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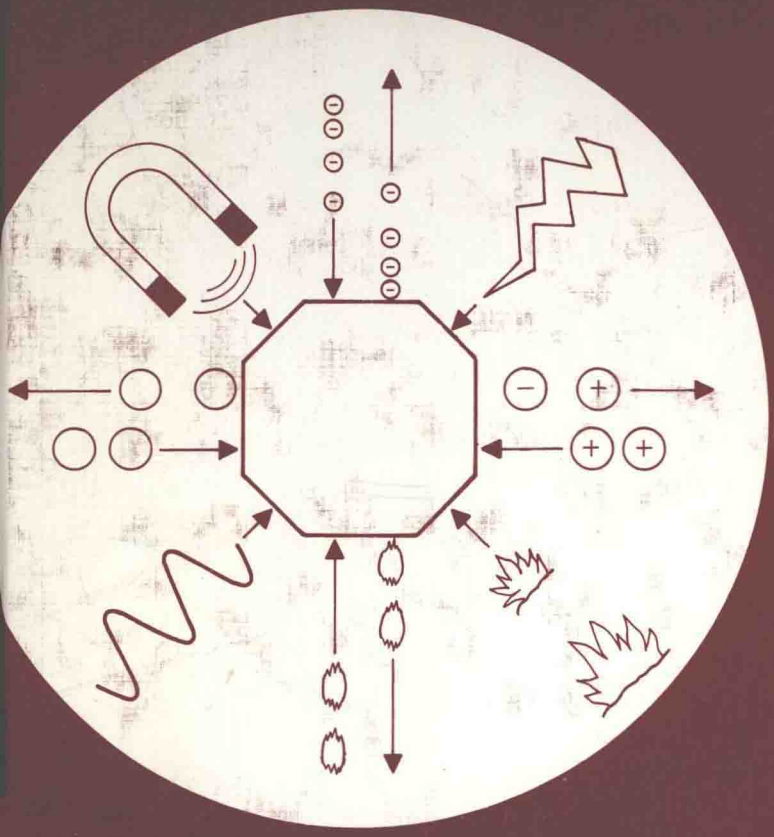

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PREFACE

Catalytic hydrogenation was discovered at the end of the last century, and for several decades has aroused the interest of a vast number of academic and industrial research centres. It is used as a means of obtaining a great variety of products and semiproducts whose synthesis would otherwise be difficult. The number of original papers and books devoted to catalytic hydrogenation reflects its importance. Some examples are: "Catalytic Hydrogenation" by Augustine (Marcel Dekker, 1965), "Metally-Katalizatory Gidrogenizatsii" by Sokolskii and Sokolskaya (Nauka, 1970), "Homogeneous Hydrogenation" by James (Wiley, 1973), "Catalytic Hydrogenation in Organic Synthesis Procedures and Commentary" by Freifelder (Wiley, 1978), "Catalytic Hydrogenation in Organic Syntheses" by Rylander (Academic Press, 1979).

Why, then, yet another book entitled "Catalytic Hydrogenation"? The publication explosion of the last fifteen years has considerably impeded the efforts of potential authors to produce up to date articles on broad areas of scientific knowledge. On the other hand, specific areas can be dealt with much more quickly, easily and efficiently. I therefore requested some renowned specialists to contribute articles in their respective fields of interest. In this way, a collection of eighteen chapters was obtained which represent the most recent state of the art, summaries of published results being supplemented by results, mostly unpublished, obtained by the authors themselves. The book is divided into four parts:

Part I. Kinetics and mechanism of hydrogenation and hydrogenolytic reactions.
Part II. Heterogeneous hydrogenation catalysts. New aspects.
Part III. Advances in homogeneous hydrogenation.
Part IV. Catalytic hydrogenation reactors and technologies.

For an indication of the topics covered in the individual chapters I use the words of the authors themselves:

In Chapter 1 an attempt is made to give a concise account of the available data on the kinetics of hydrogenation of organic compounds and related kinetic problems of hydrogenation catalysis (Kiperman).

