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Preface

Aspects of C–H Activation

The problem of C–H bond activation has a special place in organometallic chemistry because it has inspired work in a very wide variety of areas since the 1970s. The early work of Shilov showed how isotope exchange and, later, functionalization of alkanes was possible with simple platinum salts. This reaction, which gives very unusual selectivity for attack at primary C–H bonds, has been developed greatly in recent years. Related catalysts based on Pd and on Hg salts are now known.

A second group of systems, which operate via oxidative addition, have led to alkane dehydrogenation and carbonylation catalysts. In this area, detailed physicochemical and theoretical studies have given very extensive information, including the detection of alkane complexes as precursors to the oxidative addition step, and delineation of the reaction trajectory. Radical processes constitute a third general category, although not all of these require organometallic reagents. Iron oxo catalysts have perhaps received the greatest attention because of their relation to the cytochrome P-450 dependent monooxygenases and to methane monooxygenase.

The vapor phase organometallic chemistry of alkanes has greatly advanced in recent years. Mass spectral studies have thrown light on the elementary steps involved in the reactions of metal ions with alkanes. Studies on Hg photosensitization have shown the presence of organometallic exciplexes as key intermediates, and matrix isolation studies have helped define the reactions of metal atoms and their excited states. Theoretical work has been particularly successful in this area.

Interest in C–H activation has also led to greater attention being paid to 'agostic' species containing C–H...M bridges, which are in turn related to molecular hydrogen complexes, a related and very active field.

I was therefore very happy to accede to Bruce King's suggestion and help him organize a Special Issue on the topic for the *Journal of Organometallic Chemistry*, in which we have attempted to bring together some of the recent developments. I thank my colleagues for taking the time to contribute and I hope the resulting issue will act as a useful reference for workers in the area as well as help define the current status of the field.

Robert H. Crabtree
Yale Department of Chemistry