

BOOK REVIEWS

Stereochemistry and Mechanism through Solved Problems. P. S. Kalsi. New Age International Publishers, 4835/24, Ansari Road, Darya Ganj, New Delhi 110 002. 1994. x +373 pp. Price: Rs 165.

The book deals with the topics stereochemistry and reaction mechanism through problems and solutions. The purpose of the book as suggested by the author in the preface, is to train students for appearing in post-graduate university examinations as well as competitive examinations like joint UGC-CSIR eligibility test. The book therefore, serves as a model question-answer book for strategic learning.

Both the areas of application and strategic learning are most sought-after materials for the benefit of the students. The book is useful to teachers for selecting problems for discussion in the classroom, setting questions for formal and terminal tests. The purpose of the book is to train students in application of the knowledge and understanding they have in stereochemistry and reaction mechanism. Problem solving builds up the application aspect of learning. The book presents each subtopic through posing a problem and solving it. Therefore, this book provides a very good medium for self-learning the application of knowledge in the area of stereochemistry and reaction mechanism.

The book contains eleven chapters. Each chapter begins with enlisting salient features of subtopic, followed by problems and solutions in the form of model answers, gradually covering the entire subtopic. The book is full of nice illustrations which depict three-dimensional aspects of the molecular structures. Chapter 4 develops the fundamental concept of molecular symmetry and chirality which is very helpful in learning stereochemistry.

Chapter 6 deals with Optical Rotatory Dispersion as an instrumental method for determining configuration of some molecules. Problem 1.60 of Chapter I also discusses use of NMR in identifying certain conformers. However, a separate chapter discussing principles of instrumental methods and their application to identify stereoisomers and to determine three-dimensional molecular structures would

have been useful to readers.

It will be beneficial to the readers if aliphatic electrophilic substitution reaction (SE1, SE2, and SEi) and the effect of substrate, leaving group and solvent can be explained with examples in a separate chapter. Again, if the reaction intermediates, i.e. carbonium ions (classical and non-classical), carbanions, carbenes, nitrenes and arynes are discussed elaborately with examples, it will be helpful to the students appearing at various competitive examinations.

The book needs minor corrections at some places.

Some questions do not contain proper action verbs. For example: Problem 1.5 (page 5) states 'Draw and explain the hybridizations...', which can be modified more appropriately as 'Explain the hybridization... with suitable diagrams'. Problem 1.23 (page 16) stating: 'What do you understand by gauche and anti-conformations' may be modified as 'Define gauche and anti-conformations'. Problem 4.13 b (page 139) stating 'Tell, if *trans*-1,2-dichlorocyclopropane is asymmetric or dissymmetric?' can be modified as 'State whether *trans*-1,2-dichlorocyclopropane is asymmetric or dissymmetric'.

Some answers are not explicit, some are with mistakes. For example, in problem 1.85 (page 48) numbering of carbons in cubane would have made it easy for a reader to correlate the nomenclature. In problem 2.71, the answer states the condition for a compound to be meso isomer whereas the question was to identify a meso isomer in a list of three compounds. In problem 2.72, the answer does not explain why only three isomers are observed when there is a possibility of four isomers. Besides, the diagram of *cis*-1,3 dimethylcyclohexane would have made the answer complete. In Chapter 10, Huckel and Mobius systems should have been explained with diagram showing nodes.

In problem 1.25 and many others, the answer is in the conversational style. The book aims at giving model answers for written tests. So the answer should not be a phrase or an incomplete sentence.

The order of some problems needs change. For example, answers to problems 8.6b and 8.6c are referred to Chapter 9 (9.33a and 9.33b). The ques-

tion of stereo and regio selectivity should not have been raised in Chapter 8 when it is discussed in Chapter 9.

As a whole the book is very useful to both teachers and students for classroom and test purposes.

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State of the Art in Polymer Science and Engineering in India. M. Santappa. T. R. Publications Pvt. Ltd., PMG Complex, 2nd Floor, 57, South Usman Road, T-nagar, Chennai 600 017. 576 pp. Price: Rs 795.00

In this book the author has compiled the summary (often in one line) of the research papers on polymers published by Indian scientists, technologists and engineers based on their research work carried out in India for the last fifty years or so. He has set aside biopolymers excepting collagen from the purview of his compilation and also the polymer involved works in the fields of electronics, material science and space science. The author has, by and large, refrained from making commentary on the works and accordingly the book turns out to be a reference book on the subject and not a review. In the preface of the book he has commented that although our contributions to the polymer literature are substantial in quantity, they are poor in quality with very few exceptions, of course. Our works are mostly repetitive, uninteresting and often devoid of a clear objective. The question therefore arises – Why then did the author undertake such an arduous task to compile such voluminous but insignificant contributions? The author answers that the book has laid bare the glaring deficiency in the quality of our research papers. It comes as a lesson for the posterity so that quality gets priority over quantity.

