
BOOK REVIEWS

Annual Review of Nuclear and Particle Science, 1986. Vol. 36, pp. 743, (ed.) J. D. Jackson, (Published by Annual Reviews Inc., 4139, El Camino Way, Palo Alto, California 94306, USA), Price: USA \$ 34, Elsewhere \$ 37.

The Annual Review of Nuclear and Particle Science is one of the most popular and sought after review journals in the area of subatomic physics. The present volume (Vol. 36) continues the tradition of the earlier volumes and includes a number of informative reviews spanning the areas of nuclear physics, particle physics and particle accelerators.

Nuclear physics research of the seventies and eighties is synonymous with studies of heavy ion-induced reactions and high spin states. Not only were a number of new heavy ion accelerator facilities constructed in the last decade but a number of low energy accelerators have also been upgraded with the addition of heavy ion sources and post-accelerators to increase the energy of the beams. The present volume includes four articles in the area of medium energy heavy ion research — on nuclear structure studies in rapidly rotating nuclei, giant resonances in excited nuclei, sub-barrier fusion reactions and on nuclear shapes studied by Coulomb excitation. These articles, which have focussed on recent developments in these areas, are critical reviews of our current understanding on these subjects which continue to be vigorously studied in several heavy ion accelerator facilities. The volume also contains an excellent article on superconducting linear accelerators which have proved to be excellent postaccelerators for heavy ions. There is also an article on nuclear reactions in stars, not only putting in perspective the role of charged particle nuclear reactions in astrophysics but indicating areas where further laboratory work may be necessary.

Scattering of leptons and hadrons by nuclei is one of the direct means of studying nuclear structure. The availability of several new accelerators providing diverse high quality beams has enabled such studies to be carried out over a wide range of energy and momentum transfers. The complementarity of the probes further enables one to define the transition densities more precisely. The present status of such studies is reviewed in the two articles on lepton and hadron scattering and pion absorption by nuclei.

One of the outstanding developments in theoretical physics is the recent unification of the strong,

electromagnetic and weak interactions based on quantum field theory and local gauge invariance. The recent developments in this most exciting area are reviewed in a number of articles in the volume. These include a review of the popular models, their implications and various tests of the models.

The present-day nuclear and particle physics research cannot be decoupled from developments in accelerator technology and detector technology. This close interaction is reflected in the three articles on nonlinear problems in accelerator physics, design principles of detectors at colliding beams and on superconducting Linac accelerators for heavy ions. The volume also includes a review on fissile materials and nuclear weapons proliferation. It is not quite clear to which section of readers this review is aimed at. However, the nuclear issue has long since ceased to be the exclusive domain of the nuclear scientists and technologists. Much of the public debate is based on political and emotional considerations rather than on economic and technical. The lack of authentic information on sensitive issues has only added to this undesirable state. The present article is one of the few technical articles available in open literature on the nuclear proliferation issue and should be of interest to all socially conscious scientists.

This volume of the annual review of nuclear and particle science will be a very welcome addition in all libraries catering to the nuclear and particle physics community.

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Annual Review of Physical Chemistry, 1986, Vol. 37, pp. 615 (eds) H. L. Strauss, G. T. Babcock and C. B. Moore, (Published by Annual Reviews Inc., 4139, El Camino Way, Palo Alto, California 94303, USA) Price: \$ 32, Elsewhere \$ 35.

As in previous years, the 37th volume of Annual Review of Physical Chemistry contains a large number of articles, 20 in all, on various aspects of physical chemistry/chemical physics. Some of the articles are extremely interesting and almost all the articles are on the subjects of current interest. In the following, we briefly review some of the articles published.

The first article, entitled "The Journal of Chemical Physics: The first 50 years" is a historical survey of the initial years of the famous journal by the former editor J. W. Stout. For the authors who publish in the journal of Chemical Physics, this article is an interesting account of the mode of working of the editorial office providing a first hand information on such topics as how the choice of referees for submitted papers is made and the percentage of papers that is rejected. This article also contains a thought-provoking discussion on the role of referees in the modern science where rapid dissemination of results is essential.

The second article of the volume is entitled "Probing phenomena at metal surfaces by NMR" by C. P. Slichter. This article contains a useful review of NMR studies of Group VIII metals with emphasis on the catalysis by the metal surfaces. Various adsorbed species are considered including CO, SiO₂, ethylene, acetylene and hydrogen. The account of the recent studies of diffusion of atoms and molecules on metal surfaces is quite interesting particularly for the specialists in the field.

