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Cross-Coupling Reactions

A Practical Guide

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Preface

In 1972, a very powerful catalytic cycle for carbon-carbon bond formation was first discovered by the coupling reaction of Grignard reagents at the sp^2 -carbon. Over the past 30 years, the protocol has been substantially improved and expanded to other coupling reactions of Li, B, N, O, Al, Si, P, S, Cu, Mn, Zn, In, Sn, and Hg compounds. These reactions provided an indispensable and simple methodology for preparative organic chemists. Due to the simplicity and reliability in the carbon-carbon, carbon-heteroatom, and carbon-metalloid bond-formations, as well as high efficiency of the catalytic process, the reactions have been widely employed by organic chemists in various fields. Application of the protocol ranges from various syntheses of complex natural products to the preparation of biologically relevant molecules including drugs, and of supramolecules, and to functional materials. The reactions on solid surfaces allow robot synthesis and combinatorial synthesis. Now, many organic chemists do not hesitate to use transition metal complexes for the transformation of organic molecules. Indeed, innumerable organic syntheses have been realized by the catalyzed reactions of transition metal complexes that are not achievable by traditional synthetic methods. Among these, the metal-catalyzed cross-coupling reactions have undoubtedly contributed greatly to the development of such a new area of “metal-catalyzed organic syntheses”.

An excellent monograph for the cross-coupling reactions and other metal-catalyzed C-C bond-forming reactions recently appeared in *Metal-catalyzed Cross-coupling Reactions* (Wiley-VCH, 1998). In order to avoid overlapping with previous publications, also in view of space limitation, this book is restricted to the most recent and practical developments in this field. The book covers new advances in the representative coupling reactions of organoboron, -silicon, and -tin compounds, as well as two new areas for carbon-heteroatom bond formation and the carbon-carbon bond formation via direct C-H substitution. The actual practical procedures of the cross-coupling reactions are given, including technical advice on actual applications in organic synthesis. The hope of the authors is that this book will help both expert and novice practitioners to use metal-catalyzed cross-reactions for organic syntheses.

Sapporo, October 2001

Norio Miyaura

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