NEW CATALYTIC SYSTEMS FOR SELECTIVE HYDROGENATION

J.Klankermayer, W.Leitner

Institut für Technische und Makromolekulare Chemie, RWTH Aachen University, Worringerweg 1, D-52074 Aachen, Germany

Homogeneous hydrogenation is one of the most extensively studied reactions in homogeneous catalysis and constitutes an important synthetic procedure in academia as well as in industry.[1] Advances in hydrogenation systems have offered remarkable improvements and also contributed significantly to progress in homogeneous catalysis. Nevertheless, most of these improvements in catalytic hydrogenations concentrated in past on the modification and the recycling of the homogeneous catalyst, whereas investigations towards innovative solvent systems have only attracted increasing interest in recent years.[2]

The application of benign reaction media has gained growing attention for the replacement of common organic solvents and the development of new reaction concepts. Recently, Ionic Liquids (ILs) were introduced as novel reaction media and it could be demonstrated that supercritical carbon dioxide (*sc*CO_2) is the predestined partner solvent.[3] The biphasic combination of ILs and scCO_2 provides a highly attractive system and offers fascinating new possibilities for the design of environmentally friendly processes.[4]

The present contribution reports on the application of the IL/CO_2 system for biphasic hydrogenation with immobilised homogeneous catalysts and spectroscopic investigations towards the understanding and optimisation of the reaction system.[5] As chiral ionic liquids (cILs) are of increasing interest as reaction media or additives in asymmetric catalysis and enable to enhance and optimise the solvent effectiveness,[6] we investigated the applicability of amino acid derived cILs in Rh-catalysed hydrogenation reactions with tropos and racemic atropos ligands.[7]

---

[1] J. G. de Vries, C. J. Elsevier, "Handbook of Homogeneous Hydrogenation", Wiley-VCH **2007**.
[2] B. Cornils, W. A. Herrmann, I. T. Horváth, W. Leitner, S. Mecking, H. Olivier-Bourbigou, D. Vogt, "Multiphase Homogeneous Catalysis", Wiley-VCH **2005**.
[3] L. A. Blanchard, D. Hancu, E. J. Beckman, J. F. Brennecke, *Nature* **1999**, *399*, 28.
[4] P. G. Jessop, W. Leitner, "Chemical Synthesis Using Supercritical Fluids", Wiley-VCH **1999**.
[5] M. Solinas, A. Pfaltz, A.P. G. Cozzi, W. Leitner, *J. Am. Chem. Soc.* **2004**, *126*, 16142.
[6] P. Wasserscheid, T. Welton, "*Ionic Liquids in Synthesis 2*", Wiley-VCH. **2007**
[7] M. Schmitkamp, D. Chen, W. Leitner, J. Klankermayer, G. Franciò, *Chem. Commun.* **2007**, 4012.