The third article is on interatomic potentials in solid state chemistry by A. M. Stoneham and J. H. Harding. This article is on a field of tremendous current interest as can be seen from the large number of papers that are published in journals each month. The article does a good job in stressing the importance of interatomic potential approach to diverse solid state properties. However, this article suffers from the drawback of being too qualitative. The article could have been more useful if more quantitative information on the potentials were provided.

The next article in this volume is by G. R. Fleming on subpicosecond spectroscopy. The author starts by giving an interesting chart of approximate time scales of elementary molecular relaxation phenomena and of some chemical and biological manifestation of these phenomena. It is clear from the chart that many chemically and biologically interesting processes occur on the subpicosecond time scales. The author succinctly discusses the various methods of generating ultrashort laser pulses. Interesting reviews of current research on isomerization dynamics in liquid, dissociation reactions, electron solvation dynamics, the optical Kerr effect, optical dephasing, relaxation processes in biological systems and in organic crystals are provided. The author has done a remarkable job in this short review and it is highly recommended to the interested readers.

The next article in this volume is by R. G. Cole and G. T. Evans on "Dynamics in polyatomic fluids, a kinetic theory approach". The article is well-written and kept at a level understandable to experimentalists. The section on orientational relaxation is particularly informative with a good discussion on collective effects in orientational dynamics.

The article on "Excited state electron and proton transfers" by E. M. Kosower and D. Huppert is undoubtedly one of the most attractive articles of the volume. The authors are well-known in this field and their article certainly lives upto the expectation. The article contains a nice discussion on solvent effects, including the effects of nonequilibrium solvation dynamics, which are of tremendous current interest. This article may very well become a standard reference on the subject. It is highly recommended for a careful study by the workers interested in this field.

The article of D. D. Dlott on "Optical phonon dynamics in molecular crystals" discusses the applications of recent spectroscopic techniques such as picosecond CARS neutron scattering and femtosecond Raman scattering to study the relaxation of optical phonons in molecular crystals and proteins. The review starts at an elementary level and easy to understand. An interesting account of phonon dynamics in complex materials, as in naphthalene and perylene, is provided.

The article by J. V. Senger and J. M. H. Levett Senger on "Thermodynamic behaviour of fluids near the critical point" is well-written except, perhaps, that it is too brief. However, as the authors pointed out, there are many excellent reviews that are available on the subject. The highlight of this review is the brief and succinct criticism of the current ideas at the end of each section. An extensive list of references forms an additional attraction of this review.

The review article of De Leeuw, Perram and Smith on the computer simulation of the static dielectric constant of systems with permanent dipole moment is rather interesting because of the negative conclusions that are arrived at. It clearly brings out our lack of knowledge of the static dielectric constants of systems with model interaction potentials.

The article entitled "Photo-initiated unimolecular reactions" by Reisler and Wittig provides a detailed discussion on various aspects of unimolecular pre-dissociation reactions. The emphasis here is on material that has become available since 1981. The

review contains good discussions on both the theory and the experimental aspects of the subject.

The review on small angle neutron scattering studies of the structure and interaction in micellar and microemulsion systems by S. H. Chen is quite thorough and quantitative in its information content. This is a rapidly developing field and the article of Chen provides an indepth discussion on the subject. The article may have one limitation — it is too technical for an average reader.

In an interesting article of this volume, Berne and Thirumalai reviewed the recent advances in the simulation of quantum systems by the path integral methods, with emphasis on systems of chemical interest. This article reviews the recent simulation studies of structure of liquid neon, low temperature properties of liquid helium, structure of water clusters, electron localization in molten KCl, electron in a quenched disordered solids and electron in water. The review elegantly brings out the enormous strides that have been achieved in the past several years in the simulation of quantum systems. It is rather unfortunate that the review does not illustrate the results with graphs and pictures.

There are several other articles that are of interest. The article on "Clusters: properties and formation" by Castleman and Keese reviews such problems as vibrational structure of small clusters, electronic structure of molecules in a cluster and relaxation processes. Flynn and Weston reviewed recent advances in laser photolysis and product detection with emphasis on hot hydrogen atom processes initiated by laser photolysis of the atom precursors. In the last article of this volume, Lin and Ertl reviewed "Laser probing of molecules desorbing and scattering from solid surfaces". This article reviews recent advances in the determination of internal (i.e. rotational and vibrational state) populations by means of laser studies of molecules scattered at or desorbed from solid surfaces.