Chapter 2 considers the evidence for the role played by surface-mobile hydrogen in various heterogeneously catalysed reactions where synergy occurs. The reaction of spill-over hydrogen with organic molecules or inorganic solids is also discussed (Hodnett and Delmon).

Chapter 3 is confined predominantly to the transition-metal catalysed hydrogenation of isolated carbonyl functions (Tanaka).

Chapter 4 summarizes existing knowledge on the hydrogenation of nitriles in the liquid phase, and supplements it by some, mostly unpublished results from the authors' own research (Volf and Pašek).

Chapter 5 deals with the hydrogenolysis reactions of saturated hydrocarbons performed on platinum-based bimetallic catalysts (Garin, Hilaire, Maire).

Chapter 6 discusses hydrogenative denitrogenation of model compounds as related to the refining of liquid fuels (Schulz, Schon and Rahman).

Chapter 7 summarizes the literature data on the influence of the catalyst composition on the product distribution in the hydrodesulphuration of model sulphur compounds (Zdražil and Kraus).

In Chapter 8 some ancient data on the hydrogenation of ethylenic and acetylenic bonds in linear hydrocarbons, of aromatics or cycloolefins, and of other functions are first considered. It is then shown that, when account is taken of the metal-support interaction, the interpretation of the role of the support in the catalytic activity becomes easier (Pajonk and Teichner).

Chapter 9 demonstrates how the ensemble size, dispersion, nature of adsorbed hydrogen, metal - support interaction and other factors control the behaviour of bimetallic catalysts in some hydrocarbon transformations (Guczi and Schay).

In Chapter 10 a new attempt is made to elucidate the relationships between the structure of bimetallic catalysts and their specific catalytic properties, as evidenced by the conversion of hydrocarbons with hydrogen (Völter).

The aim of Chapter 11 is to demonstrate that the principle of Controlled Surface Reactions is a very powerful approach, and that supported bimetallic catalysts prepared by these methods possess unique catalytic properties, in hydrocarbon conversion and in the hydrogenation of organic compounds (Margitfalvi, Szabó, Nagy).

Chapter 12 reviews new supported nickel catalysts, revealing the significant progress in the characterization of such catalysts and their use in catalytic processes (Marinas, Campelo, Luna).

Chapter 13 analyzes the results of the anchoring of metal complexes in the preparation of hydrogenation catalysts (Yermakov and Arzamaskova).

In Chapter 14 studies on asymmetric hydrogenation, homogeneous catalysts attached to organic polymers and inorganic supports are surveyed (Hetflejš).

In Chapter 15, hydrogenation is modelled in terms of the Langmuir-Hinshelwood type kinetic behaviour, emphasis being placed on the effects of heat and mass transfer on kinetics (Gut, Kut, Yücelen and Wagner).

Chapter 16 concerns the application of fixed-bed reactors to liquid-phase hydrogenation. The simple pseudohomogeneous reactor model is recommended for the description of the majority of hydrogenations in organic technology (Hanika and Staněk).

No monographs or specialized chapters in textbooks have been published on hydrogenation autoclave control. In Chapter 17 guidance is provided for the design of control systems, limited to smaller plants with changing product spectra (Horák).

The final Chapter (Derrien) is beyond the scope of this book. It deals mostly with technological aspects (of hydrorefining of C_2, C_3, C_4 and gasoline cuts). However, because of the immense importance of such matters in the petrochemical industry, I believe that the reader will find this chapter useful.

Unfortunately, no space was left for chapters devoted to the effect of reactant structure and solvent properties on the kinetics of the liquid phase hydrogenation. To those interested in these problems, our papers in the Advances in Catalysis (1981) or in the Catalysis Reviews (1982) can be recommended.

It is my pleasant duty to thank all those who have found time to contribute to this book.

Libor Červený

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CONTENTS