

Organic Synthesis: The Science Behind the Art, W.A. Smit, A.F. Bochkov and R. Caple, The Royal Society of Chemistry, Cambridge, 1998 pp. xix + 477, Price £25.00, ISBN 0-85404-544-9

The synthesis of complex molecules from simple available precursors usually involves a step-by-step protocol. In addition to the selection of suitable precursors and reactions for the creation of the chosen bonds in the target molecule, the synthetic chemist also has to address a more general and in many cases problematic strategic task, namely the design of a detailed plan for the entire synthetic pathway.

Organic Synthesis: The Science Behind the Art, therefore presents the general ideology of pursuits in the area of organic synthesis, and examines the methodologies that have evolved in the search for solutions to synthetic problems. The first chapter of the book discusses the goals of an organic synthesis, and provides a selection of specific examples to chart the historical application of useful naturally occurring organic compounds, e.g. the development of dye chemistry by the Romans and the isolation of taxol (an anti-cancer drug) from the yew tree. This chapter then moves on to discuss the fact that not all synthesised molecules are of specific value in any given application; indeed quite often the challenging complexity of the target per se serves as a powerful driving force to challenge the synthetic skill of the researcher. The second chapter goes on to discuss the tactics of synthesis and offers background information illustrating the typical features of organic reactions, factors determining the course of the reaction, its rate, and the actual possibility of the reaction occurring. Specific sections include desired transformations, carbon–carbon bond formation, functional group inter-conversions, selectivity, synthons, cyclic structures, and carbon skeleton remodelling.

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The third chapter details the strategy of synthesis. One could expect the vast arsenal of contemporary methods to enable the chemist to solve practically any problem of synthetic chemistry. However, mastering the skill of planning a synthesis is of paramount importance, i.e. to be able not only to master its tactics, but also its strategy. The penultimate chapter examines molecular design, focussing upon structure-oriented design and function-oriented design. The former refers to the synthesis of molecules with unusual structural characteristics not necessarily related to some useful property, whilst the latter refers to the synthesis of molecules expected to possess a well-defined set of properties. The final chapter aims to pull together the conclusions from its predecessors and provide a fundamental philosophy for integrating the separate parts of organic chemistry into a unified and closely bound system.

The choice of examples is paramount to the success of such a volume, and the carefully selected examples used to discuss the strategies developed in each chapter of this book serve to illustrate both the evolution of well-known approaches, as well as recently emerged trends most likely to determine the future development of organic synthesis. Overall, this book is a concise and readable account of the role of organic synthesis in modern science and is particularly recommended for advanced undergraduate and post-graduate students, and should also be of interest to all researchers requiring an introduction to contemporary organic synthesis.

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Analytical Chemistry of Carbohydrates. Heimo Scherz and Gunther Bonn. Thieme Medical Publishers, Stuttgart, 1998, 354pp. ISBN 0-86577-666-0

Being some of the most biologically significant chemical compounds, carbohydrates are the key groups of compounds of life. Found in many foodstuffs, ranging from cereals to fruit, they are a necessary requirement in the daily diet. Carbohydrates have also come to be used in a large variety of non-food applications such as paints, medicals aid, paper and board, biodegradable plastics, etc. Due to this ever increasing level of interest in carbohydrates there has been a vast improvement in the development of techniques available for the investigation and characterisation of carbohydrates. Such methods are discussed in the text of the book currently under review.

Analytical Chemistry of Carbohydrates is the latest publication from the Thieme organic chemistry monograph series. Akin to its predecessors, it is aimed primarily at the professional research market but could also play an important part at degree level, perhaps as a recommended text. The book covers a wide range of classic photometric procedures, along with other less dated techniques: these include enzymatic, chromatographic and electrophoretic methods of analysis.

This scientifically sound publication gives a comprehensive, up-to-date, and authoritative understanding of the whole field of not only quantitative but also qualitative methods of analysis for monosaccharides, disaccharides and also oligosaccharides. This well-balanced publication also delves into the realms of sugar alcohols, uronic acids, sugar phosphates and amino sugars.