In conclusion, we find that the 1986 volume of Annual Review of Physical Chemistry contains quite a large number of excellent review articles on various topics of current interest. This book would be a very useful addition to any research library on chemical and physical sciences.

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Development of Fermentation Technology at the Indian Institute of Science, Bangalore, India, (1911–52), by T. N. Ramachandra Rao, (Published by the Department of Biochemistry, Indian Institute of Science, Bangalore 560 012), 1987, pp. 285, Price: not given.

The aim of this enjoyable book is to present an introduction to this important branch of bioscience to science students, within the context of the rapid expansion in knowledge of biotechnology in modern times. The author's credentials to write this book are excellent, since he was associated in his early professional years with the development of fermentation technology and continued to work in this area in laboratories outside Bangalore for nearly four decades. In tracing the development of fermentation technology at the Indian Institute of Science, Bangalore, the author has devoted considerable space to the growth of science in India in pre-independence and early post-independence era. This fact should make the book attractive to life-scientists throughout the country. The book is liberally interspersed with reproductions of important scientific papers in microbiology appearing in Indian journals of this period as well as of reports of committees containing recommendations of how science in India should be developed.

The subject covered in this book is somewhat biased towards the contributions of Prof. M. Sreenivasaya "who was mainly responsible", in the words of the author, "for developing research and application of Fermentation Technology in India". This is understandable since the author was Prof. Sreenivasaya's student at the Indian Institute of Science and closely associated with him. This has not, however, precluded the author from incorporating in the book contributions to the field by the contemporaries of Prof. Sreenivasaya.

Early in the book (Part I) there is a succinct account of the early scientific research in India which serves as the background for the general reader to understand how far in science we have progressed in India since the beginning of the twentieth century. This is followed (Part II) by details of the "Dawn of fermentation technology", mainly concerning work at the Indian Institute of Science, Bangalore, which has the distinction of being the first institution organized in India, with the specific purpose of furthering advanced research in pure and applied sciences. Some work in fermentation technology was also carried out at Madras, Calcutta and Lahore, summaries of which are given in the book.

The appointment of Dr G. J. Fowler as the first Professor of Biochemistry at the Indian Institute of Science in 1921 marked the creation of the first chair of biochemistry in India. Prof. Fowler initiated work on acetone fermentation, production of alcohol from Mahua flowers and fermentation of cellulose at the Institute. Readers who are interested in the origin of these fermentation processes in the world will find a delightful account of them in this book and will be reminded that the discovery of Chaim Weizmann of a new fermentation process for production of acetone in Britain during the first World War laid the basis for a national home of the Jews in Palestine.

The remainder of Part II deals with the life and early work of Prof. M. Sreenivasaya at the Institute and with the work he initiated in lac production, spike disease of sandal and chemistry and structure of proteins.

Part III deals with the science climate and research planning in India after the first world war. The pioneering work of Sir C. V. Raman in Physics and Sir T. S. Venkatraman in sugarcane genetics was a turning point in the history of science in India, after which Indians replaced Englishmen as Directors and Professors in all Indian research centres. Dr V. Subramanyam became the Professor of Biochemistry at the Indian Institute of Science and in the same department Prof. Sreenivasaya developed insects (rice moth) as experimental animals for researches on nutrition and vitamins.

The eminent English biologist Prof. A. V. Hill visited India in 1943 and his report to the Govt. of India gave much comfort to the scientific community here. He recommended that "one of the greatest needs of Indian science and technology is of better opportunities from childhood onwards for practical and technological training and experience, especially in biological science". The Council of Scientific and Industrial Research (CSIR) was set up in 1944, mainly due to the attempts of Sir Ramaswamy Mudaliar. Since CSIR did not have any laboratories of its own, investigations on fermentation technology were funded at three centres—Bangalore, Calcutta and Lahore. The National Collection of Type Cultures was one of the activities funded at Bangalore and was later transferred to National Chemical Laboratory, Poona. Details of the other projects will be found in the book.

