Water in Organic Synthesis, Workbench Edition (Science of Synthesis); edited by Shū Kobayashi, 1st ed., Georg Thieme Verlag: Stuttgart, New York, **2012**, softcover, 960 pp., €249 (Germany), €256 (Austria), CHF349, US$299, ISBN: 978-3-13-169351-8

Water is a solvent with unique physical-chemical properties. Its use as a solvent or co-solvent has unique synthetic advantages leading in some cases to exceptionally high selectivities or reaction rates. This excellent volume of *Science of Synthesis* describes the modern aspects of the performance of organic reactions in (or on) water or using water and organic solvents. Shū Kobayashi has put together the worldwide top specialists in the field. The most actual and important aspects of synthetic chemistry in water are covered in this volume. The inclusion of typical experimental procedures, as usual in the *Science of Synthesis* series, makes this volume an indispensable book for synthetic organic chemistry in industry or in the academic world. The broadness of the topics covered is impressive.

After a short overview of the structure and properties of water, the performance of asymmetric oxidation reactions in aqueous-organic medium is covered. A special chapter is dedicated to the hydrogenation of alkenes, dienes, arenes, and N-heterocycles with hydrogen using water-soluble transition-metal complexes and related nano-size catalysts. The hydroformylation and related reactions in aqueous media are then described, followed by the performance of conjugate addition reactions of various nucleophiles in water. The use of water-soluble catalysts also allows the performance of cyclopropanations and metathesis reactions. The catalysts proved to be robust and allow long active lifetimes.

Various reductions of carbonyl and imino groups are described in the next chapter and transfer hydrogenation was shown to be well suited for such reductions in water. Metal-mediated Barbier-type reactions pioneered by Luche are covered in two chapters describing the alkylation, allylation, benzylation, arylation, vinylation, and alkynylation of carbonyl and imino groups. Carbonyl chemistry can be readily performed in water and the use of aqueous solvents for the synthesis of aldol products is described in the next chapter. Homogeneous solvent mixtures or biphasic solvent systems containing water using Brønsted acid and base catalysts prove to be suited for Mannich and Baylis–Hillman reactions. Concerted reactions, such as cycloadditions and pericyclic rearrangements, can be greatly influenced by the presence of water or by performing these reactions in water.

Aromatic or allylic substitution reactions in aqueous medium in the presence of palladium catalysts are well covered in the next chapter. The use of palladium and copper complexes in aqueous heterogeneous media also allows the performance of useful cross-couplings and Heck reactions.

This last chapter includes also useful C–H activation reactions, Buchwald–Hartwig aminations as well as Sonogashira and Hiyama cross-couplings. Aqueous media can be advantageous for the ring opening of expoxides and aziridines as well as for the asymmetric α-functionalization of carbonyl compounds such as the alkylation of enolates. This led to especially powerful chiral phase-transfer catalysts. The oxidation of alcohols in aqueous medium allows the use of environmentally friendly oxidants like dioxygen or hydrogen peroxides. Free-radical reactions can readily be performed in water. A chapter is also dedicated to the living radical polymerization in aqueous media.

Several chapters emphasize future possible applications of reactions in an aqueous environment such as reactions ‘on water’, synthesis using sub- and supercritical water or β-cyclodextrin. The industrial aspects and practical implications for the performance of large-scale reactions in aqueous media are well covered in two chapters dedicated to the hydroformylation reaction and other reactions such as Suzuki cross-coupling.

In summary, this book can be considered as the bible for reactions in water. The appropriate inclusion of typical experimental procedures makes this book indispensable in every modern research laboratory.

Paul Knochel, Ludwig-Maximilians-Universität München, Germany

SYNTHESIS 2012, 44, 2474–2474
Advanced online publication: 23.07.2012
DOI: 10.1055/s-0032-1316762; Art ID: B11512SS