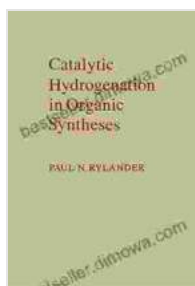


Catalytic Hydrogenation in Organic Syntheses: A Comprehensive Guide

Catalytic hydrogenation, the process of adding hydrogen atoms to organic molecules, plays a crucial role in the synthesis of various pharmaceuticals, fine chemicals, and industrial products. This technique enables the selective reduction of functional groups, such as alkenes, alkynes, and carbonyl compounds, to form saturated or partially saturated analogues. The use of catalysts in hydrogenation reactions dramatically accelerates the process and enhances its efficiency and selectivity.

Chapter 1: Historical Overview and Fundamental Principles of Catalytic Hydrogenation

This chapter provides a historical perspective on the development of catalytic hydrogenation, tracing its origins from the pioneering work of Paul Sabatier and Joseph-Balthasar Senderens in the late 19th century. The fundamental principles underlying catalytic hydrogenation, including the role of catalysts, reaction mechanisms, and hydrogen source, are thoroughly discussed.



Catalytic Hydrogenation in Organic Syntheses

by Laura Trethewey

★★★★★ 5 out of 5

Language : English

File size : 30619 KB

Print length : 325 pages

Screen Reader : Supported

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Chapter 2: Catalysts for Hydrogenation Reactions

A comprehensive overview of the various catalysts used in hydrogenation reactions is presented in this chapter. The properties, advantages, and limitations of different catalyst types, including heterogeneous catalysts (e.g., palladium on carbon, platinum oxide), homogeneous catalysts (e.g., Wilkinson's catalyst, Crabtree's catalyst), and supported catalysts, are подробно описаны.

Chapter 3: Reaction Mechanisms and Selectivity in Catalytic Hydrogenation

The complex reaction mechanisms involved in catalytic hydrogenation are explored in detail in this chapter. The different pathways for hydrogen addition, including syn and anti-addition, and the factors influencing selectivity, such as catalyst structure, reaction conditions, and substrate properties, are thoroughly examined.

Chapter 4: Applications in Pharmaceutical and Fine Chemical Synthesis

This chapter highlights the significance of catalytic hydrogenation in the pharmaceutical and fine chemical industries. The use of hydrogenation reactions to produce a wide range of drug molecules, including antibiotics, steroids, and anticancer agents, is discussed. The challenges and strategies for achieving high enantioselectivity in the synthesis of chiral intermediates are also explored.

Chapter 5: Industrial Applications of Catalytic Hydrogenation

The chapter focuses on the large-scale applications of catalytic hydrogenation in various industrial processes. The hydrogenation of

vegetable oils for the production of margarine and edible fats, the synthesis of fuels and chemicals from petroleum, and the removal of impurities from industrial gases are discussed as key examples of the industrial significance of hydrogenation reactions.

Chapter 6: Recent Advances and Future Prospects

The chapter concludes with a review of the latest advancements in catalytic hydrogenation, including the development of novel catalysts with improved activity, selectivity, and stability. The potential applications of hydrogenation in emerging fields, such as renewable energy and sustainable chemistry, are also explored.

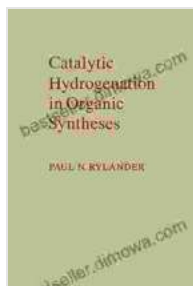
"Catalytic Hydrogenation in Organic Syntheses" provides a comprehensive and up-to-date overview of this essential technique in organic chemistry. The detailed explanations, numerous examples, and extensive references make this book an invaluable resource for researchers, students, and professionals working in the field of organic synthesis. By understanding the principles, applications, and limitations of catalytic hydrogenation, readers can effectively utilize this powerful tool to create new and valuable molecules.

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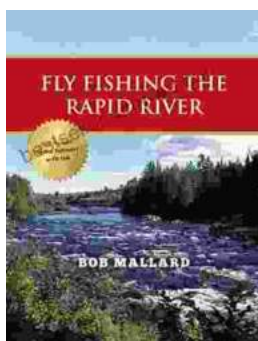
A comprehensive and visually appealing book cover with an image representing the process of catalytic hydrogenation in an organic reaction. The cover design should include a title that captures the essence of the book and a brief description highlighting its key features.

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by Laura Trethewey

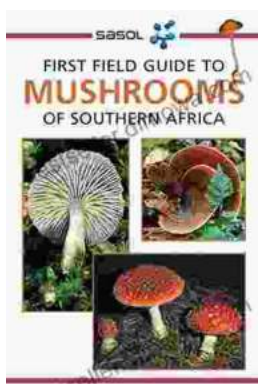


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