Part IV deals extensively with the development of Fermentation Technology in India immediately after CSIR was established. Even in 1944, the Journal of Scientific and Industrial Research, Delhi, hoped in its editorial, reproduced in this book, that

"the Institute of Fermentation Technology would find a place in the network of National Laboratories for which plans are under preparation". Such an institute was established only four decades later—at Chandigarh—the Institute of Microbial Technology! In the meantime, four fermentation industries—for the production of yeast, industrial enzymes, antibiotics and power alcohol, details of which are given in the text, were started in India. It may be mentioned that in India, as far back as 1940, the admixture of alcohol and petrol was legalised and shown to be efficient from 15 to 30% admixture, long before Brazil started using it for its automobiles.

In addition to research related to the above industries, other aspects of microbiology studied during this period in India, especially at Bangalore, were the biochemical studies on type cultures and yeast and microbiological formation of sulphur on the east coast.

The work of Dr M. K. Subramaniam, on cytology of yeast at the Indian Institute from 1947 for a decade established for the first time that yeast cell contains a cellular nucleus and chromocenter. Details of this work are given in this book and of the implications of this finding to the brewing industry which could now produce yeast hybrids capable of higher alcohol production.

A brief summary of fermentation technology work at Kanpur during 1940–1950 is followed by an extensive overview of fermentation technology in India during this period.

In Part V—the Postscript—contains details of work by Prof. Sreenivasaya on silkworm and by Dr M. K. Subramaniam on the meristematic cells of plants, and other memorabilia regarding these scientists and their colleagues. There is also a short account of the journal *Current Science* and Prof. Sreenivasaya's role in starting the journal and nurturing it in its early years. The book ends with a good index.

I have greatly enjoyed reading the book and can certainly recommend to microbiologists for thought-provoking reading even though much of it is snapshots of an interesting era in Indian science. I share with the author the hope that the book may contribute to an appreciation of fermentation technology in India "before it entered the fashionable phase in the 1980's with a 'super-star status' as biotechnology".

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The Prehistory of Metallurgy in the British Isles, by R. F. Tylecote, (Published by The Institute of Metals, 1, Corlton House Terrace, London SW1Y 5DB, UK), 1986, pp. 256. Price: UK £ 19.95, Elsewhere \$ 34.95.

The role of metallurgy in archaeology is now being fully understood and appreciated, and Prof. Tylecote developed this theme in 1962. This book is basically a revised version of his earlier treatment and is addressed both to metallurgists and archaeologists.

To build a history of metallurgy around archaeological findings is an extremely difficult task. Literature evidence is practically nil in the case of British Isles on its metallurgical 'past'. From what is presented in the book, one gets the impression that Britain has no worthwhile metallurgical 'past' of its own, except through the influence of the Romans.

After a clear Preface and Introduction, the book extends to over 11 Chapters followed by supporting Appendices. The native metals in Chapter 1 are followed by copper and copper alloys in Chapter 2, tin and its alloys in Chapter 3, and lead, silver and antimony in Chapter 4. The likely smelting and refining practices are indicated, but these are based on an extrapolation backwards of current practices to get a particular alloy. Conjectures alone are possible and Tylecote has done the job excellently. Fabrication techniques are presented in Chapter 5. The next three chapters deal with 'the coming of iron', 'the Roman iron age', and 'iron in the early mediaeval period'. These chapters lead us to 'water-powered bloomeries : the end of an era' in Chapter 9, 'the charcoal blast furnace and the finery' in Chapter 10, and 'fuels and their ashes' in Chapter 11. With his extensive knowledge of the Roman, the Greek, the Arabian, the Chinese, the Australian and the American history of metallurgy, Tylecote has been able to give a prehistory of metallurgy in the British Isles.

To write a book of this type is no easy job. While the overall structure and the thematic developments are excellent, the readability is poor. After reading a chapter, one does not get the temptation to go over to the next spontaneously. The book is a very important contribution, especially with regard to the metallurgical past of the British Isles. The book would appeal to those metallurgists who would like to probe into evolution of metal-producing techniques. The book also opens up a new tool for

archaeologists in the Archaeometallurgy.

