
BOOK REVIEWS

Physical Chemistry Through Problems by S. K. Dogra and S. Dogra, (published by Wiley Eastern Limited, 4835/24, Ansari Road, Daryaganj, New Delhi 110 002, Bangalore, Bombay, Calcutta, Madras and Hyderabad) 1984, pp. 674, Price Rs. 45.00.

This book gives an excellent account of the fundamental principles of Physical Chemistry needed for a study of pure and applied sciences—especially industrial and biological sciences. These principles or techniques have been discussed in depth through their applications to solving problems. There are not many texts, at present, which satisfy these criteria.

The topics in this book have been organized and arranged in a systematic manner, first structure, then dynamics and finally synthesis. The first two come under the domain of Physical Chemistry and the last one under those of Organic and Inorganic Chemistry. The chapters 2 to 4 discuss elementary quantum mechanics, atomic and molecular structure and spectroscopy. The latter discusses all the spectroscopic methods used to determine the structure of molecules and their parameters. Chapters six, seven and eight give a concise account of the three states of matter—solids, liquids and gases, their structure and their physical properties. Chapter nine discusses the principles of statistical mechanics, serving as a link between the microsystems and macrosystems. This chapter illustrates the methods of calculating the properties of macrosystems from those of microsystems—the thermodynamic functions from the concept of partition function. Chapters 10 to 17 deal with the principles of thermodynamics and electrochemistry as applied to ideal systems. These studies will help in determining whether a particular process, physical or chemical, is reversible or spontaneous. Chapter 18 discusses the principles of the previous chapters as applicable to non-ideal systems. The basic principles of chemical kinetics are discussed in chapter 19. They help in following the progress of a reaction.

Since SI units are used predominantly nowadays in all scientific literature, they have been included along with CGS units (for comparison) in chapter one, so that the students can be familiar with both the systems.

Each chapter contains a number of problems which have been solved or illustrated so that the student can grasp the fundamental principles of each of the concepts discussed. In addition, there are a number of

unsolved problems, arranged in the order in which the concepts have been introduced. The answers to these problems have been given at the end.

However, there are some printing mistakes here and there in the text as well as in the solved problems. This is understandable as it is the first edition of the book. Yet the authors have done an excellent job in undertaking a strenuous and challenging task of bringing forth such a comprehensive Physical Chemistry text satisfying the needs of advanced undergraduates as well as M.Sc (Previous) students of Indian Universities. This book can therefore be recommended as a valuable text to these students. Moreover, the price is also reasonable and well within the reach of a common student.

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Nuclear Power and its Environmental Effects by Samuel Glasstone and Walter H. Jordan, (published by American Nuclear Society, La Grange Park, Illinois, U.S.A.) 1980, pp. 395, Price not stated.

It is nearly four years since this book was published but a review of it is still worthwhile considering the increasing interest in India on the environmental effects of nuclear power development. The book has had a second printing in 1982, thereby testifying to its popularity. The wellknown authors, Glasstone and Jordan, have done an admirable job of writing a comprehensive and technical yet lucid and precise text book on the risks and benefits of nuclear power generation. The main feature of the book is the development of the subject matter from first principles in a manner not requiring a prior knowledge of nuclear physics reactor engineering or biology. A good amount of information is presented in 48 tables and 70 figures, supplemented by carefully developed explanations in the text.

Starting from a description of the principles of electric power generation and of nuclear reactors, the fourteen chapters of this book deal in succession with

licensing of nuclear power plants, nuclear reactor safety, radiation protection standards, the radiation environment, biological effects of radiation, radioactivity in reactor fuel production, radioactive effluents from nuclear facilities, management of wastes, transportation and safeguarding of nuclear materials, biological effects of condenser cooling systems, disposal of waste heat and nuclear power plant site assessment. Each chapter is followed by a fairly comprehensive bibliography. There is a succinct and comprehensible discussion of the 'Three Mile Island accident' and its after effects. However, a separate chapter on important accidents in actual nuclear power reactors and their radiological and safety design consequences would have been welcome.

