

**Ionic Liquids in Synthesis**; Edited by P. Wasserscheid and T. Welton; Wiley-VCH: Weinheim, 2003, hardcover, 380 pp, €155.00, ISBN 3527305157

The 2003 monograph edited by Wasserscheid and Welton is a collection of nine chapters, which are contributed by a group of scientist/researchers involved in various aspects of ionic liquid chemistry. The preface provides a strong endorsement/justification and calls attention to the ever-increasing number of papers involving ionic liquids.

The book begins with a historical introduction on the evolution of molten salts. Chapter 2 deals with synthesis and purification of various classes of ionic liquids but with emphasis on the more widely used imidazolium-based onium salts. Essential preparative issues such as anion exchange/metathesis and purification protocols are addressed together with aspects focusing on the commercial production and scale-up. This chapter also contains an enlightening section on designing 'task-specific' ionic liquids.

Chapter 3 (the 2<sup>nd</sup> largest chapter in the book) focuses on physiochemical properties of ionic liquids from melting points, viscosity, and density to solubility and solvation. Included in this chapter is an interesting section on exploration of polarity of ionic liquid media via its effect on chemical reactions. As examples in the field (considered by authors to be presently in its infancy) are C- versus O-alkylation of sodium 2-naphthoxide, the *exo/endo* rate ratio in the Diels–Alder reaction, and the rate dependency of certain photochemical reactions on the ionic liquid solvent. Other aspects such as electrochemistry, conductivity, and transport properties are extensively dealt with as part of this chapter.

Aspects dealing with the molecular structure and dynamics in ionic liquids are presented in chapter 4. These include neutron and X-ray diffraction, molecular dynamics simulations, and *ab initio*, DFT and semi-empirical calculations on representative ionic liquids.

The largest chapter in the book is chapter 5, which deals with organic synthesis

in ionic liquid media. This chapter is probably most rele-

vant to the synthetic organic/organometallic chemistry community. It provides a review of various categories of organic transformations that have been conducted in acidic and neutral ionic liquid solvents. The review is reasonably comprehensive without necessarily being exhaustive. A separate section under this heading deals with transition metal catalysis in ionic liquids, where fundamental reactions such as hydrogenation, hydroformylation, oxidation and coupling reactions (Heck, Suzuki, Stille, Negishi) are performed.

Chapter 6 focuses on inorganic synthesis. Judging from the limited number of examples for synthesis of coordination compounds and for organometallic reactions, this area is not as yet well-developed (as compared to organic/organometallic reactions in molten salts). The chapter also deals with the electrochemical synthesis of inorganic materials.

Chapters 7 and 8 highlight the progress made towards polymer synthesis in ionic liquids and the potential of ionic liquid solvents in bio-transformations respectively.

The last chapter is an 'outlook' section by the volume editors in which they emphasize the potentialities and leave the reader with an optimistic view of the future development of this area and its potential benefits to 'clean synthesis'.

Overall the book is a valuable source for both the researchers active in the field and those who might be just curious about the prospects. This volume when placed alongside of the two 2002 volumes 'Ionic Liquids; Industrial applications to Green Chemistry' (ACS symposium series 818) and 'Clean Solvents; Alternative Media for Chemical Reactions and Processing' (ACS symposium series 819), create a worthy triad for those who wish to develop a broader, more comprehensive, perception of the progress in the field, in particular in relation to synthesis.

**Kenneth K. Laali**, Kent State University, USA.