Reaction Mechanisms in Organic Synthesis
Postgraduate Chemistry Series

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Reaction Mechanisms in Organic Synthesis

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To Riya, Manya and Indu with love and to
my parents with immense respect
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Exciting new methods and reagents are being discovered and used everyday in the synthesis of organic molecules. Knowing the mechanism of these reactions is very important, without which it is almost impossible to carry out the synthesis of important molecules in the laboratory or in industry. Thus, the importance of organic reaction mechanisms continues to increase, and this book is a welcome addition to the available sources on the subject.

While teaching organic synthesis and practicing it in the laboratory, a need is often felt of a handy book combining organic synthesis and mechanisms of reactions employed in synthesis instead of large volumes or monograms on synthesis. There are not many such books covering these two very essential aspects of organic chemistry.

Writing a textbook for any level is always a challenge. However, Dr Parashar deserves praise for undertaking this project and interlinking these two areas of organic chemistry so well throughout the book.

The book is designed to provide fundamental aspects of organic chemistry in a flexible way rather than presenting a traditional approach. The mechanisms and stereochemical features of common reactions used in organic synthesis are discussed in a qualitative and quantitative manner. Specific examples are taken from the latest literature.

The contents of the book give a general impression about what is dealt with. The selection of topics has been done very carefully and judiciously. The material is condensed to a manageable text of 363 pages and presented in a clear and logical fashion over eight chapters. This is done by focusing purely on the basics of the subject without going through exhaustive detail or repetitive examples.

This book would be of immense help to students at the postgraduate level as well as to research workers because of its contents and the way those have been dealt with. I sincerely hope that the book will go a long way to satisfy the long-felt need of students and teachers who inspire the students to take up synthetic organic chemistry as their research topic and career.

I hope practitioners and professionals will be benefited from the experience of learning reaction mechanisms of important synthetic reactions.

I am happy to recommend this book as a self-guide for students and professionals.

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An organic chemist is primarily concerned with (a) the synthesis of organic molecules of particular interest to the pharmaceutical and agrochemical industries and (b) the way these molecules interact in biological pathways.

Synthesis involves a careful selection of reactions; new reactions are being developed everyday. Knowing how structure affects a reaction, a rational sequence of transformations can be used to synthesize target molecules. An understanding of organic reaction mechanisms is essential without which it is impossible to plan organic synthesis. It is also required to extend one’s knowledge of different areas related to organic chemical reaction mechanisms. The vital importance of the organic synthesis processes is established by the fact that many Nobel laureates have been associated with this field.

Beginning with basic introductory course, this book covers all aspects of organic reaction mechanisms, expands on the foundation acquired in chemistry courses, and enables students and research workers to understand the mechanisms and then to plan syntheses. This book will help postgraduate students to write reasonable mechanisms for organic chemical transformations, which are arranged according to an ascending order of difficulty.

Established reactions are being subjected to both technical improvements and increasing number of applications. For example, intense efforts are made in industry and university laboratories to devise innovative ways to speed up reactions, to carry them out in a continuous fashion and to provide for separation of complex mixtures. For example, ultrasound can dramatically affect the rates of chemical reactions. Microwave-assisted protocols often result in high yields and time efficiency. Solid-phase synthesis allows for easy separation of the resulting products while providing for libraries of compounds to be made. Although these methods have been discussed in special monographs and review articles, there is no recent single book covering reactions (modern or newer) with latest procedural modifications and also simultaneously explaining reaction mechanism and covering stereospecificity and regiospecificity.

The book contains examples from recently published research work to illustrate the important steps involved in synthesis. The discussion is organized by the conditions under which the reaction is executed rather than by the types of mechanisms as is the case in most textbooks at the graduate level.

The author believes that students are well aware of the basic reaction pathways such as substitutions, additions, eliminations, aromatic substitutions, aliphatic nucleophilic substitutions and electrophilic substitutions. Students may follow undergraduate books on reaction mechanisms for basic knowledge of reactive intermediates and oxidation and reduction processes. Reaction Mechanisms in Organic Synthesis provides extensive coverage of various carbon–carbon bond forming reactions such as transition metal catalyzed reactions; use of stabilized carbanions, ylides and enamines for the carbon–carbon bond forming reactions; and advance level use of oxidation and reduction reagents in synthesis.