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Preface

Recent advances in organonickel chemistry

It is my great pleasure to serve as Guest Editor of this *Tetrahedron Symposium-in-Print*. This is the second *Tetrahedron Symposium-in-Print* dedicated entirely to organonickel chemistry. Appearing in 1998 as TSIP number 69, the first of these was edited by Prof. Bruce Lipshutz and provided an excellent snapshot of the field at the time. On one hand, it may seem that a second organonickel *Symposium-in-Print* may not be warranted after such a short period of time has elapsed, but this relatively small, eight-year gap is more reflective of the fact that this area of chemistry continues to expand and flourish, as also demonstrated by the diversity of chemistry that appears herein.

A particularly noteworthy aspect of this TSIP is that *all* 13 papers in this issue have been individually dedicated to the same person, Prof. Dr. Günther Wilke of the Max-Planck-Institut für Kohlenforschung (Mülheim an der Ruhr, Germany), in honor of his innumerable groundbreaking contributions to organonickel chemistry. Without Prof. Wilke, much if not all of the research described in this issue would not have been possible.[1]

The articles are organized thematically to some extent. The first (Wender) and second (Tamaru) both feature nickel-catalyzed coupling reactions of 1,3-dienes, but the similarities end there. The former details a [4+4] cycloaddition in the context of a natural product synthesis, and the latter describes the development of a coupling reaction of 1,3-dienes and imines.

Next, Knochel provides us with an account of the development of a cross-coupling reaction, and then a series of papers describing reactions of alkynes appears. Nickel-catalyzed cyclotrimerization and tetramerization of alkynes to give arenes and cyclooctatetraenes, respectively, are two of the earliest transition metal-catalyzed, carbon–carbon bond-forming reactions ever described, developed primarily by Reppe in the late 1940's and 1950's. In the articles in these papers, however, such processes are not the desired outcome and are often competing processes, especially cyclotrimerization.

What is especially striking about this collection of papers is that the species that couple with the alkyne differ greatly from one another, highlighting the diversity of chemistry catalyzed by nickel mentioned above. The coupling partner is an aldehyde in the case of Takai's intermolecular reductive coupling and, in three subsequent formal cycloaddition reactions, is a cyclobutanone (Murakami), a chromium carbene (Barluenga), or an isocyanate (Louie). In the final two papers of this subset, Montgomery and Hiyama each report an addition reaction, a hydrosilylation and an arylcyanation, respectively.

Two of the themes of the next two articles are reaction mechanism and X-ray crystallography of nickel complexes. Hillhouse focuses on several of the steps involved in oxidative addition reactions between Ni(0) and the Si–H bonds of silanes, and Ogoshi describes investigations of a dimerization reaction of aldehydes that gives pinacol derivatives.

In each of the final two articles, 1,6-enynes are involved, but play very different roles in the two cases. In the contribution from Mori and Sato, nickel effects a tandem carbocyclization–carboxylation, whereas in the case of the work from my laboratory, the alkene does not react, but rather directs the regioselectivity of addition to the alkyne.

I would like to thank Prof. Harry Wasserman for the invitation to be the Guest Editor of this *Symposium-in-Print* and for all of his help throughout the process. I am delighted to have had the opportunity not only to be involved with the production of this issue, but also to be able to contribute an article to it. Finally, I would like to thank all of the other contributors and reviewers, without whom, of course, this issue would not have been possible.

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[1] For a very readable personal account of not only Prof. Wilke's contributions, but of also the history of the field through the mid-1980's, see: Wilke, G. Contributions to Organo-Nickel Chemistry. *Angew. Chem., Int. Ed. Engl.* **1988**, *27*, 185–206.

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