An understanding of organic reaction mechanisms is an essential part of any undergraduate chemistry course. This book describes the principles that govern chemical reactivity, and shows how these principles can be used to make predictions about the mechanisms and outcomes of chemical reactions.

Molecular orbital theory is used to provide up-to-date explanations of chemical reactivity, in an entirely non-mathematical approach suited to organic chemists. A valuable section explains the use of curly arrows, vital for describing reaction mechanisms. A whole chapter is devoted to exploring the thought processes involved in predicting the mechanisms of unfamiliar reactions. Each chapter is followed by a summary of the important points and a selection of problems to help the reader make sure that the material in that chapter has been assimilated. The book concludes with a comprehensive glossary of technical terms.

Understanding organic reaction mechanisms

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A. Jacobs

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Preface

Reaction mechanisms are a fundamental part of the study of organic chemistry, and the aim of this book is to help you to understand them. Organic reaction mechanisms are sometimes perceived to be an incoherent and difficult subject, but in fact there are principles underlying them that make them much easier to grasp. Reading this book should give you a mastery of these principles.

Chapter 1 introduces the basics of chemical bonding. This contains a discussion of frontier orbitals (HOMOs and LUMOs), which are an important part of understanding chemical reactivity. Chapters 2 and 3 describe more of the background to understanding reaction mechanisms, namely the nature of ionic species, which are found in the vast majority of reactions, and the driving forces behind reactions. Chapters 4 and 5 look more closely at the molecules that take part in organic reactions, Chapter 4 dealing with species whose reactivity is centred on carbon, and Chapter 5 addressing molecules with other atoms. Chapter 6 describes the reactions themselves. By this stage in the book, most of the principles behind chemical reactivity have already been explained, so the reactions can be seen to be no more than logical consequences of these. Chapter 7 is something of an aside, and looks at how we know about reaction mechanisms from experimental evidence. Chapter 8 draws on the material presented earlier in the book to help you to suggest mechanisms for unknown reactions, a vital part of any undergraduate chemistry course. Finally, Chapter 9 looks at how knowledge of reaction mechanisms has been used in practice.

This book is primarily designed to be read sequentially, as each chapter makes use of principles explained in previous ones. However, you can also turn to any part of the book to look up a particular topic, as material explained earlier in the book is indicated by cross references.

Organic chemistry is a very rewarding subject, and I hope this book will allow you to pursue your studies more easily. Although organic reaction mechanisms can seem

something of a mystery at first, time spent studying them will be richly rewarded in a greater understanding of organic chemistry as a whole.

A. Jacobs 1997

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