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BOOK REVIEW
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Book Review of Solvents and Solvent Effects in Organic Chemistry, 4th ed.

Solvents and Solvent Effects in Organic Chemistry, 4th ed. By Christian Reichardt (Philipps-Universität, Marburg, Germany) and Thomas Welton (Imperial College London, U.K.). Wiley-VCH Verlag & Co. KGaA: Weinheim. 2011. xxvi + 692 pp. $230. ISBN 978-3-527-32473-6.

This is the fourth, updated, and enlarged edition of Reichardt's well-known book on solvents and solvent effects in organic chemistry. A second author, Welton, has joined Reichardt's effort in order to add a more diversified orientation toward green chemistry, environmental impact, and ionic liquids. Many of the newest references are for publications dealing with such topics.

Compared to previous editions, the number of pages continued the steady increase of about 20% for each new edition, taking into account that, unlike previous editions, the present volume no longer contains an author index. A detailed 15-page subject index concludes the volume, after a comprehensive bibliography of 97 pages. A 40-page appendix including tables about properties, purification, toxicity, and uses of solvents for reaction media, recrystallization, extraction, chromatography, electrochemistry, and titrations has its own bibliography for each table.

After a brief introductory chapter, the first six chapters cover solute−solvent interactions; solvent classification, i.e., atomic, molecular, and ionic liquids; solvent effects on homogeneous chemical equilibria, on rates of homogeneous chemical reactions, and on absorption spectra of organic compounds; and empirical parameters of solvent polarity. The Dimroth−Reichardt empirical parameter $E_T(30)$ is available for a vast majority of solvents and is based on solvent-induced color changes of a pentaphenyl-substituted pyridinium *N*-phenolate betaine dye whose formula is illustrated on the front cover. Because it has a less dipolar excited state, this betaine dye absorbs at λ_{max} = 810 nm in a nonpolar solvent such as diphenyl ether and at λ_{max} = 453 nm in a polar solvent such as water, changing through all the colors of the rainbow for intermediate polarities. In a later section, it is mentioned that the polarity of water decreases at high pressure and temperature.

The last chapter, entitled "Solvents and Green Chemistry", has no precedent in previous editions. Ionic liquids are discussed in both this chapter and in Chapter 5 on solvent effects on rates of homogeneous chemical reactions. In the former chapter, emphasis is placed on industrial applications. Also, some industrial applications for supercritical fluids are mentioned, including successful procedures involving supercritical carbon dioxide. However, attempts to use supercritical water industrially failed mainly because of corrosion, taking into account that critical parameters are much higher for the polar water than for the nonpolar carbon dioxide.

A paragraph on page 586 is worth citing *ad-litteram*:

Of special interest is the renaissance of water as a useful solvent for many organic reactions, as well as the increasing importance of supercritical fluids and ionic liquids. In the context of sustainable chemistry and clean technology, the best solvent is no solvent at all. In following this axiom, increasing efforts have recently been made to develop solvent-free synthetic reactions using various modern techniques. The results are interesting but not so promising that this book on solvent effects will become superfluous in the foreseeable future.

The authors' own experience enabled them to provide the reader with practical advice for almost all problems encountered in an organic chemical laboratory where solvents reign supreme. I consider this book to be a must for any chemist who uses solvents for carrying out organic reactions, extractions of organic compounds from natural sources, or purification of organic compounds.

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