Press, Inc., 227; West 17th Street, New York-11), 1962. Pp. xi + 564. Price $ 17.50.

The Universe and Man. By Paul Bergsoe. (Methuen and Co., London W.C. 2), 1962. Pp. x + 234. Price 36 *sh.*

Advances in Computers (Vol. 3). By F. L. Alt and M. Rubinoff. (Academic Press, New York and London), 1962. Pp. xiii + 361. Price $ 12.00.

Symposium of the International Society for Cell Biology. (Vol. I)—*The Interpretation of Ultrastructure.* Edited by R. J. C. Harris. (Academic Press, New York), 1962. Pp. x + 438. Price $ 14.00.

Symposium of the Society for Experimental Biology No. XVI—*Biological Receptor Mechanisms.* (Cambridge University Press, London N.W. 1), 1962. Pp. vi + 372. Price 50 *sh.*

The Biology of Cilia and Flagella. By M. A. Sleigh. (Pergamon Press, Headington Hill Hall, Oxford), 1962. Pp. xiii + 242. Price 70 *sh.*

Adsorption and Collective Paramagnetism. By P. M. Selwood. (Academic Press, New York and London), 1962. Pp. ix + 189. Price $ 7.50.

Practical Chemistry an Integrated Course. By J. W. Buttle and D. J. Daniels. (Butterworths, London W.C. 2), 1962. Pp. xi + 294. Price 21 *sh*

SCIENCE NOTES AND NEWS

Award of Research Degree

Andhra University has awarded the D.Sc. degree in Geophysics to Shri P. Jaganmohana Rao for his thesis entitled "Studies on Local Heat Balance at Waltair".

Indian Journal of Pharmacy—Silver Jubilee Year

The Indian Journal of Pharmacy was started in 1939 at Benares as "a quarterly Journal devoted to the science and practice of Pharmacy in all its branches". It became the official publication of the Indian Pharmaceutical Association in the next year. The publication offices were transferred to Bombay in 1946. The Journal was converted into a bimonthly in 1949 and from the following year it has been appearing as a monthly periodical.

The Journal has successuflly served as a medium for the publication of the results of researches carried out in the various branches of pharmacy both in academic institutions and in pharmaceutical industry. Other features of the Journal are Technical Notes, Hospital Pharmacy, New Products and Equipment and Forensic Notes.

The Indian Journal of Pharmacy enters the Silver Jubilee Year—the 25th year—of its publication and proposes to celebrate it by publishing enlarged issues featuring a number of special articles.

"*Discovery*" to Join the Indian Ocean Expedition

Britain's research ship, the *Discovery*, will leave London shortly for an 18-month voyage as part of the international Indian Ocean expedition. The *Discovery*, which is one of the best equipped research vessels will carry a team of 20 scientists and is to join two other British survey vessels already taking part.

Among the many problems to be investigated by scientists on board the *Discovery* in the Indian Ocean are those relating to the manganese nodules known to be present at the bottom of the ocean, and meteorological and oceanographic conditions affecting marine life in this virtually unknown sea. The scientists hope to make a full assessment of the extent of the nodule deposits and their economic value to neighbouring lands. They will also use underwater equipment for detecting concentrations of fish and marine animals.

Natural Triploid in Brinjal (*Solanum melongena*, Linn.)

Messrs. V. M. Chavan, D. G. Bhapkar and D. P. Bhore of the Agricultural College, Poona, write: During the hot weather season of 1961-62, a very vigorous plant was observed in a brinjal (variety *manjri-gota*) plot at the Agricultural College Farm, Poona. It showed peculiarities in flower, all the flowers being long styled which