The author is one of the seniormost and a much respected member of the profession. So his comments command attention and respect. But is the scenario not the same for every other field of research in our country? That this is

so is common knowledge. In order to find the cause behind the generally dismal performance in scientific research, one has to look into the socio-economic conditions of the country. We are amongst the poorest nations of the world with an average per capita income of around 300 dollars and a literacy rate of only about 50%. With such abysmally low economic condition and literacy it is hard to expect that our science will flourish and the general level will compare with the best in the world. It may be possible to build certain centers of excellence with excessive funding for the sake of improving the quality of research. But this would not help improve the general level, as our experience during the last two decades of effort in this respect would prove.

It may be pertinent here to discuss the situation in the two so-called Asian tiger countries, viz. South Korea and Taiwan. There were hardly any publications coming out from these countries even 20 years ago. Now, they are economically sound and scientific research there has gained ground so much that our scientists are flocking to these countries to gain post-doctoral research experience. Paradoxically, according to the *Economist* (*Economist Newspaper Limited, London, 1996* reproduced in the *Sunday Statesman, Calcutta, 22 September, 1996*) one of the key factors contributing to the great economic boom in these countries has been identified to be their emphasis in imparting primary as well as secondary-level education to the whole population rather than to a part of it which would otherwise have assumed elitist character. The university education and research gained importance in a subsequent stage. The example of these two countries which belonged to the third world three decades ago proved right the prophecy of Carl Sagan, the renowned astrophysicist, who holds the view that Science in the third world countries is not gaining ground because of the lopsided educational policy which is elitist in character. We are yet to learn from the above examples.

Coming back to the book proper, the author has done a stupendous job in going through so many papers, which amount to more than one thousand. He has classified the work into eight top-

ics, covered in as many chapters. These are; 1. Synthesis of novel monomers, catalysts and polymers 2. Kinetics of polymerization; 3. Graft copolymerization; 4. Physical chemistry of polymers; 5. Chemical engineering and technology of polymers; 6. Some properties and uses of polymers; 7. Applications of polymers in industries; 8. Science & Technology of leather. The last one surely has found place because of the association of the author with the Central Leather Research Institute as its Director. The contributions in each of the above topics have been entered institutionwise, i.e. Universities, Research institutes, CSIR laboratories, IITs, other technological Institutes, Defence Research Laboratories, Space and atomic research laboratories. Also as has been stated earlier, the author has not made any commentary on the works except on rare occasions. Accordingly, the book is not a review but a dictionary of polymer research done in India during approximately the last 50 years.

It may be noted that the bulk of polymer research in India consisted of studies on free radical polymerization, finding out new initiator systems and establishing the kinetics and mechanism of polymerization reactions. In many other countries, polymer research started in much the same way. But while they quickly caught up with the ever-emerging new lines of research, we in India continued in the same line far too long. One obvious reason is that this particular line of research required minimum of funding. At present, however, in some of our laboratories research is going on in contemporary topics but these are very few in number. Unfortunately, on going through the book one does not easily get a feel of this change.

Furthermore, even though the stated policy of the author is not to evaluate the merit of the works, it would have been proper to highlight the landmark achievements which are not many in number and discuss them in brief. Take for example, the dye techniques developed by Palit in the early sixties. This technique stands out as the most original work from India in the sixties. It provided the polymer chemists with an easy and inexpensive means of identifying transient free radical intermediates which are used to initiate free radi-

cal polymerization. The technique served as a substitute of the hazardous radio-chemical assay technique. Using this, Palit and coworkers unraveled the mechanism of a large number of redox reactions that generate free radicals. Although mention has been made of this technique on pages 71 and 139, the significance and importance of the technique have not been properly made out and a brief description of the principle of the technique would have been desirable. This is particularly so since the author has in many places of the book devoted space to describe non-seminal works. The result is that many a gem got lost in the milieu.

As regards the preparation of the book, the compilation is disjointed in many places. Consider, for example, the two sentences under section 6 on page 139. The first sentence speaks of Palit's dye technique while the immediately next one deals with an entirely different subject. Also wrong references are cited for several works. For example, on page 70, 3rd para, refs. of Maiti *et al.* and Kar *et al.* are wrongly placed, similar is the situation with Das *et al.* in para 4 and also the references 147-151 in the same para are inappropriate. Furthermore, some references are also factually wrong, e.g. 166 and 167 on page 92. In chapter 1 there is no mention of the contribution from Indian Association for the Cultivation of Science in the contents and this contribution has been included under that of Calcutta University on page 27, section 10. There is also no uniformity maintained in the reference list. On the surface these lapses do not appear to be grave enough but such errors do not befit a reference book.

Finally, the title of the book *State of the Art* seems a misnomer. Perhaps, an appropriate title would have been 'A Concise Account of Research of Polymer Science and Engineering done in India' or something similar. Nevertheless, the book will serve the purpose of a source book on the subject and like all books of reference it should find place in technical and science libraries.

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