It is to be noted that the treatment of the subject is entirely with reference to the nuclear power industry as developed in the U.S.A. As a consequence, though the treatments of the Pressurized Water Reactor and the Boiling Water Reactor are comprehensive and detailed and there are brief descriptions of the Liquid Metal cooled Fast Breeder Reactor and the High Temperature Gas cooled Reactor, there is only a passing mention of the use of graphite as a moderator and no mention of heavy water reactors. Thus, in the Indian context, many of the finer details presented in the discussions on nuclear reactors, nuclear reactor safety, radiation exposures from nuclear power plants, and radioactive effluents from nuclear reactors would not be applicable to our Pressurized Heavy Water Reactor nuclear power stations. Similarly, the chapter on Licensing of Nuclear Power Plants is essentially based on U.S. codes and practices. However, the chapter on Radiation Protection Standards does contain a good description of international standards and a comparison with the U.S. standards. As regards the fast reactor fuel cycle, there are good discussions on spent fuel reprocessing, mixed oxide fuel production and fabrication, and on the transportation and safeguarding of nuclear materials, but no discussion of the nuclear weapons proliferation issue. The results of the 'International Nuclear Fuel Cycle Evaluation' were available too late to be incorporated in this edition.

The book has an attractive get up and an excellent, error-free printing. In conclusion, the book is strongly recommended as a fine introduction to the field. Though the specialist in any particular area of the subject may not find the in-depth treatment required for further research, this book will be valuable to students, academics, nuclear energy professionals, and all those requiring a comprehensive, coherent, logical

and matter-of-fact treatment of a complex, often misunderstood, and sometimes sensationally treated subject. All informed members of the public who have an interest in the effects of nuclear power development on the environment are well advised to give a careful reading to this book. It should do much to clear the false impressions created by unsubstantiated accounts of the risks of nuclear power generation that are often found in the popular media.

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Annual Review of Astronomy and Astrophysics (published by Annual Reviews Inc. Palo Alto, El camino 4139, California 94306, USA) Vol. 21, 1983, pp. 482, Price USA \$44.00, Elsewhere \$47.00.

This volume contains thirteen articles covering a wide range of subjects. The prefatory chapter is written by Bengt Strömgren, the distinguished Scandinavian astrophysicist. In this autobiographical note Strömgren recalls his early years at the old Copenhagen Observatory of which his father was the Director and where, as a boy of 12, he first started his career as an astronomer. His early interest in the problems of celestial mechanics gave way to the more enduring charm of modern astrophysics when he enrolled as a student of Copenhagen University and there association with Niels Bohr and the Institute for Theoretical Physics played a significant role in his scientific development. Strömgren belongs to a disappearing class of great scientists who have been equally at home with theory and experiments and his reminiscences convey a very different flavor to the current readership, used to thinking of science in compartmentalised terms.

The next article by Bradt and McClintock is on the Optical Identification of Galactic X-ray Sources. This is followed by a review on Galactic Gamma-ray Sources by Bignami and Hermsen. Besides discussing the various classes of discrete x-ray sources in the Galaxy, Bradt and McClintock have done a commendable job on the compilation of properties at all wavelengths of sources that emit hard x-rays at a flux density of $1 \mu\text{Jy}$ or higher. Their Bright Source Digest should serve as a very useful catalogue and their bibliography running to no less than 722 entries is perhaps the most exhaustive of its kind in this

particular area. Problems of stellar physics have been discussed by Iben and Renzini in their article on the Asymptotic Giant Branch Evolution of low and intermediate-mass stars. This is a sequel to two earlier review articles in the Annual Reviews on the evolution of single stars by the first author. Another serial review is the one on Thermonuclear Reaction Rates with Michael J. Harris's name added to the original trio Fowler, Caughlan and Zimmerman (FCZ). FCZ I and FCZ II appeared in the series in 1967 and 1975 respectively. Although there are no articles on solar system objects in the present volume, there is one on the Sun by Newkirk which deals with the Variations in Solar Luminosity.

A timely review on Astrometry has been written by van Altena. As he asserts at the very beginning "Astrometry is in the midst of an unparalleled revolution." This will become even truer in the near future when the field of Space Astrometry opens up with the launch of the Hubble Space Telescope and Hipparcos, the dedicated astrometric satellite of the European Space Agency. van Altena also discusses Radio Astrometry which is so full of exciting problems today.

Aspects of interstellar matter have been reviewed in two articles—the first by Schwartz on Herbig-Haro Objects and the next by Ho and Townes on Interstellar Ammonia. A related article on Dust in Galaxies has been written by Stein and Soifer. This last article includes discussions of the existence of dust in Active Nuclei Galaxies and of the possibility of its existence in Quasistellar Objects. The volume contains two reviews on the Large-scale Structure of the Universe—the first on the Local Anisotropy of the Hubble Flow by Davis and Peebles and the second by Jan Oort on Superclusters. Readers will find both very exciting.

