

Preface

Global energy consumption has increased tremendously in past decades due to intensified industrialization and growing world population. Apart from inventing new energy producing processes, the development of energy saving procedures offers the greatest chance to meet our energy needs in the long run. In this context, catalysis is certainly one of the key technologies for the coming decade. In order for a catalytic process to really make an impact, it has to be:

- Broadly applicable
- Selective
- Waste free
- Affordable
- Based on abundant materials

Modern research in catalysis tries to fulfill most of these criteria and a variety of powerful concepts have been developed within the past 30 years. However, the price of the catalyst is another variable that needs to be optimized in this equation. Iron offers some advantages with regard to this problem. It is abundant in sufficient amounts, nontoxic, and even nonnatural complexes can be metabolized into nontoxic products. However, iron complexes as catalysts have only recently been rediscovered after a period of almost 30 years, which was dominated by late transition metal complexes based on, for example, Ru, Rh, or Pd. This is even more surprising if one considers iron complexes to be the origin of modern organometallic chemistry. However, with regard to stability and reactivity, these complexes oppose severe synthetic challenges like, for example, spin ground state, oxidation state, etc. The advent of new spin-independent analytical techniques, plus the progress in the field of well-established techniques like Mössbauer spectroscopy, ESR, NMR, EXAF, SQUID, etc., have helped to address some of the fundamental problems in modern iron-based organometallic chemistry. Based upon this technological progress and the aforementioned general interest in identifying catalytic transformation by using readily available metal sources, catalysis by iron complexes is witnessing a tremendous comeback.

In line with these current developments, publishing a book dealing with the most recent achievements in this field is particularly timely. The volume is structured in chapters according to the type of metal complex. In every chapter, a brief introduction on the general chemical properties of the respective class of Fe-complexes will be given. Subsequently, representative examples for different catalytic transformations with a special emphasis on the various reaction manifolds will be presented. This structure implies that the reviews are not comprehensive but are meant to improve the understanding of the catalytic role a certain iron complex plays within the mechanism.

This book will complement existing reviews and monographs in this field and will be a source of inspiration for chemists working in various field of chemistry.

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