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Geo-Ecology of Malnutrition—A Study of The Haryana Children by S. K. Aggarwal, (Published by Inter-India Publications, D-17 Raja Garden Extension, New Delhi 110 015), 1986, pp. 142 + 26, Price: Rs. 95/-

The magnitude of malnutrition among young children of the developing countries has increased the need for systematic understanding and planning to combat the problem. In a systematic and scientifically rigorous manner, the author has examined child nutrition in ten purposely selected villages of Haryana, India. The results are presented in this monograph. The study has confirmed the findings of various nutritional surveys in other parts of India. The author has demonstrated that improved environmental sanitation and adoption of family planning are positively associated with better child nutrition.

The holistic perspective adopted in this book should make it valuable not only to researchers in social sciences but also the health professionals and especially the agencies concerned with delivering material and child health programmes.

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Apple Scab; (*Venturia inaequalis*) by G. K. Gupta, (Published by E. Merck (India) Limited, Agrochemical Division, Shivsagar Estate 'A', Dr Annie Besant Road, Worli, Bombay 400 018), pp. 36, Price: Not given.

The booklet is published by E. Merck (India) Limited, Agrochemical Division, Worli, Bombay 400 018. The foreword is written by R. J. W. Byrde of Long Ashton Research Station, University of Bristol, UK. The author discusses distribution of the pathogen in India, economic loss, host plants and susceptible cultivars, symptoms of the disease on various plant parts, the disease cycle, weather conditions favourable to the disease and

control. The booklet also gives the spray schedule and precautions on the use of fungicides. The booklet could have discussed the possible areas for further research and also the relevance of the Mills chart under conditions obtaining in India. This is a useful publication for those who are interested in the control of apple scab, particularly the orchardist as well as the researcher.

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Beneficial Fungi and their Utilization by M. C. Nair, and S. Balakrishnan, (Published by Scientific Publishers, Jodhpur, India.) 1986, p. 196, Rs. 150/-

This is a compilation of 12 invited papers presented at a Symposium held on the subject in Kerala in 1985. It is dedicated to (Late) Dr K. Ramakrishnan, a well known Mycologist. There are five papers on mushrooms which cover various aspects of edible mushrooms cultured in India. The one by M. C. Nair and S. Bhavani Devi gives very useful information on collection and identification of mushrooms. The paper on *Pleurotus* by N. Shanmugam gives valuable basic data on oyster mushrooms, which are becoming increasingly popular in India. The two papers on 'Paddy Straw Mushroom' by H. S. Sohi and S. Bhavani Devi and M. C. Nair give valuable information, besides a historical account of this mushroom cultivated in India. The paper on 'Natural Mushroom' by N. C. Pathak gives a good compilation of the important species of mushrooms and also basic data on the biochemical analyses of the important species.

D. J. Bagyaraj has given an excellent review of the potentials of Mycorrhiza in crop plants. He has pointed out that more work on the applied aspects needs to be done so as to fully exploit the potentials. The one on the same subject by B. L. Jalali gives detailed information on one branch of Mycorrhizal Association with plants.

The paper by H. C. Dube and S. M. Trivedi on 'Fungal Cellulases' and by C. Balagopalan on 'Single Cell Protein' gives details on the potentials of microbial biotechnology under Indian conditions. More work needs to be done on the fungi mentioned by them and also several others which are found under tropical conditions in India.

H. R. Reddy and V. S. Seshadri have reviewed with examples, the 'Use of Fungi in Controlling

Fungal Diseases of Plants', which is a very valuable compilation. P. C. Sundara Babu and S. Jayaraj have reviewed the fungi which could be used for controlling insect pests of crops. An unusual article on 'Exploiting Fungal Plant Diseases' for the welfare of mankind is written by K. M. Rajan and R. Kalpana Sastry. This is a new thought, which is worth pursuing.

The Appendix carries "The State of Mycology in India" by K. Ramakrishnan delivered as Presidential Address at the Annual Meeting of the Mycological Society of India in 1977, which is apt as a part of dedication of the book to Dr. Ramakrishnan.

In general, the book gives very valuable information on 'Beneficial Fungi'. Upto-date data and information are presented in most cases. However, not all beneficial fungi have been covered to fully justify the title. There are a large number of grammatical, spelling and printing mistakes which reduce the value of the book. I trust this could have been easily avoided if a bit more care had been taken in editing and proof-reading.

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New Directions in Solid State Chemistry by C. N. R. Rao and J. Gopalakrishnan, (Published by Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU) 1986, pp. viii + 516, Price: £ 55.00; \$ 79.50.

