

ACTIVATION AND FUNCTIONALIZATION OF ALKANES

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Chapter I

HISTORICAL EVOLUTION OF HOMOGENEOUS ALKANE ACTIVATION SYSTEMS

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I. Introduction

Since the end of the 1960s a new problem has arisen in the field of homogeneous catalysis, that of homogeneous activation of saturated hydrocarbons by metal complexes. The development of coordination chemistry and catalysis had led to increased success in the activation of various molecules by metal complexes, such as hydrogen, olefins, aromatics, carbon monoxide, and molecular nitrogen. "Activation" of a certain molecule by a metal complex, although a rather vague concept, usually means that the molecule or its part becomes a ligand in the coordination sphere of the complex and then undergoes a subsequent chemical transformation.

For some time saturated hydrocarbons remained outside of this process, which involved all the other classes of organic and inorganic substances. Meanwhile, an increasingly urgent problem involved the great resources of natural gas that necessitated the creation of new selective processes involving methane, which constitutes its primary part. At the same time, the activation of methane and its analogs is an interesting theoretical problem, since the absence of double or triple bonds, lone electron pairs, and the strength of covalent C-H and C-C σ -bonds in alkanes constitute natural difficulties in the search for desirable systems.

In 1968 J. Halpern¹, one of the leading specialists in homogeneous catalysis, described the task as "to develop a successful