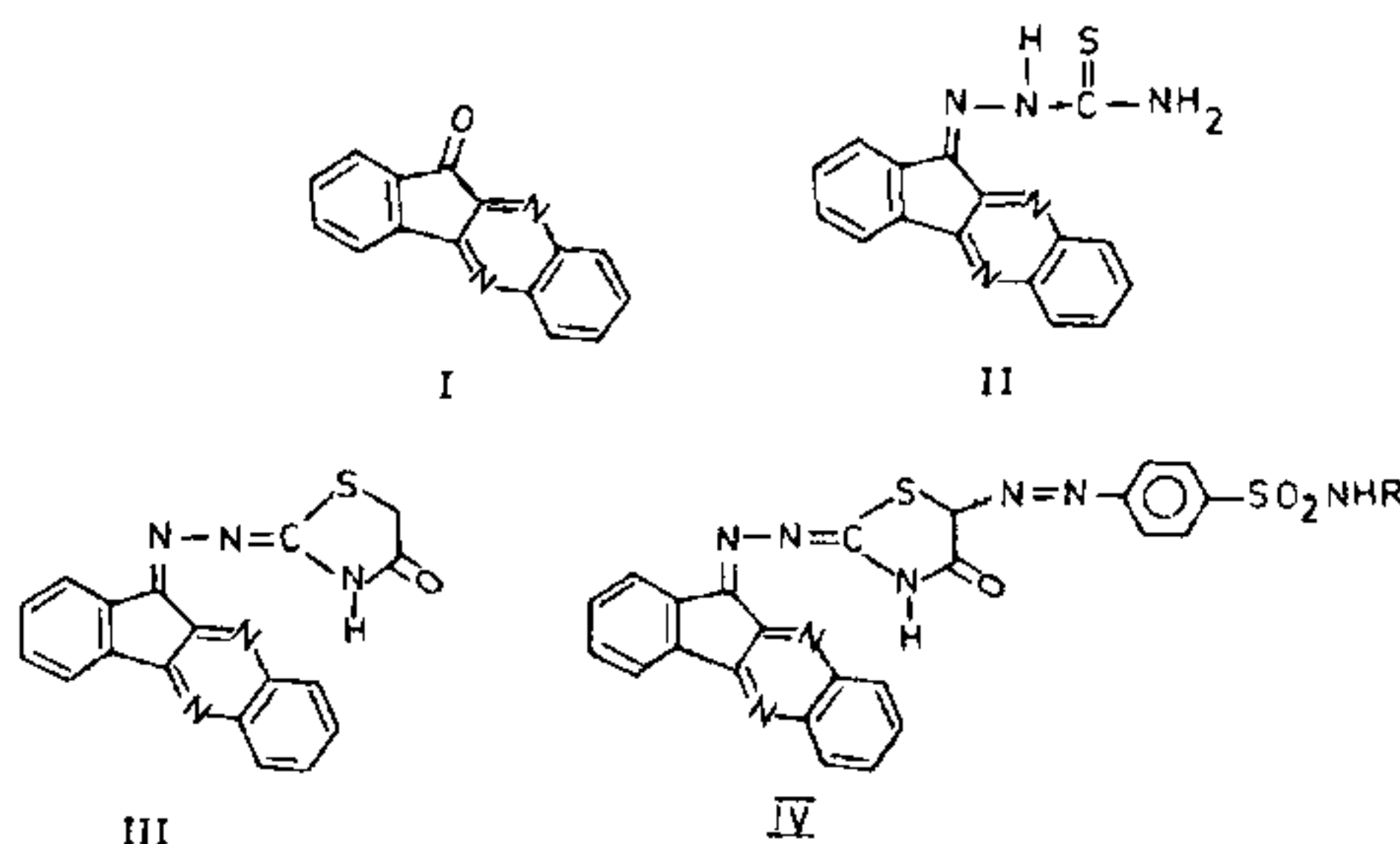
At the end, there is a Subject Index to the volume and Cumulative Indexes for the volumes 11 to 21 which list all the contributing authors as well as the chapter titles. This last addition is a particularly helpful act on the part of the Editors. The volume, like its predecessors, is a valuable addition to all science libraries.

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ERRATA

In the article "Synthesis and physiological evaluation of a thiazolidinedione and its azoderivatives from ninhydrin" by V. Rameshwar Rao, T. V. Padmanabha Rao and S. Girisham, (*Curr. Sci.* August 5, 1984, Vol. 53, No. 15, p. 799) the figure containing the structure formulae (I–IV) have been inadvertently omitted. Readers are requested to read the article with the structure formulae given below:



We regret for the error.

Editor