

Molecular Orbitals and Organic Chemical Reactions

Generations of students and teachers of organic chemistry experienced “Fleming” as a long-standing and reliable companion, because the book provides a unique and didactically very easy introduction to the role of (frontier) orbitals in organic chemistry. It succeeded so well in doing that because the mathematical basis was kept to a minimum. The book gave a deeper conceptual insight into the understanding of structure, reactivity, and selectivity. But wait a moment!—The first English edition dates back to 1976, and now after more than 30 years the second edition is being published with a slightly modified title: *Molecular Orbitals and Organic Chemical Reactions—Student Edition*. Hasn’t too much time passed since 1976 to be covering this topic again? Isn’t the subject now out of fashion?

My answer to that is definitely NO! The new “Fleming” has undergone a reshaping, and the concept of molecular orbitals, which was discussed with the main emphasis on pericyclic reactions in the first edition, is now covered extremely well and at greater length, without losing the character of a student edition. In the preface to this second edition, the author rightly points out that the concept of frontier orbitals is highly debatable, and one theoretician has commented about the use of frontier orbitals: “it has no right to work as well as it does”.

Therefore, in this new edition Ian Fleming has focused more on the essential aspects of molecular orbitals, which is why the title has been slightly altered. The term “frontier orbitals” has been dropped and replaced by “molecular orbitals”. This conceptual change leads to the successful broadening of the scope of the book. The introductory chapters that cover the theory of molecular orbitals have been completely rewritten and expanded. Also, a new chapter about the effects

of orbital interactions on the structure of organic molecules has been added. Topics that are discussed in this part include the anomeric effect, hyperconjugation, hypervalency, and the stability of anions stabilized by sulfur, phosphorus, and silicon. Another new chapter deals with the theoretical basis of the HSAB principle, and the application of the hard and soft concept to acids and bases and to electrophiles and nucleophiles. In addition, the reader will find a chapter on the stereochemical course of fundamental organic reactions such as nucleophilic substitutions, all kinds of elimination reactions, and nucleophilic addition to π bonds, with the latter extended to the Felkin–Anh model. The former main chapter on pericyclic reactions remains as a central feature of this edition, extended and supplemented by new examples and correlation diagrams. Finally, the reader gains a deeper understanding of the role of orbitals in free-radical reactions and electrochemistry.

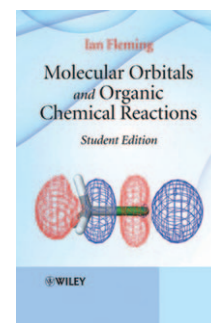
This short overview describes the broad scope of this new book, which one could also expect from a classical textbook on organic chemistry. However, the student will need to have a basic knowledge of organic chemistry before studying this book. It will then provide him or her with a new perspective—it is the orbitals that reveal so many fundamental principles and unifying ideas of organic chemistry in a clear and easy to follow way, and explain the interplay of structure, reactivity, and selectivity. The new “Fleming” is a must for every lecturer and every student of chemistry—a fantastic book. In this new form the textbook will last for another 30 years and remain as fresh as did its predecessor!

Reference 3 of this Student Edition also mentions a Reference Edition of this book, which is to be published soon. One can also look forward with keen anticipation to that.

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