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### BOOK REVIEW

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## BOOK REVIEW

The Design of Organic Syntheses by Stephen Turner, Elsevier Scientific Publishing Co., P. O. Box 211, Amsterdam, The Netherlands and 52 Vanderbilt Ave., New York, N. Y. 10017; 1976, xii + 228. Price: \$22.95

Reviewer: Ernest I. Becker, University of Massachusetts at Boston

In "The Design of Organic Syntheses" Steven Turner comes closest, in this Reviewer's opinion, to providing a rational intellectual approach to organic synthesis. The usual approach for a beginner is to learn one-step reactions, two-step reactions, three-step reactions, etc. Even in graduate studies, the principal effort appears to be to increase the student's knowledge of individual reactions hoping that the students will see connections and so learn how to do multistep syntheses. In addition to this limited approach, texts purporting "how to do synthesis" have largely fallen short in the philosophy of the problem in part because of the lack of appropriate language. Turner succeeds in his effort to rationalize complex syntheses because he develops a vocabulary which enables him to discuss and the reader to "see" purpose in a given synthetic strategy. Target molecules, "point-type" and "plateau-type" reactions, obvious syntheses, irrational syntheses, regiospecific and stereospecific control elements and synthons are some examples of these clarifying terms.

Chapters 1 and 2 are introductory and present a brief historical overview, the "ideal" synthesis, reasons for synthesis, types of synthesis, and the target molecule. Chapters 3 and 4 discuss the design of "obvious" and also complex syntheses. Assembly of the carbon skeleton is the subject of Chapter 5. Chapters 6 and 7 present the concepts of controlled reactions: regiospecific control and stereospecific control elements, resolution and asymmetric synthesis. Chapter 8 focusses on assesment of the synthetic tree, while Chapter 9 concentrates on practical aspects of reactions. Analysis of prostaglandin syntheses is the main topic of Chapter 10. Prognostications are rather conservatively presented in Chapter 11.

The academic scientist and, in general, research scientists are quite happy when they have devised and carried out the synthesis of a given target molecule. Turner points out that additional factors bear on the choice of a synthetic pathway in the industrialization of a given process. Selection and availability of a solvent, conditions for obtaining an easily filterable form of a solid, availability of equipment, applicability of automatic controls, and cost often are decisive in choosing one pathway over another.

Two additional approaches to design of synthesis are the significant computerized approach and the application of biological conversions as part of a total scheme. The merits of computerized approaches are still to be decided, probably because they are still in development. The use of biological steps is largely unexplored by organic chemists; much more needs to be done.

## BOOK REVIEW

Throughout the text syntheses have been carefully chosen to exemplify the points being made. Molecules whose syntheses are discussed totally or in part include adamantane, prostaglandins, strychnine, penicillin, vitamin B<sub>12</sub>, a gene, and macrocyclic dienes. About 250 references are provided.

The author has an obvious enthusiasm and affection for synthesis and he communicates well his fascination with the accomplishments of organic chemists. He goes so far as to suggest new reactions which may be predicted from certain correlations of synthetic methodology.

This Reviewer has only minor cavils. Umlauts are omitted from the names of several chemists, which I regard as misspellings. Methyllithium should be one word (p. 21). The typing for the camera-ready reproduction is highly uneven and frequently disrupted my concentration. Otherwise the text is notably free from chemical errors.

This book will stimulate and reward organic chemists who are beyond an introductory course in organic chemistry. The text may be skimmed with profit, but some parts will require careful study. I recommend it highly for these virtues.