

Synthetic Methods of Organometallic and Inorganic Chemistry, Volume 10: Catalysis. By W. A. Herrmann. Thieme Verlag: Stuttgart, 2002, hardback EUR 139.00; ISBN 3-13-115-161-7, 237 pp.

This Volume represents an extension of a series that debuted in 1996 as a modern, English language version of a classic German language compendium, Georg Brauer's 'Handbuch der Präparativen Anorganischen Chemie'. The objective is to collect a broad range of detailed synthetic procedures for inorganic and organometallic compounds of general interest and utility. Volumes 1–9 systematically treated each segment of the periodic table, and were reviewed earlier, almost always with high enthusiasm.

Volume 10 differs in having a thematic focus, 'catalysis', and thereby a license to roam throughout the periodic table. The twenty chapters, five of which are edited by leading industrial chemists, treat a variety of contemporary themes in catalysis, including several developments that are barely 1–2 years old. Both ligand and (pre)catalyst syntheses are presented. A majority of the catalyst systems are homogeneous and utilize organic solvents, but substantial numbers of heterogeneous, colloidal, and aqueous systems are also described. Enantioselective catalysis is also well represented, and several chapters offer detailed descriptions of non-standard methodologies or techniques.

The first chapter details syntheses of two types of ligands with $[RN-C=NR]^-$ linkages, (amidinates, aminopyridinates), and their group 3–11 and lanthanide metal complexes. In the second chapter, 'designer' phosphorus donor ligands are described, and applications in rhodium and palladium-catalyzed reactions (hydroformylation, hydroxycarbonylation, Heck vinylation and amination of aryl halides). The third chapter focuses on catalysts generated via rhodium vapor deposition, and their use in hydroformylation and hydrosilylation. The fourth chapter features enantioselective hydrogenations, hydrosilylations, and cycloadditions with catalysts generated in-situ from rhodium or cobalt precursors and chiral ligands.

Chapter five presents a variety of enantioselective $C=C$, $C=N$, and $C=O$ hydrogenations. Some utilize Josiphos under homogeneous conditions, others utilize related ligands that have been anchored to silica via $Si(OMe)_3$ linkages, and others Cinchona-modified Pt/alumina systems. Chapter six describes a ruthenium(II) catalyst for the stereose-

lective hydrogenation of sorbic acid. Various palladium and nickel catalyzed reactions of aryl bromides and chlorides (Suzuki coupling, conversions to amides $ArCONH_2$, arylation of malononitrile) are presented in chapters seven and eight. Chapter nine focuses on a solid base catalyst for the Knoevenagel condensation.

A very timely subject, the catalytic oxidation of methane and cyclohexane by vanadium complexes containing pyrazole-2-carboxylato ligands, is treated in chapter ten. Chapter eleven describes biphasic hydrogenations of arenes catalyzed by arene triruthenium clusters. Chapter twelve details the synthesis of a variety of $Re(VII)$ and $Mo(VI)$ oxo complexes, and their application as olefin and arene oxidation catalysts. Procedures for cobalt-catalyzed co-cyclizations of alkynes and nitriles to pyridines are reported in chapter thirteen.

Chapter fourteen presents solvent-stabilized transition metal cations that serve as initiators for cyclopentadiene polymerization. Chapters fifteen and seventeen describe numerous types of zirconium metallocenes for ethylene and propylene polymerization that use methylalumoxane (MAO) as the activator. Chapter sixteen focuses on a nickel catalyst for ethylene oligomerization, while chapters eighteen and nineteen deal mainly with palladium catalysts for the alternating copolymerization of ethylene and CO. The Volume concludes with a chapter on improved routes to heterogeneous mono- and bimetallic colloidal catalysts, and applications in fine chemical synthesis.

In summary, this Volume attempts to anticipate the future of homogeneous and heterogeneous catalysis in the context of a reference work for ligand/catalyst synthesis and catalytic procedures. Although the coverage is somewhat subjective and by no means comprehensive, as dictated by the length restrictions in this series, this reviewer strongly endorses the vision presented. This Volume can be heartily recommended for all scientific libraries, and as a very useful desk reference for anyone engaged in the development and application of metal-based catalysts or their constituent ligands.

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