The efforts of solid state chemists in the last few decades have led to the development of several novel preparation/characterization techniques and new materials of practical importance. The most breathtaking achievement has been the discovery in the last few months of high temperature superconductors belonging to the Y-Ba-Cu-O System. Professor CNR Rao's group at Bangalore has been one of the world leaders in all these activities. It is therefore in the fitness of things that a monograph on "New directions in solid state chemistry" should have been written by Prof. Rao and J. Gopalakrishnan.

Starting from the fundamental concepts of crystal chemistry and solid state physics, the authors build up the various topics of modern solid state chemistry in an unconventional though attractive fashion leading up to the latest developments in the field.

The book is divided into eight chapters. The first chapter deals with the crystal structures of various

inorganic and organic solids with a brief discussion on bonding in these materials. The structural models of noncrystalline solids and quasicrystals are also touched upon.

The second chapter describes the different techniques developed over the years, for the structural characterization of solids. These include X-ray, electron and neutron diffraction, electron microscopy, extended X-ray absorption fine structure (EXAFS), X-ray absorption near edge structure (XANES), magic angle spinning nuclear magnetic resonance (MASNMR), photoelectron spectroscopy using X-rays or UV. Auger electron spectroscopy and electron energy loss spectroscopy, electron spin resonance, Mossbauer spectroscopy and Raman spectroscopy.

The third chapter is concerned with the various methods of preparing solids of different types. For crystalline materials the "strategies" elucidated are ceramic (powder compaction and sintering) and chemical (precursor route, vapour phase decomposition, fused salt electrolysis, intercalation/deintercalation, ion-exchange) methods, high pressure synthesis, use of electric arc, skull melting and chemical vapour deposition. Syntheses of conducting organic polymers, preparation of microcrystalline particles and amorphous materials are delineated. The various crystal-growing techniques are also surveyed.

The fourth chapter devotes itself to the fundamental aspects of phase transition in different solids. Some of the topics covered are, thermodynamic basis of phase changes, role of soft modes, structural changes involved during transition, nucleation and growth mechanism, order-disorder and martensitic transitions, incommensurate phases, spin-state transitions, transitions in organic solids, plastic crystalline, liquid crystalline and noncrystalline states.

In Chapter 5 the different types of defects in solids are described viz., point, line and surface. The interrelationship between nonstoichiometry in inorganic solids and the ordering of point defects and superstructures are brought out with examples drawn from metal chalcogenides and carbides, some metal oxides and fluorite-related compounds. Block and infinitely adaptive structures and intergrowths in several oxides are illustrated with high resolution electron micrographs taken from the literature. The specific "case" of defect ordering and superstructures shown by perovskite oxides is dealt with in detail at the end.

Chapter 6 discusses electronic, magnetic, dielectric and optical properties of solids—the mechanisms responsible for these and the relationship between the structure of solids and these properties. The latter has been brought out clearly through some "case studies" on metal oxides, metal sulphides, metal fluorides, metal-nonmetal transitions, metal clusters, mixed valence compounds, low dimensional solids, Ferroics and liquid crystals.

Chapter 7 brings into focus some of the practical aspects of materials design and devices. Some "selected materials applications" are presented. These include fast ion conductors, photoelectrochemical cells, magnetic, hydrogen storage, amorphous and organic materials, Langmuir-Blodgett films, liquid crystals, nonlinear optical materials, luminescent and laser materials.

Chapter 8 captioned "Reactivity of solids" brings out the strong correlation between the chemical reactivity and the crystal (including defect) structure of solid materials. Reactions of solid-gas solid-solid and solid-liquid types are discussed. Intercalation chemistry, reactions of organic solids and heterogeneous catalysis are delineated with respect to some specific systems.

The book thus covers all the vital aspects of the subject. Though the authors have deliberately avoided theoretical details with regard to the origin of the physical properties of materials, they have given a lucid exposition of the concepts involved. The vast canvas painted by the authors with the rapidly expanding knowledge in solid state chemistry will surely excite the inquisitive mind of a serious reader to delve deeper into the subject with the help of extensive references provided at the end. The discussion on the practical aspects of materials design and some of the case studies of structure – property relationship will be most useful as a reference manual for practicing materials scientists.

In summary, the monograph is an excellent treatise on modern solid state chemistry and will be of immense value both to solid state chemists and materials scientists.

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